SAFER OUTER STARK
CRASH ANALYSIS

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Introduction

The Portland Bureau of Transportation (PBOT) is planning to make improvements along the three-mile section of SE Stark Street between SE 108th Avenue and SE 162nd Avenue.

This corridor has been identified as a **High Crash Corridor for all modes** – people in motor vehicles, people walking, and people bicycling. Of all Portland streets, SE Stark Street has the:

- 6th highest number of deadly and serious injury crashes for **people in cars.**
- 6th highest number of crashes for **people walking.**
- 9th highest number of crashes for **people bicycling.**

SAFER OUTER STARK PROJECT GOALS

- Reduce deadly and serious crashes for all people using all modes.
- Reduce excess motor vehicle speeds.
- Provide safe access and crossings for people walking, riding bicycles, and accessing transit.
- Support future development of enhanced transit along the corridor.

CRASH ANALYSIS

The following document provides an exploration of crash data for the Safer Outer Stark project. Crash data is provided by the Oregon Department of Transportation. This analysis uses a five year window from 2012-2016, the most recent data available. Some fatal and serious injury crash data is available for 2017 to present.

Portland's Vision Zero Action Plan has a goal of eliminating traffic crashes that result in fatalities and serious injuries. To accomplish this goal, crash analyses focus on crashes that led to fatalities or serious injuries, as well as other injury crashes involving the most vulnerable road users—people walking and people biking. The Safer Outer Stark crash analysis focuses on these **Vision Zero-Focused Crashes** unless details for other crashes are important for certain analyses. Crash data for all crashes on this corridor can be found in the appendix.

Key Findings

Vision Zero-Focused Crashes, those crashes involving a fatality, serious injury, or injury to a person walking or biking, happened throughout the SE Stark Street corridor. There are notable **concentrations of Vision Zero-Focused Crashes at and near NE 122nd Avenue, NE 148th Avenue, and NE 160th Avenue.** Additionally four of the seven fatalities that have occurred since 2016 happened between NE 146th Avenue and NE 148th Avenue, and two happened at NE 122nd Avenue.

There were **seven fatalities in 2017 and 2018**, more than twice as many as during the 2012-2016 period studied in this report.

Three to five times as many people who were hit while walking or biking were men compared with women. By contrast the sex ratio is about equal for all crashes.

A third of people hit while walking were 18-24 years old, about twice the proportion of people 18-24 involved in all crashes.

None of the people who were killed were reported as having committed an error.

Although most crashes happen in the daytime, **two-thirds of crashes where people walking were hit happened in dark or low light conditions.**

Nearly three-quarters of Vision Zero-Focused Crashes happened at an intersection. Roughly a third of Vision Zero-Focused Crashes happened at an unsignalized intersection.

Pedestrian collisions were the most common Vision Zero-Focused collision type, followed by turning movements. Left turns were a more common movement type for crashes where people walking were hit and for vehicle only crashes, while right turns were more common for crashes where people biking were hit.

Left turns account for 20 percent of crashes where people walking were hit citywide and **22 percent of pedestrian crashes on SE Stark Street.** Half of left turn crashes where people walking were hit happened at **a signal with no protected left turns.** Three-fifth of left turn vehicle crashes resulting in fatality or serious injuries happened at an **unsignalized intersections.**

Alcohol use was about as common in Vision Zero-Focused Crashes on SE Stark Street as it is throughout Portland. **Speed was about three times more common as a factor in a crash** where people walking were hit on SE Stark Street as it is citywide.

Failure to yield was the most common crash cause for Vision Zero-Focused Crashes and played a part in 86 percent of crashes where people biking were hit.

Nearly three-quarters of Vision Zero-Focused Crashes happened at an intersection, and two-thirds of all crashes happened at an intersection. There were six intersections where two or more Vision Zero-Focused Crashes occurred.

Vision Zero-Focused Crash Map

| Traffic Signal |
| RRFB |
| Pedestrian Hybrid Beacon |
| Fatal crashes from 2017-Present |

Crash Victim

	Fatality	Serious Injury	Other Injury
Pedestrian			
Bicycle			
Motor Vehicle			

All Crashes

Fewer Crashes — More Crashes

SAFER OUTER STARK
CRASHES 2012-2016

May 2019

2012-2016	Fatal	Serious Injury	Other Injury	Total	Fatal Crashes 2017-Present
Pedestrian	1	3	14	18	4
Bicycle	0	1	6	7	0
Motor Vehicle	2	12	-	14	3
Total	3	16	20	39	7

148th AVE

122nd AVE

162nd AVE

SE STARK ST

E BURNSIDE ST

SE WASHINGTON ST

SE DIVISION ST

Crashes: 2017-Present

2017 Data

ODOT releases preliminary data that only includes crashes involving a fatality or a serious injury before releasing full crash data at a later time. Such preliminary data is available for 2017. The data is analyzed separately to clarify time windows.

There were **four crashes involving a fatality** and an additional **four crashes involving a serious injury** on SE Stark Street in 2017. As a result:
- Four people died—two of them were walking.
- Five people were seriously injured—two of them were riding a motorcycle.
- Four people suffered other injuries—one of them was on a motorcycle.

Over half of crashes involved people who were **driving recklessly or carelessly or who were driving too fast**. Both crashes where people walking were killed happened at night and away from an intersection, raising concerns around visibility and lighting.

Five of the eight crashes happened at intersections. Of the non-intersection crashes, two involved people walking and happened near SE 146th Avenue and SE 148th Avenue. There was additionally a crash involving a person riding a motorcycle near SE 109th Avenue.

Cause	Crashes	Ped Crashes
Reckless or careless driving	3	-
Driving too fast	3	1
Followed too closely or failed to avoid	2	-
Non-motorist in roadway	2	2
Not visible	2	2
Disregard traffic signal or TCD	2	-
Did no yield right-of-way	1	-

Light	Crashes	Ped Crashes
Daylight	2	-
Darkness with street lighting	5	1
Darkness	1	1

Number of Crashes by Intersection	
SE 122nd AVE	3
SE 135th AVE	1
SE 151st AVE	1
Total	5

2018-Present

No crash data is available after 2017. However, PBOT tracks fatal crashes on a daily basis.

There were **three fatalities on SE Stark Street in 2018.** Two of the people killed were walking, one at SE 146th Avenue and the other at SE 148th Avenue. One person killed was driving at SE 122nd Avenue.

At the time of writing this report, there have been no fatal crashes on SE Stark Street in 2019.

Demographics

The demographic data available for crash participants includes sex and age. Race data is not available in the ODOT crash dataset.

Men make up a larger percentage of people hit while walking or biking. Men and women were almost equally represented among people receiving serious injuries from a crash. Women make up a larger percentage of people who died as a result of a crash, but the sample size is very small for this type of comparison (three fatalities).

A third of people hit while walking were between the ages of 18 and 24, and two-thirds were under the age of 45. Comparatively, **half of people receiving serious injuries from a crash were over the age of 45,** and less than a fifth under the age of 25.

PARTICIPANT ERROR

The crash reports did not identify any of the people who were killed in crashes as having committed errors that led to that crash.
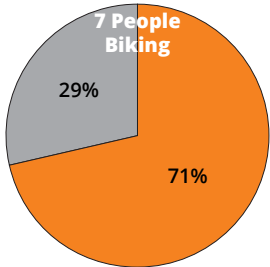
Crash reports indicate that people walking committed errors in roughly 60 percent of pedestrian crashes, most commonly disregarding the signal or crossing between intersections. People biking committed errors in two out of the seven bicycle crashes.

Sex	Fatality	Serious Injury	Ped	Bike
Male	33%	56%	72%	86%
Female	67%	44%	28%	14%

Age	Fatality	Serious Injury	Ped	Bike
0-4	-	-	-	-
5-17	-	6%	11%	14%
18-24	-	13%	33%	14%
25-44	33%	31%	22%	-
45-64	-	31%	22%	29%
65+	67%	19%	11%	-
Unknown			-	43%

Committed Error by Crash Type

Did not Commit error   Committed error

3 Fatalities

100%

16 Serious Injuries

44%   56%

18 People Walking

61%   39%

7 People Biking

29%   71%
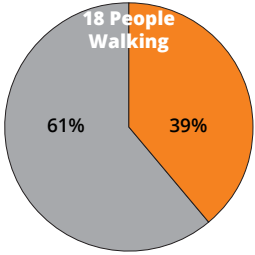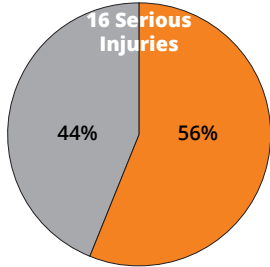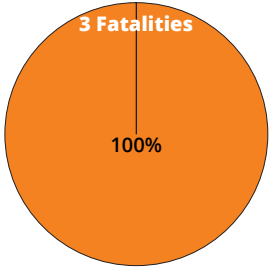
Lighting

Lighting was mentioned as a concern in the Human Centered Design pilot outreach along the SE Stark Street corridor and as a concern for Portland as a whole by the Walking While Black focus groups.

Two-thirds of crashes involving people walking happened in dark or low light conditions. The majority of vehicle crashes resulting in a fatality or serious injury also occurred in dark or low light conditions.

In comparison, nearly three-fourths of all crashes on SE Stark Street happened during the day. See the appendix for more details.

Number of Crashes by Lighting Condition

	Ped	Bike	Vehicle*	Total
Daylight	6	6	6	18
Darkness with street lighting	9	-	7	16
Twilight	3	-	1	4
Darkness	-	1	-	1

Percent of Crashes by Lighting Condition

Day   Dark with lighting   Twilight   Dark

Pedestrian: 33%, 50%, 17%

Bicycle: 86%, 14%

Vehicle*: 43%, 50%, 7%
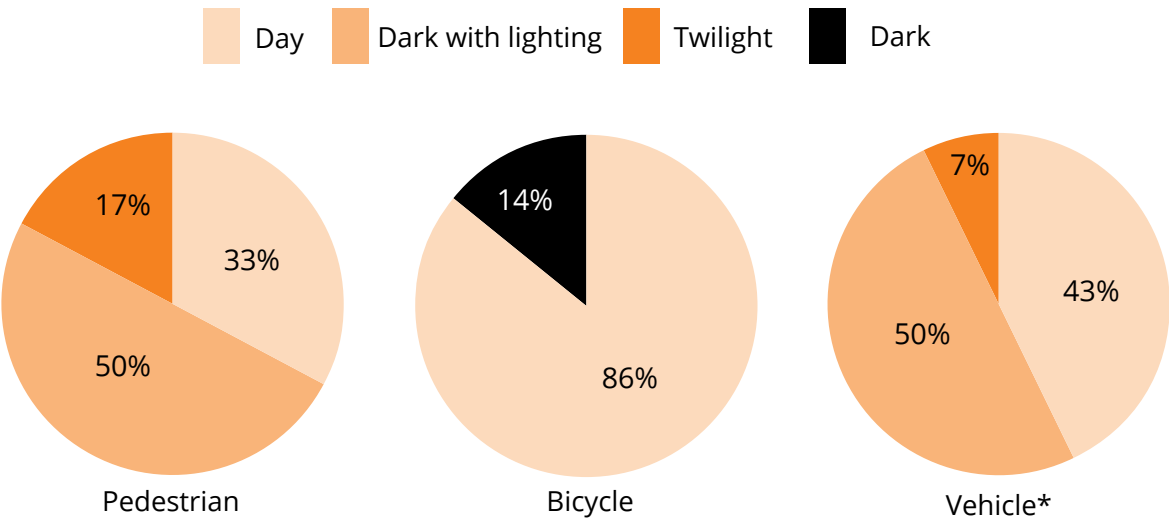
Only fatal and serious injury vehicle crashes are included.

Roadway Character

The roadway character where crashes occur can help reveal important trends because the associated risk factors and countermeasures are different.

One third of Vision Zero-Focused Crashes[†] happened at unsignalized intersections. Unsignalized intersections made up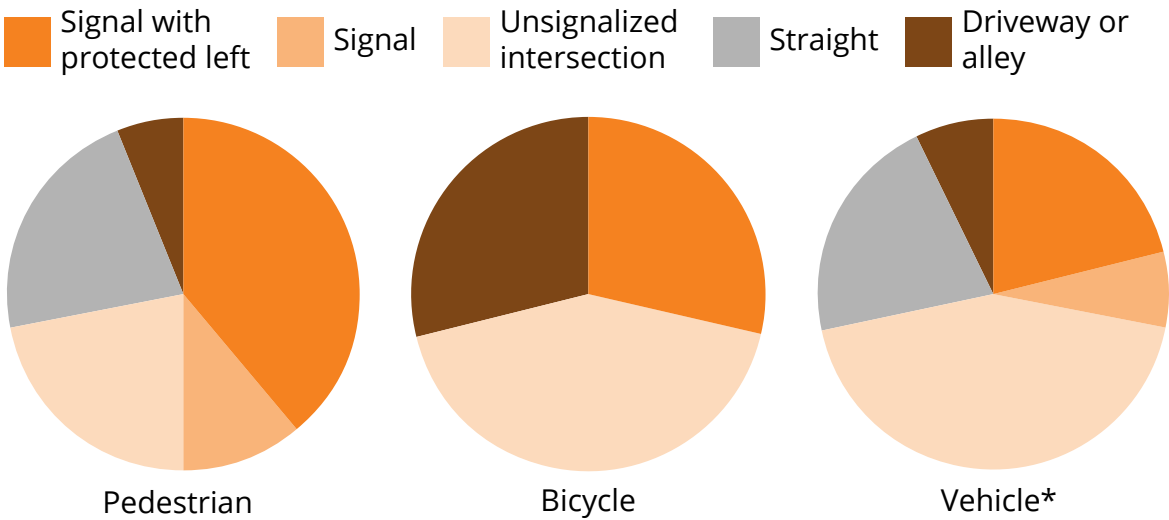 nearly half of crashes involving people biking and nearly half of vehicle only crashes that led to a fatality or serious injury, but less than a quarter of crashes involving people walking.

Half of all pedestrian crashes happened at an intersection with a signal, most of which have protected left turn signal. Intersections with a signals with a protected left were also one of the most common roadway place for all Vision Zero-Focused Crashes. These types of intersections are also where SE Stark Street intersects with other large arterials and experiences proportionally higher traffic volumes.

Number of Crashes by Roadway Character

	Ped	Bike	Vehicle*	Total
Signal with protected left	7	2	3	12
Signal	2	-	1	3
Unsignalized intersection	4	3	6	13
Straight	4	-	3	7
Driveway or alley	1	2	1	4

Percent of Crashes by Roadway Character

Legend: Signal with protected left | Signal | Unsignalized intersection | Straight | Driveway or alley

Pedestrian

Bicycle

Vehicle*

*Only fatal and serious injury vehicle crashes are included.
[†]All fatal or serious injury crashes and all crashes involving people walking and people biking.
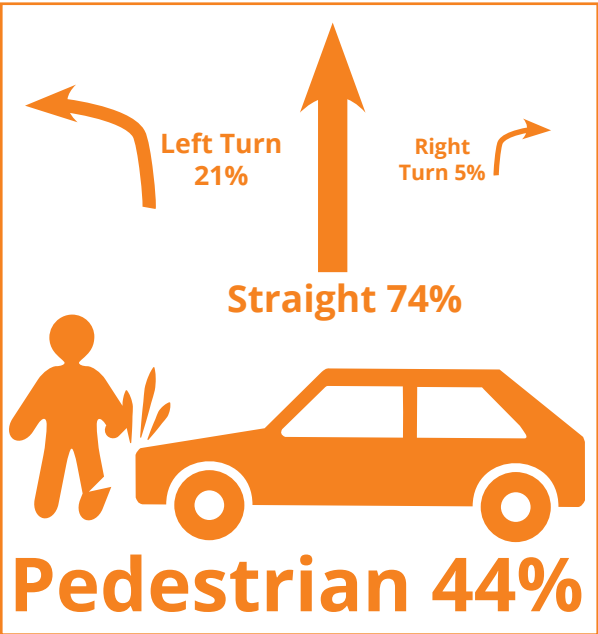
Collision Type

Collision type offers another perspective on the kinds of crashes happening on SE Stark Street and the issues that may be leading to these crashes. **Nearly half of Vision Zero-Focused collision types are coded "pedestrian"**. Because this collision type does not indicate vehicle movement, vehicles movements were also included. Bicycle crashes are coded based on the vehicle movement type, like with crashes only involving vehicles.

Turning movements were the most common crash cause for people biking, and make up roughly a third of crashes involving people walking and crashes only involving vehicles. **Left turns account for eighty percent of turning movements that hit people walking and all turning movements that led to a fatal or serious injury vehicle crash.** Right turn crashes are more common for crashes involving people biking. Rear end crashes made up nearly half of fatal and serious injury vehicle crashes.

Collision Type	Ped	Bike	Vehicle*	Total
Pedestrian	17	-	-	17
Turning Movement	-	4	5	9
Rear-End	1	-	6	7
Angle	-	3	1	4
Fixed Object	-	-	2	2

Movement†	Ped	Bike	Vehicle*	Total
Straight	14	3	20	37
Left turn	4	1	5	10
Right turn	1	3	-	4

*Only fatal and serious injury vehicle crashes are included.
†Movement counts are greater than the total number of collisions because of crashes where more than one vehicle is involved.

Left Turn 21%

Right Turn 5%

Straight 74%

Pedestrian 44%

Turning crashes 23%

Rear end crashes 18%

Angle 10%

Fixed object 5%

Left Turns

Left turns increase the number of potential conflict points and are a common cause for crashes throughout Portland and on SE Stark Street. **Left turns account for 20 percent of crashes involving people walking citywide and 22 percent of pedestrian crashes on SE Stark Street.**

Left turns can happen in a number of different roadway contexts, which may point to different potential countermeasures. **Half of left turn crashes involving people walking** happened at a **signal with no protected left turns**. **Three-fifths of left turn vehicle crashes** resulting in fatality or serious injuries happened at an **unsignalized intersections.**

Location type	Ped	Bike	Vehicle*	Total
Signal with protected left†	1	-	1	2
Signal	2	-	-	2
Unsignalized intersection	-	-	3	3
Driveway	1	1	1	3

*Only fatal and serious injury vehicle crashes are included.
†These signals offer protected lefts on all legs.

LEFT TURNS
CRASHES 2012-2016
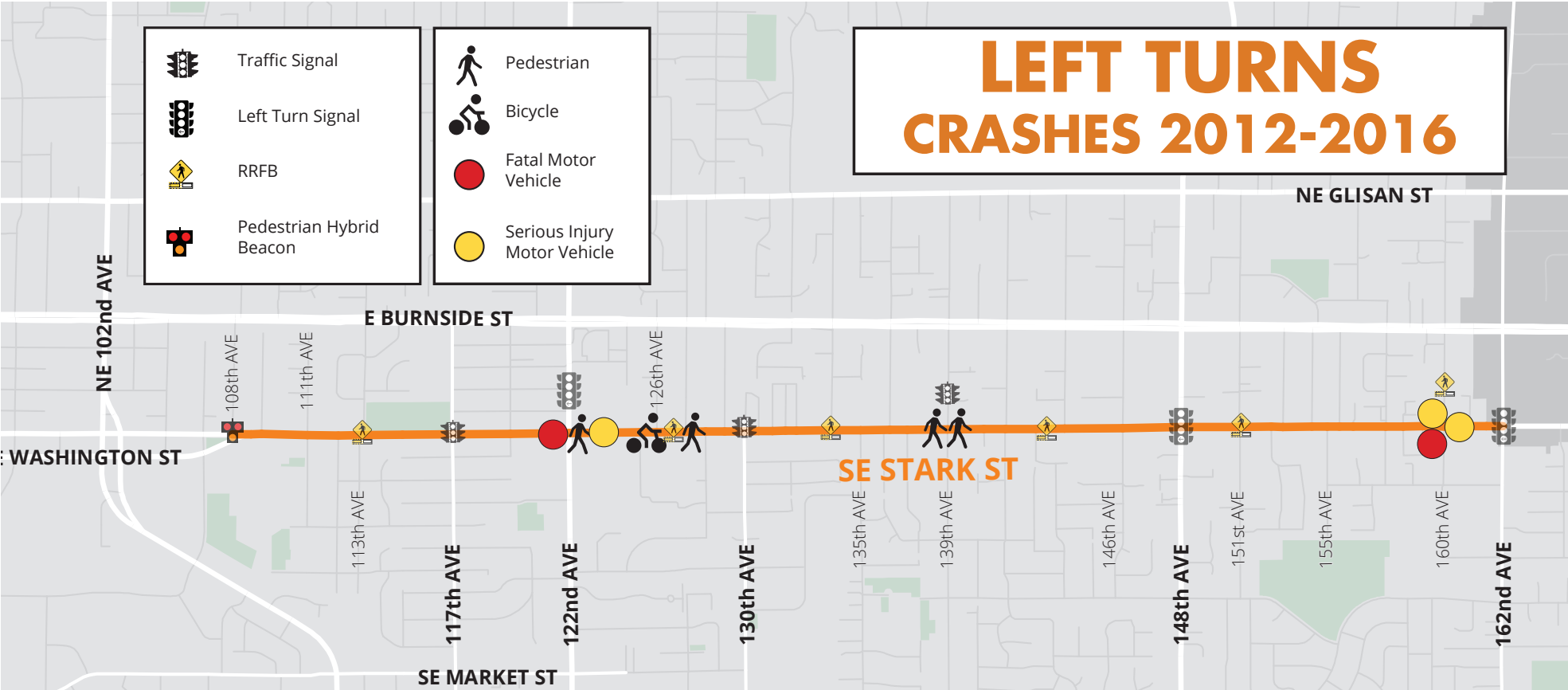
Crash Cause

Crash cause identifies actions or circumstances that lead to the crash occurring. Factors such as alcohol and drug use are not included in crash cause. Instead they are flagged, along with speed, for each crash. Not all crashes flagged with speed include speed as a crash cause, and vice versa due to reporting inconsistencies.

Drugs were not a factor in any Vision Zero-Focused Crashes[†] on SE Stark Street, and alcohol and speed were not a factor in any crashes involving someone biking.

Alcohol was a factor in 11 percent of crashes involving people walking, which is the same as the rate citywide. Speed was a factor in six percent of crashes involving people walking, which is **three times as high as the rate citywide.**

Alcohol and speed factored in 14 percent of vehicle only crashes that led to a fatality or a serious injury. This is slightly lower than the citywide average rate (18 percent for alcohol, 23 percent for speed).

Occurrence of Crashes Involving Alcohol, Drugs, and Speed

	Pedestrian	Bike	Vehicle*
Alcohol	2		2
Drugs			
Speed	1		2

Percent of Crashes Involving Alcohol, Drugs, and Speed
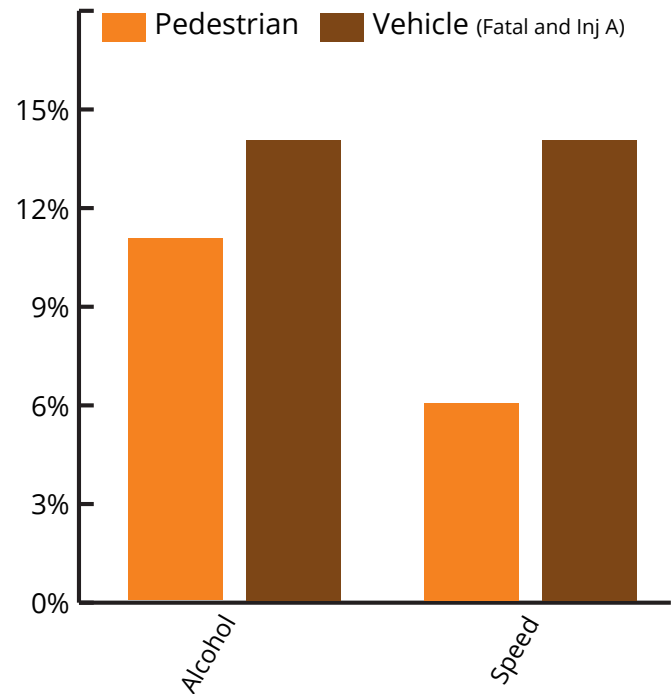
Only fatal and serious injury vehicle crashes are included.
[†]All fatal or serious injury crashes and all crashes involving people walking and people biking.

Crash Cause (cont.)

| Crash Cause Occurrence	Ped	Bike	Vehicle*	Total
Did no yield right-of-way	5	6	4	15
Non-motorist in roadway	8	1	-	9
Disregard traffic signal	4	1	2	7
Followed too closely or failed to avoid	-	-	5	5
Reckless or careless driving	2	-	2	4
Disregard stop sign or other TCD	1	1	1	3
Not visible	2	-	0	2
Driving too fast	1	-	1	2
Others:				
Improper driving			1	1
Inattention			1	1
Driver issue (illness, fatigued, etc.)			1	1

Percent Crash Cause Occurrence

Failure to yield was the most common cause for Vision Zero-Focused Crashes, and was a cause in **86% of crashes involving a person riding a bicycle.**

A non-motorist illegally in the roadway† was a cause in **nearly half** of all crashes involving a **person walking**.

Nearly **forty percent of vehicle crashes** that led to a fatality or serious injury included someone **following too closely or failing to avoid.**
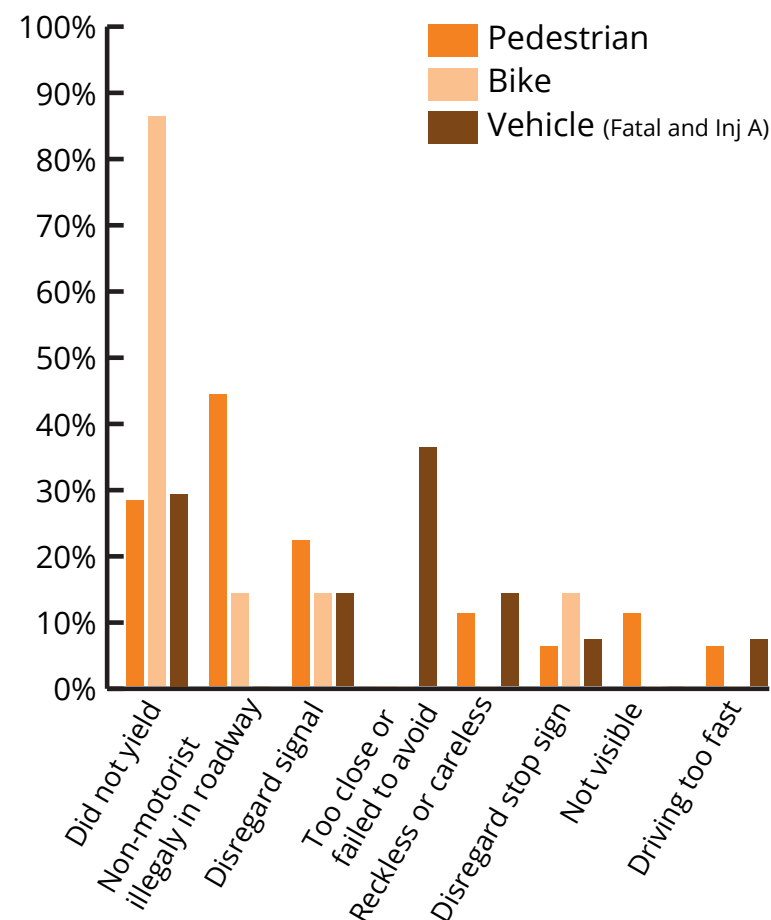
Note: Percents of crash cause occurrence sum to more than 100% because some crashes have more than one cause.

*Only fatal and serious injury vehicle crashes are included.
†Non-motorist illegally in the roadway may include people crossing next to the cross walk, people crossing midblock, people walking along the roadway, or people otherwise in the roadway in a manner that was deemed illegal by the reporting officer.

Intersections

Intersections introduce many opportunities for conflict along a corridor. Vehicles turn, cross each other's paths, and stop to yield right of way. Signalized, marked, and unmarked intersections are the legal and most common location for pedestrians to cross the street. **Almost three-quarters of all Vision Zero-Focused Crashes[†] happened at intersections. A similar rate applies for each of the three groups of crashes involving people walking, people biking, and vehicle only crashes that led to a fatality or serious injury.** Nearly two-thirds of all crashes on the Safer Outer Stark extent happened at intersections. All crashes are included in the main intersection analysis because otherwise the sample size of crashes would be too small.

The tables to the right shows intersections that had Vision Zero-Focused Crashes, sorted from the greatest number of Vision Zero-Focused Crashes to the fewest. The following pages explore the crash data for intersections where two or more Vision Zero-Focused Crashes occurred. Some other intersections with many crashes are presented in the appendix.

Intersection	Ped	Bike	Vehicle*	All VZ-Focus	All Crashes
SE 160th AVE	2	1	3	6	25
SE 148th AVE	2	2	1	5	71
SE 122nd AVE	2	-	2	4	101
SE 139th AVE	2	-	1	3	52
SE 162nd AVE	3	-	-	3	27
SE 111th AVE	1	1	-	2	7
SE 108th AVE	-	-	1	1	18
SE 151st AVE	-	-	1	1	7
SE 136th AVE	-	1	-	1	6
SE 142nd AVE	1	-	-	1	5
SE 155th AVE	-	-	1	1	2
Total	13	5	10	28	458

*Only fatal and serious injury vehicle crashes are included.
[†]All fatal or serious injury crashes and all crashes involving people walking and people biking.

SE 160th Avenue

In 2012-2016 there were **25 crashes** at the SE Stark Street and SE 160th Avenue intersection. These include:

- **Two fatal crashes** involving a person walking and a person in a vehicle.
- **Two serious injury crashes** involving people in vehicles.
- **Two other injury crashes** involving a person walking and a person biking**.**
- **Thirteen other injury crashes** involving only people in vehicles.
- **Six non-injury crashes.**

The majority of crashes at SE 160th Avenue resulted from **not yielding right-of-way or failing to avoid a vehicle ahead.** The most common cause for Vision Zero-Focused Crashes was **not yielding right-of-way**, but a number of dangerous behaviors were also involved in causing crashes. Crashes involving people walking or biking all involved vehicles going straight.

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	11	-
Did no yield right-of-way	9	4
Driving too fast	2	1
Reckless or careless driving	1	1
Inattention	1	-
Improper turn	1	-
Non-motorist in roadway	1	1
Disregard stop sign or other TCD	1	1

PEDESTRIAN CRASH CAUSES
Failure to yield and non-motorist in roadway

BICYCLE CRASH CAUSES
Did not yield and disregard stop sign

VEHICLE ONLY* CRASH CAUSES
Did not yield (2), driving too fast, and reckless or careless driving

Collision Type	Crashes	VZ-Focus
Rear-End	13	-
Turning Movement	5	3
Angle	4	1
Pedestrian	2	2
Fixed Object	1	-

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	28	2	1
Stopped	19	-	-
Left turn	6	-	-

*Only fatal and serious injury vehicle crashes are included.

SE 160th Avenue (cont.)

Over half of crashes, half of Vision Zero-Focused Crashes, and both pedestrian crashes at this intersection happened during low light conditions.

The location of impact analysis shows most crashes happening as people driving approach the intersection on SE Stark Street. **A person walking was killed and a person biking was hit** while crossing at the existing island and RRFB. One person was killed and two people were seriously injured as a result of crashes when people tried to turn left at this intersection.

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	13	3	-
Darkness with street lighting	4	2	1
Twilight	7	1	1
Darkness			
Unknown	1	-	-

SE 160th Ave Location of Impact

- 🚶 Walking
- 🚲 Biking
- 🚗 In vehicle
- 🟥 Fatality
- 🟧 Serious Injury
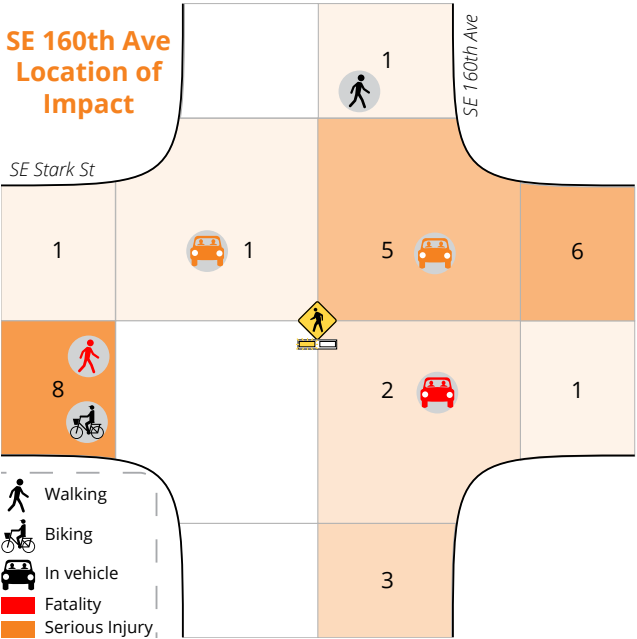
SE Stark Street at SE 160th, looking east

SE 148th Avenue

SE Stark Street and SE 148th Avenue is **the fourth most dangerous intersection** in Portland. In 2012-2016 there were **71 crashes** at this intersection. These include:

- **One serious injury** involving a person in a vehicle.
- **Two other injury crashes** involving people walking**.**
- **Two other injury crashes** involving people biking**.**
- **Thirty-six other injury crashes** involving only vehicles.
- **Thirty non-injury crashes.**

The majority of crashes at SE 148th Avenue resulted from **people following to closely or failing to avoid a vehicle ahead,** consistent with rear end crashes, which are very common at intersections and make up nearly two-thirds of crashes at this intersection. Vision Zero-Focused Crashes highlight a problem of people driving **failing to yield right-of-way.** Both bike crashes at this intersection resulted from people driving making a right turn into the path of a person biking.

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	45	1
Disregard traffic signal	7	-
Driving too fast	6	-
Improper lane change	5	-
Did no yield right-of-way	4	2
Reckless or careless driving	3	1
Improper turn	2	-
Inattention	2	-
Improper driving	1	-
Non-motorist in roadway	1	1
Left of centerline	1	-

Collision Type	Crashes	VZ-Focus
Rear-End	48	1
Turning Movement	10	2
Sideswipe-Overtaking	5	-
Angle	3	-
Pedestrian	2	2
Fixed Object	1	-
Backing	1	-
Head-On	1	-

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	73	2	-
Stopped	61	-	-
Left turn	6	-	-
Right turn	6	-	2
Backing	1	-	-

PEDESTRIAN CRASH CAUSES
Reckless or careless driving and non-motorist in roadway

BICYCLE CRASH CAUSES
Did not yield (2)

VEHICLE ONLY* CRASH CAUSES
Followed to close or failed to avoid

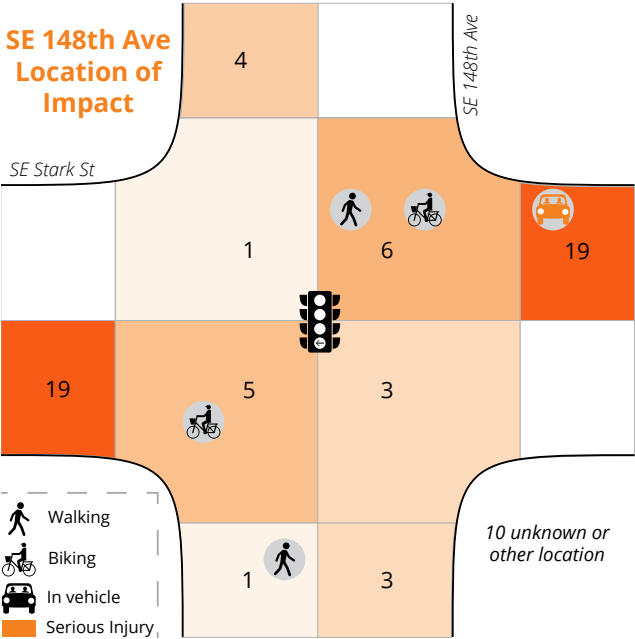**Only fatal and serious injury vehicle crashes are included.*

SE 148th Avenue (cont.)

Nearly half of crashes at this intersection happened during low light conditions, and **both crashes involving people walking** happened in darkness with street lighting.

The location of impact analysis shows proportionally more crashes for **cars approaching this intersection on SE Stark Street.** Over half of the crashes at this intersection happened at those approaches, including the crash which led to a serious injury. Both bike crashes happened in the intersection as people driving were turning right off of SE Stark Street onto SE 148th Avenue.

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	39	3	-
Darkness with street lighting	23	2	2
Twilight	7	-	-
Darkness	2	-	-

SE 148th Ave Location of Impact

- 👤 Walking
- 🚲 Biking
- 🚗 In vehicle
- 🟧 Serious Injury

10 unknown or other location

SE Stark Street at SE 148th, looking east

SE 122nd Avenue

SE Stark Street and SE 122nd Avenue is **the most dangerous intersection** in Portland. In 2012-2016 there were **101 crashes** at this intersection. These include:

- **One fatality crash** involving a person in a vehicle.
- **Two serious injury crashes** including a person walking and a person in a vehicle.
- **One other injury crash** involving a person walking**.**
- **Sixty-one other injury crashes** involving only vehicles.
- **Thirty-six non-injury crashes**, including two involving a motorcycle**.**

The majority of crashes at SE 122nd Avenue resulted from **people following to closely or failing to avoid a vehicle ahead,** consistent with rear end crashes, which are very common at intersections and make up 70 percent of crashes at this intersection. Vision Zero-Focused Crashes at this intersection were predominantly caused by **red light running or other reckless behavior.**

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	68	-
Disregard traffic signal	9	4
Did no yield right-of-way	6	-
Improper turn	6	-
Improper lane change	5	-
Reckless or careless driving	5	1
Inattention	4	-
Improper driving	3	-
Improper overtaking	2	-
Driving too fast	1	-
Disregard stop sign or other TCD	1	-
Non-motorist in roadway	1	1
Mechanical defect	1	-

Collision Type	Crashes	VZ-Focus
Rear-End	71	-
Turning Movement	16	1
Angle	5	1
Sideswipe-Overtaking	5	-
Pedestrian	2	2
Fixed Object	1	-
Backing	1	-

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	112	1	
Stopped	91	-	
Left turn	14	1	
Right turn	9	-	
Backing	1	-	
Unknown	1	-	

PEDESTRIAN CRASH CAUSES
Disregard traffic signal (2) and non-motorist in roadway

VEHICLE ONLY* CRASH CAUSES
Disregard traffic signal (2) and reckless or careless driving

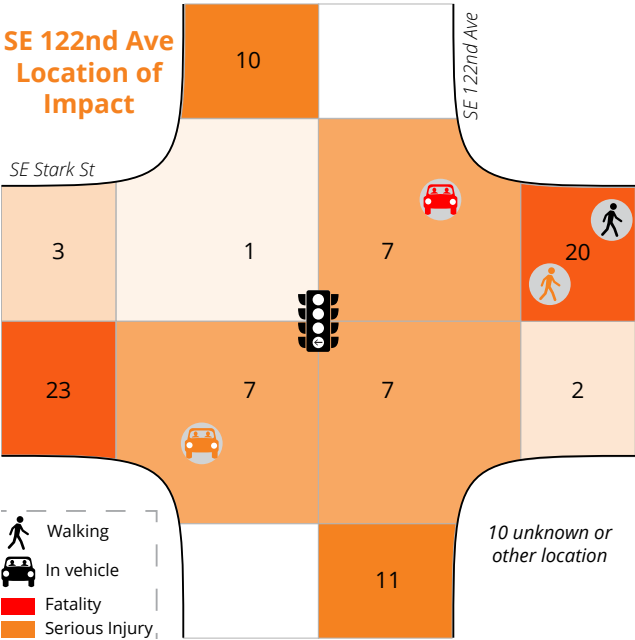**Only fatal and serious injury vehicle crashes are included.*

SE 122nd Avenue (cont.)

The location of impact analysis reveals particular concern for **cars approaching this intersection,** especially on SE Stark Street. Three of the four Vision Zero-Focused Crashes happened at the **northeast corner of this intersection.**

Almost all crashes happened in daylight conditions.

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	86	3	2
Darkness with street lighting	10	1	-
Twilight	3	-	-
Darkness	1	-	-
Unknown	1	-	-

SE 122nd Ave Location of Impact

SE Stark St

SE 122nd Ave

10			
3	1	7	20
23	7	7	2
		11	

10 unknown or other location

Walking

In vehicle

Fatality

Serious Injury

SE Stark Street at SE 122nd, looking east

SE 139th Avenue

In 2012-2016 there were **52 crashes** at the SE Stark Street and SE 139th Avenue intersection. These include:

- **One serious injury crash** involving a person in a vehicle.
- **Two injury crashes** involving people walking**.**
- **Thirty other injury crashes** involving only vehicles.
- **Twenty-one non-injury crashes** including one crash involving a motorcycle**.**

The majority of crashes at SE 139th Avenue resulted from **not yielding right-of-way, following to closely, or disregarding the traffic signal.** People were much more likely to crash because of disregarding the traffic signal and not yielding right-of-way when compared with larger intersections such as SE 122nd Avenue and SE 148th Avenue. This is reflected in the collision analysis, where rear end crashes make up about a third of crashes. Angle crashes, which are common with red light running, are much more common at this intersection. Both pedestrian crashes resulted from left turns onto SE Stark Street. This intersection has a signal but does not have a protected left turn.

Cause	Crashes	VZ-Focus
Did no yield right-of-way	19	2
Followed too closely or failed to avoid	18	-
Disregard traffic signal	12	-
Driving too fast	2	-
Reckless or careless driving	2	-
Inattention	2	1
Improper lane change	1	-
Improper turn	1	-

PEDESTRIAN CRASH CAUSES
Did not yield (2)

**VEHICLE ONLY* CRASH CAUSES**
Inattention

Collision Type	Crashes	VZ-Focus
Rear-End	19	-
Turning Movement	17	-
Angle	11	-
Sideswipe-Overtaking	2	-
Pedestrian	2	2
Fixed Object	1	1

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	63	-	
Stopped	22	-	
Left turn	18	2	
Right turn	1	-	

*Only fatal and serious injury vehicle crashes are included.

SE 139th Avenue (cont.)

Nearly half of crashes and all Vision Zero-Focused Crashes at this intersection happened during low light conditions.

The location of impact analysis shows proportionally more crashes happening inside the intersection than at the approaches, which is consistent with **more frequent red light running crashes.** The approaches on SE Stark Street are the top crash areas.

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	30	-	-
Darkness with street lighting	16	1	1
Twilight	5	2	1
Darkness	1	-	-

SE 139th Ave Location of Impact
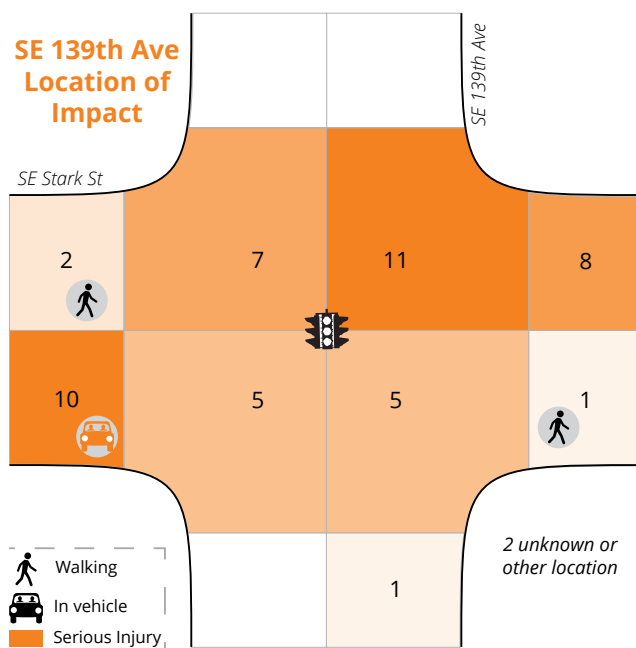
SE Stark Street at SE 139th, looking east

SE 162nd Avenue

In 2012-2016 there were **27 crashes** at the SE Stark Street and SE 162nd Avenue intersection. These include:

- **One serious injury crash** involving a person walking.
- **Two other injury crashes** involving people walking**.**
- **Fifteen other injury crashes** involving only vehicles.
- **Seven non-injury crashes.**

The majority of crashes at SE 162nd Avenue resulted from **following to closely, or disregarding the traffic signal.** All of the Vision Zero-Focused Crashes involved people walking and **someone disregarding the traffic signal.** Two of the three crashes included **visibility issues.**

Over a quarter of crashes at this intersection happened as people driving were turning. People were driving straight during all of the crashes were people walking were hit.

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	12	0
Disregard traffic signal	8	3
Did no yield right-of-way	3	0
Improper turn	3	0
Not visible	2	2
Inattention	1	0
Improper lane change	1	0
Non-motorist in roadway	1	1

Collision Type	Crashes	VZ-Focus
Rear-End	12	-
Turning Movement	7	-
Angle	4	-
Pedestrian	3	3
Sideswipe-Overtaking	1	-

| Movement	Crashes	Ped Crashes	Bike Crashes
Straight	29	3	
Stopped	14	-	
Left turn	3	-	
Right turn	7	-	

SE 162nd Avenue (cont.)

Over half of crashes and all Vision Zero-Focused Crashes at this intersection happened during low light conditions.

The location of impact analysis shows proportionally more crashes happening with vehicles approaching the intersection from SE Stark Street. People walking were hit in the north, east, and southern crosswalk.

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	13	-	-
Darkness with street lighting	10	2	2
Twilight	4	1	1
Darkness			

SE 162nd Ave Location of Impact

SE 162nd Ave
SE Stark St

2	1
4	3	4
5	1	3	1
3

Walking
Serious Injury
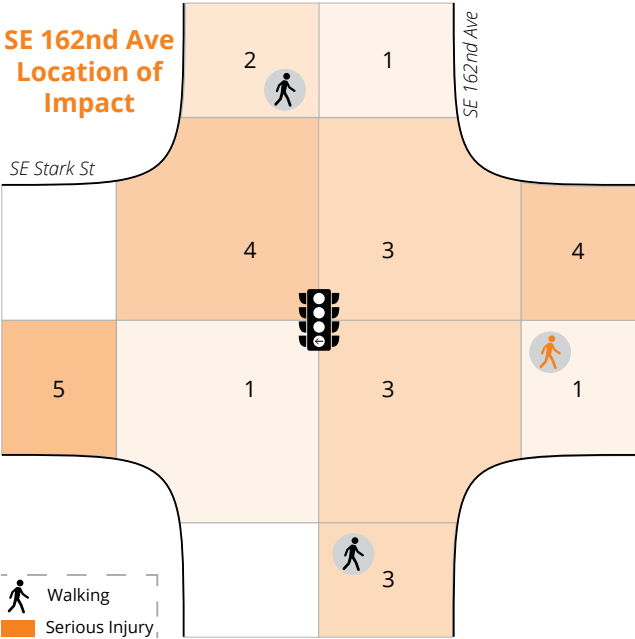
SE Stark Street at SE 162nd, looking east

SE 111th Avenue

In 2012-2016 there were **seven crashes** at the SE Stark Street and SE 111th Avenue intersection. These include:

- **Two injury crashes** involving a person walking and a person biking**.**
- **Two injury crashes** involving only people in vehicles.
- **Three non-injury crashes.**

Crashes at SE 111th Avenue resulted from **not yielding right-of-way, failing to avoid a vehicle ahead, disregarding the sign, and improper turning.**
Vision Zero-Focused crashes were caused by failure to yield right of way running the stop sign.

Almost all crashes happened in daylight.

The crashes spread throughout the intersection such that the location of impact analysis does not show any clear patterns.


SE Stark Street at SE 111th, looking east

Cause	Crashes	VZ-Focus
Did no yield right-of-way	3	1
Followed too closely or failed to avoid	2	-
Improper turn	1	-
Disregard stop sign or TCD	1	1

Collision Type	Crashes	VZ-Focus
Turning Movement	2	-
Angle	2	1
Rear-End	1	-
Pedestrian	1	1
Sideswipe-Overtaking	1	-

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	6	-	1
Stopped	2	-	-
Right turn	2	1	-
Parked	2	-	-
Left turn	1	-	-

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	5	2	1
Darkness with street lighting	1	-	-
Twilight	1	-	-
Darkness			

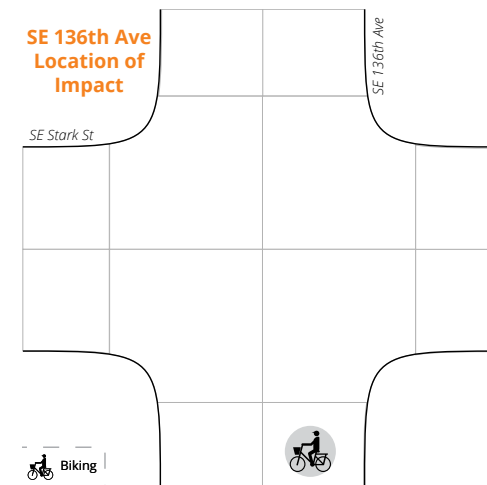**SE 111th Ave Location of Impact**
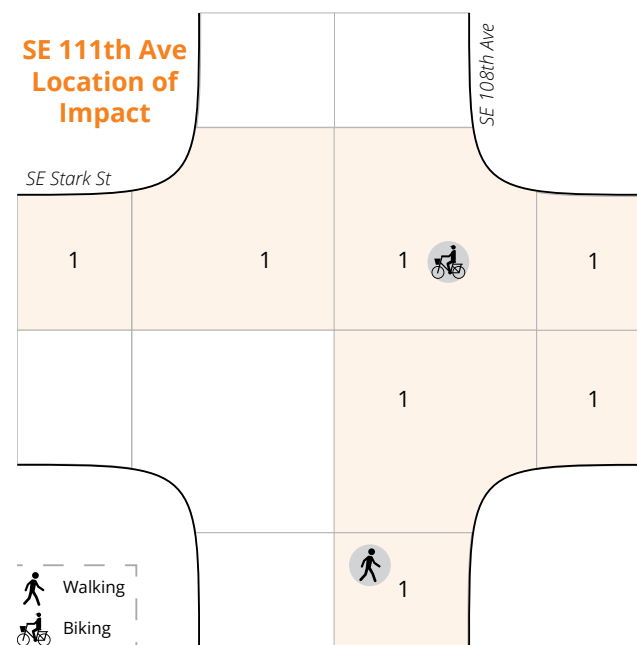
Other Intersection
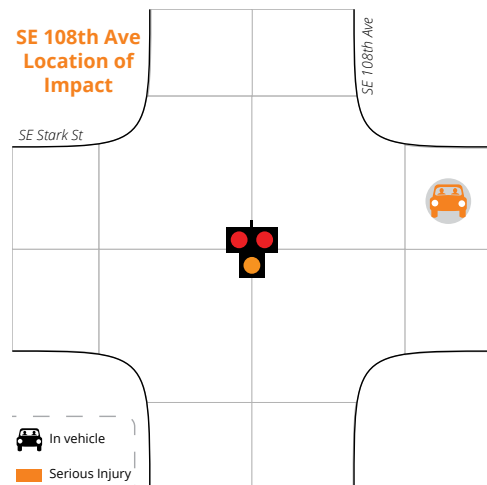
SE 108TH AVENUE
CAUSES Failure to avoid
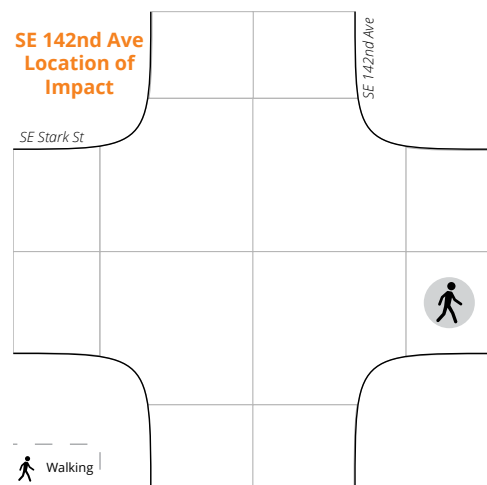**COLLISION** Rear end
LIGHTING Dark with street lighting

SE 151ST AVENUE
CAUSES Improper driving
COLLISION Fixed object
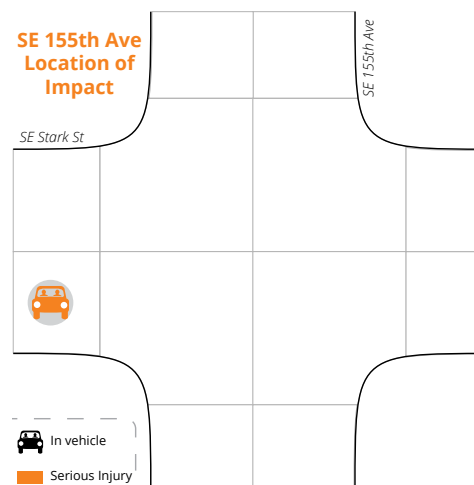**LIGHTING** Dark with street lighting

SE 136TH AVENUE
CAUSES Failure to yield
COLLISION Right turn
LIGHTING Dark

SE 142ND AVENUE
CAUSES Non-motorist in roadway
COLLISION Straight
LIGHTING Dark with street lighting

SE 155TH AVENUE
CAUSES Disregard stop sign & fail to yield
COLLISION Rear end
LIGHTING Dark with street lighting

Appendix

The appendix provides an explanation for certain terms and methodologies, as well as an overview of all crash data.

CONTENTS

METHODOLOGY

The base set of crash data was created by querying for all crashes that were indexed to intersections on SE Stark Street between SE 108th Avenue and SE 162nd Avenue. Crashes that were coded as not intersection related and happening to the north or south of an intersection were removed, as were crashes that were coded as happening to the west of SE 108th Avenue or to the east of SE 162nd Avenue.

Crashes are coded at five different levels of severity (from the ODOT Crash Analysis and Coding Manual and the American National Standards Institute Manual on Classification of Motor Vehicle Traffic Accidents - ANSI D16.1-2007). For the purposes of this analysis, Injury B and Injury C crashes were combined into an "Other Injury" category.

Fatality: A crash in which an involved participant dies as a result of injuries sustained in the crash. For the purposes of motor vehicle traffic crash classification, the death must occur within thirty days (24-hour periods) from the time of the crash.

Injury A - Incapacitating/ Serious/ Major Injury: An incapacitating injury is any injury, other than a fatal injury, which prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Examples: Severe laceration, broken or distorted limbs, skull or chest injury, abdominal injury, unconsciousness at or when taken from the crash scene, and unable to leave the crash scene without assistance.

Injury B - Non-incapacitating/ Moderate Injury: A non-incapacitating evident injury is any injury, other than a fatal injury or an incapacitating injury, which is evident to observers at the scene of the crash in which the injury occurred. Examples: Lump on head, abrasions, bruises, and minor lacerations.

Injury C - Possible Injury/ Complaint of Pain/ Minor Injury: : A possible injury is any injury reported or claimed which is not a fatal injury, incapacitating injury or non-incapacitating evident injury. Examples: Momentary unconsciousness, claim of injuries not evident, limping, complaint of pain, nausea, hysteria.

Property Damage Only (PDO): A crash that reduces the monetary value of property but does not involve any injury.

Crashes and Injuries 2012-2016

The table shows the number of crashes and injuries by mode. Crashes refers to the number of incidents where a collision occurred. Injuries refers to the number of people who were injured as a result of a crash. The number of injuries is higher than the number of crashes because multiple people may be injured in a single crash. When that is the case, it is indicated in the table by # of crashes | # of injuries.

The map shows that crashes are most heavily concentrated at NE 122nd Avenue, NE 148th Avenue, and NE 139th Avenue. There is also a concentrated spot between NE 160th Avenue and NE 162nd Avenue reflecting relatively equal numbers at those two intersections.

Mode	Fatal	Injury A	Other Injury	PDO	Total Crashes
Pedestrian	1	3	14	0	18
Bike	0	1	5	1*	7
Motorcycle	0	0	5	2	7
Vehicle	2	12	351	563	307	672
Total	3	16	375	587	310	704

As vulnerable road users, bicyclists and pedestrians must receive at least a "possible injury" or "injury C" in collisions with motor vehicles. This change was made in 2015, so collisions from before this time may still be coded as "PDO".

OUTER STARK SAFETY PROJECT
CRASHES 2012-2016
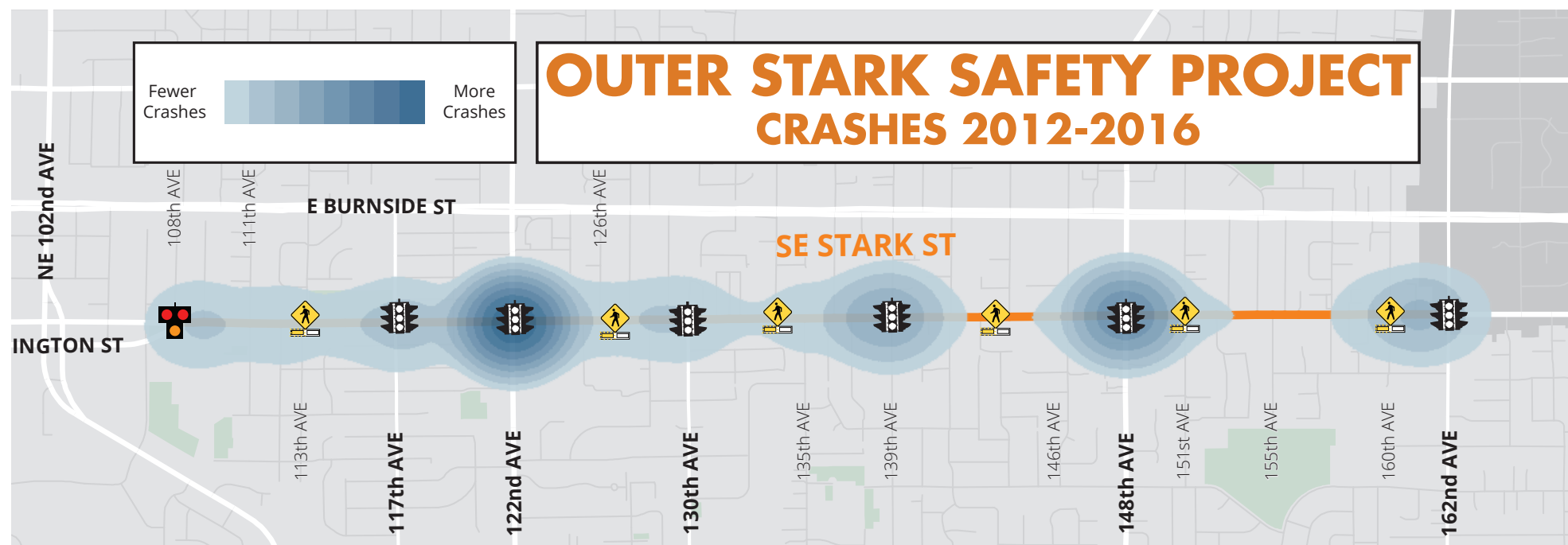
Demographics

Males and females were roughly equally represented in crashes. Two out of five people involved in crashes were between the ages of 25 and 44, and **people 25 to 64 accounted for two-thirds of all people involved in crashes.**

Men were slightly more likely to commit an error in crashes along SE Stark Street. Similarly people across age groups were about as likely to commit an error as they were represented in the crashes overall, although people under the age of 17 were slightly less likely to commit and error relative to their representation, and people 18-24 more likely.

Roughly two out of five of people committed errors in the crashes they were involved in. Nearly half committed errors in non-injury crashes and in serious injury crashes. **None of the people who were killed in crashes committed errors leading to that crash** and four out of five people who were involved in an other injury crash did not commit an error leading to that crash.
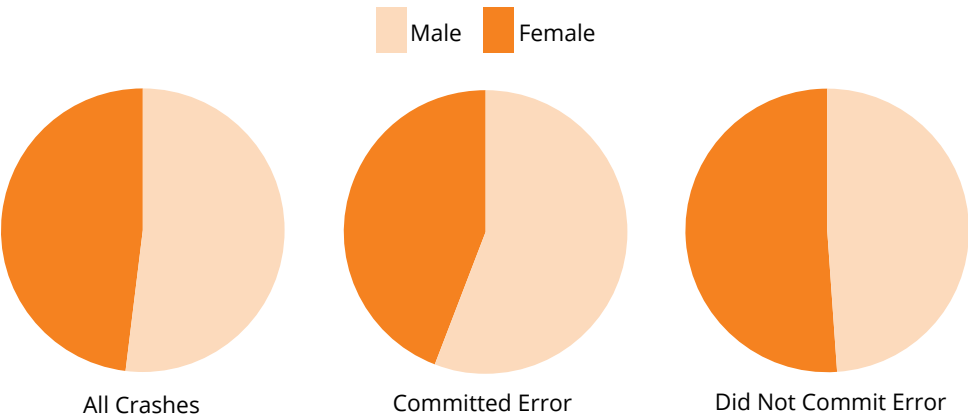
Breakdown of Participant Age by Error

Age	All Crashes	Committed Error	Did Not Commit Error
0-4	3%	0%	6%
5-17	5%	3%	6%
18-24	17%	23%	13%
25-44	39%	38%	40%
45-64	28%	27%	28%
65+	8%	9%	8%
All	**100%**	**100%**	**100%**

Male   Female

All Crashes   Committed Error   Did Not Commit Error

Participant Error by Crash Severity

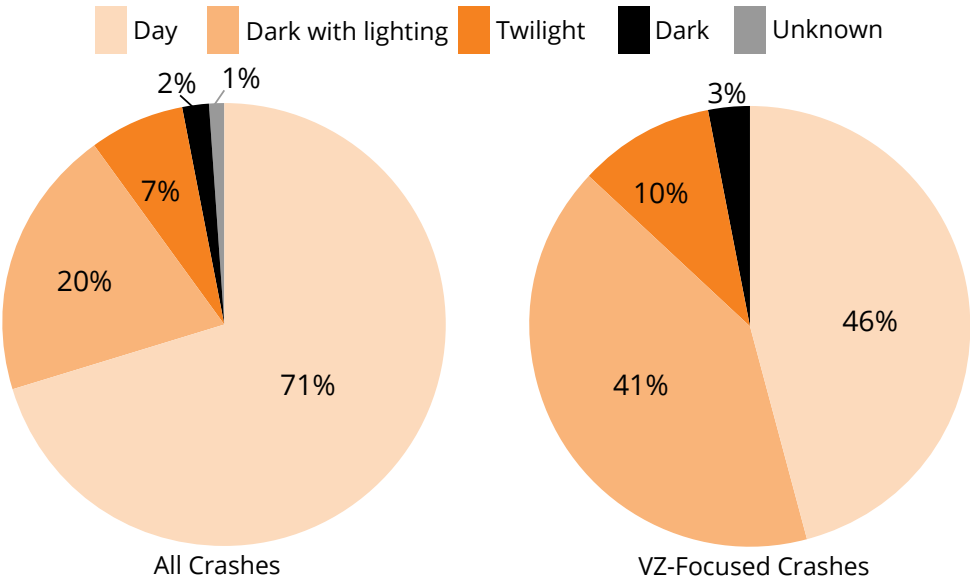|	Fatality	Serious Injury	Other Injury	No injury	Total
Committed Error	0%	44%	20%	48%	38%
Did not Commit Error	100%	56%	80%	52%	62%

Lighting

Crash and lighting data on Outer Stark reveal a trend that is common throughout Portland. Most crashes happen during the day, when most trips happen. **Vision Zero-Focused Crashes are proportionally much more likely to happen in dark or twilight circumstances.** Pedestrians are even more likely to be hit in dark or low light conditions. See the Lighting analysis in the report for more details.

The "darkness with street lighting" category suggests that street lighting of some kind is available. Street lighting is only available on one side of the street along Stark. When street lighting is only provided on one side of a wide street like Stark, the far side without lighting is not properly illuminated.

Number of Crashes by Lighting Condition

	All Crashes	VZ-Focused Crashes
Daylight	502	18
Darkness with street lighting	141	16
Twilight	46	4
Darkness	11	1
Unknown	4	0

Percent of Crashes by Lighting Condition

Day   Dark with lighting   Twilight   Dark   Unknown

All Crashes

2%   1%   7%   20%   71%

VZ-Focused Crashes

3%   10%   41%   46%

Roadway Character

The roadway character where crashes occur can help reveal important trends because the associated risk factors and countermeasures are different.
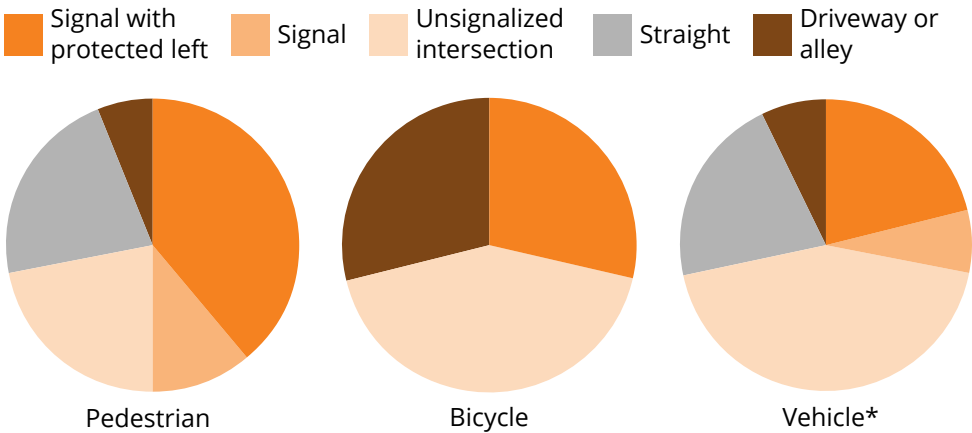
One third of Vision Zero-Focused Crashes happened at unsignalized intersections. By comparison less than a quarter of all crashes happened at unsignalized intersections.

A quarter of all crashes happened on straight portions of the roadway compared with 18 percent of Vision Zero-Focused Crashes. Overall Vision Zero-Focused Crashes happened proportionally more frequently at an intersection compared with all crashes.

Number of Crashes by Roadway Character

	All Crashes	VZ-Focus
Signal with protected left	199	12
Signal	95	3
Unsignalized intersection	161	13
Straight	177	7
Driveway or alley	72	4

Percent of Crashes by Roadway Character

Legend: Signal with protected left | Signal | Unsignalized intersection | Straight | Driveway or alley

Pedestrian — Bicycle — Vehicle*

Collision Type

Collision type offers another perspective on the kinds of crashes happening on SE Stark Street and the issues that may be leading to these crashes. **Over half of crashes were rear-end crashes.** Over a quarter of crashes were turning movement crashes. Left turn crashes are a particular concern on busy arterials, so they are analyzed further on the next page.

Nearly half of Vision Zero-Focused* collision types are coded pedestrian. Vehicle movements for crashes involving people walking and people biking can be found in the collision analysis in the report.

Collision Type	
Rear-End	366
Turning Movement	182
Sideswipe-Overtaking	57
Angle	44
Fixed Object	27
Pedestrian	17
Head-On	3
Parking	3
Backing	2
Sideswipe-Meeting	2
Non-Collision	1

VZ-Focused Collision Type	
Pedestrian	17
Turning Movement	9
Rear-End	7
Angle	4
Fixed Object	2

All fatal or serious injury crashes and all crashes involving people walking and people biking.

Rear end crashes 52%

Turning crashes 26%

Overtaking 8%

Angle 6%

Fixed object 4%

Pedestrian 2%

Left Turns

Left turns increase the number of potential conflict points and are a common cause for crashes throughout Portland and on SE Stark Street. Left turns account for 20% of crashes involving people walking citywide.

There were 159 crashes and 162 left turning vehicles involved in left turning crashes. Driveways and unsignalized intersections make up about two-thirds of all left turn crashes. However, left turn crashes clump in the high crash areas noted above: NE 122nd Avenue, NE 148th Avenue, NE 139th Avenue, and the area between NE 160th Avenue and NE 162nd Avenue.

Location type	All Crashes	VZ-Focus
Signal with protected left	23	2
Signal	32	2
Unsignalized intersection	48	3
Driveway	59	3

LEFT TURNS
CRASHES 2012-2016
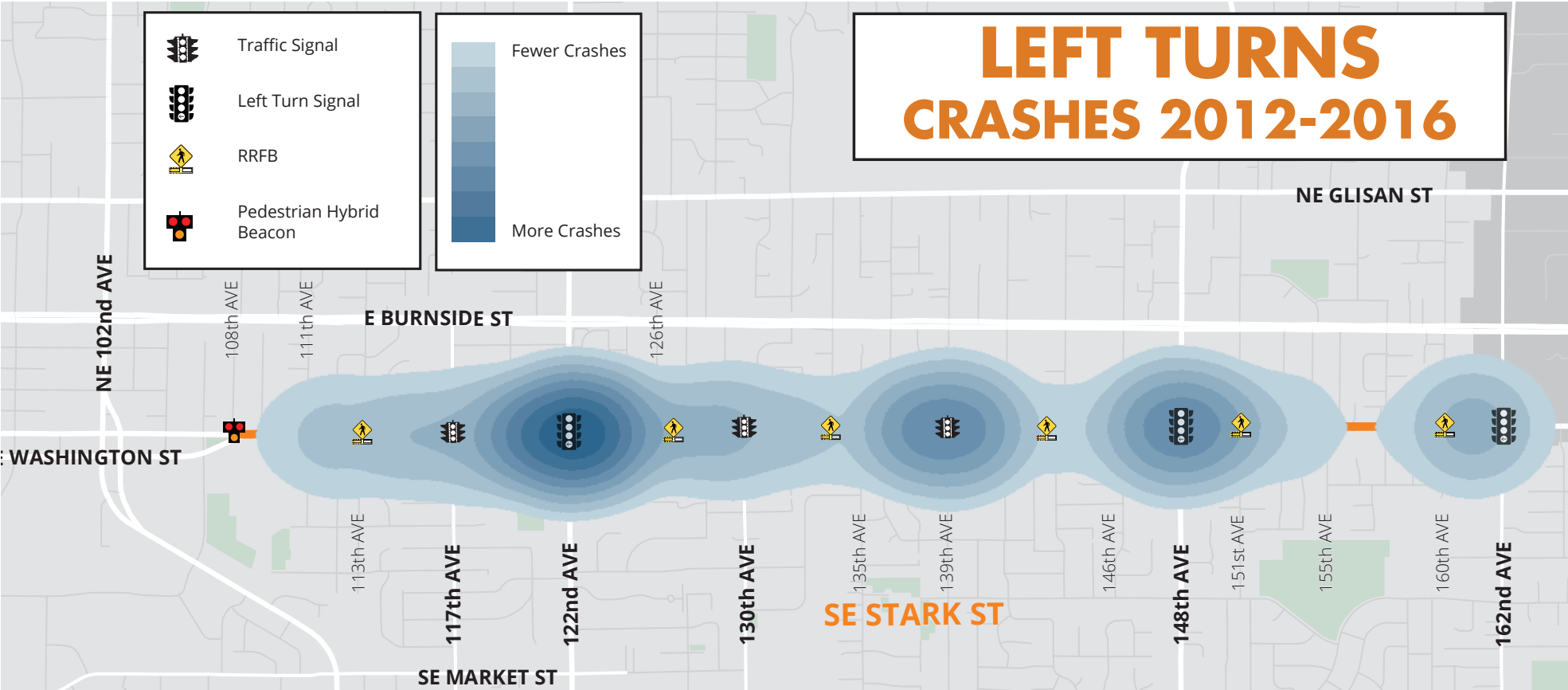
Crash Cause

Crash cause is a complex and challenging category to define and assign values to. Information is often missing, crash reconstruction can only recover information under certain circumstances, and many minor crashes do not result in crash reconstruction. The information used to determine the crash causes is often supplied by people involved in the crash or witnesses, who may be biased or improperly trained for making the necessary determinations.

For example, speed data is only available when skid marks are present or when a person walking is hit and thrown. As a result, speed is underreported as a crash cause. Furthermore, speed is reported as a crash cause when people drive in large excess of the speed limit or in adverse conditions, although research has shown that speed can increase the risk of crash and crash severity even when people are driving slightly fast or at the speed limit.

Similarly, a cause such as "followed too closely or failed to avoid vehicle" may be stand-ins when little information is available. Other contributing factors such as inattention, distraction, or fatigue, are not reported unless there is clear proof.

Factors such as alcohol and drug use are not included in crash cause. Instead they are flagged, along with speed, for each crash. Because of the discrepancies mentioned above, not all crashes flagged with speed include speed as a crash cause, and vice versa.

## Occurrence of Crashes Involving Alcohol, Drugs, and Speed

	All Crashes	VZ-Focused Crashes
Alcohol	26	4
Drugs	4	0
Speed	31	3

Percent of Crashes Involving Alcohol, Drugs, and Speed
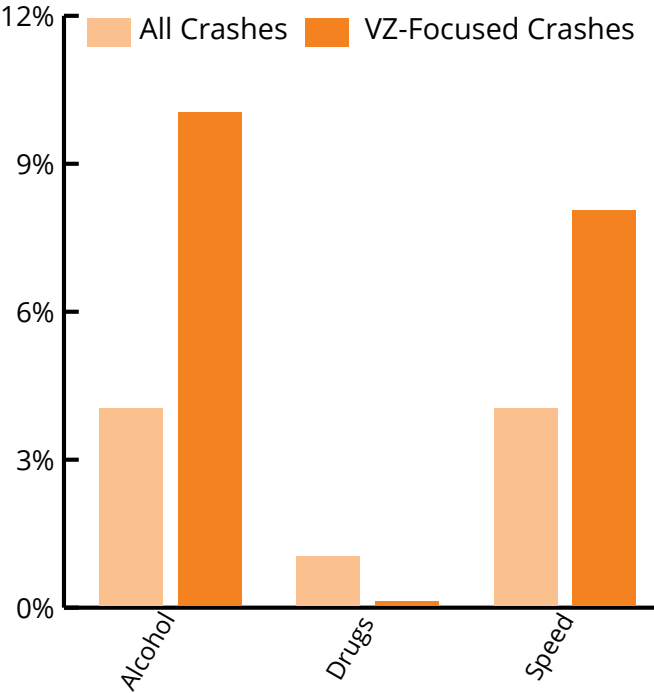
Crash Cause

Crash Cause Occurrence	
Followed too closely or failed to avoid	339
Did no yield right-of-way	173
Improper lane change	44
Disregard traffic signal	42
Reckless or careless driving	31
Driving too fast	30
Improper turn	30
Inattention	24
Improper driving	20
Others:	48
Driver issue (illness, fatigue, etc.)	9
Non-motorist in roadway	9
Affected by non-contact vehicle	7
Disregard stop sign or other TCD	4
Left of centerline	4
View obscured	4
Improper overtaking	4
Not visible	2
Mechanical defect	2
Other	2

Percent of Crash Cause Occurance
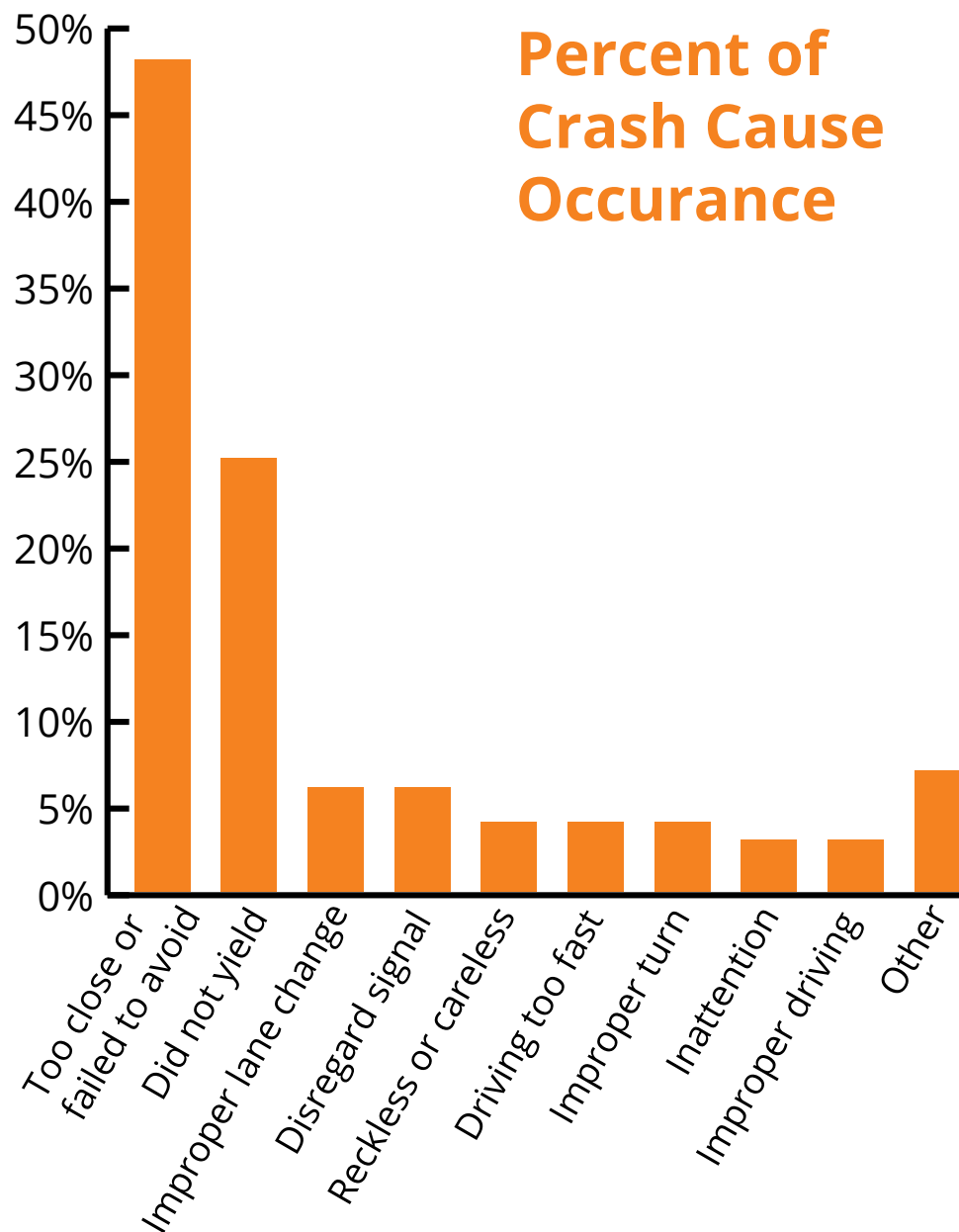
Note: Percents of crashes with crash cause sum to more than 100% because some crashes have more than one cause.

Intersections

Intersections introduce many opportunities for conflict along a corridor. Vehicles turn, cross each other's paths, and stop to yield right of way. Signalized, marked, and unmarked intersections are the legal and most common location for pedestrians to cross the street. As a result, intersections are common hot spots for crashes. **Nearly two-thirds of all crashes on the Safer Outer Stark extent happened at intersections, and almost three-quarters of all Vision Zero-Focused crashes happened at intersections.**

The tables to the right show how many crashes happened at each intersection from highest to lowest. The following pages explore the crash data for intersections where ten or more crashes occurred that were not analyzed earlier in the report.

Number of Crashes by Intersection	
SE 122nd AVE	101
SE 148th AVE	71
SE 139th AVE	52
SE 117th AVE	28
SE 162nd AVE	27
SE 160th AVE	25
SE 108th AVE	18
SE 130th AVE	15
SE 113th AVE	13
SE 135th AVE	13
SE 146th AVE	8
SE 151st AVE	7
SE 111th AVE	7
SE 136th AVE	6
SE 109th AVE	6
SE 153rd AVE	5
SE 126th AVE	5
SE 119th AVE	5
SE 143rd AVE	5
SE 142nd AVE	5

Number of Crashes by Intersection (cont.)	
SE 137th AVE	4
SE 129th AVE	4
SE 141st AVE	4
SE 133rd AVE	4
SE 128th AVE	4
SE 127th AVE	4
SE 112th AVE	3
SE 157th AVE	3
SE 155th AVE	2
SE 154th AVE	2
SE 115th AVE	1
Total	**457**

Number of VZ-Focused Crashes by Intersection	
SE 160th AVE	6
SE 148th AVE	5
SE 122ND AVE	4
SE 139th AVE	3
SE 162nd AVE	3
SE 111th AVE	2
SE 108th AVE	1
SE 151st AVE	1
SE 136th AVE	1
SE 142nd AVE	1
SE 155th AVE	1
Total	**28**

SE 117th Avenue

In 2012-2016 there were **28 crashes** at the SE Stark Street and SE 117th Avenue intersection. These include:

- **Fourteen injury crashes** involving only vehicles.
- **Fourteen non-injury crashes.**

Half of the crashes at SE 117th Avenue resulted from **following too closely or failing to avoid.** This is consistent with rear end crashes which are very common at intersections and make up half of the crashes at this intersection. Over a quarter of crashes resulted from people driving **failing to yield right-of-way**.

A quarter of crashes at this intersection happened in dark or low light conditions.

The location of impact analysis shows a high number of crashes for **people arriving at this intersection from the west.** Crashes inside the intersection are dispersed.

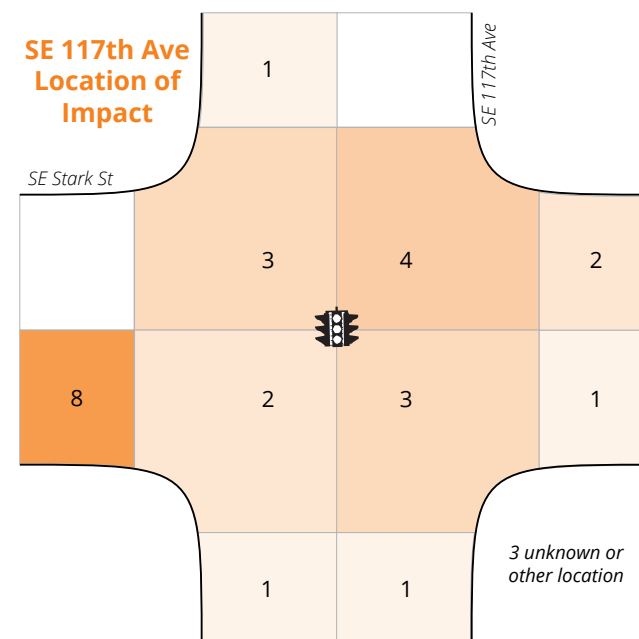This intersection has a signal without a protected left turn phase.

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	14	
Did no yield right-of-way	8	
Disregard traffic signal	4	
Reckless or careless driving	2	
Driving too fast	1	
Inattention	1	
Improper driving	1	

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	21		
Darkness with street lighting	6		
Twilight	1		
Darkness			

Collision Type	Crashes	VZ-Focus
Rear-End	14	
Turning Movement	8	
Angle	4	
Fixed Object	2	

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	33		
Stopped	17		
Left turn	8		

SE 117th Ave Location of Impact

3 unknown or other location

SE 108th Avenue

In 2012-2016 there were **18 crashes** at the SE Stark Street and SE 108th Avenue intersection. These include:

- **One serious injury crash** involving a person in a vehicle.
- **Nine other injury crashes** involving only vehicles.
- **Eight non-injury crashes** including one person on a motorcycle**.**

Almost all of crashes at SE 108th Avenue resulted from **following to closely or not yielding right-of-way.**

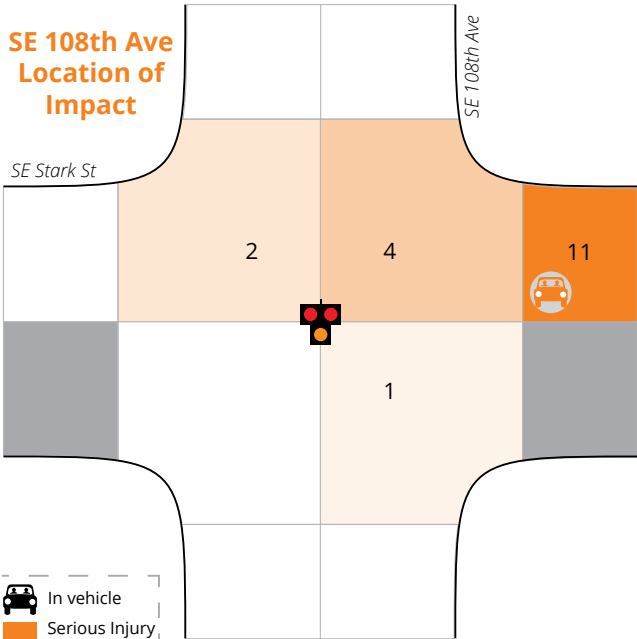Nearly all of the crashes happened in daylight.

Almost all crashes happened as vehicles approached this intersection from the east.

This is the location of a pedestrian hybrid beacon. SE Stark Street is one-way in the westbound direction at this intersection.

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	10	1
Did no yield right-of-way	7	-
Inattention	1	-
Driver issue (illness, fatigue, etc.)	1	-

Collision Type	Crashes	VZ-Focus
Rear-End	11	1
Angle	7	-

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	15	-	
Darkness with street lighting	2	1	
Twilight	1	-	
Darkness			

SE 108th Ave Location of Impact

- In vehicle
- Serious Injury

SE 130th Avenue

In 2012-2016 there were **15 crashes** at the SE Stark Street and SE 130th Avenue intersection. These include:

- **Six injury crashes** involving only vehicles.
- **Eight non-injury crashes.**

The majority of crashes at SE 130th Avenue resulted from **not yielding right-of-way.** Turning movements were the most common collision type, **particularly left turns**.

Another difficulty at this intersection is that it is officially a T-intersection, however there is a small street to the north that is part of the mobile home park located there. This street is not connected to the signal and does not have a detector.

One-third of crashes at this intersection happened in dark or low light conditions.

The location of impact analysis shows proportionally more crashes happening with **cars approaching the intersection from the west,** either before arriving at the intersection or as a result of turning conflicts. East to south left turning conflicts are particularly common.

This intersection has a signal without a protected left turn.

Cause	Crashes	VZ-Focus
Did no yield right-of-way	8	
Followed too closely or failed to avoid	7	
Inattention	1	
Reckless or careless driving	1	

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	10		
Darkness with street lighting	4		
Twilight	1		
Darkness			

Collision Type	Crashes	VZ-Focus
Turning Movement	8	
Rear-End	7	

Movement	Crashes	Ped Crashes	Bike Crashes
Straight	16		
Stopped	13		
Left turn	6		
Right turn	1		

SE 130th Ave Location of Impact

SE Stark St

SE 130th Ave

		1	2
5	5	1	
		1	
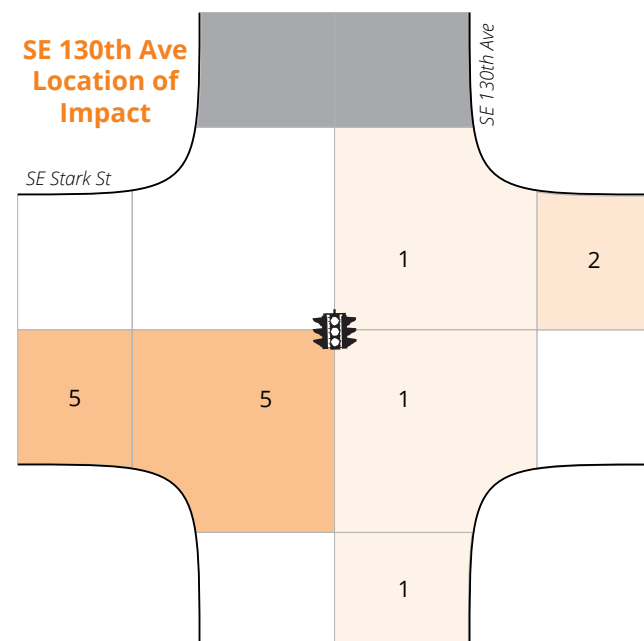
SE 113th Avenue

In 2012-2016 there were **13 crashes** at the SE Stark Street and SE 113th Avenue intersection. These include:

- **Nine injury crashes** involving only vehicles.
- **Four non-injury crashes.**

The majority of crashes at SE 113th Avenue resulted from **following too closely or not yielding right-of-way.** This is consistent with rear end crashes, which are common at intersections and make up more than half of crashes at this intersection. **Failure to yield right-of-way accounted for nearly a third of crashes.**

About a fourth of crashes at this intersection happened in dark or low light conditions.

The location of impact analysis shows proportionally more crashes happening with **cars traveling eastbound.**

Cause	Crashes	VZ-Focus
Followed too closely or failed to avoid	6	
Did no yield right-of-way	4	
Driving too fast	1	
Improper turn	1	
Affected by non-contact vehicle	1	

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	10		
Darkness with street lighting	2		
Twilight	1		
Darkness			

Collision Type	Crashes	VZ-Focus
Rear-End	7	
Turning Movement	4	
Fixed Object	2	

SE 113th Ave Location of Impact
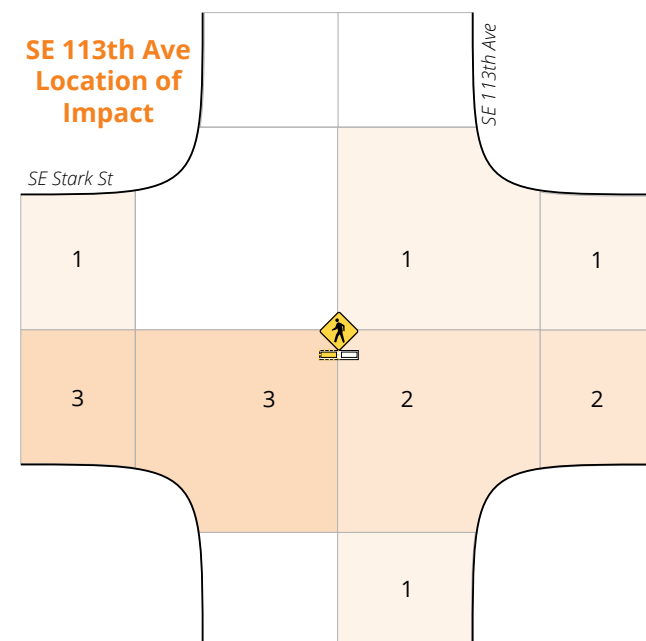
SE 135th Avenue

In 2012-2016 there were **13 crashes** at the SE Stark Street and SE 135th Avenue intersection. These include:
- **Eight injury crashes** involving only vehicles.
- **Five non-injury crashes** including one involving a person on a motorcycle.

The majority of crashes at SE 135th Avenue resulted from **not yielding right-of-way or following to closely.**

About a fourth of crashes at this intersection happened in dark or low light conditions.

The location of impact analysis shows proportionally more crashes happening as cars **approach the intersection from the south** or try to make a turn from the south.

Cause	Crashes	VZ-Focus
Did no yield right-of-way	6	
Followed too closely or failed to avoid	4	
Improper turn	2	
Driving too fast	1	
Driver issue (illness, fatigue, etc.)	1	

Light	Crashes	VZ-Focus	Ped Crashes
Daylight	10		
Darkness with street lighting	3		
Twilight			
Darkness			

Collision Type	Crashes	VZ-Focus
Turning Movement	7	
Rear-End	5	
Head-On	1	

SE 135th Ave Location of Impact

SE 135th Ave

SE Stark St

1		1	2
1	1	3	1
		3	