

Seattle Department of Transportation

# WEST MARGINAL WAY SW SAFETY PROJECT EVALUATION REPORT



**Seattle**  
Department of  
Transportation

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# EXECUTIVE SUMMARY

## BACKGROUND

In March 2020 the West Seattle High Bridge, a vital lifeline connecting the West Seattle Peninsula to the rest of the city, was abruptly closed due to structural issues. In response to this unexpected disruption, the Seattle Department of Transportation (SDOT) initiated the Reconnect West Seattle (RWS) program. Community members identified and voted on projects for the RWS program, and the West Marginal Way Corridor Safety Improvement Project was a key RWS project based on both community voting and feedback, and SDOT's vision for a safer, more predictable transportation corridor.

The project's initial focus was on closing a gap in Seattle's bike network, providing a protected bike lane (PBL) from SW Marginal Pl to just south of SW Idaho St and linking the Duwamish and West Seattle Trails. In response to concerns from local businesses, the project was expanded to analyze the entire corridor south to Highland Park Way SW. Careful about the impact to the area's industrial businesses, SDOT studied the corridor extensively, analyzed potential impacts to general purpose and freight traffic, and delayed the opening of the PBL until after the West Seattle High Bridge reopened. To facilitate this analysis, SDOT has collected data along this roughly 2.5-mile corridor 13 different times since 2020.

## DESIGN

In addition to the 0.4-mile two-way PBL, this project included a variety of improvements that were identified by the industrial business stakeholders along the corridor aimed at increasing safety along West Marginal Way SW and the Duwamish Trail. These improvements included better signage and markings for the Duwamish Trail, improved driveway and trail

intersections, and vegetation trimming to enhance visibility. The project also installed a pedestrian signal and temporary asphalt walkway (to be upgraded to concrete) and ADA curb ramps to better facilitate access to the Duwamish Longhouse and Cultural Center.

## POST INSTALLATION RESULTS

- Prior to the addition of the PBL, SDOT took several steps aimed at reducing high operating speeds along West Marginal Way SW including lowering the speed limit to 30 mph and adding Radar Feedback Signs. After these interventions, speeds along the corridor are down by 12% from 43 mph to 37 mph on average.
- The traffic volumes currently on the West Marginal Way SW corridor returned to pre-West Seattle High Bridge and COVID-19 Pandemic levels at about 14,000 vehicles per day.
- Weekday bike volumes have increased by 144% from an average of 103 people biking before the project to an average of 251 after the project. Weekend bike volumes have also increased by 53%.
- The number of people walking/rolling (mobility assistance device or scooter) has almost doubled from approximately 20 users per day.
- An analysis of southbound travel times indicates that since the repurposing of the southbound curbside travel lane into a PBL there has been almost no increase in travel times, less than 1 second of additional delay for drivers in the constrained section.
- A 7-day traveler interaction analysis at the two busiest driveway/intersections showed that less than 4 percent of such interactions were between trail users and drivers moving in and out of the businesses.

# WEST MARGINAL WAY SW

## BACKGROUND

In March of 2020, the West Seattle High Bridge was suddenly closed to traffic after routine inspections showed rapidly growing cracks along its span. Built in 1984, the bridge provides a vital connection between the West Seattle Peninsula and the rest of Seattle, averaging over 100,000 travelers per day at the time of its closure. In response, the Seattle Department of Transportation (SDOT) initiated a wide array of projects providing traffic mitigation and alternative routing for West Seattle residents, visitors, and businesses, while repairing the bridge as fast as possible.

The Reconnect West Seattle (RWS) program was established to engage West Seattle and Duwamish Valley residents to co-create a suite of projects that would help mitigate traffic along the bridge detour routes and increase safety for neighbors, make it easier for people to get around without a car, and improve/maintain freight mobility and more.

The outreach effort resulted in the RWS Implementation Plan which included over 70 different projects located across the West Seattle Peninsula and the Duwamish Valley. The list of projects was generated from ideas SDOT received from the community, businesses, freight stakeholders, along with some of the Department's own concepts, and projects from existing transportation and neighborhood plans. Some of the selected projects were planned to be implemented to address immediate concerns, while others were developed and constructed over several years.

The West Marginal Way SW Corridor Safety Improvement Project was identified by SDOT and the community as an important project to address two needs in the transportation network. The first



Figure 1 Project extents

was to create a safe crossing for people accessing the Duwamish Longhouse and Cultural Center, the second was to link the Duwamish and West Seattle Bridge Trails (Figure 1) to provide more travel options during and after the West Seattle High Bridge closure. Since the Longhouse's opening in 2009, the Duwamish had advocated for improved pedestrian access between the new facility on the west side of West Marginal Way SW and the parks on the east side of the street that border the Duwamish River—located on land that has cultural significance to them. The Duwamish Longhouse and Cultural Center's overflow parking facility is also located on the east side of West Marginal Way SW within the SPU South Operations Center lot.

The second need addressed by the West Marginal Way SW Corridor Safety Improvement Project was to close a 0.4-mile gap in the Duwamish Trail, connecting it to the West Seattle Bridge Trail and downtown Seattle. The Duwamish Trail runs along the east side of West Marginal Way SW and provides a vital non-motorized connection to the South Park neighborhood. The gap in the trail, however, meant that people biking would have to either bike on West Marginal Way SW—a high-speed, high volume, multi-lane arterial street—or along a narrow sidewalk on the west side of the street. To make it easier and safer to bike throughout the trail network and across the Duwamish River, SDOT—in tandem with the community—embarked on an effort to close the Duwamish Trail gap.

Additionally, SDOT engaged with all the business owners, the Port of Seattle, and the freight community to conduct a safety evaluation of West Marginal Way SW between Highland Park Way SW and SW Marginal Place to identify opportunities to improve the interaction between Duwamish Trail users and large freight vehicles accessing businesses, particularly, on the east side of the corridor.



**Figure 2 Southbound Lane Drop Under the West Seattle Bridge**

## EXISTING CONDITIONS

West Marginal Way SW is a principal arterial that is primarily lined with industrial land uses as well as several parks and the Duwamish Longhouse and Cultural Center. It is a 5-lane street with two general purpose lanes in each direction and a center two-way left-turn lane. The street has 100 ft. of right of way width. The Duwamish Trail runs from approximately SW Idaho St to Highland Park Way SW continuing to South Park and the 1st Ave S Bridge. There is also an active Burlington Northern Santa Fe (BNSF) operated rail line on the east side of West Marginal Way SW between the Duwamish Trail and the roadway. West Marginal Way SW is constrained at the north end with only a single southbound lane underneath the West Seattle High Bridge and in front of the Duwamish Longhouse (See Figure 2.)

West Marginal Way SW is identified as a Major Truck Street and Heavy Haul Route in the Freight Master Plan. It is also a part of the Regional Bicycle Network. The stretch of West Marginal Way SW between SW Marginal Pl and just south of SW Idaho St is identified as a gap in the Seattle Bicycle Network in the Bicycle Master Plan. Per the City of Seattle Complete Streets Ordinance Section 1, SDOT must plan for, design, and construct all new projects to provide safe and appropriate accommodation for pedestrians, bicyclists, transit riders, and persons of all abilities. Per Section 3 of the Complete Streets Ordinance, on Major Truck Streets freight must be designated as the priority when designing projects.

During the West Seattle High Bridge closure, West Marginal Way SW was designated as a detour route that carried as many as 33,500 vehicles per day. Prior to the bridge closure, the typical traffic volumes were about 13,000-14,000 vehicles per day.

Even with the dramatic increase in traffic volumes along West Marginal Way SW during the bridge closure, initial data collected showed median speeds to be high. The corridor has a posted speed limit of 30 mph, but SDOT data collected in April of 2020 showed median travel speeds of drivers to be 43.1 mph for northbound and 39.5 for southbound. To achieve Seattle’s long-term goal of Vision Zero, an initiative to eliminate traffic deaths and serious injuries on city streets, the City addresses speeding as it is a major contributor to crashes and their severity. SDOT initially lowered the speed limit on West Marginal Way SW from 40 mph to 30 mph in May 2020 and later installed radar feedback signs at the end of 2020 to help mitigate the speeding concerns and improve safety, especially in the vicinity of the Duwamish Longhouse and Cultural Center. These efforts resulted in a moderate decrease in operating speeds along the corridor.

### ACCESS SAFETY IMPROVEMENTS

To address the Duwamish Longhouse’s longstanding concern and the need for safe access across West Marginal Way SW to the Cultural Center, SDOT installed a new pedestrian-controlled signal at the driveway to the Seattle Public Utilities facility and Herring’s House Park, about 0.25-mi south of SW Idaho St, in 2022. The project also installed a new interim (asphalt) sidewalk along the west side of West Marginal Way SW connecting the new signal to the Longhouse. SDOT is currently working to upgrade to a permanent concrete sidewalk with curb bulbs at the existing Longhouse driveway/ SW Alaska St and the new planned driveway south of the Duwamish Longhouse and Cultural Center. The 5-lane configuration in front of the Duwamish Longhouse was reduced to one southbound travel lane and a parking lane, see Figure 3, two northbound travel lanes, and a center turn lane in 2019 (to provide immediate relief to patrons parking and accessing the Duwamish Longhouse and Cultural Center).



**Figure 3 Southbound Lane Drop in Front of the Duwamish Longhouse**

### REDESIGN

To address the gap in the bike network between the Duwamish Trail and the West Seattle Bridge Trail, the project initially focused on the segment of West Marginal Way SW between SW Marginal Place and just south of SW Idaho St. At the request of the business and freight community for a broader safety analysis, the project limits were expanded all the way south to Highland Park Way SW. The analysis was aimed to better understand the volume of vehicular traffic that uses the driveways and analyze potential conflicts between various road users, the existing trail, and the proposed bike connection. We collected people biking speeds to get a baseline count and compare it to other multi-use trails for contrast. SDOT also walked portions of the trail with adjacent industrial business employees to identify visibility issues at driveways along West Marginal Way SW and the Duwamish Trail for the truck drivers. This part of the project was divided into two sections. In the north section, a two-way protected bike lane was proposed by repurposing the southbound curb lane between SW Marginal Pl and just south of SW Idaho St connecting to the Duwamish Trail at the new pedestrian-controlled signal. This design was chosen after extensive analysis of five different alternatives. SDOT initially envisioned this as a quick-build project to be delivered concurrently with other RWS projects

during bridge closure. However, after evaluating detour needs and understanding concerns from industrial businesses along West Marginal Way SW, SDOT decided to postpone the construction of a two-way protected bike lane until after the West Seattle High Bridge reopened.

The West Seattle High Bridge reopened on September 17, 2022. After hearing additional concerns about the interaction of trail users and trucks accessing business at various driveways, SDOT performed additional data analysis and further refined safety elements where driveways cross the Duwamish Trail. This additional work informed the final project design, project scope, and the project evaluation criteria.

In January 2023, a temporary version of the PBL design was implemented after the Spokane Street Swing bridge needed emergency repairs thereby closing the West Seattle Bridge Trail and creating the need for a safe bike detour route. Data was collected during this period as well. The final project was completed in May 2023 with a new two-way protected bike lane from SW Marginal Pl to the Duwamish Trail crossing and new signage and pavement markings at all 17 driveways along the trail. Final post-project data collection was gathered in August, September, and October 2023.

In the south section, between the new pedestrian-controlled signal and Highland Park Way SW, several improvements were implemented to ensure people walking/rolling and biking on the Duwamish Trail and drivers crossing it have better awareness of each other.



# BEFORE AND AFTER PHOTOS

## SW MARGINAL PL



Figure 4 SW Marginal Pl BEFORE



Figure 5 SW Marginal Pl AFTER

## WEST MARGINAL WAY SW NEAR SW DAKOTA ST



Figure 6 SW Dakota St BEFORE



Figure 7 SW Dakota St AFTER

## WEST MARGINAL WAY SW NEAR SW IDAHO ST



*Figure 8 SW Idaho St BEFORE*



*Figure 9 SW Idaho St AFTER*

## DUWAMISH TRAIL MARKINGS



*Figure 10 Duwamish Trail Markings BEFORE*



*Figure 11 Duwamish Trail Markings AFTER*

## DUWAMISH LONGHOUSE WALKWAY



Figure 12 Duwamish Longhouse Walkway BEFORE



Figure 13 Duwamish Longhouse Walkway AFTER

## VEGETATION CLEARANCE AND LANE REDUCTION



Figure 14 Vegetation BEFORE



Figure 15 Vegetation AFTER

# RESULTS

During the design and outreach process, SDOT consulted with stakeholders regarding the data collection and analysis scope and used stakeholder input to inform project design and pre/post-installation evaluation. The following data and analysis evaluate a variety of metrics pre- and post-construction of the protected bike lanes in the 0.4-mile gap on West Marginal Way SW between SW Marginal Pl and just south of SW Idaho St. In response to concerns from stakeholders, data was also collected and analyzed at all business driveways and intersections between Highland Park Way SW and SW Marginal Pl to assess the impact of the new bike lanes and other improvements. Below is a list of the data collected:

- Vehicular speeds in the NB and SB directions
- Weekday 24-hour NB and SB traffic volumes by vehicle class
- Truck volumes by direction
- Peak hour volumes
- Count of people walking or rolling along the 2.5-mile corridor
- Count of people biking along the 2.5-mile corridor
- Traveler interaction analysis of the top two driveways crossing the Duwamish Trail
- Weekday turning movement counts for all driveway locations on both sides of the corridor
- People biking speeds

Date	Driveway Counts	GP Volumes	Truck Volumes	Bike/Ped Volumes	Vehicular Speeds	Bike Speeds	Travel Times	Gap Analysis	Lane Utilization	Traveler Interaction Analysis
April 2020										
July 2020										
November 2020										
March/April 2021										
July 2021										
February 2022										
August/Sept 2022										
October 19, 2022 (Before S/B Lane Closure Pilot)										
October 31, 2022 (After S/B Lane Closure Pilot)										
September 2020 (WSHB Closed)										
September 2022 (WSHB Open)										
January 2023 (Temporary PBL Detour)										
August/September/October 2023 (Post Project)										

Figure 16 Data Collection Summary

## VOLUMES

### People Driving Volumes

Daily traffic volumes have decreased significantly since the reopening of the West Seattle High Bridge. During the closure, West Marginal Way SW was a primary detour route and carried between 24,400 and 33,500 vehicles per day. After the high bridge reopened daily volumes dropped to as low as 10,000 vehicles in January 2023. Data collected in August 2023 shows an

uptick in daily volumes to 13,700 vehicles per day. The vehicle volumes after the uptick are in line with daily volumes registered before the Covid-19 Pandemic, see Figure 17.

Overall truck volumes on West Marginal Way SW have decreased significantly since the West Seattle High Bridge reopened in September of 2022, falling from a peak of 9,400 per day to a four year low of 2,180.

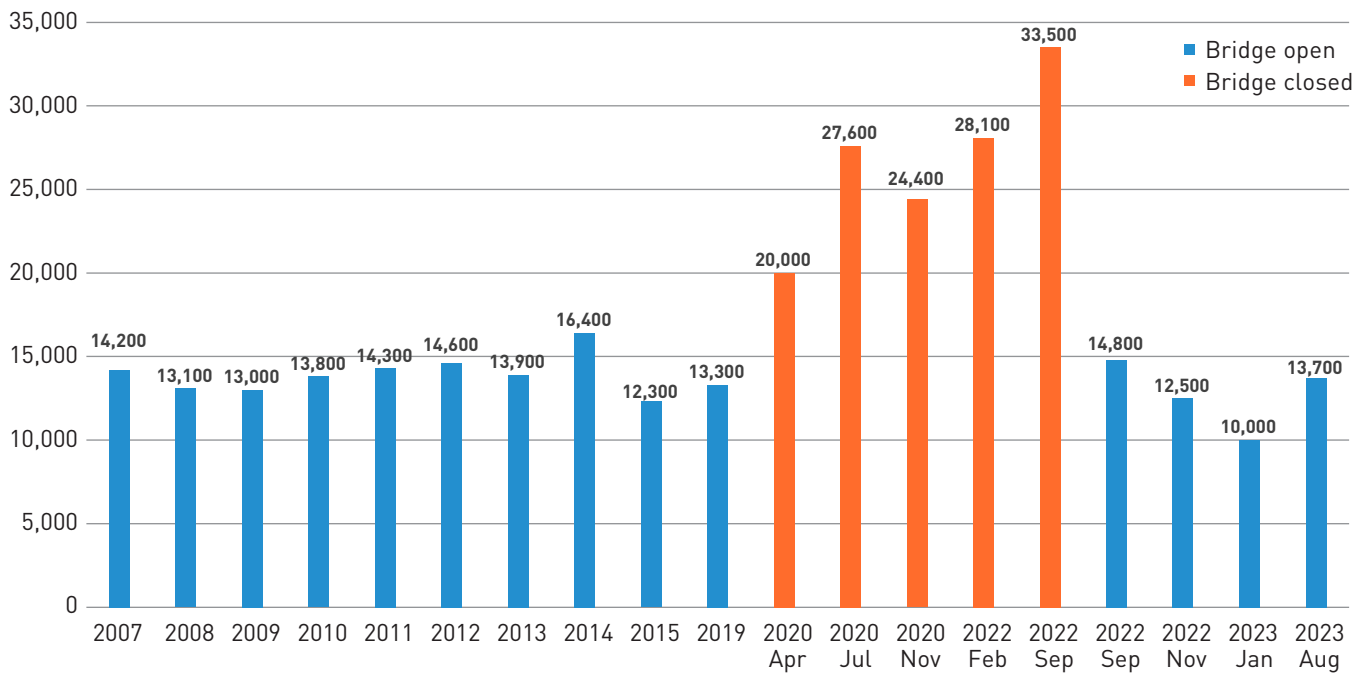


Figure 17 Daily Traffic Volumes

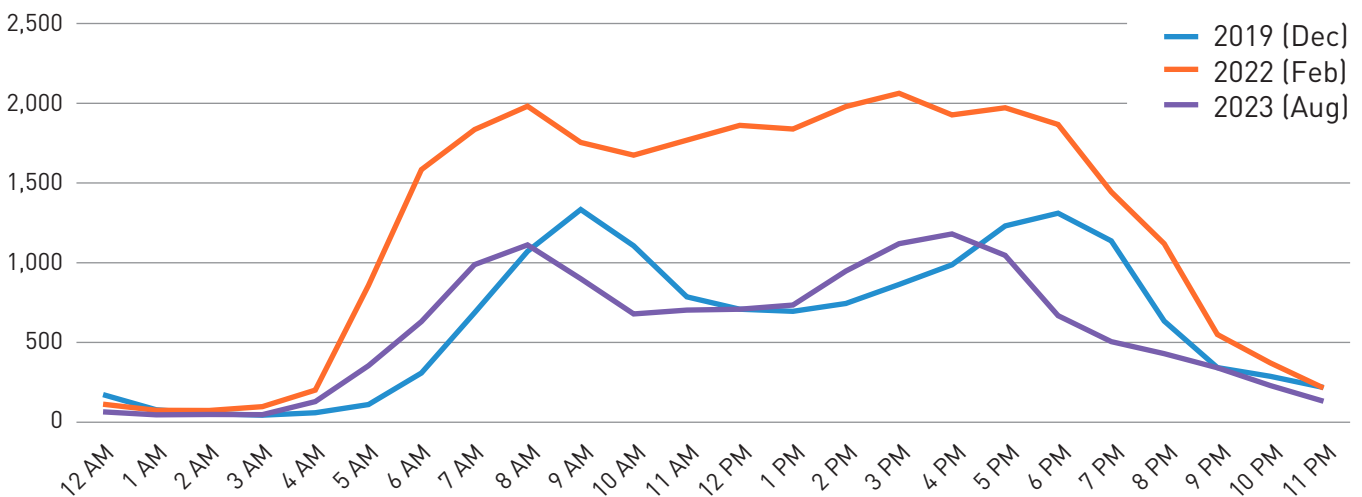
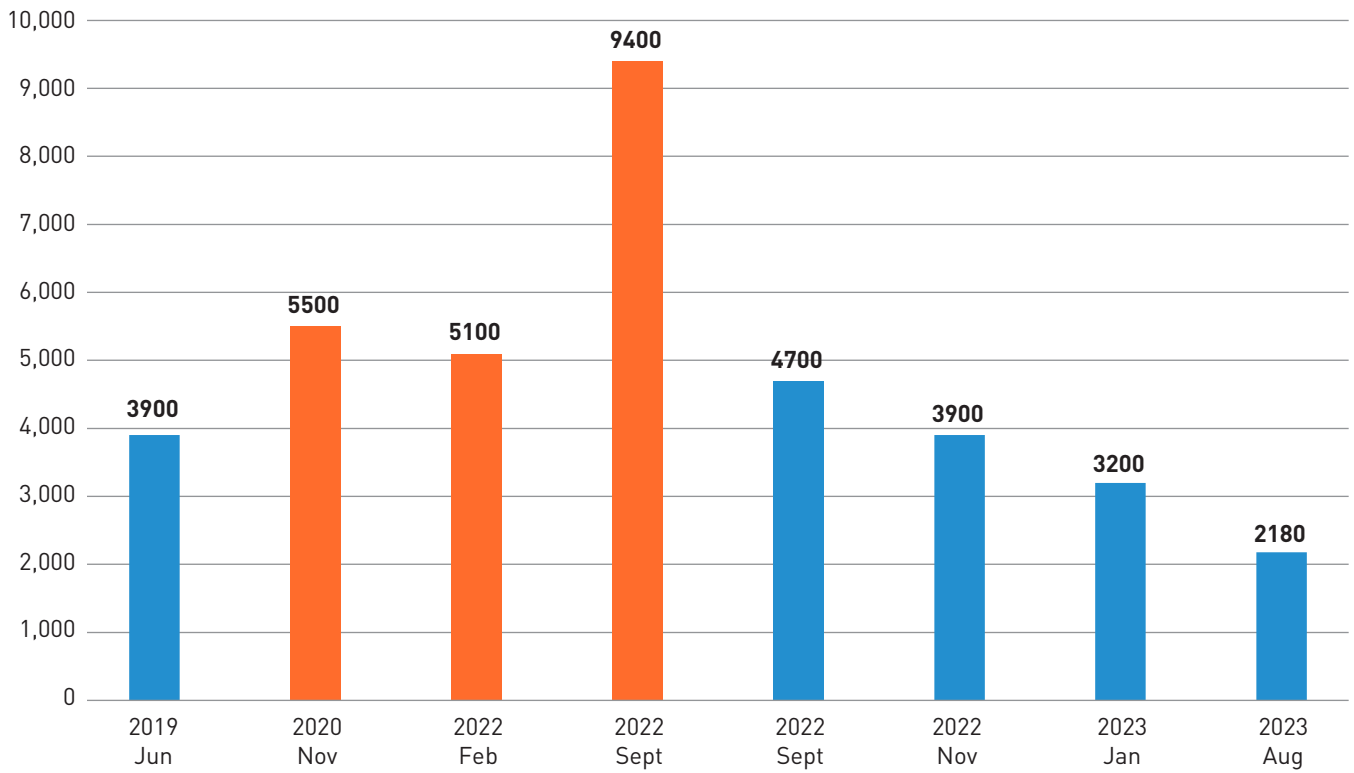
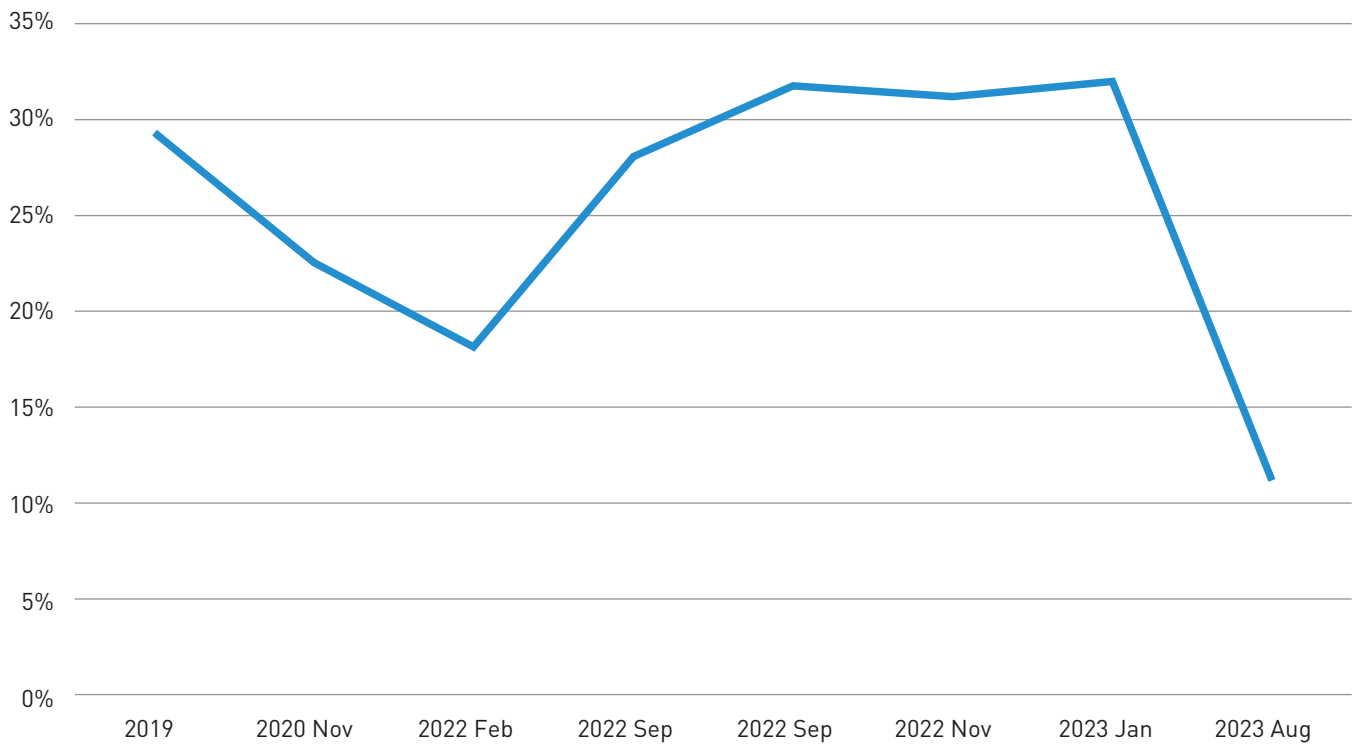


Figure 18 Hourly Traffic Volumes



**Figure 19 Daily Truck Volumes**



**Figure 20 Proportion of Trucks**

## Business Driveway Volumes

In 2022, there were 2 driveways with over 730 trucks per day, 3 driveways with over 400 per day, and 2 driveways with over 300 per day. Turning movement data collected in August of 2023 shows zero driveways with over 400 trucks per day and only one with more than 300. This drop

off was unexpected and the data does not reveal a clear cause. Anecdotally, SDOT saw a decrease in truck volumes going to and from Harbor Island during the same time period, potentially indicating the influence of macro-economic factors on the observed truck volumes.

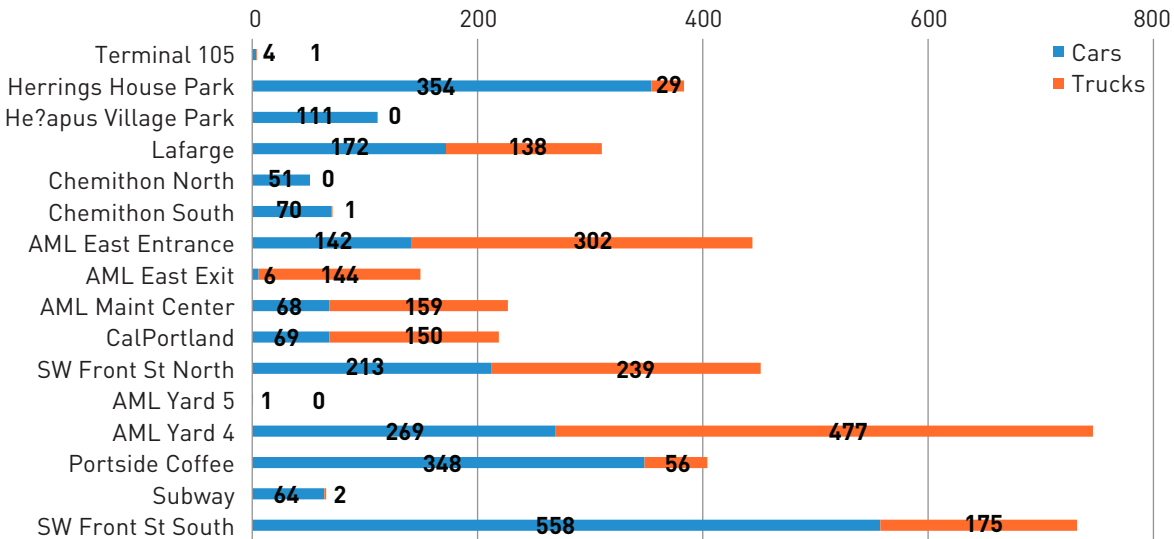


Figure 21 Eastside Driveways BEFORE

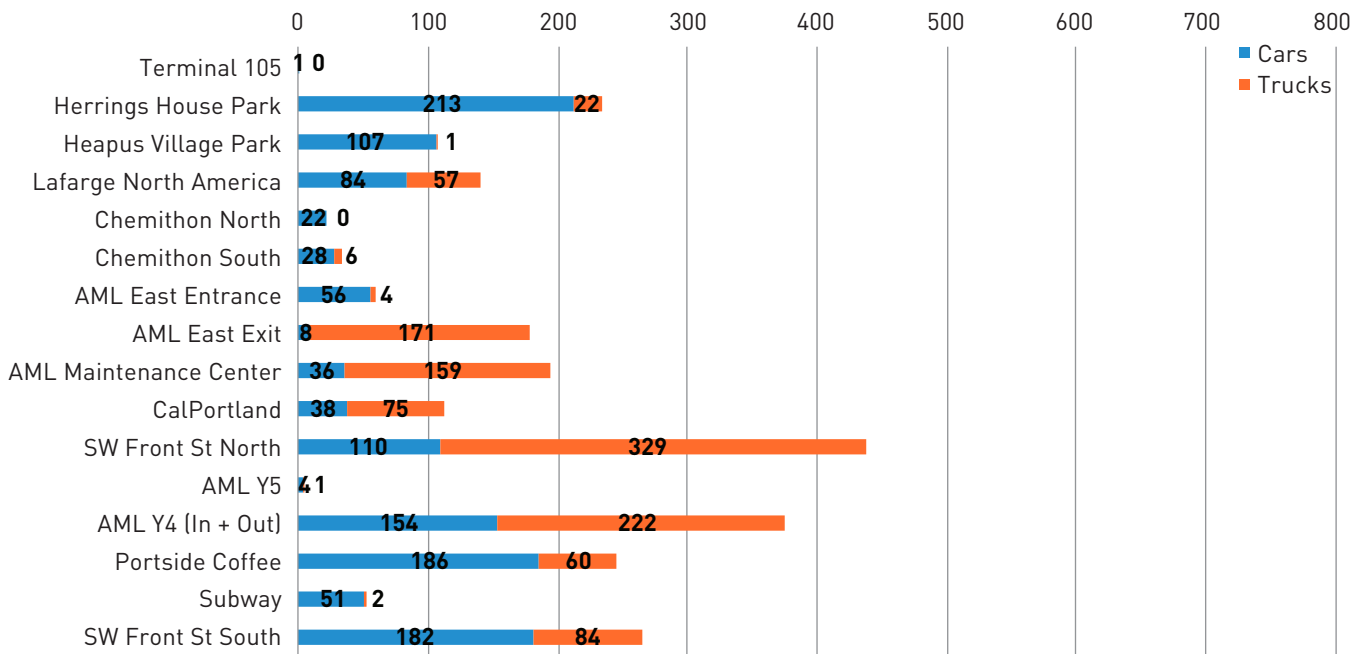
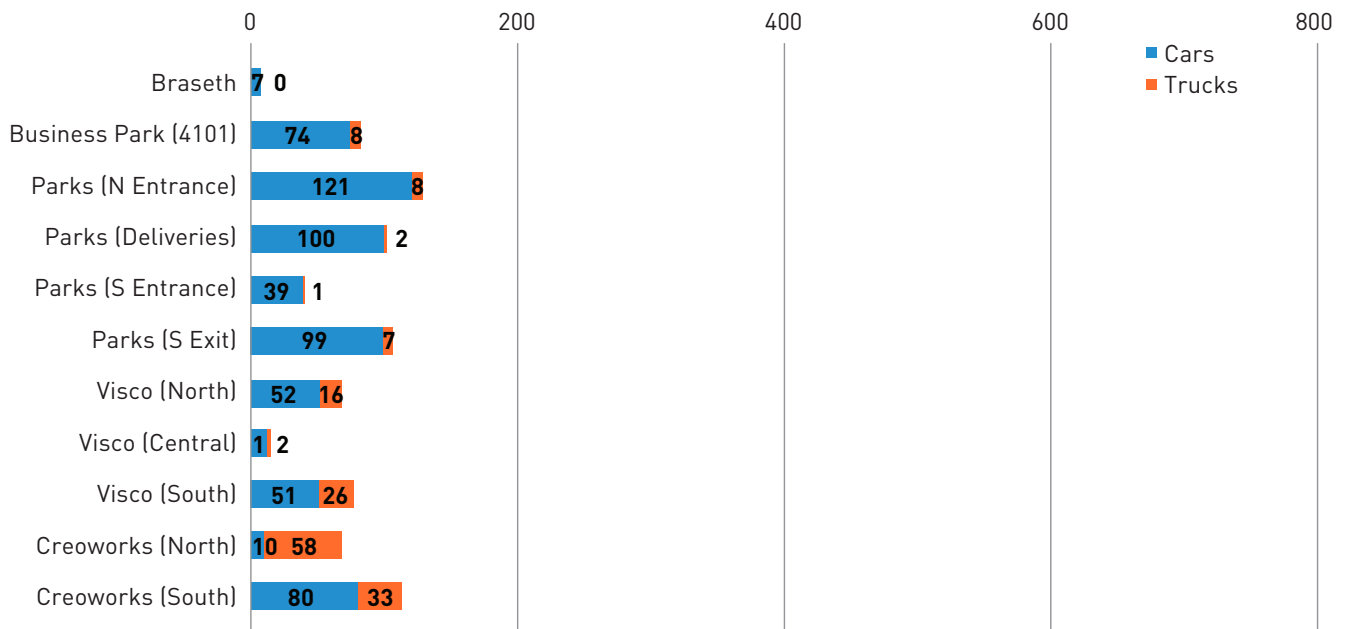
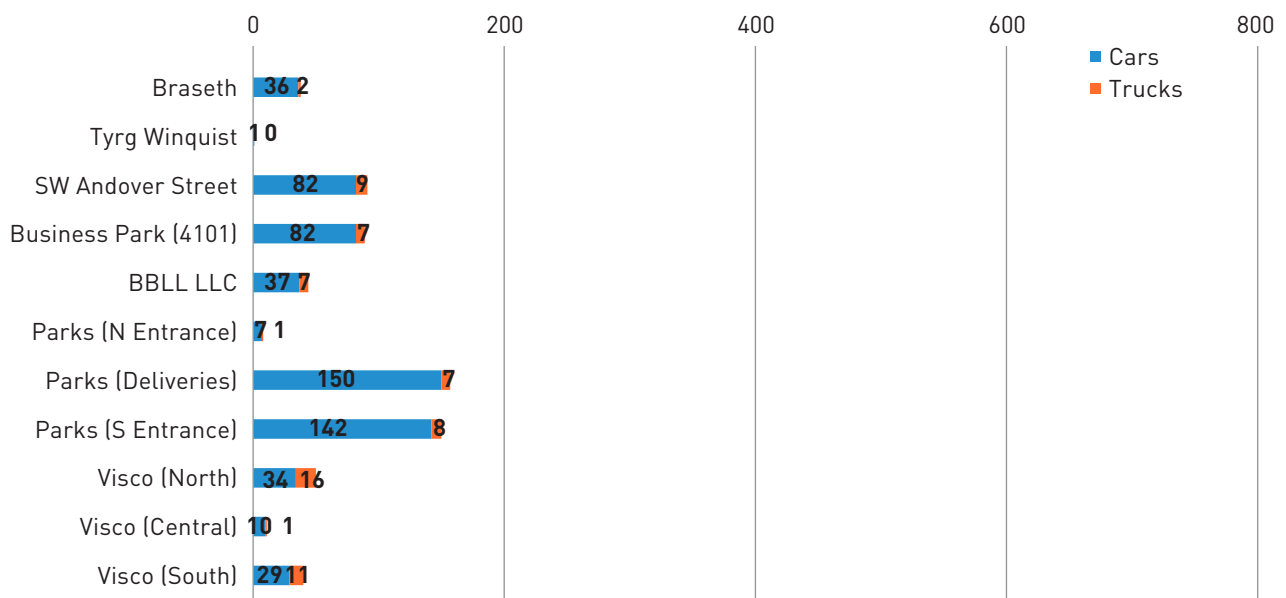


Figure 22 Eastside Driveways AFTER



**Figure 23 Westside Driveways BEFORE**



**Figure 24 Westside Driveways AFTER**

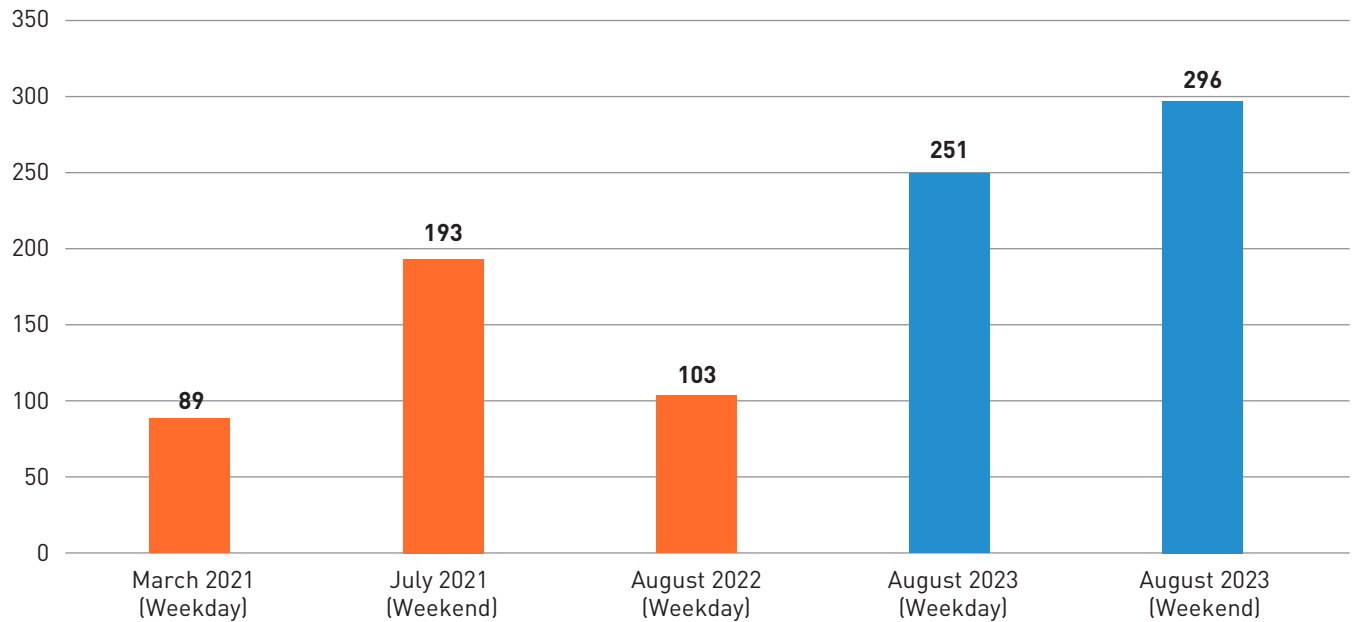


## People Biking Volumes

The number of people biking has increased both on weekdays and weekends since the new two-way protected bike lanes were completed. Biking on weekends increased by 53% between 2021 and 2023. Comparing August weekdays between 2022 and 2023, it increased 144%.

Date	Weekday/Weekend	Bikes
July 2021	Weekend	193
August 2022	Weekday	103
August 2023	Weekday	251
August 2023	Weekend	296

**Table 1 People Biking Volumes**



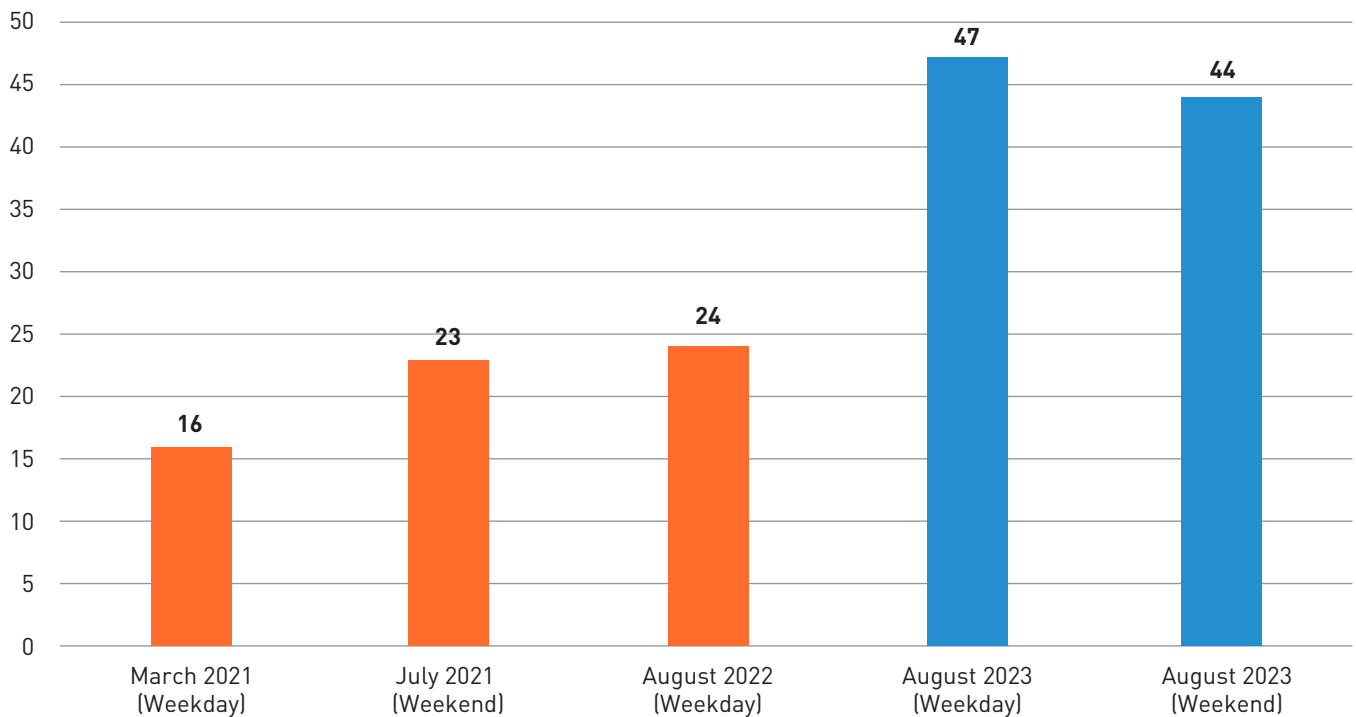
**Figure 25 People Biking Volumes**

## People Walking/Rolling Volumes

The number of people walking or rolling (mobility assistance device or scooter) has increased since the project was completed. It almost doubled on both weekdays and weekends after the new two-way protected bike lane connection.

Date	Weekday/Weekend	People Walking/Rolling
March 2021	Weekday	16
July 2021	Weekend	23
August 2022	Weekday	24
August 2023	Weekday	47
August 2023	Weekend	44

**Table 2 People Walking/Rolling Volumes**



**Figure 26 People Walking/Rolling Volumes**

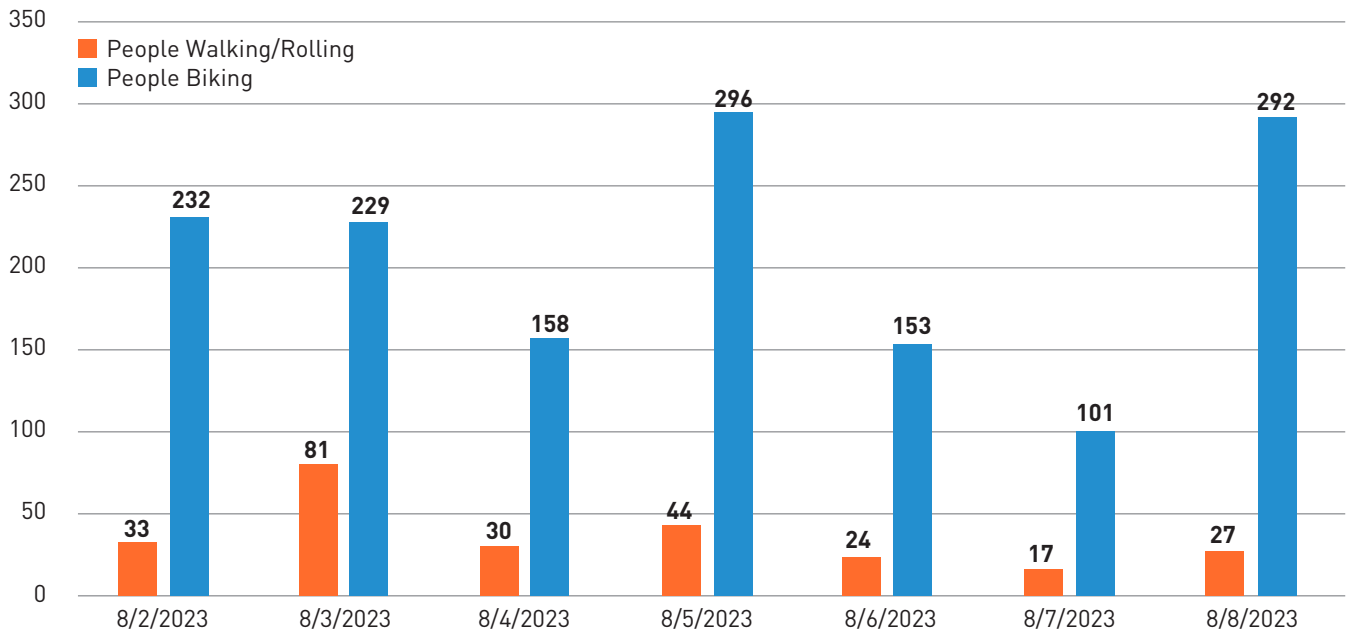


Figure 27 Vulnerable User Volumes Per Day in 2023

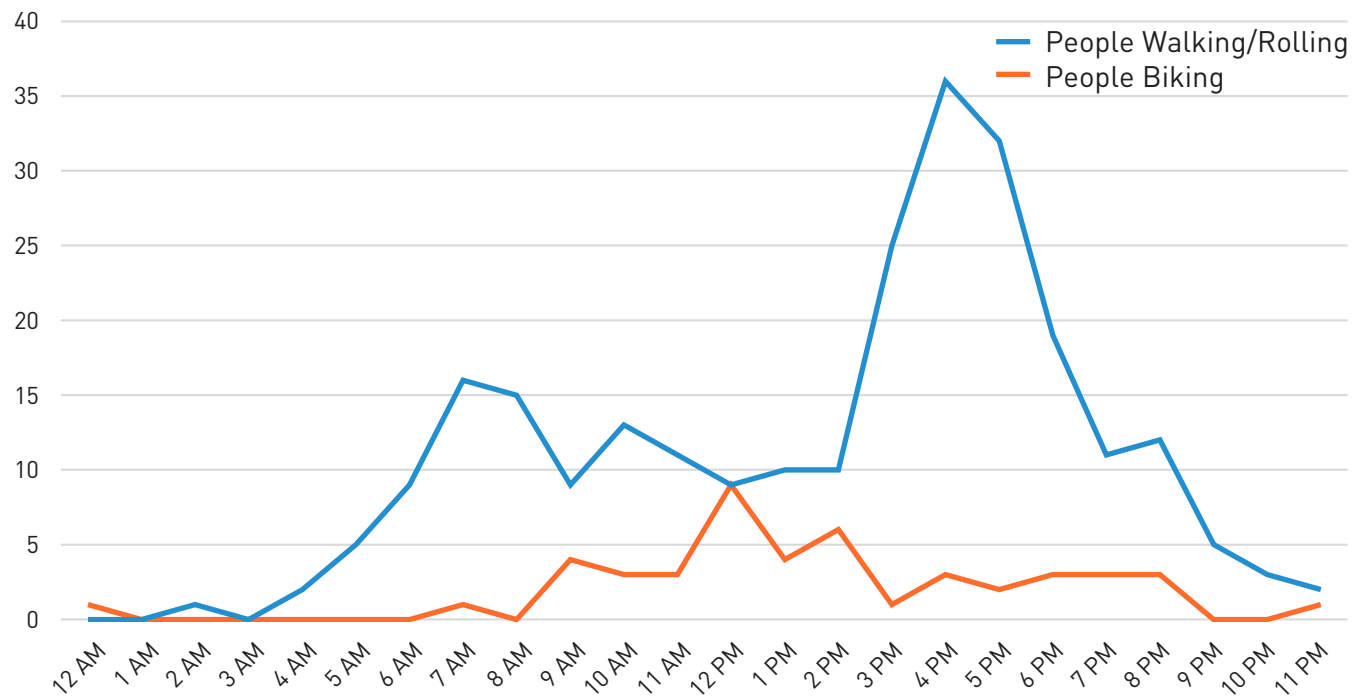


Figure 28 Average Hourly People Biking/Walking Volumes

## TRAVEL TIMES

Southbound travel lanes were reduced from two to one between SW Marginal Place and Duwamish Longhouse Driveway/SW Alaska St to accommodate new two-way protected bike lanes and on-street parking in front of the Longhouse. To analyze the effect of this change, travel time data was collected for southbound vehicles from SW Marginal Pl to SW Alaska St, approximately 0.55 miles. Southbound travel times have

remained broadly consistent from January of 2022 when West Seattle High Bridge was closed, January of 2023 when the High Bridge was open, but a temporary bike lane facility was installed to August 2023 when the permanent bike facility was constructed. The data below shows that the southbound lane reduction on West Marginal Way SW had negligible impact on vehicular travel times.

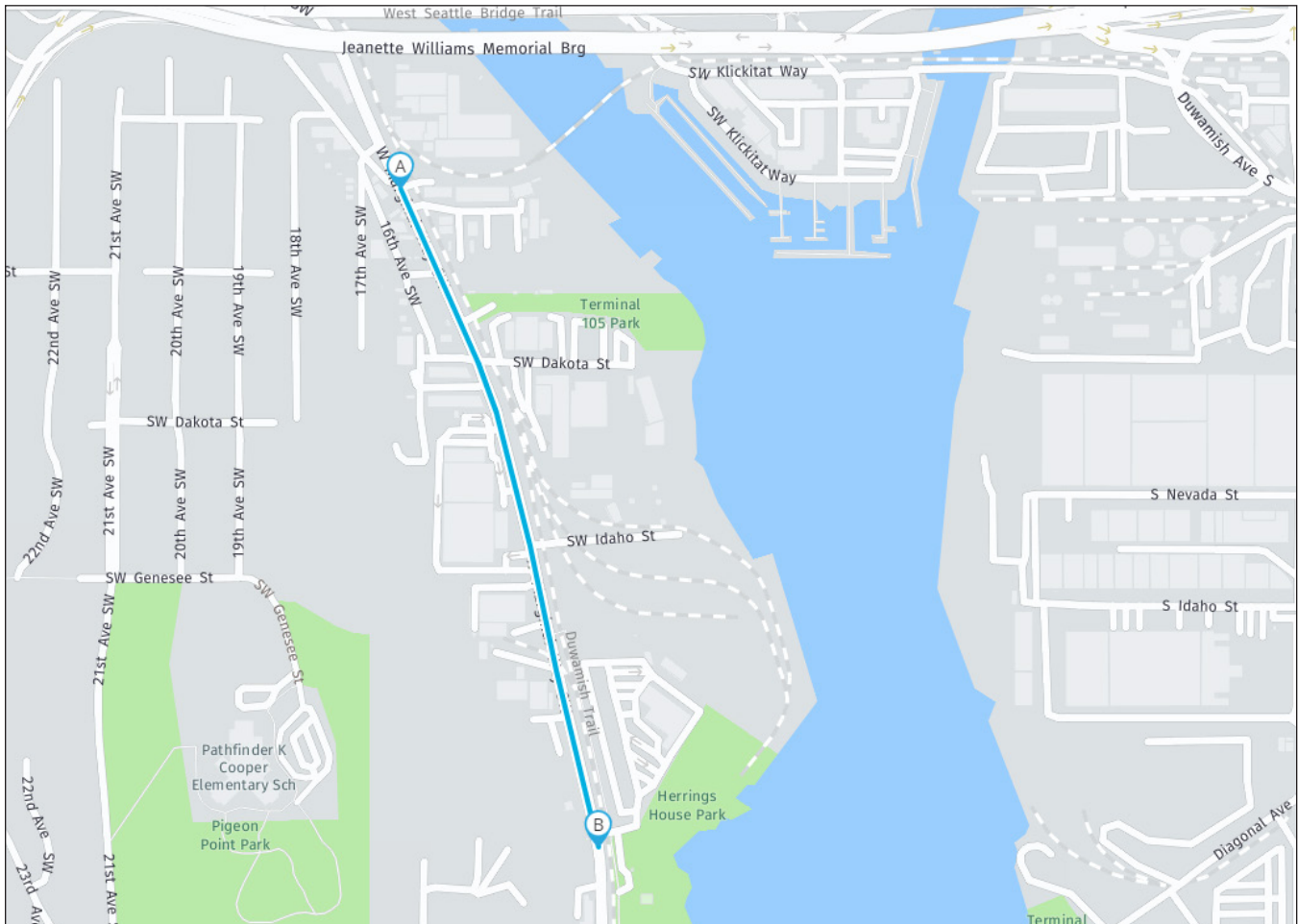
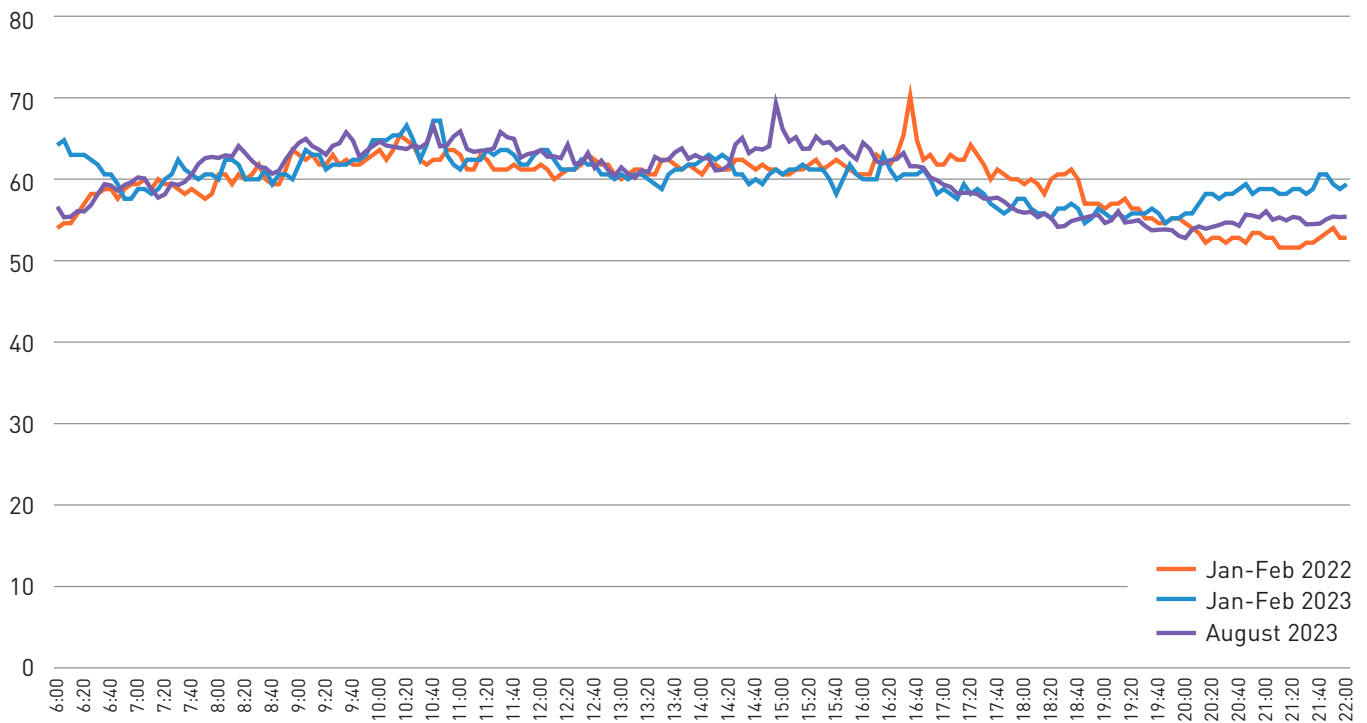


Figure 29 Extents of Travel Time Analysis



**Figure 30 Southbound Travel Time Results**

## SPEEDS

### People Driving Speeds

Data collected along West Marginal Way SW since early 2020 indicated high speeds on the corridor. SDOT implemented several measures aimed at reducing speeds along West Marginal Way SW. The first intervention in Spring of 2020 was to reduce the speed limit from 40 mph to 30 mph and to install new speed limit signs frequently

along the corridor. Radar Speed Feedback signs which show drivers the speed at which they are traveling were installed in May 2020. Finally, new two-way protected bike lanes were installed by reducing the number of southbound travel lanes earlier this year. Since these interventions, speeds have steadily and modestly decreased. At SW Alaska St, speeds have decreased from 39.5 mph to 37.9 mph and at SW Dakota St speeds have decreased from 40.9 mph to 36.4 mph.

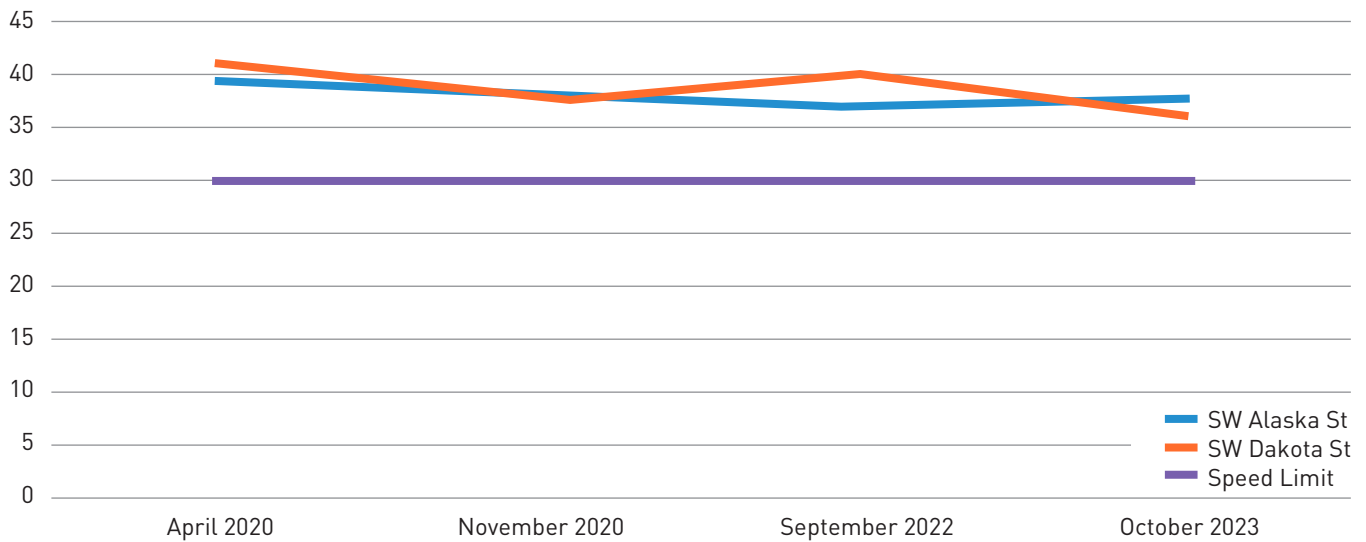


Figure 31 Southbound Average Speeds

## Traffic Speeds

Street	April 2020	November 2020	September 2022	October 2023	PCT Change since beginning of Project
SW Alaska St	39.5 mph	37.9 mph	37 mph	37.9 mph	-4.05%
SW Dakota St	40.9 mph	37.8 mph	40.2 mph	36.4 mph	-11.00%

Table 3 Southbound Average Speeds

## People Biking Speeds

Bike speeds were only collected after the new two-way protected bike lanes were constructed at the request of freight stakeholders. As such these bike operating speeds were compared to those observed on other major trail facilities across the city. The bike speeds along the Duwamish Trail and the West Marginal Way SW PBL are comparable—if not a bit lower—compared to speeds collected on other major Seattle bike trails. On the Duwamish Trail and new PBL, speeds were higher during the morning and afternoon peak periods, around 17 MPH, when riders tend to be commuters and destination focused. Speeds were noticeably lower on Saturday (just below 13 MPH), this may be due to there being more leisure biking, groups, and families on a sunny August weekend.

	West Marginal Way SW PBL	Duwamish Trail
Morning (7am – 9am)	17.3 mph	17.9 mph
Afternoon (4pm – 6pm)	17.2 mph	14.3 mph
Saturday Peak	12.7 mph	12.9 mph

Table 4 People Biking Speeds

	Burke-Gilman Trail	Elliott Bay Trail	Alki Beach Trail
85th Percentile Speeds	19 mph	18 mph	16 mph

Table 5 People Biking Speeds at Different Seattle Trails

## TRAVELER INTERACTION ANALYSIS

SDOT reviewed collision history along the Duwamish Trail and the various business driveways/streets on the east side of West Marginal Way SW corridor. Only one vehicle (not a truck) vs bike collision was recorded in the last 10 years. This occurred at Mighty Mugs coffee shop driveway along the trail. No pedestrian crashes were recorded in 10 years along the trail. Given the short duration between the new two-way protected bike lane installation and this after study, SDOT chose to analyze the interaction between Duwamish Trail users and various vehicles at the two busiest business intersection/driveways.

The two locations evaluated were Alaska Marine Lines Yard 4 driveway and the southern SW Front St intersection. Each location was analyzed 24hrs/day for seven consecutive days in the last week of August 2023. Multiple cameras were set up at each driveway to capture a variety of angles. The footage was processed and analyzed by Street Simplified (a third-party analytics vendor), using artificial intelligence to determine the interactions between different users. This process enables an evaluation of interactions based on their potential for conflict or collision rather than the actual collisions themselves.

The interactions were analyzed using a measure called Post Encroachment Time (PET). This is the time between the departure of one user, say a person biking, from the conflict point and the arrival of another user, say a car or a truck, with the right-of-way at the same conflict point. In other words, this evaluation counts the seconds between User A leaving a location and User B entering the location. The interactions that qualified as a traveler interaction were then categorized by severity on a 1 – 4 scale with 1 being the least severe and 4 being the most.

There were 419 interactions that were classified as a user interaction and given a PET and score between the two locations over the study week. Most interactions identified did not involve any Duwamish Trail users. Only 15 of the 419 interactions were between vehicles and trail users, or just 3.6% of all scored interactions. Rarely did these interactions score higher than a 2.

No interaction between trail users and vehicles scored higher than a 3 or had a PET lower than 1.9 seconds. (see Figure 32 for an example of an interaction that was scored a 3).



Figure 32 Example 3 PET Score Traveler Interaction

# CONCLUSION

In May 2023, SDOT converted a southbound general purpose travel lane on West Marginal Way SW into a two-way protected bike lane between SW Marginal Pl and just south of SW Idaho St, connecting the Duwamish and West Seattle Bridge Trails. Since then, more people are safely and predictably walking and biking along the corridor than before. At the same time, there have been minimal effects on the operations of general purpose and freight traffic operating in the southbound direction along West Marginal Way SW.

- Prior to the addition of the PBL, SDOT took several steps aimed at reducing high operating speeds along West Marginal Way SW including lowering the speed limit to 30 mph and adding Radar Feedback Signs. After these interventions, speeds along the corridor are down by 12% from 43 mph to 37 mph on average.
- The traffic volumes currently on the West Marginal Way SW corridor returned to pre-West Seattle High Bridge and COVID-19 Pandemic levels at about 14,000 vehicles per day.
- Weekday bike volumes have increased by 144% from an average of 103 people biking before the project was installed to an average of 251 after the project. Weekend bike volumes have also increased by 53%
- The number of people walking/rolling (mobility assistance device or scooter) has almost doubled from approximately 20 users per day.
- An analysis of southbound travel times indicates that since the repurposing of the southbound curbside travel lane into a PBL there has been almost no increase in travel times, less than 1 second of additional delay for drivers in the constrained section.
- A 7-day traveler interaction analysis at the two busiest driveway/intersections showed that less than 4 percent of such interactions were between trail users and drivers moving in and out of the businesses.

This safety project resulted in a more holistic approach to improvements along the entire West Marginal Way SW corridor. The value of listening and understanding all travelers' perspectives and their view of safety pushed the project team to make more improvements at conflict points between people using, and drivers crossing over, the existing Duwamish Trail and the newly installed Protected Bike Lane. Visibility improvements and acknowledgement of each other's existence with awareness of surroundings help the multimodal environment succeed. The amount of data collected during this project required more time and resources than most previous SDOT projects. However, it allowed SDOT to gain a better understanding of all the travelers using the corridor and their operations and incorporate different timeframes and traffic scenarios. The worst-case scenario for traffic volumes on West Marginal Way SW corridor was experienced during the closure of the West Seattle Bridge. The data showed that even with only one southbound travel lane in the constrained section, the impact on general purpose traffic and freight travel time delay has been minimal.



## NEXT STEPS

Soon, SDOT will upgrade the temporary sidewalk connection between the new pedestrian-actuated signal and the Duwamish Longhouse and Cultural Center. SDOT needs to add an ADA curb ramps at the new pedestrian signal on the east side of the street and will move forward after BNSF completes their work. The final improvement that this safety corridor project will make is to upgrade the ADA curb ramps and add crosswalk markings for the crossing across SW Front St. This work is anticipated to occur in 2024 or 2025.

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