Parkrose Community Plan

Transportation Safety Solutions: Final Report

May 2022

THE BUREAU OF PLANNING & SUSTAINABILITY

HISTORIC PARKROSE EST. 1911

PBOT PORTLAND BUREAU OF TRANSPORTATION

INTRODUCTION

The following report looks at existing transportation issues and needs along Sandy Boulevard and the broader Parkrose neighborhood and proposes recommendations developed in consultation with community stakeholders and the Parkrose neighborhood. It first analyzes existing analyzes crash data and existing infrastructure along Sandy Boulevard, noting contributing factors, trends and deficiencies. It then outlines recommendations for improvements along Sandy Boulevard intended to address the identified deficiencies and safety issues. The memo then summarizes feedback received from the community regarding transportation improvements elsewhere in the Parkrose neighborhood, and provides solutions developed in consultation with the community. The solutions listed in this report were considered by the Transportation Community Working Group (CWG) and Community Project Decision Teams (PDT), which helped prioritize which of these recommendations should be elevated as in the *Parkrose Community Plan*.

TRAFFIC SAFETY ON SANDY BLVD

According to ODOT's All Roads Transportation Safety data[1], there were a total of 327 crashes on Sandy Boulevard (NE 95th/I-205 to 122nd Avenue) between 2015 and 2019. Of these, five were serious injury crashes, 31 were minor injury crashes, 131 were possible injury crashes, and 160 were property damage only (PDO) crashes. There were no fatal crashes in this section of Sandy Boulevard during these five years.

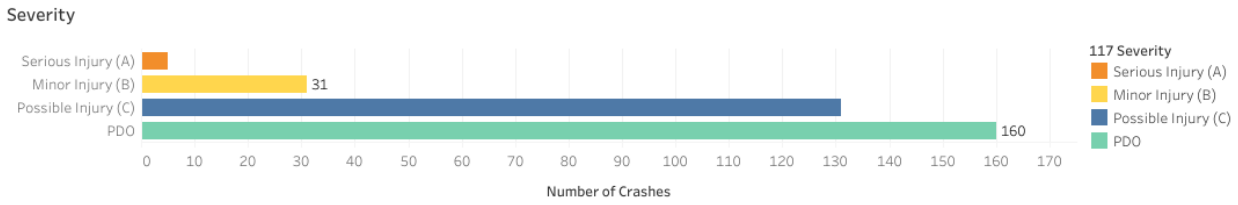

Figure 1 – Crash Severity

[1] This data and visuals were gathered using ODOT's Crash Data dashboard: http://odot2020arts.com/crash-data-dashboard/.

The below graphic illustrates the collision types of these crashes. The most common type of collision was a rear-end, and the second most common was a turning-movement crash. The highest number of "Serious Injury" crashes involved pedestrians.

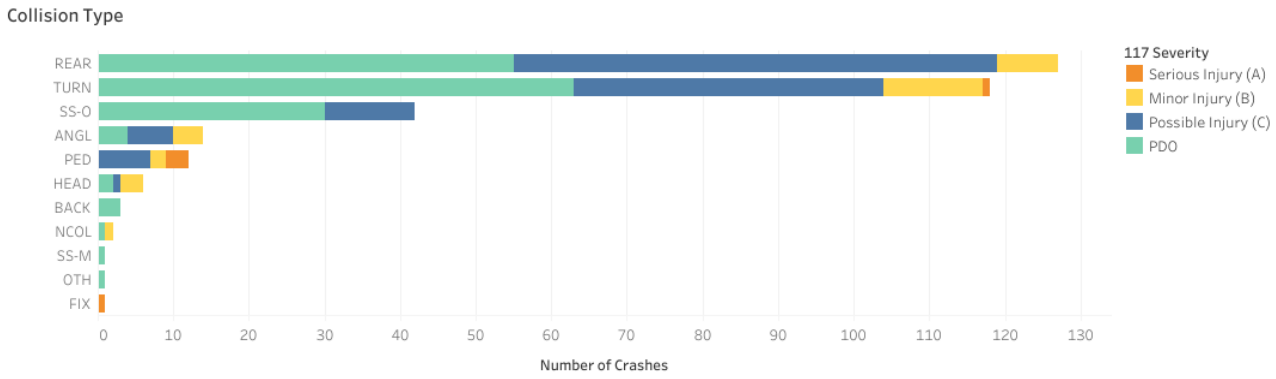

Figure 2 - Collision Type

The cause of crashes can be seen in Figure 3 below. The most prevalent documented causes of all crashes were "Failure to Avoid" and "Not Yielding," followed by "Improper Lane Change" and "Improper Turn." While "Speed" and "In Roadway" were far less prevalent crash causes, they were a larger percentage of serious crashes.

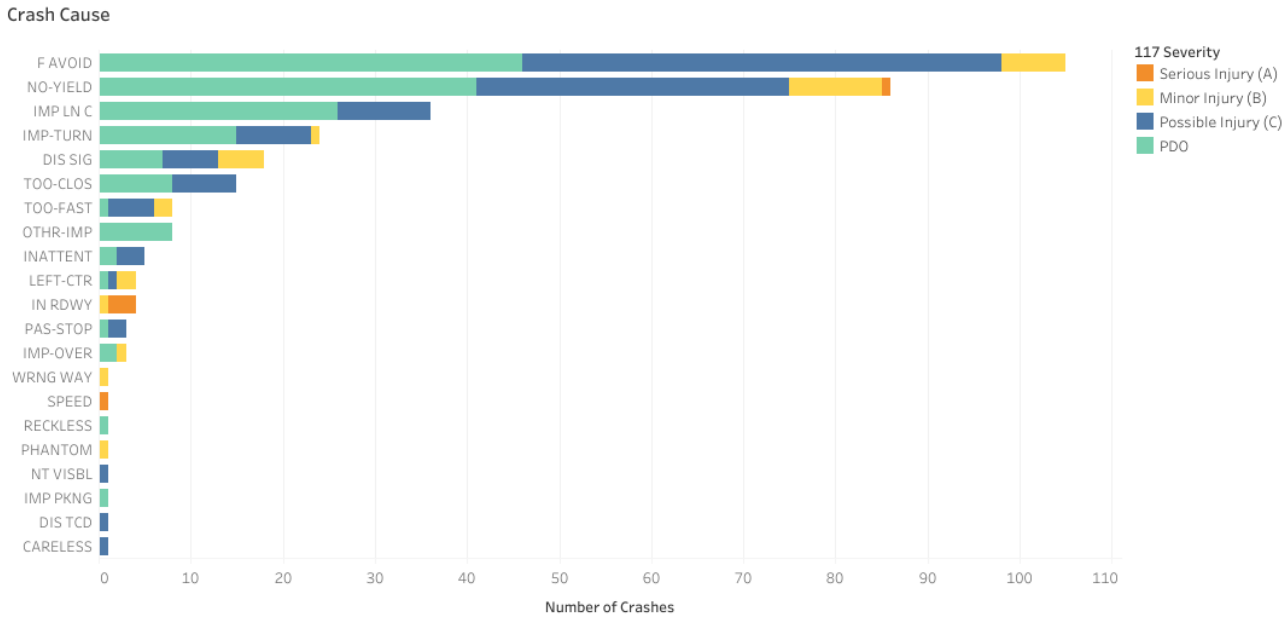

Figure 3 - Crash Cause

CRASH HEAT MAP

The following map, Figure 4, shows a heat map of all serious, injury, and possible injury crashes on Sandy Boulevard and the surrounding area. There are hot spots around the

Killingsworth/Sandy intersection east to NE 102nd Avenue, and clusters at NE 105th, NE 112th, and near NE 122nd avenues.

Figure 4 - Sandy Boulevard Crash Heat Map

Below, Figure 5, shows a heat map of the fatal and serious crashes along Sandy and the surrounding Parkrose area. In this map, there are hot spots along Sandy Boulevard near the Parkrose/Sumner Transit Center, near NE 106th/107th avenues, and near NE 113th and NE 115th avenues.

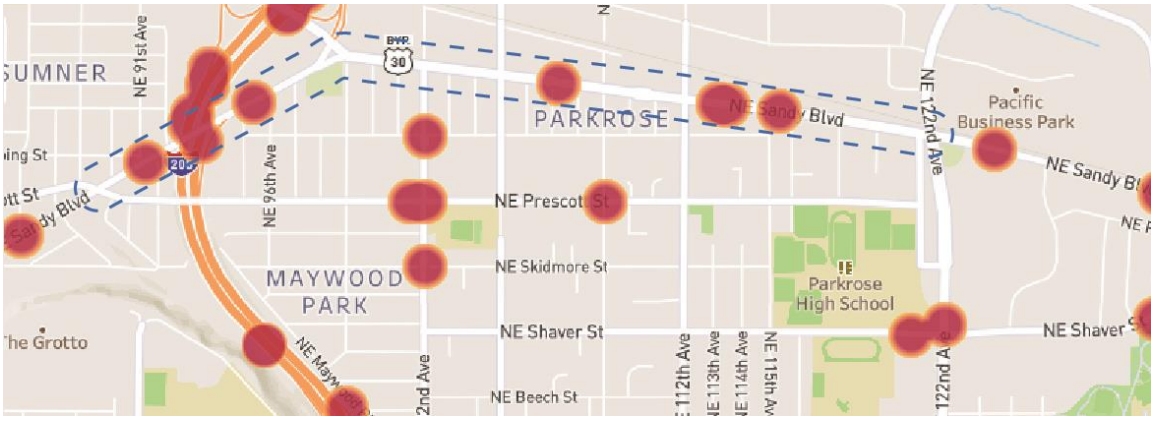

Figure 5 - Fatal and Serious Crash Heat Map

SERIOUS CRASHES

The five serious crashes were dispersed, although two occurred at NE 112th Avenue and Sandy Boulevard.

- NE 96th Avenue and Sandy Boulevard: Crash involving a pedestrian in the roadway during the evening (8pm) in March 2016. Alcohol was a factor.

- NE 107th Avenue and Sandy Boulevard: A fixed object crash due to speed involving someone driving a motor vehicle at dusk (8pm) in the rain in March 2017. Alcohol was a factor.

- NE 112th Avenue and Sandy Boulevard: Two crashes occurred here. The first involved a pedestrian in the roadway during the day (9am) in April 2017. The second involved a driver of a motor vehicle failing to yield during a left turn to another driver during the day (6pm) in June 2017.

- NE 116th Avenue and Sandy Boulevard: A crash involving a pedestrian in the roadway in the late evening (11pm) in August 2017.

CRASHES INVOLVING PEDESTRIANS

Between the years 2015-2019, 12 reported crashes on this section of Sandy Boulevard involved pedestrians. Of these, three were serious injury crashes, two were minor injury crashes, and seven were possible injury crashes. The graphic below, Figure 6, illustrates the reported crash cause.

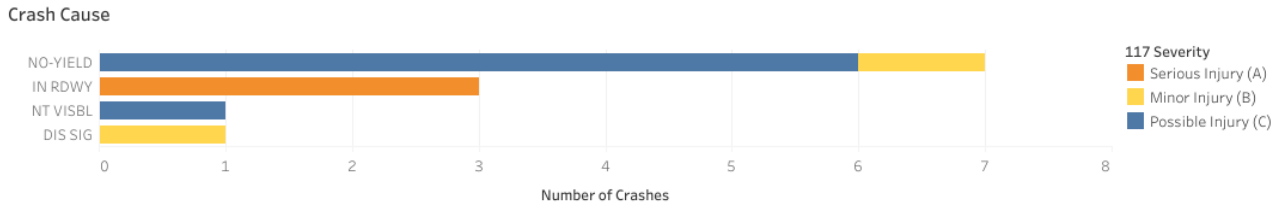

Figure 6 - Crash Causes

The below map, Figure 7, illustrates where the crashes occurred. While there were no fatal crashes within the segment of Sandy being studied, there was a fatal crash on NE Sandy Boulevard east of NE 122nd Avenue, just outside the study area.

Figure 7 – Pedestrian Crashes on Sandy Boulevard

CRASHES INVOLVING PEOPLE BIKING

Between the years 2015-2019, 8 reported crashes on this section of Sandy Boulevard involved people biking. One of these crashes was a serious injury crash, four were minor injury crashes, and 3 were possible injury crashes. All the crashes were the result of turning conflicts (either turning or angle crashes). The map below illustrates were these crashes occurred.

Figure 8 - Bicycle Crashes on Sandy Boulevard

INTERSECTION CRASHES

As seen in the heat map, Figure 4, many crashes on Sandy Boulevard occurred at intersections. The following describes the crash types and causes at high crash intersections. The information below excludes "Property Damage Only" (PDO) crashes.

- **NE 96th Avenue**: This intersection is signalized, with one leg serving as the entrance to the Parkrose/Sumner Transit Center. During the five years of data, there were 13 crashes at this location. Two involved pedestrians. Four crashes were rear-end collisions, and three were turning.
- **NE 97th Avenue**: This is an unsignalized intersection. At this location there were 10 crashes, one involving a person biking. Six of the crashes were turning, with the cause often improper turning or failing to yield.
- **NE 100th Avenue**: This is an unsignalized intersection, with a stop sign on the south side Sandy Boulevard and a driveway on the north side. There were nine crashes, one involving a pedestrian and another involving a person biking. Most of the crashes were a result of failing to yield.
- **NE 101st Avenue**: This is an unsignalized intersection, with a stop sign on both the north and south legs of the intersection. There were 11 crashes, one involving a person biking.
- **NE 102nd Avenue**: There were 19 crashes at this signalized intersection. One involved a pedestrian, with the driver of a motor vehicle failing to yield to the person in a crosswalk. Eight crashes were reported to be caused by "Failure to Avoid," and five for not yielding. Two occurred in snowy/icy conditions.

- **NE 105th Avenue**: There were 12 crashes at this signalized intersection, with one involving a pedestrian and another a person biking. Eight of the crashes were due to not yielding or disregarding the signal, and three were reported to be failure to avoid.
- **NE 112th Avenue**: There were 15 crashes at this signalized intersection, with one involving a pedestrian. Eight were rear end crashes, with seven due to failure to avoid.
- **NE 121st Place**: There were nine crashes at this signalized intersection, one involving a pedestrian. Six of the crashes were rear end crashes.
- **122nd Avenue/Sandy Boulevard:** This intersection serves as the entrance/exit ramp between Sandy Boulevard and NE 122nd Avenue. There were 18 crashes here, all involving motor vehicles.

EXISTING INFRASTRUCTURE AND DEFICIENCIES

CROSSINGS AND LIGHTING

Between I-205 and NE 112th Avenue, Sandy Boulevard has been identified in Portland's *PedPDX Plan* as a "Pedestrian District." According to *PedPDX*: "In these areas, it is recommended that opportunities for pedestrians to cross the street not exceed 530'…demonstrating existing crossing demand will not be required to justify new marked crossings within Pedestrian Districts." Currently on Sandy Boulevard, there are several places where this is the case as seen in the illustration below, Figure 9. The 1,360' gap between NE 92nd Avenue and NE 96th Avenue is largely a result of the bridge over I-205. Another large gap currently exists between NE 105th and NE 112th Avenue, though a new crossing will soon be installed near NE108th/NE 109th avenues.

Outside of Pedestrian Districts, PedPDX recommends a crossing frequency of 800' or less. Between NE 112th Avenue and NE 121st Place, there is a significant crossing gap (~2,290').

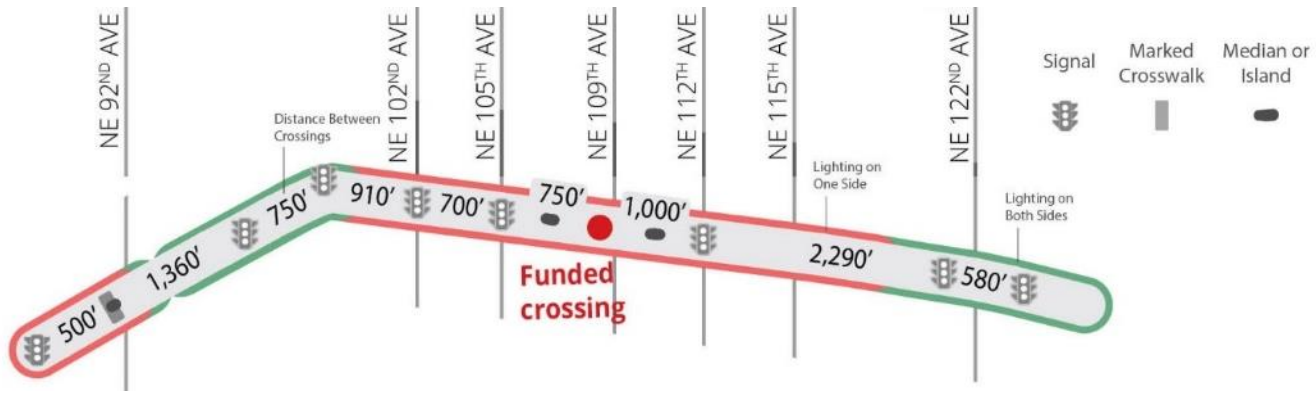

Figure 9 - Distance Between Pedestrian Crossings

PedPDX also prioritized crossing gaps throughout the City. The crossing gap on Sandy Boulevard between NE 97th Avenue and NE Killingsworth Street is identified as a Tier 1 crossing gap (out of 5), the highest priority. The rest of Sandy Boulevard between NE 95th Avenue and NE 122nd Avenue is identified as a Tier 2 gap, the second highest priority.

The above graphic also illustrates lighting deficiencies on Sandy Boulevard. According to PBOT guidelines, lighting should be installed on both sides of corridors that are 48' or wider. Sandy Boulevard is approximately 64' wide. Currently, there is only uniform lighting on the south side of the street between NE 100th and NE 118th avenues. There is also a lack of lighting on the north side of Sandy Boulevard southwest of NE 92nd Avenue.

TRANSIT RIDERSHIP

The illustration below, Figure 10, shows the locations of existing transit stops and approximate number of people getting on or off at these locations. Understandably, the highest number of riders are from the Parkrose/Sumner Transit Center as the MAX Red Line and multiple transit lines intersect at this location. TriMet's Line 21 runs east from the transit center along Sandy Boulevard, and the Line 87 runs on Sandy Boulevard between NE 102nd and NE 105th avenues. Many of the stops are located near intersections, although several do not have signals or other crossing improvements.

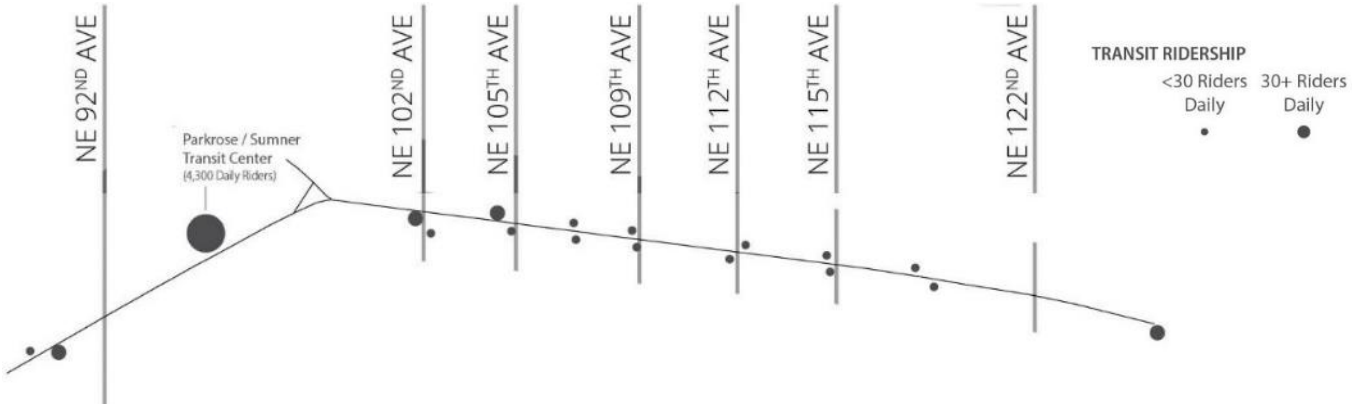

Figure 10 - Transit Ridership

More detailed information about transit stops along Sandy Boulevard between the Parkrose/Sumner Transit Center and NE 122nd Avenue can be seen below. The data is from the fall of 2019, prior to the COVID-19 pandemic.

Stop	Line	Direction	Ons	Offs	Total
NE Sandy & 118th	21	W	8	14	22
NE Sandy & 115th	21	W	11	5	16
NE Sandy & 112th	21	W	18	7	25
NE Sandy & 109th	21	W	6	9	15
NE Sandy & 107th	21	W	11	12	23
NE Sandy & 104th	21	W	13	18	31
NE Sandy & 104th	87	W	11	11	22
NE Sandy & Parkrose/Sumner Transit Center	21	W	0	295	295
Parkrose/Sumner Transit Center	21	E	382	26	408
NE Sandy & 102nd	21	E	23	11	34
NE Sandy & 102nd	87	N	12	11	23
NE Sandy & 105th	21	E	11	15	26
NE Sandy & 107th	21	E	11	11	22
NE Sandy & 109th	21	E	7	7	14
NE Sandy & 112th	21	E	5	17	22
NE Sandy & 115th	21	E	7	16	23
NE Sandy & 118th	21	E	17	9	26

Table 1 - Sandy Boulevard Transit Stop Data

STREET CHARACTERISTICS

There are several driveways on Sandy Boulevard between NE 102nd and NE 122nd Avenue, as well as curb extensions on the south side of the street between NE 102nd and NE 109th avenues. There is also a sidewalk gap on the south side of the street near 122nd Avenue.

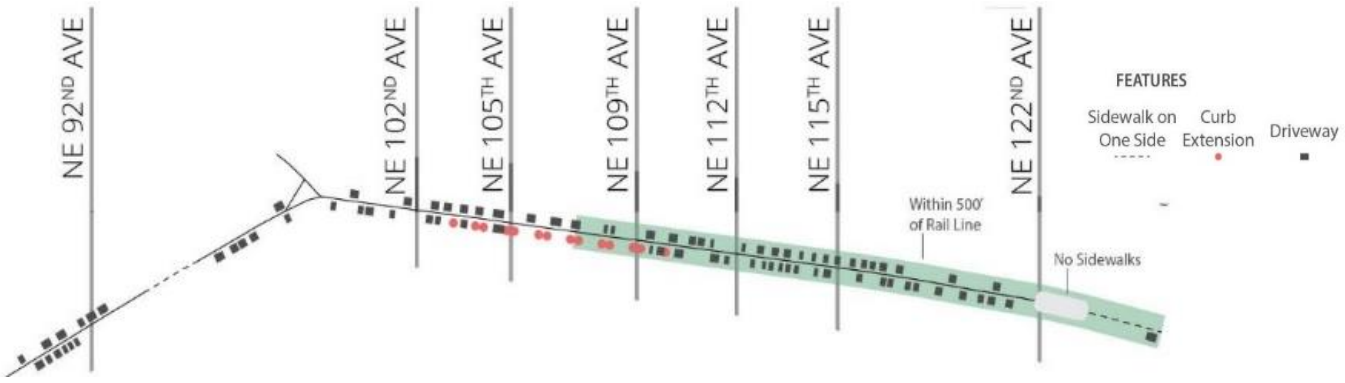

Figure 11 - Sidewalks, Driveways and Curb Extensions

Figure 12- NE Sandy Boulevard at NE 104th Avenue

TRAFFIC CHARACTERISTICS

The graphic below, Figure 13, illustrates the corridor speed limits and peak hour traffic volume. The speed limit southwest of NE 99th Avenue is 35mph, while between NE 99th and and NE 112th avenues it is 30mph. The speed limit again increases to 35mph east of NE 115th Avenue.

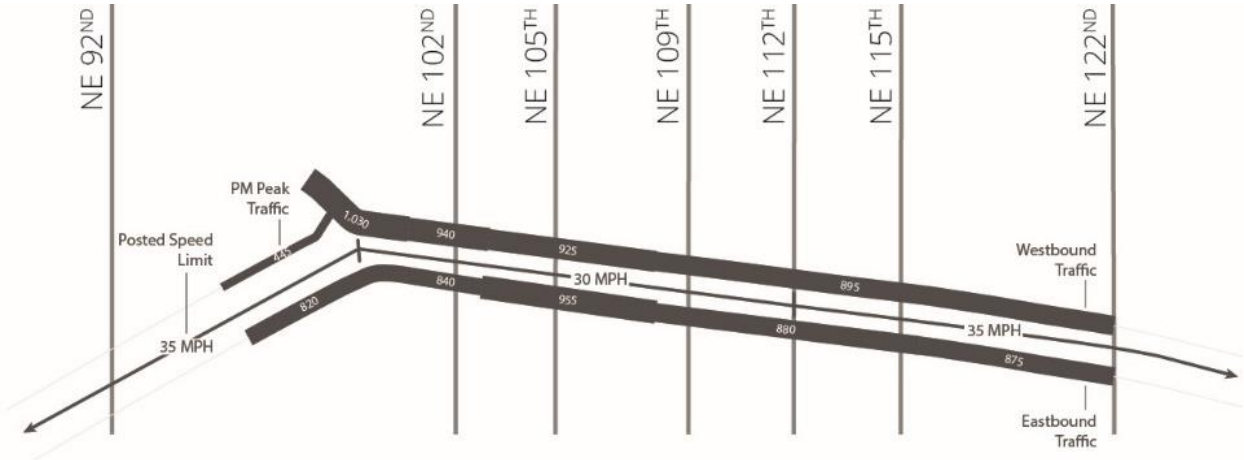

Figure 13 – Speed limits and peak hour volumes along Sandy Boulevard

The following graphic, Figure 14, shows daily traffic volumes. According to data retrieved in March 2021, the busiest section of this section of Sandy Boulevard is between I-205 and NE 105th Avenue, with more than 25,000 vehicles. Traffic volumes decrease to the east, with approximately 22,000 and 21,000 per day at NE 108th Avenue and 116th Avenue, respectively. Traffic volumes are lowest to the southwest, with volumes of approximately 15,500 vehicles per day near NE 97th Avenue.

Figure 14 - March 2021 traffic volumes along Sandy Boulevard

COMMUNITY CONCERNS

In addition to the quantitative analysis of crashes and deficiencies, City staff also held listening sessions with various stakeholder groups in the spring and summer of 2021 to learn about issues, needs, and desires for Sandy Boulevard and the Parkrose neighborhood. The following summarizes the desires and/or concerns for Sandy Boulevard heard during those meetings:

- There are not many crosswalks
- There is a lack of streetlights
- There are not many businesses that would be appealing to frequent
- There is lengthy spacing between marked/signalized/enhanced crossings, unimproved streets and driveways, and gravel spread. Need to have driveway consolidation and access management, with wide travel lanes and median.
- Residents mostly go to businesses on the south side of Sandy, and usually don't cross to the north side, which is more industrial.
- Not comfortable walking on Sandy alone, and there are lots of gas stations. People go to Grocery Outlet or the hardware store, but don't go to the street to stroll.
- Turning into the Grocery Outlet parking lot feels unsafe with people rushing in and out of it. There are conflicts when drivers are trying to leave and enter at the same time because of no lane separation.
- The street is used to visit specific locations like the hardware store, Grocery Outlet, Elmers, but not many other places.
- Further east on Sandy Boulevard you really notice the lack of street lights.
- There is a desire for more boutique stores, smaller local businesses, and places that would be more welcoming to younger crowd/teenagers.
- The street lacks the businesses and services needed by the community.
- When walking, it doesn't feel pedestrian friendly due to the lack of crosswalks and traffic noise.

- Many people feel unsafe both as a driver and a pedestrian due to reckless drivers, high speeds, and/or criminal activity/shootings.
- Parkrose Transit Center is in Parkrose, but people forget that it is part of the neighborhood.
- There needs to be better pedestrian infrastructure and lighting at the Sandy off-ramp of I-205.
- There are a lot of industrial uses of the road, and deficiencies that haven't been addressed over time.
- Some trees along Sandy have been cut down because people thought they were obstructing signs for businesses.
- Near the I-205 triangle would be great place to commission art to celebrate the first people on this land, native peoples.
- Intersections have small waiting spaces for pedestrians waiting to cross the street.
- It feels like there are lots of crashes near the Parkrose transit center.
- To feel safer more crosswalks and streetlights are needed, especially near transit stops.
- PBOT should work with ODOT to green up Sandy Boulevard.
- Removing motor vehicle lanes on Sandy Boulevard would not help reduce speeds, and could lead to more traffic on neighborhood streets.

These comments, along with the analysis, were taken into consideration during the development of recommendations.

RECOMMENDED SOLUTIONS – SANDY BLVD.

To improve safety along Sandy Boulevard, and the deficiencies identified in the previous sections of this memo, several recommendations have been developed. These recommendations are described and shown below.

CROSSINGS

1. Add additional pedestrian crossings of Sandy Boulevard to address the significant spacing gaps and meet the City's PedPDX guidelines.

Actions: To meet the City of Portland's PedPDX guidelines, seven additional crossings are needed on Sandy Boulevard between NE 95th Avenue and NE 122nd Avenue. To help address immediate safety concerns, it is recommended that five locations be prioritized for further analysis.

- A mid-block crossing between NE 97th and Sandy/Killingsworth[2]
- A mid-block crossing between NE 100th and NE 101st
- A mid-block crossing between NE 106th and NE 107th
- A crossing treatment or signal at NE 115th
- A crossing treatment or signal at NE 118th

These crossings have higher pedestrian activity, are near transit stops, and/or are near high-activity land uses such as the Grocery Outlet/Parkrose Hardware at NE 106th/107th avenues and food trucks at NE 118th avenues. Crossings to fill the remaining gaps between NE 103rd and NE 104th, and at/near NE 110th avenues should also be considered. Finally, a crosswalk and flashing beacon should be considered at the I-205 off-ramp onto Sandy Boulevard near NE 95th Avenue to improve visibility of pedestrians.

INTERSECTIONS

2. Improve pedestrian visibility and safety at signalized intersections.

Actions: Crosswalks at signalized intersections should be upgraded to have continental bar striping and should be considered for "pedestrian head start" phasing. "Pedestrian head starts" (otherwise known as "leading pedestrian intervals") give pedestrians an indication to enter the crosswalk a few seconds before the traffic signal changes, which allows for more visibility. These locations include:

- NE 96th Avenue

[2] Additional analysis determined a crossing is not feasible at this location. For more information, see "Analysis of Unsignalized Crossings" below.

- NE 102nd Avenue
- NE 105th Avenue
- NE 112th Avenue

3. Redesign the intersections of Sandy Boulevard and NE Killingsworth/I-205[3], and NE Sandy Boulevard and NE 121st/NE 122nd Avenues to improve safety.

Actions:

- Redesign the intersection of Sandy Boulevard and NE Killingsworth/I-205 to add continental crosswalks, increase the pedestrian/bicycle refuge area, and improve the I-205 multi-use path connection.
- Redesign the intersection of Sandy Boulevard near NE 122nd Avenue to add a bike facility from 122nd ramp to Sandy, add continental crosswalks, and assess whether the turn radius can be tightened.

LIGHTING

4. Upgrade/increase lighting along Sandy Boulevard.

Actions:

- Lighting should be added on the north side of Sandy Boulevard between NE Killingsworth Street and NE 115th Avenue to meet current lighting standards.
- Pedestrian scale lighting should be added between NE 95th Avenue and NE 112th Avenue, prioritizing locations near crossings and transit stops.

TRANSIT

5. Improve transit service along Sandy Boulevard.

Action:

- Upgrade the Line 21 to frequent service as identified in TriMet's Service Enhancement Plan.

6. Improve transit amenities and access on Sandy Boulevard.

Actions: In several locations bus stops should be improved and/or relocated. These include:

- NE 102nd Avenue: Add space for a seat on the south side of Sandy Boulevard and consider adding a stop and seat on north side of street.
- NE 105th Avenue: Relocate eastbound stop to the far side of the intersection and make it more accessible, consider seating at westbound stop.
- NE 107th Avenue and NE 109th Avenues: Consolidate stops with the new crossing at NE 108th Avenue.
- NE 115th Avenue: Improve ADA accessibility and consider upgrades to facilities.

[3] Note: The Columbia/Lombard Wayfinding project will be changing the name of this section Killingsworth Street to NE Lombard Street (estimated to begin May 2022). This document uses Killingsworth Street.

- At/near NE 118th Avenue: Create space for a bench at the eastbound stop.

SAFETY AND OTHER IMPROVEMENTS

7. Improve active transportation along/near Sandy Boulevard.

Actions:

- Widen the I-205 multi-use path running along the east side of Sandy Boulevard between NE 95th and NE 96th avenues and improve the connection to NE 96th Avenue and the Parkrose Sumner Transit Center.
- Improve the I-205 multi-use path running along the south side of NE Killingsworth Street and the crossing of Sandy Boulevard.
- Provide a connection from NE 102nd Avenue to the I-205 path by widening the sidewalk on the north side of the street.

8. Improve safety and comfort along Sandy Boulevard.

Actions:

- Determine locations for median islands to improve access management, reduce turning conflicts, slow traffic, and potentially create space for street trees and vegetation. Also consider access management at side streets as part of crossing improvements to reduce the risk of turning movement crashes.
- Determine locations for additional street trees and vegetation along the corridor.

9. Fill sidewalk gaps

Action: Fill sidewalk gap on the south side of Sandy Boulevard near NE 122nd Avenue.

10. Resurface Sandy Boulevard.

Action: Resurface Sandy Boulevard between NE Killingsworth Street and NE 122nd Avenue.

11. Extend Sandy Boulevard improvements east of NE 122nd Avenue.

Action: Advocate for a future project to focus on improvements to Sandy Boulevard east of NE 122nd to address the lack of pedestrian and transit amenities along a corridor with a lot of multifamily housing.

Map of Recommended Solutions

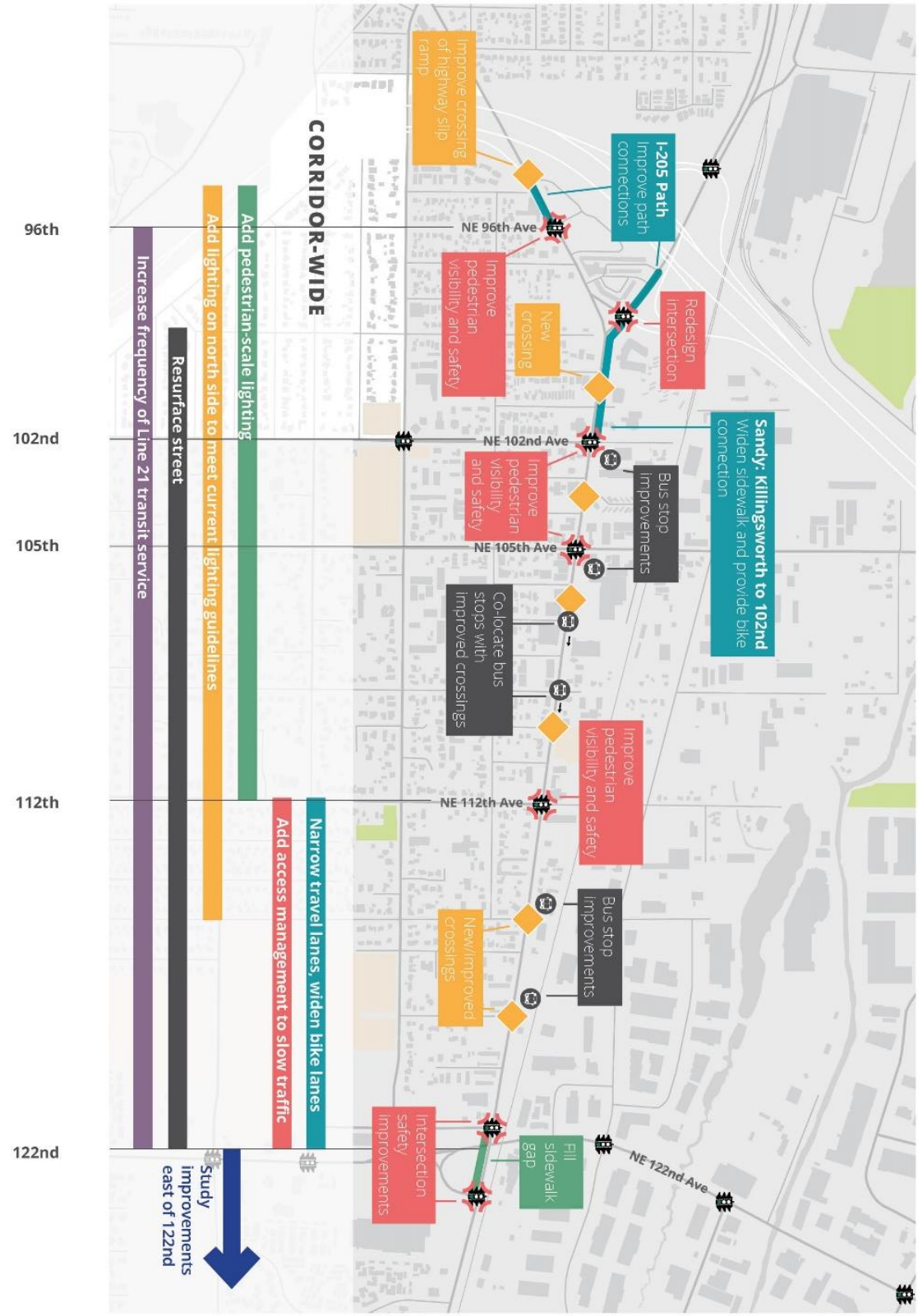

Figure 15 – Map of Recommendations

The table below lists the recommendations for Sandy Boulevard:

Table of Recommended Solutions

Number	Location	Issue/Concern	Recommended Solution
S-1	Sandy Boulevard between Sandy/I-205 off-ramp and NE 96th Avenue	Substandard path	Widen multi-use path on east side of Sandy Boulevard and improve the connection to NE 96th Avenue/ Parkrose Sumner Transit Center
S-2	Sandy Boulevard and I-205 off-ramp	Pedestrian safety	Analyze adding crosswalk and flashing beacon
S-3	Sandy Boulevard and NE 96th Avenue	Intersection safety	Add LPIs and continental crosswalks
S-4	Between NE 96th Avenue and Sandy/Killingsworth	Pedestrian crossing gap	Add a signalized crossing at or near NE 97th Avenue
S-5	Sandy/Killingsworth	Intersection safety	Redesign intersection to add continental crosswalks, increase the pedestrian/bicycle refuge area, and improve the I-205 multi-use path connection.
S-6	Between I-205 path and NE 102nd Avenue	Bicycle connection	Widen sidewalk on north side to multi-use path to provide a bicycle connection from NE 102nd Avenue to the I-205 path
S-7	At/near NE 100th Avenue	Pedestrian crossing gap	Add pedestrian crossing
S-8	NE 102nd Avenue	Intersection safety	Add LPIs and continental crosswalks, make ADA upgrades
S-9	NE 102nd Avenue	Transit need	Add bus shelter, consider transit island, add stop and shelter on north side of street
S-10	At/near NE 103rd/104th Avenue	Pedestrian crossing gap	Add pedestrian crossing
S-11	NE 105th Avenue	Intersection safety	Add LPIs and continental crosswalks
S-12	NE 105th Avenue	Transit need	Upgrade stops, relocate WB stop closer to intersection
S-13	Between NE 106th Avenue and NE 107th Avenue	Pedestrian crossing gap	Add pedestrian crossing
S-14	NE 107th Avenue	Transit need	Upgrade transit amenities, and/or consider relocation to new crossing at NE 108th

S-15	At/near NE 110th Avenue	Pedestrian crossing gap, transit need	Add pedestrian crossing, potentially relocate transit stop currently at NE 109th
S-16	NE 112th Avenue	Intersection safety	Add continental crosswalks, make ADA upgrades
S-17	NE 115th Avenue	Pedestrian crossing gap, lack of bike crossing	Add pedestrian/bicycle crossing
S-18	NE 115th Avenue	Transit need	Upgrade transit amenities
S-19	At/near NE 118th Avenue	Pedestrian crossing gap, transit need	Add pedestrian crossing, improve transit amenities and/or relocate stops
S-20	NE 121st Place	Bicycle safety/comfort, intersection safety	Improve intersection design to remove right turn/bike lane conflict, upgrade crossings to continental crosswalks
S-21	NE 121st Place to NE 122nd Avenue	Sidewalk gap	Fill gap in sidewalk on southside of street
S-22	NE 122nd Avenue	Intersection safety	Redesign intersection to add bike facility from 122nd ramp to Sandy, add continental crosswalk, tighten turn radius if possible
S-23	NE 112th Avenue to NE 122nd Avenue	Safety	Add access management/medians to channel left turns and add landscaping. Consider side street access management at crossings where angle crashes have occurred.
S-24	NE Killingsworth to NE 115th	Lighting need	Add lighting on north side to fill gaps and meet current lighting guidelines
S-25	NE 95th to NE 112th	Lighting need	Add pedestrian scale lighting
S-26	Transit Center to NE 122nd Avenue	Transit need	Increase frequency of Line 21
S-27	East of NE 122nd Avenue	Safety, Active Transportation	In a future project, focus on improvements on Sandy Boulevard east of 122nd Avenue.

Table 2 - Recommended Solutions for Sandy Boulevard

PARKROSE NEIGHBORHOOD: ADDITIONAL TRANSPORTATION NEEDS AND RECOMMENDED SOLUTIONS

During the development of the Parkrose Community Plan, several concerns, needs, and requests were brought up by the community for the broader Parkrose neighborhood. The following outlines these desires and potential solutions. Additional information about existing infrastructure, crashes, and deficiencies in the Parkrose neighborhood can be found in the *Parkrose Community Plan Existing Transportation Conditions* document found as **Appendix A**.

In the general "Community Working Group" meeting held on April 7, 2021, the following comments were heard:

- There was a concern about the lack of safety for children walking/biking in the Parkrose neighborhood
- There was a desire for the light rail station to be more integrated into the neighborhood with safer access to the station from the neighborhood

Additional meetings focused specifically on transportation improvements were held on May 12th and July 7th, 2021. The following summarizes the comments and suggestions for the Parkrose neighborhood that were brought up in these meetings:

- Fremont Street between NE 102nd and NE 122nd avenues feels unsafe, as there are few sidewalks and many apartment complexes and homes.
- Shaver Street is a main route to Parkrose Middle School and High School, and it would be good to widen/improve sidewalks between NE 105th and NE 117th avenues.
- Trees and more greening in the neighborhood would make it feel nicer and more pedestrian friendly.
- One participant recommended that Prescott be looked at as a main street for walking rather than Sandy, but another participant noted there are more destinations along Sandy Boulevard. Agreement there should be a balance.
- Our kids want to walk in the neighborhood and feel safe but there are no crosswalks and we don't feel safe. It's hard to feel safe to have kids walk.
- There are no biking routes on the sidewalks for kids and family and there are fast cars, so we do not do much walking or riding. Bikes ride in car lanes and this doesn't feel safe.
- Speed cameras to deter people from speeding would be helpful.
- NE Killingsworth Street between NE 102nd and NE 109th avenues could be used as an alternative parallel route to Sandy Boulevard, but is currently narrow, in poor condition and is prone to flooding.
- For new immigrants, we don't even have bike lane guides in various languages for Parkrose. We love biking and access local businesses but not safe bike lanes etc.

- Better development of side streets in Parkrose would be nice to still have direct routes to places without having to bike on Sandy Boulevard.
- NE Wygant Street was recommended as a street that is quiet and could be used as both a walking and biking street.
- I-205 path has become uncomfortable and feels unsafe and is often blocked by people experiencing homelessness.

These comments, along with the existing conditions, were considered in developing the following proposed solutions.

RECOMMENDED SOLUTIONS – PARKROSE NEIGHBORHOOD

To address the concerns of the community, and improve safety and mobility within the Parkrose neighborhood, several solutions are proposed below. These solutions will need further analysis by City staff before funding and implementation. Note that these do not include recommendations for Sandy Boulevard, as these are detailed in the previous section. And additional consideration should be given to the potential of major or multiple street improvements to contribute to increased property values and rents, and potentially contribute to residential and commercial displacement.

SIDEWALKS

12. Prioritize constructing sidewalks or filling sidewalk gaps on streets that have high volumes/speeds of motor vehicle traffic, are identified as "Major City Walkways" or "Neighborhood Walkways," or have been designated by the Safe Routes to School program as "Primary Investment Routes."

Actions: The following streets should be prioritized for constructing sidewalks and/or filling sidewalk gaps:

- Shaver Street between NE 102nd Avenue and Parkrose Middle School (very high priority)
- NE Prescott Street between NE 102nd Avenue and NE 121st Place
- NE Fremont Street between NE 102nd and NE 122nd avenues
- NE 105th Avenue between NE Sandy Boulevard and NE Fremont Street
- NE 112th Avenue between NE Sandy Boulevard and NE Fremont Street, and between NE Sandy Boulevard and the railroad
- NE 115th Avenue between NE Shaver and NE Prescott streets (lower priority)
- NE 118th Avenue between NE Prescott Street and NE Sandy Boulevard (lower priority)

CROSSINGS

13. Add crosswalks or pedestrian crossings to address crossing gaps and deficiencies

Actions: Priority should be given to locations with transit stops and/or that have been identified in the City's PedPDX plan such as:

- NE Prescott Street between I-205 and NE 122nd Avenue
- NE Fremont Street between NE 102nd and NE 122nd avenues
- NE Shaver Street between NE 102nd and NE 115th avenues
- NE 102nd Avenue between NE Fremont Street and NE Sandy Boulevard
- NE 122nd Avenue between I-84 and NE Sandy Boulevard

Additional crossings should also be added throughout the neighborhood to meet PedPDX spacing guidelines.

BICYCLE FACILITIES

14. Add or improve bicycle facilities to make it easier and safer to access destinations by bicycle, prioritizing improvements to facilities on low-traffic streets, as alternatives to having to bicycle on high-traffic streets.

Currently, bike facilities in the Parkrose neighborhood exist on NE 102nd Avenue, NE Fremont Street, 122nd Avenue, and Sandy Boulevard. Additional facilities should be added that correspond with the City's Bicycle Plan and Transportation System Plan designations. Priority should be given to facilities that would improve connectivity and access and that provide low-stress options for bicycling on low-traffic streets, as alternatives to facilities on high-traffic streets.

Actions

- Prioritize adding neighborhood greenways on NE 115th Avenue between NE Fremont and NE Sandy Boulevard, on NE Skidmore Street between I-205 and Parkrose High School, and on NE Wygant between NE 95th and NE 115th avenues.
- Add bike lanes to NE 102nd Avenue between NE Prescott Street and NE Sandy Boulevard
- Upgrade the bicycle lanes on NE Fremont Street and NE 122nd Avenue to improve bicycle comfort and safety

Additionally, bicycle lanes should be considered on NE 105th and NE 112th avenues, and/or a neighborhood greenway on NE 109th Avenue between NE Fremont Street and NE Sandy Boulevard.

SAFETY AND OTHER IMPROVEMENTS

In addition to the improvements above, additional improvements should be added to improve transportation safety and comfort. These include:

15. Improve lighting for pedestrians

Actions

- Improve lighting for pedestrians, including on secondary streets, especially near schools and on local service streets with higher levels of traffic.
- Conduct a detailed lighting analysis on side streets in the neighborhood to identify priority locations.

- Improve lighting and transit amenities at transit stops, particularly stops with high ridership such as NE 102nd Avenue and Prescott Street and NE 105th Avenue and Prescott Street.

16. Improve active transportation connections from the Parkrose neighborhood to the Columbia Corridor employment district and Airport Way.

Actions:

- Improve active transportation connections (transit, bicycle, transit) on streets in Parkrose that provide connections to employment areas, including the I-205 pathway, NE 105th Avenue and NE 122nd Avenue.
- Advocate for improving nearby connections outside the Parkrose neighborhood, including NE 138th Avenue. NE 148th Avenue, and a potential Levee Active Transportation Route between NE 138th and 148th avenues.

17. Include trees and improve connections to natural areas

Actions:

- Add street trees as part of sidewalk or other transportation improvements.
- Improve access to the Columbia Slough and add directional/wayfinding signage throughout the neighborhood

18. Address safety issues

Actions:

- Add speed reader signs on high traffic volume streets, such as NE 102nd Avenue, NE Prescott Street, NE Fremont Street, and NE 122nd Avenue.
- Install "leading pedestrian intervals" at signalized intersections in the neighborhood, prioritizing intersections near schools and other high pedestrian activity locations.
- Improve the condition of the road on NE Killingsworth Street between NE 102nd Avenue and NE 109th Avenue.
- Improve city/state coordination of maintenance and safety on the I-205 path.

19. Install electric vehicle charging stations around businesses and to serve multifamily residents

Actions:

- Increase the number of electric vehicle charging stations close to businesses, at employment centers, and multifamily housing to support the ability of residents and workers to use electric vehicles.

A map and comprehensive list of the proposed solutions for the Parkrose neighborhood are below.

Map of Recommended Solutions

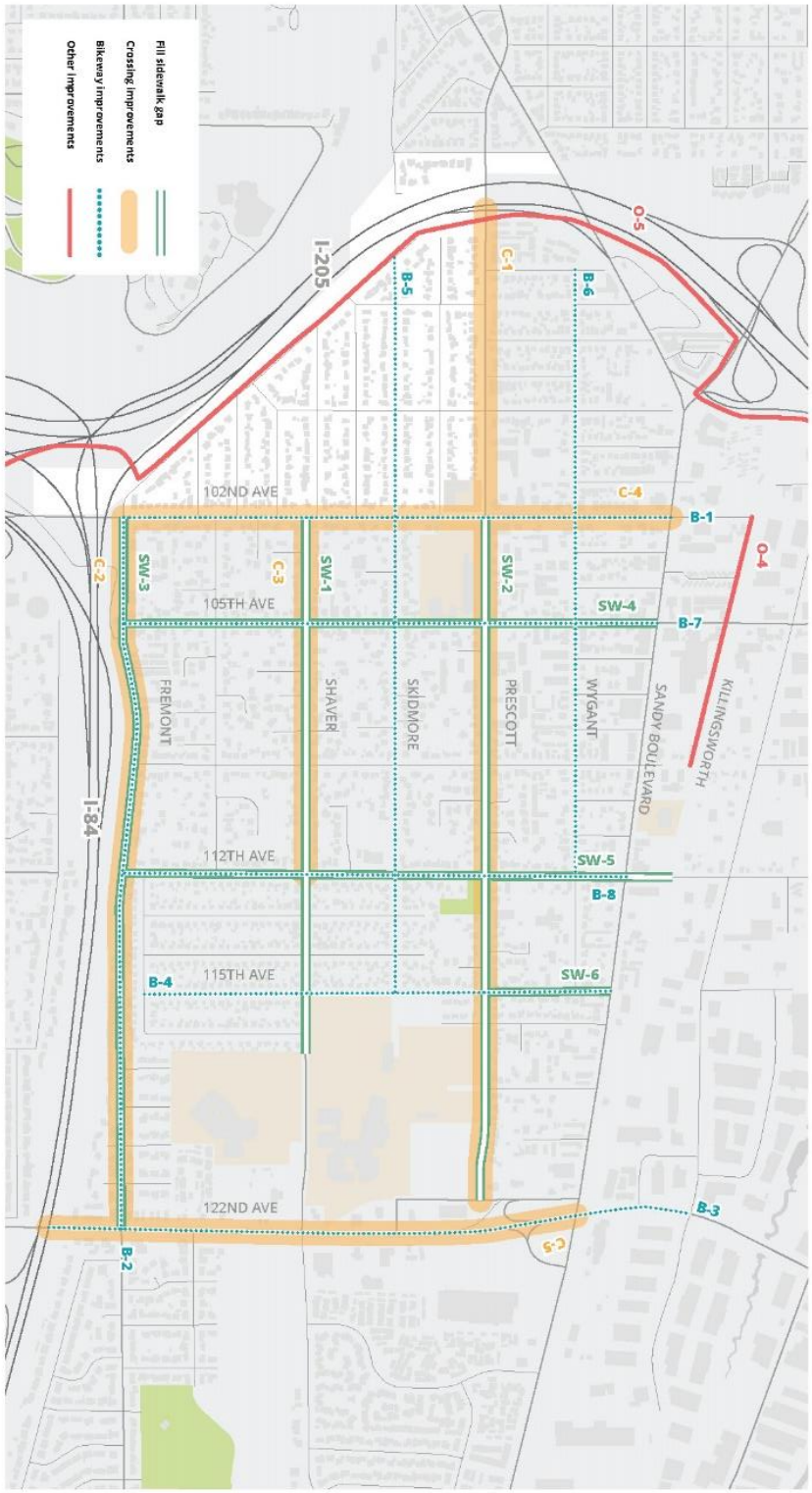

Figure 16- Map of Parkrose Neighborhood Recommendations

Table of Recommended Solutions

ID	Location	Issue/Concern	Recommended Solution
SW-1	NE Shaver Street (NE 102nd - Parkrose Middle School)	Lack of sidewalk	Add sidewalk
SW-2	NE Prescott Street (NE 102nd - NE 121st Place)	Lack of sidewalk	Add sidewalk
SW-3	NE Fremont Street (NE 102nd - NE 122nd)	Lack of sidewalk	Add sidewalk
SW-4	NE 105th Avenue (NE Sandy - NE Fremont)	Lack of sidewalk	Add sidewalk
SW-5	NE 112th Avenue (NE Sandy - NE Fremont, NE Sandy - railroad)	Lack of sidewalk	Add sidewalk
SW-6	NE 115th Avenue (NE Shaver - NE Prescott)	Lack of sidewalk	Add sidewalk
SW-7	NE 118th Avenue (NE Prescott - Sandy)	Lack of sidewalk	Add sidewalk
C-1	NE Prescott Street (between I-205 and NE 122nd)	Does not meet crossing spacing guidelines	Add crossings
C-2	NE Fremont Street (NE 102nd - NE 122nd)	Does not meet crossing spacing guidelines	Add crossings
C-3	NE Shaver Street (NE 102nd - NE 115th)	Does not meet crossing spacing guidelines	Add crossings
C-4	NE 102nd Avenue (NE Fremont and NE Sandy Boulevard)	Does not meet crossing spacing guidelines	Add crossings
C-5	NE 122nd Avenue (I-84 - Sandy Boulevard)	Does not meet crossing spacing guidelines	Add crossings
B-1	NE 102nd Avenue (NE Prescott - Sandy Boulevard)	Gap in bike facility	Add bicycle facility
B-2	NE Fremont Street (NE 102nd - NE 122nd)	Deficient bicycle facility	Add buffer or protection to bike lane

B-3	NE 122nd Avenue (I-84 - NE Marx Street)	Deficient bicycle facility	Add buffer or protection to bike lane
B-4	NE 115th Avenue (NE Fremont - Sandy)	Lack of bicycle facility on low-traffic volume street	Develop neighborhood greenway
B-5	NE Skidmore Street (I-205 - Parkrose High School)	Lack of bicycle facility on low-traffic volume street	Develop neighborhood greenway
B-6	NE Wygant Street (NE 95th - NE 115th)	Lack of bicycle facility on low-traffic volume street	Develop neighborhood greenway
B-7	NE 105th Avenue (NE Sandy - NE Fremont)	No bike facility	Add bicycle facility
B-8	NE 112th Avenue (NE Sandy - NE Fremont)	No bike facility	Add bicycle facility
O-1	NE 102nd, NE Prescott, NE Fremont, NE 122nd	Speeding	Add speed reader signs
O-2	Signalized intersections	Pedestrian safety	Add leading pedestrian intervals, high-visibility crosswalk markings
O-3	Transit Stops	Lack of amenities	Improve transit amenities and lighting
O-4	NE Killingsworth (NE 102nd - 109th)	Unimproved/failing road conditions	Upgrade/pave road
O-5	I-205 Path	Trash, feelings of personal safety	Improve city/state coordination on maintenance and safety
O-6	Columbia Slough	Lack of access	Improve access and add directional/wayfinding signage throughout the neighborhood
O-7	Parkrose Neighborhood	Lack of trees	Add trees as part of sidewalk projects and other transportation improvements
O-8	Parkrose Neighborhood	Lighting	Conduct a lighting analysis on side streets in the Parkrose neighborhood and enhance lighting near schools and transit stops.
O-9	Parkrose Neighborhood	Access to Jobs	Improve active transportation connections (transit, bicycle, transit) from Parkrose to employment areas.
0-10	Parkrose Neighborhood	Charging Station	Increase electric vehicle charging stations.

Table 3 - Recommended Transportation Solutions for the Parkrose Neighborhood

COMMUNITY WORKING GROUP – PRIORITIES AND RECOMMENDATIONS

On November 8, 2021, the Parkrose Community Plan's Community Working Group (CWG) met to review and discuss the Sandy Safety Solutions Memo. The following outlines their recommendations, and whether these changes have been incorporated into this report.

A main priority of the CWG was to focus more on pedestrian-scale lighting, including on side streets and at transit stops. The group noted that investment should be on lighting that makes it safer for pedestrians and noted that lighting came up in the youth workshops to improve safety walking to/from school and waiting at bus stops. Many felt it was important to light side streets, especially ones with no sidewalks or uneven walking areas. While lighting on side streets currently meets PBOT guidelines, a recommendation was added to the memo requesting that lighting on side streets be enhanced near schools/transit stops, and that a more detailed lighting analysis on side streets in the neighborhood be conducted.

Another main recommendation of the group was to invest on lower-traffic bicycle facilities (like neighborhood greenways) as a higher priority than bike facilities on busier streets (like Sandy Boulevard or 122nd Avenue). The group felt like more money/energy should go towards pedestrian infrastructure, greenspace, and/or neighborhood greenways rather than bike lanes on main streets.

The CWG also recommended adding "signalized" to the recommendation for crossings on Sandy Boulevard, specifically S-4 and the crossing at NE 97th Avenue. One member noted that turning left is currently difficult without a signal, and they felt simply adding a crosswalk with no signal would not be a good solution. The type of crossing is typically determined by engineering warrants, so the recommendations in the table were not revised. However, a note was added to the text in the memo saying that crossing treatments should be enhanced where possible.

Another recommendation was to repair/replace deficient sidewalks in the neighborhood, as well as add new ones. Sidewalk repair is the responsibility of the property owner, but recommendations to add new sidewalks are noted above as "SW-1" through "SW-7." There was a general feeling that investments should be focused on making it safer to walk to schools and within the neighborhood rather than on main streets like Sandy Boulevard. However, the CWG did want to see crossing improvements to cross the street more easily and safely.

ANALYSIS OF UNSIGNALIZED CROSSINGS

As noted within the Recommendations section of this report, five locations along Sandy Boulevard were identified as areas where pedestrian crossing improvements should be prioritized for further review to meet PBOT and ODOT spacing standards between signalized or enhanced crossings. The five locations identified for detailed review consist of the areas:

- between NE 97th and NE Killingsworth,
- between NE 100th and NE 101st,
- between NE 106th and NE 107th,
- the intersection of NE 115th, and
- the intersection of NE 118th.

Within the subsections that follow, a review of each location takes into consideration the types of pedestrian generators and land uses within the site vicinity, recently collected peak hour vehicle and pedestrian traffic counts, and the results of nationally recognized pedestrian safety research analyses (*NCHRP Report 562 Improving Pedestrian Safety at Unsignalized Crossings* and *FHWA Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations*). These analytical considerations, combined with local state of the practice and guidance documents, helped guide the type of crossing improvement features that are recommended at each location, as well as a more precise recommendation for where the crossing should be positioned. An estimated project cost is provided for the recommended crossing improvements at each location.

Furthermore, each crossing location was reviewed for its connection to nearby bus stops to determine whether revisions to existing bus stop locations is recommended to coincide with the proposed improvements.

CROSSING BETWEEN NE 97TH AND KILLINGSWORTH

The segment of NE Sandy Boulevard between NE 97th Avenue and the complex intersection involving NE Killingsworth Street, Sandy Boulevard, and the I-205 northbound ramps is under PBOT jurisdiction and has a gap of approximately 750 feet between marked crossings. The roadway cross section at the midpoint of this segment consists of five general purpose travel lanes with no place of refuge for pedestrians in the middle of the road.

Since NE 97th is one block away from an existing traffic signal, a mid-block crossing further east of NE 97th would provide a new crossing equidistant between existing marked crossings. However, the radius of the road along Sandy Boulevard near Killingsworth Street presents safety issues related to the amount of available sight distance for westbound drivers approaching a crossing. The radius, as well as the overall complexities involved along the eastern half of the

segment, result in the following analysis focused on the viability of a marked crossing within the western half of the segment, including the intersection of NE 97th Avenue.

EXISTING PEDESTRIAN GENERATORS

The largest pedestrian generator in this area consists of the Parkrose/Sumner Transit Center, located west of NE 97th Avenue on the north side of Sandy Boulevard. A currently vacant building located on the north side of Sandy, east of NE 97th, had been operating as a hotel and any redevelopment or reactivation of the site may result in increased pedestrian activity in the area. Along the south side of Sandy Boulevard there are small businesses, a number of residences further into the neighborhood, as well as a tavern at the SE corner of Sandy Boulevard at NE 97th Avenue. Additionally, there is also a cemetery located directly across the street from the vacant hotel, that does not generate pedestrian activity.

VEHICLE AND PEDESTRIAN COUNTS

Vehicle and pedestrian counts were collected at the intersection of Sandy Boulevard at NE 97th Avenue on Wednesday, September 29, 2021. The PM peak hour of traffic occurred between 4:45-5:45pm. A detailed summary of the traffic data is provided within **Appendix C**.

During the peak hour there were 875 eastbound vehicles and 454 westbound vehicles that traveled through the eastern leg of the intersection. During the same time period there were a total of eight pedestrians that crossed Sandy Boulevard within the site vicinity: two across the western leg of the intersection, one across the eastern leg of the intersection, and five that crossed mid-block east of the intersection. The study segment is within a Pedestrian District, therefore the pedestrian demand can be assumed to be 20 crossings per hour for the purpose of this analysis, in accordance with PBOT's PedPDX plan.

MODIFIED NCHRP 562 CROSSING ANALYSIS

The posted speed limit along the study segment is 35 mph and the curb-to-curb width across Sandy Boulevard is about 60 feet. These values, along with the vehicular and pedestrian volumes previously described, and assumed values for standard pedestrian behavior (see **Appendix C** for a detailed summary of values utilized), were inputted into a modified version of the NCHRP 562 crossing analysis (NCHRP562-PBOTv1.2) to determine the level of treatment recommended for an improved crossing.

If no median refuge island were to be introduced within the roadway, the results of the analysis using year 2021 traffic volumes recommend crossing treatments associated with the 'RED' treatment category which includes devices that display a circular red indication (e.g. a pedestrian hybrid beacon) to vehicle operators. The vehicle and pedestrian volumes do not warrant a full traffic signal at this location based on the MUTCD traffic signal warrants. To understand traffic conditions over the long-term horizon, analysis assuming 20 years of growth (year 2041) was performed using an assumed annual growth rate of 2% per year. A growth rate of 2% per year typically represents a worst-case scenario. Historical traffic counts from within the study area

have demonstrated that actual traffic growth has been far less than 2% per year within the past 10 years. The results of the analysis using year 2041 traffic volumes recommend the same 'RED' crossing treatments.

If a median refuge island were to be introduced within the roadway by revising the existing striping, the largest curb-to-curb crossing width would be reduced to approximately 30 feet across the eastbound traffic lanes, and the year 2021 analysis results would no longer recommend the 'RED' treatment category of crossing treatments. Instead, standard crosswalk striping and signage treatments would be considered acceptable. However, analysis results based on the assumed year 2041 traffic volumes suggest that rectangular rapid flashing beacons (RRFBs) would be desired as directed by PBOT's state of the practice.

RECOMMENDED CROSSING LOCATION AND SAFETY FEATURES

Based on the results of the modified NCHRP 562 crossing analysis, future growth in traffic volumes, and the local context of crossing three eastbound lanes, it is recommended that future crossing improvements at this location consist of RRFBs and the inclusion of a median refuge island by shifting the westbound lanes toward the north curb line.

It is recommended that the enhanced crossing be located across the east leg of the NE 97th Avenue intersection to capture pedestrian routes that are more likely to take place in the vicinity of NE 97th Avenue, rather than a mid-block crossing east of NE 97th Avenue which appears to provide less utility based on the surrounding land uses.

Unfortunately, a crossing at the east leg of NE 97th Avenue would still encounter sight distance issues if no revisions were made to the roadway or existing land uses. The radius of Sandy Boulevard in conjunction with the position of the existing hotel structure on the north side of Sandy Boulevard would not provide the minimum stopping sight distance required to meet the City's standards. The City standard requires a minimum stopping sight distance of approximately 390 feet to be provided in the westbound direction, assuming an 85th-percentile speed of 40 mph and based on the *Manual on Uniform Traffic Control Devices (MUTCD) Table 4D-2 Minimum Sight Distance for Signal Visibility*. The future possibility of providing an enhanced crossing at this location would likely depend on substantial redevelopment of the currently inactive hotel site to incorporate increased building setbacks and/or lowered speed limits along Sandy Boulevard, at which time this concept could be reviewed in greater detail.

See **Figure 177** for a visual representation of possible crossing enhancements and the current conflict with sight distance requirements.

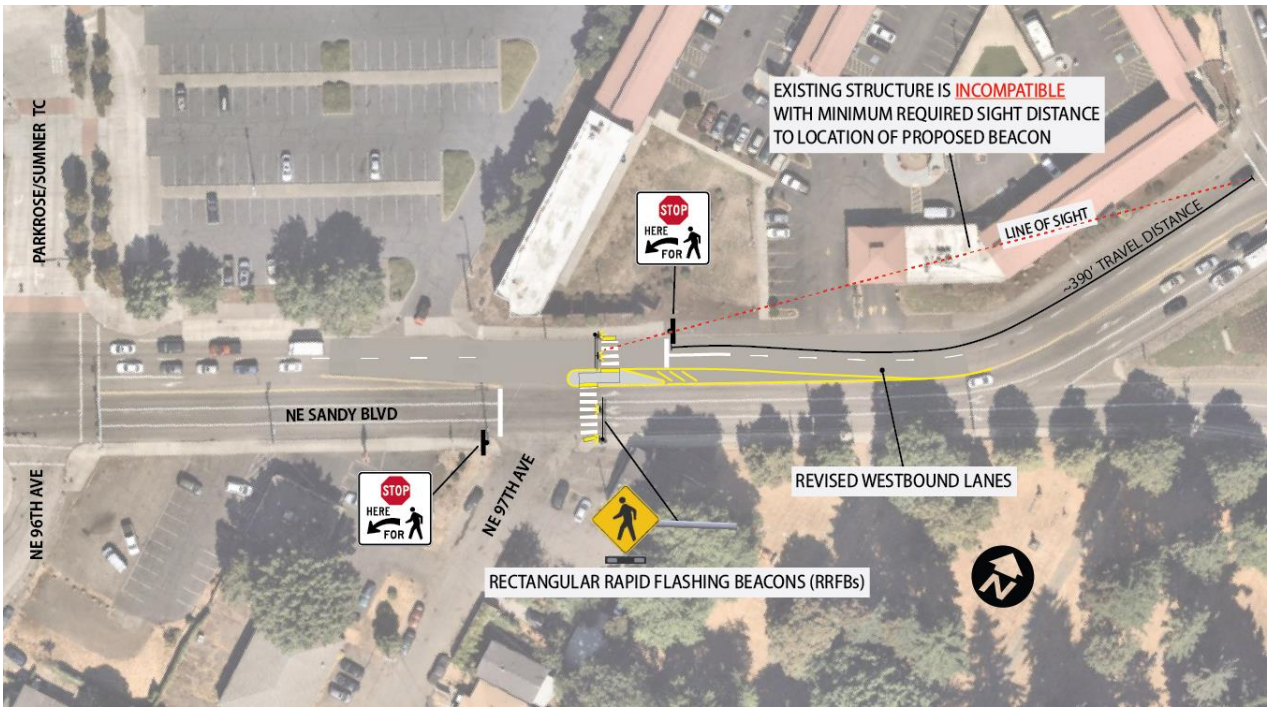

Figure 177 – Possible Crossing Enhancements at NE 97th Avenue

A crossing with a median refuge island located across the east leg of the NE 97th Avenue intersection would achieve the goal of providing a marked crossing every 530 feet or less within a Pedestrian District in this area, would allow for northbound left-turning vehicles to be able to perform their turn at the skewed intersection angle without the need to navigate around a refuge island, and would not restrict any of the other turning movements at the NE 97th Avenue intersection.

It is estimated that crossing enhancements as shown in **Figure 177** would cost approximately $495,000 based on year 2022 values, details of which are provided within **Appendix D**.

BUS STOP RECOMMENDATIONS

Due to the proximity of the Parkrose/Sumner Transit Center, there are no suggested revisions to bus stops in the vicinity of the proposed crossing. The #21 bus line runs along Sandy Boulevard in this study segment and would be expected to continue serving riders in this study area at the Transit Center rather than introducing an additional stop at the location of the proposed crossing.

CROSSING BETWEEN NE 100TH AND NE 101ST

The segment of NE Sandy Boulevard between NE 100th Avenue and NE 101st Avenue is under ODOT jurisdiction and has a gap of approximately 910 feet between marked crossings. The roadway cross section of this segment consists of four general purpose travel lanes and one center two-way left turn lane.

Similar to the NE 97th crossing analysis, a mid-block crossing at this study segment was considered in the interest of simplifying the pedestrian crossing experience. However, the land uses on either side of Sandy Boulevard along this block would not seamlessly connect to a mid-block crossing, as there is a line of bushes along the north sidewalk and an automotive land use along the south sidewalk that contains a driveway access point near the mid-block location. Additional review was focused on crossing options to the west of the mid-block location, specifically the intersection of NE 100th Avenue, in an effort to provide equidistant spacing between existing marked crossings.

EXISTING PEDESTRIAN GENERATORS

The largest pedestrian generators in this area consist of the Elmer's restaurant located east of NE 100th Avenue and a hotel located west of NE 100th Avenue, both of which are along the north side of Sandy Boulevard. The restaurant and hotel have a defined pedestrian route within their parking lots that most directly connects to the northeast corner of the NE 100th Avenue intersection. South of Sandy Boulevard are numerous residences that may visit commercial establishments located on the north side of Sandy Boulevard. There are a number of other land uses east of NE 101st Avenue that would attract pedestrians with a need to cross Sandy Boulevard, many of which would be well served by the existing signalized crossings at NE 102nd Avenue or a proposed crossing located west of NE 101st Avenue. West of NE 100th Avenue the land uses do not generate much for pedestrian activity as Sandy Boulevard transitions into the intersection with Killingsworth and the I-205 on/off ramps.

VEHICLE AND PEDESTRIAN COUNTS

Vehicle and pedestrian counts were collected at the intersection of Sandy Boulevard at NE 101st Avenue on Monday, October 4, 2021. The PM peak hour of traffic occurred between 4:00-5:00pm. A detailed summary of the traffic data is provided within **Appendix C**.

During the peak hour there were 1,152 eastbound vehicles and 1,210 westbound vehicles that traveled through the western leg of the intersection. During the same time period there were a total of five pedestrians that crossed Sandy Boulevard within the site vicinity: three across the eastern leg of the intersection and two that crossed mid-block west of the intersection. The study segment is within a Pedestrian District, therefore the pedestrian demand can be assumed to be 20 crossings per hour for the purpose of this analysis, in accordance with PBOT's PedPDX plan.

ODOT's TransGIS data from 2020 has this roadway segment in the range of 20,001-30,000 AADT.

ODOT UNCONTROLLED MARKED CROSSWALKS ANALYSIS

The posted speed limit along the study segment is 30 mph, there are more than 15,000 vehicles that pass through this area per day, and there are four general purpose travel lanes for pedestrians to cross. These values were used in conjunction with *ODOT's 2022 Traffic Manual*

Table 310.3-A: Uncontrolled Marked Crosswalk Treatments (see **Appendix E**) to determine recommended crossing enhancements.

If a median refuge island is not provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by a Pedestrian Hybrid Beacon (PHB) or Traffic Signal, in addition to signage and striping revisions.

If a median refuge island is provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by RRFBs, in addition to signage and striping revisions.

Any future growth in traffic volumes would result in the same recommendations described above.

RECOMMENDED CROSSING LOCATION AND SAFETY FEATURES

Based on the review of ODOT's guidance documents, and similar treatments that are existing or planned along the Sandy Boulevard corridor within the general site vicinity, it is recommended that the crossing at this location be controlled by RRFBs and also contain a median refuge island within the center two-way left turn lane. With a portion of the eastbound traffic coming directly from a high-speed interstate highway environment, it is preferred to retain the level of protection afforded by a median refuge island across these multi-lane approaches. The proximity of this crossing to the interstate is within the Interchange Influence Area and further development of this concept will need to undergo detailed traffic analysis as part of the approval process to evaluate queuing impacts that may affect interchange operations.

It is recommended that the enhanced crossing be located across the east leg of the NE 100th Avenue intersection to capture pedestrian routes that are likely to travel through the northeast corner of the intersection based on the development pattern of the existing land uses. Consideration was given to a mid-block crossing between NE 100th Avenue and NE 101st Avenue, but the existing land uses are not designed in a way to encourage increased usage of an enhanced crossing at such a location. Consideration was also given to a crossing located on the west leg of the NE 100th Avenue intersection, but it is less likely a median refuge island could be included as part of the proposed design based on the relatively large number of eastbound left turns that are expected to utilize the northern driveway access point across from NE 100th Avenue. In addition, the location of a crossing on the west leg of the intersection would more likely negatively impact interchange operations at the intersection of Killingsworth and the I-205 on/off ramps.

See **Figure 18** for a visual representation of the proposed crossing.

Figure 18 – Recommended Crossing Enhancements at NE 100th Avenue

A crossing with a median refuge island located across the east leg of the NE 100th Avenue intersection would achieve the goal of providing a marked crossing every 530 feet or less within a Pedestrian District in this area, and would not restrict any of the turning movements at the NE 100th Avenue intersection. Westbound left turns would no longer be able to utilize the center two-way left turn lane, but would still be allowed to turn left from Sandy as is done at other locations along Sandy Boulevard such as NE Failing Street.

It is estimated that crossing enhancements as shown in **Figure 18** would cost approximately $364,000 based on year 2022 values, details of which are provided within **Appendix D**.

BUS STOP RECOMMENDATIONS

The #21 bus line runs along Sandy Boulevard in this study segment. The eastbound portion of the route is served relatively well by a bus stop at the southwest corner of the intersection at NE 102nd Avenue, providing a close connection to the #87 bus line that travels along NE 102nd Avenue.

The westbound portion of the #21 route contains a relatively large gap between bus stops within the study area, with the closest bus stop to the east located at NE 104th Avenue and the closest bus stop to the west located at the Parkrose/Sumner Transit Center. If a westbound bus stop were to be added in the vicinity of NE 100th Avenue, it is expected that it would mostly benefit riders wanting to depart the bus to reach commercial or residential destinations in the immediate site vicinity. Very few boardings would be expected to occur at this location given that the route terminates one stop later at the transit center. Furthermore, the #21 westbound route requires a transition to the westbound left turn lane at the intersection of Killingsworth

and the I-205 on/off ramps. To better facilitate this transition, and in the interest of minimizing impacts to the northern driveway access point across from NE 100th Avenue, it is recommended to consider adding a westbound bus stop between NE 100th Avenue and NE 101st Avenue.

The recommended location for the bus stop to be on the nearside of the proposed crosswalk should be designed such that stopped buses do not block the required amount of sight distance needed for safe operation of the multi-lane approach to the proposed crosswalk. Coordination with TriMet will be required to determine if an additional bus stop at this location is supported and feasible based on the context of the site and bus route.

CROSSING BETWEEN NE 106TH AND NE 107TH

The segment of NE Sandy Boulevard between NE 106th Avenue and NE 107th Avenue is under ODOT jurisdiction and will have a gap of approximately 725 feet between marked crossings once the funded crossing planned for NE 108th Avenue is implemented as there is an existing signalized crossing at NE 105th Avenue. The roadway cross section of this segment consists of four general purpose travel lanes, a center two-way left turn lane along the western half and a median island along the eastern half, two striped bike lanes, and on-street parking along the south side of Sandy Boulevard. The existing median island is designed to allow large vehicles to drive atop the island when performing an eastbound left turn.

The northern side of the roadway in this segment contains two major driveways with the western driveway serving much of Parkrose Hardware traffic and the eastern driveway serving much of the Grocery Outlet traffic as well as delivery vehicles serving the two businesses.

The southern side of the roadway in this segment contains two intersections with local streets, NE 106th Avenue to the west which forms a t-intersection, and NE 107th Avenue to the east which is directly opposite the Grocery Outlet driveway entrance.

EXISTING PEDESTRIAN GENERATORS

The largest pedestrian generators in this area consist of Parkrose Hardware and Grocery Outlet located along the north side of Sandy Boulevard, the smaller businesses located along the south side of Sandy Boulevard, as well as the numerous residences within the neighborhood south of Sandy Boulevard. Community representatives have reiterated that Parkrose Hardware and Grocery Outlet are arguably the most important pedestrian destinations for the surrounding neighborhood.

VEHICLE AND PEDESTRIAN COUNTS

Vehicle and pedestrian counts were collected at the intersection of Sandy Boulevard at the Parkrose Hardware driveway on Wednesday, September 29, 2021. The PM peak hour of traffic occurred between 4:45-5:45pm. A detailed summary of the traffic data is provided within **Appendix C**.

During the peak hour there were 820 eastbound vehicles and 931 westbound vehicles that traveled through the eastern leg of the intersection. During the same time period there were a total of four pedestrians that crossed Sandy Boulevard within the site vicinity: two across the western leg of the intersection/driveway, one across the eastern leg of the intersection/driveway, and one that crossed the western leg of the NE 107th Avenue intersection. The study segment is within a Pedestrian District, therefore the pedestrian demand can be assumed to be 20 crossings per hour for the purpose of this analysis, in accordance with PBOT's PedPDX plan.

ODOT's TransGIS data from 2020 has this roadway segment in the range of 20,001-30,000 AADT.

ODOT UNCONTROLLED MARKED CROSSWALKS ANALYSIS

The posted speed limit along the study segment is 30 mph, there are more than 15,000 vehicles that pass through this area per day, and there are four general purpose travel lanes for pedestrians to cross. These values were used in conjunction with *ODOT's 2022 Traffic Manual Table 310.3-A: Uncontrolled Marked Crosswalk Treatments* (see **Appendix E** to determine recommended crossing enhancements.

If a median refuge island is not provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by a Pedestrian Hybrid Beacon (PHB) or Traffic Signal, in addition to signage and striping revisions.

If a median refuge island is provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by RRFBs, in addition to signage and striping revisions.

Any future growth in traffic volumes would result in the same recommendations described above.

RECOMMENDED CROSSING LOCATION AND SAFETY FEATURES

Based on the review of ODOT's guidance documents and detailed discussions with project stakeholders, it is recommended that the long-term vision for a crossing at this location be located across the west leg of the intersection with NE 107th Avenue and be controlled by a Traffic Signal, while consolidating the two access points serving the shopping center into one access point at the traffic signal.

A mid-block crossing with a median refuge island may be considered for a near-term solution, but there is existing complexity with the access points in this area which may still require prohibition of certain turning movements to/from the shopping center in order to provide a safe crossing.

See **Figure 19** for a visual representation of the proposed crossing.

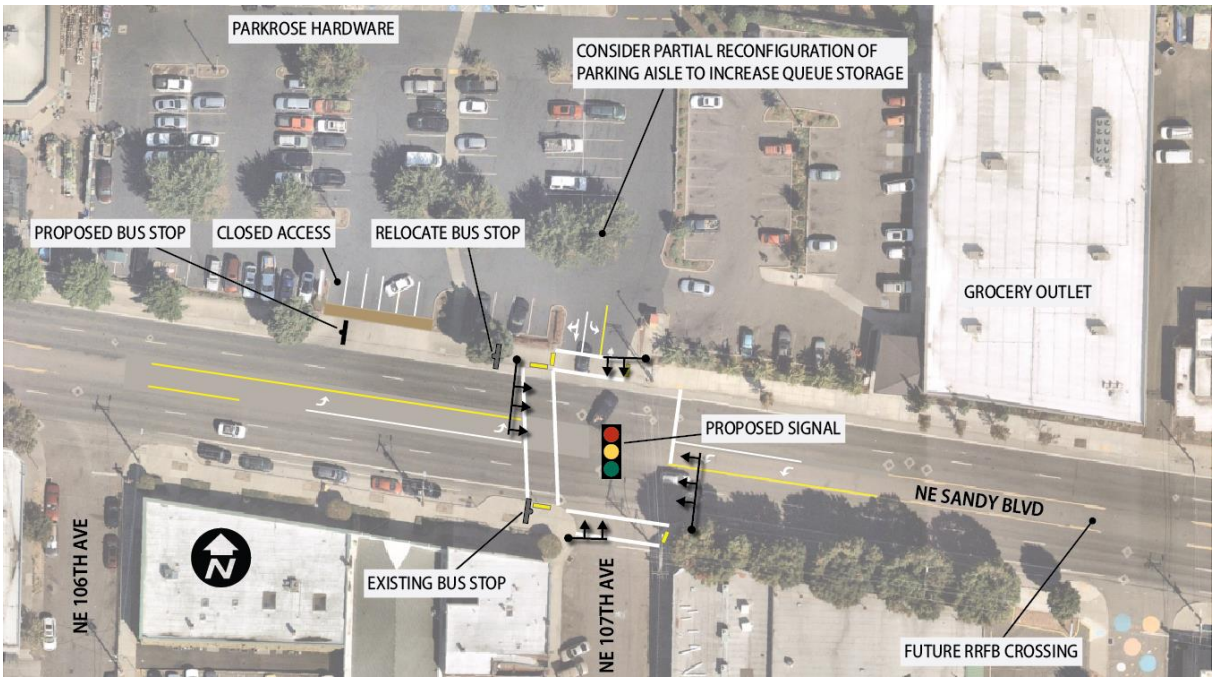

Figure 19 – Recommended Crossing Enhancements at NE 107th Avenue

A crossing on the west side of NE 107th Avenue would achieve the goal of providing a marked crossing every 530 feet or less within a Pedestrian District in this area and would allow for the Grocery Outlet driveway to operate more efficiently than how it does today. However, the closure of the Parkrose Hardware driveway would significantly alter existing operations and would require substantial coordination between all stakeholders.

It is estimated that crossing enhancements as shown in **Figure 19** would cost approximately $1,090,000 based on year 2022 values, details of which are provided within **Appendix D**.

BUS STOP RECOMMENDATIONS

The #21 bus line runs along Sandy Boulevard in this study segment. The eastbound portion of the route would be well served by the proposed crossing, as the closest existing bus stop is located at the southwest corner of the intersection at NE 107th Avenue. The existing farside bus stop location would be too close to the future crossing and is recommended to be relocated further west of the intersection.

CROSSING AT NE 115TH

The intersection of NE Sandy Boulevard at NE 115th Avenue is under ODOT jurisdiction and located within an extensive gap of approximately 2,290 feet between marked crossings, between NE 112th Avenue and NE 121st Place. The roadway cross section at the intersection consists of two general purpose travel lanes eastbound, one general purpose travel lane westbound, one center two-way left turn lane, and two striped bike lanes. NE 115th Avenue terminates at Sandy Boulevard, forming a t-intersection.

EXISTING & FUTURE PEDESTRIAN GENERATORS

There are a number of businesses in the immediate vicinity of Sandy Boulevard at NE 115th Avenue, including a hotel, restaurant, sign shop, and gas station, as well as many other businesses in the surrounding area. While an enhanced crossing would potentially be useful to people visiting these businesses, a major reason to include crossing improvements at this location is to more seamlessly connect the northern end of NE 115th Avenue to Sandy Boulevard as there is a funded project to create a neighborhood greenway along NE 115th Avenue. A well-connected terminus of a neighborhood greenway will allow more people to utilize the facility.

VEHICLE AND PEDESTRIAN COUNTS

Vehicle and pedestrian counts were collected at the intersection of Sandy Boulevard at NE 115th Avenue on Wednesday, September 22, 2021. The PM peak hour of traffic occurred between 4:15-5:15pm. A detailed summary of the traffic data is provided within **Appendix B**.

During the peak hour there were 888 eastbound vehicles and 761 westbound vehicles that traveled through the intersection. During the same time period there was one pedestrian that crossed Sandy Boulevard across the eastern leg of the intersection. The study intersection contains bus stops on both sides of Sandy Boulevard, therefore the pedestrian demand can be assumed to be 20 crossings per hour for the purpose of this analysis, in accordance with PBOT's PedPDX plan.

ODOT's TransGIS data from 2020 has this roadway segment in the range of 15,001-20,000 AADT.

ODOT UNCONTROLLED MARKED CROSSWALKS ANALYSIS

The posted speed limit along the study segment is 35 mph, there are more than 15,000 vehicles that pass through this area per day, and there are three general purpose travel lanes for pedestrians to cross. These values were used in conjunction with *ODOT's 2022 Traffic Manual Table 310.3-A: Uncontrolled Marked Crosswalk Treatments* (see **Appendix E**) to determine recommended crossing enhancements.

If a median refuge island is not provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by a Pedestrian Hybrid Beacon (PHB) or Traffic Signal, in addition to signage and striping revisions.

If a median refuge island is provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by RRFBs, in addition to signage and striping revisions.

Any future growth in traffic volumes would result in the same recommendations described above.

RECOMMENDED CROSSING LOCATION AND SAFETY FEATURES

Based on the review of ODOT's guidance documents, and similar treatments that are existing or planned along the Sandy Boulevard corridor within the general site vicinity, it is recommended that the crossing at this location be controlled by RRFBs and also contain a median refuge island within the center two-way left turn lane.

Given that NE 115th Avenue is planned to be configured as a neighborhood greenway, it is recommended that the enhanced crossing(s) be located either across both the west and east legs of the intersection, if feasible, or across the east leg of the intersection if only one side of the crossing is determined to be necessary.

If there is support for crossings on both sides of the intersection, there is an additional opportunity to extend the median across the entirety of the intersection to prohibit any left turns. This type of treatment could potentially support the use of traffic control in the form of a half signal rather than RRFBs, as detailed in PBOT's Half Signals directive (LW-003) effective 12/11/2019.

See **Figure 20** for a visual representation of crossings located on both sides of the intersection and **Figure 21** for the proposed crossing on the east side of the intersection.

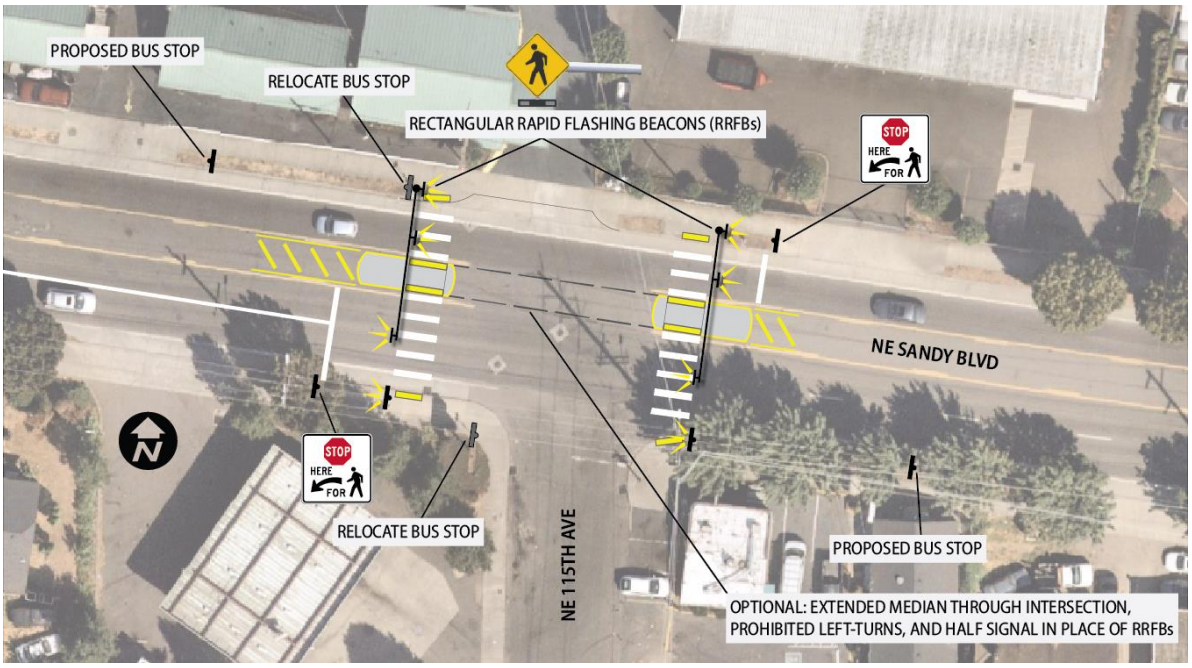

Figure 20 – Recommended Crossing Enhancements at NE 115th Avenue, Both Sides

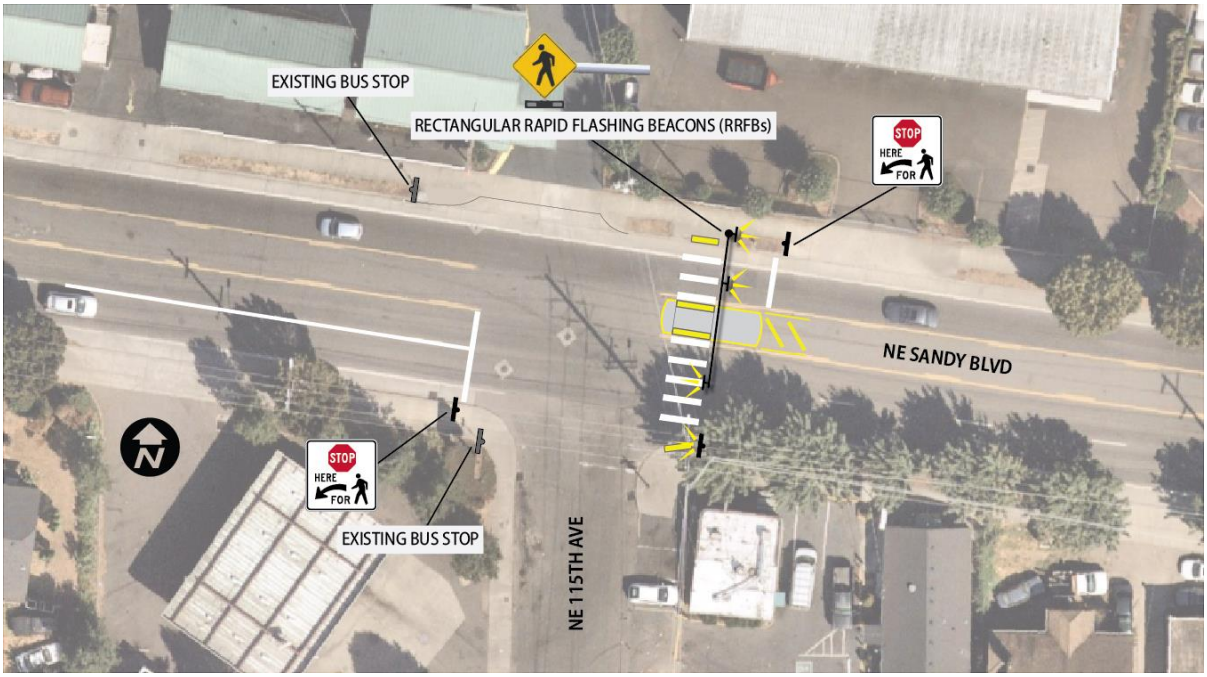

Figure 21 – Recommended Crossing Enhancements at NE 115th Avenue, East Side

Reviewing the segment of Sandy Boulevard between NE 112th Avenue and NE 115th Avenue, enhanced crossings across both legs of Sandy Boulevard at NE 115th Avenue would achieve the goal of providing a marked crossing every 800 feet or less along a Major City Walkway outside of a Pedestrian District, whereas an enhanced crossing solely across the east leg of the intersection would not achieve this goal.

It is estimated that crossing enhancements as shown in **Figure 20** would cost approximately $638,000 based on year 2022 values, and crossing enhancements as shown in **Figure 21** would cost approximately $308,000 based on year 2022 values, details of both are provided within **Appendix D**.

BUS STOP RECOMMENDATIONS

The #21 bus line runs along Sandy Boulevard in this study segment and contains bus stops on the northwest and southwest corners of the intersection at NE 115th Avenue. The existing westbound bus stop at the northwest corner would be in close proximity to the proposed enhanced crossing across the west leg of the intersection, which would result in a stopped bus overhanging into the crossing. It is recommended that the bus stop continue to be a farside stop but relocated further west to avoid impacts to the proposed crossing. The existing eastbound bus stop at the southwest corner would present safety issues if left as a nearside stop on a multi-lane approach at an enhanced crossing. It is recommended that the eastbound stop be relocated to the farside of the intersection east of NE 115th Avenue, potentially requiring trimming of the street trees to accommodate curbside buses.

If no enhanced crossing is provided across the west leg of the intersection, no revisions are proposed to the existing bus stops.

CROSSING AT NE 118TH

The intersection of NE Sandy Boulevard at NE 118th Avenue is under ODOT jurisdiction and located within an extensive gap of approximately 2,290 feet between marked crossings, between NE 112th Avenue and NE 121st Place. The roadway cross section at the intersection consists of two general purpose travel lanes eastbound, one general purpose travel lane westbound, one center two-way left turn lane, and two striped bike lanes. NE 118th Avenue terminates at Sandy Boulevard, forming a t-intersection. In comparison to the NE 115th Avenue intersection, the NE 118th Avenue intersection is less complex in that it has fewer driveway conflicts in the immediate vicinity for all users to be cognizant of.

EXISTING PEDESTRIAN GENERATORS

There are a few businesses in the immediate vicinity of Sandy Boulevard at NE 118th Avenue, including a hotel, a bar, and a car dealership, amongst other businesses in the surrounding vicinity. While an enhanced crossing would potentially be useful to people visiting these businesses, a major reason to include crossing improvements at this location is that the intersection at NE 118th Avenue has been identified as part of a Safe Routes to School (SRTS) plan to provide an improved connection between the bus stops along Sandy Boulevard and the Parkrose schools located directly south of the study intersection.

VEHICLE AND PEDESTRIAN COUNTS

Vehicle and pedestrian counts were collected at the intersection of Sandy Boulevard at NE 118th Avenue on Tuesday, September 21, 2021. The PM peak hour of traffic occurred between 4:15-5:15pm. A detailed summary of the traffic data is provided within **Appendix B**.

During the peak hour there were 856 eastbound vehicles and 815 westbound vehicles that traveled through the intersection. During the same time period there were a total of five pedestrians that crossed Sandy Boulevard within the site vicinity: one across the western leg of the intersection, two that crossed mid-block west of the intersection, and two that crossed mid-block east of the intersection. The study intersection contains bus stops on both sides of Sandy Boulevard; therefore, the pedestrian demand can be assumed to be 20 crossings per hour for the purpose of this analysis, in accordance with PBOT's PedPDX plan.

ODOT's TransGIS data from 2020 has this roadway segment in the range of 15,001-20,000 AADT.

ODOT UNCONTROLLED MARKED CROSSWALKS ANALYSIS

The posted speed limit along the study segment is 35 mph, there are more than 15,000 vehicles that pass through this area per day, and there are three general purpose travel lanes for pedestrians to cross. These values were used in conjunction with *ODOT's 2022 Traffic Manual Table 310.3-A: Uncontrolled Marked Crosswalk Treatments* (see **Appendix E**) to determine recommended crossing enhancements.

If a median refuge island is not provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by a Pedestrian Hybrid Beacon (PHB) or Traffic Signal, in addition to signage and striping revisions.

If a median refuge island is provided as part of the crossing enhancements, ODOT's guidance recommends that the crossing be controlled by RRFBs, in addition to signage and striping revisions.

Any future growth in traffic volumes would result in the same recommendations described above.

RECOMMENDED CROSSING LOCATION AND SAFETY FEATURES

Based on the review of ODOT's guidance documents, and similar treatments that are existing or planned along the Sandy Boulevard corridor within the general site vicinity, it is recommended that the crossing at this location be controlled by RRFBs and also contain a median refuge island within the center two-way left turn lane.

It is recommended that the enhanced crossing be located across the east leg of the NE 118th Avenue intersection to work best with the surrounding land uses. The parking areas associated with the existing hotel along the south side of Sandy Boulevard and the west side of NE 118th Avenue create a hostile and potentially unsafe environment for pedestrians and would limit the utility of an enhanced crossing, if it were located across the west leg of Sandy Boulevard. Instead, the southeast corner has a more protected sidewalk and presents itself as a more attractive near-term solution.

See **Figure 22** for a visual representation of the proposed crossing.

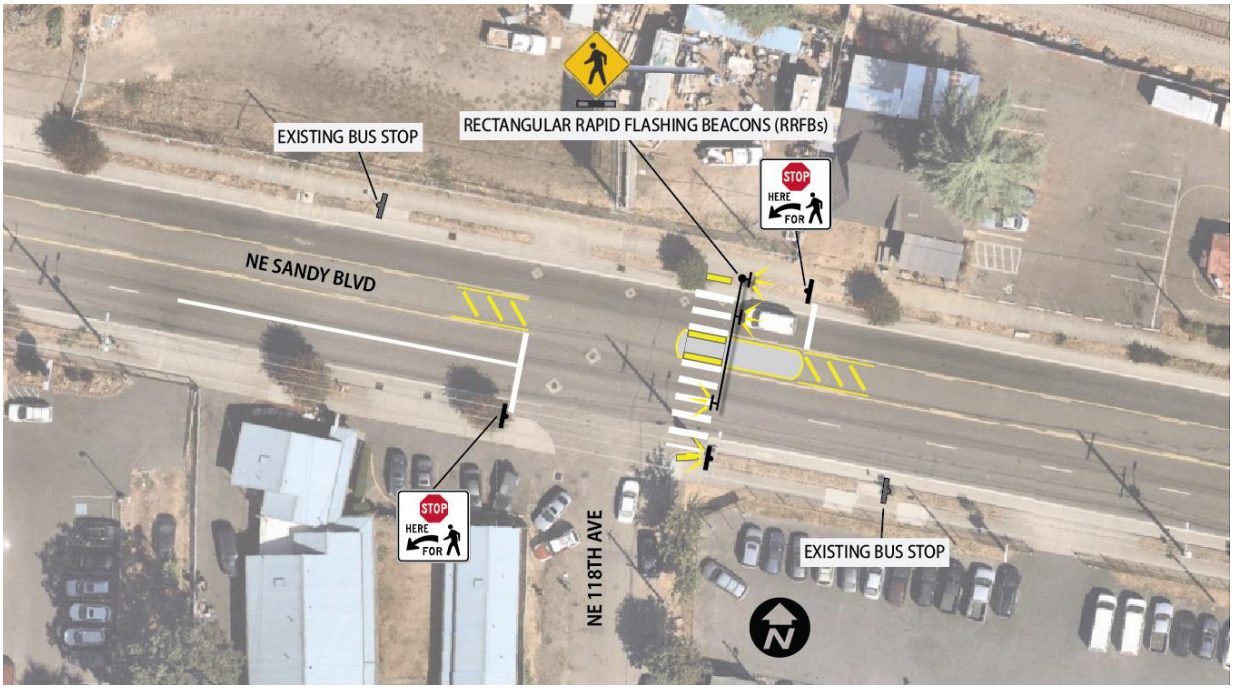

Figure 22 – Recommended Crossing Enhancements at NE 118th Avenue

Reviewing the segment of Sandy Boulevard between NE 115th Avenue and NE 121st Place, an enhanced crossing at NE 118th Avenue would achieve the goal of providing a marked crossing every 800 feet or less along a Major City Walkway outside of a Pedestrian District.

It is estimated that crossing enhancements as shown in **Figure 22** would cost approximately $338,000 based on year 2022 values, details of which are provided within **Appendix D**.

BUS STOP RECOMMENDATIONS

The #21 bus line runs along Sandy Boulevard in this study segment and contains bus stops on the northwest and southeast corners of the intersection at NE 118th Avenue. Both bus stops would be located in a farside location to the proposed crossing, and are set back from the crossing an adequate amount. No changes are recommended to the location of the bus stop.

PEDESTRIAN LIGHTING ANALYSIS

CROSSWALK LIGHTING

As part of this project, it is expected that the illumination of enhanced pedestrian crossings across Sandy Boulevard shall conform to ODOT's policies. ODOT's Lighting Policy and Guidelines document, specifically Section 3.3 – Pedestrian and Bicyclist Lighting, says to "Refer to the Traffic Lighting Design Manual for guidelines on illumination installation at pedestrian crosswalks." Within ODOT's Traffic Lighting Design Manual, specifically Chapter 3.0 Lighting Analysis, it is stated that "It is ODOT's practice to provide adequate illumination levels on the roadway according to the national standards, which are listed in Chapter 17." One of the resources listed within Chapter 17 is "Federal Highway Administration Rules and Guidelines."

Specific to crosswalk illumination, it is recommended that this project apply design treatments as outlined within the FHWA publication titled *Informational Report on Lighting Design for Midblock Crosswalks*. Another detailed FHWA document (*FHWA Lighting Handbook*) references the *Informational Report on Lighting Design for Midblock Crosswalks* guide within Section 2.5 Crosswalks, mentioning an important takeaway that "a vertical illuminance of 20 lx in the crosswalk, measured at a height of 5 ft from the road surface, provided adequate detection distances in most circumstances. Although the research was constrained to midblock placements of crosswalks, the report includes a brief discussion of considerations in lighting crosswalks co-located with intersections."

Furthermore, the *Informational Report on Lighting Design for Midblock Crosswalks* contains updated guidance focused on the position of luminaires as they relate to the location of the marked crossing, in that it is recommended for luminaires to be offset from the crosswalk to allow light to display the front side of pedestrians to approaching traffic. A graphic from the FHWA guide demonstrating offset luminaires is displayed in **Figure 23**.

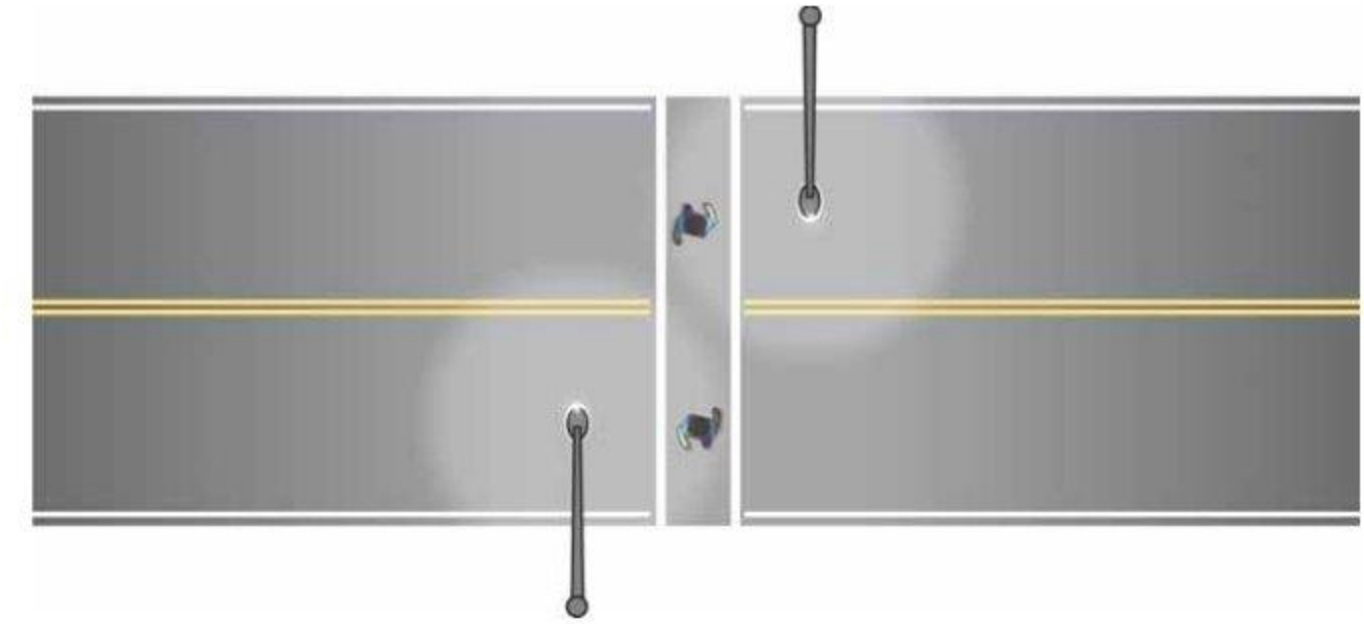

Figure 23 – Offset Luminaires at Marked Crosswalks

Other key takeaways from ODOT's Traffic Lighting Design Manual would suggest that crosswalk lighting across Sandy Boulevard would consist of LED luminaires, be directly connected to commercial power, and be a minimum height of 30 feet above the ground. It is expected that the design of crosswalk luminaires would follow ODOT's standard detail TM629, included within **Appendix F**.

SIDEWALK LIGHTING

As part of this project, it is expected that the illumination of sidewalks along Sandy Boulevard shall conform to PBOT's policies, where lighting is currently not provided. Both PBOT and the community have a desire to provide pedestrian-scale lighting along the project corridor. Appendix K of PBOT's PedPDX plan contains one paragraph specific to the illumination of sidewalks:

"Sidewalks are intended to provide a safe place for pedestrians to navigate the transportation network without conflicts from vehicles and, in the downtown area, conflicts with bicyclists. Illumination levels for sidewalks are intended to aid pedestrians in identifying obstacles and are not intended to provide sufficient illumination for facial recognition. Illuminating sidewalks may affect nearby properties in the form of light trespass. Average horizontal illumination for sidewalks should be between 0.2 and 0.9 fc average with no uniformity metric. Sidewalks should be illuminated to include no areas devoid of measurable light."

Lighting analysis will need to be performed to determine an appropriate spacing of luminaires along the sidewalk, particularly where street trees may present barriers to uniform lighting levels.

PBOT has standard drawings of various ornamental light poles that are appropriately sized for a pedestrian-scale environment, with the base of the luminaire positioned approximately 14 feet above the sidewalk. Standard drawings P-652, P-653-A, P-653-B, and P-659 are provided within **Appendix F** as examples of possible pedestrian-scale light poles that could be used along Sandy Boulevard. It is recommended that public engagement with community stakeholders be performed to determine the community's preference of the ornamental poles that are available for further analysis.

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. This TGM grant is financed, in part, by the federal Fixing America's Surface Transportation Act ("FAST Act"), local government, and State of Oregon funds.
The contents of this document do not necessarily reflect views or policies of the State of Oregon.