

**CENTRAL PUGET SOUND REGIONAL TRANSIT AUTHORITY
(Sound Transit)**

**Sounder Maintenance Base Project
(formerly known as the Sounder Yard and Shops Facility Project)
SEPA Addendum**

to the

**SEPA Addendum (April 23, 2018)
and
SEPA Environmental Checklist (March 25, 2016)**

Prepared Pursuant to the State Environmental Policy Act,
Chapter 43.21C RCW and WAC 197-11-625

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Introduction

This State Environmental Policy Act (SEPA) Addendum describes the proposed updated design and potential environmental impacts of the Sound Transit's Souder Yard and Shops Facility Project, now known as the Souder Maintenance Base. This addendum adds analysis and information about the proposal, but does not substantially change the analysis of impacts found in existing environmental documents. The proposed Souder Maintenance Base Project (the Project) would be located at Sound Transit's Century Yard, which is in Lakewood, Washington (see Attachment A). The Project would support planned and future Sound Transit Souder commuter rail service. The Project as originally designed and evaluated in a SEPA Environmental Checklist in 2016 was to provide sufficient capacity starting in 2017 to maintain the Souder fleet expansion planned as part of the ST2 program. Recent Souder ridership forecasts, however, established that the expansion of Souder services would progress faster than previously assumed (Sound Transit 2017a). The new ridership forecast anticipates the need to expand the maintenance facility only 8 to 12 years after the initial start of operations at the Souder Maintenance Base in 2024. Under the original ridership forecasts, no future expansion was anticipated. Considering the time it would take to develop a maintenance facility appropriately sized to meet the anticipated need, Sound Transit decided it would be more efficient if the design of the Project was updated at this time to accommodate anticipated maintenance services needed in 2024 and long term through 2040, consistent with the ST3 program.

Purpose of this Addendum

Projects completed at Sound Transit's Century Yard site include the Souder Yard Expansion Project, which included the construction of a third layover track, Train and Engine Crew (T&E) Building, and other improvements. In 2005 the Souder Yard and Shops Facility Project was proposed, which included the construction of a Maintenance Building. Sound Transit published a SEPA Environmental Checklist for the Souder Yard and Shops Facility Project in March 2016 (2016 SEPA Checklist) and a SEPA Addendum in April 2018 (2018 SEPA Addendum). The 2018 SEPA Addendum addressed potential environmental impacts resulting from modifications to the proposed Maintenance Building.

The purpose of this 2020 SEPA Addendum is to update the environmental documentation previously completed to address updated design elements and changes to the Souder Maintenance Base Project.

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Nine key elements to the updated design are evaluated in this SEPA Addendum. These elements are listed below and shown in Attachment B, Updated Site Layout and Configuration (2020):

1. Maintenance Building approximately 60,000 square-foot footprint expanded to an approximate 112,000 square-foot footprint to accommodate more efficient maintenance operations. Building design modified to a run-through facility and shifted from the north end of the site to the central portion of the site.
2. Maintenance Building parking lot shifted from east of the building at the north end of the site to Parcel 5087000040 east of the new location of the Maintenance Building.
3. New lead track, run-through tracks, tail tracks, and storage tracks.
4. Wheel truing facility relocated off the shop lead track in the south-central portion of the site to a location inside the Maintenance Building.
5. Existing Puget Sound Energy (PSE) and Tacoma Public Utility (TPU) overhead power lines both relocated offsite.
6. Maintenance-related train access to the Maintenance Building via crossings of 100th Street SW only, rather than both 100th Street SW and Steilacoom Boulevard SW.
7. Existing Train and Engine Crew (T&E) Building located in the central portion of the site to be either relocated or demolished and a new T&E Building constructed in the northern portion of the site. An associated parking lot, storage shed building, and air compressor also would be constructed in the northern portion of the site.
8. Construction of a new Maintenance-of-Way (MOW) Shop Building and storage yard to be located west of the mainline in the southwest portion of the site.
9. Acquisition of Parcel 5087000040 and demolition of the existing building for on-site parking, potential lay down yard, and relocated utilities.

Attachment B shows the proposed design updates evaluated in this SEPA Addendum and the location of the site expansion. Attachment C shows the site layout and configuration for the Project improvements as evaluated in the 2018 SEPA Addendum, and Attachment D depicts the site configuration evaluated in the 2016 SEPA Checklist. The construction period for the Project would be similar in duration to what was described in the 2018 SEPA Addendum; however, the construction period has shifted from 2019–2023 to 2021–2024.

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Sound Transit developed the updated site layout and configuration of facilities considering several factors. A key objective influencing the updated site layout and configuration was to improve the efficiency of the operations maintenance activities. The site layout and configuration for both the 2016 SEPA Checklist and the 2018 SEPA Addendum assumed the train sets would be broken apart into smaller units for maintenance services in a smaller footprint building located at the northern portion of the site. The updated site layout and configuration allows a complete train set to enter the Maintenance Building and get serviced without the need to break apart the train set. The updated site layout and configuration is referred to as a run-through facility. Other factors resulting in the updated site layout include the following: improving construction efficiency, minimizing construction and operation impacts to adjacent properties, reducing construction risks, and reducing some environmental effects. Sound Transit also considered temporary construction impacts, measures to achieve long-term maintenance cost savings, and measures to avoid conflicts with utilities.

This 2020 SEPA Addendum describes the updated design layout and provides an updated evaluation of anticipated project-related environmental impacts. The original project design accommodated maintenance services for the planned ST2 81-vehicle fleet. The updated project design evaluated in the 2018 SEPA Addendum would support the ST2 93-vehicle fleet starting in 2023, as well as the ST3 106-vehicle fleet planned by 2040. This 2020 SEPA Addendum evaluates whether the updated project design would change the impact analyses contained in the 2016 SEPA Checklist and the 2018 SEPA Addendum. Technical information supporting the conclusions in this 2020 SEPA Addendum include the following:

Attachment A. Project Vicinity Map

Attachment B. Updated Site Layout and Configuration (2020)

Attachment C. Site Layout and Configuration (April 23, 2018)

Attachment D. Site Layout and Configuration (March 25, 2016)

Attachment E. Transportation Technical Memorandum Update

Attachment F. ESA Screening Checklist Update

Attachment G. Updated Modeled Sound Levels of Project-Related Noise and Map of Modeled Area

Project Design Updates

The following is a detailed description of the major changes in the updated design for the Project, including Table 1 that summarizes project design changes since the 2016 SEPA Checklist.

1. Relocation and Construction of a Larger Maintenance Base Building

The size of the Maintenance Building would increase from an approximate 60,000 square-foot footprint to an approximate 112,000 square-foot footprint and would continue to accommodate 10 repair positions. The building would be shifted south from the north end of the site to the central portion of the site to allow the facility to be a run-through facility designed to accommodate two 10-car train sets on the two rail tracks running through the Maintenance Building. The Maintenance Building would remain two stories, approximately 50 feet high, to accommodate the hoist equipment in the shops portion of the building. One through-track would have an approximate 5-foot-deep work pit that would run the length of the track allowing workers easy access to the underside of the train car vehicles. Excavation would be approximately 7 feet deep. Two drop tables would be located on the Progressive Maintenance Track and the Heavy Repair Track that would be approximately 19 feet deep, requiring excavation up to 21 feet deep. A third track would run along the outside of the Maintenance Building on the west side, but may also be covered with a canopy the length of the building or may be totally enclosed to become part of the Maintenance Building. Toilet waste dumping would occur in the Maintenance Building with up to 2,400 gallons per day toilet waste discharged directly into the Pierce County Sewer system during nighttime hours.

The loading docks would be located on the north side of the Maintenance Building. Delivery trucks would arrive from the gated driveway off 100th Street SW, drive past the guard booth along the site access road and back into the loading dock, and then exit the site traveling north to the guard booth at the gated entrance off 39th Avenue SW.

Several ancillary buildings would be located near the Maintenance Building. An emergency generator would be located near the Maintenance Building. A double-walled diesel fuel tank to refuel the emergency generator would be located immediately adjacent to the generator with enough fuel for 24 hours continuous operation during emergency power outage. The emergency generator may also be operated with natural gas, which would not require the fuel tank. A new electrical substation would be constructed on the site near the new Maintenance Building to supply power to the building. A hazardous materials storage area would be located within a small hazardous materials building outside of the Maintenance Building, west on the parcel to be acquired. In addition, a separate load cell facility would be located near the new

Maintenance Building and used for testing of the locomotive engines during daytime hours, approximately 1 to 2 hours per day.

Vehicle fueling and train washing would continue to occur at the existing Amtrak facilities at the Holgate Yard in South Seattle.

2. Relocation of the Maintenance Building Parking Lot

The Maintenance Building parking lot would be expanded from approximately 60 parking spaces to approximately 100 parking spaces for workers and visitors. Of the approximate 64 workers anticipated to work at the Maintenance Building, an estimated 50 would work day shift and 14 would work night shift. The parking lot would be shifted south from the northern portion of the site to the newly acquired parcel (Parcel 5087000040), which is located east of the Maintenance Building in the central portion of the site. A driveway off of 39th Avenue Court SW would allow the Maintenance Building workers direct access to the parking lot on the acquired Parcel 5087000040.

3. Construction of New Rail Tracks

The updated configuration of the site includes a different track layout. Similar to the 2018 SEPA Addendum, there would be no new tracks crossing either Steilacoom Boulevard SW or 100th Street SW. Once onsite, the tracks would split from the mainline and proceed to either the load cell, the Maintenance Building, the overnight maintenance track, or the train storage area located at the northern portion of the site.

4. Relocation and Construction of a New Wheel Truing Facility

The updated project design relocates the wheel truing facility, which was evaluated in the 2018 SEPA Addendum in a separate building in the central portion of the site. In the updated layout, the wheel truing facility would be within the new Maintenance Building. One of the through tracks within the Maintenance Building would have the wheel truing facility, which would include an under-car access pit requiring excavation to a depth of approximately 10 feet.

5. Relocation of Two Overhead Utility Power Lines

The Project would relocate both the PSE and TPU overhead power lines off Sound Transit's Century Yard site rather than relocating them on-site as evaluated in the 2018 SEPA Addendum. Preliminary discussions

with the two utilities have identified new alignments for the power lines in nearby public roadway rights-of-way and private utility easements, which would require potentially traversing private parcels.

6. Train Crossings of Steilacoom Boulevard SW and 100th Street SW

Due to the updated configuration with run-through tracks, the maintenance-related crossings of Steilacoom Boulevard SW and 100th Street SW would change compared to the evaluation in the 2018 SEPA Addendum. In this previous analysis, the maintenance-related train movements could enter the Century Yard by crossings either Steilacoom Boulevard SW or 100th Street SW. Due to the layout of the run-through Maintenance Building, the updated train movements would all enter the site for either scheduled or unscheduled maintenance from the south crossing at 100th Street SW. Trains would not enter the site for maintenance from Steilacoom Boulevard SW, which would reduce potential impacts compared to the 2018 SEPA Addendum.

7. Relocation of the Train and Engine Crew Building and Storage Shed

The existing approximately 3,200-square-foot Train and Engine Crew (T&E) Building (also referred to as the Operations Building) would be demolished or relocated from its existing location in the central portion of the site to make room for the new run-through Maintenance Building. The T&E Building, parking lot, storage building, electrical substation, and air compressor would be relocated or replaced in the north end of the site. The size of the new building would be approximately 4,000 square feet. The number of workers at this building would increase from an estimated 31 workers to approximately 42 day-shift workers (locomotive engineers and conductors) and 62 night-shift workers (locomotive engineers, conductors, and 20 coach cleaners). There would be an increase in parking for the T&E Crew Building to approximately 55 spaces.

8. Construction of the New Maintenance-of-way Shop Building

The updated site layout includes the construction of a MOW Shop Building and associated outdoor fenced areas for equipment and materials storage. The footprint of the MOW Shop Building would be an estimated 6,000 square feet. The building and fenced storage areas would be in the southwestern portion of the site, west of the existing mainline tracks. The existing gravel drive onto this portion of the site would be paved and up to approximately 10 parking spaces would be located on the north side of the building. A one-way driveway would be constructed such that trucks would enter the site to the south of the MOW Shop Building, make deliveries at the building, and continue north to exit the site. The design would avoid

impacts to vehicles traveling on Lakeview Avenue SW as well as vehicles stopped at the railroad track crossing north of the planned MOW Shop Building. The MOW Shop Building storage yards would be located to the south and north of the building. No workers would be stationed full-time at this facility, but rather would be part of the work force at the Maintenance Building and making occasional trips to the MOW Shop.

9. Acquisition of Parcel 5087000040

A parcel located adjacent and east of the central portion of the Century Yard site would be acquired for the Project. The approximately 1-acre property to be acquired is Parcel 5087000040, which is currently owned by Pierce County Fire District #3. There is an existing 8,000 square-foot storage warehouse located on the parcel. Nearly the entire remainder of the property is paved. The parcel would be the location of the Maintenance Building worker parking lot. The existing location of the property driveway curb cut on 39th Avenue Court SW may or may not change.

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Table 1. Summary of Project Design Changes, 2016, 2018, and 2020

Design Element	2016 SEPA Checklist	2018 SEPA Addendum	2020 SEPA Addendum
Maintenance Building	40,000 SF footprint, one story Maintenance Building located in the north end of the site.	Up to 60,000 SF footprint, partial two-story Maintenance Building located in the north end of the site, separate hazardous materials shed accessed via delivery truck driveway from Steilacoom Boulevard SW.	Up to 112,000 SF footprint, partial two-story run-through facility, located in the central portion of the site includes a wheel truing facility, and train toilet waste discharge. A new electrical substation would be constructed nearby to service the building. A third track running outside of the Maintenance Building on the west side may be covered with a canopy the length of the building and/or totally enclosed as part of the Maintenance Building. An emergency generator would be located outside of the Maintenance Building, a double-walled diesel fuel tank to refuel the emergency generator would be located immediately adjacent to the generator with enough fuel for 24 hours continuous operation during emergency power outage. The emergency generator may also be operated using natural gas.
Maintenance Building Parking Lot	Up to 40 spaces located in the north end of the site with a driveway to the private roadway, 39 th Avenue SW.	Up to 60 spaces located in the north end of the site with a driveway to the private roadway, 39 th Avenue SW.	Up to 100 spaces, relocated to the central portion of the site east of the new Maintenance Building on the newly acquired parcel, accessed from a driveway to a public roadway, 39 th Avenue Court SW. Delivery truck access would be from 100 th Street SW north through the site and exiting onto 39 th Avenue SW.
Rail Tracks	Single shop lead track added off the existing mainline tracks.	New switching track would be constructed adjacent to the shop lead track.	Shop track would travel north and quickly divide to form the two run-through tracks that would travel through the Maintenance Building. Another track would split off and travel north adjacent to the west side of the maintenance base building. Up to eleven storage tracks and two tail tracks would be constructed in the north end of the site for train car storage.

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Design Element	2016 SEPA Checklist	2018 SEPA Addendum	2020 SEPA Addendum
Wheel Truing Facility	Not proposed.	Wheel truing facility to the south of the Train and Engine Crew (T&E) Building. A new spur track off the shop lead track in the southern portion of the Century Yard site to provide access to the wheel truing facility.	Wheel truing facility within the proposed new Maintenance Building instead of in a separate building.
Utility Power Lines	Relocation of an existing Tacoma Public Utilities (TPU) power line on the existing site	Relocation of a Puget Sound Energy (PSE) and Tacoma Public Utilities (TPU) power lines on the existing site.	Relocation of both the PSE and TPU overhead power lines to off-site locations primarily in nearby public roadway utility easement and some sections in new private utility easements across private property.
Train Crossings	Did not include additional maintenance-related crossings of Steilacoom Boulevard SW, but only 100th Street SW.	Proposed train switching operations for unscheduled maintenance activities would require crossings of both Steilacoom Boulevard SW and 100th Street SW.	Due to the run-through layout of the Maintenance Building, all trains would enter the site by crossing 100 th Street SW. The number of nighttime crossings would be consistent with the number evaluated in the 2018 SEPA Addendum, but train crossings on Steilacoom Boulevard SW would be eliminated.
Train and Engine Crew Building	No changes.	No changes.	Existing approximately 3,200 SF T&E Building would be demolished or relocated from its existing location in the central portion of the site to the northern portion of the site to make room for the new run-through Maintenance Building. The new 4,000 SF T&E Building, 55-space parking lot, storage building, and air compressor would be constructed in the north end of the site.
Maintenance-of-way Shop and Storage Yard	Not proposed	Not proposed	Construction of a MOW Shop Building in the southwestern portion of Century Yard site with associated outdoor fenced equipment and materials storage areas and a parking lot for about 10 vehicles. The building would be about 6,000 SF.

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Design Element	2016 SEPA Checklist	2018 SEPA Addendum	2020 SEPA Addendum
Parcel Acquisition to East of Existing Site	Not proposed.	Not proposed.	Acquisition of a single parcel located adjacent and east of the central portion of the site. The approximately 1-acre property to be acquired is Parcel 5087000040, which is currently owned by Pierce County Fire District #3. Property could be used for construction laydown and Design Build contractor's office. The existing building would be demolished at the end of construction. A Maintenance Building worker parking lot is proposed on the parcel with direct driveway access to 39 th Avenue Court SW.

Notes: MOW = maintenance-of-way
PSE = Puget Sound Energy
SF = square foot
T&E = train and engine crew
TPU = Tacoma Public Utility

Changes in Environmental Effects

The following sections discuss anticipated changes in environmental effects of the updated design and layout for the Souder Maintenance Base Project. The updated design and layout of the Project would not change environment impacts for the following elements of the environment: natural resources, and parks and recreation resources. Therefore, these elements are not discussed further in this SEPA Addendum.

The following sections describe potential changes in environmental impacts of the updated design for the following elements of the environment: transportation, land use, aesthetics, air, noise, ecosystems, water resources, environmental health, cultural resources, public services, energy and natural resources, and utilities. The potential environmental impacts related to the acquisition and development of one additional parcel and planned relocation of the two overhead power lines is integrated into several of the discussions of individual elements of the environment. The updated design and layout of the Souder Maintenance Base Project would not alter the conclusions of the 2016 SEPA Checklist or the 2018 SEPA Addendum. No probable significant adverse environmental impacts would arise.

Transportation

The updated and expanded Souder Maintenance Base Project results in similar transportation impacts as evaluated in the 2018 SEPA Addendum. The project would employ and accommodate more workers with slightly different shifts, and the site layout would have different access driveways to the site than evaluated in the 2018 SEPA Addendum. The existing conditions analysis year shifted from 2015 to 2020; and the opening year shifted from 2023 to 2024. No changes in the nighttime train crossings across 100th Street SW impacts would occur since the updated site operating plan reflects the same number of potential crossings (up to eight train crossings) and duration (up to 3.5 minutes) of crossings. Impacts, however, would no longer occur to Steilacoom Boulevard SW as trains must now all enter the site from the south crossing 100th Street SW. Attachment E provides an updated quantitative analysis of potential transportation impacts.

Existing transportation conditions for the Project (reflecting year 2020) in terms of the non-motorized amenities and freight activity within the study area are the same as described in the *Transportation Technical Memorandum* (2016), which was the previous study that performed quantitative modeling analysis. However, the roadway network, transit service levels, signals, and crash history at study

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intersections were updated to reflect 2020 conditions. Future impacts to non-motorized movements and/or freight mobility are not expected to change.

Per updated worker estimates and shift assumptions, approximately 50 entering trips are estimated for the morning peak hour (7 to 8 a.m.) and 42 entering trips and 50 exiting trips are estimated for the afternoon peak hour (4 to 5 p.m.). These trips would be distributed across the three site access driveways based on an assumed percentage split per facility, i.e., the Maintenance Building, relocated T&E Building, and the new MOW Shop Building. This would result in a total of 10 entering and exiting trips in/out of the 39th Avenue SW driveway, 39 trips in/out of the new 39th Avenue Court SW driveway, and 10 trips in/out of the 100th Street SW in the AM peak hour. In the PM peak hour, there would be 48 combined entering and exiting trips in/out of the 39th Avenue SW driveway, 41 trips in/out of the new 39th Avenue Court SW driveway, and 12 trips in/out of the 100th Street SW driveway.

Because of the increased number of site-generated trips compared to the previous analysis summarized in the *Transportation Technical Memorandum* (2016) as well as the future opening year shift from 2023 to 2024, the peak-hour delay and level of service estimates for the study intersections would increase slightly compared to the previous findings. Nonetheless, all of the study intersections would operate at acceptable levels of service under the 2024 Build conditions.

Due to the modest changes in site trip generation for the updated Sunder Maintenance Base Project operations compared to previously documented conditions, no mitigation measures would be needed to ensure reasonable arterial or intersection operations during weekday peak traffic periods. In addition, since the previously updated crossing/blockage durations and number of crossings for train crossing activity would remain at up to 3.5 minutes and eight crossings, respectively, the overall nighttime train blockage duration would remain consistent with the previous *Transportation Technical Memorandum Update* (2017) prepared to support the 2018 SEPA Addendum. As such, no specific mitigation would be needed to address queueing or delays to vehicles traveling on 100th Street SW between 8 p.m. and 4 a.m. As stated in the 2016 SEPA Checklist and 2018 SEPA Addendum, alternative routes are available via Steilacoom Boulevard SW or 108th Street SW for bikes, pedestrians, and general-purpose traffic.

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Consistent with previous analyses, Sound Transit and Pierce Transit would continue discussions through final design to identify opportunities to minimize potential impacts to nighttime public transit riders on Route 4 and Route 48 and non-revenue buses using 100th Street SW due to maintenance related train crossings.

Emergency responders (police, fire, and ambulance) using 100th Street SW could be disrupted as a result of nighttime train crossing activity; however alternate routes via Lakeview Avenue SW or Steilacoom Boulevard SW would be available and response times would not be expected to increase substantially.

The relocation of the two overhead power lines would generally be along the edges of public road rights-of-way, with some new private utility easements and would not affect vehicular traffic in the roadway travel lanes in the study area. During installation of the relocated overhead power lines within the public road rights-of-way, minor traffic delays could occur, but the streets would remain open. The required height of the power line conductors would ensure public safety and there would be no effects on pedestrians or bicyclists. The placement of the power line poles would avoid disruption to existing sidewalks.

As such, the project refinements associated with the Project would not result in significant adverse effects.

Land Use

The proposed updated project layout for the Sounder Maintenance Base Project is consistent with existing commercial and industrial zoning identified in the City of Lakewood's current zoning map¹. The Century Yard site is zoned Industrial One (I1) and the two previously acquired parcels (0220368018 and 0220368019) at the north end of the site are zoned Commercial Two (C2). Government services are defined in the Lakewood Municipal Code (LMC) 18A.40.070, and include maintenance shops and vehicle and equipment parking and storage areas. These uses are permitted uses in the I1 zone, but are not permitted in the C2 zone. The updated layout for the Sounder Maintenance Base Project has the T&E Building and its associated parking lot extend into the area encompassing the two previously acquired parcels. In LMC 18A.40.070, General government offices, including parking lots (LMC 18A.40.140), are permitted in the C2 zone. One additional property (5087000040) would need to be acquired for the updated layout for the proposed Project. This parcel is owned by the Pierce County Fire District #3 and has been offered for sale. The parcel contains a storage warehouse, not a fire station. The parcel is also designated

¹ City of Lakewood's current zoning map has a map date of June 27, 2017. https://cityoflakewood.us/wp-content/uploads/2018/06/Zoning_11x17.jpg

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as I1 in the City of Lakewood's zoning map (2017), and construction of the Maintenance Building parking lot would be a permitted land use. As such, the proposed Project is consistent with the City's Zoning Ordinance and would be compatible with adjacent commercial and light industrial uses, no impacts are anticipated. Additional temporary construction easements may be required for facilities proposed to be constructed along the eastern property boundary, and as described in the 2016 SEPA Checklist and 2018 SEPA Addendum. Property affected by such easements would be restored to its pre-construction condition following the completion of construction.

Relocation of the PSE and TPU transmission lines would not affect land use, and no land uses would be displaced. The transmission lines would primarily be relocated along public road rights-of-way with a portion of both power lines in new private utility easements on private property. The power lines would be consistent with the commercial and industrial character of the area. Where not in public rights of way, the power lines would be along private road rights-of-way and easements at the back edge of commercial properties. The relocation of the overhead power lines along the proposed alignments would also be permitted as electric transmission lines are a permitted land use in all zoning districts in the City of Lakewood. The commercial uses would not be substantially affected by the utility lines, and only minor disruption would occur during installation.

Aesthetics

The height of the proposed Maintenance Building would remain the same as described in the 2018 SEPA Addendum. The other new features of the updated design for the Project, including the shift in location, would not substantially alter views in the immediate vicinity of the site.

The updated Project layout includes additional buildings and structures, some of which would be have exterior lighting. Lighting of the Maintenance Building parking lot would be increased because of the increased size of the parking lot. Similarly, the existing T&E Building parking lot would be relocated and expanded in size with lighting. General site lighting would need to cover the areas around the new buildings, the areas for the new track layout and track storage area, and parking areas, the guard booths, as well as gated entrances to the site. As described in the 2016 SEPA Checklist and 2018 SEPA Addendum, all lighting fixtures would be shielded and directed toward the interior of the site to minimize light or glare spill-over to adjacent properties, and LED lamps would be used to conserve energy and reduce glare.

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The PSE and TPU overhead power lines currently located on site would be relocated off-site as shown in Attachment B. The area is commercial and industrial in nature, and the utility lines would not impact sensitive viewers or block important views. The visual character and scale of the proposed relocated power lines would be compatible with the existing character of the Century Yard site and the surrounding commercial and industrial land uses. Moreover, the proposed relocation of the two transmission lines would be of similar height as existing power lines in the vicinity. No light and glare impacts are anticipated to affect nearby sensitive land uses and no additional measures would be required.

Air

The anticipated air quality effects of the updated and expanded Souder Maintenance Base Project would be similar to what was presented in the 2016 SEPA Checklist. Although the Project would have an increase in the number of employees and, as a result, automobile trips, these trips are not expected to increase congestion-related air emissions in the area. Traffic impacts are discussed in further detail in the *Transportation Technical Memorandum Update (2020)* (see Attachment E). The Project would not provide additional train service, only train storage and maintenance. Therefore, no additional air emissions would occur from train service.

The relocation of the power lines would not affect air quality.

The proposed project is located in an area that previously exceeded the National Ambient Air Quality Standard for particulate matter less than 2.5 microns in diameter (PM_{2.5}), and it is currently subject to a maintenance plan. Projects in a PM_{2.5} maintenance area are subject to the Federal Transportation Conformity Rule in 40 CFR Part 93. Under the Transportation Conformity Rule, this project is considered exempt based on Washington Administrative Code (WAC) 173-420-110(2)(k) and 40 Code of Federal Regulations 93.126, Exempt Projects, "Construction of new vehicle storage and maintenance facilities." Exempt projects do not require additional project-level analysis to demonstrate compliance with the National Ambient Air Quality Standards.

Additionally, as the proposed maintenance facility would not affect regional vehicle miles traveled (VMT), no substantial change in air pollutant or GHG emissions would be anticipated. The operation of the maintenance facility would result in a minor increase in air pollutant and GHG emissions associated with exhaust from worker vehicles and any fossil-fueled maintenance equipment. In addition, the nighttime train

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crossing activity required for train access into the site would result in a minor increase in car and bus idling only at the main line track intersection on 100th Street SW (up to 8 nighttime crossings for up to 3.5 minutes per crossing). Because this activity would occur during the lowest volume periods of the day (8:00 PM to 4:00 AM), the impact of the idling of vehicles would result in a negligible increase in emissions.

Noise

The updated noise analysis shows that noise from the Project would be the same levels at all sites included in the 2018 SEPA Addendum (see Attachment G). Project noise levels at one new site (Site 5) are lower than noise levels at some of the other sites. The updated layout involves changes in the physical location of several maintenance-related facilities planned within the existing Century Yard. In addition to the relocation of several on-site facilities, new lead track, run-through tracks, tail tracks, and storage tracks are planned. The Project does not include additional maintenance related train crossings of 100th Street SW. There would be no maintenance related train crossings of Steilacoom Boulevard SW. Load testing at the load cell would occur approximately 170 times per year during daytime hours except in an emergency, with a typical duration of approximately one-hour for annual inspection. The highest noise level resulting from load testing would be approximately 62 dBA (Leq) at 100 feet, which would not result in an impact under FTA criteria.

The updated layout and operation of the Project would not increase the number of nighttime train crossings of arterials. The updated layout requires all trains to enter the site from the south, crossing 100th Street SW. In the 2018 SEPA Addendum, trains also could enter the site from the north crossing Steilacoom Boulevard SW, so these train crossings have now been eliminated. The number of potential nighttime (between 8pm and 4 am) train crossings of 100th Street SW and duration of up to 3.5 minutes would be the same as evaluated in the 2018 SEPA Addendum, with up to 8 one-way train crossings. The moderate noise impacts identified under the FTA criteria in 2018 (affecting one site that represents 12 multifamily and 4 single-family residences) are consistent with the moderate impacts predicted at the same location with the updated layout because of the use of wayside horns and crossing bells when trains would cross 100th Street SW. The residential sound insulation previously recommended to reduce the impact remains the recommended mitigation measure.

No residences or other noise-sensitive land uses would be adversely affected by the updated site design, and operations. The physical relocation of several facilities including the two power lines in the updated design would not result in additional operational noise impacts.

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There is no change to the construction noise effects or the proposed measures to reduce impacts during the required occasional nighttime construction.

Ecosystems

The enlarged project footprint for the updated layout for the Sounder Maintenance Base Project would require increased disturbance of the Century Yard during construction. However, there are no known listed threatened or endangered species on or near the site nor any designated critical habitat for listed species (see Attachment F). Site clearance during construction would be minimized, and the site would be restored and revegetated (as appropriate) at the end of construction. A small patch of Garry oak (*Quercus garryana*), which is a Washington state-listed priority habitat, is located at the south end of the site near 100th Street SW. Another individual Garry oak tree is located in the southwestern corner of the site south of the proposed MOW Shop (it is the southernmost tree of several located in this area). These Garry oaks would be protected during construction consistent with commitments in the 2016 SEPA Checklist and the 2018 SEPA Addendum. To protect the trees and roots, a temporary fence would be installed at the tree drip-line. There is no other habitat or significant vegetation on the site. Agency consultation would occur to identify potential measures to avoid or minimize potential impacts to migratory birds.

The PSE and TPU transmission lines would be relocated to nearby developed commercial and industrial areas, and there would be no habitat or significant vegetation affected.

There would be no substantial change in ecosystem impacts resulting from the updated project design.

Water Resources

Sole Source Aquifer

The Project is located within the federally designated Central Pierce County Sole Source Aquifer, which means the aquifer supplies 50 percent or more of the drinking water for the area with no economically viable alternative source for drinking water. In addition, Title 18E of the Pierce County Code designates the aquifer as a Critical Recharge Area, which are defined as those areas that have a critical recharge effect on groundwater and/or demonstrate a high level of susceptibility or vulnerability to groundwater contamination from land use activities. Per the Aquifer Recharge and Wellhead Protection Area Standards in Title 18E.50.040 Part D, Non-Hazardous Sites, the Project and associated activities are allowed in the Critical Recharge Area, subject to standards listed including stormwater treatment and control. The Project

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adheres to these standards as described in Section B Environmental Elements, Part 3 Water in the 2016 SEPA Checklist.

Two key geotechnical studies have been conducted to assess the depth of the groundwater at the site. A geotechnical report, prepared by GeoEngineers, for the Sounder Yard and Shop Facilities (December 17, 2014) reported groundwater was encountered at the northwest corner of the intersection of 100th Street SW and SW Lakeview Boulevard when drilling at depths of 30 feet below the surface. A more recent study indicates that there is perched groundwater from about 12 to 20 feet below ground surface and the depth to groundwater was recorded in a deep well at about 40 feet (GeoEngineers 2019).

Proposed construction of the wheel truing facility inside of the Maintenance Building is not expected to exceed depths of approximately 10 feet below the ground surface; however, excavation for the work pit in the Maintenance Building would require excavation to approximately 21 feet in depth. The recent groundwater studies, however, indicate that this deep excavation would not likely extend into the sole source aquifer.

Areas where train maintenance activities would occur would be either inside or under a roof to prevent water from these areas draining to the stormwater. These areas would be connected to the sanitary sewer system. During facility operation, all liquid hazardous materials would be stored indoors. The planned construction does not include the installation of any underground storage tanks. No vehicle washing would occur on the site, and vehicle fueling would continue to primarily occur at the existing Amtrak Holgate Yard in South Seattle. As such, impacts to the groundwater would primarily occur during construction.

The proposed relocation alignments for the two power lines would not cross or be adjacent to any water bodies. Nor would the depth of the installed poles reach the estimated level of the perched water or groundwater table of the sole source aquifer.

The updated project design would not change potential effects to the sole source aquifer.

Impervious Surface

The updated design would increase impervious surface at the site. The updated layout would result in impervious surface totaling approximate 94 percent of the site and would consist of approximately 1,047,000 square feet of compacted gravel, pavement, concrete, and rooftops. This would be an increase

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of approximately 322,000 square feet compared to existing conditions. The updated layout, however, has increased in size with the acquisition of the additional parcel. The resulting impervious surface on the acquired parcel, however, is not new impervious surface and the existing building and surrounding parking lot and pavement cover nearly the entire parcel. The installation of the utility poles for the relocation of the two power lines would not affect surface water drainage.

Consistent with the original project, stormwater from project improvements will be collected and treated using BMPs approved by Washington Department of Ecology prior to infiltration into the subsurface. A Construction Stormwater Management Pollution Prevention Plan, including pollution prevention BMPs such as spill reporting and cleanup and temporary erosion and sediment control BMPs, will be developed and implemented during construction to avoid or minimize other potential impacts.

Environmental Health

The potential effects on hazardous materials from the updated design would be somewhat increased over what was presented in the 2018 SEPA Addendum.

As described in the 2016 SEPA Checklist, lube-oil-range hydrocarbons are present on the Century Yard site at concentrations greater than MTCA Method A clean-up levels. In addition, diesel-range petroleum hydrocarbons have been detected in a limited surface soil area and polyfluoroalkyl substances have been detected in groundwater approximately 15 feet below ground surface on the parcel to be acquired (5087000040) (Shannon & Wilson 2020).

During construction, the contractor would likely use small amounts of diesel fuel, oil, hydraulic fluid, construction adhesives, cleaning solvents, and similar chemical compounds on the site. To address environmental health hazards during construction, the contractor will prepare and implement plans to address the following: hazardous materials management, construction stormwater pollution prevention, health and safety, spill prevention, control and countermeasures, contaminated media management, and lead and asbestos abatement programs, as necessary. All required remediation will be consistent with applicable regulations, including the proper disposal of any contaminated soils. These plans will establish procedures for managing hazardous materials in accordance with state and federal regulations.

During operation, the updated project would continue to provide maintenance services for the same 106-vehicle fleet planned for 2040 and the same number of 10 repair positions in the Maintenance Building as

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evaluated in the 2018 SEPA Addendum. The types of ancillary facilities such as compressors, emergency generators, load cell testing facility, and transformers would be the same as previously proposed as part of the project. The emergency generator would be fueled by either natural gas or diesel fuel. The latter would require installation of an adjacent aboveground fuel storage tank that would either be a double-walled tank or surrounded by a secondary containment facility of equal to or greater than 110 percent of the tank capacity. The updated layout for the enlarged project, however, includes the MOW Shop Building for equipment storage and the additional nighttime coach cleaners stationed at the T&E Building. The types of maintenance and repair work on the train cars would require the use of diesel fuel, lubricants, cleaning solvents, and similar chemical compounds. All hazardous materials will be stored indoors, and the majority of mechanical activities will be conducted indoors. The proposed project includes the construction of a stand-alone hazardous materials shed near the Maintenance Building for safe storage of these chemicals. The handling and disposal of all hazardous wastes and hazardous materials resulting from operation and maintenance activities at the proposed facility will follow all applicable federal and state regulations. These BMPs will be used to reduce potential hazardous materials adverse impacts. The operation of the two relocated power lines would not affect environmental health conditions.

Cultural Resources

The *Cultural Resources Assessment for the Sounder Yard Expansion Project, Lakewood, Washington* conducted by Historical Research Associates, Inc (HRA) in 2013 included review of archival information, a cultural resource survey, and subsurface investigations (15 shovel probes). The Department of Archaeology and Historic Preservation predictive model for probabilities for prehistoric cultural resources indicates the Area of Potential Effect (APE) extends across Moderate and High risk areas. Based on their archival research, HRA determined there was a low to moderate probability for ethnohistoric period cultural remains and a Moderate to High probability of finding historic-period archaeological remains associated with the Northern Pacific Railroad. The historic Northern Pacific Railroad alignment was identified within the APE; however, no other landmarks, features or other evidence of Indian or historic use or occupation was found within the APE or any material evidence, artifacts, or areas of cultural importance on or near the site. Table 7-1 of the HRA report indicates that most of the shovel probes reached glacial outwash and that the glacial outwash begins well above the depth that would be excavated for the wheel truing building. On page 47 of the HRA report, the findings of the shovel probes identified sediments that were either: 1) highly disturbed and represented no potential to contain significant undisturbed archaeological deposits, or 2)

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were glacially deposited and therefore had no potential to contain deeply buried archaeological deposits. The HRA report recommends that all ground-disturbing activities be halted in the event archaeological deposits or human remains are inadvertently discovered during project construction to allow for further investigation. The State Historic Preservation Officer concurred with a determination of no adverse effect on October 1, 2013.

The proposed Project also includes acquisition of an adjacent parcel located east of the central portion of the site. The existing building, to be demolished for the Project, was built in 1990 and does not meet the age criteria of 50 years to be evaluated as an historic resource. The construction of the existing building also would more than likely have disturbed any buried archaeological resources. The property could be used for construction laydown and the design build contractor's office during construction and a parking lot is proposed on this parcel for workers at the nearby Maintenance Building.

The proposed relocation of the two power lines is not anticipated to result in any adverse effects on either historic resources or buried archaeological resources. No historic resources would be removed to relocate the utilities, and utility lines are consistent with the commercial and industrial nature of existing uses. Furthermore, the majority of the alignments for both relocated power lines would be within the public road rights-of-way or private roadway easement for 39th Avenue SW, which would mean the construction of those roads would likely already have disturbed any potential buried archaeological resources. It is unknown if there may be buried archaeological resources that could be disturbed during construction for the short portion of the PSE overhead power line relocated to an easement on private property.

Public Services

The proposed Souder Maintenance Base Project is not expected to increase the need for public services. The updated project design would not increase either the number or duration of nighttime train crossings of 100th Street SW and would eliminate Steilacoom Boulevard SW crossings compared to impacts in the 2018 SEPA Addendum. The relocation of the two power lines would not affect fire, police, or other emergency service providers. The power lines would generally be located along the edges of public road rights-of-way and would not affect any vehicular traffic, including emergency service providers. Therefore, there would be no increase in impacts to public services or emergency response times.

Energy and Natural Resources

The energy consumed by the updated and expanded project evaluated in this 2020 SEPA Addendum would increase. The proposed building footprint, including the Maintenance Building and the MOW Shop Building, would expand from approximately 60,000 SF to up to 118,000 SF, a near doubling of building footprint. These proposed buildings would require electrical power for lighting and operation of equipment and would be heated with natural gas. The proposed relocation or re-construction of a similar size T&E Building and the required ancillary buildings would not substantially increase energy consumption compared to the project evaluated in the 2018 SEPA Addendum. In addition, the outside areas including expanded parking lot areas, access roads, and expanded new track work also would increase electricity for lighting consumed on the site.

Best management practices are proposed to reduce these impacts. The proposed indoor and outdoor areas would be lit with LED lamps to conserve energy. Skylights would be incorporated within the Maintenance Building roof to provide additional daylighting, and reduce energy use related to lighting, where possible. Those areas in the Maintenance Building and the MOW Shop Building associated with maintenance and repair activities would not be cooled and would be heated only to ensure temperatures inside would not fall below freezing. Only the Maintenance Building's office and worker welfare space and the T&E Building would be fully heated and cooled for worker comfort. As such, the total area of these conditioned building spaces has not substantially increased since the evaluation of energy impacts in the 2016 SEPA Checklist. Moreover, the overall effect of the proposed project would be to contribute to the reliable and efficient operation of the commuter rail system (Souder). The operation of the two relocated power lines would not change energy consumption.

Utilities

To make room for the proposed new track layout proposed as part of the updated layout, the PSE and TPU overhead power lines currently located on the Century Yard site are proposed to be relocated offsite in nearby public roadway rights-of-way and utility easements on private property. The relocation of the power lines would occur at the beginning of the construction period by the utility contractors. Attachment B shows the proposed alignments for the relocated utility lines. These alignments may be refined during final design through coordination between Sound Transit and the two utilities, PSE and TPU. The alignment, number, and type of poles, as well as the height of the power line would be coordinated to ensure adequate

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horizontal and vertical clearances are maintained for safe operations of the power lines. Additional minor communication utility relocations may also be required, including existing bundled fiber optic lines, and would be coordinated with the fiber optic utility providers. The relocation of a City of Lakewood owned storm pipe will also be coordinated with the City of Lakewood.

Train toilet waste discharge would occur in the planned Maintenance Building. A total of up to 2,400 gallons per day of train toilet waste would be discharged directly into the Pierce County Sewer system. This discharge would all occur during nighttime hours. Preliminary coordination with the utility indicates this toilet waste discharge would not result in adverse effects with respect to wastewater volumes as it would be occurring during off-peak nighttime hours.

No other impacts to utilities are anticipated, and no additional mitigation measures would be required.

Environmental Justice

The original Project did not have disproportionately high and adverse impacts on minority or low-income populations. The updated project layout would not increase such impacts. Therefore, the Project with identified mitigation does not have disproportionately high and adverse impacts on minority or low-income populations.

Cumulative and Indirect Impacts

There are no reasonably foreseeable actions in the Project area that would result in an increase in cumulative impacts. The traffic analysis assumes future traffic growth and planned improvements. The revised site layout and updated train operations plan for the maintenance activities would not increase impacts over those described in the 2016 SEPA Checklist. Therefore, there is no change in cumulative or indirect effects.

Conclusion

The updated design and layout to the Sounder Maintenance Base Project would not alter the conclusions of the 2016 SEPA Checklist and DNS or the 2018 SEPA Addendum. Mitigation will include residential noise mitigation and coordination with Pierce Transit to reduce impacts to bus routes. No new probable significant adverse environmental impacts would arise. Table 2 is a list of all of the Project's environmental commitments that have been presented in each of the past environmental documents – the 2016 SEPA

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Checklist, the 2018 SEPA Addendum, and this 2020 SEPA Addendum. These include mitigation measures to reduce adverse impacts as well as standard best management practices.

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Table 2. Comprehensive Summary of Environmental Commitments

Resource Area	Environmental Commitments
Transportation	Discussions with Pierce Transit and Sounder train operations workers will continue through final design to identify opportunities to minimize potential impacts to public transit riders and non-revenue (deadheading) buses due to train blockages at 100th Street SW. Potential options may include temporary (time of day) rerouting of buses to Steilacoom Boulevard SW or permanent route realignment to circumvent 100th Street SW. Also, temporary (time of day) or permanent rerouting of deadheading buses returning to the Pierce Transit maintenance base in the evening could minimize the impact of train switching activity on bus routes and non-revenue bus operations.
Water Quality/Erosion	Sound Transit will develop project design, preliminary construction methods, and construction specifications that would notify the construction contractor of the sensitive nature of the aquifer resources and require Best Management Practices be implemented during construction to protect it.
	A construction de-watering plan or other methods may be needed for the construction of the work pits to prevent mobilization of possible contamination.
	Sound Transit will include information about the Central Pierce County Sole Source Aquifer's importance to local drinking water supplies in the construction and maintenance contracts
	Sound Transit will post signs in the completed facility educating workers about the sole source aquifer and its importance to local drinking water supplies.
	The following best management practices (BMPs) will be used to reduce or control erosion and sediment impacts during construction to the extent possible: Construction BMPs, such as the use of stabilized construction entrances, silt fencing, sediment traps, application of seeding or mulching for soil stabilization, or other techniques, will be incorporated as necessary in accordance with the requirements of the NPDES permit for construction. <ul style="list-style-type: none"> • The areal extent of exposed soil will be minimized at any given time. • A Temporary Erosion and Sediment Control Plan will be prepared prior to construction to identify erosion and sediment control procedures.
	Construction BMPs, such as the use of stabilized construction entrances, silt fencing, sediment traps, application of seeding or mulching for soil stabilization, or other techniques, will be implemented as necessary in accordance with the NPDES Construction Stormwater General Permit requirements.
Post-construction, stormwater from project improvements will be collected and treated using BMPs approved by Washington Department of Ecology Stormwater Management Manual requirements prior to infiltration.	

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Resource Area	Environmental Commitments
Air Quality	The construction contractor will be required to comply with all relevant federal, state, and local air quality laws, including the requirements of the Puget Sound Clean Air Agency.
	<p>Appropriate BMPs will be employed to reduce surface and air movement of dust during grading, demolition, and construction. Construction-related mitigation measures will include the following as needed to control dust:</p> <ul style="list-style-type: none"> • Impervious surfaces on the site would be maintained to suppress dust. • Project-specific and appropriate BMPs for disturbed soil covers and/or stockpiled materials will be implemented. • Construction will be planned to minimize exposing areas of earth for extended periods. • Appropriate emission-control devices will be required on all construction equipment powered by gasoline or diesel fuel to reduce carbon monoxide and nitrogen oxide emissions in vehicular exhaust.
Ecosystems	During construction, the Garry Oaks that are east of the existing access road at 100 th Street SW and south of the MOW Shop Building south storage yard will be protected by a temporary 6-foot-high chain link fence to avoid damage to the trees or their root systems.
	<p>Minimize vegetation clearing, restoring temporarily affected areas and prepare and implement a revegetation plan.</p> <p>In accordance with the Migratory Bird Treaty Act, Sound Transit will consult with the U.S. Fish and Wildlife Service on measures to avoid impacts on migratory birds. Measures likely to be required may include preconstruction surveys for migratory birds and/or restrictions on vegetation clearing during the breeding season for migratory birds. Except where hazard trees pose an immediate threat to rail safety or reliability, vegetation maintenance and hazard tree removal will be conducted outside of the breeding season for migratory birds.</p>
Energy	The Sounder Maintenance Base Project improvements will be lit with LED lamps to conserve energy. In addition, the proposed Project would comply with applicable requirements of the Lakewood Energy Code. Skylights will be included within the Maintenance Building roof to provide additional daylighting, and reduce energy use related to lighting, where possible.
Visual	Landscaping for the proposed Project will be consistent with Sound Transit's Design Criteria Manual Rev 5 - June 2018 requirements, which may include landscaping along Steilacoom Boulevard SW, east of the existing drive, in the parking lot, and building landscaping as determined through the permit approval process.
	Outdoor lighting will be shielded and focused downward.

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Resource Area	Environmental Commitments
Noise	<p>Moderate noise impacts under the FTA criteria are predicted to occur at one of the four locations evaluated for the Project, representing 12 multi-family residences and 4 single family residences, as a result of the warning devices sounded at the 100th Street SW maintenance-related train crossings during nighttime hours. Because the impacts would result from safety devices located at a roadway crossing, constructing barriers to shield residences from noise is not possible while maintaining access to the crossing and continuing to provide an audible warning to approaching traffic. Instead, residential sound insulation will be evaluated for the 12 multi-family residential units and 4 single family units that would experience moderate impacts and offered at properties where the existing building does not already achieve a sufficient exterior-to-interior reduction of noise levels. During final design, all predicted noise levels and mitigation measures will be reviewed. If equivalent mitigation can be achieved by a less costly means or if the final design analysis shows no impact, then the mitigation measure may be modified or eliminated.</p>
	<p>All construction activities will comply with local noise regulations. Nighttime work (10:00 PM to 7:00 AM weekdays and 10:00 PM to 9:00 AM weekends) is regulated by the City of Lakewood as a public disturbance. If construction occurs during nighttime hours, the following measures will be implemented as needed to reduce potential effects of construction noise:</p> <ul style="list-style-type: none"> • Natural and artificial barriers (e.g., ground elevation changes and existing buildings) will be considered for use as shielding against construction noise. • Noisier activities involving large machinery will be limited to daytime hours as much as practical. • Stationary construction equipment will be placed as far away from sensitive receiving locations as much as possible. • Construction hours will be set, and construction activity noise level emission criteria will be determined and compliance required during construction.
Hazardous Materials	<p>Given that there are lube oil-range hydrocarbons present on the site at concentrations greater than MTCA Method A clean-up levels and diesel-range petroleum hydrocarbons have been detected in surface soil and polyfluoroalkyl substances have been detected in groundwater approximately 15 feet below ground surface on the parcel to be acquired (5087000040), any required remediation will be consistent with applicable regulations including the proper handling and disposal of any contaminated soils disturbed during construction.</p>
	<p>To address environmental health hazards during construction, the contractor will implement plans to address hazardous materials management, construction stormwater pollution prevention, health and safety, spill control and prevention, contaminated media management, and lead and asbestos abatement programs as necessary. These plans will establish the procedures for managing hazardous materials in accordance with state and federal regulations</p>
	<p>To address the hazardous materials being stored on site, health and safety plans and spill control and prevention plans will be implemented post-construction to establish the procedures for managing hazardous materials in accordance with state and federal regulations.</p>
Cultural Resources	<p>In the event that archaeological deposits are inadvertently discovered during construction in any portion of the APE, ground disturbing activities in the vicinity of the find will be halted immediately and Sound Transit will be notified immediately. Sound Transit will contact DAHP, as well as other agencies and affected Tribes, as appropriate.</p>

References

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- GeoEngineers. 2019. *Environmental and Hydrogeologic Conditions, Summary Report for the Souder Maintenance Base, Lakewood, Washington*. Submitted to WSP USA. April 2019.
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- Sound Transit. 2016. *Sound Transit 3, The Regional System Plan for Central Puget Sound (ST3)*. Adopted June 23, 2016.
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- Sound Transit. 2017b. *Souder Yard and Shops Facility Project, ESA Screening Checklist Update*. Prepared by WSP USA Inc. December 2017.
- Sound Transit. 2017c. *Souder Yard and Shops Facility Project, Noise and Vibration Technical Memorandum Update*. Prepared by WSP USA Inc. December 2017.
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- Sound Transit. 2017e. *Souder Yard and Shops Facility Project, Transportation Technical Memorandum Update*. Prepared by WSP USA Inc. December 2017.

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Sound Transit. 2018. *Sounder Yard and Shops Facility Project SEPA Addendum to the Sounder Yard and Shops Facility Project SEPA Environmental Checklist (March 25, 2016)*. April 23, 2018.

Sound Transit. 2018. *Design Criteria Manual*, Revision 5. June 2018.

Sound Transit. 2020. *Transportation Technical Memorandum Update*. Prepared by WSP USA Inc. March 13, 2020.

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ATTACHMENTS

- A. Project Vicinity Map
- B. Updated Site Layout and Configuration (2020)
- C. Site Layout and Configuration (April 23, 2018)
- D. Site Layout and Configuration (March 25, 2016)
- E. Transportation Technical Memorandum Update
- F. ESA Screening Checklist Update
- G. Updated Modeled Sound Levels of Project-Related Noise Updated Data and Map of Modeled Area

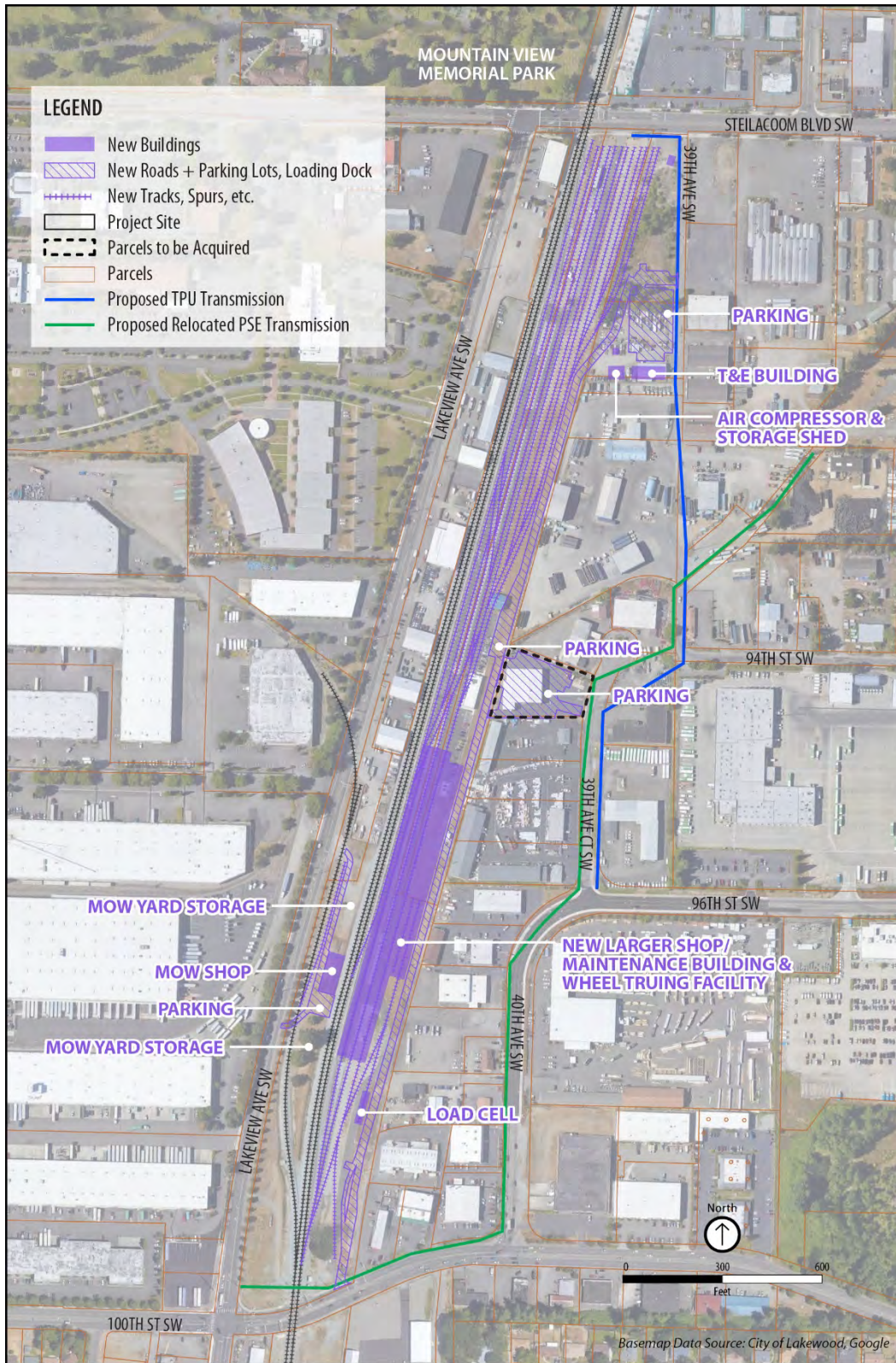
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ATTACHMENT A. Project Vicinity Map



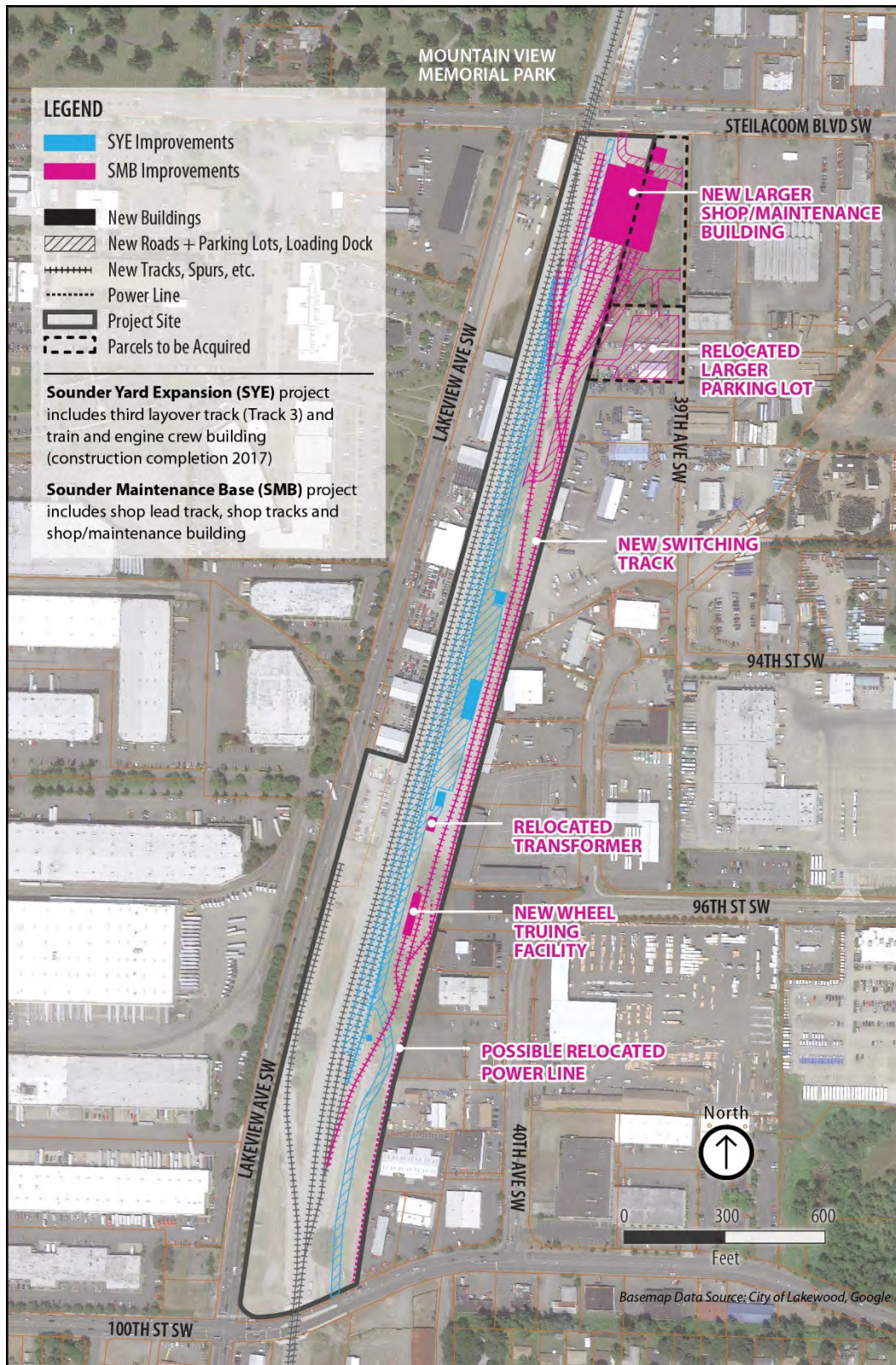
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ATTACHMENT B. Updated Site Layout and Configuration (2020)



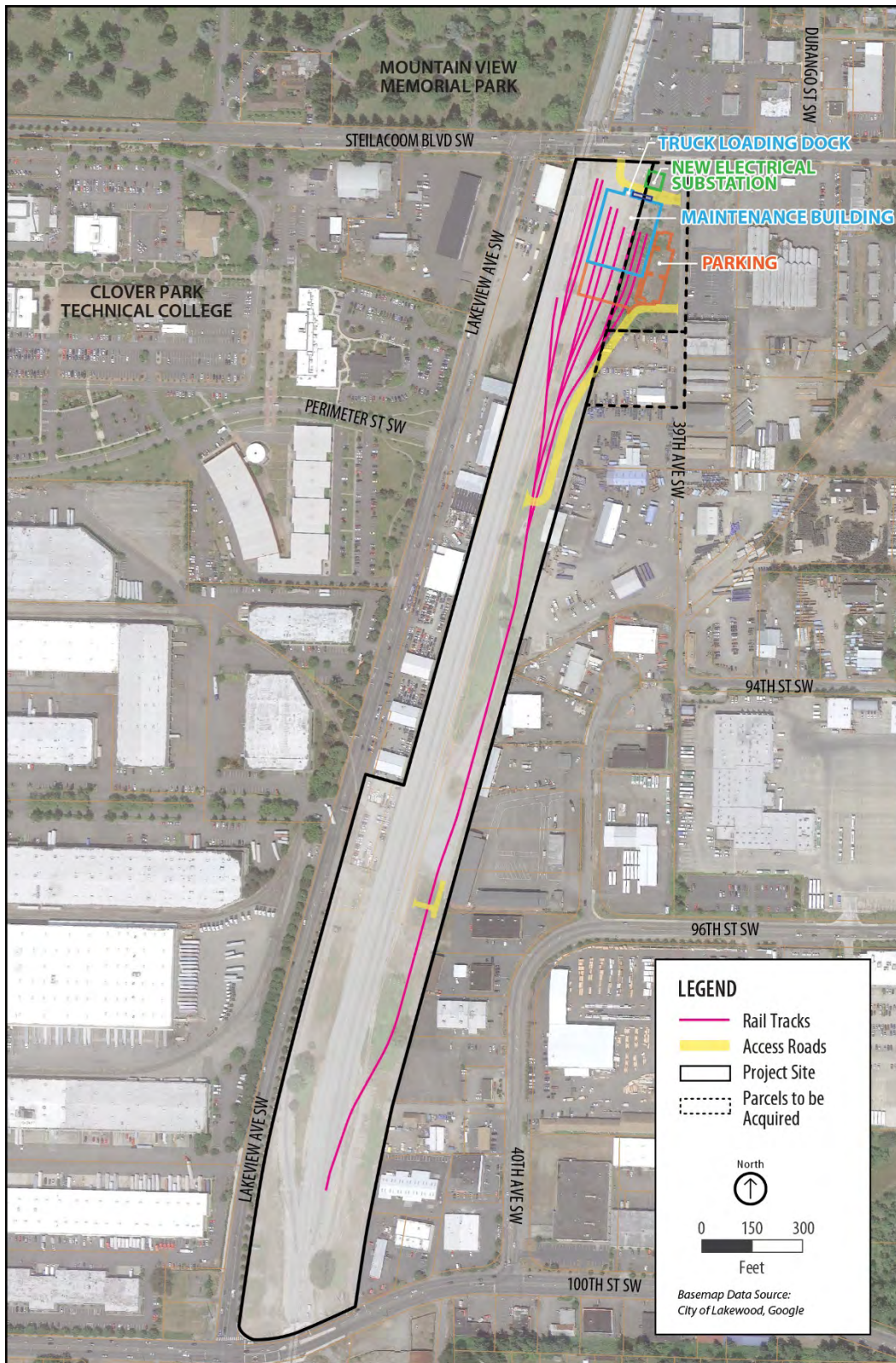
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ATTACHMENT C. Site Layout and Configuration (April 23, 2018)



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ATTACHMENT D. Site Layout and Configuration (March 25, 2016)



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ATTACHMENT E
Transportation Technical Memorandum Update

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MEMORANDUM

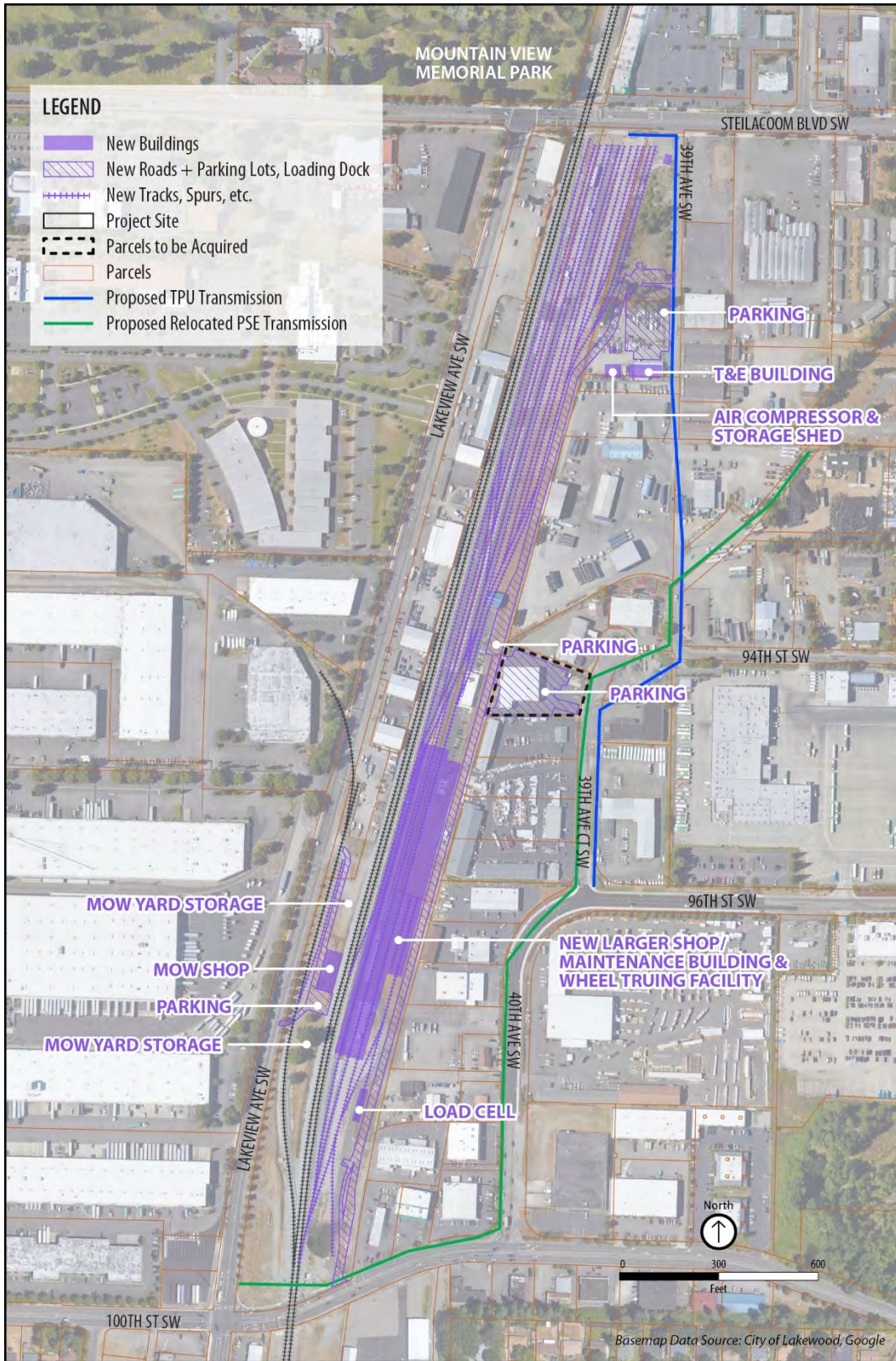
TO: Lauren Swift, Senior Environmental Planner
FROM: Tony Lo, WSP USA Inc.
SUBJECT: Transportation Technical Memorandum Update
DATE: March 13, 2020

1 Introduction

This Transportation Technical Memorandum Update provides supporting documentation for the Sounder Yard and Shops Facility Project (now known as the Sounder Maintenance Base Project) Washington State Environmental Policy Act (SEPA) Addendum to reflect a second update to the Sounder Maintenance Base design and operations plan. The purpose of the memorandum update is to address any potential transportation impacts that may result from the updated maintenance base facility design.

The updated design and operation of the proposed Sounder Maintenance Base Project differs in several ways from the project previously evaluated in the 2018 SEPA Addendum. Several key issues including site access, number of workers, and shift hours affect the analysis of potential transportation impacts. To access the maintenance facility loading docks on the north side of the building, all delivery trucks would arrive from the gated driveway off 100th Street SW, drive past the guard booth along the site access road and back into the loading dock, and then exit the site traveling north to the guard booth at the gated entrance off 39th Avenue SW. In the 2018 SEPA Addendum, trucks could enter the site either directly from Steilacoom Boulevard SW or from the 39th Avenue SW driveway. Additional trucks would deliver equipment and materials to the proposed Maintenance-of-way (MOW) Shop Building from a new driveway on Lakeview Avenue SW. Workers would continue to enter the Century Yard site from a proposed driveway at 39th Avenue SW, but a new driveway off of 39th Avenue Court SW would allow workers direct access to the Maintenance Building parking lot on the acquired Parcel 5087000040. See Figure 1 for the updated site layout.

Figure 1. Updated Site Layout and Configuration (2020)



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The updated layout would require all trains to enter the Century Yard site from the south, crossing 100th Street SW. In the 2018 SEPA Addendum, trains also could enter the site from either the south or the north crossing Steilacoom Boulevard SW. The number of potential nighttime (between 8pm and 4 am) train crossings of 100th Street SW and duration of up to 3.5 minutes would be the same as evaluated in the 2018 SEPA Addendum.

The number of workers on the site would substantially increase. The Maintenance Building workers would increase from 41 day-shift and 4 night-shift workers to about 50 days-shift and 14 night-shift workers. The number of workers at the Train and Engine Crew (T&E) Building would increase from about 31 workers (assumed 31 day and 31 night, but not evaluated in the 2018 SEPA Addendum as no changes proposed to that facility) to approximately 42 day-shift workers and 62 night-shift workers. The night-shift T&E Building workers includes 20 coach cleaners. No workers would be stationed full-time at the MOW Shop Building. In the 2018 SEPA Addendum, the Maintenance Building shift changes were conservatively assumed to coincide with the typical commute periods, when actual shifts would not occur during peak commute period. With the increased number of workers, this conservative approach is no longer appropriate.

2 Methodology

This memorandum provides both a qualitative and quantitative assessment of how the updated site design and operations plan affect the traffic analysis results compared to the previous analysis prepared to support the 2018 SEPA Addendum. The existing year analysis has been updated to reflect 2020 conditions and future Baseline and Build horizon years have been revised from 2023 evaluated in the 2018 SEPA Addendum to the new opening year of 2024. Also, included in the assessment are the transportation impacts related to changes in worker activity levels and peak-hour traffic conditions. The full site build-out and peak staffing levels are assumed to be in place at the start of operations in 2024. This provides a conservative estimate of potential site-related impacts and avoids the need to examine a longer-range horizon.

Nighttime train maintenance-related crossings across 100th Street SW are assumed to be the same as previously documented. That analysis assumed up to eight train crossings for a duration of up to 3.5 minutes per crossing for the 10-car train sets. As these assumptions are unchanged,

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no new rail crossing analysis was conducted. Site access per the updated design and operations are evaluated for this work, however. These includes site accesses from 100th Street SW, 39th Avenue SW and 39th Avenue Ct SW. The new driveway from Lakeview Avenue SW to the MOW Shop Building is not included in the analysis. This is because trucks entering the MOW Shop Building would drive one-way through the site and would not impact Lakeview Avenue SW. Maintenance-related access to the site would not occur from Steilacoom Boulevard SW with the proposed refinements.

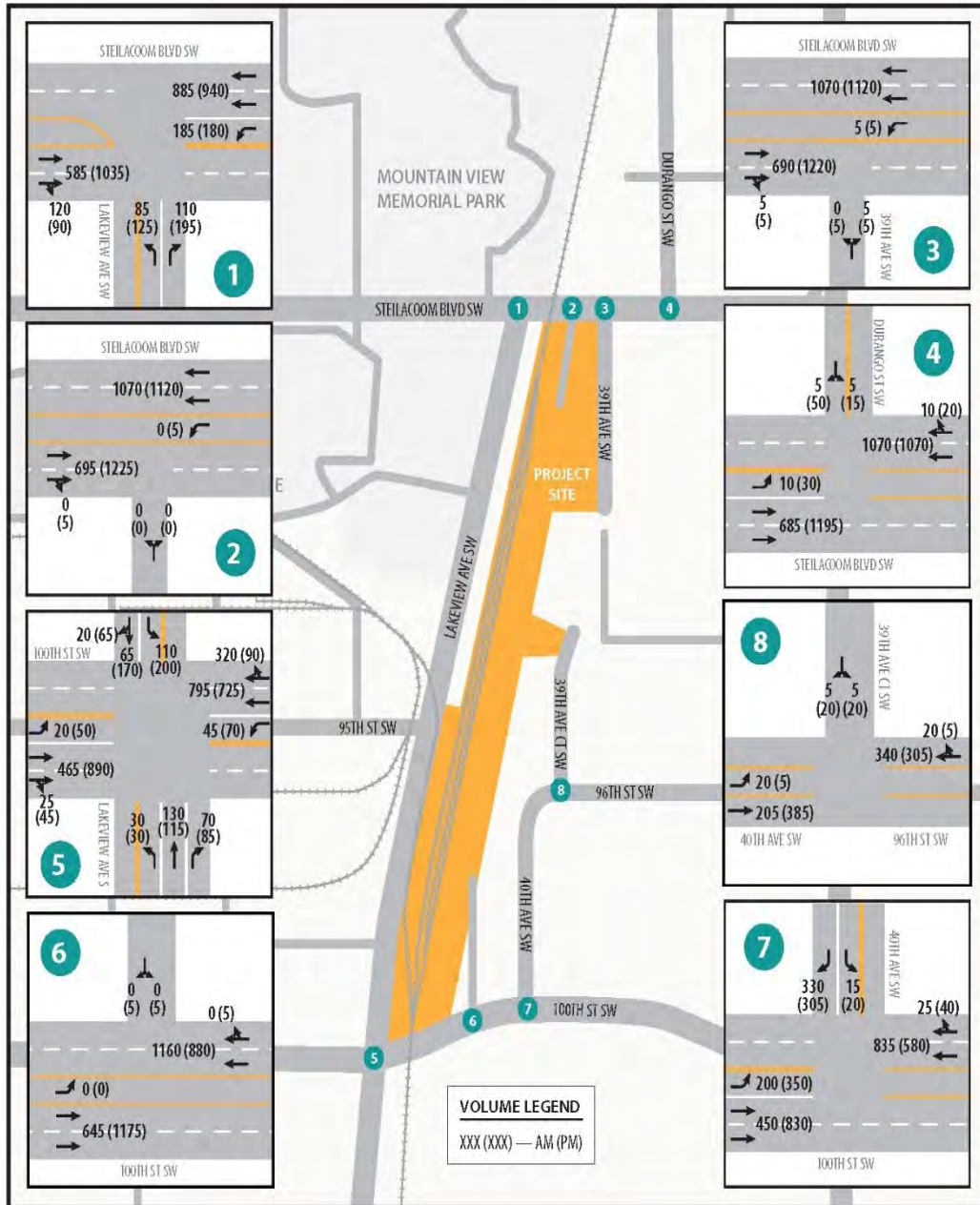
3 Existing Conditions

3.1 Peak-Hour Traffic Volumes

Existing transportation conditions for the Sounder Maintenance Base Project in terms of the roadway network, signals, transit service levels, crashes, non-motorized amenities, and freight activity within the study area have been updated for the model analysis since the previous *Sounder Yard and Shops Facility Transportation Technical Memorandum* (March 25, 2016) to now reflect 2020 conditions. The existing year of the updated Synchro traffic analysis has been revised from 2015 to 2020 to reflect current year conditions (see Appendix C). Since the Sounder Yard Expansion Project was completed in 2017, two new driveways associated with that project [(1) a full access driveway to/from Steilacoom Boulevard SW and (2) a site driveway to/from 100th Street SW] were added to the existing year analysis. Vehicle turning movement counts for these two locations were collected in February 2020 (see Appendix D). Volumes for the remaining study intersections were scaled and normalized based on an annual growth rate of 1.5 percent from the original 2015 volumes and balanced to match the collected count data at the two driveway locations. Due to a new Sounder Maintenance Base Project access point proposed from 39th Avenue Court SW, the 40th Avenue SW/39th Avenue Court SW intersection was added to the analysis of intersections. Turning movement volumes at that location are estimated based on volume balancing and turning volume proportions.

The updated existing conditions volumes are shown in Figure 2. Analysis was conducted for the commute AM and PM peaks, which are generally defined as 7:00 to 8:00 AM and 4:00 to 5:00 PM, respectively.

Figure 2. Existing (2020) AM and PM Volumes



3.2 Intersection Level of Service

The operational analysis update for AM and PM existing peak-hour traffic conditions reflecting the eight study intersections was performed using the Synchro (Version 10) analysis package. HCM 2000 Signalized and HCM 2010 Two-way Stop Approach methodologies were used for the reporting of intersection delays and level of service.

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The AM and PM peak-hour traffic congestion levels for the eight study intersections, shown in Table 1, shows a slight increase in delay compared to the previous analysis results due to the background increase in volume between the 2015 and 2020 existing years. Nonetheless, the results indicate low to moderate intersection delays and acceptable level of service for all study locations.

Table 1. Existing (2020) Peak-Hour Level of Service

AM Peak Hour					
Intersection	Control	Intersection Average		Worst Movement	
		LOS	Delay ¹	Movement	Delay ¹
Steilacoom Blvd SW/Lakeview Ave SW	Signal	A	9.9	NBL	54.4
Steilacoom Blvd SW/39th Ave SW	Stop	A	< 5	NBL	11.8
Steilacoom Blvd SW/Durango St SW	Stop	A	< 5	SBL	22.4
Steilacoom Blvd SW/Sounder Yard Expansion Driveway ²	Stop	A	< 5	NBL	< 5 ³
100th Street SW/Lakeview Ave SW	Signal	C	26.4	WBL	53.6
100th Street SW/40th Ave SW	Signal	B	18.8	WBT	26.5
100th Street SW/Sounder Yard Expansion Driveway ²	Stop	A	< 5	SBL	< 5 ³
40th Ave SW/39th Ave Ct SW	Stop	A	< 5	SBL	11.3
PM Peak Hour					
Intersection	Control	Intersection Average		Worst Movement	
		LOS	Delay ¹	Movement	Delay ¹
Steilacoom Blvd SW/Lakeview Ave SW	Signal	B	14.7	NBL	58.6
Steilacoom Blvd SW/39th Ave SW	Stop	A	< 5	NBL	24.7
Steilacoom Blvd SW/Durango St SW	Stop	A	< 5	SBL	22.5
Steilacoom Blvd SW/Sounder Yard Expansion Driveway ²	Stop	A	< 5	WBL	11.8
100th Street SW/Lakeview Ave SW	Signal	C	32.5	NBL	48.4
100th Street SW/40th Ave SW	Signal	B	12.1	SBL	22.6
100th Street SW/Sounder Yard Expansion Driveway ²	Stop	A	< 5	SBL	39.5
40th Ave SW/39th Ave Ct SW	Stop	A	< 5	SBL	11.8

Notes: NBL = Northbound left; SBL = Southbound left; WBL = Westbound left;

¹Delays are represented in seconds per vehicle.

²Study location added due to the completion of Sound Yard Expansion Project

³No volume for minor street approach.

3.3 Transit Routes and Service

Public transit near the Century Yard site described in this study reflects 2020 transit service levels. Based on 2020 bus schedules and time tables for Pierce Transit, four main bus routes serve the site and are near (or relatively near) the site: Route 48 along Steilacoom Boulevard SW (north side of the site), Route 4 along 100th Street SW (south side of the site), and Route 3 on South Tacoma Way (east side of the site). Pierce Transit also operates Sound Transit bus route 574 on 108th Street SW; and during weekday evening hours, several deadheading buses (non-revenue service trips) use 100th Street SW to return to the Pierce Transit bus maintenance base on 96th Street SW. Service levels (headways) for these routes are approximately 30 minutes for most of the day and 60 minutes for the last few trips during the evening and on weekends. The exception is Route 3, which has 30-minute headways on Saturdays. These routes are summarized in Table 2. More detailed information regarding routes/service levels can be found on the Pierce Transit website.

Table 2. Bus Routes Serving the Century Yard Site Area

Bus Route	Relevant Arterial	Origin–Destination Pair	Peak/Off peak Frequency	Weekday Hours of Operation	Nearest Stop to Site
48	Steilacoom Blvd SW	Lakewood—Tacoma	30/60 minutes	5:15 AM—9:15 PM	~800 feet
4	100th St SW	Lakewood—South Hill Mall	30/60 minutes	5:45 AM—10:15 PM	~650 feet
3	South Tacoma Way	Lakewood—Tacoma	30/60 minutes	5:15 AM—9:15 PM	~0.5 mile
574	108th St SW	Lakewood-SeaTac	30/60 minutes	2:13 AM – 11:30 PM	~0.6 mile

Source: Pierce Transit

3.4 Crash History

The crash history summarized in this study was provided by the City of Lakewood and presents updated crash data from 2014 to 2018. A detailed crash data summary is shown in Appendix A. The locations analyzed for crashes mirror those described in the previous *Transportation Technical Memorandum* (2016) as no crash analysis was included in the 2017 study supporting the 2018 SEPA Addendum. Table 3 summarizes the updated crash history.

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From the data summarized for the 2014-2018 period, the Steilacoom Boulevard SW and Lakeview Avenue SW intersection resulted in the highest number of crashes (47). However, the majority of crashes resulted in no injuries (27). The findings for this location are consistent with the crash history from 2009 to 2015 reported previously. The 100th Street SW and Lakeview Avenue SW intersection has experienced the second highest number of crashes and similarly shows the second highest number of serious injuries (2). The intersection of 40th Avenue SW and 39th Avenue Court SW shows the lowest number of crashes. However, despite the low overall crash numbers at this location, a fatality and a serious injury was reported.

Table 3. Five-Year Crash History Summary (2014 to 2018)

Intersection	Number of Crashes	Severity				
		No Injury	Possible Injury	Serious Injury	Fatality	Unknown
100th St SW/ Lakeview Ave SW	39	21	13	2	0	3
100th St SW/ 40th Ave SW	33	24	7	1	0	1
Steilacoom Blvd SW/ Lakeview Ave SW	47	27	17	1	0	2
Steilacoom Blvd SW/ 39th Ave SW	0	0	0	0	0	0
Steilacoom Blvd SW/ Durango St SW	14	10	3	0	0	1
40th Ave SW/ 39th Ave CT SW	6	4	0	1	1	0

Source: Washington State Department of Transportation Crash Data, 1/1/2014 through the end of 2018

4 Future Conditions

Future transportation conditions described in this study reflect the updates to the Century Yard site to accommodate expanded maintenance operations, increased staff counts, and facility design. The focus of this discussion is on arterial and intersection traffic operations (morning and evening peak hour) and nighttime crossing impacts on 100th Street SW as they compare to the previous findings. Future impacts to non-motorized demands, and/or freight movements are not expected to change, and have not been analyzed in this study.

4.1 Roadway Network Changes

Planned or proposed changes to the study area arterials captured in the 2015-2020 City of Lakewood *Six-Year Comprehensive Transportation Improvement Program* were described in the previous *Transportation Technical Memorandum Update* (2017). Of those projects, the roadway restoration for Steilacoom Boulevard SW from Lakewood Drive SW to S Tacoma Way and the signal replacement at the intersection of Steilacoom Boulevard SW and Lakeview Avenue SW have been completed.

Based on the 2020-2025 City of Lakewood *Six-Year Comprehensive Transportation Improvement Program*, the proposed new traffic signal at Steilacoom Boulevard SW and Durango Street SW is awaiting full funding for implementation by the 2024 horizon.

4.2 Future Traffic Volumes

Background growth in traffic volume was described previously with the assumption that future traffic levels on the main study arterials of Steilacoom Boulevard SW, 100th Street SW, and Lakeview Avenue SW would increase consistent with the 2016 modeled analysis. That analysis assumed the growth in traffic volumes would increase at approximately 1.5 percent per year from 2015 through 2020. This level of background growth is assumed in this analysis for the Souder Maintenance Base Project through opening year in 2024.

Provided the expanded site operations and the new estimated worker counts (168), trip generation for the site was reassessed based on the staff shifts and counts assumptions outlined in Appendix B. Based on the staff shifts schedule, there are four shifts among all workers from the Maintenance Building and T&E Building workers. These shifts are 3:00 to 6:30 a.m., 7:00 a.m. to 4:00 p.m., 5:00 p.m. to 8:00 p.m., and 8:00 p.m. to 4:00 a.m. Except for Maintenance Building workers, all other workers have shifts starting and ending at off-peak times. A summary of the revised trip generation for the Souder Maintenance Base Project based on the increased number of workers at the site is provided in Table 4.

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Table 4. Project Trip Generation Summary

Time Period	Sounder Maintenance Base Project		Other Purpose Trips ¹		Total Project Trips	
	Entering	Exiting	Entering	Exiting	Entering	Exiting
Morning Peak Hour (7 to 8 a.m.)	50	0	5	5	55	5
Afternoon Peak Hour (4 to 5 p.m.)	42	50	5	5	47	55
Evening (7 to 8 p.m.)	34	42	0	0	34	42
Early Morning (3 to 6:30 a.m.)	42	76	0	0	42	76
Daily (24-hour period)	168	168	10	10	178	178
Total trips occurred outside of commute peak periods	76	118	0	0	76	118
Total trips occurred during the commute peak periods	92	50	10	10	102	60

Note:

¹Reflects staff break and delivery trips.

The previous trip generation approach used for the 2016 SEPA Checklist and 2018 SEPA Addendum assumed the arrival and departure of all workers coinciding with typical commute period activity for simplicity because of the low number of workers at the site. However, due to an expected more than 50 percent increase in the estimated total worker count compared to the previous concept/operations plan, this approach is no longer deemed appropriate. Instead, shifts that are scheduled to occur outside of the commute peak periods (ex. T&E Building workers that arrive before 6 am and leave before 4 pm) are not included in the AM and PM peak hours modeling scenarios. As shown in Table 4, the total number of site generated trips captured during the peak hours account for approximately 54 percent of total entering trips and 30 percent of the total exiting trips.

The trip demand anticipated to occur in the morning and afternoon peak hours (bolded in Table 4) are distributed across the three driveways serving the site to/from 39th Avenue SW, 39th Avenue Court SW, and 100th Street SW. Previously, the 2018 SEPA Addendum traffic analysis assumed an even split in the trip distribution among the two proposed driveways. For this update, the driveway locations and numbers have been modified so detailed information has been provided on potential arrival and departure patterns for workers. The split percentages assumed for trip distribution and assignment purposes is shown in Table 5 based on the following assumptions:

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- No traffic is entering from Steilacoom Boulevard SW
- All truck deliveries and some workers would enter the site from 100th Street SW
- All truck deliveries would leave the site via 39th Avenue SW
- Most workers at the T&E Building would enter and exit via 39th Avenue SW
- Most workers at the Maintenance Building would enter and exit via the driveway to 39th Avenue Court SW (new driveway).

Table 5. Percentages of Trips Assigned to Each Driveway per Facility

Entrances	Maintenance Building	MOW Shop (from MB)	T&E Building
39th Ave Ct SW	90%	33%	5%
39th Ave SW	5%	34%	90%
100th St SW	5%	33%	5%

Note: Trips from the MOW Shop Building are originating at the Maintenance Building.

Summaries of the 2024 Baseline intersection volumes, trips generated from the Sounder Maintenance Base Project, and the 2024 Build condition intersection volumes for the eight key intersections are provided in Figure 3, Figure 4, and Figure 5. It is important to note that the Sounder Yard Expansion Project was completed in 2017, and therefore the volumes associated with that project previously assumed in the *Transportation Technical Memorandum* (2016) and the 2018 SEPA Addendum are replaced by new empirical count data collected in 2020.

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Figure 3. 2024 Baseline Intersection AM and PM Peak Hour Volumes

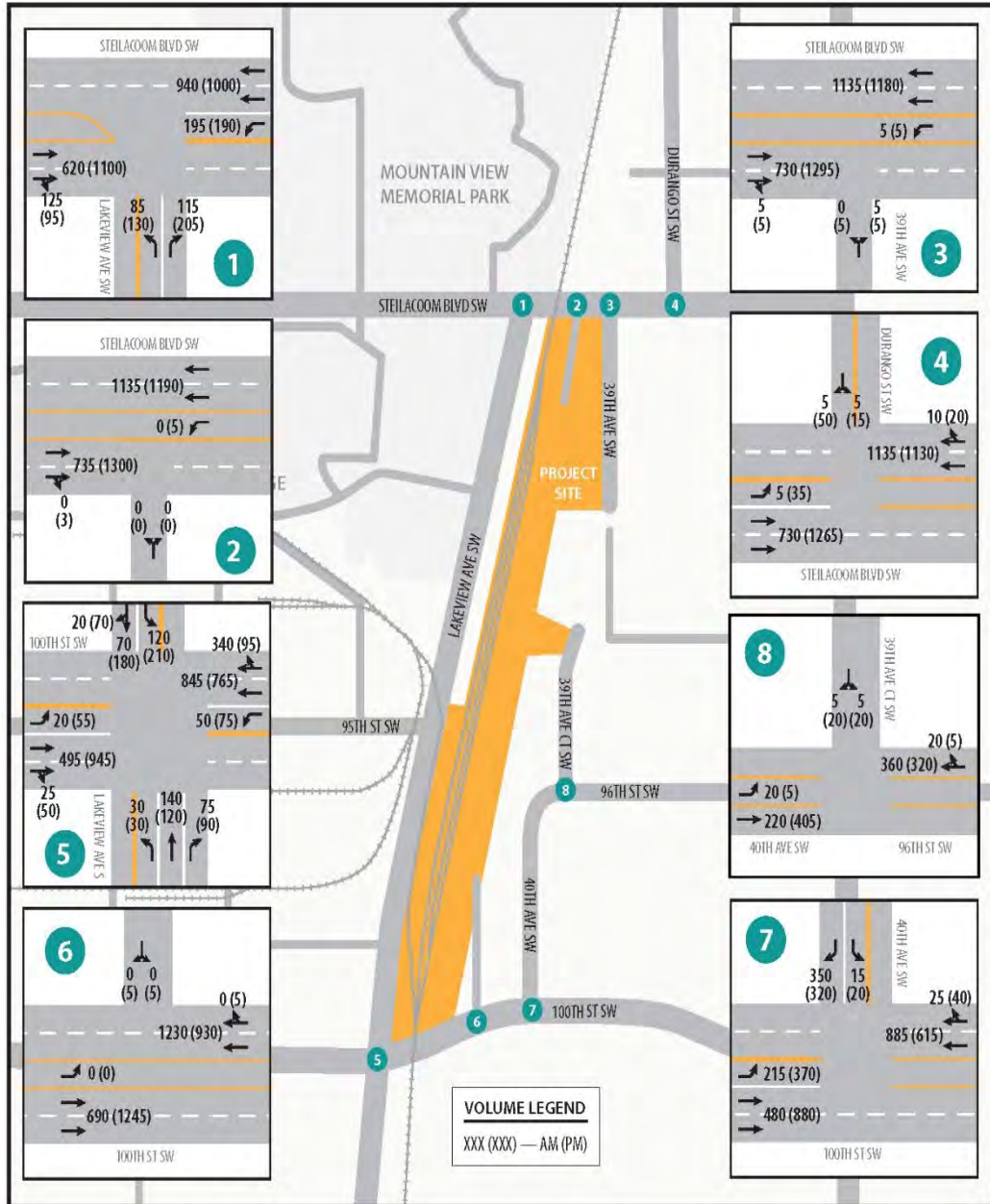
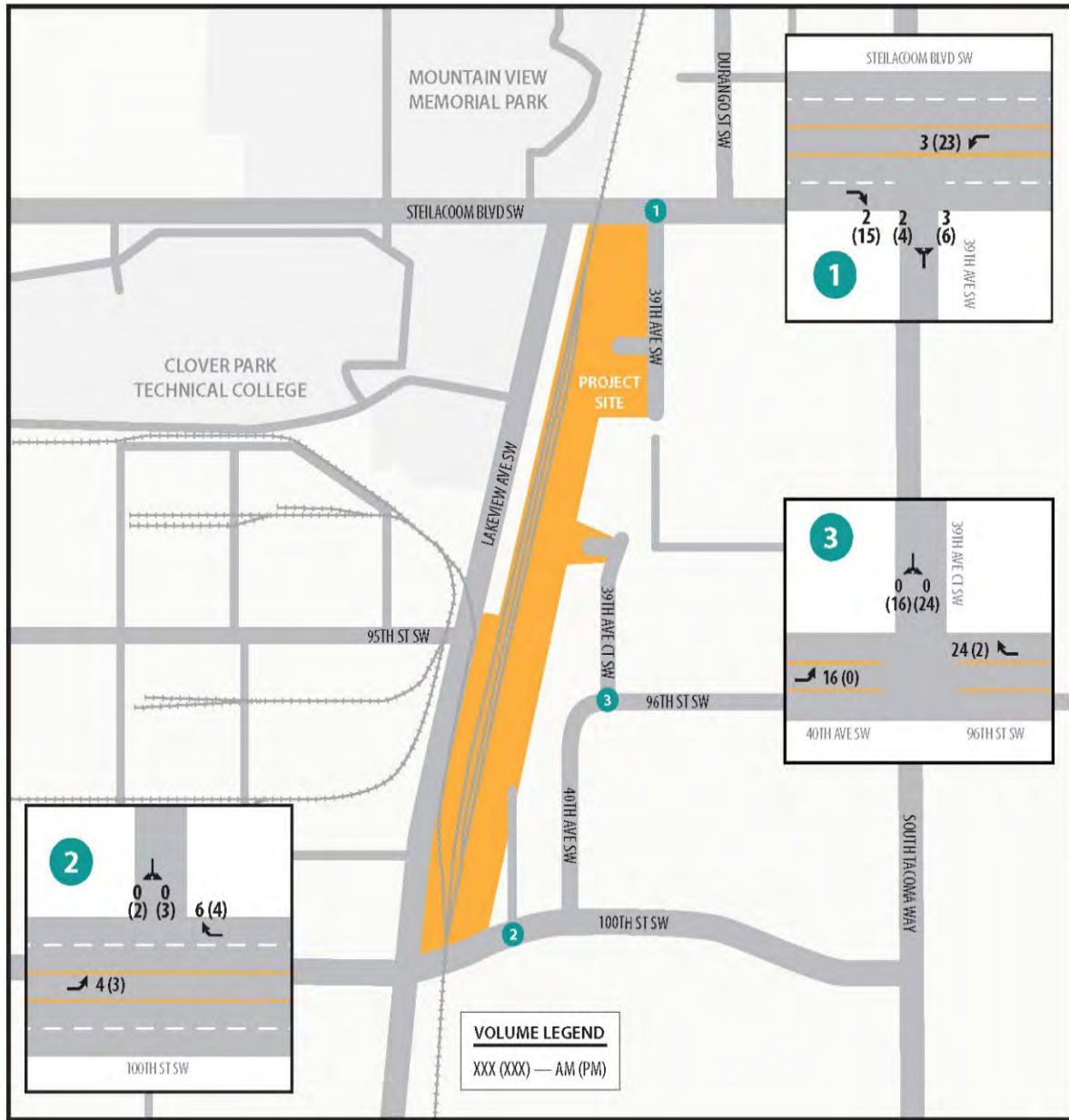
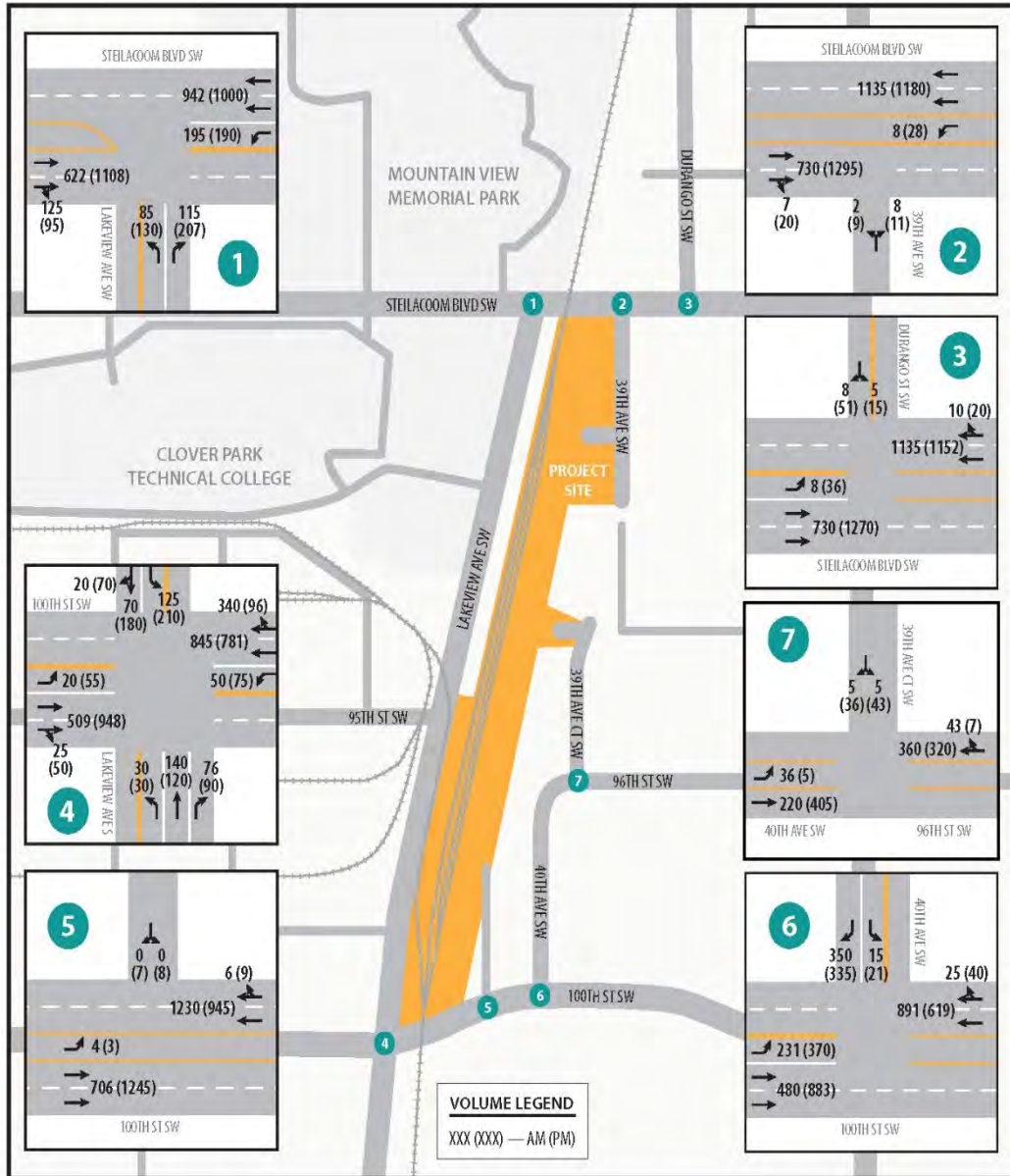


Figure 4. Project Trip Generation AM and PM Peak Hour Volumes



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Figure 5. 2024 Build Condition Intersection AM and PM Peak Hour Volumes



4.3 Intersection Traffic Operations

Operational analysis of future Baseline and Build conditions for AM and PM peak hours was performed using Synchro (Version 10) analysis software. As with the existing conditions assessment, the two primary performance measures used to compare future conditions were average vehicle delay and level of service. No major roadway network changes were included for the future Baseline and Build conditions compared to existing conditions. Signal split optimization adjustments for the Steilacoom Boulevard SW/Lakeview Avenue SW, 100th Street SW/Lakeview Avenue SW, and 100th Avenue SW/40th Avenue SW intersections were incorporated.

The planned signal at Steilacoom Boulevard SW and Durango Street SW is not yet funded (based on the City of Lakewood capital improvement program 2020-2025), so it was not included in the analysis to provide a worst-case scenario in terms of potential project impacts. The results of the 2024 analyses for Baseline and Build conditions are summarized in Table 6. For additional information, see Appendices C through E.

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Table 6. Future 2024 Peak-Hour Level of Service

AM Peak Hour								
Intersection	2024 Baseline Conditions				2024 Build Conditions			
	Intersection Average		Worst Movement		Intersection Average		Worst Movement	
	LOS	Delay ¹	Mov't	Delay ¹	LOS	Delay ¹	Mov't	Delay ¹
Steilacoom Blvd SW/Lakeview Ave SW	A	10	NBL	54.4	A	10	NBL	54.4
Steilacoom Blvd SW/39th Ave SW	A	<5	NBL	12.1	A	< 5	NBL	16.7
Steilacoom Blvd SW/ Durango St SW	A	< 5	SBL	24	A	< 5	SBL	22.4
100th Street SW/Lakeview Ave SW	C	28.7	NBL	50.2	C	29	NBL	50.7
100th Street SW/40th Ave SW	C	20.3	SBL	30.4	C	20.6	SBL	31.0
100th Street SW/Site Driveway	A	< 5	SBL	< 5 ²	A	< 5	EBL	17.4
40th Ave SW/39th Ave Ct SW	A	< 5	SBL	11.5	A	< 5	SBL	11.7
PM Peak Hour								
Intersection	2024 Baseline Conditions				2024 Build Conditions			
	Intersection Average		Worst Movement		Intersection Average		Worst Movement	
	LOS	Delay ¹	Mov't	Delay ¹	LOS	Delay ¹	Mov't	Delay ¹
Steilacoom Blvd SW/Lakeview Ave SW	B	15.2	NBL	58.9	B	15.2	NBL	58.9
Steilacoom Blvd SW/39th Ave SW	A	< 5	NBL	26.8	A	< 5	NBL	28
Steilacoom Blvd SW/ Durango St SW	A	< 5	SBL	22.1	A	< 5	SBL	23.2
100th Street SW/Lakeview Ave SW	C	33.6	NBL	60.3	C	33.7	NBL	60.4
100th Street SW/40th Ave SW	B	13.3	SBL	23.9	B	13.7	SBL	23.9
100th Street SW/Site Driveway	A	< 5	SBL	45.8	A	< 5	SBL	55.6
40th Ave SW/39th Ave Ct SW	A	< 5	SBL	12	A	< 5	SBL	12.8

Notes: NBL = Northbound left; SBL = Southbound left; EBL = Eastbound left

¹ Delays are represented in seconds per vehicle.

² No volume for minor street approach.

As shown in the Table 6, peak-hour delays for the future Baseline and Build conditions are expected to be similar to existing conditions. The findings show low to moderate for all intersections evaluated with the exception of the critical 100th Street SW/Site Driveway exiting movements. The exiting left turn delay at this site driveway is expected to be high, but only for brief durations within the peak hours. It is important to distinguish this movement delay, which affects fewer than 20 vehicles per hour, from the average intersection delay. Most vehicles at this intersection are on the major approaches of 100th Street SW, which experiences little to no delay.

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The average intersection delay at this location is thus negligible. Furthermore, due to the low peak-hour factor for the driveway movements, the change in delay for exiting left turns tends to respond more dramatically to changes in volume. Thus, a higher change in delay is seen for that location, though LOS is no worse than under 2020 Baseline conditions. Except for 100th Street SW/Site Driveway, there are no substantial changes in overall intersection delay or level of service between the Baseline and Build conditions.

4.4 Nighttime Train Switching Impacts

No changes in the night-time maintenance-related arterial road train crossing impacts would occur since the updated site operating plan would reflect the same number of potential crossings of 100th Street SW and the same duration for each 10-car train crossing evaluated in the 2018 SEPA Addendum. The updated site layout, however, requires all trains to enter the site from the south, such that the train blockages would occur only on 100th Street SW. Impacts to Steilacoom Boulevard SW would no longer occur compared to impacts discussed in the 2018 SEPA Addendum. Moreover, the total nightly train blockages on 100th Street SW would be modest, totaling approximately 28 minutes across the 8-hour nighttime period.

5 Mitigation

Despite the changes in site trip generation for the updated Sunderland Maintenance Base Project operations compared to previously documented conditions, no specific mitigation measures would be needed to ensure reasonable arterial/intersection operations during weekday peak traffic periods. All of the intersections evaluated meet the City of Lakewood's LOS standard of D or better on arterial streets in Baseline and Build conditions. As discussed in the Section 4.3 Intersection Traffic Operations narrative, some delays for exiting left turns may occur at the site driveway on 100th Street SW due to temporary traffic pulses during the PM peak hour. However, since these driveway trips are expected to be modest in magnitude (approximately 20 vehicles or less), no explicit traffic control or safety measures would be needed to address these brief periods of delay. In the event that peak-hour exiting volumes at this site driveway are significantly higher than predicted, right-in/right-out turning movement restrictions could be implemented as a backstop measure to reduce driveway conflicts and minimize delays. Prohibiting left turns in such a way

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could also enhance safety along 100th Street SW by addressing the high proportion of trucks expected into and out of this driveway.

In addition, since the previously updated crossing blockage durations and number of crossings for train crossing activity would remain at up to 3.5 minutes and eight crossings, respectively, the overall nighttime train blockage duration would remain consistent with the previous *Transportation Technical Memorandum Update* (2017). As such, no specific mitigation would be needed to address queuing or delays to vehicles traveling on 100th Street SW between 8 p.m. and 4 a.m. As stated in the previous memoranda, alternative routes are available via Steilacoom Boulevard SW or 108th Street SW for bikes, pedestrians, and general-purpose traffic.

Consistent with the original project and the previous 2017 traffic analysis, Sound Transit and Pierce Transit should continue discussions through final design to identify opportunities to further minimize potential impacts to public transit riders and non-revenue buses. Coordination with Pierce Transit would identify potential opportunities to further minimize nighttime impacts to both Route 4 and Route 48 transit riders and non-revenue (deadheading) buses resulting from train blockages on 100th Street SW. Potential options may include temporary (time of day) rerouting of buses and deadheading buses or permanent route realignment to circumvent blockages on 100th Street SW or Steilacoom Boulevard SW.

As described in the 2016 SEPA Checklist, emergency responders (police, fire, and ambulance) using 100th Street SW could be disrupted as a result of nighttime train crossing activity. However, alternate routes via Lakeview Avenue SW or Steilacoom Boulevard SW would be available and are not expected to substantially increase response times.

6 References

City of Lakewood. 2014. *Six-Year Comprehensive Transportation Improvement Program 2015 – 2020*. Final July 21, 2014.

_____. 2019. *Six-Year Comprehensive Transportation Improvement Program 2020-2025*. Final June 3, 2019.

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APPENDICES

- A. Crash Summary
- B. Sounder Maintenance Base Staff Levels
- C. Synchro Reports
- D. Data Collection – Turning Movement Counts
- E. Signal Timing and Phasing Data

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APPENDIX A
Crash Summary

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JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	STELACOOM BLVD SW	E299140	1/8/2014	5:00:00 PM	Possible Injury	2	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	LAKEVIEW AVE SW	E299582	1/9/2014	2:56:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Truck (Flatbed, Van, etc.)	At Driveway	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E300396	1/15/2014	5:39:00 PM	No Apparent Injury	0	0	3	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	LAKEVIEW AVE SW	E302885	1/26/2014	2:39:00 PM	Possible Injury	3	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E308582	2/9/2014	1:21:00 PM	Suspected Serious Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	STELACOOM BLVD SW	E307276	2/12/2014	7:04:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Intersection Related but Not at Intersection	From same direction - all others	Same Direction
City Street	100TH ST SW	E318170	4/1/2014	8:10:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E324743	4/30/2014	3:00:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	LAKEVIEW AVE SW	E342210	7/17/2014	9:46:00 AM	No Apparent Injury	0	0	1	0	1	Pickup, Panel Truck or Vanette under 10,000 lb		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	STELACOOM BLVD SW	E346935	8/6/2014	11:17:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E347191	8/6/2014	10:47:00 AM	Possible Injury	3	0	3	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E358251	9/21/2014	5:44:00 PM	Unknown	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STELACOOM BLVD SW	E363565	10/9/2014	6:00:00 PM	Unknown	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELACOOM BLVD SW	E365694	10/15/2014	10:23:00 AM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E392040	10/17/2014	4:00:00 PM	Unknown	0	0	2	0	0	Not Stated	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	40TH AVE SW	E366107	10/18/2014	2:37:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E366946	10/20/2014	1:00:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Angle
City Street	40TH AVE SW	E367254	10/22/2014	9:05:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELACOOM BLVD SW	E367246	10/22/2014	3:00:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E368072	10/25/2014	4:30:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Not Stated	At Intersection and Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	100TH ST SW	E377399	11/21/2014	11:42:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E381818	12/6/2014	3:18:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	40TH AVE SW	E384466	12/16/2014	9:09:00 AM	No Apparent Injury	0	0	2	0	0	Truck Tractor & Semi-0 Trailer	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - all others	Same Direction
City Street	40TH AVE SW	E384610	12/17/2014	5:45:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	40TH AVE SW	E385550	12/20/2014	1:00:00 PM	No Apparent Injury	0	0	3	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELACOOM BLVD SW	E394374	1/15/2015	12:00:00 PM	Unknown	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe

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JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	LAKEVIEW AVE SW	E395040	1/25/2015	3:22:00 PM	Possible Injury	1	0	3	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E408207	3/1/2015	3:23:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STELACOOM BLVD SW	E408246	3/2/2015	4:53:00 PM	Possible Injury	1	0	2	0	0	School Bus	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	40TH AVE SW	E414196	4/6/2015	3:06:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E416748	4/18/2015	9:41:00 AM	No Apparent Injury	0	0	3	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELACOOM BLVD SW	E420849	5/1/2015	9:23:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E424369	5/12/2015	6:19:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E427966	5/27/2015	2:00:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Same direction - both turning left - both moving - rear-end	Rear End
City Street	LAKEVIEW AVE SW	E430194	6/4/2015	7:44:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELACOOM BLVD SW	E439173	7/1/2015	6:53:00 PM	No Apparent Injury	0	0	3	0	0	Passenger Car	Passenger Car	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	LAKEVIEW AVE SW	E442296	7/13/2015	9:22:00 AM	Possible Injury	1	0	1	0	0	Pickup, Panel Truck or Vanette under 10,000 lb		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	100TH ST SW	E442705	7/14/2015	6:27:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Angle
City Street	100TH ST SW	E448563	7/31/2015	2:18:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	40TH AVE SW	E456472	8/29/2015	6:45:00 PM	Possible Injury	1	0	1	0	1	Passenger Car	Passenger Car	At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	100TH ST SW	E461374	9/3/2015	3:45:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Angle
City Street	STELACOOM BLVD SW	E464781	9/24/2015	7:47:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	LAKEVIEW AVE SW	E469827	10/10/2015	3:00:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E471599	10/10/2015	2:21:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Driveway	From same direction - one right turn - one straight	Same Direction
City Street	100TH ST SW	E483416	11/17/2015	12:07:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	LAKEVIEW AVE SW	E488467	12/1/2015	8:50:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E489106	12/2/2015	5:29:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - both moving - head-on	opposite
City Street	100TH ST SW	E488686	12/2/2015	7:29:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STELACOOM BLVD SW	E491738	12/8/2015	7:56:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELACOOM BLVD SW	E502259	1/4/2016	4:27:00 PM	No Apparent Injury	0	0	3	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E503656	1/8/2016	11:50:00 PM	Possible Injury	1	0	1	0	0	Pickup, Panel Truck or Vanette under 10,000 lb		At Intersection and Not Related	Railway Signal Pole	Rear End
City Street	100TH ST SW	E504845	1/12/2016	6:40:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle

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JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	100TH ST SW	E508818	1/23/2016	9:30:00 PM	Possible Injury	1	0	2	0	0	Not Stated	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E512308	2/3/2016	4:05:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Bus or Motor Stage	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELLACOOM BLVD SW	E514716	2/10/2016	12:00:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	100TH ST SW	E516710	2/17/2016	7:22:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E518712	2/22/2016	2:37:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E518990	2/23/2016	7:55:00 AM	Possible Injury	5	0	3	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E529934	3/30/2016	1:25:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E531384	4/5/2016	7:48:00 AM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELLACOOM BLVD SW	E536300	4/21/2016	1:09:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELLACOOM BLVD SW	E542118	5/3/2016	1:35:00 PM	Suspected Serious Injury	4	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E546404	5/22/2016	4:40:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	100TH ST SW	E550930	6/6/2016	12:45:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Angle
City Street	100TH ST SW	E569204	7/14/2016	1:38:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Driveway	Entering at angle	Angle
City Street	40TH AVE SW	E570263	8/1/2016	2:07:00 PM	No Apparent Injury	0	0	3	0	0	Passenger Car	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E588881	9/26/2016	11:30:00 AM	Possible Injury	2	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E596268	10/13/2016	3:44:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	STELLACOOM BLVD SW	E596236	10/15/2016	5:45:00 PM	Possible Injury	1	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	40TH AVE SW	E597472	10/17/2016	12:48:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	Entering at angle	Angle
City Street	100TH ST SW	E598193	10/20/2016	9:43:00 AM	Possible Injury	1	0	2	0	0	Not Stated	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E602674	10/31/2016	3:23:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E611151	11/7/2016	1:37:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E611871	11/24/2016	11:23:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E617060	11/28/2016	2:43:00 AM	No Apparent Injury	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Tree or Stump (stationary)	Fixed Object
City Street	STELLACOOM BLVD SW	E620542	12/9/2016	11:44:00 AM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	LAKEVIEW AVE SW	E622601	12/30/2016	6:42:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E626553	12/23/2016	12:45:00 PM	No Apparent Injury	0	0	3	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe	Sideswipe
City Street	100TH ST SW	E632920	1/9/2017	4:46:00 AM	No Apparent Injury	0	0	1	0	0	Pickup, Panel Truck or Vanette under 10,000 lb		Not at Intersection and Not Related	Fence	Fixed Object

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JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	STELLACOOM BLVD SW	E633472	1/18/2017	6:08:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	LAKEVIEW AVE SW	E637443	1/30/2017	7:57:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E638328	2/3/2017	7:15:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E640941	2/10/2017	2:24:00 PM	Suspected Minor Injury	1	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Utility Pole	Fixed Object
City Street	100TH ST SW	E647878	2/28/2017	1:29:00 PM	No Apparent Injury	0	0	2	0	0	Not Stated	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	STELLACOOM BLVD SW	E652505	3/7/2017	8:05:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STELLACOOM BLVD SW	E652503	3/15/2017	5:28:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STELLACOOM BLVD SW	E654283	3/20/2017	2:45:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	STELLACOOM BLVD SW	E662661	4/17/2017	5:11:00 PM	Possible Injury	2	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	40TH AVE SW	E663770	4/20/2017	3:10:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From opposite direction - all others	opposite
City Street	100TH ST SW	E663760	4/21/2017	1:37:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	40TH AVE SW	E677998	6/5/2017	11:43:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Motorcycle	At Driveway	Entering at angle	Angle
City Street	STELLACOOM BLVD SW	E678888	6/7/2017	7:35:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E686632	6/29/2017	11:18:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	100TH ST SW	E695802	7/24/2017	6:49:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Motorcycle	At Driveway	From opposite direction - one left turn - one straight	opposite
City Street	STELLACOOM BLVD SW	E699379	8/3/2017	7:26:00 AM	Possible Injury	1	0	1	0	1	Passenger Car		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	STELLACOOM BLVD SW	E702389	8/16/2017	10:25:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	STELLACOOM BLVD SW	E705763	8/24/2017	7:15:00 AM	Suspected Minor Injury	1	0	1	0	1	Passenger Car		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	STELLACOOM BLVD SW	E706075	8/29/2017	7:42:00 AM	Suspected Minor Injury	1	0	1	0	1	Passenger Car		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	100TH ST SW	E714584	9/11/2017	5:20:00 PM	Unknown	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	LAKEVIEW AVE SW	E715004	9/23/2017	7:46:00 PM	Suspected Minor Injury	2	0	1	0	0	Passenger Car		Intersection Related but Not at Intersection	Tree or Stump (stationary)	Fixed Object
City Street	100TH ST SW	E726188	10/21/2017	1:28:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	LAKEVIEW AVE SW	E727974	10/27/2017	2:58:00 PM	Possible Injury	1	0	1	0	1	Pickup, Panel Truck or Vanette under 10,000 lb		At Intersection and Related	Vehicle - Pedalcyclist	Pedestrian/Bike
City Street	STELLACOOM BLVD SW	E730272	11/1/2017	6:12:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	STELLACOOM BLVD SW	E730709	11/2/2017	11:50:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe	Sideswipe
City Street	STELLACOOM BLVD SW	E740431	11/15/2017	12:17:00 PM	Possible Injury	1	0	3	0	0	Not Stated	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E745271	12/9/2017	8:15:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Angle

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JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	STEILACOOM BLVD SW	E748748	12/18/2017	5:48:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E754790	1/3/2018	10:16:00 AM	Suspected Minor Injury	1	0	2	0	0	Passenger Car	Bus or Motor Stage	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STEILACOOM BLVD SW	E757080	1/10/2018	5:29:00 PM	Possible Injury	2	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E763059	1/27/2018	1:19:00 AM	No Apparent Injury	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Concrete Barrier/Jersey Barrier - Face	Fixed Object
City Street	100TH ST SW	E763207	1/27/2018	4:17:00 PM	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	40TH AVE SW	E766611	2/2/2018	10:05:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - all others	opposite
City Street	100TH ST SW	E773830	2/26/2018	12:20:00 PM	Possible Injury	2	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	From opposite direction - one left turn - one straight	opposite
City Street	100TH ST SW	E781851	3/20/2018	9:51:00 PM	Unknown	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Other Objects	Rear End
City Street	LAKEVIEW AVE SW	E784904	3/22/2018	8:30:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Same direction -- both turning left - one stopped -- rear end	Rear End
City Street	STEILACOOM BLVD SW	E790278	4/18/2018	11:53:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STEILACOOM BLVD SW	E807698	5/23/2018	5:25:00 PM	No Apparent Injury	0	0	1	0	0	Pickup, Panel Truck or Vanette under 10,000 lb		Not at Intersection and Not Related	Wood Sign Post	Fixed Object
City Street	BOWLERO LANES THRU WY	E805779	6/7/2018	2:26:00 PM	No Apparent Injury	0	0	1	0	0	Pickup, Panel Truck or Vanette under 10,000 lb		At Driveway	Linear Curb	Fixed Object
City Street	100TH ST SW	E807330	6/8/2018	7:55:00 PM	Unknown	0	0	2	0	0	Passenger Car	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STEILACOOM BLVD SW	E808116	6/13/2018	11:28:00 AM	No Apparent Injury	0	0	4	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	opposite
City Street	STEILACOOM BLVD SW	E808776	6/16/2018	2:57:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Driveway	Entering at angle	Angle
City Street	STEILACOOM BLVD SW	E824987	8/2/2018	11:55:00 AM	Possible Injury	1	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	STEILACOOM BLVD SW	E830046	8/20/2018	4:35:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - all others	Same Direction
City Street	STEILACOOM BLVD SW	E833056	8/29/2018	5:25:00 PM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - all others	Same Direction
City Street	100TH ST SW	E837215	9/12/2018	9:57:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Driveway	Entering at angle	Angle
City Street	STEILACOOM BLVD SW	E844749	10/1/2018	9:10:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - one stopped - sideswipe	Sideswipe
City Street	STEILACOOM BLVD SW	E844428	10/2/2018	8:22:00 AM	No Apparent Injury	0	0	2	0	0	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - one right turn - one straight	Same Direction
City Street	100TH ST SW	E852368	10/19/2018	7:13:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Angle
City Street	100TH ST SW	E858964	11/9/2018	7:05:00 PM	Suspected Serious Injury	1	0	1	1	0	Passenger Car		Not at Intersection and Not Related	Vehicle going straight hits pedestrian	Fixed Object
City Street	LAKEVIEW AVE SW	E860163	11/12/2018	12:53:00 PM	No Apparent Injury	0	0	1	0	1	Passenger Car	Passenger Car	At Intersection and Related	Pedalcyclist Strikes Moving Vehicle	Rear End
City Street	100TH ST SW	E865707	11/27/2018	2:00:00 PM	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	100TH ST SW	E871180	12/7/2018	8:20:00 AM	Suspected Serious Injury	1	0	3	0	0	Passenger Car	Pickup, Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	opposite

**Sound Transit
Sounder Maintenance Base Project**

UNDER 33 UNITED STATES CODE - SECTION 405, THIS DATA CANNOT BE USED IN DISCOVERY OR AS EVIDENCE AT TRIAL IN ANY ACTION FOR DAMAGES AGAINST THE WSDOT, OR ANY JURISDICTIONS INVOLVED IN THE DATA

JURISDICTION	PRIMARY TRAFFICWAY	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	INJURY	FATALITY	VEHICLE	PEDESTRIANS	BIKES	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	COL_TYPE
City Street	100TH ST SW	E870884	12/11/2018	6:19:00 AM	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Rear End
City Street	40TH AVE SW	E322254	4/20/2014	4:52:00 AM	Dead at Scene	0	1	1	1	0	Pickup,Panel Truck or Vanette under 10,000 lb		Not at Intersection and Not Related	Vehicle going straight hits pedestrian	Fixed Object
City Street	40TH AVE SW	E224935	1/31/2013	4:07:00 PM	Suspected Serious Injury	4	0	3	5	0	Pickup,Panel Truck or Vanette under 10,000 lb	Truck (Flatbed, Van, etc)	Not at Intersection and Not Related	From opposite direction - both going straight - sideswipe	opposite
City Street	40TH AVE SW	E827182	8/12/2018	10:32:00 AM	No Apparent injury	0	0	1	0	0	Passenger Car		At Intersection and Not Related	Guardrail - Face	Same Direction
City Street	96TH ST SW	E362192	10/3/2014	1:57:00 PM	No Apparent injury	0	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Rear End
City Street	95TH ST SW	E299620	1/12/2014	5:45:00 PM	No Apparent injury	0	0	1	0	0	Passenger Car		At Intersection and Not Related	Fence	Fixed Object
City Street	96TH ST SW	E322044	4/20/2014	4:52:00 AM	No Apparent injury	0	0	1	0	0	Passenger Car		At Intersection and Not Related	Boulder (stationary)	Fixed Object

APPENDIX B
Sounder Maintenance Base Staff Levels

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**Sound Transit
Sounder Maintenance Base Project**

SOUNDER MAINTENANCE BASE STAFF LEVELS			
February 28, 2020			
Maintenance Facility			
POSITION	SHIFT		TOTALS
	7:00 - 16:00	20:00 - 4:00	
Sound Transit Staff			
Superintendent Mechanical (Attendance Part Time)	1		1
Mechanical Specialist	1		1
Totals:	2		2
Contractor Management Staff (Offices)			
General Manager	1		1
Quality Control Manager	1		1
Safety Manager	1		1
Human Resources Manager	1		1
Budget & Invoicing Clerk	1		1
Payroll Clerk	1		1
Office Support Clerk	1		1
Warehouse Manager	1		1
Warehouse Specialist	1		1
Warehouse Inventory Clerk	1		1
Totals:	10		10
Contractor Operations Staff (Shop Floor)			
Supervisors	2		2
Machinists	6		6
Electricians	10		10
Carmen	10		10
Laborers (Facilities Contractor Maintenance)	0		0
Totals:	28		28
MOW Staff (Maintenance Facility)			
	7:00 - 16:00		
ST Superintendent of MOW	1		1
Contractor MOW Manager	1		1
MOW Operations	8		8
Totals:	10		10
Layover Yard Maintenance Staff			
Yard Supervisor (Work out of Maintenance Building)		2	2
Yard Mechanics (Work out of Maintenance Building)		10	10
Train Operators (Switch Crew)		2	2
Totals:		14	14
Train & Enginemen's (T&E) Building			
POSITION	3:00 - 6:30	17:00 - 20:00	
Locomotive Engineers*	14	14	28
Conductors*	28	28	56
		20:00-4:00	
Coach Cleaners		20	20
Totals:			104
<p>* Note, Engineers and Conductors are there in the morning and afternoon, this is not a double count. Only to provide information on when they will arrive and depart. Each crew member will arrive one hour before train departure so they will be staggered on their arrival both in the morning and afternoon. But there will be multiple crews present at any one time during the morning and afternoon shifts.</p>			

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APPENDIX C
Synchro Reports

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HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/27/2020

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↵		↵↵	
Traffic Vol, veh/h	10	685	1070	10	5	5
Future Vol, veh/h	10	685	1070	10	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	6	5	5	25	25
Mvmt Flow	11	787	1230	11	6	6

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1241	0	-	0	1652 621
Stage 1	-	-	-	-	1236 -
Stage 2	-	-	-	-	416 -
Critical Hdwy	4.22	-	-	-	7.3 7.4
Critical Hdwy Stg 1	-	-	-	-	6.3 -
Critical Hdwy Stg 2	-	-	-	-	6.3 -
Follow-up Hdwy	2.26	-	-	-	3.75 3.55
Pot Cap-1 Maneuver	535	-	-	-	71 378
Stage 1	-	-	-	-	196 -
Stage 2	-	-	-	-	571 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	535	-	-	-	70 378
Mov Cap-2 Maneuver	-	-	-	-	153 -
Stage 1	-	-	-	-	192 -
Stage 2	-	-	-	-	571 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	22.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	535	-	-	-	218
HCM Lane V/C Ratio	0.021	-	-	-	0.053
HCM Control Delay (s)	11.9	-	-	-	22.4
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	690	5	5	1070	0	5
Future Vol, veh/h	690	5	5	1070	0	5
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	6	5	5	25	25
Mvmt Flow	793	6	6	1230	0	6

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	804	0	1428
Stage 1	-	-	-	-	801
Stage 2	-	-	-	-	627
Critical Hdwy	-	-	4.2	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.25	-	3.75
Pot Cap-1 Maneuver	-	-	797	-	102
Stage 1	-	-	-	-	348
Stage 2	-	-	-	-	436
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	794	-	101
Mov Cap-2 Maneuver	-	-	-	-	221
Stage 1	-	-	-	-	347
Stage 2	-	-	-	-	433

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	533	-	-	794	-
HCM Lane V/C Ratio	0.011	-	-	0.007	-
HCM Control Delay (s)	11.8	-	-	9.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↔↔		↔↔	
Traffic Vol, veh/h	0	645	1160	0	0	0
Future Vol, veh/h	0	645	1160	0	0	0
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	88	88	25	25
Heavy Vehicles, %	9	9	6	6	0	0
Mvmt Flow	0	709	1318	0	0	0

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1322	0	-	0	1677 663
Stage 1	-	-	-	-	1322 -
Stage 2	-	-	-	-	355 -
Critical Hdwy	4.28	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.29	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	483	-	-	-	88 409
Stage 1	-	-	-	-	217 -
Stage 2	-	-	-	-	686 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	481	-	-	-	87 407
Mov Cap-2 Maneuver	-	-	-	-	87 -
Stage 1	-	-	-	-	216 -
Stage 2	-	-	-	-	683 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	481	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Vol, veh/h	695	0	0	1070	0	0
Future Vol, veh/h	695	0	0	1070	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	20	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	84	84	25	25
Heavy Vehicles, %	5	5	4	4	0	0
Mvmt Flow	818	0	0	1274	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	818	0	1455 409
Stage 1	-	-	-	-	818 -
Stage 2	-	-	-	-	637 -
Critical Hdwy	-	-	4.18	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	-	-	2.24	-	3.5 3.3
Pot Cap-1 Maneuver	-	-	793	-	123 597
Stage 1	-	-	-	-	399 -
Stage 2	-	-	-	-	494 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	793	-	123 597
Mov Cap-2 Maneuver	-	-	-	-	257 -
Stage 1	-	-	-	-	399 -
Stage 2	-	-	-	-	494 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	793	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑	↵		↵	
Traffic Vol, veh/h	20	205	340	20	5	5
Future Vol, veh/h	20	205	340	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	22	223	370	22	5	5

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	392	0	-	0	648 381
Stage 1	-	-	-	-	381 -
Stage 2	-	-	-	-	267 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1161	-	-	-	433 664
Stage 1	-	-	-	-	688 -
Stage 2	-	-	-	-	775 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1161	-	-	-	425 664
Mov Cap-2 Maneuver	-	-	-	-	521 -
Stage 1	-	-	-	-	675 -
Stage 2	-	-	-	-	775 -


























Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1161	-	-	-	584
HCM Lane V/C Ratio	0.019	-	-	-	0.019
HCM Control Delay (s)	8.2	-	-	-	11.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/27/2020

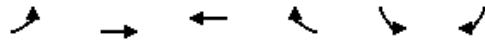
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	20	465	25	45	795	320	30	130	70	110	65	20
Future Volume (vph)	20	465	25	45	795	320	30	130	70	110	65	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3412		1703	3237		1687	1776	1484	1570	1587	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3412		1703	3237		1687	1776	1484	1570	1587	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	27	620	33	49	864	348	34	146	79	125	74	23
RTOR Reduction (vph)	0	2	0	0	27	0	0	0	65	0	9	0
Lane Group Flow (vph)	27	651	0	49	1185	0	34	146	14	125	88	0
Confl. Peds. (#/hr)	2						2	4	5	5		4
Heavy Vehicles (%)	5%	5%	5%	6%	6%	6%	7%	7%	7%	15%	15%	15%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	4.3	45.8		4.8	46.3		4.7	17.1	17.1	12.1	24.5	
Effective Green, g (s)	4.3	45.8		4.8	46.3		4.7	17.1	17.1	12.1	24.5	
Actuated g/C Ratio	0.04	0.46		0.05	0.47		0.05	0.17	0.17	0.12	0.25	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0	
Lane Grp Cap (vph)	74	1581		82	1516		80	307	256	192	393	
v/s Ratio Prot	0.02	0.19		c0.03	c0.37		0.02	c0.08		c0.08	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.36	0.41		0.60	0.78		0.42	0.48	0.05	0.65	0.22	
Uniform Delay, d1	45.9	17.6		46.1	22.0		45.7	36.8	34.1	41.3	29.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.2		7.6	2.5		3.6	1.2	0.1	5.9	0.1	
Delay (s)	49.0	17.7		53.6	24.5		49.3	38.0	34.2	47.2	29.7	
Level of Service	D	B		D	C		D	D	C	D	C	
Approach Delay (s)		19.0			25.6			38.3			39.6	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			26.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			98.8			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			65.2%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	200	450	835	25	15	330
Future Volume (vph)	200	450	835	25	15	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1687	3374	3389		1638	1468
Flt Permitted	0.12	1.00	1.00		0.95	1.00
Satd. Flow (perm)	215	3374	3389		1638	1468
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.75	0.75
Adj. Flow (vph)	233	523	949	28	20	440
RTOR Reduction (vph)	0	0	2	0	0	8
Lane Group Flow (vph)	233	523	975	0	20	432
Confl. Peds. (#/hr)	2			2	2	
Heavy Vehicles (%)	7%	7%	6%	6%	10%	10%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	49.1	49.1	30.0		22.1	41.2
Effective Green, g (s)	49.1	49.1	30.0		22.1	41.2
Actuated g/C Ratio	0.60	0.60	0.37		0.27	0.50
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	374	2020	1239		441	737
v/s Ratio Prot	0.10	0.16	c0.29			c0.29
v/s Ratio Perm	0.27				0.01	
v/c Ratio	0.62	0.26	0.79		0.05	0.59
Uniform Delay, d1	13.7	7.8	23.2		22.1	14.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.3	0.3	3.4		0.0	1.2
Delay (s)	16.0	8.1	26.5		22.2	15.6
Level of Service	B	A	C		C	B
Approach Delay (s)		10.6	26.5		15.9	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			18.8		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			82.0		Sum of lost time (s)	16.2
Intersection Capacity Utilization			55.1%		ICU Level of Service	B
Analysis Period (min)			15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/27/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	585	120	185	885	85	110
Future Volume (vph)	585	120	185	885	85	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3193		1677	3355	1641	1468
Flt Permitted	1.00		0.30	1.00	0.95	1.00
Satd. Flow (perm)	3193		527	3355	1641	1468
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	672	138	213	1017	98	126
RTOR Reduction (vph)	8	0	0	0	0	113
Lane Group Flow (vph)	802	0	213	1017	98	13
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	6%	6%	4%	4%	10%	10%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	80.3		95.7	95.7	12.5	12.5
Effective Green, g (s)	80.3		95.7	95.7	12.5	12.5
Actuated g/C Ratio	0.68		0.81	0.81	0.11	0.11
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2172		529	2720	173	155
v/s Ratio Prot	0.25		0.04	c0.30		0.01
v/s Ratio Perm			c0.29		c0.06	
v/c Ratio	0.37		0.40	0.37	0.57	0.09
Uniform Delay, d1	8.0		3.3	3.0	50.2	47.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5		0.2	0.4	4.2	0.2
Delay (s)	8.5		3.5	3.4	54.4	47.8
Level of Service	A		A	A	D	D
Approach Delay (s)	8.5			3.4	50.7	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			9.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.44			
Actuated Cycle Length (s)			118.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			50.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/27/2020

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↵		↵↵	
Traffic Vol, veh/h	30	1195	1070	20	15	50
Future Vol, veh/h	30	1195	1070	20	15	50
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	3	3	6	6	12	12
Mvmt Flow	34	1374	1230	23	17	57

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1255	0	-	0	1999 629
Stage 1	-	-	-	-	1244 -
Stage 2	-	-	-	-	755 -
Critical Hdwy	4.16	-	-	-	7.04 7.14
Critical Hdwy Stg 1	-	-	-	-	6.04 -
Critical Hdwy Stg 2	-	-	-	-	6.04 -
Follow-up Hdwy	2.23	-	-	-	3.62 3.42
Pot Cap-1 Maneuver	545	-	-	-	46 402
Stage 1	-	-	-	-	216 -
Stage 2	-	-	-	-	400 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	544	-	-	-	43 401
Mov Cap-2 Maneuver	-	-	-	-	140 -
Stage 1	-	-	-	-	202 -
Stage 2	-	-	-	-	399 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	22.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	544	-	-	-	280
HCM Lane V/C Ratio	0.063	-	-	-	0.267
HCM Control Delay (s)	12.1	-	-	-	22.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Vol, veh/h	1220	5	5	1120	5	5
Future Vol, veh/h	1220	5	5	1120	5	5
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	6	6	20	20
Mvmt Flow	1326	5	5	1217	5	5

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1336	0	1953
Stage 1	-	-	-	-	1334
Stage 2	-	-	-	-	619
Critical Hdwy	-	-	4.22	-	7.2
Critical Hdwy Stg 1	-	-	-	-	6.2
Critical Hdwy Stg 2	-	-	-	-	6.2
Follow-up Hdwy	-	-	2.26	-	3.7
Pot Cap-1 Maneuver	-	-	491	-	45
Stage 1	-	-	-	-	180
Stage 2	-	-	-	-	453
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	489	-	44
Mov Cap-2 Maneuver	-	-	-	-	133
Stage 1	-	-	-	-	179
Stage 2	-	-	-	-	448

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	24.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	194	-	-	489	-
HCM Lane V/C Ratio	0.056	-	-	0.011	-
HCM Control Delay (s)	24.7	-	-	12.4	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	0	1175	880	5	5	5
Future Vol, veh/h	0	1175	880	5	5	5
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	77	77	78	78
Heavy Vehicles, %	3	3	3	3	2	2
Mvmt Flow	0	1382	1143	6	6	6

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	1839 577
Stage 1	-	-	-	-	1148 -
Stage 2	-	-	-	-	691 -
Critical Hdwy	-	-	-	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	-	-	3.52 3.32
Pot Cap-1 Maneuver	0	-	-	-	67 460
Stage 1	0	-	-	-	264 -
Stage 2	0	-	-	-	459 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	67 459
Mov Cap-2 Maneuver	-	-	-	-	67 -
Stage 1	-	-	-	-	263 -
Stage 2	-	-	-	-	458 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	39.5
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	117
HCM Lane V/C Ratio	-	-	-	0.11
HCM Control Delay (s)	-	-	-	39.5
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.4

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	1225	5	5	1120	0	0
Future Vol, veh/h	1225	5	5	1120	0	0
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	20	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	88	88	25	25
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	1289	5	6	1273	0	0

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1298	0	1945
Stage 1	-	-	-	-	1296
Stage 2	-	-	-	-	649
Critical Hdwy	-	-	4.12	-	6.8
Critical Hdwy Stg 1	-	-	-	-	5.8
Critical Hdwy Stg 2	-	-	-	-	5.8
Follow-up Hdwy	-	-	2.21	-	3.5
Pot Cap-1 Maneuver	-	-	535	-	58
Stage 1	-	-	-	-	224
Stage 2	-	-	-	-	487
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	533	-	57
Mov Cap-2 Maneuver	-	-	-	-	161
Stage 1	-	-	-	-	223
Stage 2	-	-	-	-	482

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	533	-
HCM Lane V/C Ratio	-	-	-	0.011	-
HCM Control Delay (s)	0	-	-	11.8	-
HCM Lane LOS	A	-	-	B	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑	↵		↵	
Traffic Vol, veh/h	5	385	305	5	20	20
Future Vol, veh/h	5	385	305	5	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	5	418	332	5	22	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	337	0	-	0	763 335
Stage 1	-	-	-	-	335 -
Stage 2	-	-	-	-	428 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1217	-	-	-	371 705
Stage 1	-	-	-	-	722 -
Stage 2	-	-	-	-	655 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1217	-	-	-	370 705
Mov Cap-2 Maneuver	-	-	-	-	481 -
Stage 1	-	-	-	-	719 -
Stage 2	-	-	-	-	655 -



























Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1217	-	-	-	572
HCM Lane V/C Ratio	0.004	-	-	-	0.076
HCM Control Delay (s)	8	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/27/2020

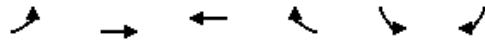
													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 								
Traffic Volume (vph)	50	890	45	70	725	90	30	115	85	200	170	65	
Future Volume (vph)	50	890	45	70	725	90	30	115	85	200	170	65	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00		
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.96		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1736	3442		1736	3405		1752	1845	1568	1752	1762		
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1736	3442		1736	3405		1752	1845	1568	1752	1762		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.84	0.84	0.84	0.75	0.75	0.75	
Adj. Flow (vph)	53	947	48	74	771	96	36	137	101	267	227	87	
RTOR Reduction (vph)	0	3	0	0	7	0	0	0	84	0	10	0	
Lane Group Flow (vph)	53	992	0	74	860	0	36	137	17	267	304	0	
Confl. Peds. (#/hr)	2		2	2		2	1					1	
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%	
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA		
Protected Phases	5	2		1	6		3	8		7	4		
Permitted Phases									8				
Actuated Green, G (s)	6.9	34.6		7.2	34.9		4.6	16.1	16.1	19.9	31.4		
Effective Green, g (s)	6.9	34.6		7.2	34.9		4.6	16.1	16.1	19.9	31.4		
Actuated g/C Ratio	0.07	0.36		0.07	0.36		0.05	0.17	0.17	0.21	0.32		
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0		
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0		
Lane Grp Cap (vph)	123	1230		129	1227		83	306	260	360	571		
v/s Ratio Prot	0.03	c0.29		c0.04	0.25		0.02	0.07		c0.15	c0.17		
v/s Ratio Perm									0.01				
v/c Ratio	0.43	0.81		0.57	0.70		0.43	0.45	0.06	0.74	0.53		
Uniform Delay, d1	43.1	28.1		43.3	26.5		44.8	36.3	34.0	36.0	26.7		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	2.4	4.0		3.8	1.5		3.6	1.0	0.1	7.0	0.5		
Delay (s)	45.5	32.1		47.1	28.0		48.4	37.4	34.1	43.1	27.2		
Level of Service	D	C		D	C		D	D	C	D	C		
Approach Delay (s)		32.7			29.5			37.6			34.5		
Approach LOS		C			C			D			C		
Intersection Summary													
HCM 2000 Control Delay			32.5			HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			96.8			Sum of lost time (s)			19.0				
Intersection Capacity Utilization			63.8%			ICU Level of Service				B			
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	350	830	580	40	20	305
Future Volume (vph)	350	830	580	40	20	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1752	3505	3405		1751	1568
Flt Permitted	0.24	1.00	1.00		0.95	1.00
Satd. Flow (perm)	444	3505	3405		1751	1568
Peak-hour factor, PHF	0.85	0.85	0.95	0.95	0.86	0.86
Adj. Flow (vph)	412	976	611	42	23	355
RTOR Reduction (vph)	0	0	5	0	0	39
Lane Group Flow (vph)	412	976	648	0	23	316
Confl. Peds. (#/hr)					1	
Heavy Vehicles (%)	3%	3%	5%	5%	3%	3%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	45.4	45.4	22.8		14.8	37.4
Effective Green, g (s)	45.4	45.4	22.8		14.8	37.4
Actuated g/C Ratio	0.64	0.64	0.32		0.21	0.53
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	600	2241	1093		364	825
v/s Ratio Prot	c0.17	0.28	0.19			c0.20
v/s Ratio Perm	c0.27				0.01	
v/c Ratio	0.69	0.44	0.59		0.06	0.38
Uniform Delay, d1	8.1	6.4	20.2		22.5	10.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.6	0.9		0.1	0.3
Delay (s)	10.7	7.0	21.1		22.6	10.3
Level of Service	B	A	C		C	B
Approach Delay (s)		8.1	21.1		11.0	
Approach LOS		A	C		B	

Intersection Summary

HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/27/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	1035	90	180	940	125	195
Future Volume (vph)	1035	90	180	940	125	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3275		1630	3261	1761	1583
Flt Permitted	1.00		0.16	1.00	0.95	1.00
Satd. Flow (perm)	3275		279	3261	1761	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1125	98	196	1022	136	212
RTOR Reduction (vph)	3	0	0	0	0	187
Lane Group Flow (vph)	1220	0	196	1022	136	25
Confl. Peds. (#/hr)		5	5		2	
Heavy Vehicles (%)	5%	5%	7%	7%	2%	2%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	79.7		99.3	99.3	14.9	14.9
Effective Green, g (s)	79.7		99.3	99.3	14.9	14.9
Actuated g/C Ratio	0.64		0.80	0.80	0.12	0.12
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2104		383	2611	211	190
v/s Ratio Prot	c0.37		c0.06	0.31		0.02
v/s Ratio Perm			0.35		c0.08	
v/c Ratio	0.58		0.51	0.39	0.64	0.13
Uniform Delay, d1	12.6		7.7	3.6	52.0	48.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2		0.5	0.4	6.6	0.3
Delay (s)	13.8		8.2	4.0	58.6	49.1
Level of Service	B		A	A	E	D
Approach Delay (s)	13.8			4.7	52.8	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			14.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			124.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			60.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/28/2020

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑↑	↑↑		↵	
Traffic Vol, veh/h	5	730	1135	10	5	5
Future Vol, veh/h	5	730	1135	10	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	6	5	5	25	25
Mvmt Flow	6	839	1305	11	6	6

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1316	0	-	0	1743 658
Stage 1	-	-	-	-	1311 -
Stage 2	-	-	-	-	432 -
Critical Hdwy	4.22	-	-	-	7.3 7.4
Critical Hdwy Stg 1	-	-	-	-	6.3 -
Critical Hdwy Stg 2	-	-	-	-	6.3 -
Follow-up Hdwy	2.26	-	-	-	3.75 3.55
Pot Cap-1 Maneuver	500	-	-	-	61 356
Stage 1	-	-	-	-	177 -
Stage 2	-	-	-	-	560 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	500	-	-	-	60 356
Mov Cap-2 Maneuver	-	-	-	-	140 -
Stage 1	-	-	-	-	175 -
Stage 2	-	-	-	-	560 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	24
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	500	-	-	-	201
HCM Lane V/C Ratio	0.011	-	-	-	0.057
HCM Control Delay (s)	12.3	-	-	-	24
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Vol, veh/h	730	5	5	1135	0	5
Future Vol, veh/h	730	5	5	1135	0	5
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	6	5	5	25	25
Mvmt Flow	839	6	6	1305	0	6

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	850	0	1512
Stage 1	-	-	-	-	847
Stage 2	-	-	-	-	665
Critical Hdwy	-	-	4.2	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.25	-	3.75
Pot Cap-1 Maneuver	-	-	765	-	89
Stage 1	-	-	-	-	328
Stage 2	-	-	-	-	416
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	762	-	88
Mov Cap-2 Maneuver	-	-	-	-	206
Stage 1	-	-	-	-	327
Stage 2	-	-	-	-	413

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	514	-	-	762	-
HCM Lane V/C Ratio	0.011	-	-	0.008	-
HCM Control Delay (s)	12.1	-	-	9.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	0	690	1230	0	0	0
Future Vol, veh/h	0	690	1230	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	750	1337	0	0	0

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	1712 669
Stage 1	-	-	-	-	1337 -
Stage 2	-	-	-	-	375 -
Critical Hdwy	-	-	-	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	-	-	3.52 3.32
Pot Cap-1 Maneuver	0	-	-	-	81 400
Stage 1	0	-	-	-	210 -
Stage 2	0	-	-	-	665 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	-	-	-	-	81 400
Mov Cap-2 Maneuver	-	-	-	-	81 -
Stage 1	-	-	-	-	210 -
Stage 2	-	-	-	-	665 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑	↵		↵	
Traffic Vol, veh/h	20	220	360	20	5	5
Future Vol, veh/h	20	220	360	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	22	239	391	22	5	5

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	413	0	-	0	685 402
Stage 1	-	-	-	-	402 -
Stage 2	-	-	-	-	283 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1141	-	-	-	412 646
Stage 1	-	-	-	-	673 -
Stage 2	-	-	-	-	763 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1141	-	-	-	404 646
Mov Cap-2 Maneuver	-	-	-	-	505 -
Stage 1	-	-	-	-	660 -
Stage 2	-	-	-	-	763 -


























Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1141	-	-	-	567
HCM Lane V/C Ratio	0.019	-	-	-	0.019
HCM Control Delay (s)	8.2	-	-	-	11.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/28/2020

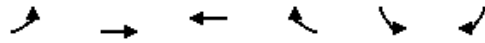
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	20	495	25	50	845	340	30	140	75	120	70	20
Future Volume (vph)	20	495	25	50	845	340	30	140	75	120	70	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3414		1703	3237		1687	1776	1484	1570	1591	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3414		1703	3237		1687	1776	1484	1570	1591	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	27	660	33	54	918	370	34	157	84	136	80	23
RTOR Reduction (vph)	0	2	0	0	27	0	0	0	69	0	8	0
Lane Group Flow (vph)	27	691	0	54	1261	0	34	157	15	136	95	0
Confl. Peds. (#/hr)	2						2	4	5	5		4
Heavy Vehicles (%)	5%	5%	5%	6%	6%	6%	7%	7%	7%	15%	15%	15%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	4.4	44.4		6.5	46.5		4.7	17.5	17.5	12.9	25.7	
Effective Green, g (s)	4.4	44.4		6.5	46.5		4.7	17.5	17.5	12.9	25.7	
Actuated g/C Ratio	0.04	0.44		0.06	0.46		0.05	0.17	0.17	0.13	0.26	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0	
Lane Grp Cap (vph)	75	1511		110	1500		79	309	258	201	407	
v/s Ratio Prot	0.02	0.20		c0.03	c0.39		0.02	c0.09		c0.09	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.36	0.46		0.49	0.84		0.43	0.51	0.06	0.68	0.23	
Uniform Delay, d1	46.6	19.5		45.3	23.6		46.5	37.5	34.5	41.7	29.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.9	0.2		1.3	4.2		3.7	1.3	0.1	6.9	0.1	
Delay (s)	49.5	19.8		46.6	27.9		50.2	38.8	34.6	48.6	29.6	
Level of Service	D	B		D	C		D	D	C	D	C	
Approach Delay (s)		20.9			28.6			38.9			40.4	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			28.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			100.3			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			70.4%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	215	480	885	25	15	350
Future Volume (vph)	215	480	885	25	15	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1687	3374	3390		1637	1468
Flt Permitted	0.16	1.00	1.00		0.95	1.00
Satd. Flow (perm)	276	3374	3390		1637	1468
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.75	0.75
Adj. Flow (vph)	250	558	1006	28	20	467
RTOR Reduction (vph)	0	0	2	0	0	20
Lane Group Flow (vph)	250	558	1032	0	20	447
Confl. Peds. (#/hr)	2			2	2	
Heavy Vehicles (%)	7%	7%	6%	6%	10%	10%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	69.7	69.7	51.0		27.6	46.3
Effective Green, g (s)	69.7	69.7	51.0		27.6	46.3
Actuated g/C Ratio	0.64	0.64	0.47		0.26	0.43
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	351	2175	1599		417	628
v/s Ratio Prot	0.09	0.17	0.30			c0.30
v/s Ratio Perm	c0.37				0.01	
v/c Ratio	0.71	0.26	0.65		0.05	0.71
Uniform Delay, d1	13.8	8.2	21.7		30.3	25.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.6	0.3	0.9		0.0	3.8
Delay (s)	19.4	8.5	22.6		30.4	29.2
Level of Service	B	A	C		C	C
Approach Delay (s)		11.8	22.6		29.3	
Approach LOS		B	C		C	

Intersection Summary

HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	108.1	Sum of lost time (s)	16.2
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/28/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	620	125	195	940	85	115
Future Volume (vph)	620	125	195	940	85	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Fr _t	0.97		1.00	1.00	1.00	0.85
Fl _t Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3195		1677	3355	1641	1468
Fl _t Permitted	1.00		0.28	1.00	0.95	1.00
Satd. Flow (perm)	3195		496	3355	1641	1468
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	713	144	224	1080	98	132
RTOR Reduction (vph)	8	0	0	0	0	118
Lane Group Flow (vph)	849	0	224	1080	98	14
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	6%	6%	4%	4%	10%	10%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	80.1		95.7	95.7	12.5	12.5
Effective Green, g (s)	80.1		95.7	95.7	12.5	12.5
Actuated g/C Ratio	0.68		0.81	0.81	0.11	0.11
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2168		509	2720	173	155
v/s Ratio Prot	0.27		0.04	c0.32		0.01
v/s Ratio Perm			c0.32		c0.06	
v/c Ratio	0.39		0.44	0.40	0.57	0.09
Uniform Delay, d ₁	8.3		3.5	3.1	50.2	47.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d ₂	0.5		0.2	0.4	4.2	0.3
Delay (s)	8.8		3.8	3.5	54.4	47.9
Level of Service	A		A	A	D	D
Approach Delay (s)	8.8			3.6	50.6	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			10.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			118.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			51.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/28/2020

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↕		↵	
Traffic Vol, veh/h	35	1265	1130	20	15	50
Future Vol, veh/h	35	1265	1130	20	15	50
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	6	6	12	12
Mvmt Flow	38	1375	1228	22	16	54

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1252	0	-	0	2005 627
Stage 1	-	-	-	-	1241 -
Stage 2	-	-	-	-	764 -
Critical Hdwy	4.16	-	-	-	7.04 7.14
Critical Hdwy Stg 1	-	-	-	-	6.04 -
Critical Hdwy Stg 2	-	-	-	-	6.04 -
Follow-up Hdwy	2.23	-	-	-	3.62 3.42
Pot Cap-1 Maneuver	546	-	-	-	46 403
Stage 1	-	-	-	-	217 -
Stage 2	-	-	-	-	395 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	545	-	-	-	43 402
Mov Cap-2 Maneuver	-	-	-	-	139 -
Stage 1	-	-	-	-	201 -
Stage 2	-	-	-	-	394 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	22.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	545	-	-	-	280
HCM Lane V/C Ratio	0.07	-	-	-	0.252
HCM Control Delay (s)	12.1	-	-	-	22.1
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑↑	
Traffic Vol, veh/h	1295	5	5	1180	5	5
Future Vol, veh/h	1295	5	5	1180	5	5
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	6	6	20	20
Mvmt Flow	1408	5	5	1283	5	5

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1418	0	2068
Stage 1	-	-	-	-	1416
Stage 2	-	-	-	-	652
Critical Hdwy	-	-	4.22	-	7.2
Critical Hdwy Stg 1	-	-	-	-	6.2
Critical Hdwy Stg 2	-	-	-	-	6.2
Follow-up Hdwy	-	-	2.26	-	3.7
Pot Cap-1 Maneuver	-	-	456	-	38
Stage 1	-	-	-	-	161
Stage 2	-	-	-	-	434
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	454	-	37
Mov Cap-2 Maneuver	-	-	-	-	119
Stage 1	-	-	-	-	160
Stage 2	-	-	-	-	429

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	26.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	176	-	-	454	-
HCM Lane V/C Ratio	0.062	-	-	0.012	-
HCM Control Delay (s)	26.8	-	-	13	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	0	1245	930	5	5	5
Future Vol, veh/h	0	1245	930	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	77	77	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1465	1208	6	6	6

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	1944 607
Stage 1	-	-	-	-	1211 -
Stage 2	-	-	-	-	733 -
Critical Hdwy	-	-	-	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	-	-	3.52 3.32
Pot Cap-1 Maneuver	0	-	-	-	57 439
Stage 1	0	-	-	-	245 -
Stage 2	0	-	-	-	436 -
Platoon blocked, %	-	-	-	-	
Mov Cap-1 Maneuver	-	-	-	-	57 439
Mov Cap-2 Maneuver	-	-	-	-	57 -
Stage 1	-	-	-	-	245 -
Stage 2	-	-	-	-	436 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	45.8
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	101
HCM Lane V/C Ratio	-	-	-	0.127
HCM Control Delay (s)	-	-	-	45.8
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.4

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	1300	5	5	1190	0	0
Future Vol, veh/h	1300	5	5	1190	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	20	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	88	88	25	25
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1413	5	6	1352	0	0

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1418	0	2104
Stage 1	-	-	-	-	1416
Stage 2	-	-	-	-	688
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	476	-	44
Stage 1	-	-	-	-	190
Stage 2	-	-	-	-	460
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	476	-	43
Mov Cap-2 Maneuver	-	-	-	-	138
Stage 1	-	-	-	-	190
Stage 2	-	-	-	-	454

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	476	-
HCM Lane V/C Ratio	-	-	-	0.012	-
HCM Control Delay (s)	0	-	-	12.7	-
HCM Lane LOS	A	-	-	B	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑	↵		↵	
Traffic Vol, veh/h	5	405	320	5	20	20
Future Vol, veh/h	5	405	320	5	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	5	440	348	5	22	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	353	0	-	0	801 351
Stage 1	-	-	-	-	351 -
Stage 2	-	-	-	-	450 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1200	-	-	-	352 690
Stage 1	-	-	-	-	710 -
Stage 2	-	-	-	-	640 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1200	-	-	-	351 690
Mov Cap-2 Maneuver	-	-	-	-	466 -
Stage 1	-	-	-	-	707 -
Stage 2	-	-	-	-	640 -


























Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1200	-	-	-	556
HCM Lane V/C Ratio	0.005	-	-	-	0.078
HCM Control Delay (s)	8	-	-	-	12
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	55	945	50	75	765	95	30	120	90	210	180	70
Future Volume (vph)	55	945	50	75	765	95	30	120	90	210	180	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3441		1736	3405		1752	1845	1568	1752	1761	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1736	3441		1736	3405		1752	1845	1568	1752	1761	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	59	1005	53	80	814	101	36	143	107	280	240	93
RTOR Reduction (vph)	0	2	0	0	7	0	0	0	91	0	12	0
Lane Group Flow (vph)	59	1056	0	80	908	0	36	143	16	280	321	0
Confl. Peds. (#/hr)	2		2	2		2	1					1
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	5.7	38.4		8.0	40.7		3.7	15.7	15.7	20.9	32.9	
Effective Green, g (s)	5.7	38.4		8.0	40.7		3.7	15.7	15.7	20.9	32.9	
Actuated g/C Ratio	0.06	0.38		0.08	0.40		0.04	0.15	0.15	0.20	0.32	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0	
Lane Grp Cap (vph)	97	1295		136	1358		63	283	241	358	568	
v/s Ratio Prot	0.03	c0.31		c0.05	0.27		0.02	0.08		c0.16	c0.18	
v/s Ratio Perm									0.01			
v/c Ratio	0.61	0.82		0.59	0.67		0.57	0.51	0.07	0.78	0.56	
Uniform Delay, d1	47.1	28.6		45.4	25.1		48.4	39.6	36.9	38.4	28.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.3	4.1		4.1	1.0		11.9	1.4	0.1	9.8	0.8	
Delay (s)	57.4	32.7		49.6	26.1		60.3	41.0	37.0	48.2	29.4	
Level of Service	E	C		D	C		E	D	D	D	C	
Approach Delay (s)		34.0			28.0			41.9			38.0	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			33.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			102.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			66.0%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	370	880	615	40	20	320
Future Volume (vph)	370	880	615	40	20	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1752	3505	3407		1751	1568
Flt Permitted	0.22	1.00	1.00		0.95	1.00
Satd. Flow (perm)	402	3505	3407		1751	1568
Peak-hour factor, PHF	0.85	0.85	0.95	0.95	0.86	0.86
Adj. Flow (vph)	435	1035	647	42	23	372
RTOR Reduction (vph)	0	0	4	0	0	32
Lane Group Flow (vph)	435	1035	685	0	23	340
Confl. Peds. (#/hr)					1	
Heavy Vehicles (%)	3%	3%	5%	5%	3%	3%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	48.7	48.7	24.0		15.9	40.6
Effective Green, g (s)	48.7	48.7	24.0		15.9	40.6
Actuated g/C Ratio	0.65	0.65	0.32		0.21	0.54
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	605	2263	1084		369	844
v/s Ratio Prot	c0.18	0.30	0.20			c0.22
v/s Ratio Perm	c0.28				0.01	
v/c Ratio	0.72	0.46	0.63		0.06	0.40
Uniform Delay, d1	10.1	6.7	21.9		23.8	10.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.4	0.7	1.2		0.1	0.3
Delay (s)	13.5	7.4	23.1		23.9	10.6
Level of Service	B	A	C		C	B
Approach Delay (s)		9.2	23.1		11.3	
Approach LOS		A	C		B	

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.4	Sum of lost time (s)	16.2
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/27/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	1100	95	190	1000	130	205
Future Volume (vph)	1100	95	190	1000	130	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Fr t	0.99		1.00	1.00	1.00	0.85
Fl t Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3276		1631	3261	1761	1583
Fl t Permitted	1.00		0.14	1.00	0.95	1.00
Satd. Flow (perm)	3276		248	3261	1761	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1196	103	207	1087	141	223
RTOR Reduction (vph)	4	0	0	0	0	196
Lane Group Flow (vph)	1295	0	207	1087	141	27
Confl. Peds. (#/hr)		5	5		2	
Heavy Vehicles (%)	5%	5%	7%	7%	2%	2%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	79.8		99.0	99.0	15.2	15.2
Effective Green, g (s)	79.8		99.0	99.0	15.2	15.2
Actuated g/C Ratio	0.64		0.80	0.80	0.12	0.12
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2108		357	2603	215	194
v/s Ratio Prot	c0.40		c0.07	0.33		0.02
v/s Ratio Perm			0.40		c0.08	
v/c Ratio	0.61		0.58	0.42	0.66	0.14
Uniform Delay, d1	13.0		9.7	3.8	51.9	48.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4		1.4	0.5	7.0	0.3
Delay (s)	14.4		11.1	4.3	58.9	48.9
Level of Service	B		B	A	E	D
Approach Delay (s)	14.4			5.4	52.8	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			15.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			124.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			63.5%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/28/2020

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑↑	↑↑		↵	
Traffic Vol, veh/h	8	730	1135	10	5	8
Future Vol, veh/h	8	730	1135	10	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	6	5	5	25	25
Mvmt Flow	9	839	1305	11	6	9

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1316	0	-	0	1749 658
Stage 1	-	-	-	-	1311 -
Stage 2	-	-	-	-	438 -
Critical Hdwy	4.22	-	-	-	7.3 7.4
Critical Hdwy Stg 1	-	-	-	-	6.3 -
Critical Hdwy Stg 2	-	-	-	-	6.3 -
Follow-up Hdwy	2.26	-	-	-	3.75 3.55
Pot Cap-1 Maneuver	500	-	-	-	60 356
Stage 1	-	-	-	-	177 -
Stage 2	-	-	-	-	556 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	500	-	-	-	59 356
Mov Cap-2 Maneuver	-	-	-	-	139 -
Stage 1	-	-	-	-	174 -
Stage 2	-	-	-	-	556 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	22.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	500	-	-	-	222
HCM Lane V/C Ratio	0.018	-	-	-	0.067
HCM Control Delay (s)	12.3	-	-	-	22.4
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	730	7	8	1135	2	8
Future Vol, veh/h	730	7	8	1135	2	8
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	6	7	5	5	80	50
Mvmt Flow	839	8	9	1305	2	9

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	852	0	1519
Stage 1	-	-	-	-	848
Stage 2	-	-	-	-	671
Critical Hdwy	-	-	4.2	-	8.4
Critical Hdwy Stg 1	-	-	-	-	7.4
Critical Hdwy Stg 2	-	-	-	-	7.4
Follow-up Hdwy	-	-	2.25	-	4.3
Pot Cap-1 Maneuver	-	-	764	-	52
Stage 1	-	-	-	-	233
Stage 2	-	-	-	-	306
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	761	-	51
Mov Cap-2 Maneuver	-	-	-	-	143
Stage 1	-	-	-	-	232
Stage 2	-	-	-	-	302

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	16.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	318	-	-	761	-
HCM Lane V/C Ratio	0.036	-	-	0.012	-
HCM Control Delay (s)	16.7	-	-	9.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↑↑	↑↑		↵	
Traffic Vol, veh/h	4	706	1230	6	0	0
Future Vol, veh/h	4	706	1230	6	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	88	88	25	25
Heavy Vehicles, %	50	2	2	50	2	2
Mvmt Flow	4	776	1398	7	0	0

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1405	0	-	0	1798 703
Stage 1	-	-	-	-	1402 -
Stage 2	-	-	-	-	396 -
Critical Hdwy	5.1	-	-	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	2.7	-	-	-	3.52 3.32
Pot Cap-1 Maneuver	295	-	-	-	71 380
Stage 1	-	-	-	-	193 -
Stage 2	-	-	-	-	649 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	295	-	-	-	70 380
Mov Cap-2 Maneuver	-	-	-	-	70 -
Stage 1	-	-	-	-	190 -
Stage 2	-	-	-	-	649 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	295	-	-	-	-
HCM Lane V/C Ratio	0.015	-	-	-	-
HCM Control Delay (s)	17.4	-	-	-	0
HCM Lane LOS	C	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶		↶	
Traffic Vol, veh/h	36	220	360	43	5	5
Future Vol, veh/h	36	220	360	43	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	39	239	391	47	5	5

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	438	0	-	0	732
Stage 1	-	-	-	-	415
Stage 2	-	-	-	-	317
Critical Hdwy	4.13	-	-	-	6.43
Critical Hdwy Stg 1	-	-	-	-	5.43
Critical Hdwy Stg 2	-	-	-	-	5.43
Follow-up Hdwy	2.227	-	-	-	3.527
Pot Cap-1 Maneuver	1117	-	-	-	387
Stage 1	-	-	-	-	664
Stage 2	-	-	-	-	736
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1117	-	-	-	373
Mov Cap-2 Maneuver	-	-	-	-	481
Stage 1	-	-	-	-	641
Stage 2	-	-	-	-	736


























Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1117	-	-	-	547
HCM Lane V/C Ratio	0.035	-	-	-	0.02
HCM Control Delay (s)	8.3	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/28/2020

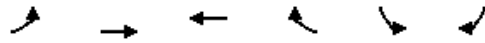
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	20	509	25	50	845	340	30	140	76	125	70	20
Future Volume (vph)	20	509	25	50	845	340	30	140	76	125	70	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3414		1703	3237		1687	1776	1484	1570	1591	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3414		1703	3237		1687	1776	1484	1570	1591	
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	27	679	33	54	918	370	34	157	85	142	80	23
RTOR Reduction (vph)	0	2	0	0	27	0	0	0	70	0	8	0
Lane Group Flow (vph)	27	710	0	54	1261	0	34	157	15	142	95	0
Confl. Peds. (#/hr)	2						2	4	5	5		4
Heavy Vehicles (%)	5%	5%	5%	6%	6%	6%	7%	7%	7%	15%	15%	15%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	4.4	44.5		6.5	46.6		4.7	17.5	17.5	13.4	26.2	
Effective Green, g (s)	4.4	44.5		6.5	46.6		4.7	17.5	17.5	13.4	26.2	
Actuated g/C Ratio	0.04	0.44		0.06	0.46		0.05	0.17	0.17	0.13	0.26	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0	
Lane Grp Cap (vph)	74	1505		109	1494		78	308	257	208	413	
v/s Ratio Prot	0.02	0.21		c0.03	c0.39		0.02	c0.09		c0.09	0.06	
v/s Ratio Perm									0.01			
v/c Ratio	0.36	0.47		0.50	0.84		0.44	0.51	0.06	0.68	0.23	
Uniform Delay, d1	46.9	19.9		45.6	23.9		46.8	37.8	34.8	41.7	29.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.2		1.3	4.4		3.9	1.3	0.1	7.2	0.1	
Delay (s)	49.9	20.1		46.9	28.3		50.7	39.1	34.9	48.9	29.5	
Level of Service	D	C		D	C		D	D	C	D	C	
Approach Delay (s)		21.2			29.0			39.3			40.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			29.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			100.9			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			70.6%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	231	480	891	25	15	350
Future Volume (vph)	231	480	891	25	15	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1687	3374	3390		1637	1468
Flt Permitted	0.15	1.00	1.00		0.95	1.00
Satd. Flow (perm)	269	3374	3390		1637	1468
Peak-hour factor, PHF	0.86	0.86	0.88	0.88	0.75	0.75
Adj. Flow (vph)	269	558	1012	28	20	467
RTOR Reduction (vph)	0	0	2	0	0	19
Lane Group Flow (vph)	269	558	1039	0	20	448
Confl. Peds. (#/hr)	2			2	2	
Heavy Vehicles (%)	7%	7%	6%	6%	10%	10%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	70.7	70.7	50.8		27.1	47.0
Effective Green, g (s)	70.7	70.7	50.8		27.1	47.0
Actuated g/C Ratio	0.65	0.65	0.47		0.25	0.43
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	364	2196	1585		408	635
v/s Ratio Prot	0.10	0.17	0.31			c0.30
v/s Ratio Perm	c0.38				0.01	
v/c Ratio	0.74	0.25	0.66		0.05	0.71
Uniform Delay, d1	14.4	7.9	22.2		31.0	25.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.3	1.0		0.1	3.6
Delay (s)	21.1	8.2	23.2		31.0	28.7
Level of Service	C	A	C		C	C
Approach Delay (s)		12.4	23.2		28.8	
Approach LOS		B	C		C	

Intersection Summary

HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	108.6	Sum of lost time (s)	16.2
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/28/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	622	125	195	942	85	115
Future Volume (vph)	622	125	195	942	85	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Fr t	0.97		1.00	1.00	1.00	0.85
Fl t Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3195		1677	3355	1641	1468
Fl t Permitted	1.00		0.28	1.00	0.95	1.00
Satd. Flow (perm)	3195		495	3355	1641	1468
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	715	144	224	1083	98	132
RTOR Reduction (vph)	8	0	0	0	0	118
Lane Group Flow (vph)	851	0	224	1083	98	14
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	6%	6%	4%	4%	10%	10%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	80.1		95.7	95.7	12.5	12.5
Effective Green, g (s)	80.1		95.7	95.7	12.5	12.5
Actuated g/C Ratio	0.68		0.81	0.81	0.11	0.11
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2168		508	2720	173	155
v/s Ratio Prot	0.27		0.04	c0.32		0.01
v/s Ratio Perm			c0.32		c0.06	
v/c Ratio	0.39		0.44	0.40	0.57	0.09
Uniform Delay, d1	8.3		3.5	3.1	50.2	47.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5		0.2	0.4	4.2	0.3
Delay (s)	8.8		3.8	3.5	54.4	47.9
Level of Service	A		A	A	D	D
Approach Delay (s)	8.8			3.6	50.6	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			10.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			118.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			51.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC
 10: Steilacoom Blvd SW & Durango St SW

02/28/2020

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↕		↵	
Traffic Vol, veh/h	36	1270	1152	20	15	51
Future Vol, veh/h	36	1270	1152	20	15	51
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	120	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	6	6	12	12
Mvmt Flow	40	1396	1266	22	16	56

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1290	0	-	0	2057 646
Stage 1	-	-	-	-	1279 -
Stage 2	-	-	-	-	778 -
Critical Hdwy	4.16	-	-	-	7.04 7.14
Critical Hdwy Stg 1	-	-	-	-	6.04 -
Critical Hdwy Stg 2	-	-	-	-	6.04 -
Follow-up Hdwy	2.23	-	-	-	3.62 3.42
Pot Cap-1 Maneuver	528	-	-	-	42 391
Stage 1	-	-	-	-	207 -
Stage 2	-	-	-	-	389 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	527	-	-	-	39 390
Mov Cap-2 Maneuver	-	-	-	-	132 -
Stage 1	-	-	-	-	191 -
Stage 2	-	-	-	-	388 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	23.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	527	-	-	-	270
HCM Lane V/C Ratio	0.075	-	-	-	0.269
HCM Control Delay (s)	12.4	-	-	-	23.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	1.1

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	1295	20	28	1180	9	11
Future Vol, veh/h	1295	20	28	1180	9	11
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	6	6	20	20
Mvmt Flow	1408	22	30	1283	10	12

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1435	0	2126 720
Stage 1	-	-	-	-	1424 -
Stage 2	-	-	-	-	702 -
Critical Hdwy	-	-	4.22	-	7.2 7.3
Critical Hdwy Stg 1	-	-	-	-	6.2 -
Critical Hdwy Stg 2	-	-	-	-	6.2 -
Follow-up Hdwy	-	-	2.26	-	3.7 3.5
Pot Cap-1 Maneuver	-	-	449	-	34 332
Stage 1	-	-	-	-	159 -
Stage 2	-	-	-	-	408 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	447	-	32 331
Mov Cap-2 Maneuver	-	-	-	-	114 -
Stage 1	-	-	-	-	158 -
Stage 2	-	-	-	-	381 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	28
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	178	-	-	447	-
HCM Lane V/C Ratio	0.122	-	-	0.068	-
HCM Control Delay (s)	28	-	-	13.6	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↔		↵	
Traffic Vol, veh/h	3	1245	945	9	8	7
Future Vol, veh/h	3	1245	945	9	8	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	77	77	78	78
Heavy Vehicles, %	50	2	2	50	2	2
Mvmt Flow	4	1465	1227	12	10	9

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1239	0	-	0	1974 620
Stage 1	-	-	-	-	1233 -
Stage 2	-	-	-	-	741 -
Critical Hdwy	5.1	-	-	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	2.7	-	-	-	3.52 3.32
Pot Cap-1 Maneuver	354	-	-	-	54 431
Stage 1	-	-	-	-	238 -
Stage 2	-	-	-	-	432 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	354	-	-	-	53 431
Mov Cap-2 Maneuver	-	-	-	-	53 -
Stage 1	-	-	-	-	235 -
Stage 2	-	-	-	-	432 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	55.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	354	-	-	-	90
HCM Lane V/C Ratio	0.01	-	-	-	0.214
HCM Control Delay (s)	15.3	-	-	-	55.6
HCM Lane LOS	C	-	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	
Traffic Vol, veh/h	5	405	320	7	43	36
Future Vol, veh/h	5	405	320	7	43	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	20	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	2	3	3	3
Mvmt Flow	5	440	348	8	47	39

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	356	0	-	0	802 352
Stage 1	-	-	-	-	352 -
Stage 2	-	-	-	-	450 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1197	-	-	-	352 689
Stage 1	-	-	-	-	710 -
Stage 2	-	-	-	-	640 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1197	-	-	-	351 689
Mov Cap-2 Maneuver	-	-	-	-	466 -
Stage 1	-	-	-	-	707 -
Stage 2	-	-	-	-	640 -


























Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1197	-	-	-	547
HCM Lane V/C Ratio	0.005	-	-	-	0.157
HCM Control Delay (s)	8	-	-	-	12.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.6

HCM Signalized Intersection Capacity Analysis

2: Lakeview Ave SW & 100th St SW

02/28/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	55	948	50	75	781	96	30	120	90	210	180	70
Future Volume (vph)	55	948	50	75	781	96	30	120	90	210	180	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3441		1736	3406		1752	1845	1568	1752	1761	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1736	3441		1736	3406		1752	1845	1568	1752	1761	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	59	1009	53	80	831	102	36	143	107	280	240	93
RTOR Reduction (vph)	0	2	0	0	7	0	0	0	90	0	12	0
Lane Group Flow (vph)	59	1060	0	80	926	0	36	143	17	280	321	0
Confl. Peds. (#/hr)	2		2	2		2	1					1
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	5.7	38.6		8.0	40.9		3.7	15.8	15.8	20.9	33.0	
Effective Green, g (s)	5.7	38.6		8.0	40.9		3.7	15.8	15.8	20.9	33.0	
Actuated g/C Ratio	0.06	0.38		0.08	0.40		0.04	0.15	0.15	0.20	0.32	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	3.0	3.0		2.0	2.0		3.0	3.0	3.0	2.0	2.0	
Lane Grp Cap (vph)	96	1298		135	1361		63	284	242	357	568	
v/s Ratio Prot	0.03	c0.31		c0.05	0.27		0.02	0.08		c0.16	c0.18	
v/s Ratio Perm									0.01			
v/c Ratio	0.61	0.82		0.59	0.68		0.57	0.50	0.07	0.78	0.56	
Uniform Delay, d1	47.2	28.7		45.6	25.3		48.5	39.7	37.0	38.6	28.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.1	4.1		4.6	1.1		11.9	1.4	0.1	10.0	0.8	
Delay (s)	58.4	32.7		50.2	26.4		60.4	41.1	37.1	48.5	29.5	
Level of Service	E	C		D	C		E	D	D	D	C	
Approach Delay (s)		34.1			28.3			42.0			38.2	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			33.7				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			102.3				Sum of lost time (s)				19.0	
Intersection Capacity Utilization			66.1%				ICU Level of Service				C	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: 100th St SW & 40th Ave SW

02/28/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	370	883	619	40	21	335
Future Volume (vph)	370	883	619	40	21	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		5.4	5.4
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1752	3505	3407		1751	1568
Flt Permitted	0.21	1.00	1.00		0.95	1.00
Satd. Flow (perm)	392	3505	3407		1751	1568
Peak-hour factor, PHF	0.85	0.85	0.95	0.95	0.86	0.86
Adj. Flow (vph)	435	1039	652	42	24	390
RTOR Reduction (vph)	0	0	4	0	0	32
Lane Group Flow (vph)	435	1039	690	0	24	358
Confl. Peds. (#/hr)					1	
Heavy Vehicles (%)	3%	3%	5%	5%	3%	3%
Turn Type	pm+pt	NA	NA		Perm	pt+ov
Protected Phases	7	4	8			6 7
Permitted Phases	4				6	
Actuated Green, G (s)	49.1	49.1	24.1		16.5	41.5
Effective Green, g (s)	49.1	49.1	24.1		16.5	41.5
Actuated g/C Ratio	0.64	0.64	0.32		0.22	0.54
Clearance Time (s)	5.4	5.4	5.4		5.4	
Vehicle Extension (s)	2.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	600	2252	1074		378	851
v/s Ratio Prot	c0.19	0.30	0.20			c0.23
v/s Ratio Perm	c0.28				0.01	
v/c Ratio	0.72	0.46	0.64		0.06	0.42
Uniform Delay, d1	10.8	6.9	22.5		23.8	10.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.7	0.7	1.3		0.1	0.3
Delay (s)	14.4	7.6	23.8		23.9	10.7
Level of Service	B	A	C		C	B
Approach Delay (s)		9.6	23.8		11.4	
Approach LOS		A	C		B	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	16.2
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: Lakeview Ave SW & Steilacoom Blvd SW

02/28/2020

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	1108	95	190	1000	130	207
Future Volume (vph)	1108	95	190	1000	130	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	4.9		4.9	4.9	4.9	4.9
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Fr t	0.99		1.00	1.00	1.00	0.85
Fl t Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3276		1631	3261	1761	1583
Fl t Permitted	1.00		0.14	1.00	0.95	1.00
Satd. Flow (perm)	3276		245	3261	1761	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1204	103	207	1087	141	225
RTOR Reduction (vph)	4	0	0	0	0	197
Lane Group Flow (vph)	1303	0	207	1087	141	28
Confl. Peds. (#/hr)		5	5		2	
Heavy Vehicles (%)	5%	5%	7%	7%	2%	2%
Turn Type	NA		pm+pt	NA	Perm	Prot
Protected Phases	4		3	8		2
Permitted Phases			8		2	
Actuated Green, G (s)	79.8		99.0	99.0	15.2	15.2
Effective Green, g (s)	79.8		99.0	99.0	15.2	15.2
Actuated g/C Ratio	0.64		0.80	0.80	0.12	0.12
Clearance Time (s)	4.9		4.9	4.9	4.9	4.9
Vehicle Extension (s)	3.0		2.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2108		355	2603	215	194
v/s Ratio Prot	c0.40		c0.07	0.33		0.02
v/s Ratio Perm			0.40		c0.08	
v/c Ratio	0.62		0.58	0.42	0.66	0.14
Uniform Delay, d1	13.1		9.9	3.8	51.9	48.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4		1.6	0.5	7.0	0.3
Delay (s)	14.5		11.5	4.3	58.9	48.9
Level of Service	B		B	A	E	D
Approach Delay (s)	14.5			5.4	52.8	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			15.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			124.0		Sum of lost time (s)	14.7
Intersection Capacity Utilization			63.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

APPENDIX D
Data Collection – Turning Movement Counts

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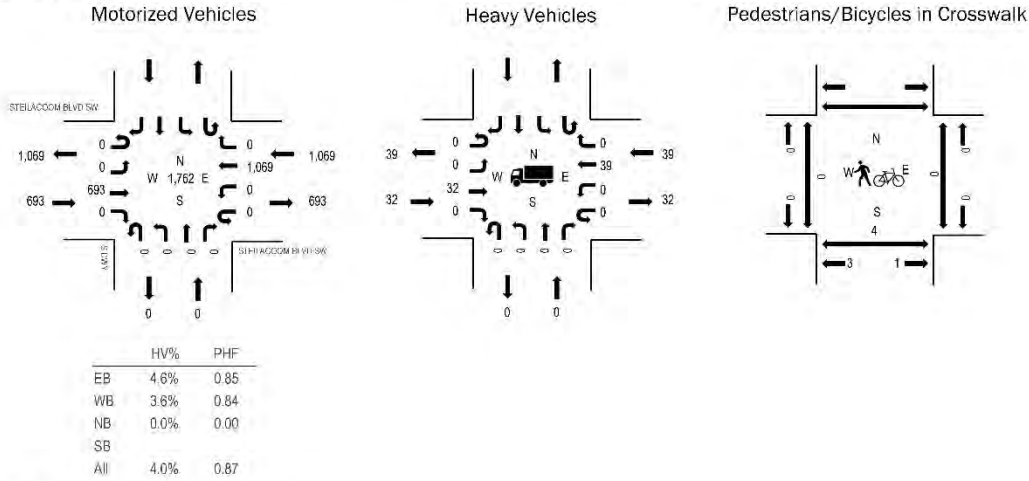
Sound Transit Sounder Maintenance Base Project



(303) 216-2439
www.alltrafficdata.net

Location: 1 S DWY & STEILACOOM BLVD SW AM
Date: Wednesday, February 19, 2020
Peak Hour: 07:30 AM - 08:30 AM

Peak Hour



Traffic Counts - Motorized Vehicles

Interval Start Time	STEILACOOM BLVD SW Eastbound				STEILACOOM BLVD SW Westbound				S DWY Northbound				Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
6:30 AM	0	0	95	0	0	0	147	0	0	0	0	0	0	0	0	0	242	1,256
6:45 AM	0	0	111	0	0	0	215	0	0	0	0	0	0	0	0	0	326	1,419
7:00 AM	0	0	126	0	0	0	186	0	0	0	0	0	0	0	0	0	312	1,601
7:15 AM	0	0	148	0	0	0	228	0	0	0	0	0	0	0	0	0	376	1,709
7:30 AM	0	0	146	0	0	0	259	0	0	0	0	0	0	0	0	0	405	1,762
7:45 AM	0	0	189	0	0	0	319	0	0	0	0	0	0	0	0	0	508	
8:00 AM	0	0	155	0	0	0	265	0	0	0	0	0	0	0	0	0	420	
8:15 AM	0	0	203	0	0	0	226	0	0	0	0	0	0	0	0	0	429	
Count Total	0	0	1,173	0	0	0	1,845	0	0	0	0	0	0	0	0	0	3,018	
Peak Hour	0	0	693	0	0	0	1,069	0	0	0	0	0	0	0	0	0	1,762	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Total	Interval Start Time	Pedestrians/Bicycles on Crosswalk					Total
	EB	NB	WB	SB				EB	NB	WB	SB		
6:30 AM	5	0	1			6	6:30 AM	0	0	0	0	0	
6:45 AM	7	0	4			11	6:45 AM	0	0	0	0	0	
7:00 AM	7	0	5			12	7:00 AM	0	0	0	0	0	
7:15 AM	7	0	5			12	7:15 AM	0	1	0	0	1	
7:30 AM	10	0	10			20	7:30 AM	0	0	0	0	0	
7:45 AM	7	0	8			15	7:45 AM	0	1	0	0	1	
8:00 AM	8	0	11			19	8:00 AM	0	0	0	0	0	
8:15 AM	7	0	10			17	8:15 AM	0	3	0	0	3	
Count Total	58	0	54			112	Count Total	0	5	0	0	5	
Peak Hour	32	0	39			71	Peak Hour	0	4	0	0	4	

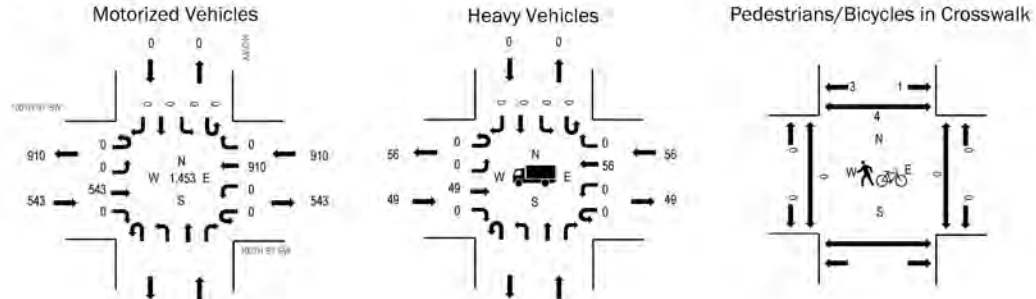
**Sound Transit
Sounder Maintenance Base Project**



(303) 216-2439
www.alltrafficdata.net

Location: 2 N DWY & 100TH ST SW AM
Date: Wednesday, February 19, 2020
Peak Hour: 07:30 AM - 08:30 AM

Peak Hour



	HV%	PHF
EB	9.0%	0.91
WB	6.2%	0.68
NB		
SB	0.0%	0.00
All	7.2%	0.57

Traffic Counts - Motorized Vehicles

Interval Start Time	100TH ST SW Eastbound				100TH ST SW Westbound				Northbound				N DWY Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
6:30 AM	0	0	107	0	0	0	104	0					0	1	0	0	212	1,128
6:45 AM	0	0	99	0	0	0	183	0					0	0	0	0	282	1,259
7:00 AM	1	0	94	0	0	0	163	0					0	0	0	0	278	1,353
7:15 AM	0	0	141	0	0	0	215	0					0	0	0	0	356	1,446
7:30 AM	0	0	131	0	0	0	212	0					0	0	0	0	343	1,353
7:45 AM	0	0	118	0	0	0	258	0					0	0	0	0	376	
8:00 AM	0	0	145	0	0	0	226	0					0	0	0	0	371	
8:15 AM	0	0	149	0	0	0	214	0					0	0	0	0	363	
Count Total	1	0	984	0	0	0	1,595	0					0	1	0	0	2,581	
Peak Hour	0	0	543	0	0	0	910	0					0	0	0	0	1,453	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
6:30 AM	7		6	0	13	6:30 AM	0		0	0	0
6:45 AM	9		7	0	16	6:45 AM	0		0	1	1
7:00 AM	9		4	0	13	7:00 AM	0		0	0	0
7:15 AM	6		12	0	18	7:15 AM	0		0	1	1
7:30 AM	9		8	0	17	7:30 AM	0		0	1	1
7:45 AM	16		9	0	25	7:45 AM	0		0	0	0
8:00 AM	17		19	0	36	8:00 AM	0		0	2	2
8:15 AM	7		20	0	27	8:15 AM	0		0	1	1
Count Total	80		65	0	145	Count Total	0		0	6	6
Peak Hour	49		56	0	105	Peak Hour	0		0	4	4

**Sound Transit
Sounder Maintenance Base Project**



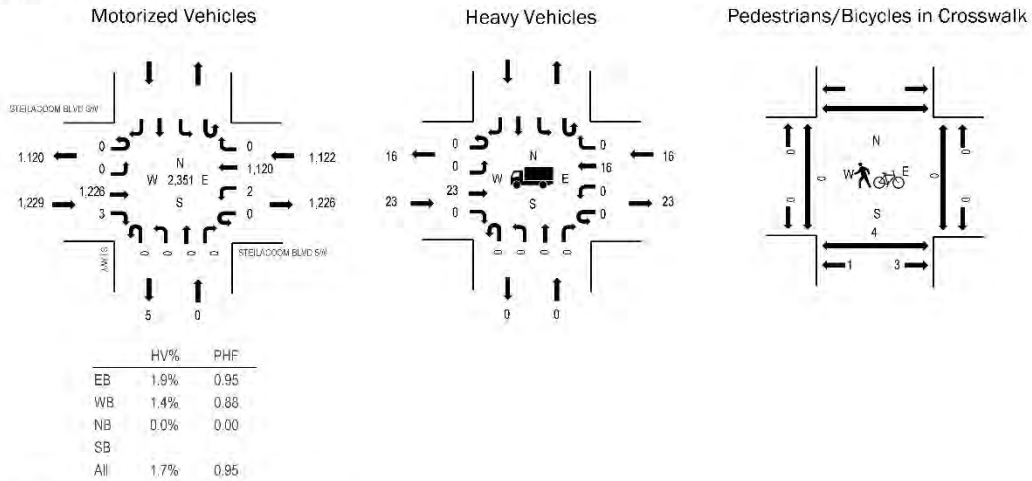
(303) 216-2439
www.alltrafficdata.net

Location: 1 S DWY & STEILACOOM BLVD SW PM

Date: Wednesday, February 19, 2020

Peak Hour: 04:30 PM - 05:30 PM

Peak Hour



Traffic Counts - Motorized Vehicles

Interval Start Time	STEILACOOM BLVD SW Eastbound				STEILACOOM BLVD SW Westbound				S DWY Northbound				Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	284	0	0	0	282	0	0	0	0	0	0	0	0	0	566	2,306
4:15 PM	0	0	249	0	0	0	289	0	0	0	0	0	0	0	0	0	538	2,316
4:30 PM	0	0	323	1	0	0	258	0	0	0	0	0	0	0	0	0	582	2,351
4:45 PM	0	0	298	2	0	1	319	0	0	0	0	0	0	0	0	0	620	2,265
5:00 PM	0	0	303	0	0	0	273	0	0	0	0	0	0	0	0	0	576	2,107
5:15 PM	0	0	302	0	0	1	270	0	0	0	0	0	0	0	0	0	573	
5:30 PM	0	0	237	0	0	0	258	0	0	0	0	0	0	0	1	0	496	
5:45 PM	0	0	199	0	0	0	263	0	0	0	0	0	0	0	0	0	462	
Count Total	0	0	2,195	3	0	2	2,212	0	0	0	0	0	0	0	1	0	4,413	
Peak Hour	0	0	1,226	3	0	2	1,120	0	0	0	0	0	0	0	0	0	2,351	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Total	Interval Start Time	Pedestrians/Bicycles on Crosswalk					Total
	EB	NB	WB	SB				EB	NB	WB	SB		
4:00 PM	9	0	11			20	4:00 PM	0	0	0			0
4:15 PM	5	0	4			9	4:15 PM	0	1	0			1
4:30 PM	4	0	2			6	4:30 PM	0	2	0			2
4:45 PM	1	0	4			5	4:45 PM	0	1	0			1
5:00 PM	9	0	5			14	5:00 PM	0	0	0			0
5:15 PM	9	0	5			14	5:15 PM	0	1	0			1
5:30 PM	4	0	2			6	5:30 PM	0	0	0			0
5:45 PM	3	0	4			7	5:45 PM	0	4	0			4
Count Total	44	0	37			81	Count Total	0	9	0			9
Peak Hour	23	0	16			39	Peak Hour	0	4	0			4

**Sound Transit
Sounder Maintenance Base Project**



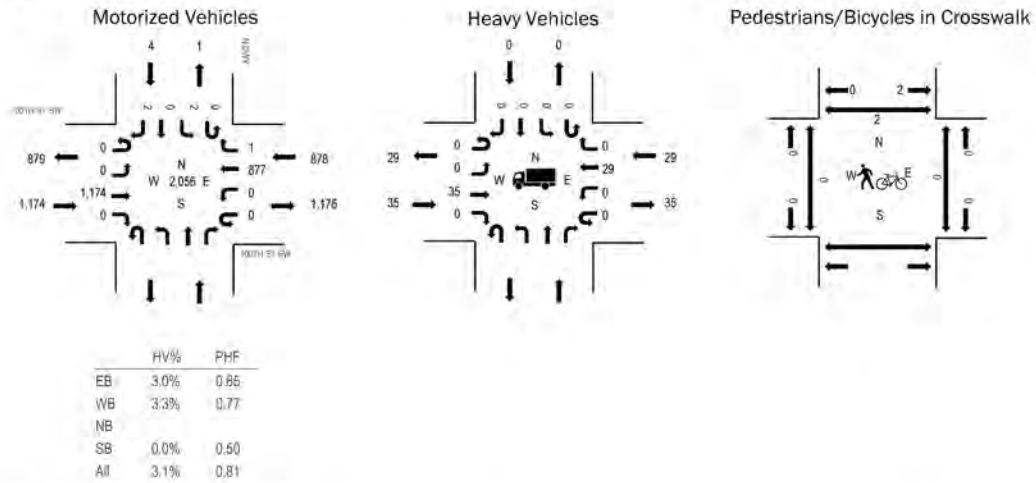
(303) 216-2439
www.alltrafficedata.net

Location: 2 N DWY & 100TH ST SW PM

Date: Wednesday, February 19, 2020

Peak Hour: 04:30 PM - 05:30 PM

Peak Hour



Traffic Counts - Motorized Vehicles

Interval Start Time	100TH ST SW Eastbound				100TH ST SW Westbound				Northbound				N DWY Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	281	0	0	0	238	0					0	0	0	0	519	2,015
4:15 PM	0	0	189	0	0	0	175	1					0	0	0	0	375	1,941
4:30 PM	0	0	344	0	0	0	285	1					0	0	0	2	632	2,056
4:45 PM	0	0	298	0	0	0	192	0					0	1	0	0	489	1,834
5:00 PM	0	0	259	0	0	0	186	0					0	0	0	0	445	1,768
5:15 PM	0	0	275	0	0	0	214	0					0	1	0	0	490	
5:30 PM	0	0	214	0	0	0	193	0					0	3	0	0	410	
5:45 PM	0	0	224	0	0	0	197	0					0	0	0	0	421	
Count Total	0	0	2,082	0	0	0	1,680	2					0	5	0	2	3,781	
Peak Hour	0	0	1,174	0	0	0	877	1					0	2	0	2	2,066	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Total	Interval Start Time	Pedestrians/Bicycles on Crosswalk					Total
	EB	NB	WB	SB				EB	NB	WB	SB		
4:00 PM	10		5	0		15	4:00 PM	0		0	0	0	0
4:15 PM	8		3	0		11	4:15 PM	0		0	0	0	0
4:30 PM	7		7	0		14	4:30 PM	0		0	0	1	1
4:45 PM	11		7	0		18	4:45 PM	0		0	0	0	0
5:00 PM	9		4	0		13	5:00 PM	0		0	1	1	
5:15 PM	8		11	0		19	5:15 PM	0		0	0	0	0
5:30 PM	4		5	0		9	5:30 PM	0		0	1	1	
5:45 PM	8		8	0		16	5:45 PM	0		0	0	0	
Count Total	65		50	0		115	Count Total	0		0	3	3	
Peak Hour	35		29	0		64	Peak Hour	0		0	2	2	

APPENDIX E
Signal Timing and Phasing Data

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**Sound Transit
Sounder Maintenance Base Project**

City of Lakewood

Timing Sheet

1/27/2020 4:57:07 PM

Station : 59 - 100th / 40th Ave (Standard File)

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		7				7		7								
Ped Clearance		20				20		16								
Min Green				8		8	5	8	5	5	5	5	5	5	5	5
Passage				3		3	2	3	1	1	1	1	1	1	1	1
Max1				40		30	40	40	25	25	25	25	25	25	25	25
Max2									50	50	50	50	50	50	50	50
Yellow	3	3	3	3.9	3	3.9	3.9	3.9	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red	1	1	1	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Red Revert				2		2	2	2								
Added Initial																
Max Initial																
Time Before Reduce				10		10		10								
Cars Before Reduce																
Time To Reduce				10		10		10								
Reduce By																
Min Gap				2		2		2								
Dynamic Max Limit																
Dynamic Max Step																
Enable		ON		ON		ON	ON	ON					ON			
Auto Entry																
Auto Exit																
Non Act1																
Non Act2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall																
Max Recall				ON												
Ped Recall																
Soft Recall				ON				ON								
Dual Entry				ON				ON								
Sim Gap Enable				ON				ON	ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk																
Cond Service																
Add Init Calc																
Bike Clear																

Preemption

Channel	1	2	3	4	5	6
Lock Input	ON	ON				ON
Override Flash	ON	ON				ON
Override Higher	ON	ON				ON
Flash Dwell	ON	ON				ON
Link						
Delay						
Min Duration			4	4	4	
Min Green			2	2	2	
Min Walk			4	4	4	
Ped Clear			16	16	20	
Track Green						
Min Dwell			6	6	6	
Max Presence			120	120	120	
Track R1						
Track R2						
Track R3						
Track R4						
Dwell Ped1						
Exit R1			4	4	4	
Exit R2			8	8	8	
Exit R3						
Exit R4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Type				
Platoon Rx				
Cond Lockout				
Coord in Preempt				
Platoon Tx				
Lock				
Begin Mode	SKIP	SKIP	SKIP	SKIP
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Max Lockout				
Ext Dwell				
Ant Arrival				
Max Grn 1				
Max Grn 2				
Max Grn 3				
Max Grn 4				
Max Grn 5				
Max Grn 6				
Max Grn 7				
Max Grn 8				
Max Grn 9				
Max Grn 10				
Max Grn 11				
Max Grn 12				
Max Grn 13				
Max Grn 14				
Max Grn 15				
Max Grn 16				
Headway Group				
Queue Jump				
Headway Time				
TX Time				
PP Hold Time				
PP Tx Phase 1				
PP Tx Phase 2				
PP Tx Phase 3				
PP Tx Phase 4				

City of Lakewood

Timing Sheet

1/27/2020 4:57:07 PM

**Sound Transit
Sounder Maintenance Base Project**

City of Lakewood

Timing Sheet

1/23/2020 8:13:51 AM

Station : 16 - Steilacoom Blvd / Lakeview Ave ATC (Standard File)

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk				7		7										
Ped Clearance				19		19										
Min Green		8	5	8				8								
Gap Ext		3	2	3				3								
Max1		30	24	50				50								
Max2																
Yellow Ctr		3.9	3.9	3.9		3.9		3.9								
Red Ctr		1	1	1		1		1								
Red Revert	2	2	2	2	2	2	2	2								
Added Initial																
Max Initial																
Time Before Reduce		10		15				15								
Cars Before Reduce																
Time To Reduce		10		10				10								
Reduce By																
Min Gap		2		2				2								
Dynamic Max Limit																
Dynamic Max Step																
Enable		ON	ON	ON		ON		ON								
Auto Flash Entry																
Auto Flash Exit																
Non-Actuated 1																
Non-Actuated 2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall																
Max Recall																
Ped Recall																
Soft Recall				ON				ON								
Dual Entry		ON		ON		ON		ON								
Sim Gap Enable	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk																
Cond Service																
Add Init Calc																
Concurrent Ps	1	1	1	1	2	2	2	2								

Preemption

Channel	1	2	3	4	5	6
Lock Input	ON	ON	ON	ON	ON	ON
Override Auto Flash	ON	ON	ON	ON	ON	ON
Override Higher Preempt	ON	ON				
Flash in Dwell	ON	ON				
Link to Preempt						
Delay						
Min Duration	4		4	4		4
Min Green		2	2			2
Min Walk			4	4		4
Ped Clear			19	19		19
Track Green	21					
Min Dwell			6	6	6	6
Max Presence			120	120	60	120
Track Veh 1	8					
Track Veh 2	3					
Track Veh 3						
Track Veh 4						
Dwell Cyc Veh 1			2	4		3
Dwell Cyc Veh 2						8
Dwell Cyc Veh 3						
Dwell Cyc Veh 4						
Dwell Cyc Veh 5						
Dwell Cyc Veh 6						
Dwell Cyc Veh 7						
Dwell Cyc Veh 8						
Dwell Cyc Veh 9						
Dwell Cyc Veh 10						
Dwell Cyc Veh 11						
Dwell Cyc Veh 12						
Dwell Cyc Ped1						
Dwell Cyc Ped2						
Dwell Cyc Ped3						
Dwell Cyc Ped4						
Dwell Cyc Ped5						
Dwell Cyc Ped6						
Dwell vPad7						
Dwell Cyc Ped8						
Exit 1	2		4	4		4
Exit 2			8	8		8
Exit 3						
Exit 4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Enable	ON			
Lock Mode	MAX	MAX	MAX	MAX
Coord in Preempt	ON			
No Skip				
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Lock				
Headway				
Group Lock				
Queue Jump				
Free Mode				
Alt Table				

**Sound Transit
Sounder Maintenance Base Project**

City of Lakewood

Timing Sheet

1/23/2020 8:13:51 AM

Station : 16 - Steilacoom Blvd / Lakeview Ave ATC (Standard File)

Coordination

Hour	Minute	Action	Pattern	Cycle	Offset	Split	Seqnce	Short	Long	Dwell	Split 1	Split 2	Split 3	Split 4	Split 5	Split 6	Split 7	Split 8	Split 9	Split 10	Split 11	Split 12	Split 13	Split 14	Split 15	Split 16	
Day Plan 1											Easy																
7		1	1	118	112	1	1		20			38	26	54		38		80									
9	59	10	254																								
10		4	4	118	82	4	1		20			38	26	54		38		80									
14	29	10	254																								
14	30	8	8	124	60	8	1		20			40	26	58		40		84									
18		10	254																								
Day Plan 2											Easy																
Day Plan 3											Easy																

Sound Transit Sounder Maintenance Base Project

City of Lakewood

Timing Sheet

1/23/2020 8:19:39 AM

Station : 58 - 100th / Lakeview Ave (Standard File)

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		7		7		7		7								
Ped Clearance		20		20		24		23								
Min Green	5	8	5	8	5	8	5	8								
Passage	2	3	2	3	2	3	2	3								
Max1	20	50	20	30	20	50	30	30								
Max2	50	50	50	50	50	50	50	50								
Yellow	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5								
Red Revert																
Added Initial																
Max Initial																
Time Before Reduce		15		10		15		10								
Cars Before Reduce																
Time To Reduce		10		10		10		10								
Reduce By																
Min Gap		2		2		2		2								
Dynamic Max Limit																
Dynamic Max Step																
Enable	ON	ON	ON	ON	ON	ON	ON	ON								
Auto Entry																
Auto Exit																
Non Act1																
Non Act2																
Lock Call									ON	ON	ON	ON	ON	ON	ON	ON
Min Recall																
Max Recall																
Ped Recall																
Soft Recall		ON				ON										
Dual Entry		ON		ON		ON		ON								
Sim Gap Enable		ON		ON		ON		ON	ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk																
Cond Service																
Add Init Cate																
Bike Clear																

Preemption

Channel	1	2	3	4	5	6
Lock Inout	ON	ON	ON	ON	ON	ON
Override Flash	ON	ON	ON	ON	ON	ON
Override Higher	ON	ON	ON	ON	ON	ON
Flash Dwell	ON	ON				
Link						
Delay						
Min Duration			4	4	4	4
Min Green			2	2	2	2
Min Walk			4	4	4	4
Ped Clear			23	23	24	24
Track Green	27					
Min Dwell			6	6	6	6
Max Presence			120	120	120	120
Track R1	1					
Track R2	6					
Track R3						
Track R4						
Dwell Ped1						
Exit R1	4		2	4	2	4
Exit R2	7		6	8	6	8
Exit R3						
Exit R4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Type				
Platoon Rx				
Cond Lockout				
Coord in Preempt				
Platoon Tx				
Lock				
Begin Mode	SKIP	SKIP	SKIP	SKIP
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Max Lockout				
Ext Dwell				
Ant Arrival				
Max Grn 1				
Max Grn 2				
Max Grn 3				
Max Grn 4				
Max Grn 5				
Max Grn 6				
Max Grn 7				
Max Grn 8				
Max Grn 9				
Max Grn 10				
Max Grn 11				
Max Grn 12				
Max Grn 13				
Max Grn 14				
Max Grn 15				
Max Grn 16				
Headway Group				
Queue Jump				
Headway Time				
TX Time				
PP Hold Time				
PP Tx Phase 1				
PP Tx Phase 2				
PP Tx Phase 3				
PP Tx Phase 4				

Prepared By

Date Implemented

Reviewed By

Traffic Engineer

City of Lakewood

Timing Sheet

1/23/2020 8:19:39 AM

**Sound Transit
Sounder Maintenance Base Project**

City of Lakewood

Timing Sheet

1/23/2020 8:19:24 AM

Station : 64 - 108th St / Lakeview Ave (Standard File)

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		7		7		7		7								
Ped Clearance		15		16		19		16								
Min Green		8	5	8		8	5	8								
Passage		3	1.5	3		3	1.5	3								
Max1		40	24	50		40	24	50								
Max2																
Yellow	3	3.9	3.9	3.9	3	3.9	3.9	3.9	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red	1	1	1	1	1	1	1	1								
Red Revert		2		2		2		2								
Added Initial																
Max Initial																
Time Before Reduce		10		15		10		15								
Cars Before Reduce																
Time To Reduce		10		10		10		10								
Reduce By																
Min Gap		2		2		2		2								
Dynamic Max Limit																
Dynamic Max Step																
Enable		ON	ON	ON		ON	ON	ON								
Auto Entry																
Auto Exit																
Non Act1																
Non Act2																
Lock Call																
Min Recall																
Max Recall																
Pod Recall																
Soft Recall				ON				ON								
Dual Entry		ON		ON		ON		ON								
Sim Gap Enable		ON		ON		ON		ON	ON	ON	ON	ON	ON	ON	ON	ON
Guar Passage																
Rest In Walk																
Cond Service																
Add Init Calc																
Bike Clear																

Preempt

Channel	1	2	3	4	5	6
Lock Input	ON	ON			ON	ON
Override Flash	ON	ON			ON	ON
Override Higher	ON	ON			ON	ON
Flash Dwell	ON	ON			ON	ON
Link						
Delay						
Min Duration			6	6		
Min Green			2	2		
Min Walk			4	4		
Ped Clear			19	16		
Track Green	33					
Min Dwell			4	4		
Max Presence			60	60		
Track R1	8					
Track R2	3					
Track R3						
Track R4						
Dwell Pod1						
Exit R1	4		2	4		
Exit R2	8		6	8		
Exit R3						
Exit R4						

Preempt LP

Channel	1	2	3	4
Min				
Max				
Type				
Platoon Rx				
Cond Lockout				
Coord In Preempt				
Platoon Tx				
Lock				
Begin Mode	SKIP	SKIP	SKIP	SKIP
Priority P1				
Priority P2				
Priority P3				
Priority P4				
Max Lockout				
Ext Dwell				
Ant Arrival				
Max Grn 1				
Max Grn 2				
Max Grn 3				
Max Grn 4				
Max Grn 5				
Max Grn 6				
Max Grn 7				
Max Grn 8				
Max Grn 9				
Max Grn 10				
Max Grn 11				
Max Grn 12				
Max Grn 13				
Max Grn 14				
Max Grn 15				
Max Grn 16				
Headway Group				
Queue Jump				
Headway Time				
TX Time				
PP Hold Time				
PP Tx Phase 1				
PP Tx Phase 2				
PP Tx Phase 3				
PP Tx Phase 4				

Prepared By

Date Implemented

Reviewed By

Traffic Engineer

City of Lakewood

Timing Sheet

1/23/2020 8:19:24 AM

**Sound Transit
Sounder Maintenance Base Project**

Station : 64 - 108th St / Lakeview Ave (Standard File)

Coordination

	Split 16	Split 15	Split 14	Split 13	Split 12	Split 11	Split 10	Split 9	Split 8	Split 7	Split 6	Split 5	Split 4	Split 3	Split 2	Split 1	Dwell	Long	Short	Sequenc	Split	Offset	Cycle	Pattern	Action	Minute	Hour														
Day Plan 1	Easy																																								
Day Plan 2	Easy																																								
Day Plan 3	Easy																																								

ATTACHMENT F
ESA Screening Checklist Update

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ESA SCREENING CHECKLIST

Note: The purpose of this checklist is to assist sponsoring agencies and FTA in gathering and organizing materials for environmental analysis required under the Endangered Species Act (ESA). Submission of the checklist by itself does not meet ESA requirements. This checklist is intended solely for Region X use. Please contact the FTA Region 10 office at (206) 220-7954 if you have any questions regarding this worksheet.

Sponsoring Agency Sound Transit	Date Submitted March 13, 2020	
Project Title Sounder Maintenance Base Project (formerly known as Sounder Yard and Shops Facility Project)	FTA Project Number (if known)	
Project Location (Include Street Address, City, County) Between Lakeview Avenue SW and 40th Avenue SW, and between 100th Street SW and Steilacoom Blvd. SW		
Project Contact: Lauren Swift, Senior Environmental Planner	Phone Number 206-398-5302	E-mail Address (if available) lauren.swift@soundtransit.org

Please answer the following questions as completely as possible. If the question is not applicable, check "NA" in the space to the right

-
1. Describe the project and its purpose. Identify the jurisdiction(s) and watersheds (Watershed Resource Inventory Area/WRIA or Hydrologic Unit Code/HUC) in which the project is located.

The project is located in the City of Lakewood, Pierce County, in WRIA 12, (Chambers/Clover) (see Figure 1). It is in the Puget Sound subbasin; the hydrologic unit code (HUC) is 17110019. The legal description is Township 19 North, Range 2 East, Section 36 and Township 20 North, Range 2 East, Section 1.

Design refinements proposed for the Sounder Yard and Shops Facility Project, now known as the Sounder Maintenance Base Project, would support planned and future Sound Transit Sounder commuter rail service (see Figure 2). The design refinements would provide sufficient capacity to maintain the Sounder fleet expansion planned as part of the ST2 program (starting in 2017). Recent Sounder ridership forecasts, however, determined that the rate of expansion of the Sounder services associated with the 2016-adopted ST3 program was faster than originally anticipated (ST Sounder Maintenance Base, Ridership Forecast and Fleet Size Analysis Technical Memorandum, dated May 18, 2017). Thus, where Sound Transit had not originally anticipated a need to expand the maintenance base facility in the foreseeable future, the new ridership forecast anticipated required expansion about 8 to 12 years after the initial start of operations at the Sounder Maintenance Base now planned for 2024. Considering the time it would take to prepare a conceptual plan to reconfigure the existing maintenance facility, complete the environmental review, obtain construction permits and approvals, and complete project construction, Sound Transit decided it would be more efficient if the design of the Sounder Maintenance Base was updated at this time to accommodate anticipated maintenance services needed in 2024 and long term through 2040, consistent with the ST3 program.

There are nine key elements to the design refinements proposed at this time. All other elements of the proposed project would remain unchanged with the exception that the construction period has shifted one year such that operations would begin in 2024.

1. Relocation and Construction of a larger maintenance base building: The 2018 design for a partial two-story, six-bay, ten repair positions maintenance base has been updated to a partial two-story building that would accommodate two 10-car train sets on two rail tracks running through the building. A third track running outside of the Maintenance Building on the west side would be covered with a canopy the length of the building. The building would be shifted south, to the central portion of the site to allow the facility to be a run-through facility. The size of the building has increased from approximately 60,000 square feet to up to 112,000 square feet, but the maximum height of the building remains approximately 50 feet.

2. Relocation of Maintenance Building parking lot: The 2018 design of the parking lot was south of the maintenance building, but due to the larger footprint of the maintenance building and it being in the central portion of the site, the parking lot would be shifted south from the northern portion of the site to the newly acquired parcel (Parcel 5087000040) located east of the Maintenance Building in the central portion of the site. The larger maintenance facility would employ more workers so the parking lot would be expanded from approximately 60 parking spaces to up to 99 parking spaces for employees, ADA disability parking, Sound Transit security and staff, and visitors.

3. Construction of new rail tracks: The updated configuration of the site would have a somewhat different layout of tracks. There would be no new crossings on Steilacoom Boulevard SW or 100th Street SW. Once onsite, the tracks would split from the mainline and proceed to either the load cell, Maintenance Building, the overnight maintenance track, or the train storage area (located at the northern portion of the site).

4. Relocation and Construction of a New Wheel Truing Facility: The updated project design relocates the wheel truing facility, which was previously evaluated in the 2018 SEPA Addendum in a separate building in the central portion of the site. In the updated layout, the wheel truing facility would be located within the new Maintenance Building in the central portion of the site. One of the through tracks located within the Maintenance Building would have the wheel truing facility, which would include an under-car access pit. The wheel truing facility would be up to 8 feet deep and would require excavation to a depth of approximately 10 feet.

5. Relocation of Two Utility Power Lines: The original design for the Sounder Maintenance Base included the relocation of an existing Tacoma Public Utilities power line in the northern portion of the Century Yard site; however, the updated Sounder Maintenance Base Project may also require the relocation of a power line owned by Puget Sound Energy located in the southern portion of the site. This power line is about 25-50 feet from the eastern boundary of the site. To make space for the new project design, the Puget Sound Energy power line

would need to be relocated. Preliminary discussions with the two utilities have identified new alignments for the power lines in nearby public roadway utility easements, which would require potentially traversing private parcels.

6. Train Crossings of Steilacoom Boulevard SW and 100th Street SW: Due to the revised configuration with run-through tracks, the maintenance-related crossings of Steilacoom Boulevard SW and 100th Street SW would change compared to the evaluation in the 2018 SEPA Addendum. In the previous analysis, the maintenance-related train movements could enter the Century Yard by crossings either Steilacoom Boulevard SW or 100th Street SW. Due to the layout of the run-through Maintenance Building, the updated train movements would all enter the site for either scheduled or unscheduled maintenance from the south across 100th Street SW.

7. Relocation of the Train and Engine Crew Building (T&E Building) and Storage Shed: The existing approximately 3,200-square-foot T&E Building would be demolished or relocated from its existing location in the central portion of the site to make room for the new run-through Maintenance Building. The T&E Building, parking lot, storage building, substation, and air compressor would be relocated to the north end of the site. The size of the new building would be approximately 4,000 square feet, an increase of approximately 800 square feet from the existing T&E Building. The number of workers at this building would increase from existing conditions, an increase from an estimated 31 workers to approximately 42 day-shift workers (locomotive engineers and conductors) and 62 night-shift workers (locomotive engineers, conductors, and coach cleaners). There would be an increase in parking to approximately 54 spaces. A guard booth would be installed at the site driveway entrance from 39th Avenue SW as was proposed in the 2018 SEPA Addendum.

8. Construction of the New Maintenance-of-way Shop: The updated site layout and configuration for the project includes the construction of a MOW Shop and associated outdoor fenced storage areas for equipment and materials storage. The footprint of the MOW Shop would be an estimated 6,000 square feet. These facilities would be in the southwestern portion of the site, west of the existing mainline tracks. The existing gravel drive onto this portion of the site would be paved and up to approximately 8 parking spaces would be located on the north side of the building. The Maintenance-of-way Shop storage yards would be located to the south and north of the building. No workers would be stationed full-time at this facility, but rather would be part of the work force at the Maintenance Building and making occasional trips to the MOW Shop.

9. Acquisition of Parcel 5087000040: A parcel located adjacent and east of the site in the central portion of the site would be acquired for the project. The 1.09-acre property to be acquired is Parcel 5087000040, which is currently owned by Pierce County Fire District #3. There is an existing 8,000 square-foot storage warehouse located on the parcel. Nearly the entire remainder of the property is paved. The parcel would be the site of the Maintenance Building worker parking. The existing location of the property driveway curb cut on 39th Avenue Court SW may or may not change, but a new guard booth would be constructed for site security.

2. Have all other NEPA requirements been completed for this project?

Yes No

If so, under which NEPA Class does this project fall? (Refer to DCE letter, FONSI, or ROD)

Class I Class II Class III

3. Does the project qualify as a CE or a DCE?

Yes No

Has a Region X Documented Categorical Exclusion Worksheet been completed?

Yes No

Will the project include Best Management Practices / Conservation Measures?

Yes No

Has the BMP / CM Checklist (Appendix A) been completed?

Yes No

(Note: If the project: 1) includes in-water work or work below the ordinary high water mark (OHWM) of a waterbody with listed salmonids, 2) adds > 5,000 square feet of impervious surface, OR 3) includes any new impervious surface within 150 feet of a stream waterbody with listed salmonids, it may need to go through formal consultation with the NMFS and USFWS)

4. Has the applicant obtained Endangered/Threatened Species lists and critical habitat lists from both National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) for the project area?

Yes No

List NMFS species/habitat here (and attach documentation):

Endangered: none

Threatened: Puget Sound Steelhead and Puget Sound Chinook are listed threatened species with designated critical habitat. These species and designated habitat are not present in the project area. Puget Sound steelhead and chinook are presumed present in Flett Creek, approximately 0.4 mile northwest of the project area and in Clover Creek, approximately 1.5 miles southwest of the project area (see Table 1). The project would have no impacts on Flett Creek or Clover Creek.

Proposed: none

List USFWS species/habitat here (and attach documentation):

Endangered: One endangered species, Marsh sandwort, is listed as occurring in Pierce County, however no suitable habitat is present in the project area for any of the species (see Table 1).

Threatened: Seven threatened species are listed as occurring in Pierce County, four species with listed designated critical habitat, however no suitable habitat is present in the project area for any of the species (see Table 1).

Proposed: One proposed endangered and one proposed threatened species is listed as occurring in Pierce County, however no suitable habitat is present in the project area for this species (see Table 1).

5. Has the applicant obtained Essential Fish Habitat (EFH) lists from the NMFS website (as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA)) for the project area?

Yes No

List Essential Fish Habitat here (and attach documentation):

The Puget Sound subbasin is listed EFH for Chinook Salmon, Coho Salmon (see Appendix B).

6. List the names of your partners for the project. Identify the project lead agency.

N/A

Sound Transit (lead SEPA agency)

7. Check the federal permits needed for your project. List the numbers of the nationwide permits if needed.

	N/A	Pending	Approved
ACOE Nationwide _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ACOE Individual _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NPDES (Gen. or Ind.) _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Check State and local permits needed for your project. Circle jurisdiction.

	N/A	Pending	Approved
HPA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surface Mining	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forest Practices	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoreline	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoreline Exemption	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clearing and Grading	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Building or Subdivision	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sensitive Areas Ordinance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Which federal, State, or tribal agencies have you contacted regarding your project and its impacts?

N/A

The Federal Transit Administration (FTA) was previously contacted regarding the Sounder Yard and Shops Facility project.

Describe any modifications to the project as a result of these contacts:

No modifications have been requested or needed.

10. What is the specific location of your project? Provide the zoning designation and the ¼ section, section, township, WRIA(s), and range.

The improvements associated with the Sounder Maintenance Base Project would extend south from Steilacoom Boulevard SW to 100th Street SW (see Figure 2). It is anticipated that Sound Transit plans to purchase one additional parcel in the central portion of the existing yard near to accommodate construction activities and vehicle parking. The acquisition of this parcel is covered under a separate NEPA/SEPA checklist.

The legal description is Township 19 North Range 2 East Section 1 and Township 20 North Range 2 East Section 36. The site is in WRIA 12 (Chambers/Clover). It is zoned industrial and commercial. Land uses adjacent to the property on the east and west are Industrial/Warehouse and Industrial/Commercial. South of 100th Street SW adjacent to the west side of the right-of-way are industrial uses, with residential land uses on the west side of Lakeview Avenue SW. To the east of the right-of-way in this area are a school and residential land uses. North of Steilacoom Boulevard SW is a cemetery and commercial uses.

Does the project occur within an existing transportation corridor?

Yes No

11. Is the project within 150 feet of a lake, river, stream or bay, etc.? Yes No

If so, name the waterbodies.

Do these waterbodies contain listed salmonids or bull trout? Yes No

If so, name the listed species and agency with jurisdiction (USFWS or NMFS).

12. a. Will blasting or pile-driving occur within 1 mile of suitable owl or murrelet habitat (specifically, old growth tree(s) or forest)? Yes No (if no, go to 12b)

b. Is the project within 0.25 miles of suitable owl or murrelet habitat? Yes No

13. a. Will blasting or pile-driving occur within 1 mile of a known bald eagle nest? (Contact the State Department of Fish & Wildlife for nest locations.) Yes No (must answer both 13a and 13b)

b. Is the project within 0.5 miles (line-of-sight) or 0.25 miles (non-line-of-sight) of a bald eagle nest, wintering concentration, roost, or foraging area?

Yes No

14. What is the size of the project (list area or length of disturbance), the amount of new impervious surface, and the total impervious surface?

N/A

The entire Century Yard site is approximately 36 acres, but that portion north of 100th Street SW is about 25.6 acres. The total impervious surface amount is approximately 1,047,200 square feet, approximately 94% of the site. The total amount of new impervious surface is approximately 322,000 square feet.

In answering the following questions, please describe the impacts assuming no mitigation:

IMPACT ASSESSMENT

15. Describe the potential beneficial and adverse impacts upon aquatic resources that will be caused by construction of the project:

N/A

The site is within the Clover Creek/Chambers or Murray Creek drainage basins. There are two wetlands mapped by the Pierce County Wetland Inventory on the site, however a site visit performed for the Sounder Yard and Shops Facility Project in 2016 confirmed that there were no surface-water features or hydrophytic vegetation on the site.

- The project would increase impervious surface coverage. Drainage facilities will be provided and/or updated.
- No impacts on Flett Creek, which is approximately 0.3 mile north of Steilacoom Boulevard SW, are expected with BMPs to control stormwater runoff and erosion.
- Site disturbance and associated grading activities during construction would not affect surface-water quality, as there are no surface water features on site and site disturbance impacts are expected to be avoided or minimized with appropriate BMPs.

-
16. Describe the potential beneficial and adverse impacts upon aquatic resources resulting from the maintenance, use, or operation of the project (post-construction impacts):
N/A

Currently stormwater runoff on the Century Yard site is managed through pre-treatment prior to infiltration. A water quality/infiltration ditch provides pre-treatment of precipitation which is then infiltrated into subsurface soil. Runoff treatment will be provided for all new and replaced pollution generating impervious surfaces. Full infiltration is proposed for this site due to the favorable on-site soils that are well suited to infiltration. All runoff from impervious surfaces, both new and replaced, will be treated and infiltrated.

Rooftops and paved areas not subject to vehicular use are considered non-pollution generating, and do not require runoff treatment. However, if flow from non-pollution generating surfaces mixes with flow from pollution generating surfaces, then it will also be treated.

-
17. Describe the potential beneficial and adverse impacts upon terrestrial resources that will be caused by construction of the project:
N/A

The project area provides minimal, low-quality habitat for wildlife and migratory bird species and therefore adverse impacts to these terrestrial resources are not anticipated. In addition, large vegetated open space areas located immediately north of the project site, provide more opportunity for nesting and foraging habitat.

There is an osprey nest approximately 0.8 miles west of the project site. While short-term construction noise could potentially disturb the osprey, migratory birds and any other wildlife in the vicinity, species present in the project area are likely accustomed to human-induced noise associated with the existing industrial land uses. Any avoidance of the area during construction would be temporary and species would be expected to return to their pre-construction behavior after completion of the project.

There is a small patch of Garry oak (*Quercus garryana*) at the south end of the project site, approximately 90 feet north of 100th Street SW. Garry oak is Washington's only native oak and is the "official tree" of the City of Lakewood. The oak trees will be protected and maintained during construction according to Lakewood City Ordinance No. 00157.

-
18. Describe the potential beneficial and adverse impacts upon terrestrial resources resulting from the maintenance, use, or operation of the project (post-construction impacts):
N/A

- Removing vegetation such as grasses and small shrubs east of the rail bed would remove habitat and could displace small mammals and birds.
- Train traffic and maintenance activities could disrupt wildlife; however, the site is in an urbanized area with existing rail traffic and industrial noise.

MITIGATION

19. Is the project likely to alter the water quality of any water bodies such as bays, estuaries, lakes, streams, rivers or wetlands (through sedimentation, urban runoff, toxics, turbidity, etc.)?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

20. Will the project discharge water or generate runoff to any water bodies such as bays, estuaries, lakes, streams, rivers or wetlands?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

21. Are clearing and grading activities part of the project? What is the area of direct disturbance? Include soil-disturbing activities, tree/shrub removal, and alteration of upland habitat.

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

Construction BMPs (see Appendix A), such as the use of stabilized construction entrances, silt fencing, sediment traps, application of seeding or mulching for soil stabilization, or other techniques, would be implemented as necessary in accordance with requirements of the NPDES permit for construction.

Measures would be implemented before and during project construction to avoid or minimize effects on vegetation and wildlife resources. Examples of these measures are minimizing vegetation clearing, restoring temporarily affected areas, preparing and implementing a revegetation plan, and implementing construction methods to avoid impacts on migratory birds. The existing patch of Garry oak located in the far south portion of the project area, approximately 90 feet north of 100th Street SW, would not be disturbed to minimize impacts to vegetation and wildlife habitat. The oaks would be surrounded by a temporary three-foot high chain-link fence during construction to avoid damage to the trees or their root systems.

In accordance with the Migratory Bird Treaty Act, Sound Transit would consult with the U.S. Fish and Wildlife Service on measures to avoid impacts on migratory birds. Measures likely to be required may include preconstruction surveys for migratory birds and/or restrictions on vegetation clearing during the breeding season for migratory birds. Except where hazard trees pose an immediate threat to rail safety or reliability, vegetation maintenance and hazard tree removal would be conducted outside of the breeding season for migratory birds.

b. What mitigation is proposed for long-term impacts?

none

22. Will the project remove or modify riparian vegetation within 150 feet of a water body?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

23. Will the project place a structure within—or cause any change to—the bed or banks of a body of water?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

24. Will the project place fill or structures within any 100-year floodplain?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

25. Will the project divert water to or from the bay, estuary, lake, stream, river or wetland?

Yes No (If yes, answer a and b.)

a. What mitigation is proposed for construction impacts?

b. What mitigation is proposed for long-term impacts?

26. Will construction and/or operation of the project produce noise above ambient levels?

Yes No

If so, explain:

Elements that contribute to noise and vibration resulting from the short-term construction and long-term operation of the project include:

- Train operation and horn blows, as required for train movements across 100th Street SW for nighttime maintenance work
- Train idling time in the yard
- Train brake squeal and air release
- Wheel squeal associated with the track curves
- Guideway type
- Track crossover/switches for trains entering and exiting the yard
- Updates to current train traffic and vehicular traffic data
- Proposed shop facilities
- Additional noise sources from the yard including maintenance operations, building components, parking, etc.

27. Has all necessary environmental documentation been provided to FTA (request letters, agency response documentation, permit approvals)?

Yes No

Appendix A

Best Management Practices (BMPs) / Conservation Measures (CM) Checklist

Please confirm use of the following measures in your project. If the question is not applicable, check "NA" in the space to the right and provide an explanation of why. Consult your FTA Region 10 contact for more information on this checklist.

Conservation Measures During Construction

Exposed Soils/Riparian Vegetation:

- Yes No N/A Minimize the areal extent of exposed soil at any given time. Stabilize all unstable slopes with the potential to impact listed fish-bearing waters.
- Yes No N/A Replant disturbed riparian areas outside of the 150 foot setback with native species at a 2:1 ratio, including the removal of mature trees (greater than 6 inches diameter breast height, or dbh).
- Yes No N/A Do not place temporary material storage piles (>12 hours storage) in the 100-year floodplain during the rainy season unless storage occurs when flooding is not imminent, and storage piles with erosive material are covered with plastic tarps (or similar) and surrounded with erosion control devices.
- Yes No N/A Conduct extensive soil-disturbing work, including excavation, in the "dry" season (generally from June to October).
- Yes No N/A Prepare a Temporary Erosion and Sediment Control (TESC) Plan prior to construction to identify standard erosion and sediment control procedures.

Stormwater Maintenance:

- Yes No N/A Develop and implement a Stormwater Site Plan for > 1 acres of clearing, grading, or grubbing.
- Yes No N/A No untreated, undetained stormwater or dewatering will leave the limits of the construction site.
- Yes No N/A Discharged water will not exceed existing (baseline) conditions based on a 2-year storm event.

Spill Controls

- Yes No N/A Restrict vehicle use in wetland and/or riparian areas.
- Yes No N/A Maintain a 300 ft setback for construction staging areas and equipment refueling near wetlands, streams, rivers, or drainages.
- Yes No N/A Prepare a Spill Prevention, Containment, and Control Plan (SPCCP) prior to construction to address potentially toxic materials used on-site during construction.
- Yes No N/A Keep spill clean-up equipment available onsite during construction, and include a spill control separator in the overall drainage system, if necessary.
- Yes No N/A Paving, chip sealing, and/or painting should occur in dry weather. Use 2-gallon pails and drip pans/protective devices when available.
- Yes No N/A For projects involving concrete, establish concrete truck chute cleanout areas to properly contain wet concrete. Protect all inlets and catchments from fresh concrete, tackifier, paving, or paint stripping if inclement weather unexpectedly occurs.
- Yes No N/A Collect and dispose debris accumulations prior to fresh water flushing. Use clean water only.
- Yes No N/A Clean paint materials and maintenance equipment outside of surface waters. Do not discharge cleaning runoff into surface waters.

Long-Term Conservation Measures

- Yes No N/A All construction & operation will occur greater than 150 feet from a listed salmonid-bearing waterbody.
- Yes No N/A Oil-water separators, bioswales, or other appropriate water quality treatment will be provided for 100% of all new and disturbed impervious surfaces..
- Yes No N/A Stormwater infiltration facilities will be designed with appropriate infiltration conditions and will be upgraded to handle increased flows or treatment.
- Yes No N/A Stream modifications or in-stream structures will not occur.

Figure 1
Project Vicinity Map



Figure 2

Site Layout and Configuration Map

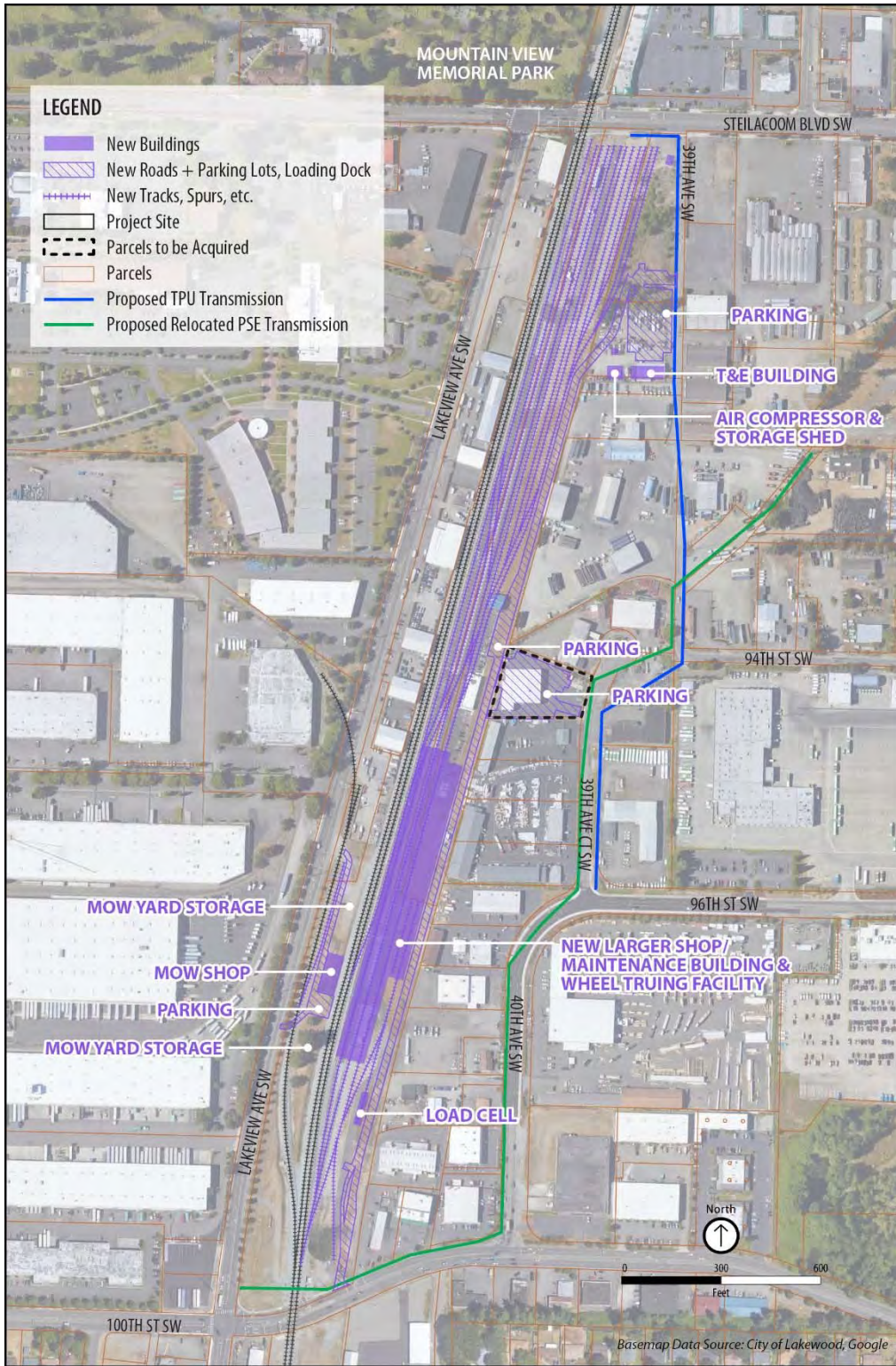


Table 1

U.S. Fish and Wildlife Service and National Oceanic Atmospheric Administration Threatened and Endangered Species Considered for the Souder Maintenance Base Project

Species	Federal Status	Designated Critical Habitat (CH)	CH in Project Area?	Effect Determination	Suitable Habitat in Project Vicinity?
Puget Sound Fish Species (NMFS)					
Puget Sound Steelhead (Oncorhynchus mykiss)	Threatened	Designated	No	No effect	No. Occurs in Flett Creek (migration) approximately 0.4 mile northwest of project area.
Puget Sound chinook (Oncorhynchus tshawytscha)	Threatened	Designated	No	No effect	No. Presumed present in Clover Creek 1.5 mile southwest of project area.
Pierce County T&E (USFWS)					
Gray Wolf (Canis lupus)	Proposed Endangered	None	No	No effect	No suitable habitat in the project vicinity.
North American Wolverine (Gulo gulo luscus)	Proposed Threatened	None	No	No effect	No suitable habitat in the project vicinity.
Marbled Murrelet (Brachyramphus marmoratus)	Threatened	Designated	No	No effect	No suitable habitat in the project vicinity.
Streaked Horned Lark (Eremophila alpestris strigata)	Threatened	Designated	No	No effect	No suitable habitat in the project vicinity.
Yellow-billed Cuckoo (Coccyzus americanus)	Threatened	Proposed	No	No effect	No. Breeds in wooded riparian areas.
Oregon Spotted Frog (Rana pretiosa)	Threatened	Designated	No	No effect	No. Occurs in wetlands within forested landscapes.
Bull Trout (Salvelinus confluentus)	Threatened	Designated	No	No effect	No, closest occurrence is Puyallup River (migration).
Golden Paintbrush (Castilleja levisecta)	Threatened	None	No	No effect	No suitable habitat in the project vicinity. Occurs in open grasslands at elevations below 100 m. Often on glacial outwash or deposits (Natureserve).

Marsh Sandwort (<i>Arenaria paludicola</i>)	Endangered	None	No	No effect	No suitable habitat in the project vicinity.
Water Howellia (<i>Howellia aquatilis</i>)	Threatened	None	No	No effect	No suitable habitat in the project vicinity. Habitat is small vernal wetlands with firmly consolidated bottoms (Natureserve).



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
<http://www.fws.gov/wafwo/>

In Reply Refer To:

December 30, 2019

Consultation Code: 01EWF00-2020-SLI-0357

Event Code: 01EWF00-2020-E-00712

Project Name: Souder Maintenance Base Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: <http://wdfw.wa.gov/mapping/phs/> or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at <http://www.fws.gov/pacific/eagle/for> information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: <http://www.nmfs.noaa.gov/pr/laws/mmpa/>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:

National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office

510 Desmond Drive Se, Suite 102

Lacey, WA 98503-1263

(360) 753-9440

Project Summary

Consultation Code: 01EWF00-2020-SLI-0357

Event Code: 01EWF00-2020-E-00712

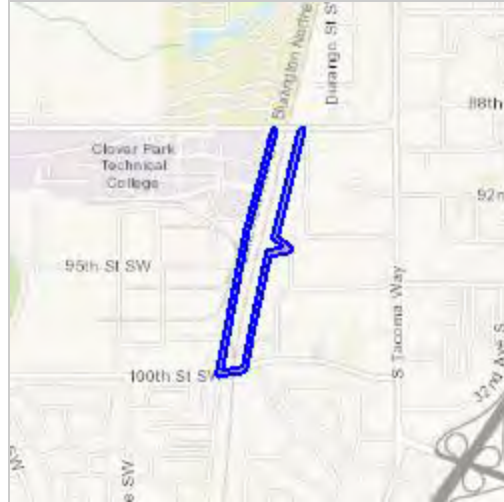
Project Name: Sounder Maintenance Base Project

Project Type: TRANSPORTATION

Project Description: The proposed project would support planned and future Sound Transit Sounder commuter rail service. The Sounder Maintenance Base Project as originally designed and evaluated in a SEPA Environmental Checklist in 2016 was to provide sufficient capacity to maintain the Sounder fleet expansion planned as part of the ST2 program (starting in 2017). Recent Sounder ridership forecasts, however, determined that the expansion of Sounder services associated with the 2016-adopted ST3 program would be faster than previously assumed (Sound Transit 2017a). As a result, where Sound Transit had not originally anticipated a need to expand the maintenance base facility in the foreseeable future, the new ridership forecast anticipates required expansion about 8 to 12 years after the initial start of operations at the Sounder Maintenance Base now planned for 2025. Considering the time it would take to prepare a conceptual plan to reconfigure the existing maintenance facility, complete the environmental review, obtain construction permits, and complete project construction, Sound Transit has decided it would be more efficient if the design of the Sounder Maintenance Base was updated at this time to accommodate anticipated maintenance services needed in 2025 and longer term through 2040, consistent with the ST3 program.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/47.171567766451645N122.49063624178544W>



Counties: Pierce, WA

Endangered Species Act Species

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Wolf <i>Canis lupus</i> Population: Western Distinct Population Segment No critical habitat has been designated for this species.	Proposed Endangered
North American Wolverine <i>Gulo gulo luscus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Birds

NAME	STATUS
Marbled Murrelet <i>Brachyramphus marmoratus</i> Population: U.S.A. (CA, OR, WA) There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Streaked Horned Lark <i>Eremophila alpestris strigata</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo <i>Coccyzus americanus</i> Population: Western U.S. DPS There is proposed critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Amphibians

NAME	STATUS
Oregon Spotted Frog <i>Rana pretiosa</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6633	Threatened

Fishes

NAME	STATUS
Bull Trout <i>Salvelinus confluentus</i> Population: U.S.A., conterminous, lower 48 states There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Flowering Plants

NAME	STATUS
Golden Paintbrush <i>Castilleja levisecta</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7706	Threatened
Marsh Sandwort <i>Arenaria paludicola</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2229	Endangered
Water Howellia <i>Howellia aquatilis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7090	Threatened

Critical habitats

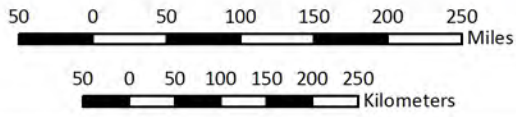
THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Coho Salmon West Coast States Essential Fish Habitat (EFH)

Salmonid EFH described in "Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 18 to the Salmon Fishery Management Plan" published in the Federal Register / Vol. 79, No. 243/ Thursday, December 18, 2014.



Impassable Dam	Coho Salmon EFH (2014)	Marine Salmon EFH (2014)	4th Field Hydrologic Unit (HU)
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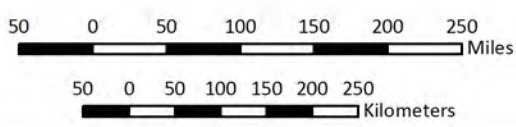
12/2014, C. Gavette Coho_EFH_2014.mxd
UNITED STATES DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 WEST COAST REGION
 777 Sonoma Ave., Room 325
 SANTA ROSA, CALIFORNIA 95404

Chinook Salmon West Coast States Essential Fish Habitat (EFH)

Salmonid EFH described in "Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 18 to the Salmon Fishery Management Plan" published in the Federal Register / Vol. 79, No. 243/ Thursday, December 18, 2014.



Impassable Dam	Chinook Salmon EFH (2014)	Marine Salmon EFH (2014)	4th Field Hydrologic Unit (HU)
Natural Barrier			



12/2014, C. Gavette Chinook_EFH_2014.mxd
UNITED STATES DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 WEST COAST REGION
 777 Sonoma Ave., Room 325
 SANTA ROSA, CALIFORNIA 95404

ATTACHMENT G
Updated Modeled Sound Levels of Project-Related Noise
and Map of Modeled Area

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**Sound Transit
Sounder Yard and Shops Facility Project**

Table G-1. Modeled Sound Levels of Project-Related Noise (dBA)

Site # & Name	FTA Land Use Category ¹	Measured Noise Levels 2015 and 2020 ² (Existing ³)	FTA Thresholds for Moderate/ Severe Impact ⁴	Sounder Maintenance Base Project Noise Exposure ⁵	Future Total Noise Exposure ⁶	Calculated Total Noise Increase	FTA Impact with Project (Moderate or Severe)
Site 1: Clover Park Technical College	3	60 Leq	63-68/ >68	53 Leq	61 Leq	1	None
Site 2: Residences at 101st Street SW	2	60 Ldn	58-63 >63	55 Ldn	61 Ldn	1	None
Site 3: Residences at Lakewood Avenue SW	2	62 Ldn	59-64/ >64	59 Ldn	64 Ldn	2	Moderate
Site 4A: Residences at Rainier Avenue S	2	60 Ldn	58-63 >63	54 Ldn	61 Ldn	1	None
Site 4 B: Southgate Elementary School	3	60 Leq	64-69 >69	50 Leq	60 Leq	0	None
Site 5: 3718 Steilacoom Blvd SW	2	65 Ldn	60-65 > 65	53 Ldn	65 Ldn	0	None

Notes:

1. FTA Land Use Categories are described in Chapter 4 of the Sounder Yard and Shops Facility Project Noise and Vibration Technical Memorandum.
2. Measured noise levels were collected as part of this study in 2015 at Sites 1-4 and 2020 at Site 5.
3. Existing L_{dn} is reported for residential areas; L_{eq} is reported for other noise-sensitive areas.
4. FTA Noise Impact Criteria are L_{dn} or L_{eq} values as appropriate, calculated from Figure 4-3 in Chapter 4.0 of the Sounder Yard and Shops Facility Project Noise and Vibration Technical Memorandum.
5. Sounder Maintenance Base Project noise exposure includes noise from the increased future transit noise associated with project operations; non-project-related noise sources are not included.
6. Future noise exposure includes noise from the increased future transit noise associated with project operations and non-project-related noise sources.

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**Sound Transit
Sounder Yard and Shops Facility Project**

Figure G-1. Map of Modeled Area



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