U.S. Department of Veterans Affairs

VA Portland Veterans Affairs Medical Center Final Environmental Assessment for Seismic Upgrades and Improvement Projects

July 2022

U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Executive Summary

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA; 42 United States Code 4321 et seq.), the President's Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and Environmental Effects of the Department of Veterans Affairs Actions (38 CFR Part 26). This EA is required to determine if the Department of Veterans Affairs' (VA's) proposed action would have significant environmental impacts. Federal agencies are required to consider the environmental and related social and economic effects of their proposed actions. This EA has been prepared in accordance with relevant guidance from VA's NEPA Interim Guidance for Projects dated September 2010.

Purpose and Need

The purpose of the proposed action is to correct seismic deficiencies, address federal setback and physical security requirements, while providing sufficient patient and staff parking facilities at the Portland Veterans Affairs Medical Center (VAMC) to meet existing needs. The seismic upgrades and improvements proposed would enhance patient, staff, and visitor safety and ensure the continued operation of the Portland VAMC in the aftermath of a major earthquake. No new operational programs or additional health care services are being proposed as part of the proposed action.

The proposed action is needed because the Portland VAMC facilities do not meet VA design criteria and seismic and physical security standards. The existing main hospital (Building 100), the administrative and research building (Building 101), and the underground parking garage (Building 102) were constructed in the 1980s and are not designed to modern VA seismic standards. Buildings 100 and 101 are listed on VA's extremely high-risk seismic list based on their design and the seismic characteristics of the area. There are several active faults in the region and Portland has a long history of earthquakes. The Portland VAMC is located within a high potential earthquake hazard zone with a very high risk for liquefaction of soils, according to USGS (Figure 1-3) (USGS, 2018).

Further, the Portland VAMC currently operates at full capacity and space impediments are being encountered routinely in many functions, including parking. An increase in the number of hospital beds or patient capacity is not anticipated as a result of new construction. However, the proposed action will increase the capacity of existing services, such as specialty care, to meet VA workload projections and the latest health care standards. Staff and patients would use the Specialty Care Building. Currently, most outpatient visits and VA business functions occur within the Main Hospital Building (Building 100). Outpatient services would be moved to Building 110 in order to allow space within Building 100 to provide single-bed rooms as opposed to the current multi-bed rooms, with their own bathroom, for increased privacy and improved health care for VAMC patients. The new Specialty Care Building would provide adequate space for outpatient services along with primary VA business functions. Additionally, having the new building would allow for seismic upgrades while accommodating staff, patients, and VA workload. The proposed action would renovate and modernize Portland VAMC facilities while addressing capacity issues to meet the health care needs of Portland area Veterans.

Additionally, parking expansion is needed at the VAMC to meet current staff and patient demand. The VAMC employs a large work force of approximately 4,500 employees with only 1000 staff-designated parking spaces. For this reason, VA has implemented several alternative transportation incentives and subsidies, such as the extensive use and promotion of public transportation; government funded transport options, including the Portland Vancouver shuttle; and carpooling to reduce single-occupancy vehicle trips to the VAMC campus. Approximately 30 current VA staff commute via bicycle to the Portland VAMC. These currently implemented travel demand management programs will continue to be enhanced and expanded to further reduce the number of current and future passenger car trips to the Portland VAMC as well as the demand for parking. Even with the success of the VA travel demand programs, the Portland VAMC still has a deficiency of parking spaces for current staff, patients, and visitors. The proposed action would add approximately 600 additional parking spaces to help meet the current parking demand and would aide in improving traffic flow on the VAMC campus by increasing parking efficiency.

Proposed Action

Seismic upgrades and improvements are proposed at the Portland VAMC to specifically correct seismic deficiencies, address federal setback requirements, improve HVAC and electrical distribution systems, and to provide sufficient parking facilities. The proposed action, which would allow the VAMC to properly serve and meet the current health care needs of Portland area Veterans, includes the following project components (Figure 2-1):

- Design and construction for required seismic upgrades and improvements to Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101) including a new water tank and realignment of the associated plaza and roadway to address physical security concerns.
- Design and construction for a complete seismic upgrade to Building 100 (main hospital building) and nearby Building 101 (research and administration building) including the replacement of the façade on both buildings. Building 100 improvements would also include a new service elevator.
- Demolition of Building T-41, Building T-51, and Trailer 1 to provide adequate working space for the proposed construction and site layout.
- Design and construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111 (parking garage), an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 300,000 gross square foot Specialty Care Building.
- Energy plant improvements and upgrades such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades, including HVAC upgrades, and the full renovation and modernization of Buildings 100 and 101.

The proposed action would be implemented over an extended period of years and sequenced to minimize impacts to VAMC services and the surrounding community to the greatest extent practicable.

Alternatives

Two alternatives are being considered.

Alternative A will comprise the following project components to address seismic deficiencies, address federal setback requirements, improve HVAC and electrical distribution systems, and provide sufficient parking facilities at the Portland VAMC to properly serve Portland area Veterans (Figure 2-1):

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction.
- Design and construction of two additional parking levels at Building 108 to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111, an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 300,000 gross square foot Specialty Care Building and related energy plant upgrades

- Energy plant improvements and upgrades would include new boilers, chillers, cooling towers, and the electrical distribution system.

Alternative B would include all projects under Alternative A, including the design and construction for the required seismic upgrades in addition to structural, energy, and facility related improvements to Buildings 100, 101, and 102; full renovation and modernization of Buildings 100 and 101; and minor roadway realignments as further detailed under the proposed action.

Under the no action alternative, the proposed seismic upgrade and improvement projects would not be implemented. VA would continue to provide services at existing buildings at the Portland VAMC. This alternative would limit VA's ability to provide needed health care services to Veterans in the region. The no action alternative does not meet the purpose and need of the proposed action. However, analysis of the no action alternative is required by CEQ regulations. It also provides a benchmark for comparing and analyzing the effects of the action alternatives.

Affected Environment and Environmental Consequences

The EA describes the baseline physical, environmental, cultural, and socioeconomic conditions at the alternative project sites and the general vicinity, with emphasis on those resources potentially impacted by the alternatives. Potential impacts on physical, environmental, cultural, and socioeconomic conditions are analyzed for each alternative. Resource areas considered in this EA are aesthetics; air quality; cultural and historic resources; geology and soils; hydrology and water quality; wildlife and habitat; noise; land use; floodplains, wetlands, and coastal zone management; socioeconomics; community services; solid waste and hazardous materials; traffic, transportation, and parking; utilities; and environmental justice. Table ES-1 summarizes the findings of the impact analysis.

Table ES-1. Summary of Impact Analysis

Resource Area	Alternative A	Alternative B	No Action Alternative
Aesthetics	The proposed physical changes to the VAMC campus would not detract from the aesthetics. Aesthetic impacts during construction activities would be temporary and less than significant. Physical changes to the VAMC campus would be consistent with existing architecture. Aesthetic impacts would be less than significant.	The proposed physical changes to the VAMC campus would not detract from the aesthetics. Aesthetic impacts during construction activities would be temporary and less than significant. Physical changes to the VAMC campus would be consistent with existing architecture. Aesthetic impacts would be less than significant.	None
Air Quality	Construction activities would have short-term minor impacts related to emissions and fugitive dust. Combined construction and operation emissions would be substantially below the General Conformity maintenance area de minimis	Construction activities would have short-term minor impacts related to emissions and fugitive dust. Combined construction and operation emissions would be substantially below the General Conformity maintenance area de minimis	None

	threshold. Air quality impacts would be less than significant.	threshold. Air quality impacts would be less than significant.	
Historic Resources	The Portland VAMC, in consultation with the State Historic Preservation Office (SHPO), determined that the VA campus was not eligible for the National Register of Historic Places (NRHP), therefore the proposed upgrades and improvements will not adversely affect any historic resources. Further, Terwilliger Parkway, a nearby scenic linear park and roadway, is listed on the NRHP. Wooded areas surrounding the campus will remain intact, providing a visual buffer between campus construction and the historic Terwilliger Parkway. Proposed building heights would also not exceed the height of existing structures.	The Portland VAMC, in consultation with the State Historic Preservation Office (SHPO), determined that the VA campus was not eligible for the National Register of Historic Places (NRHP), therefore the proposed upgrades and improvements will not adversely affect any historic resources. Further, Terwilliger Parkway, a nearby scenic linear park and roadway, is listed on the NRHP. Wooded areas surrounding the campus will remain intact, providing a visual buffer between campus construction and the historic Terwilliger Parkway. Proposed building heights would also not exceed the height of existing structures.	None
Archeological Resources	Consultation with the SHPO for archeological resources is underway. Construction will primarily occur on previously disturbed ground, and the Portland VAMC campus is a low risk for inadvertent discovery of pre-contact cultural resources and a low risk for uncovering historic-period cultural resources.	Consultation with the SHPO for archeological resources is underway. Construction will primarily occur on previously disturbed ground, and the Portland VAMC campus is a low risk for inadvertent discovery of pre-contact cultural resources and a low risk for uncovering historic-period cultural resources.	None.
Geology and Soils	Construction activities would have minimal changes to topography. Ground disturbances would be stabilized during operation and all permit requirements would be met. New construction of buildings and structures would be designed to current seismic standards. Impacts to geology and soils	Construction activities would have minimal changes to topography. Ground disturbances would be stabilized during operation and all permit requirements would be met. New construction of buildings and structures would be designed to current seismic standards. Impacts to geology and soils	None

	would be less than significant.	would be less than significant.	
Hydrology and Water Quality	On-site stormwater engineering controls to retain and manage stormwater flow would be implemented, and permit requirements would be met, resulting in less than significant impacts to hydrology and downgradient water quality.	On-site stormwater engineering controls to retain and manage stormwater flow would be implemented, and permit requirements would be met, resulting in less than significant impacts to hydrology and downgradient water quality.	None
Wildlife and Habitat	The VAMC campus does not contain any critical or suitable habitat for state or federally listed species. Any disturbance or clearing of vegetation or trees would be avoided between April 15 and July 31 to avoid any potential impacts to nesting birds. Further, no effects to essential fish habitat (EFH), designated habitat or listed species are anticipated, resulting in less than significant impacts to wildlife and habitat.	The VAMC campus does not contain any critical or suitable habitat for any state or federally listed species. Any disturbance or clearing of vegetation or trees would be avoided between April 15 and July 31 to avoid potential impacts to nesting birds. Further, no effects to essential fish habitat (EFH), designated habitat or listed species are anticipated, resulting in less than significant impacts to wildlife and habitat.	None
Noise	Construction activities would comply with the City of Portland’s and VA’s construction noise regulations, including applying for variances if necessary, resulting in less than significant noise impacts. There are no significant long-term operational noise impacts.	Construction activities would comply with the City of Portland’s and VA’s construction noise regulations, including applying for variances if necessary, resulting in less than significant noise impacts. There are no significant long-term operational noise impacts.	None
Land Use	The VAMC campus would remain compatible with surrounding land uses, resulting in less than significant impacts.	The VAMC campus would remain compatible with surrounding land uses, resulting in less than significant impacts.	None
Floodplains, Wetlands, and	No impacts to floodplains or potentially jurisdictional wetlands or waterways are anticipated. No coastal	No impacts to floodplains or potentially jurisdictional wetlands or waterways are anticipated. No coastal	None

Coastal Management	management areas exist on the VAMC campus.	management areas exist on the VAMC campus.	
Socioeconomics	There would be short-term beneficial impacts to local employment and personal income during construction activities. Additional facilities would enhance health care for Veterans in the region.	There would be short-term beneficial impacts to local employment and personal income during construction activities. Additional facilities would enhance health care for Veterans in the region.	None
Community Services	Construction activities at the VAMC campus are not expected to place additional substantial demands on police, fire, emergency services, and other community services.	Construction activities at the VAMC campus are not expected to place additional substantial demands on police, fire, emergency services, and other community services.	None
Solid Waste and Hazardous Materials	During construction, the presence and use of petroleum and hazardous substances could increase the potential for accidental release or spill; however, minimization measures would make this potential impact less than significant. There would not be a long-term and significant increase in the amount of hazardous waste generated by the VAMC campus.	During construction, the presence and use of petroleum and hazardous substances could increase the potential for accidental release or spill; however, minimization measures would make this potential impact less than significant. There would not be a long-term and significant increase in the amount of hazardous waste generated by the VAMC campus.	None
Traffic, Transportation, and Parking	Project activities are not anticipated to significantly impact existing or future traffic patterns surrounding the VAMC campus. Minor to moderate impacts to traffic patterns and flow during construction activities would be mitigated through the implementation of Traffic Management/Circulation and Mitigation Plans that would be reviewed and approved by VA for implementation. Further, shuttles for contractors and non-peak hour deliveries of	Project activities are not anticipated to significantly impact existing or future traffic patterns surrounding the VAMC campus. Minor to moderate impacts to traffic patterns and flow during construction activities would be mitigated through the implementation of Traffic Management/Circulation and Mitigation Plans that would be reviewed and approved by VA for implementation. Further, shuttles for contractors and non-peak hour deliveries of	None

	construction equipment and materials will be implemented to mitigate any short-term traffic impacts.	construction equipment and materials will be implemented to mitigate any short-term traffic impacts.	
Utilities	There would be a negligible increase in the consumption of utilities, including electricity, natural gas, potable water, and stormwater/sanitary sewer discharges. Impacts would be less than significant.	There would be a negligible increase in the consumption of utilities, including electricity, natural gas, potable water, and stormwater/sanitary sewer discharges. Impacts would be less than significant.	None
Environmental Justice	There would be no disproportionate impacts to minority or low-income populations.	There would be no disproportionate impacts to minority or low-income populations.	None

Agency Coordination and Public Participation

VA published a notice of scoping on May 9, 2021, in The Oregonian newspaper. The notice described the proposed action and solicited public comments with a deadline of June 11, 2021. VA mailed scoping letters to federal, state, and local agencies; public officials; federally recognized Tribes; and special interest groups. Similar to the notices published in the newspaper, the letters included information on the proposed action, the comment period, and instruction on submitting comments. During the public scoping period, VA received written comments from eight commenters or interest groups. For more details regarding scoping comments and public concerns, see Section 5.0.

VA published the Draft EA for a 30-day public comment period as announced by the Notice of Availability (NOA) that was published in The Oregonian newspaper on February 13 and February 14 of 2022**.** Review copies of the Draft EA were made available online at https://www.cfm.va.gov/environmental/index.asp and at Multnomah County Central Library. VA has responded to all public comments in the Final EA (Appendix B).

Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

ACM	asbestos-containing materials
amsl	above mean sea level
APE	area of potential effects
BCC	birds of conservation concern
bgs	below ground surface
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
EA	environmental assessment
dBA	A-weighted decibels
DoD	Department of Defense
FE	federally endangered
FT	federally threatened
GHG	greenhouse gas
GSF	gross square feet
ISCP	indirect source construction permit
LBP	lead-based paint
LOS	level of service
LUCS	land use compatibility statement
LUST	leaking underground storage tank
MG	million gallons
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife

ODOT	Oregon Department of Transportation
OHSU	Oregon Health and Science University
PBES	Portland Bureau of Environmental Services
PBT	Portland Bureau of Transportation
PM10	particulate matter ten micrometers and smaller
PM2.5	particulate matter 2.5 micrometers and smaller
REC	recognized environmental condition
SE	state endangered
SO2	sulfur dioxide
ST	state threatened
SW	southwest
SWPPP	stormwater pollution prevention plan
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USFWS IPaC	USFWS Information for Planning and Consultation
UST	underground storage tank
VA	U.S. Department of Veterans Affairs
VAMC	VA Medical Center
VOC	volatile organic compound

1.0 Introduction

This draft environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA; 42 United States Code 4321 et seq.), the President's Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and Environmental Effects of the Department of Veterans Affairs Actions (38 CFR Part 26). This EA is required to determine if the Department of Veterans Affairs' (VA's) proposed action would have significant environmental impacts. Federal agencies are required to consider the environmental and related social and economic effects of their proposed actions. This EA has been prepared in accordance with relevant guidance from VA's NEPA Interim Guidance for Projects dated September 2010.

This EA identifies, analyzes, and documents the potential physical, environmental, cultural, and socioeconomic impacts associated with VA's proposed implementation of projects to seismically upgrade, renovate, modernize, and expand the existing Portland VA Medical Center (VAMC) facilities within the existing campus footprint. The 28.5-acre Portland VAMC is located at 3710 Southwest (SW) U.S. Veterans Hospital Road in Portland, Multnomah County, Oregon and is adjacent to the Oregon Health and Science University (OHSU). Primary access to the Portland VAMC is provided by SW Terwilliger Boulevard via SW U.S. Veterans Hospital Road (Figure 1-1 and Figure 1-2).

In accordance with the cited regulations, this EA allows for public input into the federal decision-making process, provides federal decision-makers with an understanding of potential environmental effects of their proposed action prior to making these decisions, identifies measures the federal decision-maker could implement to reduce potential environmental effects, and documents the NEPA process.

Final design activities cannot be advanced prior to a NEPA determination. This EA and environmental analysis herein is based upon preliminary designs which serve to define the project location and general design concepts. The NEPA determination for the Portland VAMC Seismic Upgrades and Improvement Projects will be evaluated with final engineering designs to determine the need for any future supplemental NEPA documentation.

1.1 Background

The Portland VAMC serves the Veterans of the greater Portland region, including northern Oregon and southern Washington. The VA Portland Health Care System consists of the Portland VAMC; the Vancouver VAMC in Vancouver, Washington; and ten outpatient clinics across central and northwest Oregon. The health care system provides inpatient, outpatient, long-term, and emergency care services to Veterans in the region. The Portland VAMC is intimately connected to the OHSU physically and through academic partnerships with shared research efforts; training of health care professionals; and use of shared staff, scientists, clinician-educators, and clinician-researchers.

In 1927, the Oregon Medical School donated 25 acres of land on Marquam Hill to the U.S. Veterans Bureau to establish a Veterans Hospital. Ground was broken in 1927 and construction began in 1928. The first 15 buildings were completed and dedicated in 1929. A new administration building was added in 1932 and additional structures were constructed from 1946 to 1949. In 1981, Building T-51 was constructed to move services out of the footprint of a newly proposed hospital. Construction of the existing main hospital building (Building 100) started in 1982 and the main hospital was opened to patients in 1988. As a result, old structures at the Portland VAMC were demolished with the exception of Buildings 6 and 16. The 600-foot-long pedestrian skybridge was constructed in 1991 to connect the Portland VAMC and OHSU. In 1999, the Cancer Research Center (Building 103) was opened followed by Building 104, which provides primary care services.

The Portland VAMC has been previously expanded and the number of Veterans being served continues to increase. The Portland VAMC campus is limited by the available horizontal space, development area, zoning, and steepness of the terrain. The available development area of the existing site is quite constrained. Furthermore, the configuration and interconnected layout of the existing buildings, parking structures, roadways, and ramps increases the complexity of proposed future development.

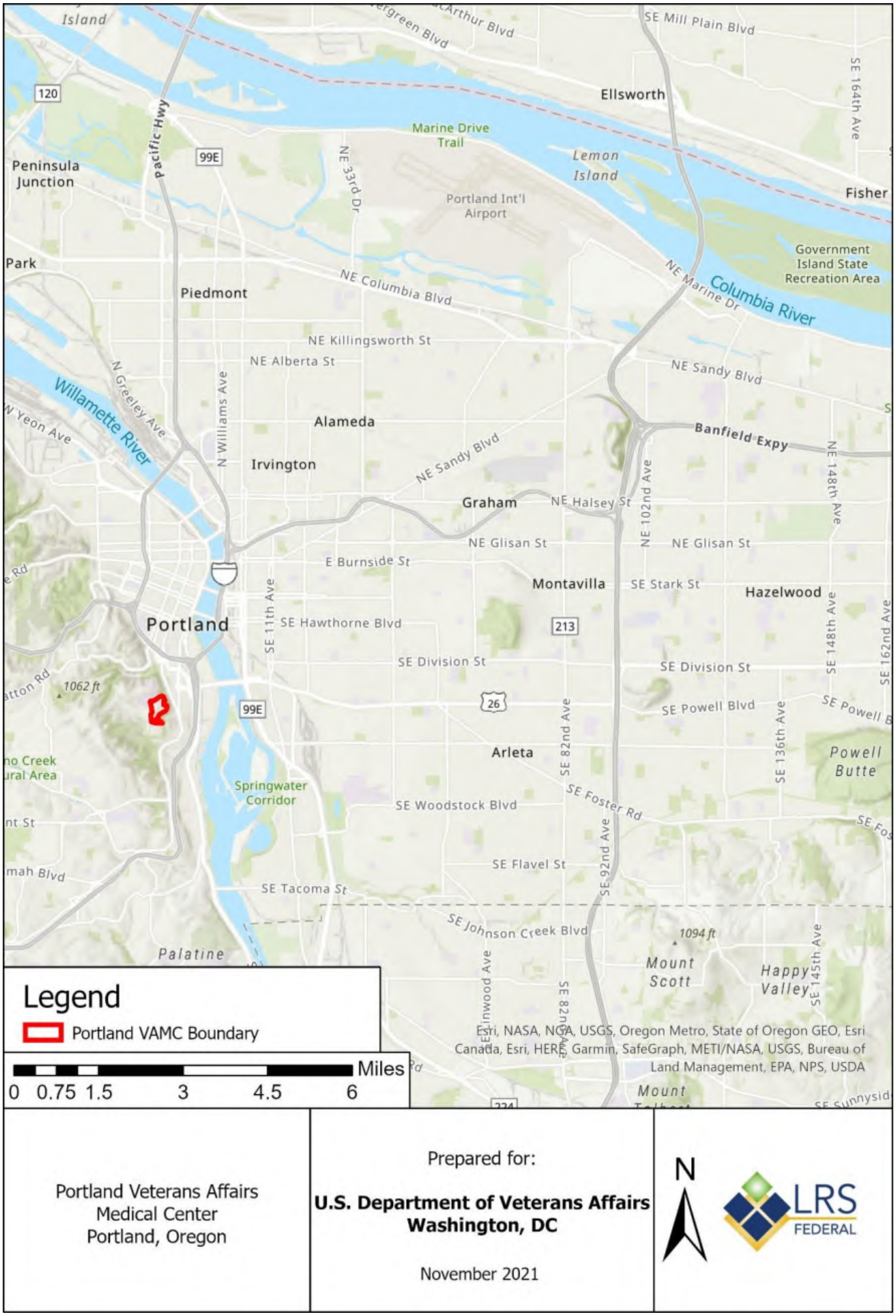


Figure 1-1. Site Vicinity Map of the Portland VAMC

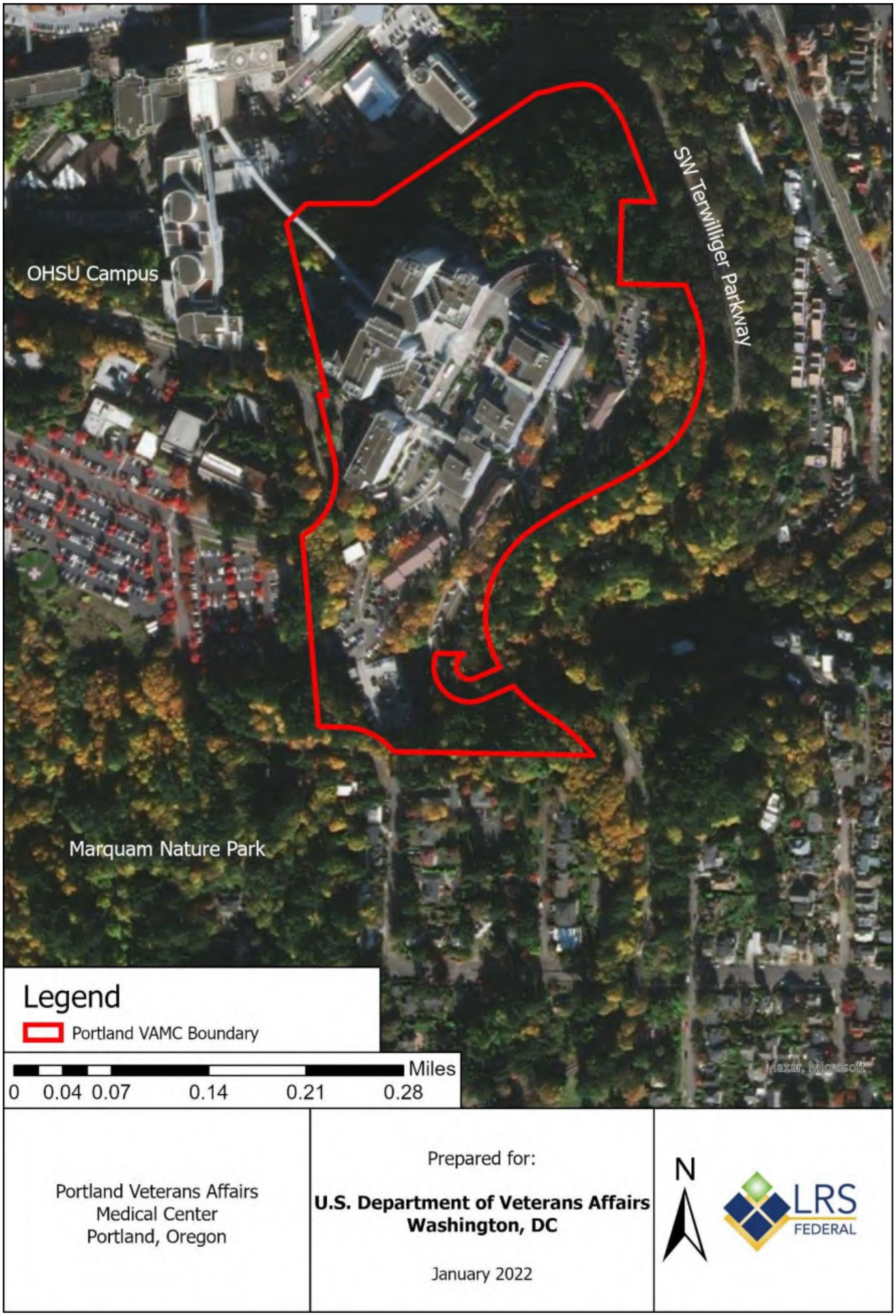


Figure 1-2. Aerial Image of the Portland VAMC

Due to the age of many of the Portland VAMC buildings and changes to rules, standards, and design criteria over the years, many of the existing buildings are considered nonconforming with current building seismic structural performance and physical security requirements. Current VA standards and codes require that site designs be modified to an extent that is functional and practical to conform with current standards.

The surrounding community consists of the OHSU campus and residential single-family homes built into the forested hillsides, the Shriners Hospital, Doernbecher's, and the Casey Eye Institute. In addition, the VAMC is located adjacent to Terwilliger Parkway, a scenic and historic linear park and roadway, which brings interest from the Friends of Terwilliger non-profit organization. Section 3.17 Potential for Generating Substantial Controversy further details input received following the VA's solicitation for input from federal, state, and local agencies as well as community organizations.

1.2 Purpose and Need

The purpose of the proposed action is to correct seismic deficiencies, address federal setback and physical security requirements, while providing sufficient patient and staff parking facilities at the Portland VAMC to meet existing needs. The seismic upgrades and improvements proposed would enhance patient, staff, and visitor safety and ensure the continued operation of the Portland VAMC in the aftermath of a major earthquake. No new operational programs or additional health care services are being proposed as part of the proposed action.

The proposed action is needed because the Portland VAMC facilities do not meet VA design criteria and seismic and physical security standards. The existing main hospital (Building 100), the administrative and research building (Building 101), and the underground parking garage (Building 102) were constructed in the 1980s and are not designed to modern VA seismic standards. Buildings 100 and 101 are listed on VA's extremely high-risk seismic list based on their design and the seismic characteristics of the area. There are several active faults in the region and Portland has a long history of earthquakes. The Portland VAMC is located within a high potential earthquake hazard zone with a very high risk for liquefaction of soils (Figure 1-3). Further, the Portland VAMC currently operates at full capacity and space impediments are being encountered routinely in many functions, including parking. An increase in the number of hospital beds or patient capacity is not anticipated as a result of new construction. However, the proposed action will increase the capacity of existing services, such as specialty care, to meet VA workload projections and the latest health care standards. Staff and patients would use the Specialty Care Building. Currently, most outpatient visits and VA business functions occur within the Main Hospital Building (Building 100). Outpatient services would be moved to Building 110 in order to allow space within Building 100 to provide single-bed rooms as opposed to the current multi-bed rooms, with their own bathroom, for increased privacy and improved health care for VAMC patients. The new Specialty Care Building would provide adequate space for outpatient services along with primary VA business functions. Additionally, having the new building would allow for seismic upgrades while accommodating staff, patients, and VA workload. The proposed action would renovate and modernize Portland VAMC facilities while addressing capacity issues to meet the health care needs of Portland area Veterans.

Additionally, parking expansion is needed at the VAMC to meet current staff and patient demand. The VAMC employs a large workforce of approximately 4,500 employees with only 1000 staff-designated parking spaces. For this reason, VA has implemented several alternative transportation incentives and subsidies, such as the extensive use and promotion of public transportation; government funded transport options, including the Portland Vancouver shuttle; and carpooling to reduce single-occupancy vehicle trips to the VAMC campus. Approximately 30 current VA staff commute via bicycle to the Portland VAMC. The currently implemented travel demand management programs will continue to be enhanced and expanded to further reduce the number of current and future passenger car trips to the Portland VAMC as well as the demand for parking. Even with the success of the VA travel demand programs, the Portland VAMC still has a deficiency of parking spaces for current staff, patients, and visitors. The proposed action would add approximately 600 additional parking spaces to help meet the current parking demand and would aide in improving traffic flow on the VAMC campus by increasing parking efficiency.

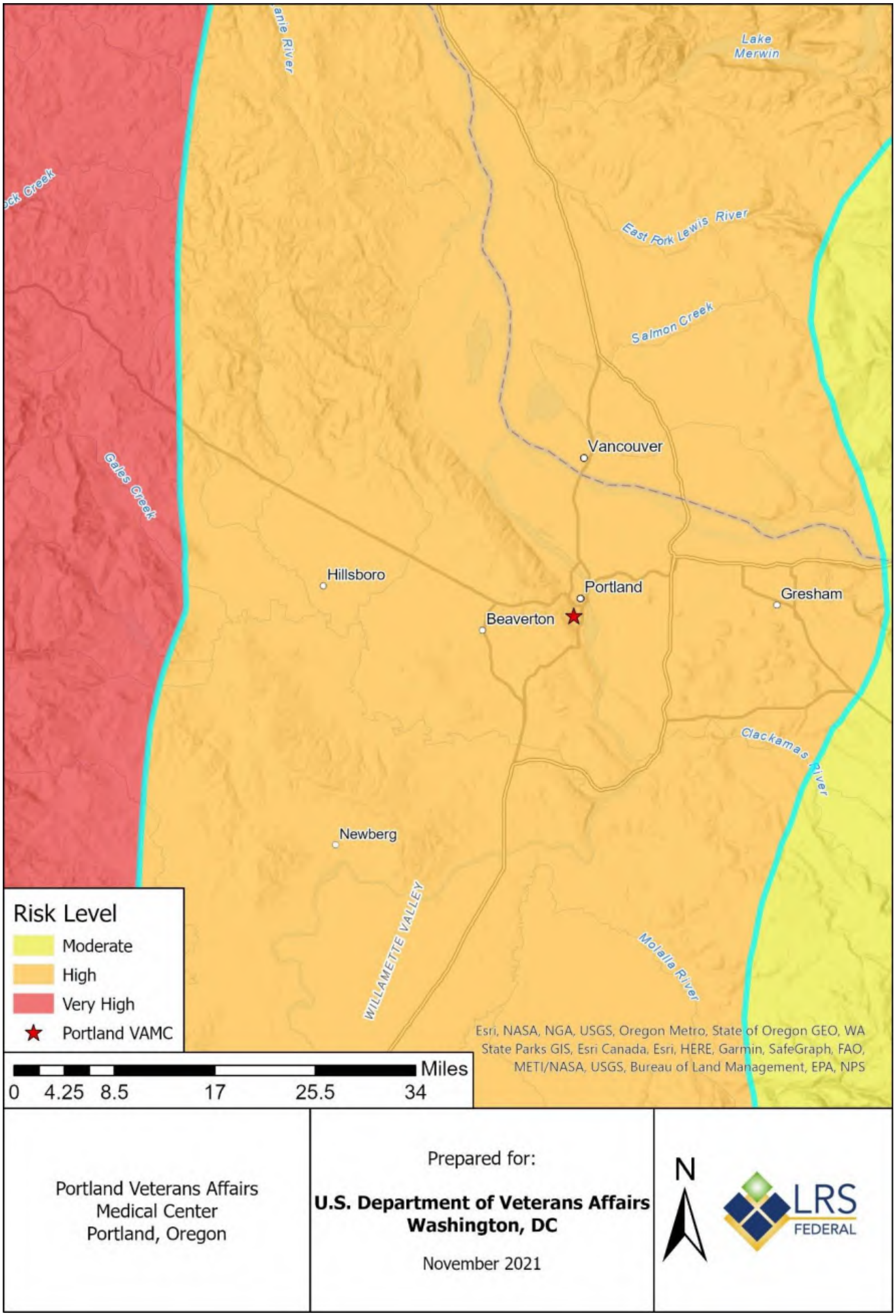


Figure 1-3. Seismic Hazards Map for the Portland VAMC (USGS, 2018)

2.0 Alternatives

This section describes the proposed action and alternatives considered by VA, including those alternatives eliminated from further analysis. NEPA and VA-specific NEPA regulations require all reasonable alternatives to be rigorously explored and objectively evaluated.

VA is considering the implementation of several undertakings at the Portland VAMC. The various projects, if authorized and approved, would occur over an extended duration (six or more years) to continue to provide the necessary health care services to Portland area Veterans. These projects would consist of a series of components that would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC facilities within its existing footprint. The proposed upgrades and improvements to Portland VAMC would also further enhance patient and employee safety and accessibility while serving to meet the existing health care needs of Portland area Veterans.

2.1 Proposed Action

Seismic upgrades and improvements are proposed at the Portland VAMC to specifically correct seismic deficiencies, address federal setback requirements, improve HVAC and electrical distribution systems, and to provide sufficient parking facilities. The proposed action, which would allow VAMC to properly serve and meet the current needs of Portland area Veterans, includes the following project components (Figure 2-1):

- Design and construction for required seismic upgrades and improvements to Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101) including a new water tank and realignment of the associated plaza and roadway to address physical security concerns.
- Design and construction for a complete seismic upgrade to Building 100 (main hospital building) and nearby Building 101 (research and administration building) including the replacement of the façade on both buildings. B100 improvements would include a new service elevator.
- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction and site layout.
- Design and construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111 (parking garage), an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 325,000 gross square foot Specialty Care Building.
- Energy plant improvements and upgrades such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades, including HVAC upgrades, and the full renovation and modernization of Buildings 100 and 101.

The proposed action would be implemented over an extended period of years and sequenced to minimize impacts to VAMC services and surrounding community to the greatest extent practicable. Construction for Building 108 additional parking levels is anticipated to begin by December 2022 and last approximately one year. Building 110 and Building 111 construction is proposed to commence by December 2025 with all renovations and upgrades being completed by January 2030. The overall construction timeline is dependent upon availability of funding, authorization, contract procurement, permitting, and design schedules for the various components.

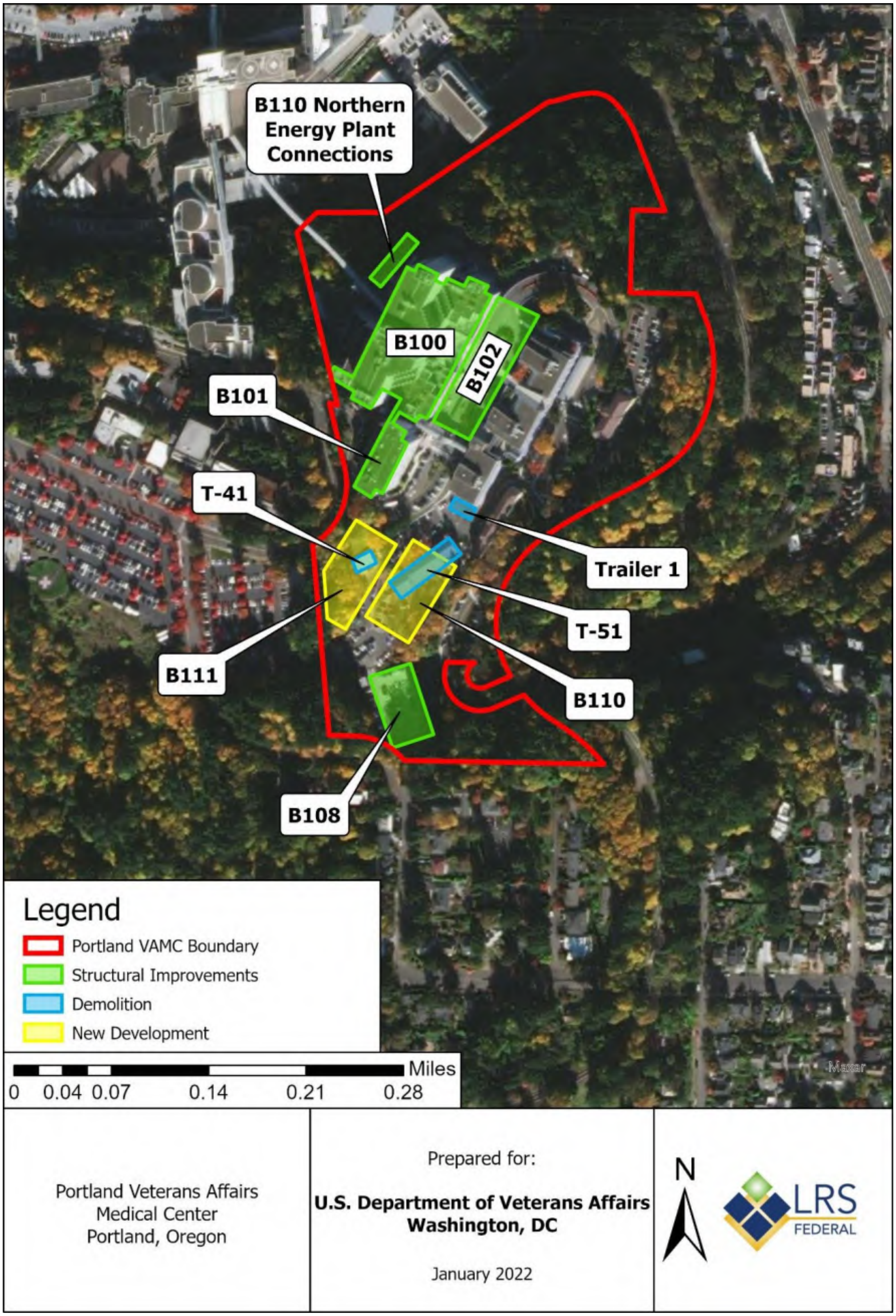


Figure 2-1. Project Component Map

2.2 Alternatives Evaluated

This EA examines two action alternatives for the implementation of the proposed action (Alternative A and Alternative B) and the no action alternative.

2.2.1 Alternative A

Alternative A will comprise the following project components to correct seismic deficiencies, address federal setback requirements, improve HVAC and electrical distribution systems, and provide sufficient parking facilities at the Portland VAMC to properly serve Portland area Veterans (Figure 2-1):

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction.
- Design and construction of two additional parking levels at Building 108 to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111, an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 325,000 gross square foot Specialty Care Building and related energy plant upgrades.
- Energy plant improvements and upgrades would include new boilers, chillers, cooling towers, and the electrical distribution system.

2.2.2 Alternative B

Alternative B would include all projects under Alternative A including the design and construction for the required seismic upgrades in addition to structural, energy, and facility related improvements to Buildings 100, 101, and 102; full renovation and modernization of Buildings 100 and 101; and minor roadway realignments as further detailed under Section 2.1 Proposed Action.

2.2.3 No Action Alternative

Under the no action alternative, the proposed seismic upgrade and improvement projects would not be implemented. VA would continue to provide services at existing buildings at the Portland VAMC. This alternative would limit VA's ability to provide needed health care services to Veterans in the region. The no action alternative does not meet the purpose and need. However, analysis of the no action alternative is required by CEQ regulations. It also provides a benchmark for comparing and analyzing the effects of implementing the proposed action under each alternative.

2.3 Alternatives Eliminated from Further Consideration

After identifying deficiencies of the existing Portland VAMC facilities, VA examined alternatives. These alternatives were not viable or failed to meet the purpose and need for the proposed action. The following provides a brief discussion of these alternatives and VA's rationale for eliminating them from further consideration.

VA did consider the light rail expansion as a commuting option for VAMC staff during planning; however, TriMet Metro issued a statement regarding the Southwest Corridor expansion stating, 'In November 2020, voters rejected Measure 26-218 (also known as Get Moving 2020), a proposal to fund the Southwest Corridor Light Rail Project and many other transportation programs across the region. At this time, the project is on hold until funding is identified.' The light rail expansion is not moving forward at this time and preliminary design efforts for the Southwest Corridor Light Rail Project have been halted. As such, the TriMetro light rail expansion was no longer considered as a commuting option to the VAMC.

Development of a New VAMC at a New Location in the Portland Area

VA would acquire land then design and develop a new, modern medical center at a new site in the Portland area. This alternative would maintain the continuity of health care provided by VA during the new medical center construction and would provide a modern VA health care facility that would meet Portland area Veterans' needs for the foreseeable future. The cost of purchasing a new site and constructing an entirely new VA medical center facility would be far greater than the renovation and modernization of the existing Portland VAMC. In addition, this alternative would relocate the Portland VAMC away from OHSU. OHSU is a strategic partner and invaluable resource to the Portland VAMC. VA leverages OHSU to efficiently procure medical services that the Portland VAMC is unable to provide patients, such as nuclear medicine treatments. While it might be possible to maintain this relationship from afar, distance would make sharing personnel and other resources with OHSU challenging and would impact the continuity of health care provided to Portland area Veterans. Consequently, this alternative was eliminated from further consideration.

Lease Off-Campus Space and Close Buildings 100 and 101

VA would lease space at an off-VAMC location to house clinical and other services. The seismically deficient Buildings 100 and 101 would be effectively decommissioned. More than 1,200,000 gross square feet (GSF) of leased space would be required to mitigate the loss of the two existing buildings and accommodate Portland's patient growth projections. This alternative would put many clinical and ancillary support functions too far from the medical center to effectively interact with services that would continue to be offered on campus. The cost of this option is prohibitive, even if acceptable space could be located near the Portland VAMC. While suitable space could possibly be leased in the greater Portland area, it would likely be impossible to find adequate contiguous clinical (inpatient and outpatient) space. The solution would likely be several leased buildings scattered across the area, which would result in operational inefficiencies and loss of coordinated health care services for Veterans. Due to both cost and loss of critical space adjacencies, this alternative was eliminated from further consideration.

Contract Out Core Medical/Support Services and Close Buildings 100 and 101

VA would send Veteran patients to other existing medical facilities in the Portland metropolitan area where they could receive health care. The seismically deficient Buildings 100 and 101 would then be decommissioned. While Veterans may, with many exceptions (Veteran special needs care), receive the care they require under this alternative, this alternative would not allow VA to fulfill its purpose of providing the best and most comprehensive medical care possible to Veterans. In addition, VA would not be able to effectively control the quality and consistency of outsourced medical care and the high cost of outsourcing would be cost-prohibitive. This alternative does not meet the purpose of or need for the proposed action and does not address existing space and care deficiencies at the Portland VAMC. As such, this alternative was not considered reasonable and was eliminated from further consideration.

Acquisition of an Existing Medical Facility Through Purchase

VA considered acquiring an existing medical facility in the local community that would be suitable for renovation and fit all other project requirements in the same manner as the proposed action. However, high-level market research and interviews with local VA planners have indicated that a suitable facility for possible acquisition and subsequent renovation that would meet all project requirements does not exist in the Portland area. As such, this alternative was eliminated from further consideration.

Collaboration with the Department of Defense for a Joint Lease Project

VA also considered collaboration with the Department of Defense (DoD) for a Joint Lease Project; however, there are currently no active DoD facilities or other VA/DoD operations in the Portland area. As such, this alternative was eliminated from further consideration.

Only Implementing Necessary Seismic Upgrades

This alternative would involve the design and construction for required seismic upgrades and improvements to Building 102 and a complete seismic upgrade to Buildings 100 and 101. Seismic upgrades to these buildings are a small portion of the existing infrastructure needs on the Portland VAMC campus. As such, implementing this alternative would fail to meet the purpose and need for the proposed action and therefore, was eliminated from further consideration.

Only Implementing the Necessary Seismic Upgrades and Improvements to Other Existing Structures

This alternative would address the seismic deficiencies at buildings on the Portland VAMC campus and would improve existing buildings, such as Building 108 (the existing parking garage) and the energy plant. This would only add approximately 150 parking spaces to the Portland VAMC campus, and the VA is seeking an additional 600 net new parking spaces to aide in addressing the current parking deficit and improve traffic flow on the campus and adjacent roadways. This alternative would fail to meet the purpose and need for the proposed action and therefore, was eliminated from further consideration.

Only Implementing the Necessary Seismic Upgrades, Improvements to Other Existing Structures, and Addition of the New Parking Garage but Not the Expansion of the Existing Parking Garage

Similar to the previous alternative, this alternative would fail to meet the need for 600 net new parking spaces, adding only 450 new parking spaces via Building 111. Since this alternative would not meet the VA's need and purpose for the proposed action, this alternative was eliminated from further consideration.

Expanding Usage and Parking for the Portland Aerial Tram

VA considered an expansion of parking for the Portland Aerial Tram to reduce single-occupancy vehicle trips to the VAMC campus, thus reducing the strain on the current parking deficit. However, an expansion of parking for the Portland Aerial Tram would not fall under the jurisdiction of the VA. The tram is part of Portland's public transportation system and is operated in coordination with TriMet and Portland Streetcar. Since this alternative is not a viable option for the VA, it was eliminated from further consideration.

Emphasize Telehealth Options to Reduce the Need for Parking on Campus

VA considered leveraging the increase in telehealth capabilities due to the Coronavirus Disease 2019 (COVID-19) pandemic to address the parking deficit on the Portland VAMC campus. This alternative would expand the use of telehealth to care for patients and may alleviate the need for additional patient parking spaces. While there has been an increased presence of telemedicine, there has also been an overwhelming need for testing centers, hospitalization, and inpatient services to meet the needs of Portland area Veterans. The VAMC continues to offer diagnostic testing for Veterans enrolled in VA health care and who meet the CDC testing criteria. The VAMC mission is to provide comprehensive health care services to Portland area Veterans through a vast array of health care delivery methods. There are many patients still requiring inpatient services and frontline staff unable to utilize telehealth, and parking at the Portland VAMC campus must be expanded to meet this demand. Therefore, opportunities to telecommute or for telemedicine do not negate the purpose and need for the proposed undertaking, and this alternative was eliminated from further consideration.

3.0 Affected Environment and Environmental Consequences

This section describes the baseline physical, environmental, cultural, and socioeconomic conditions at the proposed project site and the general vicinity, with emphasis on those resources potentially impacted.

CEQ guidelines and regulations encourage agencies to streamline environmental analyses in their EAs (CEQ, 2012) by focusing on significant issues and discussing insignificant issues only briefly, discussing impacts in proportion to their significance, and incorporating by reference other environmental analyses (40 CFR 1500.4(c), 1502.2(b), and 1502.21).

Impacts are identified as either significant or less than significant. The terms “effects” and “impacts” are synonymous in this EA. Where possible, impacts are identified as short-term, temporary, or long-term in relation to the length of the effect of the impact.

Resource areas considered in this EA are aesthetics; air quality; cultural and historic resources; geology and soils; hydrology and water quality; wildlife and habitat; noise; land use; floodplains and wetlands; socioeconomics; community services, solid waste and hazardous materials; traffic, transportation, and parking; utilities; and environmental justice. This section also addresses cumulative impacts and the potential for generating substantial controversy.

3.1 Aesthetics

3.1.1 Affected Environment

The Portland VAMC campus is located on approximately 28.5 acres of land and includes 12 buildings, one below-grade parking garage (Building 102), one above-grade parking garage (Building 108), and ten surface-level parking lots (Figure 1-2). The campus, first constructed in the early 1900s, sits near the top of Marquam Hill, south of downtown Portland and within a mile of the Willamette River. The northern, eastern, and southern perimeter of the VAMC campus is wooded and slopes steeply toward Terwilliger Parkway, a scenic and historic linear park and roadway, listed in the National Register of Historic Places (NRHP) in March 2021. The VAMC campus is located in a mixed use, institutional, residential, and recreational urban area. Residences are located across SW Terwilliger Boulevard and south of the campus. Adjacent northwest of the campus is the OHSU campus, and approximately 175 feet southwest of the VAMC campus is Marquam Nature Park, across SW 6th Avenue Drive. The OHSU and VAMC medical campuses have similar aesthetics.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A and Alternative B

The seismic upgrade and improvement projects would be implemented over a period of approximately six years and would include activities such as site preparation, grading, excavation, vehicle traffic, movement of heavy equipment, and paving roadways and parking areas. The improvement projects would require construction activities which would temporarily disrupt the aesthetics of the Portland VAMC campus. Demolition activities would be limited to T-41, T-51, and Trailer 1, and construction activities would be limited to Building 108, the energy plant, Building 110, and Building 111. Building 108, a parking garage located on the southern portion of the VAMC campus, would be vertically expanded to add two additional levels of parking. This action would increase the height of the parking structure; however, the building would still be within the height range of other buildings on the campus. Energy plant improvements would primarily impact the interior of the building. The design of Building 110, the new

Specialty Care Building, and Building 111, the new parking structure, would be consistent with the surrounding buildings on the campus.

Construction of Building 111 would require some tree removal within the interior portion of campus along existing retaining walls as well as removal of some ornamental landscape trees. All disturbed areas around the new parking structure would be landscaped following the completion of construction to preserve aesthetics at the campus. Tree removal would be in accordance, to the maximum extent practicable, with the City of Portland tree removal process. Chapter 11.05.040 of the City of Portland's Tree Code states that trees within public rights-of-way that are managed by the State of Oregon are exempt from the code's regulations. Trees located on lands or within utility corridor easements that are owned by State or Federal agencies are also exempt from the code's regulations. However, these trees may be subject to other City regulations or Intergovernmental Agreements. Furthermore, the City retains summary abatement authority for nuisances posing an immediate threat to public safety (City of Portland, Oregon).

Aesthetic impacts to the campus during demolition and construction activities would be temporary, and due to the steeply sloping and wooded hillsides surrounding the VAMC campus, it is unlikely that they would be seen by residential areas located northeast, east, and south of the campus. Impacts to aesthetics described under Alternatives A and B would be less than significant.

The Portland VAMC and Terwilliger Parkway are separated by steep, wooded slopes with a fairly dense understory and canopy. New buildings would be designed to be architecturally and visually consistent with the existing Portland VAMC campus buildings and forested areas around the perimeter of the campus would remain largely intact. As such, physical changes to the VAMC campus, such as the addition of the Specialty Care Building and new parking structures, would not detract from the aesthetics of Terwilliger Parkway or surrounding area.

3.1.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to the aesthetics of the site would occur as a result of VA's actions.

3.2 Air Quality

3.2.1 Affected Environment

Ambient air quality in an area is characterized by compliance with the primary and secondary National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency (USEPA) sets standards for pollutants considered harmful to public health and the environment. Areas are then classified as attainment, non-attainment, or maintenance with respect to compliance with NAAQS. The USEPA Green Book provides information about the area NAAQS designations and non-attainment status. According to USEPA Green Book, Multnomah County, Oregon is designated as a maintenance area for carbon monoxide (CO) and is therefore subject to the General Conformity Rule of the Clean Air Act for the proposed action. Multnomah County, Oregon is an attainment area for the remaining NAAQS. Maintenance designations indicate that the state completed an air quality planning process for an area which was previously designated as non-attainment (USEPA, 2021).

The Portland VAMC Final Air Quality Resource Report (Appendix E) presents air quality monitoring data which indicates that local air quality meets federal and state standards and is considered good in the project area. USEPA and the Oregon Department of Environmental Quality (ODEQ) have designated air quality in the project area as either attainment or maintenance for all federal and state standards (Jacobs and LRS Federal, 2021a).

Sensitive air quality receptors in the vicinity of the Portland VAMC include residences northeast and east of the VAMC campus, located 300 feet or more from the proposed construction areas, and residences south of the campus, located 100 feet or more from the proposed construction areas. The project would be constructed within a hospital and, therefore, be co-located with sensitive receptors which include an onsite childcare facility. The nearest school is OHSU, located across the street from the facility which includes OHSU Hospital, as well as the Doernbecher Children's Hospital, the Casey Eye Institute, the School of Nursing, and other learning, research, and treatment facilities (Jacobs and LRS Federal, 2021a).

3.2.2 Environmental Consequences

3.2.2.1 Alternative A and Alternative B

The Portland VAMC Final Air Quality Resource Report (Appendix E) was prepared for the VAMC campus to estimate the total emissions that would be generated by the proposed action from construction and operations. Construction activities for both alternatives are anticipated to occur intermittently between 2022 and 2028 (Jacobs and LRS Federal, 2021a).

Construction projects would result in air pollutant emissions from the following:

- Fugitive dust from soil disturbance, demolition, and other construction activities;
- Engine exhaust from vehicle trips traveled by construction workers, haul trucks, and concrete trucks;
- Fuel combustion in off-road construction equipment.

Short-term air quality impacts from fugitive dust generated during construction would require monitoring to ensure that contractors implement best management practices (BMPs) mandated by the State of Oregon. Mitigation measures to control fugitive dust from construction equipment and vehicles include (Jacobs and LRS Federal, 2021a):

- Use, where possible, of water for control of dust during construction, the grading of roads, or clearing of land.
- Application of water or on unpaved roads, materials stockpiles, and other surfaces which could create airborne dusts.
- Full or partial enclosure of materials stockpiles in cases where application of water or other suitable chemicals are not sufficient to prevent particulate matter from becoming airborne.
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials.
- Proper containment during sandblasting or other similar operations.
- Covering, at all times when in motion, open-bodied trucks transporting materials likely to become airborne.
- Prompt removal from paved streets of earth or other material that does or may become airborne.

The proposed action would also cause a potential net increase in long-term stationary combustion emissions because of increased boiler and emergency generator capacity. Operational emissions associated with future project-related vehicle use and maintenance would be negligible. Upgrading energy utilities to potentially include renewable energy sources and/or improve efficiency of energy utilities could help to offset any anticipated increases in operational emissions (Jacobs and LRS Federal, 2021a).

The proposed action would not result in the VAMC becoming a major source for actual or potential emissions at or above any Clean Air Act (CAA) air pollutant threshold, therefore, a Title V CAA operating permit is not anticipated to be required for the VAMC. A new indirect source construction permit (ISCP) is not likely to be required since the proposed 600 new parking spaces do not exceed the threshold of 1,000 or more parking spaces within a location defined as a maintenance area for carbon monoxide. VA would obtain a Title V operating permit and a new ISCP from ODEQ, if required.

An asbestos inspection and lead-based paint survey were conducted for the VAMC in November 2020. The structures to be renovated or demolished include materials that contain asbestos and lead-based paint. An ODEQ Permit for Asbestos Abatement would be required for demolition or renovation projects involving asbestos-containing materials (LRS Federal, 2021b). Demolition work would need to be performed by licensed contractors, and mitigation and disposal requirements would be implemented. Standard demolition measures to control dust would reduce lead-based paint dust emissions during demolition (LRS Federal, 2021).

Though not subject to General Conformity, emissions are anticipated to be substantially below the General Conformity maintenance area de minimis threshold of 100 tons per year for all pollutants and all years (2022 to 2028); however, the overall construction timeline is dependent upon availability of funding, authorization, contract procurement, permitting, and design schedules for the various components. The proposed improvements would not likely result in a significant increase of air emissions or interfere with the attainment of air quality standards in the area. The projects would not adversely affect regional air quality and would comply with applicable federal and state air quality permitting and regulatory requirements (Jacobs and LRS Federal, 2021a).

Currently, there are no applicable quantitative emission thresholds to evaluate the significance of greenhouse gases (GHG) and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, USEPA’s Mandatory GHG Reporting Rule has a threshold for rule applicability of 25,000 metric tons (MT) of carbon dioxide equivalent (CO_2e) emissions per year (40 CFR Part 98) from stationary fuel combustion. Since the proposed projects will likely generate CO_2e emissions in excess of the 25,000 MT per year threshold established by USEPA, VA will likely be required to report its CO_2e emissions (Jacobs and LRS Federal, 2021a).

The maximum annual estimated emissions for volatile organic compounds (VOCs), nitrogen oxides (NOx), CO, sulfur dioxide (SO2), particulate matter ten micrometers and smaller (PM10), particulate matter 2.5 micrometers and smaller (PM2.5), and CO_2e from the construction and operation of the proposed action projects under Alternatives A and B are presented in Table 3-1. Based on the location’s attainment or maintenance status for all federal and state standards, the increase in emissions anticipated to be substantially below the General Conformity maintenance area de minimis threshold, and the mitigation measures that would be enforced to protect sensitive receptors in the area, the proposed action under both alternatives is considered to have a less than significant impact on air quality.

Table 3-1. Total and Maximum Annual Estimated Emissions for Alternative A and Alternative B

Alternative and Emission Summary Category		Emissions (tons per year)						
		VOC	NOx	CO	SO2	PM10	PM2.5	CO_2e (MT)
A	Maximum Annual	2.3	49.6	31.5	0.2	3.1	3.0	37,037
B	Maximum Annual	2.4	50.9	32.2	0.2	3.2	3.1	37,219

3.2.2.2 No Action Alternative

Under the no action alternative, construction of proposed action projects would not occur. No impacts to air quality would occur as a result of VA's actions.

3.3 Cultural and Historic Resources

Historic properties are defined by the National Historic Preservation Act (NHPA) as properties including prehistoric and historic sites, structures, buildings, objects, districts, or any other physical evidence of human activity associated with important historic events, with persons important in history, representing the work of a master or exemplary as a type, or have or may yield information important to history or prehistory. Cultural resources are protected through several federal laws and associated regulations, including the NHPA of 1966, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990.

Section 106 of the NHPA and its implementing regulations, 36 CFR Part 800, requires an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's area of potential effect (APE), which is defined as the geographic area "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist."

3.3.1 Affected Environment

The APE for the proposed action consists of the Portland VAMC campus, encompassing approximately 28 acres of land and a portion of Terwilliger Parkway located to the immediate east (Figure 3-1. Map Depicting the Portland VAMC Campus and Area of Potential Effects). Terwilliger Parkway was listed on the NRHP in March 2021. Pursuant to VA's NHPA Section 10 responsibilities, which require VA on an ongoing basis to evaluate its properties for eligibility to the NRHP, VA transmitted a determination in 2020 to the Oregon State Historic Preservation Office (OR SHPO) stating that there are no properties eligible for the NRHP on the Portland VA Medical Center campus. The OR SHPO concurrence letter, dated November 16, 2020, which specifically addresses above-ground historic properties and VA's findings, is included in Appendix H. Subsequently, the VA requested concurrence from OR SHPO in February 2022 for its finding that no historic properties and archaeological resources within the APE, including Terwilliger Parkway, would be impacted as a result of the proposed action as described herein. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway as a result of the proposed action (Appendix H).

There are no known cultural resources identified within the direct or indirect APE on the VAMC campus. The Portland VAMC Cultural Resources Inventory (Appendix G) provides a review of available archaeological, historical, and geological data and communicates that there is low potential for encountering significant pre-contact cultural resources and historic period cultural resources in the project APE due to the natural and cultural settings. The construction of the original medical center required significant excavation on campus to establish a level grade, effectively removing cultural horizon of soils. Further, structures identified to be 50 years or older were Buildings 6, 16, 41, and the stone masonry walls within the campus. These structures were determined not eligible for the NRHP due to previous renovations of the structures (LRS Federal and SWCA, 2021).

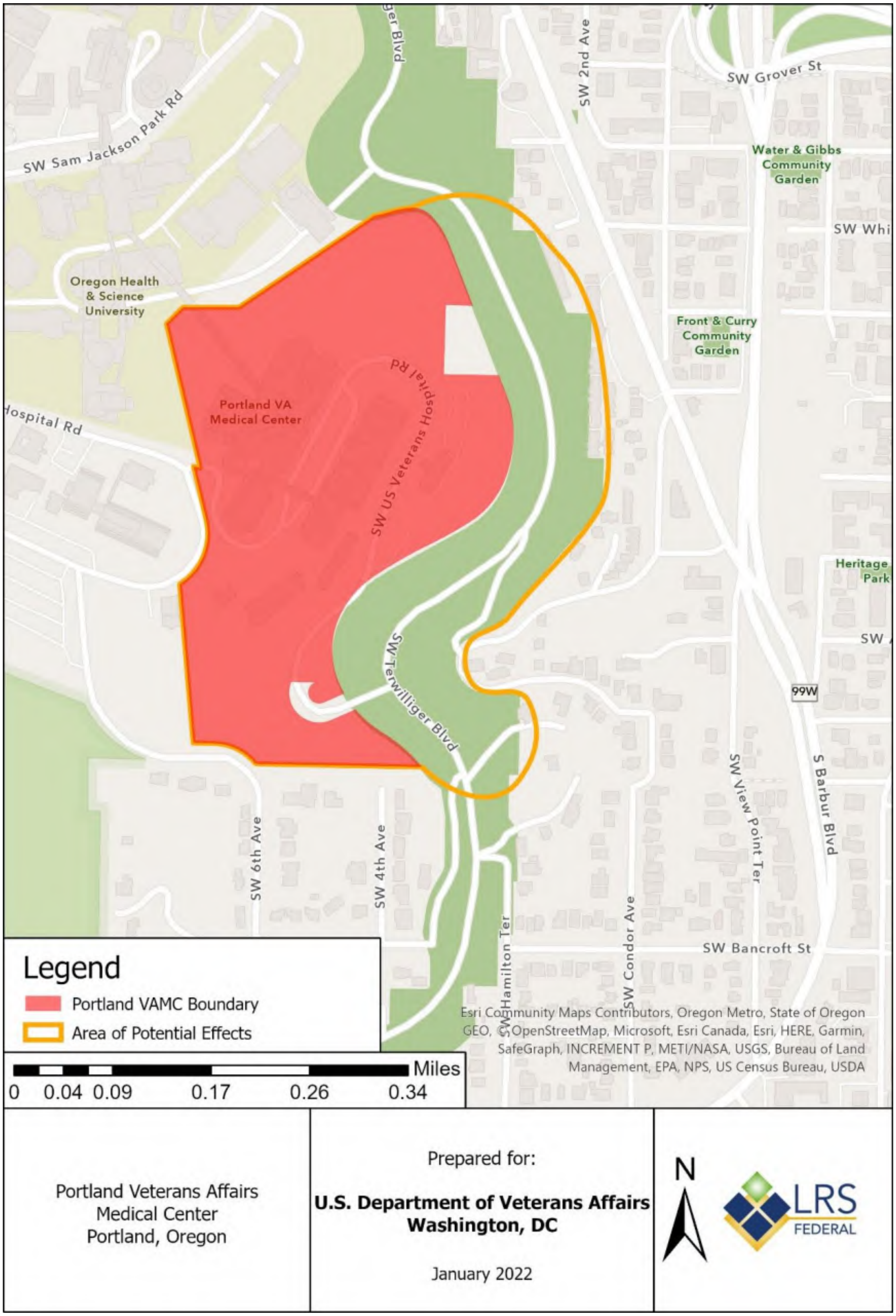


Figure 3-1. Map Depicting the Portland VAMC Campus and Area of Potential Effects

3.3.2 Environmental Consequences

3.3.2.1 Alternative A and Alternative B

The proposed projects under both Alternative A and Alternative B would not impact historic buildings since there are no historic buildings on the Portland VAMC campus. Construction activities would also be almost entirely limited to previously developed portions of the campus (LRS Federal and SWCA, 2021) (Appendix G). While the proposed undertaking may negligibly increase traffic on historic-period SW Terwilliger Boulevard, this change will not likely have negative impacts to the historic parkway. The roadway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. The Portland VAMC and Terwilliger Parkway are separated by steep, wooded slopes with a fairly dense understory. These wooded areas surrounding the campus will remain intact, providing a buffer between campus construction and the historic Terwilliger Parkway. No ancillary activities are proposed outside of the VAMC campus boundary or APE. Under Alternatives A and B, building heights would still be in the range of other buildings on the campus and physical changes to the VAMC campus proposed would not detract from the aesthetics or scenic characteristics of Terwilliger Parkway. Therefore, Terwilliger Parkway would not be affected by the proposed action under Alternatives A or B (March 7, 2022 OR SHPO Correspondence, Appendix H).

The proposed project on the Portland VAMC campus would present a low risk for inadvertent discovery of pre-contact cultural resources and a low risk for uncovering below-ground cultural resources. It is therefore unlikely that the proposed action under Alternatives A or B would impact archeological resources (LRS Federal and SWCA, 2021). It is unlikely that the proposed projects would affect previously undisturbed sediments within the direct APE as the Portland VAMC campus has been significantly altered through time. Based on the known prior disturbance and the absence of historic buildings at the Portland VAMC campus, impacts to cultural resources from the proposed action would be less than significant. However, it is recommended that a project-related inadvertent discovery plan be created, outlining procedures on what to do and who to contact if there is an inadvertent discovery as a result of any project-related ground-disturbing activities in previously undisturbed locations within the APE during construction (LRS Federal and SWCA, 2021). Future Section 106 consultation with the OR SHPO or Native American Tribes would be required if ground-disturbing activities (e.g., ground disturbance for ancillary locations, terrain reconfigurations, staging areas or excavations for utilities) are proposed in areas outside of the APE for the VAMC. Likewise, further consultation would be required if an inadvertent discovery occurred during construction.

3.3.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to cultural or historic resources would occur as a result of VA’s actions.

3.4 Geology and Soils

3.4.1 Affected Environment

The Portland VAMC campus is located within the lower Willamette Basin geological region. Elevations at the Portland VAMC range from as high as 560 feet above mean sea level (amsl) near the southwest corner to as low as 350 feet amsl near the north end. Generally, topography at the Portland VAMC slopes down from the west to the east and from the south to the north. Areas along the northern, eastern, and southern perimeter of the Portland VAMC are steeply sloping (25 percent [%] or greater) (LRS Federal, 2021).

The Portland VAMC is located in Portland Hills fault zone. Central and southern portions of the Portland VAMC are located in a high potential relative earthquake hazard zone. Northern, eastern, and southeastern portions of the campus are located in a moderate potential relative earthquake hazard zone. The Portland area, located in the Cascadia subduction zone, has several active faults and a long history of earthquakes. The entire Portland VAMC is located in the City of Portland Title 33 Potential Landslide Hazard Area. Risk for liquefaction of soils is very high (LRS Federal, 2021).

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, there are four distinct soil series at the Portland VAMC. The soil series identified at the Portland VAMC are Goble-Urban Land Complex (3 to 15% slopes), Goble Silt Loam (30 to 60% slopes), Goble-Urban Land Complex (15 to 30% slopes), and Haplumbrepts (very steep). A geotechnical investigation of the Portland VAMC found the soils in the central portion generally consist of fill material (sand to silty sand with gravel) underlain by clay or silt to depths up to 100 feet below ground surface (bgs), underlain by basalt bedrock. In some places, clayey sand or silty sand is located above or below the clay or silt layer, or the clay/silt layer may be absent. In the area of Buildings 100, 101, and 102, bedrock is estimated to range from approximately 15 to 75 feet bgs (LRS Federal, 2021).

3.4.2 Environmental Consequences

3.4.2.1 Alternative A and Alternative B

Construction activities would have minimal changes to topography. The proposed Specialty Care Building and proposed parking garage would be partially located in moderately sloping areas which may necessitate the use of BMPs, such as temporary shoring and retaining walls. The proposed disturbance of more than one acre of land would require an erosion and sediment control plan including BMPs, such as earth berms and vegetative buffers (LRS Federal, 2021b). A geotechnical investigation conducted in 2019 indicated that basalt bedrock may be located close to ground surface in some areas, which could require removal prior to proposed construction activities. Additional investigations would be needed to determine the depth to bedrock in previously uninvestigated soils (LRS Federal, 2021).

Since the Portland VAMC campus is located in a moderate potential relative earthquake hazard zone with a very high risk for liquefication of soils, the construction of new structures on the campus would be designed to the current seismic standards (LRS Federal, 2021).

Based on the prior disturbance of soils and the BMPs that would be implemented during construction, the proposed action under Alternatives A and B would have less than significant impacts to soils and geology at the Portland VAMC.

3.4.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to geology or soils would occur as a result of VA’s actions.

3.5 Hydrology and Water Quality

3.5.1 Affected Environment

The Portland VAMC campus is located in the Marquam-Woods sub-watershed of the Willamette River Watershed. The nearest traditional navigable water (TNW) to the Portland VAMC is the Willamette River, located approximately 0.6 miles east of the campus. Soils onsite are classified as hydrologic soils Group Type C, which is typified by slow infiltration rates when thoroughly wet and slow rates of water transmission. This group consists of soils with either a layer that impedes the downward movement of water or layers of moderately fine to fine texture soils. Moderately high runoff potential is inherent in these types of soils. The stormwater runoff from the VAMC site is directed to separated stormwater inlets and conveyed to the city’s combined stormwater-sanitary sewer network downgradient, eventually discharging indirectly into the Columbia River following treatment at the Columbia Boulevard Wastewater Treatment Plant.

Figure 3-2. VAMC Hydrologic Drainage Feature Map depicts two surface drainage features previously identified onsite and the combined stormwater-sanitary sewer network that conveys stormwater runoff to the Columbia Boulevard Wastewater Treatment Plant (Jacobs and LRS Federal, 2021b). The City of Portland operates the Columbia Boulevard Wastewater Treatment Plant. Wastewater is treated and discharged to the Columbia River in accordance with the applicable National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit (Permit No. 101505) (State of Oregon Department of Environmental Quality, 2020) and ODEQ Water Quality Standards (WQS).

The two drainage features that convey stormwater runoff from adjacent roads, paved parking lots, and adjacent uplands downgradient to stormwater inlets are further detailed under Section 3.9 Floodplains, Wetlands and Coastal Zone Management. Surface water features and the combined stormwater-sanitary conveyance system located on the VAMC campus are depicted on Figure 3-2. VAMC Hydrologic Drainage Feature Map. An abandoned section of storm sewer pipeline is located at the northern section of the Portland VAMC campus. During a site visit conducted in June 2018, flow was observed through the storm sewer pipeline assumed to be abandoned. The City of Portland Bureau of Environmental Services (PBES) would need to be notified if this line is later determined to be active in order to update their GIS system maps (LRS Federal LLC, 2021e).

The proposed action is subject to the City of Portland 2020 Storm Water Management Manual (SWMM). The SWMM maintains current standards with BMPs and regulatory requirements, as well as analysis and design standards relative to Portland's water quality goals. Low-impact development and/or treatment for pollution reduction are required, as is flow reduction depending on the discharge point. The SWMM defines the City's Infiltration and Discharge Hierarchy and ranks discharge systems by levels (e.g., Levels I – III) in order of preference. Level I requires treatment and infiltration where possible; Level II requires treatment and flow control for discharge to separated storm sewer systems; and Level III requires flow control for discharge to combined sewer systems that send flow to the Columbia Boulevard Wastewater Treatment Plant for treatment and discharge to the Columbia River. Other Portland technical standards, design guidelines, and policies impacting the stormwater and water quality aspects of this project include the Sewer and Drainage Facilities Design Manual (SDFDM) (City of Portland, 2020a) and the Source Control Manual (SCM) (City of Portland, 2020b).

The Portland VAMC campus is not located within a wellhead protection area, which is a drinking water source area for a public water supply. Therefore, the project is not subject to additional groundwater protections put in place by the city. Further, the geotechnical investigation for the Portland VAMC did not encounter groundwater. It is unlikely that groundwater would be encountered during construction activities associated with the proposed action (Jacobs and LRS Federal, 2021b).

3.5.2 Environmental Consequences

3.5.2.1 Alternative A and Alternative B

Proposed projects under Alternative A and Alternative B, would not significantly impact drainage features, drainage patterns, or general hydrology of the site. Post-construction stormwater would be discharged to the municipal combined sewer system for treatment reflecting current conditions. All captured combined sewer flows directed to the Columbia Boulevard Wastewater Treatment Plant will be treated in accordance with Schedule A.2 of the applicable NPDES Wastewater Discharge Permit (Permit No. 101505) (State of Oregon Department of Environmental Quality, 2020). The Columbia Boulevard plant has a two-phase treatment process. The primary phase screens out large debris for landfilling; skims off grease, oil, and floatable solids; and collects and thickens settleable solids. In the secondary phase, naturally occurring microorganisms feed on organic pollutants in the wastewater and the resulting residue is separated. After disinfection, the treated water flows into the Columbia River. Sodium hypochlorite, a strong bleach, is used to disinfect treated wastewater before it is discharged to the Columbia River. To reduce chlorine residual to no more than one part per million, liquid sodium bisulfite is used to dechlorinate treated wastewater. Discharges from the plant must also comply with limits permitted for biological oxygen demand (BOD), total suspended solids (TSS), pH, E.coli, and chlorine among other pollutants (ODEQ Wastewater Discharge Permit No.101505). No affect to water quality within the Columbia River is anticipated following primary treatment, secondary treatment, and disinfection processes prior to discharge.

PBES provides municipal combined stormwater/sanitary sewer services to the Portland VAMC. Portland VAMC would continue to maintain compliance with the applicable PBES permit No. 400.229 by following prescribed BMPs related to discharge of wastewater to the publicly-owned treatment system as outlined in the 2020 SWMM. Under Alternatives A and B, discharges into the combined sewer system from the VAMC campus would continue to be in accordance with NPDES regulatory requirements and permit limitations (State of Oregon Department of Environmental Quality, 2020), as well as the OAR 340—041, City of Portland's SWMM (2020), the SDFDM (City of Portland, 2020a), and the SCM (City of Portland, 2020b)

Level III SWMM requirements for offsite discharge to the combined sewer system, as defined in Section 1.3.6 of the 2020 SWMM, would be applicable to project activities. Level III only requires flow control. Onsite infiltration would be required to provide runoff control for Portland's 10-year, 24-hour design storm event (i.e., 3.4 inches of rainfall over 24 hours). Onsite stormwater engineering controls to manage stormwater flow could include below-grade detention facilities to mitigate the increased runoff. Although the City of Portland prefers infiltration through vegetated, above-grade facilities (ponds, basins, swales), the soil, topography, and available space of the Portland VAMC campus do not make this a viable option. All soils on the VAMC campus are classified as hydrologic soils Group Type C. Hydrologic soils Group Type C is typified by slow infiltration rates when thoroughly wet and slow rates of water transmission. This group consists of soils with either a layer that impedes the downward movement of water or layers of moderately fine to fine texture soils, which is not conducive for engineered, above-grade infiltration facilities (Jacobs and LRS Federal, 2021b). The determination of capacity impacts within the receiving combined sewer networks and details of onsite infiltration facilities requires further analysis during the design phase and prior to construction. Onsite stormwater facilities would be constructed to adhere to specific operations and maintenance procedures to ensure proper, long-term functionality. Through implementation of engineering controls, no impacts to hydrology and water quality would occur as a result of the proposed action (Jacobs and LRS Federal, 2021b). It is further anticipated that there would be an overall net reduction in existing stormwater flow into the City of Portland's combined sewer system as a result of implementing the above engineering controls in accordance with the permit requirements for 2020 SWMM.

Potential stormwater impacts during construction would be mitigated by development and implementation of a site-specific Stormwater Pollution Prevention Plan (SWPPP), as applicable, in accordance with ODEQ NPDES 1200-C Construction General Stormwater permit (LRS Federal, 2021b).[1] Downstream sedimentation and adverse impacts to stormwater conveyances due to site runoff during construction are not anticipated through the implementation of adequate perimeter controls as well as erosion and sediment controls.

---

[1] In accordance with the State of Oregon DEQ Construction Stormwater Application and Forms Manual (1200-C NPDES Construction Stormwater General Discharge Permit), dated March 2022, projects with construction activities disturbing less than one acre are not required to submit for a 1200-C permit coverage. Further, there is no notice of intent submission requirement in Oregon for projects that do not require NPDES 1200-C permit coverage.

3.5.2.2 No Action Alternative

Under the no action alternative, construction of proposed action projects would not occur. Therefore, no impacts to hydrology and water quality in addition to existing conditions would occur.

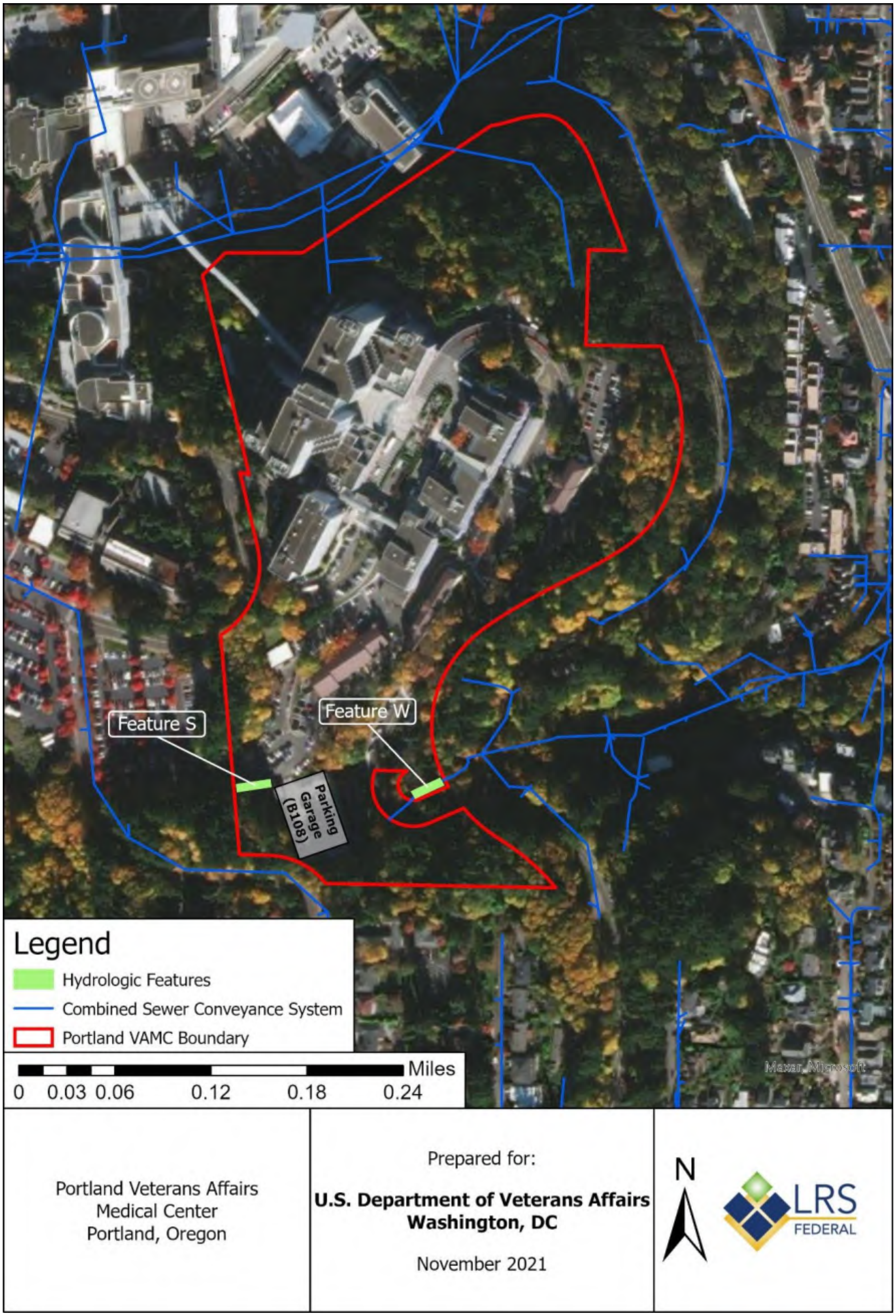


Figure 3-2. VAMC Hydrologic Drainage Feature Map

3.6 Wildlife and Habitat

3.6.1 Affected Environment

The Portland VAMC campus is mostly developed with buildings, asphalt roads, and parking lots. The perimeter, particularly the northern and eastern sides, is steeply sloped, wooded, and mostly undeveloped. This wooded area adjacent to the VAMC campus provides habitat connectivity within the surrounding Marquam Nature Park to the north and south.

A review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool for migratory birds of conservation concern (BCC) identified eight species with the potential to occur on the Portland VAMC campus (USFWSa, 2021) (Table 3-2). Data maintained by eBird indicates that the Olive-sided Flycatcher, Rufous Hummingbird, and Western Screech-owl have been observed in the vicinity of the Portland VAMC campus (The Cornell Lab of Ornithology, 2020). For this reason and due to the likelihood for their habitat to occur near the site, these birds were deemed “Likely” to occur in the project study area.

Table 3-2. Migratory Bird Species of Conservation Concern

Common Name	Scientific Name	Listing Status	Habitat Description	Potential for Occurrence
California Thrasher	*Toxostoma redivivum*	BCC Rangewide	Chaparral (shrubs and small trees) with copious underbrush	Not likely
Great Blue Heron	*Ardea Herodias fannini*	BCC – Bird Conservation Regions	Freshwater and saltwater wetlands, grasslands, and agricultural fields	Not likely
Lesser Yellowlegs	*Tringa flavipes*	BCC Rangewide	Fresh and brackish, vegetated wetlands	Not likely
Olive-sided Flycatcher	***Contopus cooperi***	**BCC Rangewide**	**Open woodlands**	**Likely**
Rufous Hummingbird	***selasphorus rufus***	**BCC Rangewide**	**Open or shrubby areas, forest openings, yards, and parks, and sometimes in forests, thickets, swamps, and meadows**	**Likely**
Semipalmated Sandpiper	*Calidris pusilla*	BCC Rangewide	Shorelines	Not likely
Short-billed Dowitcher	*Limnodromus griseus*	BCC Rangewide	Wetlands, often near the edges of bogs (muskegs), small lakes, or wet meadows; some also nest in river floodplains	Not likely
Western Screech-owl	***Megascops kennicottii***	**BCC – Bird Conservation Regions**	**Forested habitats, especially in bands of deciduous trees along canyons and other drainages**	**Likely**

Available information from USFWS and the Oregon Department of Fish and Wildlife (ODFW) was reviewed to identify potential federally and state listed protected species on or in the vicinity of the Portland VAMC campus. ODFW's COMPASS mapping tool was also used to evaluate the potential of occurrence of listed species. Federally listed protected species include federally endangered (FE) and federally threatened (FT) species, and state listed protected species include state endangered (SE) and state threatened (ST) species. The USFWS IPaC tool was reviewed for federally listed species, and a list of state identified threatened or endangered species for Oregon was reviewed to incorporate any additional species of interest. The species identified from these sources and the potential for habitat at the site are listed in Table 3-3. Federally and state listed fish species potentially occurring within the Lower Willamette River and Lower Columbia River are identified in Table 3-4 (USFWSa, 2021) (ODFW, 2021).

Table 3-3. Federally and State Listed Protected Species

Common Name	Scientific Name	Listing Status	Habitat Description	Potential Habitat Present
Birds				
California Brown Pelican	*Pelecanus occidentalis californicus*	SE	Sea coasts	No
Northern Spotted Owl	*Strix occidentalis caurina*	FT, ST	Old-growth forests	Potential for flyover
Streaked Horned Lark	*Eremophila alpestris strigata*	FT	Prairie and open coastal habitat	Potential for flyover only
Yellow-billed Cuckoo	*Coccyzus americanus*	FT	Wooded habitat with dense cover and water nearby	Potential for flyover only
Mammals (Terrestrial)				
Kit Fox	*Vulpes macrotis*	ST	Chaparral, halophytic regions, and grasslands	No
Washington Ground Squirrel	*Urocitellus washingtoni*	SE	Shrub-steppe	No
Wolverine	*Gulo*	ST	Open forests and alpine areas	No
Flowering Plants				
Kincaid's Lupine	Lupinus sulphureus ssp. kincaidii	FT	Upland prairies	No
Nelson's Checker-mallow	Sidalcea nelsoniana	FT	Soils that become saturated during the rainy season, with plants frequently becoming inundated for several weeks or longer	No
Willamette Daisy	Erigeron decumbens	FE	Deschampsia Caespitosa Valley prairie; clay soiled prairie in valley bottoms, often by creek drainages	No

Table 3-4. Federally and State Listed Fish Species Potentially Occurring within the Lower Willamette and Lower Columbia Rivers

Common Name	Scientific Name	Listing Status	Designated Critical Habitat
Bull Trout	*Salvelinus confluentus*	FT	Yes
Eulachon/Smelt	*Thaleichthys pacificus*	FT	Yes
Green Sturgeon	*Acipenser medirostris*	FT	Yes
Columbia River Chum Salmon	*Oncorhynchus keta*	FT	Yes
Lower Columbia River Chinook Salmon	*Oncorhynchus tshawytsha*	FT	Yes
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	SE, FT	Yes
Lower Columbia River Steelhead	*Oncorhynchus mykiss*	FT	Yes
Sockeye Salmon	*Oncorhynchus nerka*	FT	Yes

The National Oceanic and Atmospheric Administration (NOAA) Fisheries website was also utilized to identify threatened and endangered species in the area (NOAA Fisheries). Per NOAA Essential Fish Habitat (EFH) Mapper, fisheries resources for the Lower Willamette River and Columbia River are the Chinook Salmon and Steelhead Trout; both listed as “threatened” under the Endangered Species Act (ESA). The Willamette River, the closest water body with EFH, is located approximately 0.6 miles east of the Portland VAMC campus. There is no EFH located on the site or within the City of Portland’s combined sewer system network upstream of the Columbia Boulevard Wastewater Treatment Plant. The species identified from these sources and the potential for habitat at the site are listed in Table 3-5.

Table 3-5. National Oceanic and Atmospheric Administration Fisheries Threatened and Endangered Species

Common Name	Scientific Name	Listing Status	Habitat Description	Habitat Distance from VAMC
Chinook Salmon	*Oncorhynchus tshawytscha*	FT	Lower Willamette River	0.6 miles
Steelhead Trout	*Oncorhynchus mykiss*	FT	Lower Willamette River	0.6 miles

3.6.2 Environmental Consequences

3.6.2.1 Alternative A and Alternative B

Construction projects would occur on previously developed land and would require limited removal of vegetation. After reviewing information from USFWS and ODFW, it was determined that the site does not contain essential habitats for any of the state or federally listed species (USFWSa, 2021) (ODFW, 2021). Data maintained by eBird identifies the Olive-sided Flycatcher, Rufous Hummingbird, and Western Screech-owl as migratory bird species of conservation concern occurring near the Portland VAMC campus (The Cornell Lab of Ornithology, 2020). These bird species live and forage in forested and open woodland habitats.

Construction activities proposed under Alternative A and Alternative B and the continued operation of the Portland VAMC are not anticipated to significantly impact avian species or habitats. Nesting bird season for these species in Oregon is primarily between April 15 and July 31. Disturbance of vegetation will be avoided during this time in accordance with the Migratory Bird Treaty Act (MBTA) to avoid impacts to nesting birds, and limits of clearing will be clearly defined prior to construction activities. No measures (i.e., architectural features or deterrents) are proposed under either alternative to address the potential for bird collisions. Building 111 will require minimal tree removal with the anticipated footprint of the parking structure being approximately 27,000 square feet. Chapter 11.05.040 of the City of Portland's Tree Code states that trees within public rights-of-way that are managed by the State of Oregon are exempt from the code's regulations. Trees located on lands or within utility corridor easements that are owned by State or Federal agencies are also exempt from the code's regulations. However, these trees may be subject to other City regulations or Intergovernmental Agreements. Furthermore, the City retains summary abatement authority for nuisances posing an immediate threat to public safety (City of Portland, Oregon). No impacts to the wooded areas surrounding the campus that provide habitat connectivity with Marquam Nature Park are anticipated. As such, Alternative A and B would both have less than significant impacts to state or federally listed terrestrial species.

There is potential for federal and state listed fish species to occur within both the Lower Willamette River and Lower Columbia River. Based on the NOAA National Marine Fisheries Service (NMFS) EFH Mapper, EFH for the Chinook Salmon and Steelhead Trout is also located within these two rivers (NOAA Fisheries). No effects to EFH, listed species, or designated critical habitat are anticipated as a result of improvements described under the alternatives considered. This determination is based on the proximity of the project to aquatic habitat and the known stormwater pretreatment and BMP implementation as detailed under Section 3.5 Hydrology and Water Quality and wastewater NPDES treatment processes provided by the Columbia Boulevard Wastewater Treatment Plant before discharge to the Columbia River.

The Columbia Boulevard Wastewater Plant is operated in accordance with Oregon's NPDES Wastewater Discharge Permit Requirements and is required to meet state WQS as further described under Section 3.5

Hydrology and Water Quality. Many of Oregon's state WQS are derived from water quality criteria developed from research on salmonids, and Oregon's standards also require that water quality conditions protect species listed under the ESA Oregon Administrative Rule. Discharges and effluent associated with the proposed action into Portland's combined sanitary stormwater system will continue to be in accordance with the City of Portland's Columbia Boulevard Wastewater Treatment Plant NPDES wastewater discharge permit and self-monitoring program, which ensure ODEQ WQS are met and in accordance with OAR 340-041-0004 WQS: Beneficial Uses, Policies, and Criteria for Oregon 340-041-0004 Antidegradation Policy such that compliance with the ESA is maintained.

A further description of VA's determination of no effect to federally and state listed protected species is provided in Appendix C: VA CFM Project Review File - Endangered Species Act Section 7 Determination of No Effect.

3.6.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. Therefore, no additional impacts to wildlife or habitat over existing conditions would occur as a result of VA's continued actions.

3.7 Noise

3.7.1 Affected Environment

The existing noise environment around the Portland VAMC campus is dominated by vehicle traffic/parking, mechanical equipment, and routine landscaping and maintenance. In addition, there is intermittent, occasional noise associated with the helicopter pads at the OHSU Marquam Hill Campus, located approximately 500 feet north and 750 feet west of the Portland VAMC campus. No other notable noise-generating sources are present in the immediate vicinity. Sensitive noise receptors that could be affected by construction and operational noise from the Portland VAMC campus include Portland VAMC patients, visitors, and staff; nearby residences, parks, and churches; and the patients, visitors, and staff of the OHSU medical center. Residences located northeast and east of the VAMC campus are located 300 feet or more from the proposed construction areas. Residences south of the campus are located 100 feet or more from the proposed construction areas. Indoor noise levels with windows closed typically would be 15 decibels lower than outdoor levels (Jacobs and LRS Federal, 2021) (Appendix F).

The City of Portland enforces construction noise regulations. Construction noise is permissible from the hours of 7:00 a.m. to 6:00 p.m. from Monday through Saturday. Permissible construction noise levels are 85 decibels at a 50-foot distance. The few types of equipment which cannot meet the permissible level, such as jack hammers, concrete saws, and pile drivers, are exempt from this standard during this time period. The exempted equipment of Portland City Code Section 18.10.060 are not exempted from night, weekend, and legal holiday limitations that include from 6:00 p.m. to 7:00 a.m. the following morning, 6:00 p.m. Saturday to 7:00 a.m. the following Monday, and on legal holidays. Outside of regulated construction hours, construction noises must meet the baseline permitted decibel levels of the area in which the work is taking place (Jacobs and LRS Federal, 2021). For activities that make more noise than the code allows, or if construction were to take place outside of the permitted construction hours, VA would apply for a noise variance to obtain permission via the City of Portland (City of Portland, Oregon).

3.7.2 Environmental Consequences

3.7.2.1 Alternative A and Alternative B

Construction and demolition activities associated with the proposed projects will require the use of a variety of noise-generating equipment, including cranes, excavators, and compactors. The seismic retrofit activities included under Alternative B will include the installation of additional piles and new pile-supported foundations which will require the use of pile drivers. According to the Portland VAMC Final Noise Report (Appendix F), pile driving has the potential to emit a noise level of 101 A-weighted decibels (dBA) at 50 feet (Jacobs and LRS Federal, 2021).

Compliance with the City of Portland's construction noise regulations would only allow construction-related noise to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday, with the exception of emergency work. Although it is not anticipated that any work would generate noise outside of the City of Portland's construction noise regulations, permissible construction noise regulations would require VA to apply for a noise variance and obtain permission via the City of Portland (City of Portland, Oregon). BMPs would be incorporated into the proposed action to mitigate noise, including complying with VA's "Temporary Environmental Controls" specifications and the City of Portland Noise Regulations. Additional BMPs would include:

- coordinating proposed construction activities in advance with nearby sensitive receptors;
- limiting construction and associated heavy truck traffic to occur between 7:00 a.m. and 6:00 p.m. on Monday through Saturday;
- locating stationary operating equipment as far away from sensitive receptors as possible;
- selecting material transportation routes as far away from sensitive receptors as possible;
- shutting down noise-generating heavy equipment when it is not needed;
- maintaining equipment per manufacturer's recommendations to minimize noise generation;
- utilizing broadband, self-adjusting backup alarms in lieu of backup-beepers consistent with applicable safety requirements;
- encouraging construction personnel to operate equipment in the quietest manner practicable (Jacobs and LRS Federal, 2021).

There are no significant long-term operational noise impacts associated with the proposed projects. Minor increases to noise levels generated by employee and patient vehicular traffic, HVAC systems, ground maintenance equipment and activities, emergency vehicles, and infrequent use of generators are not anticipated to generate a significant noise impact for the area surrounding the Portland VAMC campus (Jacobs and LRS Federal, 2021).

3.7.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to noise levels in the region would occur as a result of VA's actions.

3.8 Land Use

3.8.1 Affected Environment

The Portland VAMC campus is located on approximately 28.5 acres of developed land and includes 12 buildings, one below-grade parking garage (Building 102), one above-grade parking garage (Building 108), and ten surface-level parking lots. The VAMC campus is located adjacent to the OHSU campus in a mixed use, institutional, residential, and recreational urban area. The northern, eastern, and southern perimeter of the VAMC campus is wooded and slopes steeply toward a scenic and historic linear park and roadway called, Terwilliger Parkway.

The Portland VAMC is currently zoned Central Employment (EX) Institutional Campus (IC) with a Design (d) Overlay District. The mostly wooded northern, eastern, and southern portions of the Portland

VAMC also include Environmental Conservation (c) or Environmental Protection (p) Overlay Districts. The Portland VAMC is a suitable use for the EX(IC) zoning district. The Design Overlay District is intended to conserve and enhance areas of the City of Portland with special scenic, architectural, or cultural value. Environmental Conservation/Protection (c/p) Overlay Districts are intended to conserve important resources while allowing environmentally sensitive development. According to the Portland Bureau of Development Services, local zoning related regulations within the City of Portland that include tree removal restrictions do not apply to federally owned land such as the Portland VAMC campus (LRS Federal, 2021).

3.8.2 Environmental Consequences

3.8.2.1 Alternative A and Alternative B

The proposed projects would include construction of a Specialty Care Building and a parking garage which are partially located within the Environmental Protection Overlay District; however, the proposed building locations are mostly developed with asphalt-paved parking lots. Building 111 will require minimal tree removal with the anticipated footprint of the parking structure being approximately 27,000 square feet. Chapter 11.05.040 of the City of Portland's Tree Code states that trees within public rights-of-way that are managed by the State of Oregon are exempt from the code's regulations. Trees located on lands or within utility corridor easements that are owned by State or Federal agencies are also exempt from the code's regulations. However, these trees may be subject to other City regulations or Intergovernmental Agreements. Furthermore, the City retains summary abatement authority for nuisances posing an immediate threat to public safety (City of Portland, Oregon). Although local zoning related regulations do not apply to federally owned land such as the VAMC, the VA intends to comply with the intent of these regulations, to the extent practicable. Only minor disturbance to undeveloped areas is anticipated, resulting in less than significant impacts to land use (LRS Federal, 2021). Figure 3-3 below shows the local zoning codes for the Portland VAMC and surrounding areas.

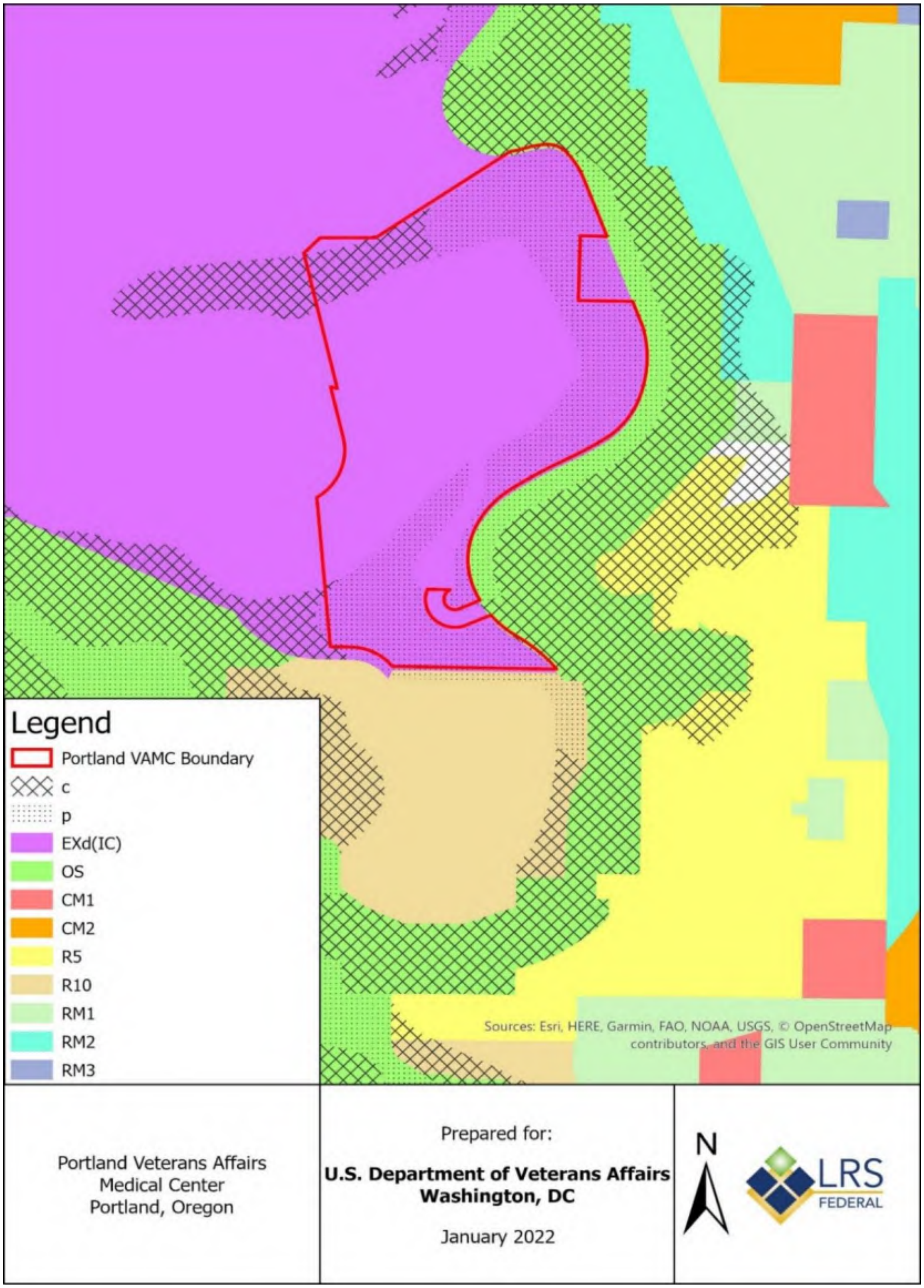


Figure 3-3. Portland Zoning Map[2]

[2]Portland Zoning Definitions: c/p – Environmental Zone, CM – Commercial/ Mixed Use Zones, d – Design Overlay Zone, EX – Employment and Industrial Zones, IC – Institutional Campus Zone, OS – Open Space Zone, R – Single Dwelling Zones, RM – Multi-Dwelling Zones

Although VA is not subject to local zoning regulations or restrictions, the proposed action projects would be consistent with the Portland VAMC campus and surrounding area developments and the overall land use and land use compatibility statement (LUCS) would not change as a result of the proposed action (LRS Federal, 2021b). A LUCS may be provided by VA as part of the ODEQ permitting process in order to demonstrate consistency with the existing LUCS process.

3.8.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to land use of the site would occur as a result of VA's actions.

3.9 Floodplains, Wetlands, and Coastal Zone Management

3.9.1 Affected Environment

According to the Federal Emergency Management Agency (FEMA) floodplain mapping, the Portland VAMC campus and surrounding properties are not located in the 100-year or 500-year floodplains (LRS Federal, 2021). The Portland VAMC is not located within the designated coastal zone boundary (Oregon.gov, 2021).

The Portland VAMC campus is in the Marquam-Woods sub-watershed of the Willamette River Watershed. The nearest traditional navigable water (TNW) to the Portland VAMC is the Willamette River, located approximately 0.6 miles east of the campus. Two drainage features were identified on site that discharge directly into the combined stormwater-sanitary sewer system, which conveys stormwater runoff to the Columbia Boulevard Wastewater Treatment Plant (LRS Federal, 2021). The drainage features [feature W and feature S (Parametrix Engineering, Planning, Environmental Sciences, 2020)] convey stormwater runoff from adjacent roads, paved parking lots, and adjacent uplands downgradient to stormwater inlets. Surface water features and the combined stormwater-sanitary conveyance system located on the VAMC campus are depicted on Figure 3-2. VAMC Hydrologic Drainage Feature Map.

3.9.2 Environmental Consequences

3.9.2.1 Alternative A and Alternative B

No impacts to potentially jurisdictional drainage features or wetlands are anticipated as a result of construction activities proposed under Alternatives A and B. Feature S is located near the southwestern boundary of the VAMC campus and approximately 75 feet northwest of the proposed construction footprint for Building 108. Feature W is located along the southeastern boundary of the VAMC campus and approximately 325 feet east of the proposed Building 108 (Figure 2-1. Project Component Map and Figure 3-2. VAMC Hydrologic Drainage Feature Map). In the event that impacts to drainage features previously identified onsite are proposed during the design phase, a formal wetland and waters delineation would be required.

Level III requirements for offsite discharge to the combined sewer system, as defined in Section 1.3.6 of the 2020 SWMM, will require engineered controls to manage stormflow and connections to the receiving combined stormwater-sanitary system network. No significant impacts to floodplains, wetlands, or jurisdictional drainage features are anticipated as a result of construction or stormwater management controls proposed under Alternatives A and B. If any impacts are proposed in potentially jurisdictional water features or wetlands, a wetland/water delineation will be required for Clean Water Act permitting.

3.9.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to floodplains, wetlands, and coastal zone management would occur as a result of VA's actions.

3.10 Socioeconomics

3.10.1 Affected Environment

Socioeconomics can be characterized as the demographics, employment, and income of a region. U.S. Census Bureau data from the 2019 American Community Survey 5-year estimates were used (U.S. Census Bureau, 2019). Oregon, Multnomah County, and Portland have similar demographic characteristics (Table 3-6). The percentage of individuals under 18 years of age is greatest for the State of Oregon and lowest for the City of Portland. The percentage of individuals over the age of 65 is roughly the same for the county and city and higher for the state. The percentage of minorities is roughly the same for the county and city and lower for the state. The percentage of Veterans is higher in the state than the county or city (U.S. Census Bureau, 2019).

Table 3-6. Population and Veteran Status

Geographic Area	Population	Population Under 18 Years	Population 65 Years and Over	Minority	Veterans
Oregon	4,129,803	21%	17.2%	24.3%	6.8%
Multnomah County	804,606	19%	13%	30.3%	4.6%
Portland	645,291	17.8%	12.8%	29.4%	4.4%

The median household income in Oregon is lower than the income for Multnomah County and the City of Portland (Table 3-7). The percent of households below the poverty level and unemployment rates are comparable for the state, county, and city (U.S. Census Bureau, 2019).

Table 3-7. Income, Poverty, and Employment

Geographic Area	Number of Households	Median Household Income	Percent Below Poverty Level	Unemployment Rate
Oregon	1,611,982	$62,818	13.2%	5.5%
Multnomah County	326,229	$69,176	13.8%	4.9%
Portland	268,718	$71,005	13.7%	4.8%

The only grade school within 0.5 miles of the campus is the Cedarwood Waldorf School (3030 SW 2nd Avenue), which is a private school located approximately 800 feet to the northeast. Additionally, there is a daycare facility, where children are present, located on the VAMC campus.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A and Alternative B

Construction associated with the proposed action under Alternatives A and B would likely result in short-term, direct, and beneficial impacts to local employment and personal income. Construction would provide temporary construction jobs and could have short-term socioeconomic benefits to the immediate area and local economy. Long-term beneficial impacts associated with the proposed projects include enhancing the health care experience for Veterans in the region.

It is not likely that there would be any impacts to child populations as a result of the proposed projects. The construction sites would be secured to prevent unauthorized access by children and others. BMPs would be implemented during construction to minimize and control construction noise, fugitive dust, and limit access to construction areas which would minimize adverse impacts to child populations, resulting in less than significant impacts.

3.10.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to socioeconomics would occur as a result of VA's actions.

3.11 Community Services

3.11.1 Affected Environment

The Portland VAMC campus is located within the Portland Public Schools District. The only grade school within 0.5 miles of the campus is the Cedarwood Waldorf School (3030 SW 2nd Avenue), which is a private school located approximately 800 feet to the northeast.

The Portland Police and Fire Departments provide police and fire protection and emergency medical services to the Portland VAMC campus and its vicinity.

The Oregon Department of Transportation (ODOT) and Portland Bureau of Transportation (PBT) provide maintenance to primary roads and bridges in the vicinity of the Portland VAMC campus.

There are two recreational areas/parks that are located within the vicinity of the VAMC campus: Terwilliger Parkway and Marquam Nature Park. Terwilliger Parkway is a scenic and historic linear park and roadway east and northeast of the campus and includes an overlook and a pedestrian/biking path. Marquam Nature Park is a 178-acre park located approximately 175 feet southwest of the campus.

The OHSU medical center and Doernbecher Children's Hospital (located on the OHSU campus) are the only major medical facilities located in the vicinity of the Portland VAMC campus. OHSU has two helipad areas, located approximately 500 feet north and 750 feet west of the Portland VAMC campus. These facilities are utilized for medical emergencies. The Portland VAMC does not provide emergency medical services, so construction activities on the campus would not impact these services for the area.

The Portland TriMet System provides public transportation to the vicinity of the Portland VAMC campus. The Portland Aerial Tram transports staff, patients, and visitors from the South Waterfront to the OHSU campus.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A and Alternative B

The proposed Alternative A and Alternative B projects are not expected to place additional substantial demands on police, fire, emergency services, and other community services. There could be an increase in the use of public transportation, including the Portland TriMet System and Portland Aerial Tram. During construction, any potential partial road closures would be temporary and short-term. Closures would be coordinated with the Portland Police and Fire Departments and TriMet to prevent significant disruption to their services. Impacts to community services are anticipated to be less than significant as a result of the proposed action.

3.11.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to community services would occur as a result of VA's actions.

3.12 Solid Waste and Hazardous Materials

3.12.1 Affected Environment

A Phase I Environmental Site Assessment (ESA) was conducted by LRS in January 2021. There are two recognized environmental concerns (RECs) associated with the Portland VAMC campus. The report identified a REC regarding the presence of asbestos-containing materials (ACMs) in Buildings 6, 16, 100, 101, T-41, T-51, and underground steam line vaults. There is also a REC associated with lead-based paint (LBP) present in Buildings 6, 16, and T-41. The known presence of radon and mercury on the VAMC campus was not further evaluated as they are not considered RECs by definition. Further, the proposed activities would not present conditions that pose a material threat of further release (LRS Federal, 2021).

There are four diesel fuel underground storage tanks (USTs) located on the Portland VAMC campus near the Energy Center and seven USTs are located within 0.25 miles of the campus; however, there are no leaking underground storage tank (LUST) cases associated with the USTs located on the VAMC campus, and there are no leaks or violations reported regarding the USTs at the surrounding facilities. Therefore, the Phase I ESA did not identify RECs in connection with USTs located on or in the vicinity of the VAMC campus (LRS Federal, 2021).

A Spill Prevention, Control, and Countermeasures (SPCC) Plan currently addresses the Department of Veterans Affairs' intent to prevent the discharge of chemicals and petroleum-based products into navigable waters and follows the guidelines described in 40 CFR 112 Final Rule for Oil Pollution Prevention and Response: Non-Transportation-Related Onshore and Offshore Facilities July 17, 2002, and related amendments to 40 CFR 112.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A and Alternative B

The Alternative A and Alternative B proposed construction projects would not impact the USTs located on the Portland VAMC campus. During construction, the presence and use of petroleum and hazardous substances could increase the potential for accidental release or spill of oil, diesel, gasoline, and antifreeze. Standard construction BMPs would be implemented to mitigate and minimize potential impacts, including proper storage and appropriate labeling of petroleum products and hazardous materials in approved containers; storage of containers on a level and impervious surface; and use of secondary containment systems around fuel storage containers during refueling activities. Should a spill or release occur, any impacted soil would be properly handled per federal and state laws and regulations.

There are buildings containing ACMs and LBP which would need to be demolished as part of the proposed projects. ACM abatement would be handled by licensed contractors. Demolition of buildings containing LBP would require implementation of standard demolition BMPs to control dust to reduce dust emissions to less than significant levels.

Following construction there would not be a long-term and significant increase in the amount of hazardous waste generated by the Portland VAMC campus. Wastes generated after construction and during operation of the Portland VAMC would be managed in compliance with federal and state laws and regulations. Further, the applicable SPCC Plan must be reviewed and amended to reflect the proposed changes in facility design, construction, operation, and maintenance.

Based on the enforcement of BMPs during construction activities and the absence of long-term increases in hazardous waste at the site, the proposed actions are anticipated to result in less than significant impacts from solid waste and hazardous materials to the Portland VAMC and surrounding areas.

3.12.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts from solid waste or hazardous materials would occur as a result of VA's actions.

3.13 Traffic, Transportation, and Parking

3.13.1 Affected Environment

In May 2019, a traffic impact analysis (TIA) was conducted for the Portland VAMC at five intersections based on counts collected in April 2019 (2019 TIA). After the 2019 TIA, traffic studies were completed in February 2021 and January 2022 for the Portland VAMC campus, (Jacobs and LRS Federal, 2021c) and (Jacobs and LRS Federal, 2022). The January 2022 Traffic Impact Study was conducted to reflect the project components further considered in the Draft and Final EA, including the elimination of parking garage B112 from the proposed action. The January 2022 Traffic Impact Study supplemented the 2019 TIA by including traffic counts from five additional intersections as well as recounts at the three original intersections studied in 2019 (Appendix D). The project team collected the additional counts and made observations in December 2020 and then re-analyzed the traffic operations under a full build of the proposed project and a no-build alternative (Jacobs and LRS Federal, 2022).

As stated above, a supplemental Traffic Impact Study was provided in June 2022 (Jacobs and LRS Federal, 2022a). The June 2022 Traffic Impact Study supplements the previous traffic impact analyses performed, while including traffic counts for an additional eight intersections not previously studied in January 2022. In support of the June 2022 Traffic Impact Study, the project team collected traffic counts and made observations in May 2022 for intersections of concern and then analyzed the traffic operations under a full build of the proposed project and a no-build (no action) alternative. The supplemental June 2022 Traffic Impact Study also included a crash analysis for SW Terwilliger Boulevard to respond to public comments received regarding bicycle safety (Jacobs and LRS Federal, 2022a).

Roadways in the vicinity of the VAMC campus analyzed in the January 2022 Traffic Impact Study include:

- SW US Veterans Hospital Road and SW Gibbs Street/SW Sam Jackson Park Road
- S Gaines Street and SW US Veterans Hospital Road
- SW 6th Avenue Drive & S Gaines Street
- SW Terwilliger Boulevard and SW Campus Drive
- SW US Veterans Hospital Road and Shipping/Receiving Access
- SW US Veterans Hospital Road and Building T-51
- SW US Veterans Hospital Road and Building 108 Driveway
- SW Terwilliger Boulevard and SW US Veterans Hospital Road

To further address comments received during the public comment period for the Draft EA, a supplemental Traffic Impact Study was provided in June 2022, which provided an analysis of the following additional intersections:

- SW 6th Avenue and SW Sherman Street
- SW 6th Avenue and SW Sheridan Street
- SW Terwilliger Boulevard and SW Condor Lane
- SW Terwilliger Boulevard and Homestead Drive
- SW Hamilton Terrace and SW Terwilliger Boulevard
- SW Hamilton Terrace and SW Bancroft Street
- SW Hamilton Street and SW Terwilliger Boulevard
- SW Terwilliger Boulevard and SW Capitol Highway

Additionally, the supplemental June 2022 Traffic Impact Study reanalyzed SW Terwilliger Boulevard and SW Campus Drive as well as SW Terwilliger Boulevard and SW U.S. Veterans Hospital Road as primary intersections of concern for the VA, which were examined during the January 2022 study. The January 2022 Traffic Impact Study concluded that operations for the two intersections would be substandard across multiple scenarios; however, based on the May 2022 traffic counts, the June 2022 supplemental study found that none of the intersection operations would be substandard. The following are contributing reasons for these differences:

- Background traffic growth between 2020 and 2022 was determine to be less than assumed by previous studies, likely as a result of changes in travel patterns related to COVID-19.
- For the June 2022 supplemental study, traffic counts were collected in May 2022 at intersections of concern for an accurate representation of existing traffic patterns. While studies have indicated that traffic volumes have generally returned to pre-COVD-19 volumes, some of the volumes collected were still lower than the volumes collected in 2019.[3]
- The factoring process used in the January 2022 study applied a flat multiplier to the traffic volumes collected in 2020 to account for the reduced volumes counted during the initial period of COVID-19 pandemic. However, it is likely that not all volumes were affected the same amount by COVID-19, so the multiplier may have overestimated some of the traffic counts. No scaling or factoring was utilized in the June 2022 supplemental study because overall statewide traffic volumes are close to pre-COVID-19 traffic volumes. The ODOT Observed Statewide Traffic Volume Patterns Related to COVID-19 Monitoring Final Report is available online at https://www.oregon.gov/odot/Data/Documents/ODOT_TrafficReport_July_9_2021.pdf.

Traffic studies conducted for the Portland VAMC describe the current capacity of the roads and the existing level of service (LOS) for the study intersections. The LOS is based on the estimated delay at the intersection and ranges from A, the best, to F, which is the worst. For unsignalized intersections, the City of Portland's operational standards are an LOS of E or better, and for signalized intersections, the City of Portland's operational standards are an LOS or D or better. Table 3-8 lists the description of each level of service rating (Jacobs and LRS Federal, 2022).

Table 3-8. Level of Service Descriptions

Level of Service	Description
A	Little or no delay
B	Little to no delay
C	Average delay
D	Delay is increasing and noticeable
E	Limit of acceptable delay
F	Major delay; characteristic of oversaturated conditions

3.13.2 Environmental Consequences

3.13.2.1 Alternative A and Alternative B

Alternative A and Alternative B would provide an increase in parking capacity of approximately 600 additional parking spaces. These improvements would increase the available parking spaces for staff, patients, and visitors and improve access to the Portland VAMC while improving traffic flow on the campus (Jacobs and LRS Federal, 2021c). The final decision on how those spaces will be allocated

[3] Oregon Department of Transportation, Observed Statewide Traffic Volume Patterns, July 9, 2021.

between staff and patient spaces has not been made but no more than 350 of the 600 spaces will be staff-only parking.

Intersection performance operations are summarized in Table 3-9 for intersections analyzed in the January 2022 traffic study and June 2022 supplemental traffic study that utilized May 2022 traffic counts as a basis for analysis. The anticipated 2030 LOS performance provided in Table 3-9 for SW Terwilliger Boulevard and SW Campus Drive in addition to SW Terwilliger Boulevard and SW U.S. Veterans Hospital Road are based upon June 2022 findings for the no-build and build scenarios.

Table 3-9. Intersection Performance Summary

Intersection	2020 (AM/PM)	2022 (AM/PM)	2030 LOS, No-build (AM/PM)	2030 LOS, Build (AM/PM)
SW Terwilliger Boulevard and SW Sam Jackson Park Road	B/B	-	B/B	B/C
SW U.S. Veterans Hospital Road and S Gaines Street	A/A	-	B/A	B/B
SW 6th Avenue Drive and S Gaines Street	A/A	-	A/B	A/B
SW U.S. Veterans Hospital Road and Shipping/Receiving Access	A/A	-	A/A	A/B
SW U.S. Veterans Hospital Road and Building T-51	B/B	-	B/B	B/B
SW U.S. Veterans Hospital Road and Building 108 Driveway	A/A	-	A/B	A/C
SW 6th Avenue and SW Sherman Street	-	C/B	C/B	C/B
SW 6th Avenue and SW Sheridan Street	-	A/A	A/A	A/A
SW Condor Lane and SW Terwilliger Boulevard	-	B/B	C/B	C/B
SW Terwilliger Boulevard and Homestead Drive	-	B/C	B/C	B/C
SW Hamilton Terrace and SW Terwilliger Boulevard	-	B/A	B/C	C/A
SW Hamilton Terrace and SW Bancroft Street	-	A/A	A/A	B/A
SW Hamilton Street and SW Terwilliger Boulevard	-	B/B	B/B	B/B
SW Terwilliger Boulevard and SW Capitol Highway	-	B/C	C/C	C/C
SW U.S. Veterans Hospital Road and SW Terwilliger Boulevard	F/E	C/C	C/C	D/D

SW Terwilliger Boulevard and SW Campus Drive	F/D	D/C	E/C	E/C

Based on the findings of the supplemental June 2022 Traffic Impact Study, all intersections meet the minimum traffic operations standards in all no-build and build scenarios. The proposed actions under Alternative A and Alternative B, therefore, would not require traffic mitigations. The projected 2030 no-build scenario that assumes a one percent annual growth would result in 9,118 average daily trips (ADT) on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in approximately 746 new trips per day on SW Terwilliger Boulevard, an increase of 8.2 percent over the no action alternative, which would result in minor cumulative impacts to traffic patterns through the implementation of the proposed action in conjunction with projected future traffic growth in the area (Jacobs and LRS Federal, 2021c). Regardless of whether the proposed action is to be implemented, VA recognizes and supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation (PBOT), to improve traffic conditions surrounding the Portland VAMC campus.

No intersection improvements are being proposed by VA along SW Terwilliger Boulevard as part of Alternative A or Alternative B. PBOT has prepared a preliminary analysis for an all-way stop control at the intersection of SW Terwilliger Parkway and SW Campus Drive in support of the nearby OHSU Hospital Expansion Project. Based on the preliminary analysis, PBOT may recommend installation of the necessary signage as a condition of building permits for the OHSU Hospital Expansion Project, which would improve the level of service at the SW Terwilliger Parkway and SW Campus Drive intersection (Final Findings and Decision for Case Number LU 19-195718 DZ). Regardless of any intersection improvements proposed as part of the OHSU Hospital Expansion Project, all nearby intersections will meet the City of Portland's operational standards in a 2030 build scenario (as per Alternatives A and B).

Construction activities would result in short-term, minor to moderate traffic impacts. Prior to project construction, Traffic Management/Circulation and Mitigation Plans would be reviewed and approved by the VAMC for implementation. The plans would include traffic and parking management and mitigation measures, traffic flow plans, parking reconfigurations, schedules for off-peak delivery hours for construction equipment and supplies, and designated shuttle services for contractors as well as for VAMC staff as required. This would help to alleviate traffic issues and congestion during construction. Additionally, the VA remains committed to coordinating to minimize increased traffic through the neighborhood by requesting that staff and personnel avoid using residential streets to access the campus. VA is especially committed to coordinating with VAMC management staff to ensure that other routes of entry to the campus are not allowed to be utilized during construction activities. VA will initiate a 'Neighborhood Communication Plan (NCP)' which will notify and communicate directly with nearby residents regarding potential construction schedule and especially those construction activities on campus that may impact traffic flow. Although not anticipated, VA would coordinate and obtain approval from the City of Portland on any temporary partial road closures resulting from construction activities.

The City of Portland designated SW Terwilliger Boulevard as a high-crash bike corridor based on crash data from 2004 through 2013. SW Terwilliger Boulevard between SW Capitol Highway and SW Sherman Street features curbside standard bike lanes and one travel lane in each direction. Parking is restricted on SW Terwilliger Boulevard except at a few locations where turnouts have been designed for scenic vistas and trailheads. As a result, bicyclists and vehicles generally do not cross each other's path except at intersections when vehicles turn. Therefore, the proposed action is projected to negligibly influence bicycle safety at the intersections of SW Terwilliger Boulevard and SW Homestead Drive and

SW Terwilliger Boulevard and SW US Veterans Hospital Road. Bike crashes in this section of SW Terwilliger Boulevard have become less frequent over time, possibly in part because of improved roadway pavement markings and signage installed over the years (Jacobs and LRS Federal, 2021c).

3.13.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to traffic, transportation, and parking would occur as a result of VA's actions.

3.14 Utilities

3.14.1 Affected Environment

A Utilities Identification and Capacity Report was completed in January 2021 for the Portland VAMC campus (LRS Federal, 2021a). A description of the availability of utilities, including electric, natural gas, water, sewer, and telecommunications services, to the campus is summarized below.

Main data and backup data services are delivered to the Portland VAMC via 24 fiber optic lines. Voice services are delivered to the Portland VAMC via copper lines. Patient data services are delivered to the Portland VAMC via a single mode, 12 strand fiber optic line. There are four circuits in use with eight strands on the first cable and none on the second. Cable television service is only provided to Building T51 at the Portland VAMC. Dish television service is only provided to Building 100.

Electricity is provided to the Portland VAMC via two 12.47 kilovolts, 3 phase, 60 hertz feeders. The Preferred Feeder (GAINES) is an aerial No. 4/0 American Wire Gauge aluminum feeder. The Alternate Feeder (OHSU) is a No. 2 AWG aluminum feeder. The two feeders are sized to meet the existing peak demand of 5.041 megawatts.

Potable water is provided to the Portland VAMC via two, 8-inch connections located at S Gaines Street. The two, 8-inch connections feed a 10-inch ductile iron pipe, which provides a service loop to the Portland VAMC. Between the years 2014 to 2018, the most water used in one month by the Portland VAMC was 5,265,000 gallons. This is an average flow rate of approximately 118 gallons per minute which equates to a peak flow demand of approximately 472 gallons per minute. An 8-inch pipe can easily convey approximately 625 gallons per minute at a pipe velocity of 4 feet per second. Therefore, the connection to the Portland VAMC appears to be large enough to meet demand. Stormwater is discharged from the Portland VAMC via an 8-inch pipe and a 21-inch pipe. The 8-inch pipe discharges 7.85 cubic feet per second and the 21-inch pipe discharges 38.5 cubic feet per second of stormwater (KPFF Consulting Engineers Survey, 2019). Wastewater is discharged from the Portland VAMC via 8-inch and 15-inch pipes that feed into a 15-inch pipe and an 8-inch pipe that transitions to a 12-inch pipe. The 15-inch pipe discharges 35.8 cubic feet per second and the 12-inch pipe discharges 38.2 cubic feet per second of wastewater (KPFF Consulting Engineers Survey, 2019). The Portland Bureau of Environmental Services regulates industrial discharges to the Columbia Boulevard Wastewater Treatment Plant. Facilities that are major dischargers of wastewater other than sanitary wastes into the Columbia Boulevard Wastewater Treatment Plant are required to obtain a permit. The VAMC facility has previously corresponded with the City Bureau and does not require a Pretreatment Permit with the Portland Bureau of Environmental Services for discharges to sanitary sewers but must follow the City's Ordinance Title 17.34.070 Industrial Wastewater Discharge Permits.

Natural gas is provided to the Portland VAMC via a 4-inch diameter pipe. The 4-inch pipe has a capacity of up to 5,250 cubic feet per hour on a total developed length of 100 feet. The average monthly gas consumption at the Portland VAMC is 91,841 therms per month.

Steam is generated at the Portland VAMC via three, 500 horsepower boilers. The majority of steam produced at the Portland VAMC is intended for the supply of mechanical services within Buildings 100 and 101. The highest capacity on record for steam production at the Portland VAMC is 35,000 pounds per hour (LRS Federal, 2021a).

3.14.2 Environmental Consequences

3.14.2.1 Alternative A and Alternative B

Proposed projects under Alternative A and Alternative B would increase the consumption of utilities, including electricity, natural gas, potable water, and stormwater/sanitary sewer discharges. These major utilities are already provided to the Portland VAMC campus and would likely have the capacity to meet forecasted demands; however, each utility provider would be required to review final designs and plans to determine if anticipated demands for utilities can be met. There are no significant impacts to utilities anticipated as a result of the proposed projects.

Also, the projects could include the installation of renewable energy systems; however, the design details are not currently available. Renewable energy sources could partially offset the increased consumption of electricity and natural gas.

3.14.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No impacts to utilities would occur as a result of VA's actions.

3.15 Environmental Justice

3.15.1 Affected Environment

The USEPA-developed environmental justice screening and mapping tool, EJSCREEN, was used to identify and compare minority and low-income populations. These populations in the vicinity of the sites were compared to statewide data. A 5-mile buffer was applied around the Portland VAMC campus, located in USEPA Region 10. Table 3-10 summarizes the data from EJSCREEN (EPA, 2020).

Table 3-10. Summary of Environmental Justice Data

Demographic Indicator	Oregon	Portland VAMC Campus
Minority Population	24%	21%
Low-income Population	33%	24%

Based on the population data, the Portland VAMC campus is not located in an area with disproportionately high minority or low-income populations when compared to the State of Oregon.

3.15.2 Environmental Consequences

3.15.2.1 Alternative A and Alternative B

The Alternative A and Alternative B proposed projects would have less than significant environmental justice impacts. Minority and low-income populations within the vicinity of the Portland VAMC campus are comparable to that of the state. There would be short-term beneficial impacts to local employment and personal income during construction. Long-term effects of construction, including facilitation of high-quality health care to Veterans in the region, would be beneficial to Veterans in the region, including those in minority and low-income populations.

3.15.2.2 No Action Alternative

Under the no action alternative, construction of the proposed action projects would not occur. No environmental justice impacts would occur as a result of VA's actions.

3.16 Cumulative Impacts

As defined by the CEQ Regulations in 40 CFR 1508.7, cumulative impacts are those which "result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action, without regard to the agency (Federal or non-Federal) or individual who undertakes such other actions." "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7)." Cumulative impact analysis captures the effects that result from the proposed action in combination with the effects of other actions taken during the duration of the proposed action in the same geographic area. Because of extensive influences of multiple forces, cumulative effects are the most difficult to analyze.

NEPA requires the analysis of cumulative environmental effects of a proposed action on resources that may often be manifested only at the cumulative level to the extent reasonable and practical. The land surrounding the Portland VAMC campus is primarily used for commercial and residential development. Aside from Marquam Nature Park and the wooded areas surrounding the VAMC, much of the land has already undergone ground disturbance. There are no additional projects or activities proposed in the immediate vicinity of the VAMC campus that would significantly impact the above-referenced wooded areas or surrounding vegetative communities. Short-term and minor cumulative impacts to traffic are further discussed, as the future non-VA construction projects may impact some roadways in the vicinity of the Portland VAMC campus during construction. The available development area of the VAMC campus is also quite constrained. Furthermore, the configuration and interconnected layout of the existing buildings, parking structures, roadways, and ramps increases the complexity of proposed future development.

There are a couple of upcoming sewer line construction projects proposed within 0.5 miles of the Portland VAMC campus. The purpose of these projects is to replace or repair aging infrastructure; restore Portland's watersheds; and reduce the possibility of sewage releases into homes, streets, rivers, and streams. Notably, the Woods Trunk Sewer Project would repair 1,700 feet of aging, large-diameter brick sewer pipes in South Portland, approximately 700 feet east of the VAMC campus. This project is anticipated to begin in early 2023 and last approximately one year. Construction activities for this project will be concentrated at existing manholes along the sewer alignment. Some project activities will require parking restrictions and road closures, leading to minor and temporary traffic delays. Impacted roads as a result of the Woods Trunk Sewer Project are located east of SW Terwilliger Boulevard. It is unlikely that there would be any cumulative impacts to SW Terwilliger Boulevard or roadways surrounding the VAMC campus.

The Sheridan Trunk Sewer Project is also scheduled to begin in 2023 and will relocate a mainline public sewer pipe from private property south of Sam Jackson Road near Duniway Park to improve sewage flows and increase accessibility for future maintenance. This project intersects SW Terwilliger Boulevard and may require restricting parking and closing travel lanes. Investigative activities will be performed to gather information and minimize construction impacts on residents, park users, and businesses. It is possible that construction related to this project could impact SW Terwilliger Boulevard, producing short-term, negligible traffic impacts due to construction occurring concurrently with the proposed VAMC improvements.

The OHSU Hospital Expansion Project proposed would add approximately 220 new patient and visitor parking spaces and is proposed to begin Spring 2022. The new construction will occur on the site of the former OHSU School of Dentistry and will increase the net total of inpatient beds and adult inpatient operating rooms to improve the ability to care for patients with the most critical health care needs. The proposed site developments and parking expansion at OHSU are consistent with surrounding buildings and amenities on the OHSU campus and fully meet the Marquam Hill Design Guidelines and the Terwilliger Parkway Design Guidelines (Final Findings and Decision by the Design Commission Rendered on December 12, 2019, Case File Number: LU 19-195718 DZ). It is possible that construction related to this project could impact SW Terwilliger Boulevard, producing short-term, minor traffic impacts due to construction occurring concurrently with the proposed VAMC improvements.

Beneficial cumulative impacts associated with the proposed action in conjunction with past, current, and future projects and development include negligible short- and long-term increased job opportunities associated with construction proposed between 2022 and 2032.

3.17 Potential for Generating Substantial Controversy

VA solicited input from various federal, state, and local government agencies regarding the proposed action. Several agencies provided input; none of which identified opposition to the proposed action.

It was recommended by Friends of Terwilliger, Homestead Neighborhood Association, and private citizens to perform additional NEPA review, especially related to traffic impacts to Terwilliger Parkway and the surrounding area. Intensive traffic studies and intersection analysis was conducted by VA to address public concerns as described in Section 3.13 Traffic, Transportation and Parking. There were additional concerns related to preserving the aesthetics of Marquam Hill and Terwilliger Parkway and protecting the associated local wildlife corridors. VA has committed to minimizing tree removal to maintain the area’s aesthetics and wildlife habitats that surround the VAMC campus. Additionally, traffic associated with upgrades to the Portland VAMC campus would minimally contribute to existing traffic volumes. Although not anticipated, VA would coordinate and obtain approval from the City of Portland on any temporary partial road closures or traffic delays resulting from construction activities.

4.0 Protection and Mitigation Measures

Resource Area	Description	Type
Aesthetics	Design new buildings to be architecturally and visually consistent with the current buildings located on the campus.	BMP
	Minimize tree removal to the furthest extent possible.	BMP
Air Quality	Use appropriate fugitive dust suppression measures.	BMP
	Use newer construction equipment with emissions controls and maintain equipment.	BMP
	Reduce idling of construction equipment and vehicles to minimize exhaust emissions.	BMP
	Obtain Asbestos Abatement permit from ODEQ for renovation and demolition projects involving ACMs.	Regulatory requirement
	Perform all demolition work under licensed contractors.	Regulatory requirement
	Use standard measures to control dust to reduce LBP dust emissions during demolition.	BMP
Cultural and Historic Resources	Should previously unidentified historic or culturally significant items be discovered during project construction, the construction contractor would immediately cease work in the area of the discovery until VA, a qualified archaeologist, OR SHPO, and the consulting Tribes are contacted to properly identify and curate discovered items in accordance with applicable state and federal law(s).	Regulatory requirement
	Should human remains be identified during ground-disturbing activities, all work in the vicinity of the discovery would cease immediately. An Inadvertent Discovery Plan would be implemented, which would include the VA project representative contacting the Multnomah County coroner to evaluate any human remains.	Regulatory requirement
	Should ground disturbing be proposed in areas outside of the direct APE for the VAMC projects proposed, further Section 106 consultation with SHPO and Native American Tribes will be required.	Regulatory requirement

Geology and Soils	Implement an erosion and sediment control plan to address soil disturbance during construction that includes the implementation of erosion and sediment control devices and stabilization practices.	Regulatory requirement
Hydrology and Water Quality	Implement SWPPP and erosion and sediment control plan during construction to minimize sediment discharges and downstream contamination of receiving waters during construction. Disturbance of over an acre is not anticipated; however, if the proposed action exceeds one acre of land, coverage under the 1200-C permit will be obtained.	Regulatory requirement (if disturbing more than one acre of land)
	If shallow groundwater is encountered during construction, implement appropriate groundwater control and dewatering measures, such as sump pumps, wellpoint systems, or deep well systems.	BMP
	Implement SWMM Level III flow controls to provide runoff control for the City's 10-year, 24-hour design storm event (3.4 inches of rainfall over 24 hours). Onsite stormwater engineering controls to manage stormwater flow may include below-grade detention facilities to mitigate the increased runoff.	Regulatory requirement
	Maintain compliance with the applicable PBES permit by following prescribed best management practices (BMPs) related to discharge of wastewater to the publicly-owned treatment works.	Regulatory requirement
Wildlife and Habitat	Limit disturbance of wooded area habitats.	BMP
	Avoid disturbance of vegetation between April 15 and July 31 to avoid impacts to nesting birds.	BMP
	Clearly demarcate limits of clearing prior to construction activities to avoid impacts to wooded areas and wildlife corridors surrounding the VAMC campus.	BMP
Noise	Comply with the City of Portland's construction noise regulations, only allowing construction-related noise to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday, with the exception of emergency work. Obtain a variance for any noise generating work being proposed outside of permissible hours.	Regulatory requirement
	Limit construction-related noise near sensitive receptors and coordinate proposed construction	BMP

	activities in advance with any nearby sensitive receptors.	
	Shut down noise-generating heavy equipment when it is not needed and maintain equipment per manufacturer’s recommendations to minimize noise generation.	BMP
	Utilize broadband, self-adjusting backup alarms in lieu of backup-beepers consistent with applicable safety requirements and encourage construction personnel to operate equipment in the quietest manner practicable.	BMP
	Locate stationary operating equipment as far away from sensitive receptors as possible.	BMP
	Select material transportation routes as far away from sensitive receptors as possible.	BMP
	Maintain equipment per manufacturer’s recommendations to minimize noise generation.	BMP
Land Use	Comply with local land use regulations. The LUCS may be sent to and signed by a City of Portland planner to confirm that the project is complying with local land use.	Regulatory requirement
Floodplains, Wetlands, and Coastal Zone Management	Implement a SWPPP as part of the ODEQ NPDES 1200-C Construction Stormwater permit to address stormwater runoff during construction.	Regulatory requirement (if disturbing more than one acre of land)
	Clearly demarcate designated work areas	BMP
Socioeconomics	Secure the construction area to prevent unauthorized access to the property and to reduce the potential of health and safety risks.	Protection measure
	Implement site-specific SWPPP and erosion and sediment control plan to minimize and avoid fugitive dust.	Regulatory requirement
	Comply with the City of Portland’s City Code Section 18.10.060.	Regulatory requirement
Community Services	Coordinate any short-term road closures with the Portland Police and Fire Departments and TriMet to prevent significant disruption to their services.	BMP

Solid Waste and Hazardous Materials	Ensure the proper storage and appropriate labeling of petroleum products and hazardous materials in approved containers.	BMP
	Implement and update, as needed, the SPCC for the VAMC.	Regulatory requirement
	Store containers on a level and impervious surface.	BMP
	Provide a secondary containment system around fuel storage containers and during refueling activities.	BMP
	Manage and dispose of solid waste, hazardous materials, and medical waste in compliance with federal, state, and local regulations. The wastes would be collected and properly disposed of by a waste disposal company at approved disposal facilities.	Regulatory requirement
Traffic, Transportation, and Parking	Coordination with the City of Portland on any temporary road closures during construction.	BMP
	Sequence construction to the extent feasible to minimize impacts to traffic or transportation patterns.	BMP
	Implement engineered traffic control plans in coordination with the City of Portland Bureau of Transportation and/or ODOT.	Regulatory requirement
	Prior to construction, Traffic Management/Circulation and Mitigation Plans would be reviewed and approved by VA for implementation.	BMP
	The VA will create and implement an NCP to notify and communicate directly with nearby residents regarding potential construction schedule and especially those construction activities on campus that may impact traffic flow.	BMP
Utilities	Follow the City’s Ordinance Title 17.34.070 for Industrial Wastewater Discharge Permits.	Regulatory requirement
Environmental Justice	None required.	
Other	The VA government team will deploy an environmental representative responsible for ensuring commitments and best management practices identified in the EA are met.	BMP

5.0 Public Participation

VA invites public participation in decision-making on new proposals through the NEPA process. Public participation is guided by the VA NEPA regulations (38 CFR Part 26) and with additional guidance provided in VA's NEPA Interim Guidance for Projects. Agencies, organizations, and members of the public with a potential interest in the proposed action are encouraged to participate.VA fully supports the continued planning and open dialogue with local stakeholders.

5.1 Agency Coordination

VA coordinated with agencies regarding the proposed construction projects at the Portland VAMC starting in 2019. In May 2021, VA sent scoping letters to agencies, state, county, and municipal governments, including USEPA, U.S. Army Corps of Engineers, USDA, USFWS, NOAA, and ODEQ. In February 2022, VA sent notices to agencies, state, county, and municipal government announcing the availability of the Draft EA for the proposed action. In April 2022, following the public comment period for the Draft EA, VA notified all stakeholders of the intent to incorporate public input and further traffic analysis into the Final EA as detailed in Section 3.13 Traffic, Transportation, and Parking. VA also initiated Section 106 consultation with OR SHPO in April 2022. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway as a result of the proposed action (Appendix H). There has been no additional correspondence with agencies or government officials.

In addition to the regulatory framework of NEPA, the CEQ Regulations Implementing the Procedural Provisions of NEPA, VA's NEPA regulations (38 CFR Part 26), and VA's NEPA Interim Guidance for Projects, various federal, state, and/or local environmental permits and approvals are required as part of the proposed action. This list may not be exhaustive and additional compliance requirements permits may be necessary. Appendix A provides the Regulatory Requirements Report for the proposed action (LRS Federal, 2021b).

5.2 Native American Consultation

VA sent scoping letters to federally-recognized Native American Tribes in the vicinity of the Portland VAMC campus, including Confederated Tribes of Siletz Indians of Oregon, Confederated Tribes of the Grand Ronde Community of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation of Oregon, Cowlitz Indian Tribe, and Nez Perce Tribe. The Tribes did not respond to the scoping letters or submit scoping comments. In February 2022, VA sent notices to Tribes announcing the availability of the Draft EA for the proposed action. In April 2022, following the public comment period for the Draft EA, VA notified all Tribes of their intent to incorporate public input and further traffic analysis into the EA as detailed in Section 3.13 Traffic, Transportation, and Parking. Section 106 consultation letters were also sent to the federally-recognized Native American Tribes in the vicinity of the Portland VAMC campus. The Tribes did not provide comments on the Draft EA or respond to the Section 106 consultation letters sent. There has been no additional correspondence with Native American Tribes.

5.3 Scoping

VA provided federal, state, and local agencies; the public; and potentially affected parties with an opportunity to participate in scoping. Scoping is a tool for identifying the issues that should be addressed during the NEPA and NHPA compliance processes. Scoping allows the agencies, public, and stakeholders to help define priorities and express stakeholder and community issues to the agency through oral and written comments.

VA published a notice of scoping on May 9, 2021 in The Oregonian newspaper. The notice described the proposed action and solicited public comments with a deadline of June 11, 2021.

VA mailed letters to federal, state, and local agencies; public officials; federally recognized Tribes; and special interest groups. Similar to the notices published in the newspaper, the letters included information on the proposed action, the comment period, and instruction on submitting comments.

During the public scoping period, VA received written input from eight commenters or interest groups. Table 5-1 summarizes the comments received by resource area analyzed in this EA.

Table 5-1. Summary of Scoping Comments

Resource Area	Comment	Response
Aesthetics	Commenters expressed concern over the new parking spaces and their effect on the traffic and character of Terwilliger Parkway. Stated that construction of Building 112 close to SW Terwilliger will likely cause a 'visual intrusion' on the park. Expressed concern for impacts to the visual corridor of Terwilliger Parkway and from residential dwellings. Requested additional information regarding the visibility of any new structures, especially the proposed parking garages or any retaining wall or other visible structures, that can be seen from historic Terwilliger Parkway.	Building 112 has been removed from the proposed action. The wooded area between Terwilliger Parkway and the VAMC campus will remain intact and would provide a visual buffer between Terwilliger Parkway and construction and post-construction activities. All new developments will be designed to be aesthetically consistent with the surrounding buildings on the campus. See Sections 3.1, 3.3, and 3.6 for additional information.
Cultural and Historic Resources	Commenters stated that SW Terwilliger Boulevard is designated a 'Forest Corridor' and has been listed on the National Register of Historic Places and requested that all guidelines in the Marquam Hill Plan be utilized in the project. Suggested identifying potential use of Section 4(f) parks and recreational properties and the potential adverse impacts resulting from the project.	VA is aware of the 'Forest Corridor' and historic designation of Terwilliger Parkway. The project will not directly impact the roadway, and the wooded area surrounding the roadway will be preserved. See Sections 3.3 and 3.6 for additional information.
Geology and Soils	Commenters recommended designing buildings for changing climate conditions and studying the potential of landslide and earthquake impacts resulting from the project. Expressed concern for soil stability and the potential for repercussions downhill of the site, including an increase in water runoff which could	This project seeks to seismically upgrade buildings on the VAMC campus. New buildings will be designed to comply with the latest seismic standards. During construction, soil stabilization techniques will be utilized to reduce erosion.

	contribute to erosion, flooding, degradation of habitats, and potentially, landslides.	See Sections 3.4 and 3.5 for additional information.
Wildlife and Habitat	Commenters requested that all wildlife corridors be identified and studied for potential negative impacts, including potential impacts on the watershed, tree canopy, and stormwater systems in the area. Expressed concern for wildlife which use Terwilliger Parkway as a migration corridor.	The wooded area surrounding the VAMC campus will remain intact. Any traffic impacts to Terwilliger Parkway will be temporary. Stormwater from the site discharges to the combined sanitary-stormwater system and is treated at the Columbia Boulevard Wastewater Treatment Plant. See Sections 3.5, 3.6, and 3.13 for additional information.
Wildlife and Habitat / Land Use	Commenters expressed concern and request additional information related to potential tree removal impacts.	The proposed action would require minimal tree removal on the VAMC campus. The wooded area surrounding the campus would remain intact. See Sections 3.6 and 3.8 for additional information.
Noise	The commenter stated concern over construction noises and vibrations.	Construction activities would comply with the City of Portland's noise regulations, limiting working hours to 7:00 a.m. through 6:00 p.m. on Monday through Saturday. Although not anticipated, VA would obtain a variance for any noise generating work being proposed outside of permissible hours. See Section 3.7 for additional information.
Land Use	The commenter expressed concern for preserving the scenic and ecological values along the roadway	The wooded area surrounding the VAMC campus would remain intact.

	which are intended by the open space zoning.	See Section 3.8 for additional information.
Community Services	The commenter expressed concern over the impact on emergency response vehicles from the addition of a thousand parking spaces to the VAMC campus.	Any road closures as a result of the proposed action would be temporary and properly communicated with local emergency response services. Additionally, VA has reduced the number of new parking spaces being added as part of the proposed action to 600 parking spaces. These spaces will be created to address the current parking deficit on the campus. See Sections 3.11 and 3.13 for additional information.
Traffic, Transportation, and Parking	Commenters requested the completion of a traffic impact study, including a transportation plan, to understand the impacts of the project to SW Terwilliger Boulevard, Sam Jackson Park Road, and neighborhood streets and suggest adopting and providing alternative methods to travel to and from the hospital. Recommended a study to review the need for additional parking spaces, off-site impacts, including parking, air quality, noise, energy consumption, and neighborhood livability as a result of added traffic, and impacts to pedestrians and bicyclists. Suggested collaborating with other partners, such as OHSU, Tri-Met, and the City of Portland. Expressed concern and request additional information regarding the potential new signalized intersection or traffic controls, if any, that could negatively impact the SW Terwilliger Boulevard character, experience, and aesthetics.	A traffic study was conducted as part of the traffic impact analysis for the EA. No new signalized intersections are proposed by VA. See Section 3.13 for additional information.

Public Involvement	Commenters suggested adopting a 'Neighborhood Communication Plan' to collaborate with and inform the Homestead residents of upcoming construction impacts. Requested that the public comment period be extended to the end of the 2021 summer.	VA would communicate with the public throughout the project.

5.4 Public Review

VA published and distributed the Draft EA for a 30-day public comment period as announced by an NOA in The Oregonian newspaper on February 13 and February 14 of 2022. Review copies of the Draft EA were made available online at https://www.cfm.va.gov/environmental/index.asp and at the Multnomah County Central Library. VA responses to public comments received during the 30-day public comment period are provided in Appendix B. VA greatly appreciates all comments received on the Draft EA, input on the seismic upgrades and improvements proposed at the Portland VAMC, and moreover support for Portland area Veterans.

6.0 Agencies and Persons Consulted

Affiliation	Contact	Address	Email and Phone Number
Federal Agencies			
U.S. Environmental Protection Agency, Region 10	Regional Administrator	1200 Sixth Avenue, Suite 155 Seattle, WA 98101	epa-seattle@epa.gov 206-553-1200
U.S. Army Corps of Engineers, Portland District	Bryan McClure, Project Manager	P.O. Box 2946 Portland, OR 97208-2946	Bryan.M.McClure@usace.army.mil 503-808-4206
USDA Natural Resource Conservation Service Oregon	State Conservationist	1201 NE Lloyd Blvd, Suite 900 Portland, OR 97232	jason.jeans@usda.gov 503-414-3222
U.S. Fish and Wildlife Service Oregon Fish and Wildlife Office	Paul Henson, State Supervisor	2600 SE 98th Avenue, Suite 100 Portland, OR 97266-1398	Paul_Henson@fws.gov 503-231-6179
NOAA Fisheries West Coast Region	Barry Thom, Regional Administrator	1201 NE Lloyd Blvd, Suite 1100 Portland, OR 97232	barry.thom@noaa.gov 503-231-6266
State Agencies			
Oregon Department of Environmental Quality (DEQ), Air Quality	Ali Mirzakhalili, Air Quality Division Administrator	700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100	mirzakhalili.ali@deq.state.or.us 503-229-5696

Affiliation	Contact	Address	Email and Phone Number
Oregon DEQ, Drinking Water Protection Program	Julie Harvey, Drinking Water Program Coordinator	700 NE Multnomah Street, Suite 600 Portland, OR 97232	HARVEY.Julie@deq.state.or.us 503-229-5664
Oregon DEQ, Groundwater Protection Program	Justin Green, Water Quality Division Administrator	700 NE Multnomah Street, Suite 600 Portland, OR 97232	green.justin@deq.state.or.us 503-229-6834
Oregon DEQ, Environmental Cleanup Program	Jessika Cohen, Manager	700 NE Multnomah Street, Suite 600 Portland, OR 97232	cohen.jessika@deq.state.or.us 503-229-6258
Oregon DEQ, Hazardous Waste Program	David Livengood, Manager	700 NE Multnomah Street, Suite 600 Portland, OR 97232	david.livengood@state.or.us 503-229-5769
Oregon DEQ, Nonpoint Source Program	Gene Foster, Manager	700 NE Multnomah Street, Suite 600 Portland, OR 97232	FOSTER.Eugene@deq.state.or.us 503-229-5325
Oregon Department of Transportation, Region 1 – Portland Metro	Rian Windsheimer, Region 1 Manager	123 NW Flanders Portland, OR 97209	Rian.M.WINDSHEIMER@odot.state.or.us 503-731-8200
Oregon Department of Fish and Wildlife, Wildlife Division	Wildlife Division Administrator	4034 Fairview Industrial Drive SE Salem, OR 97302	ODFW.WildlifeInfo@state.or.us 503-947-6000
Oregon Health Authority, Drinking Water Services	Dave Emme, Manager	PO Box 14450 Portland, OR 97293-0450	david.h.emme@dhsoha.state.or.us 971-673-0405
Oregon State Historic Preservation Office	John Pouley, State Archaeologist	725 Summer St NE, Suite C Salem, OR 97301	john.pouley@oregon.gov 50-480-9164
Local Agencies			
Portland Bureau of Parks and Recreation	Adena Long, Director	1120 SW 5th Avenue First Floor Portland, OR 97204	parksbureaudirector@portlandoregon.gov 503-823-7529
Portland Bureau of Development Services	Rebecca Esau, Director	1900 SW 4th Avenue Portland, OR 97201	Director.Esau@portlandoregon.gov 503-823-7300
Portland Bureau of Environmental Services	Michael Jordan, Director	1120 SW 5th Avenue Suite 613 Portland, OR 97204	mike.jordan@portlandoregon.gov 503-823-7740

Affiliation	Contact	Address	Email and Phone Number
Portland Bureau of Planning and Sustainability	Andrea Durbin, Director	1900 SW 4th Avenue, Suite 7100 Portland, OR 97201	andrea.durbin@portlandoregon.gov 503-823-7700
Portland Water Bureau	Gabe Solmer, Director	1120 SW 5th Avenue, Suite 405 Portland, OR 97204	Gabriel.Solmer@portlandoregon.gov 503-823-7770
Portland Bureau of Transportation	Chris Warner, Director	1120 SW 5th Avenue, Suite 1331 Portland, OR 97204	Chris.Warner@portlandoregon.gov 503-823-1055
Portland Metropolitan Planning Entity (Metro)	Lynn Peterson, President	600 NE Grand Ave. Portland, OR 97232-2736	lynn.peterson@oregonmetro.gov 503-797-1700
Multnomah County Land Use Planning	Director	1600 SE 190th Avenue Portland, OR 97233	land.use.planning@multco.us 503-988-3043
Elected Officials			
U.S. Senate	The Honorable Jeff Merkley	531 Hart Senate Office Bldg. Washington, DC 20510	amy_amrhein@merkley.senate.gov 202-224-3753
U.S. Senate	The Honorable Ron Wyden	221 Dirksen Senate Office Bldg. Washington, DC 20510	juine_chada@wyden.senate.gov 202-224-5244
U.S. House of Representatives	The Honorable Earl Blumenauer	1111 Longworth House Office Bldg. Washington, DC 20515	liv.brumfield@mail.house.gov 202-225-4811
City of Portland	Ted Wheeler, Mayor	1221 SW 4th Ave Room 340 Portland, OR 97204	mayorwheeler@portlandoregon.gov 503-823-4120
City of Portland	Mingus Mapps, Commissioner	Portland City Hall 1221 SW 4th Ave Room 210 Portland, OR 97204	MappsOffice@portlandoregon.gov 503-823-4682
City of Portland	Carmen Rubio, Commissioner	Portland City Hall 1221 SW 4th Ave Room 220 Portland, OR 97204	Comm.Rubio@portlandoregon.gov 503-823-3008
City of Portland	Jo Ann Hardesty, Commissioner	Portland City Hall 1221 SW 4th Ave Room 230 Portland, OR 97204	joann@portlandoregon.gov 503-823-4151

Affiliation	Contact	Address	Email and Phone Number
City of Portland	Dan Ryan, Commissioner	Portland City Hall 1221 SW 4th Ave Room 240 Portland, OR 97204	CommissionerRyanOffice@portlandoregon.gov 503-823-3589
Tribes			
Confederated Tribes of Siletz Indians of Oregon	Delores Pigsley	PO Box 549 Siletz, OR 97380	dpigsley@msn.com 541-270-5017
Confederated Tribes of the Grand Ronde Community of Oregon	David Harrelson	8720 Grand Ronde Road Grand Ronde, Oregon 97347-9712	david.harrelson@grandronde.org thpo@grandronde.org 503-879-1630
Confederated Tribes of the Umatilla Indian Reservation	Carey L. Miller	46411 Ti'mine Way Pendleton, OR 97801	CareyMiller@ctuir.org 541-429-7234
Confederated Tribes of the Warm Springs Reservation of Oregon	Robert Brunoe	1233 Veterans Street PO Box C Warm Springs, OR 97761	robert.brunoe@ctwsbnr.org 541-553-2002
Cowlitz Indian Tribe	James Gordon	PO Box 2547 Longview, WA 98632	jgordon@cowlitz.org 360-353-9997
Nez Perce Tribe	Keith Baird	PO Box 365 Lapwai, ID 83540-0365	keithb@nezperce.org 208-621-3851
Local Community			
OHSU	Michael Harrison, Director of Local Government Relations	OHSU Government Relations, L101 3181 SW Sam Jackson Park Rd. Portland, OR 97239	harmicha@ohsu.edu 503-494-8681
Friends of Marquam Nature Park	Director	Friends of Marquam Nature Park PMB #191 6312 SW Capitol Highway Portland, OR 97239-1938	fmnp@comcast.net 971-599-3667
Friends of Southwest Terwilliger Boulevard	Director	16 SW Canby Portland, OR 97219	info@terwilligerfriends.org 503-293-1069

Affiliation	Contact	Address	Email and Phone Number
Homestead Neighborhood Association	Ed Fischer, President	Southwest Neighborhoods, Inc. 7688 SW Capitol Hwy. Portland, OR 97219	homestead@swni.org

7.0 List of Preparers

7.1 Department of Veterans Affairs Staff

Mr. Patrick Read
Environmental Engineer
Construction & Facilities Management
U.S. Department of Veterans Affairs

Mr. Héctor M. Abreu, AIC
Senior Historic Preservation Specialist
CFM, Historic Preservation Office
U.S. Department of Veterans Affairs

7.2 LRS Federal (Consultants)

Name	Role	Degree	Years of Experience
Jesse Byrd	Environmental Project Manager	BA, Environmental Studies	15
Kelly Culver	Project Review	MA, English	5
Karen Pearson	Project Review	MBA BS, Real Estate and Finance	25
Sara Schulkowski	Environmental Engineer	MS, Environmental Resources Engineering BS, Environmental Science and Technology	2

8.0 References

CEQ. (2012, March 6). Improving the Process for Preparing Efficient and Timely Environmental Reviews uner the National Environmental Policy Act. Washington, D.C. Retrieved June 18, 2021, from https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Improving_NEPA_Efficiencies_06Mar2012.pdf

City of Portland. (2020a). Sewer and Drainage Facilities Design Manual.

City of Portland. (2020b). Source Control Manual.

City of Portland, Oregon. (n.d.). Apply for a Noise Code Variance. Retrieved from https://www.portland.gov/civic/noise/apply-noise-variance

City of Portland, Oregon. (n.d.). Chapter 11.05 Legal Frameworks and Relationships.

EPA. (2020). EJSCREEN. Retrieved July 13, 2021, from https://ejscreen.epa.gov/mapper/

Jacobs and LRS Federal. (2021). *Portland Veterans Affairs Medical Center Final Noise Report.*

Jacobs and LRS Federal. (2021a). *Portland Veterans Affairs Medical Center Final Air Quality Resource Report.*

Jacobs and LRS Federal. (2021b). *Portland Veterans Affairs Medical Center Final Hydrology/Stormwater Report.*

Jacobs and LRS Federal. (2021c). *Portland Veterans Affairs Medical Center Final Traffic Impact Study*.

Jacobs and LRS Federal. (2022). *Portland Veterans Affairs Medical Center Final Traffic Impact Study*.

Jacobs and LRS Federal. (2022a). *Supplemental Traffic Impact Study*.

KPFF Consulting Engineers Survey. (2019, July 13). Seismic Retrofit and Renovation at Buildings 100 and 101 Project Book.

LRS Federal. (2021). *Portland Veterans Affairs Medical Center Final Phase I Environmental Site Assessment.*

LRS Federal. (2021a). *Portland Veterans Affairs Medical Center Final Utilities Identification and Capacity Report.*

LRS Federal. (2021b). *Portland Veterans Affairs Medical Center Regulatory Requirements Report.*

LRS Federal and SWCA. (2021). *Portland Veterans Affairs Medical Center Cultural Resources Inventory.*

NOAA Fisheries. (n.d.). Species Directory. Retrieved June 14, 2021, from https://www.fisheries.noaa.gov/species-directory/threatened-endangered

ODFW. (2021, February 12). Threatened, Endangered, and Candidate Fish and Wildlife Species. Retrieved June 14, 2021, from https://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp

Oregon.gov. (2021, July 26). Oregon's Coastal Zone. Retrieved from https://www.oregon.gov/lcd/OCMP/Pages/Coastal-Zone.aspx

Parametrix Engineering, Planning, Environmental Sciences. (2020). Technical Memorandum.

State of Oregon Department of Environmental Quality. (2020). National Pollutant Discharge Elimination System Waste Discharge Permit. Retrieved from https://ormswd2.synergydcs.com/HPRMWebDrawer/RecordView/5815610

The Cornell Lab of Ornithology. (2020). eBird. Retrieved June 1, 2021, from https://ebird.org/map

U.S. Census Bureau. (2019). Explore Census Data. Retrieved July 26, 2021, from https://data.census.gov/cedsci/

USEPA. (2021, May 31). Nonattainment Areas for Criteria Pollutants (Green Book). Washington, D.C. Retrieved June 18, 2021, from https://www.epa.gov/green-book

USFWSa. (2021). Information for Planning and Consultation. Retrieved June 1, 2021, from https://ecos.fws.gov/ipac/location/index

USGS. (2018). Long-term National Seismic Hazard Map.

9.0 Glossary

Aesthetics—Pertaining to the quality of human perception of natural beauty.

Ambient—The environment as it exists around people, plants, and structures.

Ambient Air Quality Standards—Those standards established according to the Clean Air Act to protect health and welfare.

Attainment area—Region that meets the National Ambient Air Quality Standard (NAAQS) for a criteria pollutant under the Clean Air Act.

Best management practices (BMPs)—Methods, measures, or practices to prevent or reduce environmental impacts.

Contaminants—Any physical, chemical, biological, or radiological substances that have an adverse effect on air, water, or soil.

Council on Environmental Quality (CEQ)—An agency in the Executive Office of the President composed of three members appointed by the President, subject to approval by the Senate. Each member shall be exceptionally qualified to analyze and interpret environmental trends, and to appraise programs and activities of the federal government. Members are to be conscious of and responsive to the scientific, economic, social, aesthetic, and cultural needs of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment. Develop and issue guidance for implementing the National Environmental Policy Act.

Cultural resources—The physical evidence of our Nation's heritage. Includes archaeological sites; historic buildings, structures, and districts; and localities with social significance to the human community.

Decibel (dB)—A unit of measurement of sound pressure level.

Emission—A release of a pollutant.

Endangered species—Any species which is in danger of extinction throughout all or a significant portion of its range.

Environmental assessment (EA)—An EA is a publication that provides sufficient evidence and analyses to show whether a proposed system will adversely affect the environment or be environmentally controversial.

Erosion—The wearing away of the land surface by detachment and movement of soil and rock fragments through the action of moving water and geological agents.

Floodplain—The relatively flat area or lowlands adjoining a river, stream, ocean, lake, or other body of water that is susceptible to being inundated by floodwaters.

Fugitive dust—Particles light enough to be suspended in air, but not captured by a filtering system. For this document, this refers to particles put in the air by moving vehicles and air movement over disturbed soils at construction sites.

Geology—Science which deals with the physical history of the earth, the rocks of which it is composed, and physical changes in the earth.

Groundwater—Water found below the ground surface. Groundwater may be geologic in origin and as pristine as it was when it was entrapped by the surrounding rock or it may be subject to daily or seasonal effects depending on the local hydrologic cycle. Groundwater may be pumped from wells and used for drinking water, irrigation, and other purposes. It is recharged by precipitation or irrigation water soaking into the ground. Thus, any contaminant in precipitation or irrigation water may be carried into groundwater.

Hazardous materials—Defined within several laws and regulations to have certain meanings. For this document, a hazardous material is any one of the following:

> Any substance designated pursuant to section 311 (b)(2)(A) of the Clean Water Act.
>
> Any element, compound, mixture, solution, or substance designated pursuant to Section 102 of Comprehensive Environmental Response, Compensation and Liability (CERCLA).
>
> Any hazardous substance as defined under the Resource Conservation and Recovery Act (RCRA).
>
> Any toxic pollutant listed under TSCA.
>
> Any hazardous air pollutant listed under Section 112 of the Clean Air Act.
>
> Any imminently hazardous chemical substance or mixture with respect to which the USEPA Administrator has taken action pursuant to Subsection 7 of TSCA.
>
> The term does not include: 1) Petroleum, including crude oil or any thereof, which is not otherwise specifically listed or designated as a hazardous substance in a above. 2) Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). A list of hazardous substances is found in CFR 302.4.

Jurisdictional wetland—Areas that meet the wetland hydrology, vegetation, and hydric soil characteristics, and have a direct connection to the Waters of the U.S. These wetlands are regulated by the USACE.

Listed species—Any plant or animal designated by a state or the federal government as a threatened, endangered, special concern, or candidate species.

Mitigation—Measures taken to reduce adverse impacts on the environment.

National Ambient Air Quality Standards (NAAQS)—Nationwide standards set up by the USEPA for widespread air pollutants, as required by Section 109 of the Clean Air Act. Currently, six pollutants are regulated by primary and secondary NAAQS: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Non-attainment area—An area that has been designated by the USEPA or the appropriate State air quality agency as exceeding one or more national or state ambient air quality standards.

Particulates or particulate matter—Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog found in air.

Sensitive receptors—Include, but are not limited to children, and the elderly, as well as specific facilities, such as long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, and childcare centers.

Significant impact—According to 40 CFR 1508.27, “significance” as used in NEPA requires consideration of both context and intensity.

> Context. The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.

Soil—The mixture of altered mineral and organic material at the earth's surface that supports plant life.

Solid waste—Any discarded material that is not excluded by section 261.4(a) or that is not excluded by variance granted under sections 260.30 and 260.31.

Threatened species—Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Topography—The relief features or surface configuration of an area.

Watershed—The region draining into a particular stream, river, or entire river system.

Wetlands—Areas that are regularly saturated by surface or groundwater and, thus, are characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include swamps, bogs, fens, marshes, and estuaries.

Wildlife habitat—Set of living communities in which a wildlife population lives.

A Appendix A: Permits

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center Regulatory Requirements Report

February 2022

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
LRS Federal LLC

Table of Contents

Acronyms and Abbreviations

APE	area of potential effects
BMP	best management practice
CEQ	Council on Environmental Quality
dBA	decibel A
ESCP	Erosion and Sediment Control Plan
ISCP	Indirect Source Construction Permit
LRS	LRS Federal LLC
LUCS	Land Use Compatibility Statement
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
ODEQ	Oregon Department of Environmental Quality
ODOT	Oregon Department of Transportation
OHSU	Oregon Health and Science University
PBES	City of Portland Bureau of Environmental Services
PBT	Portland Bureau of Transportation
POTW	publicly-owned treatment works
PPR	Portland Parks and Recreation
Schwab	Schwab Engineering & Management
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TTL	TTL Associates, Inc.
U.S.	United States
VA	United States Department of Veterans Affairs
VAMC	VA Medical Center

1.0 Introduction

The United States (U.S.) Department of Veterans Affairs (VA) is considering implementation of several projects at the Portland VA Medical Center (VAMC). These potential projects, if authorized and approved, would be extended over six or more years as part of the Portland VAMC master plan. The Portland VAMC is located at 3710 Southwest U.S. Veterans Hospital Road in Portland, Multnomah County, Oregon.

1.1 Site Description

The Portland VAMC is an urban medical center located on Marquam Hill and is adjacent to the Oregon Health and Science University (OHSU) campus. The Portland VAMC is physically connected to OHSU by a pedestrian bridge. The Portland VAMC encompasses approximately 28.5 acres and is predominantly covered by buildings, paved parking lots, driveways, and forested hillsides.

Directly north and west of the Portland VAMC are OHSU and forested hillsides. Directly east and northeast of the Portland VAMC are SW Terwilliger Boulevard, residential homes, and forested hillsides. Directly south of the Portland VAMC are primarily forested hillsides and some residential homes.

1.2 Proposed Action

Seismic upgrades and improvements are proposed at the Portland VAMC to specifically correct seismic deficiencies, address federal setback requirements, improve HVAC and electrical distribution systems, and to provide sufficient parking facilities. The proposed action, which would allow the VAMC to properly serve and meet the current health care needs of Portland area Veterans, includes the following project components:

- Design and construction for required seismic upgrades and improvements to Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101) including a new water tank and realignment of the associated plaza and roadway to address physical security concerns.
- Design and construction for a complete seismic upgrade to Building 100 (main hospital building) and nearby Building 101 (research and administration building) including the replacement of the façade on both buildings. Building 100 improvements would also include a new service elevator.
- Demolition of Building T-41, Building T-51, and Trailer 1 to provide adequate working space for the proposed construction and site layout.
- Design and construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111 (parking garage), an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 300,000 gross square foot Specialty Care Building.
- Energy plant improvements and upgrades such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades, including HVAC upgrades, and the full renovation and modernization of Buildings 100 and 101.

The proposed action would be implemented over an extended period of years and sequenced to minimize impacts to VAMC services and the surrounding community to the greatest extent practicable.

2.0 Regulatory Requirements

On behalf of the VA, LRS Federal LLC (LRS) identified federal environmental protection permits and authorizations required for proposed actions at the Portland VAMC. The U.S. Government is only required to apply for federal permits and authorizations; however, the U.S. Government must demonstrate, to the maximum extent practicable, consistency with state and local regulations, even if not applying for these permits and authorizations. Therefore, LRS has also identified state and local environmental protection permits and authorizations.

The Seismic Retrofit and Renovation at Buildings 100 and 101 Project Book dated 13 July 2019 (Schwab Engineering & Management [Schwab], 2019) and Draft Environmental Assessment of the Proposed Seismic Upgrade, Renovation, Modernization, and Expansion of the VA Portland Health Care System-Portland Campus dated 20 November 2019 (TTL Associates, Inc. [TTL], 2019) were referenced for the environmental protection permits and authorizations required for proposed actions at the Portland VAMC.

2.1 Environmental Protection Permits and Authorizations Required

In addition to the regulatory framework of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA, VA's NEPA regulations (38 CFR Part 26), and VA's NEPA Interim Guidance for Projects, the following federal, state, and/or local environmental permits and approvals are required as part of the proposed action. While the federal government applies only for federal permits and authorizations, they must still demonstrate consistency with state and local regulations, even if not applying for these permits. This list may not be exhaustive and additional compliance permits may be required.

- National Pollutant Discharge Elimination System (NPDES) 1200-C Construction Stormwater Permit
    - This permit is only required for land disturbances of one acre or more and includes an Erosion and Sediment Control Plan (ESCP) and a Stormwater Pollution Prevention Plan (SWPPP). Proposed improvements are not likely to disturb one acre or more of land.
    - The NPDES permit would require stormwater runoff and erosion management to protect surface water quality using best management practices (BMPs), such as earth berms, vegetative buffers and filter strips, and spill prevention and management techniques.
    - Additional information about this permit is available at: https://www.oregon.gov/deq/wq/wqpermits/Pages/Stormwater.aspx.
- National Emission Standards for Hazardous Air Pollutants (NESHAP)/Oregon Department of Environmental Quality (ODEQ) Permit for Asbestos Abatement
    - This permit is required for the abatement of asbestos. Proposed improvements at the Portland VAMC may require the renovation or demolition of structures containing asbestos.
    - Additional information about this permit is available at: https://www.oregon.gov/deq/Hazards-and-Cleanup/Pages/Asbestos-Forms.aspx.
- ODEQ Indirect Source Construction Permit (ISCP)
    - This permit is required for certain facilities, structures, or installations that indirectly cause air contaminant emissions by attracting vehicle activity. According to ODEQ, the Portland VAMC was issued an ISCP (Permit Number 26- 8109) in 1981 for 930 parking spaces. Oregon Rule 340-254-0040 requires an ISCP when 1,000 or more new parking spaces are developed at a facility within the boundaries of a carbon monoxide non-attainment or maintenance area. With an additional 600 spaces proposed, an ISCP will not be required.

  - Additional information about this permit is available at: https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=75684.
- City of Portland Land Use Compatibility Statement (LUCS)
  - A LUCS is used to determine if an ODEQ permit or approval will be consistent with local government plans and other regulations. According to the Portland Bureau of Development Services, local zoning related regulations within the City of Portland do not apply to federally owned land such as the Portland VAMC campus. Although VA is not subject to local zoning regulations or restrictions, the proposed action projects would be consistent with the Portland VAMC campus and surrounding area developments and the overall land use, and the LUCS would not change as a result of the proposed action.
  - To complete a LUCS, the applicant must complete Section 1 of the LUCS and submit it to a specific city or county office. After being reviewed and returned by either the city or county office, the applicant must submit a completed LUCS and any additional required information to ODEQ, along with the permit or approval request.
  - Additional information about this permit is available at: https://www.oregon.gov/deq/Permits/Pages/LUCS.aspx.
- City of Portland Bureau of Environmental Services (PBES) Stormwater/Sanitary Discharge Permit
  - PBES provides municipal combined stormwater/sanitary sewer services to the Portland VAMC. Discharge to the stormwater/sanitary sewer requires a permit from PBES in accordance with the Sewer and Drainage Facilities Design Manual and Stormwater Management Manual. Proposed projects at the Portland VAMC require discharge to the combined stormwater/sanitary sewer.
  - Additional information about this permit is available at: https://www.portland.gov/code/17/39#toc--17-39-060-discharge-permits-and-other-authorizations-.
  - Compliance with this permit is achieved by following prescribed BMPs related to discharge of wastewater to the publicly-owned treatment works (POTW).
- Federal Aviation Administration Notice of Proposed Construction or Alteration
  - This permit is required for any construction or alterations which may affect navigable airspace. OHSU has two helipad areas, located approximately 500 feet north and 750 feet west of the Portland VAMC. Projects at the Portland VAMC may require construction in navigable airspace.
  - Additional information about this permit is available at: https://www.faa.gov/forms/index.cfm/go/document.information/documentid/186273.
- City of Portland Noise Regulations
  - Proposed projects at the Portland VAMC would generate noise. Proposed actions would require coordination in advance with nearby residences and businesses. Portland City Code Section 18.10.060, "Construction Activities and Equipment", establishes regulations for construction noise in the City of Portland, which can be summarized as follows:
    - Permissible Hours and Noise Level – From 7 a.m. to 6 p.m. Monday through Saturday, the City permits 85 decibel A (dBA) at a 50-foot distance. Equipment that cannot readily comply (e.g., jack hammers, concrete saws, and pile drivers) are exempt from the standard during this time period.

        - Outside Permissible Hours – Work at other hours must meet the "baseline permitted decibel levels" of the area in which the work is taking place. Most activities would be in violation of the code for exterior work (e.g., clearing, grading, excavating, framing, roofing, and so forth) before 7 a.m., after 6 p.m., or on Sundays and the holidays such as New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.
    - The City of Portland establishes a variance process for times when work must occur outside permissible hours. Noise regulations do not apply for emergency work, "…necessary to restore property to a safe condition following a public calamity, work to restore public utilities, or work required to protect persons or property from imminent exposure to danger." For non-emergency work outside permitted hours, projects may apply for a variance. Construction noise variances may be issued if the need is valid and there is ample notification to nearby neighbors.
    - Additional information is available at: https://www.portland.gov/code/18/10/060#:~:text=Maximum%20sound%20levels%3A%20No%20person,to%20trucks%20(see%20Section%2018.10.

2.2 Consultation Required

No permits are required from the following federal, state, and local agencies. However, consultation or coordination with the following tribes and federal, state, and local agencies could be required.

- Federally Recognized Native American Tribes
    - Proposed projects may affect Native American Tribes' land. VA should initiate consultation with Native American Tribes whose lands may be affected by the action or who may attach religious and cultural significance to affected properties. In addition, modifications to SW Terwilliger Boulevard could require consultation with Native American Tribes as they may have possible ancestral ties to the area.
    - There is a low risk of inadvertently discovering pre-contact cultural resources and a low risk for uncovering historic-period cultural resources during construction. Additional consultation with Native American Tribes could be required if an inadvertent discovery occurs.
    - Future consultation with Native American Tribes would be required if ground-disturbing activities (e.g., ground clearing for staging of materials, terrain reconfigurations or excavations) are proposed in areas outside of the direct area of potential effects (APE) for the VAMC.
- Oregon Parks and Recreation State Historic Preservation Office (SHPO)
    - No structures at the Portland VAMC are currently listed as properties eligible for the National Register of Historic Places (NRHP). The only structures identified to be 50 years old or older are Buildings 6, 16, and the stone masonry walls within the campus. However, these structures have been determined not eligible for the NRHP.
    - There is a low risk of inadvertently discovering pre-contact cultural resources and a low risk for uncovering historic-period cultural resources during construction. Additional consultation with SHPO could be required if an inadvertent discovery occurs.
    - SW Terwilliger Boulevard appears to be eligible for listing on the NRHP. Modifications to SW Terwilliger Boulevard could require a Memorandum of Agreement with the Oregon SHPO, Advisory Council on Historic Preservation, and other interested parties to mitigate adverse historic impacts to SW Terwilliger Boulevard.
    - Future consultation with SHPO would be required if ground-disturbing activities (e.g., ground clearing for staging of materials, terrain reconfigurations or excavations) are proposed in areas outside of the direct APE for the VAMC.

- Oregon Department of Transportation (ODOT), Portland Parks and Recreation (PPR), Portland Bureau of Transportation (PBT), and OHSU
    - PPR manages SW Terwilliger Boulevard and ODOT and PBT provide maintenance to primary roads and bridges in the vicinity of the Portland VAMC. OHSU is physically connected to the Portland VAMC and primary entrance is on SW Terwilliger Boulevard. Proposed improvements within the VAMC campus do not appear to impact SW Terwilliger Boulevard.
- Portland Police and Fire Departments and Portland TriMet System
    - Road improvements require coordination with the Portland Police and Fire Departments and Portland TriMet System to prevent significant disruption to their services. Proposed projects at the Portland VAMC could require temporary, partial road closures and detours.
- PBES
    - An “abandoned” section of storm sewer pipeline is located at the northern section of the Portland VAMC. During a site visit conducted in June 2018, flow was observed through the storm sewer pipeline assumed to be abandoned. PBES would need to be notified if this line is active and if there are any discrepancies so they can update their GIS maps.

3.0 References

Schwab Engineering & Management (Schwab) 2019. Seismic Retrofit and Renovation at Buildings 100 and 101 Project Book. July 13.

TTL Associates, Inc. (TTL) 2019. Environmental Assessment of the Proposed Seismic Upgrade, Renovation, Modernization, and Expansion of the VA Portland Health Care System-Portland Campus. November 20.

B Appendix B: Stakeholder and Public Correspondence

B.1 Stakeholder Scoping Notice

B.2 Proof of Publication for Scoping Notice and Notice of Availability in The Oregonian

B.3 Notice of Availability for Draft Environmental Assessment

B.4 Responses to Public Comments Received on Draft Environmental Assessment

B.1 Stakeholder Scoping Notice

DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

Date: May 5, 2021

Notice: Valued Stakeholders

Subject: Notice of Scoping and Stakeholder Involvement for the Proposed Seismic Upgrades and Improvements at the Portland VA Medical Center, Oregon

The U.S. Department of Veterans Affairs (VA) Office of Construction and Facilities Management (CFM) is gathering information to assist with the preparation of an Environmental Assessment (EA) as part of the Federal decision-making process for the proposed seismic upgrades and improvements at the Portland VA Medical Center (VAMC) at 3710 SW U.S. Veterans Hospital Road, Portland, Oregon (Figure 1). The proposed upgrades and improvements have been divided into multiple phases. Phase I projects have been authorized for design and potential construction (Figure 2). Phase II and Phase III projects are in conceptual development but have not been authorized for additional design or potential construction. The Phase I projects include the following:

- Design and construction of seismic upgrades to Building 100 (main hospital building), Building 101 (research/administration building), and Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101).
- Replacement of the façade of Buildings 100 and 101.
- Building 102 improvements and realignment of the plaza and roadway to address physical security concerns.
- Construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces and resulting in a net gain of approximately 100 parking spaces for the VAMC campus.

The Phase II and Phase III projects are in the conceptual stage and may be authorized for future design and potential construction (Figure 2). These projects have limited conceptual details, they will be included and analyzed in the EA to the extent practicable. These projects include:

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction.
- Construction of Building 110, an approximately 370,000 gross square foot

Specialty Care Building.

- Construction of Building 111, an approximately 450-space parking structure in the area south of Building 101.
- Construction of Building 112, an approximately 450-space parking structure near Building 16 and in the current location of surface parking Lot 4.
- Improvements and upgrades of the Energy Center such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades including the renovation and modernization of Buildings 100 and 101 to achieve full seismic compliance.

As part of the federal decision-making process, VA will undertake an environmental assessment of the proposed action in compliance with the National Environmental Policy Act (NEPA). The VA is seeking input as part of the scoping process on issues to be addressed during the NEPA process, including environmental concerns.

NEPA requires that a federal agency provide the public with an opportunity to participate in the process of analyzing the impact of federal actions on the human environment. The purpose of this letter is to notify members of the community and other stakeholders of this opportunity to assist VA in identifying issues, including environmental concerns that may occur as a result of the proposed Federal action.

A public scoping comment period will be open through **June 11, 2021**. During this time, agencies and stakeholders are encouraged to submit written comments and input on the proposed action in order to help identify potential issues or concerns for consideration in the NEPA process. Submissions received during the scoping period will be considered in the NEPA compliance process.

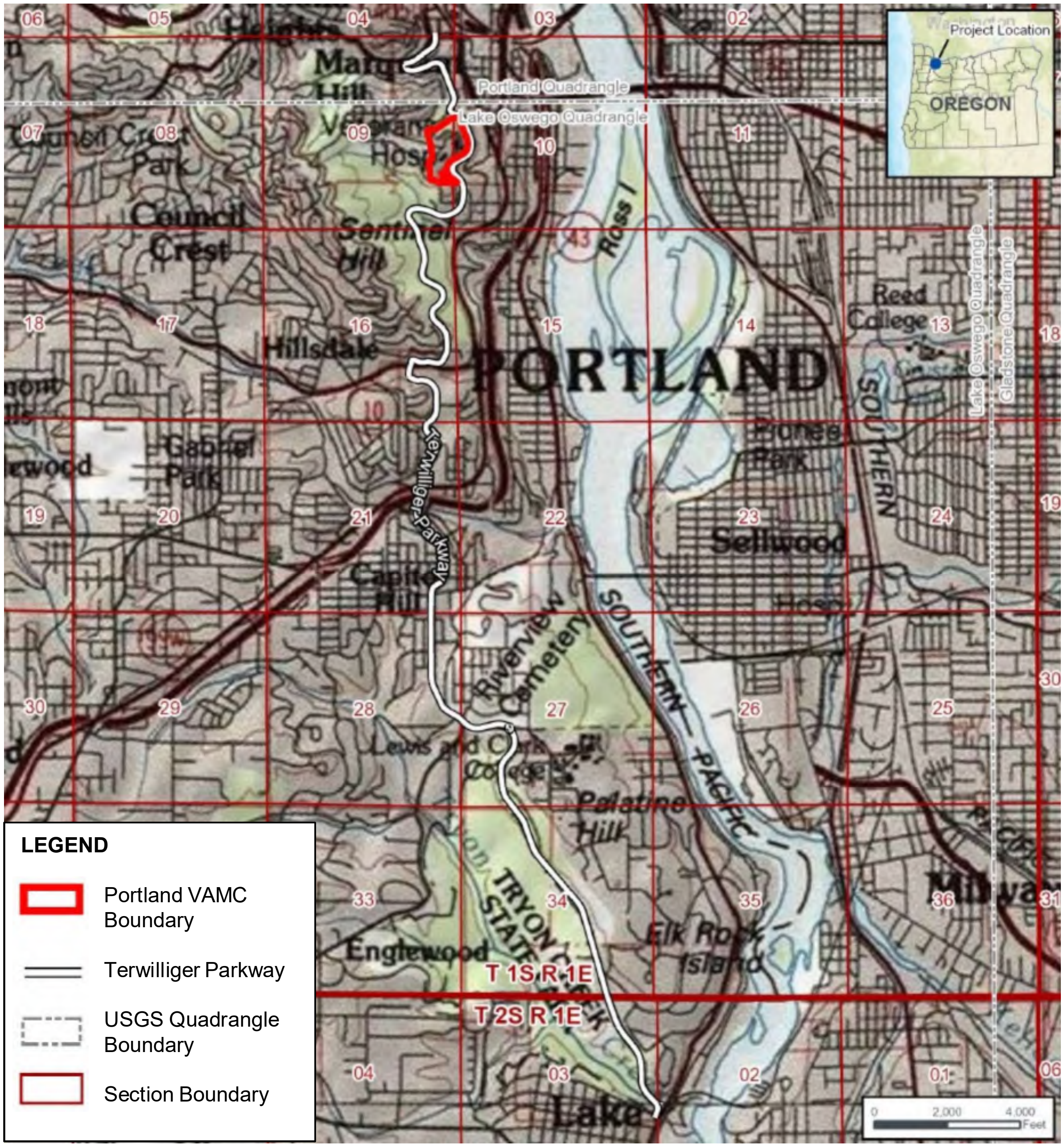
Due to the on-going COVID-19 pandemic, all submissions should be sent/made via email to vacoenvironment@va.gov with the subject line “Portland VAMC Scoping.”

For more information, please contact Mr. Patrick Read at (202) 891-9713.

Darwin G Goodspeed 273021

Digitally signed by Darwin G Goodspeed 273021
Date: 2021.05.05 08:15:08 -07'00'

DARWIN G. GOODSPEED, FACHE
Director



PORTLAND VETERANS AFFAIRS MEDICAL CENTER PORTLAND, OREGON	PREPARED FOR **U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC** APRIL 2021	N	LRS FEDERAL

Figure 1. Topographic Map of the Portland VA Medical Center

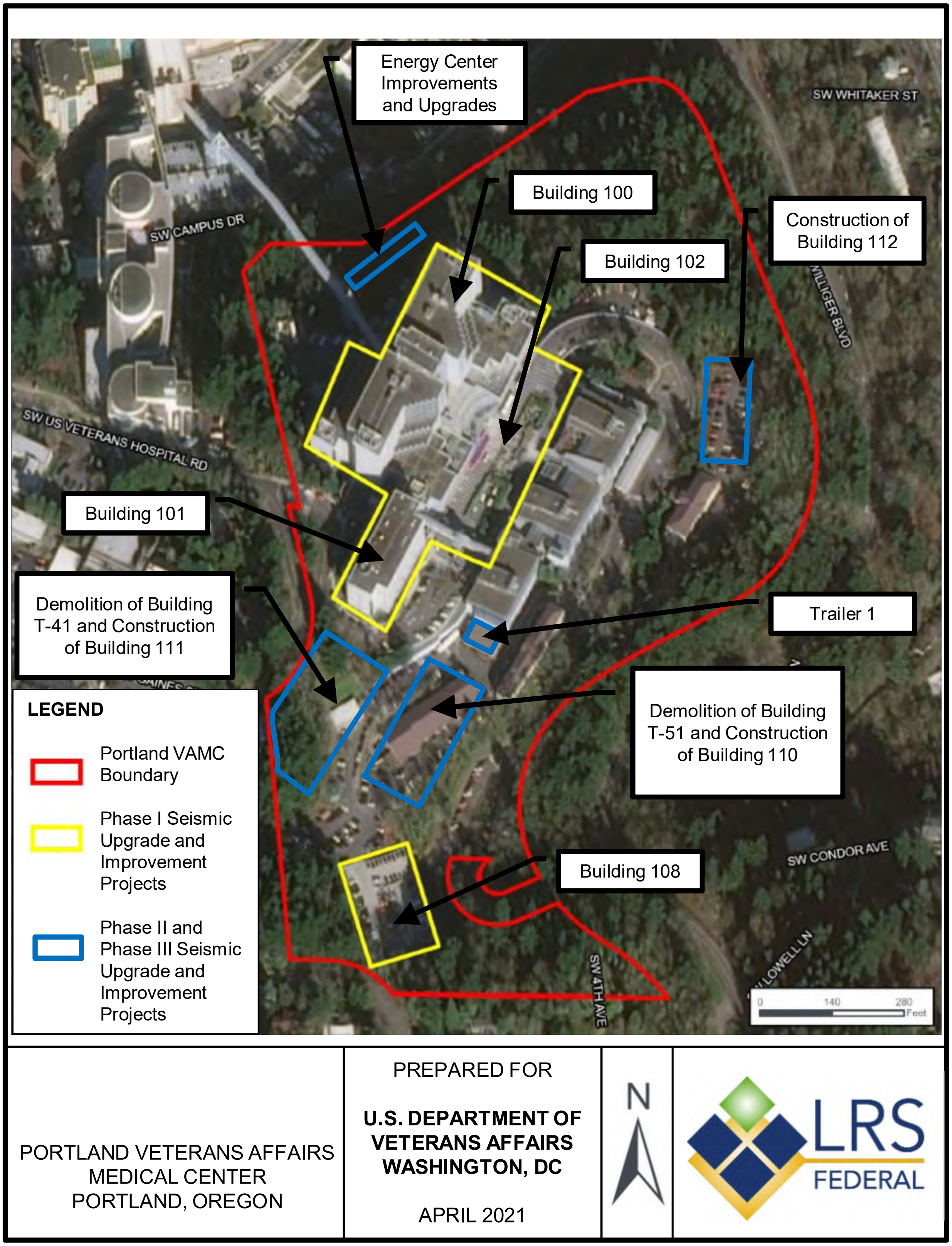


Figure 2. Aerial Image of the Portland VA Medical Center

B.2 Proof of Publication for Scoping Notice and Notice of Availability in The Oregonian

EMPLOYMENT

› GENERAL EMPLOYMENT

CONSUMER PRODUCTS

Art Director – NIKE, Inc., Beaverton, OR. Lead a team of multidisciplinary designers across multiple projects, working closely with both producers and narrators to deliver well-crafted and innovative creative designs. Apply at www.jobs.nike.com (Job #IR368).

CONSUMER PRODUCTS

Product Manager – NIKE, Inc., Beaverton, OR. Analyze data gathered and develop solutions to lead the creation of world class digital experience for athletes. Apply at www.jobs.nike.com (Job #IR375).

CONSUMER PRODUCTS

Senior Global Planner, Men's Footwear–NIKE, Inc., Beaverton, OR. Develop, integrate and provide forecasts for internal operations. Up to 25% international travel required. Apply at www.jobs.nike.com (Job #IR363).

DATA

Voice of Consumer Insights Analytics Manager – NIKE, Inc., Beaverton, OR. Collaborate with analytic teams, business partners, and external research partners to identify opportunities for improvement on consumer friction to optimize experiences. Apply at www.jobs.nike.com (Job # IR359)

ENGINEER

HDR Engineering, Inc., seeks a Traffic Engineer in Portland, OR. Req's: Master in Civil Engineering + 3mo exp in civil engineering or planning or Bach + 2 yrs exp. Req'd exp may be professional or intern and must include exp in transportation analysis & planning; Microstation; AutoCAD; GIS. PE not req'd. Background check. May be subject to pre-employment drug testing. Resumes to Allison Geiser, HDR, 1917 S 67th St, Omaha, NE 68106. Reference Job # 161453. Emp. Pd. Ad. EOE.

ENGINEERING

Electrical Engineer: Design & medium voltage systems & studies: load/flow, short/circuit, grounding, protective device coordination & arc flash; develop proposals: writing/reviewing tech specifications, drawing requirements, clarifications and exceptions & responses; interface w/team members; develop single-line/elevation drawings & schematics, arrangement & layout for protection and control, PV & wind farm collector, cable, conduit, and grounding systems; BS/Energy Engineering; PE or EIT, 7662 SW Mohawk St, Tualatin, OR; RRS, cv@5122512518.

ENGINEERING

Engineering Manager – NIKE, Inc., Beaverton, OR. Develop, configure, and test programs, systems and solutions in order to meet defined digital product specifications and direction. Apply at www.jobs.nike.com (Job #IR376).

ENGINEERING

Qorvo US, Inc. has an opening in Hillsboro, OR for Senior Design Engineer: Use simulation tools such as Agilent ADS, AWR Microwave Office and HFSS for design, and to create layout of HBT Power Amplifier, and Module laminate. Mail resumes to: Qorvo US, Inc., Attn: HR Connect, Ref# 20711.119, 2300 NE Brookwood Parkway, Hillsboro, OR 97124. Must include job Ref# 20711.119

ENGINEERING

Senior Software Engineer – NIKE, Inc., Beaverton, OR. Revolutionize the intersection of technology and the product line planning function by delivering an application ecosystem to produce, consume, and distribute data. Apply at www.jobs.nike.com (Job # IR367).

ENGINEERING

Senior Distributed Systems Data Engineer – NIKE, Inc., Beaverton, OR. Develops, configures, and tests programs, systems and solutions in order to meet defined digital data product specifications and direction. Apply at www.jobs.nike.com (Job# IR369).

ENGINEER - PRINCIPAL VERIFICATION (DESIGN)

Ampere Computing LLC is hiring a Principal Verification Engineer (Design) in Portland, OR. Subject to background check. Email resume to:careers @amperecomputing.com, Attn. B. Walls, Reference code 20210310VK.

› GENERAL EMPLOYMENT

ENGINEER

Senior Competence Engineer sought by ASML in Hillsboro, OR, to develop customer relationships, identify customer needs & how to address them & define & implement application solutions to address them. Master's degree in Applied Physics or a closely-related field & 2 yrs of exp in a semiconductor environment (within the area of lithography, patterning &/or metrology); excellent process knowledge (able to provide insight in process information, front till back end processes); technical background with ASML's tools & products; knowledge of semiconductor devices, processes & challenges; & up to 25% domestic & international travel required. Send resume to Attn: 25020-N, 2650 W. Geronimo Place, Chandler, AZ 85224.

HEALTHCARE

Mental Health Therapist (Bilingual Spanish/English), BestCare Treatment Services, Inc. Madras and Redmond, Oregon. Multiple Openings. Work as a member of a treatment team to provide a range of clinically appropriate services to adults, young people, and families. The majority of the clients served are Spanish-speaking. Diagnose and treat mental and emotional disorders related to and caused by substance abuse. Work will be performed at BestCare clinics in Madras and Redmond and will require weekly local travel within normal commuting distance. Apply at https://bestcaretreatment.org /employment-opportunities/.

IT

Amazon Web Services, Inc., an Amazon.com Company, has multiple openings in Portland, OR, for Cloud Support Engineer II positions in the following profiles/domains:
- Databases, Analytics, Big Data – Job Code: 59645-3
- Deployment, DMS – Job Code: 59645-1
- Linux – Job Code: 59645-2
- Storage & Content Delivery, Networking, Security – Job Code: 59645-5
- Windows – Job Code: 59645-4

Duties to incl: providing advanced remote tech support to customers by responding to difficult tech inquiries rel to large & production critical issues to propose solutions to/resolve root causes of cloud network/system issues; leading & overseeing documenting all varieties of corner case scenarios & troubleshooting of workflows in AWS internal knowledge databases. To apply: send resume to Amazon Web Services, Inc., ATTN: Hiring Manager – (insert applicable job code from above), PO Box 81226, Seattle, Washington, 98108-1300.

IT

Principal Solution Architect – NIKE, Inc., Hillsboro, OR. Design and develop IT architecture (integrated process, applications, data, and technology) solutions to business problems in alignment with the enterprise architecture direction and standards. Apply at www.jobs.nike.com (Job #358).

IT

Senior Systems Administrator, Wieden + Kennedy, Inc., Portland, OR. Maintain and administer computer networks and related computing environments. Manage design, implementation, and maintenance of all office systems and servers (hardware, software, and network infrastructure) at a global level. Oversee and set global IT initiatives to ensure IT Managers in each global office meet set initiatives. Diagnose, troubleshoot, and resolve hardware, software, and network infrastructure problems, including MediaOcean VPN/access issues. 5% domestic and international travel required. Apply online at https://www.wk.com/jobs/

› GENERAL EMPLOYMENT

IT-SOFTWARE

Advisory: KPMG LLP seeks Managers in our Portland, OR office. Positions require bachelor's degree or foreign equivalent from accredited college/university in Computer Science or related field plus 5 years experience in offered position or related occupation. Employer will accept a master's degree plus 2 years of experience in lieu of a bachelor's degree plus 5 years of experience. Any suitable combination of education, training, or experience is acceptable. Up to 100 % travel to various locations per business need. Two years of experience must include: Analyzing, identifying, designing, and implementing technology services, I.T. systems, and operational processes for state/local government clients; software Development Life Cycle (SDLC), including Agile implementations utilizing Scrum or Scaled Agile Frameworks (SAFe); business Process Model and Notation (BPMN) tools, including Sparx, Microsoft Visio, and ARIS; and project management and team collaboration tools, including SharePoint, JIRA, and Microsoft Teams. Interested? Apply online at http://us-jobs.kpmg.com/careers/FindALocation & type requisition number 58261 in the keyword search box. Should you have any difficulty in applying for this position through our website, please contact: us-hrscatsadmin@kpmg.com for assistance in the application process. If offered employment, must have legal right to work in the U.S. EOE. KPMG offers a comprehensive compensation and benefits package. No phone calls or agencies please. KPMG Affirmative Action, Equal Opportunity Employer, Minority/Female/Disability/Veteran. KPMG maintains a drug-free workplace. © 2021 KPMG LLP, a Delaware limited liability partnership and the U.S. member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

MANAGEMENT - BUSINESS AFFAIRS

Senior Business Affairs Manager, Wieden + Kennedy, Inc., Portland, Oregon. Manage and negotiate all aspects of broadcast and digital productions. Secure legal clearances, negotiate terms, prepare contracts, and facilitate payments for commercial use of intellectual property, scale and over-scale celebrity talent, stock footage licensing, and Synchronization & Master Recording rights. 10% travel, including international. Apply online at https://www.wk.com/jobs/

MEDIA PRODUCTION

Broadcast Producer, Wieden + Kennedy, Inc., Portland, OR. Lead all aspects of international and domestic small and large productions, simultaneously for radio, interactive, and television media-based ad campaigns with multi-million dollar budgets. Actively manage day-to-day aspects of production processes, elevating creative tone throughout, developing detailed project schedules, managing project scope, documenting change requests, leading project meetings, reviewing all campaign deliverables for quality and accuracy, maintaining project documentation and identifying project risk. 50% travel, including international. Apply online at https://www.wk.com/jobs/

› GENERAL EMPLOYMENT

PHYSICIAN

Pacific Kidney & Hypertension, LLC d/b/a Oregon Kidney & Hypertension Clinic (Tigard, OR) seeks Physician. Reqs incl pro med deg, internal medicine residency, nephrology & transplant fellowship. Please email resumes to: Attn: HR physicianjobs@davita.com

RESTAURANT

Sushi Chef, Prepare sushi rice & sauces according to traditional Japanese sushi making methods. Select ingredients; store food and maintain supplies. Prepare sushi plates. FT, 40hrs/wk, 2pm-10pm in Portland, OR. **Min. reqmts**: Must have two years of experience in the job offered. Send resume to Mr. Masayuki Murata of Murata Corporation 200 SW Market Street P105 Portland, OR 97201

SOFTWARE

Senior Software Engineer – NIKE, Inc., Beaverton, OR. Develop, configure, and test programs, systems and solutions in order to meet defined digital product specifications and direction. Apply at www.jobs.nike.com (Job #IR365)

SOFTWARE

Senior Software Engineer – NIKE, Inc., Hillsboro, OR. Design, develop, configure, and test programs, systems and solutions in order to meet defined product roadmap deliverables. May telecommute. Apply at www.jobs.nike.com (Job #IR366)

SOFTWARE

Software Development Engineer – NIKE, Inc., Beaverton, OR. Develop, configure, and test programs, systems and solutions in order to meet defined digital product specifications and direction. Apply at www.jobs.nike.com (Job #360).

SOFTWARE

Software Engineer – NIKE, Inc., Beaverton, OR. Design, develop, configure, and test programs, systems and solutions in order to meet defined digital product specifications and direction. Apply at www.jobs.nike.com (Job #IR361).

PUBLIC NOTICES

› PUBLIC NOTICES GENERAL

Curry Health Network in Gold Beach, Oregon is soliciting RFQs for Hosted ERP Services. Email questions to rkenmark@itoptimizers.com or call 510.287.3922. The RFQ is available online at **http://www.curryhealthnetwork.com/getpage.php?name=RFP-RFQ** and the deadline for submissions is May 28, 2021.

PUBLIC NOTICES

U.S. DEPARTMENT OF VETERANS AFFAIRS OFFICE OF CONSTRUCTION AND FACILITIES MANAGEMENT

NOTICE OF SCOPING AND PUBLIC INVOLVEMENT UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT FOR THE PROPOSED SEISMIC UPGRADES AND IMPROVEMENTS AT THE PORTLAND VA MEDICAL CENTER, OREGON

The U.S. Department of Veterans Affairs (VA) Office of Construction and Facilities Management (CFM) is gathering information to assist with the preparation of an Environmental Assessment (EA) for the proposed seismic upgrades and improvements at the Portland VA Medical Center (VAMC) at 3710 SW U.S. Veterans Hospital Road, Portland Oregon. The proposed upgrades and improvements have been divided into multiple phases. Phase I projects have been authorized for design and potential construction. Phase II and Phase III projects are in conceptual development but have not been authorized for additional design nor potential construction. The Phase I projects include the following:
- Design and construction of seismic upgrades to Building 100, Building 101, and Building 102.
- Replacement of the façade of Buildings 100 and 101.
- Building 102 improvements and realignment of the plaza and roadway.
- Construction of two additional parking levels at Building 108.

The Phase II and Phase III projects are in the conceptual stage and may be authorized for future design and potential construction. These projects have limited conceptual details, however they will be included and analyzed in the EA to the extent practicable.
In accordance with the National Environmental Policy Act (NEPA), VA is seeking the public's input on issues to be addressed during the NEPA process, including alternatives and environmental concerns.
A public scoping period is open through **June 11, 2021**. During this time, the public is invited to submit comments on the proposed action and identify potential issues or concerns for consideration in the NEPA process. All submissions should be sent/made via email to vacoenvironment@va.gov with the subject line "Portland VAMC Scoping."

PUBLIC NOTICES

› PUBLIC NOTICES GENERAL

NOTICE OF FINDING OF NO SIGNIFICANT IMPACT AND NOTICE OF INTENT TO REQUEST RELEASE OF FUNDS
May 9, 2021
Washington County Office of Community Development
328 W. Main St., Suite 100, Hillsboro, OR 97123
(503) 846-8814 (voice); 1 (800) 735-1232 (TYY)

These notices shall satisfy two separate but related procedural requirements for activities to be undertaken by the **Housing Authority of Washington County and Washington County Office of Community Development** .
REQUEST FOR RELEASE OF FUNDS
On or about **Monday, May 24, 2021 Washington County Office of Community Development will** submit a request to the U.S. Department of Housing and Urban Development (HUD) for the release of Housing Choice Voucher Program funds as authorized by the United States Housing Act of 1937, Section 8 (c)(9), as amended, and as authorized by the 2008 Consolidated Appropriations Act, Public Law 110-161 as authorized under Section 8 (o)(19) of the United States Housing Act of 1937, as amended, for the purposes of attaching three (3) project-based Section 8 vouchers to be utilized at the Terrace Glen project located at 9640 SW Greenburg Road, Tigard Oregon.
FINDING OF NO SIGNIFICANT IMPACT
The **Washington County Office of Community Development** has determined that the project will have no significant impact on the human environment. Therefore, an Environmental Impact Statement under the National Environmental Policy Act of 1969 (NEPA) is not required. Additional project information is contained in the Environmental Review Record (ERR) on file at **the Washington County Office of Community Development, 328 W. Main Street, Suite 100, Hillsboro, OR 97123**. Copies of the environmental review may be requested by calling 503-846-8814.
PUBLIC COMMENTS
Any individual, group, or agency disagreeing with this determination or wishing to comment on the project may submit written comments to the **Washington County Office of Community Development or at ann_hawkins@co.washington.or.us.** All comments received by **May 24, 2021** will be considered by the **Washington County Office of Community Development** prior to authorizing submission of a request for release of funds. Comments should specify which Notice they are addressing.
RELEASE OF FUNDS
The **Washington County Office of Community Development** certifies to HUD that Jennie H. Proctor in her capacity as **Program Manager** consents to accept the jurisdiction of the Federal Courts if an action is brought to enforce responsibilities in relation to the environmental review process and that these responsibilities have been satisfied. HUD's approval of the certification satisfies its responsibilities under NEPA and related laws and authorities and allows the **Housing Authority of Washington County** to use Housing Choice Voucher Program funds.
OBJECTIONS TO RELEASE OF FUNDS
HUD will accept objections to its release of funds and the **Washington County Office of Community Development**'s certification for a period of fifteen days following the anticipated submission date or its actual receipt of the request (whichever is later) only if they are on one of the following bases: (a) the certification was not executed by the Certifying Officer of the RE; (b) the RE has omitted a step or failed to make a decision or finding required by HUD regulations at 24 CFR Part 58; (c) the grant recipient has committed funds or incurred costs not authorized by 24 CFR Part 58 before approval of a release of funds by HUD; or (d) another Federal agency acting pursuant to 40 CFR Part 1504 has submitted a written finding that the project is unsatisfactory from the standpoint of environmental quality. Objections must be prepared and submitted in accordance with the required procedures (24 CFR Part 58) and shall be addressed to HUD at 1220 SW 3rd Avenue, Suite 400, Portland, Oregon 97204. Potential objectors should contact HUD to verify the actual last day of the objection period.
Jennie Proctor, Program Manager,
Washington County Office of Community Development

› PUBLIC NOTICES GENERAL

NOTICE OF FINDING OF NO SIGNIFICANT IMPACT AND NOTICE OF INTENT TO REQUEST RELEASE OF FUNDS
May 9, 2021
Washington County Office of Community Development
328 W. Main St., Suite 100, Hillsboro, OR 97123
(503) 846-8814 (voice); 1 (800) 735-1232 (TYY)

These notices shall satisfy two separate but related procedural requirements for activities to be undertaken by the **Housing Authority of Washington County and Washington County Office of Community Development** .
REQUEST FOR RELEASE OF FUNDS
On or about **Monday, May 24, 2021 Washington County Office of Community Development** will submit a request to the U.S. Department of Housing and Urban Development (HUD) for the release of Housing Choice Voucher Program funds as authorized by the United States Housing Act of 1937, Section 8 (c)(9), as amended, and as authorized by the 2008 Consolidated Appropriations Act, Public Law 110-161 as authorized under Section 8 (o)(19) of the United States Housing Act of 1937, as amended, for the purposes of attaching eight (8) project-based Section 8 vouchers to be utilized at the DCM/HAWC Forest Grove project located at 2525 A Street in Forest Grove Oregon.
FINDING OF NO SIGNIFICANT IMPACT
The **Washington County Office of Community Development** has determined that the project will have no significant impact on the human environment. Therefore, an Environmental Impact Statement under the National Environmental Policy Act of 1969 (NEPA) is not required. Additional project information is contained in the Environmental Review Record (ERR) on file at **the Washington County Office of Community Development, 328 W. Main Street, Suite 100, Hillsboro, OR 97123**. Copies of the environmental review may be requested by calling 503-846-8814.
PUBLIC COMMENTS
Any individual, group, or agency disagreeing with this determination or wishing to comment on the project may submit written comments to the **Washington County Office of Community Development or at ann_hawkins@co.washington.or.us.** All comments received by **May 24, 2021** will be considered by the **Washington County Office of Community Development** prior to authorizing submission of a request for release of funds. Comments should specify which Notice they are addressing.
RELEASE OF FUNDS
The **Washington County Office of Community Development** certifies to HUD that Jennie H. Proctor in her capacity as **Program Manager** consents to accept the jurisdiction of the Federal Courts if an action is brought to enforce responsibilities in relation to the environmental review process and that these responsibilities have been satisfied. HUD's approval of the certification satisfies its responsibilities under NEPA and related laws and authorities and allows the **Housing Authority of Washington County** to use Housing Choice Voucher Program funds.
OBJECTIONS TO RELEASE OF FUNDS
HUD will accept objections to its release of funds and the **Washington County Office of Community Development**'s certification for a period of fifteen days following the anticipated submission date or its actual receipt of the request (whichever is later) only if they are on one of the following bases: (a) the certification was not executed by the Certifying Officer of the RE; (b) the RE has omitted a step or failed to make a decision or finding required by HUD regulations at 24 CFR Part 58; (c) the grant recipient has committed funds or incurred costs not authorized by 24 CFR Part 58 before approval of a release of funds by HUD; or (d) another Federal agency acting pursuant to 40 CFR Part 1504 has submitted a written finding that the project is unsatisfactory from the standpoint of environmental quality. Objections must be prepared and submitted in accordance with the required procedures (24 CFR Part 58) and shall be addressed to HUD at 1220 SW 3rd Avenue, Suite 400, Portland, Oregon 97204. Potential objectors should contact HUD to verify the actual last day of the objection period.
Jennie Proctor, Program Manager,
Washington County Office of Community Development

The Oregonian OREGONLIVE.COM
OREGONIAN MEDIA GROUP

Order Confirmation

Ad Order Number 0010243643

Customer	**Payor Customer**		
LRS FEDERAL	**LRS FEDERAL**		
Account: 1000936819	*Account:* 1000936819	*PO Number*	VAMC_Portland_NOA_
LRS FEDERAL	LRS FEDERAL		
565 BENFIELD RD STE 400	565 BENFIELD RD STE 400	*Sales Rep.*	Kimberlee O'Neill
SEVERNA PARK MD 21146 USA	SEVERNA PARK MD 21146 USA	*Order Taker*	Kimberlee O'Neill
(410)544-3570	(410)544-3570	*Order Source*	Rep
		Special Pricing	
FAX:			

Tear Sheets	0	*TearsheetsCost*	$0.00	*Net Amount*	$1,346.82
Proofs	0			*Tax Amount*	$0.00
Affidavits	1	*AffidavitsCost*	$0.00	*Total Amount*	$1,346.82
Blind Box				*Payment Method*	Invoice
Promo Type	OR Legal Ad 2x			*Payment Amount*	$0.00
Materials				*Amount Due*	$1,346.82
Invoice Text	VAMC_Portland_NOA_fnl				

Ad Schedule

Product	The Oregonian::Full Run OR	*Placement/Class*	Announcements
# Inserts	2	*POS/Sub-Class*	Public Notices
Cost	$1,331.82	*AdNumber*	0010243643-01
Ad Type	OR CLS Legal	*Ad Size*	2 X 64 li
Pick Up #		*Ad Attributes*	
External Ad #		*Color*	<NONE>
Production Method	OR AdBooker	*Production Notes*	

Run Dates *Sort Text* NOTICEOFAVAILABILITYUSDEPARTMENTOFVETERANSAFFAIRSDRAFTENVIRONMENTALASSESSMENTPROPOS
02/13/2022, 02/14/2022

Product	OregonLive.com	*Placement/Class*	Announcements
# Inserts	2	*POS/Sub-Class*	Public Notices
Cost	$15.00	*AdNumber*	0010243643-01
Ad Type	OR CLS Legal	*Ad Size*	2 X 64 li
Pick Up #		*Ad Attributes*	
External Ad #		*Color*	<NONE>
Production Method	OR AdBooker	*Production Notes*	

Run Dates *Sort Text* NOTICEOFAVAILABILITYUSDEPARTMENTOFVETERANSAFFAIRSDRAFTENVIRONMENTALASSESSMENTPROPOS
02/13/2022, 02/14/2022

0010243643-01

Ad Content Proof

NOTICE OF AVAILABILITY

U.S. DEPARTMENT OF VETERANS AFFAIRS

DRAFT ENVIRONMENTAL ASSESSMENT

PROPOSED SEISMIC UPGRADES AND IMPROVEMENTS AT THE VETERANS AFFAIRS MEDICAL CENTER (VAMC) LOCATED IN PORTLAND OREGON

The U.S. Department of Veterans Affairs (VA) Office of Construction & Facilities Management announces the availability of a draft environmental assessment (Draft EA) for public review and comment. The Draft EA evaluates the potential environmental effects of proposed seismic upgrades and improvements at the Portland VAMC that will correct seismic deficiencies, address federal setback and physical security requirements, and provide more sufficient patient and staff parking facilities. The seismic upgrades and improvements proposed would enhance patient, staff, and visitor safety, provide adequate parking, and ensure the continued operation of the Portland VAMC in the aftermath of a major earthquake. The proposed action is needed because the Portland VAMC facilities do not meet VA design criteria and seismic and physical security standards.

No new operational programs or additional healthcare services are being proposed as part of the proposed action. Proposed projects would be implemented over an extended period of years and sequenced to minimize impacts to VAMC services and the surrounding community to the greatest extent practicable. VA will prepare and publish a Final EA following the 30-day comment period. The Final EA will summarize, and address comments received on the Draft EA.

The Draft EA is available for review online via: the VA website, https://www.cfm.va.gov/environmental/index.asp, or via email upon request. A hard copy for review is also on file at the Multnomah County Central Library in Portland, Oregon. VA invites you to attend a **virtual public meeting** on this Draft EA. VA will present information on the proposed project, summarize the Draft EA findings, and provide an opportunity for questions and comments.

The Virtual Public Meeting is scheduled for:

Date: **February 22, 2022 at 6 PM (PST)**
Please use the link below to join the public meeting:
https://us06web.zoom.us/j/81005011943
Or One tap mobile:
US: 1-346-248-7799, 81005011943# or 1-720-707-2699, 81005011943#
Or Telephone Dial: (253) 215-8782
Webinar/Meeting ID: 810 0501 1943

The 30-day comment period closes **March 15, 2022**. Comments or questions may be sent by email on or before that date to vacoenvironment@va.gov. Please use the subject line "Portland VAMC Draft EA". For additional questions, please contact Mr. Patrick Read, VA Environmental Engineer, at patrick.read@va.gov. Reference "Portland VAMC Draft EA" in your correspondence.

B.3 Notice of Availability for Draft Environmental Assessment

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

DATE: April 6, 2022

SUBJECT: Notice to Stakeholders – Comments Received and Status Update on the Environmental Assessment (EA) for the Veterans Affairs Medical Center (VAMC) located in Portland, Oregon.

Dear Valued Stakeholder,

The U.S. Department of Veterans Affairs (VA) Office of Construction & Facilities Management has reviewed all comments received during the public comment period that closed on March 15, 2022. VA is currently revising the Draft EA to incorporate public input received as part of the National Environmental Policy Act (NEPA) process.

As a result, the VA is undertaking a Supplemental Traffic analysis to address comments regarding traffic impacts at additional intersections identified during the public comment period. The supplemental traffic study will include an analysis of identified intersections not previously studied.

The VA greatly appreciates all comments received on the Draft EA, input on the seismic upgrades and improvement projects proposed at the Portland VAMC, and moreover the continued support for Portland area Veterans. VA fully supports the continued planning and continued dialogue with local stakeholders.

Respectfully,

Glenn Elliott

GLENN ELLIOTT

Digitally signed by GLENN ELLIOTT
Date: 2022.04.06 14:10:33 -04'00'

Director, Environmental Program Office
Office of Construction & Facilities Management

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

February 14, 2022

SUBJECT: **Notice of Availability of the Draft Environmental Assessment for the Proposed Seismic Upgrades and Improvements at the Veterans Affairs Medical Center (VAMC) located in Portland, Oregon.**

Dear Valued Stakeholder,

The U.S. Department of Veterans Affairs (VA) Office of Construction & Facilities Management announces the availability of a draft environmental assessment (Draft EA) for public review and comment. The Draft EA evaluates the potential environmental effects of proposed seismic upgrades and improvements at the Portland VAMC that will correct seismic deficiencies, address federal setback and physical security requirements, and provide more sufficient patient and staff parking facilities. The seismic upgrades and improvements proposed would enhance patient, staff, and visitor safety, provide adequate parking, and ensure the continued operation of the Portland VAMC in the aftermath of a major earthquake. The proposed action is needed because the Portland VAMC facilities do not meet VA design criteria and seismic and physical security standards.

No new operational programs or additional healthcare services are being proposed as part of the proposed action. Proposed projects would be implemented over an extended period of years and sequenced to minimize impacts to VAMC services and the surrounding community to the greatest extent practicable. VA will prepare and publish a Final EA following the 30-day comment period. The Final EA will summarize, and address comments received on the Draft EA.

The Draft EA is available for review online via:
the VA website, https://www.cfm.va.gov/environmental/index.asp, or via email upon request. A hard copy for review is also on file at the Multnomah County Central Library in Portland, Oregon. VA invites you to attend a *virtual public meeting* on this Draft EA. VA will present information on the proposed project, summarize the Draft EA findings, and provide an opportunity for questions and comments.

The Virtual Public Meeting is scheduled for:
Date: **February 22, 2022 at 6 PM (PST)**
Please use the link below to join the public meeting:
https://us06web.zoom.us/j/81005011943
Or One tap mobile :
US: 1-346-248-7799, 81005011943# or 1-720-707-2699, 81005011943#

Or Telephone Dial: (253) 215-8782
Webinar/Meeting ID: 810 0501 1943

The 30-day comment period closes **March 15, 2022**. Comments or questions may be sent by email on or before that date to vacoenvironment@va.gov. Please use the subject line “Portland VAMC Draft EA”.

For additional questions, please contact Mr. Patrick Read, VA Environmental Engineer, at patrick.read@va.gov. Reference “Portland VAMC Draft EA” in your correspondence.

Respectfully,

Glenn Elliott

Glenn Elliott

Director, Environmental Program Office
Office of Construction & Facilities Management

B.4 Responses to Public Comments Received on Draft Environmental Assessment

U.S. DEPARTMENT OF VETERANS AFFAIRS

PROPOSED SEISMIC UPGRADES AND IMPROVEMENTS AT THE VETERANS AFFAIRS MEDICAL CENTER (VAMC) LOCATED IN PORTLAND OREGON

Documentation of Stakeholder Responses to Notice of Availability

Veterans Affairs (VA) sent a Notice of Availability (NOA) for the Draft Environmental Assessment (EA) to identified stakeholders in the Portland community on February 14, 2022. The Draft EA was made available online at https://www.cfm.va.gov/environmental/index.asp and as a hardcopy at the Multnomah County Central Library. The stakeholder comments received by VA and VA's responses are summarized in Table 1 below.

VA greatly appreciates all comments received on the Draft EA, input on the seismic upgrades and improvements proposed at the Portland VAMC, and moreover support for Portland area Veterans. VA fully supports the continued planning and open dialogue with local stakeholders. As stated in the EA, the proposed upgrades and improvements are not intended to increase capacity of the VAMC but will serve to address current standards of operational care and the required space allocations for health care delivery as well as the current parking deficit. A major component of the proposed VAMC improvements will include the construction of a new Specialty Care Building (Building 110). VAMC outpatient services will be relocated to Building 110 in order to allow space within the Main Hospital Building – Building 100 where most outpatient visits and VA business functions currently occur. As proposed, Building 110 will provide adequate space for outpatient services along with primary VA business functions, while freeing up space in Building 100 to provide single-bed rooms, with their own bathroom, for increased privacy and improved healthcare for our patients.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to consider the effects of their undertakings on historic properties and consult with the State Historic Preservation Officer (SHPO). Section 106 of the NHPA also requires an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's area of potential effect (APE), which is defined as the geographic area "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The regulations governing the Section 106 review process (36 CFR 800) are available on the Advisory Council on Historic Preservation website at http://www.achp.gov. In accordance with the NHPA and its implementing regulations, VA has fully assessed potential impacts to historic properties, including the historic Terwilliger Parkway, that may result from the proposed seismic upgrades and improvements at the Portland VAMC. VA has consulted with SHPO and tribal affiliates. Correspondence received from SHPO, including concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151), has been included in Appendix H of the Final EA.

In response to comments received from stakeholders regarding potential impacts to traffic and intersection performance surrounding the Portland VAMC campus, VA conducted a supplemental Traffic Impact Study in June 2022 (Jacobs and LRS Federal, 2022a) as provided in the Final EA (Appendix D), which provides an analysis of the following additional intersections: SW 6th Avenue and SW Sherman Street, SW 6th Avenue and SW Sheridan, SW Condor Lane and SW Terwilliger Boulevard, SW Terwilliger and Homestead Drive, SW Hamilton Terrace and SW Terwilliger Boulevard, SW Hamilton Terrace and SW Bancroft Street, SW Hamilton Street and SW Terwilliger, and SW Terwilliger and SW Capitol Highway. The supplemental study additionally reanalyzed SW Terwilliger and SW Campus Drive as well as SW Terwilliger and SW US Veterans Hospital Road.

Table 1. Summary of Stakeholder Responses to NOA and VA's Responses

Stakeholder	Stakeholder Comment	VA Comment Response
Homestead Neighborhood Association	Our comments relate to the increased parking and resultant traffic. The Portland VAMC is a valued and respected part of our neighborhood. We believe, however, that the Traffic Impact Analysis (TIA) neglects to include coverage of several intersections and residential neighborhood streets that will be affected by increased traffic. It fails to address the impacts to an underdeveloped infrastructure that is already under pressure from heavy congestion -- the local neighborhood streets that are used to access the VA campus. It also underestimates the impact of small increases in traffic on Marquam Hill. Given the near failing nature of several intersections, the largely residential nature of the street grid, and the historic nature of the main road accessing the VMAC, even small changes in traffic volume have large impacts.	The VA thanks Homestead Neighborhood Association for its comments on the Draft EA (responses to specific concerns are addressed below).
	Two unstudied areas of impact are worth noting in particular. The first is the intersection at SW 6th Avenue and SW Sherman Street which is well known as one of the worst rush-hour traffic jams in the City. All VAMC traffic heading north to leave Marquam Hill passes through this intersection. We believe traffic counts and projections of project related traffic into this intersection should be made to	The first intersection of concern, SW 6th Avenue Drive/SW Sherman Street, is located approximately 0.5 miles from the Portland VAMC campus. This intersection was not previously identified by traffic engineers during the planning stages or during the 2019 Portland VAMC Expansion TIA (Global Transportation Engineering, May 2019) as an

Stakeholder	Stakeholder Comment	VA Comment Response
	document and address the increase in congestion at this already failing location. We further request that an assessment of the additional traffic through this area be addressed in collaboration with other partners such as OHSU, Tri-Met and the City of Portland.	intersection of concern. The nearest intersection that was studied is SW Terwilliger Boulevard and SW Campus Drive. The Traffic Impact Study for the Portland VAMC (Jacobs and LRS Federal, 2022) focused on intersections that provide direct access to the VAMC. Further, the intent of the Traffic Impact Study, supplementing the 2019 Portland VAMC Expansion TIA, and 2020 traffic counts, was to analyze the effects of the proposed action rather than intersection performance in the vicinity of the Portland VAMC campus. VA supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address existing operational issues at these intersections and improve traffic conditions. To further address comments received, a supplemental Traffic Impact Study was conducted in June 2022. VA has provided the supplemental Traffic Impact Study (Jacobs and LRS Federal, 2022a) in the Final EA (Appendix D), which provides an analysis of the following additional intersections: SW 6th Avenue and SW Sherman Street, SW 6th Avenue and SW Sheridan, SW Condor Lane and SW Terwilliger Boulevard, SW Terwilliger and Homestead Drive, SW Hamilton Terrace and SW Terwilliger Boulevard, SW Hamilton Terrace and SW Bancroft Street, SW Hamilton Street and SW Terwilliger, and SW Terwilliger and SW Capitol Highway. Additionally, the supplemental June 2022 Traffic Impact Study reanalyzed SW Terwilliger and SW Campus Drive as well as SW Terwilliger and SW US Veterans Hospital Road as primary intersections of concern for the VA.
	The second is the “back door” route to the VAMC using residential streets off of Terwilliger, beginning at SW Homestead Drive (Terwilliger to Homestead to Bancroft to Sixth to SW Gaines to Veterans Hospital Road). Because of the increased congestion at Terwilliger/Veterans Rd., as noted in the TIA, we believe it is likely that commuters will use this "back-door" residential cut-through route to the new 650 parking space structure as an alternative to the main entrance given its location on the VAMC campus unless they are somehow prevented from doing this. We also question whether the traffic distribution shown in the TIA entering and leaving the new parking structure, with its location very near SW Gaines, adequately estimates the percentage of vehicles that will choose to use the "back door" route instead of the main entrance. We request that those volumes and their impact on the intersection of Terwilliger and Homestead be evaluated in light of the increased congestion and delay that will be present at the main entrance at Terwilliger and Veteran's Hospital Road from the proposed project.	The SW Homestead Drive and SW Terwilliger Boulevard intersection was not identified during the planning stages for the VAMC improvements as an intersection of concern based upon engineering judgement. The SW 6th Avenue and SW Gaines Street intersection that leads to the VAMC campus was however analyzed in the Traffic Impact Study (Jacobs and LRS Federal, 2022) and no operational issues were observed. Further, a minimal increase in right-hand turn volume from SW 6th Avenue Drive to SW Gaines Street was determined as a result of the proposed action. To further address numerous comments received on additional intersections of concern, VA has provided a supplemental Traffic Impact Study in the Final EA (Appendix D), which provides an analysis of SW Terwilliger and SW Homestead Drive.
	There are other unstudied streets and intersections that are affected by the increased traffic from the VAMC. Examples are SW Hamilton and SW Bancroft streets and Hamilton/Terwilliger and Condor/Terwilliger intersections. We would like to work with the VA and OHSU and other partners to seek possible solutions.	VA supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address existing operational issues at these intersections and improve traffic conditions. SW 6th Avenue and SW Sherman Street, SW 6th Avenue and SW Sheridan, SW Condor Lane and SW Terwilliger Boulevard, SW Terwilliger and Homestead Drive, SW Hamilton Terrace and SW Terwilliger Boulevard, SW Hamilton Terrace and SW Bancroft Street, SW Hamilton Street and SW Terwilliger, and SW Terwilliger and SW Capitol Highway have since been studied by VA in response to comments received. Refer to the supplemental June 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022a) in the Final EA (Appendix D).
	We also would like the VA to consider some way of minimizing or eliminating that increase in traffic through the neighborhood by prohibiting personal cars from using Veteran's Road between Gaines and the new parking structure.	The VA remains committed to coordinating to minimize increased traffic through the neighborhood by requesting that staff and personnel avoid using residential streets to access the campus. VA is especially committed to coordinating with VAMC management staff to ensure that these “back-door” routes of entry to the campus are not allowed to be utilized during

Stakeholder	Stakeholder Comment	VA Comment Response
	We believe that a "Neighborhood Communication Plan" should be adopted to collaborate with and inform the Homestead residents of upcoming construction impacts, to include the allowed routes of construction vehicles and staging and waiting areas. We support the VAMC and this project but feel the documentation of the impacts of traffic have not been adequately documented in this DEA. The VAMC has always been a good neighbor. We have successfully worked together to improve previous projects. What we do ask is that the VAMC will join us in addressing traffic and related problems going forward. We believe that future cooperation will result in a better neighborhood for all of us.	construction activities. VA will initiate a 'Neighborhood Communication Plan (NCP)' which will notify and communicate directly with nearby residents regarding potential construction schedule and especially those construction activities on campus that may impact traffic flow. The NCP will provide for a continued engagement between stakeholders and VA. Prior to any project construction, Traffic Management/Circulation and Mitigation Plans would be publicly available on the VAMC website prior to implementation. The plans would include traffic and parking management and mitigation measures, traffic flow plans, parking reconfigurations, schedules for off-peak delivery hours for construction equipment and supplies, and designated shuttle services for contractors as well as for VAMC staff, as required. This would help to alleviate traffic issues and congestion during construction. VA greatly appreciates the Homestead Neighborhood Association support of the project and support for Portland area Veterans. VA fully recognizes and supports the continued planning, discussion, and potential implementation of future traffic improvement measures, in conjunction with the local stakeholders and the City of Portland Bureau of Transportation, to address the existing operational issues and to improve traffic patterns surrounding the Portland VAMC campus.
Helen Westbrook	I understand that Veterans Affairs' must improve and upgrade its facilities over time to enhance service for their patients and provide a good working environment for employees. But the submitted final draft Environmental Assessment does not adequately address my concerns about the negative impacts this project will impose on the Terwilliger Parkway and on its hillside forest and viewscapes. Of particular concern regarding the DEA is the reference only to "Terwilliger Boulevard". Terwilliger Parkway is comprised of the roadway, the paved pathways and park land on both sides of the roadway. The DEA needs to address the Parkway in its entirety. With the proposed addition of hundreds of new parking spaces, obviously the volume of traffic will increase. The increase will negatively impact the natural and scenic qualities enjoyed by walkers, bikers, and runners from throughout Portland and the region in very significant ways. The diminution of air quality and increased noise of so many additional vehicle trips will have a significant effect. Additionally, the proposed new parking garage, Bldg. 111, will increase traffic likely coming up Homestead Dr./6th Ave Dr. to Gaines. Much more VA bound traffic will likely be using the Homestead Dr./Terwilliger intersection. Both these intersections need to be analyzed thoroughly to assess the impacts of the proposal. I believe that the scope of the VA proposal and the predictable impact it will have on our neighborhood and the historic Parkway require that an Environmental Impact Study be conducted before moving forward on the VA expansion.	The VA thanks you for your comments on the Draft EA. Terwilliger Parkway was included in the APE for the proposed action (refer to Figure 3-1: Map Depicting the Portland VAMC Campus and Area of Potential Effects within the Draft and Final EA). VA fully acknowledges that Terwilliger Boulevard is one element of Terwilliger Parkway, as recognized under the National Register of Historic Places (NRHP). The VA fully analyzed potential impacts to the historic integrity of the Parkway and historic districts in the region. VA has consulted with OR State Historic Preservation Office (SHPO) and tribal affiliates regarding the proposed undertaking and any potential effects to historic resources, including Terwilliger Parkway. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151). Correspondence received from OR SHPO is provided in Appendix H of the Final EA. Although there will be no adverse effects to Terwilliger Parkway as confirmed by OR SHPO, or outside of the Portland VAMC campus, it was included in the APE to assess potential impacts to the historic resource, including those related to aesthetics and increased traffic on Terwilliger Boulevard. Minor increases in traffic will not present adverse impacts to the Parkway or historical significance under Criterion A within the National Register Criteria for Evaluation for which the parkway is listed. Terwilliger Boulevard has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's NRHP listing will not be affected by the undertaking because standard re-pavement alterations, continual maintenance, and growth over time do not affect its listing under Criterion A, or its integrity. While Terwilliger Parkway encompasses the pedestrian paths, adjacent parkland, viewpoints, and lighting, it should be noted that the effect of increased traffic would be confined to the physical road surface of Terwilliger Boulevard. There are no planned activities on the VAMC campus that impact the integrity of location, design, setting, feeling, and association of

Stakeholder	Stakeholder Comment	VA Comment Response
		Terwilliger Parkway or recreational uses. The proposed action will not have any direct impacts to the wooded area surrounding the VAMC campus. The VAMC campus upgrades will be visually consistent with the rest of the campus and new building heights will not exceed that of current buildings. As design progresses, visual representation and/or schematics will be publicly available on the VAMC website as part of the NCP. Indirect visual impacts from construction equipment would be temporary. Further, no significant long-term air quality or noise impacts are anticipated as a result of the proposed action, as evaluated by the Air Quality Resource Report (Jacobs and LRS Federal, January 2021a) and Noise Report (Jacobs and LRS Federal, January 2021), provided in the Final EA (Appendix E and Appendix F, respectively). Regarding the Homestead Drive/6th Avenue Drive to Gaines Street intersection, the SW 6th Avenue/SW Gaines Street intersection that leads directly to the VAMC campus was analyzed and no operational issues were observed. Further, a minimal increase in right-hand turn volume from SW 6th Avenue Drive to SW Gaines Street was determined as a result of the proposed action, as detailed in the Traffic Impact Study (Jacobs and LRS Federal, 2022). As a result of comments received, a supplemental Traffic Impact Study for the Portland VAMC analyzed impacts to the Homestead Drive and Terwilliger Intersection, and has been included in Appendix D of the Final EA.
Dr. Robert F Bonner	After a 37 yr career in the US Public Health Service's Senior Biomedical Research Service at NIH in Bethesda, I understand that the VA may have compelling reasons for upgrading their facilities to better serve their patients and employees and wishes to simplify the process by issuing a EA finding of no significant impact. However, I am greatly concerned that the VA's submitted final draft Environmental Assessment fails to adequately address major risks for significant negative impact on the historic Terwilliger Parkway (National Historic Registry) and on its hillside forest and views and the neighboring Homestead community of which I am a resident. This EA appears hastily written and poorly edited, without demonstrable knowledge of the heavily wooded, steep, urban hillside environment of the Portland VA. The lack of reasonable risk analysis and justification for its statements of "no significant impact" in many of the required areas of environmental assessment is shocking. The Portland VA complex is located on the steep western slope of Marquam Hill immediately above the historic Terwilliger Parkway, Portland's only 250 ft wide heavily forested scenic linear park.	The VA thanks you for your comments on the Draft EA. VA fully recognizes Terwilliger Parkway's eligibility for listing in the NRHP under the applicable National Register Criterion A. VA does not anticipate any direct or indirect impacts that would adversely affect Terwilliger Parkway as a result of additional traffic generated on the Parkway under the proposed action. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151). Correspondence received from OR SHPO during the NHPA Section 106 consultation process is provided in Appendix H of the Final EA. Terwilliger Parkway's listing includes the pedestrian paths, lighting, a border of secondary growth forest, and scenic viewpoints, it should be noted that any effects would be limited to vehicular traffic and confined to the physical road surface. As such, potential effects do not pose a risk to the Criterion A aspects of the resource. Terwilliger Boulevard has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's NRHP listing will also not be affected by the undertaking because standard re-pavement alterations, continual maintenance, and growth over time do not affect its listing under Criterion A, or its integrity. The proposed action will not have any direct impacts to Portland's only 250 foot wide heavily forested scenic linear park surrounding the VAMC campus. Further visual or aesthetic impacts adjacent to the campus are not anticipated to be significant. The VAMC campus upgrades will be visually consistent with the rest of the campus and new building heights will not exceed that of current buildings. Indirect visual impacts from construction equipment would be temporary and intermittent during the construction period. The VA team will deploy an environmental representative responsible for ensuring commitments and best management practices identified in the EA are met.
	Historically the northeast section of the VA property has experienced a number of landslides and the entire complex is at high to very high risk for deep landslides https://gis.dogami.oregon.gov/maps/slido/). It is ironic that a major justification for the expanded VA	The VAMC buildings are in need of seismic retrofits to comply with Portland's seismic design requirements. Construction activities on the campus would be temporary, but the result would improve the safety of VAMC staff and patients for years to come. While the VA cannot predict

Stakeholder	Stakeholder Comment	VA Comment Response
	construction project is the seismic upgrade to the VA hospital complex to minimize hazards in a Cascadian Subduction zone earthquake. A major risk for the VA in such an CSZ event is that all access roads such as US Veterans Hospital Road and Terwilliger Parkway will be inaccessible to vehicular traffic due to landslides and downed forest trees. So increasing the dependence of employees and patients on increased vehicle use by a major expansion of onsite parking will worsen the effectiveness of any required evacuation. The large 800 parking space increase proposed and increased use of private vehicles is also at odds with the current planning for a SW light rail system including a Marquam Hill connector which was not mentioned or analyzed in the EA. Adding increased employee parking will add to this burden and greatly increase the risk for pedestrian injury particularly after the completion of the Marquam Hill Connector (Light Rail).	future seismic activity, the proposed undertaking incorporates beneficial safety improvements within the VAMC campus. The VAMC employs a large work force of approximately 4,500 employees with only one thousand staff-designated parking spaces. The VAMC is currently experiencing a parking deficiency, so the proposed six hundred net new spaces serve to alleviate the current parking deficit. The supporting traffic studies, provided in Appendix D of the Final EA, examined the projected traffic growth on SW Terwilliger Boulevard as a result of the proposed action, and the results show that the proposed action would result in a maximum of approximately 746 new daily trips in 2030 (which is a maximum of 8.2% increase in projected average daily trips over the no-build scenario). VA has implemented several alternative transportation incentives and subsidies to reduce the number of vehicles accessing the campus, such as the extensive use and promotion of public transportation; government funded transport options, including the Portland Vancouver shuttle; and carpooling to reduce single-occupancy vehicle trips to the VAMC campus. These currently implemented travel demand management programs will continue and will be expanded upon regardless of the action proposed. VA was optimistic about the light rail expansion as a commuting option for VAMC staff; however, TriMet Metro issued a statement regarding the Southwest Corridor expansion stating, ‘In November 2020, voters rejected Measure 26-218 (also known as Get Moving 2020), a proposal to fund the Southwest Corridor Light Rail Project and many other transportation programs across the region. At this time, the project is on hold until funding is identified.’ The light rail expansion is not moving forward at this time and preliminary design efforts for the Southwest Corridor Light Rail Project have been halted.
	As a local resident living just below Terwilliger Parkway on Bancroft, I observe the interacting daily traffic jams at the closely packed successive intersections of SW Hamilton Terrace & Bancroft St, Hamilton Terrace & Terwilliger Blvd, Terwilliger & Homestead Dr, Terwilliger and US Veterans Hospital Rd, Condor Ave & Terwilliger, and Terwilliger and Campus Drive. All these intersections are failing during employee rush hours and should be carefully studied in a time window without pandemic related reductions in traffic to the Marquam Hill medical complexes.	VA supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address existing operational issues at these intersections and improve traffic conditions. To further address comments received, a supplemental Traffic Impact Study was conducted in June 2022 which provides detailed analysis of the following additional intersections: SW 6th Avenue and SW Sherman Street, SW 6th Avenue and SW Sheridan, SW Condor Lane and SW Terwilliger Boulevard, SW Terwilliger and Homestead Drive, SW Hamilton Terrace and SW Terwilliger Boulevard, SW Hamilton Terrace and SW Bancroft Street, SW Hamilton Street and SW Terwilliger, and SW Terwilliger and SW Capitol Highway. Additionally, the supplemental June 2022 Traffic Impact Study reanalyzed SW Terwilliger and SW Campus Drive as well as SW Terwilliger and SW US Veterans Hospital Road as primary intersections of concern for the VA. The supplemental June 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022a) is provided in Appendix D of the Final EA. Please also note that the 2020 traffic analysis includes adjustments made to traffic volumes to better reflect pre-Coronavirus Disease 2019 (COVID-19) volumes. Because the Portland VAMC was restricting all visitors, guests, and persons under the age of eighteen during this time, the traffic engineering team developed the method for adjusting volumes to pre-COVID-19 levels, as described in Section 2.3 of the Traffic Impact Study (Jacobs and LRS Federal, 2022) and provided in Appendix D of the Final EA.

Stakeholder	Stakeholder Comment	VA Comment Response
		Please also note that nearly 80% of VAMC staff remained on the front line since the start of the COVID-19 pandemic, providing health care to patients. The COVID-19 pandemic has impacted healthcare in many ways. While there has been an increased presence of telemedicine, there has also been an overwhelming need for testing centers, hospitalization, and inpatient services to meet the needs of Portland area Veterans. The VAMC continues to offer diagnostic testing for Veterans enrolled in VA health care and who meet the CDC testing criteria. The VAMC mission is to provide comprehensive healthcare services to Portland area Veterans through a vast array of healthcare delivery methods. Telemedicine is used as one such option but does not replace or limit other options available to Veterans healthcare services. Opportunities to telecommute or for telemedicine do not negate the purpose and need for the proposed undertaking. The VA brought non-bargaining unit employees back to the office as of the week of March 14th 2022 and expects bargaining unit employees to return to the office by May. The office reentry affects only a portion of the VA's total workforce.
	In many other ways the EA is superficial and fails to identify the obvious potential for serious environmental impact of the proposed expanded project. My concern is this superficial and naive conclusion of no significant risk will prevent risk mitigation in the final design and construction plans and almost certainly lead to lasting but preventable environmental damage. Given the numerous factual and legal inadequacies in the draft EA, including its incorrect conclusion that the project would have no significant impacts, I request that the VA withdraw the document and conduct a new NEPA analysis addressing these concerns and issue a draft EIS for further public comment. Veterans Administration Hospital Environmental Assessment Final Draft Comments.	The VA does not expect it will be necessary to conduct an Environmental Impact Statement for the proposed action based on the analysis provided in the Draft EA, substantiated by the supplemental baseline reports as provided in the Final EA; however, VA remains committed to working with the local community to ensure that any potential impacts are minimized.
Jack Liskear, Carol Henry, Timothy Henry, Robin Vesey, and Anton Vetterlein	In particular, I find the following areas poorly analyzed or not addressed in the final Draft EA: **Draft Environmental Analysis (DEA):** 3.1.1 The historic resource we are advocating to protect is "Terwilliger Parkway", of which Terwilliger Blvd. is one part. The parkway includes public park land on either side of the boulevard. The Terwilliger Parkway as a whole district has been listed on the National Register of Historic Places, not just the roadway. The DEA makes reference only to "Terwilliger Boulevard". 3.1 The DEA ignores impacts to the aesthetics of Terwilliger Parkway. Increased traffic and the visibility of Bldg. 110 will negatively impact the natural and scenic qualities enjoyed by walkers, bikers, and runners from throughout Portland and the region. Construction impacts will be especially disruptive to the aesthetics of the parkway. The visibility and intrusiveness of Bldg. 110 depends on how it is designed; if it is reflective or brightly lit or colored then it will stand out from the natural surroundings and will have more of a negative impact on the natural aesthetics of the parkway. Bldg. 110 will be visible from Terwilliger, especially when leaves are off the trees, but there is no discussion of how building materials will affect its appearance. 3.2 The DEA ignores impacts to the air quality of Terwilliger Parkway. 1356 additional daily car trips a day, on top of the several thousand already, will certainly affect the air quality. The Terwilliger pathway is used by many walkers, bikers, and runners for exercise, training, and relaxation and would be negatively impacted by reduced air quality. Diesel emissions from construction vehicles will be especially harmful to those using the parkway.	The VA thanks you for your comments on the Draft EA. **Draft Environmental Analysis (DEA):** Response to comments on Section 3.1, 3.1.1 and 3.2: The APE for the proposed undertaking accounted for all possible effects to the historic integrity of Terwilliger Parkway including land adjacent to Terwilliger Boulevard. VA fully acknowledges that Terwilliger Boulevard is one portion of Terwilliger Parkway, as recognized under the NRHP. Editorial errors in Section 3.3 Cultural and Historic Resources of the Draft EA that reference Terwilliger Boulevard as a NRHP-listed historic resource have been addressed in the Final EA (refer to Section 3.3 Cultural and Historic Resources). The historical significance of the Parkway satisfies Criterion A within the National Register Criteria for Evaluation. No improvements to the Parkway, changes to speed limits, or traffic configurations are proposed by the VA as part of this undertaking. Moreover, character-defining features will remain intact. The Parkway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historic-period road over time. Further, the road surface does not represent any distinctive characteristics of a type, period, materials, or method of construction. Nor does the road represent the work of a master with artistic value, and therefore, the Parkway does not possess Criterion C significance. VA has consulted with OR State Historic Preservation Office (SHPO) and tribal affiliates regarding the proposed undertaking and any potential effects to historic resources, including Terwilliger Parkway. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151). Correspondence received from OR SHPO is provided in Appendix H of the Final EA.

Stakeholder	Stakeholder Comment	VA Comment Response
	3.3 The DEA ignores impacts to the historic resources of Terwilliger Parkway. The parkway was conceived by J.C. Olmsted as a "pleasure drive" and "an informal picturesque parkway". One of the goals of the Terwilliger Parkway Corridor Plan of 1983 is "To reinforce the primary transportation function of the parkway as a leisurely, scenic drive and a bicycle commuting path, rather than a heavily used route for vehicular through traffic." Existing traffic levels in the morning and evening commutes are already far in excess of this historic function of the parkway; the proposed increase will certainly make it worse and must be addressed. Also, the proposal for traffic signals and additional turning lanes is out of character with the historic function of the parkway.	Response to comments on Section 3.3: While Terwilliger Boulevard's listing includes the pedestrian paths, adjacent parkland, and lighting, it should be noted that there are no planned activities that impact the integrity of location, design, setting, feeling, and association of Terwilliger Parkway. New buildings, including Building 110, would be designed to be architecturally and visually consistent with the existing Portland VAMC campus buildings (e.g., colors, lighting, building heights) and forested areas around the perimeter of the campus would remain intact. Architectural details would be determined during the structural design phase. Proposed building heights would also not exceed the heights of existing structures. As such, physical changes to the VAMC campus, such as the addition of the Specialty Care Building and new/expanded parking structures, would not detract from the aesthetics or historical value of Terwilliger Parkway or surrounding area and more specifically, would not pose a risk to the Criterion A aspects of the historic resource. The VA is not proposing any alterations to the parkway or installation of traffic signals or turning lanes. As part of the analysis and engineering judgement, the Traffic Impact Study (Jacobs and LRS Federal, 2022) analysis made recommendations for non-VA mitigation measures to address existing and future traffic conditions regardless of whether the proposed action is implemented (refer to Appendix D in the Final EA).
	3.7 As with air quality, the noise impacts to Terwilliger Parkway are ignored. Noise has a similar impact to the diverse users of the parkway as bad air quality.	Response to comments on Section 3.7: Air quality within the vicinity of the Portland VAMC was analyzed, as provided in the Draft EA. The supporting Air Quality Resource Report (Jacobs and LRS Federal, January 2021a) has been provided in the Final EA (Appendix E). The Air Quality Resource Report was prepared for the VAMC campus to estimate the total emissions that would be generated by the proposed action from construction and operations. Any short-term air quality impacts from fugitive dust generated during construction would require monitoring to ensure that contractors implement best management practices (BMPs) mandated by the State of Oregon. The proposed action would also cause a potential net increase in long-term stationary combustion emissions because of increased boiler and emergency generator capacity; however, operational emissions associated with future project-related vehicle use and maintenance would be negligible. Upgrading energy utilities to potentially include renewable energy sources and/or improve efficiency of energy utilities would, at minimum, partially offset any anticipated increases in operational emissions. Noise pollution in the vicinity of the Portland VAMC campus and Terwilliger Parkway was analyzed in support of the Draft EA. A Noise Report (Jacobs and LRS Federal, January 2021) was also prepared in January 2021, and is included in Appendix F of the Final EA. There are no significant long-term operational noise impacts associated with the proposed undertaking. Minor increases to noise levels generated by employee and patient vehicular traffic, HVAC systems, ground maintenance equipment and activities, emergency vehicles, and infrequent use of generators are not anticipated to generate a significant noise impact for the area surrounding the Portland VAMC campus (Jacobs and LRS Federal, January 2021). Construction activities would comply with the City of Portland's noise regulations, limiting working hours to 7:00 a.m. through 6:00 p.m. on Monday through Saturday. Although not anticipated, VA would obtain a variance for any noise generating work being proposed outside of permissible hours. BMPs would be required, as part of the proposed action to mitigate noise, including complying with VA's "Temporary Environmental Controls" specifications and the City of Portland Noise Regulations (refer to Section 3.7 of the Draft EA for a list of BMPs that will be implemented to control noise impacts).

Stakeholder	Stakeholder Comment	VA Comment Response
	3.8 The DEA does not adequately address the land use impacts of the proposed action on Terwilliger Parkway. The Marquam Hill Plan (City of Portland, 2003) sets a limit of 1258 parking spaces in "Subdistrict D" which comprises the VAMC. This parking limit is intended to "reduce congestion and other transportation-related impacts on Terwilliger Boulevard and the neighborhoods surrounding the plan district." The total of existing and proposed parking spaces with this action will be around 2145 spaces, or 58% over this limit. The VA participated in the creation of the Marquam Hill Plan and expresses its intent to follow local laws but does not address this discrepancy in the DEA.	Response to comments on Section 3.8: The VA considered applicable local laws, standards, and guidelines. Although local zoning, ordinances, and related regulations do not apply to federally owned land such as the Portland VAMC, the VA intends to comply with the intent of these regulations, to the extent practicable. The VA emphasizes that minimal disturbance to undeveloped areas within the Portland VAMC campus is anticipated, resulting in less than significant impacts to surrounding land use. Prior to construction activity, a land use compatibility statement (LUCS) may be provided for ODEQ review and acceptance upon request to obtain any required state-issued permits (e.g., Portland Bureau of Environmental Services (PBES) Stormwater/Sanitary Discharge Permit, National Emission Standards for Hazardous Air Pollutants (NESHAP)/Oregon Department of Environmental Quality (ODEQ) Permit, or National Pollutant Discharge Elimination System (NPDES) stormwater permits), as applicable.
	3.13 The DEA does not adequately address the Traffic, Transportation, and Parking impacts to Terwilliger Parkway. It merely states that "Project activities are not anticipated to significantly impact existing or future traffic patterns around the VAMC campus." Additionally, the rationale that since the Terwilliger/VA Hosp. Rd. intersection is already at failing (Loss of Service-LOS F), it does not matter if more traffic is added, is disingenuous and conveniently fails to address the problem. The separate critique on the Traffic Impact Analysis (below) shows that the study was too narrowly focused to give an accurate picture of the actual traffic patterns and that its conclusions on impact are erroneous. 3.16 The discussion of Cumulative Impacts is incomplete and inaccurate. It states that most of the land surrounding the VAMC is in commercial and residential development, when in fact a comparatively high percentage is zoned Open Space and used for park and natural area purposes. Terwilliger Parkway to the east and Marquam Nature Park to the south and west comprise over 100 acres. And the cumulative impact of the current and proposed new parking and traffic have been completely ignored. The DEA dismisses the functional failure of two intersections in 3.13.2.1 as a pre-existing condition, but 3.16 states "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." This is also a good reason to extend the TIA to the additional intersections requested above. The narrow scope, lack of detail, and erroneous conclusions in this DEA show that a more in-depth Environmental Impact Study is required before the project should move forward.	Response to comments on Sections 3.13 and 3.16: The proposed undertaking may increase traffic on historic-period SW Terwilliger Boulevard; however, this change is not likely have adverse impacts to the historic Parkway. Terwilliger Boulevard has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's listing will not be affected by the undertaking because standard re-pavement alterations, continual maintenance, and growth over time along Terwilliger Boulevard do not affect its listing under Criterion A, or its integrity. Therefore, Terwilliger Parkway will not be affected by the proposed undertaking. As stated in the Draft EA, no activities are proposed outside of the Portland VAMC campus. The VA is not proposing traffic signals on any roadway, including SW Terwilliger Boulevard. Traffic mitigation measures, as typically provided in traffic analysis reports, were recommended in the supporting traffic impact study; however, they are not being pursued by the VA as part of the proposed action. The VA's actions would negligibly contribute to the overall functionality of nearby intersections. The supporting traffic studies, provided in Appendix D of the Final EA, examined the projected traffic growth on SW Terwilliger Boulevard as a result of the proposed action, and the results show that the proposed action would result in approximately 746 new daily trips in 2030 (which is a maximum of 8.2% increase in projected average daily trips over the no-build scenario). Minor cumulative impacts are anticipated through the implementation of the proposed action in conjunction with additional projected future traffic growth in the area as noted in Sections 3.13 Traffic, Transportation, and Parking as well as 3.16 Cumulative Impacts of the Final EA.
	Traffic Impact Study 1.0 The Draft Environmental Assessment says Traffic Impact Analyses (TIA) were done in 2021 and 2022, but the TIA itself says it was done in 2019 and 2020. 2.1 The traffic counts were done on one day only, and in 2020 only at peak hours, whereas comparable traffic studies (for OHSU, etc.) are for a period of several days and then averaged. This TIA does not provide a broad enough sample. 3.1 Background traffic growth of 1% over 10 years doesn't seem to anticipate a new 450 space parking garage being built at OHSU near the Campus Dr./Terwilliger intersection, along with an inpatient facility to accommodate 154 additional beds.	**Traffic Impact Study – Response to Comments:** The January 2022 Traffic Impact Study (refer to Appendix D of the Final EA) was prepared to address changes in the alternatives proposed by VA. Analysis provided in this study supplements the pre-COVID 2019 Portland VAMC Expansion TIA (Global Transportation Engineering, May 2019) by including 2020 traffic counts from five additional intersections as well as traffic recounts at the three original intersections counted in 2019. Traffic engineers collected these counts and made observations in December 2020 and re-analyzed the traffic operations under a full build of the proposed project and a no-build alternative. Typical engineering practice would estimate the number of trips generated based on calculations as defined in the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual*, 10th Edition[5] for the "610: Hospital" land use designation. Traffic engineers at Jacobs

Stakeholder	Stakeholder Comment	VA Comment Response
	3.2.2 Only traffic counts for pre-determined "peak hours" were used in the TIA (7:00-9:00 AM and 4:00-6:00 PM) but 24-hour traffic counts in 2019 show that the actual peak hours are 6:00 to 9:00 AM, and 3:00 to 7:00 PM (Table 3-1). Narrowing the peak hour period leaves out over 34% of true peak hour traffic. Both the VAMC and OSHU utilize staggered work hours, so the defined "peak hours" should be determined by the actual data rather than a generalized rule. Therefore, the TIA's conclusions for the intersections they studied are erroneous because they are based on incomplete or selected information. TIA states "…new Building 110 is a staff-only building with no new beds" and would thus generate only employee parking traffic, whereas VA staff says it will be a specialty care and outpatient facility. It is a known fact that outpatient facilities, especially one that is 300,000 sq. ft., will generate multiple patient trips over the course of the day rather than the single in and out of employee traffic. 3.2.3 The new parking garage, Bldg. 111, will be accessed from upper VA Hospital Rd. near SW Gaines St., with traffic likely coming up Homestead Dr./6th Ave Dr. to Gaines. Even though 45% of projected 2030 VA traffic will use SW Gaines St. those traffic impacts were not studied in the TIA. The intersection of Terwilliger and Homestead Dr. is necessary to study to understand the impacts of the biggest of the two proposed parking structures (with 650 parking spaces, nearly a third of all VA parking.) Much more VA bound traffic will likely be using the Homestead Dr./Terwilliger intersection (not analyzed) than the Campus Dr./Terwilliger intersection (was analyzed). Additionally, there is significant VA-bound traffic that goes through the nearby intersections of SW Condor Lane and SW Hamilton Terrace where they intersect SW Terwilliger Blvd. near the VA Hospital Rd. entrance. These intersections frequently back-up and/or are the sites of crashes, including pedestrians being hit in crosswalks, and therefore should be studied as well in the TIA. 4.1 Traffic signals as a mitigation or solution to the failed LOS at key intersections are not compatible with the Terwilliger Parkway Corridor Plan or the historic character of the parkway. Friends of Terwilliger will strenuously oppose any effort to change the configuration of the historic roadway or its traffic flow. In closing, I am registering a strong disagreement with the concluding statements that this project would have no impact on Terwilliger Parkway. I do not believe the draft EA is adequate to support the proposed VA project and I request that the deficiencies in the EA be remedied and reassessed, or that an environmental impact statement be prepared.	Engineering gathered site-specific data for the VAMC campus to provide more accurate trip generation forecasts. As noted, the OHSU Hospital Expansion Project proposed would add between 200 and 300 new patient parking spaces and is proposed to begin Spring 2022. Background growth, as it relates to the OHSU project, would have negligible impacts on the results of the traffic study as indicated in the supplemental June 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022a) and provided in Appendix D of the Final EA. Section 3.16 Cumulative Impacts has been updated in the Final EA in response to comments received regarding background growth generated from the proposed OHSU parking expansion. Table 3-1 in the January 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022) aggregates all exiting and entering vehicles observed per hour and provides total traffic counts. It further identifies the singular peak hour per day in which traffic volumes were at their highest. References to 7 – 9 AM and 4 – 6 PM are typical for traffic studies in that the AM peak hour usually occurs between 7 AM – 9 AM and the PM peak hour usually occurs between 4 PM – 6 PM. However, it is a singular hour that determines the peak traffic hour. Further analysis in the traffic study does in fact incorporate all traffic count data and does not exclude any data or further narrow the peak hour as defined. In regard to staggered work hours, the VA will utilize existing traffic data and available information from the VAMC medical center on work hours, shifts, ingress and egress to further evaluate traffic patterns on campus for maintenance of traffic during construction. Staff and patients will use the Specialty Care Building. Currently, most outpatient visits and VA business functions occur within the Main Hospital Building – Building 100. Outpatient services will be moved to Building 110 in order to allow space within Building 100 to provide single-bed rooms, with their own bathroom, for increased privacy and improved healthcare for our patients. The new Specialty Care Building will provide adequate space for outpatient services along with primary VA business functions. Additionally, having the new building will allow for seismic upgrades while accommodating staff, patients, and VA workload. The intersection at SW Homestead Drive and SW Terwilliger Boulevard was not identified during the planning stages for the VAMC improvements as an intersection of concern based upon engineering judgement. The intersection of SW 6th Avenue Drive and SW Gaines Street was analyzed and no operational issues were observed. Further, a minimal increase in right-hand turn volume from SW 6th Avenue Drive to SW Gaines Street was determined as a result of the proposed action. Construction related vehicles will not be accessing the VAMC campus using SW Homestead Drive and 6th Avenue Drive. VA is committed to coordinating with medical center staff to also ensure this route is not utilized as a primary route to the VAMC. The VA is not proposing traffic signals on any roadway, including SW Terwilliger Boulevard. Traffic mitigation measures, as typically provided in traffic analysis reports, were recommended in the January 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022); however, they are not being pursued by the VA as part of the proposed action. Based on the findings of the June 2022 supplementary study, no intersections operate below the minimum acceptable Level of Service (LOS) in any of the examined scenarios, including after full buildout of the proposed action in 2030.

Stakeholder	Stakeholder Comment	VA Comment Response
		To further address public comments received, VA has provided a supplemental Traffic Impact Study (Jacobs and LRS Federal, 2022a) in the Final EA (refer to Appendix D), which provides an impact analysis of SW 6th Avenue and SW Sherman Street, SW Terwilliger and Homestead Drive, SW Hamilton Terrace and SW Bancroft Street, SW Hamilton Terrace and Terwilliger Boulevard, SW Condor Lane and SW Terwilliger Boulevard, SW Hamilton Street and SW Terwilliger, SW Terwilliger and SW Capitol Highway, S. Bancroft Terrace and SW Terwilliger and SW 6th Avenue and Sheridan Street. The VA does not expect it will be necessary to conduct an Environmental Impact Statement for the proposed action based on the analysis provided in the EA, substantiated by the supplemental and baseline reports as provided in respective appendices.
Friends of Terwilliger	Given the numerous factual and legal inadequacies in the draft EA, including its incorrect conclusion that the project would have no significant impacts, FoT requests that the VA withdraw the document and reconduct its NEPA analysis in an environmental impact statement ("EIS") that addresses the concerns detailed below and is made available for further public comment.	The VA thanks Friends of Terwilliger for comments on the Draft EA. The VA does not expect it will be necessary to conduct an Environmental Impact Statement for the proposed action based on the analysis of potential environmental impacts provided in the Draft EA and substantiated by supplemental-baseline reports. No significant impacts to environmental resources are anticipated as a result of the proposed undertaking. As noted in comments received (refer to footnote), a final rule revising the regulations was published on July 16, 2020 and became effective on September 14, 2020. CEQ subsequently issued an Interim Final Rule on June 29, 2021, which extended the deadline by two years (to September 14, 2023) for Federal agencies including VA to develop or update their NEPA implementing procedures to conform to the CEQ regulations. On October 7, 2021, CEQ published Phase 1 Notice of Proposed Rulemaking, initiating a 45-day comment period. The proposed rule announces a narrow set of proposed changes to generally restore regulatory provisions that were in effect for decades before the 2020 rule modified them for the first time.
	I. The draft EA's Purpose and Need Statement is too narrow. The draft EA's purpose for the proposed action lists three distinct objectives for the project: (1) "correct seismic deficiencies," (2) "address federal setback and physical security requirements," and (3) "provide sufficient patient and staff parking facilities." These three unique objectives are largely independent of one another, and the EA's proposed action describes their implementation at separate locations across the property on a variety of different buildings and lots. EA at 7. By narrowly defining the project's purpose and need to require all three objectives be satisfied by the proposed project, the VA effectively eliminated an array of otherwise reasonable alternatives from review that would accomplish the broad goals of the project. For example, the draft EA did not consider alternatives that implemented the seismic upgrades and building modernization components of the project, but did not expand the parking capacity. EA at 7–9. Ultimately, this resulted in the alternatives considered by the EA to be largely the same as the proposed action, defeating NEPA's purpose of requiring agency's consider alternatives in the first place. Additionally, the VA ignored the request made by FoT in its scoping comments asking that the agency expressly include language in the purpose and need statement that indicated the project's need to adhere to local planning guidelines and city ordinances to the fullest extent practicable in order to preserve Terwilliger Parkway in a manner consistent with those ordinances and planning documents. Doing so would have directly aided the VA in accomplishing its own policy objective to "[p]reserve historical,	**I. The draft EA's Purpose and Need Statement is too narrow.** EPA requires federal agencies to consider the potential environmental impacts of their proposed actions and is used as a planning and decision-making tool. No new operational programs or additional health care services are being proposed as part of the proposed action. Alternatives that were not viable or failed to meet the existing infrastructure needs at the Portland VAMC were eliminated from further consideration. The VA considered applicable local laws, standards, and guidelines when developing the purpose and need statement for the proposed action. Although local zoning, ordinances, and related regulations, do not apply to federally owned land such as the Portland VAMC, the VA intends to comply with the intent of these regulations, to the extent practicable. The VA emphasizes that minimal disturbance to undeveloped areas within the Portland VAMC campus is anticipated, resulting in less than significant impacts to surrounding land use. The COVID-19 pandemic has impacted healthcare in many ways. While there has been an increased presence of telemedicine, there has also been an overwhelming need for testing centers, hospitalization, and inpatient services to meet the needs of Portland area Veterans. The VAMC continues to offer diagnostic testing for Veterans enrolled in VA health care and who meet the CDC testing criteria. The VAMC mission is to provide comprehensive healthcare

Stakeholder	Stakeholder Comment	VA Comment Response
	cultural, and natural aspects of our national heritage," by respecting the local guidelines and ordinances enacted to protect those values. 38 C.F.R. § 6.4(a)(2). Despite stating that the EA was prepared in accordance with the agency's regulations found in 38 C.F.R. § 26, the VA did not explicitly incorporate those requirements in its purpose and need statement. See EA at ii, 5. Not only did the VA not explain its reasoning for rejecting FoT's request, but it would proceeded to violate the policy objectives it claimed to abide by, proposing actions that violate local guidelines and ordinances intended to protect historical, cultural, and natural resources of the project area. Furthermore, the draft EA did not acknowledge or respond to FoT's request in its scoping comments that the VA fully analyze the likely impacts that the projected growth of remote telemedicine and telecommuting may have on the demand for staff and patient parking at the VAMC. Scoping Comments at 7; attached as Ex. G. Despite the VA clearly beginning to develop this proposal prior to the COVID-19 pandemic, the draft EA does not mention the myriad of ways in which society, work, and medicine have changed in the intervening years. The EA needed to reevaluate the many assumptions present in the plan regarding parking demand, how healthcare is provided, and what is expected from healthcare workers in light of what the pandemic response has shown is possible and in many cases preferable. Absent such analysis it is unclear whether the VA's stated need to expand parking is as strong as characterized in the EA. EA at 5. Therefore, FoT requests the VA reissue its analysis including a discussion of the impacts of COVID-19 and the shift to remote work and health care that may continue even after COVID restrictions are eased, as well as consider alternatives that prioritize remote healthcare in order to alleviate some of the purported demand for parking. Given the demonstrated inadequacies in the EA's purpose and need statement for the project, FoT requests the VA retract the EA and revise the statement to comply with NEPA and the agency's own implementing regulations.	services to Portland area Veterans through a vast array of healthcare delivery methods. Telemedicine is used as one such option but does not replace or limit other options available to Veterans healthcare services. Opportunities to telecommute or for telemedicine do not negate the purpose and need for the proposed undertaking. The VA brought non-bargaining unit employees back to the office as of the week of March 14th 2022 and expects bargaining unit employees to return to the office by May. The office reentry affects only a portion of the VA's total workforce. Nearly 80% of its employees remained on the front line since the start of the COVID-19 pandemic, providing health care to patients and administering services at national cemeteries. The VA does not expect it will be necessary to conduct an Environmental Impact Statement for the proposed action based on the analysis provided in the EA and substantiated in supplemental reports.
	II. The EA did not analyze an adequate range of alternatives. Despite the VA's obligation to consider reasonable alternatives, the VA examined in its EA only two alternatives, which were substantially similar to both each other and the proposed action. EA at 7–9. In doing this, the VA ignored additional alternatives that were reasonable given the circumstances, including those proposed by FoT in its scoping comments. Ex. G at 5–7. **A. The VA did not consider an alternative that involved only implementing the necessary seismic upgrades.** As stated above, the VA's narrow tailoring of the project's purpose and need statement artificially constrained the agency from considering reasonable alternatives to the proposed action including one that implemented only the seismic upgrade components of the project. Analyzing this alternative would have allowed the VA to explore the impacts of the seismic retrofitting only, which would be completed entirely on existing structures. Limiting the project to seismic retrofitting would obviate concerns regarding the negative impacts of additional traffic because parking capacity would not be increased, and would avoid potential visual incursions into Terwilliger Parkway and adjacent public spaces because no new structures would be constructed. Given that the bulk of the project's potential impacts are linked to the increased number of parking spaces and its associated effects, and not the seismic upgrades this alternative should have been considered and the VA's failure to do so was unreasonable. Such analysis is required under CEQ's NEPA regulations which instruct federal agencies to evaluate to the fullest extent possible all reasonable	**II. The EA did not analyze an adequate range of alternatives.** **A. The VA did not consider an alternative that involved only implementing the necessary seismic upgrades.** Thank you for the alternative suggested. In response to comments received, Section 2.3 Alternatives Eliminated from Further Consideration has been updated in the Final EA. Section 2.3 describes alternatives that were not viable or failed to meet the purpose and need for the proposed action along with VA's rationale for eliminating them from further consideration. Addressing seismic deficiencies would only address a small portion of the existing infrastructure needs on the Portland VAMC campus and as such, an alternative that involved only implementing seismic upgrades would fail to meet the purpose and need for the VA proposed action. Therefore, alternatives that did not meet the purpose and need for the proposed action were not considered in the EA analysis.

Stakeholder	Stakeholder Comment	VA Comment Response
	alternatives that will avoid or minimize adverse effects of the proposed action to the quality of the human environment. 40 C.F.R. § 1500.2(e).	
	II B. The VA did not consider an alternative that involved only implementing the necessary seismic upgrades and improvements to other existing structures. Similar to the alternative suggested above, FoT in its scoping comments proposed the VA consider an alternative that implemented the necessary seismic upgrades and improvements to existing buildings. Ex. G at. 5–7. This alternative would reduce the potential impacts of traffic compared to those considered in the EA, but would still result in a net gain of 150 parking spaces through the extension of Building 108's parking structure. This alternative was not considered by the VA in the draft EA despite its addressing all three of the stated purposes of the project. Conversely, the EA did not consider an alternative that included the seismic retrofitting, building upgrades, and the addition of the new 650-space parking garage, but not the existing garage expansion. EA at 9. Again this alternative would meet the stated purpose and need of the project and while it may still incur some of the associated traffic impacts as the proposed action, it would be to a lesser extent due to the comparatively reduced number of total spaces being added. The VA's exclusion of such reasonable alternatives from its analysis without providing any reasoning as to why those alternatives were infeasible or did not meet the project's purpose and need demonstrates the agency did not meet its obligations under NEPA to consider reasonable alternatives. Instead, the VA seems committed to a significant expansion of parking, refusing to consider any alternatives that do not more drastically expand the number of spaces, thereby increasing the likelihood of more significant impacts on the character of the surrounding area.	**II B. The VA did not consider an alternative that involved only implementing the necessary seismic upgrades and improvements to other existing structures.** Thank you for the alternative suggested. In response to comments received, Section 2.3 Alternatives Eliminated from Further Consideration has been updated in the Final EA. Section 2.3 describes alternatives that were not viable or failed to meet the purpose and need for the proposed action along with VA's rationale for eliminating them from further consideration. Neither alternative considered in the Draft EA results in significant or adverse environmental impacts. Increased parking availability would result in improved traffic flow on campus and reduce queuing on adjacent roadways by increasing parking availability and efficiency. The VA is seeking an additional 600 net new parking spaces to aide in addressing the current parking deficit at the VAMC campus. Suggested alternatives would only add between 150 parking spaces via Building 108 and 450 parking spaces via Building 111.
	II C. The VA did not consider an alternative that addressed parking concerns by expanding usage and parking for the Portland Aerial Tram. Given the VA's claimed demand for staff parking that the VA describes in its analysis, the EA should have considered alternatives that could address those needs without expanding the actual parking footprint on the campus. One obvious solution would be to utilize the Portland Aerial Tram, which connects the VAMC via OHSU to the intersection of South Moody & Gibbs at the base of Marquam Hill. The tram drops riders off at a central location on OHSU's campus only several hundred feet away from the enclosed pedestrian skybridge that connects the two facilities. VA employees ride the tram for free with a VA Portland Healthcare System Employee badge, so there are limited impediments to increasing ridership by those who would otherwise need a parking space on the VAMC campus. Increasing incentives for tram usage, or even expanding the parking area at the tram's base should have been alternatives considered by the EA as they would satisfy the stated purpose and need of the project without jeopardizing Terwilliger Parkway to the impacts of increased traffic. While the tram is owned and maintained by the city of Portland, CEQ's implementing regulations expressly require an EIS to consider "reasonable alternatives that are not within the jurisdiction of the lead agency." 40 C.F.R. § 1502.14(c) (emphasis added). As a result, an agency's refusal to consider an alternative that would require some action beyond that of its congressional authorization is counter to NEPA's intent to provide options for both agencies and Congress. Thus, any concerns about the jurisdiction of the VA to take on such a project are not	**II C. The VA did not consider an alternative that addressed parking concerns by expanding usage and parking for the Portland Aerial Tram.** Thank you for the alternative suggested. In response to comments received, Section 2.3 Alternatives Eliminated from Further Consideration has been updated in the Final EA. Section 2.3 describes alternatives that were not viable or failed to meet the purpose and need for the proposed action along with VA's rationale for eliminating them from further consideration. VA has implemented several alternative transportation incentives and subsidies, such as the extensive use and promotion of public transportation; government funded transport options, including the Portland Vancouver shuttle; Portland Aerial Tram; and carpooling to reduce single-occupancy vehicle trips to the VAMC campus. Approximately 30 current VA staff commute via bicycle to the Portland VAMC. The currently implemented travel demand management programs will continue to be enhanced and expanded to further reduce the number of current and future passenger car trips to the Portland VAMC as well as the demand for parking. Even with the success of the VA travel demand programs, the Portland VAMC has a deficiency of parking spaces for existing staff, patients, and visitors. An expansion of parking for the Portland Aerial Tram would not fall under the jurisdiction of the VA. The tram is part of Portland's public transportation system and is operated in coordination with TriMet and Portland Streetcar. The regulations cited pertain to an Environmental Impact Statement, not an Environmental Assessment. NEPA requires Federal agencies to consider reasonable or feasible alternatives in

Stakeholder	Stakeholder Comment	VA Comment Response
	relevant to whether that option should have been considered in the analysis of reasonable alternatives. Therefore, the draft EA should have considered an alternative expanding the usage and/or parking available to the VA staff at the base of the Portland Aerial Tram.	an Environmental Assessment rather than an infinite range. Additionally, the Council on Environmental Quality has concluded that it is not efficient or reasonable to require agencies to develop detailed analyses relating to alternatives outside the jurisdiction of the agency (85 FR 43330, July 16, 2020). Thus, VA evaluated alternatives which meet the need and purpose of the agency and are technically feasible based on VA's authority.
	II D. The draft EA did not consider an alternative that emphasized telehealth options to reduce the need for parking on campus. As explained above and in FoT's scoping comments, the landscape of remote healthcare and work has changed dramatically since the inception of this project. FoT, in its scoping comments explicitly called upon the VA to address these changes and how they might impact the need for and alternatives to the project. Scoping Comments at 7. Unfortunately, the VA did not respond to this request and the VA itself is devoid of references to the ways in which the COVID-19 pandemic has shaped the need for this project. The EA claims that there is a demonstrated demand for staff parking on campus. EA at 5. Yet, it does not describe whether that demand still exists or has even been measured in the reality of the post-COVID world, and whether there still are or needs to be as many employees coming in to work on a daily basis. The COVID restrictions demonstrated that some health care can effectively be provided remotely, and such practices may continue even after COVID restrictions are eased. The VA should consider an alternative that focuses on providing more health care remotely and therefore requires less on-site parking, just as many businesses are reviewing the need for all work to be performed at one centralized office location. While FoT recognizes there will always be a need for in-person healthcare options, the EA's failure to consider or even recognize that alternatives might exist that encourage and support remote healthcare options is unreasonable. An alternative that embraced telehealth would allow the VA to meet its stated seismic and building purpose and need through those independent portions of the project, while alleviating some of the staff demand for parking by facilitating remote options where feasible. FoT requests that in its EIS reanalyzing the project, the VA consider such an alternative.	**II D. The draft EA did not consider an alternative that emphasized telehealth options to reduce the need for parking on campus.** Thank you for the alternative suggested. In response to comments received, Section 2.3 Alternatives Eliminated from Further Consideration has been updated in the Final EA. Section 2.3 describes alternatives that were not viable or failed to meet the purpose and need for the proposed action along with VA's rationale for eliminating them from further consideration. The COVID-19 pandemic has impacted healthcare in many ways. While there has been an increased presence of telemedicine, there has also been an overwhelming need for testing centers, hospitalization, and inpatient services to meet the needs of Portland area Veterans. The VAMC mission is to provide comprehensive healthcare services to Portland area Veterans through a vast array of healthcare delivery methods, telemedicine is used as one such option but does not replace or limit other options available to Veterans for receipt of healthcare services. Opportunities to telecommute or for telemedicine do not negate the purpose and need for the proposed undertaking. The VA brought non-bargaining unit employees back to the office as of the week of March 14th 2022 and expects bargaining unit employees to return to the office by May. The office reentry affects only a portion of the VA's total workforce. Nearly 80% of its employees remained on the front line since the start of the COVID-19 pandemic, providing health care to patients and administering services at national cemeteries.
	II E. Both the proposed action and alternatives considered are not consistent with local regulations. FoT remains concerned about components of the proposed action and alternatives that are plainly inconsistent with local ordinances as well as the VA's own NEPA implementing regulations. Terwilliger Parkway's 2.5-mile length and 115 acres are listed on the National Register of Historic Places as an example of the City Beautiful ideals of the nationally renowned Olmsted Brothers Landscape Architects. NRHP Listing form at 3; attached as Ex. A. Additionally, Terwilliger Parkway includes an ecologically important Forest Corridor. Id. This makes the VA's compliance with 40 C.F.R. § 1502.16(c) and § 1502.16(g) – which require agencies to discuss any possible conflicts between the proposed action and the objectives of local land use plans, policies, and controls for the area concerned and to evaluate the environmental impacts of the proposed action on historic and cultural resources – especially critical. In addition, the VA's own environmental policy requires the agency to "preserve historical, cultural, and natural aspects of our national heritage." 38 C.F.R. § 6.4(a)(2). In furtherance of the VA's own policy to preserve such resources, FoT asked in its initial comments that the VA analyze in-depth alternatives that did not sacrifice the nature and quality of the Terwilliger Parkway Corridor. Ex. G at 7–9. Specifically, FoT requested that the VA develop and analyze alternatives that are consistent with local regulations and ordinances including the Terwilliger Parkway Corridor Plan ("TPCP") and the Marquam Hill Plan ("MHP"). See Bureau of Planning, City of Portland,	**II E. Both the proposed action and alternatives considered are not consistent with local regulations.** The VA remains committed to avoiding disturbance of the 250 foot wide heavily forested scenic linear park and ecological resources surrounding the VAMC campus. The VA will also avoid disturbance of trees and vegetation on campus between April 15 and July 31 to avoid impacts to nesting birds in accordance with the requirements of the Migratory Bird Treaty Act (MBTA). Finally, the VA will clearly demarcate any limits of clearing on campus prior to construction activities to ensure wooded areas and surrounding wildlife corridors are avoided. As stated in Section 3.6 Wildlife and Habitat of the Draft EA, the proposed action would require minimal tree clearing on campus. The VA considered applicable local laws, standards, and guidelines. Although local zoning, ordinances, and related regulations do not apply to federally owned land such as the Portland VAMC, the VA intends to comply with the intent of these regulations, to the extent practicable. The VA emphasizes that minimal disturbance to undeveloped areas within the Portland VAMC campus is anticipated, resulting in less than significant impacts to surrounding land use.

Stakeholder	Stakeholder Comment	VA Comment Response
	Oregon, Marquam Hill Plan, Ordinance No. 177739 (Aug. 2003); attached as Ex. C; see also Terwilliger Parkway Corridor Plan, Ordinance No. 155241 (Oct.1983); attached as Ex. D. The VA's proposed action and the studied alternatives are at odds with a number of these goals, policies, and objectives. For example, TPCP Goal II (F) to maintain the "primary transportation function of the parkway as a leisurely, scenic drive and a bicycle commuting path, rather than a heavily used route for through traffic" will likely be jeopardized by increased traffic congestion resulting from higher parking capacity at the Medical Center, as implemented under the proposed action and Alternatives A and B. Similarly the TPCP Transportation Policy C(3) explicitly refer to limiting increases in traffic volumes to the extent practical, and to the extent that traffic must be increased, it must be reduced so as to not require turn lanes and traffic signals that would take away from the historic nature of the Parkway. FoT also requested that, should the VA advance any actions or alternatives that are inconsistent with these regulations and ordinances, the VA analyze how to minimize adverse impacts to the resources these plans seek to protect. See 40 C.F.R. §§ 1500.2(e) and (f), 1502.16(h). Additionally, the Marquam Hill Plan sets a limit of 1,258 parking spaces in "Subdistrict D" which comprises the VAMC. MHP at 164, 173. This parking limit is intended to "reduce congestion and other transportation-related impacts on Terwilliger Boulevard and the neighborhoods surrounding the plan district." Id. The total of existing and proposed parking spaces with this action will be around 2145 spaces, or 58% over this limit. Portland Veterans Affairs Medical Center Traffic Impact Study, U.S. Department of Veterans Affairs (January 2022) ("TIA" or "the study") Appendix C–7; attached as Ex. B. The VA participated in the creation of the Marquam Hill Plan and expresses its intent to follow local laws but does not address this discrepancy in the draft EA. Given the clear limits on parking in the area would be further exceeded by the proposed action and the alternatives considered by the EA, this underscores why the EA needed to consider an alternative like aerial tram option that would serve the employee parking needs without adding parking spaces to the already crowded area. Because the proposed action itself was not consistent with local regulations governing development in the area, the VA should have considered alternatives that complied with those requirements. For a complete alternatives analysis the agency needed to examine whether such options met the project's purpose while also satisfying local regulations so as to reduce the impact on the project area.	
	III. The Draft EA's conclusion that the project will have no significant effects is flawed and not supported by the VA's own analysis: The draft EA incorrectly concluded that the proposed action and its alternative's impacts would be "less than significant" on each of the many resources contained in the project area. EA at iv–vii. However, the draft EA's analysis in support of these findings, is in many cases flawed, incomplete, and ultimately inadequate to support the VA's underlying conclusion the project will not have a significant effects. **A. The draft EA does not adequately analyze the project's impact on cultural and historic resources:** The draft EA's analysis of the project's impacts on cultural and historic resources focuses primarily on the lack of significant impacts to historic resources on the VAMC campus. The draft EA asserts that because the VAMC campus is already developed and has historic buildings protected under the NHPA	**III. The Draft EA's conclusion that the project will have no significant effects is flawed and not supported by the VA's own analysis:** **A. The draft EA does not adequately analyze the project's impact on cultural and historic resources:** In accordance with the NHPA and its implementing regulations, VA has fully assessed potential impacts to historic properties, including the historic Terwilliger Parkway, that may result from the proposed seismic upgrades and improvements at the Portland VAMC. The regulations governing the Section 106 review process (36 CFR 800) are available on the Advisory Council on Historic Preservation website at http://www.achp.gov. VA has consulted with SHPO and tribal affiliates. Correspondence received from SHPO, including concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151), has been included in Appendix H of the Final EA.

Stakeholder	Stakeholder Comment	VA Comment Response
	on the property, that the likelihood of significant historical impacts is low. EA at 15–17. To the extent that the draft EA does consider impacts of the project outside the VAMC campus, it relies on the VA's section 106 analyses under the National Historic Preservation Act (NHPA). EA at 14–16. However, as FoT explained to the VA in its section 106 consultation letter response, the agency's impact analysis under the NHPA was fundamentally flawed in both its scope and assessment of impacts and was therefore inadequate. FoT Consult Letter Response at 3–9; attached as Ex. H. Both the draft EA and the VA's section 106 analysis fail to properly identify the area of potential effect (APE) of the project. 36 C.F.R § 800.6 clearly defines the term as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" and "is influenced by the scale and nature of an undertaking" § 800.6(d). Yet, despite this clear definition, both the draft EA and section 106 analyses by the VA incorrectly identify the APE for the project as only the VAMC campus and SW Terwilliger Boulevard. EA at 15, 106 Consultation Letter at 2–3; attached as Ex. F. Terwilliger Parkway is listed as an entire district on the National Register of Historic Places ("NRHP"), and consists of more than merely Terwilliger Boulevard. National Register of Historic Places Registration Form: Terwilliger Parkway, National Parks Service, (Aug. 10, 2020). The Parkway includes not only the road itself, but also the public parkland on either side of the roadway. Because the APE was not identified to include the Parkway as a whole, see EA at 15 and Ex. F at 2 (only including Terwilliger Blvd in the APE), it follows that "the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the [APE]" were not adequately considered or addressed in the VA's analysis. The inadequacy of the VA's analysis on this point is reflected in the impacts discussed in the EA, which discusses solely how the project may impact the road itself, and not the many user groups such as pedestrians and cyclists who use the Parkway as whole.	To assist in determining the APE for the undertaking, a Cultural Resources Inventory (SWCA and LRS Federal, May 2021) was prepared, which fully examined past planning, research, and cultural studies. The inventory has been provided in Appendix G of the Final EA. VA determined the APE to consist of the entire Portland VAMC campus, including footprints of existing buildings and parking locations as well as for construction around the perimeter of each location, and Terwilliger Parkway, which became listed in the NRHP in March 2021 as noted. VA fully acknowledges that Terwilliger Boulevard is one aspect of Terwilliger Parkway, as recognized under the NRHP. The nature and location of historic properties within the defined APE for the proposed undertaking was fully considered as part of VA's environmental analysis. VA does not currently anticipate any direct or indirect impacts that would adversely affect Terwilliger Parkway as a result of additional traffic generated on the Parkway under the proposed action. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151). Correspondence received from OR SHPO during the NHPA Section 106 consultation process is provided in Appendix H of the Final EA. NRHP nomination form describes Terwilliger Parkway as having three contributing resources (1921 comfort station, Elk Point Viewpoint, and Terwilliger Parkway itself), as well as one non-contributing resource (Eagle Point Viewpoint). The historical significance of the Parkway satisfies Criterion A within the National Register Criteria for Evaluation. The Parkway derives its Criterion A significance through association with events, The Olmsted Portland Park Plan and the City Beautiful Movement. While Terwilliger Boulevard's listing includes the pedestrian paths and lighting, it should be noted that any potential effects would be limited to vehicular traffic and confined to the physical road surface. Further, while the proposed undertaking may result in a minor increase traffic on historic-period Terwilliger Boulevard this change will not likely have adverse effect to the Parkway nor alter its eligibility under Criterion A for which it is listed under the National Register. The Parkway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's listing will not be affected by the undertaking because standard re-pavement alterations over time do not affect its listing under Criterion A, or its integrity. Therefore, Terwilliger Parkway will not be affected by the proposed undertaking.
	III B. The project will have significant impacts on cultural and historical resources requiring an EIS. Not only is the scope of the analysis on historic properties too narrow as demonstrated above, but the EA's conclusion that the project will only negligibly increase traffic and is unlikely to have significant negative impacts on the roadway is flawed. As described below, the traffic study the VA relied upon for its analysis to the roadway impacts is inaccurate and reaches unsupported conclusions, but, even if its assumptions were correct, the VA improperly dismissed the nearly 7% projected increase in traffic for Terwilliger Boulevard as "minor." EA at 34. The VA asserts that this increase in traffic will have only negligible impacts solely because it would not be the "primary cause" of the projected growth and	**III B. The project will have significant impacts on cultural and historical resources requiring an EIS.** Any direct effects to Terwilliger Parkway would be limited to vehicular traffic and confined to the physical road surface. There are no planned activities that impact the integrity of location, design, setting, feeling, functionality and association of Terwilliger Parkway. Minor increases in average daily traffic, as previously discussed, do not pose a risk to the Criterion A aspects of the resource. While the proposed undertaking may increase traffic on historic-period Terwilliger Boulevard, this change is not likely to have adverse impacts to the historic Parkway as the integrity of the resource has remained through numerous maintenance activities since the early 1900s and steadily increasing traffic on the historical road over time up until its NRHP

Stakeholder	Stakeholder Comment	VA Comment Response
	because the level of service in the area is already failing under certain metrics. Traffic Impact Analysis (TIA) at 4; attached as Ex. B. However, nothing in the CEQ regulations describing significance requires a project to be the sole cause of a problem for its impacts to be significant. See 40 C.F.R. § 1508.27. In fact, the regulations specifically state that significance can vary depending on the context of a proposed action. § 1508.27(a). Given that the setting here includes a historic roadway whose purpose was to provide a respite in nature for leisurely driving, a nearly 7% increase in average daily trips in an area already experiencing traffic congestion, (EA at 33–34), could serve as the tipping point for a significant negative impact on the Parkway's integrity and the fundamental purpose for which it is recognized as a historic resource. Over time, upgrades to the parkway have been necessary to preserve its design and integrity in the face of significantly increased vehicle and pedestrian traffic. The addition of even more traffic could impact the parkway's integrity and eligibility for listing, for it could make more modifications necessary. Simply put, the EA fails to consider the context in which its impacts are occurring, and in doing so ignores the ways in which a 7% increase could fundamentally alter the feeling and usage of the Parkway for a variety of users. As a result, the draft EA's finding of no significant impacts on the cultural and historic resources is inadequate and must be reexamined.	listing. The Terwilliger Parkway NRHP listing will not be affected by the proposed undertaking. On March 7, 2022, OR SHPO provided concurrence with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (OR SHPO Case No.20-1151). Correspondence received from OR SHPO during the NHPA Section 106 consultation process is provided in Appendix H of the Final EA. The VA will continue to communicate with FoT, VA affiliates, and stakeholders, including Portland Bureau of Transportation, to implement strategies to avoid effects to Terwilliger Parkway, nearby residential areas, as well as surrounding roadways.
	III C. The draft EA relied on inadequate analysis of the project's traffic impacts: To comply with NEPA, the effects of increasing the parking capacity on traffic flow must be analyzed. See Ocean Advocates v. U.S. Army Corps of Engineers, 402 F.3d 846, 867 (9th Cir. 2005) (in which a federal agency was required to analyze the effects of extending a dock on shipping traffic); see also Friends of Mt. Hood v. U.S. Forest Serv., No. CV97-1787-KI, 2000 WL 1844731 *1, *12 (D. Or. Dec. 15, 2000) (in which the court found that the Forest Service 18 violated NEPA when it failed to seriously consider an alternative that would reduce highway congestion by providing fewer parking spaces on Mt. Hood). Here, the draft EA fails to adequately perform this analysis because, despite examining traffic impacts in the form of a traffic study, the agency's analysis and subsequent conclusions contained numerous errors, unsupported conclusions, and failed to consider multiple key factors. Finally, to the degree that the traffic study could be relied upon, the VA applies its findings to reach the incorrect conclusion that the project's impacts on the traffic are insignificant. Central to the draft EA's conclusion that the project's impacts are not significant is its assertion that "project activities are not anticipated to significantly impact existing or future traffic patterns around the VAMC campus." EA at vii. The VA primarily relied on a traffic impact analysis study conducted in December 2020 and released in January 2022 ("TIA" or "the study") as the basis for this finding. Ex. B. Conducted over only a single day in December 2020, the study found that found that the Project could result in a 6.89% increase in average daily trips on Terwilliger Boulevard when compared to the increase in average daily trips under the "nobuild" scenario. TIA at, EA at 34. Notably, this study was conducted during the first year of the COVID-19 pandemic, forcing the study to convert the 2020 results using metrics from previous years to formulate its baseline level of traffic in the area. TIA at 10. Not only does this conversion raise substantial questions as to the study's accuracy, the methodology used directly conflicts with the Oregon Department of Transportation traffic study handbook, which states that best practice is to "avoid collecting manual traffic counts during special events, holidays, construction periods, bad weather, or any other times when conditions at the site or in its vicinity may affect average traffic conditions." Oregon Department of Transportation Best Practices for Traffic Impact Studies Final Report, 23. As such, the VA should reconduct its traffic counts in accordance with	**III C. The draft EA relied on inadequate analysis of the project's traffic impacts:** VA has deemed the traffic analysis and data provided in the January 2022 Traffic Impact Study (Jacobs and LRS Federal, 2022) to be accurate and generally consistent with previously conducted traffic studies in the vicinity. As noted, the traffic analysis includes adjustments made to traffic volumes to better reflect pre-Coronavirus Disease 2019 (COVID-19) volumes, as detailed in Section 2.3 of the Traffic Impact Study (refer to Appendix D of the Final EA). The supplemental June 2022 Traffic Impact Study provides supporting data based on traffic counts collected in May 2022. The projected 746 new daily trips SW Terwilliger Boulevard that could result from the proposed action make up a minor percentage (8.2%) of the 9,118 projected or baseline-growth daily trips in 2030 based upon sound engineering judgement and the supplemental June 2022 Traffic Impact Study. Under the No Action Alternative, the projected baseline growth of daily trips in 2030 would be 9,118 representing (91.8%) of trips generated on the Parkway not associated with the proposed action as further described in the June 2022 study (Jacobs and LRS Federal, 2022a). Based on the findings of the June 2022 supplementary study, no intersections operate below the minimum acceptable Level of Service (LOS) in any of the examined scenarios, including after full buildout of the proposed action in 2030. The proposed action conforms to the City of Portland's Transportation Element of the Comprehensive Plan. There are no known impacts to the transportation system, including: access, on-street parking, transit service, transit connectivity, pedestrian facilities, bike facilities, neighborhood impacts, and safety for all modes. Table 3-1, as referred to in the TIA, aggregates all exiting and entering vehicles observed per hour and provides total traffic counts. It further identifies the singular peak hour per day in which traffic volumes were at their highest, which in the AM was 7AM to 8AM and in the PM was between 5 PM and 6 PM. References to 7 – 9 AM and 4 – 6 PM are typical for traffic studies in that the AM peak hour usually occurs between 7 AM – 9 AM and the PM peak hour

Stakeholder	Stakeholder Comment	VA Comment Response
	the best practices in order to ensure the results of the study actually reflect current traffic conditions, as that is necessary to understand the scope of potential impacts on traffic. The study's veracity is further undermined by its methodology that utilized traffic counts only for pre-determined "peak hours." TIA at 17. The issue here is that the hours studied were not actually reflective of true peak traffic hours when compared to previous 24 hour traffic reviews. TIA Table 3-1 at 17. As a result, the counts obtained by the study were artificially constrained, likely underestimating the total number of vehicles using the area by a significant margin. The study only conducted peak traffic counts from 7:00 to 9:00 am and from 4:00 to 6:00 pm. TIA at 17. However, the 24 hour traffic counts conducted the year prior in 2019 revealed that the true peak hours for the area were from 6:00 to 9:00 AM and 3:00 to 7:00 pm. TIA Table 3-1 at 17. By narrowing the peak hour period, the study eliminated 34% of true peak hour traffic from its counts. Because the VAMC and OSHU utilize staggered work hours, the reliance on pre-defined "peak hours" instead of the empirically demonstrated true peak hours resulted in substantial undercounting of the total traffic load for the project area. This mistake further calls into question the entire conclusions of the study as they are based on a convenient fiction of when traffic is actually peaking and therefore likely underestimated the degree to which the project will worsen the current traffic conditions. The errors in the study's estimation of the project impact are compounded by the fact that when selecting a background traffic growth of 1% over 10 years, the VA failed to account for other nearby projects likely to also increase traffic in the area. Neither the study nor the EA addresses how traffic growth may be driven above 1% annually by recently completed and proposed projects taking place at the neighboring campus of OHSU. For example, a new 220 space parking garage will be built below the new OHSU Expansion Project that has received all city approvals (LU-19-163449 PR) and is scheduled to begin construction this year. Similarly, the traffic analysis fails to consider the approved new inpatient facility construction at OHSU to provide 154 additional beds and how increased patient traffic will contribute to impacts on the Parkway. Ignoring relevant projects like these not only contribute to the EA's failure to fully address cumulative impacts as required by NEPA and discussed below, but it underscores the many ways in which the traffic study's results are shown to be inaccurate. Additionally, the traffic study contains basic inconsistencies with the EA that make for less accurate analysis that skews towards underestimating the vehicle numbers and impacts of traffic. For example, when discussing the number of trips likely to be generated by the proposed action, the study asserts that because under the proposed action Building 110 is a staff-only facility and the additional parking spaced are staff-only spaces, the estimated the number of daily trips associated with those projects would reflect similar staff-only parking trends at 1.12 entering trips per day and 1.14 exiting trips per day, a lower number of trips than if they were for patient-use. TIA at 16. However, this conclusion seems to be directly contradicted by the proposed action in the EA, which describes Building 110 as a 300,000-370,000 square foot specialty care building, that would be used for enhancing patient care. EA at ii. Given that the draft EA seems to specifically contemplate a major portion of the project and the primary new building constructed being used extensively by and for patients, the traffic study should have taken this fact into account when estimating the number of daily trips that would be generated by the project. Given that patients come and go throughout the day at levels far greater than the 1.12-1.14 times for staff, this mistake likely resulted in a significant underestimation of how many new trips would be generated from the project.	usually occurs between 4 PM – 6 PM. It is a singular hour that determines the peak traffic hour. Further analysis in the traffic study does in fact incorporate all traffic count data and does not exclude any data or further narrow the peak hour. While the COVID-19 pandemic impacted healthcare in many ways, nearly 80% of the VAMC's employees remained on the front line since the start of the COVID-19 pandemic, providing health care to patients and administering services at national cemeteries. In regard to staggered work hours, the VA will utilize existing traffic data and available information from the VAMC medical center on work hours, shifts, ingress and egress to better assess traffic patterns on campus prior to final design and construction. VA will coordinate this effort with local community stakeholders and work to ensure construction related trips have a minor impact to traffic patterns on campus and the surrounding neighborhoods. Previous traffic counts conducted accounted for all traffic exiting and entering the VA campus and captured staggered workhours and shifts in the traffic count data. Peak AM and PM hours were then further derived based on the observed traffic counts and the AM peak hour and PM peak hour calculated. Traffic counts were conducted in 2019 (prior to the COVID-19 pandemic) and again in 2020 to support the peak hour capacity analysis. To further address comments received, a supplemental Traffic Impact Study was provided in June 2022 (Jacobs and LRS Federal, 2022a). The June 2022 Traffic Impact Study supplements the previous traffic impact analyses performed in May 2019 and January 2022, while including traffic counts for an additional eight intersections not studied in 2019 or January 2022 as a baseline for analysis. In support of the June 2022 study, the project team collected traffic counts and made observations in May 2022 for intersections of concern and then analyzed the traffic operations under a full build of the proposed project and a no build (no action) alternative. The projected 2030 no-build scenario that assumes a one percent annual growth would result in 9,118 average daily trips (ADT) on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in approximately 746 new trips per day on SW Terwilliger Boulevard, which is an increase of 8.2% over the no action alternative, which would result in minor cumulative impacts to traffic patterns through the implementation of the proposed action in conjunction with projected future traffic growth in the area. Remaining trips would be distributed across roadways to the west of Terwilliger including SW Sam Jackson Park Road or SW 6th Avenue as shown in Figure 3-2 of the supplemental June 2022 Traffic Impact Study (refer to Appendix D of the Final EA). The OHSU Hospital Expansion Project proposed would add approximately 220 new patient/visitor parking spaces and is proposed to begin Spring 2022. The new construction will occur on the site of the former OHSU School of Dentistry and will increase the net total of inpatient beds and adult inpatient operating rooms to improve the ability to care for patients with the most critical health care needs. Regardless of background traffic growth generated, which is accounted for in the 1% annual growth anticipated in both January 2022 and June 2022 traffic impact studies, the VA's proposed action would result in only minor impacts on existing and future traffic patterns. VA recognizes and supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address the existing operational issues at these intersections and improve traffic conditions. VA supports a comprehensive approach to improving safety and alleviating congestion on roadways

Stakeholder	Stakeholder Comment	VA Comment Response
	The inadequacy of the study in estimating the projected traffic impacts is worsened by the fact that it did not review critical intersections along the Parkway likely to be the source of increased congestion under the project. The new 650-space parking garage Building 111, will primarily be accessed via upper section SW US Veterans Hospital Road, just east of S Gaines Street. TIA at 18. The Study projects that 55% of all trips will access SW US Veterans Hospital Road via SW Terwilliger Blvd, and the other 45% from S Gaines Street. Id. However, the study ignored that a substantial portion of the Gaines Street traffic will likely be approaching via the Homestead Drive/6th Avenue Drive route, accessing that road from the intersection of Homestead Drive and SW Terwilliger Blvd. The study disregarding this fact is critical because while it estimates the project to generate 1,356 new daily trips, it posited only 746 would utilize SW Terwilliger BLVD. TIA at 18, 30. Yet, the intersection of Terwilliger and Homestead is not analyzed by the study despite a considerable amount of traffic likely to access the facility via that route. Given that a considerable number of drivers will be approaching the Gaines Street entrance from Terwilliger Blvd, the true number of increased traffic is almost certainly larger than the 746 estimated by the study. Additionally, there is significant VA-bound traffic that goes through the nearby intersections of SW Condor Ln. and SW Hamilton Terr. where they intersect SW Terwilliger Blvd near the VA Hospital Rd. entrance. FoT is aware that these intersections frequently back-up and/or are the sites of crashes and therefore should have been, but were not studied in the traffic study. Given the myriad of flaws identified in the traffic study central to the draft EA's finding of no significant impact, the study should be reconducted and its new results discussed in an EIS. However, even if the study's results were accurate, the VA's conclusion that an increase of traffic by nearly 7% along the Parkway is not a significant impact is contrary to the NEPA implementing regulations. 40 C.F.R. § 1508.27. Here, the EA concludes that because several of the intersections studied in the traffic analysis are not meeting traffic standards meant that the 7% increase, which amounts to at least 746 new daily trips on the boulevard by 2030 would not be the primary cause for the poor traffic conditions. EA at 34. Frankly, it is difficult to understand the basis for this conclusion. There is little to support the VA's position that simply because traffic might already be bad in certain areas by certain metrics, that making it worse therefore does not matter or cannot be significant. This is not to mention that there are a majority of intersections in the area that are not failing under the same traffic metrics. TIA at 23. The draft EA does not explain whether the 7% increase could be significant when applied to those nonfailing areas. Finally, the draft EA fails to consider in its discussion of traffic impacts how the addition of parking spaces may influence those not currently driving to alter their commuting methods. The EA touts the VA's alternative transportation incentive program that has been successful in encouraging employees to utilize public transportation, government funded transport options including the Portland-Vancouver shuttle and Portland Aerial Tram, as well as carpooling and cycling to work. EA at 5, 41. Yet, the EA does not examine if, and to what extent the increase in parking spaces may result in employees who currently rely on alternative modes of transportation switching to driving. The EA seems to assume that the 600 new spaces added by the project will be filled entirely by employees who are otherwise driving to work and parking elsewhere off the VAMC campus. Yet that basic assumption underlying their conclusions about how much new traffic will be generated doesn't consider that the availability of additional parking may actually result in employees choosing to drive their cars when they otherwise would not. The scientific literature on this subject supports the conclusion that increasing available	surrounding the VAMC campus in accordance with guidance provided by Portland Bureau of Transportation (PBOT) (refer to October 3, 2019 meeting minutes provided in Appendix B of the Final EA).

Stakeholder	Stakeholder Comment	VA Comment Response
	parking will drive increased traffic, and for the VA's analysis to be adequate, they must take this information into account in a future analysis examining just how much new traffic will be a direct result of those who did not previously drive to work choosing to do so as a result of the new parking options.	
	III D. The draft EA ignored impacts to the aesthetics of Terwilliger Parkway: The draft EA's analysis of the project's aesthetic impacts is conclusory, finding that because the aesthetic impacts of the construction itself are merely temporary and that the buildings constructed would not detract from the aesthetic values. EA at 11–12. First as a threshold matter, an impact may still be significant even if it is temporary, i.e. only occurring in the "short-term". 40 C.F.R § 1508.27(a). The EA notes that the construction associated with the project would occur over the course of six years, and given the fact that it is occurring in an area noted for its natural beauty and peaceful conditions suitable for recreation and escaping the city, the impacts of construction over so many years are likely significant. Further, to the limited extent that the EA discusses aesthetic impacts it considers them only with respect to the VAMC campus, the surrounding homes, and the boulevard itself. Here, the agency continues to make the mistake of not examining the impact of the project when considering the Parkway as an entire district. Given that Building 110 is located in an area visible from the road and park pathways, and will require the removal of trees will make for a substantial disruption to the current aesthetic conditions of the area, requiring further analysis in an EIS. Additionally, the exterior form and finishes of the new building could detract from the aesthetics of the parkway if they are reflective or brightly colored, etc. Non-federal buildings are required to go thru a Design Review to conform with the Marquam Hill Design Guidelines. MHP at 137; Marquam Hill Design Guidelines, Marquam Hill Plan (July 10, 2002) at 46-47; attached as Ex. K. While the VA is ultimately not bound by this obligation, if it wishes to comply with local regulations and requirements as it purports to, it should conduct this review. Doing so would likely serve to reduce the aesthetic impacts associated with the project. While the EA mentions that the design of Building 110 will be consistent with other buildings on the VAMC campus (EA at 12), that does little to assuage FoT's concerns about the significance of its impacts, as that has more to do with blending the buildings in with each other than blending in with the aesthetic character of the parkway. As required by the Design Guidelines the building should be constructed with non-reflective materials and painted colors that blend in with the forest instead of standing out. Ex. K at 46–47. Many of the existing buildings on the campus are painted light blue and stand out amongst the trees and foliage of the parkway. The VA should have done more than just state that the building will be consistent with current designs. Instead, it should have analyzed in the EA the comparative impacts of using stone and earth toned materials and paints to reduce the visual impacts and blend in with the forest. Thus, FoT requests the VA in its EIS examines the ways in which aesthetic impacts can be reduce, specifically by complying with the Marquam Hill Design Guidelines.	**III D. The draft EA ignored impacts to the aesthetics of Terwilliger Parkway:** No improvements to the historic Terwilliger Parkway, changes to speed limits, clearing of vegetation outside of the already primarily disturbed VAMC campus, or traffic configurations are proposed by the VA as part of this undertaking. Moreover, character-defining features will remain intact. A significant increase in daily traffic volume that would result in adverse impacts is also not anticipated based upon traffic analysis conducted by the VA. The historic Parkway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historic-period road over time up until its NRHP listing. As depicted on Figure 3-1: Map Depicting the Portland VAMC Campus and Area of Potential Effects within the Draft and Final EA, Terwilliger Parkway was included in the APE for the proposed action. The Portland VAMC and SW Terwilliger Boulevard are separated by steep, wooded slopes with a fairly dense understory and canopy. New buildings would be designed to be architecturally and visually consistent with the existing Portland VAMC campus buildings and forested areas around the perimeter of the campus would remain largely intact. As such, physical changes to the VAMC campus, such as the addition of the Specialty Care Building and new parking structures, would not detract from the aesthetics of SW Terwilliger Boulevard or surrounding area. As design progresses, visual representation and/or schematics will be publicly available on the VAMC website as part of the NCP.
	III E. The draft EA did not adequately consider impacts to the air quality of Terwilliger Parkway: The air quality analysis fails to consider the ways in which increased vehicle trips resulting from the project may impact air quality within Terwilliger Parkway. Under NEPA, significance is measure in both short- and long-term effects (40 C.F.R. § 1508.27(a)) and, by focusing on the emissions and air quality impacts of the construction vehicles during the project, but then ignoring those same impacts from the increase of traffic directly resulting from the project is a glaring flaw in the analysis that the VA needs to consider. The EA gives no consideration to the ways in which emissions from the 746 estimated new daily trips caused by the project will impact users of the Parkway. Many walkers, bikers,	**III. E. The draft EA did not adequately consider impacts to the air quality of Terwilliger Parkway:** Air quality within the vicinity of the Portland VAMC, including sensitive air quality receptors, was analyzed as provide in the Draft EA (Section 3.2 Air Quality). The supporting Air Quality Resource Report (Jacobs and LRS Federal, January 2021a) has been provided in Appendix E of the Final EA. Projects resulting in an increase of potential emissions of less than the CAA General Conformity de minimis thresholds in maintenance areas are considered to have a less than significant impact in an area that is maintenance or attainment for criteria pollutants. The

Stakeholder	Stakeholder Comment	VA Comment Response
	and runners for exercise, training, and relaxation, all of which are likely to be hampered by an increased amount of vehicle exhaust in the ambient air, use the paths and roads of the Parkway. Additionally, the diesel emissions of heavy construction equipment used on the project will likely have an especially detrimental impact on those users. The EA incorrectly concludes that because mitigation measures will be taken to control fugitive dust from spreading during construction and that the project will not result in any additional permitting under the Clean Air Act, that the impacts are not significant. EA at 13–14. This conclusion is at odds with the CEQ and VA NEPA regulations, both of which explicitly note public health and safety as impacts that need to be evaluated for significance. 40 C.F.R §§ 1508.27(b)(2) 1508.8; 38 C.F.R. § 26.6(a)(2)(iv). Because the EA does not consider the ways in which public health may be jeopardized as a result of the project increasing traffic in the Parkway, its finding of no significant impact is not valid and should be reconsidered.	proposed action, though not subject to General Conformity, is below the maintenance area de minimis threshold of 100 tons per year for all pollutants. Therefore, the proposed action would not result in a significant increase of air emissions to interfere with the attainment status of the area. That is, the proposed action would not adversely affect air quality in the region and no further analysis for comparison to the concentration-based National Ambient Air Quality Standards (NAAQS) or Oregon Ambient Air Quality Standards (OAAQS) is required.
	III F. The draft EA ignored noise impacts to Terwilliger Parkway: The draft EA's analysis of noise impacts is almost entirely focused on the noise impacts resulting from the project's construction. It dedicates a single sentence to evaluating the whether the amplified levels of noise generated by the projected increase of vehicular traffic would have a significant impact. EA at 27. The EA finds that the impact is minor, but provides no reasoned explanation as to why a minimum of 746 new vehicle trips daily through the parkway will not create a significant impact in the form of increased vehicle noise. Given the purpose of the Parkway as recognized under the NHPA for quiet respite from the city and the recreational activities taking place along the road, the EA needs to provide a more reasoned explanation for its finding than mere conclusory statements.	**III F. The draft EA ignored noise impacts to Terwilliger Parkway:** Noise pollution in the vicinity of the Portland VAMC campus, including Terwilliger Parkway, was analyzed in support of the Draft EA (refer to Section 3.7 Noise). A Noise Report (Jacobs and LRS Federal, January 2021) was also prepared in January 2021 and has been provided in Appendix F of the Final EA. There are no significant long-term operational noise impacts associated with the proposed undertaking. Minor increases to noise levels generated by employee and patient vehicular traffic, HVAC systems, ground maintenance equipment and activities, emergency vehicles, and infrequent use of generators are not anticipated to generate a significant noise impact for the area surrounding the Portland VAMC campus (Jacobs and LRS Federal, January 2021). Compliance with the City of Portland's construction noise regulations would only allow construction-related noise to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday, with the exception of emergency work. Although it is not anticipated that any work would generate noise outside of the City of Portland's construction noise regulations, permissible construction noise regulations would require VA to apply for a noise variance and obtain permission via the City of Portland (City of Portland, Oregon). BMPs would be incorporated into the proposed action to mitigate noise, including complying with VA's "Temporary Environmental Controls" specifications and the City of Portland Noise Regulations. Additional BMPs to mitigate construction-related noise in the vicinity of Terwilliger Parkway and the Portland VAMC campus would include: • Coordinating proposed construction activities in advance with nearby sensitive receptors and community stakeholders; • Limiting construction and associated heavy truck traffic to occur between 7:00 a.m. and 6:00 p.m. on Monday through Saturday; • Locating stationary operating equipment as far away from sensitive receptors as possible; • Selecting material transportation routes as far away from sensitive receptors as possible; • Shutting down noise-generating heavy equipment when it is not needed; • Maintaining equipment per manufacturer's recommendations to minimize noise generation; • Utilizing broadband, self-adjusting backup alarms in lieu of backup-beepers consistent with applicable safety requirements.

Stakeholder	Stakeholder Comment	VA Comment Response
		• Construction related vehicles will not be accessing the VAMC campus using SW Homestead and 6th Avenue Drive. VA is committed to coordinating with medical center staff to also ensure this route is not utilized as a primary route to the VAMC.
	III G. The draft EA's analysis of the project's cumulative impacts is inadequate Despite recognizing in the EA that cumulative impacts are those which "result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action" 40 C.F.R 1508.7, the analysis by the VA fails to consider the ways in which the project's impacts may be cumulatively significant. Importantly, cumulative impacts can results from "individually minor but collectively significant actions taking place over a period of time." Id. The draft EA's analysis of cumulative impacts merely notes that there are two sewer line construction projects in the area and because those projects are unlikely to significantly impact the environment that there are no cumulative impacts to the VAMC campus or surrounding roads. EA at 37–38. The EA's cursory analysis of cumulative impacts is inadequate because it ignores the baseline conditions in the area, refuses to consider how its traffic impacts may be cumulatively significant, and fails to account for other traffic inducing projects occurring in the vicinity that may also contribute to a cumulatively significant impact. The EA states that most of the land surrounding the VAMC is in commercial and residential development, (EA at 37), when in fact a comparatively high percentage is zoned Open Space and used for park and natural area purposes. Terwilliger Parkway to the east and Marquam Nature Park to the south and west comprise over 100 acres. Yet the EA states that because much of the surrounding area is already developed, the project's impacts to the wooded areas are insignificant. Id. This analysis misunderstands the purpose of the cumulative impacts requirement in NEPA, the very purpose of the analysis should be to understand whether a seemingly insignificant action may actually be significant when evaluated in the context of the area and the impacts already occurring/likely to occur in the area. Thus, the fact that much of the land surrounding the wooded area is developed makes it more likely that the impacts from cutting down trees, constructing new buildings, and increasing traffic will be cumulatively significant given that the natural character of the area has been degraded over time. The VA must reassess its cumulative impacts analysis using this framework instead of the relying unsupported conclusions currently in place in the EA. Additionally, the EA's analysis of cumulative traffic impacts is deeply inadequate, completely ignoring the impacts of the current conditions in the area. The section only mentions how the traffic impacts of the two sewer construction projects mentioned in the EA are unlikely to be cumulatively significant in conjunction with the proposed action. The errors of the EA's framing of its traffic analysis are exposed here, as the traffic study recognized that the area already has two failing intersections. The EA does not grapple with how the project's estimated 6.89% increase in traffic, which the VA deems "minor," might be cumulatively significant considering that traffic conditions are already failing or deteriorating along the Parkway. The EA's entire traffic analysis does not consider the functional failure of two intersections identified by the traffic study as pre-existing conditions, despite cumulative impacts explicitly requiring the agency to analyze how those conditions interact with the proposed action. Finally, the EA's cumulative impacts analysis does not consider the project's taking place nearby that are likely to also contribute to the traffic problem in the area. For example, OHSU is expanding its parking by 220 spaces on its campus and increasing bed capacity by 154 beds. Ex. L. An adequate cumulative impacts analysis must take into account those and other projects in order to comply with NEPA and the draft EA as proposed does not meet this requirement.	**III G. The draft EA's analysis of the project's cumulative impacts is inadequate** The proposed action would not result in clearing of any wooded areas surrounding the VAMC campus. The large majority of the VAMC campus is paved or disturbed. Minimal tree removal, primarily for crane swing space, will result in negligible impacts to the natural character of the area. Tree removal would be in accordance, to the maximum extent practicable, with the City of Portland tree removal ordinances, which would apply to trees 12 inches in diameter at 4.5 feet (breast height) above the ground, as stated in section 3.1.2.1 of the Draft and Final EA. Nearby intersection performance, traffic counts, and base line growth were all taken into account during previous impact analysis for the proposed undertaking. The VA's actions would minimally contribute to the overall functionality of nearby intersections based upon the January 2022 Traffic Impact Study conducted by the VA. To further address comments received, a supplemental Traffic Impact Study was provided in June 2022 (Jacobs and LRS Federal, 2022a). The June 2022 Traffic Impact Study supplements the previous traffic impact analyses performed in May 2019 and January 2022, while including traffic counts for an additional eight intersections not studied in 2019 or January 2022 as a baseline for analysis. In support of the June 2022 study, the project team collected traffic counts and made observations in May 2022 for intersections of concern and then analyzed the traffic operations under a full build of the proposed project and a no build (no action) alternative. The projected 2030 no-build scenario that assumes a one percent annual growth would result in 9,118 average daily trips (ADT) on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in approximately 746 new trips per day on SW Terwilliger Boulevard, which is an increase of 8.2% over the no action alternative. This would result in minor cumulative impacts to traffic patterns through the implementation of the proposed action in conjunction with projected future traffic growth in the area as noted in Sections 3.13 Traffic, Transportation, and Parking as well as 3.16 Cumulative Impacts of the Final EA. Remaining trips would be distributed across roadways to the west of Terwilliger including SW Sam Jackson Park Road or SW 6th Avenue as shown in Figure 3-2 of the supplemental Traffic Impact Study (refer to Appendix D of the Final EA). There are no additional projects or non-VA activities proposed in the immediate vicinity of the VAMC campus, that combined with the proposed action, would result in significant impacts to environmental resources.

<table>
<tr><th>Stakeholder</th><th>Stakeholder Comment</th><th>VA Comment Response</th></tr>
<tr><td></td><td>IV. The draft EA does not consider impacts to Terwilliger Parkway as a whole:

Although the EA claims to analyze the project's impacts on the project site and "general vicinity," (EA at 11), the actual analysis is primarily focused on the potential impacts to the VAMC campus itself. To the extent that the EA does consider impacts to the surrounding area, it primarily focuses on Terwilliger Boulevard not Terwilliger Parkway. As explained above, the EA incorrectly defines the APE as only the roadway when analyzing impacts on historic and cultural resources, as well ignoring impacts on Parkway's many recreational uses such as running, walking, and cycling when evaluating the project's noise, air, and aesthetic impacts.

This is a critical distinction that reveals the inadequacy of the analysis as a whole.
Because the Parkway is recognized as a single district under the NHPA, focusing solely on the roadway does not meet the threshold level of reasonableness considering the diverse user groups and numerous resources present in the immediately surrounding area that are likely to be impacted by the project.</td><td>IV. The draft EA does not consider impacts to Terwilliger Parkway as a whole:

Figure 3-1: Map Depicting the Portland VAMC Campus and Area of Potential Effects accurately depicts the APE considered for the proposed action. VA fully acknowledges that Terwilliger Boulevard is one portion of Terwilliger Parkway, as recognized under the NRHP. Editorial errors referencing Terwilliger Boulevard in the Draft EA as a NRHP-listed historic resource, are addressed in the Final EA (Section 3.3 Cultural and Historic Resources).

There are no planned activities that impact the integrity of location, design, setting, feeling, and association of Terwilliger Parkway and potential effects do not pose a risk to the Criterion A aspects of the resource. Any potential effects would be limited to vehicular traffic and confined to the physical road surface. On March 7, 2022, SHPO concurred with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (SHPO Case No.20-1151). Correspondence received from OR SHPO has been included in Appendix H of the Final EA.</td></tr>
<tr><td></td><td>V. An EIS is necessary to satisfy the requirements of NEPA

Upon review of the draft EA, it is apparent that the VA's proposed project may have significant effects and therefore requires the agency to prepare an EIS.

Despite CEQ NEPA regulations requiring the action agency to evaluate the context of the impacts on varying scales, (§ 1508.27(a)), the EA ignored impacts on the Parkway and its users, the context where the impacts of the project are most likely to be significant. Had the EA examined the most relevant contexts as required by the regulations, the VA would have been left with no option but to conclude that the effects on the Parkway may be significant and require the agency prepare an EIS.

Additionally, the NEPA regulations require the agency to weigh the projects significance by considering the intensity of the proposed action. § 1508.27(b). When considering the intensity, i.e. severity of the impacts, the regulations provide a list of ten factors to consider. Id. Had the VA properly utilized these factors in its analysis, the requirement to prepare an EIS would have been obvious as the proposed action is likely to have severe impacts on a variety of resources along the Parkway. For example, § 1508.27(b)(2) requires the agency to consider the "degree to which the proposed action affects public health or safety." Yet, the EA is notably lacking any analysis of the ways in which the project may jeopardize the safety of pedestrians, cyclists, and other drivers by increasing the number of vehicles in the area. Furthermore, the EA fails to consider in its air quality impacts section the ways in which public health may impacted from increased vehicle emissions generated from the project along the parkway. Had the VA properly analyzed these factors, an EIS would be necessary due to the likely significance of the impacts.

Similarly, had the VA analyzed the "unique characteristics of the geographic area such as proximity to historic or cultural resources [and] park lands" (§1508.27(b)(3)), the results would have shown significant effects necessitating an EIS. FoT's central concerns lie in the fact that despite recognizing that the VAMC campus and project impact area includes a nationally recognized historic district, the EA then fails to evaluate the impacts in the scope of that district, and instead applies a more narrow framing that examines solely the roadway. Given that the impacts on the historic and cultural resources and the surrounding park lands are likely to be significant due to the increased traffic, and EIS is necessary.</td><td>V. An EIS is necessary to satisfy the requirements of NEPA

Under NEPA, a Federal agency may first choose to prepare an EA rather than an EIS. The EA process is designed to determine if an EIS is necessary. The EA process either concludes with a Finding of No Significant Impact (FONSI) or, if significant impacts are identified, a Notice of Intent to prepare an EIS. Based on the analysis in the current EA, VA does not expect to conduct an EIS for the proposed action.

VA determined the APE for the proposed action to consist of the entire Portland VAMC campus, including footprints of existing buildings and parking locations as well as construction around the perimeter of each location, and Terwilliger Parkway, which became listed in the NRHP in March 2021. Terwilliger Parkway was included in the APE to take into account all possible effects of the proposed undertaking including effects to the historic integrity of potential contributing properties and historic districts in the region. VA fully acknowledges that Terwilliger Boulevard is one portion of the historic Terwilliger Parkway, as recognized under the NRHP. Editorial errors referencing Terwilliger Boulevard in the Draft EA, as a NRHP-listed historic resource, will be corrected in the Final EA as previously noted.

The VA is not proposing any changes to traffic infrastructure on the nearby roadways and does not anticipate any new safety concerns for pedestrians utilizing SW Terwilliger Boulevard or the Parkway. Any short-term air quality impacts from fugitive dust generated during construction would require monitoring to ensure that contractors implement best management practices (BMPs) mandated by the State of Oregon. The proposed action would also cause a potential net increase in long-term stationary combustion emissions because of increased boiler and emergency generator capacity; however, operational emissions associated with future project-related vehicle use and maintenance would be negligible. Upgrading energy utilities to potentially include renewable energy sources and/or improve efficiency of energy utilities would, at minimum, partially offset any anticipated increases in operational emissions.

The VA considered applicable local laws, standards, and guidelines. Although local zoning, ordinances, and related regulations do not apply to federally owned land such as the Portland VAMC, the VA intends to comply with the intent of these regulations, to the extent practicable.</td></tr>
</table>

Stakeholder	Stakeholder Comment	VA Comment Response
	NEPA's regulations require the agency consider "[t]he degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources." § 508.27(b)(8). As explained throughout these comments, FoT has identified a myriad of ways in which the analysis of impacts on Terwilliger Parkway was deficient. Namely, the errors in the traffic study lead to a significant undercounting of traffic likely generated by the parking development, as well as the EA's plainly incorrect conclusion that even a 7% increase would be insignificant, despite the historic nature and purpose of the parkway. Had the VA adequately considered the purpose for which the Parkway is listed in the NRHP, and the ways in which increased traffic risk destroying that very use, the significance of the impact and the necessity of an EIS under the regulations would have been apparent. Finally, the regulations require the agency to consider "whether the action threatens a violation of Federal, State or local law or requirements imposed for the protection of the environment." § 1508.27(b)(10) (emphasis added). While the VA recognizes it may not be legally bound to adhere to local ordinances or regulations governing the area, NEPA's regulations explicitly require the agency to consider whether it is violating any local policies when assessing the significance of the impacts. Here, despite claiming it intended to abide by local regulations, the EA conflicts with or ignores entirely numerous requirements, objectives, and plans for the area under both the Terwilliger Parkway Corridor Plan, and the Marquam Hill Plan, including a limitation on the number of parking spaces allowed. MHP at 164, 173. Again, had the VA considered the many ways in which its' proposal violates local regulations and environmental policies as required under NEPA, the significance of the impact and the necessity of performing an EIS would have been obvious. In addition, at least four, and potentially five of the considerations listed under the VA's own regulations indicating that the project is an action that rises to the level of requiring an EIS. 38 C.F.R. § 26.6(a)(2). First, the Terwilliger Parkway Corridor is listed on the National Register of Historic Places and holds cultural significance to the community in which it exists; significance that is jeopardized by the increasing number of cars in the area that the project will generate. The parkway also provides critical green space and recreation opportunity to the community and is designated as a Forest Corridor which wildlife use regularly as a migration corridor. These resources are also impacted by the project. Second, while the VA's traffic study only estimates a 7% increase in traffic, not meeting the 20% threshold present in the VA's regulations, FoT has demonstrated numerous ways in which that analysis was inadequate and likely underestimated the traffic impacts by a considerable margin. Thus, when the VA reconducts this analysis as requested, it is possible the impact could reach that 20% marker of significance. Given that a number of access roads in the area already have intersections that are experiencing failing levels of traffic (EA at 33–34), the purpose of this threshold is likely met by traffic increases even when below 20%. If the traffic situation is already deteriorated to failing levels, it follows that increases of traffic less than 20% could have just as significant, if not more so, negative impacts on the overall traffic situation. Third, there is a demonstrated conflict with local environmental requirements, as indicated by the project's inconsistency with local ordinances and regulations regarding open spaces. For instance, the MHP recognizes that "Marquam Hill presents many opportunities to enjoy nature in its parks and open spaces," and Policy 4 of the MHP has the objective of "enhancing the Marquam Hill area through the preservation, protection, stewardship, and enhancement of open spaces and natural resources." MHP at	The VA emphasizes that minimal disturbance to undeveloped areas within the Portland VAMC campus is anticipated, resulting in less than significant impacts to land use. VA does not anticipate any direct or indirect impacts that would adversely affect Terwilliger Parkway as a result of the additional traffic generated on the Parkway under the proposed action. While Terwilliger Parkway's listing includes the pedestrian paths, lighting, a border of secondary growth forest, and scenic viewpoints, it should be noted that any direct effects would be limited to vehicular traffic and confined to the physical road surface. Any potential effects do not pose a risk to the Criterion A. Therefore, the Terwilliger Parkway NRHP listing will not be affected by the proposed undertaking. The boulevard has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's NRHP listing will not be affected by the undertaking because standard re-pavement alterations, continual maintenance, and growth over time do not affect its listing under Criterion A, or its integrity. On March 7, 2022, SHPO concurred with VA's finding of no adverse effect to historic properties including Terwilliger Parkway (SHPO Case No.20-1151). Correspondence received from OR SHPO has been included in Appendix H of the Final EA. As stated in the EA, the proposed upgrades and improvements are not intended to increase the capacity of the VAMC but will serve to address current standards of operational care and the required space allocations for health care delivery. The proposed undertaking will also address current parking deficiencies. The proposed action would add a total of 600 new parking spaces to the VAMC campus to increase the available parking spaces for staff, patients, and visitors and improve access to the Portland VAMC while improving traffic flow on the campus. When assuming a one percent annual growth in the supplemental June 2022 Traffic Impact Study, the projected 2030 no-build scenario would result in 9,118 average daily trips (ADT) on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in approximately 746 new trips per day on SW Terwilliger Boulevard, which is an increase of 8.2% over the no action alternative, which would result in minor cumulative impacts to traffic patterns through the implementation of the proposed action in conjunction with projected future traffic growth in the area (Jacobs and LRS Federal, 2022a). The proposed action is also unlikely to result in any hazards to pedestrians, bicyclists, and vehicle users. Increased parking will more likely improve traffic flow on the VAMC campus improving safety for visitors and VAMC staff. To address comments received regarding safety, a bicycle crash analysis for Terwilliger Boulevard has been included in the supplemental Traffic Impact Study (Jacobs and LRS Federal, 2022a) provided in Appendix D of the Final EA. The VA does not expect it will be necessary to conduct an Environmental Impact Statement for the proposed action based on the analysis provided in the EA and further substantiated by the supplemental baseline reports.

Stakeholder	Stakeholder Comment	VA Comment Response
	14, 91. Further, the MHP's land use policy seeks to ensure that "potentially adverse impacts of institutional development on … the environment are avoided or minimized and mitigated." Id. at 75. The proposed project, as is, would be in conflict with these goals. Fourth, the increase in traffic congestion that will result from this project is likely to pose hazards to pedestrians, bicyclists, and vehicle users. And fifth, there exists a probable conflict with local zoning and land use plans, because again, the project is not consistent with the MHP or TPCP. For the above reasons, the size, scope, and significance of the VA's project indicate the need for the VA to prepare an EIS instead of an EA. These factors in combination with the narrow scope, lack of detail, and erroneous conclusions in draft EA's impacts analysis demonstrate that a more in-depth Environmental Impact Study is required before the project can move forward.	

C Appendix C: VA CFM Project Review File - Endangered Species Act Section 7 Determination

DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

Date: February 3, 2022

From: Glenn Elliott, Director Environmental Programs
U.S. Department of Veterans Affairs
Office of Construction & Facilities Management, Facilities Planning

To: CFM-Environmental project review file

Subject: Endangered Species Act Section 7: Determination of No Effect for the Portland, Oregon Veterans Affairs Medical Center Seismic Upgrades and Improvement Projects

Project Summary

The Portland Veterans Affairs Medical Center (VAMC) campus is located on approximately 28.5 acres of land and includes 12 buildings, one below-grade parking garage, one above-grade parking garage, and ten surface-level parking lots. The campus, first constructed in the early 1900s, sits near the top of Marquam Hill, south of downtown Portland and within a mile of the Willamette River. The northern, eastern, and southern perimeter of the VAMC campus is wooded and slopes steeply toward SW Terwilliger Boulevard, a scenic and historic roadway. Proposed construction projects on the campus are needed to correct seismic deficiencies, address federal setback and physical security requirements, and provide sufficient patient and staff parking facilities at the Portland VAMC to meet existing needs. This is a federal project through the Department of Veterans Affairs (VA), its actions are subject to Section 7(c) of the Endangered Species Act (ESA). This No Effect Documentation was developed on behalf of VA Office of Construction and Facilities Management (VA CFM) to address potential effects the proposed project may have on federally listed species and habitat protected by the ESA.

VA CFM has determined the proposed project would have **no effect** on species identified in the Official Species List for this site, obtained from the U.S. Fish and Wildlife Service (USFWS) and Oregon Department of Fish and Wildlife (ODFW) websites on November 16, 2021. VA CFM has determined that its proposed action will not affect a listed species designated critical habitat within the Lower Willamette River and Lower Columbia River.

Species and Habitat Information

Available information from USFWS and ODFW was reviewed to identify potential federally and state listed protected species on or in the vicinity of the Portland VAMC campus. Federally listed protected species include federally endangered (FE) and federally threatened (FT) species, and state listed protected species include state endangered (SE) and state threatened (ST) species. The USFWS Information for Planning and Consultation (IPaC) tool was reviewed for federally listed species, and a list from the ODFW website of state-identified threatened or endangered species for Oregon was reviewed to incorporate any additional species of interest. Species identified from these sources and their critical habitats are identified in Table 1. Additionally, federally and state listed fish species potentially occurring within the Lower Willamette River and Lower Columbia River are identified in Table 2.

Table 1. Federally and State Listed Species Potentially Occurring at the Proposed Site

Species	Habitat	Listing Status	Potential Habitat Present
Birds			
California Brown Pelican *Pelecanus occidentalis californicus*	Sea coasts	SE	No
Northern Spotted Owl *Strix occidentalis caurina*	Old-growth forests	FT, ST	No
Streaked Horned Lark *Eremophila alpestris strigata*	Prairie and open coastal habitat	FT	No
Yellow-billed Cuckoo *Coccyzus americanus*	Wooded habitat with dense cover and water nearby	FT	No
Mammals			
Kit Fox *Vulpes macrotis*	Chaparral, halophytic regions, and grasslands	ST	No
Washington Ground Squirrel *Urocitellus washingtoni*	Shrub-steppe	SE	No
Wolverine *Gulo*	Open forests and alpine areas	ST	No
Plants			
Bradshaw's Lomatium *Lomatium bradshawii*	Wet prairie habitats	FE	No
Kincaid's Lupine *Lupinus sulphureus ssp. Kincaidii*	Upland prairies	FT	No
Nelson's Checker-mallow *Sidalcea nelsoniana*	Soils that become saturated during the rainy season, with plants frequently becoming inundated for several weeks or longer	FT	No
Water Howellia *Howellia aquatillis*	Small vernal wetlands with firmly consolidated bottoms	FT	No
Willamette Daisy *Erigeron decumbens*	Deschampsia Caespitosa Valley prairie; clay soiled prairie in valley bottoms, often by creek drainages	FE	No

FE – Federally Endangered
FT – Federally Threatened
SE – State Endangered
ST – State Threatened

Table 2. Federally and State Listed Fish Species Potentially Occurring within the Lower Willamette and Lower Columbia Rivers

Common Name	Scientific Name	Listing Status	Designated Critical Habitat
Bull Trout	*Salvelinus confluentus*	FT	Yes
Eulachon/Smelt	*Thaleichthys pacificus*	FT	Yes
Green Sturgeon	*Acipenser medirostris*	FT	Yes
Columbia River Chum Salmon	*Oncorhynchus keta*	FT	Yes
Lower Columbia River Chinook Salmon	*Oncorhynchus tshawytsha*	FT	Yes
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	SE, FT	Yes
Lower Columbia River Steelhead	*Oncorhynchus mykiss*	FT	Yes
Sockeye Salmon	*Oncorhynchus nerka*	FT	Yes

FT – Federally Threatened
SE – State Endangered

Additionally, the National Oceanic and Atmospheric Administration (NOAA) Fisheries website was utilized to identify Essential Fish Habitat (EFH) for threatened and endangered species in the area. Per NOAA EFH Mapper, fisheries resources identified by NOAA National Marine Fisheries Service (NMFS) for the Lower Willamette River and Lower Columbia River are the Chinook Salmon and Steelhead Trout, which are both listed as “threatened” under the ESA (Table 3). The Willamette River is located approximately 0.6 miles east of the Portland VAMC campus. There is no essential fish habitat located on the site or within the City of Portland’s combined sewer system network located downgradient from the site.

Table 3. National Oceanic and Atmospheric Administration Fisheries Threatened and Endangered Species

Common Name	Scientific Name	Listing Status	Habitat Description	Habitat Distance from VAMC
Chinook Salmon	*Oncorhynchus tshawytscha*	FT	Lower Willamette River	0.6 miles
Steelhead Trout	*Oncorhynchus mykiss*	FT	Lower Willamette River	0.6 miles

FT – Federally Threatened

Regulatory Background

Stormwater discharge and site runoff requirements are regulated by both the State of Oregon's National Pollutant Discharge Elimination System (NPDES) program and the federal Environmental Protection Agency (EPA). Oregon Department of Environmental Quality (ODEQ) has also developed a Water Quality Standards (WQS) program in collaboration with NMFS and USFWS to not only comply with the requirements of the federal ESA but also to assist in salmonid recovery. Many of Oregon's state WQS are derived from water quality criteria developed from research on salmonids and require that water quality conditions protect species listed under ESA (Oregon Administrative Rule [OAR] 340-041-0042). Section 7 ESA and NMFS consultation was conducted by EPA during the development of the State of Oregon's WQS and NPDES program.

The City of Portland Bureau of Environmental Services (PBES) provides municipal combined stormwater/sanitary sewer services to the Portland VAMC. Discharge to the stormwater/sanitary sewer requires a permit from PBES in accordance with the Sewer and Drainage Facilities Design Manual and Stormwater Management Manual (2020). Portland VAMC would maintain compliance with the PBES permit by following prescribed best management practices (BMPs) related to discharge of wastewater to the publicly-owned treatment works (POTW). Stormwater design criteria and requirements for the proposed action will be in compliance with the City of Portland's Sewer and Drainage Facilities Design Manual and Stormwater Management Manual (2020). Both manuals require stormwater treatment technologies that meet water quality, infiltration, and/or flow control requirements to protect the integrity of the downstream stormwater system.

Discharges and effluent associated with the proposed action into Portland's combined stormwater/sanitary system will also continue to be in accordance with the City of Portland's Columbia Boulevard Wastewater Treatment Plant NPDES wastewater discharge permit and self-monitoring program, which ensure ODEQ WQS are met and in accordance with OAR 340-041-0004 WQS: Beneficial Uses, Policies, and Criteria for Oregon 340-041-0004 Antidegradation Policy such that compliance with the ESA is maintained.

The NPDES 1200-C Construction Stormwater Permit is required for land disturbances of one acre or more and includes an Erosion and Sediment Control Plan (ESCP) and a Stormwater Pollution Prevention Plan (SWPPP). Proposed improvements will likely disturb one acre or more of land. The NPDES permit would require stormwater runoff and erosion management to protect surface water quality using BMPs, such as earth berms, vegetative buffers and filter strips, and spill prevention and management techniques during construction.

Analysis of Effects

VA CFM determined that the site does not contain essential habitats for any of the state or federally listed species. Construction projects would occur on previously developed land on the Portland VAMC campus and would require limited removal of vegetation during construction. Construction activities proposed during the continued operation of the Portland VAMC are not anticipated to adversely impact state or federally listed avian species. Nesting bird season in Oregon is primarily between April 15 and July 31. Disturbance of vegetation will be avoided during this time to ensure no impacts to nesting birds occur and limits of clearing will be clearly defined prior to construction activities in accordance with the Migratory Bird Treaty Act (MBTA) requirements. No impacts to the wooded areas that border the VAMC campus are anticipated.

As of April 7, 2021, all projects must meet 2020 Storm Water Management Model (SWMM) requirements for project authorization. The SWMM contains local requirements that apply to all development, redevelopment, and improvement projects on private and public property and in the public right-of-way to protect the public stormwater system and meet clean water goals. Resulting effluent being deposited into the existing combined stormwater/sanitary conveyance system will continue to meet all applicable pretreatment requirements as specified in the 2020 SWMM and in accordance with the NPDES stormwater permit for the City of Portland. During construction the combined stormwater/sanitary conveyance system will be safeguarded from sediment loads and site runoff through the implementation of an approved site-specific ESCP and SWPPP in accordance with ODEQ NPDES 1200-C Construction General Stormwater permit.

Stormwater and sanitary discharges from the Portland VAMC are currently conveyed to the City of Portland's combined sewer system and discharged into the Columbia River following treatment at the Columbia Boulevard Wastewater Treatment Plant. The quality of effluent discharged from the treatment plant into the Columbia River meets Oregon and EPA NPDES waste discharge requirements and WQS, under NPDES permit number 101505. Stormwater from the VAMC will continue to meet these standards during and after the proposed construction and therefore, will not impact any federally or state listed species or designated critical habitats in the Lower Columbia River or Lower Willamette River.

Conclusions and Effect Determinations

Construction activities and improvements to the Portland VAMC campus and the continued operation of the Portland VAMC are not anticipated to affect federally or state listed species or critical habitats. Further, no effects to EFH or aquatic species are anticipated based on the proximity of the proposed projects to habitats for aquatic species, known stormwater treatment processes, and BMP implementation that occurs before indirect discharge to the Columbia River.

D Appendix D: Traffic Impact Study

D.1 Portland Veterans Affairs Medical Center Supplemental Traffic Impact Study

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center
Traffic Impact Study

June 2022

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
LRS Federal LLC

Executive Summary

The U.S. Department of Veterans Affairs (VA) is considering a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center campus) in Oregon. This report, commissioned as a response to public comments received on the Draft Environmental Assessment, supplements the traffic impact analyses performed in 2019 and January 2022. This supplementary study includes traffic counts for an additional eight intersections not studied in 2019 or January 2022.

Based on the findings of this supplementary study, no intersections operate below the minimum acceptable Level of Service (LOS) in any of the examined scenarios, including after full buildout of the proposed action in 2030. These findings differ slightly from the results of the 2019 and January 2022 traffic impact analyses. The most likely reasons for the difference in findings are (1) a shorter background traffic growth period, (2) traffic for some movements was less in 2022 than in 2019, and (3) a traffic factoring method was not used due to a statewide return to pre-COVID volumes.

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms and Abbreviations

ADT	Average Daily Traffic
AM (PM)[1]	AM peak period (PM peak period)
BGSF	building gross square foot (feet)
COVID-19	Coronavirus Disease 2019
ITE	Institute of Transportation Engineers
LOS	level of service
OHSU	Oregon Health & Science University
TIA	traffic impact analysis
v/c	volume to capacity ratio
VA	U.S. Department of Veterans Affairs
VAMC	Veterans Affairs Medical Center

[1] Two traffic periods were studied: the weekday AM peak period and the weekday PM peak period. Where parentheses are used, the number not in parentheses refers to the AM period and the number in parentheses refers to the PM period. This applies for traffic volumes, level of service, and other metrics.

1.0 Introduction

The U.S. Department of Veterans Affairs (VA) is proposing a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus) in Oregon. In May 2019, a traffic impact analysis (TIA) was conducted at five intersections based on counts collected in April 2019 (2019 Study). After the 2019 Study, details of the proposed actions changed and were finalized, which led to two additional studies; in February 2021, a second study was conducted at eight intersections based on counts collected in October 2020. This study was revised in January 2022 (January 2022 Study). This report supplements the previous TIAs by studying 10 intersections on and near Terwilliger Boulevard. This study was commissioned as a response to public comments received on the Draft Environmental Assessment. The public comments focused on additional intersections on SW Terwilliger Boulevard which were added to this study. The two intersections recommended for improvement in the 2019 and January 2022 Studies are re-examined along with one intersection included in the 2019 Study and seven new intersections not previously studied. The project team collected traffic counts and made observations in May 2022 and then analyzed the traffic operations under a full build of the proposed project and a no-build alternative. This report concludes with recommendations based on the traffic study results.

The report is organized as follows:

- **Section 1.0, Introduction,** includes a description of the proposed construction project.
- **Section 2.0, Existing Traffic Data,** discusses traffic counts collected at key intersections around the Portland VAMC campus and the differences with previously collected traffic counts.
- **Section 3.0, Proposed Action,** describes the potential future performance of traffic operations by determining the anticipated number of trips generated by the proposed action at the Portland VAMC campus, distributing those trips throughout the traffic network, accounting for background traffic growth, and then analyzing the performance of the traffic network with and without the full buildout.
- **Section 4.0, Summary,** summarizes the findings of this study.

1.1 Project Description

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-building-gross-square-foot (BGSF) facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101. Buildings 110 and 111 would be constructed over Lot 5 (196 parking spaces) and Building T-51.

Therefore, the proposed action results in a net increase of 600 parking spaces. The final decision on how those spaces will be allocated between staff and patient spaces has not been made but no more than 350 of the 600 spaces will be staff-only parking. These components would be constructed over an extended period of approximately 6 to 8 years. For this analysis, 2030 was used for the opening year of the project. The site location map is shown on Figure 1-1 and the proposed improvements site map is shown on Figure 1-2.

Figure 1-1. Site Location Map

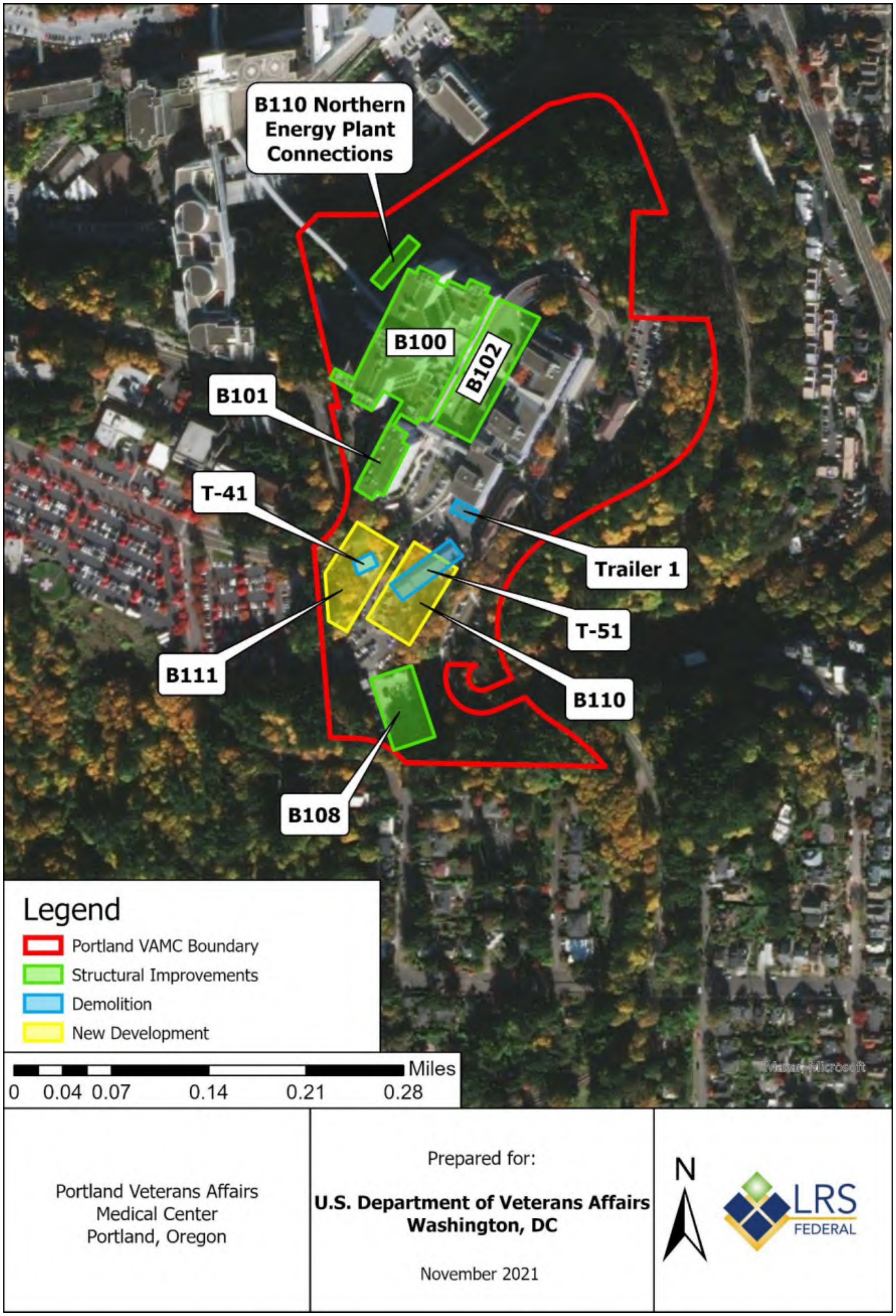


Figure 1-2. Proposed Improvements Site Map

1.2 Existing Infrastructure

The consulting firm Global Transportation Engineering performed a TIA for the site in May 2019. The 2019 Study is included as Appendix A. The underlying infrastructure conditions surrounding the Portland VAMC campus have not changed and the 2019 Study should be referenced for general information such as roadway functional classifications, speed limits, number of lanes, and so forth.

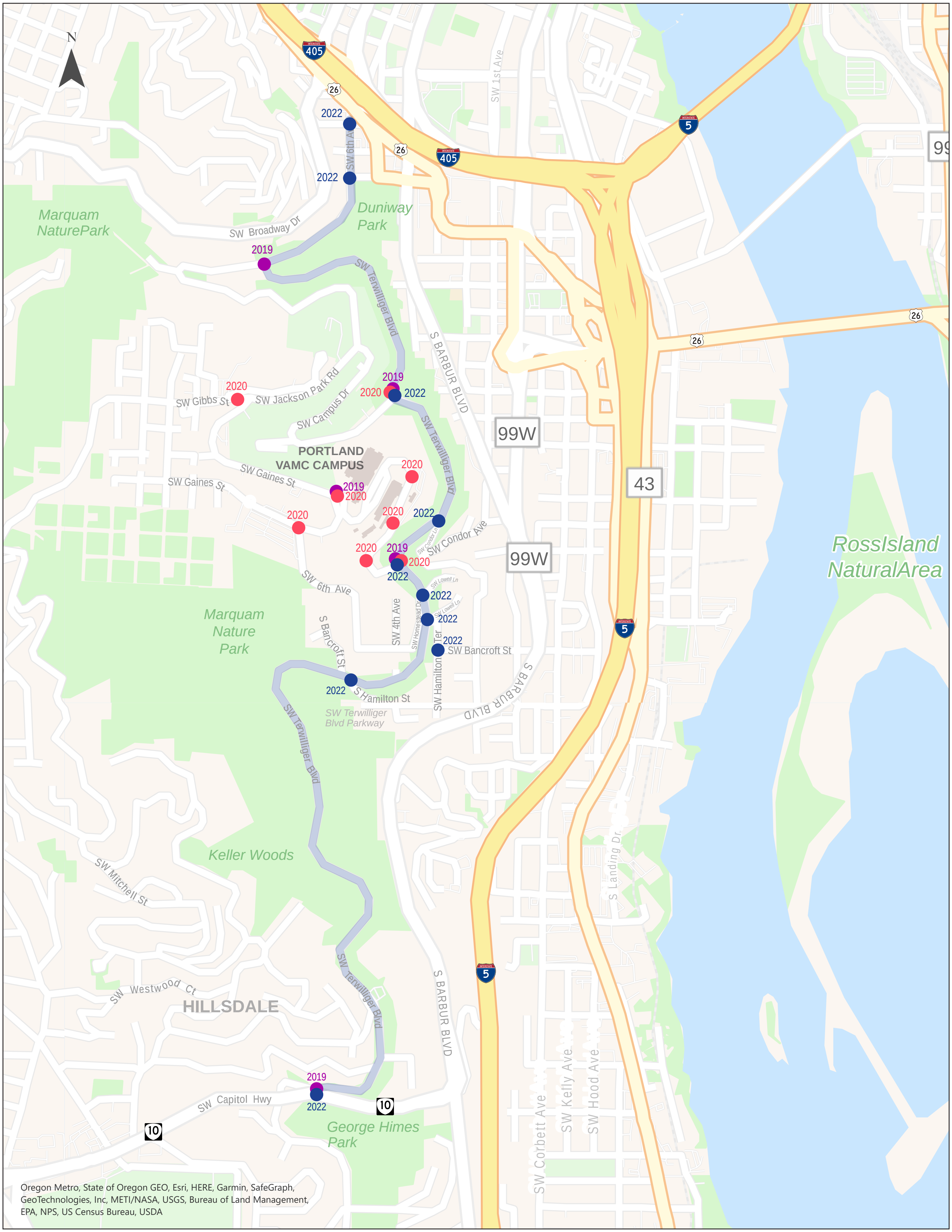
1.3 Current Study Scope

The scope of this study includes 10 intersections on or near SW Terwilliger Boulevard near the Portland VAMC Campus. Two of the intersections were also studied in all previous studies and one of the intersections was studied in the 2019 Study. The remaining seven intersections were added in response to public comments on the January 2022 Study and have not been previously studied. Table 1-1 and Figure 1-3 show when traffic data were collected at each intersection. Intersections that performed well above the minimum standard LOS were not restudied. The anticipated trip generation volumes and distribution remain the same as the January 2022 Study because the proposed action has not changed since that time; however, the background traffic volumes use the new counts collected in May 2022 as a baseline.

Table 1-1. Intersection Count History

Int. No.	Street 1	Street 2	Counted in
1	SW 6th Ave	SW Sherman St	2022
2	SW Terwilliger Blvd/SW 6th Ave	SW Sheridan St	2022
3	SW Terwilliger Blvd	SW Campus Dr	2022, 2020, 2019
4	SW Terwilliger Blvd	SW Condor Ln	2022
5	SW Terwilliger Blvd	SW US Veterans Hospital Rd	2022, 2020, 2019
6	SW Terwilliger Blvd	SW Homestead Dr/SW Lowell Ln	2022
7	SW Terwilliger Blvd	SW Hamilton Terr/SW Lowell Ln	2022
8	SW Hamilton Terr	SW Bancroft St	2022
9	SW Terwilliger Blvd	SW Hamilton Terr/SW Bancroft Terr	2022
10	SW Terwilliger Blvd	SW Capitol Hwy	2022
-	SW Terwilliger Blvd	SW Sam Jackson Park Rd	2019
-	SW Sam Jackson Park Rd	SW US Veterans Hospital Rd/SW Gibbs St	2020
-	S Gaines St	SW US Veterans Hospital Rd	2020, 2019
-	S Gaines St	SW 6th Avenue Dr	2020
-	SW US Veterans Hospital Rd	Shipping/Receiving Access	2020
-	SW US Veterans Hospital Rd	Building T-51 Entrance	2020
-	SW US Veterans Hospital Rd	Building 108 Driveway	2020

Figure 1-3. Intersection Count History



FES0519221717CHC

2.0 Existing Traffic Data

2.1 2019, 2020, and 2022 Traffic Counts

Figure 1-3 shows the locations of turning movement counts collected in 2019, 2020, and 2022. Ten intersections were counted for this supplementary study, with 2 of the 10 also counted in 2019 and 2020.

The traffic counts analyzed in this study were collected on May 10, 2022, from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. and included counts of passenger vehicles, heavy trucks, pedestrians, and bicyclists. The counts are provided in Appendix B. The network-wide AM peak hour was found to be 7:25 a.m. to 8:25 a.m. and the PM peak hour was found to be 4:35 p.m. to 5:35 p.m. Activity into and out of the hospital was found to be slightly heavier from 6:30 am to 7:30 a.m., but the overall traffic volumes during this time were lower than during the network-wide peak hour. Therefore, this supplementary study evaluates traffic impacts from the 7:25 a.m. to 8:25 a.m. and 4:35 p.m. to 5:30 p.m. peak hours.

The Portland Bureau of Transportation lists daily traffic counts performed on SW Terwilliger Boulevard on either side of SW Campus Drive (Intersection 3) from 2019. These counts list the bidirectional daily traffic to be 8,173 vehicles.[2]

2.2 Effects of COVID-19 Pandemic on Traffic Counts

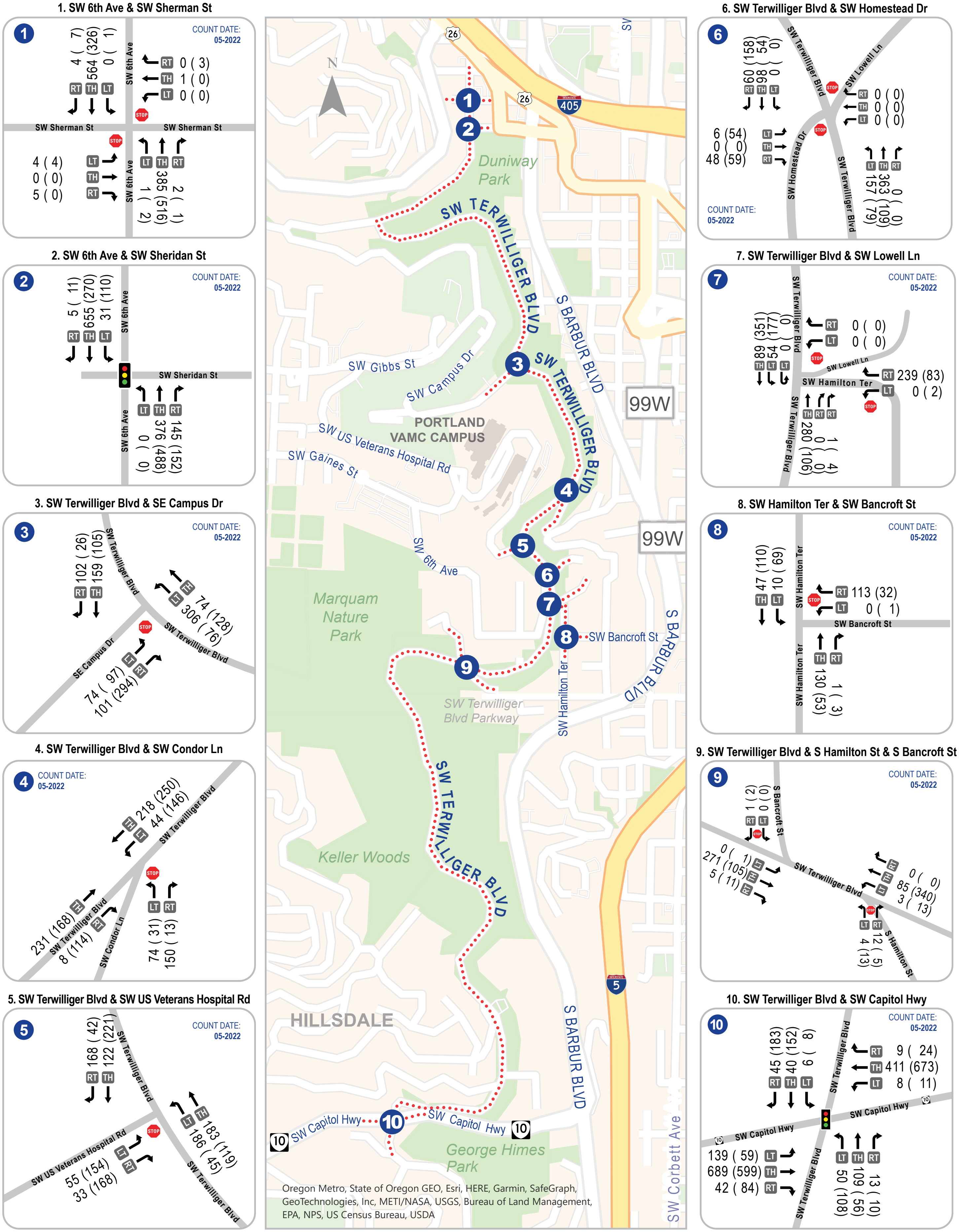
General travel patterns were altered greatly by the onset of the COVID-19 pandemic in 2020, which may have lingering effects on the traffic volumes counted as part of this study. However, the Portland VAMC campus was not restricting access at the time of the count collection—merely requiring masking during visits—so the traffic volumes counted in 2022 are assumed to accurately reflect current travel demand to and from the Portland VAMC campus.[3]

2.3 Traffic Count Results

Figure 2-1 shows the 2022 traffic volumes for the 10 intersections analyzed as part of this supplementary study.

[2] https://www.portland.gov/transportation/engineering/how-we-gather-traffic-counts. Accessed June 2, 2022.
[3] https://www.va.gov/portland-health-care/ Accessed May 20, 2022.

Figure 2-1. 2022 Observed Volumes



3.0 Proposed Action

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-BGSF facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101.

Therefore, the proposed action results in a net increase of 600 parking spaces. The final decision on how those spaces will be allocated between staff and patient spaces has not been made but not more than 350 of the 600 spaces will be staff-only parking.

3.1 Baseline Traffic Growth

This supplementary study assumes a 1 percent annual growth rate from the count date (2022) through the opening of the project (2030), which is an 8-year analysis period. This annual growth rate accounts for increased trips from other developments such as the Oregon Health & Science University (OHSU) campus expansion, expected to be completed in 2026. Figure 3-1 shows the expected 2030 no-build conditions that represent the 2022 adjusted volumes growing by 1 percent annually until 2030.

3.2 Site Trip Generation and 2030 Combined Volumes

3.2.1 Methodology and Observations

This report follows the same trip generation methodology as the previous January 2022 Study. A common engineering practice is to estimate the number of trips generated based on calculations as defined in the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual*, 10th Edition.[4] However, for the "610: Hospital" land use designation, ITE's *Trip Generation Manual* provides average trip generation rates from a large number of studies at hospital facilities throughout the country, with a large amount of variability between the projects and results. In this case, site-specific data for the Portland VAMC campus provide more accurate trip generation forecasts than the average data. Based on data collected during the 2019 Study, actual traffic volumes were observed to be more concentrated in the AM and PM peak hours and directionality was more focused on entering trips in the AM and exiting trips in the PM than the data shown in the *Trip Generation Manual*.

3.2.2 Trips Generated by the Proposed Action

The 2019 Study counted daily trips for three entrances to staff parking lots: Building 108, Lot 5, and Lot 4. Each parking space generated 1.12 entering staff trips per space per day and 1.14 exiting staff trips per space per day. The number of trips per parking space being close to 1.0 indicates that most trips are staff arriving for work in the AM, staying in the parking lot all day, and then departing in the PM. It was assumed that patient spaces would generate the same number of daily trips, but they would be less concentrated in the peak hours. Table 3-1 aggregates the observed exiting and entering staff vehicles at the three driveways measured as part of the 2019 Study. The data include 2 days of measurements for the driveways to Building 108 and Lot 5 (averaged) and 1 day for the driveway to Lot 4.

[4] Institute of Transportation Engineers (ITE). 2019. *Trip Generation Manual*, 10th Edition.

Figure 3-1. 2030 No-build Volumes

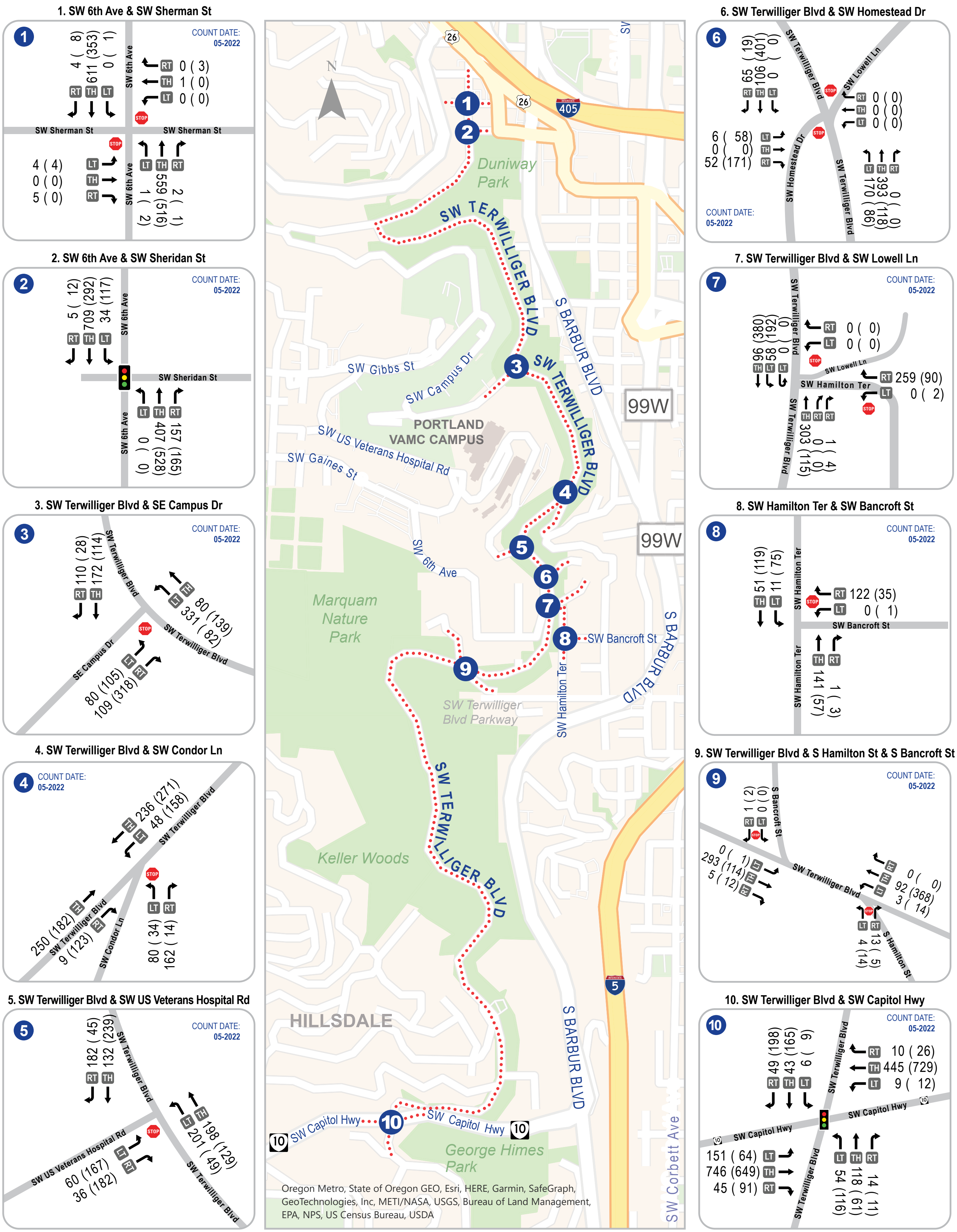


Table 3-1. Measured Entering and Exiting Staff Volumes During Peak Periods as Percentage of Daily Entering and Existing Volumes

	2019 Entering Trips		2019 Exiting Trips	
Hour Start	**Count**	**Percent**	**Count**	**Percent**
12:00 AM	0	0.0%	0	0.0%
1:00 AM	0	0.0%	1	0.1%
2:00 AM	3	0.2%	1	0.1%
3:00 AM	1	0.1%	0	0.0%
4:00 AM	8	0.6%	1	0.1%
5:00 AM	56	4.2%	5	0.4%
6:00 AM	364	27.6%	9	0.7%
7:00 AM	**417**	**31.6%**	21	1.6%
8:00 AM	199	15.1%	25	1.8%
9:00 AM	62	4.7%	**48**	**3.6%**
10:00 AM	40	3.0%	30	2.2%
11:00 AM	36	2.7%	45	3.3%
12:00 PM	32	2.4%	43	3.2%
1:00 PM	18	1.4%	41	3.0%
2:00 PM	10	0.8%	54	4.0%
3:00 PM	21	1.6%	196	14.5%
4:00 PM	13	1.0%	**355**	**26.3%**
5:00 PM	**24**	**1.8%**	233	17.2%
6:00 PM	8	0.6%	113	8.4%
7:00 PM	3	0.2%	98	7.2%
8:00 PM	4	0.3%	24	1.8%
9:00 PM	0	0.0%	2	0.1%
10:00 PM	1	0.1%	3	0.2%
11:00 PM	1	0.1%	4	0.3%
TOTAL	1,321	100.0%	1,352	100%

The above data were collected at the entrances and exits to staff-only lots. The final decision on how the new spaces will be allocated between staff and patient spaces has not been made but not more than 350 of the 600 spaces will be staff-only parking. Patients are predicted to have different commuting patterns than staff. Patient trips to and from the hospital are more spread out throughout the day than staff trips and are less likely to occur in the AM and PM peak hours. Using data from a comparable VA facility, patient trips are 2.2 times less likely to occur in the AM peak hour than staff trips and 3.2 times less likely to occur in the PM peak hour.[5] Using these numbers and the trip patterns observed at existing Portland VAMC parking facilities, the following trip generation numbers per parking space can be computed:

Table 3-2. Trips Generated per Parking Space

	Entering			Exiting	
	Staff Space	Patient Space		Staff Space	Patient Space
AM Peak Hour	0.354	0.161		0.040	0.018
PM Peak Hour	0.020	0.006		0.299	0.093
TOTAL DAY	**1.120**	**1.120**		**1.140**	**1.140**

[5] *Final Transportation Report: VA Alameda Point Multi-Specialty Outpatient Clinic and Columbarium* (2020) HDR

As is shown in Table 3-3, each patient space generates fewer trips in the AM and PM peak hours than each staff space. The proposed action would result in a net increase of 600 parking spaces (+150 from Building 108, +650 from Building 111, and -200 from the removal of Lot 5). No more than 350 of the new spaces will be staff spaces. For this study, we assumed that 350 spaces will be staff spaces and 250 spaces will be patient spaces, the most conservative estimate.

Table 3-3. Proposed Daily Trips Generated

	Entering				Exiting		
	Staff Space	Patient Space	**TOTAL**		Staff Space	Patient Space	**TOTAL**
AM Peak Hour	124	40	**164**		14	5	**19**
PM Peak Hour	7	2	**9**		105	23	**128**
TOTAL DAY	**392**	**280**	**672**		**399**	**285**	**684**

Comparing these numbers to the *Trip Generation Manual* numbers shows that the AM peak trips are approximately the same using either method but have a different distribution (i.e., more entering trips, fewer exiting trips). The PM peak trips and the total daily trips are both lower than the number that would be predicted by the *Trip Generation Manual* because of the lower turnover of parking spaces at the Portland VAMC than at other hospitals.

3.2.3 Distribution of Generated Trips and Combined 2030 Volumes

The driveway to Building 108 is projected to be located on the lower (eastern) section of SW US Veterans Hospital Road, just west of SW Terwilliger Boulevard. The driveway for Building 111 is projected to be on the upper (western) section of SW US Veterans Hospital Road, just east of S Gaines Street. Based on the proposed driveway locations, existing traffic patterns, and engineering judgement, generated trips have been distributed to the study intersections as shown on Figure 3-2 as percentages and Figure 3-3 as trips. Some generated trips are projected to leave the network through intersections that are not being studied as part of this supplementary study. Only those generated trips that travel through the 10 study intersections are shown on Figures 3-2 and 3-3. All turning movements at these 10 intersections are shown, but if the proposed buildout does not add trips to that movement, it is shown only as "- (-)". Adding these generated volumes to the 2030 no-build base volumes results in the combined 2030 volumes after full buildout, as shown on Figure 3-4.

In 2019, there was a bidirectional Average Daily Traffic (ADT) volume of 8,173 vehicles on SW Terwilliger Boulevard on either side of SW Campus Drive. The projected 2030 no-build scenario that assumes a 1% annual growth would result in 9,118 ADT on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in 746 new trips per day on SW Terwilliger Boulevard, which is an increase of 8.2% over the no-build scenario.

Figure 3-2. Distribution of Generated Volumes

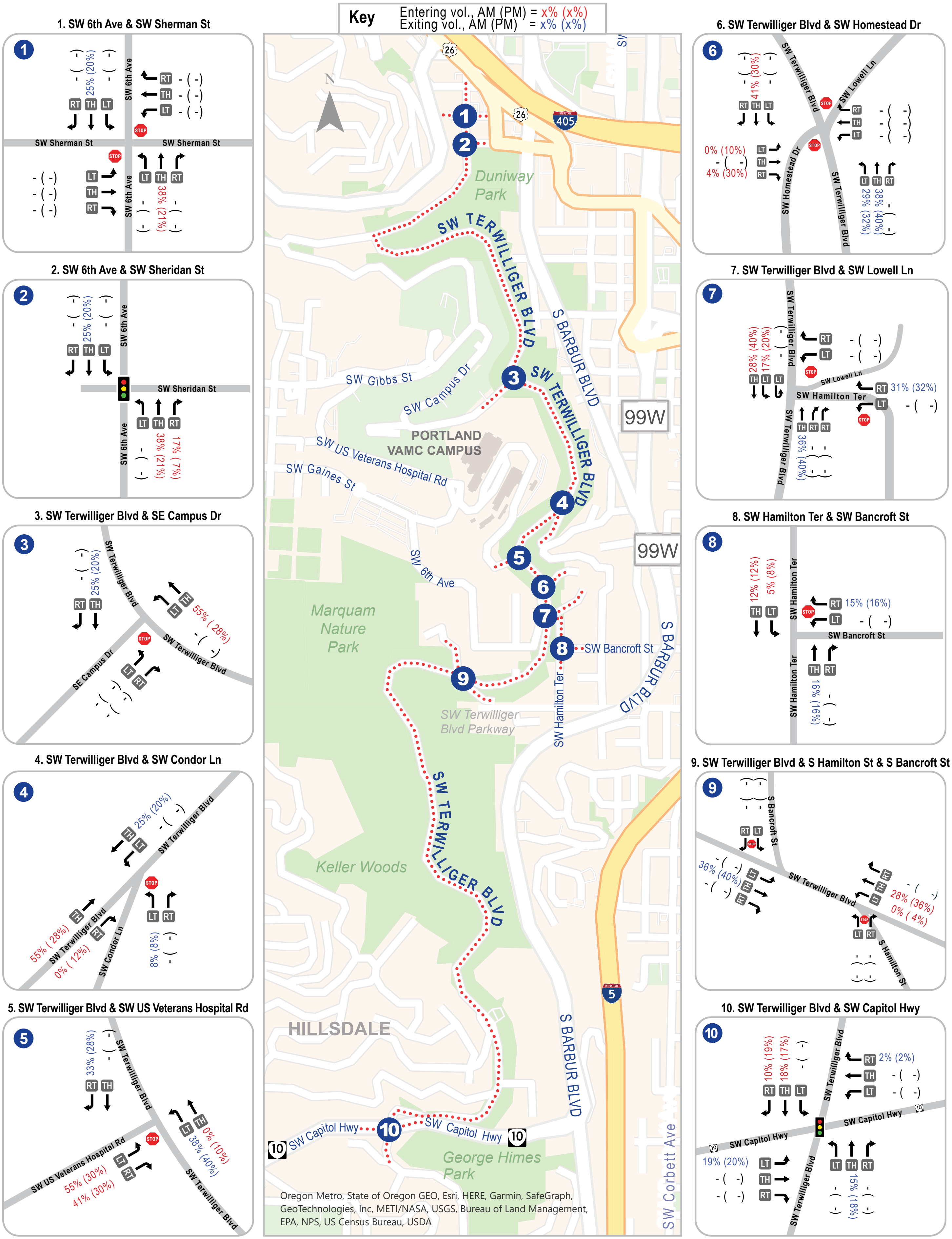


Figure 3-3. Buildout Generated Volumes

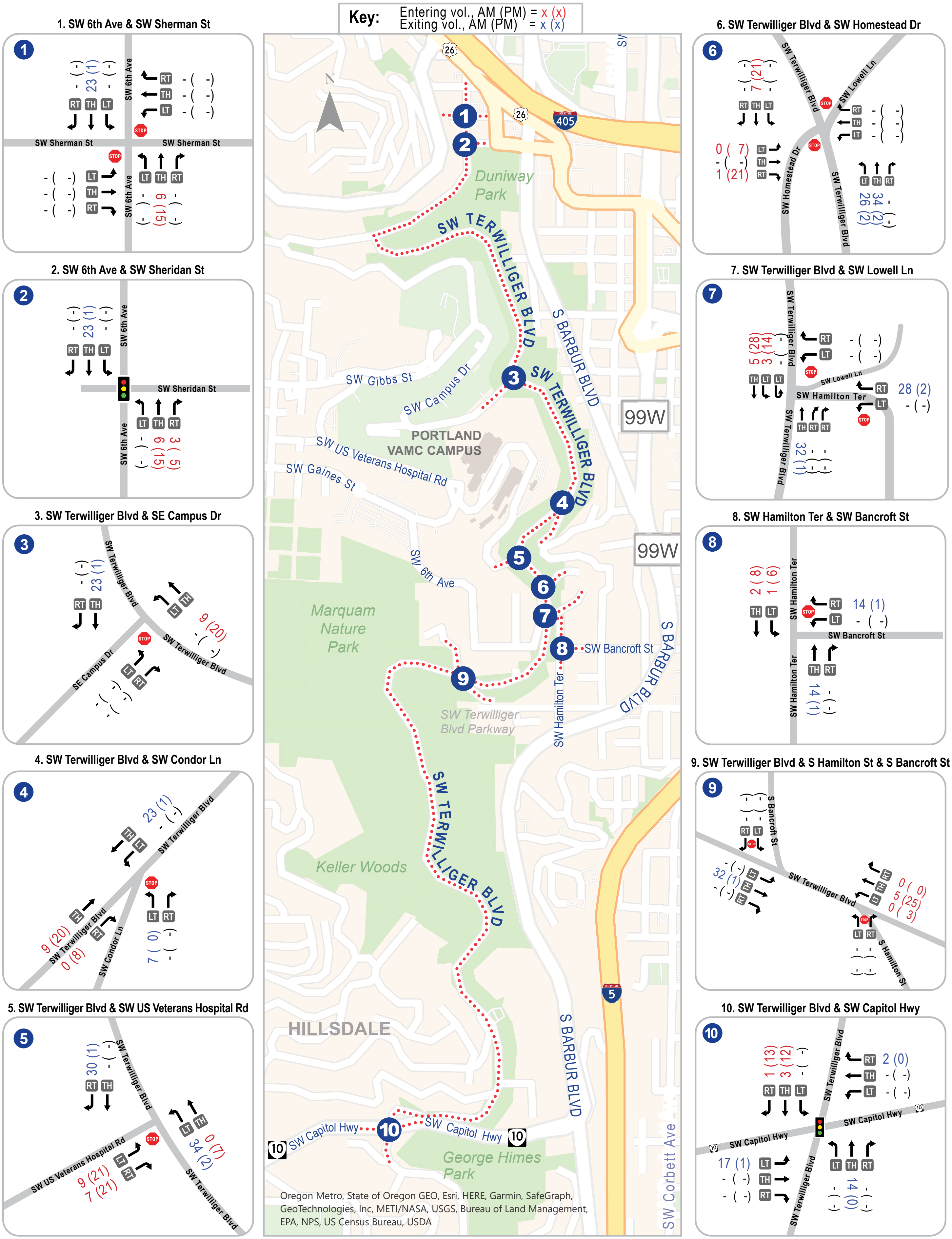
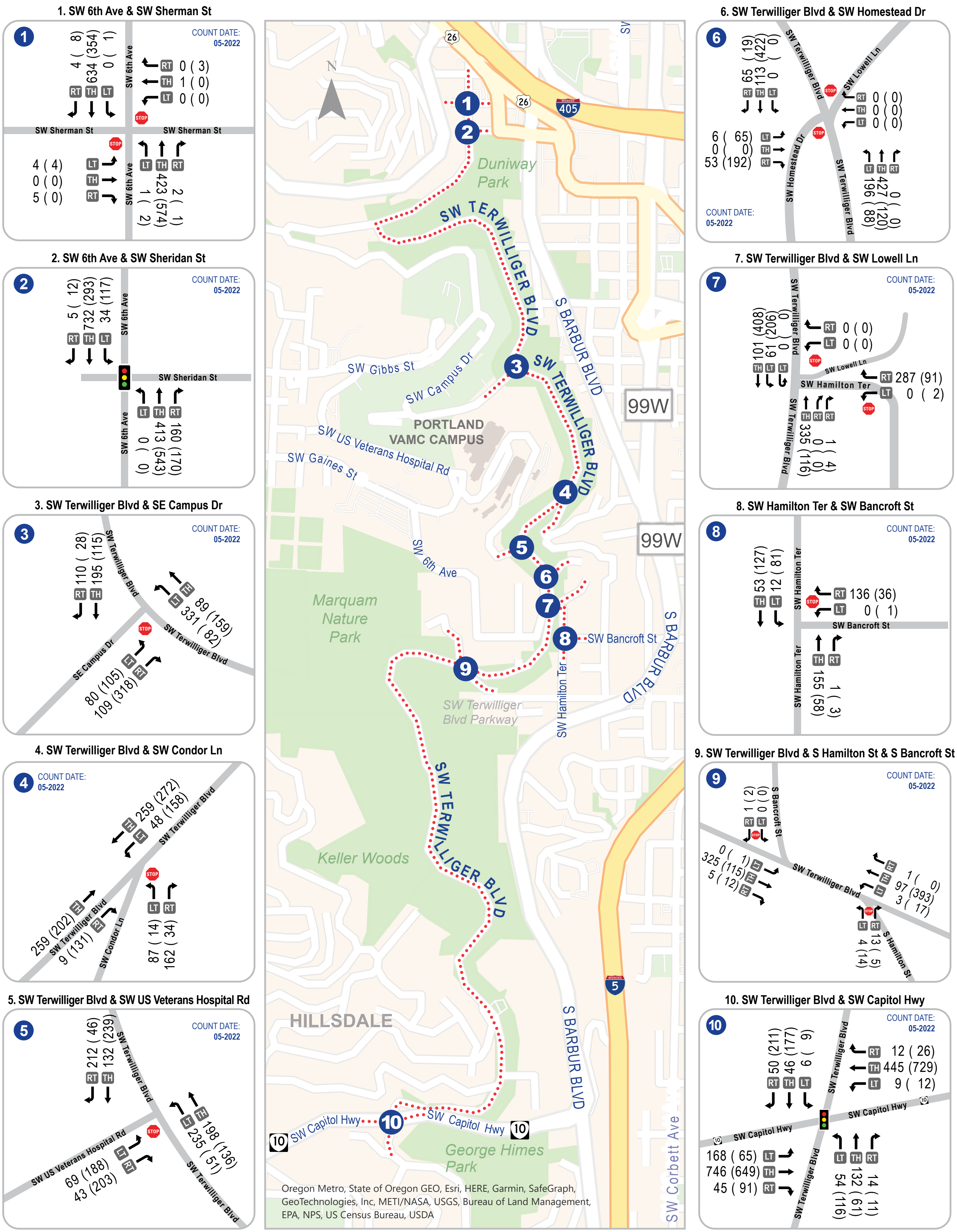


Figure 3-4. 2030 Build Combined Volumes



3.3 Intersection Performance

Traffic operations at the 10 study intersections were analyzed using Synchro 11 software, which uses capacity analysis methodologies defined in the *Highway Capacity Manual*, which is published by the Transportation Research Board, a division of the National Academy of Sciences, Engineering, and Medicine.[6] Intersections were analyzed for the following three scenarios:

- 2022 Existing–Volumes collected in May 2022 (Figure 2-1)
- 2030 No-build Scenario–Year 2022 adjusted volumes plus 1 percent annual growth (Figure 3-1)
- 2030 Build Scenario–2030 no-build volumes combined with the distributed, site-generated trips Figure 3-4)

Intersection operations are shown in Table 3-4. Full Synchro reports are included in Appendices D, E, and F.

Traffic operation performance at intersections is measured using several factors: average vehicle delay, volume to capacity ratio (v/c), and level of service (LOS). LOS is a categorization of the performance, ranging from A to F, that is directly related to the average vehicle delay, where LOS A represents minimal vehicle delay, LOS E represents an intersection operating at full capacity, and LOS F represents failing conditions with excessive delay. The City of Portland requires that unsignalized intersections operate at LOS E or better (i.e., not LOS F) based on individual vehicle movements for two-way, stop-controlled intersections and based on a weighted average of vehicle delay for all-way, stop-controlled intersections. Signalized intersections must operate at LOS D or better based on a weighted average of vehicle delay for the intersection.[7]

As shown in Table 3-4, no intersections operate below the standard LOS. Therefore, no intersections are recommended for mitigation as part of the proposed action.

[6] Transportation Research Board. 2016. *Highway Capacity Manual, 6th Edition: A Guide for Multimodal Mobility Analysis*.
[7] City of Portland Title 17 Public Improvements Administrative Rules, Section TRN-10.27

Table 3-4. Intersection Performance Summary

Intersection	2022 Existing			2030 No-build			2030 Build		
	LOS[a]	Delay[b]	Max. v/c[c]	LOS[a]	Delay[b]	Max. v/c[c]	LOS[a]	Delay[b]	Max. v/c[c]
1: SW 6th Ave & SW Sherman St [TWS]	C – WB (B – EB)	22 (14)	0.00 (0.01)	C – WB (B - EB)	24 (15)	0.01 (0.01)	C - WB (B - WB)	25 (15)	0.01 (0.01)
2: SW 6th Ave & SW Sheridan St [S]	A (A)	1 (1.6)	0.40 (0.35)	A (A)	3 (7)	0.46 (0.45)	A (A)	1 (2)	0.44 (0.40)
3: SW Terwilliger Blvd & SW Campus Dr [TWS]	D – EB (C – EB)	29 (16)	0.57 (0.56)	E - EB (C - EB)	43 (18)	0.72 (0.63)	E - EB (C - EB)	49 (18)	0.76 (0.64)
4: SW Terwilliger Blvd & SW Condor Ln [TWS]	B – WB (B – WB)	15 (13)	0.41 (0.10)	C - WB (B - WB)	16 (14)	0.46 (0.12)	C - WB (B - WB)	18 (14)	0.51 (0.12)
5: SW Terwilliger Blvd & SW US Veterans Hospital Rd [TWS]	C – EB (C – EB)	19 (19)	0.28 (0.59)	C - EB (C - EB)	22 (23)	0.34 (0.68)	D - EB (D - EB)	29 (29)	0.46 (0.77)
6: SW Terwilliger Blvd & SW Homestead Dr [TWS]	B – EB (C – EB)	11 (17)	0.09 (0.45)	B - EB (C - EB)	11 (20)	0.10 (0.52)	B - EB (C - EB)	11 (24)	0.10 (0.61)
7: SW Terwilliger Blvd & SW Hamilton Terr [TWS]	B – WB (A – WB)	13 (10)	0.37 (0.11)	B - WB (A - WB)	14 (10)	0.42 (0.12)	C - WB (A - WB)	15 (10)	0.48 (0.12)
8: SW Hamilton Terr & SW Bancroft St [TWS]	A – WB (A – WB)	10 (9)	0.14 (0.04)	A - WB (A - WB)	10 (9)	0.16 (0.04)	B - WB (A - WB)	10 (9)	0.18 (0.04)
9: SW Terwilliger Blvd & S Hamilton St [TWS]	B – WB (B – WB)	10 (12)	0.03 (0.04)	B - WB (B - WB)	11 (13)	0.03 (0.05)	B - WB (B - WB)	11 (13)	0.03 (0.05)
10: SW Terwilliger Blvd & SW Capitol Hwy [S]	B (C)	19 (26)	0.65 (0.98)	C (C)	21 (28)	0.70 (0.89)	C (C)	22 (29)	0.70 (0.91)

[a] Vehicle movement LOS–worst-performing approach direction indicated for stop-controlled intersections
[b] Movement delay in seconds
[c] Maximum v/c (volume/capacity) ratio for the movement
Notes:
AM (PM) = AM Peak Period (PM Peak Period) values
LOS = level of service
[TWS] = Two-way stop-controlled intersection, [S] = Signalized intersection
EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

3.3.1 Difference in Results from Previous Studies

The previous traffic studies from 2019 and January 2022 both examined the intersections of SW Terwilliger Boulevard and SW Campus Drive and SW Terwilliger Boulevard and SW US Veterans Hospital Road. Both studies found that operations for the two intersections would be substandard across multiple scenarios; however, based on the May 2022 traffic counts, this supplementary study found that none of the intersection operations would be substandard. The following are contributing reasons for these differences:

- Background traffic growth between 2020 and 2022 was less than assumed by previous studies, likely as a result of changes in travel patterns related to COVID-19. The 2019 Study (traffic counts collected in 2019) and January 2022 Study (counts collected in 2020) both assumed 10 years of background traffic growth at 1% per year. This supplementary study (counts collected in 2022) also assumes traffic growth at 1% per year, but it is now only 8 years until 2030 instead of 10 years. As a result, the total projected volumes, even in the 2030 No-build scenario, are lower in this study than in previous studies.
- For this supplementary study, traffic counts were collected in 2022. While studies have indicated that traffic volumes have generally returned to pre-COVD-19 volumes, some of the volumes collected were still lower than the volumes collected in 2019. The Oregon Department of Transportation Observed Statewide Traffic Volume Patterns Related to COVID-19 Monitoring Final Report is available online at https://www.oregon.gov/odot/Data/Documents/ODOT_TrafficReport_July_9_2021.pdf. [8]
- The factoring process used in the January 2022 Study applied a flat multiplier to the traffic volumes collected in 2020 to account for the reduced volumes counted during the initial period of COVID-19 pandemic. However, it is likely that not all volumes were affected the same amount by COVID-19, so the multiplier may have skewed some of the counts. The volumes collected in May 2022 are assumed to be the "new normal" at this point, so no scaling or factoring is needed to account for changes in travel patterns related to COVID-19.[8]

3.3.2 Study Sensitivity and OHSU Development

Intersection 3—SW Terwilliger Boulevard and SW Campus Drive—in the AM peak hour is the worst-performing intersection in the existing conditions, no-build conditions, and build conditions primarily because of heavy delay for eastbound traffic. While the VAMC proposed actions are not expected to add trips to the eastbound movement, it would add through trips on SW Terwilliger Boulevard, making the eastbound movement perform worse (though not fail).

All-Way Stop

OHSU is currently constructing a multi-story expansion of the hospital on the site of the former School of Dentistry on its Marquam Hill Campus. The expansion includes capacity for additional inpatient services and up to 220 parking spaces. It is located primarily on SW Campus Drive, just west of SW Terwilliger Boulevard. A traffic study performed for this expansion, with counts collected in 2019, found that the intersection of SW Campus Drive and SW Terwilliger Boulevard (Intersection 3) operates at sub-standard LOS in 2019 existing conditions, 2023 no-build conditions, and 2023 full build conditions. Therefore, that study recommended mitigation at the intersection. As of the writing of this report, an all-way stop is being considered as mitigation for that intersection--PBOT has developed a work order for installing an all-way stop--but it is not certain whether it will be installed before the VAMC proposed action is complete.

[8] Oregon Department of Transportation, *Observed Statewide Traffic Volume Patterns*, July 9, 2021. https://www.oregon.gov/odot/Data/Documents/ODOT_TrafficReport_July_9_2021.pdf

Installation of the all-way stop at this intersection is predicted to cause the intersection to operate at LOS C or better in the 2030 build conditions, adding robustness to the system and making it less likely to fail if growth assumptions are incorrect.

3.4 Safety Analysis

Crash data were obtained from the Oregon Department of Transportation for the years 2015–2019 on SW Terwilliger Boulevard from SW Capitol Highway to SW Sheridan Street. During that time, 64 crashes were recorded, of which 39 (61%) occurred at intersections. Of the total crashes, five (8%) were bike crashes and two (3%) were pedestrian crashes.

3.4.1 Bicycle Safety Impacts

The City of Portland designated SW Terwilliger Boulevard as a high crash bike corridor based on crash data from 2004 through 2013. SW Terwilliger Boulevard between SW Capitol Highway and SW Sherman Street features curbside standard bike lanes and one travel lane in each direction. Parking is restricted on SW Terwilliger Boulevard except at a few locations where turnouts have been designed for scenic vistas and trailheads. As a result, bicyclists and vehicles generally do not cross each other's path except at intersections when vehicles turn. Many of the intersections are three-legged T-intersections, so only one bike lane is affected at a time by turning movements.

Of the five bike crashes between 2015 and 2019, two occurred at SW Hamilton Street, one occurred at SW Condor Lane, one occurred at SW Capitol Highway, and one occurred at SW 6th Avenue. The proposed action is projected to mainly influence the intersections of SW Terwilliger Boulevard and SW Homestead Drive (Intersection 6) and SW Terwilliger Boulevard and SW US Veterans Hospital Road (Intersection 5). These two intersections did not have any reported bike crashes between 2011–2020.

Bike crashes in this section of SW Terwilliger Boulevard have become less frequent over time, possibly in part because of improved roadway pavement markings and signage installed over the years. Between 2011 and 2014, 14 bike crashes occurred on the corridor (3.5 per year), but from 2015 to 2019, 5 crashes occurred (1.0 per year).

4.0 Summary

The VA is proposing construction at the Portland VAMC campus that includes adding 150 parking spaces to the Building 108 parking garage, constructing a 300,000-BGSF facility (Building 110), and constructing a new parking garage (Building 111). The project would provide a net increase of approximately 450 parking spaces, for a total of 600 new parking spaces. The final decision on how those spaces will be allocated between staff and patient spaces has not been made but no more than 350 of the 600 spaces will be staff-only parking. The proposed action is projected to generate 183 bidirectional trips in the AM peak hour and 137 bidirectional trips in the PM peak hour.

In 2019, there was a bidirectional ADT volume of 8,173 vehicles on SW Terwilliger Boulevard on either side of SW Campus Drive. The projected 2030 no-build scenario that assumes a 1% annual growth would result in 9,118 ADT on SW Terwilliger Boulevard in 2030. The proposed action is projected to result in 746 new trips per day on SW Terwilliger Boulevard, which is an increase of 8.2% over the no-build scenario.

4.1 Recommendations

All intersections meet the minimum traffic operations standards in all no-build and build scenarios. The proposed actions, therefore, do not require traffic mitigations.

The findings of this supplementary study vary slightly from the 2019 and January 2022 Studies, which recommended intersection improvements at Intersections 3 and 5. Shorter background growth periods and changes in travel patterns since COVID-19 are likely the primary causes of the different results. General travel patterns were altered greatly by the onset of the COVID-19 pandemic in 2020, which may have lingering effects on the traffic volumes counted as part of this study. However, the Portland VAMC campus was not restricting access at the time of the count collection—merely requiring masking during visits—so the traffic volumes counted in 2022 are assumed to accurately reflect current travel demand to and from the Portland VAMC campus.[9]

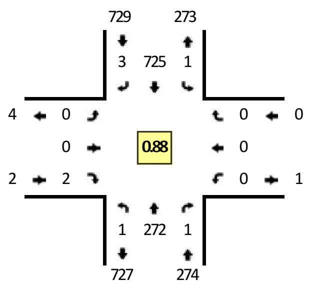
Regardless of whether the proposed action is to be implemented, VA recognizes and supports the planning, discussion, and potential implementation of future traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address the existing operational issues at these intersections and improve traffic conditions.

[9] https://www.va.gov/portland-health-care/ Accessed May 20, 2022.

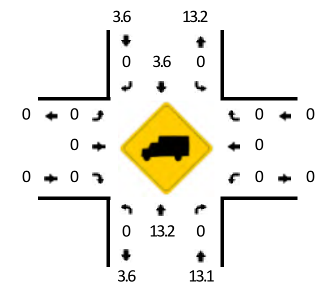
Appendix C
2022 Traffic Counts

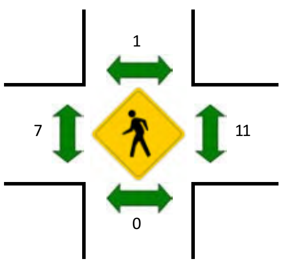
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

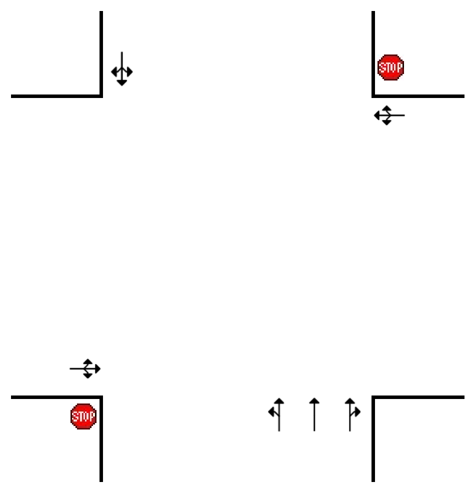
LOCATION: SW 6th Ave -- SW Sherman St | **QC JOB #:** 15769401
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

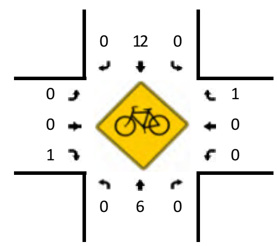


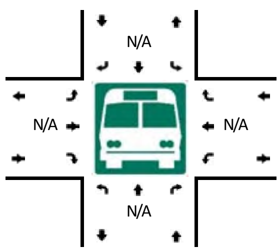
Peak-Hour: 6:30 AM -- 7:30 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

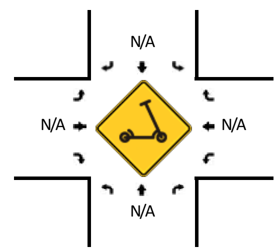












5-Min Count Period Beginning At	SW 6th Ave (Northbound)				SW 6th Ave (Southbound)				SW Sherman St (Eastbound)				SW Sherman St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	14	0	0	0	23	0	0	0	0	0	0	0	0	0	0	37	
6:05 AM	0	8	0	0	0	28	0	0	0	0	0	0	0	0	0	0	36	
6:10 AM	0	9	0	0	0	36	0	0	0	0	0	0	0	0	0	0	45	
6:15 AM	0	6	0	0	0	53	0	0	0	0	0	0	0	0	0	0	59	
6:20 AM	1	11	0	0	0	61	0	0	0	0	0	0	0	0	0	0	73	
6:25 AM	0	10	1	0	0	53	1	0	0	0	0	0	0	0	0	0	65	
6:30 AM	0	21	0	0	0	72	0	0	0	0	0	0	0	0	0	0	93	
6:35 AM	0	8	0	0	0	78	0	0	0	0	0	0	0	0	0	0	86	
6:40 AM	0	20	0	0	0	61	0	0	0	0	0	0	0	0	0	0	81	
6:45 AM	0	25	0	0	0	83	0	0	0	0	0	0	0	0	0	0	108	
6:50 AM	0	16	0	0	0	69	0	0	0	0	1	0	0	0	0	0	86	
6:55 AM	0	20	0	0	0	73	0	0	0	0	0	0	0	0	0	0	93	862
7:00 AM	0	29	1	0	0	57	1	0	0	0	0	0	0	0	0	0	88	913
7:05 AM	0	28	0	0	0	33	1	0	0	0	0	0	0	0	0	0	62	939
7:10 AM	1	14	0	0	0	58	0	0	0	0	1	0	0	0	0	0	74	968
7:15 AM	0	26	0	0	0	46	0	1	0	0	0	0	0	0	0	0	73	982
7:20 AM	0	39	0	0	0	35	0	0	0	0	0	0	0	0	0	0	74	983
7:25 AM	0	26	0	0	0	60	1	0	0	0	0	0	0	0	0	0	87	1005
7:30 AM	1	40	0	0	0	40	0	0	0	0	1	0	0	0	0	0	82	994
7:35 AM	0	47	0	0	0	42	0	0	0	0	0	0	0	0	0	0	89	997
7:40 AM	0	27	0	0	0	53	0	0	1	0	0	0	0	0	0	0	81	997
7:45 AM	0	36	1	0	0	64	0	0	0	0	2	0	0	1	0	0	104	993
7:50 AM	0	36	0	0	0	45	0	0	1	0	1	0	0	0	0	0	83	990
7:55 AM	0	23	0	0	0	50	1	0	0	0	0	0	0	0	0	0	74	971
8:00 AM	0	42	0	0	0	47	0	0	0	0	0	0	0	0	0	0	89	972
8:05 AM	0	23	1	0	0	44	2	0	1	0	0	0	0	0	0	0	71	981
8:10 AM	0	34	0	0	0	35	0	0	0	0	0	0	0	0	0	0	69	976
8:15 AM	0	21	0	0	0	43	0	0	1	0	1	0	0	0	0	0	66	969
8:20 AM	0	30	0	0	0	41	0	0	0	0	0	0	0	0	0	0	71	966
8:25 AM	0	23	0	0	0	51	0	0	0	0	0	0	0	0	0	0	74	953
8:30 AM	0	21	0	0	0	33	0	0	1	0	0	0	0	0	1	0	56	927
8:35 AM	0	22	0	0	0	48	0	0	0	0	0	0	0	0	0	0	70	908
8:40 AM	0	20	0	0	1	41	0	0	0	0	0	0	0	0	0	0	62	889
8:45 AM	0	33	0	0	0	49	0	0	0	0	0	0	0	0	0	0	82	867
8:50 AM	0	28	0	0	0	46	1	0	1	0	1	0	0	0	0	0	77	861
8:55 AM	0	18	0	0	0	44	0	0	0	0	0	0	0	0	0	0	62	849

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	244	0	0	0	900	0	0	0	0	4	0	0	0	0	0	1148
Heavy Trucks	0	32	0		0	16	0		0	0	0		0	0	0		48
Buses																	
Pedestrians		0				0				8				16			24
Bicycles	0	0	0		0	12	0		0	0	0		0	0	0		12
Scooters																	

Comments:

Report generated on 5/19/2022 10:48 AM

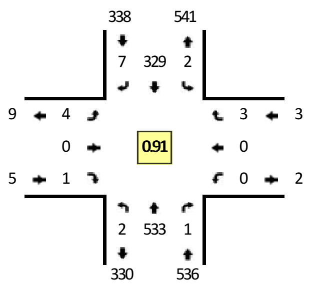
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

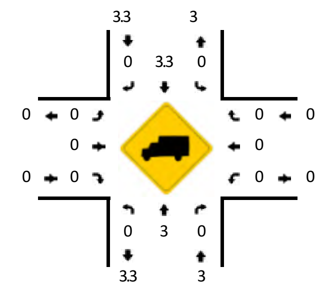
LOCATION: SW 6th Ave -- SW Sherman St | **QC JOB #:** 15769402

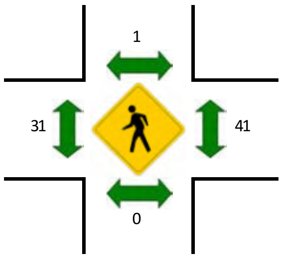
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

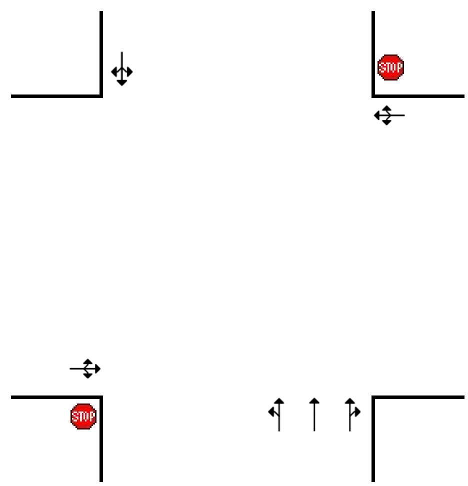
Peak-Hour: 4:40 PM -- 5:40 PM

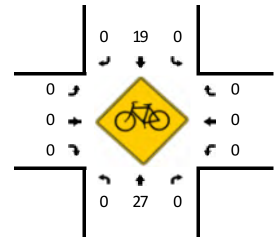
Peak 15-Min: 5:20 PM -- 5:35 PM

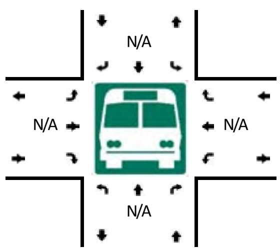


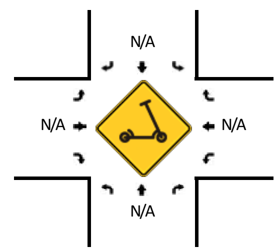












5-Min Count Period Beginning At	SW 6th Ave (Northbound)				SW 6th Ave (Southbound)				SW Sherman St (Eastbound)				SW Sherman St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	48	0	0	0	18	0	0	0	0	0	0	0	0	0	0	66	
3:05 PM	0	48	0	0	0	21	0	0	0	0	0	0	0	0	0	0	69	
3:10 PM	0	44	0	0	0	23	1	0	0	0	0	0	0	0	0	0	68	
3:15 PM	0	43	0	0	0	25	1	1	1	0	0	0	0	0	0	0	71	
3:20 PM	0	50	0	0	0	16	0	0	0	0	0	0	0	0	0	0	66	
3:25 PM	0	32	0	0	0	17	0	0	0	0	0	0	0	0	0	0	49	
3:30 PM	0	44	0	0	0	20	0	0	1	0	0	0	1	0	0	0	66	
3:35 PM	0	58	0	0	0	29	1	0	1	0	1	0	1	0	0	0	91	
3:40 PM	0	54	0	0	0	15	1	0	0	0	2	0	0	0	0	0	72	
3:45 PM	0	37	1	0	0	28	0	0	0	0	0	0	0	0	0	0	66	
3:50 PM	0	31	0	0	0	24	0	0	0	0	0	0	0	0	0	0	55	
3:55 PM	0	27	1	0	0	26	0	0	0	0	0	0	0	0	0	0	54	793
4:00 PM	0	38	0	0	0	22	0	0	0	0	0	0	0	0	0	0	60	787
4:05 PM	0	26	0	0	0	28	0	0	0	0	0	0	1	0	0	0	55	773
4:10 PM	0	44	0	0	0	19	0	0	0	0	2	0	0	0	0	0	65	770
4:15 PM	0	49	0	0	0	16	0	1	0	0	0	0	0	0	1	0	67	766
4:20 PM	1	47	0	0	0	17	0	0	0	0	0	0	0	0	0	0	65	765
4:25 PM	0	35	0	0	0	23	0	0	0	0	0	0	0	0	0	0	58	774
4:30 PM	0	25	0	0	0	24	0	0	1	0	0	0	0	0	0	0	50	758
4:35 PM	0	33	0	0	0	14	0	1	0	0	0	0	0	0	0	0	48	715
4:40 PM	1	34	0	0	0	34	1	1	0	0	0	0	0	0	0	0	71	714
4:45 PM	0	46	0	0	0	31	0	0	1	0	0	0	0	0	1	0	79	727
4:50 PM	0	50	0	0	0	32	0	0	0	0	0	0	0	0	0	0	82	754
4:55 PM	0	42	1	0	0	26	0	0	0	0	0	0	0	0	0	0	69	769
5:00 PM	0	56	0	0	0	22	2	0	0	0	0	0	0	0	1	0	81	790
5:05 PM	0	43	0	0	0	15	1	0	0	0	0	0	0	0	1	0	60	795
5:10 PM	0	40	0	0	0	24	0	0	0	0	0	0	0	0	0	0	64	794
5:15 PM	0	33	0	0	1	28	1	0	2	0	0	0	0	0	0	0	65	792
5:20 PM	0	61	0	0	0	43	1	0	0	0	0	0	0	0	0	0	105	832
5:25 PM	0	41	0	0	0	28	0	0	1	0	0	0	0	0	0	0	70	844
5:30 PM	1	37	0	0	0	29	1	0	0	0	0	0	0	0	0	0	68	862
5:35 PM	0	50	0	0	0	17	0	0	0	0	1	0	0	0	0	0	68	882
5:40 PM	0	38	0	0	0	27	1	0	0	0	2	0	0	0	0	0	68	879
5:45 PM	0	29	0	0	0	14	0	0	1	0	0	0	0	0	0	0	44	844
5:50 PM	0	34	0	0	0	16	0	0	0	0	0	0	0	0	0	0	50	812
5:55 PM	0	28	0	0	0	12	0	0	0	0	0	0	0	0	0	0	40	783

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	556	0	0	0	400	8	0	4	0	0	0	0	0	0	0	972
Heavy Trucks	0	20	0		0	16	0		0	0	0		0	0	0		36
Buses																	
Pedestrians		0				0				24				12			36
Bicycles	0	48	0		0	12	0		0	0	0		0	0	0		60
Scooters																	

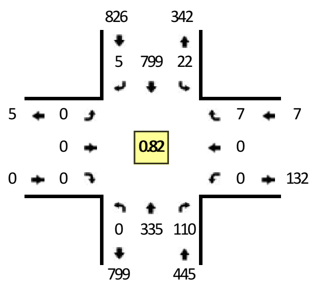
Comments:

Report generated on 5/19/2022 10:48 AM

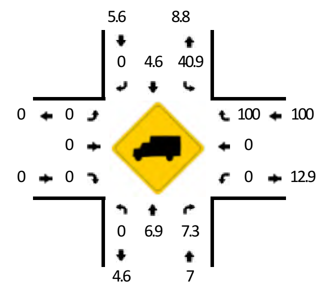
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

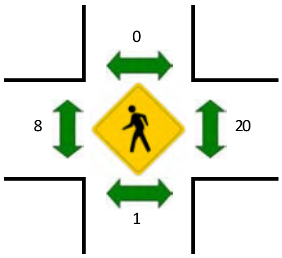
Type of peak hour being reported: Intersection Peak   Method for determining peak hour: Total Entering Volume

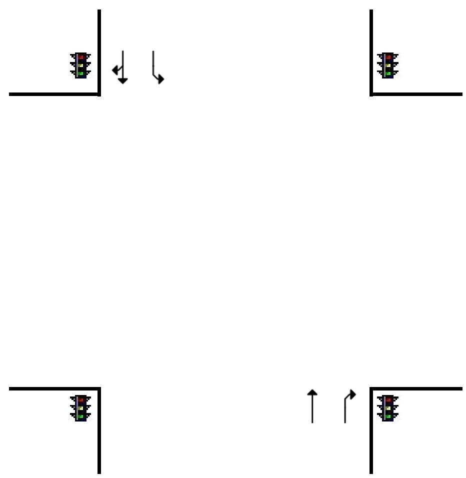
LOCATION: SW 6th Ave/SW Terwilliger Blvd -- SW Sheridan St   **QC JOB #:** 15769403
CITY/STATE: Portland, OR   **DATE:** Tue, May 10 2022

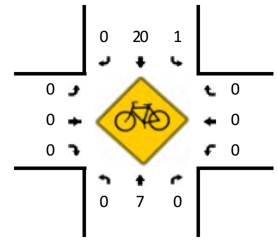


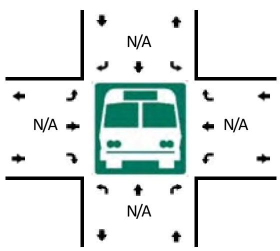
Peak-Hour: 6:45 AM -- 7:45 AM
Peak 15-Min: 6:45 AM -- 7:00 AM

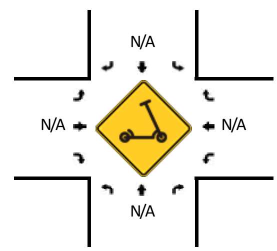












5-Min Count Period Beginning At	SW 6th Ave/SW Terwilliger Blvd (Northbound)				SW 6th Ave/SW Terwilliger Blvd (Southbound)				SW Sheridan St (Eastbound)				SW Sheridan St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	12	4	0	1	29	0	0	0	0	0	0	0	0	1	0	47	
6:05 AM	0	7	4	0	1	27	0	0	0	0	0	0	0	0	1	0	40	
6:10 AM	0	9	4	0	3	43	1	0	0	0	0	0	0	0	1	0	61	
6:15 AM	0	6	2	0	3	62	0	0	0	0	0	0	0	0	1	0	74	
6:20 AM	0	10	4	0	1	71	1	0	0	0	0	0	0	0	0	0	87	
6:25 AM	0	9	4	0	1	67	1	0	0	0	0	0	0	0	1	0	83	
6:30 AM	0	18	7	0	2	83	1	0	0	0	0	0	0	0	1	0	112	
6:35 AM	0	6	5	0	3	95	0	0	0	0	0	0	0	0	1	0	110	
6:40 AM	0	16	6	0	5	74	1	0	0	0	0	0	0	0	1	0	103	
6:45 AM	0	23	8	0	1	114	0	0	0	0	0	0	0	0	0	0	146	
6:50 AM	0	13	3	0	2	93	0	0	0	0	0	0	0	0	1	0	112	
6:55 AM	0	21	6	0	2	100	0	0	0	0	0	0	0	0	1	0	130	1105
7:00 AM	0	23	5	0	1	67	1	0	0	0	0	0	0	0	1	0	98	1156
7:05 AM	0	25	11	0	0	44	0	0	0	0	0	0	0	0	0	0	80	1196
7:10 AM	0	12	5	0	3	61	0	0	0	0	0	0	0	0	1	0	82	1217
7:15 AM	0	28	3	0	2	59	1	0	0	0	0	0	0	0	1	0	94	1237
7:20 AM	0	35	8	0	1	36	2	0	0	0	0	0	0	0	0	0	82	1232
7:25 AM	0	29	12	0	1	60	0	0	0	0	0	0	0	0	0	0	102	1251
7:30 AM	0	49	20	0	3	50	0	0	0	0	0	0	0	0	1	0	123	1262
7:35 AM	0	44	19	0	5	53	0	0	0	0	0	0	0	0	1	0	122	1274
7:40 AM	0	33	10	0	1	62	1	0	0	0	0	0	0	0	0	0	107	1278
7:45 AM	0	33	9	0	1	75	0	0	0	0	0	0	0	0	1	0	119	1251
7:50 AM	0	27	7	0	4	51	0	0	0	0	0	0	0	0	1	0	90	1229
7:55 AM	0	34	17	0	1	51	2	0	0	0	0	0	0	0	0	0	105	1204
8:00 AM	0	38	17	0	4	63	0	0	0	0	0	0	0	0	1	0	123	1229
8:05 AM	0	17	15	0	5	46	0	0	0	0	0	0	0	0	1	0	84	1233
8:10 AM	0	24	5	0	1	42	2	0	0	0	0	0	0	0	0	0	74	1225
8:15 AM	0	15	3	0	4	53	0	0	0	0	0	0	0	0	0	0	75	1206
8:20 AM	0	33	11	0	1	49	0	0	0	0	0	0	0	0	1	0	95	1219
8:25 AM	0	18	4	0	1	55	2	0	0	0	0	0	0	0	0	0	80	1197
8:30 AM	0	21	4	0	0	43	1	0	0	0	0	0	0	0	0	0	69	1143
8:35 AM	0	22	4	0	3	52	0	0	0	0	0	0	0	0	0	0	81	1102
8:40 AM	0	19	7	0	4	51	2	0	0	0	0	0	0	0	0	0	83	1078
8:45 AM	0	29	5	0	0	62	0	0	0	0	0	0	0	0	0	0	96	1055
8:50 AM	0	23	6	0	4	54	1	0	0	0	0	0	0	0	1	0	89	1054
8:55 AM	0	19	7	0	2	49	1	0	0	0	0	0	0	0	1	0	79	1028

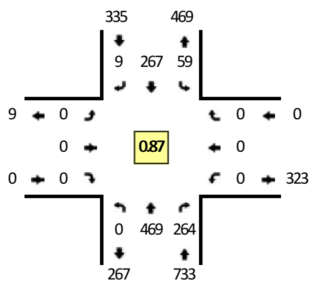
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	228	68	0	20	1228	0	0	0	0	0	0	0	0	8	0	1552
Heavy Trucks	0	28	12		8	28	0		0	0	0		0	0	8		84
Buses																	
Pedestrians		0				0				4				24			28
Bicycles	0	0	0		0	24	0		0	0	0		0	0	0		24
Scooters																	

Comments:

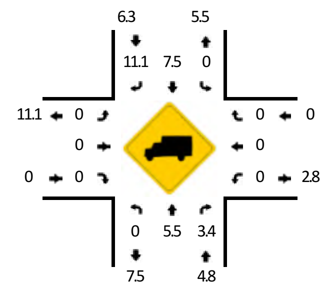
Report generated on 5/19/2022 10:48 AM

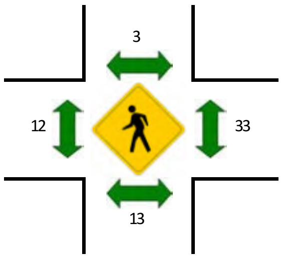
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

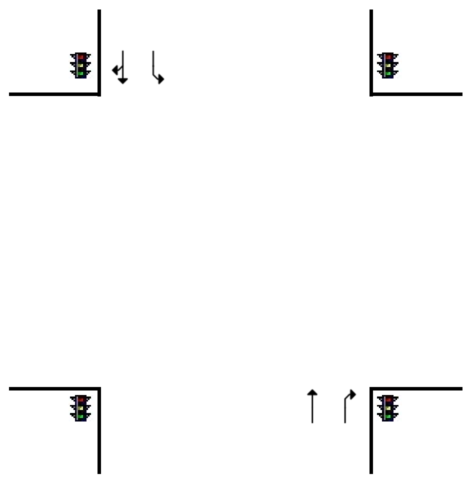
LOCATION: SW 6th Ave/SW Terwilliger Blvd -- SW Sheridan St | **QC JOB #:** 15769404
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

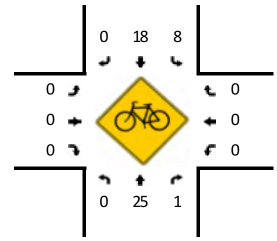


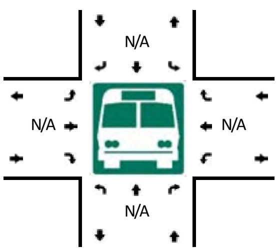
Peak-Hour: 3:30 PM -- 4:30 PM
Peak 15-Min: 3:35 PM -- 3:50 PM

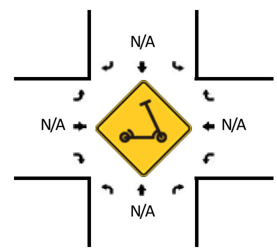












5-Min Count Period Beginning At	SW 6th Ave/SW Terwilliger Blvd (Northbound)				SW 6th Ave/SW Terwilliger Blvd (Southbound)				SW Sheridan St (Eastbound)				SW Sheridan St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	35	17	0	7	20	1	0	0	0	0	0	0	0	0	0	80	
3:05 PM	1	48	19	0	3	29	1	0	0	0	0	0	0	0	0	0	101	
3:10 PM	0	42	13	0	2	25	0	0	0	0	0	0	0	0	0	0	82	
3:15 PM	0	38	14	0	6	23	1	0	0	0	0	0	0	0	0	0	82	
3:20 PM	0	43	22	0	3	21	3	0	0	0	0	0	0	0	0	0	92	
3:25 PM	0	29	13	0	1	24	1	0	0	0	0	0	0	0	0	0	68	
3:30 PM	0	43	19	0	4	20	1	0	0	0	0	0	0	0	0	0	87	
3:35 PM	0	60	30	0	7	23	0	0	0	0	0	0	0	0	0	0	120	
3:40 PM	0	42	21	0	6	16	0	0	0	0	0	0	0	0	0	0	85	
3:45 PM	0	45	27	0	2	27	1	0	0	0	0	0	0	0	0	0	102	
3:50 PM	0	35	16	0	5	28	1	0	0	0	0	0	0	0	0	0	85	
3:55 PM	0	25	15	0	7	24	1	0	0	0	0	0	0	0	0	0	72	1056
4:00 PM	0	36	13	0	5	25	0	0	0	0	0	0	0	0	0	0	79	1055
4:05 PM	0	22	20	0	7	22	2	0	0	0	0	0	0	0	0	0	73	1027
4:10 PM	0	42	28	0	6	21	2	0	0	0	0	0	0	0	0	0	99	1044
4:15 PM	0	44	28	0	0	20	0	0	0	0	0	0	0	0	0	0	92	1054
4:20 PM	0	46	32	0	7	15	0	0	0	0	0	0	0	0	0	0	100	1062
4:25 PM	0	29	15	0	3	26	1	0	0	0	0	0	0	0	0	0	74	1068
4:30 PM	0	19	8	0	0	33	1	0	0	0	0	0	0	0	0	0	61	1042
4:35 PM	0	31	14	0	3	20	1	0	0	0	0	0	0	0	0	0	69	991
4:40 PM	0	45	14	0	14	24	0	0	0	0	0	0	0	0	0	0	97	1003
4:45 PM	0	42	10	0	8	20	1	0	0	0	0	0	0	0	0	0	81	982
4:50 PM	0	44	9	0	11	19	2	0	0	0	0	0	0	0	0	0	85	982
4:55 PM	0	40	17	0	13	22	1	1	0	0	0	0	0	0	0	0	94	1004
5:00 PM	0	54	20	0	3	25	0	0	0	0	0	0	0	0	0	0	102	1027
5:05 PM	0	29	12	0	8	18	0	0	0	0	0	0	0	0	0	0	67	1021
5:10 PM	0	36	6	0	5	11	0	0	0	0	0	0	0	0	0	0	58	980
5:15 PM	0	37	10	0	9	35	0	0	0	0	0	0	0	0	0	0	91	979
5:20 PM	0	58	19	0	10	19	3	0	0	0	0	0	0	0	0	0	109	988
5:25 PM	0	36	9	0	18	25	1	0	0	0	0	0	0	0	0	0	89	1003
5:30 PM	0	36	12	0	6	32	2	1	0	0	0	0	0	0	0	0	89	1031
5:35 PM	0	32	17	0	5	17	1	0	0	0	0	0	0	0	0	0	72	1034
5:40 PM	0	32	11	0	7	22	0	0	0	0	0	0	0	0	0	0	72	1009
5:45 PM	0	32	15	0	4	16	0	0	0	0	0	0	0	0	0	0	67	995
5:50 PM	0	30	16	0	1	19	0	0	0	0	0	0	0	0	0	0	66	976
5:55 PM	0	21	10	0	6	13	0	0	0	0	0	0	0	0	0	0	50	932

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	588	312	0	60	264	4	0	0	0	0	0	0	0	0	0	1228
Heavy Trucks	0	20	16		0	24	0		0	0	0		0	0	0		60
Buses																	
Pedestrians		8				0				8				36			52
Bicycles	0	28	0		12	16	0		0	0	0		0	0	0		56
Scooters																	

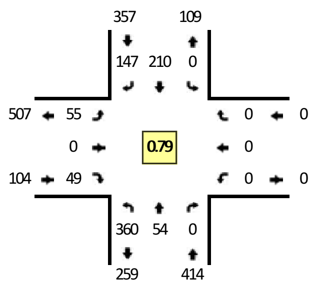
Comments:

Report generated on 5/19/2022 10:48 AM

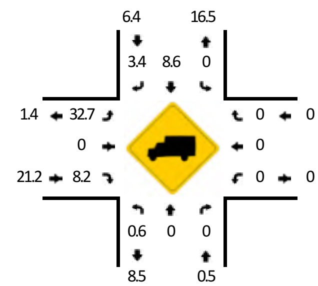
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

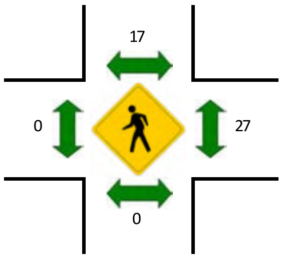
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

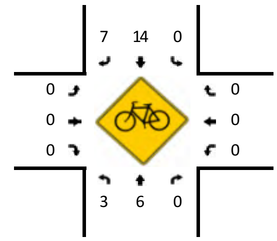
LOCATION: SW Terwilliger Blvd -- SW Campus Dr — **QC JOB #:** 15769405
CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

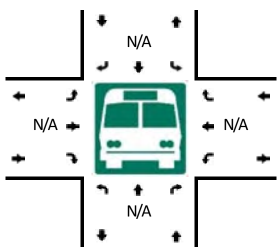


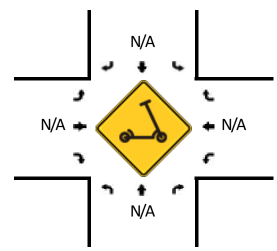
Peak-Hour: 6:35 AM -- 7:35 AM
Peak 15-Min: 6:40 AM -- 6:55 AM











5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	9	1	0	0	0	9	6	0	0	0	0	0	0	0	0	0	25	
6:05 AM	9	1	0	0	0	2	3	0	2	0	1	0	0	0	0	0	18	
6:10 AM	14	2	0	0	0	13	7	0	1	0	2	0	0	0	0	0	39	
6:15 AM	25	1	0	0	0	12	8	0	1	0	1	0	0	0	0	0	48	
6:20 AM	24	0	0	0	0	10	15	0	4	0	2	0	0	0	0	0	55	
6:25 AM	21	0	0	0	0	15	9	0	3	0	1	0	0	0	0	0	49	
6:30 AM	26	4	0	0	0	20	18	0	2	0	2	0	0	0	0	0	72	
6:35 AM	31	4	0	0	0	21	15	0	2	0	2	0	0	0	0	0	75	
6:40 AM	50	4	0	0	0	13	16	0	6	0	3	0	0	0	0	0	92	
6:45 AM	48	4	0	0	0	14	17	0	3	0	6	0	0	0	0	0	92	
6:50 AM	39	2	0	0	0	21	25	0	4	0	1	0	0	0	0	0	92	
6:55 AM	37	9	0	0	0	21	17	0	4	0	0	0	0	0	0	0	88	745
7:00 AM	19	1	0	0	0	24	14	0	4	0	1	0	0	0	0	0	63	783
7:05 AM	19	4	0	0	0	13	4	0	4	0	3	0	0	0	0	0	47	812
7:10 AM	21	4	0	0	0	22	6	0	3	0	1	0	0	0	0	0	57	830
7:15 AM	17	2	0	0	0	20	8	0	1	0	8	0	0	0	0	0	56	838
7:20 AM	23	10	0	0	0	16	3	0	6	0	4	0	0	0	0	0	62	845
7:25 AM	29	6	0	0	0	14	8	0	7	0	10	0	0	0	0	0	74	870
7:30 AM	27	4	0	0	0	11	14	0	11	0	10	0	0	0	0	0	77	875
7:35 AM	19	7	0	0	0	11	10	0	8	0	15	0	0	0	0	0	70	870
7:40 AM	24	11	0	0	0	11	8	0	6	0	10	0	0	0	0	0	70	848
7:45 AM	29	5	0	0	0	13	9	0	10	0	5	0	0	0	0	0	71	827
7:50 AM	33	1	0	0	0	21	12	0	5	0	12	0	0	0	0	0	84	819
7:55 AM	25	0	0	0	0	16	5	0	6	0	12	0	0	0	0	0	64	795
8:00 AM	29	8	0	0	0	15	9	0	4	0	3	0	0	0	0	0	68	800
8:05 AM	22	9	0	0	0	11	10	0	6	0	9	0	0	0	0	0	67	820
8:10 AM	28	7	0	0	0	11	6	0	2	0	3	0	0	0	0	0	57	820
8:15 AM	21	8	0	0	0	13	3	0	4	0	5	0	0	0	0	0	54	818
8:20 AM	20	8	0	0	0	12	8	0	5	0	7	0	0	0	0	0	60	816
8:25 AM	24	2	0	0	0	10	6	0	0	0	6	0	0	0	0	0	48	790
8:30 AM	26	7	0	0	0	16	10	0	4	0	7	1	0	0	0	0	71	784
8:35 AM	26	16	0	0	0	10	7	0	2	0	8	0	0	0	0	0	69	783
8:40 AM	16	7	0	0	0	9	5	0	5	0	5	0	0	0	0	0	47	760
8:45 AM	28	6	0	0	0	13	12	0	4	0	5	0	0	0	0	0	68	757
8:50 AM	27	11	0	0	0	11	11	0	4	0	1	0	0	0	0	0	65	738
8:55 AM	25	7	0	0	0	11	4	0	7	0	5	0	0	0	0	0	59	733

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	548	40	0	0	0	192	232	0	52	0	40	0	0	0	0	0	1104
Heavy Trucks	0	0	0		0	16	12		24	0	4		0	0	0		56
Buses																	
Pedestrians		0				32				0				44			76
Bicycles	4	0	0		0	20	0		0	0	0		0	0	0		24
Scooters																	

Comments:

Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Terwilliger Blvd -- SW Campus Dr

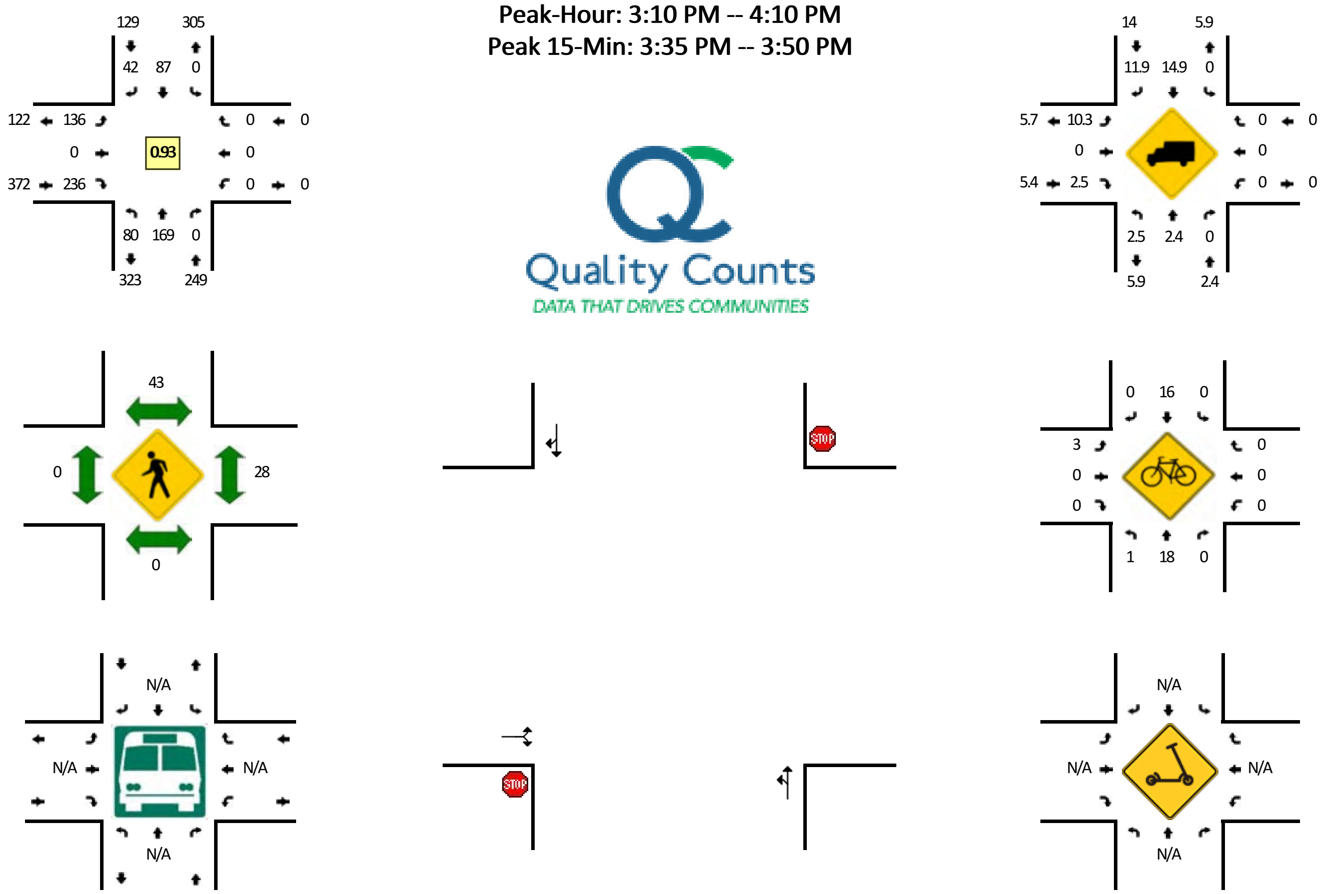
QC JOB #: 15769406

CITY/STATE: Portland, OR

DATE: Tue, May 10 2022

Peak-Hour: 3:10 PM -- 4:10 PM

Peak 15-Min: 3:35 PM -- 3:50 PM



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	7	11	0	0	0	6	7	0	9	0	8	0	0	0	0	0	48	
3:05 PM	6	12	0	0	0	3	8	0	12	0	12	0	0	0	0	0	53	
3:10 PM	13	14	0	0	0	5	6	0	10	0	12	0	0	0	0	0	60	
3:15 PM	7	16	0	0	0	7	4	0	14	0	25	0	0	0	0	0	73	
3:20 PM	8	13	0	0	0	5	2	0	9	0	21	0	0	0	0	0	58	
3:25 PM	3	17	0	0	0	2	4	0	7	0	17	0	0	0	0	0	50	
3:30 PM	9	15	0	0	0	8	4	0	14	0	20	0	0	0	0	0	70	
3:35 PM	7	15	0	0	0	7	4	0	14	0	15	0	0	0	0	0	62	
3:40 PM	6	10	0	0	0	5	3	0	13	0	29	0	0	0	0	0	66	
3:45 PM	9	18	0	0	0	9	2	0	14	0	21	0	0	0	0	0	73	
3:50 PM	5	10	0	0	0	11	3	0	14	0	17	0	0	0	0	0	60	
3:55 PM	5	13	0	0	0	4	3	0	8	0	17	0	0	0	0	0	50	723
4:00 PM	3	15	0	0	0	12	4	0	12	0	25	0	0	0	0	0	71	746
4:05 PM	5	13	0	0	0	12	3	0	7	0	17	0	0	0	0	0	57	750
4:10 PM	3	19	0	0	0	9	1	0	6	0	20	0	0	0	0	0	58	748
4:15 PM	4	6	0	0	0	6	0	0	7	0	25	0	0	0	0	0	48	723
4:20 PM	7	5	0	0	0	11	2	0	3	0	27	0	0	0	0	0	55	720
4:25 PM	10	6	0	0	0	12	2	0	4	0	29	0	0	0	0	0	63	733
4:30 PM	5	9	0	0	0	9	2	0	4	0	20	0	0	0	0	0	49	712
4:35 PM	8	12	0	0	0	6	9	0	3	0	19	0	0	0	0	0	57	707
4:40 PM	6	13	0	0	0	8	3	0	11	0	28	0	0	0	0	0	69	710
4:45 PM	5	11	0	0	0	7	0	0	13	0	24	0	0	0	0	0	60	697
4:50 PM	6	16	0	0	0	11	1	0	9	0	19	0	0	0	0	0	62	699
4:55 PM	14	13	0	0	0	6	2	0	8	0	26	0	0	0	0	0	69	718
5:00 PM	6	5	0	0	0	10	3	0	8	0	22	0	0	0	0	0	54	701
5:05 PM	8	14	0	0	0	13	1	0	7	0	29	0	0	0	0	0	72	716
5:10 PM	5	9	0	0	0	2	0	0	5	0	23	0	0	0	0	0	44	702
5:15 PM	5	14	0	0	0	13	0	0	9	0	32	0	0	0	0	0	73	727
5:20 PM	5	11	0	0	0	10	1	0	7	0	22	0	0	0	0	0	56	728
5:25 PM	6	5	0	0	0	9	3	0	5	0	27	0	0	0	0	0	55	720
5:30 PM	2	5	0	0	0	10	3	0	12	0	23	0	0	0	0	0	55	726
5:35 PM	7	12	0	0	0	11	1	0	7	0	25	0	0	0	0	0	63	732
5:40 PM	6	4	0	0	0	3	3	0	11	0	15	0	0	0	0	0	42	705
5:45 PM	13	13	0	0	0	8	0	0	5	0	12	0	0	0	0	0	51	696
5:50 PM	1	9	0	0	0	5	1	0	3	0	16	0	0	0	0	0	35	669
5:55 PM	4	8	0	0	0	4	2	0	10	0	16	0	0	0	0	0	44	644

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	88	172	0	0	0	84	36	0	164	0	260	0	0	0	0	0	804
Heavy Trucks	0	8	0		0	16	8		20	0	4		0	0	0		56
Buses																	
Pedestrians		0				28				0				20			48
Bicycles	0	20	0		0	4	0		0	0	0		0	0	0		24
Scooters																	

Comments:

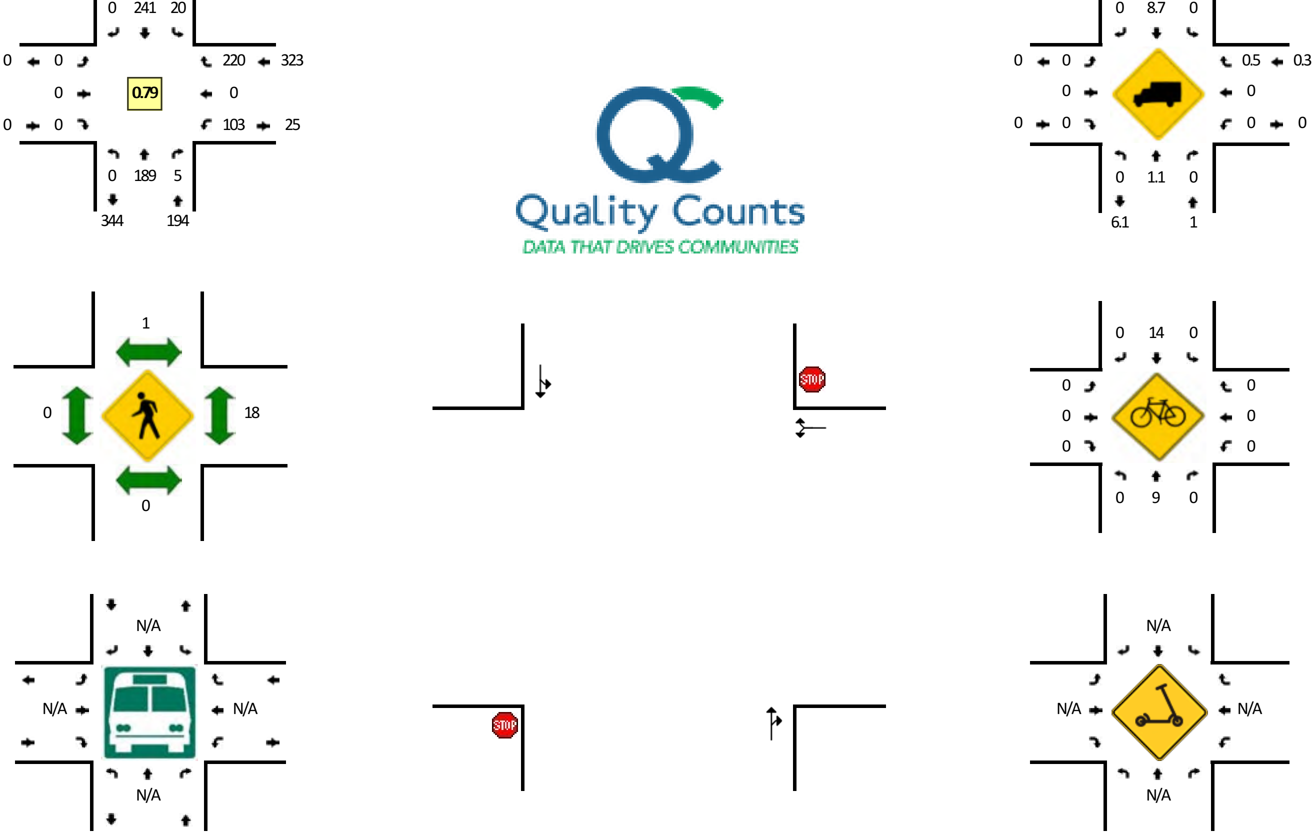
Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: SW Terwilliger Blvd -- SW Condor Ln | **QC JOB #:** 15769407
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

Peak-Hour: 6:30 AM -- 7:30 AM
Peak 15-Min: 6:40 AM -- 6:55 AM



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Condor Ln (Eastbound)				SW Condor Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	4	0	0	0	8	0	0	0	0	0	0	3	0	5	0	20	
6:05 AM	0	7	0	0	1	2	0	0	0	0	0	0	1	0	5	0	16	
6:10 AM	0	6	0	0	1	14	0	0	0	0	0	0	4	0	9	0	34	
6:15 AM	0	13	0	0	1	12	0	0	0	0	0	0	7	0	12	0	45	
6:20 AM	0	11	1	0	2	10	0	0	0	0	0	0	14	0	15	0	53	
6:25 AM	0	11	0	0	0	14	0	0	0	0	0	0	7	0	13	0	45	
6:30 AM	0	9	0	0	1	23	0	0	0	0	0	0	12	0	21	0	66	
6:35 AM	0	18	0	0	1	18	0	0	0	0	0	0	9	0	25	0	71	
6:40 AM	0	24	0	0	2	19	0	0	0	0	0	0	10	0	22	0	77	
6:45 AM	0	21	0	0	3	17	0	0	0	0	0	0	16	0	31	0	88	
6:50 AM	0	23	0	0	0	20	0	0	0	0	0	0	9	0	29	0	81	
6:55 AM	0	14	1	0	0	23	0	0	0	0	0	0	10	0	18	0	66	662
7:00 AM	0	10	2	0	0	24	0	0	0	0	0	0	7	0	8	0	51	693
7:05 AM	0	11	0	0	2	12	0	0	0	0	0	0	2	0	14	0	41	718
7:10 AM	0	8	0	0	1	25	0	0	0	0	0	0	7	0	14	0	55	739
7:15 AM	0	12	0	0	1	23	0	0	0	0	0	0	12	0	10	0	58	752
7:20 AM	0	17	1	0	3	16	0	0	0	0	0	0	2	0	17	0	56	755
7:25 AM	0	22	1	0	6	21	0	0	0	0	0	0	7	0	11	0	68	778
7:30 AM	0	15	1	0	4	18	0	0	0	0	0	0	4	0	16	0	58	770
7:35 AM	0	18	1	0	7	17	0	0	0	0	0	0	6	0	9	0	58	757
7:40 AM	0	21	0	0	4	19	0	0	0	0	0	0	9	0	14	0	67	747
7:45 AM	0	19	1	0	2	17	0	0	0	0	0	0	8	0	15	0	62	721
7:50 AM	0	17	0	0	5	23	0	0	0	0	0	0	3	0	15	0	63	703
7:55 AM	0	17	1	0	8	21	0	0	0	0	0	0	7	0	13	0	67	704
8:00 AM	0	22	1	0	1	21	0	0	0	0	0	0	9	0	9	0	63	716
8:05 AM	0	23	1	0	4	16	0	0	0	0	0	0	5	0	12	0	61	736
8:10 AM	0	24	1	0	2	13	0	0	0	0	0	0	8	0	9	0	57	738
8:15 AM	0	18	0	0	0	18	0	0	0	0	0	0	5	0	11	0	52	732
8:20 AM	0	15	0	0	1	14	0	0	0	0	0	0	3	0	16	0	49	725
8:25 AM	0	16	0	0	2	17	0	0	0	0	0	0	0	0	8	0	43	700
8:30 AM	0	26	0	0	4	15	0	0	0	0	0	0	4	0	12	0	61	703
8:35 AM	0	23	0	0	4	15	0	0	0	0	0	0	4	0	12	0	58	703
8:40 AM	0	14	0	0	1	16	0	0	0	0	0	0	8	0	15	0	54	690
8:45 AM	0	18	0	0	1	16	0	0	0	0	0	0	3	0	11	0	49	677
8:50 AM	0	25	0	0	1	13	0	0	0	0	0	0	1	0	14	0	54	668
8:55 AM	0	20	1	0	2	14	0	0	0	0	0	0	0	0	12	0	49	650

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	272	0	0	20	224	0	0	0	0	0	0	140	0	328	0	984
Heavy Trucks	0	0	0		0	24	0		0	0	0		0	0	4		28
Buses																	
Pedestrians		0				0				0				12			12
Bicycles	0	4	0		0	16	0		0	0	0		0	0	0		20
Scooters																	

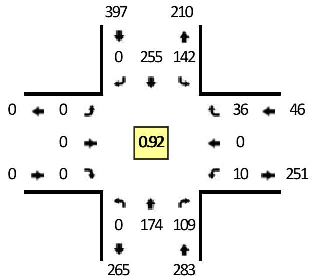
Comments:

Report generated on 5/19/2022 10:48 AM

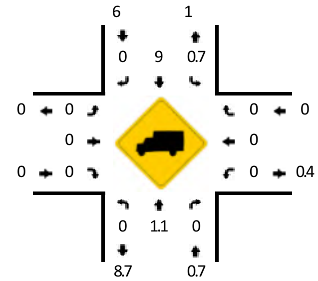
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

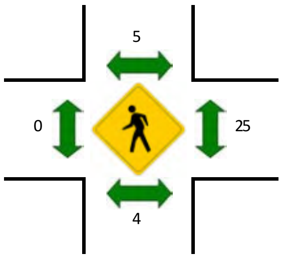
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

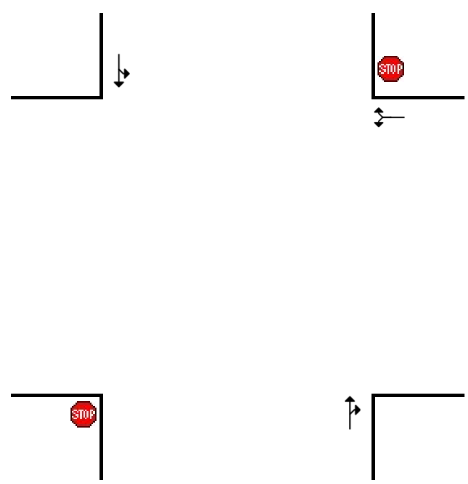
LOCATION: SW Terwilliger Blvd -- SW Condor Ln | **QC JOB #:** 15769408
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

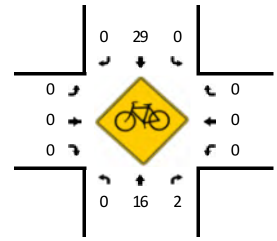


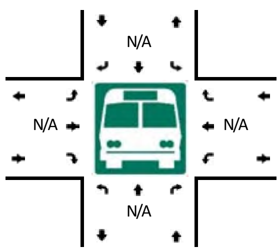
Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

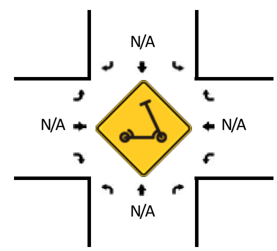












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Condor Ln (Eastbound)				SW Condor Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	15	3	0	5	11	0	0	0	0	0	0	1	0	1	0	36	
3:05 PM	0	13	5	0	0	14	0	0	0	0	0	0	1	0	6	0	39	
3:10 PM	0	23	3	0	3	15	0	0	0	0	0	0	1	0	2	0	47	
3:15 PM	0	23	6	0	9	16	0	0	0	0	0	0	2	0	3	0	59	
3:20 PM	0	16	8	0	10	20	0	0	0	0	0	0	1	0	5	0	60	
3:25 PM	0	22	7	0	7	10	0	0	0	0	0	0	1	0	0	0	47	
3:30 PM	0	18	6	0	9	19	0	0	0	0	0	0	0	0	4	0	56	
3:35 PM	0	19	11	0	6	17	0	0	0	0	0	0	0	0	2	0	55	
3:40 PM	0	16	13	0	15	21	0	0	0	0	0	0	1	0	4	0	70	
3:45 PM	0	19	2	0	12	19	0	0	0	0	0	0	0	0	4	0	56	
3:50 PM	0	12	8	0	9	19	0	0	0	0	0	0	2	0	3	0	53	
3:55 PM	0	18	8	0	10	14	0	0	0	0	0	0	0	0	1	0	51	629
4:00 PM	0	20	13	0	14	20	0	0	0	0	0	0	0	0	1	0	68	661
4:05 PM	0	13	13	0	13	16	0	0	0	0	0	0	0	0	5	0	60	682
4:10 PM	0	21	11	0	9	21	0	0	0	0	0	0	1	0	0	0	63	698
4:15 PM	0	8	8	0	16	13	0	0	0	0	0	0	0	0	1	0	46	685
4:20 PM	0	11	7	0	14	26	0	0	0	0	0	0	0	0	3	0	61	686
4:25 PM	0	10	5	0	7	30	0	0	0	0	0	0	0	0	7	0	59	698
4:30 PM	0	12	4	0	12	24	0	0	0	0	0	0	0	0	2	0	54	696
4:35 PM	0	17	11	0	6	16	0	0	0	0	0	0	0	0	2	0	52	693
4:40 PM	0	17	12	0	12	26	0	0	0	0	0	0	2	0	1	0	70	693
4:45 PM	0	14	10	0	9	19	0	0	0	0	0	0	2	0	4	0	58	695
4:50 PM	0	16	6	0	9	22	0	0	0	0	0	0	1	0	3	0	57	699
4:55 PM	0	22	5	0	18	12	0	0	0	0	0	0	1	0	5	0	63	711
5:00 PM	0	7	10	0	10	22	0	0	0	0	0	0	1	0	3	0	53	696
5:05 PM	0	19	7	0	14	26	0	0	0	0	0	0	2	0	1	0	69	705
5:10 PM	0	10	17	0	14	11	0	0	0	0	0	0	0	0	2	0	54	696
5:15 PM	0	15	9	0	20	26	0	0	0	0	0	0	1	0	4	0	75	725
5:20 PM	0	15	13	0	11	21	0	0	0	0	0	0	0	0	2	0	62	726
5:25 PM	0	8	9	0	15	22	0	0	0	0	0	0	2	0	3	0	59	726
5:30 PM	0	8	5	0	8	27	0	0	0	0	0	0	1	0	1	0	50	722
5:35 PM	0	15	6	0	11	19	0	0	0	0	0	0	0	0	4	0	55	725
5:40 PM	0	10	3	0	10	15	0	0	0	0	0	0	3	0	3	0	44	699
5:45 PM	0	17	2	0	8	12	0	0	0	0	0	0	1	0	5	0	45	686
5:50 PM	0	9	5	0	7	12	0	0	0	0	0	0	1	0	1	0	35	664
5:55 PM	0	10	1	0	9	11	0	0	0	0	0	0	1	0	1	0	33	634

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	176	132	0	192	252	0	0	0	0	0	0	12	0	28	0	792
Heavy Trucks	0	4	0		4	20	0		0	0	0		0	0	0		28
Buses																	
Pedestrians		8				8				0				16			32
Bicycles	0	24	4		0	28	0		0	0	0		0	0	0		56
Scooters																	

Comments:

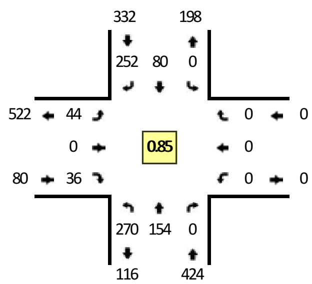
Report generated on 5/19/2022 10:48 AM

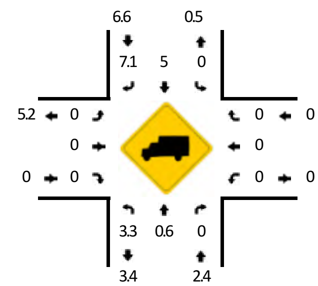
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

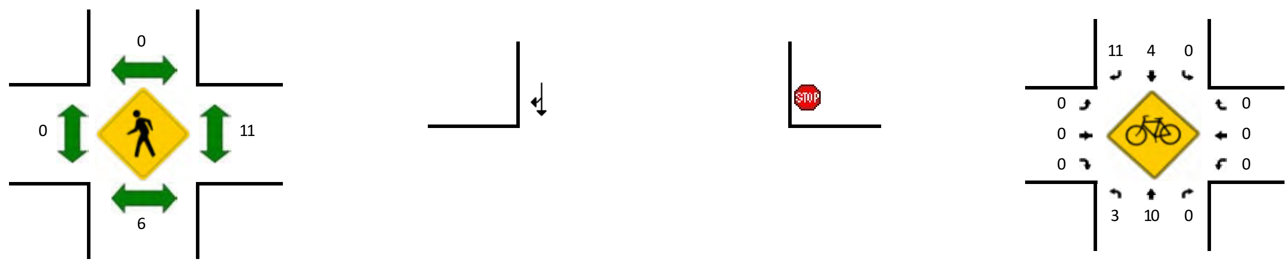
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd
CITY/STATE: Portland, OR

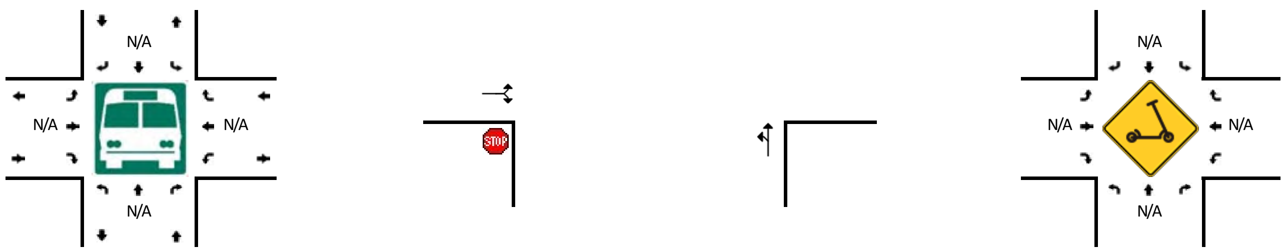
QC JOB #: 15769409
DATE: Tue, May 10 2022

Peak-Hour: 6:35 AM -- 7:35 AM
Peak 15-Min: 6:40 AM -- 6:55 AM









5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	6	4	0	0	0	2	9	0	0	0	1	0	0	0	0	0	22	
6:05 AM	10	6	0	0	0	1	2	0	2	0	1	0	0	0	0	0	22	
6:10 AM	12	5	0	0	0	6	12	0	2	0	0	0	0	0	0	0	37	
6:15 AM	15	11	0	0	0	3	16	0	0	0	0	0	0	0	0	0	45	
6:20 AM	21	12	0	0	0	6	19	0	1	0	0	0	0	0	0	0	59	
6:25 AM	21	9	0	0	0	2	19	0	2	0	0	0	0	0	0	0	53	
6:30 AM	22	7	0	0	0	10	25	0	2	0	0	0	0	0	0	0	66	
6:35 AM	20	16	0	0	0	7	20	0	2	0	1	0	0	0	0	0	66	
6:40 AM	27	21	0	0	0	7	19	0	5	0	4	0	0	0	0	0	83	
6:45 AM	26	16	0	0	0	13	23	0	7	0	2	0	0	0	0	0	87	
6:50 AM	31	19	0	0	0	2	22	0	2	0	1	0	0	0	0	0	77	
6:55 AM	29	9	0	0	0	8	27	0	4	0	4	0	0	0	0	0	81	698
7:00 AM	18	12	0	0	0	3	31	0	1	0	2	0	0	0	0	0	67	743
7:05 AM	22	6	0	0	0	3	11	0	4	0	1	0	0	0	0	0	47	768
7:10 AM	14	8	0	0	0	3	30	0	2	0	5	0	0	0	0	0	62	793
7:15 AM	19	9	0	0	0	6	25	0	1	0	1	0	0	0	0	0	61	809
7:20 AM	24	11	0	0	0	9	13	0	5	0	7	0	0	0	0	0	69	819
7:25 AM	16	17	0	0	0	11	17	0	7	0	1	0	0	0	0	0	69	835
7:30 AM	24	10	0	0	0	8	14	0	4	0	7	0	0	0	0	0	67	836
7:35 AM	18	11	0	0	0	7	13	0	8	0	6	0	0	0	0	0	63	833
7:40 AM	15	14	0	0	0	15	13	0	7	0	1	0	0	0	0	0	65	815
7:45 AM	12	15	0	0	0	9	17	0	5	0	4	0	0	0	0	0	62	790
7:50 AM	23	17	0	0	0	10	15	0	0	0	1	0	0	0	0	0	66	779
7:55 AM	21	18	0	0	0	8	20	0	2	0	4	0	0	0	0	0	73	771
8:00 AM	15	16	0	0	0	14	12	0	7	0	0	0	0	0	0	0	64	768
8:05 AM	14	18	0	0	0	15	9	0	5	0	2	0	0	0	0	0	63	784
8:10 AM	9	21	0	0	0	7	14	0	5	0	1	0	0	0	0	0	57	779
8:15 AM	12	13	0	0	0	7	14	0	2	0	1	0	0	0	0	0	49	767
8:20 AM	7	13	0	0	0	11	10	0	3	0	5	0	0	0	0	0	49	747
8:25 AM	12	14	0	0	0	7	9	0	3	0	0	0	0	0	0	0	45	723
8:30 AM	9	20	0	0	0	8	12	0	5	0	0	0	0	0	0	0	54	710
8:35 AM	9	17	0	0	0	8	10	0	4	0	4	0	0	0	0	0	52	699
8:40 AM	5	11	0	0	0	6	16	0	3	0	2	0	0	0	0	0	43	677
8:45 AM	15	16	0	0	0	8	13	0	2	0	0	0	0	0	0	0	54	669
8:50 AM	5	21	0	0	0	2	9	0	5	0	2	0	0	0	0	0	44	647
8:55 AM	13	15	0	0	0	6	10	0	6	0	4	0	0	0	0	0	54	628

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	336	224	0	0	0	88	256	0	56	0	28	0	0	0	0	0	988
Heavy Trucks	4	0	0		0	4	20		0	0	0		0	0	0		28
Buses																	
Pedestrians		4				0				0				8			12
Bicycles	8	4	0		0	0	12		0	0	0		0	0	0		24
Scooters																	

Comments:

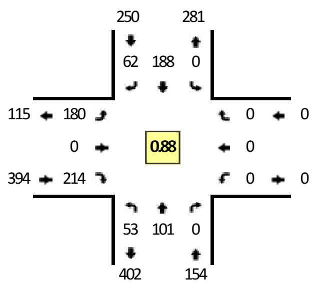
Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

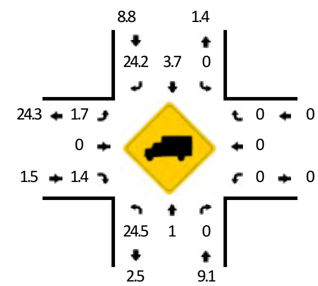
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd | **QC JOB #:** 15769410

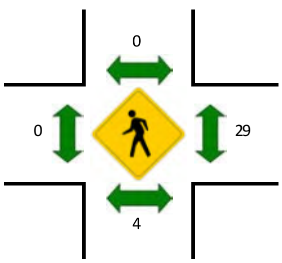
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

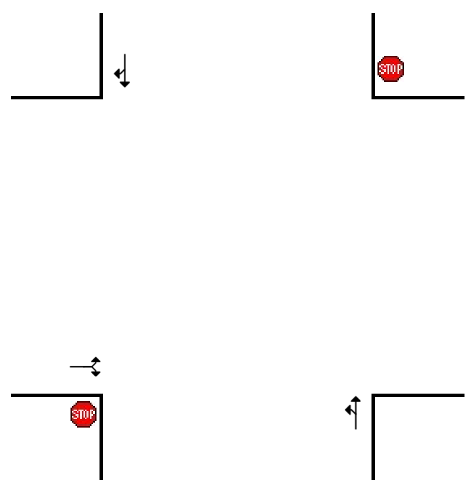


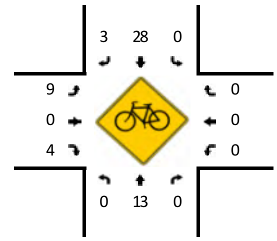
Peak-Hour: 3:50 PM -- 4:50 PM

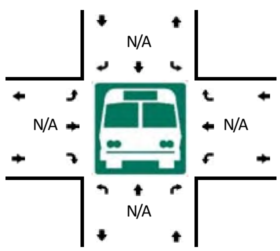
Peak 15-Min: 4:00 PM -- 4:15 PM

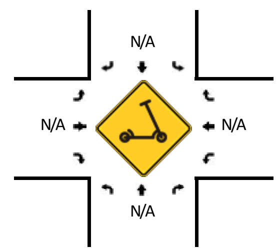












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	5	6	0	0	0	6	6	0	14	0	9	0	0	0	0	0	46	
3:05 PM	2	7	0	0	0	12	2	0	11	0	8	0	0	0	0	0	42	
3:10 PM	5	10	0	0	0	11	6	0	16	0	13	0	0	0	0	0	61	
3:15 PM	4	14	0	0	0	10	8	0	15	0	9	0	0	0	0	0	60	
3:20 PM	3	9	0	0	0	19	5	0	17	0	13	0	0	0	0	0	66	
3:25 PM	6	7	0	0	0	10	3	0	21	0	14	0	0	0	0	0	61	
3:30 PM	2	11	0	0	0	16	1	0	15	0	12	0	0	0	0	0	57	
3:35 PM	3	7	0	0	0	14	1	0	20	0	22	0	0	0	0	0	67	
3:40 PM	2	9	0	0	0	14	7	0	22	0	16	0	0	0	0	0	70	
3:45 PM	5	7	0	0	0	19	4	0	13	0	17	0	0	0	0	0	65	
3:50 PM	5	8	0	0	0	15	6	0	9	0	17	0	0	0	0	0	60	
3:55 PM	5	9	0	0	0	11	2	0	19	0	12	0	0	0	0	0	58	713
4:00 PM	7	10	0	0	0	13	7	0	24	0	27	0	0	0	0	0	88	755
4:05 PM	2	5	0	0	0	13	3	0	20	0	20	0	0	0	0	0	63	776
4:10 PM	4	11	0	0	0	19	3	0	20	0	18	0	0	0	0	0	75	790
4:15 PM	5	9	0	0	0	11	2	0	7	0	18	0	0	0	0	0	52	782
4:20 PM	4	6	0	0	0	15	6	0	13	0	14	0	0	0	0	0	58	774
4:25 PM	2	8	0	0	0	25	8	0	6	0	17	0	0	0	0	0	66	779
4:30 PM	5	5	0	0	0	18	5	0	11	0	11	0	0	0	0	0	55	777
4:35 PM	4	6	0	0	0	10	11	0	20	0	26	0	0	0	0	0	77	787
4:40 PM	5	14	0	0	0	19	4	0	17	0	16	0	0	0	0	0	75	792
4:45 PM	5	10	0	0	0	19	5	0	14	0	18	0	0	0	0	0	71	798
4:50 PM	1	7	0	0	0	16	5	0	15	0	14	0	0	0	0	0	58	796
4:55 PM	3	11	0	0	0	14	2	0	13	0	14	0	0	0	0	0	57	795
5:00 PM	5	11	0	0	0	19	2	0	7	0	9	0	0	0	0	0	53	760
5:05 PM	1	11	0	0	0	18	5	0	17	0	14	0	0	0	0	0	66	763
5:10 PM	4	10	0	0	0	17	0	0	11	0	12	0	0	0	0	0	54	742
5:15 PM	10	13	0	0	0	21	3	0	14	0	7	0	0	0	0	0	68	758
5:20 PM	3	13	0	0	0	19	1	0	13	0	8	0	0	0	0	0	57	757
5:25 PM	0	7	0	0	0	25	1	0	7	0	13	0	0	0	0	0	53	744
5:30 PM	4	6	0	0	0	24	3	0	6	0	17	0	0	0	0	0	60	749
5:35 PM	1	11	0	0	0	12	5	0	11	0	16	0	0	0	0	0	56	728
5:40 PM	1	7	0	0	0	17	3	0	6	0	7	0	0	0	0	0	41	694
5:45 PM	1	7	0	0	0	9	2	0	10	0	11	0	0	0	0	0	40	663
5:50 PM	3	8	0	0	0	13	2	0	7	0	4	0	0	0	0	0	37	642
5:55 PM	2	8	0	0	0	11	1	0	2	0	3	0	0	0	0	0	27	612

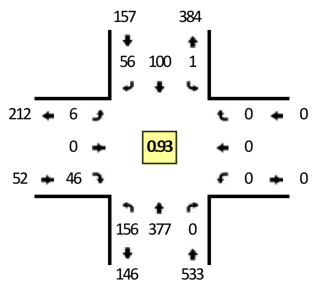
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	104	0	0	0	180	52	0	256	0	260	0	0	0	0	0	904
Heavy Trucks	16	0	0		0	8	16		8	0	0		0	0	0		48
Buses																	
Pedestrians		0				0				0				40			40
Bicycles	0	12	0		0	36	8		12	0	0		0	0	0		68
Scooters																	

Comments:

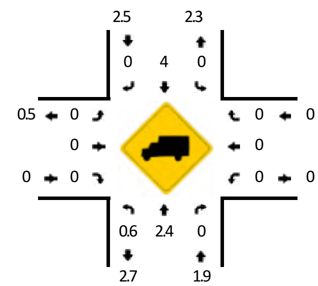
Report generated on 5/19/2022 10:48 AM

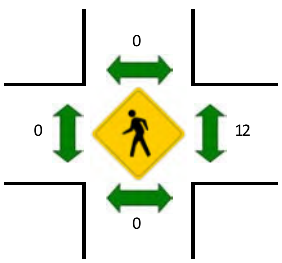
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

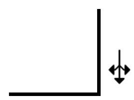
LOCATION: SW Terwilliger Blvd -- SW Homestead Dr/SW Lowell Ln
QC JOB #: 15769411
CITY/STATE: Portland, OR
DATE: Tue, May 10 2022

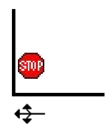


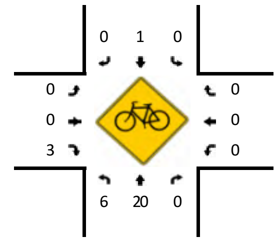
Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

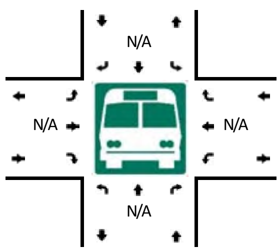


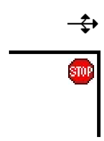


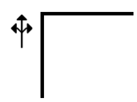


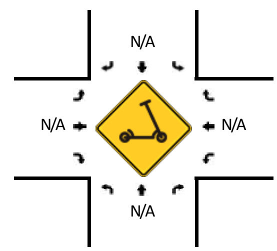












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Homestead Dr/SW Lowell Ln (Eastbound)				SW Homestead Dr/SW Lowell Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	4	10	0	0	0	1	2	0	0	0	3	0	0	0	0	0	20	
6:05 AM	4	15	0	0	0	1	1	0	0	0	0	0	0	0	0	0	21	
6:10 AM	8	17	0	0	0	1	4	0	0	0	3	0	0	0	0	0	33	
6:15 AM	3	27	0	0	0	0	4	0	0	0	0	0	0	0	0	0	34	
6:20 AM	5	32	0	0	0	1	7	0	0	0	1	0	0	0	0	0	46	
6:25 AM	7	31	0	0	0	0	2	0	0	0	3	0	0	0	0	0	43	
6:30 AM	7	29	0	0	0	3	6	0	0	0	3	0	0	0	0	0	48	
6:35 AM	16	36	0	0	0	2	6	0	0	0	3	0	0	0	0	0	63	
6:40 AM	20	48	0	0	0	4	8	0	0	0	0	0	0	0	0	0	80	
6:45 AM	17	40	0	0	0	3	10	0	0	0	3	0	0	0	0	0	73	
6:50 AM	11	52	0	0	0	4	1	0	0	0	2	0	0	0	0	0	70	
6:55 AM	8	37	0	0	0	4	8	0	1	0	1	0	0	0	0	0	59	590
7:00 AM	12	28	0	0	0	2	3	0	2	0	2	0	0	0	0	0	49	619
7:05 AM	10	28	0	0	0	3	0	0	0	0	6	0	0	0	0	0	47	645
7:10 AM	13	22	0	0	0	3	3	0	0	0	4	0	0	0	0	0	45	657
7:15 AM	10	29	0	0	0	6	2	0	0	0	2	0	0	0	0	0	49	672
7:20 AM	7	33	0	0	0	12	3	0	1	0	1	0	0	0	0	0	57	683
7:25 AM	11	34	0	0	0	6	6	0	0	0	4	0	0	0	0	0	61	701
7:30 AM	7	33	0	0	0	14	3	0	0	0	1	0	0	0	0	0	58	711
7:35 AM	19	26	0	0	0	10	2	0	1	0	2	0	0	0	0	0	60	708
7:40 AM	15	31	0	0	0	12	5	0	0	0	4	0	0	0	0	0	67	695
7:45 AM	12	27	0	0	0	7	4	0	0	0	4	0	0	0	0	0	54	676
7:50 AM	15	40	0	0	0	8	5	0	0	0	8	0	0	0	0	0	76	682
7:55 AM	14	37	0	0	0	8	3	0	1	0	2	0	0	0	0	0	65	688
8:00 AM	11	31	0	0	0	6	6	0	1	0	3	0	0	0	0	0	58	697
8:05 AM	17	30	0	0	0	8	11	0	2	0	6	0	0	0	0	0	74	724
8:10 AM	15	28	0	0	0	2	5	1	0	0	4	0	0	0	0	0	55	734
8:15 AM	13	27	0	0	0	7	3	0	0	0	7	0	0	0	0	0	57	742
8:20 AM	8	19	0	0	0	10	7	0	1	0	3	0	0	0	0	0	48	733
8:25 AM	7	25	0	0	0	6	1	0	0	0	5	0	0	0	0	0	44	716
8:30 AM	7	27	0	0	0	6	2	0	2	0	3	0	0	0	0	0	47	705
8:35 AM	10	22	0	0	0	4	7	0	5	0	5	0	0	0	0	0	53	698
8:40 AM	15	16	0	0	0	5	5	0	0	0	1	0	0	0	0	0	42	673
8:45 AM	16	30	0	0	0	2	4	0	0	0	4	0	0	0	0	0	56	675
8:50 AM	11	24	0	0	0	5	1	0	3	0	3	0	0	0	0	0	47	646
8:55 AM	10	24	0	0	0	8	2	0	2	0	3	0	0	0	0	0	49	630

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	160	432	0	0	0	88	56	0	8	0	52	0	0	0	0	0	796
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	0		4
Buses																	
Pedestrians		0				0				0				12			12
Bicycles	4	24	0		0	0	0		0	0	0		0	0	0		28
Scooters																	

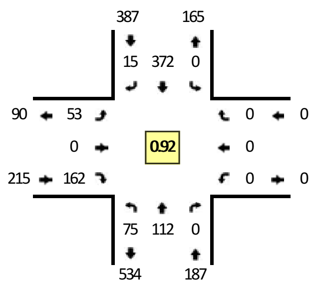
Comments:

Report generated on 5/19/2022 10:48 AM

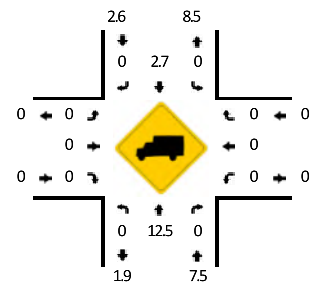
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

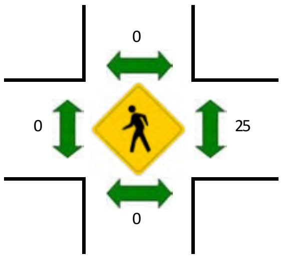
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

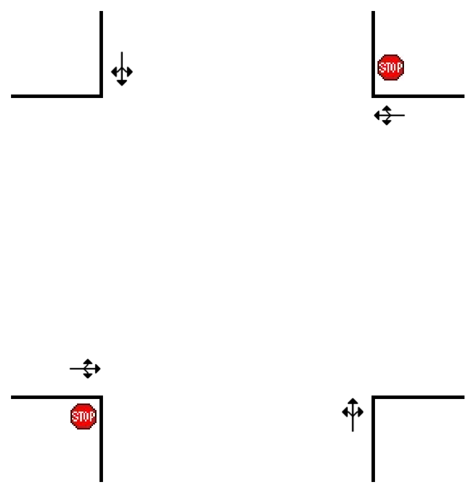
LOCATION: SW Terwilliger Blvd -- SW Homestead Dr/SW Lowell Ln | **QC JOB #:** 15769412
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

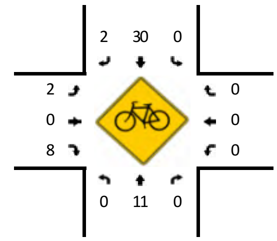


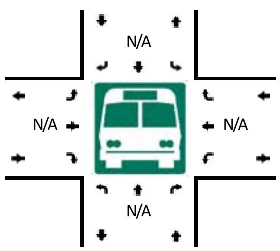
Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

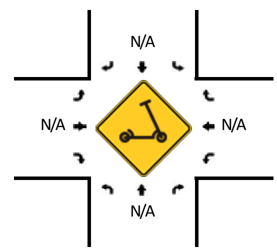












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Homestead Dr/SW Lowell Ln (Eastbound)				SW Homestead Dr/SW Lowell Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	2	9	0	0	0	17	1	0	2	0	7	0	0	0	0	0	38	
3:05 PM	4	5	0	0	0	16	1	0	3	0	7	0	0	0	0	0	36	
3:10 PM	5	15	0	0	0	24	0	0	1	0	7	0	0	0	0	0	52	
3:15 PM	2	11	0	0	0	19	1	0	7	0	8	0	0	0	0	0	48	
3:20 PM	4	9	0	0	0	29	0	0	1	0	9	0	0	0	0	0	52	
3:25 PM	1	12	0	0	0	22	1	0	3	0	14	0	0	0	0	0	53	
3:30 PM	0	8	0	0	0	29	0	0	4	0	11	0	0	0	0	0	52	
3:35 PM	3	8	0	0	0	31	1	0	5	0	10	0	0	0	0	0	58	
3:40 PM	8	8	0	0	0	30	2	0	2	0	14	0	0	0	0	0	64	
3:45 PM	6	9	0	0	0	33	1	0	2	0	15	0	0	0	0	0	66	
3:50 PM	4	12	0	0	0	33	3	0	2	0	9	0	0	0	0	0	63	
3:55 PM	3	11	0	0	0	21	0	0	3	0	6	0	0	0	0	0	44	626
4:00 PM	2	12	0	0	0	38	0	0	6	0	12	0	0	0	0	0	70	658
4:05 PM	6	5	0	0	0	35	1	0	2	0	11	0	0	0	0	0	60	682
4:10 PM	2	8	0	0	0	36	1	0	7	0	20	0	0	0	0	0	74	704
4:15 PM	5	10	0	0	0	30	0	0	4	0	19	0	0	0	0	0	68	724
4:20 PM	4	8	0	0	0	27	0	0	2	0	11	0	0	0	0	0	52	724
4:25 PM	8	7	0	0	0	42	0	0	3	0	17	0	0	0	0	0	77	748
4:30 PM	1	8	0	0	0	31	1	0	2	0	6	0	0	0	0	0	49	745
4:35 PM	6	7	0	0	0	33	3	0	3	0	15	0	0	0	0	0	67	754
4:40 PM	7	10	0	0	0	33	0	0	9	0	12	0	0	0	0	0	71	761
4:45 PM	8	10	0	0	0	37	1	0	5	0	11	0	0	0	0	0	72	767
4:50 PM	5	4	0	0	0	31	1	0	4	0	18	0	0	0	0	0	63	767
4:55 PM	6	13	0	0	0	26	1	0	1	0	8	0	0	0	0	0	55	778
5:00 PM	6	12	0	0	0	29	2	0	4	0	11	0	0	0	0	0	64	772
5:05 PM	5	7	0	0	0	29	1	0	4	0	10	0	0	0	0	0	56	768
5:10 PM	7	7	0	0	0	29	2	0	7	0	18	0	0	0	0	0	70	764
5:15 PM	7	18	0	0	0	24	2	0	5	0	16	0	0	0	0	0	72	768
5:20 PM	9	9	0	0	0	28	1	0	6	0	20	0	0	0	0	0	73	789
5:25 PM	8	5	0	0	0	33	2	0	3	0	5	0	0	0	0	0	56	768
5:30 PM	5	7	0	0	0	38	2	0	3	0	14	0	0	0	0	0	69	788
5:35 PM	3	7	0	0	0	33	0	0	5	0	8	0	0	0	0	0	56	777
5:40 PM	6	5	0	0	0	23	3	0	2	0	9	1	0	0	0	0	49	755
5:45 PM	3	8	0	0	0	17	1	0	1	0	9	0	0	0	0	0	39	722
5:50 PM	3	8	0	0	0	16	1	0	2	0	8	0	0	0	0	0	38	697
5:55 PM	5	8	0	0	0	15	0	0	3	0	6	0	0	0	0	0	37	679

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	92	136	0	0	0	324	20	0	72	0	216	0	0	0	0	0	860
Heavy Trucks	0	24	0		0	4	0		0	0	0		0	0	0		28
Buses																	
Pedestrians		0				0				0				32			32
Bicycles	0	16	0		0	40	0		4	0	16		0	0	0		76
Scooters																	

Comments:

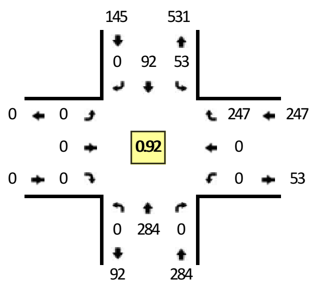
Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

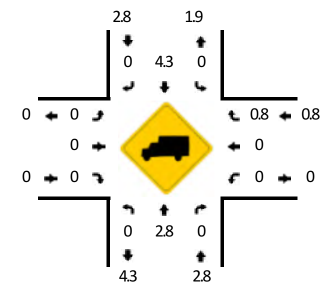
LOCATION: SW Terwilliger Blvd -- SW Hamilton Terr — **QC JOB #:** 15769413

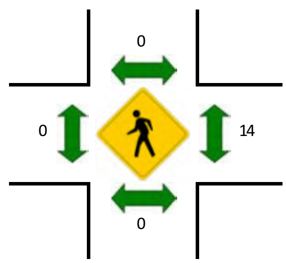
CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

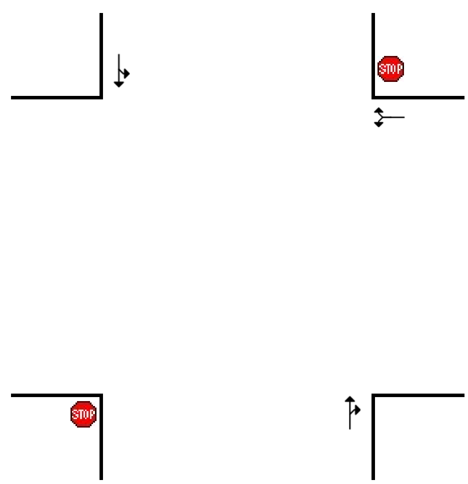


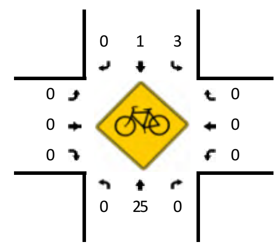
Peak-Hour: 7:20 AM -- 8:20 AM

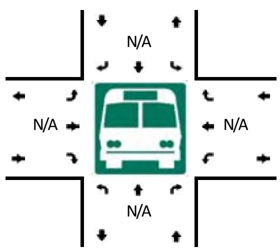
Peak 15-Min: 7:40 AM -- 7:55 AM

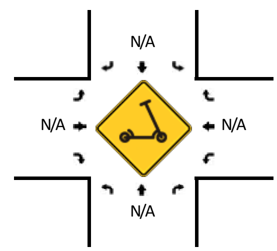












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Hamilton Terr (Eastbound)				SW Hamilton Terr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	7	0	0	1	3	0	0	0	0	0	0	0	0	7	0	18	
6:05 AM	0	14	0	0	3	2	0	0	0	0	0	0	0	0	11	0	30	
6:10 AM	0	12	0	0	0	0	0	0	0	0	0	0	0	0	10	0	22	
6:15 AM	0	16	0	0	0	0	0	0	0	0	0	0	0	0	15	0	31	
6:20 AM	0	23	0	0	1	1	0	0	0	0	0	0	0	0	21	0	46	
6:25 AM	0	15	0	0	1	2	0	0	0	0	0	0	0	0	18	0	36	
6:30 AM	0	17	0	0	2	4	0	0	0	0	0	0	0	0	17	0	40	
6:35 AM	0	23	0	0	4	1	0	0	0	0	0	0	0	0	34	0	62	
6:40 AM	0	29	0	0	2	2	0	0	0	0	0	0	0	0	36	0	69	
6:45 AM	0	31	0	0	3	3	0	0	0	0	0	0	0	0	29	0	66	
6:50 AM	0	27	0	0	4	2	0	0	0	0	0	0	0	0	31	0	64	
6:55 AM	0	23	0	0	0	5	0	0	0	0	0	0	0	0	25	0	53	537
7:00 AM	0	23	0	0	2	2	0	0	0	0	0	0	0	0	19	0	46	565
7:05 AM	0	19	0	0	5	4	0	0	0	0	0	0	0	0	16	0	44	579
7:10 AM	0	17	0	0	5	3	0	0	0	0	0	0	0	0	21	0	46	603
7:15 AM	0	24	0	0	4	4	0	0	0	0	0	0	0	0	18	0	50	622
7:20 AM	0	16	0	0	3	11	0	0	0	0	0	0	0	0	22	0	52	628
7:25 AM	0	24	0	0	3	6	0	0	0	0	0	0	0	0	20	0	53	645
7:30 AM	0	20	0	0	8	7	0	0	0	0	0	0	0	0	19	0	54	659
7:35 AM	0	29	0	0	7	5	0	0	0	0	0	0	0	0	19	0	60	657
7:40 AM	0	21	0	0	5	11	0	0	0	0	0	0	0	0	20	0	57	645
7:45 AM	0	30	0	0	3	7	0	0	0	0	0	0	0	0	15	0	55	634
7:50 AM	0	27	0	0	7	8	0	0	0	0	0	0	0	0	29	0	71	641
7:55 AM	0	22	0	0	1	11	0	0	0	0	0	0	0	0	23	0	57	645
8:00 AM	0	25	0	0	4	5	0	0	0	0	0	0	0	0	20	0	54	653
8:05 AM	0	25	0	0	7	7	0	0	0	0	0	0	0	0	19	0	58	667
8:10 AM	0	23	0	0	1	5	0	0	0	0	0	0	0	0	23	0	52	673
8:15 AM	0	22	0	0	4	9	0	0	0	0	0	0	0	0	18	0	53	676
8:20 AM	0	12	1	0	4	8	0	0	0	0	0	0	0	0	14	0	39	663
8:25 AM	0	17	0	0	7	5	0	0	0	0	0	0	0	0	14	0	43	653
8:30 AM	0	20	0	0	4	6	0	0	0	0	0	0	0	0	14	0	44	643
8:35 AM	0	14	0	0	5	4	0	0	0	0	0	0	0	0	17	0	40	623
8:40 AM	0	17	0	0	3	3	0	0	0	0	0	0	0	0	19	0	42	608
8:45 AM	0	22	0	0	2	4	0	0	0	0	0	0	0	0	20	0	48	601
8:50 AM	0	23	0	0	3	5	0	0	0	0	0	0	1	0	14	0	46	576
8:55 AM	0	19	0	0	4	7	0	0	0	0	0	0	0	0	14	0	44	563

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	312	0	0	60	104	0	0	0	0	0	0	0	0	256	0	732
Heavy Trucks	0	8	0		0	8	0		0	0	0		0	0	0		16
Buses																	
Pedestrians		0				0				0				20			20
Bicycles	0	20	0		12	0	0		0	0	0		0	0	0		32
Scooters																	

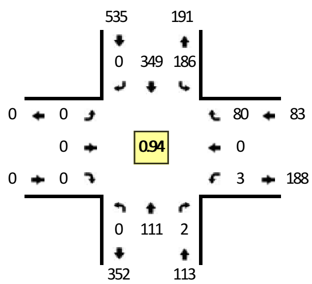
Comments:

Report generated on 5/19/2022 10:48 AM

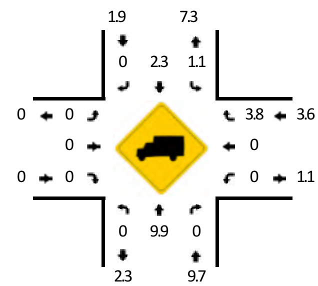
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

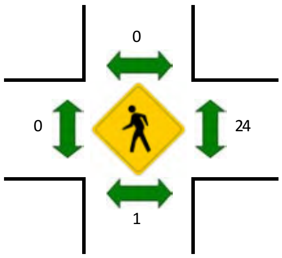
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

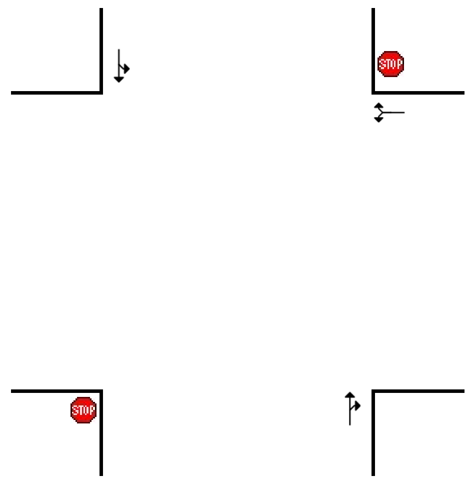
LOCATION: SW Terwilliger Blvd -- SW Hamilton Terr — **QC JOB #:** 15769414
CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

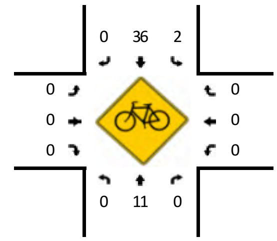


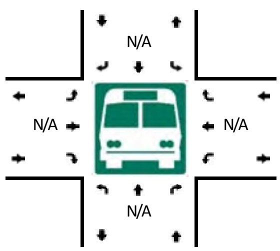
Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

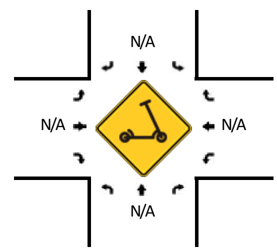












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Hamilton Terr (Eastbound)				SW Hamilton Terr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	9	0	0	8	17	0	0	0	0	0	0	0	0	3	0	37	
3:05 PM	0	6	0	0	10	15	0	0	0	0	0	0	0	0	2	0	33	
3:10 PM	0	15	1	0	11	19	0	0	0	0	0	0	0	0	6	0	52	
3:15 PM	0	7	0	0	8	20	0	0	0	0	0	0	0	0	6	0	41	
3:20 PM	0	13	1	0	13	25	0	0	0	0	0	0	0	0	3	0	55	
3:25 PM	0	6	0	0	17	19	0	0	0	0	0	0	0	0	5	0	47	
3:30 PM	0	6	0	0	11	29	0	0	0	0	0	0	0	0	3	0	49	
3:35 PM	0	8	0	0	12	30	0	0	0	0	0	0	0	0	3	0	53	
3:40 PM	0	9	1	0	17	28	0	0	0	0	0	0	0	0	7	0	62	
3:45 PM	0	11	0	0	14	34	0	0	0	0	0	0	1	0	4	0	64	
3:50 PM	0	10	0	0	14	27	0	0	0	0	0	0	0	0	7	0	58	
3:55 PM	0	10	0	0	5	23	0	0	0	0	0	0	0	0	4	0	42	593
4:00 PM	0	5	0	0	19	30	0	0	0	0	0	0	0	0	6	0	60	616
4:05 PM	0	3	1	0	17	31	0	0	0	0	0	0	0	0	8	0	60	643
4:10 PM	0	6	0	0	19	36	0	0	0	0	0	0	0	0	4	0	65	656
4:15 PM	0	6	0	0	18	30	0	0	0	0	0	0	0	0	9	0	63	678
4:20 PM	0	7	0	0	15	23	0	0	0	0	0	0	0	0	4	0	49	672
4:25 PM	0	9	0	0	24	37	0	0	0	0	0	0	1	0	7	0	78	703
4:30 PM	0	5	0	0	10	25	0	0	0	0	0	0	0	0	3	0	43	697
4:35 PM	0	6	0	0	18	31	0	0	0	0	0	0	0	0	7	0	62	706
4:40 PM	0	10	1	0	24	21	0	0	0	0	0	0	1	0	9	0	66	710
4:45 PM	0	11	0	0	15	33	0	0	0	0	0	0	0	0	5	0	64	710
4:50 PM	0	7	0	0	13	35	0	0	0	0	0	0	0	0	7	0	62	714
4:55 PM	0	7	0	0	11	23	0	0	0	0	0	0	0	0	7	0	48	720
5:00 PM	0	11	0	0	17	24	0	0	0	0	0	0	0	0	7	0	59	719
5:05 PM	0	12	1	0	13	27	0	0	0	0	0	0	0	0	2	0	55	714
5:10 PM	0	7	0	0	12	34	0	0	0	0	0	0	0	0	8	0	61	710
5:15 PM	0	14	0	0	18	23	0	0	0	0	0	0	1	0	10	0	66	713
5:20 PM	0	12	0	0	11	36	0	0	0	0	0	0	0	0	8	0	67	731
5:25 PM	0	5	0	0	10	29	0	0	0	0	0	0	0	0	6	0	50	703
5:30 PM	0	4	2	0	15	35	0	0	0	0	0	0	0	0	7	0	63	723
5:35 PM	0	4	0	0	12	28	0	0	0	0	0	0	1	0	6	0	51	712
5:40 PM	0	6	0	0	8	23	0	0	0	0	0	0	0	0	6	0	43	689
5:45 PM	0	8	1	0	10	16	0	0	0	0	0	0	0	0	5	0	40	665
5:50 PM	0	3	0	0	8	16	0	0	0	0	0	0	0	0	6	0	33	636
5:55 PM	0	6	0	0	5	17	0	0	0	0	0	0	0	0	6	0	34	622

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	132	0	0	164	372	0	0	0	0	0	0	4	0	104	0	776
Heavy Trucks	0	20	0		0	4	0		0	0	0		0	0	4		28
Buses																	
Pedestrians		0				0				0				36			36
Bicycles	0	16	0		4	52	0		0	0	0		0	0	0		72
Scooters																	

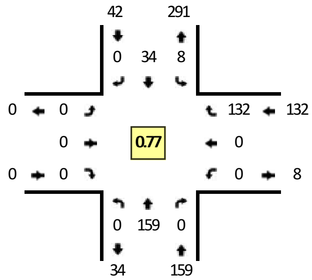
Comments:

Report generated on 5/19/2022 10:48 AM

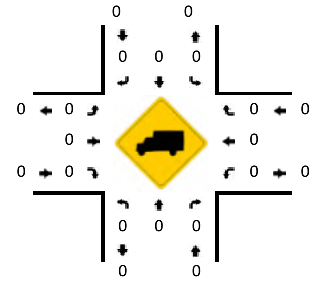
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

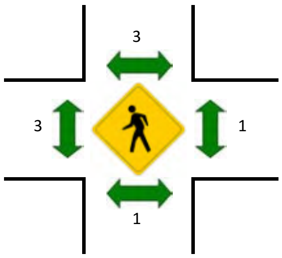
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

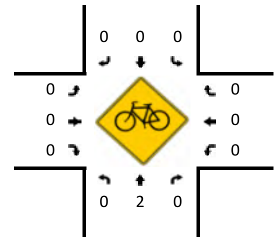
LOCATION: SW Hamilton Terr -- SW Bancroft St | **QC JOB #:** 15769419
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

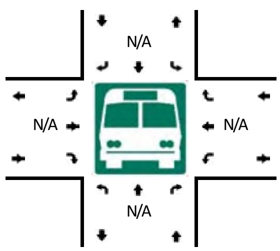


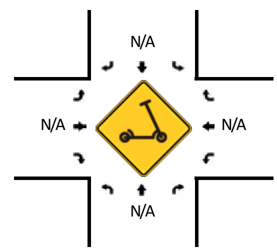
Peak-Hour: 6:35 AM -- 7:35 AM
Peak 15-Min: 6:40 AM -- 6:55 AM











5-Min Count Period Beginning At	SW Hamilton Terr (Northbound)				SW Hamilton Terr (Southbound)				SW Bancroft St (Eastbound)				SW Bancroft St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	0	5	0	8	
6:05 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	8	
6:10 AM	0	7	0	0	1	2	0	0	0	0	0	0	0	0	3	0	13	
6:15 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	7	0	13	
6:20 AM	0	19	0	0	0	1	0	0	0	0	0	0	0	0	2	0	22	
6:25 AM	0	13	0	0	0	1	0	0	0	0	0	0	0	0	9	0	23	
6:30 AM	0	9	0	0	0	0	0	0	0	0	0	0	0	0	8	0	17	
6:35 AM	0	16	0	0	0	4	0	0	0	0	0	0	0	0	16	0	36	
6:40 AM	0	17	0	0	1	2	0	0	0	0	0	0	0	0	19	0	39	
6:45 AM	0	15	0	0	2	1	0	0	0	0	0	0	0	0	14	0	32	
6:50 AM	0	18	0	0	3	1	0	0	0	0	0	0	0	0	15	0	37	
6:55 AM	0	13	0	0	0	0	0	0	0	0	0	0	0	0	11	0	24	272
7:00 AM	0	8	0	0	0	1	0	0	0	0	0	0	0	0	11	0	20	284
7:05 AM	0	13	0	0	1	5	0	0	0	0	0	0	0	0	4	0	23	299
7:10 AM	0	16	0	0	0	2	0	0	0	0	0	0	0	0	5	0	23	309
7:15 AM	0	9	0	0	0	6	0	0	0	0	0	0	0	0	6	0	21	317
7:20 AM	0	13	0	0	0	2	0	0	0	0	0	0	0	0	9	0	24	319
7:25 AM	0	9	0	0	1	4	0	0	0	0	0	0	0	0	12	0	26	322
7:30 AM	0	12	0	0	0	6	0	0	0	0	0	0	0	0	10	0	28	333
7:35 AM	0	15	0	0	0	7	0	0	0	0	0	0	0	0	4	0	26	323
7:40 AM	0	9	1	0	1	4	0	0	0	0	0	0	0	0	11	0	26	310
7:45 AM	0	9	0	0	0	4	0	0	0	0	0	0	0	0	5	0	18	296
7:50 AM	0	18	0	0	2	5	0	0	0	0	0	0	0	0	12	0	37	296
7:55 AM	0	10	0	0	0	2	0	0	0	0	0	0	0	0	14	0	26	298
8:00 AM	0	4	0	0	2	2	0	0	0	0	0	0	0	0	12	0	20	298
8:05 AM	0	12	0	0	1	4	0	0	0	0	0	0	0	0	9	0	26	301
8:10 AM	0	14	0	0	0	3	0	0	0	0	0	0	0	0	11	0	28	306
8:15 AM	0	12	0	0	1	2	0	0	0	0	0	0	0	0	7	0	22	307
8:20 AM	0	6	0	0	2	4	0	0	0	0	0	0	0	0	6	0	18	301
8:25 AM	0	10	0	0	1	3	0	0	0	0	0	0	0	0	6	0	20	295
8:30 AM	0	5	0	0	3	4	0	0	0	0	0	0	0	0	8	0	20	287
8:35 AM	0	11	0	0	0	6	0	0	0	0	0	0	0	0	7	0	24	285
8:40 AM	0	11	0	0	0	3	0	0	0	0	0	0	0	0	8	0	22	281
8:45 AM	0	12	0	0	0	3	0	0	0	0	0	0	0	0	6	0	21	284
8:50 AM	0	9	2	0	0	2	0	0	0	0	0	0	0	0	6	0	19	266
8:55 AM	0	5	0	0	1	1	0	0	0	0	0	0	0	0	8	0	15	255

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	200	0	0	24	16	0	0	0	0	0	0	0	0	192	0	432
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	4	0		0	0	0		0	0	0		0	0	0		4
Scooters																	

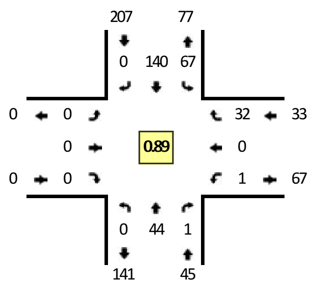
Comments:

Report generated on 5/19/2022 10:48 AM

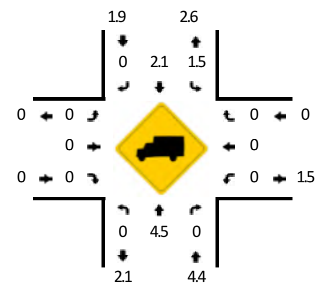
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

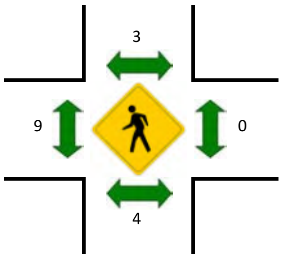
Type of peak hour being reported: Intersection Peak   Method for determining peak hour: Total Entering Volume

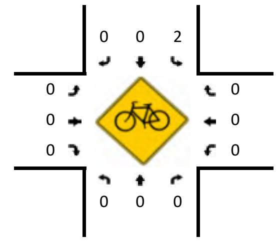
LOCATION: SW Hamilton Terr -- SW Bancroft St   **QC JOB #:** 15769420
CITY/STATE: Portland, OR   **DATE:** Tue, May 10 2022

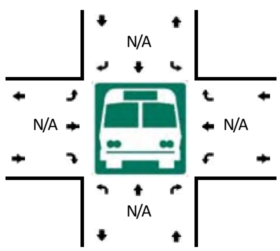


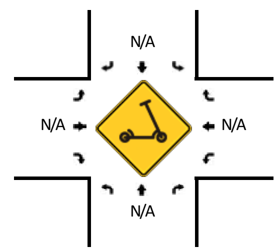
Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:35 PM -- 4:50 PM











5-Min Count Period Beginning At	SW Hamilton Terr (Northbound)				SW Hamilton Terr (Southbound)				SW Bancroft St (Eastbound)				SW Bancroft St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	3	0	0	1	7	0	0	0	0	0	0	0	0	0	0	11	
3:05 PM	0	2	0	0	0	7	0	0	0	0	0	0	0	0	0	0	9	
3:10 PM	0	4	0	0	1	11	0	0	0	0	0	0	0	0	2	0	18	
3:15 PM	0	4	0	0	2	7	0	0	0	0	0	0	0	0	2	0	15	
3:20 PM	0	1	0	0	4	10	0	0	0	0	0	0	0	0	1	0	16	
3:25 PM	0	3	0	0	4	10	0	0	0	0	0	0	0	0	2	0	19	
3:30 PM	0	2	0	0	3	9	0	0	0	0	0	0	0	0	2	0	16	
3:35 PM	0	1	0	0	2	9	0	0	0	0	0	0	0	0	1	0	13	
3:40 PM	0	7	1	0	3	17	0	0	0	0	0	0	0	0	1	0	29	
3:45 PM	0	1	0	0	2	11	0	0	0	0	0	0	0	0	4	0	18	
3:50 PM	0	5	0	0	6	10	0	0	0	0	0	0	0	0	1	0	22	
3:55 PM	0	4	0	0	3	3	0	0	0	0	0	0	0	0	2	0	12	198
4:00 PM	0	3	0	0	4	11	0	0	0	0	0	0	0	0	3	0	21	208
4:05 PM	0	5	0	0	2	17	0	0	0	0	0	0	0	0	3	0	27	226
4:10 PM	0	1	0	0	8	10	0	0	0	0	0	0	0	0	3	0	22	230
4:15 PM	0	7	0	0	6	14	0	0	0	0	0	0	0	0	2	0	29	244
4:20 PM	0	2	0	0	5	7	0	0	0	0	0	0	0	0	2	0	16	244
4:25 PM	0	3	0	0	5	17	0	0	0	0	0	0	0	0	5	0	30	255
4:30 PM	0	2	0	0	1	11	0	1	0	0	0	0	1	0	0	0	16	255
4:35 PM	0	3	0	0	8	11	0	0	0	0	0	0	0	0	5	0	27	269
4:40 PM	0	5	0	0	10	11	0	0	0	0	0	0	0	0	2	0	28	268
4:45 PM	0	5	0	0	9	9	0	0	0	0	0	0	0	0	2	0	25	275
4:50 PM	0	1	0	0	2	12	0	0	0	0	0	0	0	0	3	0	18	271
4:55 PM	0	7	0	0	4	8	0	0	0	0	0	0	0	0	3	0	22	281
5:00 PM	0	3	1	0	6	13	0	0	0	0	0	0	0	0	2	0	25	285
5:05 PM	0	1	1	0	3	7	0	0	0	0	0	0	0	0	3	0	15	273
5:10 PM	0	5	0	0	4	9	0	0	0	0	0	0	1	0	2	0	21	272
5:15 PM	0	8	1	0	7	9	0	0	0	0	0	0	0	0	3	0	28	271
5:20 PM	0	6	0	0	3	9	0	0	0	0	0	0	0	0	1	0	19	274
5:25 PM	0	4	0	0	7	2	0	0	0	0	0	0	0	0	4	0	17	261
5:30 PM	0	5	0	0	6	10	0	0	0	0	0	0	0	0	2	0	23	268
5:35 PM	0	4	0	0	3	12	0	1	0	0	0	0	0	0	3	0	23	264
5:40 PM	0	3	0	0	1	7	0	0	0	0	0	0	1	0	1	0	13	249
5:45 PM	0	4	0	0	2	9	0	0	0	0	0	0	0	0	1	0	16	240
5:50 PM	0	1	0	0	4	5	0	0	0	0	0	0	0	0	5	0	15	237
5:55 PM	0	2	0	0	0	3	0	0	0	0	0	0	0	0	4	0	9	224

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	52	0	0	108	124	0	0	0	0	0	0	0	0	36	0	320
Heavy Trucks	0	4	0		4	4	0		0	0	0		0	0	0		12
Buses																	
Pedestrians		4				0				8				0			12
Bicycles	0	0	0		4	0	0		0	0	0		0	0	0		4
Scooters																	

Comments:

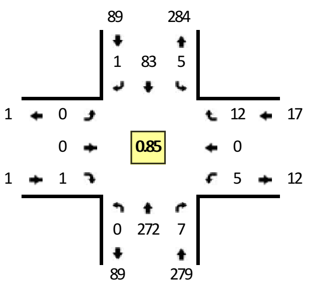
Report generated on 5/19/2022 10:48 AM

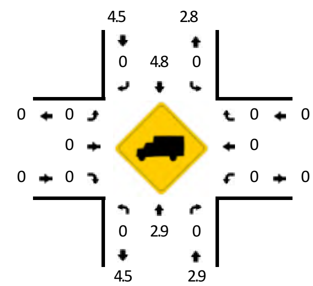
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

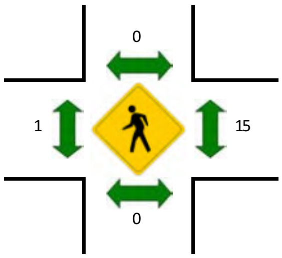
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

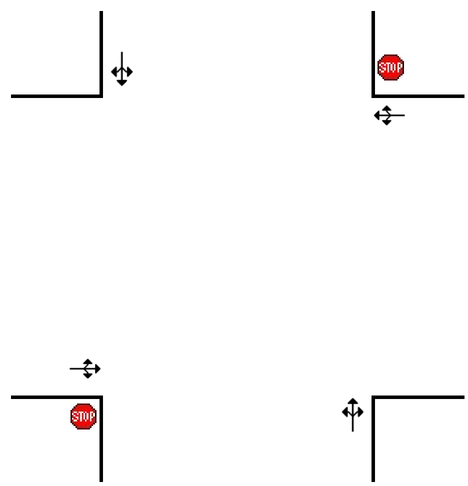
LOCATION: SW Terwilliger Blvd -- SW Bancroft Terr/SW Hamilton St — **QC JOB #:** 15769415
CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

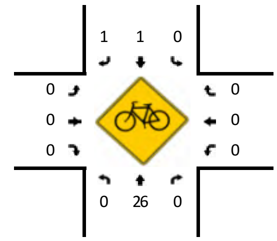
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

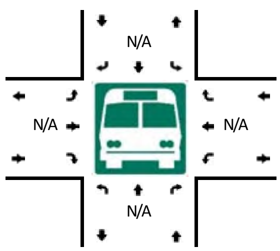


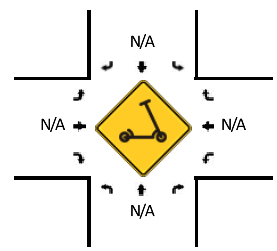












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Bancroft Terr/SW Hamilton St (Eastbound)				SW Bancroft Terr/SW Hamilton St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	3	0	0	0	4	0	0	0	0	0	0	0	0	1	0	8	
6:05 AM	0	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	13	
6:10 AM	0	10	0	0	0	2	0	0	0	0	0	0	0	0	2	0	14	
6:15 AM	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	
6:20 AM	0	21	0	0	0	1	0	0	0	0	0	0	0	0	1	0	23	
6:25 AM	0	12	0	0	0	2	0	0	0	0	0	0	0	0	2	0	16	
6:30 AM	0	22	0	0	0	4	0	0	0	0	0	0	0	0	0	0	26	
6:35 AM	0	22	0	0	0	1	0	0	0	0	0	0	0	0	1	0	24	
6:40 AM	0	29	1	0	0	2	0	0	0	0	0	0	0	0	1	0	33	
6:45 AM	0	28	0	0	0	3	0	0	0	0	0	0	0	0	3	0	34	
6:50 AM	0	21	0	0	0	2	0	0	0	0	0	0	0	0	3	0	26	
6:55 AM	0	23	1	0	0	4	0	0	0	0	0	0	0	0	0	0	28	263
7:00 AM	0	21	1	0	0	3	0	0	0	0	0	0	0	0	0	0	25	280
7:05 AM	0	25	0	0	0	4	0	0	0	0	0	0	0	0	0	0	29	296
7:10 AM	0	9	1	0	0	2	0	0	0	0	0	0	0	0	0	0	12	294
7:15 AM	0	29	3	0	1	4	0	0	0	0	0	0	1	0	0	0	38	314
7:20 AM	0	10	0	0	1	10	0	0	0	0	0	0	1	0	1	0	23	314
7:25 AM	0	23	0	0	0	5	0	0	0	0	0	0	0	0	2	0	30	328
7:30 AM	0	20	0	0	0	8	0	0	0	0	1	0	0	0	0	0	29	331
7:35 AM	0	28	0	0	0	5	0	0	0	0	0	0	0	0	0	0	33	340
7:40 AM	0	31	1	0	1	10	0	0	0	0	0	0	0	0	1	0	44	351
7:45 AM	0	25	1	0	0	7	0	0	0	0	0	0	0	0	0	0	33	350
7:50 AM	0	25	1	0	0	8	0	0	0	0	0	0	0	0	2	0	36	360
7:55 AM	0	24	0	0	0	11	0	0	0	0	0	0	0	0	2	0	37	369
8:00 AM	0	20	1	0	0	5	0	0	0	0	0	0	0	0	1	0	27	371
8:05 AM	0	16	0	0	2	5	1	0	0	0	0	0	1	0	2	0	27	369
8:10 AM	0	21	0	0	0	5	0	0	0	0	0	0	2	0	1	0	29	386
8:15 AM	0	20	0	0	0	8	0	0	0	0	0	0	0	0	1	0	29	377
8:20 AM	0	18	1	0	0	8	0	0	0	0	0	0	1	0	0	0	28	382
8:25 AM	0	16	0	0	0	5	0	0	0	0	0	0	0	0	2	0	23	375
8:30 AM	0	18	0	0	0	6	0	0	0	0	0	0	1	0	0	0	25	371
8:35 AM	0	12	0	0	0	4	0	0	0	0	0	0	0	0	0	0	16	354
8:40 AM	0	16	0	0	0	3	0	0	0	0	1	0	0	0	4	0	24	334
8:45 AM	0	18	0	0	0	4	0	0	0	0	0	0	0	0	1	0	23	324
8:50 AM	0	22	1	0	0	6	0	0	0	0	0	0	1	0	2	0	32	320
8:55 AM	0	17	0	0	0	8	0	0	0	0	0	0	1	0	1	0	27	310

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	324	12	0	4	100	0	0	0	0	0	0	0	0	12	0	452
Heavy Trucks	0	8	0		0	8	0		0	0	0		0	0	0		16
Buses																	
Pedestrians		0				0				0				16			16
Bicycles	0	20	0		0	0	0		0	0	0		0	0	0		20
Scooters																	

Comments:

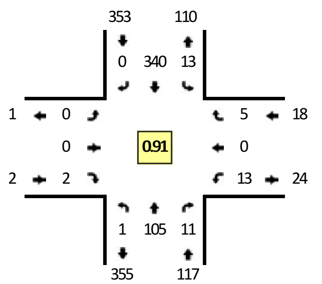
Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: SW Terwilliger Blvd -- SW Bancroft Terr/SW Hamilton St — **QC JOB #:** 15769416

CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

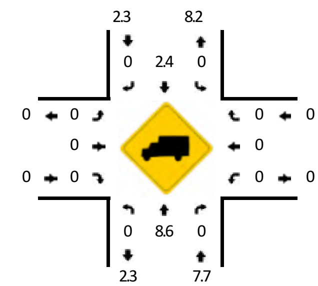


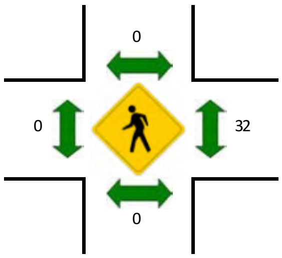
Peak-Hour: 4:35 PM -- 5:35 PM

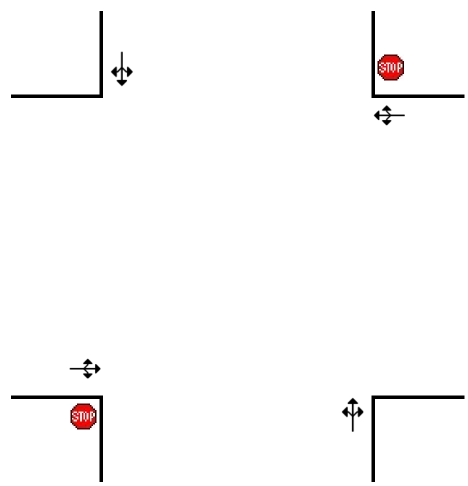
Peak 15-Min: 5:10 PM -- 5:25 PM

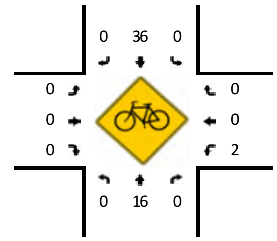
Quality Counts

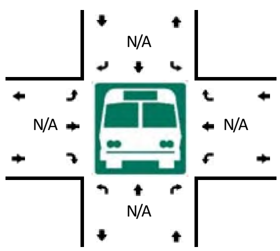
DATA THAT DRIVES COMMUNITIES

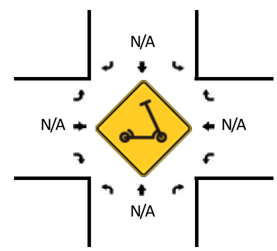












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Bancroft Terr/SW Hamilton St (Eastbound)				SW Bancroft Terr/SW Hamilton St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	8	0	0	0	20	0	0	0	0	0	0	0	0	1	0	29	
3:05 PM	0	10	1	0	1	14	0	0	0	0	1	0	1	0	1	0	29	
3:10 PM	0	8	0	0	1	17	0	0	0	0	0	0	0	0	0	0	26	
3:15 PM	0	7	0	0	0	21	0	0	0	0	0	0	0	0	0	0	28	
3:20 PM	0	13	1	0	0	24	0	0	0	0	0	0	0	0	1	0	39	
3:25 PM	1	6	2	0	0	20	0	0	0	0	0	0	2	0	0	0	31	
3:30 PM	0	4	1	0	3	26	0	0	0	0	0	0	0	0	0	0	34	
3:35 PM	0	9	0	0	0	30	0	0	0	0	0	0	1	0	3	0	43	
3:40 PM	0	8	0	0	0	28	0	0	0	0	0	0	0	0	0	0	36	
3:45 PM	0	11	0	0	0	32	0	0	0	0	0	0	3	0	0	0	46	
3:50 PM	0	9	0	0	0	27	0	0	0	0	0	0	1	0	1	0	38	
3:55 PM	0	10	0	0	0	25	0	0	0	0	0	0	0	0	0	0	35	414
4:00 PM	0	6	1	0	1	29	0	0	0	0	0	0	1	0	0	0	38	423
4:05 PM	0	5	0	0	1	26	0	0	0	0	0	0	0	0	0	0	32	426
4:10 PM	1	4	0	0	0	36	0	0	0	0	0	0	1	0	0	0	42	442
4:15 PM	0	8	0	0	1	32	0	0	0	0	0	0	2	0	1	0	44	458
4:20 PM	0	6	2	0	3	19	0	0	0	0	0	0	2	0	0	0	32	451
4:25 PM	0	8	0	0	1	36	0	0	0	0	0	0	1	0	0	0	46	466
4:30 PM	0	4	1	0	0	26	1	0	0	0	0	0	1	1	0	0	34	466
4:35 PM	0	7	1	0	1	29	0	0	0	0	0	0	3	0	0	0	41	464
4:40 PM	0	10	0	0	0	22	0	0	0	0	1	0	1	0	0	0	34	462
4:45 PM	0	11	1	0	3	30	0	0	0	0	0	0	0	0	0	0	45	461
4:50 PM	0	10	0	0	1	33	0	0	0	0	0	0	1	0	0	0	45	468
4:55 PM	0	8	1	0	0	25	0	0	0	0	0	0	1	0	1	0	36	469
5:00 PM	1	6	0	0	2	22	0	0	0	0	0	0	1	0	0	0	32	463
5:05 PM	0	14	0	0	1	25	0	0	0	0	0	0	1	0	0	0	41	472
5:10 PM	0	6	2	0	2	33	0	0	0	0	0	0	0	0	0	0	43	473
5:15 PM	0	14	1	0	2	22	0	0	0	0	0	0	1	0	2	0	42	471
5:20 PM	0	9	2	0	1	35	0	0	0	0	0	0	2	0	1	0	50	489
5:25 PM	0	4	1	0	0	30	0	0	0	0	1	0	1	0	0	0	37	480
5:30 PM	0	6	2	0	0	34	0	0	0	0	0	0	1	0	1	0	44	490
5:35 PM	0	5	0	0	0	28	1	0	0	0	0	0	1	0	0	0	35	484
5:40 PM	0	8	0	0	0	23	0	1	0	0	0	0	1	0	0	0	33	483
5:45 PM	0	7	1	0	1	15	0	0	0	0	0	0	1	0	0	0	25	463
5:50 PM	0	3	2	0	0	17	0	0	0	0	0	0	0	0	0	0	22	440
5:55 PM	0	8	1	0	0	17	0	0	0	0	0	0	0	0	0	0	26	430

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	116	20	0	20	360	0	0	0	0	0	0	12	0	12	0	540
Heavy Trucks	0	16	0		0	4	0		0	0	0		0	0	0		20
Buses																	
Pedestrians		0				0				0				56			56
Bicycles	0	20	0		0	48	0		0	0	0		4	0	0		72
Scooters																	

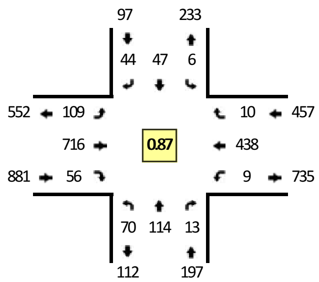
Comments:

Report generated on 5/19/2022 10:48 AM

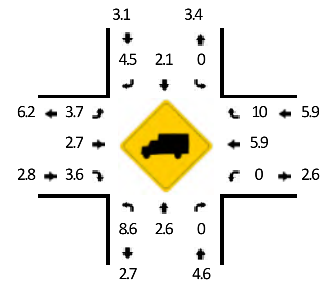
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

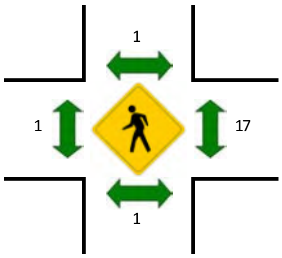
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

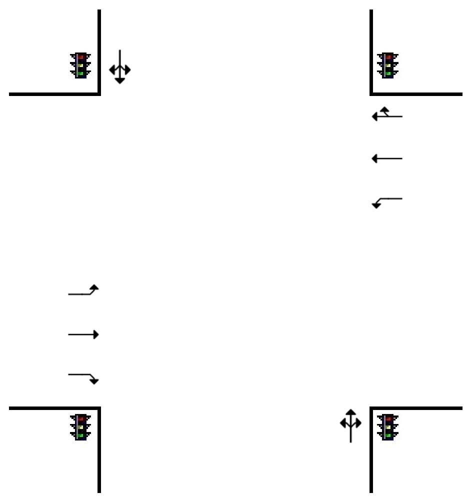
LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy — **QC JOB #:** 15769417
CITY/STATE: Portland, OR — **DATE:** Tue, May 10 2022

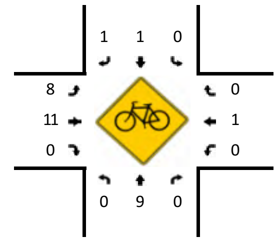


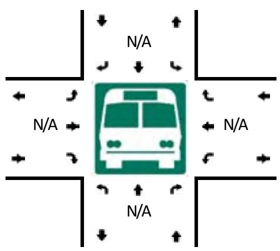
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 8:10 AM -- 8:25 AM

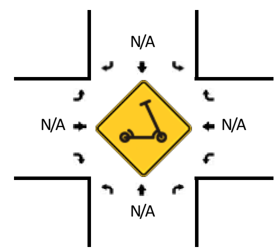












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Capitol Hwy (Eastbound)				SW Capitol Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	0	0	0	0	3	2	0	1	13	1	0	0	3	0	0	23	
6:05 AM	0	9	0	0	1	2	1	0	5	2	2	0	0	3	0	0	25	
6:10 AM	0	8	0	0	0	0	0	0	4	14	1	0	0	7	0	0	34	
6:15 AM	1	11	0	0	1	1	1	0	8	8	1	0	0	7	0	0	39	
6:20 AM	0	5	1	0	0	1	0	0	13	7	0	0	0	4	0	0	31	
6:25 AM	2	8	1	0	0	1	1	0	9	11	0	0	0	7	1	0	41	
6:30 AM	0	10	0	0	0	2	4	0	10	13	1	0	0	6	0	0	46	
6:35 AM	1	6	0	0	0	1	0	0	12	19	0	0	0	12	0	0	51	
6:40 AM	1	15	0	0	0	1	2	0	17	18	1	0	0	8	0	0	63	
6:45 AM	2	14	0	0	0	1	0	0	15	26	4	0	0	4	0	0	66	
6:50 AM	3	9	0	0	1	3	1	0	13	22	5	0	0	9	0	0	66	
6:55 AM	4	14	0	0	0	0	1	0	6	19	0	0	0	13	1	0	58	543
7:00 AM	1	11	0	0	0	3	2	0	9	16	3	0	0	13	0	0	58	578
7:05 AM	1	9	1	0	0	1	0	0	11	27	3	0	0	12	0	0	65	618
7:10 AM	2	3	0	0	0	2	1	0	13	39	2	0	0	14	0	0	76	660
7:15 AM	3	17	0	0	0	1	2	0	6	33	0	0	0	31	0	0	93	714
7:20 AM	5	3	1	0	1	3	5	0	15	31	0	0	0	21	0	0	85	768
7:25 AM	4	9	0	0	0	3	6	0	7	32	3	0	0	31	0	0	95	822
7:30 AM	2	9	2	0	1	5	2	0	12	43	0	0	0	28	1	0	105	881
7:35 AM	4	12	0	0	1	0	6	0	16	45	3	0	2	32	0	0	121	951
7:40 AM	1	7	0	0	1	1	2	0	17	64	6	0	0	31	1	0	131	1019
7:45 AM	3	9	2	0	0	4	5	0	14	53	3	0	1	37	0	0	131	1084
7:50 AM	5	9	1	0	0	2	6	0	14	55	5	0	0	33	1	0	131	1149
7:55 AM	3	11	2	0	1	5	3	0	10	58	3	0	1	30	0	0	127	1218
8:00 AM	9	4	1	0	0	7	3	0	19	59	3	0	0	33	0	0	138	1298
8:05 AM	4	14	1	0	1	3	2	0	8	53	5	0	0	20	1	0	112	1345
8:10 AM	4	9	2	0	1	3	1	0	4	72	3	0	1	49	2	0	151	1420
8:15 AM	6	8	1	0	0	2	5	0	14	75	5	0	1	40	2	0	159	1486
8:20 AM	5	8	1	0	0	5	4	0	4	80	3	0	2	47	1	0	160	1561
8:25 AM	6	6	0	0	1	9	5	0	10	44	9	0	0	44	1	0	135	1601
8:30 AM	5	16	0	0	1	2	3	0	5	62	7	0	0	28	2	0	131	1627
8:35 AM	12	9	1	0	1	0	6	0	3	48	6	0	1	34	0	0	121	1627
8:40 AM	8	11	1	0	0	5	1	0	4	57	4	0	2	43	0	0	136	1632
8:45 AM	5	11	0	0	1	4	2	0	11	50	6	0	0	16	0	0	106	1607
8:50 AM	3	7	0	0	1	3	2	0	9	43	5	0	0	28	0	0	101	1577
8:55 AM	7	6	0	0	0	1	3	0	12	37	9	0	1	37	1	0	114	1564

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	60	100	16	0	4	40	40	0	88	908	44	0	16	544	20	0	1880
Heavy Trucks	0	0	0		0	0	4		4	12	4		0	32	4		60
Buses																	
Pedestrians		0				0				0				28			28
Bicycles	0	8	0		0	0	0		4	12	0		0	0	0		24
Scooters																	

Comments:

Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

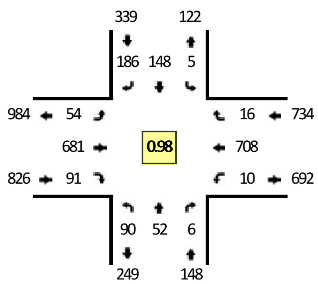
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

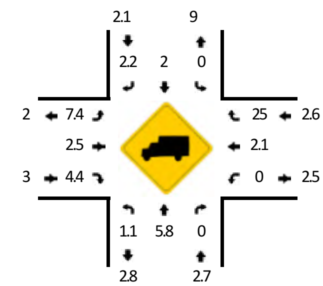
LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy | **QC JOB #:** 15769418

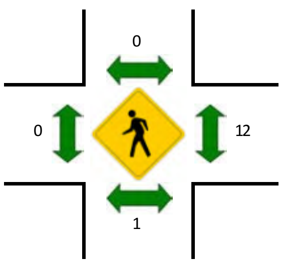
CITY/STATE: Portland, OR | **DATE:** Tue, May 10 2022

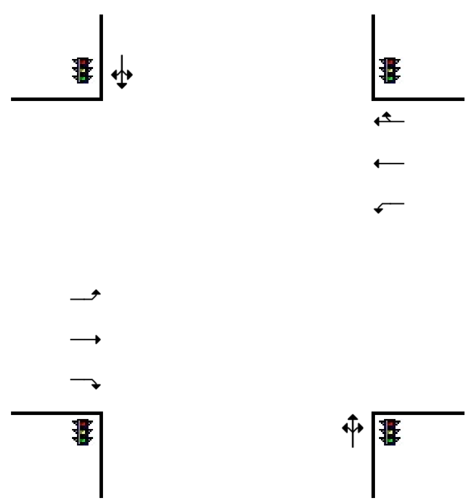
Peak-Hour: 3:45 PM -- 4:45 PM

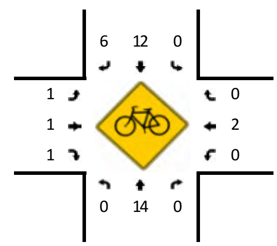
Peak 15-Min: 4:20 PM -- 4:35 PM

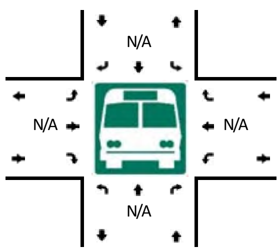


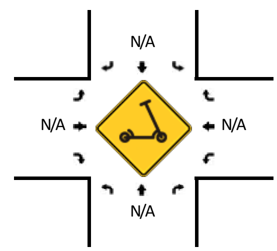












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Capitol Hwy (Eastbound)				SW Capitol Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	6	6	1	0	0	10	12	0	4	28	6	0	1	36	0	0	110	
3:05 PM	8	7	1	0	0	7	7	0	4	30	4	0	1	32	0	0	101	
3:10 PM	3	2	0	0	1	4	13	0	6	47	10	0	0	40	1	0	127	
3:15 PM	2	1	0	0	1	11	9	0	4	51	9	0	0	44	1	0	133	
3:20 PM	6	6	0	0	0	12	11	0	8	45	4	0	1	40	0	0	133	
3:25 PM	8	2	0	0	1	13	16	0	5	35	8	0	0	39	2	0	129	
3:30 PM	9	4	1	0	1	7	10	0	2	44	10	0	0	47	1	0	136	
3:35 PM	10	5	1	0	2	12	11	0	3	44	9	0	0	47	1	0	145	
3:40 PM	6	6	2	0	2	19	11	0	4	49	14	0	0	44	0	0	157	
3:45 PM	7	5	0	0	0	10	14	0	6	74	8	0	1	57	3	0	185	
3:50 PM	8	9	0	0	1	14	18	0	6	59	8	0	1	57	1	0	182	
3:55 PM	8	4	0	0	2	14	11	0	4	50	8	0	1	47	2	0	151	1689
4:00 PM	6	2	1	0	1	12	12	0	3	54	8	0	0	64	1	0	164	1743
4:05 PM	3	5	2	0	0	11	11	0	4	56	9	0	0	61	1	0	163	1805
4:10 PM	10	3	1	0	0	13	15	0	3	52	11	0	1	68	0	0	177	1855
4:15 PM	7	5	0	0	0	16	24	0	2	43	4	0	0	54	0	0	155	1877
4:20 PM	7	4	0	0	0	13	19	0	6	62	11	0	1	59	1	0	183	1927
4:25 PM	6	5	0	0	0	6	11	0	3	73	6	0	0	59	2	0	171	1969
4:30 PM	9	2	1	0	1	20	17	0	6	49	7	0	2	55	1	0	170	2003
4:35 PM	11	3	1	0	0	9	17	0	6	50	6	0	3	42	3	0	151	2009
4:40 PM	8	5	0	0	0	10	17	0	5	59	5	0	0	85	1	0	195	2047
4:45 PM	6	5	0	0	1	8	15	0	3	60	7	0	1	48	1	0	155	2017
4:50 PM	7	6	1	0	2	15	13	0	5	54	10	0	2	53	0	0	168	2003
4:55 PM	6	3	1	0	1	23	17	0	4	43	8	0	0	52	4	0	162	2014
5:00 PM	6	3	1	0	0	5	8	0	5	50	4	0	1	63	2	0	148	1998
5:05 PM	9	5	2	1	0	18	12	0	10	58	8	0	1	57	2	0	183	2018
5:10 PM	10	7	1	0	1	11	16	0	6	36	5	0	0	47	1	0	141	1982
5:15 PM	9	6	1	0	1	13	18	0	4	43	5	0	0	59	4	0	163	1990
5:20 PM	8	3	0	0	0	8	14	0	4	53	10	0	1	59	4	0	164	1971
5:25 PM	11	6	2	0	1	18	18	0	2	47	4	0	2	67	2	0	180	1980
5:30 PM	16	4	0	0	1	14	18	0	5	46	12	0	0	41	0	0	157	1967
5:35 PM	4	2	0	0	2	14	19	0	5	61	6	0	0	44	1	0	158	1974
5:40 PM	10	4	0	0	0	7	18	0	9	55	10	0	0	46	1	0	160	1939
5:45 PM	6	3	1	0	0	12	12	0	3	38	7	0	0	53	2	0	137	1921
5:50 PM	7	5	0	0	0	8	9	0	3	49	7	0	0	31	1	0	120	1873
5:55 PM	6	3	2	0	0	7	6	0	3	48	9	0	1	60	2	0	147	1858

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	88	44	4	0	4	156	188	0	60	736	96	0	12	692	16	0	2096
Heavy Trucks	0	4	0		0	4	4		4	20	4		0	12	0		52
Buses																	
Pedestrians		0				0				0				8			8
Bicycles	0	4	0		0	12	12		4	4	0		0	0	0		36
Scooters																	

Comments:

Report generated on 5/19/2022 10:48 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix D
2022 Observed Synchro Reports

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	5	0	1	0	1	385	2	0	564	4
Future Vol, veh/h	4	0	5	0	1	0	1	385	2	0	564	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	6	0	1	0	1	433	2	0	634	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	812	1073	636	1075	1074	218	638	0	0	435	0	0
Stage 1	636	636	-	436	436	-	-	-	-	-	-	-
Stage 2	176	437	-	639	638	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	313	219	477	213	219	670	944	-	-	728	-	-
Stage 1	451	471	-	500	579	-	-	-	-	-	-	-
Stage 2	771	578	-	450	470	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	311	219	477	210	219	670	944	-	-	728	-	-
Mov Cap-2 Maneuver	311	219	-	210	219	-	-	-	-	-	-	-
Stage 1	451	471	-	500	578	-	-	-	-	-	-	-
Stage 2	769	577	-	445	470	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	21.5	0	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	944	-	-	386	219	728	-	-
HCM Lane V/C Ratio	0.001	-	-	0.026	0.005	-	-	-
HCM Control Delay (s)	8.8	0	-	14.6	21.5	0	-	-
HCM Lane LOS	A	A	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	376	145	31	655	5
Future Volume (vph)	0	0	0	0	0	0	0	376	145	31	655	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.999	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1861	0
Flt Permitted										0.496		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	924	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									163		1	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	422	163	35	736	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	422	163	35	742	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								42.0	42.0	16.0	58.0	
Total Split (%)								46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)								37.8	37.8	12.8	53.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)								80.8	80.8	86.8	90.0	
Actuated g/C Ratio								0.90	0.90	0.96	1.00	
v/c Ratio								0.25	0.11	0.04	0.40	
Control Delay								1.2	0.3	0.2	0.6	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								1.2	0.3	0.2	0.6	
LOS								A	A	A	A	
Approach Delay								0.9			0.6	
Approach LOS								A			A	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 13 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

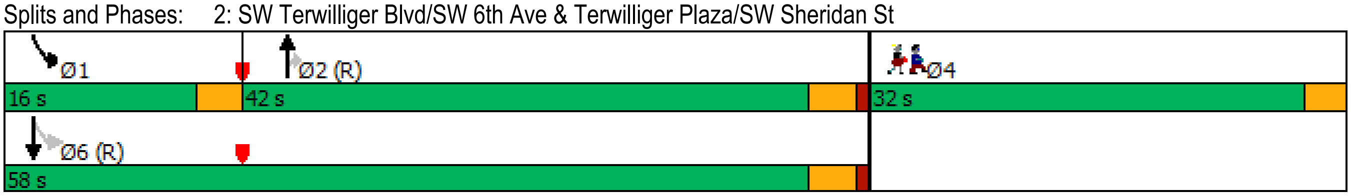
Maximum v/c Ratio: 0.40

Intersection Signal Delay: 0.7 Intersection LOS: A

Intersection Capacity Utilization 38.3% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	32.0
Total Split (%)	36%
Maximum Green (s)	29.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection						
Int Delay, s/veh	9.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	101	306	74	159	102
Future Vol, veh/h	74	101	306	74	159	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	81	111	336	81	175	112

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	984	231	287	0	-	0
Stage 1	231	-	-	-	-	-
Stage 2	753	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	251	806	1287	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	428	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	182	806	1287	-	-	-
Mov Cap-2 Maneuver	182	-	-	-	-	-
Stage 1	551	-	-	-	-	-
Stage 2	428	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.2	7.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1287	-	329	-	-
HCM Lane V/C Ratio	0.261	-	0.585	-	-
HCM Control Delay (s)	8.8	0	30.2	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	1.1	-	3.5	-	-

Intersection						
Int Delay, s/veh	5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	74	150	231	8	44	218
Future Vol, veh/h	74	150	231	8	44	218
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	83	169	260	9	49	245

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	608	265	0	0	269	0
Stage 1	265	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	459	774	-	-	1295	-
Stage 1	779	-	-	-	-	-
Stage 2	719	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	439	774	-	-	1295	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	687	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.8	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	618	1295	-
HCM Lane V/C Ratio	-	-	0.407	0.038	-
HCM Control Delay (s)	-	-	14.8	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	2	0.1	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	55	33	186	183	122	168
Future Vol, veh/h	55	33	186	183	122	168
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	62	37	209	206	137	189

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	856	232	326	0	-	0
Stage 1	232	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	324	812	1222	-	-	-
Stage 1	799	-	-	-	-	-
Stage 2	528	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	261	812	1222	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	528	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	19.3		4.3		0	
HCM LOS	C					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1222	-	350	-	-
HCM Lane V/C Ratio	0.171	-	0.283	-	-
HCM Control Delay (s)	8.6	0	19.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.6	-	1.1	-	-

Intersection						
Int Delay, s/veh	2.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	48	157	363	98	60
Future Vol, veh/h	6	48	157	363	98	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	54	176	408	110	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	904	144	177	0	-	0
Stage 1	144	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	307	903	1399	-	-	-
Stage 1	883	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	257	903	1399	-	-	-
Mov Cap-2 Maneuver	257	-	-	-	-	-
Stage 1	739	-	-	-	-	-
Stage 2	462	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1399	-	706	-	-
HCM Lane V/C Ratio	0.126	-	0.086	-	-
HCM Control Delay (s)	7.9	0	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.3	-	-

Intersection						
Int Delay, s/veh	5.3					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	239	280	1	54	89
Future Vol, veh/h	0	239	280	1	54	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	269	315	1	61	100

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	538	316	0	0	316	0
Stage 1	316	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	504	724	-	-	1244	-
Stage 1	739	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	478	724	-	-	1244	-
Mov Cap-2 Maneuver	478	-	-	-	-	-
Stage 1	739	-	-	-	-	-
Stage 2	773	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	724	1244	-
HCM Lane V/C Ratio	-	-	0.371	0.049	-
HCM Control Delay (s)	-	-	12.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.2	-

Intersection						
Int Delay, s/veh	3.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	113	130	1	10	47
Future Vol, veh/h	0	113	130	1	10	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	127	146	1	11	53

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	222	147	0	0	147	0
Stage 1	147	-	-	-	-	-
Stage 2	75	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	766	900	-	-	1435	-
Stage 1	880	-	-	-	-	-
Stage 2	948	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	760	900	-	-	1435	-
Mov Cap-2 Maneuver	760	-	-	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	940	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	900	1435	-
HCM Lane V/C Ratio	-	-	0.141	0.008	-
HCM Control Delay (s)	-	-	9.7	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	1	4	0	12	0	271	5	3	85	1
Future Vol, veh/h	0	0	1	4	0	12	0	271	5	3	85	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	1	4	0	13	0	304	6	3	96	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	417	413	97	410	410	307	97	0	0	310	0	0
Stage 1	103	103	-	307	307	-	-	-	-	-	-	-
Stage 2	314	310	-	103	103	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	546	529	959	552	531	733	1496	-	-	1250	-	-
Stage 1	903	810	-	703	661	-	-	-	-	-	-	-
Stage 2	697	659	-	903	810	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	535	527	959	550	529	733	1496	-	-	1250	-	-
Mov Cap-2 Maneuver	535	527	-	550	529	-	-	-	-	-	-	-
Stage 1	903	808	-	703	661	-	-	-	-	-	-	-
Stage 2	684	659	-	899	808	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.8	10.5	0	0.3
HCM LOS	A	B		

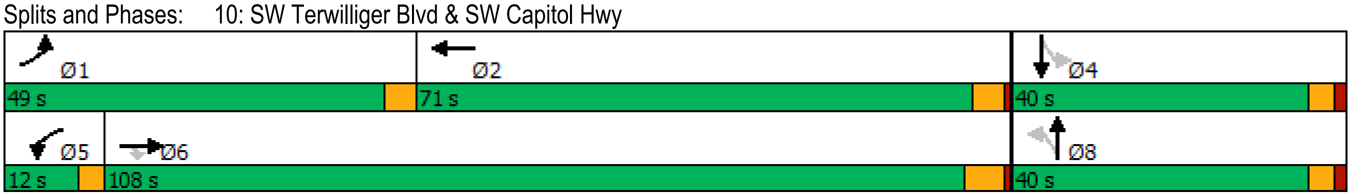
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1496	-	-	959	677	1250	-	-
HCM Lane V/C Ratio	-	-	-	0.001	0.027	0.003	-	-
HCM Control Delay (s)	0	-	-	8.8	10.5	7.9	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	689	42	8	411	9	50	109	13	6	40	45
Future Volume (vph)	139	689	42	8	411	9	50	109	13	6	40	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.997			0.990			0.933	
Flt Protected	0.950			0.950				0.986			0.997	
Satd. Flow (prot)	1770	1863	1583	1770	3529	0	0	1818	0	0	1733	0
Flt Permitted	0.950			0.950				0.894			0.976	
Satd. Flow (perm)	1770	1863	1583	1770	3529	0	0	1649	0	0	1696	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			34		2			2			28	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	156	774	47	9	462	10	56	122	15	7	45	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	156	774	47	9	472	0	0	193	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.7		29.8	29.8		29.8	29.8	
Total Split (s)	49.0	108.0	108.0	12.0	71.0		40.0	40.0		40.0	40.0	
Total Split (%)	30.6%	67.5%	67.5%	7.5%	44.4%		25.0%	25.0%		25.0%	25.0%	
Maximum Green (s)	45.3	102.4	102.4	8.8	66.3		35.2	35.2		35.2	35.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.7		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.7			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	13.2	49.5	49.5	6.3	34.8			15.4			15.4	
Actuated g/C Ratio	0.17	0.64	0.64	0.08	0.45			0.20			0.20	
v/c Ratio	0.52	0.65	0.05	0.06	0.30			0.58			0.29	
Control Delay	38.3	13.2	3.8	42.2	15.0			37.4			24.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	38.3	13.2	3.8	42.2	15.0			37.4			24.2	
LOS	D	B	A	D	B			D			C	
Approach Delay		16.7			15.5			37.4			24.2	
Approach LOS		B			B			D			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 160	
Actuated Cycle Length: 77.2	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 67.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	3	2	516	1	1	326	7
Future Vol, veh/h	4	0	0	0	0	3	2	516	1	1	326	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	0	0	0	3	2	580	1	1	366	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	608	957	370	957	961	291	374	0	0	581	0	0
Stage 1	372	372	-	585	585	-	-	-	-	-	-	-
Stage 2	236	585	-	372	376	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	419	257	675	253	256	602	1183	-	-	621	-	-
Stage 1	626	618	-	396	497	-	-	-	-	-	-	-
Stage 2	710	497	-	626	616	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	415	256	675	252	255	602	1183	-	-	621	-	-
Mov Cap-2 Maneuver	415	256	-	252	255	-	-	-	-	-	-	-
Stage 1	625	617	-	395	496	-	-	-	-	-	-	-
Stage 2	705	496	-	625	615	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.8	11	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1183	-	-	415	602	621	-	-
HCM Lane V/C Ratio	0.002	-	-	0.011	0.006	0.002	-	-
HCM Control Delay (s)	8	0	-	13.8	11	10.8	0	-
HCM Lane LOS	A	A	-	B	B	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	488	152	110	270	11
Future Volume (vph)	0	0	0	0	0	0	0	488	152	110	270	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.994	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1852	0
Flt Permitted										0.425		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	792	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									171		4	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	548	171	124	303	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	548	171	124	315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

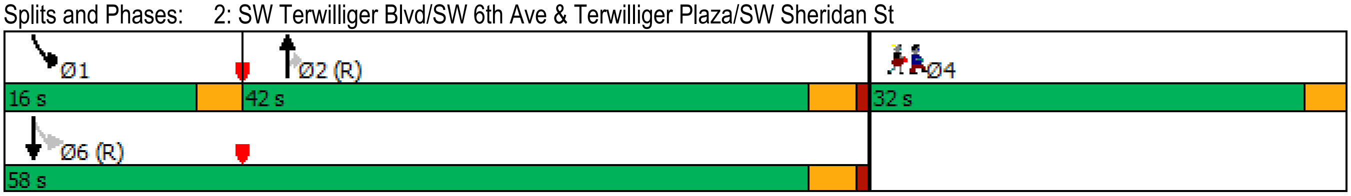
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								42.0	42.0	16.0	58.0	
Total Split (%)								46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)								37.8	37.8	12.8	53.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)								74.6	74.6	86.8	90.0	
Actuated g/C Ratio								0.83	0.83	0.96	1.00	
v/c Ratio								0.35	0.13	0.15	0.17	
Control Delay								2.8	1.0	0.4	0.2	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								2.8	1.0	0.4	0.2	
LOS								A	A	A	A	
Approach Delay								2.4			0.3	
Approach LOS								A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 35 (39%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 1.6 Intersection LOS: A
Intersection Capacity Utilization 39.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	32.0
Total Split (%)	36%
Maximum Green (s)	29.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	97	294	76	128	105	26
Future Vol, veh/h	97	294	76	128	105	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	107	323	84	141	115	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	439	130	144	0	-	0
Stage 1	130	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	536	917	1451	-	-	-
Stage 1	844	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	502	917	1451	-	-	-
Mov Cap-2 Maneuver	502	-	-	-	-	-
Stage 1	791	-	-	-	-	-
Stage 2	697	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	15.7		2.8		0	
HCM LOS	C					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1451	-	761	-	-
HCM Lane V/C Ratio	0.058	-	0.565	-	-
HCM Control Delay (s)	7.6	0	15.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	3.6	-	-

Intersection						
Int Delay, s/veh	2.5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	31	168	114	146	250
Future Vol, veh/h	13	31	168	114	146	250
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	35	189	128	164	281

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	862	253	0	0	317	0
Stage 1	253	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	325	786	-	-	1243	-
Stage 1	789	-	-	-	-	-
Stage 2	543	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	274	786	-	-	1243	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	458	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	3.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	506	1243	-
HCM Lane V/C Ratio	-	-	0.098	0.132	-
HCM Control Delay (s)	-	-	12.9	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.5	-

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	154	168	45	119	221	42
Future Vol, veh/h	154	168	45	119	221	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	173	189	51	134	248	47

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	508	272	295	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	519	772	1255	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	496	772	1255	-	-	-
Mov Cap-2 Maneuver	496	-	-	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	796	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.1	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1255	-	610	-	-
HCM Lane V/C Ratio	0.04	-	0.593	-	-
HCM Control Delay (s)	8	0	19.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	3.9	-	-

Intersection						
Int Delay, s/veh	5.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	54	158	79	109	370	18
Future Vol, veh/h	54	158	79	109	370	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	178	89	122	416	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	726	426	436	0	-	0
Stage 1	426	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	391	628	1124	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	358	628	1124	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	752	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.3	3.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1124	-	527	-	-
HCM Lane V/C Ratio	0.079	-	0.452	-	-
HCM Control Delay (s)	8.5	0	17.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	2.3	-	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	83	106	4	177	351
Future Vol, veh/h	2	83	106	4	177	351
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	93	119	4	199	394

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	913	121	0	0	123	0
Stage 1	121	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	304	930	-	-	1464	-
Stage 1	904	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	251	930	-	-	1464	-
Mov Cap-2 Maneuver	251	-	-	-	-	-
Stage 1	904	-	-	-	-	-
Stage 2	368	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	2.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	874	1464	-
HCM Lane V/C Ratio	-	-	0.109	0.136	-
HCM Control Delay (s)	-	-	9.6	7.8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.5	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	32	53	3	69	110
Future Vol, veh/h	1	32	53	3	69	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	36	60	3	78	124

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	342	62	0	0	63	0
Stage 1	62	-	-	-	-	-
Stage 2	280	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	654	1003	-	-	1540	-
Stage 1	961	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	619	1003	-	-	1540	-
Mov Cap-2 Maneuver	619	-	-	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	726	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	984	1540	-
HCM Lane V/C Ratio	-	-	0.038	0.05	-
HCM Control Delay (s)	-	-	8.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	2	13	0	5	1	105	11	13	340	0
Future Vol, veh/h	0	0	2	13	0	5	1	105	11	13	340	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	2	15	0	6	1	118	12	15	382	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	541	544	382	539	538	124	382	0	0	130	0	0
Stage 1	412	412	-	126	126	-	-	-	-	-	-	-
Stage 2	129	132	-	413	412	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	452	446	665	453	450	927	1176	-	-	1455	-	-
Stage 1	617	594	-	878	792	-	-	-	-	-	-	-
Stage 2	875	787	-	616	594	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	444	440	665	447	444	927	1176	-	-	1455	-	-
Mov Cap-2 Maneuver	444	440	-	447	444	-	-	-	-	-	-	-
Stage 1	616	586	-	877	791	-	-	-	-	-	-	-
Stage 2	869	786	-	606	586	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	12.2	0.1	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1176	-	-	665	522	1455	-	-
HCM Lane V/C Ratio	0.001	-	-	0.003	0.039	0.01	-	-
HCM Control Delay (s)	8.1	0	-	10.4	12.2	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	599	84	11	673	24	108	56	10	8	152	183
Future Volume (vph)	59	599	84	11	673	24	108	56	10	8	152	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995			0.992			0.928	
Flt Protected	0.950			0.950				0.970			0.999	
Satd. Flow (prot)	1770	1863	1583	1770	3522	0	0	1792	0	0	1727	0
Flt Permitted	0.950			0.950				0.383			0.992	
Satd. Flow (perm)	1770	1863	1583	1770	3522	0	0	708	0	0	1715	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55		4			3			65	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	66	673	94	12	756	27	121	63	11	9	171	206
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	673	94	12	783	0	0	195	0	0	386	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.9		29.8	29.8		29.8	29.8	
Total Split (s)	13.0	46.0	46.0	13.0	46.0		51.0	51.0		51.0	51.0	
Total Split (%)	11.8%	41.8%	41.8%	11.8%	41.8%		46.4%	46.4%		46.4%	46.4%	
Maximum Green (s)	9.3	40.4	40.4	9.8	41.1		46.2	46.2		46.2	46.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.9		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.9			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	1.0	1.9	1.9	1.0	1.5		1.4	1.4		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	7.9	39.5	39.5	6.2	32.7			19.9			19.9	
Actuated g/C Ratio	0.11	0.55	0.55	0.09	0.46			0.28			0.28	
v/c Ratio	0.34	0.66	0.11	0.08	0.49			0.98			0.74	
Control Delay	38.8	18.2	6.4	37.3	17.1			89.4			29.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	38.8	18.2	6.4	37.3	17.1			89.4			29.2	
LOS	D	B	A	D	B			F			C	
Approach Delay		18.5			17.4			89.4			29.2	
Approach LOS		B			B			F			C	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 71.8

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

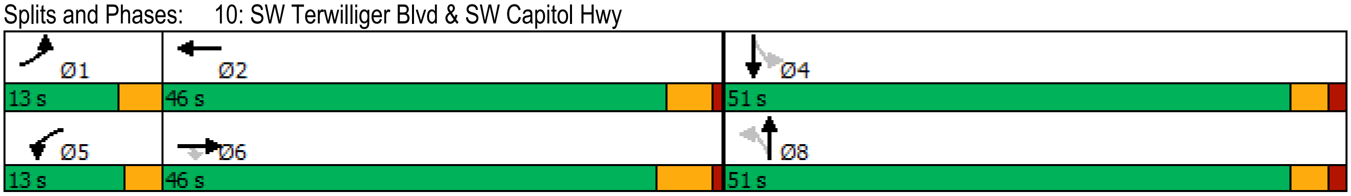
Maximum v/c Ratio: 0.98

Intersection Signal Delay: 26.2 Intersection LOS: C

Intersection Capacity Utilization 80.0% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



Appendix E
2030 No-build Synchro Reports

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	5	0	1	0	1	417	2	0	611	4
Future Vol, veh/h	4	0	5	0	1	0	1	417	2	0	611	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	6	0	1	0	1	469	2	0	687	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	879	1162	689	1164	1163	236	691	0	0	471	0	0
Stage 1	689	689	-	472	472	-	-	-	-	-	-	-
Stage 2	190	473	-	692	691	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	284	194	445	187	194	653	902	-	-	700	-	-
Stage 1	423	446	-	473	558	-	-	-	-	-	-	-
Stage 2	757	558	-	421	445	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	282	194	445	184	194	653	902	-	-	700	-	-
Mov Cap-2 Maneuver	282	194	-	184	194	-	-	-	-	-	-	-
Stage 1	422	446	-	472	557	-	-	-	-	-	-	-
Stage 2	754	557	-	416	445	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	23.7	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	902	-	-	354	194	700	-	-
HCM Lane V/C Ratio	0.001	-	-	0.029	0.006	-	-	-
HCM Control Delay (s)	9	0	-	15.5	23.7	0	-	-
HCM Lane LOS	A	A	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	407	157	34	709	5
Future Volume (vph)	0	0	0	0	0	0	0	407	157	34	709	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.999	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1861	0
Flt Permitted										0.460		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	857	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									176		1	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	457	176	38	797	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	457	176	38	803	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

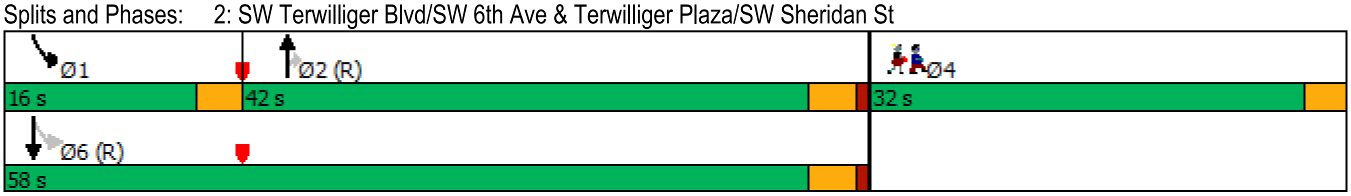
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								42.0	42.0	16.0	58.0	
Total Split (%)								46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)								37.8	37.8	12.8	53.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								25	25			
Act Effct Green (s)								75.4	75.4	81.4	83.8	
Actuated g/C Ratio								0.84	0.84	0.90	0.93	
v/c Ratio								0.29	0.13	0.04	0.46	
Control Delay								4.9	2.2	2.1	2.8	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								4.9	2.2	2.1	2.8	
LOS								A	A	A	A	
Approach Delay								4.2			2.8	
Approach LOS								A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 13 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 3.4 Intersection LOS: A
Intersection Capacity Utilization 41.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	32.0
Total Split (%)	36%
Maximum Green (s)	29.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	7
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	12.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	109	331	80	172	110
Future Vol, veh/h	80	109	331	80	172	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	88	120	364	88	189	121

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1066	250	310	0	-	0
Stage 1	250	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	224	786	1262	-	-	-
Stage 1	743	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	156	786	1262	-	-	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	399	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	43.4	7.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1262	-	290	-	-
HCM Lane V/C Ratio	0.288	-	0.716	-	-
HCM Control Delay (s)	9	0	43.4	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	1.2	-	5.1	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	162	250	9	48	236
Future Vol, veh/h	80	162	250	9	48	236
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	90	182	281	10	54	265

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	659	286	0	0	291	0
Stage 1	286	-	-	-	-	-
Stage 2	373	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	429	753	-	-	1271	-
Stage 1	763	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	408	753	-	-	1271	-
Mov Cap-2 Maneuver	408	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	661	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.3	0	1.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	588	1271	-
HCM Lane V/C Ratio	-	-	0.462	0.042	-
HCM Control Delay (s)	-	-	16.3	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.4	0.1	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	36	201	198	132	182
Future Vol, veh/h	60	36	201	198	132	182
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	67	40	226	222	148	204

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	924	250	352	0	-	0
Stage 1	250	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	295	794	1196	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	231	794	1196	-	-	-
Mov Cap-2 Maneuver	231	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	501	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.3	4.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1196	-	315	-	-
HCM Lane V/C Ratio	0.189	-	0.342	-	-
HCM Control Delay (s)	8.7	0	22.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.7	-	1.5	-	-

Intersection						
Int Delay, s/veh	2.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	52	170	393	106	65
Future Vol, veh/h	6	52	170	393	106	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	58	191	442	119	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	980	156	192	0	-	0
Stage 1	156	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	277	890	1381	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	431	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	226	890	1381	-	-	-
Mov Cap-2 Maneuver	226	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	431	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1381	-	683	-	-
HCM Lane V/C Ratio	0.138	-	0.095	-	-
HCM Control Delay (s)	8	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.3	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	259	303	1	58	96
Future Vol, veh/h	0	259	303	1	58	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	291	340	1	65	108

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	579	341	0	0	341	0
Stage 1	341	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	477	701	-	-	1218	-
Stage 1	720	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	450	701	-	-	1218	-
Mov Cap-2 Maneuver	450	-	-	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	756	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	3.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	701	1218	-
HCM Lane V/C Ratio	-	-	0.415	0.054	-
HCM Control Delay (s)	-	-	13.7	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	2	0.2	-

Intersection						
Int Delay, s/veh	3.9					
Movement	**WBL**	**WBR**	**NBT**	**NBR**	**SBL**	**SBT**
Lane Configurations						
Traffic Vol, veh/h	0	122	141	1	11	51
Future Vol, veh/h	0	122	141	1	11	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	137	158	1	12	57

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	240	159	0	0	159	0
Stage 1	159	-	-	-	-	-
Stage 2	81	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	748	886	-	-	1420	-
Stage 1	870	-	-	-	-	-
Stage 2	942	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	741	886	-	-	1420	-
Mov Cap-2 Maneuver	741	-	-	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	934	-	-	-	-	-
Approach	**WB**		**NB**		**SB**	
HCM Control Delay, s	9.8		0		1.3	
HCM LOS	A					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	886	1420	-
HCM Lane V/C Ratio	-	-	0.155	0.009	-
HCM Control Delay (s)	-	-	9.8	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	1	4	0	13	0	293	5	3	92	1
Future Vol, veh/h	0	0	1	4	0	13	0	293	5	3	92	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	1	4	0	15	0	329	6	3	103	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	450	445	104	442	442	332	104	0	0	335	0	0
Stage 1	110	110	-	332	332	-	-	-	-	-	-	-
Stage 2	340	335	-	110	110	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	519	508	951	526	510	710	1488	-	-	1224	-	-
Stage 1	895	804	-	681	644	-	-	-	-	-	-	-
Stage 2	675	643	-	895	804	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	507	506	951	524	508	710	1488	-	-	1224	-	-
Mov Cap-2 Maneuver	507	506	-	524	508	-	-	-	-	-	-	-
Stage 1	895	802	-	681	644	-	-	-	-	-	-	-
Stage 2	661	643	-	891	802	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.8	10.7	0	0.2
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1488	-	-	951	655	1224	-	-
HCM Lane V/C Ratio	-	-	-	0.001	0.029	0.003	-	-
HCM Control Delay (s)	0	-	-	8.8	10.7	7.9	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

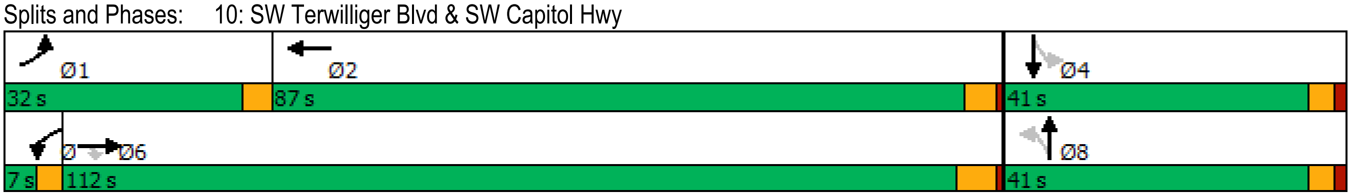
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	746	45	9	445	10	54	118	14	6	43	49
Future Volume (vph)	151	746	45	9	445	10	54	118	14	6	43	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.997			0.990			0.932	
Flt Protected	0.950			0.950				0.986			0.997	
Satd. Flow (prot)	1770	1863	1583	1770	3529	0	0	1818	0	0	1731	0
Flt Permitted	0.950			0.950				0.887			0.977	
Satd. Flow (perm)	1770	1863	1583	1770	3529	0	0	1636	0	0	1696	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			34		2			2			29	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	170	838	51	10	500	11	61	133	16	7	48	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	170	838	51	10	511	0	0	210	0	0	110	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.7		29.8	29.8		29.8	29.8	
Total Split (s)	32.0	112.0	112.0	7.0	87.0		41.0	41.0		41.0	41.0	
Total Split (%)	20.0%	70.0%	70.0%	4.4%	54.4%		25.6%	25.6%		25.6%	25.6%	
Maximum Green (s)	28.3	106.4	106.4	3.8	82.3		36.2	36.2		36.2	36.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.7		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.7			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	14.3	53.1	53.1	4.0	36.8			17.3			17.3	
Actuated g/C Ratio	0.17	0.64	0.64	0.05	0.45			0.21			0.21	
v/c Ratio	0.55	0.70	0.05	0.12	0.32			0.61			0.29	
Control Delay	41.6	14.5	3.7	51.2	16.4			39.6			25.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	41.6	14.5	3.7	51.2	16.4			39.6			25.4	
LOS	D	B	A	D	B			D			C	
Approach Delay		18.3			17.0			39.6			25.4	
Approach LOS		B			B			D			C	

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 82.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 71.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	3	2	559	1	1	353	8
Future Vol, veh/h	4	0	0	0	0	3	2	559	1	1	353	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	0	0	0	3	2	628	1	1	397	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	659	1037	402	1037	1041	315	406	0	0	629	0	0
Stage 1	404	404	-	633	633	-	-	-	-	-	-	-
Stage 2	255	633	-	404	408	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	389	231	647	225	229	581	1151	-	-	590	-	-
Stage 1	602	598	-	367	472	-	-	-	-	-	-	-
Stage 2	692	472	-	602	596	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	385	230	647	224	228	581	1151	-	-	590	-	-
Mov Cap-2 Maneuver	385	230	-	224	228	-	-	-	-	-	-	-
Stage 1	600	597	-	366	471	-	-	-	-	-	-	-
Stage 2	686	471	-	601	595	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.5	11.2	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1151	-	-	385	581	590	-	-
HCM Lane V/C Ratio	0.002	-	-	0.012	0.006	0.002	-	-
HCM Control Delay (s)	8.1	0	-	14.5	11.2	11.1	0	-
HCM Lane LOS	A	A	-	B	B	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	528	165	117	292	12
Future Volume (vph)	0	0	0	0	0	0	0	528	165	117	292	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.994	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1852	0
Flt Permitted										0.352		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	656	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									185		4	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	593	185	131	328	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	593	185	131	341	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

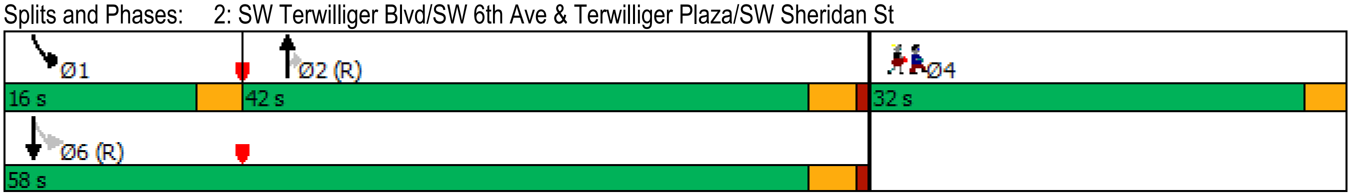
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								42.0	42.0	16.0	58.0	
Total Split (%)								46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)								37.8	37.8	12.8	53.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								50	50			
Act Effct Green (s)								63.3	63.3	76.0	77.5	
Actuated g/C Ratio								0.70	0.70	0.84	0.86	
v/c Ratio								0.45	0.16	0.20	0.21	
Control Delay								10.5	2.7	3.5	3.2	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								10.5	2.7	3.5	3.2	
LOS								B	A	A	A	
Approach Delay								8.6			3.3	
Approach LOS								A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 35 (39%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 6.6 Intersection LOS: A
Intersection Capacity Utilization 41.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	32.0
Total Split (%)	36%
Maximum Green (s)	29.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	16
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection						
Int Delay, s/veh	10.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	318	82	139	114	28
Future Vol, veh/h	105	318	82	139	114	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	115	349	90	153	125	31

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	474	141	156	0	-	0
Stage 1	141	-	-	-	-	-
Stage 2	333	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	511	904	1436	-	-	-
Stage 1	835	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	476	904	1436	-	-	-
Mov Cap-2 Maneuver	476	-	-	-	-	-
Stage 1	778	-	-	-	-	-
Stage 2	679	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.8	2.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1436	-	739	-	-
HCM Lane V/C Ratio	0.063	-	0.629	-	-
HCM Control Delay (s)	7.7	0	17.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	4.5	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	34	182	123	158	271
Future Vol, veh/h	14	34	182	123	158	271
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	38	204	138	178	304

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	933	273	0	0	342	0
Stage 1	273	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	295	766	-	-	1217	-
Stage 1	773	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	243	766	-	-	1217	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	773	-	-	-	-	-
Stage 2	424	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	3.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	471	1217	-
HCM Lane V/C Ratio	-	-	0.115	0.146	-
HCM Control Delay (s)	-	-	13.6	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.5	-

Intersection						
Int Delay, s/veh	10.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	167	182	49	129	239	45
Future Vol, veh/h	167	182	49	129	239	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	188	204	55	145	269	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	550	295	320	0	-	0
Stage 1	295	-	-	-	-	-
Stage 2	255	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	491	749	1229	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	467	749	1229	-	-	-
Mov Cap-2 Maneuver	467	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	23.1		2.2		0	
HCM LOS	C					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1229	-	581	-	-
HCM Lane V/C Ratio	0.045	-	0.675	-	-
HCM Control Delay (s)	8.1	0	23.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	5.1	-	-

Intersection						
Int Delay, s/veh	6.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	171	86	118	401	19
Future Vol, veh/h	58	171	86	118	401	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	192	97	133	451	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	789	462	472	0	-	0
Stage 1	462	-	-	-	-	-
Stage 2	327	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	359	600	1090	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	325	600	1090	-	-	-
Mov Cap-2 Maneuver	325	-	-	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	731	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.9	3.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1090	-	494	-	-
HCM Lane V/C Ratio	0.089	-	0.521	-	-
HCM Control Delay (s)	8.6	0	19.9	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	3	-	-

Intersection						
Int Delay, s/veh	3.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	90	115	4	192	380
Future Vol, veh/h	2	90	115	4	192	380
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	101	129	4	216	427

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	990	131	0	0	133	0
Stage 1	131	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	273	919	-	-	1452	-
Stage 1	895	-	-	-	-	-
Stage 2	415	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	220	919	-	-	1452	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	334	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	2.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	860	1452	-
HCM Lane V/C Ratio	-	-	0.12	0.149	-
HCM Control Delay (s)	-	-	9.8	7.9	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.5	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	35	57	3	75	119
Future Vol, veh/h	1	35	57	3	75	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	39	64	3	84	134

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	368	66	0	0	67	0
Stage 1	66	-	-	-	-	-
Stage 2	302	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	632	998	-	-	1535	-
Stage 1	957	-	-	-	-	-
Stage 2	750	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	595	998	-	-	1535	-
Mov Cap-2 Maneuver	595	-	-	-	-	-
Stage 1	957	-	-	-	-	-
Stage 2	706	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	980	1535	-
HCM Lane V/C Ratio	-	-	0.041	0.055	-
HCM Control Delay (s)	-	-	8.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	2	14	0	5	1	114	12	14	368	0
Future Vol, veh/h	0	0	2	14	0	5	1	114	12	14	368	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	2	16	0	6	1	128	13	16	413	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	585	588	413	583	582	135	413	0	0	141	0	0
Stage 1	445	445	-	137	137	-	-	-	-	-	-	-
Stage 2	140	143	-	446	445	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	422	421	639	424	425	914	1146	-	-	1442	-	-
Stage 1	592	575	-	866	783	-	-	-	-	-	-	-
Stage 2	863	779	-	591	575	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	414	415	639	418	419	914	1146	-	-	1442	-	-
Mov Cap-2 Maneuver	414	415	-	418	419	-	-	-	-	-	-	-
Stage 1	591	567	-	865	782	-	-	-	-	-	-	-
Stage 2	857	778	-	581	567	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	12.7	0.1	0.3
HCM LOS	B	B		

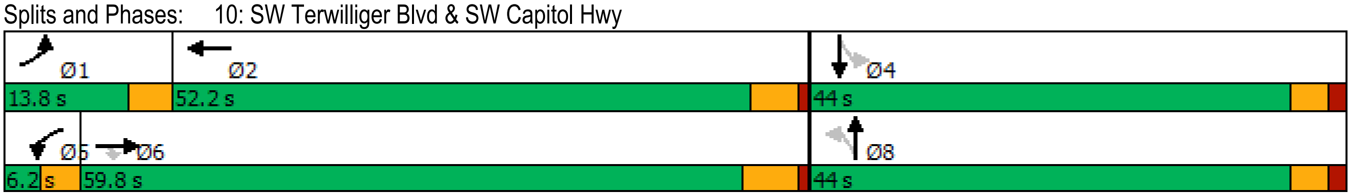
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1146	-	-	639	488	1442	-	-
HCM Lane V/C Ratio	0.001	-	-	0.004	0.044	0.011	-	-
HCM Control Delay (s)	8.1	0	-	10.7	12.7	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	649	91	12	729	26	116	61	11	9	165	198
Future Volume (vph)	64	649	91	12	729	26	116	61	11	9	165	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995			0.992			0.928	
Flt Protected	0.950			0.950				0.970			0.999	
Satd. Flow (prot)	1770	1863	1583	1770	3522	0	0	1792	0	0	1727	0
Flt Permitted	0.950			0.950				0.398			0.992	
Satd. Flow (perm)	1770	1863	1583	1770	3522	0	0	735	0	0	1715	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50		4			3			58	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	72	729	102	13	819	29	130	69	12	10	185	222
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	729	102	13	848	0	0	211	0	0	417	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.9		29.8	29.8		29.8	29.8	
Total Split (s)	13.8	59.8	59.8	6.2	52.2		44.0	44.0		44.0	44.0	
Total Split (%)	12.5%	54.4%	54.4%	5.6%	47.5%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	10.1	54.2	54.2	3.0	47.3		39.2	39.2		39.2	39.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.9		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.9			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	1.0	1.9	1.9	1.0	1.5		1.4	1.4		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	8.6	44.8	44.8	3.2	37.9			27.3			27.3	
Actuated g/C Ratio	0.10	0.53	0.53	0.04	0.44			0.32			0.32	
v/c Ratio	0.40	0.74	0.12	0.19	0.54			0.89			0.71	
Control Delay	49.8	24.1	8.2	56.8	21.1			66.5			30.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	49.8	24.1	8.2	56.8	21.1			66.5			30.0	
LOS	D	C	A	E	C			E			C	
Approach Delay		24.3			21.7			66.5			30.0	
Approach LOS		C			C			E			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 85.2	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 85.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



Appendix F
2030 Build Synchro Report

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	5	0	1	0	1	423	2	0	634	4
Future Vol, veh/h	4	0	5	0	1	0	1	423	2	0	634	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	6	0	1	0	1	475	2	0	712	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	907	1193	714	1195	1194	239	716	0	0	477	0	0
Stage 1	714	714	-	478	478	-	-	-	-	-	-	-
Stage 2	193	479	-	717	716	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	272	186	430	179	186	650	883	-	-	695	-	-
Stage 1	409	434	-	468	555	-	-	-	-	-	-	-
Stage 2	753	554	-	408	433	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	270	186	430	176	186	650	883	-	-	695	-	-
Mov Cap-2 Maneuver	270	186	-	176	186	-	-	-	-	-	-	-
Stage 1	408	434	-	467	554	-	-	-	-	-	-	-
Stage 2	750	553	-	403	433	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.9	24.5	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	883	-	-	340	186	695	-	-
HCM Lane V/C Ratio	0.001	-	-	0.03	0.006	-	-	-
HCM Control Delay (s)	9.1	0	-	15.9	24.5	0	-	-
HCM Lane LOS	A	A	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	413	160	34	732	5
Future Volume (vph)	0	0	0	0	0	0	0	413	160	34	732	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.999	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1861	0
Flt Permitted										0.477		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	889	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									180		1	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	464	180	38	822	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	464	180	38	828	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

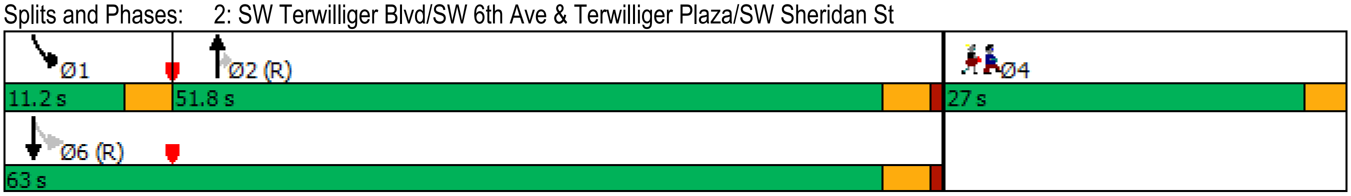
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								51.8	51.8	11.2	63.0	
Total Split (%)								57.6%	57.6%	12.4%	70.0%	
Maximum Green (s)								47.6	47.6	8.0	58.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)								80.8	80.8	86.8	90.0	
Actuated g/C Ratio								0.90	0.90	0.96	1.00	
v/c Ratio								0.28	0.13	0.04	0.44	
Control Delay								1.2	0.4	0.2	0.7	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								1.2	0.4	0.2	0.7	
LOS								A	A	A	A	
Approach Delay								0.9			0.7	
Approach LOS								A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 13 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 0.8 Intersection LOS: A
Intersection Capacity Utilization 42.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Maximum Green (s)	24.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	13.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	109	331	89	195	110
Future Vol, veh/h	80	109	331	89	195	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	88	120	364	98	214	121

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1101	275	335	0	-	0
Stage 1	275	-	-	-	-	-
Stage 2	826	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	213	761	1236	-	-	-
Stage 1	723	-	-	-	-	-
Stage 2	395	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	147	761	1236	-	-	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	498	-	-	-	-	-
Stage 2	395	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	49.5	7.2	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1236	-	275	-	-
HCM Lane V/C Ratio	0.294	-	0.755	-	-
HCM Control Delay (s)	9.1	0	49.5	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	1.2	-	5.6	-	-

Intersection	
Int Delay, s/veh	5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	87	162	259	9	48	259
Future Vol, veh/h	87	162	259	9	48	259
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	98	182	291	10	54	291

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	695	296	0	0	301	0
Stage 1	296	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	408	743	-	-	1260	-
Stage 1	755	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	387	743	-	-	1260	-
Mov Cap-2 Maneuver	387	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	643	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.6	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	562	1260	-
HCM Lane V/C Ratio	-	-	0.498	0.043	-
HCM Control Delay (s)	-	-	17.6	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.8	0.1	-

Intersection						
Int Delay, s/veh	6.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	43	235	198	132	212
Future Vol, veh/h	69	43	235	198	132	212
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	78	48	264	222	148	238

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1017	267	386	0	-	0
Stage 1	267	-	-	-	-	-
Stage 2	750	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	260	777	1162	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	461	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	193	777	1162	-	-	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	571	-	-	-	-	-
Stage 2	461	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.3	4.9	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1162	-	271	-	-
HCM Lane V/C Ratio	0.227	-	0.464	-	-
HCM Control Delay (s)	9	0	29.3	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.9	-	2.3	-	-

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	53	196	427	113	65
Future Vol, veh/h	6	53	196	427	113	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	60	220	480	127	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1084	164	200	0	-	0
Stage 1	164	-	-	-	-	-
Stage 2	920	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	240	881	1372	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	187	881	1372	-	-	-
Mov Cap-2 Maneuver	187	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	388	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	2.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1372	-	640	-	-
HCM Lane V/C Ratio	0.161	-	0.104	-	-
HCM Control Delay (s)	8.1	0	11.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.3	-	-

Intersection	
Int Delay, s/veh	6.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	287	335	1	61	101
Future Vol, veh/h	0	287	335	1	61	101
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	322	376	1	69	113

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	628	377	0	0	377	0
Stage 1	377	-	-	-	-	-
Stage 2	251	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	447	670	-	-	1181	-
Stage 1	694	-	-	-	-	-
Stage 2	791	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	419	670	-	-	1181	-
Mov Cap-2 Maneuver	419	-	-	-	-	-
Stage 1	694	-	-	-	-	-
Stage 2	742	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.3	0	3.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	670	1181	-
HCM Lane V/C Ratio	-	-	0.481	0.058	-
HCM Control Delay (s)	-	-	15.3	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.6	0.2	-

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	136	155	1	12	53
Future Vol, veh/h	0	136	155	1	12	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	174	1	13	60

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	261	175	0	0	175	0
Stage 1	175	-	-	-	-	-
Stage 2	86	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	728	868	-	-	1401	-
Stage 1	855	-	-	-	-	-
Stage 2	937	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	721	868	-	-	1401	-
Mov Cap-2 Maneuver	721	-	-	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	928	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	868	1401	-
HCM Lane V/C Ratio	-	-	0.176	0.01	-
HCM Control Delay (s)	-	-	10	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	1	4	0	13	0	325	5	3	97	1
Future Vol, veh/h	0	0	1	4	0	13	0	325	5	3	97	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	1	4	0	15	0	365	6	3	109	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	492	487	110	484	484	368	110	0	0	371	0	0
Stage 1	116	116	-	368	368	-	-	-	-	-	-	-
Stage 2	376	371	-	116	116	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	487	481	943	493	483	677	1480	-	-	1188	-	-
Stage 1	889	800	-	652	621	-	-	-	-	-	-	-
Stage 2	645	620	-	889	800	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	475	480	943	492	482	677	1480	-	-	1188	-	-
Mov Cap-2 Maneuver	475	480	-	492	482	-	-	-	-	-	-	-
Stage 1	889	798	-	652	621	-	-	-	-	-	-	-
Stage 2	631	620	-	885	798	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.8	11	0	0.2
HCM LOS	A	B		

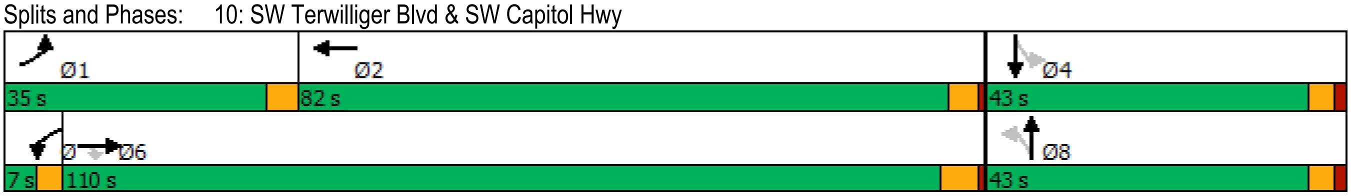
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1480	-	-	943	622	1188	-	-
HCM Lane V/C Ratio	-	-	-	0.001	0.031	0.003	-	-
HCM Control Delay (s)	0	-	-	8.8	11	8	0	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	746	45	9	445	12	54	132	14	6	46	50
Future Volume (vph)	168	746	45	9	445	12	54	132	14	6	46	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996			0.990			0.934	
Flt Protected	0.950			0.950				0.987			0.997	
Satd. Flow (prot)	1770	1863	1583	1770	3525	0	0	1820	0	0	1735	0
Flt Permitted	0.950			0.950				0.892			0.978	
Satd. Flow (perm)	1770	1863	1583	1770	3525	0	0	1645	0	0	1702	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			34		2			2			28	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	189	838	51	10	500	13	61	148	16	7	52	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	189	838	51	10	513	0	0	225	0	0	115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.7		29.8	29.8		29.8	29.8	
Total Split (s)	35.0	110.0	110.0	7.0	82.0		43.0	43.0		43.0	43.0	
Total Split (%)	21.9%	68.8%	68.8%	4.4%	51.3%		26.9%	26.9%		26.9%	26.9%	
Maximum Green (s)	31.3	104.4	104.4	3.8	77.3		38.2	38.2		38.2	38.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.7		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.7			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	15.5	54.2	54.2	4.0	36.6			18.4			18.4	
Actuated g/C Ratio	0.18	0.64	0.64	0.05	0.43			0.22			0.22	
v/c Ratio	0.58	0.70	0.05	0.12	0.34			0.63			0.29	
Control Delay	42.2	15.1	3.9	52.8	17.8			40.3			25.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	42.2	15.1	3.9	52.8	17.8			40.3			25.8	
LOS	D	B	A	D	B			D			C	
Approach Delay		19.3			18.4			40.3			25.8	
Approach LOS		B			B			D			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 160	
Actuated Cycle Length: 84.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 72.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	0	0	0	3	2	574	1	1	354	8
Future Vol, veh/h	4	0	0	0	0	3	2	574	1	1	354	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	0	0	0	3	2	645	1	1	398	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	667	1055	403	1055	1059	323	407	0	0	646	0	0
Stage 1	405	405	-	650	650	-	-	-	-	-	-	-
Stage 2	262	650	-	405	409	-	-	-	-	-	-	-
Critical Hdwy	6.78	6.53	6.23	6.78	6.53	7.13	4.13	-	-	5.33	-	-
Critical Hdwy Stg 1	6.13	5.53	-	7.33	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.73	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.669	4.019	3.319	3.669	4.019	3.919	2.219	-	-	3.119	-	-
Pot Cap-1 Maneuver	385	225	647	220	224	575	1150	-	-	579	-	-
Stage 1	601	598	-	357	464	-	-	-	-	-	-	-
Stage 2	685	464	-	601	595	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	381	224	647	219	223	575	1150	-	-	579	-	-
Mov Cap-2 Maneuver	381	224	-	219	223	-	-	-	-	-	-	-
Stage 1	599	597	-	356	463	-	-	-	-	-	-	-
Stage 2	679	463	-	600	594	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	11.3	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1150	-	-	381	575	579	-	-
HCM Lane V/C Ratio	0.002	-	-	0.012	0.006	0.002	-	-
HCM Control Delay (s)	8.1	0	-	14.6	11.3	11.2	0	-
HCM Lane LOS	A	A	-	B	B	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	543	170	117	293	12
Future Volume (vph)	0	0	0	0	0	0	0	543	170	117	293	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	70		0
Storage Lanes	0		0	0		0	0		1	1		0
Taper Length (ft)	25			25			25			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt									0.850		0.994	
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	0	0	1863	1583	1770	1852	0
Flt Permitted										0.394		
Satd. Flow (perm)	0	0	0	0	0	0	0	1863	1583	734	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)									191		4	
Link Speed (mph)		20			20			25			20	
Link Distance (ft)		149			429			102			255	
Travel Time (s)		5.1			14.6			2.8			8.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	0	0	0	610	191	131	329	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	610	191	131	342	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors								2	1	1	2	
Detector Template								Thru	Right	Left	Thru	
Leading Detector (ft)								100	20	20	100	
Trailing Detector (ft)								0	0	0	0	
Detector 1 Position(ft)								0	0	0	0	
Detector 1 Size(ft)								6	20	20	6	
Detector 1 Type								Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)								0.0	0.0	0.0	0.0	
Detector 1 Queue (s)								0.0	0.0	0.0	0.0	
Detector 1 Delay (s)								0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type								NA	Perm	pm+pt	NA	
Protected Phases								2		1	6	
Permitted Phases									2	6		

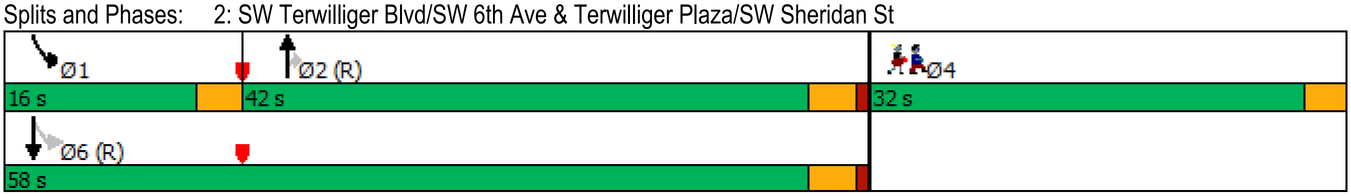
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	4
Permitted Phases	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase								2	2	1	6	
Switch Phase												
Minimum Initial (s)								10.0	10.0	8.0	10.0	
Minimum Split (s)								22.5	22.5	11.2	46.0	
Total Split (s)								42.0	42.0	16.0	58.0	
Total Split (%)								46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)								37.8	37.8	12.8	53.8	
Yellow Time (s)								3.2	3.2	3.2	3.2	
All-Red Time (s)								1.0	1.0	0.0	1.0	
Lost Time Adjust (s)								0.0	0.0	0.0	0.0	
Total Lost Time (s)								4.2	4.2	3.2	4.2	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)								3.0	3.0	3.0	3.0	
Recall Mode								C-Min	C-Min	None	C-Min	
Walk Time (s)								6.0	6.0			
Flash Dont Walk (s)								10.0	10.0			
Pedestrian Calls (#/hr)								0	0			
Act Effct Green (s)								74.3	74.3	86.8	90.0	
Actuated g/C Ratio								0.83	0.83	0.96	1.00	
v/c Ratio								0.40	0.14	0.16	0.18	
Control Delay								3.5	1.2	0.5	0.2	
Queue Delay								0.0	0.0	0.0	0.0	
Total Delay								3.5	1.2	0.5	0.2	
LOS								A	A	A	A	
Approach Delay								2.9			0.3	
Approach LOS								A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 35 (39%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 1.9 Intersection LOS: A
Intersection Capacity Utilization 42.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: SW Terwilliger Blvd/SW 6th Ave & Terwilliger Plaza/SW Sheridan St



Lane Group	Ø4
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	32.0
Total Split (%)	36%
Maximum Green (s)	29.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	17.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	10.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	318	82	159	115	28
Future Vol, veh/h	105	318	82	159	115	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	0	5	14	3
Mvmt Flow	115	349	90	175	126	31

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	497	142	157	0	-	0
Stage 1	142	-	-	-	-	-
Stage 2	355	-	-	-	-	-
Critical Hdwy	6.64	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	495	903	1435	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	461	903	1435	-	-	-
Mov Cap-2 Maneuver	461	-	-	-	-	-
Stage 1	776	-	-	-	-	-
Stage 2	663	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.2	2.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1435	-	729	-	-
HCM Lane V/C Ratio	0.063	-	0.638	-	-
HCM Control Delay (s)	7.7	0	18.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	4.6	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	34	202	131	158	272
Future Vol, veh/h	14	34	202	131	158	272
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	38	227	147	178	306

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	963	301	0	0	374	0
Stage 1	301	-	-	-	-	-
Stage 2	662	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	284	739	-	-	1184	-
Stage 1	751	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	233	739	-	-	1184	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	751	-	-	-	-	-
Stage 2	420	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	3.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	452	1184	-
HCM Lane V/C Ratio	-	-	0.119	0.15	-
HCM Control Delay (s)	-	-	14	8.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.5	-

Intersection						
Int Delay, s/veh	13.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	188	203	51	136	239	46
Future Vol, veh/h	188	203	51	136	239	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	211	228	57	153	269	52

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	562	295	321	0	-	0
Stage 1	295	-	-	-	-	-
Stage 2	267	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	483	749	1228	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	458	749	1228	-	-	-
Mov Cap-2 Maneuver	458	-	-	-	-	-
Stage 1	711	-	-	-	-	-
Stage 2	771	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.8	2.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1228	-	574	-	-
HCM Lane V/C Ratio	0.047	-	0.765	-	-
HCM Control Delay (s)	8.1	0	28.8	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	6.9	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	192	88	120	422	19
Future Vol, veh/h	65	192	88	120	422	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	216	99	135	474	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	818	485	495	0	-	0
Stage 1	485	-	-	-	-	-
Stage 2	333	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	346	582	1069	-	-	-
Stage 1	619	-	-	-	-	-
Stage 2	726	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	311	582	1069	-	-	-
Mov Cap-2 Maneuver	311	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	726	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.5	3.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1069	-	477	-	-
HCM Lane V/C Ratio	0.092	-	0.605	-	-
HCM Control Delay (s)	8.7	0	23.5	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	3.9	-	-

Intersection						
Int Delay, s/veh	3.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	91	116	4	206	408
Future Vol, veh/h	2	91	116	4	206	408
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	102	130	4	231	458

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1052	132	0	0	134	0
Stage 1	132	-	-	-	-	-
Stage 2	920	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	251	917	-	-	1451	-
Stage 1	894	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	197	917	-	-	1451	-
Mov Cap-2 Maneuver	197	-	-	-	-	-
Stage 1	894	-	-	-	-	-
Stage 2	305	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	2.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	850	1451	-
HCM Lane V/C Ratio	-	-	0.123	0.16	-
HCM Control Delay (s)	-	-	9.8	8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.6	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	36	58	3	81	127
Future Vol, veh/h	1	36	58	3	81	127
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	40	65	3	91	143

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	392	67	0	0	68	0
Stage 1	67	-	-	-	-	-
Stage 2	325	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	612	997	-	-	1533	-
Stage 1	956	-	-	-	-	-
Stage 2	732	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	573	997	-	-	1533	-
Mov Cap-2 Maneuver	573	-	-	-	-	-
Stage 1	956	-	-	-	-	-
Stage 2	685	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	8.8		0		2.9
HCM LOS	A				

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	977	1533	-
HCM Lane V/C Ratio	-	-	0.043	0.059	-
HCM Control Delay (s)	-	-	8.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	2	14	0	5	1	115	12	17	393	0
Future Vol, veh/h	0	0	2	14	0	5	1	115	12	17	393	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	2	16	0	6	1	129	13	19	442	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	621	624	442	619	618	136	442	0	0	142	0	0
Stage 1	480	480	-	138	138	-	-	-	-	-	-	-
Stage 2	141	144	-	481	480	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	400	402	615	401	405	913	1118	-	-	1441	-	-
Stage 1	567	554	-	865	782	-	-	-	-	-	-	-
Stage 2	862	778	-	566	554	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	392	395	615	394	398	913	1118	-	-	1441	-	-
Mov Cap-2 Maneuver	392	395	-	394	398	-	-	-	-	-	-	-
Stage 1	566	545	-	864	781	-	-	-	-	-	-	-
Stage 2	856	777	-	554	545	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	13.2	0.1	0.3
HCM LOS	B	B		

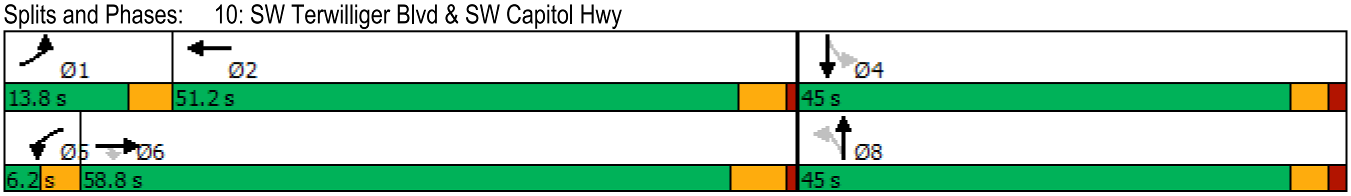
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1118	-	-	615	463	1441	-	-
HCM Lane V/C Ratio	0.001	-	-	0.004	0.046	0.013	-	-
HCM Control Delay (s)	8.2	0	-	10.9	13.2	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	649	91	12	729	26	116	62	11	9	177	211
Future Volume (vph)	65	649	91	12	729	26	116	62	11	9	177	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		95	125		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995			0.992			0.928	
Flt Protected	0.950			0.950				0.970			0.999	
Satd. Flow (prot)	1770	1863	1583	1770	3522	0	0	1792	0	0	1727	0
Flt Permitted	0.950			0.950				0.381			0.993	
Satd. Flow (perm)	1770	1863	1583	1770	3522	0	0	704	0	0	1717	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50		4			3			58	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		475			333			885			858	
Travel Time (s)		10.8			7.6			24.1			23.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	73	729	102	13	819	29	130	70	12	10	199	237
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	729	102	13	848	0	0	212	0	0	446	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				8			4		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6	6	5	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	30.0	30.0	3.0	30.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	7.7	35.6	35.6	6.2	34.9		29.8	29.8		29.8	29.8	
Total Split (s)	13.8	58.8	58.8	6.2	51.2		45.0	45.0		45.0	45.0	
Total Split (%)	12.5%	53.5%	53.5%	5.6%	46.5%		40.9%	40.9%		40.9%	40.9%	
Maximum Green (s)	10.1	53.2	53.2	3.0	46.3		40.2	40.2		40.2	40.2	
Yellow Time (s)	3.7	4.6	4.6	3.2	3.9		3.2	3.2		3.2	3.2	
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.7	5.6	5.6	3.2	4.9			4.8			4.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	1.0	1.9	1.9	1.0	1.5		1.4	1.4		3.0	3.0	
Time Before Reduce (s)	6.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Time To Reduce (s)	10.0	0.0	0.0	0.0	0.0		10.0	10.0		10.0	10.0	
Recall Mode	None	Min	Min	None	Min		None	None		None	None	
Walk Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Flash Dont Walk (s)		13.0	13.0		13.0		19.0	19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0	0		0		0	0		0	0	
Act Effct Green (s)	8.6	44.5	44.5	3.2	37.5			28.1			28.1	
Actuated g/C Ratio	0.10	0.52	0.52	0.04	0.44			0.33			0.33	
v/c Ratio	0.41	0.75	0.12	0.20	0.55			0.91			0.74	
Control Delay	50.2	25.1	8.5	57.0	21.8			70.3			31.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	50.2	25.1	8.5	57.0	21.8			70.3			31.1	
LOS	D	C	A	E	C			E			C	
Approach Delay		25.3			22.4			70.3			31.1	
Approach LOS		C			C			E			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 85.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 29.3	Intersection LOS: C
Intersection Capacity Utilization 86.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: SW Terwilliger Blvd & SW Capitol Hwy



D.2 Portland Veterans Affairs Medical Center Traffic Impact Study

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

U.S. Department of Veterans Affairs
Portland Veterans Affairs Medical Center (VAMC)
Final Traffic Impact Study

Following the finalization of the Traffic Impact Study, the U.S. Department of Veterans Affairs (VA) provided minor changes to its proposed action, as described below:

- **Building 110**, the Specialty Care Building, was reduced in size by approximately 45,000 square feet.
- **Building 111**, the proposed parking garage to be located adjacent to Building 110, increased in parking capacity.
- **Building 112**, the previously proposed parking garage to be located on the eastern boundary of the campus, was omitted from the construction plan. Building 112 included 450 parking spaces.
- Construction phasing for project components was removed from the proposed action.

These changes to the proposed action, as detailed in the Draft and Final EA, further reduce the potential for impacts to traffic on the Portland VAMC campus and surrounding roadways as a result of the proposed action. There are no new potential impacts to traffic as a result of the changes to the proposed action that would require further analysis to be performed. The following baseline reports continues to provide an accurate analysis of potential impacts to traffic as a result of the VA's proposed action, as defined in the Final EA.

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center
Traffic Impact Study

January 2022

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
LRS Federal LLC

Executive Summary

The U.S. Department of Veterans Affairs (VA) is considering a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center campus) in Oregon. This report supplements the 2019 traffic impact analysis. This 2020 study includes traffic counts for an additional five intersections not studied in 2019.

This report is subject to change as more information becomes available.

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms and Abbreviations

ADT	Average Daily Traffic
AM (PM)[1]	AM peak period (PM peak period)
BGSF	building gross square foot (feet)
COVID-19	Coronavirus Disease 2019
ITE	Institute of Transportation Engineers
LOS	level of service
MUTCD	*Manual of Uniform Traffic Control Devices*
PBOT	Portland Bureau of Transportation
TIA	traffic impact analysis
VA	U.S. Department of Veterans Affairs
VAMC	Veterans Affairs Medical Center

[1] Two traffic periods were studied: the AM peak period and the PM peak period. Where parentheses are used, the number not in parentheses refers to the AM period and the number in parentheses refers to the PM period. This applies for traffic volumes, level of service, and other metrics.

1.0 Introduction

The U.S. Department of Veterans Affairs (VA) is proposing a construction project at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus) in Oregon. A traffic impact analysis (TIA) was conducted at three intersections in May 2019. This report supplements the 2019 TIA by including traffic counts from five additional intersections as well as recounts at the three original intersections. The project team collected these counts and made observations in December 2020 and then re-analyzed the traffic operations under a full build of the proposed project and a no-build alternative. This report concludes with recommendations based on the traffic study results.

The report is organized as follows:

- **Section 1.0, Introduction,** includes a description of the proposed construction project.
- **Section 2.0, Existing Traffic Data,** discusses traffic counts collected at key intersections around the Portland VAMC campus and the adjustments made to those traffic volumes to better reflect pre-Coronavirus Disease 2019 (COVID-19) volumes.
- **Section 3.0, Proposed Actions,** describes the potential future performance of traffic operations by determining the anticipated number of trips generated by the proposed actions at the Portland VAMC campus, distributing those trips throughout the traffic network, accounting for background traffic growth, and then analyzing the performance of the traffic network with and without the full buildout.
- **Section 4.0, Recommended Mitigation (Non-VA)**, discusses recommendations to mitigate the potential future traffic growth .
- **Section 5.0, Parking Baseline Counts and Observations**, discusses parking occupancy counts and other observations made during the study.
- **Section 6.0, Summary,** provides recommendations for adequate traffic operations under the proposed action.

1.1 Project Description

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-building-gross-square-foot (BGSF) facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101. Building 110 and 111 would be constructed over Lot 5 (196 parking spaces) and Building T-51.

These components would be constructed over an extended period of approximately 6 to 8 years. The site location map is shown on Figure 1-1 and the proposed improvements site map is shown on Figure 1-2.

Figure 1-1. Site Location Map

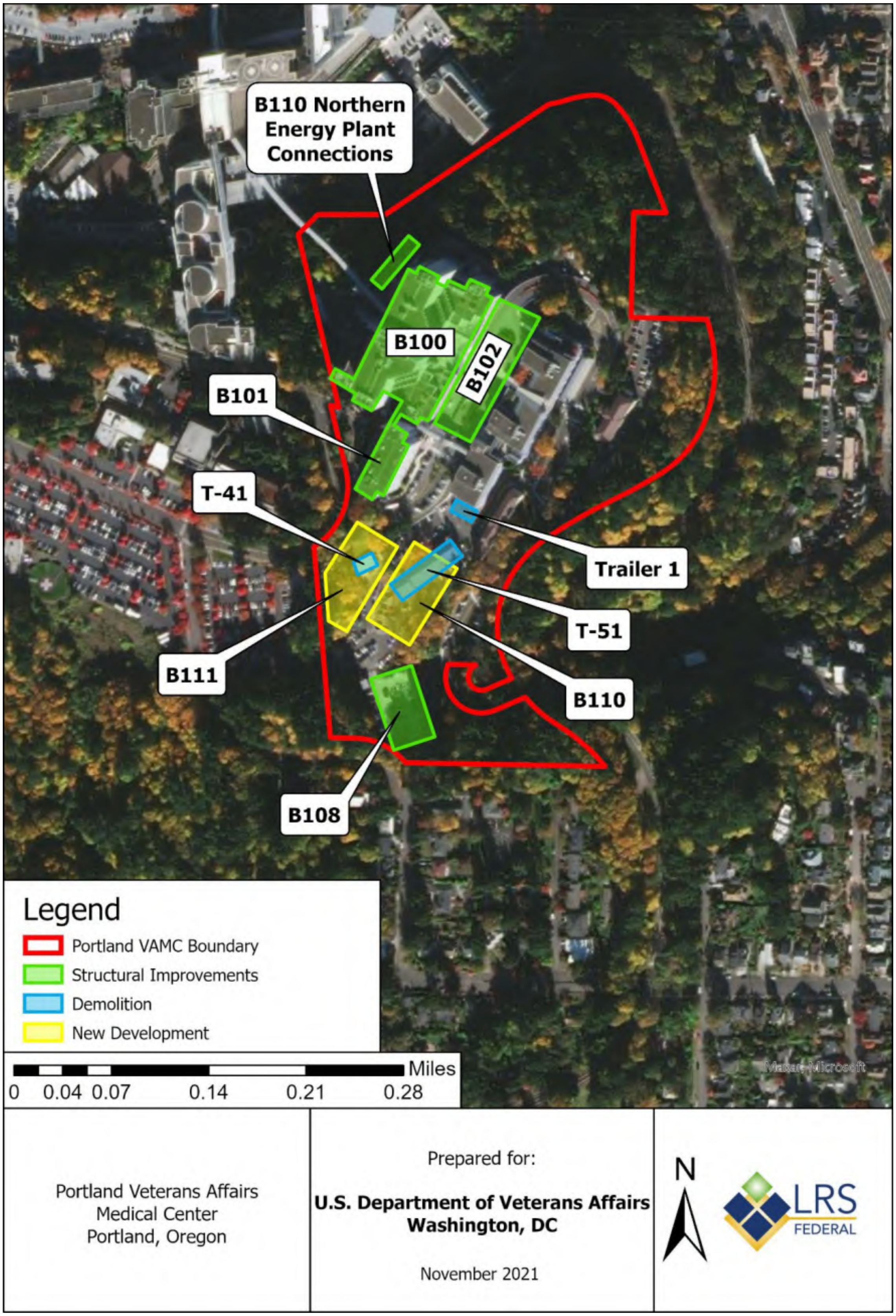


Figure 1-2. Proposed Improvements Site Map

1.2 Previous Study

Global Transportation Engineering performed a TIA for the site in May 2019. The 2019 TIA report is included as Appendix A. The underlying infrastructure conditions surrounding the VAMC campus have not changed.

1.3 Traffic Counts during the COVID-19 Pandemic

Since the 2019 TIA was conducted, travel has been greatly reduced across the country due to the COVID-19 pandemic. Travel restrictions and advisories have been deployed at all levels of government to encourage people to stay home and limit unnecessary travel.

Traffic counts were collected on December 3, 2020, for both the recounted and newly counted intersections. Because the Portland VAMC was restricting all visitors, guests, and persons under the age of 18 during this time, the project team developed a method for adjusting volumes to pre-COVID-19 levels. This method is described in Section 2.3. This method is necessarily inexact, which should be considered along with the results of the analysis.

1.4 Existing Infrastructure

The existing street network and infrastructure have not changed since the 2019 TIA was completed. The 2019 TIA report in Appendix A should be referenced for general information such as roadway functional classifications, speed limits, number of lanes, and so forth.

2.0 Existing Traffic Data

2.1 2019 and 2020 Traffic Counts

Figure 2-1 shows the location of turning movement counts collected as part of the 2019 TIA and those counted in 2020. The three intersections counted in 2019 were counted again to provide a baseline for factoring. Five additional intersections, not counted in 2019, were counted in 2020. The traffic counts were collected on December 3, 2020, from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. and included counts of passenger vehicles, heavy trucks, pedestrians, and bicyclists. The counts are provided in Appendix B.

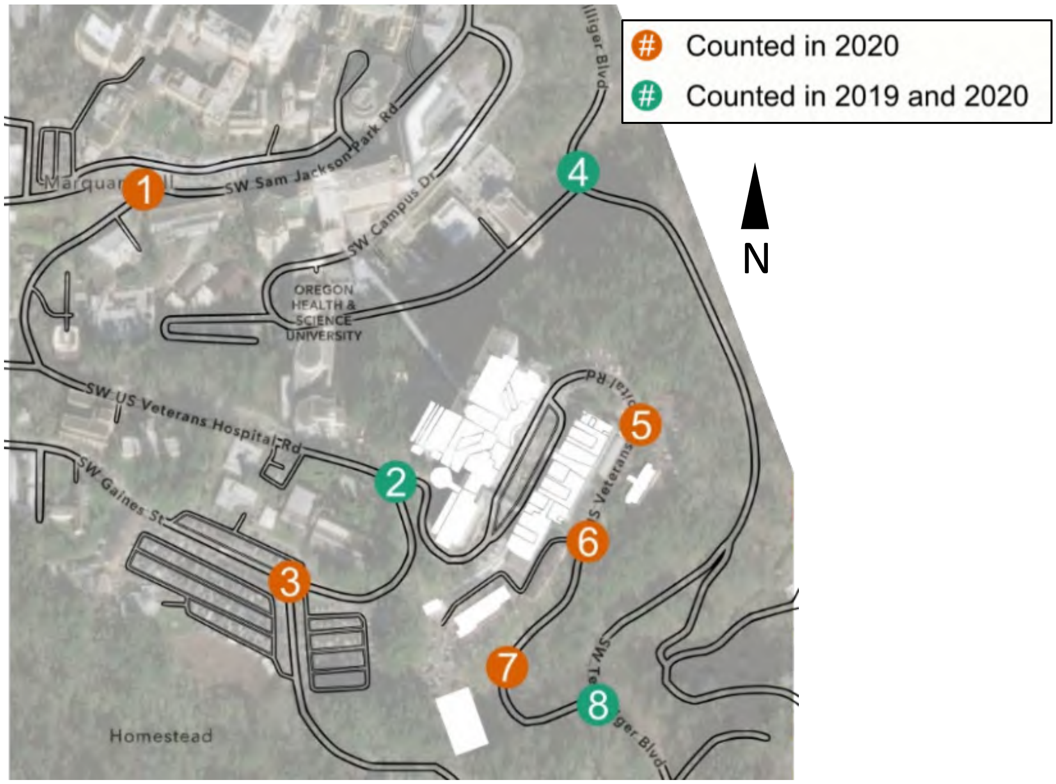


Figure 2-1. Turning Movement Count Locations

The Portland Bureau of Transportation lists daily traffic counts performed on SW Terwilliger Boulevard south of SW Condor Lane (north of Intersection 8) from 2011. These counts list the daily traffic to be 8,965 vehicles.[2]

2.2 Effects of COVID-19 Pandemic on Traffic Counts

As mentioned previously, traffic counts were collected on December 3, 2020, when the Portland VAMC was restricting all visitors, guests, and persons under the age of 18. In addition, many non-essential medical appointments were moved to tele-visits or restricted. The following guidance from the Portland VAMC website was effective as of November 18, 2020:

> *VAPORHCS facilities are operating with limited services; most appts are via phone/video teleconference; face-to-face appts and procedures are still occurring on a case-by-case basis IAW national/local guidance. ED at PVAMC is open for service; visitor restrictions are in place.*[3]

[2] https://www.portland.gov/transportation/engineering/how-we-gather-traffic-counts. Accessed December 21, 2021.
[3] https://www.portland.va.gov/emergency/index.asp. Accessed December 29, 2020.

These travel restrictions reduced the number of trips being made to and from the hospital campus by both staff and patients.

The hospital did offer COVID-19 testing to Veterans during this time, which could have generated additional trips:

> *We offer diagnostic testing for Veterans who are enrolled in VA health care and meet the CDC testing criteria.*[4]

Because of these differences in underlying traffic conditions due to the COVID-19 pandemic, the results detailed in this report may differ from the 2019 TIA study. The next section details how the analysis forecasts future growth based on counts made available in 2019 and 2020.

2.3 Factoring Method

Using data from the three intersections counted in both 2019 and 2020, the project team analyzed potential travel patterns that may have been affected differently by the travel restrictions. The patterns showed a reduced number of trips by staff, patients, and visitors and an increased number of trips for COVID-19 testing. Differences in traffic volumes at the three intersections were analyzed to determine the factor that should be applied to 2020 count volumes to make them usable for post-COVID-19 analysis.

The factors that would need to be applied to each intersection and time period are shown in Table 2-1. A factor above 1.00 would correspond to a lower 2020 volume that would need to be increased in order to reach 2019 levels. A factor below 1.00 would correspond to volumes that were higher in 2020.

Table 2-1. Intersection Calibration Factor

Intersection No.	Street 1	Street 2	Period	Intersection Factor
2	SW Gaines Street	SW US Veterans Hospital Road	AM	1.80
			PM	1.34
4	SW Terwilliger Boulevard	SW Campus Drive	AM	1.37
			PM	1.46
8	SW Terwilliger Boulevard	SW US Veterans Hospital Road	AM	1.37
			PM	1.50
		Overall Weighted Average		1.44

As shown in Table 2-1, the three intersections for which traffic volumes were counted in both 2019 and 2020 had lower volumes in 2020 than in 2019. The overall weighted average for the three recounted intersections was 1.44, meaning that, on average, 2019 volumes were 1.44 times higher than 2020 volumes. There was more variability in the individual turning movement counts, but many of these movements had relatively low volumes where a swing of a few vehicles would more drastically change the factor.

No clear patterns emerged to indicate that travel at certain intersections or in certain directions was more or less affected by the COVID-19 pandemic-related conditions. As a result, the recommended procedure is to apply the network-wide adjustment factor of 1.44 to all volumes counted in 2020.

[4] https://www.va.gov/coronavirus-veteran-frequently-asked-questions/. Accessed December 29, 2020.

2.4 Traffic Count Results

Figures 2-2 and 2-3 show the actual and adjusted 2020 traffic volumes, respectively, for the eight intersections analyzed as part of this study.

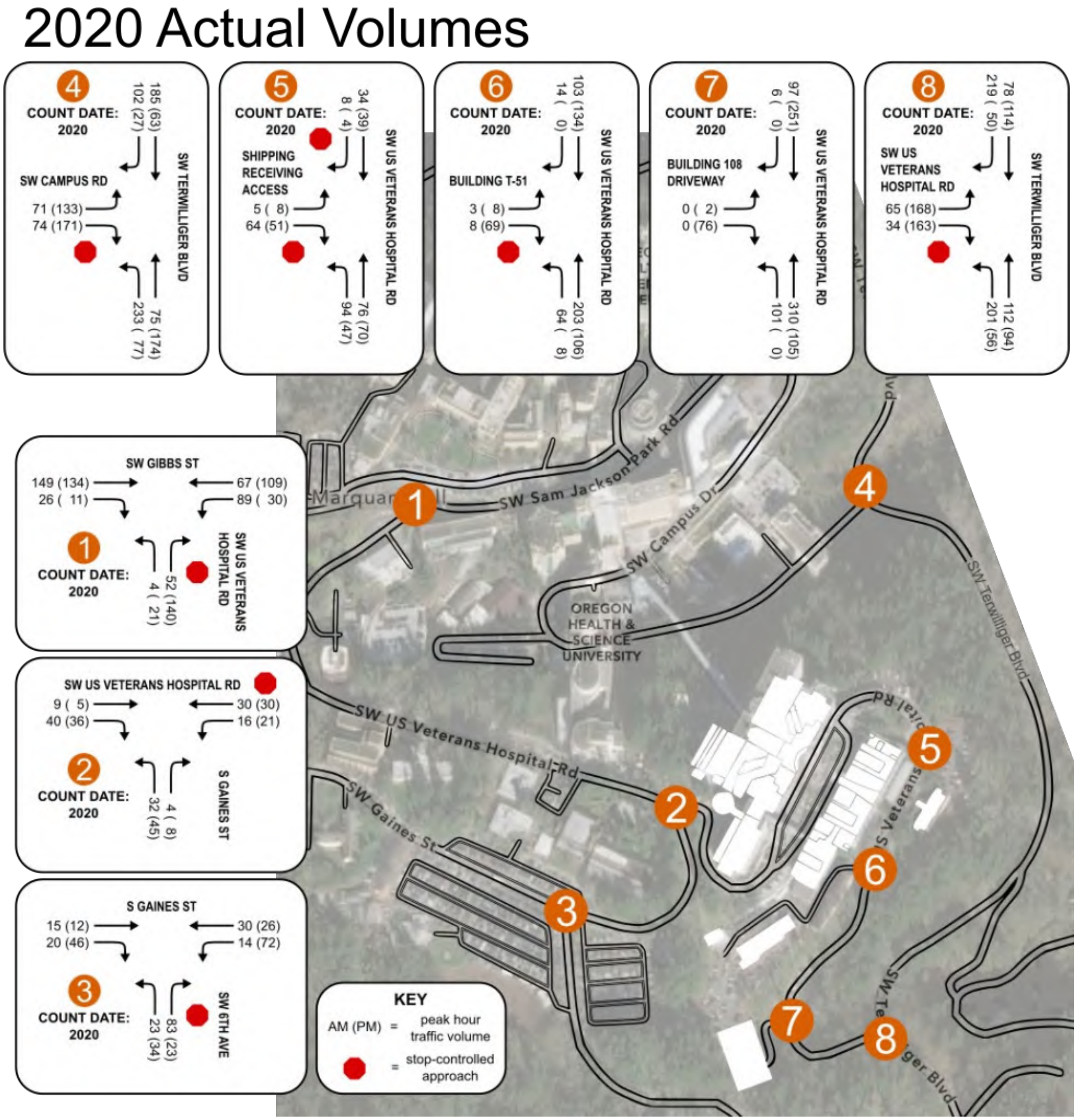


Figure 2-2. 2020 Actual Volumes

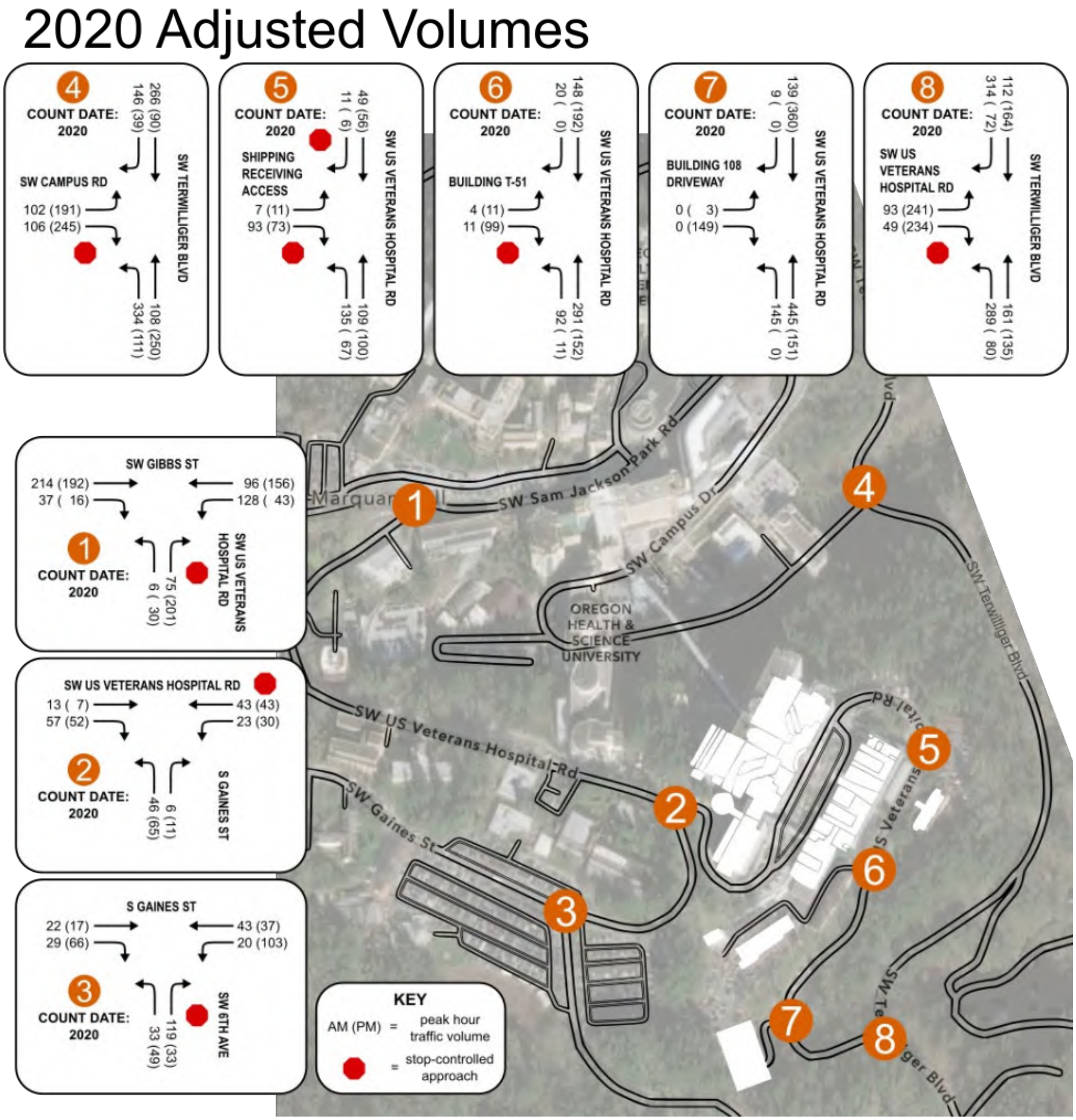


Figure 2-3. 2020 Adjusted Volumes

2.5 Traffic Observations

Traffic observations were collected at the eight study intersections to identify any existing safety or operational issues. Intersection-level observations are included in Appendix C. The main takeaways from the observations are as follows:

- Overall, there were no traffic movements that appeared to exceed their traffic capacity. Traffic volumes were light most of the day. Peak periods had higher volumes than off-peak volumes, but even during heavy periods, traffic operated without notable queuing or delays.
- Limited congestion (no more than seven-vehicle-long queues) occurs at intersections but usually for only short period of time.
- Throughout the campus, compliance with the Americans with Disabilities Act should be addressed along sidewalks/paths and at crossings that lack and/or have insufficient pavement striping and curb ramps/tactile warning devices.

3.0 Proposed Actions

The VA is planning construction at the Portland VAMC campus with the implementation of the following three components:

- Building 108 (existing parking structure): Construct two additional parking levels to add approximately 150 parking spaces.
- Building 110 (Specialty Care Building): Design and construction of an approximately 300,000-building-gross-square-foot (BGSF) facility. Approximately 200 additional staff members with no new patient beds are anticipated.
- Building 111 (parking garage): Design and construction for an approximately 650-space parking structure in the area south of Building 101. Building 110 and 111 would be constructed over Lot 5 (196 parking spaces) and Building T-51.

The implementation of these components would affect traffic patterns.

3.1 Baseline Traffic Growth

To be consistent with the 2019 TIA, this study assumed a 1 percent annual growth rate over a 10-year analysis period (from 2020 to 2030 in this case). Figure 3-1 shows the expected 2030 no-build conditions that represent the 2020 adjusted volumes growing by 1 percent annually until 2030.

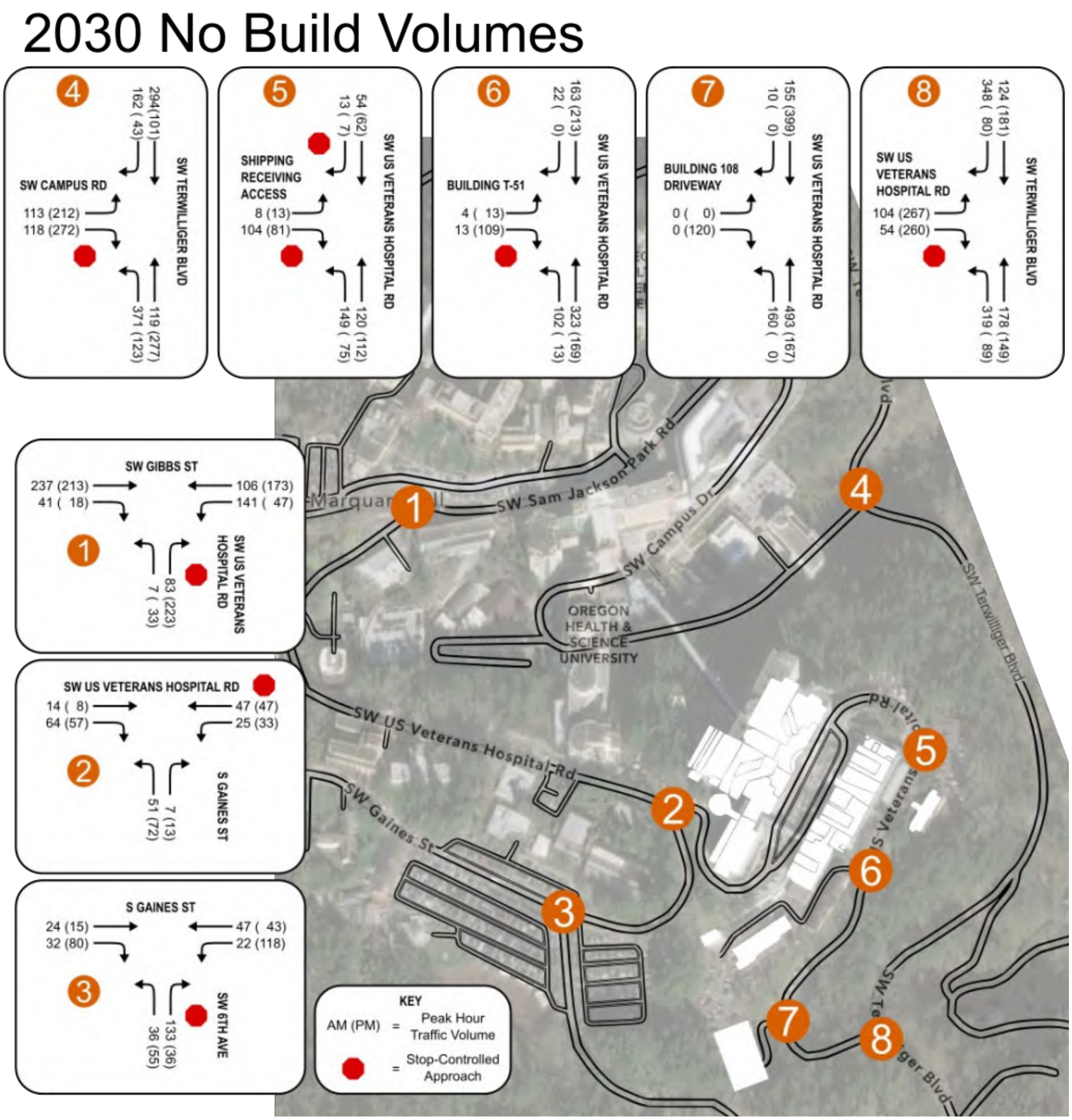


Figure 3-1. 2030 No-build Volumes

3.2 Site Trip Generation and 2030 Combined Volumes

3.2.1 Methodology and Observations

Typical engineering practice would estimate the number of trips generated based on calculations as defined in the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual*, 10th Edition[5] for the "610: Hospital" land use designation. However, ITE's *Trip Generation Manual* provides average trip generation rates from a large number of studies at hospital facilities throughout the country with a large amount of variability between the projects and results. In this case, site-specific data for the Portland VAMC campus may provide more accurate trip generation forecasts than the average data. Based on data

[5] Institute of Transportation Engineers (ITE). 2019. *Trip Generation Manual*, 10th Edition.

collected during the 2019 TIA, actual traffic volumes were observed to be more concentrated in the AM and PM peak hours and directionality was more focused on entering trips in the AM and exiting trips in the PM than the data shown in the *Trip Generation Manual*.

3.2.2 Trips Generated by the Proposed Action

The 2019 parking study counted daily trips for three entrances to staff parking lots: Building 108, Lot 5, and Lot 4. In the 2019 study, each parking space in the respective lots generated 1.12 entering trips per day and 1.14 exiting trips per day, implying that most trips are staff arriving for work in the AM, staying in the parking lot all day, and then departing in the PM. Because new Building 110 is a staff-only building with no new beds and the additional parking spaces in Buildings 108 and 111 are staff-only spaces, it is expected that future trips generated by the proposed action would follow a similar pattern to the existing traffic patterns to Building 108, Lot 5, and Lot 4.

Table 3-1 aggregates the observed exiting and entering vehicles at the three driveways measured as part of the 2019 parking study. The data include two days of measurements for the driveways to Building 108 and Lot 5, and one day of measurement for the driveway to Lot 4.

Because the traffic patterns are likely to be similar for the new parking garages, it is recommended to use a method of trip generation that is based on the number of parking spaces instead of the gross floor area. The values in ITE's *Trip Generation Manual* would overestimate the number of trips that result from the proposed action because the values represent more trips made by a wider variety of travelers (patients, staff, visitors, etc.) coming and going throughout the day.

Table 3-1. Measured Entering and Exiting Volumes During Peak Periods as Percentage of Daily Entering and Existing Volumes

	2019 Entering Trips		2019 Exiting Trips	
Hour Start	**Count**	**Percent**	**Count**	**Percent**
12:00 AM	0	0.0%	0	0.0%
1:00 AM	0	0.0%	1	0.1%
2:00 AM	3	0.2%	1	0.1%
3:00 AM	1	0.1%	0	0.0%
4:00 AM	8	0.6%	1	0.1%
5:00 AM	56	4.2%	5	0.4%
6:00 AM	364	27.6%	9	0.7%
7:00 AM	**417**	**31.6%**	21	1.6%
8:00 AM	199	15.1%	25	1.8%
9:00 AM	62	4.7%	**48**	**3.6%**
10:00 AM	40	3.0%	30	2.2%
11:00 AM	36	2.7%	45	3.3%
12:00 PM	32	2.4%	43	3.2%
1:00 PM	18	1.4%	41	3.0%
2:00 PM	10	0.8%	54	4.0%
3:00 PM	21	1.6%	196	14.5%
4:00 PM	13	1.0%	**355**	**26.3%**
5:00 PM	**24**	**1.8%**	233	17.2%
6:00 PM	8	0.6%	113	8.4%
7:00 PM	3	0.2%	98	7.2%
8:00 PM	4	0.3%	24	1.8%
9:00 PM	0	0.0%	2	0.1%
10:00 PM	1	0.1%	3	0.2%
11:00 PM	1	0.1%	4	0.3%
TOTAL	1321	100.0%	1352	100%

The proposed action would result in a net increase of 600 parking spaces (+150 from Building 108, +650 from Building 111, and -200 from the removal of Lot 5). As summarized in Table 3-2, using the same trip generation rates from the existing parking lots, the 600 new parking spaces are expected to generate 672 new entering trips and 684 new exiting trip each day, for a total of 1,356 daily trips.

Table 3-2. Proposed Trips Generated

	Entering	Exiting
Existing Daily Trips Generated per parking space	1.12	1.14
Proposed Parking Spaces	600	
Proposed Daily Trips Generated for Proposed Actions	672	684
Total Proposed Daily Trips Generated	1,356	

Traffic analysis is generally done for the AM and PM peak hours. The AM peak hour usually occurs between 7 AM–9 AM and the PM peak hour usually occurs between 4 PM–6 PM. These peak hours represent the time when traffic is heaviest, especially for work-based trips such as those to and from staff parking lots in this study. The proposed daily trips generated must be distributed among the AM and PM peak hours.

Table 3-1 shows the distribution of daily trips across each hour observed during the 2019 traffic study for the existing garages. Applying these hourly distributions to the projected generated trips results in 212 new entering trips in the AM peak hour, 24 exiting trips in the AM, 12 entering trips in the PM, and 180 exiting trips in the PM. These results are summarized in Table 3-3.

Table 3-3. Distribution of Trips in the AM and PM Peak Hour

Period	Entering	Exiting
All Day	**672**	**684**
AM Peak Hour	31.6%	3.6%
	212	24
PM Peak Hour	1.8%	26.3%
	12	180

Comparing these numbers to the *Trip Generation Manual* numbers shows that the AM peak trips are approximately the same but have a different distribution (i.e., more entering trips, fewer exiting trips). The PM peak trips and the total daily trips are lower than the number from the *Trip Generation Manual* because of the lower turnover of parking spaces at the Portland VAMC.

3.2.3 Distribution of Generated Trips and Combined 2030 Volumes

The driveway to Building 108 is projected to be located on the lower section of SW US Veterans Hospital Road, just west of SW Terwilliger Boulevard. The driveway for Building 111 is projected to be on the upper section of SW US Veterans Hospital Road, just east of S Gaines Street. Based on the driveway locations, existing traffic patterns, and projected intersection operation, 55% of all generated trips are projected to enter from SW Terwilliger Boulevard and 45% are projected to enter from S Gaines Street. Further assumed distribution of traffic at the intersection level is shown on Figure 3-2. All turning movements are shown, but if the proposed buildout did not add trips to that movement, it is only shown as "- (-)".

In 2011, there was an Average Daily Traffic (ADT) on SW Terwilliger Boulevard north of SW US Veterans Hospital Road of 8,965. The projected 2030 no-build scenario assuming 1% annual growth would result in 10,831 ADT on SW Terwilliger Boulevard. The proposed action is projected to result in 746 new trips on SW Terwilliger Boulevard, which is an increase of 6.89% over the no-build scenario.

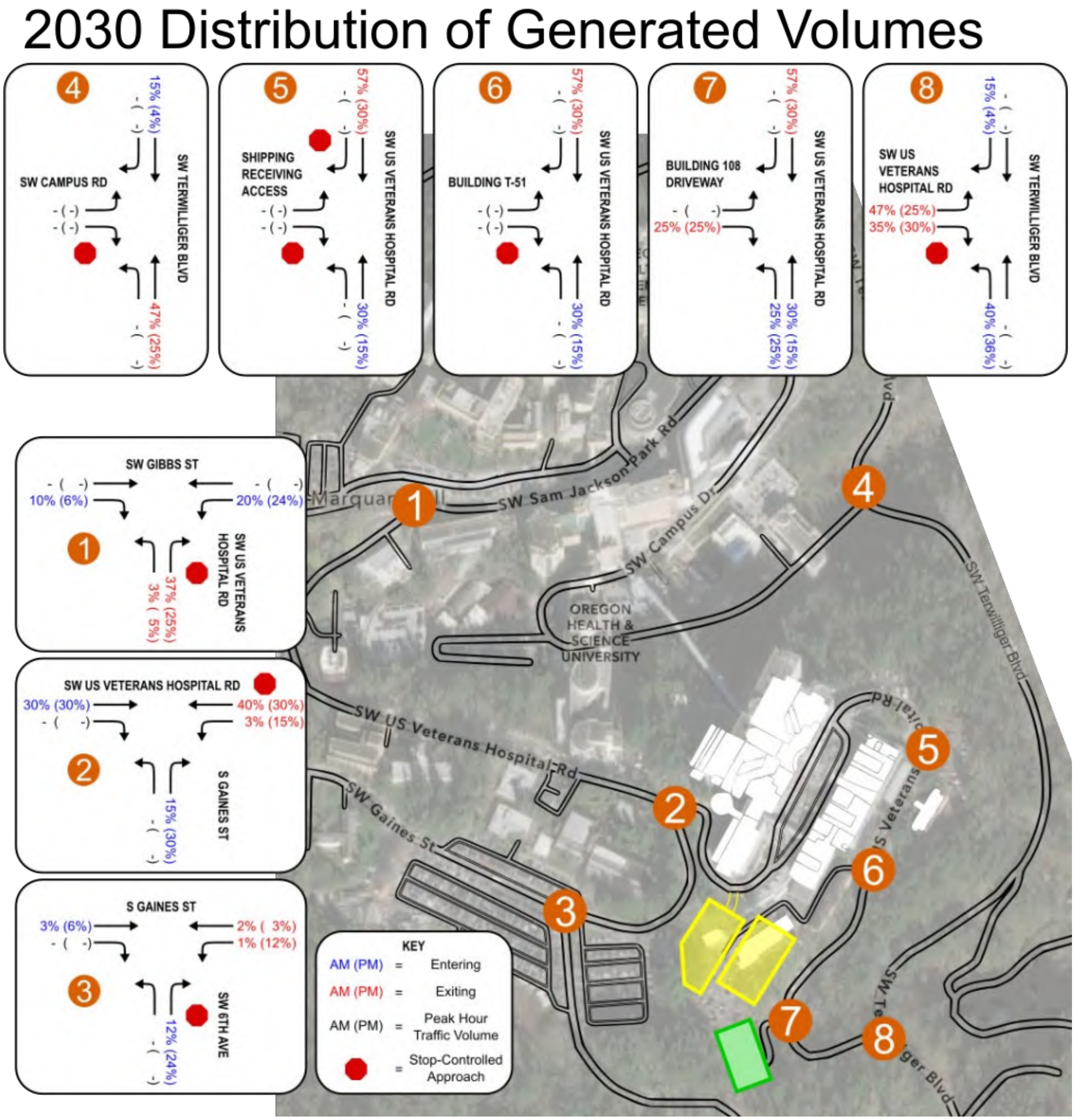


Figure 3-2. Distribution of Generated Volumes

Converting the distribution percentages into additional trips results in additional traffic, as shown on Figure 3-3.

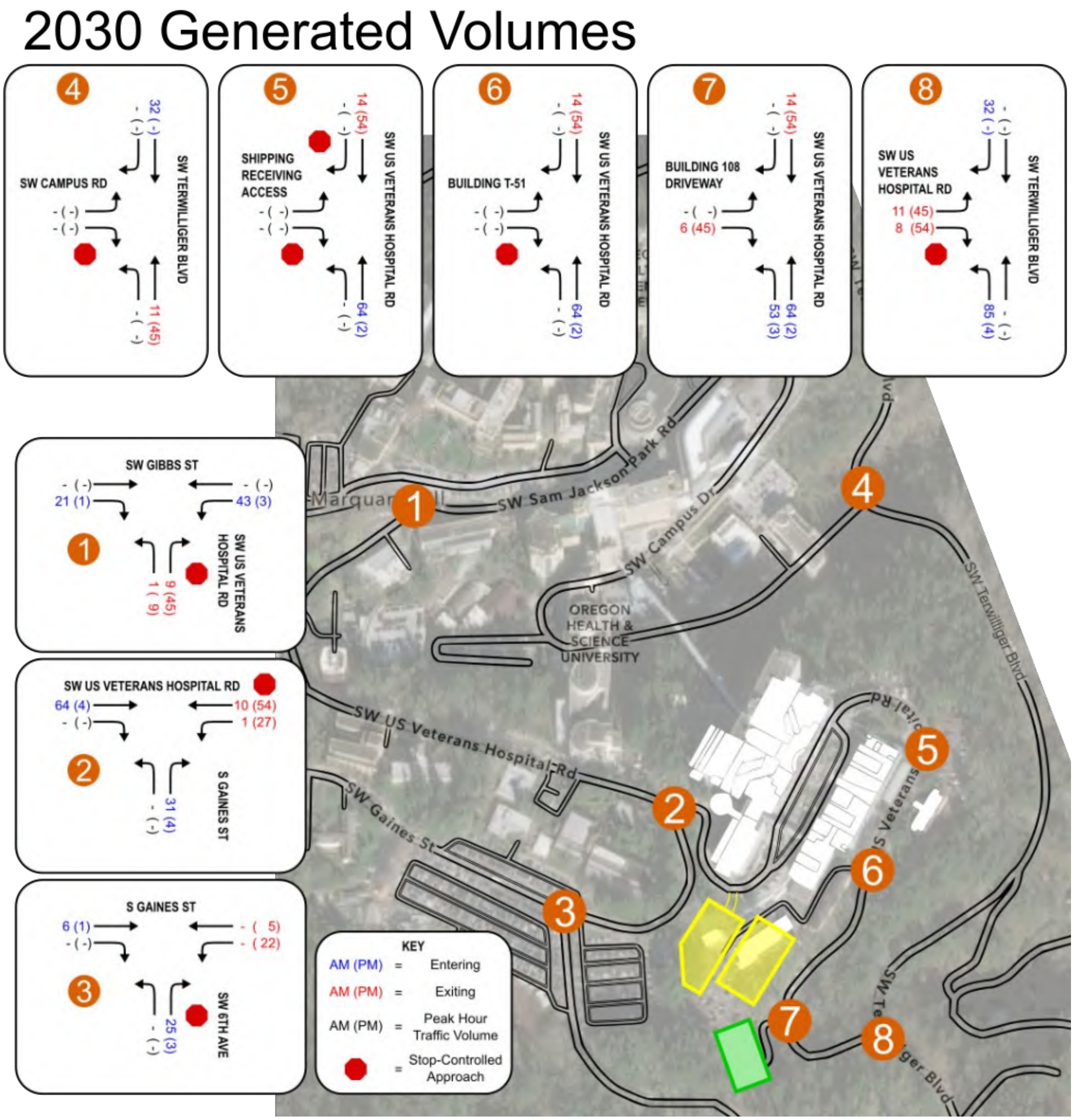


Figure 3-3. Buildout Generated Volumes

Adding these generated volumes to the 2030 no-build base volumes results in the projected 2030 volumes after full buildout, as shown on Figure 3-4.

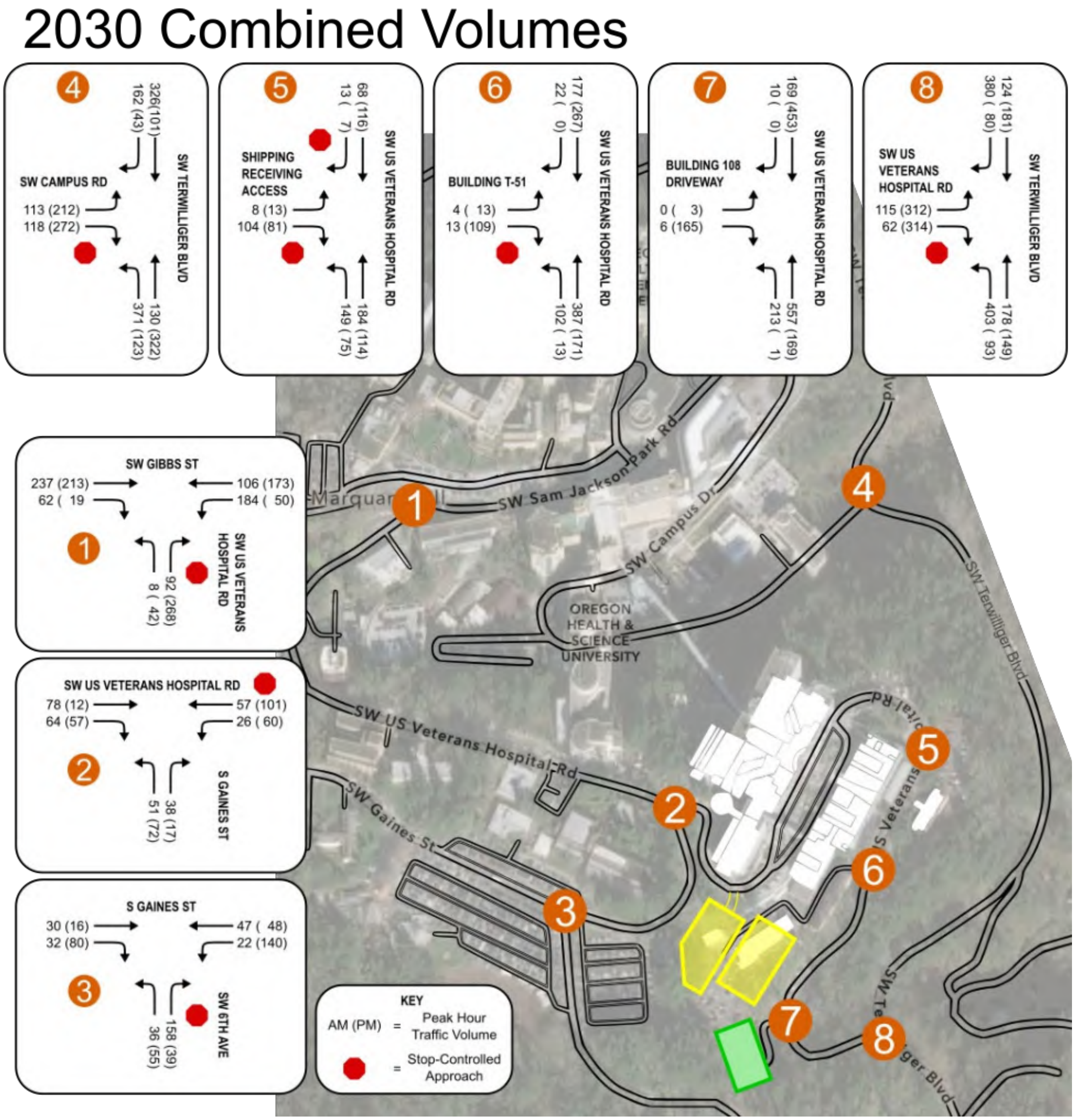


Figure 3-4. 2030 Build Combined Volumes

3.3 Intersection Performance

Traffic operations were analyzed using Synchro 11 software, which uses capacity analysis methodologies defined in the *Highway Capacity Manual*.[6] Intersections were analyzed for the following three scenarios:

- 2020 Adjusted – Volumes that were adjusted to replicate pre-COVID-19 volumes, as discussed in Section 2.0 (Figure 2-3)
- 2030 No-build – Year 2020 adjusted volumes plus 1 percent annual growth (Figure 3-1)
- 2030 Build – 2030 No-build volumes combined with the distributed, site-generated trips (Figure 3-4)

Intersection operations are shown in Table 3-4, and full Synchro reports are included in Appendices D, E, and F.

Traffic operation performance at intersections is measured using several factors: average vehicle delay, volume over capacity ratio (v/c), and level of service (LOS). LOS is a categorization of the performance, ranging from A to F, that is directly related to the average vehicle delay, where LOS A represents minimal vehicle delay, LOS E represents an intersection operating at full capacity, and LOS F represents failing conditions with excessive delay. The City of Portland requires that unsignalized intersections operate at LOS E or better (in other words, not LOS F) based on individual vehicle movements for two-way, stop-controlled intersections and based on a weighted average of vehicle delay for all-way, stop-controlled intersections. Signalized intersections must operate at LOS D or better based on a weighted average of vehicle delay for the intersection.[7]

As shown in Table 3-4, Intersection 4 (SW Campus Drive and SW Terwilliger Boulevard) and Intersection 8 (SW US Veterans Hospital Road and SW Terwilliger Boulevard) do not meet the City's minimum LOS requirements in all the scenarios, including the 2020 adjusted, 2030 no-build, and the 2030 build scenarios.

Both intersections have high numbers of northbound left turns, especially in the AM peak period and high numbers of eastbound traffic, especially in the PM peak period. Therefore, these intersections are recommended for mitigation.

[6] Transportation Research Board. 2016. *Highway Capacity Manual, 6th Edition: A Guide for Multimodal Mobility Analysis*.
[7] City of Portland Title 17 Public Improvements Administrative Rules, Section TRN-10.27

Table 3-4. Intersection Performance Summary

Intersection	2020 Adjusted			2030 No-build			2030 Build		
	LOS[a]	Delay[b]	Max. v/c[c]	LOS[a]	Delay[b]	Max. v/c[c]	LOS[a]	Delay[b]	Max. v/c[c]
1: SW US Veterans Hospital Road and SW Gibbs Street/SW Sam Jackson Park Road[TWS]	B (B) NB	11.3 (12.9)	0.137 (0.375)	B (B) NB	11.8 (14.0)	0.160 (0.430)	B (C) NB	12.3 (15.9)	0.187 (0.529)
2: S Gaines Street and SW US Veterans Hospital Road[TWS]	A (A) WB	9.8 (9.5)	0.096 (0.100)	B (A) WB	10.4 (9.6)	0.044 (0.068)	B (B) WB	12.5 (10.7)	0.062 (0.103)
3: SW 6th Avenue Drive & S Gaines Street[TWS]	A (A) NB	9.5 (10.7)	0.174 (0.132)	A (B) NB	9.6 (11.3)	0.195 (0.156)	A (B) NB	9.8 (11.8)	0.225 (0.171)
4: SW Terwilliger Boulevard and SW Campus Drive[TWS]	F (D) EB	163 (32)	1.160 (0.805)	F (F) EB	361.1 (57.0)	1.627 (0.959)	F (F) EB	435.2 (69.7)	1.788 (1.006)
5: SW US Veterans Hospital Road and Shipping/Receiving Access[TWS]	A (A) EB	9.4 (9.4)	0.120 (0.108)	A (A) EB	9.6 (9.6)	0.138 (0.123)	A (B) EB	9.8 (10.1)	0.143 (0.134)
6: SW US Veterans Hospital Road and Building T-51[TWS]	B (B) EB	10.9 (10.7)	0.028 (0.180)	B (B) EB	11.2 (11.1)	0.033 (0.206)	B (B) EB	11.6 (11.9)	0.035 (0.226)
7: SW US Veterans Hospital Road and Building 108 Driveway[TWS]	A (A) NB (EB)	7.9 (12.8)	0.124 (0.235)	A (B) NB (EB)	8.0 (13.8)	0.139 (0.276)	A (C) NB (EB)	9.3 (16.7)	0.188 (0.410)
8: SW Terwilliger Boulevard and SW US Veterans Hospital Road[TWS]	F (E) EB	68.1 (47.7)	0.791 (0.923)	F (F) EB	161 (95.5)	1.110 (1.099)	F (F) EB	558.9 (175.3)	2.009 (1.310)

[a] Vehicle movement level of service (LOS) – worst-performing approach direction indicated below LOS results
[b] Movement delay in seconds
[c] Maximum v/c (volume/capacity) ratio for the movement
Notes:
AM (PM) = AM Peak Period (PM Peak Period) values
Bold font = intersection with substandard operation
Red font/gray box = substandard LOS
LOS = level of service
[TWS] = Two-way stop-controlled intersection
EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

4.0 Recommended Mitigation (Non-VA)

4.1 SW Campus Drive and SW Terwilliger Boulevard (Intersection 4)

The intersection of SW Campus Drive and SW Terwilliger Boulevard performs poorly primarily as a result of steady traffic on SW Terwilliger Boulevard that limits the gaps for eastbound exiting traffic. Background traffic growth in the no-build scenario is projected to cause this intersection to operate at a failing condition. The proposed actions are not anticipated to add any trips to SW Campus Drive, but they would add traffic to SW Terwilliger Boulevard, contributing to the core issue. In addition, the heavy northbound left-turn volumes in the AM peak period may cause issues for the single northbound travel lane, as northbound through traffic is forced to wait behind northbound, left-turning traffic while they wait for a gap in oncoming southbound traffic.

To address the projected operational issues at this intersection, the recommended mitigation is to **install a traffic signal and northbound left-turn lane at SW Campus Drive and SW Terwilliger Boulevard**. A traffic signal would most efficiently control traffic and provide gaps for eastbound traffic on SW Campus Drive. Because of the high number of northbound left-turn movements, especially in the AM peak period, a northbound left-turn lane is also required to achieve an acceptable LOS. The intersection as a whole meets the City of Portland's standards for signalized intersections, operating at an intersection LOS B in the AM and PM periods. The critical movement operations in the full buildout scenario are presented in Table 4-1.

Table 4-1. Critical Movement Operations with Mitigation

Intersection	2030 Build w/Mitigation		
	LOS[a]	Delay[b]	Max. v/c[c]
4: SW Terwilliger Boulevard & SW Campus Drive[S]	D (B) EB	35.5 (14.2)	0.86 (0.84)

[a] Vehicle movement level of service (LOS) - worst-performing approach direction from Table 3-4 below LOS results

[b] Movement delay in seconds

[c] Maximum v/c (volume/capacity) ratio for the movement

[S] Signalized intersection

Note:

AM (PM) = AM Peak Period (PM Peak Period) values

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

4.1.1 Signal Warrant Analysis

Signal warrant requirements for the intersection of SW Campus Drive and SW Terwilliger Boulevard are met based on Warrant 3, Peak Hour Volumes, from the *Manual of Uniform Traffic Control Devices* (MUTCD).[8] The peak hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. Additional warrants could be met, but traffic volumes outside the peak hours were not analyzed as part of the scope of this study. Additional details are shown in Appendix G.

4.1.2 Additional Considerations

Installing a traffic signal with the existing roadway geometry is the most straightforward improvement to handle the traffic from the proposed action. However, alternative and additional options exist if traffic growth is less than, or greater than, the anticipated growth.

[8] Federal Highway Administration. 2009. *Manual on Uniform Traffic Control Devices*.

Interim All-way Stop

Installation of a traffic signal on SW Terwilliger Boulevard may be difficult to realize because of the limited right-of-way, limited advance sight distance due to the roadway curvature, and possible public opposition to traffic signals on SW Terwilliger Boulevard. While traffic signals may be the most effective solution to potential traffic issues, an alternative interim option could be installation of all-way stop control.

Installing an all-way stop control would negatively affect operations on SW Terwilliger Boulevard but would improve operations for eastbound traffic on SW Campus Drive. If performance at this intersection is acceptable under current conditions, but declines as traffic grows year over year, an all-way stop could be installed once traffic ceases to function at an acceptable LOS. The MUTCD allows for the installation of an all-way stop as an interim measure before a signal is installed, offering the following guidance:

> *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*[9]

Eastbound Left-turn Lane

Due to the large volumes of exiting eastbound traffic turning both left and right onto SW Terwilliger Boulevard, long queues are anticipated for eastbound traffic. The heavy concentration of traffic in the peak hours mean that these queues are unlikely to persist for long periods of time, but if these queues become an issue, an eastbound left-turn lane could also be installed. This left-turn lane is not required for an acceptable LOS (at full buildout, the movement is projected to operate at LOS D with the addition of the traffic signal) but would decrease the length of the eastbound queues.

Northbound Left-turn Lane Options

Installing a turn lane at this location would be difficult because of the steep slopes on either side of the road and the heavily wooded area. Encouraging modal shifts for commuters is recommended to delay or eliminate the need for the left-turn lane in particular.

The existing roadway width is approximately 30 feet from curb to curb, so a left-turn lane could be installed by removing the bike lanes and installing three 10-foot lanes. Removing the bike lanes is not optimal but could be used as an interim solution until other enhancements are implemented.

The northbound left-turn lane is justified based on Portland Bureau of Transportation’s (PBOT’s) current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections. The “Guide for Determining Left Turn Signal Control Form” was completed using required criteria, score-based criteria, and site-specific factors for the northbound left-turn lane. The results of this analysis can be found in Appendix I.

4.2 SW US Veterans Hospital Road and SW Terwilliger Boulevard (Intersection 8)

The intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard performs similarly to Intersection 4 in that operations are poor for the eastbound, stop-controlled movement turning onto uncontrolled SW Terwilliger Boulevard. In addition, the heavy northbound, left-turn volumes in the AM period may cause issues for the single northbound travel lane, as northbound through traffic is forced to wait behind northbound, left-turning traffic while they wait for a gap in traffic. Background traffic growth in the no-build scenario is projected to cause this intersection to operate at a failing condition. This intersection would be the primary access point for the proposed actions and would add trips to both SW

[9] *Manual on Uniform Traffic Control Devices*, Section 2B.07 Multi-Way Stop Applications.

Terwilliger Boulevard and US Veterans Hospital Road. As a result, the operations at this intersection are likely to get worse.

To address the projected operational issues at this intersection, the recommended mitigation is to **install a traffic signal and northbound left-turn lane at this intersection**. A traffic signal would most efficiently control traffic and provide gaps for eastbound traffic on SW US Veterans Hospital Road. Due to the high number of northbound left turns, especially in the AM peak period, a northbound left-turn lane is also required to achieve an acceptable LOS. The intersection as a whole meets the City of Portland's standards for signalized intersections, operating at an intersection LOS B in the AM and LOS C in the PM period. The critical movement operations in the full buildout scenario are shown in Table 4-2.

Table 4-2. Critical Movement Operations with Mitigation

Intersection	2030 Build w/Mitigation, Intersection		
	LOS[a]	Delay[b]	Max. v/c[c]
8: SW Terwilliger Boulevard & SW US Veterans Hospital Road[S]	C (C) EB	28.2 (22.8)	0.79 (0.91)

[a] Vehicle movement level of service (LOS) - worst-performing approach direction from Table 3-4 below LOS results

[b] Movement delay in seconds

[c] Maximum v/c (volume/capacity) ratio for the movement

[S] Signalized intersection

Note:

AM (PM) = AM Peak Period (PM Peak Period) values

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound

4.2.1 Signal Warrant Analysis

Signal warrant requirements at the intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard are met based on Warrant 3, Peak Hour Volumes, from the MUTCD. The peak-hour signal warrant is intended for use at a location where traffic conditions are such that, for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. Additional warrants could be met, but traffic volumes outside peak hours were not analyzed as part of the scope of this study. Additional details are shown in Appendix G.

4.2.2 Additional Considerations

Installing a traffic signal with the existing roadway geometry is the most straightforward improvement to handle the traffic from the proposed action. However, alternative and additional options exist if traffic growth is less than, or greater than, the anticipated growth.

Interim All-way Stop

Installation of a traffic signal on SW Terwilliger Boulevard may be difficult because of the limited right-of-way, limited advance sight distance due to the roadway curvature, and possible public opposition to traffic signals on SW Terwilliger Boulevard. While traffic signals may be the most effective solution to potential traffic issues. an alternative interim option could be to install an all-way stop.

Installing an all-way stop control would negatively affect operations on SW Terwilliger Boulevard but would improve operations for eastbound traffic on SW US Veterans Hospital Road. Performance at this intersection may be acceptable under current conditions, but if traffic increases to the point that it ceases to function at an acceptable LOS, an all-way stop could be installed. The MUTCD allows for the installation of all-way stop control as an interim measure before a signal is installed, offering the following guidance:

> *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*[10]

<u>Eastbound Left-turn Lane</u>

Given the large volume of exiting eastbound traffic turning both left and right onto SW Terwilliger Boulevard, long queues are anticipated for eastbound traffic. The heavy concentration of traffic in the peak hours means that these queues are unlikely to persist for long periods of time. If these queues become an issue, an eastbound left-turn lane could also be installed. This left-turn lane is not required for an acceptable LOS (at full buildout, the movement is projected to operate at LOS D with the addition of the traffic signal) but would decrease the length of the eastbound queues.

<u>Northbound Left-turn Lane Options</u>

Like the intersection of SW Campus Drive and SW Terwilliger Boulevard, installing a turn lane at this location would be difficult because of the steep slopes on either side of the road and the heavily wooded area. Encouraging modal shifts for commuters is recommended to delay or eliminate the need for the left-turn lane in particular.

The existing roadway width is approximately 30 feet from curb to curb, so a left-turn lane could be installed by removing the bike lanes and installing three 10-foot lanes. Removing the bike lanes is not optimal but could be used as an interim solution until other enhancements are implemented.

The northbound left-turn lane is justified based on PBOT's current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections. The "Guide for Determining Left Turn Signal Control Form" was completed using required criteria, score-based criteria, and site-specific factors for the northbound left-turn lane. The results of this analysis can be found in Appendix I.

4.3 TriMet Southwest Expansion

TriMet and Metro were working on an expansion of the existing Portland light rail system known as the Southwest Corridor Light Rail Project. This expansion included a new station at SW Barbur Boulevard at SW Gibbs Street, which would have a stairway from the station to the intersection of SW Terwilliger Boulevard and SW Campus Drive. If this expansion were built, it is likely that some vehicle trips would shift to transit trips.

In addition, the new station would cause an influx of pedestrians at the intersection of SW Terwilliger Boulevard and SW Campus Drive. Additional pedestrians crossing SW Terwilliger Boulevard could benefit from traffic control stopping of vehicle traffic on SW Terwilliger Boulevard, whether that is a stop sign or traffic signal. However, the Southwest Corridor expansion does not currently have funding identified, so the construction timeline is uncertain. The following is a statement from TriMet regarding the Southwest Corridor expansion.

> *In November 2020, voters rejected Measure 26-218 (also known as Get Moving 2020), a proposal to fund the Southwest Corridor Light Rail Project and many other transportation programs across the region. At this time, the project is on hold until funding is identified.*[11]

---

[10] *Manual on Uniform Traffic Control Devices*, Section 2B.07 Multi-Way Stop Applications.
[11] https://trimet.org/swcorridor/. Accessed December 31, 2020.

5.0 Parking Baseline Counts and Observations

A parking study and queueing analysis were completed as part of the 2019 TIA. The parking study can be found at the end of Appendix A of this report. The study contains descriptions of the existing parking lots and garages as well as their uses.

Figure 5-1 shows the location of the parking lots counted as part of this study. It also shows the location of the proposed parking lot additions.

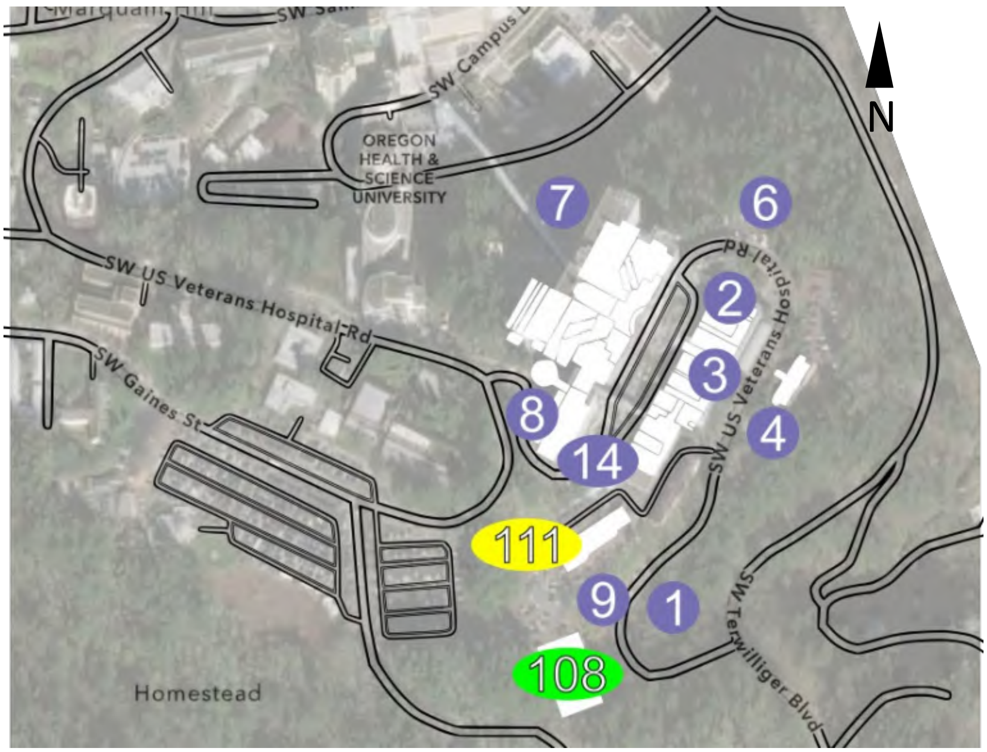


Figure 5-1. Parking Lot Locations

As part of this study, counts of the available and utilized parking spaces in each lot near the Portland VAMC were collected on December 2, 2020. Figure 5-2 shows the results of this study as well as proposed parking changes. The proposed action would add an additional 150 spaces to Building 108, remove 200 spaces from Lot 5, and install a new 650-space garage in Building 111. There are approximately 1,370 parking spaces according to the field data collected in December 2020, resulting in 600 net additional parking spaces, which represents an increase of about 45 percent.

In total, approximately 1,010 spaces were occupied out of an estimated 1,370. These numbers are inexact because of the different types of parking allowed and the fact that people arrived and left during the counting process. The following was also observed:

- Parking Levels 1 and 2 of Lot 3 were closed off as a result of drive-through COVID-19 testing; however, these levels also had many spaces reserved for Portland VAMC security and other operational needs so even if they were open, they would not provide large numbers of additional parking spaces.
- Bike parking exists in some locations, but in several locations, bikes were locked to staircase railings or other non-bike rack locations.

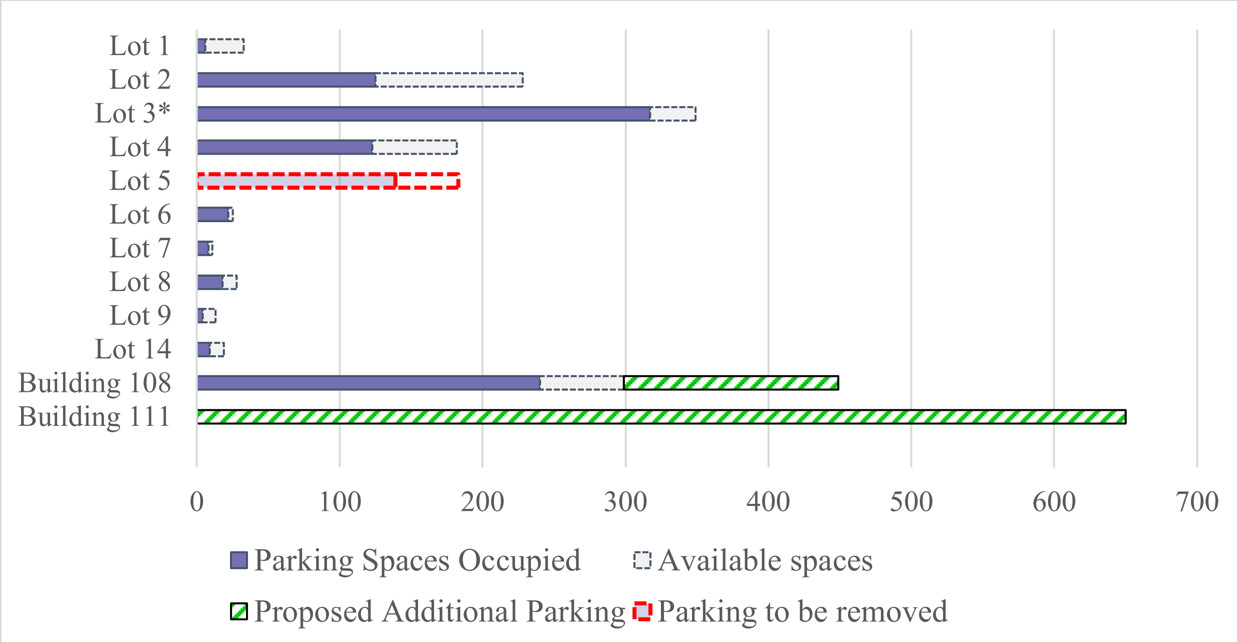


Figure 5-2. Parking Counts

**Levels 1 and 2 of Lot 3 were closed to provide space for COVID-19 testing, so additional parking would be available under normal conditions; however, a large number of spaces were reserved for campus security and other operational usage.*

6.0 Summary

The VA is proposing construction at the Portland VAMC campus that includes adding 150 parking spaces to the Building 108 parking garage, constructing a 300,000-BGSF facility (Building 110), and constructing a new parking garage (Building 111). The project would provide a net increase of approximately 450 parking spaces, for a total of 600 new parking spaces, and is anticipated to generate an additional 1,356 daily car trips, with 236 trips in the AM peak hour and 192 trips in the PM peak hour.

In 2011, there was an ADT on SW Terwilliger Boulevard north of SW US Veterans Hospital Road of 8,965. The projected 2030 no-build scenario assuming 1% annual growth would result in 10,831 ADT on SW Terwilliger Boulevard. The proposed action is projected to result in 746 new trips on SW Terwilliger Boulevard, which is an increase of 6.89%.

6.1 Recommendations

To ensure adequate traffic operations the following non-VA mitigations are recommended:

- Add a traffic signal and northbound left-turn lane at the intersection of SW Campus Drive and SW Terwilliger Boulevard (Intersection 4)
- Add a traffic signal and northbound left-turn lane at the intersection of SW US Veterans Hospital Road and SW Terwilliger Boulevard (Intersection 8)

These mitigations are recommended in both the no-build and the build scenarios. Traffic operations are projected to be sub-standard as a result of the background traffic growth, whether the proposed actions occur or not. As a result, the proposed action would lead to minor impacts on traffic ADT along on SW Terwilliger Boulevard and associated intersections in 2030. Regardless of whether the proposed action is to be implemented, VA recognizes and supports the planning, discussion, and potential implementation of future non-VA traffic mitigation measures, in conjunction with the local communities and the City of Portland Bureau of Transportation, to address the existing operational issues at these intersections and improve traffic conditions.

6.2 Recommended Interim Options

Additional interim options at these two intersections are feasible for the near term before full buildout traffic is realized, such as an all-way stop or a traffic signal without turn lanes.

No additional parking improvements are recommended aside from the proposed parking garage and garage addition.

The findings of this study confirm the results of the 2019 TIA, which also recommended intersections improvements at Intersections 4 and 8.

Appendix A
2019 Portland VAMC Expansion TIA

GLOBAL Transportation Engineering

MEMORANDUM

DATE: May 8, 2019

TO: Emery Layton, PE, MLT

FROM: Dana Beckwith, PE PTOE
Richard Martin, EIT

SUBJECT: Portland VA Hospital Expansion TIA P18-113-000

This memorandum summarizes the traffic impact analysis prepared for the proposed medical facility expansion at the Portland Veterans Association Medical Center campus in Portland, Oregon. The traffic impact analysis was prepared in accordance with the Portland Bureau of Transportation (PBOT) standards. A ten-year analysis period has been considered for the site. This memorandum includes the following:

- Project Description
- Existing Conditions
  - Study Roadway Transportation Facilities
  - Crash Analysis
- Traffic Data Analysis
  - Year 2019 Traffic
  - 2029 Background Traffic (no-build)
  - 2029 Total Traffic (with site buildout)
- Intersection Performance
  - Operating Standards
  - Capacity Analysis
  - Queueing Analysis
- Warrant Review
  - Traffic Signal Warrants
- Proposed Use Conformance with the PBOT Transportation Element of the Comprehensive Plan
  - Site Access
  - On-Street Parking Impacts
  - Transit Service and Connectivity
  - Impacts to Pedestrian and Bicycle Facilities
  - Neighborhood Impacts
  - Safety for All Modes
- Results and Recommendations

PROJECT DESCRIPTION

The Portland VA has proposed the construction of a new medical facility called the Specialty Care Building, with a reported size of 335,000 building gross square feet (BGSF) and 248,000 departmental gross square feet (DGSF). The new facility will primarily be served by the new parking facilities detailed in a previously submitted parking and queueing analysis. These new lots will increase the staff parking available on campus by approximately 600 spaces. The purpose of this analysis is to identify potential off-site improvements required to adequately serve the additional traffic generated by the campus expansion. The site vicinity map is shown in Figure 1 and the proposed site plan is presented in Figure 2.

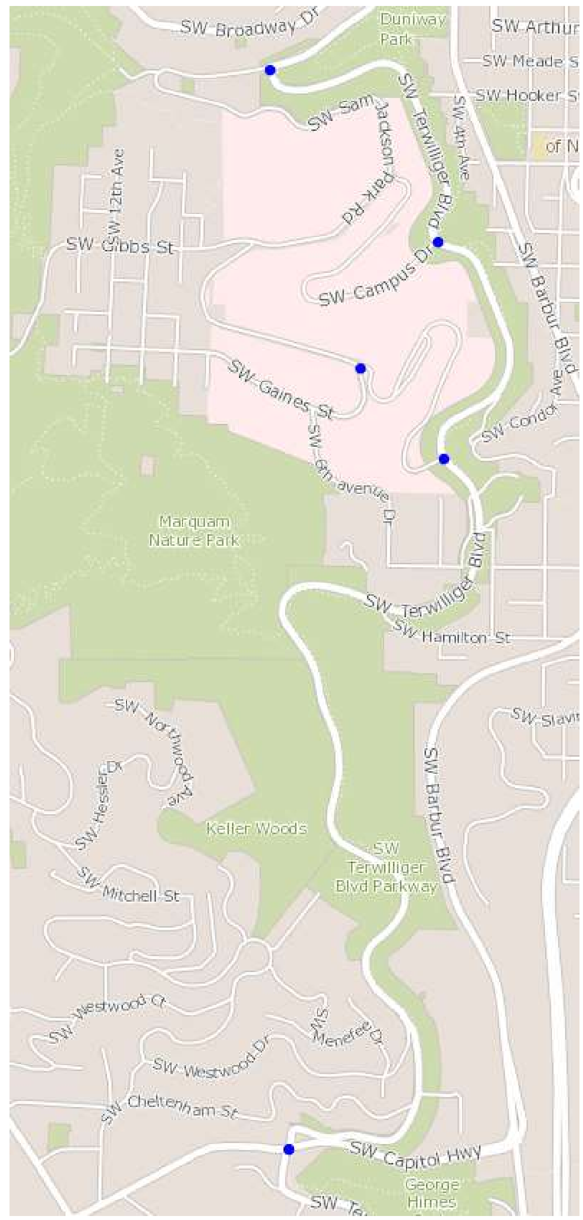


Figure 1: Vicinity Map

EXISTING CONDITIONS

Study Roadway Transportation Facilities

Existing transportation facilities were reviewed along SW US Veterans Hospital Road, SW Terwilliger Boulevard, SW Gaines Street, SW Campus Drive, SW Sam Jackson Park Road, and SW Capitol Highway. All modes of travel including pedestrian bicycles, transit, and motor vehicles were evaluated. The inventory and data collected include the following:

- Street functional classifications (Table 1)
- Inventory of existing conditions (Table 2)
    - Posted speed limits
    - Pedestrian and bicycle facility characteristics
    - Lane geometry
    - On-street parking
    - Transit route information

A vicinity map provided as Figure 1 shows the study area intersections marked in blue. Figure 2 provides a site plan for the proposed development.

Table 1: City of Portland Street Functional Classification

Roadway	Street Functional Classifications*						
	Transit	Traffic	Emergency Response	Street Design	Bicycle	Pedestrian	Freight
SW Terwilliger Blvd	Major Transit Priority	Neighborhood Collector	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Local Service Truck Street
SW US Veterans Hospital Rd	Major Transit Priority	Neighborhood Collector	Minor Emergency Response	Community Corridor	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Capitol Hwy	Major Transit Priority	Major City Traffic Street	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Truck Access Street
SW Sam Jackson Park Rd	Major Transit Priority	Neighborhood Collector	Major Emergency Response	Community Corridor	City Bikeway	City Walkway	Local Service Truck Street
SW Campus Dr	Major Transit Priority	Local Street	Minor Emergency Response	Local Street	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Gaines St	Major Transit Priority	Neighborhood Collector	Minor Emergency Response	Community Corridor	Local Service Bikeway	City Walkway	Local Service Truck Street

*Street functional classification based on the City of Portland website, www.portlandmaps.com

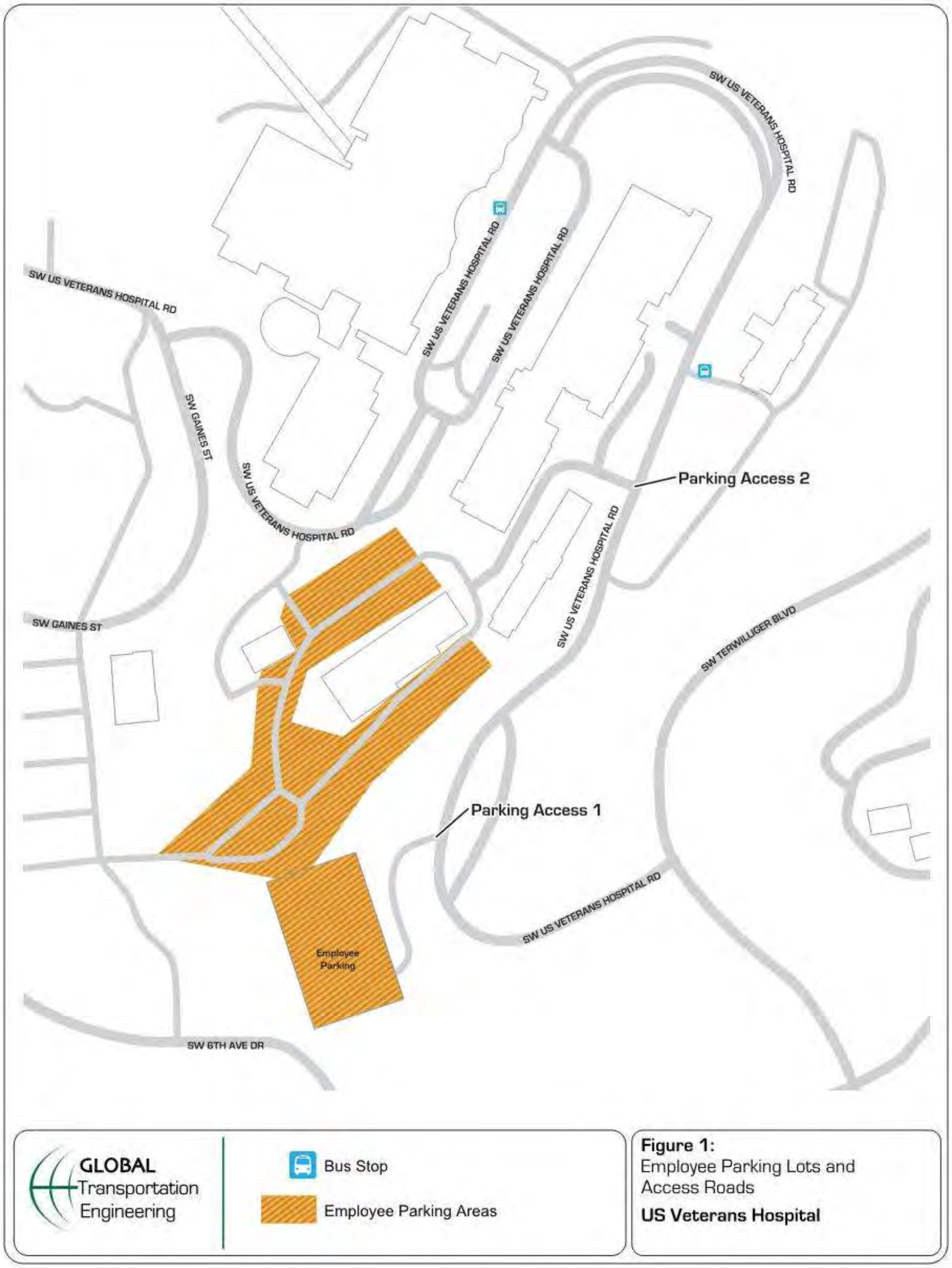


Figure 2: Site Map

Table 2: Existing Conditions in Site Vicinity

Roadway	Posted Speed Limit	Sidewalks	Bike Facilities	Lane Geometry	On-Street Parking	Transit Route
SW Terwilliger Blvd	25 mph	Multi-use Path on East Side of Street	Bike lanes both sides	One 11.5' lanes in each direction, 5' bike lanes	No	Bus Lines 8, 61, 64, 65, 66, 68, and 190
SW Capitol Hwy	30 mph	No	Westbound bike lane, eastbound bike sharrows	Two 11' westbound lanes, one 11' eastbound lane	No	Bus Lines 44, 45, 54, 55, 56
SW US Veterans Hospital Rd	15 mph	Intermittent Sidewalks	No	One 12' lane in each direction, 12' left turn lanes at major intersections / accesses, pick-up/drop-off area at main hospital entrance	Intermittent (Reserved for Employees/ Vanpool)	Bus Line 56
SW Sam Jackson Park Rd	25 mph	Intermittent	No	One 11' lane in each direction	Yes	Bus Lines 6 and 68
SW Campus Dr	20 mph	One side	No	One 11' lane in each direction	No	Tram Terminal, Bus Line 190
SW Gaines St	20 mph	Sidewalk/ Multi-use Path on East Side of Street	No	One 11' lane in each direction	No	Bus Lines 8, 61, 64, 65, 66, 68

Crash Analysis

Crash data for a five-year period from January 2012 through December 2016 was obtained from the Oregon Department of Transportation and was reviewed to identify any traffic safety concerns at the study intersections. A copy of the crash data is included in Appendix A.

The crash rates presented in Table 3 are based on the number of crashes per million entering vehicles (MEV). Typically, an intersection is not considered unsafe unless its crash rate exceeds the threshold of 1.0 crashes per MEV.

Table 3: Crash Rate Results

Intersection	Crash History (yrs)	Number of Crashes	Crashes per Year	Annual Traffic Entering (veh/yr)	Crash Rate per M.E.V.*
SW Terwilliger Blvd / SW Capitol Hwy	5	11	2.25	9,121,350	0.247
SW Terwilliger Blvd / SW US Veterans Hospital Rd	5	4	0.8	3,525,900	0.227
SW Terwilliger Blvd / SW Sam Jackson Park Rd	5	8	1.6	3,730,300	0.429
SW Terwilliger Blvd / SW Campus Dr	5	7	1.4	3,445,600	0.406
SW US Veterans Hospital Rd / SW Gaines St	5	0	0	708,100	0

*M.E.V. – million entering vehicles

The intersection of Terwilliger Boulevard at Capitol Highway had 11 crashes reported during the analysis period. Five of the crashes were rear-end collisions, five were turning-movement collisions, and one was an angle-type collision. Four of the crashes were bicycle collisions, none of which share common causes or characteristics beyond drivers failing to yield the right-of-way to cyclists.

The intersection of Terwilliger Boulevard at Veterans Hospital Road had 4 crashes reported during the analysis period. Three of the crashes were turning-movement collisions and one was a rear-end collision. None of the collisions shared directional commonalities.

The intersection of Terwilliger Boulevard at Sam Jackson Park Road had 8 crashes reported during the analysis period. Five of the crashes were rear-end collisions, two were turning-movement collisions, and one was a fixed-object collision. The rear-end collisions were largely caused by drivers following too closely to vehicles in front of them.

The intersection of Terwilliger Boulevard at Campus Drive had 7 crashes reported during the analysis period. Three of the crashes were rear-end collisions, three were turning-movement collisions, and one was a fixed-object collision. One of the turning-movement collisions involved a cyclist.

The intersection of Veterans Hospital Road at Gaines Street had no crashes reported during the analysis period.

TRAFFIC DATA ANALYSIS

2019 Existing Traffic Volumes

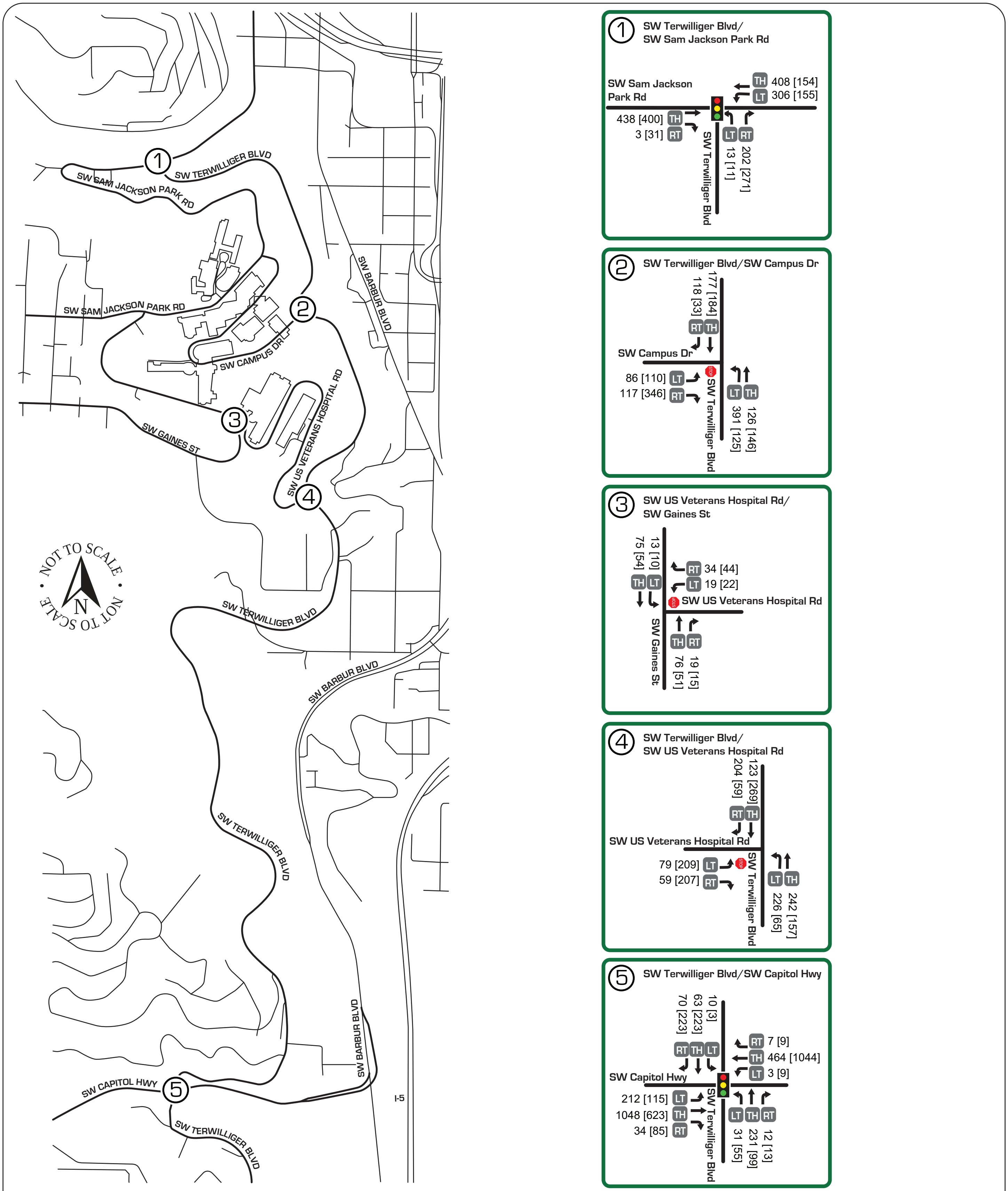
Peak hour traffic count data were gathered on a typical weekday during the AM peak period (7:00 AM – 9:00 AM) and the PM peak hour period (4:00 PM – 6:00 PM) on April 4, 2019 at the five study area intersections. Figure 3 illustrates the existing traffic volumes during the AM peak hour and PM peak hour. The peak hour traffic count data can be found in Appendix B.

2029 Background Traffic Volumes (No-build Conditions)

The 2029 background traffic is comprised of the existing traffic volumes factored with a traffic growth. No in-process developments were determined to impact the study area intersections. Traffic growth near the site has been estimated using a growth rate of 1% per year. The 2029 background traffic volumes are presented in Figure 4.

2029 Total Traffic Volumes (Build Conditions)

Trip rates presented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, Tenth Edition, were utilized to estimate the site's trip generation. The site's trip generation is based on trip rates identified for the Hospital (ITE 610) land use. Table 4 presents the trip generation estimate for the site. The VA expansion is expected to generate 2,659 net daily trips, 298 net AM peak hour trips, and 402 net PM peak hour trips.



GLOBAL Transportation Engineering

AM [PM] = Peak Hour Traffic Volumes

= Lane Configuration

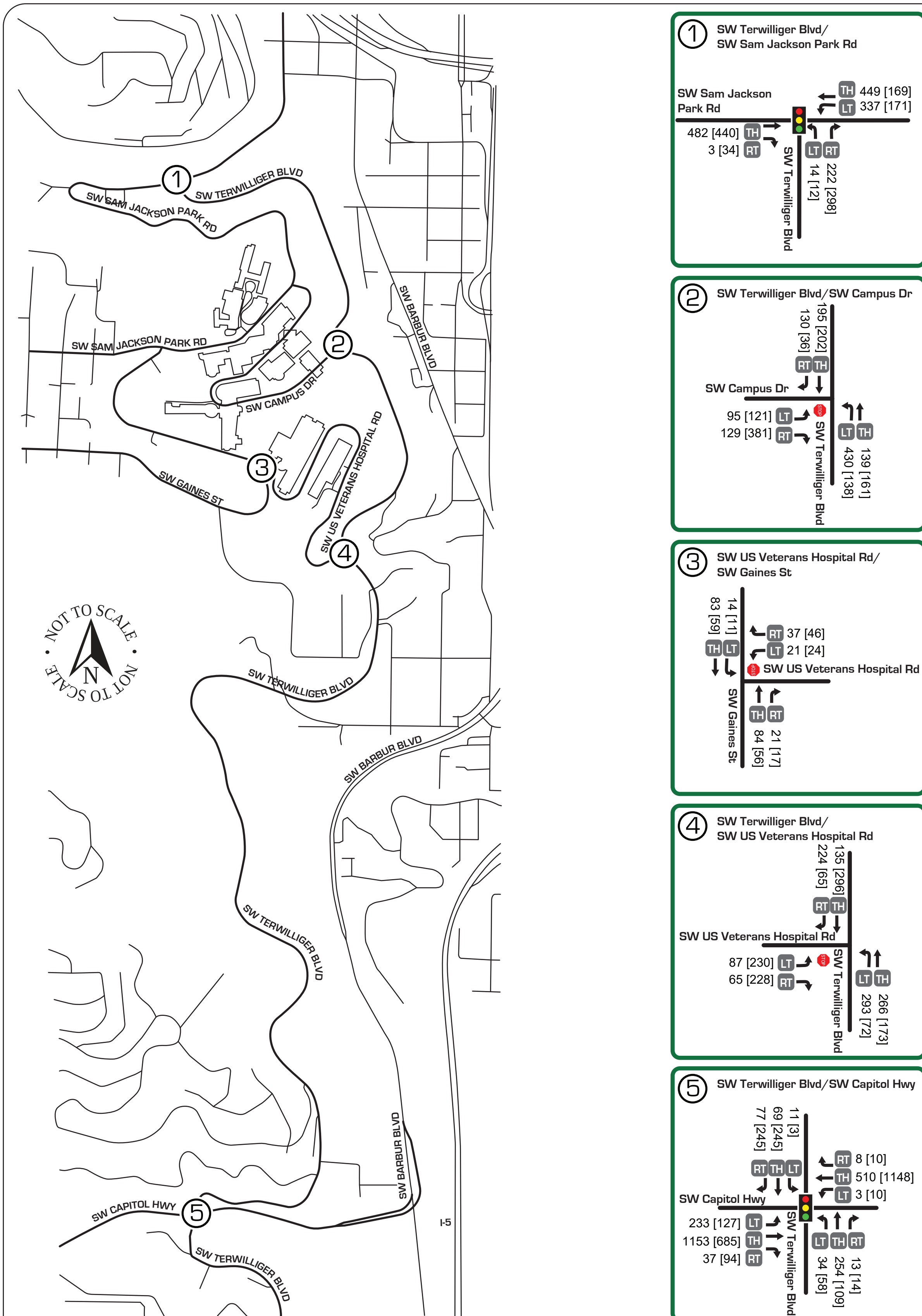
LT TH RT = Left/Through/Right

(X) = Intersection

STOP = Stop Sign

= Traffic Light

Figure 3:
2019 Existing Conditions



GLOBAL Transportation Engineering

AM [PM] = Peak Hour Traffic Volumes
= Lane Configuration
LT TH RT = Left/Through/Right
X = Intersection
STOP = Stop Sign
= Traffic Light

Figure 4:
2029 Background Conditions

Trip Generation

The site-generated trips shown in Table 4 were distributed to the study area intersections based on the layout of the site and engineering judgment. Trip distribution percentages and trip assignments are presented in Figure 5.

Trip generation for the medical center expansion was developed based on the reported departmental gross square footage of 248,000 square feet, and ITE trip generation rates were taken from Land Use Code 610: *Hospital*.

The 2029 total traffic volumes are the summation of background traffic volumes and the site generated trips. The total traffic peak hour volumes are presented in Figure 6.

Table 4: Projected trip generation for the VA Expansion

ITE Land Use	Size (ksf)	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
PROPOSED SITE								
Hospital (#610)	248							
Generation Rate [1]		10.72	1.20	72%	28%	1.62	26%	74%
Site Trips		**2,659**	**298**	215	83	**402**	105	297

[1] Source: *Trip Generation*, 10th Edition, ITE, 2017, average rates.

INTERSECTION PERFORMANCE

Operating Standards

Per the City of Portland's Title 17 Public Improvements Administrative Rules, operational standards for the intersections associated with this study are Level of Service (LOS) D or better for signalized intersections and LOS E or better for unsignalized intersections. The City's Administrative Rules for traffic capacity analysis states:

> *"TRN-10.27 For signalized intersections, adequate level of service is LOS D, based on a weighted average of vehicle delay for the intersection.*
>
> *For stop-controlled intersections, adequate level of service is LOS E. Level of service for two-way stop-controlled intersections is based on individual vehicle movement, and all-way stop-controlled intersections is based on a weighted average of vehicle delay for the intersection."*

Capacity Analysis

The existing and 2029 forecasted traffic volume data was used to evaluate traffic operations at the study intersections. The Synchro traffic operations analysis software (Version 9.0) was used to determine the level of service for each scenario considered. Synchro is based on the 2010 Highway Capacity Manual methodology. Table 5a summarizes the AM peak hour analysis results and Table 5b summarizes the PM peak hour analysis results. Copies of the capacity analysis calculations are presented in Appendix C.

Table 5a: Intersection Performance Summary - AM Peak Hour

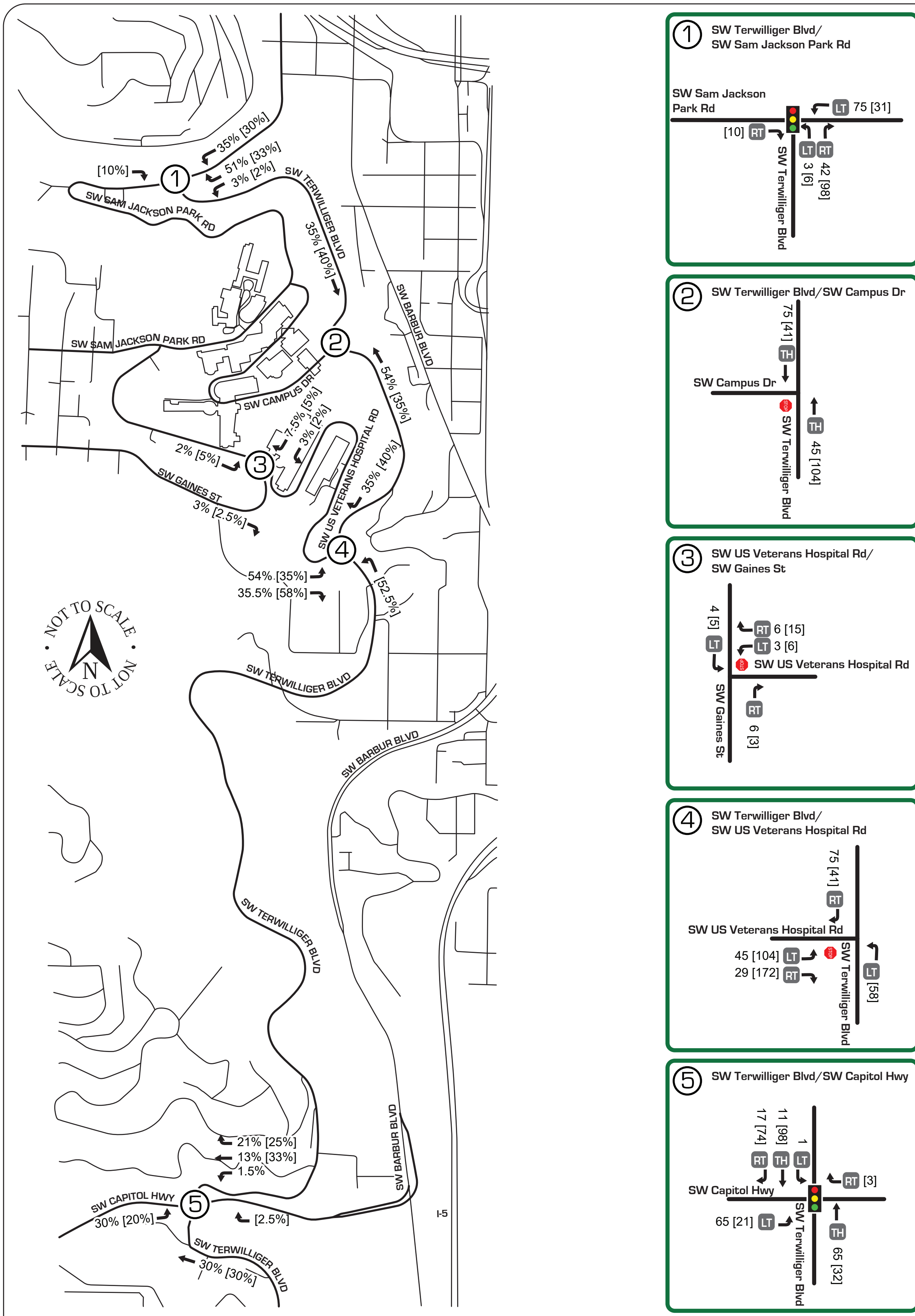
Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
UNSIGNALIZED INTERSECTIONS									
SW US Veterans Hospital Road/SW Gaines St	11.5 - WB	B	0.040	11.7 - WB	B	0.045	11.9 - WB	B	0.053
SW US Veterans Hospital Road/SW Terwilliger Blvd	41.1 - EB	E	0.626	76.8 - EB	F	0.840	>120 - EB	F	>1.0
SW Terwilliger Blvd/SW Campus Dr	>120 - EB	F	>1.0	>120 - EB	F	>1.0	>120 - EB	F	>1.0
SIGNALIZED INTERSECTIONS									
SW Terwilliger Blvd/SW Sam Jackson Park Rd	29.6	C	0.670	39.0	D	0.740	40.9	D	0.790
SW Terwilliger Blvd/SW Capitol Hwy	36.4	D	0.920	49.0	D	1.010	60.6	E	1.060

Notes: 2010 Highway Capacity Manual methodology used in analysis, Synchro v9. EB - Eastbound, WB - Westbound.

Table 5b: Intersection Performance Summary - PM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
UNSIGNALIZED INTERSECTIONS									
SW US Veterans Hospital Road/SW Gaines St	10.1 - WB	B	0.034	10.2 - WB	B	0.038	10.4 - WB	B	0.049
SW US Veterans Hospital Road/SW Terwilliger Blvd	38.8 - EB	E	0.845	71.4 - EB	F	1.005	>120 - EB	F	>1.0
SW Terwilliger Blvd/SW Campus Dr	30.2 - EB	D	0.798	44.6 - EB	E	0.908	89 - EB	F	1.070
SIGNALIZED INTERSECTIONS									
SW Terwilliger Blvd/SW Sam Jackson Park Rd	18.7	B	0.500	21.6	C	0.550	22.1	C	0.600
SW Terwilliger Blvd/SW Capitol Hwy	28.5	C	0.810	34.8	C	0.890	72.7	E	1.050

Notes: 2010 Highway Capacity Manual methodology used in analysis, Synchro v9. EB - Eastbound, WB - Westbound.



GLOBAL Transportation Engineering

AM [PM] = Peak Hour Traffic Volumes

= Lane Configuration

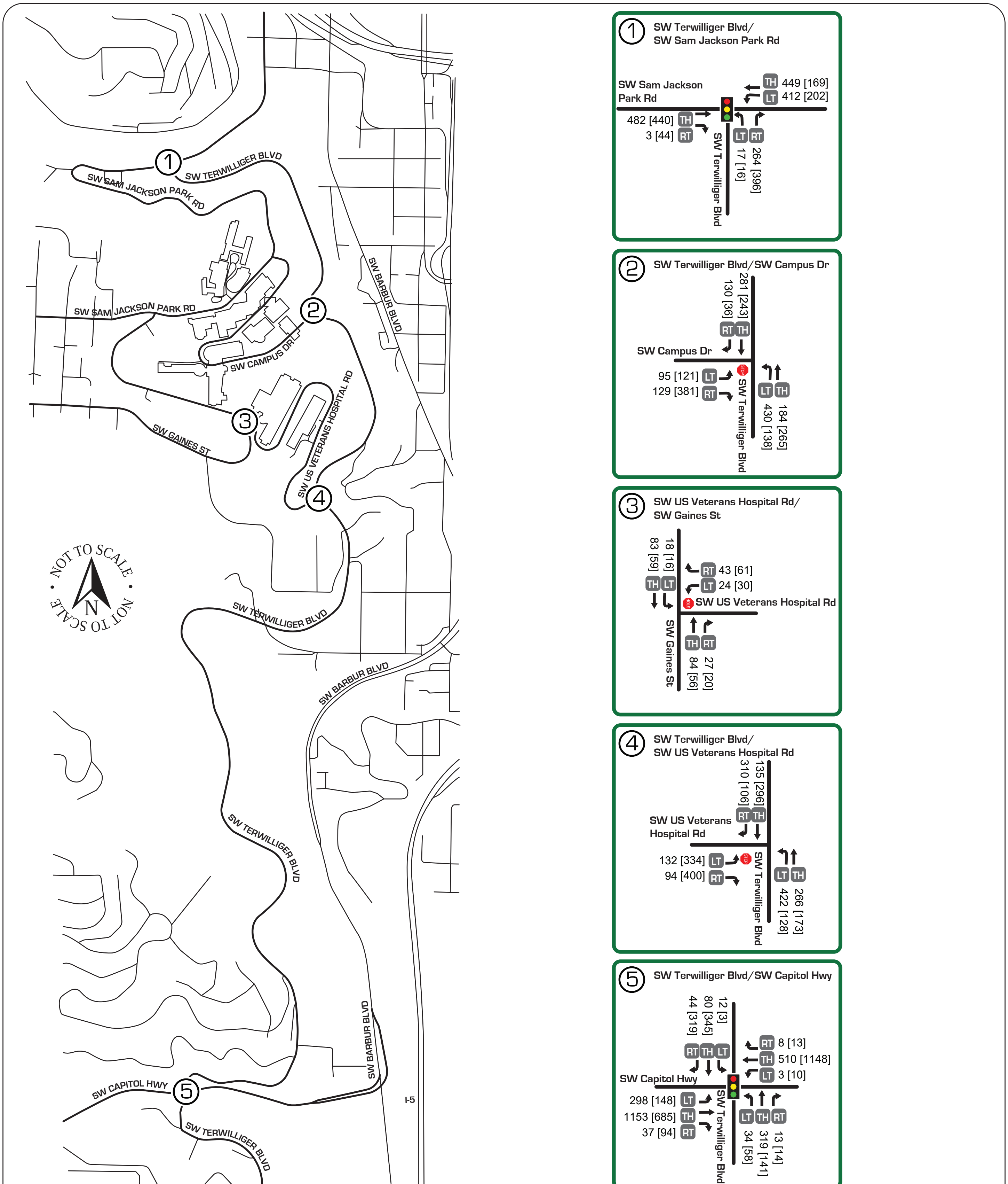
LT TH RT = Left/Through/Right

(X) = Intersection

STOP = Stop Sign

= Traffic Light

Figure 5:
Trip Assignment and Distribution



GLOBAL Transportation Engineering

AM [PM] = Peak Hour Traffic Volumes

= Lane Configuration

LT TH RT = Left/Through/Right

(X) = Intersection

STOP = Stop Sign

= Traffic Light

Figure 6:
2029 Build-Out Conditions

The intersection of Terwilliger Boulevard at Capitol Highway operates at LOS 'D' under existing and 2029 background conditions, and at LOS 'E' during the 2029 build-out conditions during both the AM and PM peak periods (reference Table 5a and Table 5b). Adjusting the signal timing at the build-out scenario to allow more time north-south travel within cycles could bring the LOS to an acceptable 'D' during both peak periods.

The intersection of Terwilliger Boulevard at Sam Jackson Park Road operates at LOS 'C' during the AM peak period and LOS 'B' during the PM peak period under existing conditions. It operates at LOS 'D' during the AM peak period and LOS' 'C during the PM peak period under both future scenarios. No mitigations are necessary or recommended for this intersection.

The intersection of Terwilliger Boulevard at Campus Drive operates at LOS 'F' under existing conditions during the AM peak period under all scenarios. During the PM peak period, the intersections operates at LOS 'D' under existing conditions, 'E' under 2029 background conditions, and 'F' under build-out conditions. Installation of a traffic signal would mitigate projected performance issues at this intersection.

The intersection of Veterans Hospital Road at Gaines Street operates at LOS 'B' during the AM and PM peak periods under all analysis scenarios. No mitigations are necessary or recommended.

The intersection of Terwilliger Boulevard at Veterans Hospital Road operates at LOS E during the AM and PM peak periods under existing conditions. It is projected to operate at LOS F during both peak hours under all future scenarios. Installation of a traffic signal would mitigate projected performance issues at this intersection.

HCM Reports for these scenarios are presented in Appendix D.

Mitigations

Due to failing levels of performance, it is recommended that traffic signals are installed at the intersections of Terwilliger Boulevard at Campus Drive and Terwilliger Boulevard at Veterans Hospital Road. A proportional share is proposed for mitigations at the intersection of Terwilliger Boulevard at Campus Drive, since the current understanding is both OHSU and Southwest Corridor Transit Improvements are also developing in the area. Tables 6a and 6b outline intersection performance under mitigated conditions.

Table 6a: Mitigated Intersection Performance Summary - AM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Terwilliger Boulevard at Veterans Hospital Road	7.7	A	0.63	7.6	A	0.63	21.4	C	0.88
Terwilliger Boulevard at Campus Drive	15.9	B	0.79	14.2	B	0.76	19.4	B	0.85

Notes: Highway Capacity Manual methodology used in analysis, Synchro v9.

Table 6b: Mitigated Intersection Performance Summary - PM Peak Hour

Intersection	2019 Existing			2029 Background			2029 Total		
	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Terwilliger Boulevard at Veterans Hospital Road	9.4	A	0.56	9.7	A	0.58	22.8	C	0.85
Terwilliger Boulevard at Campus Drive	8.2	A	0.51	8.4	A	0.53	9.5	A	0.59

Notes: Highway Capacity Manual methodology used in analysis, Synchro v9.

Queueing Analysis
Queueing was examined for the proposed traffic signals at the intersections of Veterans Hospital Road and Campus Drive at Terwilliger Boulevard under 2029 build out conditions for both peak hours. Based on a Synchro (HCM) queueing analysis for these scenarios, northbound left-turn lanes are recommended for the AM peak hour build-out conditions and eastbound left-turn lanes are recommended for the PM peak hour build-out conditions at both intersections to accommodate the peak hour queues. Providing turn lanes with 100 feet of storage will accommodate the average queues for all scenarios. HCM reports for the mitigated capacity and queueing scenarios are presented in Appendix E.

WARRANT REVIEW

Traffic Signal Warrants
The peak hour signal warrant presented in the *Manual on Uniform Traffic Control Devices* (MUTCD) was reviewed for the following locations:

- Terwilliger Boulevard at Veterans Hospital Road
- Terwilliger Boulevard at Campus Drive

Based on the 2019 existing traffic volumes, the peak hour signal warrant is met at both study intersections. Traffic signals are explored in the earlier Mitigations section. The traffic signal warrants for the VA medical center expansion are included in Appendix G.

PROPOSED USE CONFORMANCE WITH THE PBOT TRANSPORTATION ELEMENT OF THE COMPREHENSIVE PLAN

The existing site is zoned EX – Central Employment. The proposed use does not change this existing land use zoning designation. Based on a study of the Comprehensive Plan, the transportation system can support the proposed development. In addition to the previous discussed intersection capacity and warrant analysis, the following factors were also evaluated:

Site Access and Connectivity
The site will directly access Veterans Hospital Road approximately 400 feet west of its intersection with Terwilliger Boulevard. The 298 AM and 402 PM peak hour site trips will largely impact the nearby intersection of Terwilliger Boulevard at Veterans Hospital Road. Mitigations are outlined in the previously submitted queueing analysis and in the Results and Recommendations section of this report.

On-Street Parking Impacts
On-street parking is not expected to be impacted by the proposed development. Currently there is no designated on-street parking present along Terwilliger Boulevard, Capitol Highway, and Veterans Hospital Road, the heavily affected roadways near the project site. There is limited restricted on-street parking on Campus Drive and Sam Jackson Park Road that will not be impacted by the development.

Transit Service and Connectivity
Transit circulation will not change with the site operation. The site will not create a significant increase in ridership demand that would constitute a need to change transit service. Currently Trimet's Bus Routes 6, 8, 44, 45, 55, 56, 61, 64, 65, 66, 68, and 190 serve the study area, as well as the Portland Aerial Tram.

Impacts to Pedestrian and Bicycle Facilities
Pedestrian and bicycle facilities may be impacted at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive. Additional pedestrian facilities are outlined in the Planned Local Street Improvements section of this report. No additional bicycle facilities are planned or recommended.

Neighborhood Impacts
The site is within a designated Central Employment zone. The types of traffic associated with the proposed site will be those associated with hospital use which will predominately be passenger vehicles and small heavy

vehicles such as ambulances, trucks, and delivery vans. The increase in traffic due to site trips will not change the traffic characteristics of the neighborhood. The type of development is also consistent with the Marquam Hill District Plan.

Safety for All Modes

Safety may be impacted at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive based on the increased traffic flow due to site trips. The mitigative measures outlined in the Intersection Performance and Warrant Review sections would include any appropriate safety measures. Safety for all travel modes will not be affected by the addition of this facility to the area at other study intersections.

Planned Local Street Improvements

According to the City of Portland TSP, a pedestrian trail that aligns with the Gibbs Street right-of-way is proposed for development under the 11-20 year long range plan.[1] This pedestrian trail would meet the eastern side of the intersection of Terwilliger Blvd at Campus Drive. As this is a long-range plan that is not yet funded, it is not proposed as part of the conditions for approval of this project. OHSU and Oregon Metro are proposing expansions in the site vicinity. This trail is a part of the Southwest Corridor expansion, proposed by Oregon Metro as the Marquam Hill Connection[2]. No other projects were found to be planned for the project area.

RESULTS AND RECOMMENDATIONS

The VA Hospital is proposed for a 248,000 square foot expansion. The site is expected to generate 2,659 net daily trips, 298 net AM peak hour trips, and 402 net PM peak hour trips.

Crash data for a five-year period from January 2012 through December 2016 was evaluated based on the number of crashes per million entering vehicles (MEV). The highest crash rate found at any of the study area intersections was 0.429. No apparent safety concerns were found at any of the study intersections.

The intersections of Terwilliger Boulevard at Veterans Hospital Road and Campus Drive operate at LOS ‘E’ and ‘F’ under 2019 existing conditions, respectively. They are both projected to operate at LOS ‘F’ under 2029 background conditions without the addition of site trips from the proposed development. Based on these findings, and on the necessary turn-lane and signal warrant analyses, it is recommended that traffic signals are installed at the intersections of Terwilliger Boulevard at Veterans Hospital Road and Terwilliger Boulevard at Campus Drive to alleviate delays and improve intersection performance.

Based on a queueing analysis for the proposed traffic signals at the intersections of Veterans Hospital Road and Campus Drive at Terwilliger Boulevard under 2029 build out conditions, northbound and eastbound left-turn lanes are proposed to accommodate the projected average queueing.

The proposed site conforms to the City of Portland’s Transportation Element of the Comprehensive Plan. There are no known impacts to the transportation system including: access, on-street parking, transit service, transit connectivity, pedestrian facilities, bike facilities, neighborhood impacts, and safety for all modes.

---

[1] https://www.portlandoregon.gov/transportation/article/690967, TSP ID 90088, page 362.

[2] https://www.oregonmetro.gov/sites/default/files/2017/10/06/Marquam-Hill-Version1-Decision-Briefing-Book-083017.pdf

Appendix

Appendix A: Crash Data

URBAN NON-SYSTEM CRASH LISTING

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at SAM JACKSON PARK RD, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

1 - 4 of 8 Crash records shown.

SER# INVEST RD DPT UNLOC?	S P E E D	A L C	D R U G S	S C H L	W O R K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V#	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE
11850	N	N	N			10/06/2016	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	29
NO RPT						TH	0	SW SAM JACKSON PARK RD	E		TRF SIGNAL	N	DRY	REAR		PRVTE	E -W									000		00
N						2P			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	28	F	OTH-Y		026	000		29
N						45 30 10.32	-122 41 15.22																OR<25					
															02	NONE 0	STOP											
																PRVTE	E -W									011	013	00
																PSNGR CAR		01	DRVR	NONE	44	F	OR-Y		000	000		00
																							OR<25					
															03	NONE 0	STOP											
																PRVTE	E -W									022		00
																PSNGR CAR		01	DRVR	INJC	43	F	OTH-Y		000	000		00
																							N-RES					
															03	NONE 0	STOP											
																PRVTE	E -W									022		00
																PSNGR CAR		02	PSNG	INJC	00	F			000	000		00
01679	N	N	N			02/20/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT											07
NONE						WE	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	WET	REAR		PRVTE	S -N									000		00
N						4P			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	00	M	OR-Y		026	000		07
N						45 30 10.3237919	-122 41 15.220176																OR<25					
															02	NONE 0	STOP											
																PRVTE	S -N									011		00
																PSNGR CAR		01	DRVR	INJC	49	F	OR-Y		000	000		00
																							OR<25					
01653	N	N	N			02/07/2014	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE						FR	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	WET	REAR		PRVTE	S -N									000		00
N						4P			06	1		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	60	F	OR-Y		026,014	000		29
N						45 30 10.3237919	-122 41 15.2202119																OR<25					
															02	NONE 0	STOP											
																PRVTE	S -N									011		00
																PSNGR CAR		01	DRVR	NONE	70	F	OR-Y		000	000		00
																							OR>25					
08557	N	N	N			08/10/2015	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	UNKN 0	TURN-R											08
NONE						MO	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	DRY	TURN		UNKN	W -S									000		00
N						8A			06	1		N	DAY	INJ		UNKNOWN		01	DRVR	NONE	00	Unk	UNK		001	000		08
N						45 30 10.32	-122 41 15.22																UNK					
															02	NONE 0	TURN-L											
																PRVTE	S -W									000		00
																PSNGR CAR		01	DRVR	INJC	32	M	OR-Y		000	000		00
																							OR<25					

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at SAM JACKSON PARK RD, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

5 - 8 of 8 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D / P R S W / E A U C O / E L G H R / D C S L K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	SPCL USE TRLR QTY OWNER V# TYPE	MOVE FROM TO	PRTC P# TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT EVENT	CAUSE
00491	N N N	01/15/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	S-1STOP	01 NONE 0	STRGHT									07
NONE		TU	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	DRY	REAR	UNKN	W -E								000	00
N		10A			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	M	UNK		026	000	07
N		45 30	-122 41														UNK				
		10.3237919	15.220176																		
											02 NONE 0	STOP									
											PRVTE	W -E								011	00
											PSNGR CAR		01 DRVR	NONE	61	F	OR-Y		000	000	00
																	OR<25				
											02 NONE 0	STOP									
											PRVTE	W -E								011	00
											PSNGR CAR		02 PSNG	NONE	82	M			000	000	00
11833	Y N N	11/02/2013	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	Y	CLR	FIX OBJ	01 NONE 0	STRGHT								079	01
NONE		SA	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	WET	FIX	PRVTE	E -W								000 079	00
N		9A			05	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	60	F	OR-Y		047,080	017	01
N		45 30	-122 41														OR<25				
		10.3237919	15.220176																		
06261	N N N N N	06/14/2012	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01 UNKN 9	TURN-R									08
CITY		TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	TURN	UNKN	W -S								000	00
N		11A			04	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		001,007	000	00
N		45 30	-122 41														UNK				
		10.3638043	14.7142804																		
											02 NONE 0	TURN-L									
											PRVTE	S -W								000	00
											PSNGR CAR		01 DRVR	NONE	46	F	OR-Y		000	000	00
																	OR<25				
12502	N N N	11/20/2014	17	SW SAM JACKSON PARK RD	INTER	3-LEG	N	N	RAIN	S-1STOP	01 NONE 0	TURN-R									07
NONE		TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	WET	REAR	PRVTE	S -E								000	00
N		4P			04	0		N	DUSK	INJ	PSNGR CAR		01 DRVR	NONE	48	F	OR-Y		026	000	07
N		45 30 10.32	-122 41														OR<25				
			15.22																		
											02 NONE 0	STOP									
											PRVTE	S -E								013	00
											PSNGR CAR		01 DRVR	NONE	34	F	OR-Y		000	000	00
																	OR>25				
											02 NONE 0	STOP									
											PRVTE	S -E								013	00
											PSNGR CAR		02 PSNG	INJC	12	F			000	000	00

URBAN NON-SYSTEM CRASH LISTING

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at CAMPUS DR, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

1 - 5 of 7 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D / P R S W / E A U C O / E L G H R / D C S L K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF-CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	SPCL USE TRLR QTY OWNER V# TYPE	MOVE FROM TO	PRTC P# TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT EVENT	CAUSE
02980	N N N	03/20/2015	17	SW CAMPUS DR	INTER	3-LEG	N	N	RAIN	S-1STOP	01 NONE 0	STRGHT									29
NONE		FR	0	SW TERWILLIGER BLVD	SE		STOP SIGN	N	WET	REAR	PRVTE	SE-NW								000	00
N		6P			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	M	OR-Y		026	000	29
N		45 29 57.19	-122 40 57.24														OR<25				
											02 NONE 0	STOP									
											PRVTE	SE-NW								011	00
											PSNGR CAR		01 DRVR	NONE	67	F	OR-Y		000	000	00
																	OR<25				
02979	N N N	03/23/2012	17	SW CAMPUS DR	INTER	3-LEG	N	N	CLR	S-1STOP	01 NONE 0	STRGHT									07
NONE		FR	0	SW TERWILLIGER BLVD	SW		STOP SIGN	N	DRY	REAR	PRVTE	SW-NE								000	00
N		11A			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	64	F	OR-Y		026	000	07
N		45 29 57.1862131	-122 40 57.2360172														OR<25				
											02 NONE 0	STOP									
											PRVTE	SW-NE								012	00
											PSNGR CAR		01 DRVR	NONE	63	M	OR-Y		000	000	00
																	OR>25				
00545	N N N	01/17/2013	17	SW CAMPUS DR	INTER	3-LEG	N	N	CLR	S-1STOP	01 NONE 0	STRGHT									07
NONE		TH	0	SW TERWILLIGER BLVD	SW		STOP SIGN	N	DRY	REAR	UNKN	SW-NE								000	00
N		7A			06	0		N	DAY	INJ	PSNGR CAR		01 DRVR	NONE	00	F	OR-Y		026	000	07
N		45 29 57.186204	-122 40 57.236016														UNK				
											02 NONE 0	STOP									
											PRVTE	SW-NE								011	00
											PSNGR CAR		01 DRVR	INJC	61	F	OTH-Y		000	000	00
																	N-RES				
											02 NONE 0	STOP									
											PRVTE	SW-NE								011	00
											PSNGR CAR		02 PSNG	INJC	40	F			000	000	00
12353	N N N	10/15/2016	17	SW CAMPUS DR	INTER	3-LEG	N	Y	RAIN	FIX OBJ	01 NONE 9	STRGHT								092,040	26
NONE		SA	0	SW TERWILLIGER BLVD	NW		STOP SIGN	N	WET	FIX	N/A	SE-NW								000	00
N		2P			05	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		000	000	00
N		45 29 57.19	-122 40 57.24														UNK				
03124	N N N	03/31/2014	17	SW CAMPUS DR	INTER	3-LEG	N	N	CLR	BIKE	01 NONE 0	TURN-L									02
NONE		MO	0	SW TERWILLIGER BLVD	CN		STOP SIGN	N	DRY	TURN	PRVTE	SW-NW								000	00
N		12P			02	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	F	UNK		027	000	02
N		45 29 57.186204	-122 40 57.236016														OR>25				
												-									
												STRGHT	01 BIKE	NONE	26	M		I INRD	000	000	00
												SE NW									

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at CAMPUS DR, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

6 - 7 of 7 Crash records shown.

SER# INVEST RD DPT UNLOC?	S P E E D	A L C	D R U G	S C H L	W O R K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V# SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	P# PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT EVENT	CAUSE
13333	N	N	N	N	N	06/17/2016	17	SW CAMPUS DR	INTER	3-LEG	N	N	CLR	S-1TURN	01 NONE 9	STRGHT									07
CITY						FR	0	SW TERWILLIGER BLVD	CN		UNKNOWN	N	DRY	TURN	N/A	NW-SE								000	00
N						11A			03	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		000	000	00
N						45 29 57.19	-122 40 57.24														UNK				
															02 NONE 9	TURN-R									
															N/A	NW-SW								000	00
															PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		000	000	00
																					UNK				
06473	N	N	N			06/04/2016	17	SW CAMPUS DR	INTER	3-LEG	N	N	CLR	O-1 L-TURN	01 NONE 9	TURN-L								128	02
NONE						SA	0	SW TERWILLIGER BLVD	CN		STOP SIGN	N	DRY	TURN	N/A	SE-SW								000	00
N						3P			03	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		000	000	00
N						45 29 57.19	-122 40 57.24														UNK				
															02 NONE 9	STRGHT									
															N/A	NW-SE								000	00
															PSNGR CAR		01 DRVR	NONE	00	Unk	UNK		000	000	00
																					UNK				

VETERANS HOSP RD at GAINES ST, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

SER# / INVEST / RD DPT / UNLOC?	S P / E E / D	A L C	R U G S	S C H L	W O R K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC / TYPE	INJ / SVRTY	A / G / E	S / E / X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE

TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at VETERANS HOSP RD, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

1 - 4 of 4 Crash records shown.

SER# / INVEST / RD DPT / UNLOC?	S / P / E / E / D	A / L / C	D / R / U / G / S	S / C / H / L	W / O / R / K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	SPCL USE / TRLR QTY / OWNER / V# TYPE	MOVE / FROM / TO	PRTC / P# TYPE	INJ / SVRTY	A / G / E	S / E / X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE
06568	N	N	N			06/21/2012	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	CLR	S-1STOP	01 NONE 0	STRGHT									013	07
NO RPT						TH	0	SW VETERANS HOSP RD	SE		UNKNOWN	N	DRY	REAR	PRVTE	SE-NW								000		00
N						7A			06	0		N	DAY	INJ	PSNGR CAR		01 DRVR	NONE	46	F	OR-Y		026	000		07
N						45 29	-122 40														OR<25					
						40.8185076	56.5135911																			
															02 NONE 0	STOP										
															PRVTE	SE-NW								011	013	00
															PSNGR CAR		01 DRVR	INJC	23	M	UNK		000	000		00
																					OR<25					
															03 UNKN 0	STOP										
															UNKN	SE-NW								012		00
															UNKNOWN		01 DRVR	NONE	00	Unk	UNK		000	000		00
																					UNK					
01291	N	N	N			02/08/2013	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01 NONE 0	STRGHT										02
NONE						FR	0	SW VETERANS HOSP RD	CN		STOP SIGN	N	DRY	TURN	PRVTE	SE-NW								000		00
N						2P			02	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	60	M	OR-Y		000	000		00
N						45 29	-122 40														OR>25					
						40.8184799	56.5135679																			
															02 NONE 0	TURN-L										
															PRVTE	SW-NW								015		00
															PSNGR CAR		01 DRVR	NONE	73	M	OR-Y		028	000		02
																					OR<25					
03525	N	N	N			04/03/2015	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	RAIN	ANGL-OTH	01 NONE 0	STRGHT										02
NO RPT						FR	0	SW VETERANS HOSP RD	CN		STOP SIGN	N	WET	TURN	PRVTE	NW-SE								000		00
N						3P			04	0		N	DAY	INJ	PSNGR CAR		01 DRVR	INJC	22	M	OR-Y		000	000		00
N						45 29 40.82	-122 40														OR<25					
							56.51																			
															02 NONE 0	TURN-L										
															PRVTE	SW-NW								015		00
															PSNGR CAR		01 DRVR	INJB	50	F	OR-Y		028	000		02
																					OR<25					
14648	N	N	N			12/22/2015	17	SW TERWILLIGER BLVD	INTER	3-LEG	N	N	CLR	ANGL-OTH	01 NONE 0	TURN-L										02
NO RPT						TU	0	SW VETERANS HOSP RD	CN		STOP SIGN	N	DRY	TURN	PRVTE	SW-NW								015		00
N						10A			02	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	27	M	OR-Y		028	000		02
N						45 29 37.82	-122 40														OR<25					
							53.09																			
															02 NONE 0	STRGHT										
															PRVTE	SE-NW								000		00
															PSNGR CAR		01 DRVR	NONE	18	M	OR-Y		000	000		00
																					OR<25					

URBAN NON-SYSTEM CRASH LISTING

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at CAPITOL HY, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

1 - 4 of 11 Crash records shown.

	S D																							
SER#	P R S W	DATE	CLASS	CITY STREET		INT-TYPE						SPCL USE												
INVEST	E A U C O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH		TRLR QTY	MOVE				A	S						
RD DPT	E L G H R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL		OWNER	FROM		PRTC	INJ	G	E	LICNS	PED				
UNLOC?	D C S L K	LAT	LONG	LRS	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE
07030	N N N N N	07/12/2013	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	STRGHT											08
CITY		FR	0	SW TERWILLIGER BLVD	E		TRF SIGNAL	N	WET	TURN		PRVTE	W -E									000		00
N		8A			05	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	37	M	OR-Y		000	000		00
N		45 28 48.7336079	-122 41 13.2072719																OR<25					
													-											
													TURN-L	01	BIKE	INJB	53	F		I INRD	006	039		08
													W N											
12308	N N N	11/13/2013	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	07
NO RPT		WE	0	SW TERWILLIGER BLVD	S		TRF SIGNAL	N	DRY	REAR		PRVTE	S -N									000		00
N		8A			06	0		N	DAWN	INJ		PSNGR CAR		01	DRVR	NONE	54	F	OR-Y		026	000		07
N		45 28 48.7336079	-122 41 13.2072719																OR>25					
											02	UNKN 0	STOP											
												PRVTE	S -N									011	013	00
												UNKNOWN		01	DRVR	NONE	00	M	OR-Y		000	000		00
																			OR>25					
											03	NONE 0	STOP											
												PRVTE	S -N									011	013	00
												PSNGR CAR		01	DRVR	NONE	00	F	OR-Y		000	000		00
																			OR<25					
											04	NONE 0	STOP											
												PRVTE	S -N									011		00
												PSNGR CAR		01	DRVR	INJC	64	M	OR-Y		000	000		00
																			OR>25					
08541	N N N	08/19/2013	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	BIKE	01	NONE 0	STRGHT											07
NO RPT		MO	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	DRY	REAR		PRVTE	W -E									000		00
N		7A			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	40	F	OR-Y		026	000		07
N		45 28 48.7336079	-122 41 13.2072719																OR<25					
													-											
													STOP	01	BIKE	INJB	62	M		I INRD	000	035		00
													W E											
12389	N N N N N	10/30/2014	14	SW CAPITOL HY	INTER	CROSS	N	N	RAIN	S-1STOP	01	NONE 0	STRGHT											07
CITY		TH	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	WET	REAR		UNKN	W -E									000		00
N		7A			06	0		N	DAWN	INJ		PSNGR CAR		01	DRVR	NONE	00	M	UNK		026	000		07
N		45 28 48.73	-122 41 13.21																UNK					
											02	NONE 0	STOP											
												PRVTE	W -E									011		00
												PSNGR CAR		01	DRVR	INJC	21	F	OR-Y		000	000		00
																			OR<25					

TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

CITY OF PORTLAND SW, MULTNOMAH COUNTY

TERWILLIGER BLVD at CAPITOL HY, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

5 - 8 of 11 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D P R S W E A U C O E L G H R D C S L K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	SPCL USE TRLR QTY OWNER V# TYPE	MOVE FROM TO	PRTC P# TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE
08386	N N N N N	05/15/2015	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	BIKE	01 NONE 0	TURN-L										02
CITY		FR	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	DRY	TURN	PRVTE	S -W								000		00
N		11A			05	0		N	DAY	INJ	PSNGR CAR		01 DRVR	NONE	43	F	OR-Y		027	000		02
N		45 28 48.73	-122 41 13.21														OR<25					
												-										
												STRGHT	01 BIKE	INJB	34	M		I XWLK	000	035		00
												S N										
02655	N N N	03/13/2015	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	S-1STOP	01 NONE 0	STRGHT									013	29
NONE		FR	0	SW TERWILLIGER BLVD	W		TRF SIGNAL	N	DRY	REAR	PRVTE	W -E								000		00
N		4P			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	55	M	OR-Y		026	000		29
N		45 28 48.73	-122 41 13.21														OR<25					
											02 NONE 0	STOP										
											PRVTE	W -E								011		00
											PSNGR CAR		01 DRVR	NONE	62	M	OR-Y		000	000		00
																	OR<25					
10179	N N N N N	09/19/2012	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	BIKE	01 NONE 0	TURN-L										02
CITY		WE	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	TURN	PRVTE	W -N								000		00
N		5P			02	0		N	DAY	INJ	PSNGR CAR		01 DRVR	NONE	29	F	OR-Y		027,004	000		02
N		45 28 48.7336327	-122 41 13.2072802														OR>25					
												-										
												STRGHT	01 BIKE	INJB	24	M		I INRD	000	039		00
												E W										
06024	N N N	06/17/2013	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	O-1 L-TURN	01 NONE 0	STRGHT										04
NO RPT		MO	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	TURN	PRVTE	E -W								000		00
N		8A			02	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	29	F	OR-Y		097	000		00
N		45 28 48.7336079	-122 41 13.2072719														OR<25					
											02 NONE 0	TURN-L										
											PRVTE	W -N								000		00
											PSNGR CAR		01 DRVR	NONE	29	F	OR-Y		097	000		00
																	OR<25					
09699	N N N	09/18/2014	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	S-OTHER	01 NONE 0	TURN-R										07
NONE		TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	REAR	PRVTE	N -W								000		00
N		6P			01	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	50	M	OR-Y		026	000		07
N		45 28 48.73	-122 41 13.21														OR<25					

TERWILLIGER BLVD at CAPITOL HY, City of Portland SW, Multnomah County, 01/01/2012 to 12/31/2016

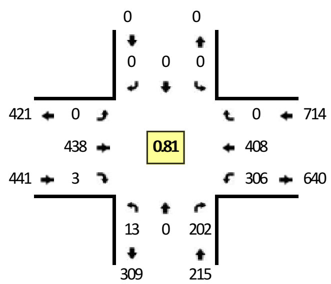
9 - 11 of 11 Crash records shown.

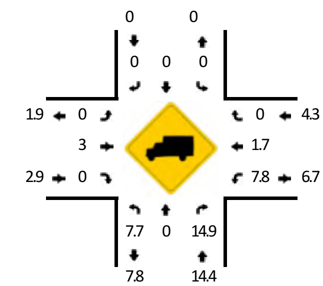
SER# / INVEST / RD DPT / UNLOC?	S P E D / A L C / D R U G S / S C H L / W O R K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V# SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	PRTC / P# TYPE	INJ SVRTY	AGE	SEX	LICNS / RES	PED LOC	ERROR	ACT EVENT	CAUSE
											02 NONE 0	STOP									
											PRVTE	N -W								011	00
											PSNGR CAR		01 DRVR	NONE	00	F	OR-Y		000	000	00
																	OR-?				
12437	N N N	11/08/2015	14	SW CAPITOL HY	INTER	CROSS	N	N	CLR	O-1 L-TURN	01 NONE 0	TURN-L									02
NONE		SU	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	DRY	TURN	PRVTE	E -S								000	00
N		4A			03	0		N	DLIT	PDO	PSNGR CAR		01 DRVR	NONE	51	F	OR-Y		004,028	000	02
N		45 28 48.73	-122 41														OR<25				
			13.21																		
											02 NONE 0	STRGHT									
											PRVTE	W -E								000	00
											PSNGR CAR		01 DRVR	NONE	67	F	OR-Y		000	000	00
																	OR<25				
12620	N N N	10/20/2016	14	SW CAPITOL HY	INTER	CROSS	N	N	RAIN	ANGL-OTH	01 NONE 0	STOP								124	04
NONE		TH	0	SW TERWILLIGER BLVD	CN		TRF SIGNAL	N	WET	ANGL	PRVTE	S -N								011	00
N		2P			02	0		N	DAY	INJ	PSNGR CAR		01 DRVR	NONE	68	F	OR-Y		020	000	04
N		45 28 48.73	-122 41														OR<25				
			13.21																		
											02 NONE 0	STRGHT									
											PRVTE	E -W								001 124	00
											PSNGR CAR		01 DRVR	INJC	34	M	OR-Y		000	000	00
																	OR<25				
											02 NONE 0	STRGHT									
											PRVTE	E -W								001 124	00
											PSNGR CAR		02 PSNG	INJC	33	F			000	000	00
											02 NONE 0	STRGHT									
											PRVTE	E -W								001 124	00
											PSNGR CAR		03 PSNG	INJC	03	F			000	000	00

Appendix B: Existing Traffic Count Volumes

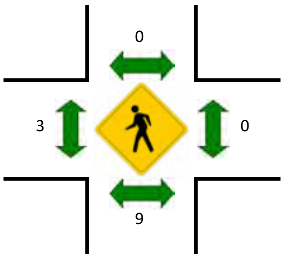
LOCATION: SW Terwilliger Blvd -- SW Sam Jackson Park Rd **QC JOB #:** 14944207
CITY/STATE: Multnomah, OR **DATE:** Thu, Apr 4 2019

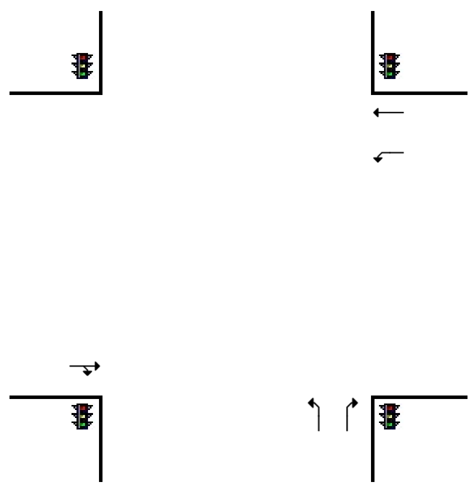
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

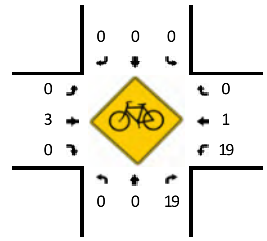


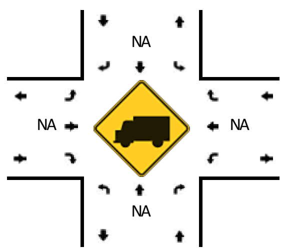


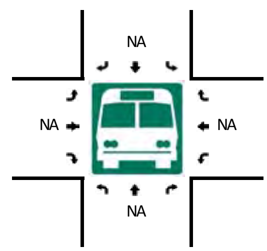
Quality Counts
DATA THAT DRIVES COMMUNITIES











5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Sam Jackson Park Rd (Eastbound)				SW Sam Jackson Park Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	0	19	0	0	0	0	0	0	24	1	0	34	31	0	0	110	
7:05 AM	0	0	9	0	0	0	0	0	0	21	0	0	31	33	0	0	94	
7:10 AM	1	0	11	0	0	0	0	0	0	16	0	0	18	23	0	0	69	
7:15 AM	2	0	14	0	0	0	0	0	0	30	0	0	27	21	0	0	94	
7:20 AM	0	0	16	0	0	0	0	0	0	27	1	0	27	37	0	0	108	
7:25 AM	0	0	11	0	0	0	0	0	0	26	0	0	23	22	0	0	82	
7:30 AM	0	0	20	0	0	0	0	0	0	54	0	0	34	39	0	0	147	
7:35 AM	2	0	24	0	0	0	0	0	0	59	1	0	24	25	0	0	135	
7:40 AM	2	0	26	0	0	0	0	0	0	63	0	0	18	31	0	0	140	
7:45 AM	0	0	17	0	0	0	0	0	0	35	0	0	41	51	0	0	144	
7:50 AM	0	0	9	0	0	0	0	0	0	25	0	0	27	47	0	0	108	
7:55 AM	0	0	21	0	0	0	0	0	0	40	0	0	24	23	0	0	108	1339
8:00 AM	4	0	21	0	0	0	0	0	0	29	1	0	24	39	0	0	118	1347
8:05 AM	2	0	15	0	0	0	0	0	0	25	0	0	18	33	0	0	93	1346
8:10 AM	1	0	8	0	0	0	0	0	0	25	0	0	19	40	0	0	93	1370
8:15 AM	1	0	12	0	0	0	0	0	0	25	0	0	20	29	0	0	87	1363
8:20 AM	2	0	13	0	0	0	0	0	0	27	1	0	23	35	0	0	101	1356
8:25 AM	2	0	12	0	0	0	0	0	0	24	0	0	19	32	0	0	89	1363
8:30 AM	0	0	17	0	0	0	0	0	0	25	0	0	15	28	0	0	85	1301
8:35 AM	0	0	15	0	0	0	0	0	0	19	0	0	28	33	0	0	95	1261
8:40 AM	1	0	14	0	0	0	0	0	0	29	0	0	23	24	0	0	91	1212
8:45 AM	0	0	18	0	0	0	0	0	0	22	0	0	24	22	0	0	86	1154
8:50 AM	0	0	20	0	0	0	0	0	0	19	1	0	26	29	0	0	95	1141
8:55 AM	2	0	19	0	0	0	0	0	0	28	1	0	28	16	0	0	94	1127

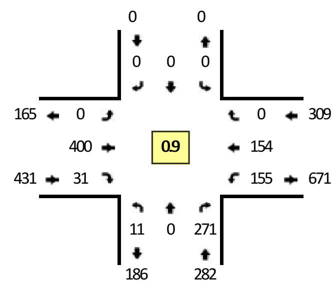
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	0	280	0	0	0	0	0	0	704	4	0	304	380	0	0	1688
Heavy Trucks	0	0	20		0	0	0		0	16	0		20	4	0		60
Pedestrians		16				0				4				0			20
Bicycles	0	0	6		0	0	0		0	1	0		3	0	0		10
Railroad																	
Stopped Buses																	

Comments:

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

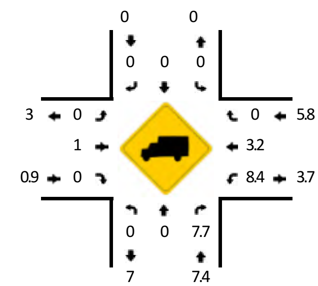
LOCATION: SW Terwilliger Blvd -- SW Sam Jackson Park Rd | **QC JOB #:** 14944208

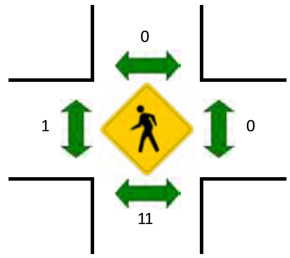
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

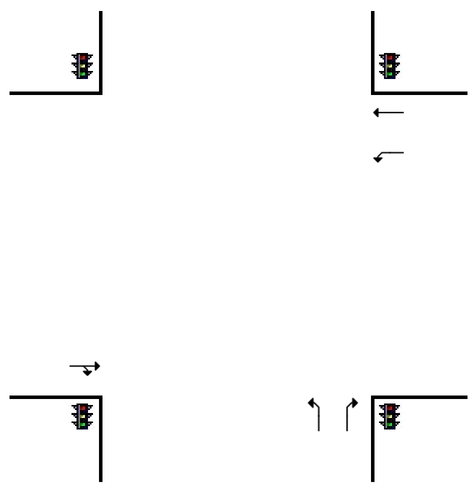


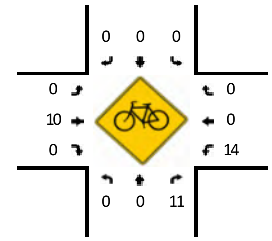
Peak-Hour: 4:00 PM -- 5:00 PM

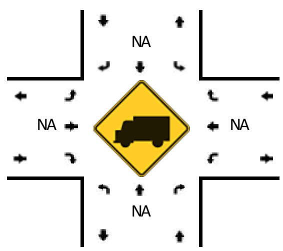
Peak 15-Min: 4:00 PM -- 4:15 PM

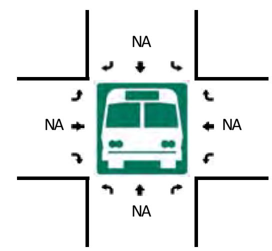












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound) Left	Thru	Right	U	SW Terwilliger Blvd (Southbound) Left	Thru	Right	U	SW Sam Jackson Park Rd (Eastbound) Left	Thru	Right	U	SW Sam Jackson Park Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	2	0	23	0	0	0	0	0	0	40	3	0	13	17	0	0	98	
4:05 PM	1	0	29	0	0	0	0	0	0	30	2	0	9	18	0	0	89	
4:10 PM	0	0	28	0	0	0	0	0	0	43	4	0	9	14	0	0	98	
4:15 PM	2	0	17	0	0	0	0	0	0	23	1	0	11	12	0	0	66	
4:20 PM	0	0	5	0	0	0	0	0	0	23	1	0	13	15	0	0	57	
4:25 PM	1	0	13	0	0	0	0	0	0	40	8	0	11	11	0	0	84	
4:30 PM	0	0	15	0	0	0	0	0	0	39	2	0	11	11	0	0	78	
4:35 PM	2	0	37	0	0	0	0	0	0	29	5	0	15	8	0	0	96	
4:40 PM	0	0	33	0	0	0	0	0	0	29	4	0	18	13	0	0	97	
4:45 PM	0	0	15	0	0	0	0	0	0	39	0	0	12	11	0	0	77	
4:50 PM	2	0	27	0	0	0	0	0	0	36	1	0	12	13	0	0	91	
4:55 PM	1	0	29	0	0	0	0	0	0	29	0	0	21	11	0	0	91	1022
5:00 PM	0	0	21	0	0	0	0	0	0	28	1	0	9	15	0	0	74	998
5:05 PM	0	0	16	0	0	0	0	0	0	34	2	0	13	16	0	0	81	990
5:10 PM	1	0	14	0	0	0	0	0	0	20	4	0	13	8	0	0	60	952
5:15 PM	0	0	12	0	0	0	0	0	0	38	8	0	10	13	0	0	81	967
5:20 PM	0	0	13	0	0	0	0	0	0	35	0	0	15	8	0	0	71	981
5:25 PM	0	0	30	0	0	0	0	0	0	22	3	0	17	13	0	0	85	982
5:30 PM	1	0	20	0	0	0	0	0	0	33	4	0	16	12	0	0	86	990
5:35 PM	0	0	25	0	0	0	0	0	0	24	0	0	20	12	0	0	81	975
5:40 PM	0	0	25	0	0	0	0	0	0	30	1	0	19	23	0	0	98	976
5:45 PM	0	0	21	0	0	0	0	0	0	38	0	0	12	15	0	0	86	985
5:50 PM	0	0	12	0	0	0	0	0	0	19	0	0	14	18	0	0	63	957
5:55 PM	1	0	27	0	0	0	0	0	0	29	1	0	9	11	0	0	78	944

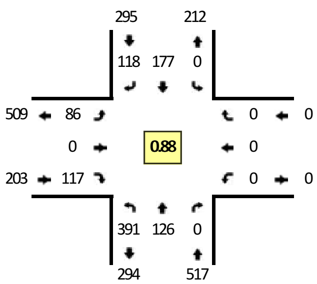
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	12	0	320	0	0	0	0	0	0	452	36	0	124	196	0	0	1140
Heavy Trucks	0	0	20		0	0	0		0	0	0		16	8	0		44
Pedestrians		8				0				0				0			8
Bicycles	0	0	2		0	0	0		0	4	0		3	0	0		9
Railroad																	
Stopped Buses																	

Comments:

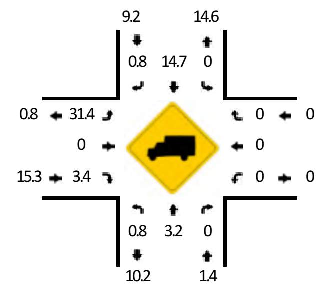
Report generated on 4/10/2019 8:21 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

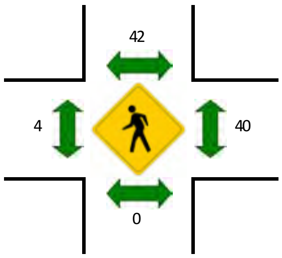
Type of peak hour being reported: Intersection Peak   Method for determining peak hour: Total Entering Volume

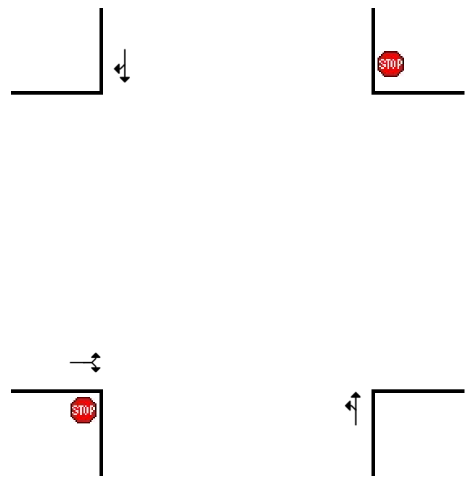
LOCATION: SW Terwilliger Blvd -- SW Campus Dr   **QC JOB #:** 14944205
CITY/STATE: Multnomah, OR   **DATE:** Thu, Apr 4 2019

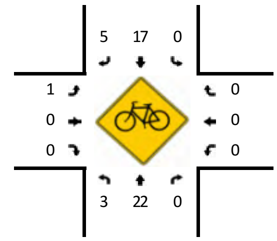


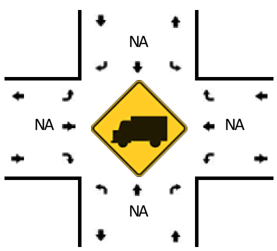
Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

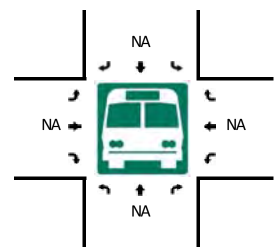












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	33	11	0	0	0	16	11	0	5	0	5	0	0	0	0	0	81	
7:05 AM	17	6	0	0	0	23	8	0	4	0	4	0	0	0	0	0	62	
7:10 AM	27	7	0	0	0	11	12	0	6	0	3	0	0	0	0	0	66	
7:15 AM	32	9	0	0	0	16	8	0	7	0	6	0	0	0	0	0	78	
7:20 AM	31	13	0	0	0	17	7	0	5	0	5	0	0	0	0	0	78	
7:25 AM	23	11	0	0	0	12	14	0	3	0	10	0	0	0	0	0	73	
7:30 AM	19	17	0	0	0	19	10	0	6	0	10	0	0	0	0	0	81	
7:35 AM	34	12	0	0	0	9	13	0	11	0	16	0	0	0	0	0	95	
7:40 AM	26	11	0	0	0	14	11	0	12	0	15	0	0	0	0	0	89	
7:45 AM	35	8	0	0	0	23	16	0	8	0	11	0	0	0	0	0	101	
7:50 AM	45	4	0	0	0	13	8	0	6	0	7	0	0	0	0	0	83	
7:55 AM	47	11	0	0	0	17	11	0	9	0	11	0	0	0	0	0	106	993
8:00 AM	30	11	0	0	0	14	10	0	12	0	9	0	0	0	0	0	86	998
8:05 AM	31	12	0	0	0	16	3	0	3	0	11	0	0	0	0	0	76	1012
8:10 AM	33	6	0	0	0	12	8	0	5	0	2	0	0	0	0	0	66	1012
8:15 AM	37	10	0	0	0	11	7	0	6	0	10	0	0	0	0	0	81	1015
8:20 AM	30	7	0	0	0	14	13	0	7	0	4	0	0	0	0	0	75	1012
8:25 AM	30	7	0	0	0	14	13	0	7	0	4	0	0	0	0	0	75	1014
8:30 AM	34	7	0	0	0	8	6	0	8	0	6	0	0	0	0	0	69	1002
8:35 AM	32	12	0	0	0	17	8	0	5	0	3	0	0	0	0	0	77	984
8:40 AM	29	12	0	0	0	18	5	0	4	0	1	0	0	0	0	0	69	964
8:45 AM	31	9	0	0	0	16	9	0	6	0	5	0	0	0	0	0	76	939
8:50 AM	37	12	0	0	0	15	8	0	9	0	7	0	0	0	0	0	88	944
8:55 AM	31	10	0	0	0	19	10	0	6	0	7	0	0	0	0	0	83	921

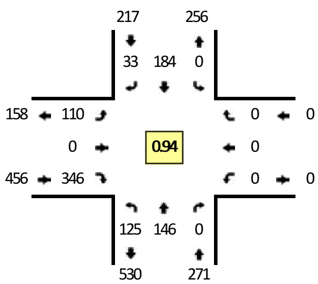
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	508	92	0	0	0	212	140	0	92	0	116	0	0	0	0	0	1160
Heavy Trucks	4	8	0		0	24	0		32	0	4		0	0	0		72
Pedestrians		0				52				0				48			100
Bicycles	1	5	0		0	3	1		0	0	0		0	0	0		10
Railroad																	
Stopped Buses																	

Comments:

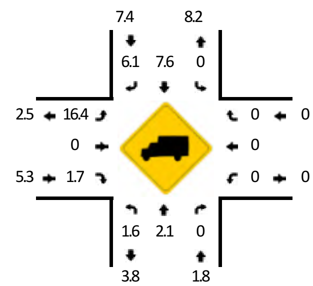
Report generated on 4/10/2019 8:21 PM   SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

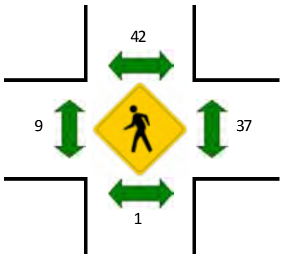
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

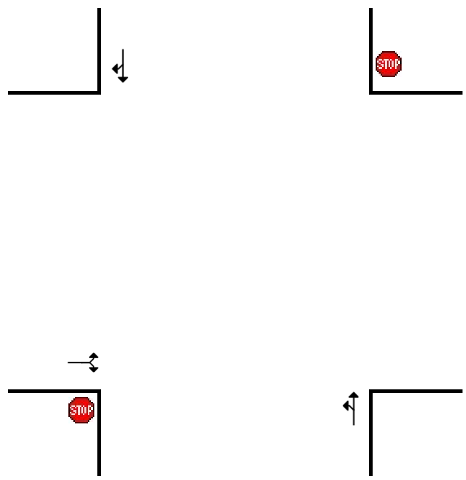
LOCATION: SW Terwilliger Blvd -- SW Campus Dr | **QC JOB #:** 14944206
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

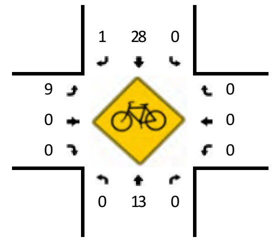


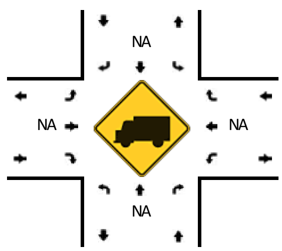
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

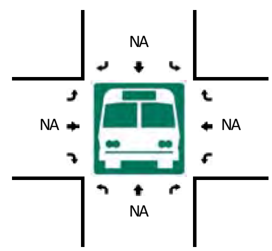












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	9	0	0	0	13	4	0	14	0	28	0	0	0	0	0	73	
4:05 PM	8	15	0	0	0	8	3	0	17	0	27	0	0	0	0	0	78	
4:10 PM	12	19	0	0	0	9	2	0	11	0	44	0	0	0	0	0	97	
4:15 PM	9	14	0	0	0	11	2	0	5	0	18	0	0	0	0	0	59	
4:20 PM	12	14	0	0	0	10	3	0	11	0	30	0	0	0	0	0	80	
4:25 PM	11	14	0	0	0	22	4	0	5	0	23	0	0	0	0	0	79	
4:30 PM	6	9	0	0	0	12	1	0	15	0	36	0	0	0	0	0	79	
4:35 PM	6	19	0	0	0	13	8	0	8	0	23	0	0	0	0	0	77	
4:40 PM	8	11	0	0	0	17	2	0	10	0	25	0	0	0	0	0	73	
4:45 PM	11	16	0	0	0	9	4	0	12	0	36	0	0	0	0	0	88	
4:50 PM	11	17	0	0	0	13	4	0	6	0	17	0	0	0	0	0	68	
4:55 PM	5	13	0	0	0	15	7	0	7	0	27	0	0	0	0	0	74	925
5:00 PM	11	9	0	0	0	7	2	0	10	0	30	0	0	0	0	0	69	921
5:05 PM	7	11	0	0	0	11	3	0	10	0	38	0	0	0	0	0	80	923
5:10 PM	6	18	0	0	0	20	2	0	9	0	32	0	0	0	0	0	87	913
5:15 PM	15	12	0	0	0	20	1	0	12	0	24	0	0	0	0	0	84	938
5:20 PM	8	12	0	0	0	20	0	0	10	0	29	0	0	0	0	0	79	937
5:25 PM	12	5	0	0	0	15	0	0	7	0	31	0	0	0	0	0	70	928
5:30 PM	11	6	0	0	0	22	1	0	4	0	36	0	0	0	0	0	80	929
5:35 PM	18	15	0	0	0	16	5	0	9	0	22	0	0	0	0	0	85	937
5:40 PM	10	12	0	0	0	16	4	0	14	0	24	0	0	0	0	0	80	944
5:45 PM	6	7	0	0	0	11	3	0	9	0	21	0	0	0	0	0	57	913
5:50 PM	9	15	0	0	0	7	2	0	6	0	13	0	0	0	0	0	52	897
5:55 PM	11	16	0	0	0	10	5	0	8	0	15	0	0	0	0	0	65	888

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	112	164	0	0	0	204	24	0	124	0	376	0	0	0	0	0	1004
Heavy Trucks	0	0	0		0	12	0		20	0	4		0	0	0		36
Pedestrians		0				52				12				44			108
Bicycles	0	5	0		0	6	1		3	0	0		0	0	0		15
Railroad																	
Stopped Buses																	

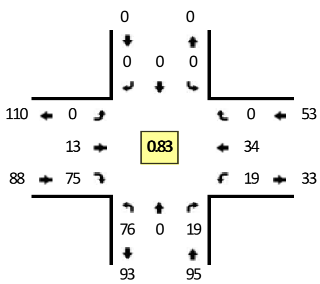
Comments:

Report generated on 4/10/2019 8:21 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

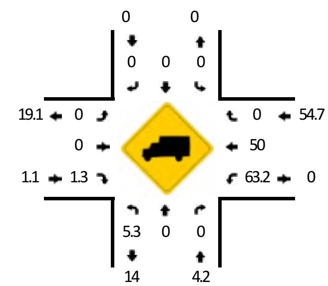
LOCATION: SW Gaines St -- SW US Veterans Hospital Rd — **QC JOB #:** 14944201

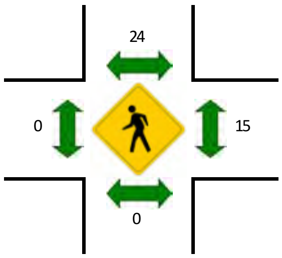
CITY/STATE: Multnomah, OR — **DATE:** Thu, Apr 4 2019

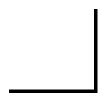


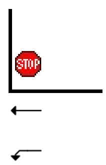
Peak-Hour: 7:30 AM -- 8:30 AM

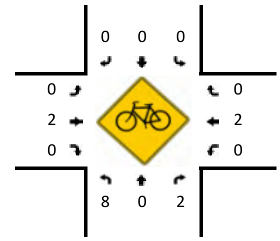
Peak 15-Min: 7:40 AM -- 7:55 AM

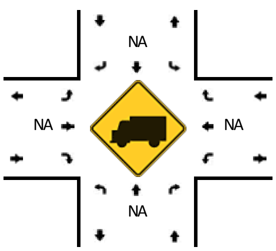


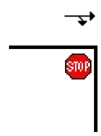


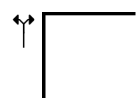


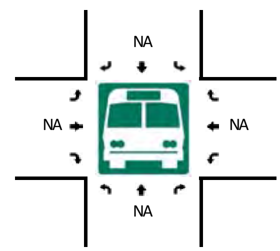












5-Min Count Period Beginning At	SW Gaines St (Northbound)				SW Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	0	1	0	0	0	0	0	0	0	5	0	1	2	0	0	15	
7:05 AM	1	0	3	0	0	0	0	0	0	5	0	0	1	3	0	0	13	
7:10 AM	8	0	3	0	0	0	0	0	0	1	8	0	4	3	0	0	27	
7:15 AM	5	0	1	0	0	0	0	0	0	2	1	0	1	1	0	0	11	
7:20 AM	6	0	2	0	0	0	0	0	0	1	2	0	0	2	0	0	13	
7:25 AM	5	0	1	0	0	0	0	0	0	4	4	0	1	1	0	0	16	
7:30 AM	4	0	1	0	0	0	0	0	0	1	5	0	1	2	0	0	14	
7:35 AM	9	0	0	0	0	0	0	0	0	1	9	0	2	4	0	0	25	
7:40 AM	6	0	0	0	0	0	0	0	0	0	9	0	1	3	0	1	20	
7:45 AM	8	0	0	0	0	0	0	0	0	1	9	0	2	4	0	0	24	
7:50 AM	11	0	4	0	0	0	0	0	0	3	4	0	2	3	0	0	27	
7:55 AM	6	0	3	0	0	0	0	0	0	1	3	0	0	1	0	0	14	219
8:00 AM	4	0	6	0	0	0	0	0	0	1	10	0	2	2	0	0	25	229
8:05 AM	4	0	1	0	0	0	0	0	0	1	3	0	1	2	0	0	12	228
8:10 AM	5	0	1	0	0	0	0	0	0	1	6	0	2	2	0	0	17	218
8:15 AM	11	0	1	0	0	0	0	0	0	2	4	0	1	3	0	0	22	229
8:20 AM	5	0	0	0	0	0	0	0	0	0	4	0	3	2	0	0	14	230
8:25 AM	3	0	2	0	0	0	0	0	0	1	9	0	1	6	0	0	22	236
8:30 AM	7	0	1	0	0	0	0	0	0	1	1	0	1	3	0	0	14	236
8:35 AM	4	0	1	0	0	0	0	0	0	2	5	0	1	5	0	0	18	229
8:40 AM	4	0	0	0	0	0	0	0	0	1	2	0	1	2	0	0	10	219
8:45 AM	7	0	1	0	0	0	0	0	0	0	7	0	1	2	0	0	18	213
8:50 AM	7	0	0	0	0	0	0	0	0	2	13	0	3	1	0	0	26	212
8:55 AM	5	0	1	0	0	0	0	0	0	0	3	0	0	3	0	1	13	211

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	100	0	16	0	0	0	0	0	0	16	88	0	20	40	0	4	284
Heavy Trucks	4	0	0		0	0	0		0	0	0		12	20	0		36
Pedestrians		0				20				0				20			40
Bicycles	3	0	0		0	0	0		0	0	0		0	1	0		4
Railroad																	
Stopped Buses																	

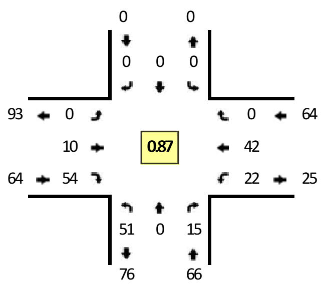
Comments:

Report generated on 4/10/2019 8:21 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

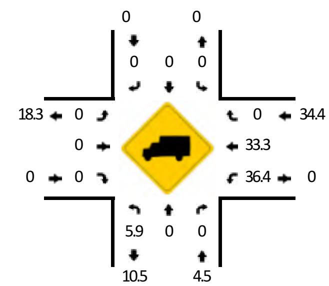
LOCATION: SW Gaines St -- SW US Veterans Hospital Rd | **QC JOB #:** 14944202

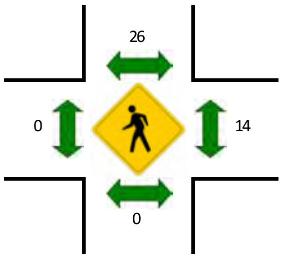
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

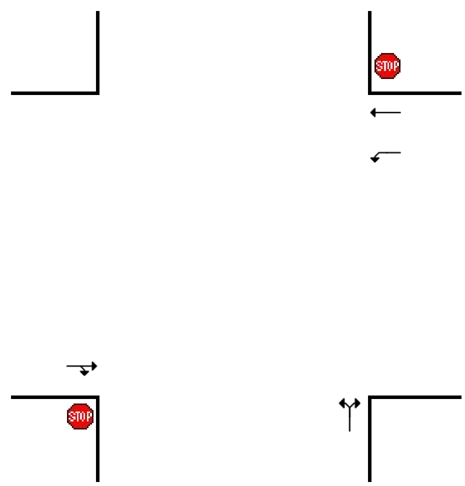


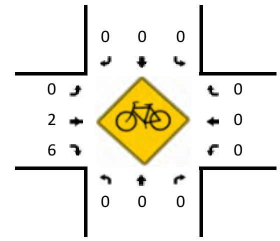
Peak-Hour: 4:25 PM -- 5:25 PM

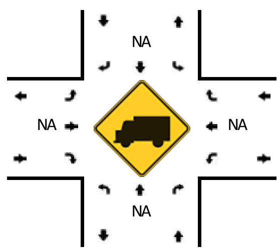
Peak 15-Min: 5:10 PM -- 5:25 PM

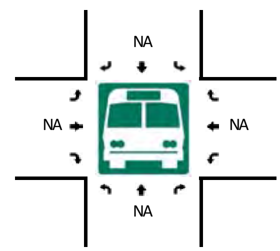












5-Min Count Period Beginning At	SW Gaines St (Northbound)				SW Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	0	0	0	0	0	0	0	0	0	7	0	1	5	0	0	14	
4:05 PM	2	0	1	0	0	0	0	0	0	0	8	0	2	3	0	0	16	
4:10 PM	5	0	1	0	0	0	0	0	0	1	3	0	4	6	0	0	20	
4:15 PM	1	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	9	
4:20 PM	2	0	1	0	0	0	0	0	0	3	4	0	4	6	0	0	20	
4:25 PM	4	0	0	0	0	0	0	0	0	2	8	0	1	1	0	0	16	
4:30 PM	2	0	3	0	0	0	0	0	0	1	5	0	4	3	0	0	18	
4:35 PM	4	0	2	0	0	0	0	0	0	0	5	0	4	4	0	0	19	
4:40 PM	2	0	2	0	0	0	0	0	0	0	6	0	2	5	0	0	17	
4:45 PM	3	0	2	0	0	0	0	0	0	1	1	0	2	3	0	0	12	
4:50 PM	2	0	0	0	0	0	0	0	0	0	2	0	2	5	0	0	11	
4:55 PM	3	0	0	0	0	0	0	0	0	0	4	0	1	2	0	0	10	182
5:00 PM	4	0	3	0	0	0	0	0	0	0	2	0	1	4	0	0	14	182
5:05 PM	9	0	0	0	0	0	0	0	0	1	6	0	1	4	0	0	21	187
5:10 PM	5	0	1	0	0	0	0	0	0	0	4	0	2	4	0	0	16	183
5:15 PM	9	0	1	0	0	0	0	0	0	1	4	0	1	1	0	0	17	191
5:20 PM	4	0	1	0	0	0	0	0	0	4	7	0	1	6	0	0	23	194
5:25 PM	4	0	2	0	0	0	0	0	0	0	4	0	2	1	0	0	13	191
5:30 PM	4	0	1	0	0	0	0	0	0	0	7	0	1	5	0	0	18	191
5:35 PM	3	0	4	0	0	0	0	0	0	0	5	0	3	5	0	0	20	192
5:40 PM	3	0	0	0	0	0	0	0	0	2	4	0	0	2	0	0	11	186
5:45 PM	1	0	1	0	0	0	0	0	0	0	3	0	3	4	0	0	12	186
5:50 PM	3	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	9	184
5:55 PM	0	0	1	0	0	0	0	0	0	0	3	0	1	1	0	0	6	180

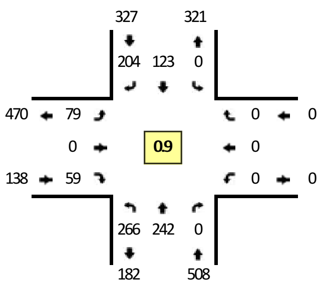
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	72	0	12	0	0	0	0	0	0	20	60	0	16	44	0	0	224
Heavy Trucks	4	0	0		0	0	0		0	0	0		8	16	0		28
Pedestrians		0				32				0				20			52
Bicycles	0	0	0		0	0	0		0	0	3		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

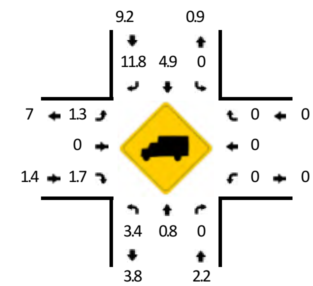
Report generated on 4/10/2019 8:21 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

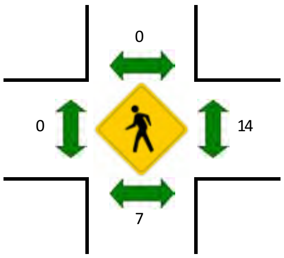
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

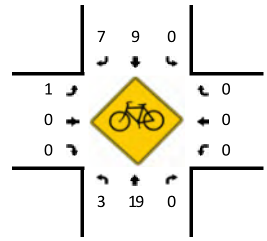
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd | **QC JOB #:** 14944203
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

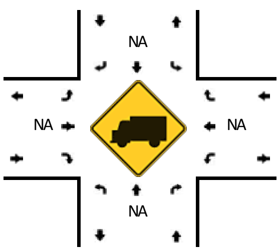


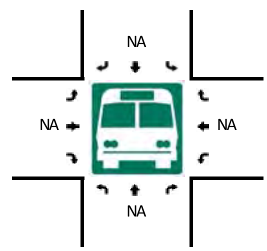
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:45 AM -- 8:00 AM











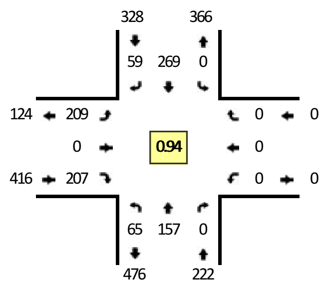
5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	20	17	0	0	0	9	16	0	9	0	7	0	0	0	0	0	78	
7:05 AM	17	13	0	0	0	9	26	0	4	0	6	0	0	0	0	0	75	
7:10 AM	29	14	0	0	0	5	14	0	6	0	1	0	0	0	0	0	69	
7:15 AM	21	17	0	0	0	3	18	0	10	0	5	0	0	0	0	0	74	
7:20 AM	31	14	0	0	0	10	25	0	4	0	6	0	0	0	0	0	90	
7:25 AM	23	19	0	0	0	10	15	0	8	0	7	0	0	0	0	0	82	
7:30 AM	21	16	0	0	0	11	17	0	16	0	6	0	0	0	0	0	87	
7:35 AM	19	15	0	0	0	14	14	0	5	0	5	0	0	0	0	0	72	
7:40 AM	18	22	0	0	0	15	12	0	5	0	4	0	0	0	0	0	76	
7:45 AM	20	25	0	0	0	12	19	0	4	0	6	0	0	0	0	0	86	
7:50 AM	27	44	0	0	0	12	13	0	5	0	2	0	0	0	0	0	103	
7:55 AM	20	26	0	0	0	13	15	0	3	0	4	0	0	0	0	0	81	973
8:00 AM	16	22	0	0	0	9	10	0	7	0	4	0	0	0	0	0	68	963
8:05 AM	18	25	0	0	0	11	16	0	4	0	4	0	0	0	0	0	78	966
8:10 AM	10	25	0	0	0	8	12	0	5	0	1	0	0	0	0	0	61	958
8:15 AM	16	22	0	0	0	7	8	0	2	0	4	0	0	0	0	0	59	943
8:20 AM	17	34	0	0	0	9	10	0	2	0	2	0	0	0	0	0	74	927
8:25 AM	15	21	0	0	0	11	16	0	3	0	6	0	0	0	0	0	72	917
8:30 AM	18	29	0	0	0	7	15	0	4	0	1	0	0	0	0	0	74	904
8:35 AM	14	19	0	0	0	10	10	0	6	0	2	0	0	0	0	0	61	893
8:40 AM	14	22	0	0	0	6	18	0	10	0	6	0	0	0	0	0	76	893
8:45 AM	9	35	0	0	0	11	13	0	4	0	3	0	0	0	0	0	75	882
8:50 AM	15	21	0	0	0	6	17	0	6	0	3	0	0	0	0	0	68	847
8:55 AM	11	25	0	0	0	10	8	0	5	0	4	0	0	0	0	0	63	829

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	268	380	0	0	0	148	188	0	48	0	48	0	0	0	0	0	1080
Heavy Trucks	4	4	0		0	4	28		4	0	4		0	0	0		48
Pedestrians		4				0				0				8			12
Bicycles	0	7	0		0	2	2		0	0	0		0	0	0		11
Railroad																	
Stopped Buses																	

Comments:

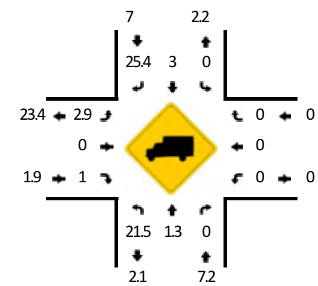
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

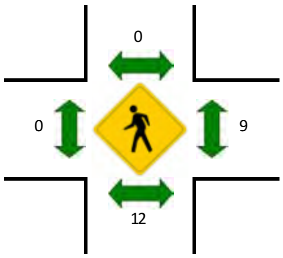
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd | **QC JOB #:** 14944204
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

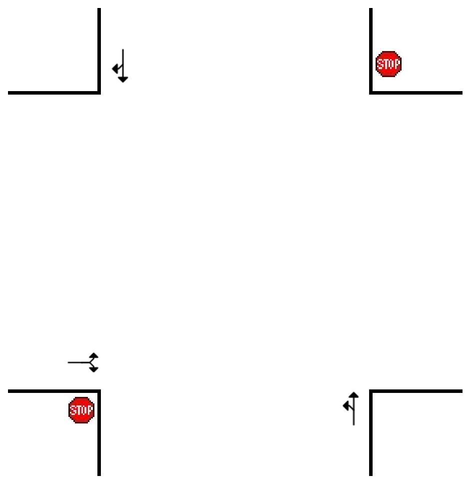


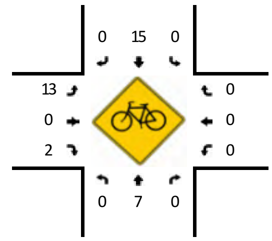
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

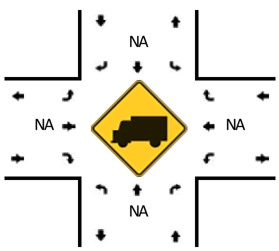
Quality Counts
DATA THAT DRIVES COMMUNITIES

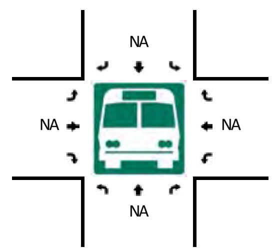












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound) Left	Thru	Right	U	SW Terwilliger Blvd (Southbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Eastbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	4	13	0	0	0	24	5	0	18	0	19	0	0	0	0	0	83	
4:05 PM	7	16	0	0	0	18	6	0	15	0	23	0	0	0	0	0	85	
4:10 PM	5	10	0	0	0	32	1	0	25	0	16	0	0	0	0	0	89	
4:15 PM	6	18	0	0	0	19	4	0	16	0	16	0	0	0	0	0	79	
4:20 PM	6	13	0	0	0	16	2	0	20	0	16	0	0	0	0	0	73	
4:25 PM	4	14	0	0	0	23	7	0	11	0	17	0	0	0	0	0	76	
4:30 PM	4	6	0	0	0	33	6	0	15	0	22	0	0	0	0	0	86	
4:35 PM	6	4	0	0	0	18	4	0	26	0	17	0	0	0	0	0	75	
4:40 PM	6	15	0	0	0	21	8	0	22	0	13	0	0	0	0	0	85	
4:45 PM	6	18	0	0	0	25	3	0	14	0	22	0	0	0	0	0	88	
4:50 PM	4	18	0	0	0	15	3	0	15	0	12	0	0	0	0	0	67	
4:55 PM	7	12	0	0	0	25	10	0	12	0	14	0	0	0	0	0	80	966
5:00 PM	7	16	0	0	0	21	2	0	15	0	6	0	0	0	0	0	67	950
5:05 PM	3	13	0	0	0	24	3	0	13	0	10	0	0	0	0	0	66	931
5:10 PM	1	26	0	0	0	23	4	0	14	0	14	0	0	0	0	0	82	924
5:15 PM	4	21	0	0	0	32	4	0	7	0	11	0	0	0	0	0	79	924
5:20 PM	3	13	0	0	0	25	4	0	9	0	15	0	0	0	0	0	69	920
5:25 PM	5	8	0	0	0	38	4	0	6	0	17	0	0	0	0	0	78	922
5:30 PM	0	12	0	0	0	36	2	0	7	0	18	0	0	0	0	0	75	911
5:35 PM	5	18	0	0	0	33	5	0	7	0	13	0	0	0	0	0	81	917
5:40 PM	5	16	0	0	0	22	5	0	12	0	11	0	0	0	0	0	71	903
5:45 PM	3	10	0	0	0	22	3	0	6	0	8	0	0	0	0	0	52	867
5:50 PM	2	11	0	0	0	15	1	0	16	0	8	0	0	0	0	0	53	853
5:55 PM	6	17	0	0	0	17	3	0	7	0	5	0	0	0	0	0	55	828

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	64	156	0	0	0	296	48	0	232	0	232	0	0	0	0	0	1028
Heavy Trucks	16	4	0		0	8	16		8	0	4		0	0	0		56
Pedestrians		8				0				0				4			12
Bicycles	0	3	0		0	4	0		2	0	0		0	0	0		9
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/10/2019 8:21 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

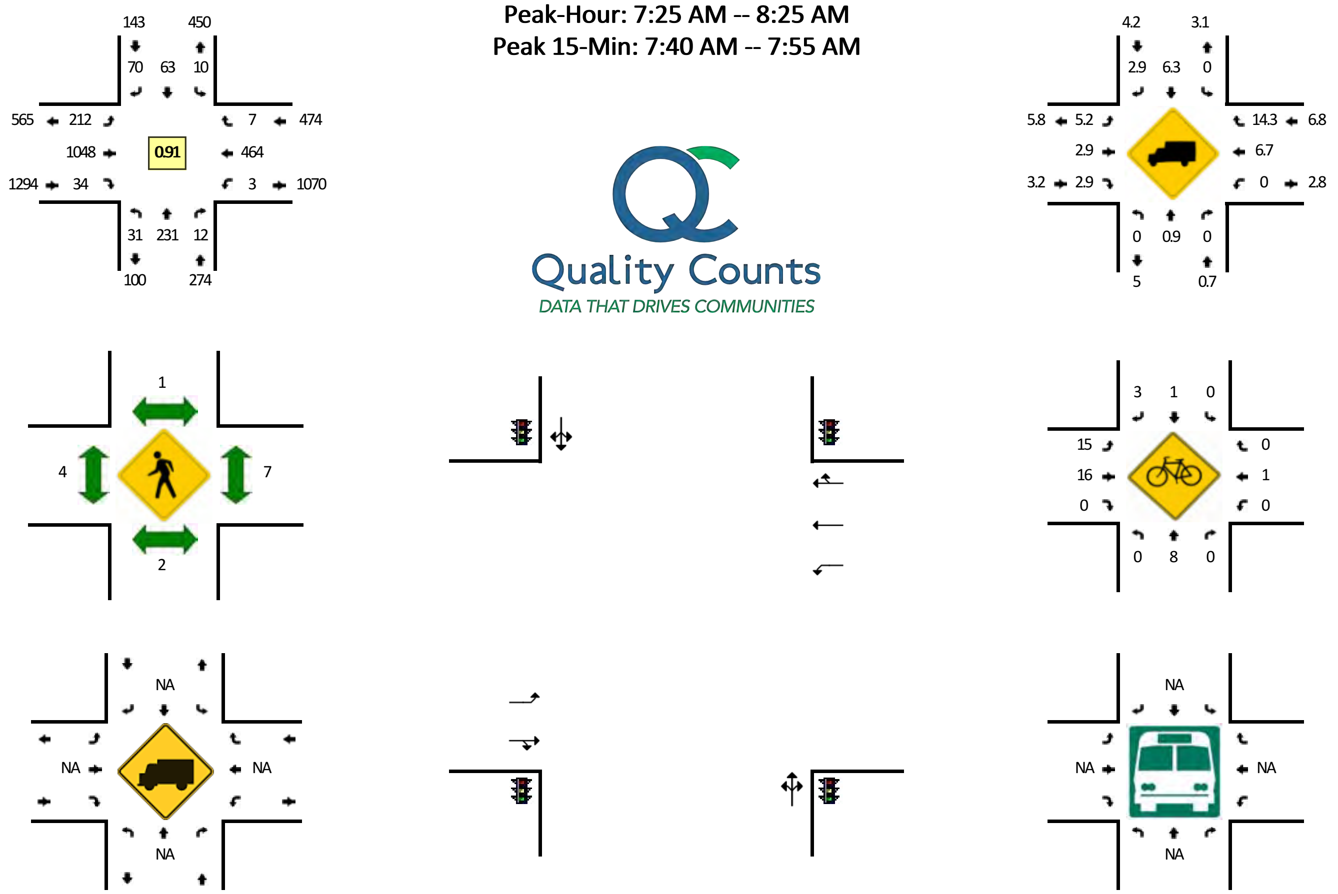
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy — **QC JOB #:** 14944209

CITY/STATE: Multnomah, OR — **DATE:** Thu, Apr 4 2019

Peak-Hour: 7:25 AM -- 8:25 AM

Peak 15-Min: 7:40 AM -- 7:55 AM



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Capitol Hwy (Eastbound)				SW Capitol Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	17	0	0	1	5	5	0	8	33	0	0	0	18	0	0	87	
7:05 AM	1	13	0	0	1	2	4	0	12	80	1	0	0	34	0	0	148	
7:10 AM	4	20	0	0	0	4	6	0	14	65	3	0	0	24	0	0	140	
7:15 AM	8	15	1	0	1	1	4	0	12	90	5	0	0	41	0	0	178	
7:20 AM	1	8	0	0	1	4	3	0	20	64	4	0	0	42	0	0	147	
7:25 AM	3	17	0	0	1	4	6	0	11	89	1	0	0	33	0	0	165	
7:30 AM	0	24	0	0	1	4	5	0	10	86	2	0	0	39	0	0	171	
7:35 AM	2	21	0	0	1	8	5	0	21	83	3	0	0	36	0	0	180	
7:40 AM	4	16	2	0	1	6	11	0	18	93	1	0	0	45	0	0	197	
7:45 AM	3	26	0	0	1	6	10	0	32	78	5	0	0	41	0	0	202	
7:50 AM	6	23	1	0	0	6	8	0	14	94	4	0	0	44	1	0	201	
7:55 AM	1	8	1	0	1	5	6	0	21	95	3	0	1	49	1	0	192	2008
8:00 AM	5	17	0	0	0	3	3	0	19	75	7	0	0	40	1	0	170	2091
8:05 AM	0	13	3	0	2	10	4	0	10	88	1	0	1	48	3	0	183	2126
8:10 AM	3	24	2	0	0	5	4	0	14	91	3	0	0	35	0	0	181	2167
8:15 AM	3	21	1	0	0	2	5	0	23	87	1	0	1	29	1	0	174	2163
8:20 AM	1	21	2	0	2	4	3	0	19	89	3	0	0	25	0	0	169	2185
8:25 AM	2	12	0	0	0	7	5	0	23	70	4	0	0	31	4	0	158	2178
8:30 AM	4	17	0	0	0	8	3	0	16	77	4	0	0	42	2	0	173	2180
8:35 AM	3	14	0	0	0	4	5	0	14	96	2	0	0	39	1	0	178	2178
8:40 AM	4	8	1	0	0	3	3	0	19	80	7	0	1	33	2	0	161	2142
8:45 AM	3	13	0	0	0	5	5	0	14	84	4	0	0	39	0	0	167	2107
8:50 AM	5	19	0	0	1	9	5	0	13	90	4	0	0	40	0	0	186	2092
8:55 AM	7	13	0	0	0	5	3	0	9	55	1	0	2	43	0	0	138	2038

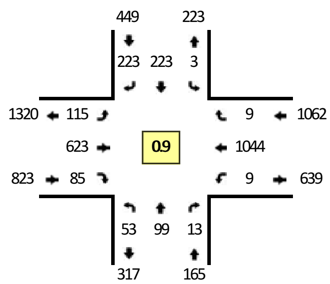
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	260	12	0	8	72	116	0	256	1060	40	0	0	520	4	0	2400
Heavy Trucks	0	0	0		0	4	0		4	32	4		0	32	0		76
Pedestrians		4				0				4				4			12
Bicycles	0	5	0		0	0	1		3	6	0		0	0	0		15
Railroad																	
Stopped Buses																	

Comments:

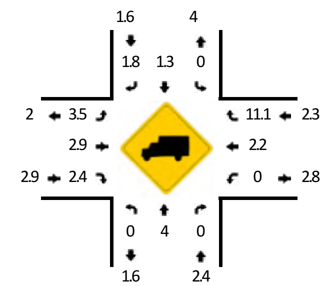
Report generated on 4/10/2019 8:21 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

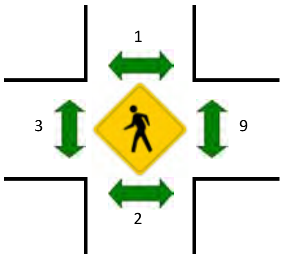
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

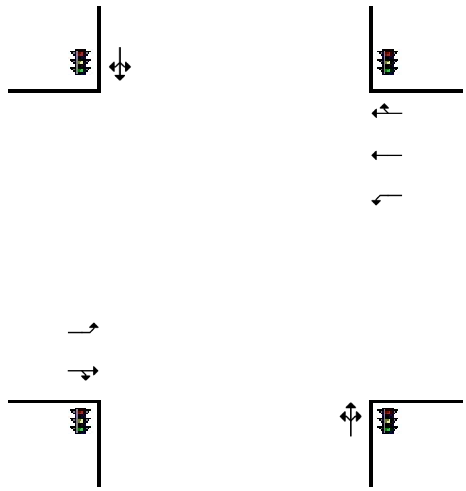
LOCATION: SW Terwilliger Blvd -- SW Capitol Hwy | **QC JOB #:** 14944210
CITY/STATE: Multnomah, OR | **DATE:** Thu, Apr 4 2019

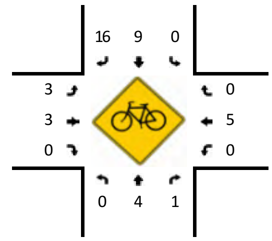


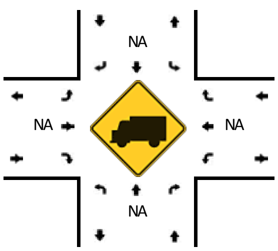
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:30 PM -- 5:45 PM

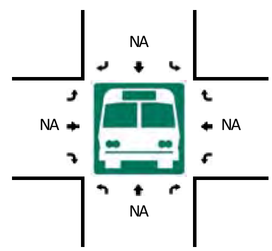












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound) Left	Thru	Right	U	SW Terwilliger Blvd (Southbound) Left	Thru	Right	U	SW Capitol Hwy (Eastbound) Left	Thru	Right	U	SW Capitol Hwy (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	7	1	0	0	14	17	0	9	65	5	0	1	71	1	0	194	
4:05 PM	9	5	2	0	0	14	23	0	7	71	5	0	2	65	1	0	204	
4:10 PM	8	7	0	0	0	20	28	0	3	53	11	0	0	73	1	0	204	
4:15 PM	8	8	1	0	1	23	17	0	10	60	12	0	0	95	2	0	237	
4:20 PM	5	4	0	0	0	10	10	0	9	69	9	0	1	82	1	0	200	
4:25 PM	6	8	1	0	0	25	22	0	6	45	9	0	1	57	1	0	181	
4:30 PM	4	2	0	0	0	18	18	0	2	66	7	0	0	82	0	0	199	
4:35 PM	4	7	1	0	0	15	25	0	11	61	6	0	0	92	2	0	224	
4:40 PM	6	8	0	0	0	25	13	0	9	70	7	0	2	92	0	0	232	
4:45 PM	2	3	1	0	1	17	30	0	9	50	7	0	0	65	0	0	185	
4:50 PM	7	3	2	0	2	27	22	0	4	37	7	0	2	86	1	0	200	
4:55 PM	3	3	2	0	0	6	12	0	22	49	9	0	0	81	1	0	188	2448
5:00 PM	6	7	2	0	0	23	19	0	11	46	9	0	1	87	2	0	213	2467
5:05 PM	1	5	0	0	0	14	15	0	16	59	13	0	0	83	0	0	206	2469
5:10 PM	2	11	1	0	1	14	21	0	8	44	7	0	0	88	0	0	197	2462
5:15 PM	5	13	0	0	0	15	25	0	7	47	6	0	0	87	0	0	205	2430
5:20 PM	9	10	1	0	0	20	21	0	3	62	1	0	1	73	0	0	201	2431
5:25 PM	7	5	1	0	1	19	23	0	4	39	6	0	1	79	2	0	187	2437
5:30 PM	2	12	3	0	0	18	13	0	10	63	3	0	2	102	1	0	229	2467
5:35 PM	4	8	0	0	1	38	25	0	6	46	10	0	0	101	1	0	240	2483
5:40 PM	5	13	0	0	0	22	22	0	6	67	8	0	0	83	1	0	227	2478
5:45 PM	3	4	1	0	0	26	14	0	4	50	5	0	1	79	0	0	187	2480
5:50 PM	6	8	2	0	0	8	13	0	18	51	8	0	3	101	1	0	219	2499
5:55 PM	2	10	1	0	0	12	11	0	9	50	6	0	1	64	2	0	168	2479

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	44	132	12	0	4	312	240	0	88	704	84	0	8	1144	12	0	2784
Heavy Trucks	0	4	0		0	4	0		0	20	0		0	40	4		72
Pedestrians		4				0				0				8			12
Bicycles	0	1	0		0	6	4		1	1	0		0	2	0		15
Railroad																	
Stopped Buses																	

Comments:

Report generated on 4/10/2019 8:21 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix C: Volume Calculations

Volume Calculations

Terwilliger Blvd at Sam Jackson Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	13	0	202	0	0	0	0	438	3	306	408	0
0.01												
2029 Background Traffic Volume	14.3	0	222.2	0	0	0	0	481.8	3.3	336.6	448.8	0
Site generated trips	3	0	42	0	0	0	0	0	0	75	0	0
2029 Total Traffic Volumes	17.3	0	264.2	0	0	0	0	481.8	3.3	411.6	448.8	0

Terwilliger Blvd at Sam Jackson Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	11	0	271	0	0	0	0	400	31	155	154	0
0.01												
2029 Background Traffic Volume	12.1	0	298.1	0	0	0	0	440	34.1	170.5	169.4	0
Site generated trips	6	0	98	0	0	0	0	0	10	31	0	0
2029 Total Traffic Volumes	18.1	0	396.1	0	0	0	0	440	44.1	201.5	169.4	0

Terwilliger Blvd at Campus Drive AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	391	126	0	0	177	118	86	0	117	0	0	0
0.01												
2029 Background Traffic Volume	430.1	138.6	0	0	194.7	129.8	94.6	0	128.7	0	0	0
Site generated trips	0	45	0	0	86	0	0	0	0	0	0	0
2029 Total Traffic Volumes	430.1	183.6	0	0	280.7	129.8	94.6	0	128.7	0	0	0

Terwilliger Blvd at Campus Drive PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	125	146	0	0	184	33	110	0	346	0	0	0
0.01												
2029 Background Traffic Volume	137.5	160.6	0	0	202.4	36.3	121	0	380.6	0	0	0
Site generated trips	0	104	0	0	41	0	0	0	0	0	0	0
2029 Total Traffic Volumes	137.5	264.6	0	0	243.4	36.3	121	0	380.6	0	0	0

Gaines St at Veterans Hospital Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	76	0	19	0	0	0	0	13	75	19	34	0
0.01												
2029 Background Traffic Volume	83.6	0	20.9	0	0	0	0	14.3	82.5	20.9	37.4	0
Site generated trips	0	0	6	0	0	0	0	4	0	3	6	0
2029 Total Traffic Volumes	83.6	0	26.9	0	0	0	0	18.3	82.5	23.9	43.4	0

Gaines St at Veterans Hospital Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	51	0	15	0	0	0	0	10	54	22	42	0
0.01												
2029 Background Traffic Volume	56.1	0	16.5	0	0	0	0	11	59.4	24.2	46.2	0
Site generated trips	0	0	3	0	0	0	0	5	0	6	15	0
2029 Total Traffic Volumes	56.1	0	19.5	0	0	0	0	16	59.4	30.2	61.2	0

Terwilliger Blvd at Veterans Hospital Rd AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	266	242	0	0	123	204	79	0	59	0	0	0
0.01												
2029 Background Traffic Volume	292.6	266.2	0	0	135.3	224.4	86.9	0	64.9	0	0	0
Site generated trips	129	0	0	0	0	86	45	0	29	0	0	0
2029 Total Traffic Volumes	421.6	266.2	0	0	135.3	310.4	131.9	0	93.9	0	0	0

Terwilliger Blvd at Veterans Hospital Rd PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	65	157	0	0	269	59	209	0	207	0	0	0
0.01												
2029 Background Traffic Volume	71.5	172.7	0	0	295.9	64.9	229.9	0	227.7	0	0	0
Site generated trips	56	0	0	0	0	41	104	0	172	0	0	0
2029 Total Traffic Volumes	127.5	172.7	0	0	295.9	105.9	333.9	0	399.7	0	0	0

Terwilliger Blvd at Capitol Hwy AM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	31	231	12	10	63	70	212	1048	34	3	464	7
0.01												
2029 Background Traffic Volume	34.1	254.1	13.2	11	69.3	77	233.2	1152.8	37.4	3.3	510.4	7.7
Site generated trips	0	65	0	1	11	17	65	0	0	0	0	0
2029 Total Traffic Volumes	34.1	319.1	13.2	12	80.3	94	298.2	1152.8	37.4	3.3	510.4	7.7

Terwilliger Blvd at Capitol Hwy PM

	NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
2019 Traffic Volume	53	99	13	3	223	223	115	623	85	9	1044	9
0.01												
2029 Background Traffic Volume	58.3	108.9	14.3	3.3	245.3	245.3	126.5	685.3	93.5	9.9	1148.4	9.9
Site generated trips	0	32	0	0	98	74	21	0	0	0	0	3
2029 Total Traffic Volumes	58.3	140.9	14.3	3.3	343.3	319.3	147.5	685.3	93.5	9.9	1148.4	12.9

Appendix D: HCM Reports

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	438	3	306	408	13	202
Future Volume (vph)	438	3	306	408	13	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	541	4	378	504	16	249
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	545	0	378	504	16	249
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		27.3	35.5	19.5	76.0
Effective Green, g (s)	26.2		27.3	35.5	19.5	76.0
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	580		548	794	391	1309
v/s Ratio Prot	c0.30		c0.23	0.27	0.01	c0.11
v/s Ratio Perm						0.07
v/c Ratio	0.94		0.69	0.63	0.04	0.19
Uniform Delay, d1	27.7		24.3	18.8	24.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	25.1		3.6	1.7	0.2	0.1
Delay (s)	52.8		27.9	20.4	24.8	0.4
Level of Service	D		C	C	C	A
Approach Delay (s)	52.8			23.6	1.9	
Approach LOS	D			C	A	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	83.2	Sum of lost time (s)	13.2
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	80.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	86	117	391	126	177	118
Future Vol, veh/h	86	117	391	126	177	118
Conflicting Peds, #/hr	48	48	48	0	0	52
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	32	3	1	3	15	1
Mvmt Flow	98	133	444	143	201	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1399	368	387	0	-	0
Stage 1	320	-	-	-	-	-
Stage 2	1079	-	-	-	-	-
Critical Hdwy	6.72	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.72	-	-	-	-	-
Critical Hdwy Stg 2	5.72	-	-	-	-	-
Follow-up Hdwy	3.788	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	133	675	1177	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 68	612	1119	-	-	-
Mov Cap-2 Maneuver	~ 68	-	-	-	-	-
Stage 1	364	-	-	-	-	-
Stage 2	272	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 382.7	7.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1119	-	139	-	-
HCM Lane V/C Ratio	0.397	-	1.66	-	-
HCM Control Delay (s)	10.3	0	$ 382.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.9	-	16.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	34	76	19	13	75
Future Vol, veh/h	19	34	76	19	13	75
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	23	41	92	23	16	90

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	265	143	0	0	139	0
Stage 1	128	-	-	-	-	-
Stage 2	137	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	610	792	-	-	1457	-
Stage 1	767	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	581	763	-	-	1424	-
Mov Cap-2 Maneuver	581	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	740	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	581	763	1424	-
HCM Lane V/C Ratio	-	-	0.039	0.054	0.011	-
HCM Control Delay (s)	-	-	11.5	10	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Intersection	
Int Delay, s/veh	8.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	79	59	266	242	123	204
Future Vol, veh/h	79	59	266	242	123	204
Conflicting Peds, #/hr	8	8	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	2	3	1	5	12
Mvmt Flow	88	66	296	269	137	227

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1120	259	364	0	-	0
Stage 1	251	-	-	-	-	-
Stage 2	869	-	-	-	-	-
Critical Hdwy	6.41	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	229	780	1189	-	-	-
Stage 1	793	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	162	774	1189	-	-	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	41.5	4.7	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1189	-	245	-	-
HCM Lane V/C Ratio	0.249	-	0.626	-	-
HCM Control Delay (s)	9	0	41.5	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	1	-	3.8	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Future Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	233	1152	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1152	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.62		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.7	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.8	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.4			18.2			59.9			42.9	
Approach LOS		D			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	400	31	155	154	11	271
Future Volume (vph)	400	31	155	154	11	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	444	34	172	171	12	301
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	475	0	172	171	12	301
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.26		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.6		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2		0.5	0.1	0.1	0.1
Delay (s)	30.8		23.1	12.6	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.8			17.8	1.3	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	15.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	110	346	125	146	184	33
Future Vol, veh/h	110	346	125	146	184	33
Conflicting Peds, #/hr	42	1	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	16	2	2	2	8	6
Mvmt Flow	117	368	133	155	196	35

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	686	224	240	0	-	0
Stage 1	223	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Critical Hdwy	6.56	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.56	-	-	-	-	-
Critical Hdwy Stg 2	5.56	-	-	-	-	-
Follow-up Hdwy	3.644	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	393	815	1327	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	343	807	1316	-	-	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	689	-	-	-	-	-
Stage 2	600	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.2	3.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1316	-	608	-	-
HCM Lane V/C Ratio	0.101	-	0.798	-	-
HCM Control Delay (s)	8	0	30.2	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	7.8	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	42	51	15	10	54
Future Vol, veh/h	22	42	51	15	10	54
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	25	48	59	17	11	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	166	108	0	0	90	0
Stage 1	82	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	752	868	-	-	1518	-
Stage 1	862	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	736	835	-	-	1498	-
Mov Cap-2 Maneuver	736	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	736	835	1498	-
HCM Lane V/C Ratio	-	-	0.034	0.058	0.008	-
HCM Control Delay (s)	-	-	10.1	9.6	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Intersection						
Int Delay, s/veh	17.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	209	207	65	157	269	59
Future Vol, veh/h	209	207	65	157	269	59
Conflicting Peds, #/hr	0	12	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	1	22	1	3	25
Mvmt Flow	222	220	69	167	286	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	623	330	349	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	305	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.32	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.398	-	-	-
Pot Cap-1 Maneuver	448	714	1107	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	417	706	1107	-	-	-
Mov Cap-2 Maneuver	417	-	-	-	-	-
Stage 1	684	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	38.8	2.5	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1107	-	524	-	-
HCM Lane V/C Ratio	0.062	-	0.845	-	-
HCM Control Delay (s)	8.5	0	38.8	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.2	-	8.8	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Future Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.58			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1064			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	128	692	94	10	1160	10	59	110	14	3	248	248
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	45	0
Lane Group Flow (vph)	128	692	29	10	1169	0	0	180	0	0	454	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			322			523	
v/s Ratio Prot	c0.07	0.38		0.01	c0.33							
v/s Ratio Perm			0.02					0.17			c0.26	
v/c Ratio	0.74	0.74	0.06	0.43	0.78			0.56			0.87	
Uniform Delay, d1	36.4	16.1	20.6	40.7	20.6			24.3			27.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.2	5.2	0.1	12.6	4.1			6.8			14.1	
Delay (s)	51.6	21.3	20.6	53.3	24.8			31.1			41.5	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.5			25.0			31.1			41.5	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	14.6
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	482	3	337	449	14	222
Future Volume (vph)	482	3	337	449	14	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	595	4	416	554	17	274
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	599	0	416	554	17	274
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		28.1	35.7	19.5	76.8
Effective Green, g (s)	26.2		28.1	35.7	19.5	76.8
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	574		558	791	387	1310
v/s Ratio Prot	c0.33		c0.25	0.30	0.01	c0.13
v/s Ratio Perm						0.07
v/c Ratio	1.04		0.75	0.70	0.04	0.21
Uniform Delay, d1	28.9		24.8	19.8	25.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	49.4		5.4	2.8	0.2	0.1
Delay (s)	78.3		30.2	22.6	25.2	0.5
Level of Service	E		C	C	C	A
Approach Delay (s)	78.3			25.8	1.9	
Approach LOS	E			C	A	

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	149.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	95	129	430	139	195	130
Future Vol, veh/h	95	129	430	139	195	130
Conflicting Peds, #/hr	48	48	48	0	0	52
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	31	3	1	3	15	1
Mvmt Flow	108	147	489	158	222	148

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1532	396	422	0	-	0
Stage 1	348	-	-	-	-	-
Stage 2	1184	-	-	-	-	-
Critical Hdwy	6.71	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.71	-	-	-	-	-
Critical Hdwy Stg 2	5.71	-	-	-	-	-
Follow-up Hdwy	3.779	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	110	651	1143	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	254	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 50	590	1086	-	-	-
Mov Cap-2 Maneuver	~ 50	-	-	-	-	-
Stage 1	315	-	-	-	-	-
Stage 2	241	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 723.2	8.3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1086	-	106	-	-
HCM Lane V/C Ratio	0.45	-	2.401	-	-
HCM Control Delay (s)	11	0	$ 723.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.4	-	22.8	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	2.8					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	37	84	21	14	83
Future Vol, veh/h	21	37	84	21	14	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	25	45	101	25	17	100

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	287	153	0	0	150	0
Stage 1	138	-	-	-	-	-
Stage 2	149	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	592	781	-	-	1444	-
Stage 1	759	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	563	752	-	-	1411	-
Mov Cap-2 Maneuver	563	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	729	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	563	752	1411	-
HCM Lane V/C Ratio	-	-	0.045	0.059	0.012	-
HCM Control Delay (s)	-	-	11.7	10.1	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Intersection	
Int Delay, s/veh	13.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	87	65	293	266	135	224
Future Vol, veh/h	87	65	293	266	135	224
Conflicting Peds, #/hr	8	8	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	2	3	1	12	5
Mvmt Flow	97	72	326	296	150	249

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1231	283	399	0	-	0
Stage 1	275	-	-	-	-	-
Stage 2	956	-	-	-	-	-
Critical Hdwy	6.41	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	197	756	1154	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	130	750	1154	-	-	-
Mov Cap-2 Maneuver	130	-	-	-	-	-
Stage 1	512	-	-	-	-	-
Stage 2	375	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	76.8	4.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1154	-	201	-	-
HCM Lane V/C Ratio	0.282	-	0.84	-	-
HCM Control Delay (s)	9.3	0	76.8	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	1.2	-	6.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Future Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1583	3368			1859			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.93			0.94	
Satd. Flow (perm)	1719	1845	1527	1583	3368			1742			1582	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	256	1267	41	3	560	9	37	279	14	12	76	85
RTOR Reduction (vph)	0	0	14	0	1	0	0	2	0	0	29	0
Lane Group Flow (vph)	256	1267	27	3	568	0	0	328	0	0	144	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	14%	7%	0%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	21.5	78.9	78.9	1.0	58.6			25.0			25.0	
Effective Green, g (s)	21.5	78.9	78.9	1.0	58.6			25.0			25.0	
Actuated g/C Ratio	0.18	0.66	0.66	0.01	0.49			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	310	1224	1013	13	1659			366			332	
v/s Ratio Prot	c0.15	c0.69		0.00	0.17							
v/s Ratio Perm			0.02					c0.19			0.09	
v/c Ratio	0.83	1.04	0.03	0.23	0.34			0.90			0.43	
Uniform Delay, d1	46.9	20.0	6.9	58.6	18.4			45.7			40.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	16.2	35.2	0.0	8.9	0.6			27.1			4.1	
Delay (s)	63.1	55.2	6.9	67.5	19.0			72.8			44.9	
Level of Service	E	E	A	E	B			E			D	
Approach Delay (s)		55.3			19.2			72.8			44.9	
Approach LOS		E			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	49.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	118.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	34	171	169	12	298
Future Volume (vph)	440	34	171	169	12	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1857		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1857		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	489	38	190	188	13	331
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	524	0	190	188	13	331
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		22.1	35.4	19.6	70.8
Effective Green, g (s)	26.1		22.1	35.4	19.6	70.8
Actuated g/C Ratio	0.33		0.28	0.45	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	621		473	837	453	1414
v/s Ratio Prot	c0.28		c0.11	0.10	0.01	c0.13
v/s Ratio Perm						0.09
v/c Ratio	0.84		0.40	0.22	0.03	0.23
Uniform Delay, d1	24.1		22.6	13.0	22.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1		0.6	0.1	0.1	0.1
Delay (s)	37.2		23.2	13.1	22.1	0.5
Level of Service	D		C	B	C	A
Approach Delay (s)	37.2			18.2	1.3	
Approach LOS	D			B	A	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	22.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	121	381	138	161	202	36
Future Vol, veh/h	121	381	138	161	202	36
Conflicting Peds, #/hr	42	1	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	2	2	2	8	6
Mvmt Flow	129	405	147	171	215	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	750	244	262	0	-	0
Stage 1	243	-	-	-	-	-
Stage 2	507	-	-	-	-	-
Critical Hdwy	6.4	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	382	795	1302	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	328	787	1291	-	-	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	604	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	44.6		3.8		0	
HCM LOS	E					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1291	-	588	-	-
HCM Lane V/C Ratio	0.114	-	0.908	-	-
HCM Control Delay (s)	8.1	0	44.6	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.4	-	11.2	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	46	56	17	11	59
Future Vol, veh/h	24	46	56	17	11	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	28	53	64	20	13	68

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	182	114	0	0	98	0
Stage 1	88	-	-	-	-	-
Stage 2	94	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	736	861	-	-	1508	-
Stage 1	857	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	720	828	-	-	1488	-
Mov Cap-2 Maneuver	720	-	-	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	720	828	1488	-
HCM Lane V/C Ratio	-	-	0.038	0.064	0.008	-
HCM Control Delay (s)	-	-	10.2	9.6	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Intersection	
Int Delay, s/veh	31.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	230	228	72	173	296	65
Future Vol, veh/h	230	228	72	173	296	65
Conflicting Peds, #/hr	0	12	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	1	22	1	3	25
Mvmt Flow	245	243	77	184	315	69

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	688	362	384	0	-	0
Stage 1	350	-	-	-	-	-
Stage 2	338	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.32	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.398	-	-	-
Pot Cap-1 Maneuver	411	685	1073	-	-	-
Stage 1	711	-	-	-	-	-
Stage 2	720	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	378	677	1073	-	-	-
Mov Cap-2 Maneuver	378	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	720	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	71.4	2.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1073	-	485	-	-
HCM Lane V/C Ratio	0.071	-	1.005	-	-
HCM Control Delay (s)	8.6	0	71.4	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	13.7	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Future Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1800			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.52			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			953			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	141	761	104	11	1276	11	64	121	16	3	272	272
RTOR Reduction (vph)	0	0	65	0	1	0	0	4	0	0	45	0
Lane Group Flow (vph)	141	761	39	11	1286	0	0	197	0	0	502	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.5	42.4	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.5	42.4	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	177	939	466	23	1492			288			521	
v/s Ratio Prot	c0.08	0.41		0.01	c0.36							
v/s Ratio Perm			0.03					0.21			c0.29	
v/c Ratio	0.80	0.81	0.08	0.48	0.86			0.68			0.96	
Uniform Delay, d1	36.6	17.1	20.8	40.8	21.8			25.5			28.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	21.5	7.5	0.1	14.8	6.8			12.4			30.0	
Delay (s)	58.0	24.6	20.9	55.7	28.7			38.0			58.6	
Level of Service	E	C	C	E	C			D			E	
Approach Delay (s)		28.9			28.9			38.0			58.6	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	14.6
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	482	3	412	449	17	264
Future Volume (vph)	482	3	412	449	17	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1770	1759	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1770	1759	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	595	4	509	554	21	326
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	599	0	509	554	21	326
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	2%	8%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		29.1	35.8	19.5	77.8
Effective Green, g (s)	26.2		29.1	35.8	19.5	77.8
Actuated g/C Ratio	0.31		0.34	0.42	0.23	0.92
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	568		605	740	383	1310
v/s Ratio Prot	c0.33		c0.29	0.31	0.01	c0.15
v/s Ratio Perm						0.09
v/c Ratio	1.05		0.84	0.75	0.05	0.25
Uniform Delay, d1	29.4		25.8	20.8	25.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	53.0		10.3	4.2	0.3	0.1
Delay (s)	82.4		36.1	25.0	25.8	0.5
Level of Service	F		D	C	C	A
Approach Delay (s)	82.4			30.3	2.0	
Approach LOS	F			C	A	

Intersection Summary			
HCM 2000 Control Delay	40.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	214.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	95	129	430	184	281	130
Future Vol, veh/h	95	129	430	184	281	130
Conflicting Peds, #/hr	48	48	48	0	0	52
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	32	3	1	3	15	1
Mvmt Flow	108	147	489	209	319	148

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1680	493	519	0	-	0
Stage 1	445	-	-	-	-	-
Stage 2	1235	-	-	-	-	-
Critical Hdwy	6.72	6.23	4.11	-	-	-
Critical Hdwy Stg 1	5.72	-	-	-	-	-
Critical Hdwy Stg 2	5.72	-	-	-	-	-
Follow-up Hdwy	3.788	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	~ 88	574	1052	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	239	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 35	521	1000	-	-	-
Mov Cap-2 Maneuver	~ 35	-	-	-	-	-
Stage 1	249	-	-	-	-	-
Stage 2	227	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1173.2	8.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1000	-	76	-	-
HCM Lane V/C Ratio	0.489	-	3.349	-	-
HCM Control Delay (s)	12	0	$ 1173.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.7	-	26	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	43	84	27	18	83
Future Vol, veh/h	24	43	84	27	18	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	29	52	101	33	22	100

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	301	157	0	0	158	0
Stage 1	142	-	-	-	-	-
Stage 2	159	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	580	777	-	-	1434	-
Stage 1	755	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	549	748	-	-	1401	-
Mov Cap-2 Maneuver	549	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	549	748	1401	-
HCM Lane V/C Ratio	-	-	0.053	0.069	0.015	-
HCM Control Delay (s)	-	-	11.9	10.2	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.2	0	-

Intersection						
Int Delay, s/veh	145.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	132	94	422	266	135	310
Future Vol, veh/h	132	94	422	266	135	310
Conflicting Peds, #/hr	8	8	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	2	3	1	5	12
Mvmt Flow	147	104	469	296	150	344

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1564	330	494	0	-	0
Stage 1	322	-	-	-	-	-
Stage 2	1242	-	-	-	-	-
Critical Hdwy	6.41	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	~ 123	712	1064	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	274	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 58	707	1064	-	-	-
Mov Cap-2 Maneuver	~ 58	-	-	-	-	-
Stage 1	349	-	-	-	-	-
Stage 2	274	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 852.3	6.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1064	-	94	-	-
HCM Lane V/C Ratio	0.441	-	2.671	-	-
HCM Control Delay (s)	11	0	$ 852.3	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.3	-	23.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Future Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1863			1677	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.91			0.89	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1710			1490	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	327	1267	41	3	560	9	37	351	14	13	88	103
RTOR Reduction (vph)	0	0	13	0	1	0	0	1	0	0	31	0
Lane Group Flow (vph)	327	1267	28	3	568	0	0	401	0	0	173	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	25.0	81.8	81.8	1.0	58.0			25.0			25.0	
Effective Green, g (s)	25.0	81.8	81.8	1.0	58.0			25.0			25.0	
Actuated g/C Ratio	0.21	0.67	0.67	0.01	0.48			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	352	1239	1025	14	1600			350			305	
v/s Ratio Prot	c0.19	c0.69		0.00	0.17							
v/s Ratio Perm			0.02					c0.23			0.12	
v/c Ratio	0.93	1.02	0.03	0.21	0.35			1.15			0.57	
Uniform Delay, d1	47.5	20.0	6.7	60.0	20.1			48.4			43.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	30.1	31.4	0.0	7.6	0.6			94.0			7.5	
Delay (s)	77.6	51.4	6.7	67.6	20.7			142.4			51.0	
Level of Service	E	D	A	E	C			F			D	
Approach Delay (s)		55.5			21.0			142.4			51.0	
Approach LOS		E			C			F			D	

Intersection Summary			
HCM 2000 Control Delay	60.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	121.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	44	202	169	16	396
Future Volume (vph)	440	44	202	169	16	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1851		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1851		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	489	49	224	188	18	440
RTOR Reduction (vph)	4	0	0	0	0	0
Lane Group Flow (vph)	534	0	224	188	18	440
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		23.8	35.7	19.5	72.4
Effective Green, g (s)	26.1		23.8	35.7	19.5	72.4
Actuated g/C Ratio	0.33		0.30	0.45	0.24	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	606		499	827	442	1416
v/s Ratio Prot	c0.29		c0.13	0.10	0.01	c0.18
v/s Ratio Perm						0.11
v/c Ratio	0.88		0.45	0.23	0.04	0.31
Uniform Delay, d1	25.3		22.6	13.5	22.9	0.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8		0.6	0.1	0.2	0.1
Delay (s)	42.0		23.2	13.6	23.1	0.6
Level of Service	D		C	B	C	A
Approach Delay (s)	42.0			18.8	1.5	
Approach LOS	D			B	A	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	13.2
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	38.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	121	381	138	265	243	36
Future Vol, veh/h	121	381	138	265	243	36
Conflicting Peds, #/hr	42	1	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	16	2	2	2	8	6
Mvmt Flow	129	405	147	282	259	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	905	288	306	0	-	0
Stage 1	287	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Critical Hdwy	6.56	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.56	-	-	-	-	-
Critical Hdwy Stg 2	5.56	-	-	-	-	-
Follow-up Hdwy	3.644	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	290	751	1255	-	-	-
Stage 1	731	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	245	744	1244	-	-	-
Mov Cap-2 Maneuver	245	-	-	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	507	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	89	2.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1244	-	499	-	-
HCM Lane V/C Ratio	0.118	-	1.07	-	-
HCM Control Delay (s)	8.3	0	89	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.4	-	16.5	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	61	56	20	16	59
Future Vol, veh/h	30	61	56	20	16	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	34	70	64	23	18	68

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	194	116	0	0	101	0
Stage 1	90	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	724	859	-	-	1504	-
Stage 1	855	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	705	827	-	-	1484	-
Mov Cap-2 Maneuver	705	-	-	-	-	-
Stage 1	844	-	-	-	-	-
Stage 2	831	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	705	827	1484	-
HCM Lane V/C Ratio	-	-	0.049	0.085	0.012	-
HCM Control Delay (s)	-	-	10.4	9.8	7.5	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0	-

Intersection	
Int Delay, s/veh	217.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	334	400	128	173	296	106
Future Vol, veh/h	334	400	128	173	296	106
Conflicting Peds, #/hr	0	12	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	1	22	1	3	25
Mvmt Flow	355	426	136	184	315	113

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	828	384	428	0	-	0
Stage 1	372	-	-	-	-	-
Stage 2	456	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.32	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.398	-	-	-
Pot Cap-1 Maneuver	~ 340	666	1032	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	636	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 290	658	1032	-	-	-
Mov Cap-2 Maneuver	~ 290	-	-	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	636	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 424	3.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1032	-	417	-	-
HCM Lane V/C Ratio	0.132	-	1.873	-	-
HCM Control Delay (s)	9	0	$ 424	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	51.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Future Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3529			1805			1733	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.39			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3529			722			1732	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	164	761	104	11	1276	14	64	157	16	3	383	354
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	42	0
Lane Group Flow (vph)	164	761	39	11	1289	0	0	234	0	0	698	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	179	940	465	23	1489			218			523	
v/s Ratio Prot	c0.09	0.41		0.01	c0.37							
v/s Ratio Perm			0.03					0.32			c0.40	
v/c Ratio	0.92	0.81	0.08	0.48	0.87			1.07			1.33	
Uniform Delay, d1	37.0	17.1	20.8	40.9	21.9			29.1			29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	43.6	7.5	0.1	14.8	7.0			81.1			163.3	
Delay (s)	80.7	24.6	20.9	55.7	28.9			110.2			192.4	
Level of Service	F	C	C	E	C			F			F	
Approach Delay (s)		33.1			29.2			110.2			192.4	
Approach LOS		C			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	72.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	14.6
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Appendix E: Mitigated Conditions HCM Reports

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	438	3	306	408	13	202
Future Volume (vph)	438	3	306	408	13	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	541	4	378	504	16	249
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	545	0	378	504	16	249
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		27.3	35.5	19.5	76.0
Effective Green, g (s)	26.2		27.3	35.5	19.5	76.0
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	580		548	794	391	1309
v/s Ratio Prot	c0.30		c0.23	0.27	0.01	c0.11
v/s Ratio Perm						0.07
v/c Ratio	0.94		0.69	0.63	0.04	0.19
Uniform Delay, d1	27.7		24.3	18.8	24.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	25.1		3.6	1.7	0.2	0.1
Delay (s)	52.8		27.9	20.4	24.8	0.4
Level of Service	D		C	C	C	A
Approach Delay (s)	52.8			23.6	1.9	
Approach LOS	D			C	A	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	83.2	Sum of lost time (s)	13.2
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	86	117	391	126	177	118
Future Volume (vph)	86	117	391	126	177	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.94			1.00	0.95	
Flpb, ped/bikes	1.00			0.96	1.00	
Frt	0.92			1.00	0.95	
Flt Protected	0.98			0.96	1.00	
Satd. Flow (prot)	1399			1726	1565	
Flt Permitted	0.98			0.58	1.00	
Satd. Flow (perm)	1399			1032	1565	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	98	133	444	143	201	134
RTOR Reduction (vph)	64	0	0	0	28	0
Lane Group Flow (vph)	167	0	0	587	307	0
Confl. Peds. (#/hr)	48	48	48			52
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	31%	3%	1%	3%	15%	1%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.8			47.1	47.1	
Effective Green, g (s)	12.8			47.1	47.1	
Actuated g/C Ratio	0.19			0.68	0.68	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	259			705	1069	
v/s Ratio Prot	c0.12				0.20	
v/s Ratio Perm				c0.57		
v/c Ratio	0.64			0.83	0.29	
Uniform Delay, d1	25.9			8.0	4.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	5.4			8.3	0.1	
Delay (s)	31.3			16.3	4.4	
Level of Service	C			B	A	
Approach Delay (s)	31.3			16.3	4.4	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	68.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	2.8					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	34	76	19	13	75
Future Vol, veh/h	19	34	76	19	13	75
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	23	41	92	23	16	90

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	265	143	0	0	139	0
Stage 1	128	-	-	-	-	-
Stage 2	137	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	610	792	-	-	1457	-
Stage 1	767	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	581	763	-	-	1424	-
Mov Cap-2 Maneuver	581	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	740	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	581	763	1424	-
HCM Lane V/C Ratio	-	-	0.039	0.054	0.011	-
HCM Control Delay (s)	-	-	11.5	10	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	59	266	242	123	204
Future Volume (vph)	79	59	266	242	123	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.92	
Flt Protected	0.97			0.97	1.00	
Satd. Flow (prot)	1693			1814	1570	
Flt Permitted	0.97			0.65	1.00	
Satd. Flow (perm)	1693			1219	1570	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	88	66	296	269	137	227
RTOR Reduction (vph)	49	0	0	0	68	0
Lane Group Flow (vph)	105	0	0	565	296	0
Confl. Peds. (#/hr)	8	8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	2%	3%	1%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	7.1			36.2	36.2	
Effective Green, g (s)	7.1			36.2	36.2	
Actuated g/C Ratio	0.14			0.69	0.69	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	229			843	1086	
v/s Ratio Prot	c0.06				0.19	
v/s Ratio Perm				c0.46		
v/c Ratio	0.46			0.67	0.27	
Uniform Delay, d1	20.8			4.6	3.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.4			2.1	0.1	
Delay (s)	22.3			6.7	3.2	
Level of Service	C			A	A	
Approach Delay (s)	22.3			6.7	3.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Future Volume (vph)	212	1048	34	3	464	7	31	231	12	10	63	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	233	1152	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1152	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.62		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.7	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.8	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.4			18.2			59.9			42.9	
Approach LOS		D			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	400	31	155	154	11	271
Future Volume (vph)	400	31	155	154	11	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	444	34	172	171	12	301
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	475	0	172	171	12	301
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.26		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.6		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2		0.5	0.1	0.1	0.1
Delay (s)	30.8		23.1	12.6	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.8			17.8	1.3	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	110	346	125	146	184	33
Future Volume (vph)	110	346	125	146	184	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.90			1.00	0.98	
Flt Protected	0.99			0.98	1.00	
Satd. Flow (prot)	1574			1816	1714	
Flt Permitted	0.99			0.74	1.00	
Satd. Flow (perm)	1574			1382	1714	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	117	368	133	155	196	35
RTOR Reduction (vph)	253	0	0	0	15	0
Lane Group Flow (vph)	232	0	0	288	216	0
Confl. Peds. (#/hr)	42	1	9			9
Confl. Bikes (#/hr)						28
Heavy Vehicles (%)	16%	2%	2%	2%	8%	6%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	9.3			11.4	11.4	
Effective Green, g (s)	9.3			11.4	11.4	
Actuated g/C Ratio	0.31			0.38	0.38	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	492			530	657	
v/s Ratio Prot	c0.15				0.13	
v/s Ratio Perm				c0.21		
v/c Ratio	0.47			0.54	0.33	
Uniform Delay, d1	8.2			7.1	6.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.7			1.1	0.3	
Delay (s)	8.9			8.3	6.7	
Level of Service	A			A	A	
Approach Delay (s)	8.9			8.3	6.7	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	29.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	42	51	15	10	54
Future Vol, veh/h	22	42	51	15	10	54
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	25	48	59	17	11	62

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	166	108	0	0	90	0
Stage 1	82	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	752	868	-	-	1518	-
Stage 1	862	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	736	835	-	-	1498	-
Mov Cap-2 Maneuver	736	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	736	835	1498	-
HCM Lane V/C Ratio	-	-	0.034	0.058	0.008	-
HCM Control Delay (s)	-	-	10.1	9.6	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	209	207	65	157	269	59
Future Volume (vph)	209	207	65	157	269	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.93			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1669			1748	1722	
Flt Permitted	0.98			0.81	1.00	
Satd. Flow (perm)	1669			1441	1722	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	222	220	69	167	286	63
RTOR Reduction (vph)	85	0	0	0	18	0
Lane Group Flow (vph)	357	0	0	236	331	0
Confl. Peds. (#/hr)		12				
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	1%	22%	1%	3%	25%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	11.7			12.2	12.2	
Effective Green, g (s)	11.7			12.2	12.2	
Actuated g/C Ratio	0.36			0.37	0.37	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	593			534	638	
v/s Ratio Prot	c0.21				c0.19	
v/s Ratio Perm				0.16		
v/c Ratio	0.60			0.44	0.52	
Uniform Delay, d1	8.7			7.8	8.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.7			0.6	0.7	
Delay (s)	10.4			8.4	8.8	
Level of Service	B			A	A	
Approach Delay (s)	10.4			8.4	8.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	32.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Future Volume (vph)	115	623	85	9	1044	9	53	99	13	3	223	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.58			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1064			1725	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	128	692	94	10	1160	10	59	110	14	3	248	248
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	45	0
Lane Group Flow (vph)	128	692	29	10	1169	0	0	180	0	0	454	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			322			523	
v/s Ratio Prot	c0.07	0.38		0.01	c0.33							
v/s Ratio Perm			0.02					0.17			c0.26	
v/c Ratio	0.74	0.74	0.06	0.43	0.78			0.56			0.87	
Uniform Delay, d1	36.4	16.1	20.6	40.7	20.6			24.3			27.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	15.2	5.2	0.1	12.6	4.1			6.8			14.1	
Delay (s)	51.6	21.3	20.6	53.3	24.8			31.1			41.5	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.5			25.0			31.1			41.5	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	14.6
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: SW Terwilliger Blvd & SW Sam Jackson Hill Rd

05/08/2019

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	482	3	337	449	14	222
Future Volume (vph)	482	3	337	449	14	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	3	337	449	14	222
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	485	0	337	449	14	222
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		26.6	35.4	19.5	75.3
Effective Green, g (s)	26.2		26.6	35.4	19.5	75.3
Actuated g/C Ratio	0.32		0.32	0.43	0.24	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	585		538	799	394	1308
v/s Ratio Prot	c0.26		c0.20	0.24	0.01	c0.10
v/s Ratio Perm						0.06
v/c Ratio	0.83		0.63	0.56	0.04	0.17
Uniform Delay, d1	26.1		23.7	17.7	24.3	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	12.8		2.3	0.9	0.2	0.1
Delay (s)	38.9		26.0	18.6	24.4	0.4
Level of Service	D		C	B	C	A
Approach Delay (s)	38.9			21.8	1.9	
Approach LOS	D			C	A	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	82.5	Sum of lost time (s)	13.2
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	95	129	430	139	195	130
Future Volume (vph)	95	129	430	139	195	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.94			1.00	0.95	
Flpb, ped/bikes	1.00			0.96	1.00	
Frt	0.92			1.00	0.95	
Flt Protected	0.98			0.96	1.00	
Satd. Flow (prot)	1398			1729	1568	
Flt Permitted	0.98			0.58	1.00	
Satd. Flow (perm)	1398			1049	1568	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	95	129	430	139	195	130
RTOR Reduction (vph)	64	0	0	0	29	0
Lane Group Flow (vph)	160	0	0	569	296	0
Confl. Peds. (#/hr)	48	48	48			52
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	32%	3%	1%	3%	15%	1%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.3			43.7	43.7	
Effective Green, g (s)	12.3			43.7	43.7	
Actuated g/C Ratio	0.19			0.67	0.67	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	264			705	1054	
v/s Ratio Prot	c0.11				0.19	
v/s Ratio Perm				c0.54		
v/c Ratio	0.61			0.81	0.28	
Uniform Delay, d1	24.1			7.6	4.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	3.9			6.7	0.1	
Delay (s)	28.0			14.4	4.4	
Level of Service	C			B	A	
Approach Delay (s)	28.0			14.4	4.4	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	2.7					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	37	84	21	14	83
Future Vol, veh/h	21	37	84	21	14	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	21	37	84	21	14	83

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	245	134	0	0	129	0
Stage 1	119	-	-	-	-	-
Stage 2	126	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	628	802	-	-	1469	-
Stage 1	775	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	599	772	-	-	1435	-
Mov Cap-2 Maneuver	599	-	-	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	751	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	599	772	1435	-
HCM Lane V/C Ratio	-	-	0.035	0.048	0.01	-
HCM Control Delay (s)	-	-	11.2	9.9	7.5	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	87	65	293	266	135	224
Future Volume (vph)	87	65	293	266	135	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.94			1.00	0.92	
Flt Protected	0.97			0.97	1.00	
Satd. Flow (prot)	1693			1814	1570	
Flt Permitted	0.97			0.66	1.00	
Satd. Flow (perm)	1693			1223	1570	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	65	293	266	135	224
RTOR Reduction (vph)	49	0	0	0	69	0
Lane Group Flow (vph)	103	0	0	559	290	0
Confl. Peds. (#/hr)	8	8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	2%	3%	1%	5%	12%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	7.1			35.6	35.6	
Effective Green, g (s)	7.1			35.6	35.6	
Actuated g/C Ratio	0.14			0.69	0.69	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	232			842	1081	
v/s Ratio Prot	c0.06				0.18	
v/s Ratio Perm				c0.46		
v/c Ratio	0.44			0.66	0.27	
Uniform Delay, d1	20.5			4.6	3.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.4			2.0	0.1	
Delay (s)	21.8			6.6	3.2	
Level of Service	C			A	A	
Approach Delay (s)	21.8			6.6	3.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	51.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Future Volume (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1858			1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95			0.96	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1773			1615	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	233	1153	37	3	510	8	34	254	13	11	69	77
RTOR Reduction (vph)	0	0	13	0	1	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	1153	24	3	517	0	0	299	0	0	129	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	1%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Effective Green, g (s)	20.2	77.8	77.8	1.0	58.8			25.0			25.0	
Actuated g/C Ratio	0.17	0.66	0.66	0.01	0.50			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	294	1218	1008	15	1677			376			342	
v/s Ratio Prot	c0.14	c0.63		0.00	0.15							
v/s Ratio Perm			0.02					c0.17			0.08	
v/c Ratio	0.79	0.95	0.02	0.20	0.31			0.80			0.38	
Uniform Delay, d1	46.8	18.1	6.9	58.0	17.5			44.0			39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	13.6	15.8	0.0	6.5	0.5			15.9			3.1	
Delay (s)	60.4	33.9	6.9	64.5	17.9			59.9			42.9	
Level of Service	E	C	A	E	B			E			D	
Approach Delay (s)		37.6			18.2			59.9			42.9	
Approach LOS		D			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	34	171	169	12	298
Future Volume (vph)	440	34	171	169	12	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1858		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1858		1671	1845	1805	1495
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	440	34	171	169	12	298
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	471	0	171	169	12	298
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		21.2	35.3	19.5	69.8
Effective Green, g (s)	26.1		21.2	35.3	19.5	69.8
Actuated g/C Ratio	0.34		0.28	0.46	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	629		460	845	457	1413
v/s Ratio Prot	c0.25		c0.10	0.09	0.01	c0.12
v/s Ratio Perm						0.08
v/c Ratio	0.75		0.37	0.20	0.03	0.21
Uniform Delay, d1	22.5		22.5	12.4	21.6	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0		0.5	0.1	0.1	0.1
Delay (s)	30.5		23.0	12.5	21.7	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	30.5			17.8	1.3	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	121	381	138	161	202	36
Future Volume (vph)	121	381	138	161	202	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.90			1.00	0.98	
Flt Protected	0.99			0.98	1.00	
Satd. Flow (prot)	1574			1816	1714	
Flt Permitted	0.99			0.74	1.00	
Satd. Flow (perm)	1574			1374	1714	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	121	381	138	161	202	36
RTOR Reduction (vph)	262	0	0	0	15	0
Lane Group Flow (vph)	240	0	0	299	223	0
Confl. Peds. (#/hr)	42	1	9			9
Confl. Bikes (#/hr)						28
Heavy Vehicles (%)	16%	2%	2%	2%	8%	6%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	9.4			11.6	11.6	
Effective Green, g (s)	9.4			11.6	11.6	
Actuated g/C Ratio	0.31			0.39	0.39	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	493			531	662	
v/s Ratio Prot	c0.15				0.13	
v/s Ratio Perm				c0.22		
v/c Ratio	0.49			0.56	0.34	
Uniform Delay, d1	8.3			7.2	6.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			1.4	0.3	
Delay (s)	9.1			8.6	6.8	
Level of Service	A			A	A	
Approach Delay (s)	9.1			8.6	6.8	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	30.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	46	56	17	11	59
Future Vol, veh/h	24	46	56	17	11	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	24	46	56	17	11	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	160	105	0	0	87	0
Stage 1	79	-	-	-	-	-
Stage 2	81	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	758	871	-	-	1522	-
Stage 1	865	-	-	-	-	-
Stage 2	863	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	742	838	-	-	1502	-
Mov Cap-2 Maneuver	742	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	742	838	1502	-
HCM Lane V/C Ratio	-	-	0.032	0.055	0.007	-
HCM Control Delay (s)	-	-	10	9.5	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	230	228	72	173	296	65
Future Volume (vph)	230	228	72	173	296	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	0.99	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.93			1.00	0.98	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1669			1747	1722	
Flt Permitted	0.98			0.81	1.00	
Satd. Flow (perm)	1669			1429	1722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	228	72	173	296	65
RTOR Reduction (vph)	84	0	0	0	18	0
Lane Group Flow (vph)	374	0	0	245	343	0
Confl. Peds. (#/hr)		12				
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	1%	22%	1%	3%	25%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.0			12.3	12.3	
Effective Green, g (s)	12.0			12.3	12.3	
Actuated g/C Ratio	0.36			0.37	0.37	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	601			527	636	
v/s Ratio Prot	c0.22				c0.20	
v/s Ratio Perm				0.17		
v/c Ratio	0.62			0.46	0.54	
Uniform Delay, d1	8.8			8.0	8.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.0			0.7	0.9	
Delay (s)	10.8			8.6	9.1	
Level of Service	B			A	A	
Approach Delay (s)	10.8			8.6	9.1	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	33.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Future Volume (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3531			1801			1727	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.59			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3531			1083			1725	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	127	685	94	10	1148	10	58	109	14	3	245	245
RTOR Reduction (vph)	0	0	65	0	1	0	0	4	0	0	45	0
Lane Group Flow (vph)	127	685	29	10	1157	0	0	177	0	0	448	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.3	42.2	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	173	936	467	23	1495			328			523	
v/s Ratio Prot	c0.07	0.37		0.01	c0.33							
v/s Ratio Perm			0.02					0.16			c0.26	
v/c Ratio	0.73	0.73	0.06	0.43	0.77			0.54			0.86	
Uniform Delay, d1	36.3	16.0	20.6	40.7	20.5			24.1			27.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	14.9	5.0	0.1	12.6	4.0			6.2			13.0	
Delay (s)	51.2	21.1	20.6	53.3	24.5			30.3			40.2	
Level of Service	D	C	C	D	C			C			D	
Approach Delay (s)		25.2			24.8			30.3			40.2	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	14.6
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	482	3	412	449	17	264
Future Volume (vph)	482	3	412	449	17	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
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	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1843		1671	1863	1671	1379
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1843		1671	1863	1671	1379
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	482	3	412	449	17	264
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	485	0	412	449	17	264
Confl. Peds. (#/hr)		4			16	16
Confl. Bikes (#/hr)		1				6
Heavy Vehicles (%)	3%	0%	8%	2%	8%	15%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.2		28.1	35.7	19.5	76.8
Effective Green, g (s)	26.2		28.1	35.7	19.5	76.8
Actuated g/C Ratio	0.31		0.33	0.43	0.23	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	574		558	791	387	1310
v/s Ratio Prot	c0.26		c0.25	0.24	0.01	c0.12
v/s Ratio Perm						0.07
v/c Ratio	0.84		0.74	0.57	0.04	0.20
Uniform Delay, d1	27.0		24.7	18.3	25.0	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	14.2		5.1	0.9	0.2	0.1
Delay (s)	41.2		29.8	19.2	25.2	0.5
Level of Service	D		C	B	C	A
Approach Delay (s)	41.2			24.3	2.0	
Approach LOS	D			C	A	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	95	129	430	184	411
v/c Ratio	0.38	0.36	0.64	0.14	0.35
Control Delay	26.3	8.3	12.5	4.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	8.3	12.5	4.1	4.7
Queue Length 50th (ft)	26	0	70	18	39
Queue Length 95th (ft)	72	38	#229	44	96
Internal Link Dist (ft)	152			148	196
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	515	601	747	1494	1293
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.21	0.58	0.12	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	129	430	184	281	130
Future Volume (veh/h)	95	129	430	184	281	130
Number	7	14	5	2	6	16
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00	1.00	0.98			0.94
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1450	1845	1881	1845	1718	1900
Adj Flow Rate, veh/h	95	129	430	184	281	130
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	31	3	1	3	15	15
Opposing Right Turn Influence	Yes		Yes			
Cap, veh/h	176	200	697	1235	728	337
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.13	0.13	0.67	0.67	0.67	0.67
Ln Grp Delay, s/veh	20.7	21.9	8.8	2.7	0.0	3.5
Ln Grp LOS	C	C	A	A		A
Approach Vol, veh/h	224			614	411	
Approach Delay, s/veh	21.3			7.0	3.5	
Approach LOS	C			A	A	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Case No		6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s		34.1		10.1		34.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green (Gmax), s		42.9		18.1		42.9		
Max Allow Headway (MAH), s		5.3		4.0		5.3		
Max Q Clear (g_c+I1), s		23.0		5.5		7.1		
Green Ext Time (g_e), s		6.7		0.6		7.9		
Prob of Phs Call (p_c)		1.00		0.94		1.00		
Prob of Max Out (p_x)		0.21		0.00		0.04		
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		
Mvmt Sat Flow, veh/h		964		1381		0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1845		0		1088		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1568		504		
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	0
Lane Assignment								

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	430	0	95	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	964	0	1381	0	0	0	0
Q Serve Time (g_s), s	0.0	15.9	0.0	2.9	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	21.0	0.0	2.9	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	964	0	1381	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	29.6	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	15.9	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	29.6	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	697	0	176	0	0	0	0
V/C Ratio (X)	0.00	0.62	0.00	0.54	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	987	0	565	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.9	0.0	18.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.9	0.0	2.6	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	8.8	0.0	20.7	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.1	0.0	1.1	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.2	0.0	1.2	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.07	0.00	0.38	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T						
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	184	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1845	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1235	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1788	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0

2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		T+R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	129	0	411	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1568	0	1592	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	3.5	0.0	5.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	3.5	0.0	5.1	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	0.32	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	200	0	1066	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.65	0.00	0.39	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	641	0	1543	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	18.4	0.0	3.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	3.5	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	21.9	0.0	3.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.5	0.0	2.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.7	0.0	2.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.22	0.00	0.26	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		8.4						
HCM 2010 LOS		A						

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	129	430	184	281	130
Future Volume (veh/h)	95	129	430	184	281	130
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98			0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1450	1845	1881	1845	1718	1900
Adj Flow Rate, veh/h	95	129	430	184	281	130
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	31	3	1	3	15	15
Cap, veh/h	176	200	697	1235	728	337
Arrive On Green	0.13	0.13	0.67	0.67	0.67	0.67
Sat Flow, veh/h	1381	1568	964	1845	1088	504
Grp Volume(v), veh/h	95	129	430	184	0	411
Grp Sat Flow(s),veh/h/ln	1381	1568	964	1845	0	1592
Q Serve(g_s), s	2.9	3.5	15.9	1.6	0.0	5.1
Cycle Q Clear(g_c), s	2.9	3.5	21.0	1.6	0.0	5.1
Prop In Lane	1.00	1.00	1.00			0.32
Lane Grp Cap(c), veh/h	176	200	697	1235	0	1066
V/C Ratio(X)	0.54	0.65	0.62	0.15	0.00	0.39
Avail Cap(c_a), veh/h	565	641	987	1788	0	1543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.1	18.4	7.9	2.7	0.0	3.3
Incr Delay (d2), s/veh	2.6	3.5	0.9	0.1	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	1.7	4.2	0.8	0.0	2.2
LnGrp Delay(d),s/veh	20.7	21.9	8.8	2.7	0.0	3.5
LnGrp LOS	C	C	A	A		A
Approach Vol, veh/h	224			614	411	
Approach Delay, s/veh	21.3			7.0	3.5	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		34.1		10.1		34.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		42.9		18.1		42.9		
Max Q Clear Time (g_c+I1), s		23.0		5.5		7.1		
Green Ext Time (p_c), s		6.7		0.6		7.9		

Intersection Summary	
HCM 2010 Ctrl Delay	8.4
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	43	84	27	18	83
Future Vol, veh/h	24	43	84	27	18	83
Conflicting Peds, #/hr	15	15	0	0	24	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	63	50	5	0	0	1
Mvmt Flow	24	43	84	27	18	83

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	256	137	0	0	135	0
Stage 1	122	-	-	-	-	-
Stage 2	134	-	-	-	-	-
Critical Hdwy	7.03	6.7	-	-	4.1	-
Critical Hdwy Stg 1	6.03	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	4.067	3.75	-	-	2.2	-
Pot Cap-1 Maneuver	618	798	-	-	1462	-
Stage 1	772	-	-	-	-	-
Stage 2	762	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	588	769	-	-	1429	-
Mov Cap-2 Maneuver	588	-	-	-	-	-
Stage 1	754	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	588	769	1429	-
HCM Lane V/C Ratio	-	-	0.041	0.056	0.013	-
HCM Control Delay (s)	-	-	11.4	10	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	132	94	422	266	445
v/c Ratio	0.40	0.26	0.64	0.20	0.37
Control Delay	25.5	7.9	12.7	4.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	7.9	12.7	4.3	2.5
Queue Length 50th (ft)	38	0	70	28	14
Queue Length 95th (ft)	91	33	#228	63	48
Internal Link Dist (ft)	143			192	64
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	660	624	727	1510	1299
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.15	0.58	0.18	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	94	422	266	135	310
Future Volume (veh/h)	132	94	422	266	135	310
Number	7	14	5	2	6	16
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00	1.00	1.00			0.98
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1845	1881	1729	1900
Adj Flow Rate, veh/h	132	94	422	266	135	310
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	2	3	1	5	5
Opposing Right Turn Influence	Yes		Yes			
Cap, veh/h	211	186	677	1298	317	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.12	0.12	0.69	0.69	0.69	0.69
Ln Grp Delay, s/veh	22.7	21.5	9.2	2.7	0.0	3.5
Ln Grp LOS	C	C	A	A		A
Approach Vol, veh/h	226			688	445	
Approach Delay, s/veh	22.2			6.7	3.5	
Approach LOS	C			A	A	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Case No		6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s		36.8		10.0		36.8		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green (Gmax), s		42.9		18.1		42.9		
Max Allow Headway (MAH), s		5.4		4.0		5.4		
Max Q Clear (g_c+l1), s		25.0		5.3		8.0		
Green Ext Time (g_e), s		7.3		0.5		9.3		
Prob of Phs Call (p_c)		1.00		0.95		1.00		
Prob of Max Out (p_x)		0.34		0.00		0.08		
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		
Mvmt Sat Flow, veh/h		932		1792		0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1881		0		460		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1056		
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	0
Lane Assignment								

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	422	0	132	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	932	0	1792	0	0	0	0
Q Serve Time (g_s), s	0.0	17.0	0.0	3.3	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	23.0	0.0	3.3	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	932	0	1792	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	32.3	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	26.3	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	32.3	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	677	0	211	0	0	0	0
V/C Ratio (X)	0.00	0.62	0.00	0.63	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	887	0	692	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.2	0.0	19.7	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.9	0.0	3.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.2	0.0	22.7	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.2	0.0	1.6	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.4	0.0	1.8	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.13	0.00	0.45	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T						
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	266	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1298	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1723	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0

2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		T+R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	94	0	445	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1516	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	2.6	0.0	6.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	2.6	0.0	6.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	0.70	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	186	0	1046	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.50	0.00	0.43	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	612	0	1388	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	19.4	0.0	3.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.1	0.0	0.3	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	21.5	0.0	3.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.1	0.0	2.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.2	0.0	2.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.16	0.00	0.60	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		8.2						
HCM 2010 LOS		A						

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	94	422	266	135	310
Future Volume (veh/h)	132	94	422	266	135	310
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1863	1845	1881	1729	1900
Adj Flow Rate, veh/h	132	94	422	266	135	310
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	2	3	1	5	5
Cap, veh/h	211	186	677	1298	317	729
Arrive On Green	0.12	0.12	0.69	0.69	0.69	0.69
Sat Flow, veh/h	1792	1583	932	1881	460	1056
Grp Volume(v), veh/h	132	94	422	266	0	445
Grp Sat Flow(s),veh/h/ln	1792	1583	932	1881	0	1516
Q Serve(g_s), s	3.3	2.6	17.0	2.4	0.0	6.0
Cycle Q Clear(g_c), s	3.3	2.6	23.0	2.4	0.0	6.0
Prop In Lane	1.00	1.00	1.00			0.70
Lane Grp Cap(c), veh/h	211	186	677	1298	0	1046
V/C Ratio(X)	0.63	0.50	0.62	0.20	0.00	0.43
Avail Cap(c_a), veh/h	692	612	887	1723	0	1388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.7	19.4	8.2	2.6	0.0	3.2
Incr Delay (d2), s/veh	3.0	2.1	0.9	0.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.2	4.4	1.2	0.0	2.6
LnGrp Delay(d),s/veh	22.7	21.5	9.2	2.7	0.0	3.5
LnGrp LOS	C	C	A	A		A
Approach Vol, veh/h	226			688	445	
Approach Delay, s/veh	22.2			6.7	3.5	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.8		10.0		36.8		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		42.9		18.1		42.9		
Max Q Clear Time (g_c+I1), s		25.0		5.3		8.0		
Green Ext Time (p_c), s		7.3		0.5		9.3		

Intersection Summary	
HCM 2010 Ctrl Delay	8.2
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Future Volume (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1719	1845	1527	1805	3361			1879			1677	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.94			0.92	
Satd. Flow (perm)	1719	1845	1527	1805	3361			1768			1541	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	298	1153	37	3	510	8	34	319	13	12	80	94
RTOR Reduction (vph)	0	0	12	0	1	0	0	1	0	0	31	0
Lane Group Flow (vph)	298	1153	25	3	517	0	0	365	0	0	155	0
Confl. Peds. (#/hr)	1		2			1	4		7	7		4
Confl. Bikes (#/hr)									5			3
Heavy Vehicles (%)	5%	3%	3%	0%	7%	14%	0%	0%	0%	0%	6%	3%
Turn Type	Prot	NA	Perm	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			6				4			8		
Actuated Green, G (s)	23.7	80.5	80.5	1.0	58.0			25.0			25.0	
Effective Green, g (s)	23.7	80.5	80.5	1.0	58.0			25.0			25.0	
Actuated g/C Ratio	0.20	0.67	0.67	0.01	0.48			0.21			0.21	
Clearance Time (s)	4.7	5.6	5.6	4.2	4.9			4.2			4.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	338	1232	1020	14	1617			366			319	
v/s Ratio Prot	c0.17	c0.63		0.00	0.15							
v/s Ratio Perm			0.02					c0.21			0.10	
v/c Ratio	0.88	0.94	0.02	0.21	0.32			1.00			0.49	
Uniform Delay, d1	47.0	17.7	6.7	59.4	19.2			47.7			42.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	22.5	14.3	0.0	7.6	0.5			46.5			5.2	
Delay (s)	69.6	32.0	6.8	66.9	19.7			94.2			47.3	
Level of Service	E	C	A	E	B			F			D	
Approach Delay (s)		38.9			20.0			94.2			47.3	
Approach LOS		D			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	44	202	169	16	396
Future Volume (vph)	440	44	202	169	16	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2		3.0	4.2	3.0	3.0
Lane Util. Factor	1.00		1.00	1.00	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)	1851		1671	1845	1805	1495
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1851		1671	1845	1805	1495
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	440	44	202	169	16	396
RTOR Reduction (vph)	4	0	0	0	0	0
Lane Group Flow (vph)	480	0	202	169	16	396
Confl. Peds. (#/hr)		11	11		1	
Confl. Bikes (#/hr)		10				
Heavy Vehicles (%)	1%	0%	8%	3%	0%	8%
Turn Type	NA		Prot	NA	Prot	custom
Protected Phases	2		1 4	6	3	1 3 4
Permitted Phases						2
Actuated Green, G (s)	26.1		23.0	35.6	19.6	71.7
Effective Green, g (s)	26.1		23.0	35.6	19.6	71.7
Actuated g/C Ratio	0.33		0.29	0.45	0.25	0.91
Clearance Time (s)	4.2			4.2	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	612		487	832	448	1415
v/s Ratio Prot	c0.26		c0.12	0.09	0.01	c0.16
v/s Ratio Perm						0.10
v/c Ratio	0.78		0.41	0.20	0.04	0.28
Uniform Delay, d1	23.9		22.5	13.1	22.5	0.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	9.7		0.6	0.1	0.1	0.1
Delay (s)	33.6		23.1	13.2	22.6	0.5
Level of Service	C		C	B	C	A
Approach Delay (s)	33.6			18.6	1.4	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	13.2
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	121	381	138	265	279
v/c Ratio	0.28	0.54	0.32	0.36	0.41
Control Delay	10.1	4.6	9.2	8.3	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	4.6	9.2	8.3	8.4
Queue Length 50th (ft)	11	0	11	22	22
Queue Length 95th (ft)	45	39	45	71	73
Internal Link Dist (ft)	152			148	196
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	1014	1143	709	1215	1129
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.33	0.19	0.22	0.25

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	121	381	138	265	243	36
Future Volume (veh/h)	121	381	138	265	243	36
Number	7	14	5	2	6	16
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00	1.00	0.99			0.94
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1638	1863	1863	1863	1763	1900
Adj Flow Rate, veh/h	121	381	138	265	243	36
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	16	2	2	2	8	8
Opposing Right Turn Influence	Yes		Yes			
Cap, veh/h	496	504	530	731	584	87
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.32	0.32	0.39	0.39	0.39	0.39
Ln Grp Delay, s/veh	8.1	11.9	9.6	7.0	0.0	7.3
Ln Grp LOS	A	B	A	A		A
Approach Vol, veh/h	502			403	279	
Approach Delay, s/veh	11.0			7.9	7.3	
Approach LOS	B			A	A	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Case No		6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s		16.7		14.4		16.7		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green (Gmax), s		18.0		18.0		18.0		
Max Allow Headway (MAH), s		5.3		4.1		5.3		
Max Q Clear (g_c+I1), s		9.0		8.7		5.7		
Green Ext Time (g_e), s		2.8		1.3		3.3		
Prob of Phs Call (p_c)		1.00		0.99		1.00		
Prob of Max Out (p_x)		0.49		0.13		0.26		
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		
Mvmt Sat Flow, veh/h		1088		1560		0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1488		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		220		
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	0
Lane Assignment								

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	138	0	121	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1088	0	1560	0	0	0	0
Q Serve Time (g_s), s	0.0	3.3	0.0	1.8	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.0	0.0	1.8	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1088	0	1560	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	12.2	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	12.2	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	530	0	496	0	0	0	0
V/C Ratio (X)	0.00	0.26	0.00	0.24	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	732	0	903	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.4	0.0	7.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.6	0.0	8.1	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.25	0.00	0.23	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T						
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	265	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	731	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1078	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0

2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		T+R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	381	0	279	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1709	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	6.7	0.0	3.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	6.7	0.0	3.7	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	0.13	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	504	0	671	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.76	0.00	0.42	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	916	0	989	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	9.5	0.0	6.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	11.9	0.0	7.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	2.9	0.0	1.7	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	3.2	0.0	1.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.42	0.00	0.20	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		9.0						
HCM 2010 LOS		A						

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	121	381	138	265	243	36		
Future Volume (veh/h)	121	381	138	265	243	36		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	0.99			0.94		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1638	1863	1863	1863	1763	1900		
Adj Flow Rate, veh/h	121	381	138	265	243	36		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Percent Heavy Veh, %	16	2	2	2	8	8		
Cap, veh/h	496	504	530	731	584	87		
Arrive On Green	0.32	0.32	0.39	0.39	0.39	0.39		
Sat Flow, veh/h	1560	1583	1088	1863	1488	220		
Grp Volume(v), veh/h	121	381	138	265	0	279		
Grp Sat Flow(s),veh/h/ln	1560	1583	1088	1863	0	1709		
Q Serve(g_s), s	1.8	6.7	3.3	3.1	0.0	3.7		
Cycle Q Clear(g_c), s	1.8	6.7	7.0	3.1	0.0	3.7		
Prop In Lane	1.00	1.00	1.00			0.13		
Lane Grp Cap(c), veh/h	496	504	530	731	0	671		
V/C Ratio(X)	0.24	0.76	0.26	0.36	0.00	0.42		
Avail Cap(c_a), veh/h	903	916	732	1078	0	989		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00		
Uniform Delay (d), s/veh	7.8	9.5	9.4	6.7	0.0	6.9		
Incr Delay (d2), s/veh	0.3	2.3	0.3	0.3	0.0	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.8	3.2	1.0	1.6	0.0	1.8		
LnGrp Delay(d),s/veh	8.1	11.9	9.6	7.0	0.0	7.3		
LnGrp LOS	A	B	A	A		A		
Approach Vol, veh/h	502			403	279			
Approach Delay, s/veh	11.0			7.9	7.3			
Approach LOS	B			A	A			
Timer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		16.7		14.4		16.7		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		18.0		18.0		18.0		
Max Q Clear Time (g_c+I1), s		9.0		8.7		5.7		
Green Ext Time (p_c), s		2.8		1.3		3.3		
Intersection Summary								
HCM 2010 Ctrl Delay			9.0					
HCM 2010 LOS			A					

Intersection	
Int Delay, s/veh	4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	61	56	20	16	59
Future Vol, veh/h	30	61	56	20	16	59
Conflicting Peds, #/hr	0	26	0	14	14	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	36	33	6	0	0	0
Mvmt Flow	30	61	56	20	16	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	171	106	0	0	90	0
Stage 1	80	-	-	-	-	-
Stage 2	91	-	-	-	-	-
Critical Hdwy	6.76	6.53	-	-	4.1	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.597	-	-	2.2	-
Pot Cap-1 Maneuver	747	870	-	-	1518	-
Stage 1	864	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	729	837	-	-	1498	-
Mov Cap-2 Maneuver	729	-	-	-	-	-
Stage 1	853	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	729	837	1498	-
HCM Lane V/C Ratio	-	-	0.041	0.073	0.011	-
HCM Control Delay (s)	-	-	10.2	9.6	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	334	400	128	173	402
v/c Ratio	0.54	0.50	0.49	0.25	0.63
Control Delay	13.0	3.8	16.9	9.3	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	3.8	16.9	9.3	13.4
Queue Length 50th (ft)	44	0	17	20	48
Queue Length 95th (ft)	115	39	62	59	132
Internal Link Dist (ft)	143			90	64
Turn Bay Length (ft)	100		100		
Base Capacity (vph)	980	1040	399	1052	954
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.38	0.32	0.16	0.42

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	334	400	128	173	296	106
Future Volume (veh/h)	334	400	128	173	296	106
Number	7	14	5	2	6	16
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00	1.00	1.00			0.97
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1881	1557	1881	1746	1900
Adj Flow Rate, veh/h	334	400	128	173	296	106
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	1	22	1	3	3
Opposing Right Turn Influence	Yes		Yes			
Cap, veh/h	575	523	395	803	519	186
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.33	0.33	0.43	0.43	0.43	0.43
Ln Grp Delay, s/veh	11.2	13.5	12.9	6.8	0.0	8.7
Ln Grp LOS	B	B	B	A		A
Approach Vol, veh/h	734			301	402	
Approach Delay, s/veh	12.5			9.4	8.7	
Approach LOS	B			A	A	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Case No		6.0		9.0		8.0		
Phs Duration (G+Y+Rc), s		20.1		16.5		20.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green (Gmax), s		18.0		18.0		18.0		
Max Allow Headway (MAH), s		5.5		4.0		5.5		
Max Q Clear (g_c+I1), s		13.9		10.2		8.7		
Green Ext Time (g_e), s		1.7		1.8		3.2		
Prob of Phs Call (p_c)		1.00		1.00		1.00		
Prob of Max Out (p_x)		1.00		0.33		0.54		
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		
Mvmt Sat Flow, veh/h		818		1757		0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1881		0		1216		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1599		436		
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	0
Lane Assignment								

Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	128	0	334	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	818	0	1757	0	0	0	0
Q Serve Time (g_s), s	0.0	5.1	0.0	5.8	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	11.9	0.0	5.8	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	818	0	1757	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	15.6	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	15.6	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	395	0	575	0	0	0	0
V/C Ratio (X)	0.00	0.32	0.00	0.58	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	449	0	864	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.4	0.0	10.2	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.9	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.9	0.0	11.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	2.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.2	0.0	2.9	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.35	0.00	0.75	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T						
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	173	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	803	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	926	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0

2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		T+R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	400	0	402	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1599	0	1652	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	8.2	0.0	6.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	8.2	0.0	6.7	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	0.26	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	523	0	705	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.76	0.00	0.57	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	787	0	813	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	11.0	0.0	7.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.7	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	13.5	0.0	8.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	3.6	0.0	3.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	3.9	0.0	3.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.52	0.00	0.73	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		10.8						
HCM 2010 LOS		B						

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	334	400	128	173	296	106
Future Volume (veh/h)	334	400	128	173	296	106
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1881	1557	1881	1746	1900
Adj Flow Rate, veh/h	334	400	128	173	296	106
Adj No. of Lanes	1	1	1	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	1	22	1	3	3
Cap, veh/h	575	523	395	803	519	186
Arrive On Green	0.33	0.33	0.43	0.43	0.43	0.43
Sat Flow, veh/h	1757	1599	818	1881	1216	436
Grp Volume(v), veh/h	334	400	128	173	0	402
Grp Sat Flow(s),veh/h/ln	1757	1599	818	1881	0	1652
Q Serve(g_s), s	5.8	8.2	5.1	2.1	0.0	6.7
Cycle Q Clear(g_c), s	5.8	8.2	11.9	2.1	0.0	6.7
Prop In Lane	1.00	1.00	1.00			0.26
Lane Grp Cap(c), veh/h	575	523	395	803	0	705
V/C Ratio(X)	0.58	0.76	0.32	0.22	0.00	0.57
Avail Cap(c_a), veh/h	864	787	449	926	0	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.2	11.0	12.4	6.6	0.0	7.9
Incr Delay (d2), s/veh	0.9	2.5	0.5	0.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	3.9	1.2	1.1	0.0	3.2
LnGrp Delay(d),s/veh	11.2	13.5	12.9	6.8	0.0	8.7
LnGrp LOS	B	B	B	A		A
Approach Vol, veh/h	734			301	402	
Approach Delay, s/veh	12.5			9.4	8.7	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		20.1		16.5		20.1		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		18.0		18.0		18.0		
Max Q Clear Time (g_c+I1), s		13.9		10.2		8.7		
Green Ext Time (p_c), s		1.7		1.8		3.2		

Intersection Summary	
HCM 2010 Ctrl Delay	10.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Future Volume (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.99			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1736	1845	1541	1805	3529			1805			1733	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.47			1.00	
Satd. Flow (perm)	1736	1845	1541	1805	3529			859			1732	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	148	685	94	10	1148	13	58	141	14	3	345	319
RTOR Reduction (vph)	0	0	65	0	1	0	0	3	0	0	42	0
Lane Group Flow (vph)	148	685	29	10	1160	0	0	210	0	0	625	0
Confl. Peds. (#/hr)	1		2	2		1	3		9	9		3
Confl. Bikes (#/hr)			3			5			4			9
Heavy Vehicles (%)	4%	3%	2%	0%	2%	11%	0%	4%	0%	0%	1%	2%
Turn Type	Prot	NA	custom	Prot	NA		D.Pm	NA		D.Pm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases			4				4			8		
Actuated Green, G (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Effective Green, g (s)	8.6	42.5	25.2	1.1	35.2			25.2			25.2	
Actuated g/C Ratio	0.10	0.51	0.30	0.01	0.42			0.30			0.30	
Clearance Time (s)	4.7	5.6	4.8	4.2	4.9			4.8			4.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	179	940	465	23	1489			259			523	
v/s Ratio Prot	c0.09	0.37		0.01	c0.33							
v/s Ratio Perm			0.02					0.24			c0.36	
v/c Ratio	0.83	0.73	0.06	0.43	0.78			0.81			1.20	
Uniform Delay, d1	36.7	16.0	20.7	40.8	20.8			26.9			29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2	25.7	4.9	0.1	12.6	4.1			23.2			105.4	
Delay (s)	62.4	20.9	20.8	53.5	24.8			50.1			134.5	
Level of Service	E	C	C	D	C			D			F	
Approach Delay (s)		27.5			25.1			50.1			134.5	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	52.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	14.6
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Appendix F and G: Warrants Analysis Nomographs

LEFT TURN WARRANT ANALYSIS
Portland VA Hospital Expansion
SCENARIO: YEAR 2029 - AM PEAK HOUR
DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	Speed	PHF	Advancing Volume	Left Turn Volume	Opposing Volume	Calculations				HRB Warrant Met?	Notes
								LT %	Warrant Factor	5% Warrant Va	Va Warrant Threshold		
2	Terwilliger Blvd/Campus Drive	NBL	25	0.88	614	430	411	70.0%	0.48	502	239	Yes	
		SB	25	0.88	411	0	184	0.0%	N/A	650	N/A	N/A	
		EBL	20	0.88	224	95	895	42.4%	0.44	306	135	Yes	
		NBT+SBT	20	0.88	895	0	129	0.0%	N/A	691	N/A	N/A	
4	Terwilliger Blvd/Veterans Hospita	NBL	25	0.90	688	422	445	61.3%	0.45	483	216	Yes	
		SB	25	0.90	445	0	266	0.0%	N/A	591	N/A	N/A	
		EBL	20	0.90	226	132	401	58.4%	0.44	508	225	Yes	
		NBT+SBT	20	0.90	401	0	94	0.0%	N/A	717	N/A	N/A	

LEFT TURN WARRANT ANALYSIS

Portland VA Hospital Expansion

SCENARIO: YEAR 2029 - PM PEAK HOUR

DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	Speed	PHF	Advancing Volume	Left Turn Volume	Opposing Volume	Calculations: LT %	Calculations: Warrant Factor	Calculations: 5% Warrant Va	Calculations: Va Warrant Threshold	HRB Warrant Met?	Notes
2	Terwilliger Blvd/Campus Drive	NBL	25	0.88	614	430	411	70.0%	0.48	502	239	Yes	
		SB	25	0.88	411	0	184	0.0%	N/A	650	N/A	N/A	
		EBL	20	0.88	224	95	895	42.4%	0.44	306	135	Yes	
		NBT+SBT	20	0.88	895	0	129	0.0%	N/A	691	N/A	N/A	
4	Terwilliger Blvd/Veterans Hospit	NBL	25	0.90	688	422	445	61.3%	0.45	483	216	Yes	
		SB	25	0.90	445	0	266	0.0%	N/A	591	N/A	N/A	
		EBL	20	0.90	226	132	401	58.4%	0.44	508	225	Yes	
		NBT+SBT	20	0.90	401	0	94	0.0%	N/A	717	N/A	N/A	

RIGHT TURN WARRANT ANALYSIS

Portland VA Hospital Expansion
SCENARIO: YEAR 2029 - AM PEAK HOUR
DATE: 2/25/2019

Unsignalized Intersections

No.	Intersection	Movement	2-lane (1), Multi-lane (2)	Posted Speed	Advancing Volume	Right Turn Volume	Calculations: NCHRP RT Volume	Taper Warrant	RT Lane Warrant	Meets NCHRP Taper	Meets NCHRP RT Lane	Notes
2	Terwilliger Blvd/Campus Drive	NB	1	25	614	0	0	20	40	No	No	
		SBR	1	25	411	130	130	29	65	Yes	Yes	
		EBR	1	20	224	129	89	48	91	Yes	No	Very close to warranted.
							0	#N/A	#N/A	#N/A	#N/A	
4	Terwilliger Blvd/Veterans Hospital Road	NB	1	25	688	0	0	20	40	No	No	
		SBR	1	25	445	310	310	26	61	Yes	Yes	
		EBR	1	20	226	94	54	48	91	Yes	No	
							0	#N/A	#N/A	#N/A	#N/A	

RIGHT TURN WARRANT ANALYSIS
Portland VA Hospital Expansion
SCENARIO: YEAR 2029 - PM PEAK HOUR
DATE: 4/25/2019

Unsignalized Intersections

No.	Intersection	Movement	2-lane (1), Multi-lane (2)	Posted Speed	Advancing Volume	Right Turn Volume	Calculations: NCHRP RT Volume	Taper Warrant	RT Lane Warrant	Meets NCHRP Taper	Meets NCHRP RT Lane	Notes
2	Terwilliger Blvd/Campus Drive	NB	1	25	403	0	0	30	67	No	No	
		SBR	1	25	279	36	36	43	84	No	No	
		EBR	1	20	502	381	381	20	53	Yes	Yes	
							0	#N/A	#N/A	#N/A	#N/A	
4	Terwilliger Blvd/Veterans Hospital Road	NB	1	25	301	0	0	40	80	No	No	
		SBR	1	25	402	106	106	30	67	Yes	Yes	
		EBR	1	20	734	400	400	20	40	Yes	Yes	
							0	#N/A	#N/A	#N/A	#N/A	

Right Turn Lane Warrants

Unsignali

	2-Lane Highway		Multi-Lane Highway	
Va	Taper	Lane	Taper	Lane
10	69	119	40	90
20	68	117	39	90
30	67	116	39	90
40	66	115	39	90
50	65	113	39	90
60	64	112	38	90
70	63	111	38	90
80	62	109	38	90
90	61	108	37	90
100	60	107	37	90
110	59	105	37	90
120	58	104	36	90
130	57	103	36	90
140	56	101	36	90
150	55	100	36	90
160	54	99	35	90
170	53	97	35	90
180	52	96	35	90
190	51	95	34	90
200	50	93	34	90
210	49	92	34	90
220	48	91	33	90
230	47	89	33	90
240	46	88	33	90
250	45	87	33	90
260	44	85	32	90
270	43	84	32	90
280	42	83	32	90
290	41	81	31	90
300	40	80	31	90
310	39	79	31	90
320	38	77	30	90
330	37	76	30	90
340	36	75	30	90
350	35	73	30	90
360	34	72	29	90
370	33	71	29	90
380	32	69	29	90
390	31	68	28	90
400	30	67	28	90
410	29	65	28	90
420	28	64	27	90
430	27	63	27	90
440	26	61	27	90
450	25	60	27	90
460	24	59	26	90
470	23	57	26	90
480	22	56	26	90

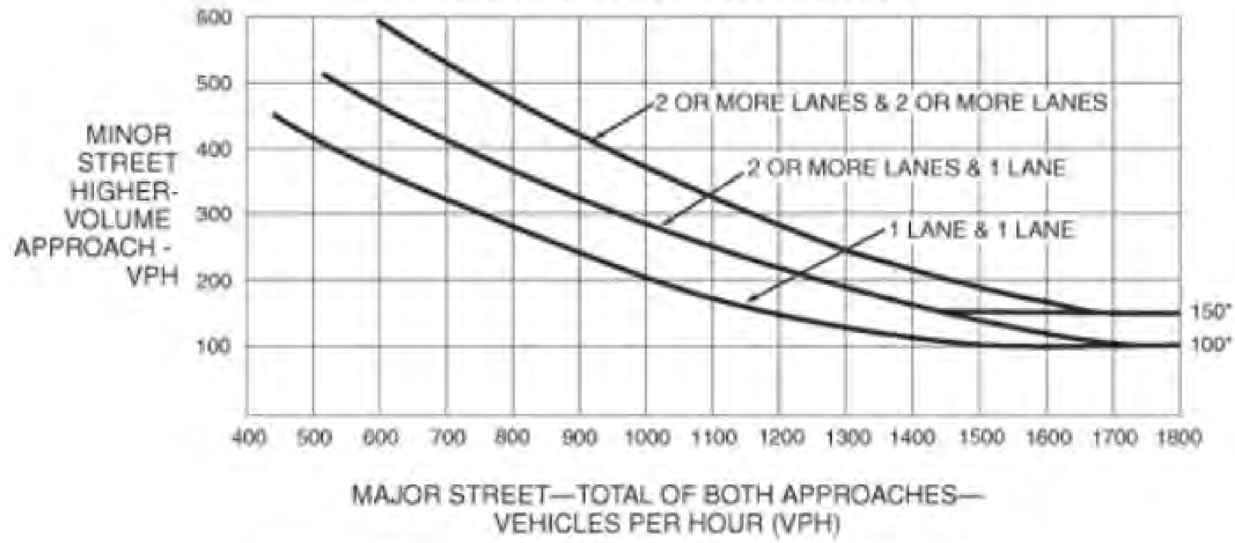
490	21	55	25	90
500	20	53	25	89
510	20	52	25	89
520	20	51	24	88
530	20	49	24	87
540	20	48	24	86
550	20	47	24	86
560	20	45	23	85
570	20	44	23	84
580	20	43	23	84
590	20	41	22	83
600	20	40	22	82
610	20	40	22	81
620	20	40	21	81
630	20	40	21	80
640	20	40	21	79
650	20	40	21	79
660	20	40	20	78
670	20	40	20	77
680	20	40	20	76
690	20	40	19	76
700	20	40	19	75
710	20	40	19	74
720	20	40	18	74
730	20	40	18	73
740	20	40	18	72
750	20	40	18	71
760	20	40	17	71
770	20	40	17	70
780	20	40	17	69
790	20	40	16	69
800	20	40	16	68
810	20	40	16	67
820	20	40	15	66
830	20	40	15	66
840	20	40	15	65
850	20	40	15	64
860	20	40	14	64
870	20	40	14	63
880	20	40	14	62
890	20	40	13	61
900	20	40	13	61
910	20	40	13	60
920	20	40	12	59
930	20	40	12	59
940	20	40	12	58
950	20	40	12	57
960	20	40	11	56
970	20	40	11	56
980	20	40	11	55
990	20	40	10	54
1000	20	40	10	54

1010	20	40	10	53
1020	20	40	10	52
1030	20	40	10	51
1040	20	40	10	51
1050	20	40	10	50
1060	20	40	10	49
1070	20	40	10	49
1080	20	40	10	48
1090	20	40	10	47
1100	20	40	10	46
1110	20	40	10	46
1120	20	40	10	45
1130	20	40	10	44
1140	20	40	10	44
1150	20	40	10	43
1160	20	40	10	42
1170	20	40	10	41
1180	20	40	10	41
1190	20	40	10	40
1200	20	40	10	40

ODOT RT Lane Volume Criteria (less than 70 km/hr)
Note: RT Volumes below 20 do not meet criteria, but shoulder should be provided if above 700 vehicles

RT	Vol
1	700
5	700
10	700
15	700
20	700
25	663
30	625
35	588
40	550
45	513
50	475
55	438
60	400
65	363
70	325
75	288
80	250
85	213
90	175
95	138
100	100
105	63
110	25
113	0

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

[1] Obtained from Manual on Uniform Traffic Control Devices, FHWA, Chapter 4

Intersection	Major Street		Minor Street Higher Volume Approach		Signal Warrant Satisfaction
	Volume (VPH)	Lanes (#)	Volume (VPH)	Lanes (#)	
2019 Year - AM Peak Hour					
Terwilliger Blvd / Campus Drive	812	1	203	1	No
Terwilliger Blvd / Veterans Hospital Road	835	1	138	1	No
2019 Year - PM Peak Hour					
Terwilliger Blvd / Campus Drive	488	1	456	1	Yes
Terwilliger Blvd / Veterans Hospital Road	550	1	416	1	Yes
2029 Year Build Out - AM Peak Hour					
Terwilliger Blvd / Campus Drive	1025	1	224	1	Yes
Terwilliger Blvd / Veterans Hospital Road	1133	2	226	1	Yes
2029 Year Build Out - PM Peak Hour					
Terwilliger Blvd / Campus Drive	682	1	502	1	Yes
Terwilliger Blvd / Veterans Hospital Road	703	2	734	1	Yes

MEMORANDUM

DATE: April 30, 2019

TO: Emery Layton, PE, MLT
FROM: Dana Beckwith, PE, PTOE
Anastasia Roeszler, PE

SUBJECT: Portland VA Campus Parking and TDM Analysis P18-113-000

This memorandum summarizes the queuing analysis associated with the proposed expansion of the Portland Veterans Administration Medical Center (VAMC). In addition to expanded medical facilities, the hospital expansion will include a new staff parking structure and additional floors added to an existing parking structure. The additional parking will be accessed through three existing parking lot entrances on SW US Veterans Hospital Road.

The purpose of this analysis is to identify potential impacts to SW US Veterans Hospital Road due to increased queuing by traffic that will be generated by the proposed hospital and parking expansion, and identify measures, if necessary, to mitigate those impacts. This traffic impact analysis is based on performance standards established by the US Department of Veterans Affairs, the City of Portland, and the Institute of Transportation Engineers.

The following intersections were evaluated as part of this traffic impact analysis:
- SW US Veterans Hospital Road and staff parking structure (Building 108) access (Parking Access 1)
- SW US Veterans Hospital Road and staff parking Lot 5 access (Parking Access 2)
- SW US Veterans Hospital Road and staff parking Lot 4 access (Parking Access 3)

This memorandum includes the following:
- Project Description
- Inventory and Existing Conditions
- Transportation Demand Management
- Site Evaluation
- Traffic Volumes
- Queue Analysis
- Results and Recommendations

PROJECT DESCRIPTION

The Portland VA Medical Center is located on Marquam Hill. SW US Veterans Hospital Road is the primary access road through the VAMC campus. SW US Veterans Hospital Road can be accessed from SW Terwilliger Boulevard to the east, and from SW Gaines Road to the west (See Figure 1 and Figure 2). Seven TriMet bus lines service the hospital, and a pedestrian bridge provides connectivity to Oregon Health and Science University (OHSU), which can be accessed by the Portland Aerial Tram.

This project will expand the Portland VA Medical Center, the existing parking structure, Building 108, within the existing employee parking area accessed by Parking Access 1 and Parking Access 2 by 150 spaces, and construct a new 450-space parking structure within Lot 4.

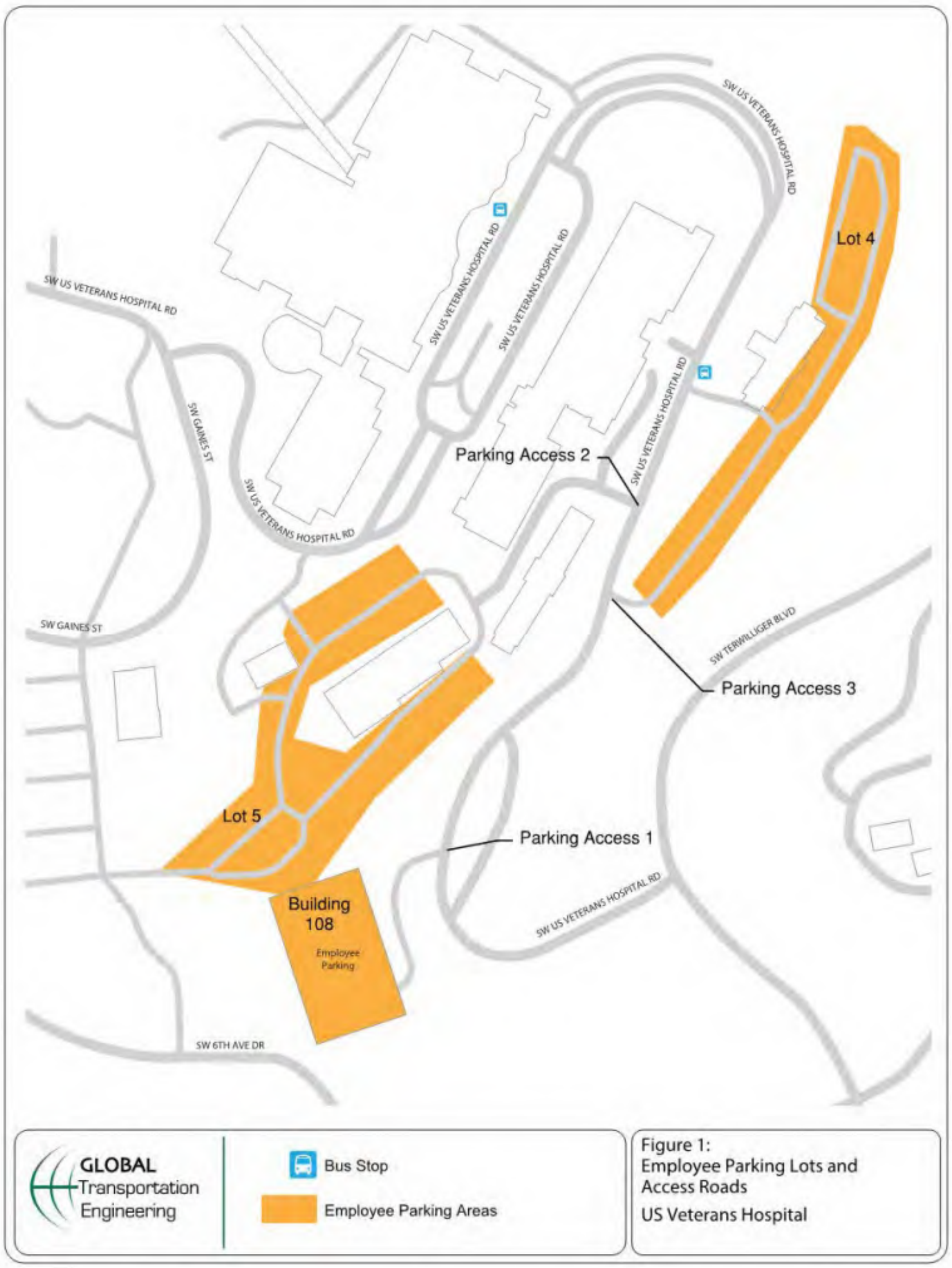


Figure 1: Site Map

INVENTORY AND EXISTING CONDITIONS

This section summarizes the inventory and evaluation of existing transportation conditions along SW US Veterans Hospital Road from SW Terwilliger Boulevard to SW Gaines Street. The inventory includes the study intersections previously identified in this report, and evaluates all modes of travel, including pedestrian, bicycle, transit, and motor vehicles. The inventory and data collected include:

- Street Functional Classification (See Table 1)
- Inventory of Existing Conditions (See Table 2)
  - Posted speed limits
  - Pedestrian and bicycle facility characteristics
  - Lane geometry
  - On-street parking
  - Transit route information

Table 1: City of Portland Functional Classification

Roadway	Functional Classification Classes (1)						
	Transit	Traffic	Emergency Response	Street Design	Bicycle	Pedestrian	Freight
SW US Veterans Hospital Road	Major Transit Priority Street	Neighborhood Collector	Minor Emergency Response	Community Corridor	City Bikeway	Local Service Walkway	Local Service Truck Street
SW Terwilliger Boulevard	Major Transit Priority Street	Neighborhood Collector	Major Emergency Response	Community Corridor	Major City Bikeway	City Walkway	Local Service Truck Street
SW Gaines Street	Major Transit Priority Street	Neighborhood Collector	Minor Emergency Response	Community Corridor	Local Service Bikeway	City Walkway	Local Service Truck Street

(1) Functional Classification based on the City of Portland website, www.portlandmaps.com

Table 2: Existing Conditions Within Study Area

Roadway	Posted Speed Limit	Sidewalks	Bike Lanes	Lane Geometry	On-Street Parking	Transit Routes
SW US Veterans Hospital Road	15 mph	Intermittent Sidewalks	No	Two 12’ lanes in each direction, 12’ left turn lanes at major intersections/accesses, pick-up/drop-off area at main entrance, parallel and angle parking in some areas	Yes, Reserved for Employees/ Vanpool	Bus Lines 8, 61, 64, 65, 66, 68, 190
SW Terwilliger Boulevard	25 mph	Multi-use Path on East Side of Street	Yes	Two 11.5’ lanes in each direction, 5’ bike lanes	No	Bus Lines 8, 65, 68
SW Gaines Street	20 mph	Sidewalk/Multi-use Path on East Side of Street	No	Two 11’ lanes in each direction	No	Bus Line 8, 61, 64, 65, 66, 68

TRANSPORTATION DEMAND MANAGEMENT

Parking for both patients and employees is limited on the VAMC campus. VAMC employs approximately 4,500 staff, but the campus has only about 1000 staff parking spaces. For this reason, the VA Medical Center has adopted strategies to reduce single-occupancy vehicle trips to the VAMC campus. Federal VAMC employees are eligible for a $255 per month non-tax subsidy that can be used to purchase TriMet passes, C-Tran bus and vanpool passes, Enterprise Vanpool services, and Portland Aerial Tram tickets. About 1000 VAMC staff are enrolled in this transit program. The VAMC only tracks enrollment in the transit program and parking card program, which provides access to the campus's 1000 staff parking spaces. VAMC does not have commuter information on the 2,500 employees that do not participate in the transit program or parking card program; many of these employees are non-federal employees and therefore are ineligible for the transit benefit. These employees likely park at OHSU, or self-fund transit passes.

Seven TriMet bus lines provide service to the VAMC campus. Line 8 provides frequent service from northeast and downtown Portland at 15-minute or better headways for most of the day, every day. Line 61 provides service from Beaverton, Line 64 provides service from Tigard, Line 65 provides service from southwest Portland, and Line 68 provides service from southeast and inner southwest Portland.

An additional connector shuttle provides service between VAMC and the OHSU campus. Additionally, a pedestrian bridge provides access between the VAMC and OHSU campuses, providing access to the Portland Aerial Tram.

The VAMC campus is accessible by popular bicycle routes. Although there are no bike lanes or other bicycle facilities on US Veterans Hospital Road, SW Terwilliger Boulevard, a major city bikeway that provides access to US Veterans Hospital Road, has bike lanes in both directions and a multi-use path on one side. Plentiful bicycle parking and bike valet is provided at the base of the Portland Aerial Tram in the South Waterfront. VAMC participates in the Federal Bicycle Benefit program, which provides subsidies to offset the cost of bicycle parking, but only about ten employees participate in the program.

VAMC has several programs in place for assisting veterans with transportation to and from their medical appointments. The Veterans Transportation Service (VTS) operates within a 20-mile radius of VAMC. VTS operates as a ride share service, picking up several patients on each trip. Rides must be scheduled in advance with the VTS office. Disabled American Veterans (DAV) is operated by a network of volunteers to provide transportation to Portland VAMC from other parts of the state. DAV shuttles operate on a fixed route, and rides must be scheduled at least four days in advance.

The VA also operates a shuttle bus between the Portland and Vancouver VA campuses. The shuttle operates Monday through Friday with one to two-hour headways from 7:15 AM to 6:45 PM.

Parking

Parking is limited on the VAMC campus. All parking on the campus is reserved for patients, visitors, or staff. VAMC issues parking cards that allow staff to access the approximately 1000 available parking spaces in staff parking lots, and parking permits that allow staff to park in reserved angle and parallel parking spaces along US Veterans Hospital Road. Day use Lot 1 requires a card swipe, but the lot is not currently gated. The remaining staff parking lots, Lot 5, Building 108, Lot 4, and Lot 3, are all gated and require a card swipe to enter or exit. Patients and visitors may park in Lot 2 below Building 102. Additional RV-only patient parking is provided in Lot 7. See Figure 2 for building and parking lot locations.

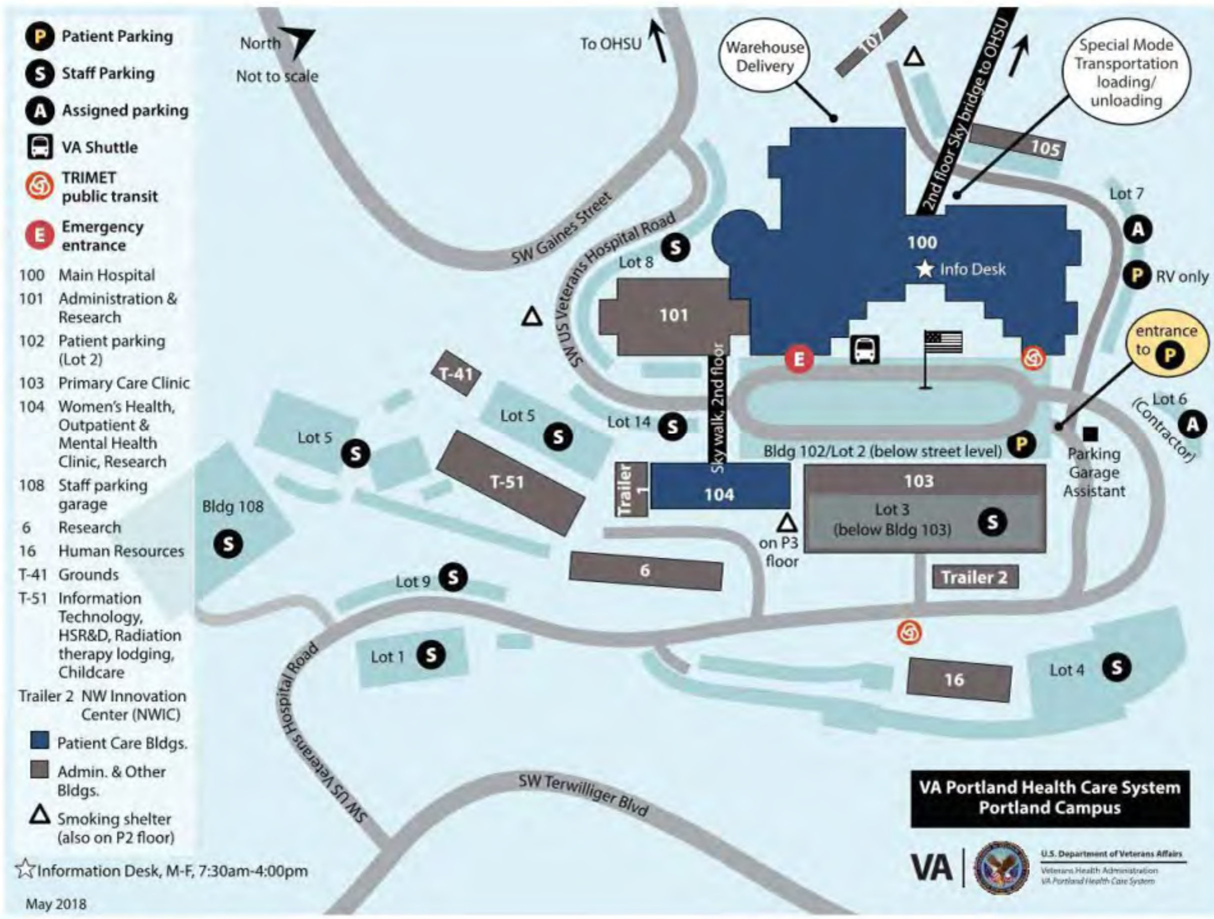


Figure 2: VAMC Site Plan

VAMC reserves a portion of parking cards for carpools of two, three, or four people. Currently, there are 172 carpools with over 400 VA staff members participating.

Campus-wide parking utilization varies by time of day and day of the week. Daytime utilization ranged from an average low of 79.1 percent utilization on Fridays to average high of 92 percent utilization on Tuesdays[1].

[1] Parking utilization information retrieved from VAMC Quarterly Parking Dashboard FY2018 Q3.

SITE EVALUATION

Two staff parking areas will be expanded with the proposed improvements. Building 108, which will be expanded by 150 parking spaces, can be accessed by Parking Access 1 and Parking Access 2. A new parking structure will be constructed within Lot 4, providing 450 additional spaces, which is accessed by Parking Access 3.

Parking Access 1 is located on SW US Veterans Hospital Road approximately 400 feet from SW Terwilliger Boulevard. Parking Access 1 provides access to a staff parking structure (Building 108), and Lot 5, which can be accessed by traveling through Building 108. Parking Access 1 is located on a section of SW US Veterans Hospital Road that has significant vertical and horizontal curves. Traffic speeds along SW US Veterans Hospital Road are typically low, with a posted speed limit of 15 mph. There are no turning movement restrictions entering or exiting the access. No right or left turn lanes are provided on SW US Veterans Hospital Road.

Inbound traffic to Parking Access 1 is controlled by an electronic security gate located approximately 20 feet from the back of the sidewalk, allowing for one vehicle to queue without blocking sidewalk access. Outbound traffic is controlled by a security gate at the back of sidewalk. The inbound and outbound security gates are controlled by a card reader.

Parking Access 2 is located on SW US Veterans Hospital Road approximately 930 feet from SW Terwilliger Boulevard. Parking Access 2 provides access to Lot 5 and provides a secondary access to staff parking structure Building 108. Sight distance for exiting vehicles at Parking Access 2 is slightly restricted by a retaining wall structure that can block visibility of northbound vehicles unless the exiting vehicle encroaches into the crosswalk. There are no turning movement restrictions entering or exiting the access. A 40-foot left turn pocket provides storage for about 2 vehicles entering from the northbound direction on US Veterans Hospital Road.

Inbound traffic to Parking Access 2 is controlled by an electronic security gate located approximately 14 feet from the back of the sidewalk. Vehicles stopped at the electronic gate may block the crosswalk while waiting for the gate to open. Outbound traffic is controlled by a security access gate approximately three feet behind the back of sidewalk. The inbound and outbound security gates are controlled by a card reader.

Parking Access 3 is located on SW US Veterans Hospital Road approximately 100 feet south of Parking Access 2. Parking Access 3 provides access to Lot 4 and Building 16. The access has a single lane that serves inbound and outbound traffic. There are no turning movement restrictions entering or exiting the access. No right or left turn lanes are provided on SW US Veterans Hospital Road.

Parking Access 3 has a single gate that controls both inbound and outbound traffic. Electronic card readers are provided in the inbound and outbound directions. There is room for one vehicle between the security gate and US Veterans Hospital Road travel lane in the inbound direction. There is no sidewalk to the south on the east side of US Veterans Hospital Road and no crosswalk across Parking Access 3.

TRAFFIC VOLUMES

Existing Year 2018 Traffic Volumes

Tube counts were collected at each access. Tube counts were collected on Wednesday, November 7th, 2018 and Thursday, November 8th, 2018 at Parking Access 1, on Tuesday, November 13th, 2018 and Wednesday November 14th, 2018 at Parking Access 2, and on Thursday, April 4th, 2019 at Parking Access 3.

Tube counts determined that the peak hour for inbound trips is between 7 AM and 8 AM at Parking Access 1 with 96 vehicles, between 6 AM and 7 AM at Parking Access 2 with 95 vehicles, and between 6 AM and 7AM at Parking Access 3 with 63 vehicles. Figure 3, Figure 4, and Figure 5 show inbound and outbound traffic volumes over time at each access. The complete traffic count data can be found in Appendix A.

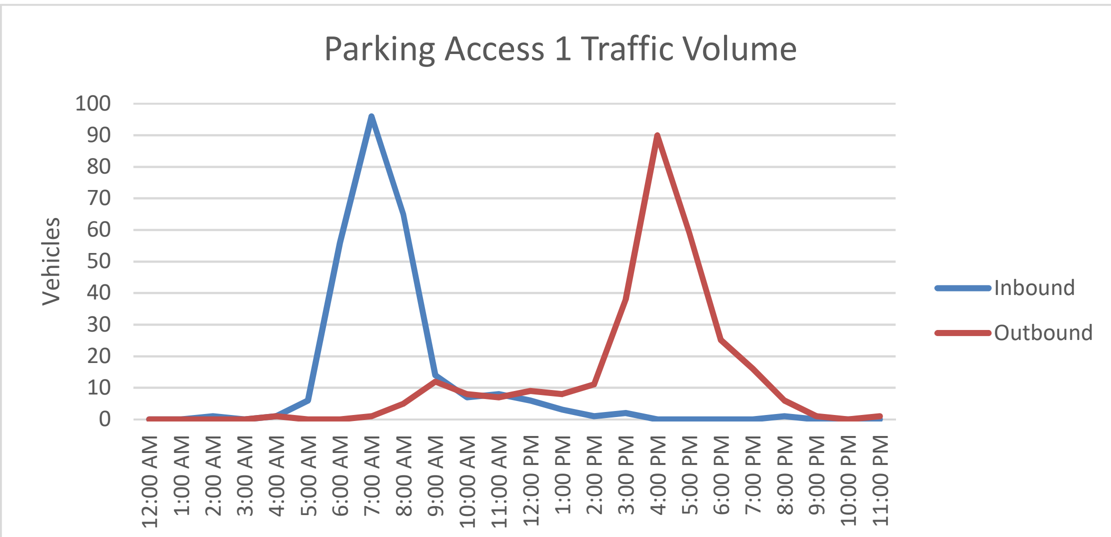


Figure 3: Parking Access 1 Traffic Volumes

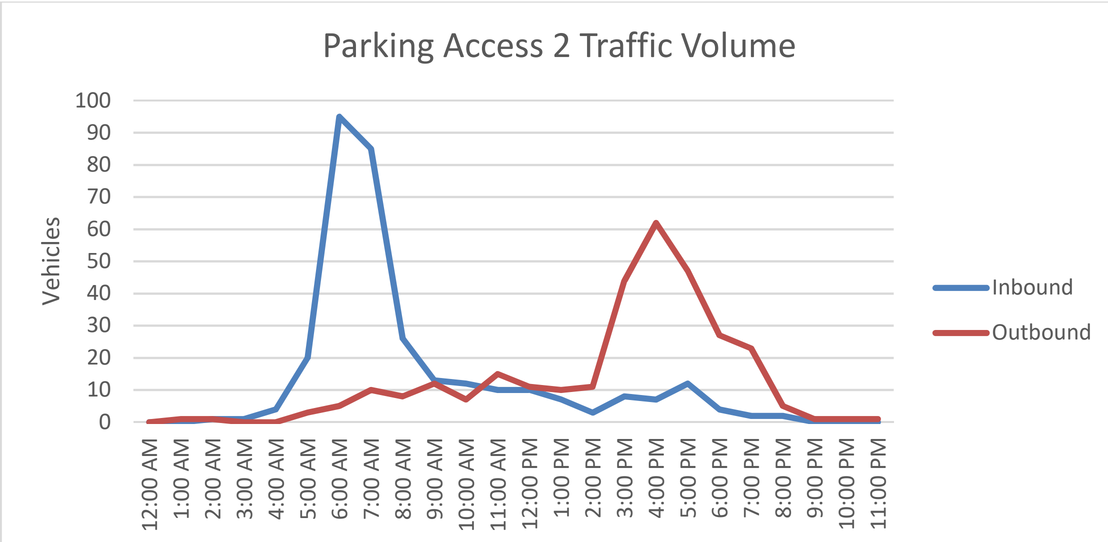


Figure 4: Parking Access 2 Traffic Volume

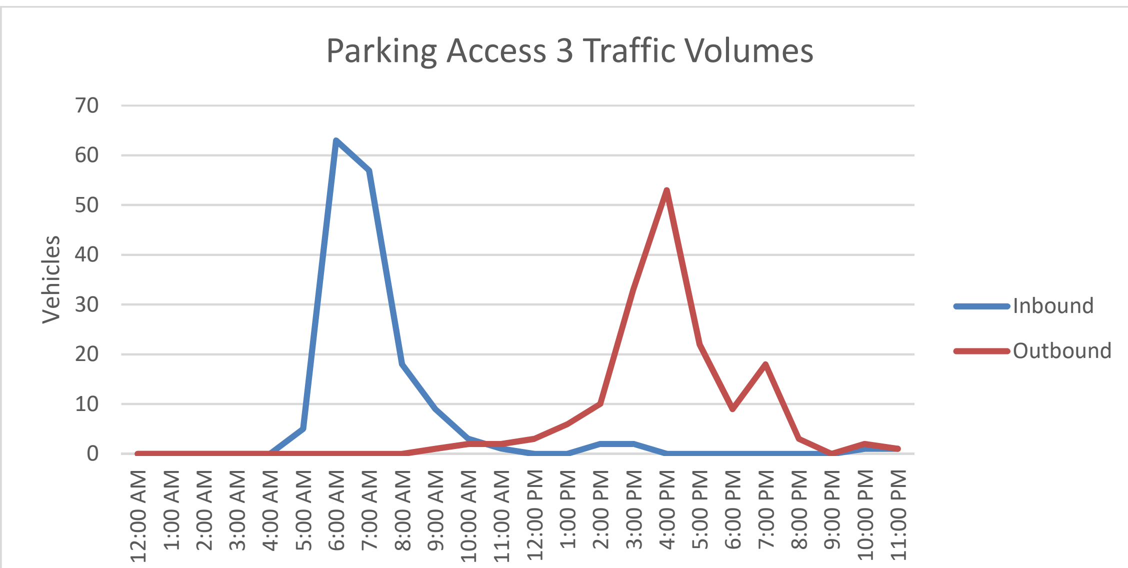


Figure 5: Parking Access 3 Traffic Volumes

Opening Day Traffic Volumes

The VAMC expansion will include 150 new parking spaces that will be accessed by Parking Access 1 and Parking Access 2 and 450 new parking spaces that will be accessed by Parking Access 3. The 600 new parking spaces are expected to generate 552 new trips per day assuming present-day parking utilization rates (92 percent). Based on existing traffic patterns, the additional daily trips were factored between the three entrances and by time of day to estimate the peak hour parking traffic volume when the VAMC expansion is complete and fully occupied.

Table 3: Parking Volumes

	2018 AM Peak Hour Volume (Inbound)	2018 PM Peak Hour Volume (Outbound)	Full Occupancy AM Peak Hour Volume (Inbound)	Full Occupancy PM Peak Hour Volume (Outbound)
Parking Access 1	96	90	186	172
Parking Access 2	95	62	184	119
Parking Access 3	63	53	224	186

QUEUING ANALYSIS

Full occupancy AM and PM peak hour traffic volumes were used to determine queue lengths at Parking Access 1, Parking Access 2, and Parking Access 3. The queueing analysis was conducted using the methodology outlined in the ITE Traffic Engineering Handbook, 6th Edition[3]. This analysis determines motor vehicle impacts due to potential inbound queuing at the secure accesses. The potential for queuing is dependent upon the gated access service rate, swing gate control equipment, and the physical characteristics of the driveway.

Both Parking Access 1 and Parking Access 2 have one travel lane in each direction separated by a concrete median. Parking Access 3 has a single travel lane that services both inbound and outbound traffic. All accesses are controlled by secure gates for entering and exiting the site that are activated with card readers. The secure gates have an opening time of five seconds[4]. Field observations indicate that the average total time for vehicles slowing for card activation to the vehicle passing through the gate is 6.5 seconds.

There are sidewalks crossing Parking Access 1 and Parking Access 2, and pedestrians are present in the study area. However, a pedestrian crossing one of the parking accesses at the same time a vehicle arrives is likely to be a rare occurrence, so no pedestrian conflict time was included in the analysis.

The following gate operations characteristics were assumed in the analysis:

- 6.5 seconds = gate activation and opening time.
- Gate location = approximately 20 feet from the back of sidewalk at Parking Access 1, and approximately 14 feet from the back of sidewalk at Parking Access 2.

A Poisson distribution was used to simulate random arrival rates of vehicles. Table 4 shows present day queuing analysis results and Table 5 shows the full buildout queueing analysis results. The probability of a queue forming at all entrances increases with the full buildout scenario.

Detailed queuing analysis results can be found in Appendix B.

---

[3] Institute of Transportation Engineers, Traffic Engineering Handbook, January 2009.
[4] Email from John Dodier, November 20, 2018

Table 4: Current Day Queuing Analysis

Queue Length	Probability of Queue					
	Parking Access 1		Parking Access 2		Parking Access 3	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
0	81%	82%	81%	88%	88%	90%
1	17%	16%	17%	11%	11%	10%
2	2%	2%	2%	1%	1%	1%

Table 5: Full Build Out Queuing Analysis

Queue Length	Probability of Queue					
	Parking Access 1		Parking Access 2		Parking Access 3	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
0	76%	78%	76%	85%	51%	60%
1	21%	19%	21%	14%	34%	30%
2	3%	2%	3%	1%	12%	8%
3	-	-	-	-	3%	1%

Inbound vehicles during the AM peak hour will arrive from both the northbound and southbound directions on SW US Veterans Hospital Road. Due to this directional split, the existing left turn lane at Parking Access 2 should be adequate to accommodate northbound traffic queues during the AM peak hour. Parking Access 1 has no existing turn lanes, and sight distance is restricted by vertical and horizontal curves on the northbound approach, which could create a safety issue if queued vehicles turning left into Parking Access 1 block the northbound lane. However, the speed limit on SW US Veterans Hospital Road is just 15 miles per hour. Stopping sight distance for a 15 mile per hour roadway is 80 feet, so approaching vehicles should be able to react and safely come to a stop before reaching the back of the queue.

Parking Access 3 has the greatest probability of a 2-vehicle or longer queue forming during the AM and PM peak hours. In the inbound direction, there is enough storage for one vehicle waiting for the secure gate to open. Based on the queuing analysis, vehicles will arrive when at least one vehicle is already present in the queue nearly half of the time during the AM peak hour. For this reason, additional mitigations such as turn lanes or adjusting the location of the security gate to allow for storage of two or three vehicles should be considered. Additionally, the Parking Access 3 has just one shared lane for inbound and outbound traffic. Traffic flow during the peak hours is highly directional with very few vehicles exiting during the AM peak and very few vehicles enter during the PM peak. However, with the additional traffic volumes expected with the new parking structure, the likelihood of opposing traffic during the peak hours will increase. For this reason, constructing an additional travel lane at the existing access or constructing a second access is recommended to provide separation between inbound and outbound traffic.

During the PM peak hour, there is enough existing storage at all accesses to accommodate outbound vehicle queues.

RESULTS AND RECOMMENDATIONS

The queuing analysis results indicate that there is an increased probability of an arriving vehicle encountering a queue at all accesses during the AM and PM peak hours under the full buildout scenario. While the probability of inbound vehicles encountering a queue at Parking Access 1 and Parking Access 2 will increase in the AM peak hour, the increase is small and the posted speed on SW US Veterans Hospital Road is low. Due to low speeds and the small increase in queuing probability, no changes to intersection geometry or left turn storage are recommended for Parking Access 1 and Parking Access 2 at this time.

At Parking Access 3, inbound vehicles will encounter a waiting vehicle almost half of the time during the AM peak hour. Presently, there is enough storage for only one vehicle, so additional mitigations such as left or right turn lanes or moving the security gate to provide storage for two to three vehicles is recommended. There is currently only one travel lane at Parking Access 3 that serves both inbound and outbound traffic. Present day traffic counts indicate that there are very few outbound vehicles during the AM peak or inbound vehicles during the PM peak, but opposing traffic could increase with the expanded parking facilities. For this reason, an additional travel lane or an additional access is recommended to provide separation between inbound and outbound traffic.

Travel Demand Management

There are no future pedestrian, bicycle, and street improvements identified by the City’s TSP in the study area. Continuation of VAMC travel demand management programs such as the federal employee transit program and the carpool parking card program is recommended to reduce future parking demand and traffic volumes at the study intersections.

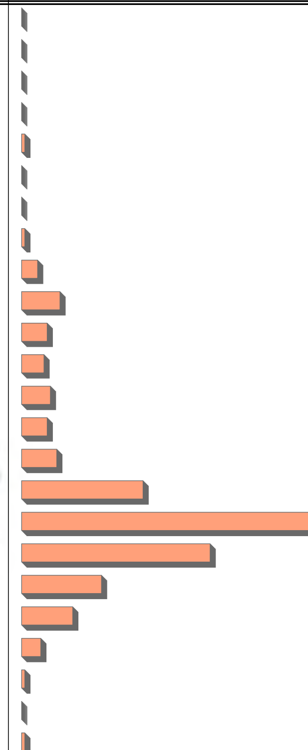
Appendix

Appendix A: Traffic Count Data

Type of report: Tube Count - Volume Data

LOCATION: US Veterans Hospital Rd & Hospital South Dwy **QC JOB #:** 14806002
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital South Dwy **DIRECTION:** NB
CITY/STATE: Portland, OR **DATE:** Nov 07 2018 - Nov 08 2018

Start Time	Mon	Tue	Wed 07-Nov-18	Thu 08-Nov-18	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			0	0		0			0	
1:00 AM			0	0		0			0	
2:00 AM			0	0		0			0	
3:00 AM			0	0		0			0	
4:00 AM			0	1		1			1	
5:00 AM			0	0		0			0	
6:00 AM			0	0		0			0	
7:00 AM			1	1		1			1	
8:00 AM			7	3		5			5	
9:00 AM			**16**	**7**		**12**			**12**	
10:00 AM			9	6		8			8	
11:00 AM			6	7		7			7	
12:00 PM			8	10		9			9	
1:00 PM			8	8		8			8	
2:00 PM			12	10		11			11	
3:00 PM			42	33		38			38	
4:00 PM			**90**	**89**		**90**			**90**	
5:00 PM			56	61		59			59	
6:00 PM			23	27		25			25	
7:00 PM			15	16		16			16	
8:00 PM			4	7		6			6	
9:00 PM			1	0		1			1	
10:00 PM			0	0		0			0	
11:00 PM			0	1		1			1	
Day Total			298	287		298			298	
% Weekday Average			100.0%	96.3%						
% Week Average			100.0%	96.3%		100.0%				
AM Peak Volume			9:00 AM 16	9:00 AM 7		9:00 AM 12			9:00 AM 12	
PM Peak Volume			4:00 PM 90	4:00 PM 89		4:00 PM 90			4:00 PM 90	



Comments:

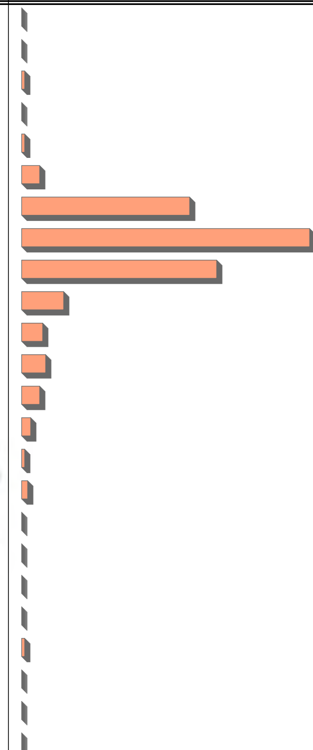
Report generated on 11/19/2018 9:09 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Volume Data

LOCATION: US Veterans Hospital Rd & Hospital South Dwy **QC JOB #:** 14806002
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital South Dwy **DIRECTION:** SB
CITY/STATE: Portland, OR **DATE:** Nov 07 2018 - Nov 08 2018

Start Time	Mon	Tue	Wed 07-Nov-18	Thu 08-Nov-18	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			0	0		0			0	
1:00 AM			0	0		0			0	
2:00 AM			0	1		1			1	
3:00 AM			0	0		0			0	
4:00 AM			0	1		1			1	
5:00 AM			6	5		6			6	
6:00 AM			57	54		56			56	
7:00 AM			**103**	**88**		**96**			**96**	
8:00 AM			75	55		65			65	
9:00 AM			13	15		14			14	
10:00 AM			10	4		7			7	
11:00 AM			8	7		8			8	
12:00 PM			**4**	**8**		**6**			**6**	
1:00 PM			3	2		3			3	
2:00 PM			0	2		1			1	
3:00 PM			2	1		2			2	
4:00 PM			0	0		0			0	
5:00 PM			0	0		0			0	
6:00 PM			0	0		0			0	
7:00 PM			0	0		0			0	
8:00 PM			1	0		1			1	
9:00 PM			0	0		0			0	
10:00 PM			0	0		0			0	
11:00 PM			0	0		0			0	
Day Total			282	243		267			267	
% Weekday Average			105.6%	91.0%						
% Week Average			105.6%	91.0%		100.0%				
AM Peak Volume			7:00 AM 103	7:00 AM 88		7:00 AM 96			7:00 AM 96	
PM Peak Volume			12:00 PM 4	12:00 PM 8		12:00 PM 6			12:00 PM 6	



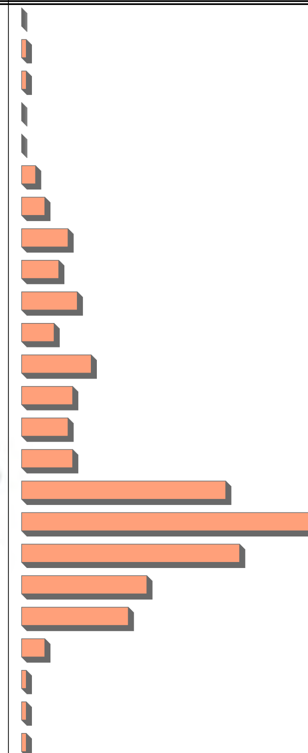
Comments:

Report generated on 11/19/2018 9:09 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: US Veterans Hospital Rd & Hospital North Dwy
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital North Dwy
CITY/STATE: Portland, OR

QC JOB #: 14806001
DIRECTION: NB
DATE: Nov 13 2018 - Nov 14 2018

Start Time	Mon	Tue 13-Nov-18	Wed 14-Nov-18	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		0	0			0			0	
1:00 AM		1	0			1			1	
2:00 AM		0	1			1			1	
3:00 AM		0	0			0			0	
4:00 AM		0	0			0			0	
5:00 AM		2	3			3			3	
6:00 AM		4	5			5			5	
7:00 AM		7	12			10			10	
8:00 AM		5	10			8			8	
9:00 AM		**16**	8			12			12	
10:00 AM		5	8			7			7	
11:00 AM		12	**18**			**15**			**15**	
12:00 PM		10	12			11			11	
1:00 PM		11	8			10			10	
2:00 PM		10	12			11			11	
3:00 PM		41	47			44			44	
4:00 PM		**55**	**68**			**62**			**62**	
5:00 PM		53	41			47			47	
6:00 PM		26	28			27			27	
7:00 PM		24	22			23			23	
8:00 PM		7	3			5			5	
9:00 PM		0	1			1			1	
10:00 PM		0	1			1			1	
11:00 PM		2	0			1			1	
Day Total		291	308			305			305	
% Weekday Average		95.4%	101.0%							
% Week Average		95.4%	101.0%			100.0%				
AM Peak		9:00 AM	11:00 AM			11:00 AM			11:00 AM	
Volume		16	18			15			15	
PM Peak		4:00 PM	4:00 PM			4:00 PM			4:00 PM	
Volume		55	68			62			62	

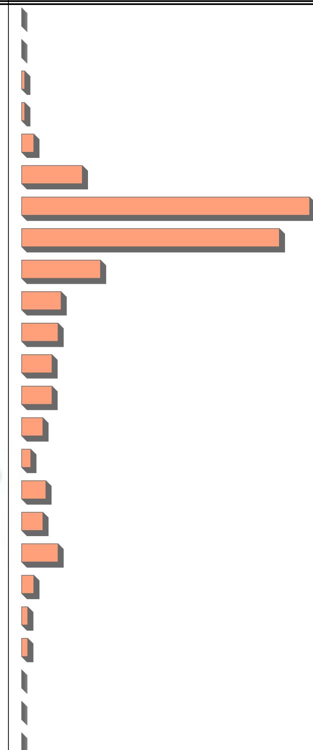


Comments:

LOCATION: US Veterans Hospital Rd & Hospital North Dwy
SPECIFIC LOCATION: US Veterans Hospital Rd & Hospital North Dwy
CITY/STATE: Portland, OR
QC JOB #: 14806001
DIRECTION: SB
DATE: Nov 13 2018 - Nov 14 2018

Start Time	Mon	Tue 13-Nov-18	Wed 14-Nov-18	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM		0	0			0			0
1:00 AM		0	0			0			0
2:00 AM		0	2			1			1
3:00 AM		0	1			1			1
4:00 AM		4	3			4			4
5:00 AM		20	20			20			20
6:00 AM		**95**	**95**			**95**			**95**
7:00 AM		81	88			85			85
8:00 AM		26	25			26			26
9:00 AM		11	14			13			13
10:00 AM		13	10			12			12
11:00 AM		9	11			10			10
12:00 PM		10	10			10			10
1:00 PM		7	6			7			7
2:00 PM		2	4			3			3
3:00 PM		9	7			8			8
4:00 PM		6	7			7			7
5:00 PM		**12**	**12**			**12**			**12**
6:00 PM		4	4			4			4
7:00 PM		1	2			2			2
8:00 PM		2	1			2			2
9:00 PM		0	0			0			0
10:00 PM		0	0			0			0
11:00 PM		0	0			0			0
Day Total		312	322			322			322
% Weekday Average		96.9%	100.0%						
% Week Average		96.9%	100.0%			100.0%			
AM Peak Volume		6:00 AM 95	6:00 AM 95			6:00 AM 95			6:00 AM 95
PM Peak Volume		5:00 PM 12	5:00 PM 12			5:00 PM 12			5:00 PM 12

Average Week Profile



Comments:

Type of report: Tube Count - Volume Data

LOCATION: Lot 4 Access
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR

QC JOB #: 14944211
DIRECTION: EB
DATE: Apr 4 2019 - Apr 4 2019

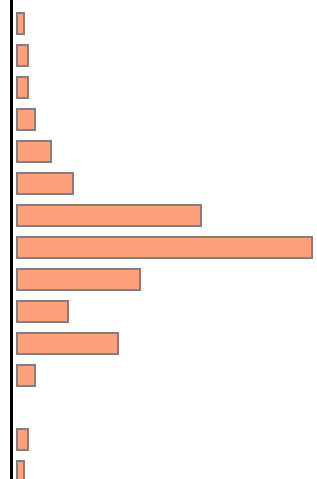
Start Time	Mon	Tue	Wed	Thu 4 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				0		0			0	
01:00 AM				0		0			0	
02:00 AM				0		0			0	
03:00 AM				0		0			0	
04:00 AM				0		0			0	
05:00 AM				5		5			5	
06:00 AM				**63**		**63**			**63**	
07:00 AM				57		57			57	
08:00 AM				18		18			18	
09:00 AM				9		9			9	
10:00 AM				3		3			3	
11:00 AM				1		1			1	
12:00 PM				0		0			0	
01:00 PM				0		0			0	
02:00 PM				**2**		**2**			**2**	
03:00 PM				2		2			2	
04:00 PM				0		0			0	
05:00 PM				0		0			0	
06:00 PM				0		0			0	
07:00 PM				0		0			0	
08:00 PM				0		0			0	
09:00 PM				0		0			0	
10:00 PM				1		1			1	
11:00 PM				1		1			1	
Day Total				162		162			162	
% Weekday Average				100%						
% Week Average				100%		100%				
AM Peak Volume				6:00 AM 63		6:00 AM 63			6:00 AM 63	
PM Peak Volume				2:00 PM 2		2:00 PM 2			2:00 PM 2	

Comments:

Type of report: Tube Count - Volume Data

LOCATION: Lot 4 Access | **QC JOB #:** 14944211
SPECIFIC LOCATION: | **DIRECTION:** WB
CITY/STATE: Multnomah, OR | **DATE:** Apr 4 2019 - Apr 4 2019

Start Time	Mon	Tue	Wed	Thu 4 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				0		0			0	
01:00 AM				0		0			0	
02:00 AM				0		0			0	
03:00 AM				0		0			0	
04:00 AM				0		0			0	
05:00 AM				0		0			0	
06:00 AM				0		0			0	
07:00 AM				0		0			0	
08:00 AM				0		0			0	
09:00 AM				1		1			1	
10:00 AM				**2**		**2**			**2**	
11:00 AM				2		2			2	
12:00 PM				3		3			3	
01:00 PM				6		6			6	
02:00 PM				10		10			10	
03:00 PM				33		33			33	
04:00 PM				**53**		**53**			**53**	
05:00 PM				22		22			22	
06:00 PM				9		9			9	
07:00 PM				18		18			18	
08:00 PM				3		3			3	
09:00 PM				0		0			0	
10:00 PM				2		2			2	
11:00 PM				1		1			1	
Day Total				165		165			165	
% Weekday Average				100%						
% Week Average				100%		100%				
AM Peak Volume				10:00 AM 2		10:00 AM 2			10:00 AM 2	
PM Peak Volume				4:00 PM 53		4:00 PM 53			4:00 PM 53	



Comments:

Report generated on 4/12/2019 10:37 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Appendix B: On-Site Queuing Analysis

Queuing Analysis **Access 1 AM Peak Present Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 12/10/2018

Peak Hour	AM
Entering Volume (vph)	96
Arrival Rate (Veh/Min)	1.60
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.17
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.036344
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.21
Average Waiting Time (Seconds)	1.36
Average Time in the System (Seconds, Includes Time Being Serve)	7.86

Queue	Probablity (Poisson Distribution)
0	81%
1	17%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 1 PM Peak Present Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 12/10/2018

Peak Hour	PM
Entering Volume (vph)	90
Arrival Rate (Veh/Min)	1.50
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.16
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.03153
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.19
Average Waiting Time (Seconds)	1.26
Average Time in the System (Seconds, Includes Time Being Serve)	7.76

Queue	Probablity (Poisson Distribution)
0	82%
1	16%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 1 AM Peak Full Occupancy**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	AM
Entering Volume (vph)	118
Arrival Rate (Veh/Min)	1.97
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.21
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.05823
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.27
Average Waiting Time (Seconds)	1.77
Average Time in the System (Seconds, Includes Time Being Serve)	8.27

Queue	Probablity (Poisson Distribution)
0	76%
1	21%
2	3%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 1 PM Peak Full Occupancy**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	PM
Entering Volume (vph)	111
Arrival Rate (Veh/Min)	1.84
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.20
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.049825
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.25
Average Waiting Time (Seconds)	1.62
Average Time in the System (Seconds, Includes Time Being Serve)	8.12

Queue	Probablity (Poisson Distribution)
0	78%
1	19%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 2 AM Peak Present Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 12/10/2018

Peak Hour	AM
Entering Volume (vph)	95
Arrival Rate (Veh/Min)	1.58
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.17
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.035513
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.21
Average Waiting Time (Seconds)	1.35
Average Time in the System (Seconds, Includes Time Being Serve)	7.85

Queue	Probablity (Poisson Distribution)
0	81%
1	17%
2	2%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 2 PM Peak Present Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 12/10/2018

Peak Hour	PM
Entering Volume (vph)	62
Arrival Rate (Veh/Min)	1.03
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.11
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.014111
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.13
Average Waiting Time (Seconds)	0.82
Average Time in the System (Seconds, Includes Time Being Serve)	7.32

Queue	Probablity (Poisson Distribution)
0	88%
1	11%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 2 AM Peak Full Occupancy**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	AM
Entering Volume (vph)	117
Arrival Rate (Veh/Min)	1.95
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.21
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.056862
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.27
Average Waiting Time (Seconds)	1.75
Average Time in the System (Seconds, Includes Time Being Serve)	8.25

Queue	Probablity (Poisson Distribution)
0	76%
1	21%
2	3%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 2 PM Peak Full Occupancy**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	PM
Entering Volume (vph)	76
Arrival Rate (Veh/Min)	1.27
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.14
Length of Vehicle	25

Queue

Average Number of Vehicles Waiting for Service	0.021942
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.16
Average Waiting Time (Seconds)	1.04
Average Time in the System (Seconds, Includes Time Being Serve)	7.54

Queue	Probablity (Poisson Distribution)
0	85%
1	14%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 3 AM Peak Present Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	AM
Entering Volume (vph)	63
Arrival Rate (Veh/Min)	1.05
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.11
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.0146
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.13
Average Waiting Time (Seconds)	0.83
Average Time in the System (Seconds, Includes Time Being Serve)	7.33

Queue	Probablity (Poisson Distribution)
0	88%
1	11%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 3 PM Peak Present Day**

Traffic Engineering Handbook, Queue Storage Methodology, Page 502

Global Transportation Engineering

Analysis Date 4/29/2019

Peak Hour	PM
Entering Volume (vph)	53
Arrival Rate (Veh/Min)	0.88
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.10
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.010126
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.11
Average Waiting Time (Seconds)	0.69
Average Time in the System (Seconds, Includes Time Being Serve)	7.19

Queue	Probablity (Poisson Distribution)
0	90%
1	10%
2	1%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:

Service Time: Gate Time

Queuing Analysis **Access 3 AM Peak Opening Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	AM
Entering Volume (vph)	224
Arrival Rate (Veh/Min)	3.73
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.40
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.27466
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.68
Average Waiting Time (Seconds)	4.41
Average Time in the System (Seconds, Includes Time Being Serve)	10.91

Queue	Probablity (Poisson Distribution)
0	51%
1	34%
2	12%
3	3%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

Queuing Analysis **Access 3 PM Peak Opening Day**
Traffic Engineering Handbook, Queue Storage Methodology, Page 502
Global Transportation Engineering
Analysis Date 4/29/2019

Peak Hour	PM
Entering Volume (vph)	186
Arrival Rate (Veh/Min)	3.10
Service Time (Secs)	6.5
Service Rate (Veh/Min)	9.231
Intensity	0.34
Length of Vehicle	25

Queue	
Average Number of Vehicles Waiting for Service	0.169771
Average Number of Vehicles in the System (Includes Vehicles Being Served)	0.51
Average Waiting Time (Seconds)	3.29
Average Time in the System (Seconds, Includes Time Being Serve)	9.79

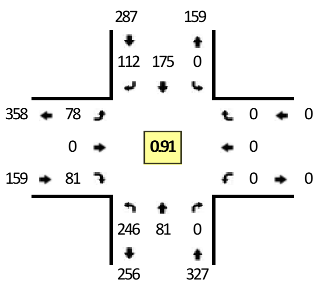
Queue	Probablity (Poisson Distribution)
0	60%
1	30%
2	8%
3	1%
4	0%
5	0%
6	0%
7	0%
8	0%
9	0%
10	0%
11	0%
12	0%
13	0%
14	0%
15	0%
16	0%
17	0%
18	0%
19	0%
20	0%

Notes:
Service Time: Gate Time

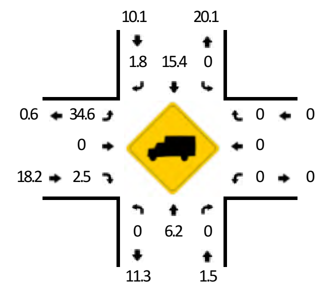
Appendix B
2020 Traffic Counts

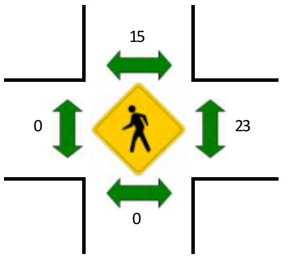
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

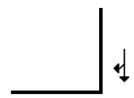
LOCATION: SW Terwilliger Blvd -- SW Campus Dr | **QC JOB #:** 15308501
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

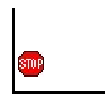


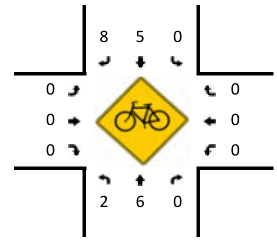
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

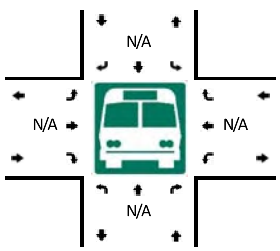


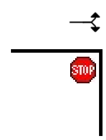


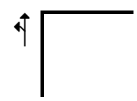


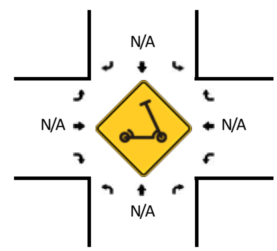












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	13	5	0	0	0	17	9	0	1	0	5	0	0	0	0	0	50	
7:05 AM	15	2	0	0	0	14	4	0	3	0	3	0	0	0	0	0	41	
7:10 AM	18	9	0	0	0	9	8	0	4	0	0	0	0	0	0	0	48	
7:15 AM	22	5	0	0	0	17	9	0	6	0	5	0	0	0	0	0	64	
7:20 AM	26	5	0	0	0	18	11	0	5	0	3	0	0	0	0	0	68	
7:25 AM	21	9	0	0	0	13	9	0	5	0	7	0	0	0	0	0	64	
7:30 AM	14	7	0	0	0	19	7	0	10	0	15	0	0	0	0	0	72	
7:35 AM	15	11	0	0	0	8	5	0	11	0	10	0	0	0	0	0	60	
7:40 AM	22	6	0	0	0	18	12	0	9	0	6	0	0	0	0	0	73	
7:45 AM	26	8	0	0	0	22	11	0	4	0	7	0	0	0	0	0	78	
7:50 AM	17	5	0	0	0	14	9	0	8	0	9	0	0	0	0	0	62	
7:55 AM	24	3	0	0	0	16	8	0	5	0	4	0	0	0	0	0	60	740
8:00 AM	28	10	0	0	0	8	10	0	5	0	6	0	0	0	0	0	67	757
8:05 AM	12	6	0	0	0	11	13	0	3	0	2	0	0	0	0	0	47	763
8:10 AM	19	6	0	0	0	11	8	0	7	0	7	0	0	0	0	0	58	773
8:15 AM	22	2	0	0	0	15	11	0	3	0	2	0	0	0	0	0	55	764
8:20 AM	23	3	0	0	0	9	7	0	5	0	4	0	0	0	0	0	51	747
8:25 AM	17	7	0	0	0	10	6	0	3	0	5	0	0	0	0	0	48	731
8:30 AM	20	3	0	0	0	14	9	0	4	0	3	0	0	0	0	0	53	712
8:35 AM	15	2	0	0	0	12	8	0	5	0	6	0	0	0	0	0	48	700
8:40 AM	16	10	0	0	0	9	8	0	5	0	7	0	0	0	0	0	55	682
8:45 AM	28	7	0	0	0	12	10	0	2	0	6	0	0	0	0	0	65	669
8:50 AM	19	3	0	0	0	7	7	0	3	0	1	0	0	0	0	0	40	647
8:55 AM	10	8	0	0	0	15	8	0	5	0	2	0	0	0	0	0	48	635

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	260	76	0	0	0	216	128	0	84	0	88	0	0	0	0	0	852
Heavy Trucks	0	8	0		0	20	0		28	0	0		0	0	0		56
Buses																	
Pedestrians		0				12				0				24			36
Bicycles	0	4	0		0	8	16		0	0	0		0	0	0		28
Scooters																	

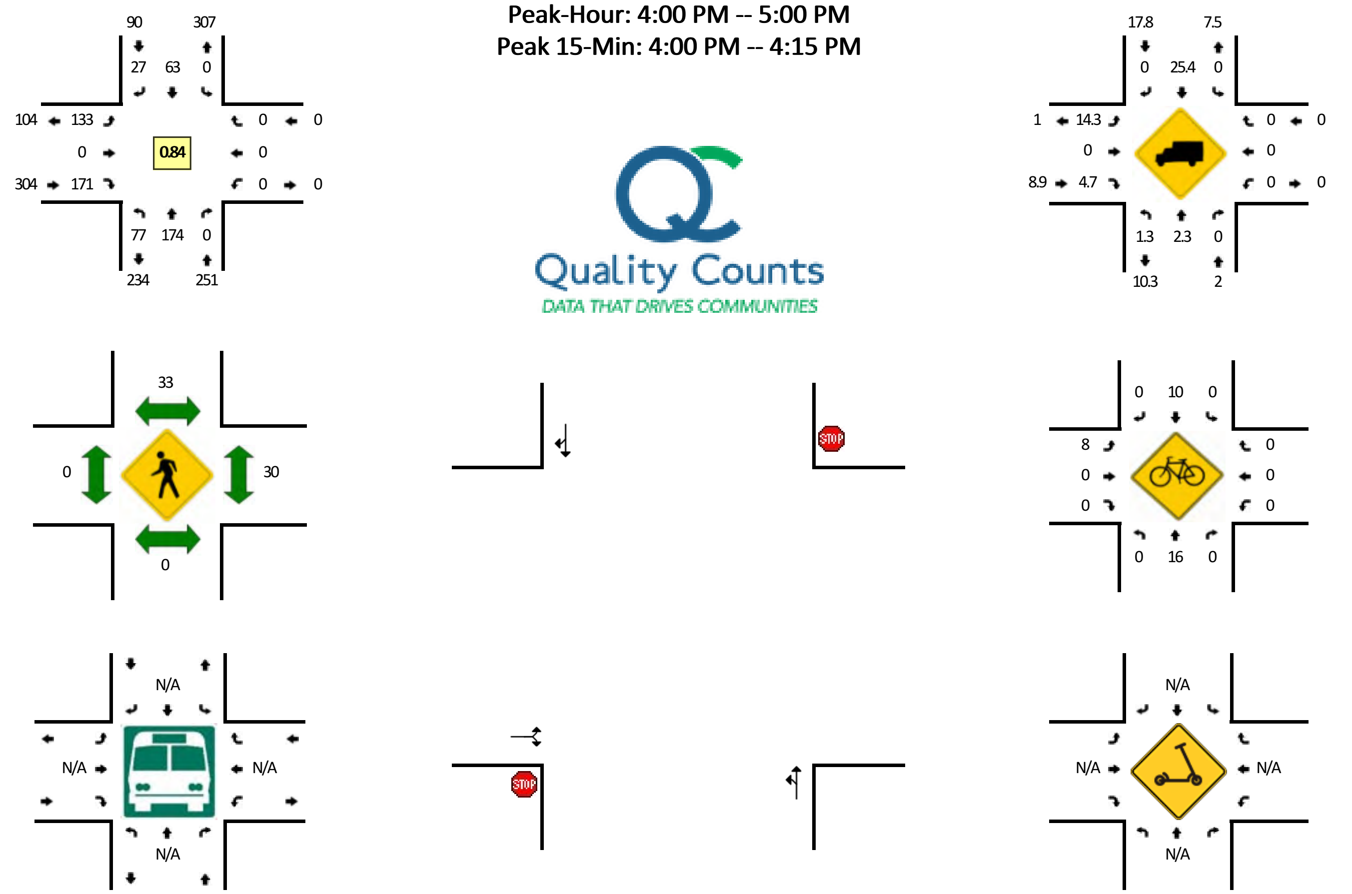
Comments:

Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: SW Terwilliger Blvd -- SW Campus Dr | **QC JOB #:** 15308502
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM



5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW Campus Dr (Eastbound)				SW Campus Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	23	0	0	0	3	4	0	12	0	11	0	0	0	0	0	58	
4:05 PM	9	17	0	0	0	7	1	0	20	0	14	0	0	0	0	0	68	
4:10 PM	6	22	0	0	0	4	4	0	12	0	19	0	0	0	0	0	67	
4:15 PM	2	14	0	0	0	9	5	0	9	0	11	0	0	0	0	0	50	
4:20 PM	5	15	0	0	0	7	1	0	8	0	19	0	0	0	0	0	55	
4:25 PM	5	14	0	0	0	6	1	0	10	0	17	0	0	0	0	0	53	
4:30 PM	8	16	0	0	0	7	3	0	9	0	12	0	0	0	0	0	55	
4:35 PM	4	13	0	0	0	3	2	0	9	0	21	0	0	0	0	0	52	
4:40 PM	7	4	0	0	0	1	2	0	10	0	13	0	0	0	0	0	37	
4:45 PM	5	16	0	0	0	4	2	0	11	0	11	0	0	0	0	0	49	
4:50 PM	14	13	0	0	0	10	2	0	9	0	10	0	0	0	0	0	58	
4:55 PM	7	7	0	0	0	2	0	0	14	0	13	0	0	0	0	0	43	645
5:00 PM	4	11	0	0	0	4	3	0	8	0	16	0	0	0	0	0	46	633
5:05 PM	4	10	0	0	0	7	1	0	5	0	14	0	0	0	0	0	41	606
5:10 PM	5	15	0	0	0	6	2	0	13	0	19	0	0	0	0	0	60	599
5:15 PM	5	9	0	0	0	6	2	0	9	0	19	0	0	0	0	0	50	599
5:20 PM	4	9	0	0	0	3	2	0	11	0	17	0	0	0	0	0	46	590
5:25 PM	6	10	0	0	0	7	1	0	9	0	12	0	0	0	0	0	45	582
5:30 PM	7	7	0	0	0	9	1	0	11	0	16	0	0	0	0	0	51	578
5:35 PM	5	15	0	0	0	7	2	0	8	0	18	0	0	0	0	0	55	581
5:40 PM	3	17	0	0	0	5	5	0	6	0	10	0	0	0	0	0	46	590
5:45 PM	4	10	0	0	0	7	4	0	7	0	13	0	0	0	0	0	45	586
5:50 PM	6	14	0	0	0	3	3	0	8	0	14	0	0	0	0	0	48	576
5:55 PM	3	9	0	0	0	3	2	0	6	0	12	0	0	0	0	0	35	568

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	80	248	0	0	0	56	36	0	176	0	176	0	0	0	0	0	772
Heavy Trucks	0	4	0		0	16	0		20	0	4		0	0	0		44
Buses																	
Pedestrians		0				52				0				36			88
Bicycles	0	16	0		0	16	0		4	0	0		0	0	0		36
Scooters																	

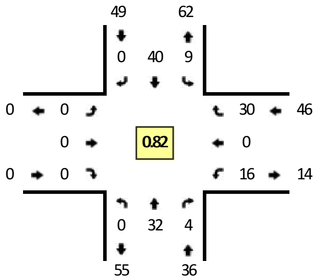
Comments:

Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

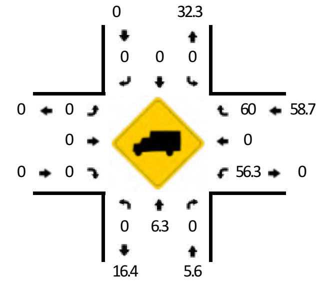
LOCATION: S Gaines St -- SW US Veterans Hospital Rd — **QC JOB #:** 15308503

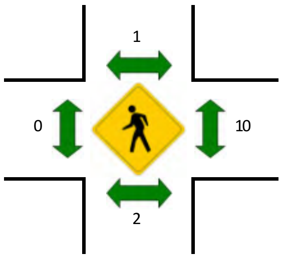
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

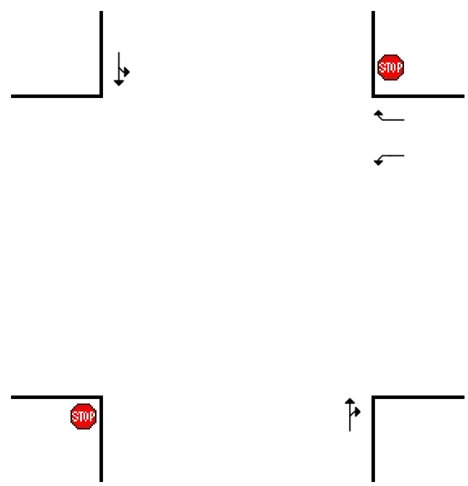


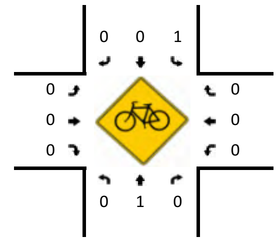
Peak-Hour: 7:00 AM -- 8:00 AM

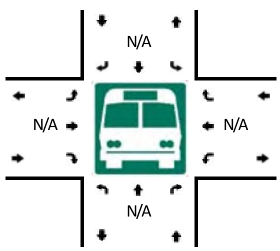
Peak 15-Min: 7:00 AM -- 7:15 AM

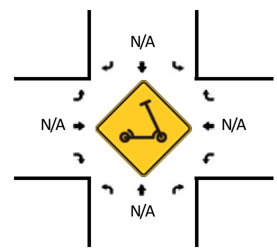












5-Min Count Period Beginning At	S Gaines St (Northbound)				S Gaines St (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	2	0	0	0	4	0	0	0	0	0	0	3	0	5	0	14	
7:05 AM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	1	0	10	
7:10 AM	0	3	1	0	1	5	0	0	0	0	0	0	1	0	5	0	16	
7:15 AM	0	3	0	0	0	5	0	0	0	0	0	0	3	0	1	0	12	
7:20 AM	0	3	1	0	0	2	0	0	0	0	0	0	1	0	0	0	7	
7:25 AM	0	3	0	0	1	3	0	0	0	0	0	0	0	0	4	0	11	
7:30 AM	0	1	0	0	2	3	0	0	0	0	0	0	2	0	3	0	11	
7:35 AM	0	2	0	0	0	1	0	0	0	0	0	0	1	0	2	0	6	
7:40 AM	0	3	0	0	0	3	0	0	0	0	0	0	1	0	3	1	11	
7:45 AM	0	4	1	0	1	4	0	0	0	0	0	0	0	0	2	0	12	
7:50 AM	0	2	1	0	2	0	0	0	0	0	0	0	2	0	2	0	9	
7:55 AM	0	1	0	0	2	6	0	0	0	0	0	0	1	0	2	0	12	131
8:00 AM	0	3	0	0	0	3	0	0	0	0	0	0	2	0	2	0	10	127
8:05 AM	0	5	0	0	1	0	0	0	0	0	0	0	2	0	2	2	12	129
8:10 AM	0	1	0	0	1	4	0	0	0	0	0	0	1	0	2	0	9	122
8:15 AM	0	5	0	0	0	4	0	0	0	0	0	0	1	0	2	0	12	122
8:20 AM	0	2	0	0	0	5	0	0	0	0	0	0	2	0	0	0	9	124
8:25 AM	0	3	0	0	2	1	0	0	0	0	0	0	2	0	2	0	10	123
8:30 AM	0	1	1	0	0	3	0	0	0	0	0	0	1	0	2	0	8	120
8:35 AM	0	1	1	0	0	2	0	0	0	0	0	0	1	0	2	0	7	121
8:40 AM	0	1	0	0	0	3	0	0	0	0	0	0	2	0	1	1	8	118
8:45 AM	0	0	0	0	1	1	0	0	0	0	0	0	2	0	1	0	5	111
8:50 AM	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	4	106
8:55 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	98

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	40	4	0	4	52	0	0	0	0	0	0	16	0	44	0	160
Heavy Trucks	0	0	0		0	0	0		0	0	0		8	0	24		32
Buses																	
Pedestrians		8				4				0				8			20
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

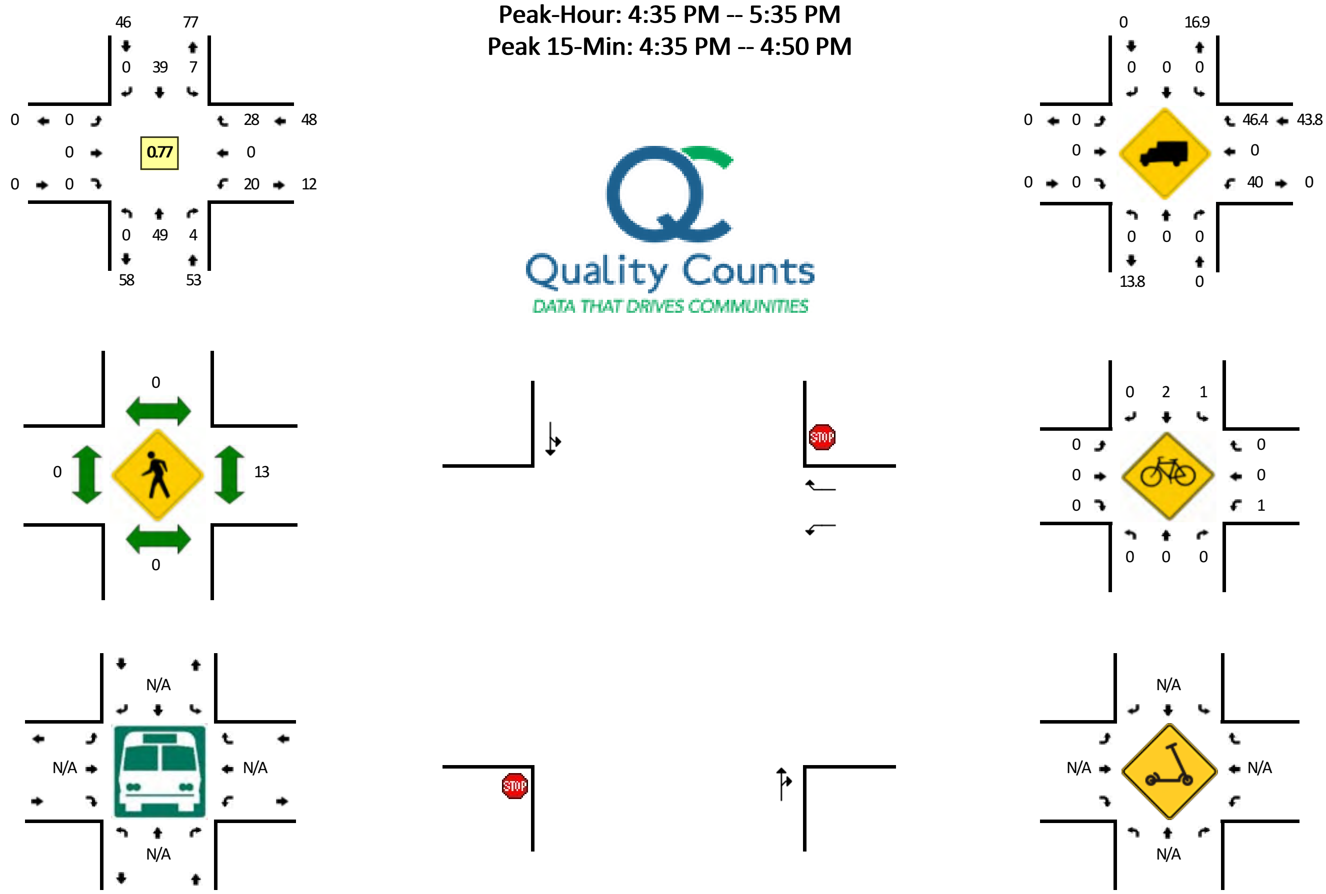
Comments:

Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: S Gaines St -- SW US Veterans Hospital Rd — **QC JOB #:** 15308504
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM



Quality Counts
DATA THAT DRIVES COMMUNITIES

5-Min Count Period Beginning At	S Gaines St (Northbound) Left	Thru	Right	U	S Gaines St (Southbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Eastbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	3	1	0	1	2	0	0	0	0	0	0	0	0	3	0	10	
4:05 PM	0	5	2	0	0	2	0	0	0	0	0	0	4	0	3	0	16	
4:10 PM	0	4	1	0	0	4	0	0	0	0	0	0	1	0	2	0	12	
4:15 PM	0	2	2	0	0	2	0	0	0	0	0	0	1	0	4	0	11	
4:20 PM	0	4	0	0	0	1	0	0	0	0	0	0	1	0	2	0	8	
4:25 PM	0	3	1	0	0	4	0	0	0	0	0	0	1	0	1	0	10	
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	2	0	3	0	7	
4:35 PM	0	7	0	0	1	5	0	0	0	0	0	0	2	0	3	0	18	
4:40 PM	0	6	0	0	2	2	0	0	0	0	0	0	2	0	4	0	16	
4:45 PM	0	4	1	0	0	5	0	0	0	0	0	0	2	0	2	0	14	
4:50 PM	0	0	0	0	0	4	0	0	0	0	0	0	3	0	1	0	8	
4:55 PM	0	6	0	0	1	4	0	0	0	0	0	0	2	0	2	0	15	145
5:00 PM	0	1	1	0	0	3	0	0	0	0	0	0	2	0	2	0	9	144
5:05 PM	0	6	0	0	2	6	0	0	0	0	0	0	0	0	2	0	16	144
5:10 PM	0	4	0	0	1	2	0	0	0	0	0	0	2	0	3	0	12	144
5:15 PM	0	3	1	0	0	2	0	0	0	0	0	0	1	0	3	0	10	143
5:20 PM	0	2	0	0	0	2	0	0	0	0	0	0	1	0	3	0	8	143
5:25 PM	0	5	0	0	0	0	0	0	0	0	0	0	2	0	2	0	9	142
5:30 PM	0	5	1	0	0	4	0	0	0	0	0	0	0	0	1	1	12	147
5:35 PM	0	2	1	0	1	2	0	0	0	0	0	0	1	0	4	0	11	140
5:40 PM	0	2	0	0	0	2	0	0	0	0	0	0	1	0	1	0	6	130
5:45 PM	0	3	0	1	0	2	0	0	0	0	0	0	0	0	1	0	7	123
5:50 PM	0	1	0	0	0	4	0	0	0	0	0	0	2	0	1	0	8	123
5:55 PM	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	111

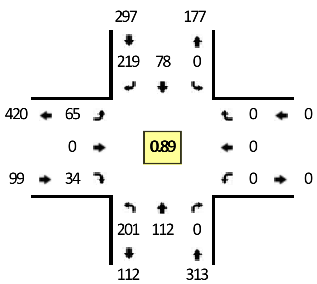
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	68	4	0	12	48	0	0	0	0	0	0	24	0	36	0	192
Heavy Trucks	0	0	0		0	0	0		0	0	0		8	0	16		24
Buses																	
Pedestrians		0				0				0				20			20
Bicycles	0	0	0		4	4	0		0	0	0		0	0	0		8
Scooters																	

Comments:

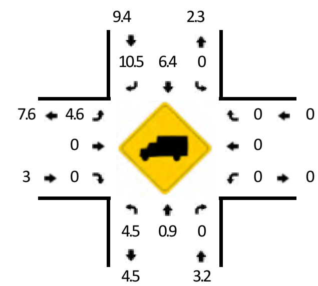
Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

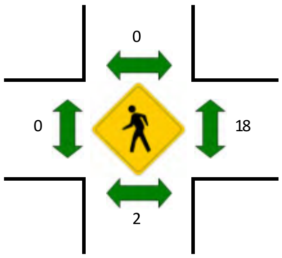
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

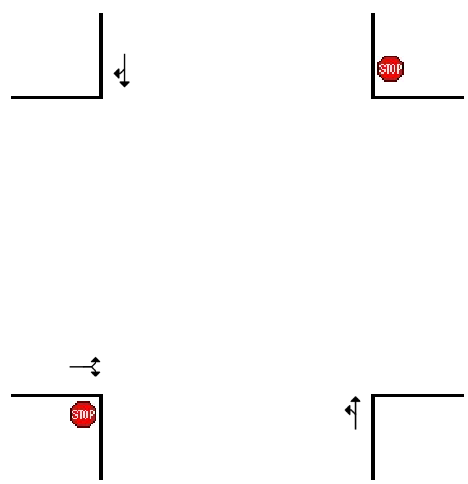
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd | **QC JOB #:** 15308505
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

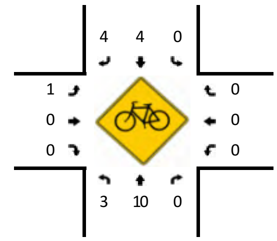


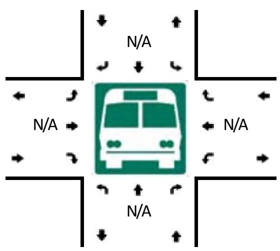
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

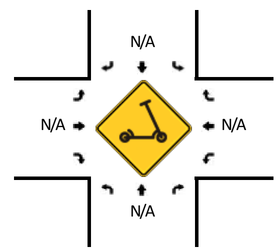












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	9	7	0	0	0	8	27	0	2	0	0	0	0	0	0	0	53	
7:05 AM	12	8	0	0	0	3	18	0	2	0	1	0	0	0	0	0	44	
7:10 AM	17	15	0	0	0	3	12	0	5	0	2	0	0	0	0	0	54	
7:15 AM	21	8	0	0	0	5	22	0	2	0	0	0	0	0	0	0	58	
7:20 AM	26	8	0	0	0	3	24	0	5	0	3	0	0	0	0	0	69	
7:25 AM	21	6	0	0	0	7	16	0	9	0	4	0	0	0	0	0	63	
7:30 AM	13	7	0	0	0	13	16	0	12	0	4	0	0	0	0	0	65	
7:35 AM	14	7	0	0	0	8	11	0	8	0	7	0	0	0	0	0	55	
7:40 AM	21	14	0	0	0	8	17	0	5	0	7	0	0	0	0	0	72	
7:45 AM	21	13	0	0	0	10	22	0	3	0	3	0	0	0	0	0	72	
7:50 AM	14	9	0	0	0	7	15	0	7	0	2	0	0	0	0	0	54	
7:55 AM	12	10	0	0	0	3	19	0	5	0	1	0	0	0	0	0	50	709
8:00 AM	12	9	0	0	0	9	7	0	9	0	2	0	0	0	0	0	48	704
8:05 AM	10	13	0	0	0	3	8	0	5	0	1	0	0	0	0	0	40	700
8:10 AM	5	6	0	0	0	8	11	0	3	0	1	0	0	0	0	0	34	680
8:15 AM	6	7	0	0	0	10	15	0	4	0	3	0	0	0	0	0	45	667
8:20 AM	5	10	0	0	0	5	12	0	2	0	0	0	0	0	0	0	34	632
8:25 AM	12	12	0	0	0	6	9	0	1	0	2	0	0	0	0	0	42	611
8:30 AM	7	15	0	0	0	8	11	0	1	0	2	0	0	0	0	0	44	590
8:35 AM	11	6	0	0	0	8	9	0	3	0	1	0	0	0	0	0	38	573
8:40 AM	10	11	0	0	0	6	11	0	9	0	4	0	0	0	0	0	51	552
8:45 AM	6	18	0	0	0	7	8	0	6	0	5	0	0	0	0	0	50	530
8:50 AM	10	9	0	0	0	8	5	0	1	0	4	0	0	0	0	0	37	513
8:55 AM	5	7	0	0	0	2	11	0	3	0	1	0	0	0	0	0	29	492

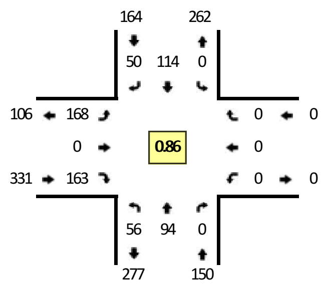
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	224	136	0	0	0	104	200	0	64	0	68	0	0	0	0	0	796
Heavy Trucks	12	0	0		0	4	20		8	0	0		0	0	0		44
Buses																	
Pedestrians		4				0				0				16			20
Bicycles	4	4	0		0	4	12		0	0	0		0	0	0		24
Scooters																	

Comments:

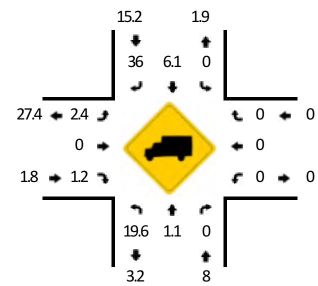
Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

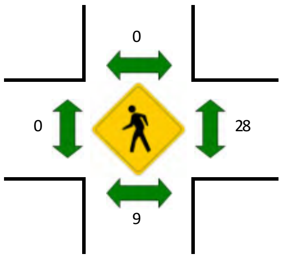
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

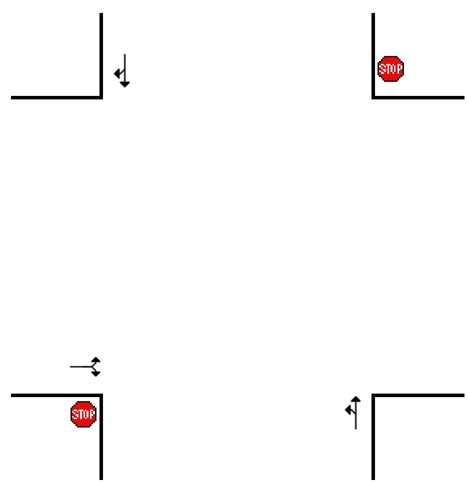
LOCATION: SW Terwilliger Blvd -- SW US Veterans Hospital Rd — **QC JOB #:** 15308506
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

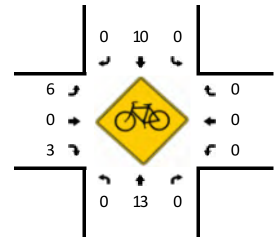


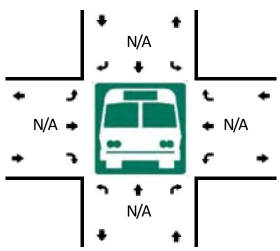
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

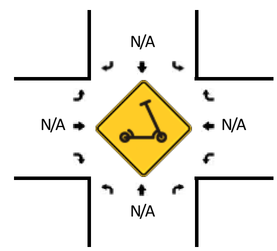












5-Min Count Period Beginning At	SW Terwilliger Blvd (Northbound)				SW Terwilliger Blvd (Southbound)				SW US Veterans Hospital Rd (Eastbound)				SW US Veterans Hospital Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	4	0	0	0	9	1	0	21	0	26	0	0	0	0	0	65	
4:05 PM	5	10	0	0	0	7	3	0	28	0	18	0	0	0	0	0	71	
4:10 PM	5	10	0	0	0	10	4	0	15	0	8	0	0	0	0	0	52	
4:15 PM	2	9	0	0	0	15	5	0	13	0	15	0	0	0	0	0	59	
4:20 PM	1	6	0	0	0	12	4	0	13	0	16	0	0	0	0	0	52	
4:25 PM	2	10	0	0	0	14	5	0	10	0	10	0	0	0	0	0	51	
4:30 PM	1	8	0	0	0	11	5	0	10	0	16	0	0	0	0	0	51	
4:35 PM	7	4	0	0	0	10	5	0	13	0	11	0	0	0	0	0	50	
4:40 PM	8	7	0	0	0	7	4	0	11	0	8	0	0	0	0	0	45	
4:45 PM	8	10	0	0	0	7	2	0	12	0	13	0	0	0	0	0	52	
4:50 PM	9	11	0	0	0	5	10	0	9	0	14	0	0	0	0	0	58	
4:55 PM	4	5	0	0	0	7	2	0	13	0	8	0	0	0	0	0	39	645
5:00 PM	4	7	0	0	0	10	2	0	7	0	9	0	0	0	0	0	39	619
5:05 PM	3	4	0	0	0	12	1	0	13	0	11	0	0	0	0	0	44	592
5:10 PM	3	7	0	0	0	13	3	0	14	0	14	0	0	0	0	0	54	594
5:15 PM	1	7	0	0	0	17	2	0	11	0	11	0	0	0	0	0	49	584
5:20 PM	2	2	0	0	0	9	3	0	9	0	6	0	0	0	0	0	31	563
5:25 PM	3	6	0	0	0	9	5	0	10	0	10	0	0	0	0	0	43	555
5:30 PM	1	3	0	0	0	16	4	0	7	0	6	0	0	0	0	0	37	541
5:35 PM	2	14	0	0	0	16	5	0	13	0	9	0	0	0	0	0	59	550
5:40 PM	3	10	0	0	0	13	1	0	16	0	9	0	0	0	0	0	52	557
5:45 PM	3	5	0	0	0	15	2	0	8	0	5	0	0	0	0	0	38	543
5:50 PM	2	6	0	0	0	8	1	0	11	0	3	0	0	0	0	0	31	516
5:55 PM	2	5	0	0	0	5	1	0	6	0	4	0	0	0	0	0	23	500

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	96	0	0	0	104	32	0	256	0	208	0	0	0	0	0	752
Heavy Trucks	8	0	0		0	4	16		4	0	0		0	0	0		32
Buses																	
Pedestrians		16				0				0				44			60
Bicycles	0	16	0		0	12	0		4	0	0		0	0	0		32
Scooters																	

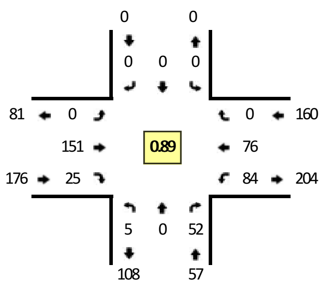
Comments:

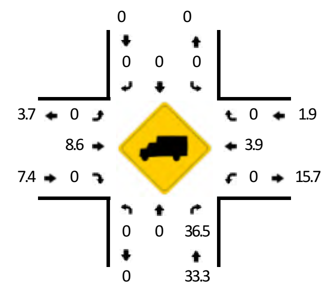
Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

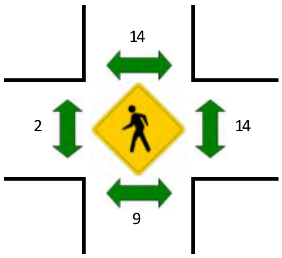
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

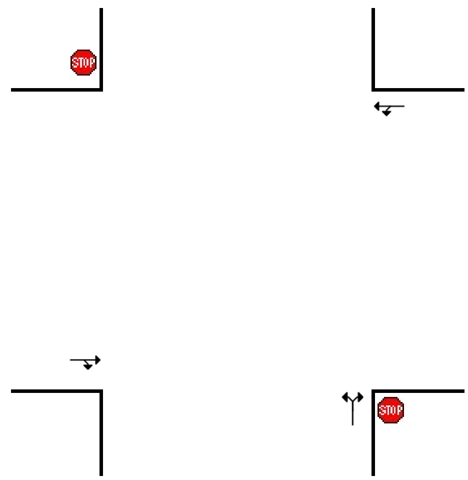
LOCATION: SW US Veterans Hospital Rd -- SW Gibbs St | **QC JOB #:** 15308507
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

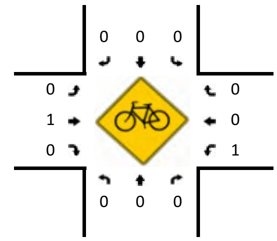
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

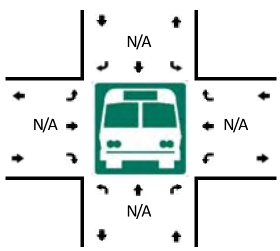


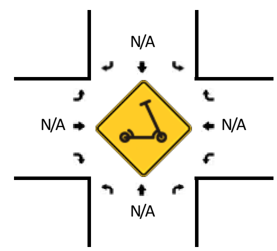












5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				SW Gibbs St (Eastbound)				SW Gibbs St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	6	0	0	0	0	0	0	9	3	0	8	4	0	0	30	
7:05 AM	0	0	7	0	0	0	0	0	0	9	0	0	5	2	0	0	23	
7:10 AM	2	0	6	0	0	0	0	0	0	10	4	0	8	7	0	0	37	
7:15 AM	0	0	2	0	0	0	0	0	0	10	2	0	13	2	0	0	29	
7:20 AM	0	0	2	0	0	0	0	0	0	7	0	0	9	8	0	0	26	
7:25 AM	0	0	3	0	0	0	0	0	0	22	0	0	8	4	0	0	37	
7:30 AM	2	0	1	0	0	0	0	0	0	23	4	0	6	6	0	0	42	
7:35 AM	0	0	5	0	0	0	0	0	0	13	0	0	3	4	0	0	25	
7:40 AM	0	0	4	0	0	0	0	0	0	14	3	0	6	8	0	0	35	
7:45 AM	0	0	4	0	0	0	0	0	0	14	6	0	8	7	0	1	40	
7:50 AM	0	0	8	0	0	0	0	0	0	9	3	0	7	8	0	0	35	
7:55 AM	0	0	4	0	0	0	0	0	0	9	1	0	8	7	0	0	29	388
8:00 AM	0	0	6	0	0	0	0	0	0	8	1	0	6	4	0	0	25	383
8:05 AM	1	0	7	0	0	0	0	0	0	12	1	0	1	11	0	0	33	393
8:10 AM	2	0	3	0	0	0	0	0	0	10	2	0	9	9	0	0	35	391
8:15 AM	0	0	4	0	0	0	0	0	0	6	3	0	7	5	0	1	26	388
8:20 AM	0	0	4	0	0	0	0	0	0	11	3	0	6	4	0	0	28	390
8:25 AM	0	0	2	0	0	0	0	0	0	15	2	0	7	7	0	0	33	386
8:30 AM	0	0	5	0	0	0	0	0	0	3	2	0	5	2	0	0	17	361
8:35 AM	1	0	3	0	0	0	0	0	0	13	1	0	7	7	0	0	32	368
8:40 AM	0	0	2	0	0	0	0	0	0	6	3	0	5	6	0	0	22	355
8:45 AM	0	0	4	0	0	0	0	0	0	8	1	0	5	10	0	0	28	343
8:50 AM	0	0	4	0	0	0	0	0	0	10	0	0	3	5	0	0	22	330
8:55 AM	1	0	1	0	0	0	0	0	0	6	1	0	5	7	0	0	21	322

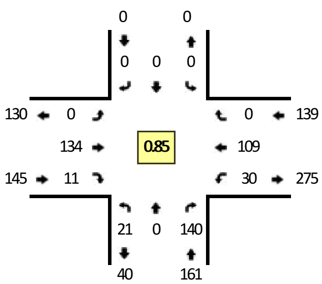
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	64	0	0	0	0	0	0	148	48	0	84	92	0	4	440
Heavy Trucks	0	0	16		0	0	0		0	20	0		0	4	0		40
Buses																	
Pedestrians		8				8				0				12			28
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

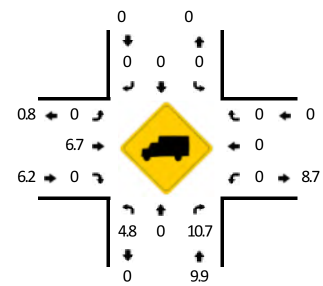
Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

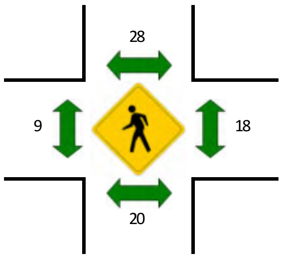
Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

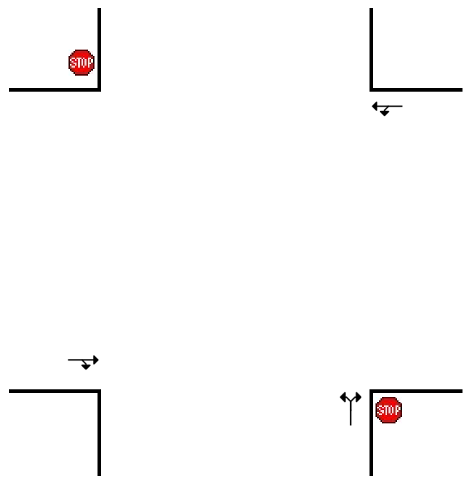
LOCATION: SW US Veterans Hospital Rd -- SW Gibbs St — **QC JOB #:** 15308508
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

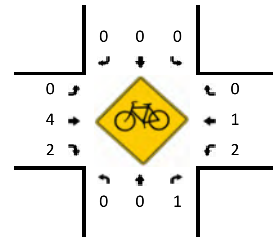


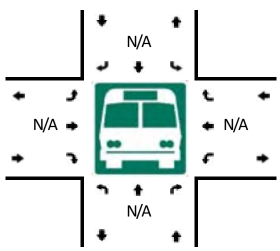
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:10 PM -- 4:25 PM

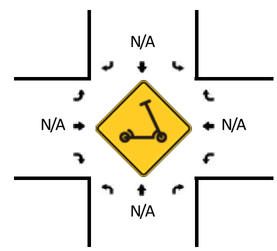












5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				SW Gibbs St (Eastbound)				SW Gibbs St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	0	12	0	0	0	0	0	0	11	1	0	1	8	0	0	35	
4:05 PM	2	0	13	0	0	0	0	0	0	10	0	0	7	9	0	0	41	
4:10 PM	1	0	14	0	0	0	0	0	0	12	0	0	4	14	0	0	45	
4:15 PM	0	0	13	0	0	0	0	0	0	14	0	0	2	7	0	0	36	
4:20 PM	2	0	14	0	0	0	0	0	0	20	1	0	4	9	0	0	50	
4:25 PM	2	0	11	0	0	0	0	0	0	10	1	0	4	6	0	0	34	
4:30 PM	2	0	10	0	0	0	0	0	0	9	0	0	2	8	0	0	31	
4:35 PM	0	0	11	0	0	0	0	0	0	11	1	0	2	10	0	0	35	
4:40 PM	5	0	16	0	0	0	0	0	0	8	4	0	0	8	0	0	41	
4:45 PM	0	0	10	0	0	0	0	0	0	12	0	0	1	9	0	1	33	
4:50 PM	1	0	6	0	0	0	0	0	0	9	2	0	2	14	0	0	34	
4:55 PM	4	0	10	0	0	0	0	0	0	8	1	0	0	7	0	0	30	445
5:00 PM	2	0	6	0	0	0	0	0	0	9	0	0	3	14	0	0	34	444
5:05 PM	1	0	12	0	0	0	0	0	0	8	0	0	4	10	0	0	35	438
5:10 PM	3	0	6	0	0	0	0	0	0	6	0	0	0	18	0	0	33	426
5:15 PM	3	0	11	0	0	0	0	0	0	10	2	0	0	11	0	0	37	427
5:20 PM	2	0	11	0	0	0	0	0	0	12	3	0	1	5	0	0	34	411
5:25 PM	2	0	9	0	0	0	0	0	0	8	0	0	0	12	0	0	31	408
5:30 PM	0	0	5	0	0	0	0	0	0	14	0	0	1	13	0	0	33	410
5:35 PM	6	0	13	0	0	0	0	0	0	5	1	0	2	12	0	0	39	414
5:40 PM	4	0	6	0	0	0	0	0	0	11	0	0	3	13	0	0	37	410
5:45 PM	2	0	2	0	0	0	0	0	0	14	0	0	4	3	0	0	25	402
5:50 PM	3	0	6	0	0	0	0	0	0	9	0	0	2	10	0	0	30	398
5:55 PM	1	0	4	0	0	0	0	0	0	10	0	0	2	7	0	0	24	392

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	0	164	0	0	0	0	0	0	184	4	0	40	120	0	0	524
Heavy Trucks	4	0	16		0	0	0		0	12	0		0	0	0		32
Buses																	
Pedestrians		24				32				28				16			100
Bicycles	0	0	0		0	0	0		0	4	0		8	0	0		12
Scooters																	

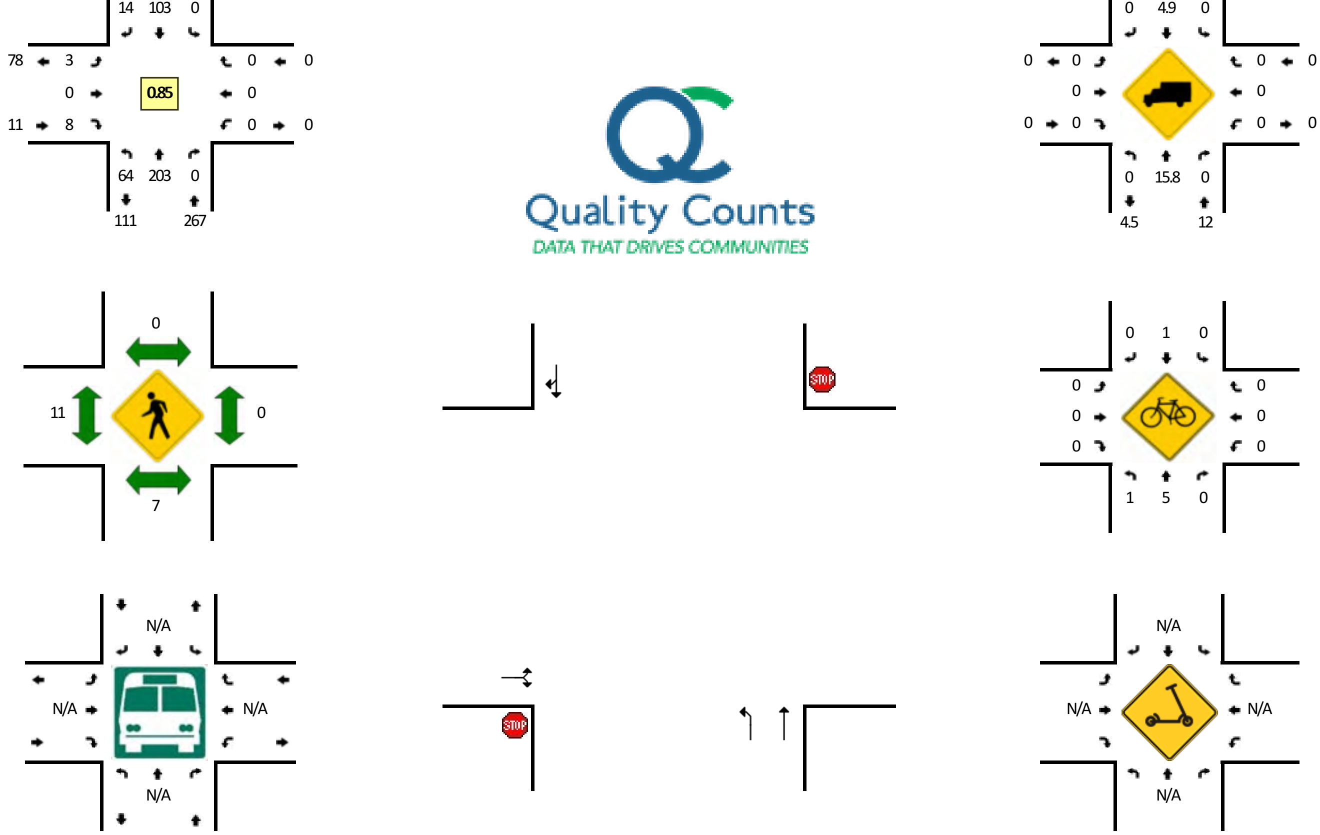
Comments:

Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: SW US Veterans Hospital Rd -- Building T-51 Access Rd — **QC JOB #:** 15308509
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM



5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building T-51 Access Rd (Eastbound)				Building T-51 Access Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	12	16	0	0	0	2	1	0	0	0	0	0	0	0	0	0	31	
7:05 AM	6	18	0	0	0	3	0	0	0	0	1	0	0	0	0	0	28	
7:10 AM	4	17	0	0	0	6	1	0	0	0	0	0	0	0	0	0	28	
7:15 AM	7	15	0	0	0	2	1	0	0	0	0	0	0	0	0	0	25	
7:20 AM	7	17	0	0	0	14	1	0	0	0	1	0	0	0	0	0	40	
7:25 AM	3	15	0	0	0	11	0	0	0	0	1	0	0	0	0	0	30	
7:30 AM	6	17	0	0	0	16	0	0	0	0	0	0	0	0	0	0	39	
7:35 AM	5	11	0	0	0	14	3	0	1	0	1	0	0	0	0	0	35	
7:40 AM	3	22	0	0	0	13	1	0	2	0	1	0	0	0	0	0	42	
7:45 AM	7	19	0	0	0	6	3	0	0	0	0	0	0	0	0	0	35	
7:50 AM	2	17	0	0	0	8	1	0	0	0	2	0	0	0	0	0	30	
7:55 AM	2	19	0	0	0	8	2	0	0	0	1	0	0	0	0	0	32	395
8:00 AM	2	13	0	0	0	11	1	0	0	0	1	0	0	0	0	0	28	392
8:05 AM	1	13	0	0	0	4	1	0	0	0	0	0	0	0	0	0	19	383
8:10 AM	2	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	17	372
8:15 AM	0	17	0	0	0	4	0	0	0	0	1	0	0	0	0	0	22	369
8:20 AM	1	8	0	0	0	6	3	0	0	0	1	0	0	0	0	0	19	348
8:25 AM	1	20	0	0	0	1	1	0	1	0	0	0	0	0	0	0	24	342
8:30 AM	0	12	0	0	0	3	0	0	0	0	0	0	0	0	0	0	15	318
8:35 AM	1	15	0	0	0	6	1	0	0	0	1	0	0	0	0	0	24	307
8:40 AM	0	22	0	1	0	14	0	0	0	0	1	0	0	0	0	0	38	303
8:45 AM	0	14	0	0	0	8	2	0	0	0	0	0	0	0	0	0	24	292
8:50 AM	0	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	15	277
8:55 AM	3	11	0	1	0	6	1	0	0	0	1	0	0	0	0	0	23	268

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	200	0	0	0	172	16	0	12	0	8	0	0	0	0	0	464
Heavy Trucks	0	36	0		0	12	0		0	0	0		0	0	0		48
Buses																	
Pedestrians		8				0				4				0			12
Bicycles	0	12	0		0	4	0		0	0	0		0	0	0		16
Scooters																	

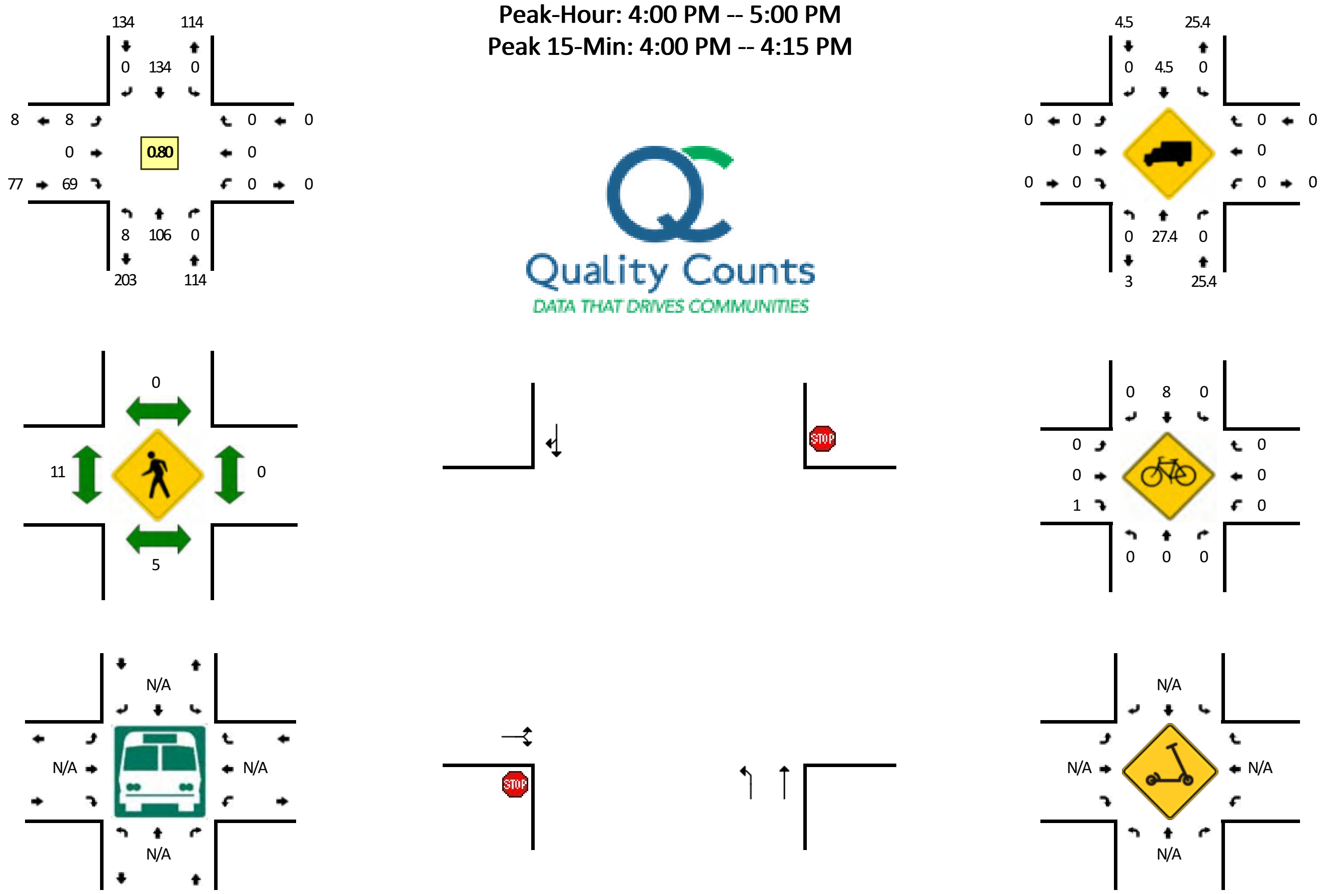
Comments:

Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: SW US Veterans Hospital Rd -- Building T-51 Access Rd — **QC JOB #:** 15308510
CITY/STATE: Portland, OR — **DATE:** Thu, Dec 3 2020

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM



5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Building T-51 Access Rd (Eastbound)				Building T-51 Access Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	7	0	0	0	22	0	0	0	0	12	0	0	0	0	0	41	
4:05 PM	0	6	0	0	0	17	0	0	0	0	8	0	0	0	0	0	31	
4:10 PM	0	12	0	0	0	9	0	0	0	0	8	0	0	0	0	0	29	
4:15 PM	0	5	0	0	0	12	0	0	1	0	4	0	0	0	0	0	22	
4:20 PM	0	6	0	0	0	14	0	0	0	0	6	0	0	0	0	0	26	
4:25 PM	0	7	0	0	0	10	0	0	2	0	4	0	0	0	0	0	23	
4:30 PM	0	8	0	0	0	7	0	0	0	0	7	0	0	0	0	0	22	
4:35 PM	0	11	0	0	0	8	0	0	2	0	4	0	0	0	0	0	25	
4:40 PM	0	9	0	0	0	8	0	0	2	0	2	0	0	0	0	0	21	
4:45 PM	2	12	0	0	0	9	0	0	0	0	5	0	0	0	0	0	28	
4:50 PM	1	18	0	0	0	10	0	0	0	0	3	0	0	0	0	0	32	
4:55 PM	5	5	0	0	0	8	0	0	1	0	6	0	0	0	0	0	25	325
5:00 PM	2	6	0	0	0	9	1	0	0	0	6	0	0	0	0	0	24	308
5:05 PM	1	4	0	0	0	11	0	0	0	0	4	0	0	0	0	0	20	297
5:10 PM	0	5	0	0	0	10	0	0	2	0	5	0	0	0	0	0	22	290
5:15 PM	0	4	0	0	0	10	0	0	0	0	1	0	0	0	0	0	15	283
5:20 PM	1	4	0	0	0	7	0	0	1	0	5	0	0	0	0	0	18	275
5:25 PM	1	6	0	0	0	8	0	0	0	0	8	0	0	0	0	0	23	275
5:30 PM	0	5	0	0	0	8	1	0	1	0	2	0	0	0	0	0	17	270
5:35 PM	0	7	0	0	0	11	0	0	1	0	5	0	0	0	0	0	24	269
5:40 PM	2	3	0	0	0	13	0	0	0	0	5	0	0	0	0	0	23	271
5:45 PM	0	5	0	0	0	5	1	0	1	0	3	0	0	0	0	0	15	258
5:50 PM	0	3	0	0	0	4	0	0	0	0	5	0	0	0	0	0	12	238
5:55 PM	0	3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	9	222

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	100	0	0	0	192	0	0	0	0	112	0	0	0	0	0	404
Heavy Trucks	0	32	0		0	4	0		0	0	0		0	0	0		36
Buses																	
Pedestrians		12				0				16				0			28
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4
Scooters																	

Comments:

Report generated on 12/10/2020 2:41 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

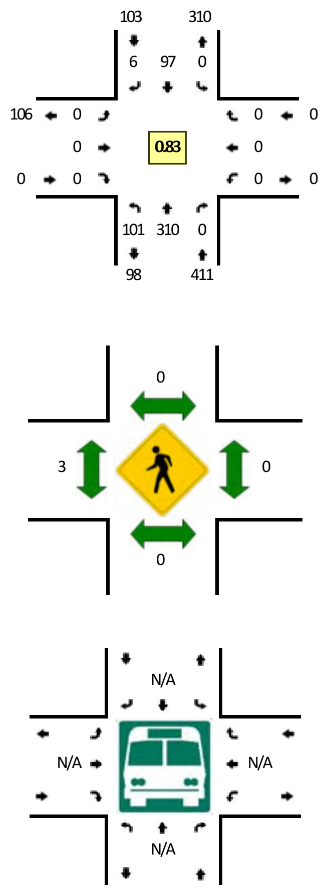
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

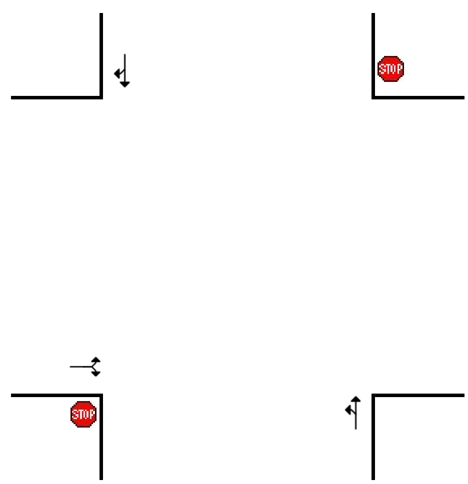
LOCATION: SW US Veterans Hospital Rd -- Building 108 Parking Access | **QC JOB #:** 15308511

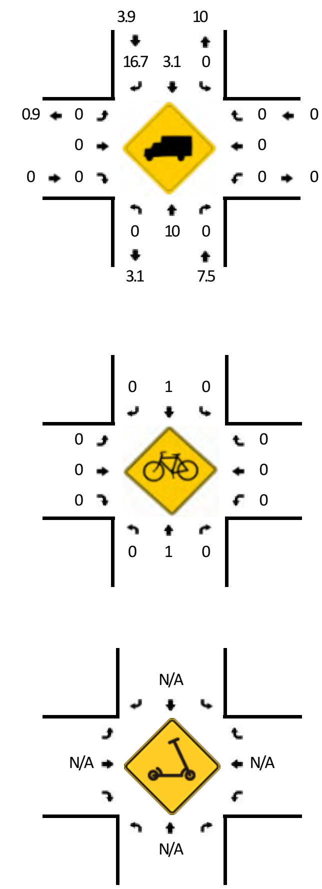
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

Peak-Hour: 7:00 AM -- 8:00 AM

Peak 15-Min: 7:20 AM -- 7:35 AM







5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Southbound) Left	Thru	Right	U	Building 108 Parking Access (Eastbound) Left	Thru	Right	U	Building 108 Parking Access (Westbound) Left	Thru	Right	U	Total	Hourly Totals
7:00 AM	6	30	0	0	0	2	0	0	0	0	0	0	0	0	0	0	38	
7:05 AM	3	27	0	0	0	4	0	0	0	0	0	0	0	0	0	0	34	
7:10 AM	6	22	0	1	0	5	1	0	0	0	0	0	0	0	0	0	35	
7:15 AM	9	31	0	0	0	1	1	0	0	0	0	0	0	0	0	0	42	
7:20 AM	17	27	0	0	0	10	1	0	0	0	0	0	0	0	0	0	55	
7:25 AM	15	26	0	0	0	12	1	0	0	0	0	0	0	0	0	0	54	
7:30 AM	3	27	0	0	0	16	0	0	0	0	0	0	0	0	0	0	46	
7:35 AM	6	18	0	0	0	15	0	0	0	0	0	0	0	0	0	0	39	
7:40 AM	10	28	0	0	0	13	0	0	0	0	0	0	0	0	0	0	51	
7:45 AM	10	28	0	0	0	4	1	0	0	0	0	0	0	0	0	0	43	
7:50 AM	8	23	0	0	0	10	0	0	0	0	0	0	0	0	0	0	41	
7:55 AM	7	23	0	0	0	5	1	0	0	0	0	0	0	0	0	0	36	514
8:00 AM	5	15	0	0	0	13	0	0	0	0	0	0	0	0	0	0	33	509
8:05 AM	3	14	0	0	0	4	0	0	0	0	0	0	0	0	0	0	21	496
8:10 AM	2	14	0	0	0	5	0	0	0	0	0	0	0	0	0	0	21	482
8:15 AM	1	19	0	0	0	5	0	0	0	0	0	0	0	0	0	0	25	465
8:20 AM	5	11	0	0	0	3	2	0	0	0	0	0	0	0	0	0	21	431
8:25 AM	2	20	0	0	0	2	0	0	0	0	0	0	0	0	0	0	24	401
8:30 AM	4	13	0	0	0	3	0	0	0	0	0	0	0	0	0	0	20	375
8:35 AM	1	20	0	0	0	6	0	0	0	0	0	0	0	0	0	0	27	363
8:40 AM	0	21	0	0	0	15	1	0	0	0	0	0	0	0	0	0	37	349
8:45 AM	0	13	0	0	0	8	0	0	0	0	0	0	0	0	0	0	21	327
8:50 AM	2	13	0	0	0	5	0	0	0	0	0	0	0	0	0	0	20	306
8:55 AM	0	17	0	0	0	7	1	0	0	0	0	0	0	0	0	0	25	295

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	140	320	0	0	0	152	8	0	0	0	0	0	0	0	0	0	620
Heavy Trucks	0	36	0		0	4	4		0	0	0		0	0	0		44
Buses																	
Pedestrians		0				0				8				0			8
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4
Scooters																	

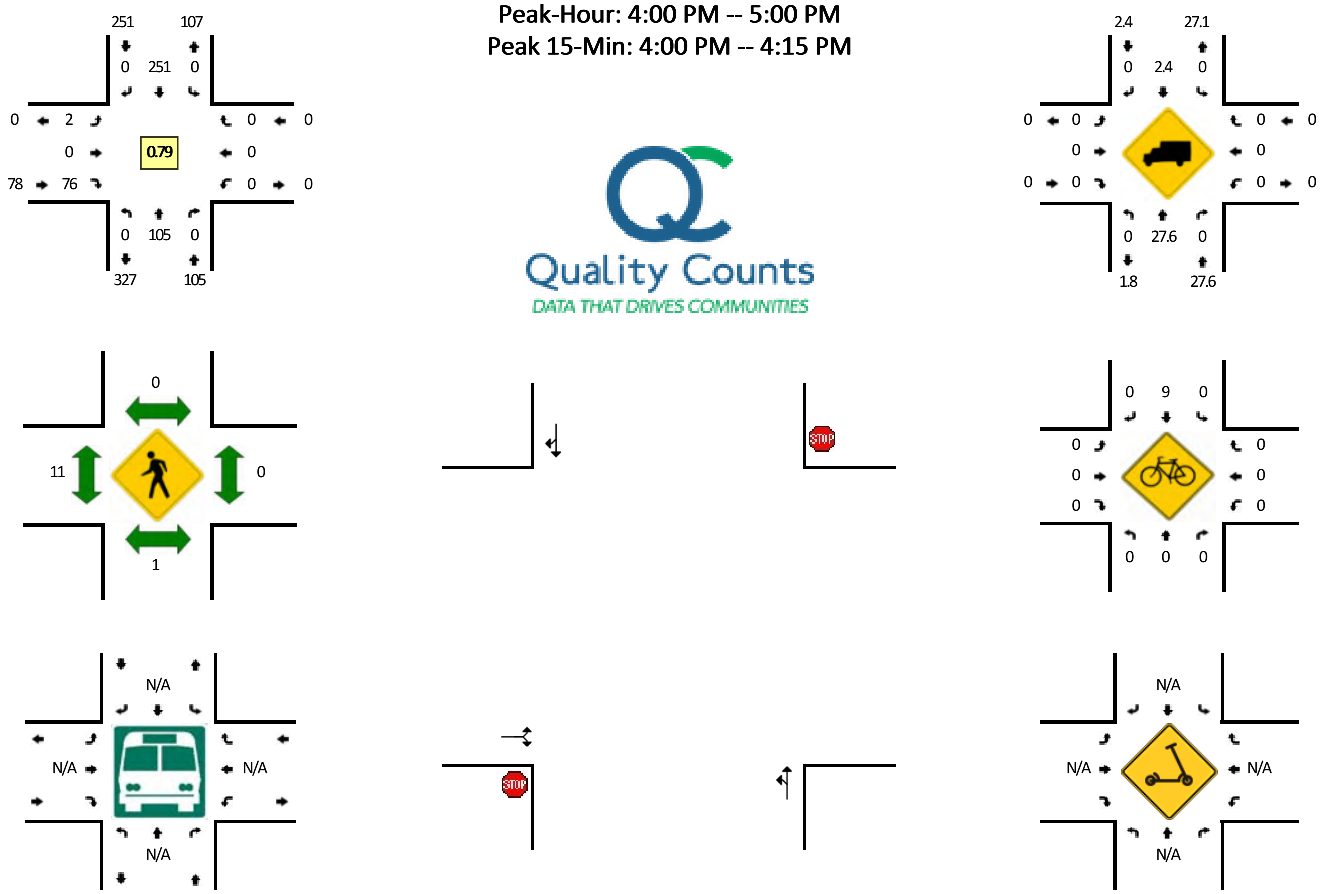
Comments:

Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

LOCATION: SW US Veterans Hospital Rd -- Building 108 Parking Access | **QC JOB #:** 15308512
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM



5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound) Left	Thru	Right	U	SW US Veterans Hospital Rd (Southbound) Left	Thru	Right	U	Building 108 Parking Access (Eastbound) Left	Thru	Right	U	Building 108 Parking Access (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	6	0	0	0	45	0	0	0	0	2	0	0	0	0	0	53	
4:05 PM	0	8	0	0	0	37	0	0	0	0	7	0	0	0	0	0	52	
4:10 PM	0	9	0	0	0	20	0	0	0	0	4	0	0	0	0	0	33	
4:15 PM	0	6	0	0	0	20	0	0	0	0	9	0	0	0	0	0	35	
4:20 PM	0	5	0	0	0	23	0	0	0	0	3	0	0	0	0	0	31	
4:25 PM	0	7	0	0	0	17	0	0	0	0	4	0	0	0	0	0	28	
4:30 PM	0	6	0	0	0	16	0	0	0	0	8	0	0	0	0	0	30	
4:35 PM	0	11	0	0	0	15	0	0	1	0	10	0	0	0	0	0	37	
4:40 PM	0	11	0	0	0	11	0	0	0	0	9	0	0	0	0	0	31	
4:45 PM	0	10	0	0	0	15	0	0	0	0	8	0	0	0	0	0	33	
4:50 PM	0	20	0	0	0	16	0	0	0	0	8	0	0	0	0	0	44	
4:55 PM	0	6	0	0	0	16	0	0	1	0	4	0	0	0	0	0	27	434
5:00 PM	0	6	0	0	0	16	0	0	0	0	3	0	0	0	0	0	25	406
5:05 PM	0	4	0	0	0	18	0	0	1	0	7	0	0	0	0	0	30	384
5:10 PM	0	6	0	0	0	16	0	0	0	0	10	0	0	0	0	0	32	383
5:15 PM	0	3	0	0	0	12	0	0	0	0	5	0	0	0	0	0	20	368
5:20 PM	0	5	0	0	0	12	0	0	0	0	4	0	0	0	0	0	21	358
5:25 PM	0	8	0	0	0	17	0	0	0	0	3	0	0	0	0	0	28	358
5:30 PM	0	5	0	0	0	11	0	0	0	0	2	0	0	0	0	0	18	346
5:35 PM	0	7	0	0	0	19	0	0	0	0	5	0	0	0	0	0	31	340
5:40 PM	0	4	0	0	0	18	0	0	0	0	5	0	0	0	0	0	27	336
5:45 PM	0	5	0	0	0	9	0	0	0	0	5	0	0	0	0	0	19	322
5:50 PM	0	3	0	0	0	10	0	0	0	0	3	0	0	0	0	0	16	294
5:55 PM	0	3	0	0	0	8	0	0	0	0	5	0	0	0	0	0	16	283

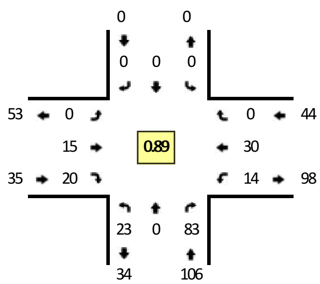
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	92	0	0	0	408	0	0	0	0	52	0	0	0	0	0	552
Heavy Trucks	0	28	0		0	4	0		0	0	0		0	0	0		32
Buses																	
Pedestrians		0				0				16				0			16
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4
Scooters																	

Comments:

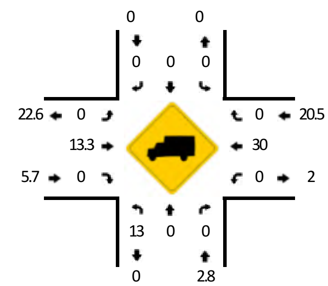
Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

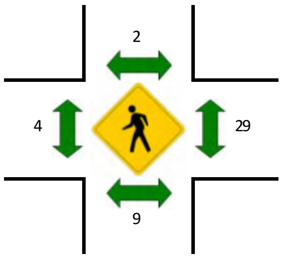
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

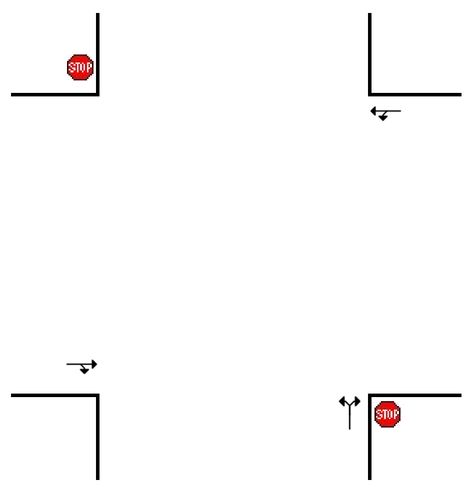
LOCATION: SW 6th Ave Dr -- S Gaines St | **QC JOB #:** 15308513
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

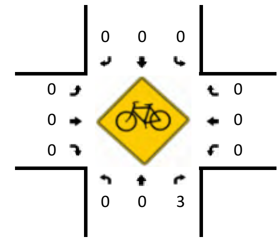


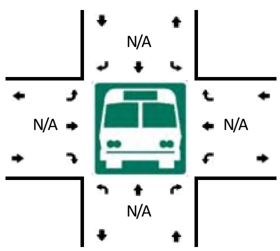
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

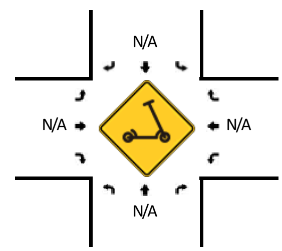












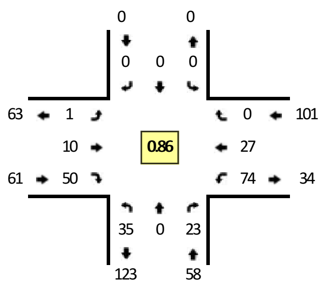
5-Min Count Period Beginning At	SW 6th Ave Dr (Northbound)				SW 6th Ave Dr (Southbound)				S Gaines St (Eastbound)				S Gaines St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	0	10	0	0	0	0	0	0	0	2	0	1	5	0	0	20	
7:05 AM	1	0	5	0	0	0	0	0	0	0	2	0	2	1	0	0	11	
7:10 AM	1	0	5	0	0	0	0	0	0	1	1	0	0	4	0	0	12	
7:15 AM	0	0	8	0	0	0	0	0	0	1	1	0	2	5	0	0	17	
7:20 AM	3	0	2	0	0	0	0	0	0	5	3	0	0	1	0	0	14	
7:25 AM	1	0	10	0	0	0	0	0	0	0	1	0	1	0	0	0	13	
7:30 AM	2	0	11	0	0	0	0	0	0	2	3	0	0	3	0	0	21	
7:35 AM	4	0	5	0	0	0	0	0	0	0	2	0	1	1	0	0	13	
7:40 AM	4	0	6	0	0	0	0	0	0	1	2	0	0	5	0	0	18	
7:45 AM	1	0	5	0	0	0	0	0	0	2	1	0	3	0	0	0	12	
7:50 AM	3	0	11	0	0	0	0	0	0	2	1	0	2	3	0	0	22	
7:55 AM	1	0	5	0	0	0	0	0	0	1	1	0	2	2	0	0	12	185
8:00 AM	1	0	8	0	0	0	0	0	0	1	0	0	1	2	0	0	13	178
8:05 AM	2	0	2	0	0	0	0	0	0	0	2	0	1	1	0	0	8	175
8:10 AM	4	0	4	0	0	0	0	0	0	0	4	0	0	3	0	0	15	178
8:15 AM	2	0	4	0	0	0	0	0	0	0	1	0	2	5	0	0	14	175
8:20 AM	1	0	5	0	0	0	0	0	0	3	2	0	3	1	0	0	15	176
8:25 AM	3	0	6	0	0	0	0	0	0	1	0	0	1	2	0	0	13	176
8:30 AM	1	0	3	0	0	0	0	0	0	1	0	0	1	2	0	0	8	163
8:35 AM	2	0	2	0	0	0	0	0	0	1	2	0	1	0	0	0	8	158
8:40 AM	2	0	2	0	0	0	0	0	0	1	0	0	1	4	0	0	10	150
8:45 AM	5	0	1	0	0	0	0	0	0	0	2	0	0	3	0	1	12	150
8:50 AM	3	0	2	0	0	0	0	0	0	1	0	0	0	1	0	0	7	135
8:55 AM	7	0	4	0	0	0	0	0	0	1	2	0	0	0	0	0	14	137

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	0	88	0	0	0	0	0	0	12	28	0	4	36	0	0	208
Heavy Trucks	8	0	0		0	0	0		0	0	0		0	12	0		20
Buses																	
Pedestrians		16				0				8				32			56
Bicycles	0	0	8		0	0	0		0	0	0		0	0	0		8
Scooters																	

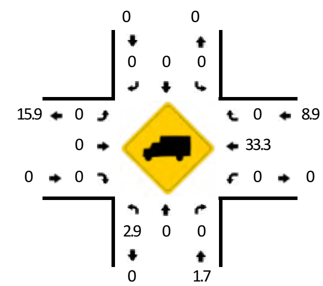
Comments:

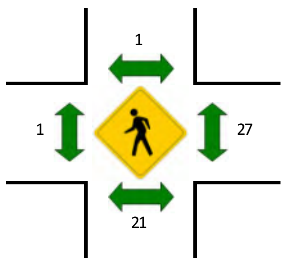
Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

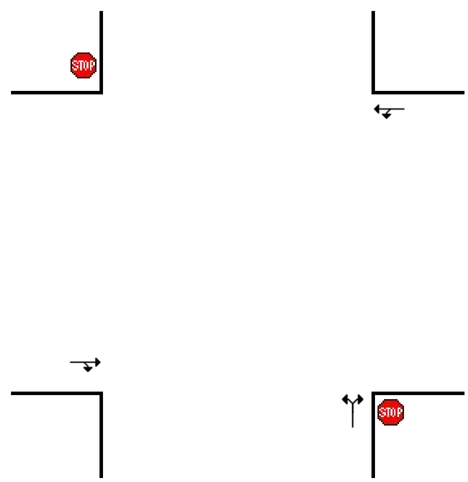
LOCATION: SW 6th Ave Dr -- S Gaines St | **QC JOB #:** 15308514
CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020

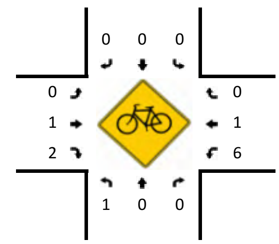


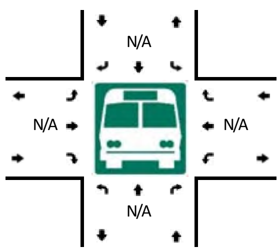
Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

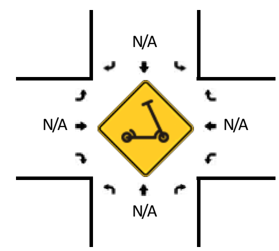












5-Min Count Period Beginning At	SW 6th Ave Dr (Northbound)				SW 6th Ave Dr (Southbound)				S Gaines St (Eastbound)				S Gaines St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	7	
4:05 PM	1	0	3	0	0	0	0	0	0	2	4	0	7	2	0	0	19	
4:10 PM	7	0	1	0	0	0	0	0	0	1	2	0	8	6	0	0	25	
4:15 PM	0	0	2	0	0	0	0	0	0	2	5	0	4	1	0	1	15	
4:20 PM	3	0	3	0	0	0	0	0	0	0	3	0	2	2	0	0	13	
4:25 PM	5	0	4	0	0	0	0	0	0	0	1	0	2	3	0	0	15	
4:30 PM	1	0	0	0	0	0	0	0	0	0	7	0	4	2	0	0	14	
4:35 PM	2	0	2	0	0	0	0	0	0	0	3	1	13	1	0	0	22	
4:40 PM	3	0	3	0	0	0	0	0	0	2	8	0	7	1	0	0	24	
4:45 PM	2	0	0	0	0	0	0	0	0	2	2	0	8	4	0	0	18	
4:50 PM	2	0	2	0	0	0	0	0	0	0	3	0	7	2	0	0	16	
4:55 PM	8	0	2	0	0	0	0	0	0	1	7	0	7	2	0	0	27	215
5:00 PM	1	0	1	0	0	0	0	0	0	0	5	0	4	1	0	0	12	220
5:05 PM	1	0	1	0	0	0	0	0	0	2	5	0	10	0	0	0	19	220
5:10 PM	1	0	2	0	0	0	0	0	0	0	2	0	7	2	0	0	14	209
5:15 PM	4	0	1	0	0	0	0	0	0	1	5	0	2	2	0	0	15	209
5:20 PM	5	0	1	0	0	0	0	0	0	0	2	0	4	1	0	0	13	209
5:25 PM	8	0	4	0	0	0	0	0	0	1	3	0	3	2	0	0	21	215
5:30 PM	4	0	3	0	0	0	0	0	0	2	4	0	4	0	0	0	17	218
5:35 PM	7	0	0	0	0	0	0	0	0	0	5	1	2	1	0	0	16	212
5:40 PM	0	0	1	0	0	0	0	0	0	1	3	0	4	1	0	0	10	198
5:45 PM	6	0	2	0	0	0	0	0	0	1	0	0	4	0	0	0	13	193
5:50 PM	2	0	0	0	0	0	0	0	0	0	3	0	5	2	0	0	12	189
5:55 PM	2	0	1	0	0	0	0	0	0	1	1	0	2	1	0	0	8	170

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	0	20	0	0	0	0	0	0	16	52	4	112	24	0	0	256
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	12	0		12
Buses																	
Pedestrians		28				4				4				16			52
Bicycles	0	0	0		0	0	0		0	0	4		4	0	0		8
Scooters																	

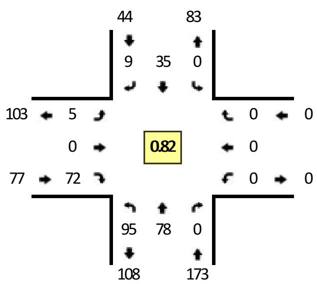
Comments:

Report generated on 12/10/2020 2:41 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

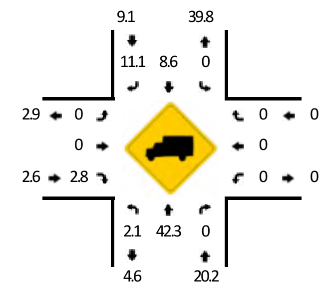
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

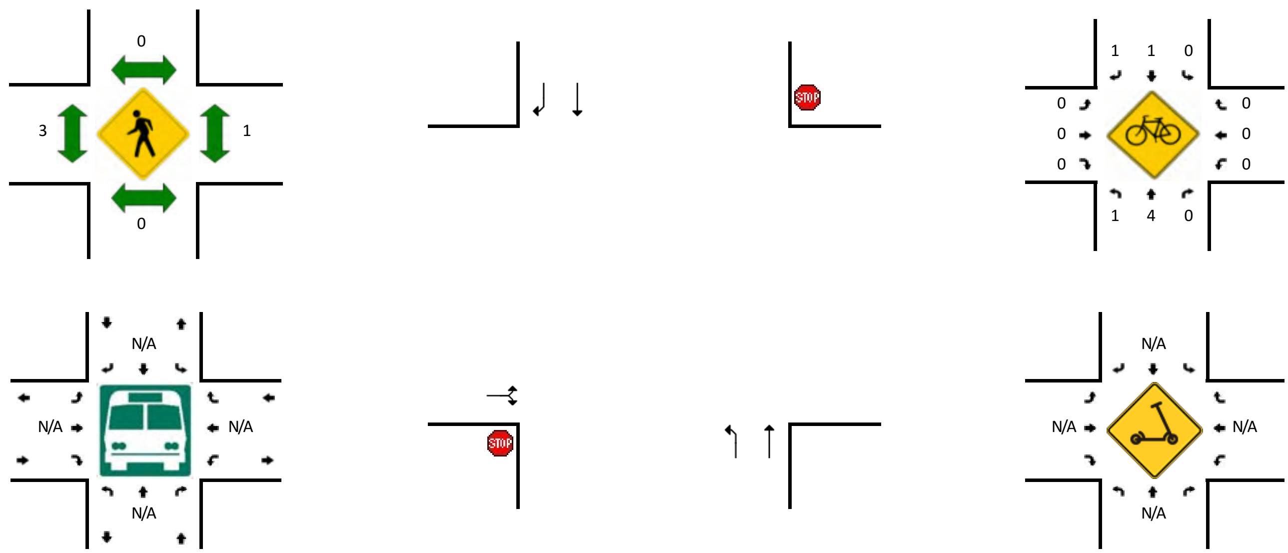
LOCATION: SW US Veterans Hospital Rd -- Shipping/Receiving Access Road | **QC JOB #:** 15308515

CITY/STATE: Portland, OR | **DATE:** Thu, Dec 3 2020



Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:30 AM -- 7:45 AM



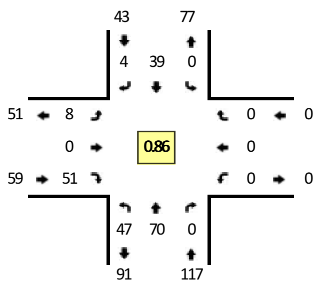


5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Shipping/Receiving Access Road (Eastbound)				Shipping/Receiving Access Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	14	
7:05 AM	7	6	0	0	0	2	0	0	0	0	1	0	0	0	0	0	16	
7:10 AM	7	10	0	0	0	3	1	0	0	0	4	0	0	0	0	0	25	
7:15 AM	5	4	0	0	0	1	0	0	1	0	1	0	0	0	0	0	12	
7:20 AM	9	5	0	0	0	0	2	0	0	0	12	0	0	0	0	0	28	
7:25 AM	11	6	0	0	0	4	0	0	0	0	7	0	0	0	0	0	28	
7:30 AM	5	8	0	0	0	3	0	0	2	0	12	0	0	0	0	0	30	
7:35 AM	6	5	0	0	0	5	2	0	0	0	10	0	0	0	0	0	28	
7:40 AM	9	8	0	1	0	3	1	0	1	0	9	0	0	0	0	0	32	
7:45 AM	9	7	0	0	0	3	1	0	1	0	2	0	0	0	0	0	23	
7:50 AM	7	5	0	0	0	5	1	0	0	0	2	0	0	0	0	0	20	
7:55 AM	13	6	0	0	0	3	0	0	0	0	5	0	0	0	0	0	27	283
8:00 AM	6	8	0	0	0	3	1	0	0	0	7	0	0	0	0	0	25	294
8:05 AM	5	3	0	0	0	3	0	0	0	0	2	0	0	0	0	0	13	291
8:10 AM	5	6	0	0	0	3	0	0	0	0	2	0	0	0	0	0	16	282
8:15 AM	10	4	0	1	0	3	0	0	0	0	1	0	0	0	0	0	19	289
8:20 AM	6	3	0	0	0	1	0	0	0	0	4	0	0	0	0	0	14	275
8:25 AM	12	6	0	0	0	1	0	0	0	0	1	0	0	0	0	0	20	267
8:30 AM	4	6	0	0	0	0	0	0	0	0	3	0	0	0	0	0	13	250
8:35 AM	10	6	0	0	0	4	2	0	0	0	3	0	0	0	0	0	25	247
8:40 AM	13	6	0	1	0	4	0	0	0	0	8	0	0	0	0	0	32	247
8:45 AM	12	4	0	0	0	3	2	0	0	0	7	0	0	0	0	0	28	252
8:50 AM	7	2	0	0	0	1	1	0	1	0	4	0	0	0	0	0	16	248
8:55 AM	7	4	0	0	0	3	1	0	0	0	4	0	0	0	0	0	19	240

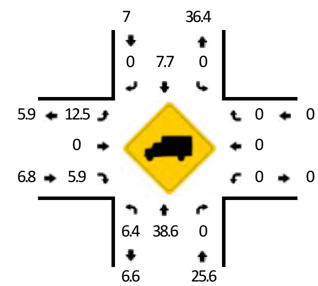
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	80	84	0	4	0	44	12	0	12	0	124	0	0	0	0	0	360
Heavy Trucks	0	36	0		0	8	0		0	0	4		0	0	0		48
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	12	0		0	4	4		0	0	0		0	0	0		20
Scooters																	

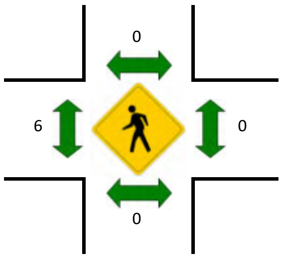
Comments:

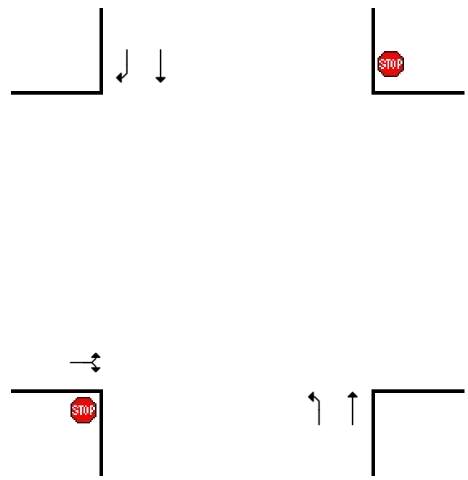
LOCATION: SW US Veterans Hospital Rd -- Shipping/Receiving Access Road
QC JOB #: 15308516
CITY/STATE: Portland, OR
DATE: Thu, Dec 3 2020

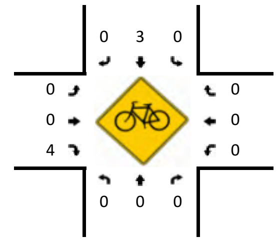


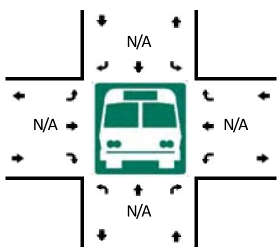
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

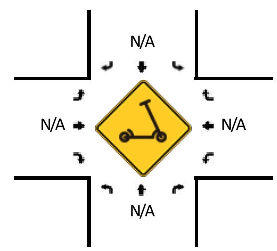












5-Min Count Period Beginning At	SW US Veterans Hospital Rd (Northbound)				SW US Veterans Hospital Rd (Southbound)				Shipping/Receiving Access Road (Eastbound)				Shipping/Receiving Access Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	5	0	1	0	3	0	0	1	0	12	0	0	0	0	0	23	
4:05 PM	0	9	0	0	0	8	0	0	1	0	4	0	0	0	0	0	22	
4:10 PM	6	2	0	0	0	4	1	0	0	0	2	0	0	0	0	0	15	
4:15 PM	2	6	0	0	0	5	0	0	0	0	7	0	0	0	0	0	20	
4:20 PM	3	4	0	0	0	5	0	0	0	0	6	1	0	0	0	0	19	
4:25 PM	3	4	0	0	0	3	0	0	1	0	2	0	0	0	0	0	13	
4:30 PM	4	5	0	0	0	2	0	0	1	0	2	0	0	0	0	0	14	
4:35 PM	2	9	0	0	0	1	0	0	0	0	2	0	0	0	0	0	14	
4:40 PM	7	7	0	0	0	3	1	0	0	0	2	0	0	0	0	0	20	
4:45 PM	6	6	0	0	0	2	1	0	1	0	2	0	0	0	0	0	18	
4:50 PM	10	8	0	0	0	1	0	0	1	0	6	0	0	0	0	0	26	
4:55 PM	2	5	0	0	0	2	1	0	1	0	4	0	0	0	0	0	15	219
5:00 PM	2	5	0	0	0	2	0	0	0	0	1	0	0	0	0	0	10	206
5:05 PM	1	3	0	0	0	3	0	0	0	0	5	0	0	0	0	0	12	196
5:10 PM	0	7	0	0	0	3	0	0	0	0	3	0	0	0	0	0	13	194
5:15 PM	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	180
5:20 PM	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	167
5:25 PM	1	5	0	0	0	1	0	0	0	0	2	0	0	0	0	0	9	163
5:30 PM	4	2	0	0	0	1	0	0	0	0	5	0	0	0	0	0	12	161
5:35 PM	0	7	0	0	0	3	0	0	0	0	4	0	0	0	0	0	14	161
5:40 PM	2	1	0	0	0	3	0	0	0	0	2	0	0	0	0	0	8	149
5:45 PM	3	3	0	0	0	2	0	0	0	0	2	0	0	0	0	0	10	141
5:50 PM	5	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	8	123
5:55 PM	0	3	0	0	0	1	0	0	0	0	2	0	0	0	0	0	6	114

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	92	84	0	0	0	24	8	0	8	0	40	0	0	0	0	0	256
Heavy Trucks	0	32	0		0	4	0		0	0	8		0	0	0		44
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	8	0		0	0	8		0	0	0		16
Scooters																	

Comments:

Appendix C
Traffic Observations

Date: 12/2/2020
Weather: Clear. Low 40 degrees in the morning. Upper 40 degrees in the afternoon.
Observer: Stuart Campbell

General Overall Observations:

- Overall, there were no traffic observations overserved. Traffic volumes were light most of the day. Peak periods saw higher volumes, but even during heavy periods, traffic moved well.
- Limited congestion – occurs at intersection, usually for only short period of time
- Freight volumes were low during observation periods
- ADA compliance needs to be addressed along sidewalks/paths and at crossings due to pavement striping and curb ramps/tactile warning devices throughout VA campus
- Parking level 2 and 1 of Lot 3 was closed off due to drive thru COVID-19 testing
- Bike parking exists in some locations, but in several locations, bikes are locked to staircase railings or other non-bike rack locations

Location: **SW Capitol Hwy & SW Terwilliger Blvd**

Time: 6:05 AM – 10-minute observation period

Observations:

- Light traffic volume – cars and bus
- 7 TriMet buses serve this intersection
- Bus stop pad turns has small path that turns into an unimproved "goat path" across grass/soil onto Terwilliger Blvd south of SW Capitol.
- No freight
- Adequate pedestrian crossing, with striping and crosswalk signal, but need new ADA curb ramps.
- Crossing time is approximately 20 seconds which could create a challenge for people using wheelchairs and other mobility devices. There is a slight incline in topography from Terwilliger Blvd to SW Capital Highway.
- Intersection includes a bike sensor on traffic light, allowing for signal change for bikes crossing SW Capitol Highway, on Terwilliger Blvd.

Bikes: 1
Peds: 2

Time: 4:47 PM – 10-minute observation period

Observations:

- Busy intersection at this time of day – moderate to heavy traffic volumes consistently, mostly on SW Capitol Highway.
- 7 car queue at light Terwilliger Blvd, south of SW Capitol Highway
    - Queue appears due to single-lane signalized left turn.

Bikes: 1
Peds: 2

Location: **SW Terwilliger Blvd & SW Sam Jackson Rd**

Time: 6:30 AM – 10-minute observation period

Observations:

- Heavy traffic volumes at this time of day – cars and bus
- Heavy left turning movements south onto Terwilliger Blvd from eastbound Sam Jackson Park Rd
- Pedestrian crossings need improvement – approximately 20 second crossing time
  - Worn striping
  - Missing ADA treatments at ramps/curbs
  - Pedestrian island at pork chop could use treatment to improve curbs and surface
- 2 TriMet buses service this intersection
- 1 small freight delivery truck

Bikes: 1
Peds: 1

Time: 4:11 PM – 6-minute observation period

Observations:

- Heavy and steady traffic – some backups but queues are relatively short and clear quickly
  - Note from Shell gas attendant – when I-405 on ramp backs up, traffic at this intersection backs up as well.

Bikes: 2
Peds: 6

Location: **SW US Veterans Hospital Road & SW Gibbs St**

Time: 6:47 AM – 10-minute observation period

Observations:

- Lots of activity at this time of day near OHSU hospital, research, and Shriners Hospital– peds, cars, and bus (TriMet and C-Tran)
- Location is across from a parking garage and near entrance of large building
- T-intersection – no turning issues observed

Bikes: 0
Peds: 10+

Time: 4:30 PM – 5-minute observation period

Observations:

- Steady traffic volumes through intersection – not heavy but just steady
- No issues

Bikes: 0
Peds: 4

Location: **SW Terwilliger Blvd & SW Campus Dr**
Time: 7:07 AM – 10-minute observation period

Observations:
• Traffic volumes are steady here at this time of day
• Lots of TriMet bus activity – buses driving through and a stop that serves 4 buses
    o Bus stop is accessed by a crosswalk. Cross walk paint is deteriorating and the landing ADA landing pad at end of crosswalk is in need of improvement
• Buses turning left onto Terwilliger Blvd, off Campus Dr is a little tight
    o Pavement issues here – one bus scraped undercarriage due to dip in road
• Slight queue of 5 cars waiting to turn left onto Campus Dr
• 3 freight vehicles – two semis and one box truck – turning/passing through intersection going to and from campus
• Drivers yielded for pedestrians, as several crossed Terwilliger Blvd to get to Campus Dr
    o There are PVC pipe holders zip-tied on the crossing signs – they look like the may have held crossing flags but none were present during observation
Bikes: 4
Peds: 5

Time: 4:00 PM – 7-minute observation period
Observations: • Moderate and steady traffic flow • 3 car queues at Campus Dr to turn onto Terwilliger Blvd • 2 freight trucks observed – one box truck and one semi Bikes: 7 Peds: 9

Location: **SW US Veterans Hospital Road & SW Terwilliger Blvd**
Time: 7:25 AM – 10-minute observation period
Observations: • Steady traffic on Terwilliger Blvd • Lots of turning onto SW US Veterans Hospital Rd, off of Terwilliger Blvd • Slight queue for left turns (7 seconds) causes approximately 6 car back up waiting for left turn onto SW US Veterans Hospital Rd   o This causes a small queue of cars on SW US Veterans Hospital Rd waiting to turn left onto Terwilliger Blvd • TriMet Buses 8, 61, and 68 turn here to enter into VA Hospital campus • Terwilliger Blvd pedestrian crossing appears to lack ADA compliant curb cuts and landing pad Bikes: 3 Peds: 3
Time: 5:00 PM – 10-minute observation period

Observations: • Steady traffic but not heavy or congested – consistent stream of cars • A few cyclists in bike lane • Pedestrians on paved multiuse path adjacent to the road Bikes: 3 Peds: 7

Location: **SW US Veterans Hospital Road & S Gaines St**
Time: 7:55 AM – 7-minute observation period
Observations: • Traffic is light with no issues – turn at T-intersection seems sharp, but no observed issue • Pedestrian crossing doesn't have paint/striping or ADA treatment, aside from old curb cuts • Pathway on one side of S Gaines St connects the crosswalk is behind guard rail – pathway is narrow and not well maintained, likely not suitable for all pedestrians. Not suitable for mobility devices. • TriMet Buses 8 and 64 flow through intersection Bikes: 1 Peds: 4
Time: 4:40 PM – 5-minute observation period
Observations: • Not much activity here – quiet • Just a few cars observed driving through • 2 buses observed Bikes: 0 Peds: 2

Location: **S Gaines St & SW 6th Ave Dr**
Time: 8:09 AM – 5-minute observation period
Observations: • Quiet here – little traffic • Location is surrounded by parking lots that are mostly full • Bus 8 has covered stop next to intersection • Pedestrian crosswalks look good – only one tactile warning device wearing out Bikes: 1 Peds: 7
Time: 4:46 PM – 5-minute observation period
Observations: • Very quiet • Just a few cars observed here and 1 bus • Only a few pedestrians observed Bikes: 0 Peds: 3

Location: **SW US Veterans Hospital Rd & Shipping/Receiving Access Road**

Time: 8:24 AM – 5-minute observation period

Observations:

- Light traffic – most activity are cars moving to/from patient and visitor parking garage
- 1 freight vehicle observed
- Pedestrian crosswalk is small/narrow with some deteriorating paint

Bikes: 0
Peds: 0

Time: 5:30 PM – 5-minute observation period

Observations:

- Very quiet
- Just a few cars observed here and 1 bus

Bikes: 0
Peds: 0

Location: **SW US Veterans Hospital Rd & Building T-51 Access Rd**

Time: 8:32 AM – 5-minute observation period

Observations:

- Traffic is light but steady
- Pedestrian crosswalk is narrow, and landings don't seem ADA compliant due to small size and sloping pavement

Bikes: 0
Peds: 0

Time: 5:22 PM – 5-minute observation period

Observations:

- Light traffic – most cars leaving garage, others driving past the garage through small intersection
- Cars yielded for pedestrians
- A few buses passing by with bus stop and shelter at this location

Bikes: 0
Peds: 11

Location: **SW US Veterans Hospital Rd & Building 108 Parking Access**

Time: 8:40 AM – 5-minute observation period

Observations:

- Light and steady traffic – no issues
- No freight observed except for 1 dumpster truck picking up a large dumpster
- Pedestrian crosswalk is small, curb ramps look older and do not seem ADA compliant

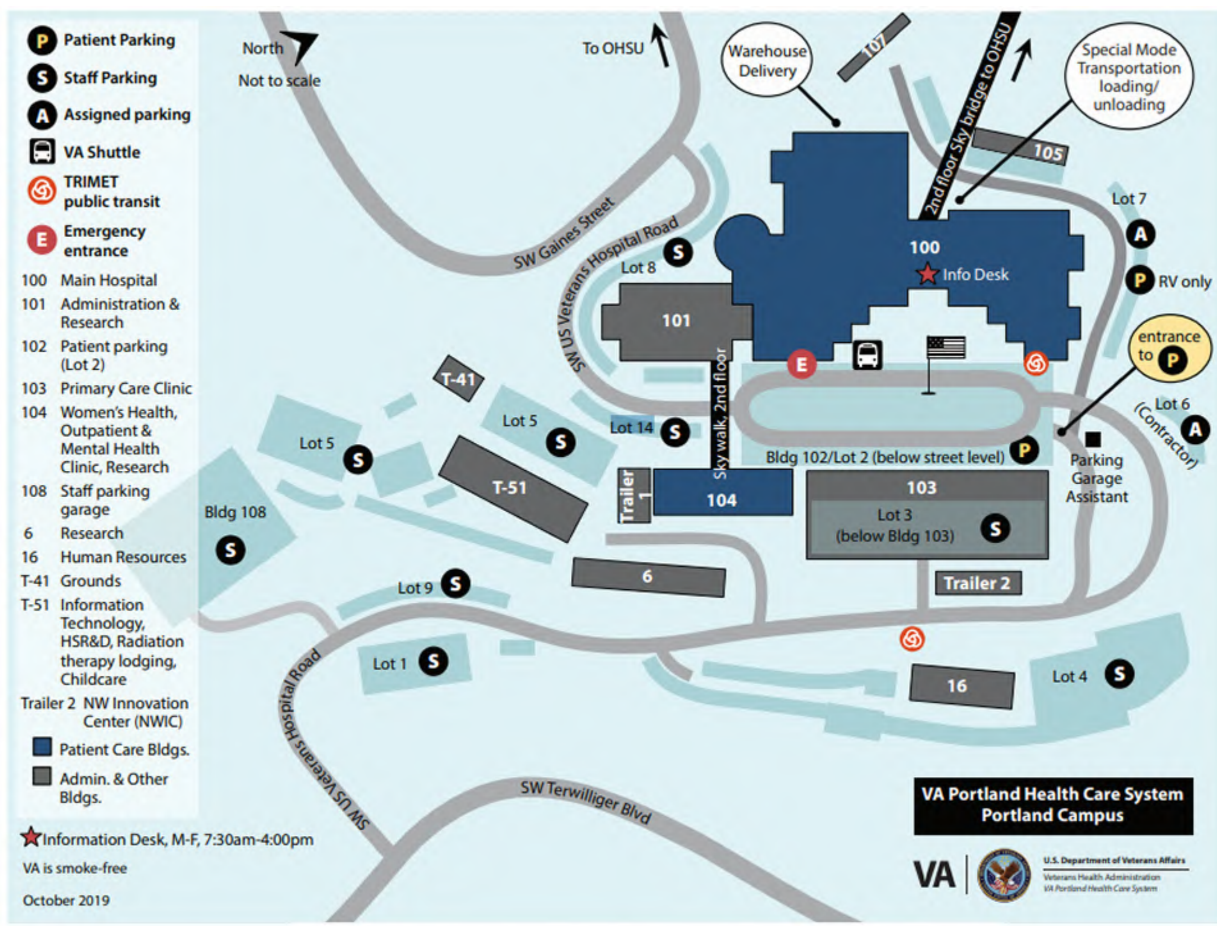
Bikes: 0
Peds: 1

Time: 5:15 PM – 5-minute observation period

Observations:

- Steady and moderate traffic with several cars leaving Lot 108 parking garage
- Traffic flowing along US Veterans Hospital Rd
- Several buses passing during this time period

Bikes: 1
Peds: 1



Date: 12/3/20

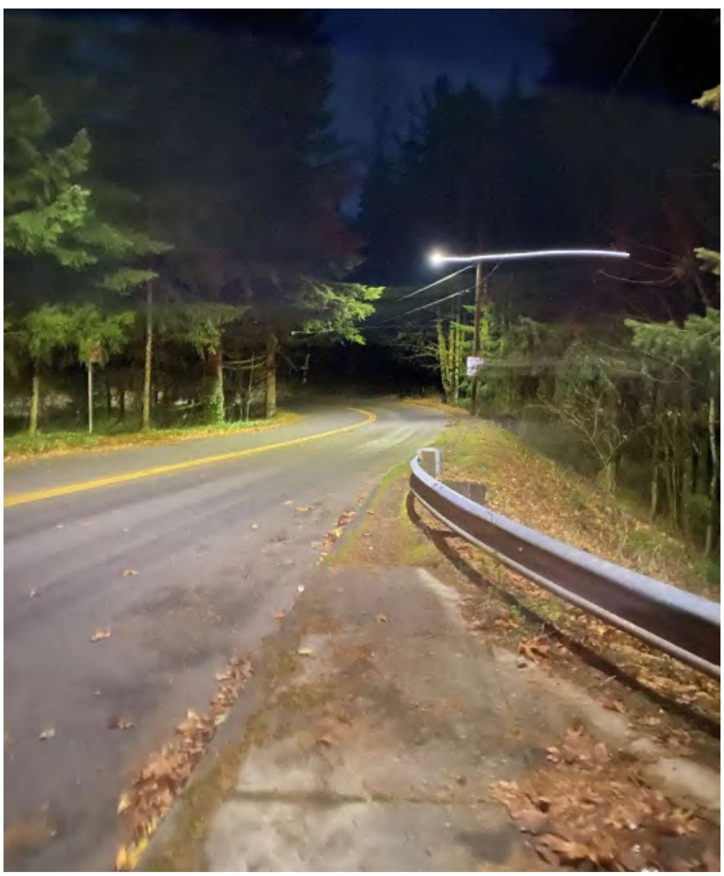
Time: All counts were completed between the hours 9:30 AM and 2:00 PM

Location	Parking Supply (Total Spaces Available)	Parking Spaces Occupied	Bike Parking Supply	Bike Parking Occupied
Lot 1	33	6	-	-
Lot 2	228	125	-	-
Lot 3*	349	317	-	-
Lot 4	182	123	-	-
Lot 5	183	139	-	-
Lot 6	25	22	-	-
Lot 7	11	8	-	-
Lot 8	28	18	6	1
Lot 9	13	4	-	-
Lot 14	19	9	6	2
Building 108 Parking Garage	299	240	-	-

Parking Notes:

- *Lot 3 parking levels 1 and 2 were closed off due to drive thru COVID-19 testing – unable to count parking.
- Some parking spots that were striped for parking were unusable due to VA equipment storage or other barriers.
- Bikes were observed throughout the campus. The bike parking counts listed above were based on permanent bike parking (actual bike racks), but bikes were observed locked to railings within some parking garages. Bike parking boxes are also provided in various garages, but it was unclear whether they were in use.

SW Capitol and SW Terwilliger Blvd



SW Terwilliger Blvd & SW Sam Jackson Rd


trimet.org

SW US Veterans Hospital Road & SW Gibbs St


COP
LOC

SW Terwilliger Blvd & SW Campus Dr

This is where the pavement dips causing one bus to scrape

SW US Veterans Hospital Road & SW Terwilliger Blvd

SW US Veterans Hospital Road & S Gaines St

S Gaines St & SW 6th Ave Dr

SW US Veterans Hospital Rd & Shipping/Receiving Access Road

SW US Veterans Hospital Rd & Building T-51 Access Rd

SW US Veterans Hospital Rd & Building 108 Parking Access

Bike parking at edge of Lot 14

Bike parking at edge of Lot 8

Appendix D
2020 Adjusted Synchro Reports

Intersection						
Int Delay, s/veh	3.5					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	214	37	128	96	6	75
Future Vol, veh/h	214	37	128	96	6	75
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	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	240	42	144	108	7	84

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	282	0	657	261
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	-	-	4.1	-	6.4	6.54
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.606
Pot Cap-1 Maneuver	-	-	1292	-	433	706
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	684	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1292	-	381	706
Mov Cap-2 Maneuver	-	-	-	-	381	-
Stage 1	-	-	-	-	787	-
Stage 2	-	-	-	-	603	-

Approach	EB	WB	NE
HCM Control Delay, s	0	4.6	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	664	-	-	1292	-
HCM Lane V/C Ratio	0.137	-	-	0.111	-
HCM Control Delay (s)	11.3	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.4	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	13	57	23	43	46	6
Future Vol, veh/h	13	57	23	43	46	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	56	60	6	0
Mvmt Flow	16	70	28	52	56	7

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	51	86
Stage 1	-	-	0	0
Stage 2	-	-	51	86
Critical Hdwy	-	-	6.96	7.1
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.96	6.1
Follow-up Hdwy	-	-	4.004	4.54
Pot Cap-1 Maneuver	-	-	838	706
Stage 1	-	-	-	-
Stage 2	-	-	850	723
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	838	0
Mov Cap-2 Maneuver	-	-	838	0
Stage 1	-	-	-	0
Stage 2	-	-	850	0

Approach	EB	WB
HCM Control Delay, s	0	9.8
HCM LOS		A

Minor Lane/Major Mvmt	EBT	EBR	WBLn1
Capacity (veh/h)	-	-	838
HCM Lane V/C Ratio	-	-	0.096
HCM Control Delay (s)	-	-	9.8
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.3

Intersection						
Int Delay, s/veh	6					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	29	20	43	33	119
Future Vol, veh/h	22	29	20	43	33	119
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	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	25	33	22	48	37	134

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	58	0	134	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	92	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1559	-	834	1034
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	905	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1559	-	821	1034
Mov Cap-2 Maneuver	-	-	-	-	821	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	891	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	979	-	-	1559	-
HCM Lane V/C Ratio	0.174	-	-	0.014	-
HCM Control Delay (s)	9.5	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection						
Int Delay, s/veh	35					

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	102	107	266	147	336	108
Future Vol, veh/h	102	107	266	147	336	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	112	118	292	162	369	119

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1230	373	0	0	454	0
Stage 1	373	-	-	-	-	-
Stage 2	857	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	177	671	-	-	1117	-
Stage 1	651	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	114	671	-	-	1117	-
Mov Cap-2 Maneuver	114	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	246	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	163	0	7.4
HCM LOS	F		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1117	-	198	-	-
HCM Lane V/C Ratio	0.331	-	1.16	-	-
HCM Control Delay (s)	9.8	0	163	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	1.5	-	11.5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	93	135	109	49	11
Future Vol, veh/h	7	93	135	109	49	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	8	104	152	122	55	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	487	61	55	0	-	0
Stage 1	61	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	543	1001	1544	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	490	1001	1544	-	-	-
Mov Cap-2 Maneuver	490	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	663	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	4.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1544	-	933	-	-
HCM Lane V/C Ratio	0.098	-	0.12	-	-
HCM Control Delay (s)	7.6	-	9.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.4	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	11	92	291	148	20
Future Vol, veh/h	4	11	92	291	148	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	13	108	342	174	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	744	186	198	0	-	0
Stage 1	186	-	-	-	-	-
Stage 2	558	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	385	861	1387	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	355	861	1387	-	-	-
Mov Cap-2 Maneuver	355	-	-	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	1.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1387	-	624	-	-
HCM Lane V/C Ratio	0.078	-	0.028	-	-
HCM Control Delay (s)	7.8	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	145	445	139	9
Future Vol, veh/h	0	0	145	445	139	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	10	3	17
Mvmt Flow	0	0	175	536	167	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1059	173	178	0	-	0
Stage 1	173	-	-	-	-	-
Stage 2	886	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	251	876	1410	-	-	-
Stage 1	862	-	-	-	-	-
Stage 2	406	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	207	876	1410	-	-	-
Mov Cap-2 Maneuver	207	-	-	-	-	-
Stage 1	709	-	-	-	-	-
Stage 2	406	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	1.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1410	-	-	-	-
HCM Lane V/C Ratio	0.124	-	-	-	-
HCM Control Delay (s)	7.9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-	-

Intersection	
Int Delay, s/veh	12.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	94	49	289	161	112	315
Future Vol, veh/h	94	49	289	161	112	315
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	106	55	325	181	126	354

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1134	303	480	0	-	0
Stage 1	303	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	221	741	1072	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	147	741	1072	-	-	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	492	-	-	-	-	-
Stage 2	423	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	68.1	6.3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1072	-	203	-	-
HCM Lane V/C Ratio	0.303	-	0.791	-	-
HCM Control Delay (s)	9.8	0	68.1	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	1.3	-	5.6	-	-

Intersection						
Int Delay, s/veh	5.2					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	192	16	43	156	30	201
Future Vol, veh/h	192	16	43	156	30	201
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	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	226	19	51	184	35	236

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	522	236
Stage 1	-	-	-	-	236	-
Stage 2	-	-	-	-	286	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1333	-	510	781
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	756	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1333	-	488	781
Mov Cap-2 Maneuver	-	-	-	-	488	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	723	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.7	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	725	-	-	1333	-
HCM Lane V/C Ratio	0.375	-	-	0.038	-
HCM Control Delay (s)	12.9	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	7	52	30	43	65	12
Future Vol, veh/h	7	52	30	43	65	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	38	53	6	0
Mvmt Flow	9	63	37	52	79	15

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	41	72
Stage 1	-	-	0	0
Stage 2	-	-	41	72
Critical Hdwy	-	-	6.78	7.03
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.78	6.03
Follow-up Hdwy	-	-	3.842	4.477
Pot Cap-1 Maneuver	-	-	886	730
Stage 1	-	-	-	-
Stage 2	-	-	897	745
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	886	0
Mov Cap-2 Maneuver	-	-	886	0
Stage 1	-	-	-	0
Stage 2	-	-	897	0

Approach	EB	WB
HCM Control Delay, s	0	9.5
HCM LOS		A

Minor Lane/Major Mvmt	EBT	EBR	WBLn1
Capacity (veh/h)	-	-	886
HCM Lane V/C Ratio	-	-	0.1
HCM Control Delay (s)	-	-	9.5
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.3

Intersection	
Int Delay, s/veh	5.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	17	66	103	37	49	33
Future Vol, veh/h	17	66	103	37	49	33
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	20	77	120	43	57	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	97	0	342	59
Stage 1	-	-	-	-	59	-
Stage 2	-	-	-	-	283	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1509	-	658	1012
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1509	-	605	1012
Mov Cap-2 Maneuver	-	-	-	-	605	-
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	708	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	722	-	-	1509	-
HCM Lane V/C Ratio	0.132	-	-	0.079	-
HCM Control Delay (s)	10.7	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-

Intersection						
Int Delay, s/veh	16					

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	192	246	91	39	111	251
Future Vol, veh/h	192	246	91	39	111	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	14	5	25	0	1	2
Mvmt Flow	204	262	97	41	118	267

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	621	118	0	0	138	0
Stage 1	118	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Critical Hdwy	6.54	6.25	-	-	4.11	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.345	-	-	2.209	-
Pot Cap-1 Maneuver	432	926	-	-	1452	-
Stage 1	878	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	391	926	-	-	1452	-
Mov Cap-2 Maneuver	391	-	-	-	-	-
Stage 1	878	-	-	-	-	-
Stage 2	529	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	32	0	2.4
HCM LOS	D		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1452	-	579	-	-
HCM Lane V/C Ratio	0.081	-	0.805	-	-
HCM Control Delay (s)	7.7	0	32	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	7.9	-	-

Intersection						
Int Delay, s/veh	4.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	73	67	100	56	6
Future Vol, veh/h	11	73	67	100	56	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	13	85	78	116	65	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	341	69	65	0	-	0
Stage 1	69	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	633	983	1512	-	-	-
Stage 1	927	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	600	983	1512	-	-	-
Mov Cap-2 Maneuver	600	-	-	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	749	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1512	-	907	-	-
HCM Lane V/C Ratio	0.052	-	0.108	-	-
HCM Control Delay (s)	7.5	-	9.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	99	11	152	192	0
Future Vol, veh/h	11	99	11	152	192	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	14	124	14	190	240	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	458	240	240	0	-	0
Stage 1	240	-	-	-	-	-
Stage 2	218	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	565	804	1339	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	559	804	1339	-	-	-
Mov Cap-2 Maneuver	559	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	823	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1339	-	770	-	-
HCM Lane V/C Ratio	0.01	-	0.179	-	-
HCM Control Delay (s)	7.7	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	109	0	151	360	0
Future Vol, veh/h	3	109	0	151	360	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	138	0	191	456	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	647	456	456	0	-	0
Stage 1	456	-	-	-	-	-
Stage 2	191	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	439	609	1115	-	-	-
Stage 1	643	-	-	-	-	-
Stage 2	846	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	439	609	1115	-	-	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	643	-	-	-	-	-
Stage 2	846	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1115	-	603	-	-
HCM Lane V/C Ratio	-	-	0.235	-	-
HCM Control Delay (s)	0	-	12.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection	
Int Delay, s/veh	25.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	241	234	80	135	164	72
Future Vol, veh/h	241	234	80	135	164	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	271	263	90	152	184	81

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	557	225	265	0	-	0
Stage 1	225	-	-	-	-	-
Stage 2	332	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	486	819	1287	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	720	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	449	819	1287	-	-	-
Mov Cap-2 Maneuver	449	-	-	-	-	-
Stage 1	744	-	-	-	-	-
Stage 2	720	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.7	3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1287	-	578	-	-
HCM Lane V/C Ratio	0.07	-	0.923	-	-
HCM Control Delay (s)	8	0	47.7	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.2	-	11.6	-	-

HCM 6th Edition methodology does not support Non-NEMA phasing.

HCM 6th Edition methodology does not support Non-NEMA phasing.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (veh/h)	0	0	0	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	748	0	160	748	713	634
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1870	0	1781	1870	1781	1585
Grp Volume(v), veh/h	0	0	0	0	0	0
Grp Sat Flow(s),veh/h/ln	1870	0	1781	1870	1781	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane		0.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	748	0	160	748	713	634
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	748	0	160	748	713	634
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A
Approach Vol, veh/h	0			0	0	
Approach Delay, s/veh	0.0			0.0	0.0	
Approach LOS						

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	22.5	22.5	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.0	18.0	18.0
Max Q Clear Time (g_c+I1), s	0.0	0.0	0.0
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	0.0
HCM 6th LOS	A

Appendix E
2030 No-build Synchro Reports

Intersection						
Int Delay, s/veh	3.6					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	237	41	141	106	7	83
Future Vol, veh/h	237	41	141	106	7	83
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	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	266	46	158	119	8	93

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	312	0	724	289
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	435	-
Critical Hdwy	-	-	4.1	-	6.4	6.54
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.606
Pot Cap-1 Maneuver	-	-	1260	-	396	680
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1260	-	343	680
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	569	-

Approach	EB	WB	NE
HCM Control Delay, s	0	4.7	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	632	-	-	1260	-
HCM Lane V/C Ratio	0.16	-	-	0.126	-
HCM Control Delay (s)	11.8	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

Intersection						
Int Delay, s/veh	3.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	47	51	7	14	64
Future Vol, veh/h	25	47	51	7	14	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	30	57	62	9	17	78

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	179	67	0	0	71	0
Stage 1	67	-	-	-	-	-
Stage 2	112	-	-	-	-	-
Critical Hdwy	6.96	6.8	-	-	4.1	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	4.004	3.84	-	-	2.2	-
Pot Cap-1 Maneuver	702	856	-	-	1542	-
Stage 1	835	-	-	-	-	-
Stage 2	794	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	694	856	-	-	1542	-
Mov Cap-2 Maneuver	694	-	-	-	-	-
Stage 1	835	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	694	856	1542	-
HCM Lane V/C Ratio	-	-	0.044	0.067	0.011	-
HCM Control Delay (s)	-	-	10.4	9.5	7.4	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0	-

Intersection						
Int Delay, s/veh	6.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	24	32	22	47	36	133
Future Vol, veh/h	24	32	22	47	36	133
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	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	27	36	25	53	40	149

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	63	0	148	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1553	-	819	1031
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	894	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1553	-	805	1031
Mov Cap-2 Maneuver	-	-	-	-	805	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	879	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	973	-	-	1553	-
HCM Lane V/C Ratio	0.195	-	-	0.016	-
HCM Control Delay (s)	9.6	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Intersection	
Int Delay, s/veh	74.2

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	113	118	294	162	371	119
Future Vol, veh/h	113	118	294	162	371	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	124	130	323	178	408	131

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1359	412	0	0	501	0
Stage 1	412	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	147	638	-	-	1074	-
Stage 1	624	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 87	638	-	-	1074	-
Mov Cap-2 Maneuver	~ 87	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	203	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	$ 361.1	0	7.9
HCM LOS	F		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1074	-	156	-	-
HCM Lane V/C Ratio	0.38	-	1.627	-	-
HCM Control Delay (s)	10.4	0	$ 361.1	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.8	-	17.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	104	149	120	54	13
Future Vol, veh/h	8	104	149	120	54	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	9	117	167	135	61	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	538	69	61	0	-	0
Stage 1	69	-	-	-	-	-
Stage 2	469	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	508	991	1536	-	-	-
Stage 1	959	-	-	-	-	-
Stage 2	634	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	453	991	1536	-	-	-
Mov Cap-2 Maneuver	453	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	634	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	4.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1536	-	914	-	-
HCM Lane V/C Ratio	0.109	-	0.138	-	-
HCM Control Delay (s)	7.6	-	9.6	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Intersection						
Int Delay, s/veh	1.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	13	102	323	163	22
Future Vol, veh/h	4	13	102	323	163	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	15	120	380	192	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	825	205	218	0	-	0
Stage 1	205	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	345	841	1364	-	-	-
Stage 1	834	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	315	841	1364	-	-	-
Mov Cap-2 Maneuver	315	-	-	-	-	-
Stage 1	761	-	-	-	-	-
Stage 2	540	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	1.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1364	-	604	-	-
HCM Lane V/C Ratio	0.088	-	0.033	-	-
HCM Control Delay (s)	7.9	-	11.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection						
Int Delay, s/veh	1.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	160	493	155	10
Future Vol, veh/h	0	0	160	493	155	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	10	3	17
Mvmt Flow	0	0	193	594	187	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1173	193	199	0	-	0
Stage 1	193	-	-	-	-	-
Stage 2	980	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	214	854	1385	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	854	1385	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	367	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1385	-	-	-	-
HCM Lane V/C Ratio	0.139	-	-	-	-
HCM Control Delay (s)	8	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	-	-

Intersection	
Int Delay, s/veh	25.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	104	54	319	178	124	348
Future Vol, veh/h	104	54	319	178	124	348
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	117	61	358	200	139	391

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1251	335	530	0	-	0
Stage 1	335	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	188	712	1027	-	-	-
Stage 1	718	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 114	712	1027	-	-	-
Mov Cap-2 Maneuver	~ 114	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	385	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	161	6.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1027	-	160	-	-
HCM Lane V/C Ratio	0.349	-	1.11	-	-
HCM Control Delay (s)	10.4	0	161	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.6	-	9.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	212	18	47	172	33	222
Future Vol, veh/h	212	18	47	172	33	222
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	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	249	21	55	202	39	261

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	572	260
Stage 1	-	-	-	-	260	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1305	-	477	757
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1305	-	455	757
Mov Cap-2 Maneuver	-	-	-	-	455	-
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	700	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.7	14
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	697	-	-	1305	-
HCM Lane V/C Ratio	0.43	-	-	0.042	-
HCM Control Delay (s)	14	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	2.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	47	72	12	8	57
Future Vol, veh/h	33	47	72	12	8	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	40	57	88	15	10	70

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	186	96	0	0	103	0
Stage 1	96	-	-	-	-	-
Stage 2	90	-	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1	-
Critical Hdwy Stg 1	5.78	-	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2	-
Pot Cap-1 Maneuver	728	837	-	-	1502	-
Stage 1	845	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	723	837	-	-	1502	-
Mov Cap-2 Maneuver	723	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	837	1502	-
HCM Lane V/C Ratio	-	-	0.068	0.006	-
HCM Control Delay (s)	-	-	9.6	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection						
Int Delay, s/veh	5.6					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	15	80	118	43	55	36
Future Vol, veh/h	15	80	118	43	55	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	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	17	93	137	50	64	42

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	110	0	388	64
Stage 1	-	-	-	-	64	-
Stage 2	-	-	-	-	324	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1493	-	619	1006
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	738	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1493	-	561	1006
Mov Cap-2 Maneuver	-	-	-	-	561	-
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	669	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	680	-	-	1493	-
HCM Lane V/C Ratio	0.156	-	-	0.092	-
HCM Control Delay (s)	11.3	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-

Intersection						
Int Delay, s/veh	27.8					

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	212	272	101	43	123	277
Future Vol, veh/h	212	272	101	43	123	277
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	14	5	25	0	1	2
Mvmt Flow	226	289	107	46	131	295

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	687	130	0	0	153	0
Stage 1	130	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Critical Hdwy	6.54	6.25	-	-	4.11	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.345	-	-	2.209	-
Pot Cap-1 Maneuver	395	912	-	-	1434	-
Stage 1	867	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	352	912	-	-	1434	-
Mov Cap-2 Maneuver	352	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	57	0	2.4
HCM LOS	F		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1434	-	537	-	-
HCM Lane V/C Ratio	0.091	-	0.959	-	-
HCM Control Delay (s)	7.8	0	57	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	12.6	-	-

Intersection						
Int Delay, s/veh	4.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	81	75	112	62	7
Future Vol, veh/h	13	81	75	112	62	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	15	94	87	130	72	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	380	76	72	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	601	974	1503	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	566	974	1503	-	-	-
Mov Cap-2 Maneuver	566	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	724	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1503	-	886	-	-
HCM Lane V/C Ratio	0.058	-	0.123	-	-
HCM Control Delay (s)	7.5	-	9.6	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Intersection						
Int Delay, s/veh	2.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	169	213	0
Future Vol, veh/h	13	109	13	169	213	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	211	266	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	509	266	266	0	-	0
Stage 1	266	-	-	-	-	-
Stage 2	243	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	528	778	1310	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	522	778	1310	-	-	-
Mov Cap-2 Maneuver	522	-	-	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	802	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1310	-	739	-	-
HCM Lane V/C Ratio	0.012	-	0.206	-	-
HCM Control Delay (s)	7.8	-	11.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	120	0	167	399	0
Future Vol, veh/h	3	120	0	167	399	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	152	0	211	505	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	716	505	505	0	-	0
Stage 1	505	-	-	-	-	-
Stage 2	211	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	400	571	1070	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	400	571	1070	-	-	-
Mov Cap-2 Maneuver	400	-	-	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	829	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1070	-	565	-	-
HCM Lane V/C Ratio	-	-	0.276	-	-
HCM Control Delay (s)	0	-	13.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	1.1	-	-

Intersection	
Int Delay, s/veh	49.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	267	260	89	149	181	80
Future Vol, veh/h	267	260	89	149	181	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	300	292	100	167	203	90

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	615	248	293	0	-	0
Stage 1	248	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	450	796	1257	-	-	-
Stage 1	786	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	410	796	1257	-	-	-
Mov Cap-2 Maneuver	410	-	-	-	-	-
Stage 1	717	-	-	-	-	-
Stage 2	694	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	95.5	3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1257	-	539	-	-
HCM Lane V/C Ratio	0.08	-	1.099	-	-
HCM Control Delay (s)	8.1	0	95.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	18.6	-	-

Appendix F
2030 Build Synchro Reports

Intersection						
Int Delay, s/veh	4.1					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	237	62	184	106	8	92
Future Vol, veh/h	237	62	184	106	8	92
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	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	266	70	207	119	9	103

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	336	0	834	301
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	533	-
Critical Hdwy	-	-	4.1	-	6.4	6.54
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.606
Pot Cap-1 Maneuver	-	-	1235	-	341	669
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	593	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1235	-	280	669
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	487	-

Approach	EB	WB	NE
HCM Control Delay, s	0	5.4	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	602	-	-	1235	-
HCM Lane V/C Ratio	0.187	-	-	0.167	-
HCM Control Delay (s)	12.3	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.6	-

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	57	51	38	78	64
Future Vol, veh/h	26	57	51	38	78	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	32	70	62	46	95	78

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	353	85	0	0	108	0
Stage 1	85	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.96	6.8	-	-	4.1	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	4.004	3.84	-	-	2.2	-
Pot Cap-1 Maneuver	549	835	-	-	1495	-
Stage 1	819	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	513	835	-	-	1495	-
Mov Cap-2 Maneuver	513	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	623	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	513	835	1495	-
HCM Lane V/C Ratio	-	-	0.062	0.083	0.064	-
HCM Control Delay (s)	-	-	12.5	9.7	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0.2	-

Intersection	
Int Delay, s/veh	6.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	32	22	47	36	158
Future Vol, veh/h	30	32	22	47	36	158
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	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	34	36	25	53	40	178

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	70	0	155	52
Stage 1	-	-	-	-	52	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1544	-	811	1021
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	894	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1544	-	797	1021
Mov Cap-2 Maneuver	-	-	-	-	797	-
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	879	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	970	-	-	1544	-
HCM Lane V/C Ratio	0.225	-	-	0.016	-
HCM Control Delay (s)	9.8	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Intersection	
Int Delay, s/veh	85.6

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	113	118	326	162	371	130
Future Vol, veh/h	113	118	326	162	371	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	24	3	14	3	0	5
Mvmt Flow	124	130	358	178	408	143

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1406	447	0	0	536	0
Stage 1	447	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Critical Hdwy	6.64	6.23	-	-	4.1	-
Critical Hdwy Stg 1	5.64	-	-	-	-	-
Critical Hdwy Stg 2	5.64	-	-	-	-	-
Follow-up Hdwy	3.716	3.327	-	-	2.2	-
Pot Cap-1 Maneuver	137	609	-	-	1042	-
Stage 1	600	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 79	609	-	-	1042	-
Mov Cap-2 Maneuver	~ 79	-	-	-	-	-
Stage 1	600	-	-	-	-	-
Stage 2	195	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	$ 435.2	0	7.9
HCM LOS	F		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1042	-	142	-	-
HCM Lane V/C Ratio	0.391	-	1.788	-	-
HCM Control Delay (s)	10.7	0	$ 435.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.9	-	19	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	104	149	184	68	13
Future Vol, veh/h	8	104	149	184	68	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	9	117	167	207	76	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	625	84	76	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	452	972	1517	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	402	972	1517	-	-	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	3.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1517	-	883	-	-
HCM Lane V/C Ratio	0.11	-	0.143	-	-
HCM Control Delay (s)	7.7	-	9.8	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	13	102	387	177	22
Future Vol, veh/h	4	13	102	387	177	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	15	120	455	208	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	916	221	234	0	-	0
Stage 1	221	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	305	824	1345	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	278	824	1345	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	499	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1345	-	564	-	-
HCM Lane V/C Ratio	0.089	-	0.035	-	-
HCM Control Delay (s)	7.9	-	11.6	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	213	557	169	10
Future Vol, veh/h	0	6	213	557	169	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	10	3	17
Mvmt Flow	0	7	257	671	204	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1395	210	216	0	-	0
Stage 1	210	-	-	-	-	-
Stage 2	1185	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	157	835	1366	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	293	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	110	835	1366	-	-	-
Mov Cap-2 Maneuver	110	-	-	-	-	-
Stage 1	581	-	-	-	-	-
Stage 2	293	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	2.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	835	-	-
HCM Lane V/C Ratio	0.188	-	0.009	-	-
HCM Control Delay (s)	8.2	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.7	-	0	-	-

Intersection	
Int Delay, s/veh	82.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	115	62	404	178	124	380
Future Vol, veh/h	115	62	404	178	124	380
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	0	4	1	6	11
Mvmt Flow	129	70	454	200	139	427

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1461	353	566	0	-	0
Stage 1	353	-	-	-	-	-
Stage 2	1108	-	-	-	-	-
Critical Hdwy	6.45	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	140	695	996	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	312	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 68	695	996	-	-	-
Mov Cap-2 Maneuver	~ 68	-	-	-	-	-
Stage 1	343	-	-	-	-	-
Stage 2	312	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 558.9	8.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	996	-	99	-	-
HCM Lane V/C Ratio	0.456	-	2.009	-	-
HCM Control Delay (s)	11.6	0	$ 558.9	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	2.4	-	16.9	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	213	19	50	173	42	268
Future Vol, veh/h	213	19	50	173	42	268
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	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	251	22	59	204	49	315

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	584	262
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1302	-	469	755
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1302	-	445	755
Mov Cap-2 Maneuver	-	-	-	-	445	-
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	691	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.8	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	690	-	-	1302	-
HCM Lane V/C Ratio	0.529	-	-	0.045	-
HCM Control Delay (s)	15.9	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	101	72	17	12	57
Future Vol, veh/h	60	101	72	17	12	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	73	123	88	21	15	70

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	199	99	0	0	109	0
Stage 1	99	-	-	-	-	-
Stage 2	100	-	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1	-
Critical Hdwy Stg 1	5.78	-	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2	-
Pot Cap-1 Maneuver	715	834	-	-	1494	-
Stage 1	842	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	708	834	-	-	1494	-
Mov Cap-2 Maneuver	708	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	708	834	1494	-
HCM Lane V/C Ratio	-	-	0.103	0.148	0.01	-
HCM Control Delay (s)	-	-	10.7	10.1	7.4	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.5	0	-

Intersection						
Int Delay, s/veh	5.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	16	80	140	48	55	39
Future Vol, veh/h	16	80	140	48	55	39
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	19	93	163	56	64	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	112	0	448	66
Stage 1	-	-	-	-	66	-
Stage 2	-	-	-	-	382	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1490	-	572	1003
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	694	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1490	-	507	1003
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	616	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.7	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	638	-	-	1490	-
HCM Lane V/C Ratio	0.171	-	-	0.109	-
HCM Control Delay (s)	11.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	32.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	101	43	123	322	212	272
Future Vol, veh/h	101	43	123	322	212	272
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	94	94	94	94	94	94
Heavy Vehicles, %	25	0	1	2	14	5
Mvmt Flow	107	46	131	343	226	289

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	153	0	735	130
Stage 1	-	-	-	-	130	-
Stage 2	-	-	-	-	605	-
Critical Hdwy	-	-	4.11	-	6.54	6.25
Critical Hdwy Stg 1	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	-	5.54	-
Follow-up Hdwy	-	-	2.209	-	3.626	3.345
Pot Cap-1 Maneuver	-	-	1434	-	370	912
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	523	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1434	-	328	912
Mov Cap-2 Maneuver	-	-	-	-	328	-
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	464	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	69.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	-	-	1434	-
HCM Lane V/C Ratio	1.006	-	-	0.091	-
HCM Control Delay (s)	69.7	-	-	7.8	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	14.1	-	-	0.3	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	81	75	114	116	7
Future Vol, veh/h	13	81	75	114	116	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	15	94	87	133	135	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	446	139	135	0	-	0
Stage 1	139	-	-	-	-	-
Stage 2	307	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	550	899	1425	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	516	899	1425	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	10.1		3.1		0	
HCM LOS	B					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1425	-	815	-	-
HCM Lane V/C Ratio	0.061	-	0.134	-	-
HCM Control Delay (s)	7.7	-	10.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	171	267	0
Future Vol, veh/h	13	109	13	171	267	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	214	334	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	580	334	334	0	-	0
Stage 1	334	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	480	712	1237	-	-	-
Stage 1	730	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	474	712	1237	-	-	-
Mov Cap-2 Maneuver	474	-	-	-	-	-
Stage 1	721	-	-	-	-	-
Stage 2	800	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1237	-	676	-	-
HCM Lane V/C Ratio	0.013	-	0.226	-	-
HCM Control Delay (s)	7.9	-	11.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection						
Int Delay, s/veh	3.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	165	3	169	453	0
Future Vol, veh/h	3	165	3	169	453	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	209	4	214	573	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	795	573	573	0	-	0
Stage 1	573	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	359	523	1010	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	820	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	358	523	1010	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	820	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1010	-	519	-	-
HCM Lane V/C Ratio	0.004	-	0.41	-	-
HCM Control Delay (s)	8.6	0	16.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2	-	-

Intersection						
Int Delay, s/veh	97.9					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	181	80	93	149	312	314
Future Vol, veh/h	181	80	93	149	312	314
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	89	89	89	89	89	89
Heavy Vehicles, %	6	11	4	1	5	0
Mvmt Flow	203	90	104	167	351	353

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	293	0	623	248
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	375	-
Critical Hdwy	-	-	4.14	-	6.45	6.2
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.236	-	3.545	3.3
Pot Cap-1 Maneuver	-	-	1257	-	445	796
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1257	-	405	796
Mov Cap-2 Maneuver	-	-	-	-	405	-
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	625	-

Approach	EB	WB	NE
HCM Control Delay, s	0	3.1	175.3
HCM LOS			F

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	537	-	-	1257	-
HCM Lane V/C Ratio	1.31	-	-	0.083	-
HCM Control Delay (s)	175.3	-	-	8.1	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	29.7	-	-	0.3	-

Appendix G
2030 Build Mitigated Synchro Reports

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	237	62	184	106	8	92
Future Vol, veh/h	237	62	184	106	8	92
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	89	89	89	89	89	89
Heavy Vehicles, %	8	0	0	4	0	34
Mvmt Flow	266	70	207	119	9	103

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	336	0	834	301
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	533	-
Critical Hdwy	-	-	4.1	-	6.4	6.54
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.606
Pot Cap-1 Maneuver	-	-	1235	-	341	669
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	593	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1235	-	280	669
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	487	-

Approach	EB	WB	NE
HCM Control Delay, s	0	5.4	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	602	-	-	1235	-
HCM Lane V/C Ratio	0.187	-	-	0.167	-
HCM Control Delay (s)	12.3	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.6	-

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	57	51	38	78	64
Future Vol, veh/h	26	57	51	38	78	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	56	60	6	0	0	0
Mvmt Flow	32	70	62	46	95	78

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	353	85	0	0	108	0
Stage 1	85	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.96	6.8	-	-	4.1	-
Critical Hdwy Stg 1	5.96	-	-	-	-	-
Critical Hdwy Stg 2	5.96	-	-	-	-	-
Follow-up Hdwy	4.004	3.84	-	-	2.2	-
Pot Cap-1 Maneuver	549	835	-	-	1495	-
Stage 1	819	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	513	835	-	-	1495	-
Mov Cap-2 Maneuver	513	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	623	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	4.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	513	835	1495	-
HCM Lane V/C Ratio	-	-	0.062	0.083	0.064	-
HCM Control Delay (s)	-	-	12.5	9.7	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0.2	-

Intersection	
Int Delay, s/veh	6.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	32	22	47	36	158
Future Vol, veh/h	30	32	22	47	36	158
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	89	89	89	89	89	89
Heavy Vehicles, %	13	2	0	30	13	0
Mvmt Flow	34	36	25	53	40	178

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	70	0	155	52
Stage 1	-	-	-	-	52	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	-	-	4.1	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.2	-	3.617	3.3
Pot Cap-1 Maneuver	-	-	1544	-	811	1021
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	894	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1544	-	797	1021
Mov Cap-2 Maneuver	-	-	-	-	797	-
Stage 1	-	-	-	-	943	-
Stage 2	-	-	-	-	879	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	970	-	-	1544	-
HCM Lane V/C Ratio	0.225	-	-	0.016	-
HCM Control Delay (s)	9.8	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (veh/h)	113	118	326	162	371	130
Future Volume (veh/h)	113	118	326	162	371	130
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1544	1856	1693	1856	1900	1826
Adj Flow Rate, veh/h	124	130	358	178	408	143
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	24	3	14	3	0	5
Cap, veh/h	144	151	424	211	501	1164
Arrive On Green	0.21	0.21	0.40	0.40	0.17	0.64
Sat Flow, veh/h	673	705	1067	530	1810	1826
Grp Volume(v), veh/h	255	0	0	536	408	143
Grp Sat Flow(s),veh/h/ln	1384	0	0	1597	1810	1826
Q Serve(g_s), s	10.8	0.0	0.0	18.5	7.1	1.9
Cycle Q Clear(g_c), s	10.8	0.0	0.0	18.5	7.1	1.9
Prop In Lane	0.49	0.51		0.33	1.00	
Lane Grp Cap(c), veh/h	296	0	0	634	501	1164
V/C Ratio(X)	0.86	0.00	0.00	0.84	0.81	0.12
Avail Cap(c_a), veh/h	413	0	0	1046	759	1895
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	0.0	0.0	16.6	11.4	4.3
Incr Delay (d2), s/veh	12.5	0.0	0.0	3.5	4.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	0.0	6.5	2.6	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.5	0.0	0.0	20.0	15.6	4.4
LnGrp LOS	D	A	A	C	B	A
Approach Vol, veh/h	255		536			551
Approach Delay, s/veh	35.5		20.0			12.6
Approach LOS	D		C			B

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		43.1		17.5	14.6	28.6
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		62.9		18.1	18.7	39.7
Max Q Clear Time (g_c+I1), s		3.9		12.8	9.1	20.5
Green Ext Time (p_c), s		0.9		0.4	0.9	3.6

Intersection Summary			
HCM 6th Ctrl Delay			19.9
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	104	149	184	68	13
Future Vol, veh/h	8	104	149	184	68	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	3	3	38	9	0
Mvmt Flow	9	117	167	207	76	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	625	84	76	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hdwy	6.4	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	452	972	1517	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	402	972	1517	-	-	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	3.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1517	-	883	-	-
HCM Lane V/C Ratio	0.11	-	0.143	-	-
HCM Control Delay (s)	7.7	-	9.8	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	13	102	387	177	22
Future Vol, veh/h	4	13	102	387	177	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	16	5	0
Mvmt Flow	5	15	120	455	208	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	916	221	234	0	-	0
Stage 1	221	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	305	824	1345	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	278	824	1345	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	499	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1345	-	564	-	-
HCM Lane V/C Ratio	0.089	-	0.035	-	-
HCM Control Delay (s)	7.9	-	11.6	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	-	-

Intersection						
Int Delay, s/veh	1.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	213	557	169	10
Future Vol, veh/h	0	6	213	557	169	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	10	3	17
Mvmt Flow	0	7	257	671	204	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1395	210	216	0	-	0
Stage 1	210	-	-	-	-	-
Stage 2	1185	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	157	835	1366	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	293	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	110	835	1366	-	-	-
Mov Cap-2 Maneuver	110	-	-	-	-	-
Stage 1	581	-	-	-	-	-
Stage 2	293	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	2.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	835	-	-
HCM Lane V/C Ratio	0.188	-	0.009	-	-
HCM Control Delay (s)	8.2	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.7	-	0	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	115	62	404	178	124	380
Future Volume (veh/h)	115	62	404	178	124	380
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1900	1841	1885	1811	1737
Adj Flow Rate, veh/h	129	70	454	200	139	427
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	5	0	4	1	6	11
Cap, veh/h	163	88	538	1294	165	506
Arrive On Green	0.15	0.15	0.18	0.69	0.42	0.42
Sat Flow, veh/h	1075	583	1753	1885	392	1203
Grp Volume(v), veh/h	200	0	454	200	0	566
Grp Sat Flow(s),veh/h/ln	1667	0	1753	1885	0	1595
Q Serve(g_s), s	6.4	0.0	7.0	2.1	0.0	17.7
Cycle Q Clear(g_c), s	6.4	0.0	7.0	2.1	0.0	17.7
Prop In Lane	0.64	0.35	1.00			0.75
Lane Grp Cap(c), veh/h	253	0	538	1294	0	671
V/C Ratio(X)	0.79	0.00	0.84	0.15	0.00	0.84
Avail Cap(c_a), veh/h	544	0	957	2137	0	1003
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	10.1	3.1	0.0	14.4
Incr Delay (d2), s/veh	5.5	0.0	3.7	0.1	0.0	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	2.4	0.5	0.0	6.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.2	0.0	13.8	3.1	0.0	18.8
LnGrp LOS	C	A	B	A	A	B
Approach Vol, veh/h	200			654	566	
Approach Delay, s/veh	28.2			10.5	18.8	
Approach LOS	C			B	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		42.6		12.9	14.7	27.8
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		62.9		18.1	23.5	34.9
Max Q Clear Time (g_c+I1), s		4.1		8.4	9.0	19.7
Green Ext Time (p_c), s		1.3		0.4	1.3	3.6

Intersection Summary			
HCM 6th Ctrl Delay			16.3
HCM 6th LOS			B

Intersection						
Int Delay, s/veh	7					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	213	19	50	173	42	268
Future Vol, veh/h	213	19	50	173	42	268
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	85	85	85	85
Heavy Vehicles, %	7	0	0	0	5	11
Mvmt Flow	251	22	59	204	49	315

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	584	262
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	322	-
Critical Hdwy	-	-	4.1	-	6.45	6.31
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.399
Pot Cap-1 Maneuver	-	-	1302	-	469	755
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1302	-	445	755
Mov Cap-2 Maneuver	-	-	-	-	445	-
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	691	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.8	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	690	-	-	1302	-
HCM Lane V/C Ratio	0.529	-	-	0.045	-
HCM Control Delay (s)	15.9	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	3.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	5.5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	101	72	17	12	57
Future Vol, veh/h	60	101	72	17	12	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	38	53	6	0	0	0
Mvmt Flow	73	123	88	21	15	70

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	199	99	0	0	109	0
Stage 1	99	-	-	-	-	-
Stage 2	100	-	-	-	-	-
Critical Hdwy	6.78	6.73	-	-	4.1	-
Critical Hdwy Stg 1	5.78	-	-	-	-	-
Critical Hdwy Stg 2	5.78	-	-	-	-	-
Follow-up Hdwy	3.842	3.777	-	-	2.2	-
Pot Cap-1 Maneuver	715	834	-	-	1494	-
Stage 1	842	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	708	834	-	-	1494	-
Mov Cap-2 Maneuver	708	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	708	834	1494	-
HCM Lane V/C Ratio	-	-	0.103	0.148	0.01	-
HCM Control Delay (s)	-	-	10.7	10.1	7.4	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.5	0	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	16	80	140	48	55	39
Future Vol, veh/h	16	80	140	48	55	39
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	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	31	0	0
Mvmt Flow	19	93	163	56	64	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	112	0	448	66
Stage 1	-	-	-	-	66	-
Stage 2	-	-	-	-	382	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1490	-	572	1003
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	694	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1490	-	507	1003
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	616	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		5.7		11.8	
HCM LOS					B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	638	-	-	1490	-
HCM Lane V/C Ratio	0.171	-	-	0.109	-
HCM Control Delay (s)	11.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (veh/h)	212	272	101	43	123	322
Future Volume (veh/h)	212	272	101	43	123	322
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1693	1826	1530	1900	1885	1870
Adj Flow Rate, veh/h	226	289	107	46	131	343
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	14	5	25	0	1	2
Cap, veh/h	268	342	169	73	433	697
Arrive On Green	0.41	0.41	0.17	0.17	0.10	0.37
Sat Flow, veh/h	660	844	1015	436	1795	1870
Grp Volume(v), veh/h	516	0	0	153	131	343
Grp Sat Flow(s),veh/h/ln	1508	0	0	1451	1795	1870
Q Serve(g_s), s	12.6	0.0	0.0	4.0	2.2	5.7
Cycle Q Clear(g_c), s	12.6	0.0	0.0	4.0	2.2	5.7
Prop In Lane	0.44	0.56		0.30	1.00	
Lane Grp Cap(c), veh/h	611	0	0	242	433	697
V/C Ratio(X)	0.84	0.00	0.00	0.63	0.30	0.49
Avail Cap(c_a), veh/h	1616	0	0	905	603	1729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.9	0.0	0.0	15.7	10.9	9.8
Incr Delay (d2), s/veh	3.3	0.0	0.0	2.7	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	0.0	0.0	1.3	0.7	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.2	0.0	0.0	18.5	11.3	10.3
LnGrp LOS	B	A	A	B	B	B
Approach Vol, veh/h	516		153			474
Approach Delay, s/veh	14.2		18.5			10.6
Approach LOS	B		B			B

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		19.6		21.0	8.4	11.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		37.5		43.5	7.7	25.3
Max Q Clear Time (g_c+I1), s		7.7		14.6	4.2	6.0
Green Ext Time (p_c), s		2.2		1.9	0.1	0.8

Intersection Summary						
HCM 6th Ctrl Delay			13.3			
HCM 6th LOS			B			

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	81	75	114	116	7
Future Vol, veh/h	13	81	75	114	116	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Stop
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	13	6	6	39	8	0
Mvmt Flow	15	94	87	133	135	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	446	139	135	0	-	0
Stage 1	139	-	-	-	-	-
Stage 2	307	-	-	-	-	-
Critical Hdwy	6.53	6.26	4.16	-	-	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	2.254	-	-	-
Pot Cap-1 Maneuver	550	899	1425	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	516	899	1425	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	3.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1425	-	815	-	-
HCM Lane V/C Ratio	0.061	-	0.134	-	-
HCM Control Delay (s)	7.7	-	10.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	109	13	171	267	0
Future Vol, veh/h	13	109	13	171	267	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	30	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	27	5	0
Mvmt Flow	16	136	16	214	334	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	580	334	334	0	-	0
Stage 1	334	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	480	712	1237	-	-	-
Stage 1	730	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	474	712	1237	-	-	-
Mov Cap-2 Maneuver	474	-	-	-	-	-
Stage 1	721	-	-	-	-	-
Stage 2	800	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1237	-	676	-	-
HCM Lane V/C Ratio	0.013	-	0.226	-	-
HCM Control Delay (s)	7.9	-	11.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection						
Int Delay, s/veh	3.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	165	3	169	453	0
Future Vol, veh/h	3	165	3	169	453	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	28	2	0
Mvmt Flow	4	209	4	214	573	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	795	573	573	0	-	0
Stage 1	573	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	359	523	1010	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	820	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	358	523	1010	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	820	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1010	-	519	-	-
HCM Lane V/C Ratio	0.004	-	0.41	-	-
HCM Control Delay (s)	8.6	0	16.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2	-	-

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	312	314	93	149	181	80
Future Volume (veh/h)	312	314	93	149	181	80
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1900	1841	1885	1811	1737
Adj Flow Rate, veh/h	351	353	104	167	203	90
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	5	0	4	1	6	11
Cap, veh/h	386	388	325	705	253	112
Arrive On Green	0.47	0.47	0.08	0.37	0.21	0.21
Sat Flow, veh/h	815	820	1753	1885	1189	527
Grp Volume(v), veh/h	705	0	104	167	0	293
Grp Sat Flow(s),veh/h/ln	1638	0	1753	1885	0	1716
Q Serve(g_s), s	23.5	0.0	2.5	3.6	0.0	9.6
Cycle Q Clear(g_c), s	23.5	0.0	2.5	3.6	0.0	9.6
Prop In Lane	0.50	0.50	1.00			0.31
Lane Grp Cap(c), veh/h	775	0	325	705	0	365
V/C Ratio(X)	0.91	0.00	0.32	0.24	0.00	0.80
Avail Cap(c_a), veh/h	1097	0	714	1327	0	550
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	15.3	12.7	0.0	22.0
Incr Delay (d2), s/veh	8.5	0.0	0.6	0.2	0.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	0.9	1.4	0.0	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.8	0.0	15.8	12.9	0.0	27.1
LnGrp LOS	C	A	B	B	A	C
Approach Vol, veh/h	705			271	293	
Approach Delay, s/veh	22.8			14.0	27.1	
Approach LOS	C			B	C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		26.5		32.4	9.5	17.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		41.5		39.5	18.1	18.9
Max Q Clear Time (g_c+I1), s		5.6		25.5	4.5	11.6
Green Ext Time (p_c), s		1.0		2.5	0.2	1.0
Intersection Summary						
HCM 6th Ctrl Delay			21.9			
HCM 6th LOS			C			

Appendix H
Signal Warrants

Signal Warrant Analysis Summary

Intersection	Major Street		Minor Street Higher Volume Approach		Signal Warrant Satisfaction
	Volume (VPH)	Lanes (#)	Volume (VPH)	Lanes (#)	
2020 Year Adjusted - AM Peak Hour					
Terwilliger Blvd / Campus Drive	857	1	209	1	No
Terwilliger Blvd / Veterans Hospital Road	874	1	143	1	No
2020 Year Adjusted - PM Peak Hour					
Terwilliger Blvd / Campus Drive	492	1	438	1	Yes
Terwilliger Blvd / Veterans Hospital Road	452	1	477	1	Yes
2030 Year - AM Peak Hour					
Terwilliger Blvd / Campus Drive	989	2	231	1	Yes
Terwilliger Blvd / Veterans Hospital Road	1086	2	177	1	Yes
2030 Year - PM Peak Hour					
Terwilliger Blvd / Campus Drive	589	2	484	1	Yes
Terwilliger Blvd / Veterans Hospital Road	503	2	626	1	Yes

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT:
2020 Adjusted Condition: Terwilliger Blvd @ Campus Drive

Analyst : JAT
Major Street : 2020 Adjusted Condition: Terwilliger Blvd
Minor Street : Campus Drive
Speed on Major Street : 25

Report Date : January 14, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 1
Minor Street - 1

24-HOUR TRAFFIC VOLUME
TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	444	0	0	444	413	147	36	413
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	362	0	0	362	130	39	30	130
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total				806				543

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	209	107	51	209	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	438	246	56	438	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total				647				0

JACOBS ENGINEERING

ARRANT ANALYSIS RESULTS - 2020 Adjusted Condition: Terwilliger Blvd @ Campus Dri

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME **(100% Thresholds)**

WARRANT 1* NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

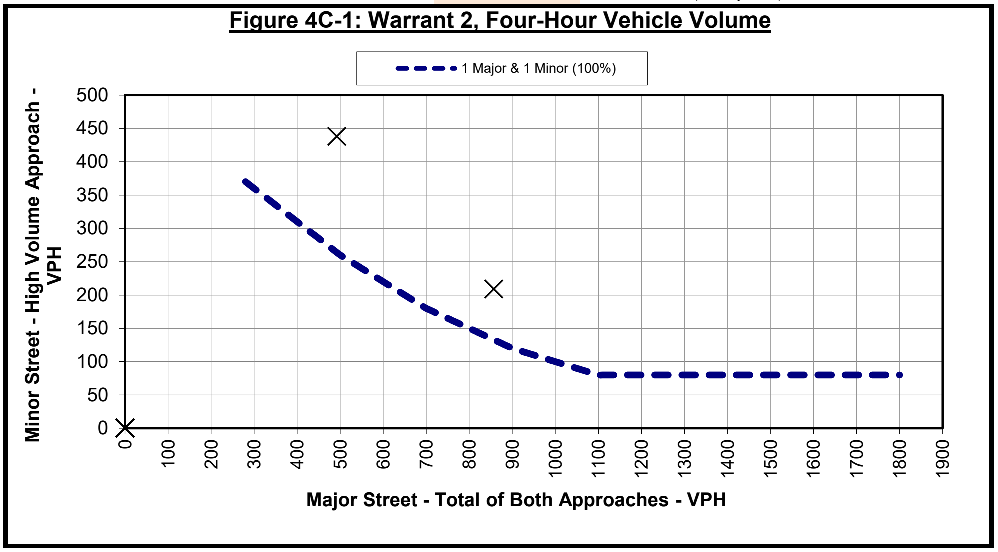
TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	857	209	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	492	438	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,349	647	1	1	2	1
			STD 1 (A OR B)		STD 2 (A & B)	
		MAJOR ST	500	750	400	600
		MINOR ST	150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME **(100% Thresholds)**

WARRANT 2* NOT SATISFIED 2 HOURS MET (4 Required)



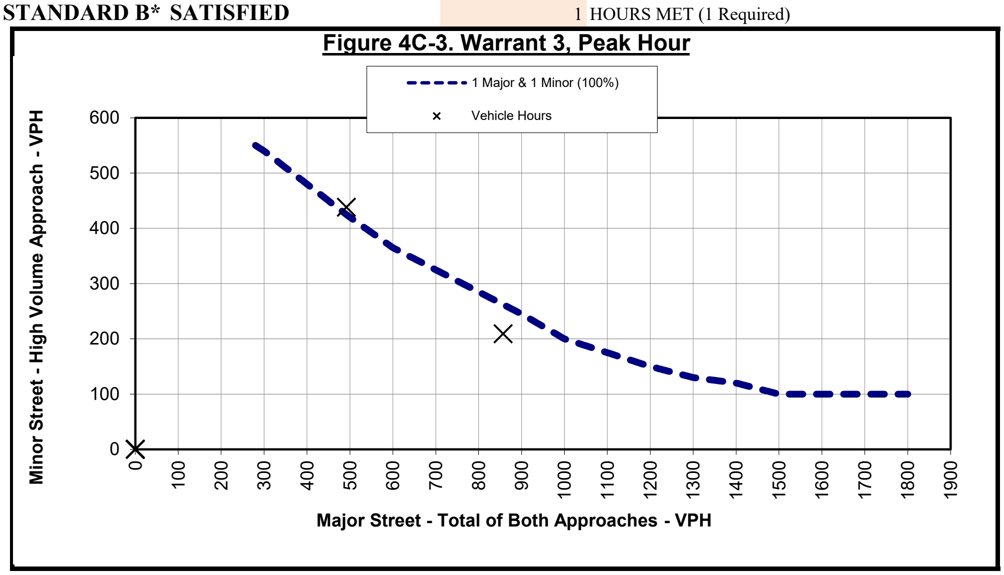
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR **(100% Thresholds)**

STANDARD A SATISFIED 18 VEHICLE HOURS (4 Required)

438	Peak Hour Minor-Street Volume
147	Average Minor-Street Delay (seconds)
1	Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED 1 HOURS MET (1 Required)



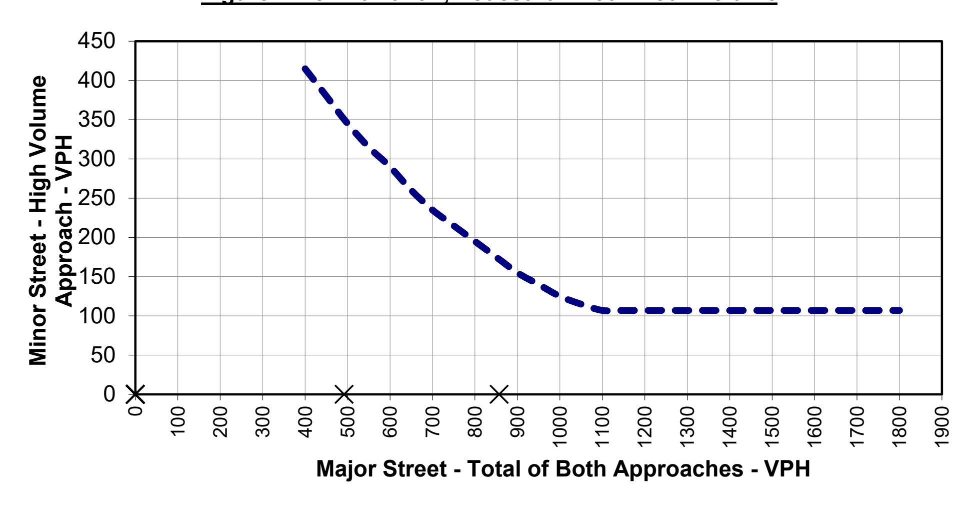
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME (100% Thresholds)

STANDARD A* NOT SATISFIED 0 HOURS MET (4 Required)

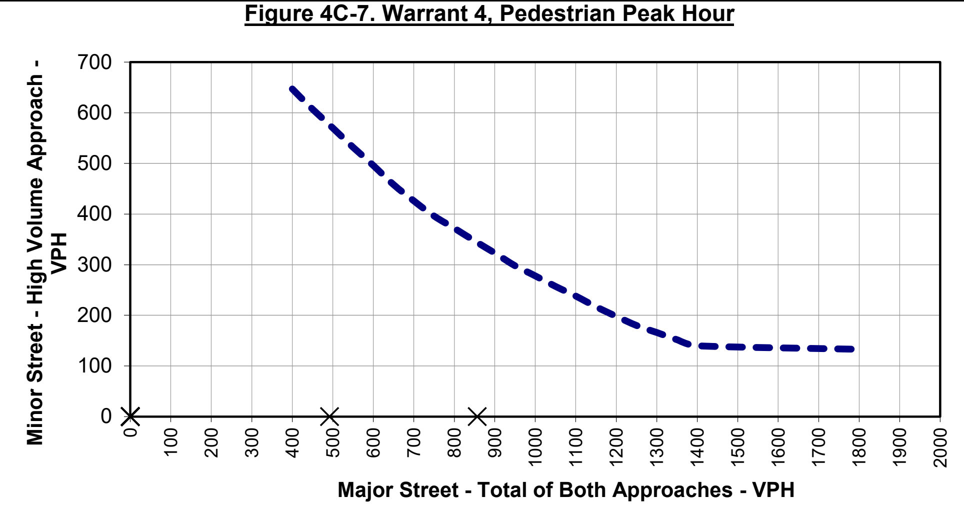
Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED 0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5 **NOT EVALUATED**

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 **NOT EVALUATED**

WARRANT 7, CRASH EXPERIENCE

WARRANT 7	**NOT SATISFIED**	
Std A	adequate trial of alternatives	Not Satisfied
Std B	≥5 correctable crashes within 12 months	Not Satisfied
Std C-1	meets 80% of Warrants 1 or 4 thresholds	Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 **NOT EVALUATED**

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT:
2020 Adjusted Condition: Terwilliger Blvd @ Veterans Hospital Road

Analyst : JAT
Major Street : 2020 Adjusted Condition: Terwilliger Blvd
Minor Street : Veterans Hospital Road
Speed on Major Street : 25

Report Date : January 13, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 1
Minor Street - 1

24-HOUR TRAFFIC VOLUME
TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	3	0	0
1:00 AM	0	0	0	0	0	2	0	0
2:00 AM	0	0	0	0	0	5	0	0
3:00 AM	0	0	0	0	0	1	0	0
4:00 AM	0	0	0	0	0	4	0	0
5:00 AM	0	0	0	0	0	6	0	0
6:00 AM	0	0	0	0	0	7	0	0
7:00 AM	450	0	0	450	427	315	74	427
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	216	0	0	216	236	72	31	236
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total								
				666				663

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME
TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	143	49	34	143	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	477	235	49	477	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
Total				620				0

JACOBS ENGINEERING

:ANT ANALYSIS RESULTS - 2020 Adjusted Condition: Terwilliger Blvd @ Veterans Hospit:

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1* NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

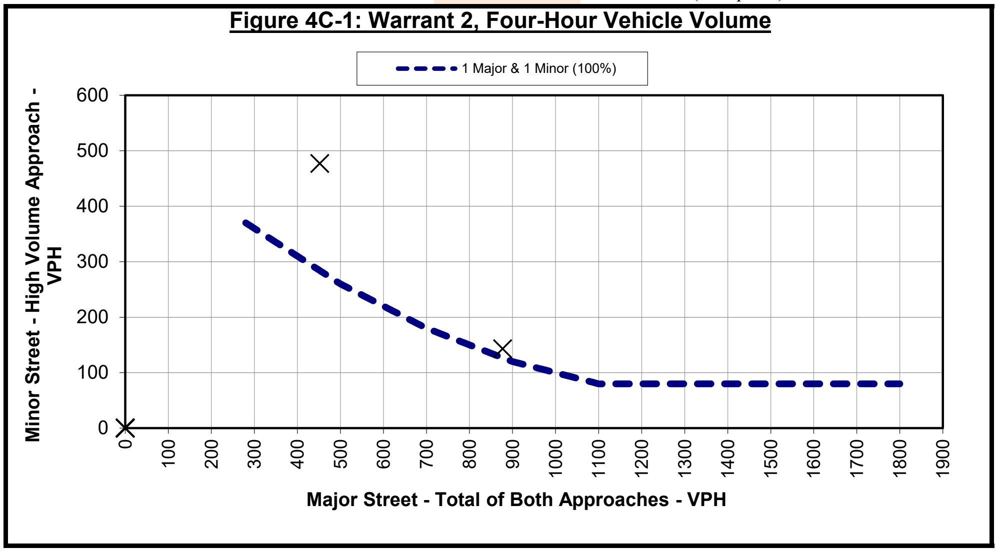
TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	877	143	MAJOR	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	452	477	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,329	620	0	1	2	1
			STD 1 (A OR B)		STD 2 (A & B)	
		MAJOR ST	500	750	400	600
		MINOR ST	150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME **(100% Thresholds)**

WARRANT 2* NOT SATISFIED 2 HOURS MET (4 Required)



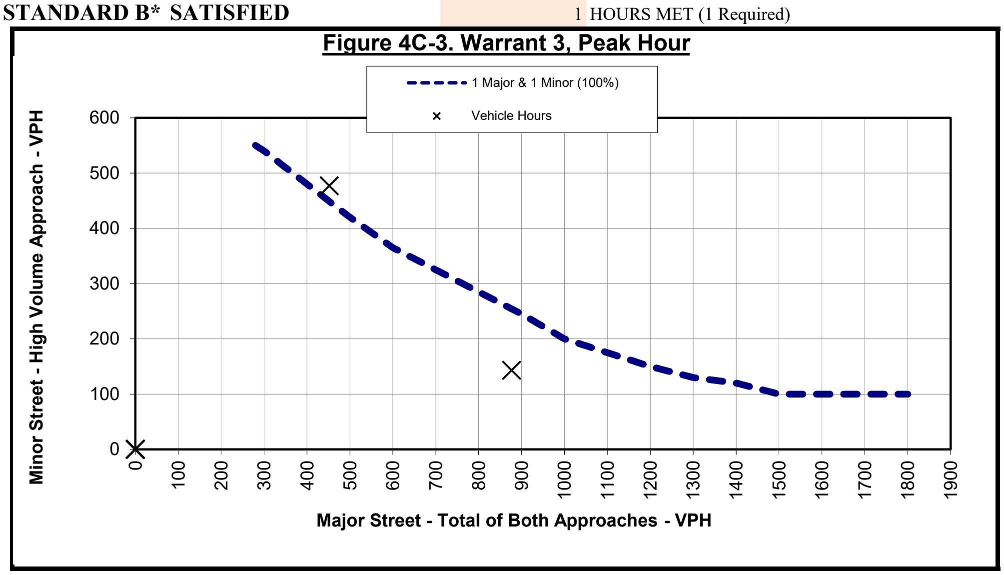
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR **(100% Thresholds)**

STANDARD A SATISFIED 7 VEHICLE HOURS (4 Required)

477	Peak Hour Minor-Street Volume
54	Average Minor-Street Delay (seconds)
1	Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED 1 HOURS MET (1 Required)

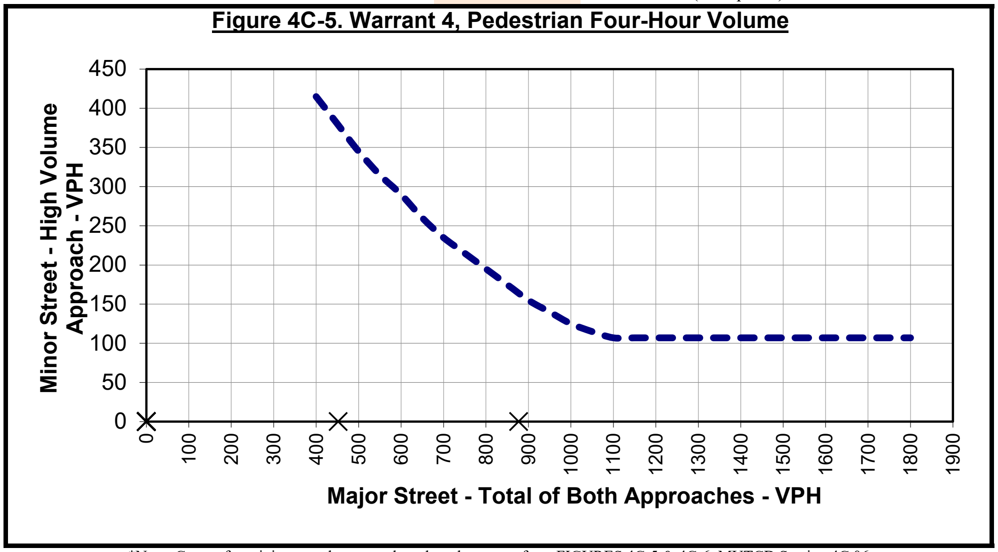


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

JACOBS ENGINEERING

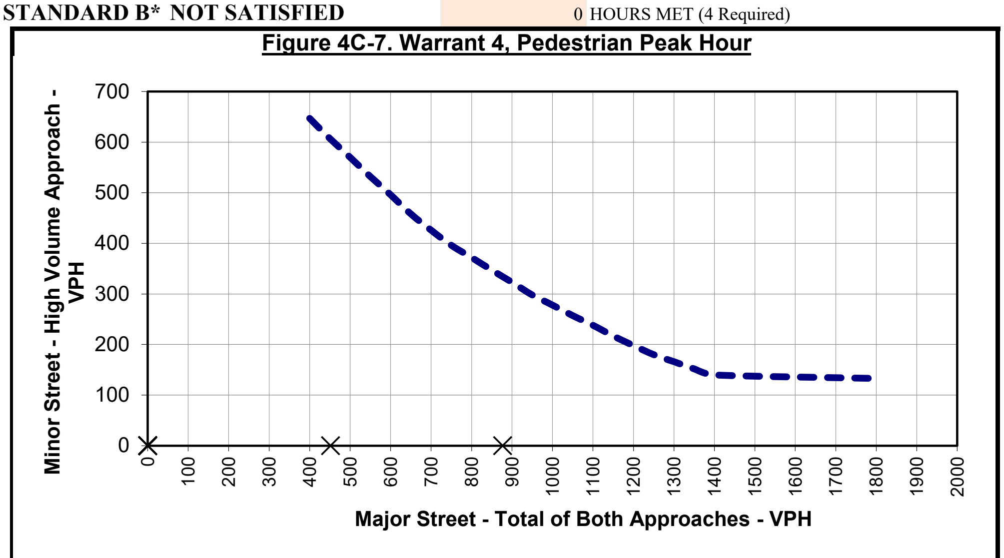
WARRANT 4, PEDESTRIAN VOLUME **(100% Thresholds)**

STANDARD A* NOT SATISFIED 0 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED 0 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5 **NOT EVALUATED**

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 **NOT EVALUATED**

WARRANT 7, CRASH EXPERIENCE

WARRANT 7	**NOT EVALUATED**	
Std A	adequate trial of alternatives	Not Satisfied
Std B	≥5 correctable crashes within 12 months	Not Satisfied
Std C-1	meets 80% of Warrants 1 or 4 thresholds	Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 **NOT EVALUATED**

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT:
2030 Build Condition: Terwilliger Blvd @ Campus Drive

Analyst : JAT
Major Street : 2030 Build Condition: Terwilliger Blvd
Minor Street : Campus Drive
Speed on Major Street : 25

Report Date : December 21, 2021
Counts Date : December 4, 2020
Lanes @ Intersection : Major Street - 2
Minor Street - 1

24-HOUR TRAFFIC VOLUME
TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	501	0	0	501	488	162	33	488
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	445	0	0	445	144	43	30	144
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total		946		632

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Minor Street Eastbound				Minor Street Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	231	118	51	231	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	484	272	56	484	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total				715				0

JACOBS ENGINEERING

WARRANT ANALYSIS RESULTS - 2030 Build Condition: Terwilliger Blvd @ Campus Drive

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1* NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

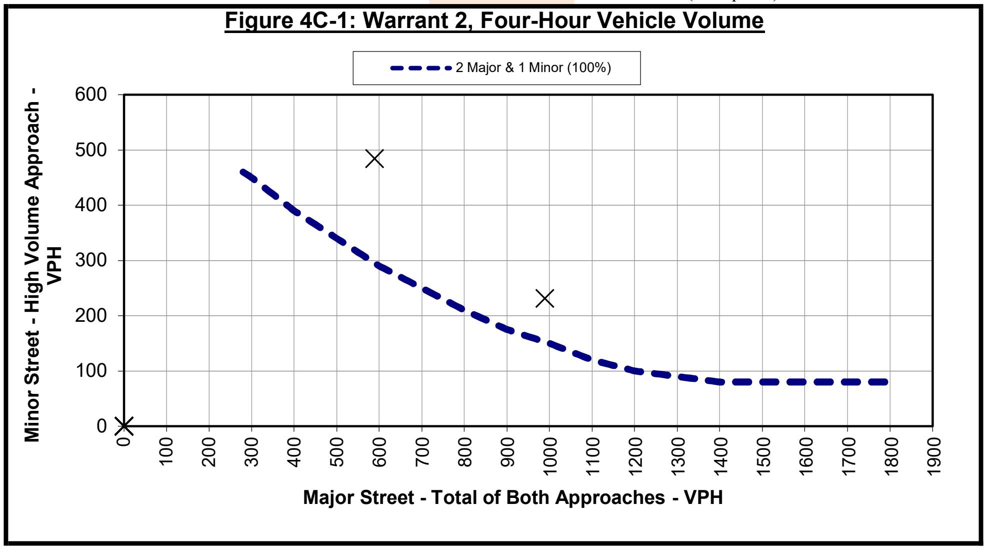
TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	989	231	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	589	484	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,578	715	1	1	2	1
			STD 1 (A OR B)		STD 2 (A & B)	
		MAJOR ST	600	900	480	720
		MINOR ST	150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME **(100% Thresholds)**

WARRANT 2* NOT SATISFIED 2 HOURS MET (4 Required)



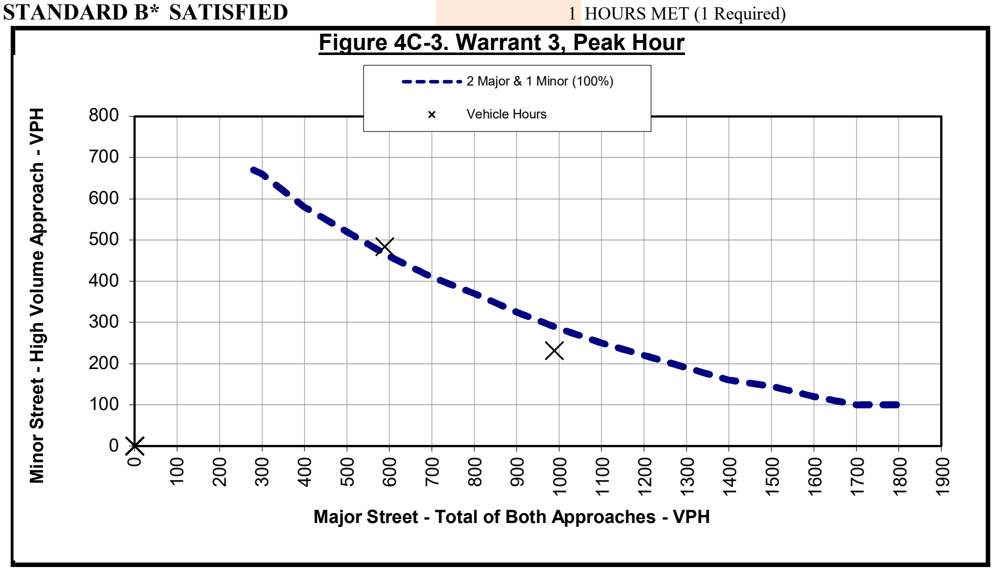
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR **(100% Thresholds)**

STANDARD A SATISFIED 15 VEHICLE HOURS (4 Required)

231	Peak Hour Minor-Street Volume
229	Average Minor-Street Delay (seconds)
1	Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED 1 HOURS MET (1 Required)



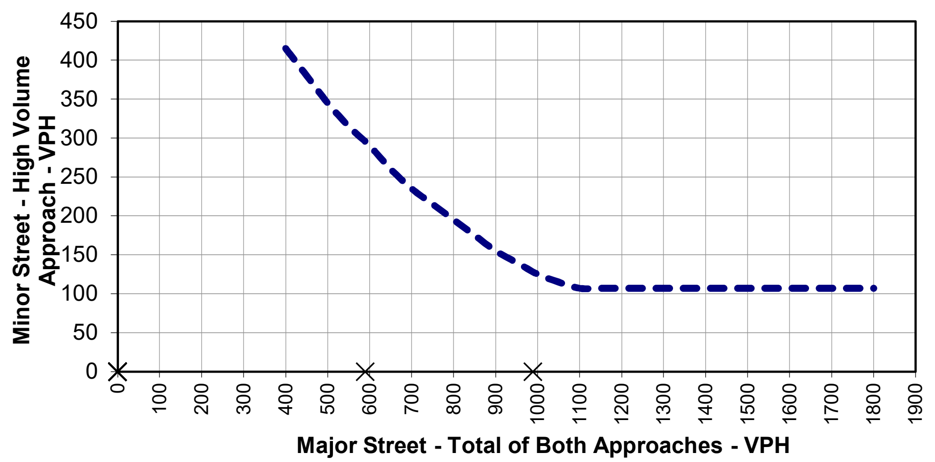
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME **(100% Thresholds)**

STANDARD A* NOT SATISFIED 0 HOURS MET (4 Required)

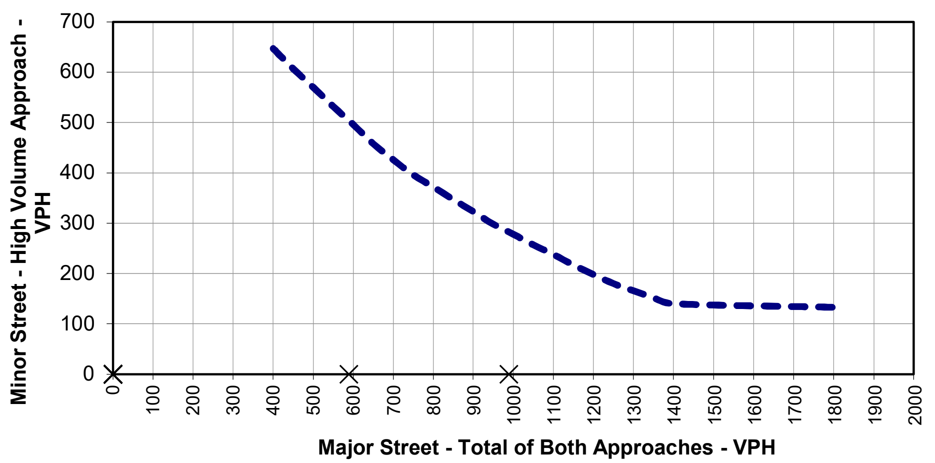
Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED 0 HOURS MET (4 Required)

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5 **NOT EVALUATED**

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 **NOT EVALUATED**

WARRANT 7, CRASH EXPERIENCE

WARRANT 7	**NOT EVALUATED**	
Std A	adequate trial of alternatives	Not Satisfied
Std B	≥5 correctable crashes within 12 months	Not Satisfied
Std C-1	meets 80% of Warrants 1 or 4 thresholds	Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 **NOT EVALUATED**

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT:
2030 Build Condition: Terwilliger Blvd @ Veterans Hospital Road

Analyst :	JAT	Report Date :	December 21, 2021
Major Street :	2030 Build Condition: Terwilliger Blvd	Counts Date :	December 4, 2020
Minor Street :	Veterans Hospital Road	Lanes @ Intersection :	Major Street - 2
Speed on Major Street :	25		Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Major Street				Major Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	3	0	0
1:00 AM	0	0	0	0	0	2	0	0
2:00 AM	0	0	0	0	0	5	0	0
3:00 AM	0	0	0	0	0	1	0	0
4:00 AM	0	0	0	0	0	4	0	0
5:00 AM	0	0	0	0	0	6	0	0
6:00 AM	0	0	0	0	0	7	0	0
7:00 AM	582	0	0	582	504	380	75	504
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	242	0	0	242	261	80	31	261
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total				824				765

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Minor Street				Minor Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	177	62	35	177	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0
4:00 PM	626	314	50	626	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total								
				803				0

JACOBS ENGINEERING

WARRANT ANALYSIS RESULTS - 2030 Build Condition: Terwilliger Blvd @ Veterans Hospital Road

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1* NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	1	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	2	HOURS
		CONDITION B	1	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

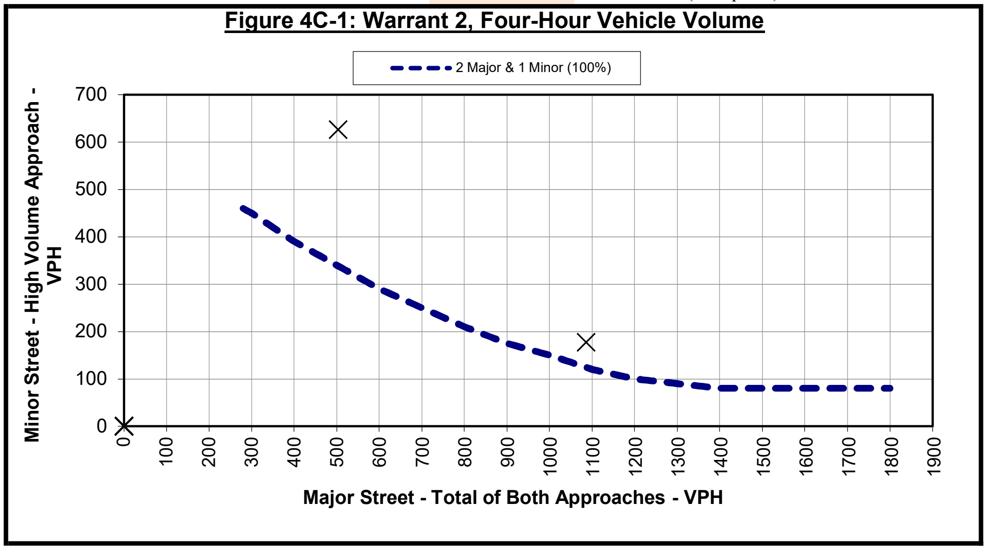
TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0
7:00 AM	1086	177	BOTH	BOTH	BOTH	BOTH
8:00 AM	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0
4:00 PM	503	626	MINOR	MINOR	BOTH	MINOR
5:00 PM	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	1,589	803	1	1	2	1
			STD 1 (A OR B)		STD 2 (A & B)	
		MAJOR ST	600	900	480	720
		MINOR ST	150	75	120	60
NO. OF HOURS MET (8 Required in either Standard 1 or Standard 2)			1		1	
			NOT SATISFIED			

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 2* NOT SATISFIED 2 HOURS MET (4 Required)



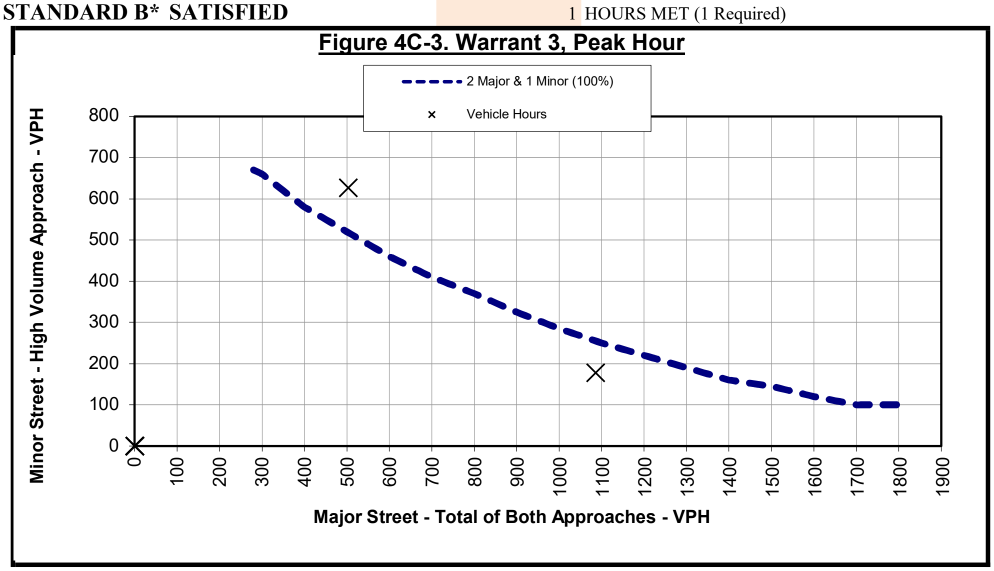
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR (100% Thresholds)

STANDARD A SATISFIED 16 VEHICLE HOURS (4 Required)

177 Peak Hour Minor-Street Volume
315 Average Minor-Street Delay (seconds)
1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED 1 HOURS MET (1 Required)

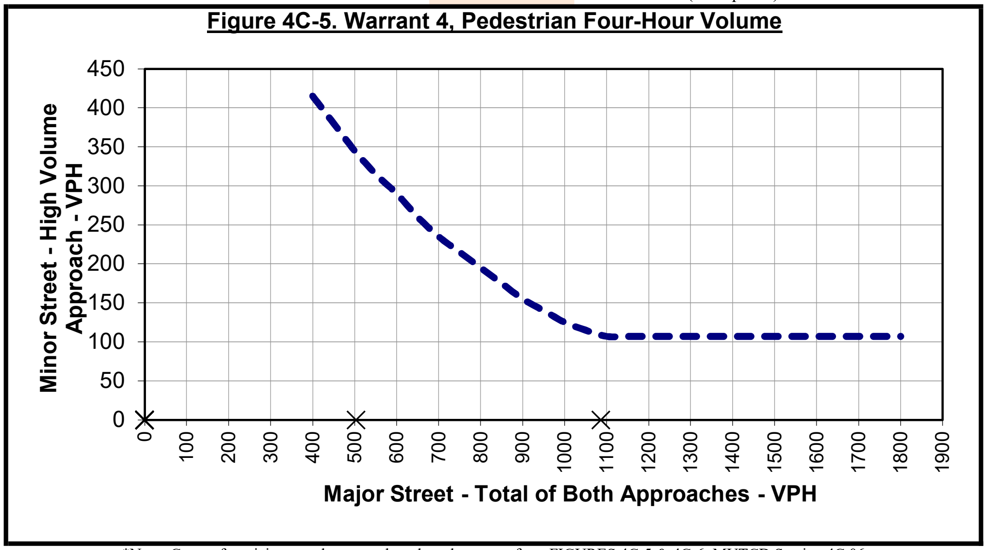


*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

JACOBS ENGINEERING

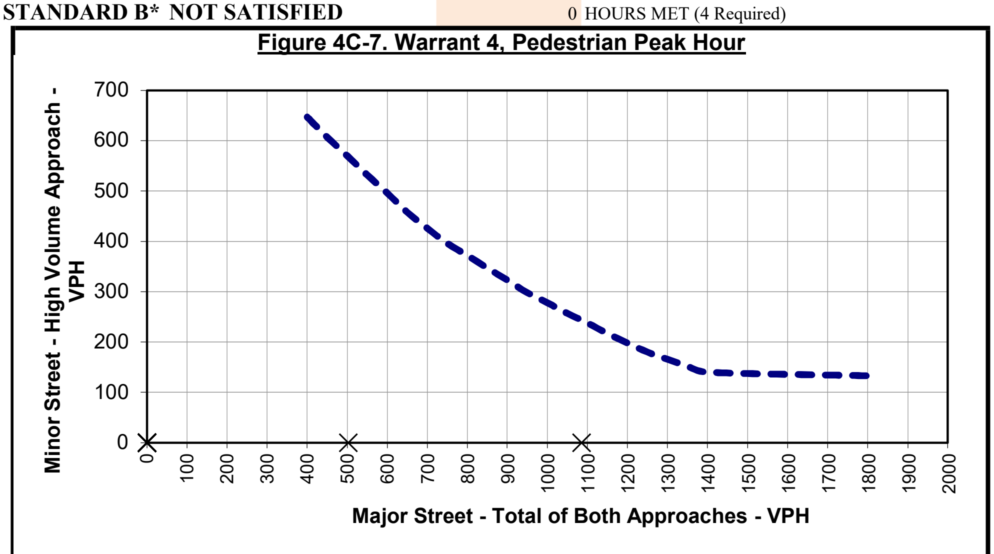
WARRANT 4, PEDESTRIAN VOLUME **(100% Thresholds)**

STANDARD A* NOT SATISFIED 0 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED 0 HOURS MET (4 Required)



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5 **NOT EVALUATED**

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 **NOT EVALUATED**

WARRANT 7, CRASH EXPERIENCE

WARRANT 7	**NOT EVALUATED**	
Std A	adequate trial of alternatives	Not Satisfied
Std B	≥5 correctable crashes within 12 months	Not Satisfied
Std C-1	meets 80% of Warrants 1 or 4 thresholds	Not Satisfied

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 **NOT EVALUATED**

Appendix I
PBOT Left Turn Guide Forms

PORTLAND BUREAU OF TRANSPORTATION

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY	Jerom Theunissen		**DATE**	01/27/2022
CHECKED BY	John Wirtz		**DATE**	01/27/2022
INTERSECTION	SW Campus Drive & SW Terwilliger Boulevard		**SIGNAL ID**	
APPROACH DIRECTION	B	SB	NB	
# of Left Turn Lanes[1]	1	0	1	
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways[2])	0	1	1	
Speed of Opposing Traffic (mph)	n/a	25	25	
Left Turn Volume (vehicles/hour)[3]	113 (212 - PM)	n/a	371 (123 - PM)	
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour)[3]	15 (33 - PM)	n/a	0 (0 - PM)	
Opposing Through / Right Turn Volume (vehicles/hour)[3]	n/a	n/a	326 (101 - PM)	

[1] Shared left-thru lanes should be counted as left-turn lanes.

[2] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

[3] Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION	B	SB	NB	
REQUIRED CRITERIA Protected-only left-turn mode **SHOULD** be provided if **ANY** of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Required Criteria?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
SCORE-BASED CRITERIA Protected-only left-turn mode **SHOULD** be provided if any criteria score is greater than or equal to four (>=4) **OR** the total score for all categories is greater than or equal to eight (>=8).				
Crash History Score (C)			0	
Volumes Score (V)			8	
Geometry Score (G)			0	
Location Score (L)			0	
Any Score-Based Criteria >=4?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Total Score (T = C + V + G + L)	0	0	8	0
Total Score >=8?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Score-Based Criteria?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
SITE-SPECIFIC FACTORS Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	☑ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Site-Specific Factors?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
NOTES	Protected NB left turn lane is justified to minimize queues and delays associated with projected heavy left turn volumes in the AM period			

INTERSECTION	SW Campus Drive & SW Te	**SIGNAL ID**		**APPROACH**	

REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	☑ Yes
Multiple left-turn lanes[1] on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		☐ Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	☐ Yes
Overlapping left-turn paths[2]			☐ Yes

[1] Shared left-thru lanes should be counted as left-turn lanes.

[2] Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50[1]	425	465
55[1]	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

[1] For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)	0	**(C)**

Criteria	Description	Reference	Satisfied?	Scoring	Score
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	☐ >=5	= 4	0 *(C.1)*
			☐ 2-4	= 2	
			☐ <=1	= 0	
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	☐ >=4	= 4	0 *(C.2)*
			☐ 2-3	= 2	
			☐ <=1	= 0	
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		☐ Fatal	= 4	0 *(C.3)*
			☐ Non-fatal injury or PDO[1]	= 0	

[1] Property damage only.

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB

Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	8 (V)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a **OR** V.1.b				4 (V.1)
	Product of opposing through vehicle and left-turn vehicle hourly volumes[1,2]	ODOT 2017	1 opposing auto lane		
			☐ >=150,000	= 4	
			☑ >=50,000	= 2	
			☐ <50,000	= 0	
			2 opposing auto lanes		
			☐ >=300,000	= 4	
			☐ >=100,000	= 2	
			☐ <100,000	= 0	(V.1.a)
	Left-turn vehicle hourly volume (per lane)[1]	ODOT 2017	☑ >=300	= 4	4
			☐ >=200	= 2	
			☐ <200	= 0	(V.1.b)
Pedestrian conflicts	Higher Score of Criteria V.2.a **OR** V.2.b				0 (V.2)
	Product of conflicting pedestrian and left-turn vehicle hourly volumes[1]	LADOT 2020	☐ 10,000+ on a two-way street	= 4	0
			☐ 10,000+ on a one-way street	= 2	
			☑ <10,000	= 0	(V.2.a)
	Conflicting pedestrian hourly volume[1]	LADOT 2020	☐ >=150	= 2	0
			☐ >=100	= 1	
			☑ <100	= 0	(V.2.b)
Bicycle conflicts	Left-turn vehicle hourly volume[1] crossing a separated in-roadway bikeway[3] is greater than volumes outlined in Table 2	MassDOT 2015	☑ Yes	= 4	4
			☐ No	= 0	(V.3)

[1] Five-year projections may be used if different than existing volumes.

[2] When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.

[3] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: "Separated Bike Lane Planning & Design Guide" (2015), MassDOT – Exhibit 6A.

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB

Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

GEOMETRY TOTAL (G = G.1 + G.2 + G.3 + G.4 + G.5)	0 (G)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways[1])		☐ Yes	= 4	0 (G.1)
			☑ No	= 0	
Speed of opposing traffic			☐ >=40 mph	= 4	0 (G.2)
			☐ >=30 mph	= 2	
			☑ <30 mph	= 0	
Multiple left-turn lanes[2] on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		☐ Yes if outside downtown	= 2	0 (G.3)
			☐ Yes if downtown	= 1	
			☑ No	= 0	
U-turns	Allowed		☐ Yes	= 2	0 (G.4)
			☑ No	= 0	
Conflicting bi-directional bicycle facility			☐ Yes	= 2	0 (G.5)
			☑ No	= 0	

[1] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).
[2] Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

LOCATION TOTAL (L = L.1 + L.2 + L.3)	0 (L)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	☐ Yes	= 1	0 (L.1)
			☑ No	= 0	
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	☐ Yes	= 1	0 (L.2)
			☑ No	= 0	
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	☐ Yes	= 1	0 (L.3)
			☑ No	= 0	

INTERSECTION	SW Campus Drive & SW Te	SIGNAL ID		APPROACH	NB

SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	☐ Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	☑ Yes	T-intersection with limited conflicting traffic turning movements except for northbound lefts and eastbound lefts
Conflicting light rail or streetcar tracks	☐ Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	☐ Yes	
Inadequacy of gaps in traffic	☑ Yes	Future volume projections will lead to the intersection having inadequate gaps in traffic (see Synchro reports)
Safety concerns and/or community support	☐ Yes	
High pedestrian and/or bicycle volumes	☐ Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	☐ Yes	
High percentage of left-turning heavy vehicles	☐ Yes	
Long vehicle delays	☑ Yes	Future volume projections will lead to the intersection having long delays especially for B vehicles (435
Queues exceeding the left-turn pocket	☐ Yes	
Transit cycle failures	☐ Yes	
Constraints with traffic signal progression	☐ Yes	
Preemption-related operational requirements	☐ Yes	

PORTLAND BUREAU OF TRANSPORTATION

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY	Jerom Theunissen		**DATE**	01/27/2022
CHECKED BY	John Wirtz		**DATE**	01/27/2022
INTERSECTION	SW US Veterans Hospital Road & SW Terwilliger Boulevard		**SIGNAL ID**	
APPROACH DIRECTION	B	SB	NB	
# of Left Turn Lanes[1]	1	0	1	
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways[2])	0	n/a	1	
Speed of Opposing Traffic (mph)	n/a	25	25	
Left Turn Volume (vehicles/hour)[3]	115 (312 - PM)	n/a	404 (93 - PM)	
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour)[3]	0	n/a	0	
Opposing Through / Right Turn Volume (vehicles/hour)[3]	n/a	n/a	124 (181 - PM)	

[1] Shared left-thru lanes should be counted as left-turn lanes.
[2] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).
[3] Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION	B	SB	NB	
REQUIRED CRITERIA Protected-only left-turn mode **SHOULD** be provided if **ANY** of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Required Criteria?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
SCORE-BASED CRITERIA Protected-only left-turn mode **SHOULD** be provided if any criteria score is greater than or equal to four (>=4) **OR** the total score for all categories is greater than or equal to eight (>=8).				
Crash History Score (C)			0	
Volumes Score (V)			8	
Geometry Score (G)			0	
Location Score (L)			0	
Any Score-Based Criteria >=4?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Total Score (T = C + V + G + L)	0	0	8	0
Total Score >=8?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Score-Based Criteria?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
SITE-SPECIFIC FACTORS Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	☑ Yes	☐ Yes	☑ Yes	☐ Yes
Protected-only left turn recommended based on Site-Specific Factors?	☐ Yes	☐ Yes	☑ Yes	☐ Yes
NOTES	Protected NB left turn lane is justified to minimize queues and delays associated with projected heavy left turn volumes in the AM period			

INTERSECTION	SW US Veterans Hospital R	SIGNAL ID		APPROACH	NB

REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	☑ Yes
Multiple left-turn lanes[1] on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		☐ Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	☐ Yes
Overlapping left-turn paths[2]			☐ Yes

[1] Shared left-thru lanes should be counted as left-turn lanes.

[2] Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50[1]	425	465
55[1]	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

[1] For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)	0	(C)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	☐ >=5	= 4	0
			☐ 2-4	= 2	
			☐ <=1	= 0	*(C.1)*
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	☐ >=4	= 4	0
			☐ 2-3	= 2	
			☐ <=1	= 0	*(C.2)*
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		☐ Fatal	= 4	0
			☐ Non-fatal injury or PDO[1]	= 0	*(C.3)*

[1] Property damage only.

INTERSECTION	SW US Veterans Hospital R	SIGNAL ID		APPROACH	NB

Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	8 (V)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a **OR** V.1.b				4 *(V.1)*
	Product of opposing through vehicle and left-turn vehicle hourly volumes[1,2]	ODOT 2017	1 opposing auto lane		
			☐ >=150,000	= 4	
			☑ >=50,000	= 2	
			☐ <50,000	= 0	
			2 opposing auto lanes		
			☐ >=300,000	= 4	
			☐ >=100,000	= 2	
			☐ <100,000	= 0	*(V.1.a)*
	Left-turn vehicle hourly volume (per lane)[1]	ODOT 2017	☑ >=300	= 4	4
			☐ >=200	= 2	
			☐ <200	= 0	*(V.1.b)*
Pedestrian conflicts	Higher Score of Criteria V.2.a **OR** V.2.b				0 *(V.2)*
	Product of conflicting pedestrian and left-turn vehicle hourly volumes[1]	LADOT 2020	☐ 10,000+ on a two-way street	= 4	0
			☐ 10,000+ on a one-way street	= 2	
			☑ <10,000	= 0	*(V.2.a)*
	Conflicting pedestrian hourly volume[1]	LADOT 2020	☐ >=150	= 2	0
			☐ >=100	= 1	
			☑ <100	= 0	*(V.2.b)*
Bicycle conflicts	Left-turn vehicle hourly volume[1] crossing a separated in-roadway bikway[3] is greater than volumes outlined in Table 2	MassDOT 2015	☑ Yes	= 4	4
			☐ No	= 0	*(V.3)*

[1] Five-year projections may be used if different than existing volumes.
[2] When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.
[3] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: "Separated Bike Lane Planning & Design Guide" (2015), MassDOT – Exhibit 6A.

INTERSECTION	SW US Veterans Hospital R	SIGNAL ID		APPROACH	NB

Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

GEOMETRY TOTAL (G = G.1 + G.2 + G.3 + G.4 + G.5)	0 (G)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways[1])		☐ Yes	= 4	0 (G.1)
			☑ No	= 0	
Speed of opposing traffic			☐ >=40 mph	= 4	0 (G.2)
			☐ >=30 mph	= 2	
			☑ <30 mph	= 0	
Multiple left-turn lanes[2] on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		☐ Yes if outside downtown	= 2	0 (G.3)
			☐ Yes if downtown	= 1	
			☑ No	= 0	
U-turns	Allowed		☐ Yes	= 2	0 (G.4)
			☑ No	= 0	
Conflicting bi-directional bicycle facility			☐ Yes	= 2	0 (G.5)
			☑ No	= 0	

[1] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).
[2] Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

LOCATION TOTAL (L = L.1 + L.2 + L.3)	0 (L)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	☐ Yes	= 1	0 (L.1)
			☑ No	= 0	
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	☐ Yes	= 1	0 (L.2)
			☑ No	= 0	
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	☐ Yes	= 1	0 (L.3)
			☑ No	= 0	

INTERSECTION	SW US Veterans Hospital R	SIGNAL ID		APPROACH	NB

SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	☐ Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	☑ Yes	T-intersection with limited conflicting traffic turning movements except for northbound lefts and eastbound lefts
Conflicting light rail or streetcar tracks	☐ Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	☐ Yes	
Inadequacy of gaps in traffic	☑ Yes	Future volume projections will lead to the intersection having inadequate gaps in traffic (see Synchro reports)
Safety concerns and/or community support	☐ Yes	
High pedestrian and/or bicycle volumes	☐ Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	☐ Yes	
High percentage of left-turning heavy vehicles	☐ Yes	
Long vehicle delays	☑ Yes	Future volume projections will lead to the intersection having long delays especially for B vehicles (558
Queues exceeding the left-turn pocket	☐ Yes	
Transit cycle failures	☐ Yes	
Constraints with traffic signal progression	☐ Yes	
Preemption-related operational requirements	☐ Yes	

PORTLAND BUREAU OF TRANSPORTATION

Guide for Determining Left Turn Signal Control

This document summarizes the Portland Bureau of Transportation's (PBOT) current practice for determining the appropriate left-turn phasing treatment at new and existing signalized intersections.

1. LEFT-TURN PHASING OPTIONS

There are three ways to operate a signalized left-turn movement (Urbanik 2015):

- **Protected:** When left-turning vehicles receive a green without having to yield to any conflicting movements. This is recognized as the safest type of left-turn operation, but the time used exclusively for the left turn may increase delay for other movements. This type of phasing typically requires an exclusive left-turn lane. In rare instances, it is accomplished through split phasing (e.g., shared left-thru lane).
- **Permitted:** When left-turning vehicles receive a green with the adjacent (or opposing) through movement, requiring vehicles to yield to conflicting vehicles, bicyclists, and pedestrians. This type of left turn has the most efficient allocation of green time, but there can be adverse effects on safety as volumes increase.
- **Protected-Permitted:** Combination of protected and permitted phasing when there is a protected interval but left-turning vehicles can also make permitted movements as the adjacent (or opposing) through receives a green.

2. GUIDELINES FOR ALL INTERSECTIONS

Selecting left-turn phasing that aligns with site-specific conditions, volumes, and modes requires careful consideration of safety and operational factors. Guidelines that apply to all intersections include:

- **Opposing left-turn modes** are often the same based on driver expectation. Opposing movements should be evaluated together to ensure that a yellow trap is not introduced. A yellow trap can occur if a left-turn movement receives a yellow indication when the opposing through movement is still receiving a green indication, potentially causing the left-turning driver to think oncoming traffic is stopping when it is not. The yellow trap can be avoided by not using lead/lag left-turn phasing when there is a five-section ("doghouse") signal head or by using a flashing yellow arrow (FYA) signal head.
- **Variable left-turn modes** can be used based on time of day, presence of gaps in oncoming traffic, or the presence of conflicting pedestrians. Protected and permitted phasing is often applied variably where FYAs are installed. For example, the permitted portion of the phase may be omitted if there is a conflicting pedestrian movement or if gaps in opposing traffic are below a certain threshold.
- **Leading Pedestrian Intervals (LPIs)** are another method for providing separation between turning vehicles and people crossing the street. An LPI gives pedestrians a walk indication a few seconds before vehicles are given a green indication. This allows pedestrians to establish presence in the crosswalk and improves their visibility to drivers. Refer to the *PBOT Leading Pedestrian Interval (LPI) Assessment & Implementation Guidelines* for more information.
- **Intersections owned by another agency** (e.g., Oregon Department of Transportation, ODOT) but maintained by PBOT will require concurrence for phasing decisions.

- **Separated in-roadway bikeways** include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks. This left-turn guidance uses a definition from the *Portland Bicycle Plan for 2030*. This definition does not require vertical separation for the bikeways to be considered "separated," as defined by the Federal Highway Administration (FHWA). According to the *Portland Bicycle Plan for 2030*, "separated in-roadway bikeways are used where motor vehicle traffic volumes or speeds are high. They include:
    - **Bike lanes:** The portion of a roadway designated by an eight-inch stripe and bicycle symbol that is protected by Oregon law for exclusive bicycle travel.
    - **Wide bike lanes, buffered bike lanes, passing bike lanes and colored bike lanes:** New bike lane types that achieve greater capacity and a more comfortable experience for bicyclists.
    - **Cycle tracks:** An exclusive bicycle facility adjacent to the roadway but separated from motor vehicle traffic by a physical barrier or other buffer. (PBOT 2010)"

3. FORM INSTRUCTIONS

The **Guide for Determining Left Turn Signal Control Form** (Appendix A) outlines three types of criteria that should be evaluated to determine a recommendation for the left turns. The criteria can also be used to prioritize locations if scores are assigned.

- **Required Criteria:** If one or more of these criteria are satisfied, protected-only left-turn mode **should** be provided for that approach.
- **Score-Based Criteria:** Approaches are assigned scores for crash history, volumes, geometry, and location. There are two ways that a protected-only left-turn mode might be recommended based on Score-Based Criteria: (1) if any one category scores four or more points (>=4) or (2) if the sum of all four categories is eight or more points (>=8).
- **Site-Specific Criteria:** Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

4. REFERENCES

References used to develop the criteria are cited throughout the form with details available below. Maps with key location information are provided in Appendix B. However, the references below should be reviewed for updated information.

Classifications	Website
High Crash Network	https://www.portland.gov/transportation/vision-zero/high-crash-network-streets-and-intersections
Speed Limits	https://www.portland.gov/transportation/vision-zero/speed-limits
Pedestrian Districts	https://www.portlandoregon.gov/transportation/72504
Major City Bikeways	https://www.portlandoregon.gov/transportation/44597
Safe Routes to School	http://www.saferoutesprojects.com

1. American Association of State Highway Transportation Officials. 2011. *A Policy on Geometric Design of Highways and Streets.*
2. City of Los Angeles Department of Transportation (LADOT). 2020. *Left Turn Signal Control Selection Guidelines*.
3. Massachusetts Department of Transportation (MassDOT). 2015. *Separated Bike Lane Planning & Design Guide*. https://www.mass.gov/lists/separated-bike-lane-planning-design-guide

4. Oregon Department of Transportation (ODOT). 2017. *Traffic Signal Policy and Guidelines*. https://www.oregon.gov/ODOT/Engineering/Documents_TrafficStandards/Traffic-Signal-Policy-Guidelines.pdf
5. Portland Bureau of Transportation (PBOT). 2019. *PBOT Leading Pedestrian Interval (LPI) Assessment & Implementation Guidelines*.
6. Portland Bureau of Transportation (PBOT). 2019. *PedPDX: Portland's Citywide Pedestrian Plan*. https://www.portlandoregon.gov/transportation/78224
7. Portland Bureau of Transportation (PBOT). 2010. *Portland Bicycle Plan for 2030*. https://www.portlandoregon.gov/transportation/44597
8. Portland Bureau of Transportation (PBOT). *High Crash Network Streets and Intersections*. https://www.portland.gov/transportation/vision-zero/high-crash-network-streets-and-intersections
9. Safe Routes to School (SRTS). *SRTS Project Planning*. http://www.saferoutesprojects.com
10. Urbanik, T., A. Tanaka, B. Lozner, E. Lindstrom, K. Lee, S. Quayle, S. Beaird, S. Tsoi, P. Ryus, D. Gettman, S. Sunkari, K. Balke, and D. Bullock. 2015. *NCHRP Report 812: Signal Timing Manual, Second Edition*. Transportation Research Board (TRB), Washington, D.C.

APPENDIX A: FORM

PORTLAND BUREAU OF TRANSPORTATION

Guide for Determining Left Turn Signal Control Form

Version 05/14/2021

The satisfaction of guideline(s) shall not in itself require the installation of left-turn signal control, and the lack of satisfaction of guideline(s) shall not in itself require the removal of left-turn signal control. Engineering judgment should be used, particularly when applying criteria to unique environments such as Downtown.

BACKGROUND INFORMATION

PREPARED BY		**DATE**	
CHECKED BY		**DATE**	
INTERSECTION		**SIGNAL ID**	

APPROACH DIRECTION				
# of Left Turn Lanes[1]				
# of Opposing Through Lanes (Including Separated In-Roadway Bikeways[2])				
Speed of Opposing Traffic (mph)				
Left Turn Volume (vehicles/hour)[3]				
Pedestrian Volume in Conflicting Crosswalk (pedestrians/hour)[3]				
Opposing Through / Right Turn Volume (vehicles/hour)[3]				

[1] Shared left-thru lanes should be counted as left-turn lanes.
[2] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).
[3] Five-year projections may be used if different than existing volumes.

RECOMMENDATION

APPROACH DIRECTION				
REQUIRED CRITERIA Protected-only left-turn mode **SHOULD** be provided if **ANY** of the Required Criteria are satisfied.				
Any Required Criteria satisfied?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
Protected-only left turn recommended based on Required Criteria?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
SCORE-BASED CRITERIA Protected-only left-turn mode **SHOULD** be provided if any criteria score is greater than or equal to four (>=4) **OR** the total score for all categories is greater than or equal to eight (>=8).				
Crash History Score (C)				
Volumes Score (V)				
Geometry Score (G)				
Location Score (L)				
Any Score-Based Criteria >=4?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
Total Score (T = C + V + G + L)	0	0	0	0
Total Score >=8?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
Protected-only left turn recommended based on Score-Based Criteria?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
SITE-SPECIFIC FACTORS Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.				
Any Site-Specific Factors satisfied?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
Protected-only left turn recommended based on Site-Specific Factors?	☐ Yes	☐ Yes	☐ Yes	☐ Yes
NOTES				

INTERSECTION		SIGNAL ID		APPROACH	

REQUIRED CRITERIA

Protected-only left-turn mode **SHOULD** be provided if **ANY** of the following criteria are satisfied.

Criteria	Description	Reference	Satisfied?
High Crash Network	Approach located on PBOT High Crash Network	PBOT	☐ Yes
Multiple left-turn lanes[1] on a single approach	2+ on a two-way street (i.e. conflicting vehicle traffic)		☐ Yes
Restricted sight distance	Engineering study indicates that sight distance to oncoming traffic is less than the distances in Table 1.	AASHTO 2011; ODOT 2017	☐ Yes
Overlapping left-turn paths[2]			☐ Yes

[1] Shared left-thru lanes should be counted as left-turn lanes.

[2] Requires special signal timing consideration – split phasing or a fixed separation with lead/lag protected lefts.

Table 1. Sight Distance Criteria

Posted Speed (mph)	Required Sight Distance (feet)	
	One Opposing Vehicle Thru Lane	Two Opposing Vehicle Thru Lanes
20	165	180
25	205	225
30	245	270
35	285	310
40	325	355
45	365	400
50[1]	425	465
55[1]	495	540

Source: "A Policy on Geometric Design of Highways and Streets" (2011), AASHTO – Table 9-14.

[1] For speeds higher than 45 mph, the stopping sight distance (higher value from Table 9-14) is used instead of intersection sight distance.

Note: The above table is based on the AASHTO intersection sight distance for passenger cars. Different sight distance values should be used if there are more than two opposing vehicle through lanes or the left turning traffic has a high percentage of trucks. Refer to Tables 9-13 and 9-14 of "A Policy on Geometric Design of Highways and Streets" 2011, 6th Edition, AASHTO.

SCORE-BASED CRITERIA

Crash History

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

CRASH HISTORY TOTAL (C = C.1 + C.2 + C.3)	0 (C)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Crash history involving left-turn movement	Number of crashes involving the left turn over a 12-month period during the last 3 years that are susceptible to correction	ODOT 2017	☐ >=5 ☐ 2-4 ☐ <=1	= 4 = 2 = 0	*(C.1)*
Crash history involving pedestrians	Number of crashes involving the left turn and pedestrians during the last 5 years that are susceptible to correction	LADOT 2020	☐ >=4 ☐ 2-3 ☐ <=1	= 4 = 2 = 0	*(C.2)*
Crash severity involving left-turn movement	Most severe crash involving the left turn during the last 5 years that is susceptible to correction		☐ Fatal ☐ Non-fatal injury or PDO[1]	= 4 = 0	*(C.3)*

[1] Property damage only.

INTERSECTION		SIGNAL ID		APPROACH	

Volumes

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

VOLUMES TOTAL (V = V.1 + V.2 + V.3)	0 (V)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Vehicle conflicts	Higher Score of Criteria V.1.a **OR** V.1.b				0 *(V.1)*
	Product of opposing through vehicle and left-turn vehicle hourly volumes[1,2]	ODOT 2017	1 opposing auto lane		
			☐ >=150,000	= 4	
			☐ >=50,000	= 2	
			☐ <50,000	= 0	
			2 opposing auto lanes		
			☐ >=300,000	= 4	
			☐ >=100,000	= 2	
			☐ <100,000	= 0	*(V.1.a)*
	Left-turn vehicle hourly volume (per lane)[1]	ODOT 2017	☐ >=300	= 4	
			☐ >=200	= 2	
			☐ <200	= 0	*(V.1.b)*
Pedestrian conflicts	Higher Score of Criteria V.2.a **OR** V.2.b				0 *(V.2)*
	Product of conflicting pedestrian and left-turn vehicle hourly volumes[1]	LADOT 2020	☐ 10,000+ on a two-way street	= 4	
			☐ 10,000+ on a one-way street	= 2	
			☐ <10,000	= 0	*(V.2.a)*
	Conflicting pedestrian hourly volume[1]	LADOT 2020	☐ >=150	= 2	
			☐ >=100	= 1	
			☐ <100	= 0	*(V.2.b)*
Bicycle conflicts	Left-turn vehicle hourly volume[1] crossing a separated in-roadway bikway[3] is greater than volumes outlined in Table 2	MassDOT 2015	☐ Yes	= 4	
			☐ No	= 0	*(V.3)*

[1] Five-year projections may be used if different than existing volumes.
[2] When there is a significant lane imbalance, twice the highest single lane volume can be substituted for the total opposing hourly volume when making this calculation. If there is a dedicated right-turn lane, the right-turn volumes may be added to the opposing through volumes.
[3] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).

Table 2. Separated Bike Lane Criteria

Separated Bike Lane Operation	Motor Vehicles Per Hour Turning Across Separated Bike Lane			
	Two-Way Street			One-Way Street
	Right Turn	Left Turn Across One Vehicle Lane	Left Turn Across Two Vehicle Lanes	Right or Left Turn
One-Way	150	100	50	150
Two-Way	100	50	0	100

Source: “Separated Bike Lane Planning & Design Guide” (2015), MassDOT – Exhibit 6A.

INTERSECTION		SIGNAL ID		APPROACH	

Geometry

Protected-only left-turn mode **SHOULD** be provided if this criteria has a score greater than or equal to four (>=4) or the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

GEOMETRY TOTAL (G = G.1 + G.2 + G.3 + G.4 + G.5)	0 (G)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Number of through lanes on the opposing approach	3+ (including separated in-roadway bikeways[1])		☐ Yes	= 4	
			☐ No	= 0	*(G.1)*
Speed of opposing traffic			☐ >=40 mph	= 4	
			☐ >=30 mph	= 2	
			☐ <30 mph	= 0	*(G.2)*
Multiple left-turn lanes[2] on a single approach	2+ on a one-way street (i.e. conflicting pedestrian and bicycle traffic)		☐ Yes if outside downtown	= 2	
			☐ Yes if downtown	= 1	
			☐ No	= 0	*(G.3)*
U-turns	Allowed		☐ Yes	= 2	
			☐ No	= 0	*(G.4)*
Conflicting bi-directional bicycle facility			☐ Yes	= 2	
			☐ No	= 0	*(G.5)*

[1] Separated in-roadway bikeways include bike lanes; wide, buffered, passing, colored bike lanes; and cycle tracks (PBOT 2010).
[2] Shared left-thru lanes should be counted as left-turn lanes.

Location

On its own, Location Criteria will not result in a recommendation for protected-only left turn mode, but it should be considered in combination with the other Score-Based Criteria. Protected-only left-turn mode **SHOULD** be provided if the total score for all Score-Based Criteria is greater than or equal to eight (>=8).

LOCATION TOTAL (L = L.1 + L.2 + L.3)	0 (L)

Criteria	Description	Reference	Satisfied?	Scoring	Score
Pedestrian District	Intersection located in Pedestrian District	PBOT 2019	☐ Yes	= 1	
			☐ No	= 0	*(L.1)*
Major City Bikeway	Approach located on a Major City Bikeway	PBOT 2010	☐ Yes	= 1	
			☐ No	= 0	*(L.2)*
Safe Routes to School	Approach located on a Safe Routes to School Primary Investment Route	SRTS	☐ Yes	= 1	
			☐ No	= 0	*(L.3)*

INTERSECTION		SIGNAL ID		APPROACH	

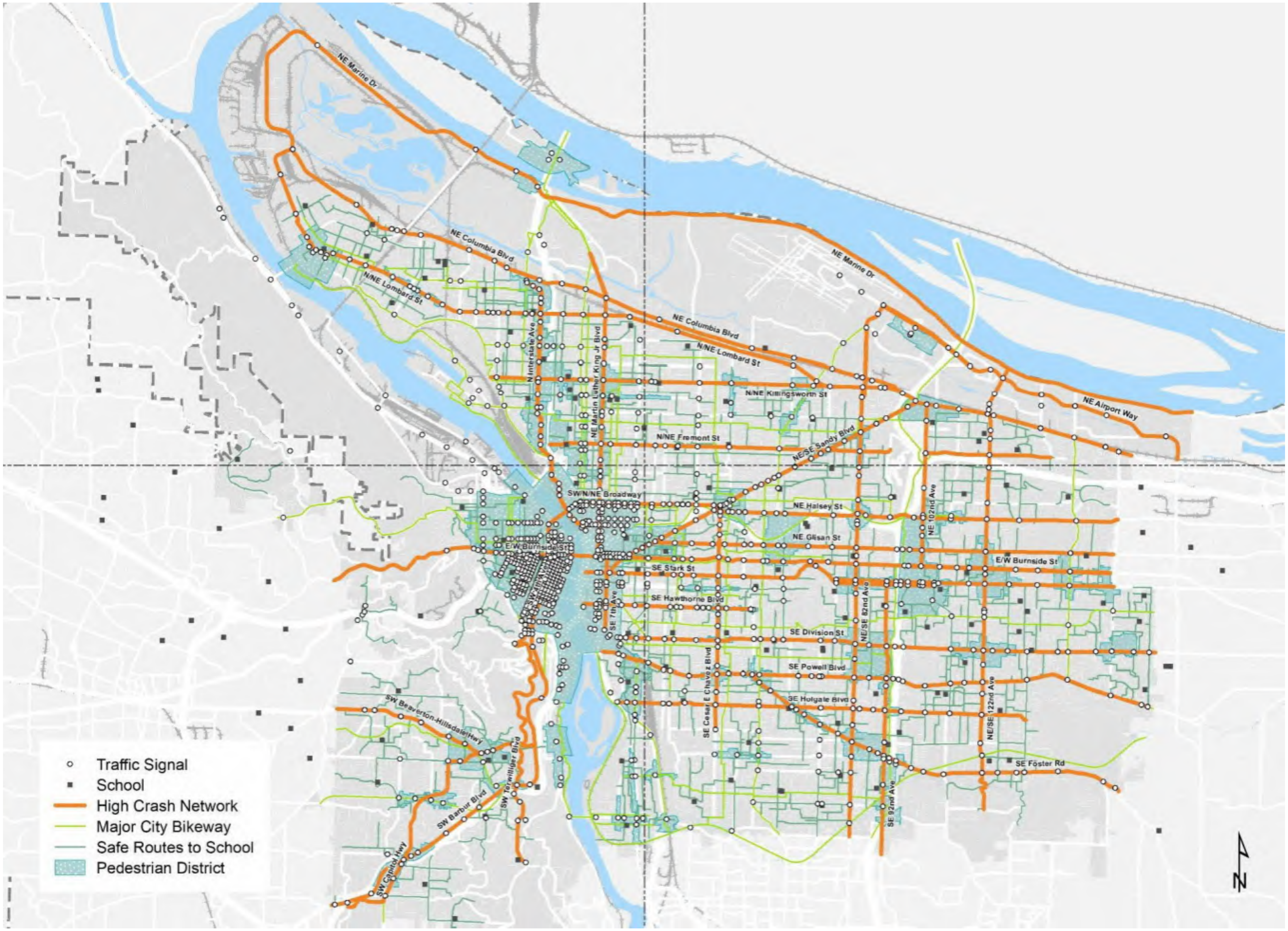
SITE-SPECIFIC FACTORS

Site-specific conditions may warrant a more restrictive mode of operation than suggested by the other criteria. Justification should be provided if using one of these factors to recommend a protected-only left turn.

Site-Specific Factors	Satisfied?	Notes
Constraints in intersection geometry (e.g., shared left-through lanes, offset approaches, set back stop bars, skewed approaches)	☐ Yes	
Drivers make left and/or right turns without the need to yield to oncoming traffic (e.g., T-intersections and intersections with one-way streets)	☐ Yes	
Conflicting light rail or streetcar tracks	☐ Yes	
Maneuverability of particular classes of vehicles (e.g., heavy trucks, buses)	☐ Yes	
Inadequacy of gaps in traffic	☐ Yes	
Safety concerns and/or community support	☐ Yes	
High pedestrian and/or bicycle volumes	☐ Yes	
High number of vulnerable roadway users (e.g., people who need additional time to cross the street)	☐ Yes	
High percentage of left-turning heavy vehicles	☐ Yes	
Long vehicle delays	☐ Yes	
Queues exceeding the left-turn pocket	☐ Yes	
Transit cycle failures	☐ Yes	
Constraints with traffic signal progression	☐ Yes	
Preemption-related operational requirements	☐ Yes	

APPENDIX B: MAPS

Figure 1. Map



NE Marine Dr
NE Columbia Blvd
N/NE Lombard St
N Interstate Ave
NE Martin Luther King Jr Blvd
N/NE Killingsworth St
N/NE Fremont St
NE/SE Sandy Blvd
SW/N/NE Broadway
NE Halsey St
NE Glisan St
E/W Burnside St
SE Stark St
SE Hawthorne Blvd
SE Division St
SE Powell Blvd
SE Holgate Blvd
SE Foster Rd
NE Airport Way
NE 102nd Ave
NE/SE 82nd Ave
NE/SE 122nd Ave
SE 92nd Ave
SE Cesar E Chavez Blvd
SW Beaverton-Hillsdale Hwy
SW Barbur Blvd
SW Capitol Hwy
SW Terwilliger Blvd
Traffic Signal
School
High Crash Network
Major City Bikeway
Safe Routes to School
Pedestrian District
N

Figure 2. Map (NW)

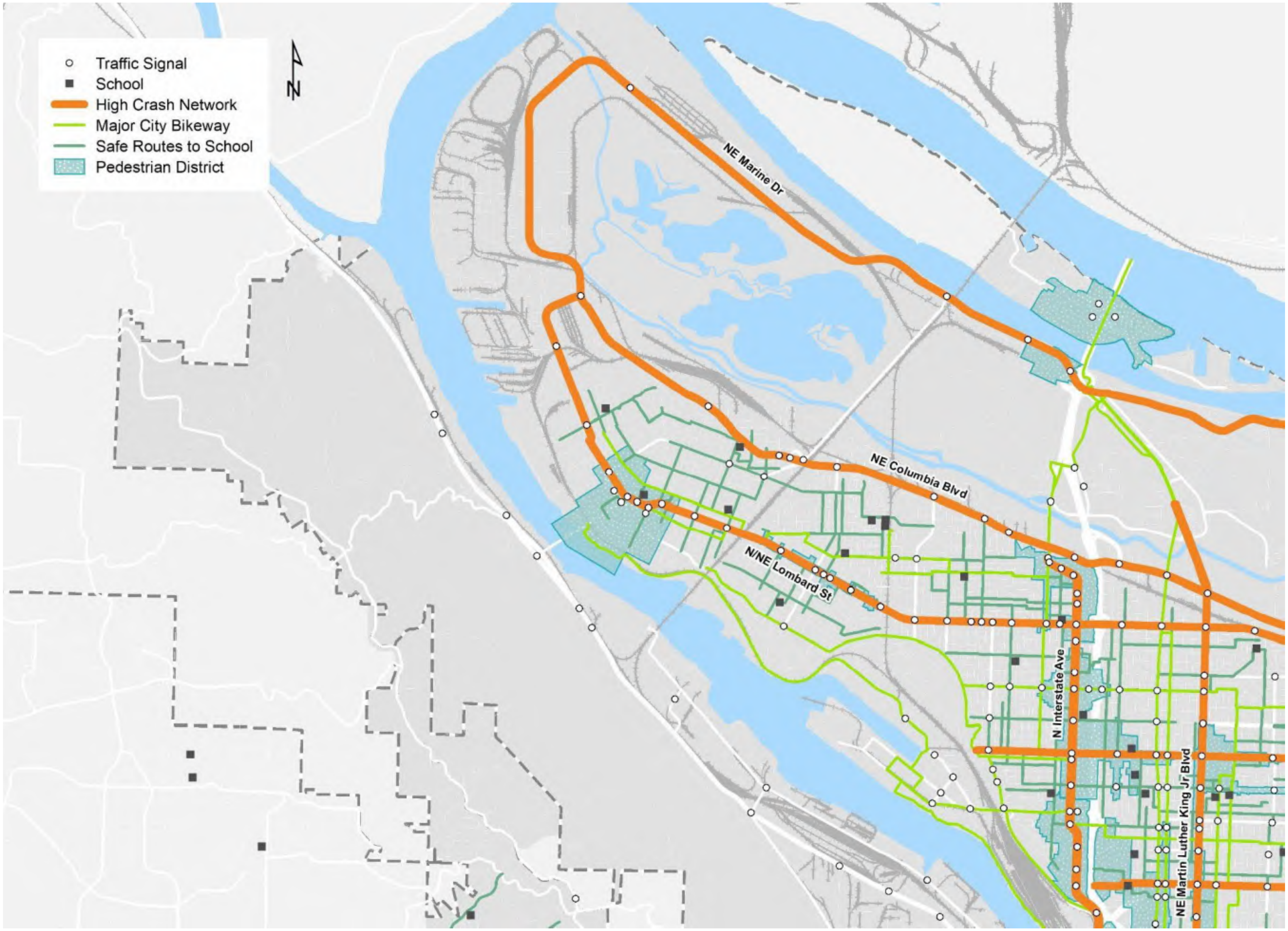


Figure 3. Map (NE)

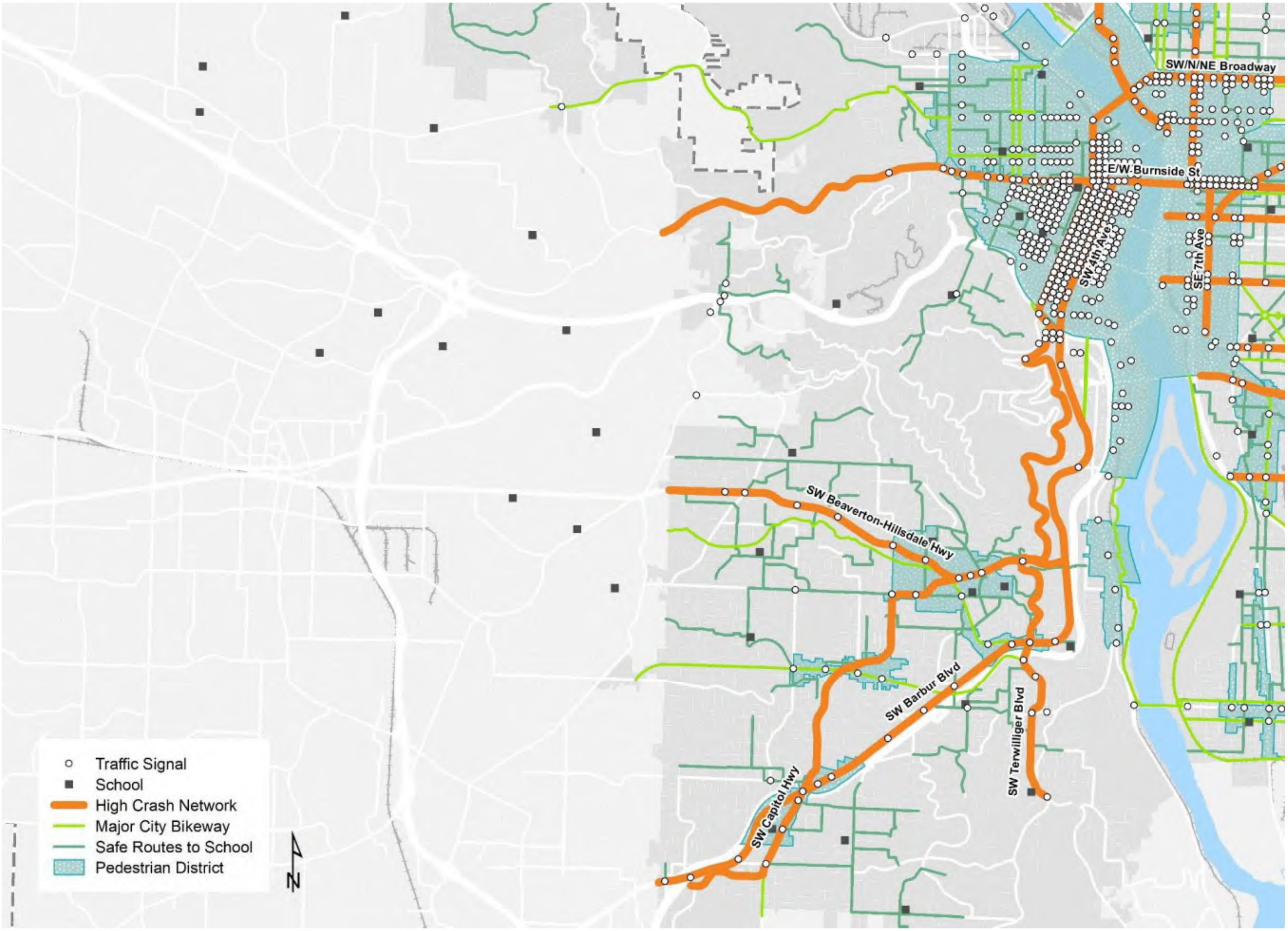


Figure 4. Map (SW)

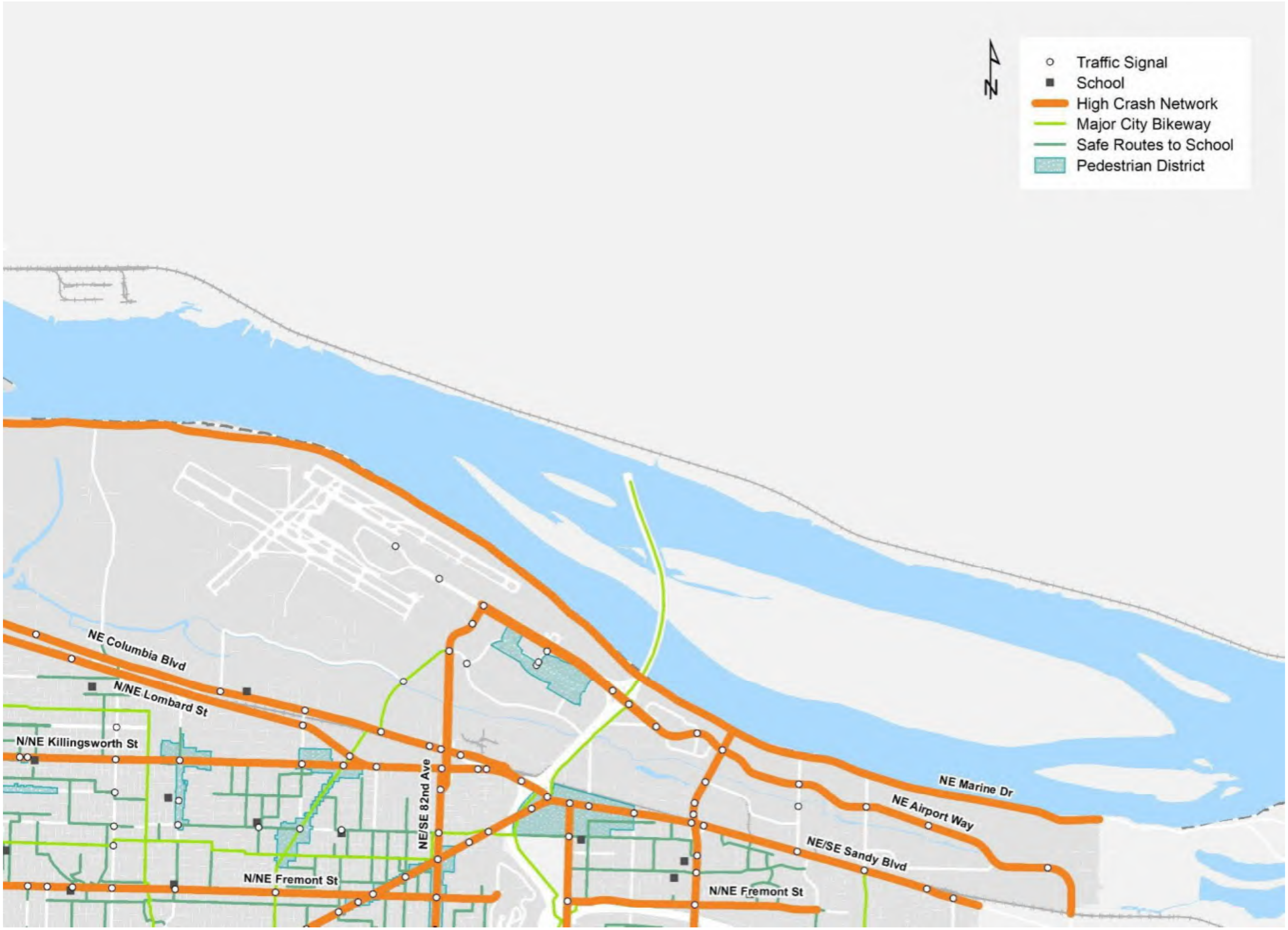
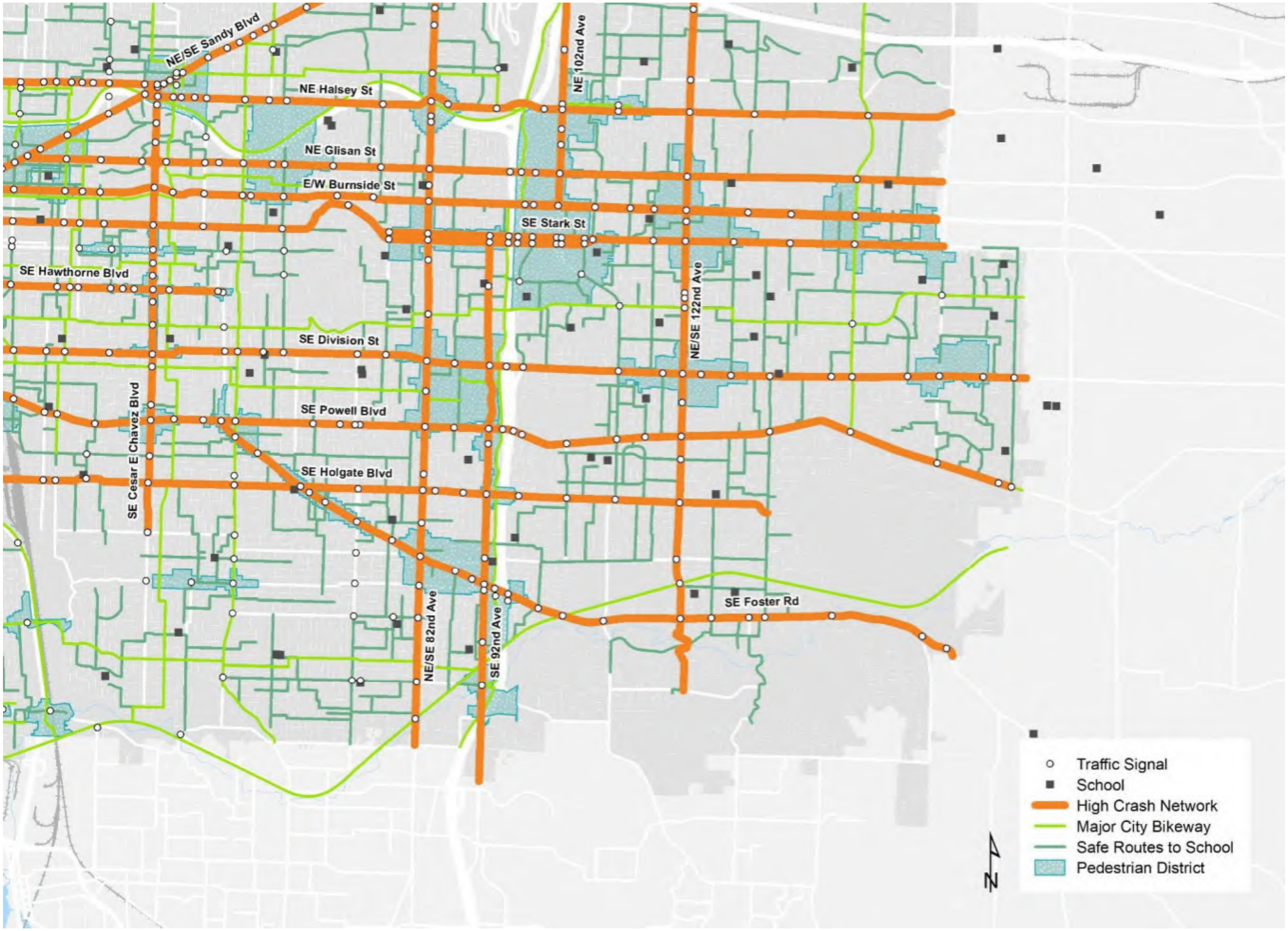


Figure 5. Map (SE)



E Appendix E: Air Quality Resource Report

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

U.S. Department of Veterans Affairs
Portland Veterans Affairs Medical Center (VAMC)
Final Air Quality Resource Report

Following the finalization of the Air Quality Resource Report, the U.S. Department of Veterans Affairs (VA) provided minor changes to its proposed action, as described below:

- **Building 110**, the Specialty Care Building, was reduced in size by approximately 45,000 square feet.
- **Building 111**, the proposed parking garage to be located adjacent to Building 110, increased in parking capacity.
- **Building 112**, the previously proposed parking garage to be located on the eastern boundary of the campus, was omitted from the construction plan. Building 112 included 450 parking spaces.
- Construction phasing for project components was removed from the proposed action.

These changes to the proposed action, as detailed in the Draft and Final EA, further reduce the potential for impacts to air quality at the Portland VAMC campus and surrounding areas as a result of the proposed action. There are no new potential impacts to air quality as a result of the changes to the proposed action that would require further analysis to be performed. The following baseline report continues to provide an accurate analysis of potential impacts to air quality as a result of the VA's proposed action, as defined in the Final EA.

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center
Final Air Quality Resource Report

January 2021

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
Jacobs Engineering Group Inc. and LRS Federal LLC

Executive Summary

The U.S. Department of Veterans Affairs (VA) is considering implementing several phased projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus) in Oregon. These potential projects, if authorized and approved, would be phased over 10 or more years as part of the Portland VAMC master plan. Projects under consideration would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC facilities within the existing campus footprint to enhance patient and employee safety and meet the current and growing healthcare needs of Portland area veterans.

The environmental assessment will focus on the environmental impacts of the Phase I projects impacts, and to the extent practicable, discuss Phase II and III projects and the potential total project-related impacts to the VAMC campus, the surrounding area, and the affected environment. Phase II and III projects and associated impacts will be fully analyzed in future supplemental studies, as deemed necessary.

This Air Quality Resource Report evaluates potential air quality impacts that would result from the Proposed Action and No Action alternatives. The preliminary analysis results indicate the Proposed Action would not have significant impacts with respect to criteria air pollutant or greenhouse gas emissions from the construction and operation of either the Proposed Action or the No Action Alternative.

Table of Contents

List of Appendixes

List of Tables

List of Figures

Acronyms and Abbreviations

$\mu g/m^3$	microgram(s) per cubic meter
CAA	Clean Air Act
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CO_2e	carbon dioxide-equivalent
EO	Executive Order
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
grams/m^2	gram(s) per cubic meter
HAP	hazardous air pollutant
hp	horsepower
kW	kilowatt(s)
mg/m^3	milligram(s) per cubic meter
MOVES3	Motor Vehicle Emissions Simulator 3
mph	miles per hour
MSAT	mobile source air toxic
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NOx	nitrogen oxides
OAAQS	Oregon Ambient Air Quality Standards
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than 10 micrometers
ppb	part(s) per billion
ppm	part(s) per million
SIP	State Implementation Plan
SO_2	sulfur dioxide
TAC	toxic air contaminant
VA	U.S. Department of Veterans Affairs
VAMC	Portland VA Medical Center
VOC	volatile organic compound

1.0 Proposed Action

The U.S. Department of Veterans Affairs (VA) is considering implementing several phased projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus), which is located at 3710 SW U.S. Veterans Hospital Road in Portland, Multnomah County, Oregon. These potential projects, if authorized and approved, would be phased over 10 or more years as part of the Portland VAMC master plan. Projects under consideration would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC facilities within the existing campus footprint to enhance patient and employee safety and meet the current and growing healthcare needs of Portland area veterans. Figure 1-1 illustrates the project location.

These projects have been divided into several phases. Phase I projects have been authorized for design and construction. Phase II and III projects are conceptual and part of the master plan but have not been authorized to move forward to design and construction. The Proposed Action includes the authorized Phase I projects. The Phase II and III projects are mentioned as part of the master plan but are not considered part of the Proposed Action. The Proposed Action consists of the following:

- Design and construction of a complete seismic upgrade to Building 100 (main hospital building), Building 101 (research/administration building), and Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101)
- Replacement of the façade of Buildings 100 and 101
- Building 102 improvements and realignment of the plaza and roadway to address physical security concerns
- Construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces

The Phase II and III projects are not part of the Proposed Action. They are in the conceptual stage and may be authorized in the future for design and construction but are not ripe for analysis at this time. These potential projects include:

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction
- Construction of Building 110, an approximately 370,000-gross-square-foot Specialty Care Building
- Construction of Building 111, an approximately 450-space parking structure in the area south of Building 101
- Construction of Building 112, an approximately 450-space parking structure near Building 16 and in the current location of surface parking Lot 4
- Improvements and upgrades of the energy center such as boilers, chillers, cooling towers, and the electrical distribution system
- Remaining structural and non-structural seismic upgrades, including the renovation and modernization of Buildings 100 and 101 to achieve full seismic compliance

The environmental assessment will focus on the environmental impacts of the Phase I projects impacts and to the extent practicable discuss Phase II and III projects and the potential total project-related impacts to the VAMC campus, the surrounding area, and the affected environment. Phase II and III projects and associated impacts will be fully analyzed in future supplemental studies, as deemed necessary.

Figure 1-1. Site Location Map

2.0 No Action Alternative

The No Action Alternative would not result in any changes from existing conditions and would only include ongoing operational emissions, such as fuel combustion in the boilers and generators.

3.0 Air Quality and Greenhouse Gases

This section describes the air quality regulatory setting in the project area, affected environment, methodology for the air quality impact analysis, and the potential emissions and air quality impacts that would be associated with constructing and operating the Proposed Action and No Action alternatives. Greenhouse gas (GHG) emissions and related impacts are also discussed.

3.1 Regulatory Setting

Federal, state, and local regulations for air quality and GHGs were reviewed for applicability to the Proposed Action and No Action alternative.

3.1.1 Federal

3.1.1.1 Clean Air Act and National Ambient Air Quality Standards

Federal air quality policies are regulated through the Clean Air Act (CAA). The U.S. Congress adopted the CAA in 1970 and passed amendments to the CAA in 1977 and 1990. In 1990, the CAA was amended to strengthen regulation of both stationary and mobile emission sources.

Under the CAA, the U.S. Environmental Protection Agency (EPA) establishes National Ambient Air Quality Standards (NAAQS) to protect public health and welfare, with an adequate margin of safety. The NAAQS contain:

- Primary standards that provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly, and
- Secondary standards that protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Oregon has similarly codified ambient air quality standards in the Oregon Administrative Rules (OAR) 240-202, known as the Oregon Ambient Air Quality Standards (OAAQS). These standards are adopted to match the NAAQS except for one additional standard for particle fallout. Table 3-1 summarizes the NAAQS and the OAAQS.

Using measured ambient air concentrations, EPA classifies areas as being in attainment or nonattainment with the NAAQS for each criteria pollutant. A region that meets the NAAQS for a pollutant is designated as being in attainment for that pollutant. If the region does not meet the NAAQS for a pollutant, it is designated as being in nonattainment for that pollutant. An area that was previously designated as a nonattainment area but has recently met the standard and has been reclassified by EPA as “attainment with a maintenance plan” is a “maintenance area.”

The CAA requires each state to develop and maintain a State Implementation Plan (SIP) for each nonattainment criteria pollutant. The SIP serves as a tool to help avoid and minimize emissions of nonattainment criteria pollutants and their precursors and to achieve compliance with the NAAQS. More details on the applicable local air quality plans and SIP are provided in the state regulatory discussion in Section 3.1.2.

Table 3-1. National and Oregon Ambient Air Quality Standards

Pollutant	Averaging Time	OAAQS[a]	NAAQS[b]	
			Primary[c]	Secondary[d]
Ozone	8 hours	0.070 ppm	0.070 ppm	0.070 ppm
PM_{10}	24 hours	150 μg/m^3	150 μg/m^3	150 μg/m^3
$PM_{2.5}$	Annual arithmetic mean	12 μg/m^3	12 μg/m^3	15 μg/m^3
	24 hours	35 μg/m^3	35 μg/m^3	35 μg/m^3
Carbon Monoxide	8 hours	9 ppm	9 ppm	–
	1 hour	35 ppm	35 ppm	–
Nitrogen Dioxide	Annual arithmetic mean	0.053 ppm	0.053 ppm	0.053 ppm
	1 hour	0.100 ppm	0.100 ppm	–
Sulfur Dioxide	24 hours	–	–	–
	3 hours	–	–	0.5 ppm
	1 hour	0.075 ppm[e]	0.075 ppm[e]	–
Lead	Calendar quarter	1.5 μg/m^3 (certain areas)	1.5 μg/m^3 (certain areas)	1.5 μg/m^3
	Rolling 3-month average	0.15 μg/m^3	0.15 μg/m^3	–
	30-day average	–	–	–
Particle Fallout	Month	3.5^{-10} grams/m^2	–	–

[a] OAAQS for particle fallout varies based upon area type and is not to be exceeded.
[b] NAAQS other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For particulate matter 10 microns or less (PM_{10}), the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m^3 is equal to or less than 1. For particulate matter 2.5 microns or less ($PM_{2.5}$), the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, is equal to or less than the standard.
[c] NAAQS Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[d] NAAQS Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[e] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 parts per billion.
μg/m^3 = micrograms per cubic meter
grams/m^2 = grams per square meter
NAAQS = National Ambient Air Quality Standards
OAAQS = Oregon Ambient Air Quality Standards
ppm = parts per million (by volume)

3.1.1.2 Air Toxics

In addition to the criteria pollutants, EPA also regulates emissions of hazardous air pollutants (HAPs). HAPs or air toxic emissions are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Controlling air toxic emissions became a national priority with the passage of the CAA amendments in 1990, when Congress mandated that EPA regulate 188 air toxics. National Emission Standards for Hazardous Air Pollutants set control technology requirements for HAPs at major and area emission sources.

For mobile sources (e.g., on-road vehicle traffic such as worker commute and haul trucks), EPA has assessed the list of the 188 HAPs in its rule titled, *Control of Hazardous Air Pollutants from Mobile Sources (Federal Register*, Vol. 72, No. 37, page 8430, February 26, 2007). EPA has identified the high-priority mobile source air toxics (MSATs), pollutants with significant emission contributions from mobile sources which are among the national and regional-scale cancer risk drivers in EPA's 2011 National Air Toxics Assessment. These high priority MSATs are:

- Acrolein
- Acetaldehyde
- Ethylbenzene
- Benzene
- 1,3-Butadiene
- Diesel particulate matter plus diesel exhaust organic gases (diesel particulate matter)
- Formaldehyde
- Naphthalene
- Polycyclic organic matter

The estimated impacts of HAPs from mobile sources require controls to dramatically reduce MSAT emissions, for example, by using cleaner fuels and low-emission engines (EPA 2007).

3.1.1.3 General Conformity

EPA's Final Conformity Rule implements Section 176(c) of the CAA, as amended in 42 United States Code 7506(c). Under the conformity provisions of the CAA, no federal agency can approve or undertake a federal action or project unless it has been demonstrated to conform to the applicable air quality plan or SIP. These conformity provisions were enacted so that federal agencies would not support projects that would interfere with states' plans and efforts to attain the NAAQS. EPA has issued two conformity regulations:

- Transportation conformity rules that apply to transportation plans and projects.
- General conformity rules that apply to all other federal actions.

If a proposed project is not a Federal Highway Administration or Federal Transit Administration transportation project, it is subject to only the general conformity requirements. A conformity determination is required for the alternative that is ultimately selected and approved.

The General Conformity Rule was promulgated in 1993 and revised in March 2010. Applicable only in areas designated as nonattainment or maintenance for NAAQS, the rule prohibits any federal action that does not conform to the applicable air quality attainment plan or SIP. The purpose of the rule is to ensure federal actions do not cause or contribute to:

- New violations of a NAAQS.
- Increases in the frequency or severity of any existing violations.
- Delays in timely attainment of a NAAQS or an interim emission reduction.

General conformity applicability analysis requires quantification of direct and indirect construction and operation emissions for the selected project alternative, and comparison of those emission levels to baseline (no project) emission levels. If the total net project-related emissions increase for any nonattainment, maintenance, or precursor pollutant associated with the proposed project would exceed any of the applicable general conformity de minimis levels, additional general conformity analysis and a formal conformity determination would be required before federal approval of the proposed action. An action is exempt from further general conformity analysis (that is, the action is assumed to conform) if the total net project-related emissions increases (construction and operation) would be less than the applicable de minimis thresholds listed in 40 *Code of Federal Regulations* (CFR) Section 93.153(b). These de minimis thresholds are used to determine the significance of a project's emissions and if further analysis is required. A project with emissions below these de minimis thresholds is considered to have less than significant effect on air quality and further analysis is not required.

3.1.1.4 Greenhouse Gases and Climate

On April 2, 2007, in *Massachusetts v. EPA* (2007) 549 U.S. 497, the Supreme Court found that GHGs meet the definition of pollutants under the CAA. The Court held that EPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that could reasonably be anticipated to endanger public health or welfare or whether the science is too uncertain to make a reasoned decision. In making these decisions, EPA was required to follow the language of Section 202(a) of the CAA. The Supreme Court's decision resulted from a petition for rulemaking under Section 202(a) filed by more than one dozen environmental, renewable energy, and other organizations.

On April 17, 2009, the EPA Administrator signed Proposed Endangerment and Cause or Contribute Findings for GHGs under Section 202(a) of the CAA. EPA held a 60-day public comment period and received more than 380,000 public comments. EPA reviewed, considered, and incorporated public comments and issued final findings. EPA found that six GHGs—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—taken in combination, endanger both the public health and the public welfare of current and future generations. EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect and, under Section 202(a) of the CAA, result in air pollution that endangers public health and welfare.

GHGs, climate change, and the associated effects are being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, manage GHG emissions, and mitigate climate change impacts. Upon taking office on January 20, 2021, President Biden issued his "*Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*." This Executive Order (EO) calls for all federal agencies to review climate-related regulations and actions taken in the past 4 years, and tasked the Council on Environmental Quality to update its final guidance entitled, "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews," 81 *Federal Register* 51866 (August 5, 2016).

3.1.2 State

3.1.2.1 Air Toxics

Oregon regulates toxic air contaminants (TACs) through its Cleaner Air Oregon Program, which is mandated in OAR 340-245-0005 through 340-245-8050. TACs consist of a variety of compounds, including metals, minerals, soot, and hydrocarbon-based chemicals. There are hundreds of different air toxics, with varying degrees of toxicity. Sources of TACs include industrial processes, such as petroleum refining and chrome-plating operations; commercial operations, such as gasoline stations and dry cleaners; and motor vehicle exhaust.

The Oregon Department of Environmental Quality (ODEQ) and Oregon Health Authority developed the Cleaner Air Oregon Program to evaluate potential health risks posed by exposure to air toxic emissions for people near industrial and commercial facilities and reduce those risks below action levels adopted in rules and laws. ODEQ and Oregon Health Authority have developed risk-based concentrations from published scientific information on air toxics that agencies can use to assess risks and protect the Oregon public.

3.1.2.2 Greenhouse Gases

In 2007, Oregon Legislature passed House Bill 3543 to define climate change goals for Oregon as well as develop the Oregon Global Warming Commission. This bill defined the following goals:

- Arrest the growth and begin reducing GHG emissions by 2010.
- Achieve GHG levels that are 10% below 1990 levels by 2020.
- Achieve GHG levels that are at least 75% below 1990 levels by 2050.

To help accomplish these goals, Oregon governs GHG through reporting rules included in OAR 340-215-0010 through 340-215-0125. This reporting program was developed to help understand and track GHG emissions in Oregon for comparison with state emission reduction goals.

3.1.2.3 Fugitive Dust

Oregon regulates short-term air quality impacts associated with fugitive dust generated during construction by requiring monitoring to ensure that contractors implement the best management practices mandated by OAR 340-208-0210. The following measures are required to control fugitive dust from construction equipment and vehicles:

- Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land.
- Application of water or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces which can create airborne dusts.
- Full or partial enclosure of materials stockpiles in cases where application of water or other suitable chemicals are not sufficient to prevent particulate matter from becoming airborne.
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials.
- Adequate containment during sandblasting or other similar operations.
- Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne.
- Prompt removal from paved streets of earth or other material that does or may become airborne.

3.1.3 Regional and Local

There is no regional or local air quality regulatory agency. ODEQ is the authority with jurisdiction for air quality management in Portland, Oregon.

3.2 Affected Environment

The project is located at the VAMC campus in Multnomah County, Portland, Oregon. Construction will occur at existing VAMC property. Regarding air permitting requirements, the Proposed Action may need to obtain an indirect source permit from ODEQ because of the parking structures and would need to apply for permits to construct and operate the new boilers and generators.

3.2.1 Topography and Climate

Air quality is affected by the rate and location of pollutant emissions and by meteorological conditions that influence movement and dispersal of pollutants in the atmosphere. Atmospheric conditions (for example, wind speed, wind direction, and air temperature gradients) and local topography affect air pollutant emissions and local air quality concentrations.

The project would be in the southern part of Portland, Oregon, west of the Willamette River. Oregon has a great climatic diversity, ranging from dense evergreen forests and mountainous terrain to elevated arid regions in the eastern portion of the state. Its varied and rugged topography, mountain ranges, and narrow valleys range in elevation from sea level to more than 11,000 feet above sea level. Multnomah County, which includes Portland and the Willamette River, has four well-defined seasons. Summers average a high of approximately 82 degrees Fahrenheit, with lows in the 50s, with typically less than 2 inches of precipitation per month. In winter, average temperatures vary between 30 and 60 degrees Fahrenheit, with most of the annual precipitation occurring between November through March. Snowfall occurs during the winter months in the area, although accumulation is rare. Multnomah County periodically experiences significant winds, either as sustained winds or gusts, with average sustained winds around 7.4 miles per hour (mph) (National Oceanic and Atmospheric Administration 2020).

3.2.2 Existing Air Quality and Attainment Status

Air quality in Oregon is evaluated based on an area's compliance with the NAAQS and OAAQS. A summary of NAAQS and OAAQS is provided in Subsection 3.1.1, *Federal*. As listed in Table 3-1, EPA and ODEQ have established concentration-based ambient air quality standards to protect public health and welfare. Compliance is based on the results of ambient air quality monitoring, typically conducted by federal, state, and local regulatory agencies, with measurements taken using a variety of established techniques.

NAAQS are the maximum allowable atmospheric concentrations for six criteria pollutants: ozone, particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, sulfur dioxide (SO_2), and lead. OAAQS are generally the same as NAAQS pollutants, with one additional pollutant: particle fallout.

ODEQ maintains ambient air monitoring stations for criteria pollutants throughout Oregon. The air monitoring station closest to the project site is the Portland Southeast Lafayette station (EPA Identification 410510080), approximately 5 miles east of the project site. The station monitors ambient concentrations of ozone, carbon monoxide, nitrogen dioxide, $PM_{2.5}$, PM_{10}, and SO_2. Table 3-2 summarizes the latest 3 years of pertinent data from the station.

Table 3-2. Monitoring Data

Pollutant	2017	2018	2019	Monitor	NAAQS
Ozone (8-Hour), ppm	0.068	0.067	0.058	1	0.070 ppm
PM_{10} (24-Hour), mg/m^3	59	27	59	1	150 µg/m^3
$PM_{2.5}$ (24-Hour), mg/m^3	34	20	20	1	35 µg/m^3
$PM_{2.5}$ (Annual), mg/m^3	7.9	7.4	6.5	1	12 µg/m^3
Carbon monoxide (1-Hour), ppm	1.6	1.9	1.8	1	35 ppm
Carbon monoxide (8-Hour), ppm	1.1	1.6	1.4	1	9 ppm
Nitrogen Dioxide (1-Hour), ppb	40	35	32	1	100 ppb
Nitrogen Dioxide (Annual), ppb	8.63	8.63	7.73	1	53 ppb
Sulfur Dioxide (1-hour), ppb	3	3	3	1	75 ppb
Sulfur Dioxide (24-hour), ppb	1.9	1.2	1.2	1	140 ppb
Sulfur Dioxide (Annual), ppb	0.36	0.44	0.22	1	30 ppb

Table 3-2. Monitoring Data

Pollutant	2017	2018	2019	Monitor	NAAQS

Air quality data was taken from EPA's AirData Web site for the worst-case concentrations monitored at Oregon monitoring sites. (https://www.epa.gov/outdoor-air-quality-data/monitor-values-report). The values for the 24-hour $PM_{2.5}$ represent the 98th percentile used for attainment demonstration. The values for carbon monoxide, 24-hour sulfur dioxide and PM_{10} represent the second maximum, which is the parameter used for attainment demonstration. The values for ozone and 1-hour sulfur dioxide represent the fourth-highest daily maximum 8-hour concentrations, the parameter used for ozone attainment demonstration. The values for annual nitrogen dioxide and sulfur dioxide are the annual average and the values for 1-hour nitrogen dioxide represent the 98th percentile maximum daily 1-hour concentration.
Monitor number legend: 1. AQS 41-051-0080 located at SE Lafayette/5824 SE Lafayette, Portland, Oregon
$\mu g/m^3$ – micrograms per cubic meter
mg/m^3 – milligrams per cubic meter
NAAQS – National Ambient Air Quality Standards
$PM_{2.5}$—particulate matter with an aerodynamic diameter less than 2.5 micrometers
PM_{10}—particulate matter with an aerodynamic diameter less than 10 micrometers
ppb—parts per billion
ppm—parts per million

Air quality monitoring data indicate that local air quality meets federal and state standards and is considered good in the project area. EPA and ODEQ have designated air quality in the project area as either attainment or unclassified for all federal and state standards.

3.2.3 Sensitive Receptors

Sensitive receptors include but are not limited to hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. These are places where the occupants may be more susceptible to the adverse effects of exposure to air pollutants.

The project area is surrounded by forested open space, residences and healthcare facilities. Residences northeast and east of the VAMC campus are located 300 feet or more from the proposed construction areas. Residences south of the campus are located 100 feet or more from the proposed construction areas. The project would be constructed within a hospital and, therefore, be co-located with sensitive receptors which include an onsite child care facility. The nearest school is the Oregon Health and Sciences University (OHSU) located across the street from the facility which includes OHSU Hospital, as well as the Doernbecher Children's Hospital, the Casey Eye Institute, the School of Nursing, and other learning, research, and treatment facilities. Other nearby schools include Portland State University and Ainsworth Elementary School, which are located approximately 0.75 and 1 mile from the project, respectively. Figure 1-1 illustrates the project location and nearby sensitive receptors.

3.2.4 Greenhouse Gases

GHGs include both naturally occurring and anthropogenic gases, such as carbon dioxide, methane, nitrous oxide, hydro-chlorofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs absorb infrared radiation, trap energy from the sun, and help maintain the temperature of Earth's surface, creating a process known as the "greenhouse effect." The accumulation of GHGs in the atmosphere influences the long-term range of average atmospheric temperatures. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce economic, physical, and social consequences across the globe.

In the United States, the main source of GHG emissions is electricity generation, followed by transportation. In Oregon, however, transportation sources (passenger cars, light-duty trucks, other trucks, buses, and motorcycles) make up the largest category of GHG-emitting sources. In 2015, the annual Oregon sector-based GHG emissions were 63 million metric tons of carbon dioxide-equivalent (CO_2e). The transportation sector accounts for about 36% of the sector-based Oregon GHG emissions inventory. The dominant GHG emitted is carbon dioxide, primarily from fossil fuel combustion (ODEQ 2018).

3.3 Methodology

This section discusses applicable significance criteria, methodology for emissions estimation, and the air quality impact analysis.

3.3.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) does not have specific significance criteria for air quality. However, NEPA regulations in 40 CFR Section 1508.27 contain guidance regarding significance analysis. Specifically, consideration of "significance" involves an analysis of both context and intensity. Though not directly applicable, thresholds used in other types of air quality impact analyses have been used as indicators of the context and intensity of emissions estimated for the Proposed Action and No Action alternatives.

3.3.2 General Conformity Thresholds

The project area is designated as attainment or unclassified for all criteria pollutants; therefore, the General Conformity Rule does not apply to the project. There are no applicable quantitative emission thresholds to evaluate the significance of the emissions associated with the project, but comparison of project emissions to the General Conformity Rule de minimis threshold values may provide an indication of potential air quality impacts. EPA has established General Conformity Rule de minimis threshold values (in tons per calendar year) for criteria and precursor pollutants; in many cases, de minimis is 100 tons per year for each regulated pollutant. If the total net project-related emissions increase for any nonattainment, maintenance, or precursor pollutant associated with the proposed project would exceed any of the applicable general conformity de minimis levels, additional general conformity analysis and a formal conformity determination would be required prior to federal approval of the proposed action. An action is exempt from further general conformity analysis (that is, the action is assumed to conform) if the total net project-related emissions increases (construction and operation) would be less than the applicable de minimis thresholds.

3.3.3 Greenhouse Gas Thresholds

Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting Rule has a threshold for rule applicability of 25,000 metric tons of CO_2e emissions per year (40 CFR Part 98) from stationary fuel combustion**.**

3.3.4 Emissions Analysis

To evaluate potential air quality impacts, emissions were estimated for construction and operation of Phase I of the Proposed Action and to the extent possible, from subsequent project phases. As reviewed by VAMC, emissions for this analysis were calculated to the extent practicable based upon typical equipment types and other project-related emission activities assumed to occur over the years of construction and operation. These assumptions and the resulting emissions are estimates and are subject to change, pending availability of more complete data and information on the proposed projects.

The emissions associated with each phase are calculated based upon each project package and its associated phase. The construction packages included in this analysis and their associated phases are listed below and illustrated in Appendix B, Construction Schedule. Stationary combustion emissions associated with emergency generators are assumed to occur in Phase 2 and emissions associated with boiler operation are assumed to occur in Phase 3.

- Package 1: B-102 & Bridge/Roadway Structural Seismic Retrofit (Phase 1)

- Package 2: B-100 &B-101 Primary Seismic and Façade Retrofit (Phase 1)
- Package 3: Prework for Parking B111, Demo, and Infrastructure (Phase 2)
- Package 4: Parking B-108; Additional 2 Floors (Phase 1)
- Package 5: New Parking B111 (Phase 2)
- Package 6: B110 (375k-sf) and Energy Center (Phase 3)
- Package 7: New Parking B112 (Phase 3)
- Package 8: B100 and B101 Secondary Seismic and Renovations (Phase 3)

3.3.4.1 Construction Impacts

Construction emissions were estimated for the Proposed Action for fugitive dust from land disturbance, demolition, and other construction activities, and for fuel combustion in construction equipment, worker commute vehicles, and haul trucks. The construction would occur intermittently from 2023 to 2031, and emissions have been evaluated for the three project Phases that would periodically overlap. A copy of the construction schedule is included in Appendix B. Emission calculations use the following preliminary assumptions and estimates:

- Construction equipment type, count, hours per day: Varies by phase; refer to Appendix A.
- Construction operating schedule: 5 days per week, 21 working days per month for all phases.
- Construction worker commute: 20 round trips per day, 15 miles per round trip (paved roads), average speed of 35 mph.
- Haul truck travel: 5 round trips per day, 30 miles per round trip (paved roads), average speed of 35 mph.
- Grading: 1 acre of total graded area for 10 days total in Packages 3, 5, 6, and 7.
- Bulldozing: 1 bulldozer operating 8 hours per day for a total of 10 days in each of Packages 3, 5, 6, and 7.

Construction equipment emissions and on-road emissions associated with construction worker commute vehicles and haul truck travel were estimated using the EPA Motor Vehicle Emissions Simulator 3 (MOVES3) (EPA 2020a) model for Multnomah County for a 2023 peak summer hour (July 4 pm to 5 pm) and peak winter morning (January 7 am to 8 am). The maximum of the two temperature and peak commute times were conservatively used for this analysis. Mobile source emission factors for 2023 were conservatively used for subsequent years of construction (2024 to 2031) given the likely emission reductions associated with future engine technology and decreasing average age of vehicle fleets.

Fugitive dust emissions from vehicle and equipment travel on paved roads, grading, and bulldozing were estimated using EPA *AP 42 Compilation of Emission Factors* (EPA 2020b) methodologies. Fugitive dust emissions associated with importing and exporting soil were not included in this analysis, because no new cut/fill would be needed for the project and excavated soil would be reused onsite.

3.3.4.2 Operational Emissions

As part of Phase II and III, projects to upgrade the energy center and expand emergency power generation capacity may involve new or modified boilers and generators to meet additional needs. The Proposed Action would ultimately increase the size of three natural gas-fired boilers from 500 horsepower (hp) to 750 hp and five diesel-fired emergency generators from 1,500 kilowatts (kW) to 1,750 kW. The emissions associated with these increases in capacity were calculated using EPA *AP 42 Compilation of Emission Factors* (EPA 2020b) emission factors and methodology. The boilers are assumed to operate 8,760 hours per year, and for maintenance and testing purposes, the emergency generators are assumed to operate 100 hours total per year. The operational emissions increases were conservatively assumed to occur starting in 2025 and to occur during all years of construction.

Additional on-road emissions associated with worker commute trips and patient trips are not included in this analysis.

3.4 Environmental Consequences

3.4.1 Proposed Action Construction

Construction of the Proposed Action would result in air pollutant emissions from the following:

- Fugitive dust from soil disturbance, demolition, and other construction activities
- Engine exhaust from vehicle trips traveled by construction workers, haul trucks, and concrete trucks
- Fuel combustion in off-road construction equipment.

Table 3-3 provides the estimated total annual emissions (Phases 1, 2, and 3) associated with the construction of the Proposed Action by year, with the highest values for any year for any pollutant taken to represent the worst plausible annual construction emissions for that pollutant. Tables 3-4, 3-5, and 3-6 break out the estimated annual emissions for construction of Phases 1, 2, and 3, respectively. A list of assumptions associated with these calculations is included in Appendix A.

Table 3-3. Proposed Action Annual Construction Emissions

Construction Year	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
2023	0.2	4.8	1.4	0.005	0.3	0.2	1,493
2024	0.2	3.8	1.5	0.004	0.3	0.2	1,221
2025	0.3	8.3	2.3	0.010	0.5	0.3	3,165
2026	0.3	7.9	2.0	0.010	0.4	0.3	3,168
2027	0.2	3.8	1.4	0.005	0.3	0.2	1,496
2028	0.2	3.7	1.4	0.005	0.3	0.1	1,496
2029	0.1	1.1	0.7	0.001	0.1	0.1	267
2030	0.1	1.0	0.6	0.001	0.1	0.1	267
2031	0.0	0.7	0.5	0.001	0.1	0.0	200
Estimated Worst Plausible Annual Construction Emissions	0.3	8.3	2.3	0.010	0.5	0.3	3,168

Table 3-4. Phase 1 Annual Construction Emissions

Construction Year	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
2023	0.2	4.1	1.2	0.0	0.2	0.1	1249.7
2024	0.1	1.3	0.8	0.0	0.1	0.1	248.6
2025	0.1	1.2	0.7	0.0	0.1	0.1	242.5
2026	0.1	0.8	0.5	0.0	0.1	0.0	181.9
2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estimated Phase 1 Annual Construction Emissions	0.2	4.1	1.2	0.0	0.2	0.1	1249.7

Table 3-5. Phase 2 Annual Construction Emissions

Construction Year	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
2023	0.0	0.6	0.2	0.0	0.1	0.0	243.0
2024	0.1	2.5	0.7	0.0	0.2	0.1	972.0
2025	0.1	3.9	0.9	0.0	0.2	0.1	1586.1
2026	0.1	3.2	0.6	0.0	0.1	0.1	1343.1
2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estimated Phase 2 Annual Construction Emissions	0.1	3.9	0.9	0.0	0.2	0.1	1586.1

Table 3-6. Phase 3 Annual Construction Emissions

Construction Year	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2025	0.1	3.2	0.7	0.0	0.2	0.1	1336.1
2026	0.1	3.8	0.8	0.0	0.2	0.1	1643.3
2027	0.2	3.8	1.4	0.0	0.3	0.2	1495.7
2028	0.2	3.7	1.4	0.0	0.3	0.1	1495.8
2029	0.1	1.1	0.7	0.0	0.1	0.1	267.0
2030	0.1	1.0	0.6	0.0	0.1	0.1	267.0
2031	0.0	0.7	0.5	0.0	0.1	0.0	200.3
Estimated Phase 3 Annual Construction Emissions	0.2	3.8	1.4	0.0	0.3	0.2	1643.3

3.4.2 Proposed Action Operation

The Proposed Action would cause a potential net increase in stationary combustion emissions because of increased boiler and emergency generator capacity. Operational emissions associated with future project-related vehicle use and maintenance are assumed to be negligible. Table 3-7 includes estimates of the annual operational emissions associated with the project by phase, with summed values representing the worst plausible annual operational emissions for the Proposed Action. Phase 1 does not have any operational emissions. A list of assumptions associated with these calculations is included in Appendix A.

Table 3-7. Proposed Action Annual Operational Emissions

Years 2025-Future	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
Phase 1 Annual Emissions	0	0	0	0	0	0	0
Phase 2 Annual Emissions	0.4	13.6	3.6	0.0	0.4	0.4	287
Phase 3 Annual Emissions	1.8	32.1	27.0	0.2	2.4	2.4	35,100
Estimated Worst Plausible Annual Operational Emissions	2.2	45.7	30.6	0.199	2.9	2.9	35,386

3.4.3 Combined Proposed Action Impacts

It is conservatively assumed that the operational emissions increase will occur during all years of construction starting in 2025. As a result, the worst-plausible annual emissions for each pollutant associated with the project are estimated as the summed total of the worst plausible annual construction and operational emissions for that pollutant (Table 3-8).

Table 3-8. Total Proposed Action Annual Emissions

Year	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
Phase 1 Total Annual Emissions							
2023	0.2	4.1	1.2	0.0	0.2	0.1	1,250
2024	0.1	1.3	0.8	0.0	0.1	0.1	249
2025	0.1	1.2	0.7	0.0	0.1	0.1	243
2026	0.1	0.8	0.5	0.0	0.1	0.0	182
2027	0.0	0.0	0.0	0.0	0.0	0.0	0
2028	0.0	0.0	0.0	0.0	0.0	0.0	0
2029	0.0	0.0	0.0	0.0	0.0	0.0	0
2030	0.0	0.0	0.0	0.0	0.0	0.0	0
2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Phase 2 Total Annual Emissions							
2023	0.0	0.6	0.2	0.0	0.1	0.0	243
2024	0.1	2.5	0.7	0.0	0.2	0.1	972
2025	0.5	17.5	4.5	0.0	0.6	0.6	1,873
2026	0.5	16.8	4.3	0.0	0.6	0.5	1,630
2027	0.4	13.6	3.6	0.0	0.4	0.4	287
2028	0.4	13.6	3.6	0.0	0.4	0.4	287
2029	0.4	13.6	3.6	0.0	0.4	0.4	287
2030	0.4	13.6	3.6	0.0	0.4	0.4	287
2031	0.4	13.6	3.6	0.0	0.4	0.4	287
Phase 3 Total Annual Emissions							
2023	0.0	0.0	0.0	0.0	0.0	0.0	0
2024	0.0	0.0	0.0	0.0	0.0	0.0	0
2025	1.9	35.4	27.7	0.2	2.6	2.5	36,436
2026	1.9	36.0	27.8	0.2	2.7	2.6	36,743
2027	2.0	36.0	28.4	0.2	2.7	2.6	36,596
2028	1.9	35.8	28.4	0.2	2.7	2.6	36,596
2029	1.8	33.2	27.7	0.2	2.5	2.5	35,367
2030	1.8	33.2	27.6	0.2	2.5	2.5	35,367
2031	1.8	32.9	27.5	0.2	2.5	2.5	35,300
Combined Phases Emissions (Phases 1, 2, and 3)							
2023	0.2	4.8	1.4	0.005	0.3	0.2	1,493
2024	0.2	3.8	1.5	0.004	0.3	0.2	1,221
2025	2.5	54.1	32.9	0.209	3.4	3.2	38,551

2026	2.4	53.6	32.6	0.209	3.3	3.1	38,555
2027	2.3	49.6	32.1	0.204	3.1	3.0	36,882
2028	2.3	49.5	32.0	0.204	3.1	3.0	36,882
2029	2.2	46.8	31.3	0.200	3.0	2.9	35,653
2030	2.2	46.8	31.2	0.200	3.0	2.9	35,653
2031	2.2	46.5	31.1	0.200	2.9	2.9	35,587
Worst Plausible Annual Emissions	2.5	54.1	32.9	0.209	3.4	3.2	38,555
General Conformity Maintenance Area de minimis Threshold (tons per year)	100	100	100	100	100	100	NA

Projects resulting in an increase of potential emissions of less than the General Conformity maintenance area de minimis thresholds are considered to have a less than significant impact on air quality in an area like Portland, which is maintenance or attainment for all criteria pollutants.

Though not subject to General Conformity, the Proposed Action is below the maintenance area de minimis threshold of 100 tons per year for all pollutants. Therefore, the Proposed Action would not result in a significant increase of air emissions or interfere with the attainment of air quality standards in the area. This study concludes that the Proposed Action would not adversely affect air quality in the region and no further analysis for comparison to the concentration-based NAAQS or OOAQS is required.

3.4.4 No Action Alternative

The No Action Alternative would result in no construction-related emissions and no increase in stationary combustion emissions. Emissions associated with the existing boilers (500 hp) and emergency generator (1,500 kW) combustion represent all scoped emissions for the No Action Alternative. Table 3-9 includes estimates of the annual No Action operational emissions. A list of all assumptions associated with these calculations is included in Appendix A.

Table 3-9. No Action Annual Operational Emissions

All Operational Years	Emissions (tons per year)						
	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (MT)
Worst Plausible Annual Emissions	1.5	33.4	21.2	0.1	2.0	2.0	23,652
General Conformity Maintenance Area de minimis Threshold (tons per year)	100	100	100	100	100	100	NA

Note: If a project is below the General Conformity de minimis thresholds for a maintenance area, then it is presumed that project would not cause an exceedance of the NAAQS/OAAQS as presented in Table 3-1.

3.4.5 Greenhouse Gas Impact Assessment

Global climate change is a cumulative impact; therefore, no individual project is expected to generate enough GHG emissions to significantly influence global climate change. Even though there is no quantitative threshold to evaluate the significance of an individual project's contribution to GHG emissions under NEPA, GHG emissions were estimated for construction and operation of the Proposed Action in terms of metric tons (MT) per year of CO_2e.

GHG emissions would occur during project construction and operation and would include emissions from fuel combustion in construction equipment, haul trucks, worker commute vehicles, and stationary sources. CO_2e emissions from construction equipment and vehicles were estimated using the MOVES3 model for the estimated project phasing, assumed equipment usage, and vehicle miles traveled. CO_2e emissions associated with fuel combustion in boilers and emergency generators were estimated based on equipment fuel usage and emission factors and methodology specified in EPA's Mandatory GHG Reporting Rule (40 CFR Part 98). Estimated annual GHG emissions in MT for the Proposed Project and No Action alternatives are included in Tables 3-8 and 3-9, respectively. Appendix A contains details of the emission calculations.

The Proposed Project stationary sources (boilers and generators) may result in emissions that exceed EPA's Mandatory GHG Reporting Rule threshold of 25,000 metric tons of CO_2e emissions per year**.** This threshold does not infer significance for the Proposed Action and is only mentioned to indicate that the Proposed Project may be subject to EPA GHG reporting requirements in the future.

The project would implement best management practices during construction, such as minimizing unnecessary construction vehicle trips and idling time, which would reduce overall GHG emissions. Ongoing maintenance activities for the project and other facilities would continue after construction is completed. Maintenance activity levels would be similar to existing operations and should not result in increased GHG emissions beyond those estimated.

3.4.6 Mitigation

Construction and operation of the project would not result in significant adverse air quality impacts; therefore, additional mitigation is not required. The project would comply with all applicable federal and state air quality permitting and regulatory requirements.

Additionally, construction and demolition associated with the project may include materials that contain asbestos or lead-based paint, which may contribute to toxic air contaminant emissions if uncontrolled. All demolition work must be performed by licensed contractors, and all required mitigation and disposal requirements must be implemented.

4.0 References

National Oceanic and Atmospheric Administration. 2020. Climate at a Glance. National Centers for Environmental Information. Available at https://www.ncdc.noaa.gov/cag/county/time-series. Accessed December 2020.

Oregon Department of Environmental Quality (ODEQ). 2018. *Oregon's Greenhouse Gas Emissions through 2015 - An assessment of Oregon's sector based and consumption-based greenhouse gas emissions*. Available at https://www.oregon.gov/deq/FilterDocs/OregonGHGreport.pdf. Accessed December 2020.

U.S. Environmental Protection Agency (EPA). 2007. *Control of Hazardous Air Pollutants from Mobile Sources. Regulatory Impact Analysis*. Assessment and Standards Division Office of Transportation and Air Quality. EPA 420-R-07-002. *Federal Register*, Vol. 72, No. 37, page 8430. February 26. https://nepis.epa.gov/Exe/ZyPDF.cgi/P1004LNN.PDF?Dockey=P1004LNN.PDF. Accessed June 21, 2018.

U.S. Environmental Protection Agency (EPA). 2011. National Air Toxics Assessment. Available at https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment-results.

U.S. Environmental Protection Agency (EPA). 2017. *Regulations for Emissions from Vehicles and Engines.* Available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-commercial-trucks. Accessed March 2017.

U.S. Environmental Protection Agency (EPA). 2020a. Motor Vehicle Emissions Simulator 3. Office of Transportation and Air Quality. Available at https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves.

U.S. Environmental Protection Agency (EPA). 2020b. *AP-42 Compilation of Air Emissions Factors*. Available at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors. Accessed December 2020.

Appendix A
Emission Calculations

U.S. Department of Veteran Affairs Portland Veterans Affairs Medical Center
Air Quality Resource Report Appendix A
December 2020

Total Project Emissions Summary

		Annual Emissions						
		VOC	**NOx**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Emissions Source	**Year**	**TPY**	**TPY**	**TPY**	**TPY**	**TPY**	**TPY**	**Metric TPY**
Construction Equipment	2023	0.2	4.2	0.8	0.0	0.1	0.1	1,367
	2024	0.1	3.0	0.6	0.0	0.1	0.1	1,052
	2025	0.3	7.3	1.1	0.0	0.2	0.2	2,933
	2026	0.2	7.0	0.9	0.0	0.2	0.2	2,958
	2027	0.1	3.1	0.6	0.0	0.1	0.1	1,328
	2028	0.1	3.0	0.5	0.0	0.1	0.1	1,328
	2029	0.1	0.7	0.2	0.0	0.0	0.0	183
	2030	0.0	0.7	0.2	0.0	0.0	0.0	183
	2031	0.0	0.5	0.1	0.0	0.0	0.0	137
Vehicle Emissions	2023	0.0	0.5	0.6	0.0	0.0	0.0	126
	2024	0.0	0.7	0.9	0.0	0.1	0.0	168
	2025	0.1	1.0	1.2	0.0	0.1	0.0	231
	2026	0.0	0.9	1.1	0.0	0.1	0.0	210
	2027	0.0	0.7	0.9	0.0	0.1	0.0	168
	2028	0.0	0.7	0.9	0.0	0.1	0.0	168
	2029	0.0	0.4	0.4	0.0	0.0	0.0	84
	2030	0.0	0.4	0.4	0.0	0.0	0.0	84
	2031	0.0	0.3	0.3	0.0	0.0	0.0	63
Fugitive Dust	2023	0.0	0.0	0.0	0.0	0.1	0.0	0
	2024	0.0	0.0	0.0	0.0	0.1	0.0	0
	2025	0.0	0.0	0.0	0.0	0.2	0.1	0
	2026	0.0	0.0	0.0	0.0	0.2	0.1	0
	2027	0.0	0.0	0.0	0.0	0.1	0.0	0
	2028	0.0	0.0	0.0	0.0	0.1	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Stationary Combustion	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2026	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2027	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2028	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2029	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2030	2.2	45.7	30.6	0.2	2.9	2.9	35,386
	2031	2.2	45.7	30.6	0.2	2.9	2.9	35,386
Total Annual Emissions (TPY)	**2023**	**0.2**	**4.8**	**1.4**	**0.0**	**0.3**	**0.2**	**1,493**
	2024	**0.2**	**3.8**	**1.5**	**0.0**	**0.3**	**0.2**	**1,221**
	2025	**2.5**	**54.1**	**32.9**	**0.2**	**3.4**	**3.2**	**38,551**
	2026	**2.4**	**53.6**	**32.6**	**0.2**	**3.3**	**3.1**	**38,555**
	2027	**2.3**	**49.6**	**32.1**	**0.2**	**3.1**	**3.0**	**36,882**
	2028	**2.3**	**49.5**	**32.0**	**0.2**	**3.1**	**3.0**	**36,882**
	2029	**2.2**	**46.8**	**31.3**	**0.2**	**3.0**	**2.9**	**35,653**
	2030	**2.2**	**46.8**	**31.2**	**0.2**	**3.0**	**2.9**	**35,653**
	2031	**2.2**	**46.5**	**31.1**	**0.2**	**2.9**	**2.9**	**35,587**
Worst Plausible Annual Emissions		**2.5**	**54.1**	**32.9**	**0.2**	**3.4**	**3.2**	**38,555**
General Conformity Rule De Minimis Threshold[a]		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**--**
Exceeds De Minimis Threshold?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**--**
Indicator GHG Threshold (Metric Tons/year)[b]		**--**	**--**	**--**	**--**	**--**	**--**	**25,000**
Exceeds NEPA GHG Threshold?		**--**	**--**	**--**	**--**	**--**	**--**	**YES**

Note:

[a] Multnomah County is attainment for all pollutant and averaging periods and therefore, General Conformity does not apply to the Project.

[b] Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting rule has a threshold for rule applicability of 25,000 metric tons of CO2e emissions per year (40 CFR Part 98).

Construction emissions are represented as the um of construction equipment, mobile sources, and fugitive dust

No Action Emissions Summary

		Annual Emissions						
		VOC	**NOx**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Emissions Source	**Year**	**TPY**	**TPY**	**TPY**	**TPY**	**TPY**	**TPY**	**Metric TPY**
Stationary Combustion	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
	2023	1.5	33.4	21.2	0.1	2.0	2.0	26,044
Total Annual Emissions (TPY)	**2023**	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2024	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2025	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2026	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2027	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2028	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2029	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2030	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
	2031	**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
Worst Plausible Annual Emissions		**1.5**	**33.4**	**21.2**	**0.1**	**2.0**	**2.0**	**26,044**
General Conformity Rule De Minimis Threshold[a]		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**--**
Exceeds De Minimis Threshold?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**--**
Indicator GHG Threshold (Metric Tons/year)[b]		**--**	**--**	**--**	**--**	**--**	**--**	**25,000**
Exceeds NEPA GHG Threshold?		**--**	**--**	**--**	**--**	**--**	**--**	**YES**

Note:

[a] Multnomah County is attainment for all pollutant and averaging periods and therefore, General Conformity does not apply to the Project.

[b] Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting rule has a threshold for rule applicability of 25,000 metric tons of CO2e emissions per year (40 CFR Part 98).

Phase 1 Project Emissions Summary

Emissions Source	Year	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
		Annual Emissions						
		TPY	**TPY**	**TPY**	**TPY**	**TPY**	**TPY**	**Metric TPY**
Construction Equipment	2023	0.2	3.7	0.7	0.0	0.1	0.1	1,145
	2024	0.1	0.9	0.3	0.0	0.1	0.1	165
	2025	0.1	0.8	0.3	0.0	0.0	0.0	158
	2026	0.0	0.6	0.2	0.0	0.0	0.0	119
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Vehicle Emissions	2023	0.0	0.4	0.5	0.0	0.0	0.0	105
	2024	0.0	0.4	0.4	0.0	0.0	0.0	84
	2025	0.0	0.4	0.4	0.0	0.0	0.0	84
	2026	0.0	0.3	0.3	0.0	0.0	0.0	63
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Fugitive Dust	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.0	0.0	0.0	0.0	0.0	0.0	0
	2026	0.0	0.0	0.0	0.0	0.0	0.0	0
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Stationary Combustion	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.0	0.0	0.0	0.0	0.0	0.0	0
	2026	0.0	0.0	0.0	0.0	0.0	0.0	0
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Phase 1 Annual Emissions (TPY)	**2023**	**0.2**	**4.1**	**1.2**	**0.0**	**0.2**	**0.1**	**1,250**
	2024	**0.1**	**1.3**	**0.8**	**0.0**	**0.1**	**0.1**	**249**
	2025	**0.1**	**1.2**	**0.7**	**0.0**	**0.1**	**0.1**	**243**
	2026	**0.1**	**0.8**	**0.5**	**0.0**	**0.1**	**0.0**	**182**
	2027	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2028	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2029	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2030	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2031	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
Worst Plausible Annual Emissions		**0.2**	**4.1**	**1.2**	**0.0**	**0.2**	**0.1**	**1,250**
General Conformity Rule De Minimis Threshold[a]		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**--**
Exceeds De Minimis Threshold?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**--**
Indicator GHG Threshold (Metric Tons/year)[b]		**--**	**--**	**--**	**--**	**--**	**--**	**25,000**
Exceeds NEPA GHG Threshold?		**--**	**--**	**--**	**--**	**--**	**--**	**NO**

Note:

[a] Multnomah County is attainment for all pollutant and averaging periods and therefore, General Conformity does not apply to the Project.

[b] Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting rule has a threshold for rule applicability of 25,000 metric tons of CO2e emissions per year (40 CFR Part 98).

Construction emissions are represented as the um of construction equipment, mobile sources, and fugitive dust

Phase 2 Project Emissions Summary

Emissions Source	Year	VOC TPY	NOx TPY	CO TPY	SO_2 TPY	PM_{10} TPY	$PM_{2.5}$ TPY	CO_2e Metric TPY
		Annual Emissions						
Construction Equipment	2023	0.0	0.6	0.1	0.0	0.0	0.0	222
	2024	0.1	2.1	0.3	0.0	0.1	0.1	888
	2025	0.1	3.5	0.4	0.0	0.1	0.1	1,502
	2026	0.1	2.9	0.3	0.0	0.1	0.1	1,280
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Vehicle Emissions	2023	0.0	0.1	0.1	0.0	0.0	0.0	21
	2024	0.0	0.4	0.4	0.0	0.0	0.0	84
	2025	0.0	0.4	0.4	0.0	0.0	0.0	84
	2026	0.0	0.3	0.3	0.0	0.0	0.0	63
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Fugitive Dust	2023	0.0	0.0	0.0	0.0	0.1	0.0	0
	2024	0.0	0.0	0.0	0.0	0.1	0.0	0
	2025	0.0	0.0	0.0	0.0	0.1	0.0	0
	2026	0.0	0.0	0.0	0.0	0.1	0.0	0
	2027	0.0	0.0	0.0	0.0	0.0	0.0	0
	2028	0.0	0.0	0.0	0.0	0.0	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Stationary Combustion	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.4	13.6	3.6	0.0	0.4	0.4	287
	2026	0.4	13.6	3.6	0.0	0.4	0.4	287
	2027	0.4	13.6	3.6	0.0	0.4	0.4	287
	2028	0.4	13.6	3.6	0.0	0.4	0.4	287
	2029	0.4	13.6	3.6	0.0	0.4	0.4	287
	2030	0.4	13.6	3.6	0.0	0.4	0.4	287
	2031	0.4	13.6	3.6	0.0	0.4	0.4	287
Phase 2 Annual Emissions (TPY)	**2023**	**0.0**	**0.6**	**0.2**	**0.0**	**0.1**	**0.0**	**243**
	2024	**0.1**	**2.5**	**0.7**	**0.0**	**0.2**	**0.1**	**972**
	2025	**0.5**	**17.5**	**4.5**	**0.0**	**0.6**	**0.6**	**1,873**
	2026	**0.5**	**16.8**	**4.3**	**0.0**	**0.6**	**0.5**	**1,630**
	2027	**0.4**	**13.6**	**3.6**	**0.0**	**0.4**	**0.4**	**287**
	2028	**0.4**	**13.6**	**3.6**	**0.0**	**0.4**	**0.4**	**287**
	2029	**0.4**	**13.6**	**3.6**	**0.0**	**0.4**	**0.4**	**287**
	2030	**0.4**	**13.6**	**3.6**	**0.0**	**0.4**	**0.4**	**287**
	2031	**0.4**	**13.6**	**3.6**	**0.0**	**0.4**	**0.4**	**287**
Worst Plausible Annual Emissions		**0.5**	**17.5**	**4.5**	**0.0**	**0.6**	**0.6**	**1,873**
General Conformity Rule De Minimis Threshold[a]		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**--**
Exceeds De Minimis Threshold?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**--**
Indicator GHG Threshold (Metric Tons/year)[b]		**--**	**--**	**--**	**--**	**--**	**--**	**25,000**
Exceeds NEPA GHG Threshold?		**--**	**--**	**--**	**--**	**--**	**--**	**NO**

Note:

[a] Multnomah County is attainment for all pollutant and averaging periods and therefore, General Conformity does not apply to the Project.

[b] Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting rule has a threshold for rule applicability of 25,000 metric tons of CO2e emissions per year (40 CFR Part 98).

Construction emissions are represented as the um of construction equipment, mobile sources, and fugitive dust

Phase 3 Project Emissions Summary

Emissions Source	Year	VOC TPY	NOx TPY	CO TPY	SO_2 TPY	PM_{10} TPY	$PM_{2.5}$ TPY	CO_2e Metric TPY
		Annual Emissions						
Construction Equipment	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.1	3.0	0.4	0.0	0.1	0.1	1,273
	2026	0.1	3.5	0.4	0.0	0.1	0.1	1,559
	2027	0.1	3.1	0.6	0.0	0.1	0.1	1,328
	2028	0.1	3.0	0.5	0.0	0.1	0.1	1,328
	2029	0.1	0.7	0.2	0.0	0.0	0.0	183
	2030	0.0	0.7	0.2	0.0	0.0	0.0	183
	2031	0.0	0.5	0.1	0.0	0.0	0.0	137
Vehicle Emissions	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.0	0.3	0.3	0.0	0.0	0.0	63
	2026	0.0	0.4	0.4	0.0	0.0	0.0	84
	2027	0.0	0.7	0.9	0.0	0.1	0.0	168
	2028	0.0	0.7	0.9	0.0	0.1	0.0	168
	2029	0.0	0.4	0.4	0.0	0.0	0.0	84
	2030	0.0	0.4	0.4	0.0	0.0	0.0	84
	2031	0.0	0.3	0.3	0.0	0.0	0.0	63
Fugitive Dust	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	0.0	0.0	0.0	0.0	0.1	0.0	0
	2026	0.0	0.0	0.0	0.0	0.1	0.0	0
	2027	0.0	0.0	0.0	0.0	0.1	0.0	0
	2028	0.0	0.0	0.0	0.0	0.1	0.0	0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0
	2030	0.0	0.0	0.0	0.0	0.0	0.0	0
	2031	0.0	0.0	0.0	0.0	0.0	0.0	0
Stationary Combustion	2023	0.0	0.0	0.0	0.0	0.0	0.0	0
	2024	0.0	0.0	0.0	0.0	0.0	0.0	0
	2025	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2026	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2027	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2028	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2029	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2030	1.8	32.1	27.0	0.2	2.4	2.4	35,100
	2031	1.8	32.1	27.0	0.2	2.4	2.4	35,100
Phase 3 Annual Emissions (TPY)	**2023**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2024	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0**
	2025	**1.9**	**35.4**	**27.7**	**0.2**	**2.6**	**2.5**	**36,436**
	2026	**1.9**	**36.0**	**27.8**	**0.2**	**2.7**	**2.6**	**36,743**
	2027	**2.0**	**36.0**	**28.4**	**0.2**	**2.7**	**2.6**	**36,596**
	2028	**1.9**	**35.8**	**28.4**	**0.2**	**2.7**	**2.6**	**36,596**
	2029	**1.8**	**33.2**	**27.7**	**0.2**	**2.5**	**2.5**	**35,367**
	2030	**1.8**	**33.2**	**27.6**	**0.2**	**2.5**	**2.5**	**35,367**
	2031	**1.8**	**32.9**	**27.5**	**0.2**	**2.5**	**2.5**	**35,300**
Worst Plausible Annual Emissions		**2.0**	**36.0**	**28.4**	**0.2**	**2.7**	**2.6**	**36,743**
General Conformity Rule De Minimis Threshold[a]		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**--**
Exceeds De Minimis Threshold?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**--**
Indicator GHG Threshold (Metric Tons/year)[b]		**--**	**--**	**--**	**--**	**--**	**--**	**25,000**
Exceeds NEPA GHG Threshold?		**--**	**--**	**--**	**--**	**--**	**--**	**YES**

Note:

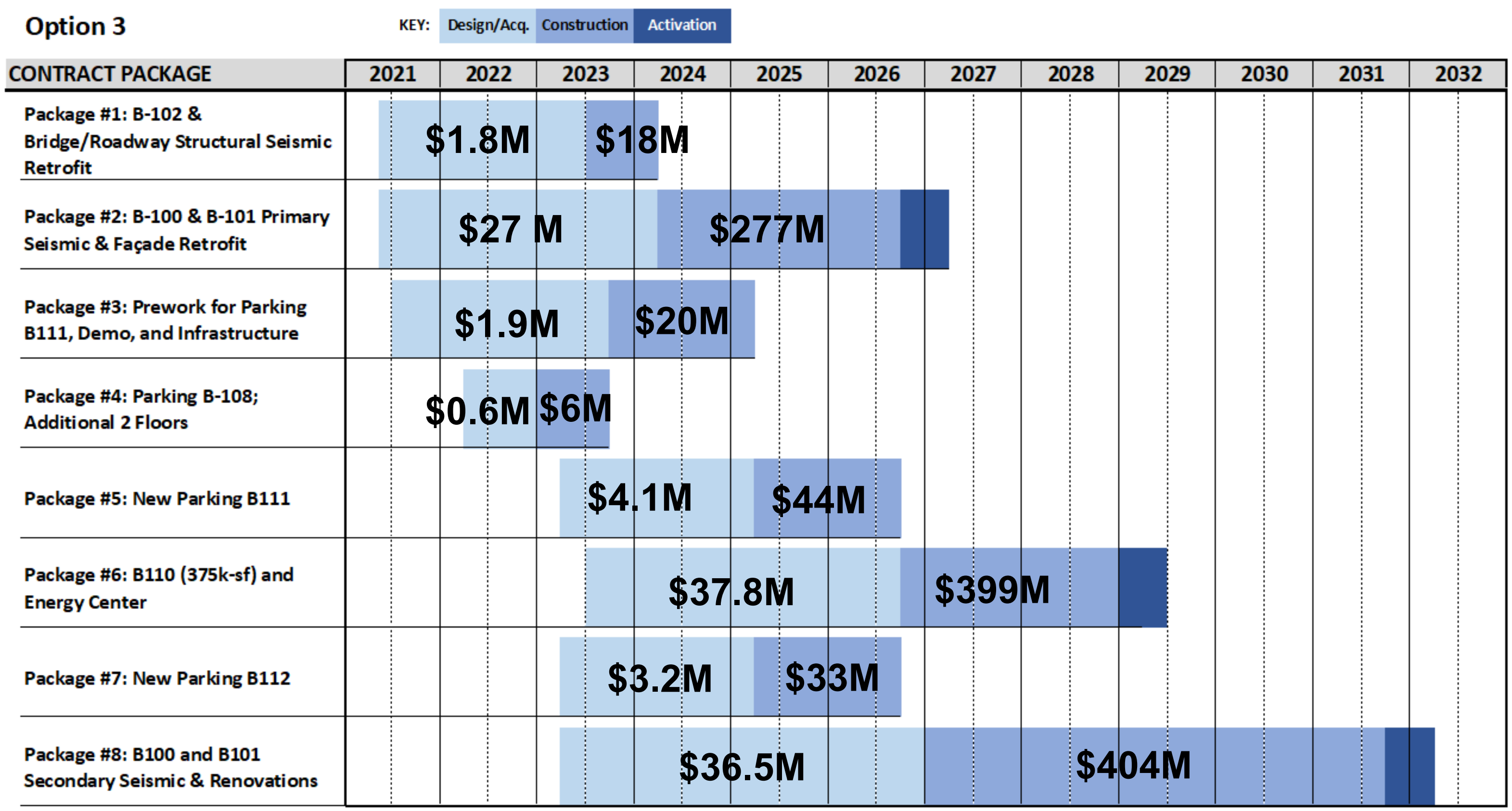
[a] Multnomah County is attainment for all pollutant and averaging periods and therefore, General Conformity does not apply to the Project.

[b] Currently, there are no applicable quantitative emission thresholds to evaluate the significance of GHG and climate change impacts associated with individual projects under NEPA. As an indicator of the magnitude of GHG emissions considered worthy of regulatory development and tracking for stationary sources of emissions, EPA's Mandatory GHG Reporting rule has a threshold for rule applicability of 25,000 metric tons of CO2e emissions per year (40 CFR Part 98).

Construction emissions are represented as the um of construction equipment, mobile sources, and fugitive dust

Appendix B
Construction Schedule

SCHEDULE: OPTION 3 – COMPLETE THE QUAD



Note: Costs are listed to depict orders of magnitude; contingencies other program fees are not included

US Army Corps of Engineers®
Portland District

U.S.ARMY

F Appendix F: Noise Analysis Report

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

U.S. Department of Veterans Affairs
Portland Veterans Affairs Medical Center (VAMC)
Final Noise Report

Following the finalization of the Noise Report, the U.S. Department of Veterans Affairs (VA) provided minor changes to its proposed action, as described below:

- **Building 110**, the Specialty Care Building, was reduced in size by approximately 45,000 square feet.
- **Building 111**, the proposed parking garage to be located adjacent to Building 110, increased in parking capacity.
- **Building 112**, the previously proposed parking garage to be located on the eastern boundary of the campus, was omitted from the construction plan. Building 112 included 450 parking spaces.
- Construction phasing for project components was removed from the proposed action.

These changes to the proposed action, as detailed in the Draft and Final EA, further reduce the potential for noise impacts at the Portland VAMC campus and surrounding areas as a result of the proposed action. There are no new potential noise impacts as a result of the changes to the proposed action that would require further analysis to be performed. The following baseline report continues to provide an accurate analysis of potential noise impacts as a result of the VA's proposed action, as defined in the Final EA.

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center
Final Noise Report

January 2021

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
Jacobs and LRS Federal LLC

Table of Contents

List of Tables

List of Figures

List of Appendixes

Acronyms and Abbreviations

BMP	best management practice
CFR	*Code of Federal Regulations*
dB	decibel(s)
dBA	A-weighted sound pressure (noise) level
EA	environmental assessment
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
L_{eq}	equivalent noise level
NEPA	National Environmental Policy Act of 1969
OHSU	Oregon Health Sciences University
U.S.	United States
VA	U.S. Department of Veterans Affairs
VAMC	VA Medical Center

1.0 Introduction

The U.S. Department of Veterans Affairs (VA) is considering implementation of several phased projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus) (Figure 1-1). These potential projects, if authorized and approved, would be phased over a long duration (10 or more years) as part of the Portland VAMC master plan and could consist of a series of projects that would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC campus facilities within its existing footprint to enhance patient and employee safety and meet the current and growing healthcare needs of Portland area Veterans. The Portland VAMC is located at 3710 SW U.S. Veterans Hospital Road in Portland, Multnomah County, Oregon.

These projects have been divided into multiple phases. Phase I projects have been authorized for design and construction. Phase II and Phase III projects are conceptual and part of the master plan but have not been authorized to move forward to design and construction.

The Proposed Action includes the authorized Phase I projects, which consist of the following (Figure 1-2):

- Design and construction of a complete seismic upgrade to Building 100 (main hospital building), Building 101 (research/administration building), and Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101).
- Replacement of the façade of Buildings 100 and 101.
- Building 102 improvements and realignment of the plaza and roadway to address physical security concerns.
- Construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces.

The Phase II and Phase III projects are not part of the Proposed Action. They are in the conceptual stage and may be authorized in the future for design and construction but are not ready for analysis at this time. These potential projects include:

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction.
- Construction of Building 110, an approximately 370,000 gross square foot Specialty Care Building.
- Construction of Building 111, an approximately 450-space parking structure in the area south of Building 101.
- Construction of Building 112, an approximately 450-space parking structure near Building 16 and in the current location of surface parking Lot 4.
- Improvements and upgrades to the Energy Center such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades including the renovation and modernization of Buildings 100 and 101 to achieve full seismic compliance.

The environmental assessment (EA) will focus on analyzing Phase I project impacts and, to the extent practical, discuss Phase II and III projects and the overall potential cumulative impacts on the VAMC campus and surrounding area. Phase II and Phase III projects and associated impacts will be fully analyzed in future supplemental EA(s) when reasonably foreseeable and sufficient information is available to properly conduct the impact analysis in accordance with National Environmental Policy Act of 1969 (NEPA).

This report provides a summary of expected sound levels associated with the construction and operation aspects of the projects.

1.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this evaluation are summarized in Table 1-1.

Table 1-1. Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient noise level is typically defined by the L_{eq} level.
Sound pressure (noise) level decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound pressure (noise) level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound (noise) levels in this report are A-weighted.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.

A-weighted sound levels are typically measured or presented as equivalent noise level (L_{eq}), defined as the average noise level on an equal-energy basis for a stated period of time. A-weighted sound levels are commonly used to measure steady-state sound or noise that is usually dominant.

1.2 Regulatory Framework

NEPA regulations require “[f]ederal agencies to include in their decision-making processes appropriate and careful consideration of all environmental effects of proposed actions, analyze potential environmental effects of proposed actions and their alternatives for public understanding and scrutiny, avoid or minimize adverse effects of proposed actions, and restore and enhance environmental quality as much as possible” (*Code of Federal Regulations* [CFR]) Title 40, Part 6). Under NEPA, an environmental impact statement must be prepared when “[t]he Federal action may directly or through induced development have a significant adverse effect upon local ambient air quality, local ambient noise levels, surface water or groundwater quality or quantity, water supply, fish, shellfish, wildlife, and their natural habitats.” NEPA does not specify a threshold for “significant adverse effect” for noise.

While no federal regulations limit overall environmental noise levels, the VA identifies construction noise management measures in its "Temporary Environmental Controls" specification (Appendix A). These noise management measures include:

- Performing noisy activities during less sensitive hours of the day or week.
- Providing sound-deadening devices on equipment and utilizing sound barriers and silencers.
- Routine monitoring of construction sound levels.

In addition, construction sound levels are regulated at the local level (Appendix A). Portland City Code Section 18.10.060, "Construction Activities and Equipment," establishes regulations for construction noise in the City of Portland, which can be summarized as follows:

- **Permissible Hours and Noise Level** – From 7 a.m. to 6 p.m. Monday through Saturday, the City permits 85 dBA at a 50-foot distance. Equipment that cannot readily comply (e.g., jack hammers, concrete saws, and pile drivers) are exempt from the standard during this time period.
- **Outside Permissible Hours** – Work at other hours must meet the "baseline permitted decibel levels" of the area in which the work is taking place. Most activities would be in violation of the code for exterior work (e.g., clearing, grading, excavating, framing, roofing, and so forth) before 7 a.m., after 6 p.m., or on Sundays and the holidays such as New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

The City of Portland establishes a variance process for times when work must occur outside permissible hours. Noise regulations do not apply for emergency work "…necessary to restore property to a safe condition following a public calamity, work to restore public utilities, or work required to protect persons or property from imminent exposure to danger," For non-emergency work outside permitted hours, projects may apply for a variance. Construction noise variances may be issued if the need is valid and there is ample notification to nearby neighbors.

The full text of the Portland City Code on construction code is as follows:

> *A. Maximum sound levels: No person shall operate any equipment or appurtenances thereto in commercial construction activities which exceeds 85 dBA, when measured at 50 feet (15.2 meters) from the source. This standard shall not apply to trucks (see Section 18.10.020), pile drivers, pavement breakers, scrapers, concrete saws and rock drills.*
>
> *B. Night, weekend, and legal holidays limitation: From 6:00 p.m. to 7:00 a.m. the following morning, and 6:00 p.m. Saturday to 7:00 a.m. the following Monday, and on legal holidays, the permissible sound levels of Section 18.10.010 shall apply to all construction activities except by variance or for reasons of emergency. The exempted equipment of Section 18.10.060 A is not exempted during these hours. For purposes of this Subsection, construction activities on a public road within a zone shall be considered as taking place on private property within that zone.*
>
> *C. The adjustments to permissible sound levels established in Section 18.10.010 B apply to Subsections A and B above.*
>
> *D. All equipment used in commercial activities shall have sound control devices no less effective than those provided on the original equipment, and no equipment shall have an unmuffled exhaust.*
>
> *E. All equipment used in commercial construction activities shall comply with pertinent standards of the U.S. Environmental Protection Agency.*

F. Pile Drivers:

1. Notwithstanding Subsection B above, the permissible sound levels of Section 18.10.010 shall apply to pile drivers from 6 p.m. to 8 a.m. the following morning, and 6 p.m. Friday to 8 a.m. the following Monday, and on legal holidays.

2. The owner of a site on which pile driving will occur shall cause a notice to be mailed to all residences within 500 feet of the site. Mailing will occur no fewer than 30 days prior to the commencement of pile driving. The notice shall list the expected starting and ending dates for pile driving and give a telephone number for further information.

If the use of pile drivers, pavement breakers, scrapers, concrete saws, or rock drills occurs between 6 p.m. to 8 a.m. the following morning, and 6 p.m. Friday to 8 a.m. the following Monday, and on legal holidays, the use is no longer exempt from the 85 dBA at 50 feet limitation and would be subject to the baseline permitted decibel levels established in Portland City Code Section 18.10.010, including the 5 dBA penalty of Section 18.10.010(B), which are as follows:

Except as specifically provided for elsewhere in this Title, no person shall cause or permit sound to intrude into the property of another person which exceeds the limits set forth below in this Section. For purposes of this Section, "day hours" shall be between 7 a.m. and 10 p.m., and "night hours" shall be between 10 p.m. and 7 a.m.

A. The sound levels established are as set forth in Figure 1 before any adjustments are applied:

FIGURE 1

PERMISSIBLE SOUND LEVELS

(7 am-10 pm, otherwise minus 5 dBA)

Zone Categories of Source	*Zone Categories of Receiver (measured at property line)*			
	Residential	*Open Space*	*Commercial/ Mixed Use*	*Industrial*
Residential	*55*	*55*	*60*	*65*
Open Space	*55*	*55*	*60*	*65*
Commercial/ Mixed Use	*60*	*60*	*70*	*70*
Industrial	*65*	*65*	*70*	*75*

B. Adjustments to Figure 1.

1. During the night hours, the sound levels of Figure 1 shall be reduced 5 dBA.

2. During all hours, the sound levels of Figure 1 shall be decreased 5 dBA for narrow band or steady sound (apply 1 only).

3. The adjustments provided herein are cumulative.

C. If a dwelling unit or noise sensitive receiver is in a nonresidential zone of the City, the nonresidential standard shall normally apply, unless:

1. a complaint is received, and

2. the dwelling unit or noise sensitive receiver type use predates that of the noise source. In that case, the permissible sound level, as measured at the lot line of the dwelling unit or other noise sensitive receiver, shall be 65 dBA in a commercial/mixed use zone, and 70 dBA in an employment or industrial zone, each subject to the adjustments of Section 18.10.010 B., F., and G.

D. Nonconforming use: The maximum permissible sound level that may be emitted from any lot containing a nonconforming use shall be the same as that permitted for the most restrictive zone in which the use would be conforming.

E. When a sound source can be identified and its sound measured in more than one zone, each of the appropriate sections shall apply at the boundaries between zones.

F. Impulse sound: Notwithstanding the sound levels of this Section, no person shall cause or permit the operation of an impulsive noise source which has a peak sound pressure level in excess of 100 dB during day hours or 80 dB during night hours.

G. Octave band measurements: When the Noise Control Officer makes a finding that the frequency characteristics of the sound are such that the A-scale levels specified in Section 18.10.010 are inadequate to protect the public health, welfare, or safety, octave-band sound pressure level measurements shall be performed.

1. Octave-band measurements shall be compared to the appropriate values indicated in Figure 2 for equivalent permissible dBA land use values; octave-band sound pressure in excess of these standards shall be considered evidence of a violation of this Title.

FIGURE 2

PERMITTED OCTAVE BAND SOUND PRESSURE LEVELS

FOR GIVEN PERMISSIBLE dBA SOUND LEVELS

When the permissible dBA level is:	*The Maximum Octave Band Sound Pressure Levels Shall Not Exceed:*								
	Octave Band Center Frequency, in Hz								
	31.5	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*
45	*64*	*58*	*51*	*46*	*42*	*39*	*36*	*33*	*30*
50	*65*	*62*	*56*	*50*	*46*	*43*	*40*	*37*	*34*
55	*68*	*65*	*61*	*55*	*52*	*49*	*46*	*43*	*40*
60	*72*	*68*	*64*	*60*	*56*	*54*	*51*	*48*	*45*
65	*76*	*72*	*68*	*64*	*61*	*59*	*56*	*53*	*50*
70	*79*	*76*	*72*	*69*	*66*	*64*	*61*	*58*	*55*
75	*82*	*79*	*76*	*73*	*71*	*69*	*66*	*63*	*60*

H. When property of the receiver is unoccupied, as in the case of any undeveloped lot, sound levels in excess of those specified herein, shall be considered only as a technical violation of the standard. No citation shall be issued in such instances, nor is corrective action required by the noise source.

FIGURE 1-1
SITE LOCATION MAP

PREPARED FOR
U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC
NOVEMBER 2020

N

SOURCE: ESRI WORLD IMAGERY

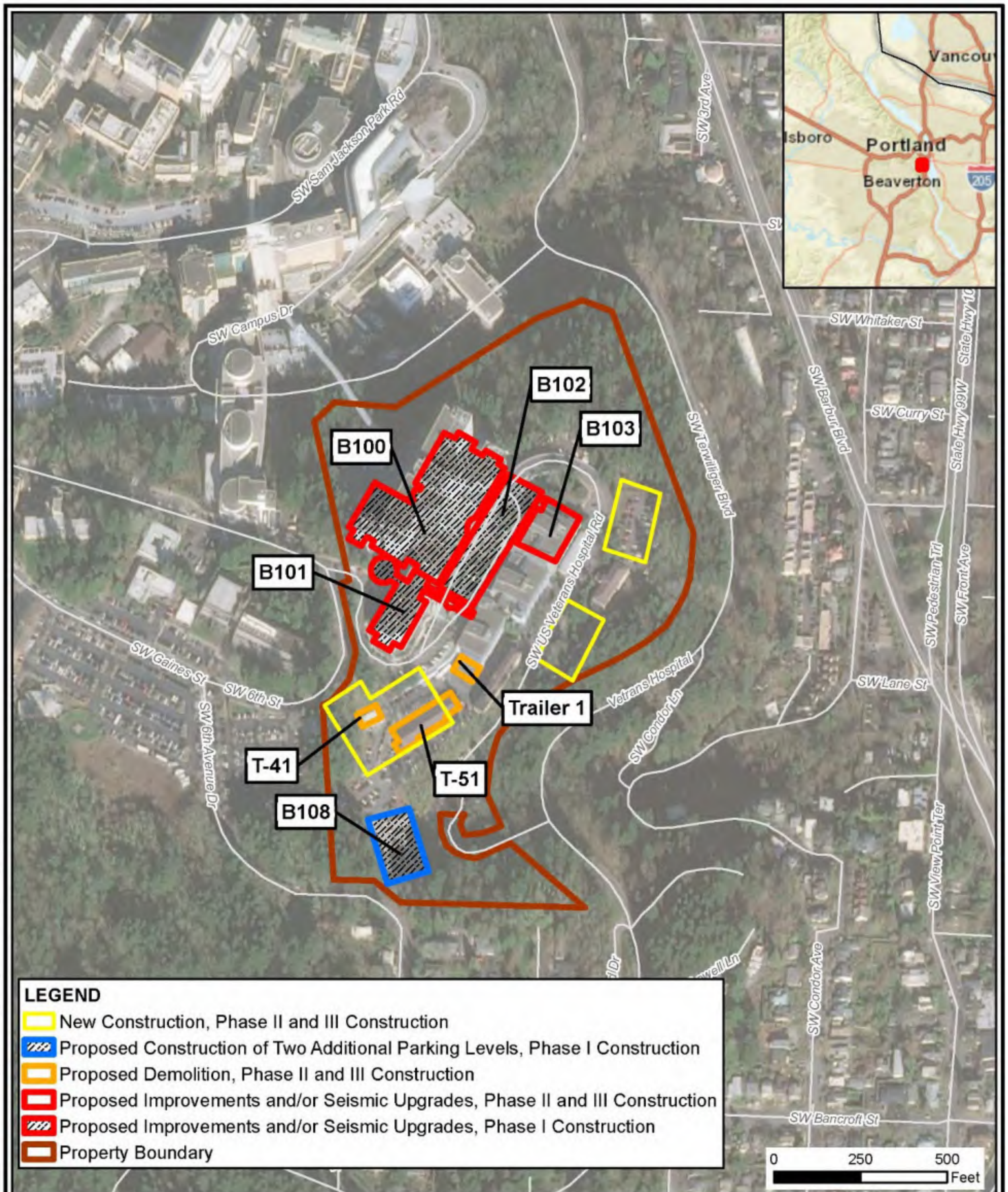


FIGURE 1-2
PROPOSED CONSTRUCTION MAP

PREPARED FOR
U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC
NOVEMBER 2020

N

Jacobs

SOURCE: ESRI WORLD IMAGERY

2.0 Existing Noise Environment

The existing noise environment around the Portland VAMC campus is dominated by vehicle traffic/parking, mechanical equipment, and routine landscaping and maintenance. In addition, there is intermittent, occasional noise associated with the helicopter pads at the Oregon Health Sciences University (OHSU) Marquam Hill Campus, located approximately 500 feet north and 750 feet west of the Portland VAMC campus. The OHSU Marquam Hill Campus includes the OHSU Hospital, as well as the Doernbecher Children's Hospital, the Casey Eye Institute, the School of Nursing, and other learning, research, and treatment facilities. No other notable noise-generating sources are present in the immediate vicinity of the Portland VAMC campus.

Land use in the vicinity includes open space, residential, commercial, and industrial (Figure 2-1). Sensitive noise receptors that could be affected by construction and operational noise from the Portland VAMC campus include Portland VAMC patients, visitors, and staff; nearby residences, parks, and churches; and the patients, visitors, and staff of the OHSU medical center (Figure 2-2).

Residences northeast and east of the VAMC campus are located 300 feet or more from the proposed construction areas. Residences south of the campus are located 100 feet or more from the proposed construction areas. Indoor noise levels with windows closed typically would be 15 decibels lower than outdoor levels.

Table 2-1 shows the distances of each possible noise sensitive receptor from the boundary of the Portland VAMC campus.

Table 2-1. Distance of Noise Sensitive Receptors from the Portland VAMC Campus

Name	Distance to VA Property Boundary (feet)
St. Elizabeth of Hungary (Church)	120
Marquam Nature Park (property boundary)	190
Multnomah Pavilion	1,000
OHSU Auditorium	1,150
Jones Hall (OHSU Campus)	1,250
Mackenzie Hall (OHSU Campus)	1,021
Shriners Hospitals for Children	880
Doernbecher Children's Hospital	250
Casey Eye Institute	190
OHSU School of Medicine	930
OHSU School of Nursing	930
Cedarwood Waldorf School	1,145

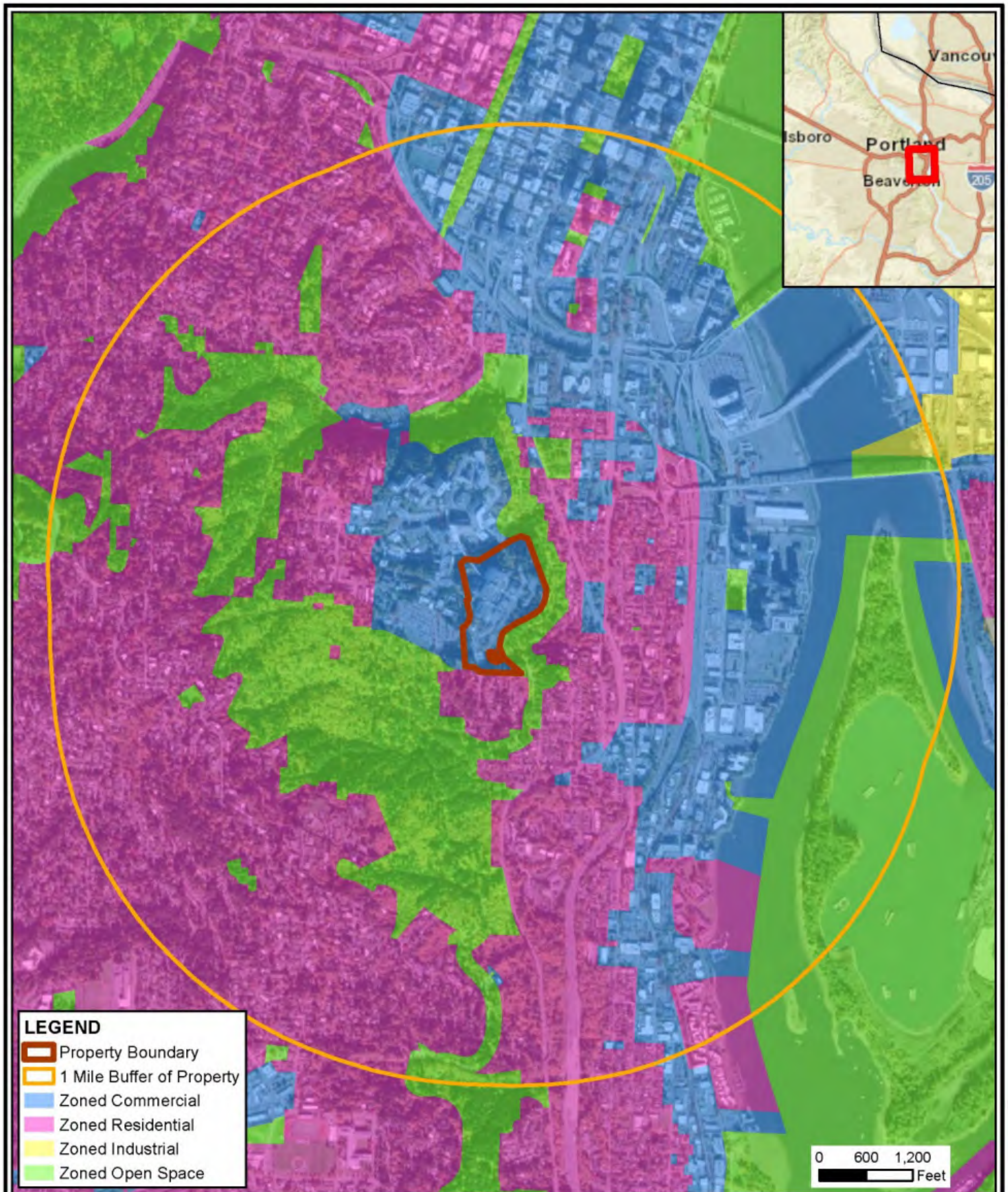


FIGURE 2-1
LAND USE MAP

PREPARED FOR
U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC
NOVEMBER 2020

N

Jacobs

SOURCE: ESRI WORLD IMAGERY

FIGURE 2-2
NOISE SENSITIVE RECEPTORS MAP

PREPARED FOR
U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC
NOVEMBER 2020

N

Jacobs

SOURCE: ESRI WORLD IMAGERY

3.0 Future Noise Environment and Impacts

3.1 Construction

The Proposed Action would result in short-term increases in noise from construction activities. Noise-generating sources during demolition and construction would be associated primarily with standard construction equipment and construction equipment transportation.

Demolition and construction activities generate noise by their very nature and are highly variable, depending on the type, number, and operating schedules of equipment. Construction projects are usually executed in stages, with each stage having its own combination of equipment and noise characteristics and magnitudes. Demolition and construction activities are expected to be typical of other similar construction projects.

Noise levels from construction activities were estimated based on data and methods derived from the Federal Highway Administration's (FHWA's) *Roadway Construction Noise Model* (FHWA, 2006) and the Federal Transit Administration's (FTA's) *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). The data represent the most recent and comprehensive tabulation of noise from common pieces of construction equipment. Construction equipment noise levels are presented in Table 3-1.

Table 3-1. Construction Equipment Noise Levels from the Roadway Construction Noise Model User's Guide

Equipment Description	Acoustical Usage Factor (%)	Specified Lmax @ 50 feet (dBA)	Actual Measured Lmax @ 50 feet (dBA)	No. of Actual Data Samples (Count)
All Other Equipment > 5 HP	50	85	N/A	0
Auger Drill Rig	20	85	84	36
*Backhoe	40	80	78	372
Bar Bender	20	80	N/A	0
Blasting	N/A	94	N/A	0
Boring Jack Power Unit	50	80	83	1
Chain Saw	20	85	84	46
Clam Shovel (dropping)	20	93	87	4
Compactor (ground)	20	80	83	57
*Compressor (air)	40	80	78	18
Concrete Batch Plant	15	83	N/A	0
*Concrete Mixer Truck	40	85	79	40
*Concrete Pump Truck	20	82	81	30
Concrete Saw	20	90	90	55
*Crane	16	85	81	405
*Dozer	40	85	82	55
Drill Rig Truck	20	84	79	22
Drum Mixer	50	80	80	1
Dump Truck	40	84	76	31

Equipment Description	Acoustical Usage Factor (%)	Specified Lmax @ 50 feet (dBA)	Actual Measured Lmax @ 50 feet (dBA)	No. of Actual Data Samples (Count)
Excavator	40	85	81	170
*Flat Bed Truck	40	84	74	4
*Front End Loader	40	80	79	96
*Generator	50	82	81	19
Generator (< 25 KVA, VMS signs)	50	70	73	74
Gradall	40	85	83	70
*Grader	40	85	N/A	0
Grapple (on backhoe)	40	85	87	1
Horizontal Boring Hydraulic Jack	25	80	82	6
Hydra Break Ram	10	90	N/A	0
*Impact Pile Driver	20	95	101	11
*Jackhammer	20	85	89	133
Man Lift	20	85	75	23
Mounted Impact Hammer (hoe ram)	20	90	90	212
Pavement Scarifier	20	85	90	2
*Paver	50	85	77	9
Pickup Truck	40	55	75	1
*Pneumatic Tools	50	85	85	90
*Pumps	50	77	81	17
Refrigerator Unit	100	82	73	3
Rivet Buster/chipping gun	20	85	79	19
*Rock Drill	20	85	81	3
Roller	20	85	80	16
Sand Blasting (Single Nozzle)	20	85	96	9
*Scraper	40	85	84	12
Shears (on backhoe)	40	85	96	5
Slurry Plant	100	78	78	1
Slurry Trenching Machine	50	82	80	75
Soil Mix Drill Rig	50	80	N/A	0
*Tractor	40	84	N/A	0
Vacuum Excavator (Vac-truck)	40	85	85	149
Vacuum Street Sweeper	10	80	82	19
Ventilation Fan	100	85	79	13
Vibrating Hopper	50	85	87	1
Vibratory Concrete Mixer	20	80	80	1
*Vibratory Pile Driver	20	95	101	44

Equipment Description	Acoustical Usage Factor (%)	Specified Lmax @ 50 feet (dBA)	Actual Measured Lmax @ 50 feet (dBA)	No. of Actual Data Samples (Count)
Warning Horn	5	85	83	12
Welder/Torch	40	73	74	5

Source*:* FHWA, 2006

* = VA "Temporary Environmental Controls" specification identifies lower sound level (VA, undated)

N/A = not applicable

As described by FTA, the average noise level from each piece of equipment is determined by the following formula for geometric spreading:

Typical Noise Level at 50 feet + 10*log (Adj_{usage}) – 20*log (distance to receptor/50) – 10*G*log(distance to receptor/50)

Because specific construction methods and daily schedules for the Proposed Action are not understood at this phase of the analysis and construction is by its nature a dynamic activity, the following typical values were used:

- Usage factor (Adj_{usage}) is 1 (i.e., equipment is operating continuously)
- Ground effect factor (G) is 0, representing hard ground (i.e., a ground condition that does not result in additional attenuation)

The total noise level then becomes solely a function of the type of equipment operating and the distance from the equipment to the noise receptor.

A review of the construction equipment noise levels presented in Table 3-1 indicates that the loudest equipment generally emits noise in the range of 80 dBA to 90 dBA at 50 feet. Noise at any specific receptor is dominated by the closest and loudest equipment. The types, numbers, and duration of equipment anticipated to be used during construction near any specific receptor location will vary over time. A general construction noise estimate was developed based on the general assumption of multiple pieces of loud equipment operating near each other (the impact pile driving is addressed separately). Specifically, the analysis uses five pieces of general construction equipment working near each other, as follows:

- One piece of equipment generating a reference noise level of 85 dBA at 50 feet at the edge of the construction area.
- Two pieces of equipment generating reference 85 dBA noise levels located 50 feet farther away from the edge of construction.
- Two more pieces of equipment generating reference 85 dBA noise levels located 100 feet farther away the edge of construction.

Expected average construction equipment noise levels at various distances, based on this scenario, are presented in Table 3-2.

Table 3-2. Average Construction Equipment Noise Levels Versus Distance

Distance from Construction Activity (feet)	Average Construction Noise Level (dBA)
50	87
100	83
200	78
400	73
800	67

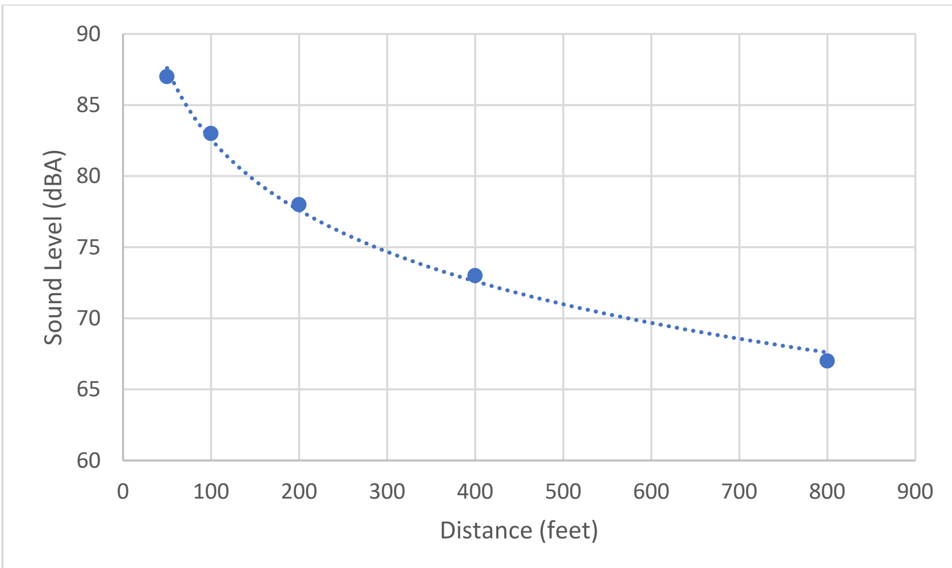


Figure 3-1. Plot of Sound Level versus Distance

Areas expected to experience the highest levels of construction noise are those closest to the construction activities, which include the occupied Portland VAMC buildings, residential areas near the VAMC campus, and the adjacent OHSU medical center. Residences northeast and east of the VAMC campus are located 300 feet or more from the proposed construction areas. Residences south of the campus are located 100 feet or more from the proposed construction areas. Indoor noise levels with windows closed would be expected to be 15 decibels lower than outdoor levels. Construction is a dynamic activity, so sound levels will vary.

The seismic retrofit activities include the installation of additional piles for Buildings 100, 101, and 102 and the installation of new pile-supported foundations for the Specialty Care Building and the new parking garages. There are a variety of potential pile installation techniques, including driven methods (e.g., impact hammer, vibratory hammer) and quieter drilled methods such auger or micropiling. Micropile installation causes less noise than conventional piling techniques, especially when compared to driven piles. A 2008 report for the FHWA, *Use of Micropiles for Foundations of Transportation Structures*, summarizes the benefits of micropiles as a "pile that would be able to carry large loads while causing minimal vibration or disturbance to in situ materials at the time of installation. The rigs required to install them are often relatively small. Because of these important advantages, micropiles have been widely used in seismic retrofitting, in the rehabilitation of foundations of structures that are very sensitive, and in locations with low headroom and severely restricted access conditions" (Seo and Prezzi, 2008).

Neither FHWA nor FTA guidance has identified specific sound levels from micropiling. Micropiling noise is not expected to exceed that of an auger drill rig (85 dBA at 50 feet), and depending on the size of the particular micropile rig, may be substantially less than this. Thus, the preceding general construction equipment estimate is representative for auger and micropile installation activities.

It is anticipated that pile installation methods will be selected during final design in consultation with the Portland VAMC with the goal of balancing the structural and geotechnical requirements with the bearing capacity provided by each pile installation method and the Portland VAMC's noise and vibration concerns. To ensure a robust analysis, the potential sound levels from impact pile driving are summarized separately from other activities in this analysis. Project documentation notes that "past site experience indicates that the basalt rock, commonly found below the ground surface, may exist at varying depths… if the basalt is located close to the surface, excavation and removal of the rock is expensive and disruptive to adjacent hospital operations." The predicted sound levels from impact pile driving are anticipated to yield a conservative assessment of noise associated with basalt removal activities.

As listed in Table 3-1, pile drivers may result in a noise level of 101 dBA at 50 feet. Pile driving sound levels would be expected to decrease at a rate of 6 dBA per doubling of distance. Table 3-3 presents the predicted sound level from impact pile driving at various distances.

Table 3-3. Predicted Pile Driving Sound Levels

Distance from Pile Driver (feet)	Sound Level (dBA)
50	101
100	95
200	89
400	83
800	77
1,600	71
3,200	65

3.2 Operations

No significant long-term noise impacts are associated with the Proposed Action. The Portland VAMC would remain a quiet medical facility with operational noise from heating, ventilation, and air conditioning (HVAC) systems and ground maintenance, similar to the current conditions at the campus. Vehicle traffic to and from the campus may increase slightly; however, a doubling in traffic volume is required for there to be a 3 dBA increase, which would be considered just perceptible.

3.3 Mitigation

The routine best management practices (BMPs) for minimizing noise concerns are summarized in this section. In addition to these BMPs, a construction noise management and communication plan will be developed during the detailed design phase and implemented prior to the start of construction. The plan will facilitate coordination and communication between the Project team and the neighboring building facility managers to assess potentially unique concerns that need to be addressed during the final constructability assessment, including the potential phasing of the planned construction activities and potential temporary relocation of facility staff and patients as appropriate. The communication plan will include a project website, which will be used to provide the public with construction updates and notifications of upcoming construction activities and allow people to sign up for email and mail updates. A communications manager will coordinate directly with representatives from adjacent properties to provide advance notice of construction activities and will be the single point of contact for residents and businesses throughout construction.

The following best management practices will be incorporated into the Proposed Action:

- Comply with the VA's "Temporary Environmental Controls" specifications (VA, undated).
- Comply with the City of Portland Noise Regulations, to the extent practicable. Obtain variance as necessary.
- Coordinate proposed construction activities in advance with nearby sensitive receptors. Let the public know what operations would be occurring at what times, including when they would start and when they would finish each day. Post signage at the entry points of the campus providing current construction information, including schedule and activity.
- Limit, to the extent possible, construction and associated heavy truck traffic to occur between 7:00 a.m. and 6:00 p.m. on Monday through Saturday.
- Locate stationary operating equipment as far away from sensitive receptors as possible.
- Select material transportation routes as far away from sensitive receptors as possible.
- Shut down noise-generating heavy equipment when it is not needed.
- Maintain equipment per manufacturer's recommendations to minimize noise generation.
- Utilize broadband, self-adjusting backup alarms in lieu of backup-beepers consistent with applicable safety requirements.
- Encourage construction personnel to operate equipment in the quietest manner practicable (e.g., speed restrictions, retarder brake restrictions, engine speed restrictions, etc.).

4.0 References

City of Portland. Portland City Code Title 18 Noise Control. https://www.portlandoregon.gov/citycode/28182

Federal Highway Administration (FHWA). 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September.

Seo, Hoyoung, and Monica Prezzi. 2008. *Use of Micropiles for Foundations of Transportation Structures*. Final report. FHWA/IN/JTRP-2008/18. December.

U.S. Department of Veterans Affairs (VA). Undated. Master Construction Specifications (PG-18-1). Division 01 – General Requirements. Temporary Environmental Controls – Section 01 57 19.

.

A Temporary Environmental Controls Specifications

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

SPEC WRITER NOTE: Refer to and edit this Section per the environmental protection actions required and identified in the specific project mitigation memorandum on file with the Project Director. Delete or add information between //----// and any other items applicable to project. Renumber the paragraphs as applicable.

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Effect other species of importance to humankind, or;
4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:

1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent

soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
7. Sanitary Wastes:
   a. Sewage: Domestic sanitary sewage and human and animal waste.
   b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

A. Establish and maintain quality control for the environmental protection of all items set forth herein.

B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. U.S. National Archives and Records Administration (NARA):
33 CFR 328..............Definitions

1.4 SUBMITTALS

A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the Resident Engineer to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the Resident Engineer // and the Contracting Officer // for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
   a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
   b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
d. Description of the Contractor's environmental protection personnel training program.
e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
h. Permits, licenses, and the location of the solid waste disposal area.
i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, // stream crossings, // material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.
j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.

B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Resident Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
   a. Box and protect from damage existing trees and shrubs to remain on the construction site.
   b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
   c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the

construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.

SPEC WRITER NOTE: The design year storm is determined by the downstream environment to be protected. Implement appropriate protection based on the estimate of damage to the downstream environment versus the design year storm that will cause damage. If permanent sediment basins are necessary for the particular project, include these permanent facilities in the project design and the contract documents. If permanent basins are not required, delete reference thereto.

a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local //______// (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.

b. Reuse or conserve the collected topsoil sediment as directed by the Resident Engineer. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.

c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.

5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features // shown. // on the Environmental Protection Plan. // Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on // and off // Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
7. Manage and control spoil areas on // and off // Government property to limit spoil to areas // shown // on the Environmental Protection Plan // and prevent erosion of soil or sediment from entering nearby water courses or lakes.

8. Protect adjacent areas from despoilment by temporary excavations and embankments.
9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
11. Handle discarded materials other than those included in the solid waste category as directed by the Resident Engineer.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.

1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.

SPEC WRITER NOTE: Specify additional operations unique to this contract.

3. Monitor water areas affected by construction.

D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of // insert Name of State and title of State

Air Pollution Statue, Rule, or Regulation // and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Resident Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 //___//a.m. and 6:00//____//p.m unless otherwise permitted by local ordinance or the Resident Engineer. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

SPEC WRITER NOTE: Insert additional information as needed when unique to a particular VA Medical Center site.

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
   a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	//--//
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

   b. Use shields or other physical barriers to restrict noise transmission.
   c. Provide soundproof housings or enclosures for noise-producing machinery.
   d. Use efficient silencers on equipment air intakes.
   e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
   f. Line hoppers and storage bins with sound deadening material.
   g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 // ____ // dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow

response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Resident Engineer noting any problems and the alternatives for mitigating actions.

G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Resident Engineer. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

- - - E N D - - -

G Appendix G: Cultural Resources Inventory

U.S. DEPARTMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Washington DC 20420

U.S. Department of Veterans Affairs
Portland Veterans Affairs Medical Center (VAMC)
Final Cultural Resources Inventory Report

Following the finalization of the Cultural Resources Inventory Report, the U.S. Department of Veterans Affairs (VA) provided minor changes to its proposed action, as described below:

- **Building 110**, the Specialty Care Building, was reduced in size by approximately 45,000 square feet.
- **Building 111**, the proposed parking garage to be located adjacent to Building 110, increased in parking capacity.
- **Building 112**, the previously proposed parking garage to be located on the eastern boundary of the campus, was omitted from the construction plan. Building 112 included 450 parking spaces.
- Construction phasing for project components was removed from the proposed action.

These changes to the proposed action, as detailed in the Draft and Final EA, further reduce the potential for impacts to cultural resources at the Portland VAMC campus and surrounding areas as a result of the proposed action. There are no new potential impacts to cultural resources as a result of the changes to the proposed action that would require further analysis to be performed. The following baseline report continues to provide an accurate analysis of potential cultural resources impacts as a result of the VA's proposed action, as defined in the Final EA.

U.S. Department of Veterans Affairs

Portland Veterans Affairs Medical Center Cultural Resources Inventory

May 2021

Prepared for:
U.S. Department of Veterans Affairs
Office of Construction and Facilities Management

Prepared by:
LRS Federal LLC

Executive Summary

The U.S. Department of Veterans Affairs (VA) is considering implementation of several phased projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus). These potential projects, if authorized and approved, would be phased over a long period (10 or more years) as part of the Portland VAMC master plan and could consist of a series of projects that would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC campus facilities within its existing footprint to enhance patient and employee safety and meet the current and growing healthcare needs of Portland-area Veterans. The Portland VAMC is located at 3710 SW US Veterans Hospital Road in Portland, Multnomah County, Oregon. These projects have been divided into multiple phases. Phase I projects have been authorized for design and construction. Phase II and Phase III projects are conceptual and part of the master plan but have not been authorized to move forward to design and construction.

As a companion study to the Phase I projects, the objective of this cultural and archaeological resource survey report is to evaluate project action effects on historic properties by conducting background research and a desktop review of the entire Portland VAMC campus with a focus on buildings undergoing proposed seismic upgrades and alterations for the proposed undertaking, as well as identifying experts and interested parties. This is intended as an internal report to assist VA with its National Historic Preservation Act (NHPA) Section 106 consultation responsibilities, by providing reporting results along with recommendations and a finding of effect.

The proposed undertaking seeks to address seismic deficiencies and construct updates to buildings and parking lots as part of Phase I at the Portland VAMC campus. Phase I will consist of seismic upgrades to Buildings 100, 101, and 102; replacement of the façades of Buildings 100 and 101; improvements and realignment of the plaza and roadway for Building 102; and construction of two additional parking levels of Building 108. No ground disturbance is proposed for the current undertaking in previously undisturbed sediments. The campus structures sit on a hilltop that was excavated to a level grade during the construction of the original hospital in the early 1900s. Most of the cultural layer of soils were removed during that process. The proposed excavations will occur within the building footprints at depths below what would have been the cultural horizon. Open areas on the periphery of the direct APE are steeply sloped and impractical for excavation or heavy equipment use. Staging and materials are planned to occur on existing parking lot spaces. The few green spaces between structures have been excavated, imported, and landscaped. Based on the previously conducted cultural resources investigations on the Portland VAMC campus, the direct APE is at a low risk for inadvertently discovering pre-contact cultural resources and a low risk for uncovering historic-period cultural resources. However, SWCA recommends a project-related inadvertent discovery plan be created for the project, outlining procedures on what to do and who to contact if there is an inadvertent discovery as a result of any project-related minor ground-disturbing activities in previously disturbed sediments during construction.

No structures are currently listed as properties eligible for the NRHP (as listed by SHPO) within the direct or indirect APE on the Portland VAMC campus. The only structures identified to be 50 years or older were recorded by Schwab Engineering and Management (2018), and include Buildings 6, 16, and the stone masonry walls within the campus. However, these structures were determined not eligible for the NRHP. While the proposed undertaking may increase traffic on historic-period Terwilliger Parkway (historically, SW Terwilliger Boulevard), this change will not likely have negative impacts to the parkway. Terwilliger Parkway was determined to be an eligible property and was added to the NRHP in March 2021. The parkway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historical road over time. Terwilliger Parkway's listing will not be affected by the undertaking because standard re-pavement alterations over time do not affect its listing under Criterion A, or its integrity. Therefore, Terwilliger Parkway will not be affected by the proposed undertaking. Further, because the Portland VAMC campus underwent major upgrades over the past

decades, most notably demolishing most existing structures in the mid-1970s and replacing them with new structures in 1981, all other structures on the campus, besides Buildings 6, 16, and the stone masonry walls, are modern. Based on the background research and the reconnaissance survey, the proposed undertaking will not negatively impact historic properties. Therefore, SWCA recommends a finding of **no historic properties affected** (36 CFR 800.5(b)) for both direct and indirect effects of the proposed project.

It is VA's responsibility to initiate NHPA Section 106 and government-to-government consultation with the SHPO and Native American tribes whose lands may be affected by the action or who may attach religious and cultural significance to affected properties. This consultation process must provide a reasonable opportunity to identify their concerns with the proposed undertaking and to request their concurrence with the finding of no adverse effect to historic properties and confirm that no historic preservation mitigation is necessary for the proposed project.

Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

APE	area of potential effects
B.P.	years before present
CFR	Code of Federal Regulations
DLC	Donation Land Claim
GIS	geographic information system
GLO	General Land Office
GPS	global positioning system
HBC	Hudson's Bay Company
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
OARRA	Oregon Archaeological Records Remote Access
RPA	Registered Professional Archaeologist
SHPO	State Historic Preservation Office
SWCA	SWCA Environmental Consultants
VA	U.S. Department of Veterans Affairs
VAMC	Veterans Affairs Medical Center

1.0 Introduction

The U.S. Department of Veterans Affairs (VA) is considering implementation of several phased projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus). These potential projects, if authorized and approved, would be phased over a long period (10 or more years) as part of the Portland VAMC master plan and could consist of a series of projects that would seismically upgrade, renovate, modernize, and expand the existing Portland VAMC campus facilities within its existing footprint to enhance patient and employee safety and meet the current and growing healthcare needs of Portland-area Veterans. The Portland VAMC campus is located at 3710 SW US Veterans Hospital Road in Portland, Multnomah County, Oregon.

These projects have been divided into multiple phases. Phase I projects have been authorized for design and construction. Phase II and Phase III projects are conceptual and part of the master plan but have not been authorized to move forward to design and construction.

The Proposed Action includes the authorized Phase I projects. The Phase II and Phase III projects are mentioned as part of the master plan but are not considered part of the Proposed Action. The Proposed Action consists of the following:

- Design and construction of a complete seismic upgrade to Building 100 (main hospital building), Building 101 (research/administration building), and Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101).
- Replacement of the façades of Buildings 100 and 101.
- Building 102 improvements and realignment of the plaza and roadway to address physical security concerns.
- Construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces.

The Phase II and Phase III projects are not part of the Proposed Action. They are in the conceptual stage and may be authorized in the future for design and construction but are not ready for analysis at this time. These potential projects include:

- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for new construction.
- Construction of Building 110, an approximately 370,000-gross-square-foot specialty care building.
- Construction of Building 111, an approximately 450-space parking structure in the area south of Building 101.
- Construction of Building 112, an approximately 450-space parking structure near Building 16 and in the current location of surface Parking Lot 4.
- Improvements and upgrades of the Energy Center such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades including the renovation and modernization of Buildings 100 and 101 to achieve full seismic compliance.

The environmental assessment will focus on analyzing Phase I projects impacts and to the extent practical discuss Phase II and III projects and the overall potential impacts on the Portland VAMC campus and surrounding area. Phase II and Phase III projects and associated impacts may also be analyzed in future supplemental environmental assessments when sufficient information is available.

1.1 Cultural Resources Team

As a companion study to the Phase I projects, the objective of this cultural and archaeological resource survey report is to make recommendations to the VA regarding historic properties and the potential project action effects on historic properties by:

- Conducting background research and a desktop review of the entire Portland VAMC campus with a focus on buildings undergoing proposed seismic upgrades and alterations for the proposed undertaking
- Completing a controlled cultural resources reconnaissance survey of the study area.
- Identifying experts and interested parties to assist VA with its National Historic Preservation Act (NHPA) Section 106 consultation responsibilities.
- Reporting results with SWCA's recommendations to the VA for evaluation, including on finding of effect.

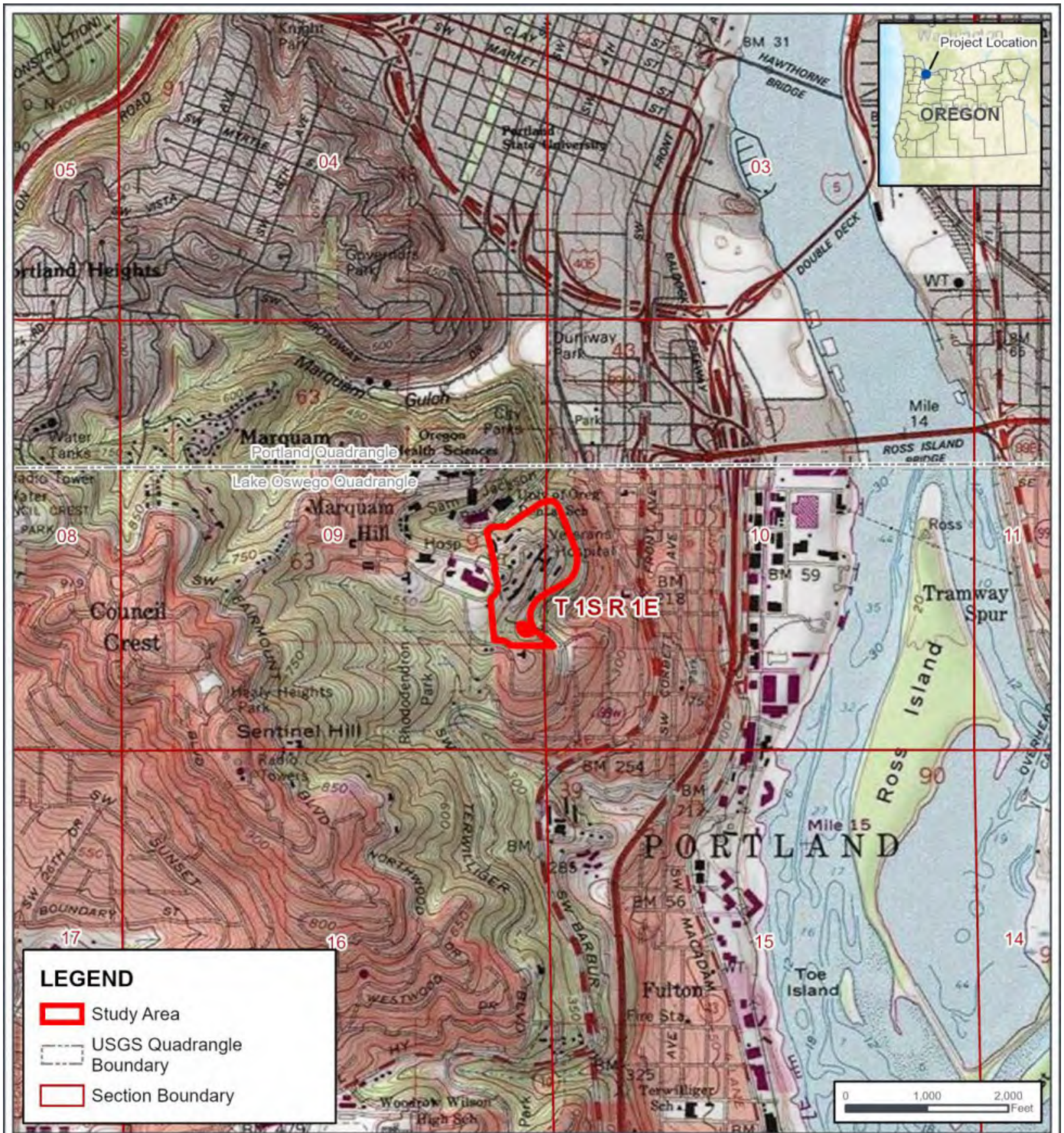
This cultural resources study was performed by SWCA Environmental Consultants (SWCA) staff who meet, or who report to those who meet, the Professional Qualifications Standards of the Secretary of the Interior (36 Code of Federal Regulations [CFR] 61). Amanda Carroll, M.A., Registered Professional Archaeologist (RPA), managed the project and coauthored the report. Colin Christiansen, B.A., led the fieldwork and coauthored the report. Rhiannon Held, M.A., edited the report and prepared the photographs. Catherine Smith produced the graphics and managed the geographic information system (GIS) data.

1.2 Area of Potential Effects and Study Area

Pursuant to the NHPA, and its implementing regulation 36 CFR 800, an area of potential effects (APE) is defined as a geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 CFR 800.16(d)). The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

The proposed undertaking seeks to address seismic deficiencies and construct updates to buildings and parking lots as part of Phase I projects at the Portland VAMC campus. The Phase I projects will consist of seismic upgrades to Building 100, 101, and 102; replacement of the façades of Buildings 100 and 101; improvements and realignment of the plaza and roadway for Building 102; and construction of two additional parking levels at Building 108. SWCA recommends the direct APE consist of the footprint of the four building and parking locations and construction around the perimeter of each location (Figures 1-3 and 1-4). The direct APE around each building encompasses possible foot traffic of construction workers and material staging areas measuring 5.39 acres. No ground disturbance is proposed for the current undertaking in previously undisturbed sediments.

The proposed Phase I projects would change the exterior of the buildings and may produce visual or aesthetic changes relative to the surrounding campus. Further, the historic-period Terwilliger Parkway is located adjacent to the Portland VAMC campus and recent traffic studies for this undertaking indicate there may be an increase in traffic along this road. In order to take into account all possible effects of this undertaking, SWCA recommends the indirect APE consist of the entire Portland VAMC campus as well as Terwilliger Parkway, measuring 28.58 acres, to consider indirect visual effects to the historic integrity of the campus and to the setting of potential contributing properties and historic districts in the region (Figures 1-1 to 1-4). This report refers to the indirect APE of the entire built Portland VAMC campus and Terwilliger Parkway as the study area.



CULTURAL RESOURCES INVENTORY
PORTLAND VETERANS AFFAIRS
MEDICAL CENTER
PORTLAND, OREGON

PREPARED FOR

U.S. DEPARTMENT OF VETERANS AFFAIRS WASHINGTON, DC

DECEMBER 2020

N

SWCA ENVIRONMENTAL CONSULTANTS

SOURCE: USA TOPO MAPS, ESRI

Figure 1-1. Topographic Map of the Study Area

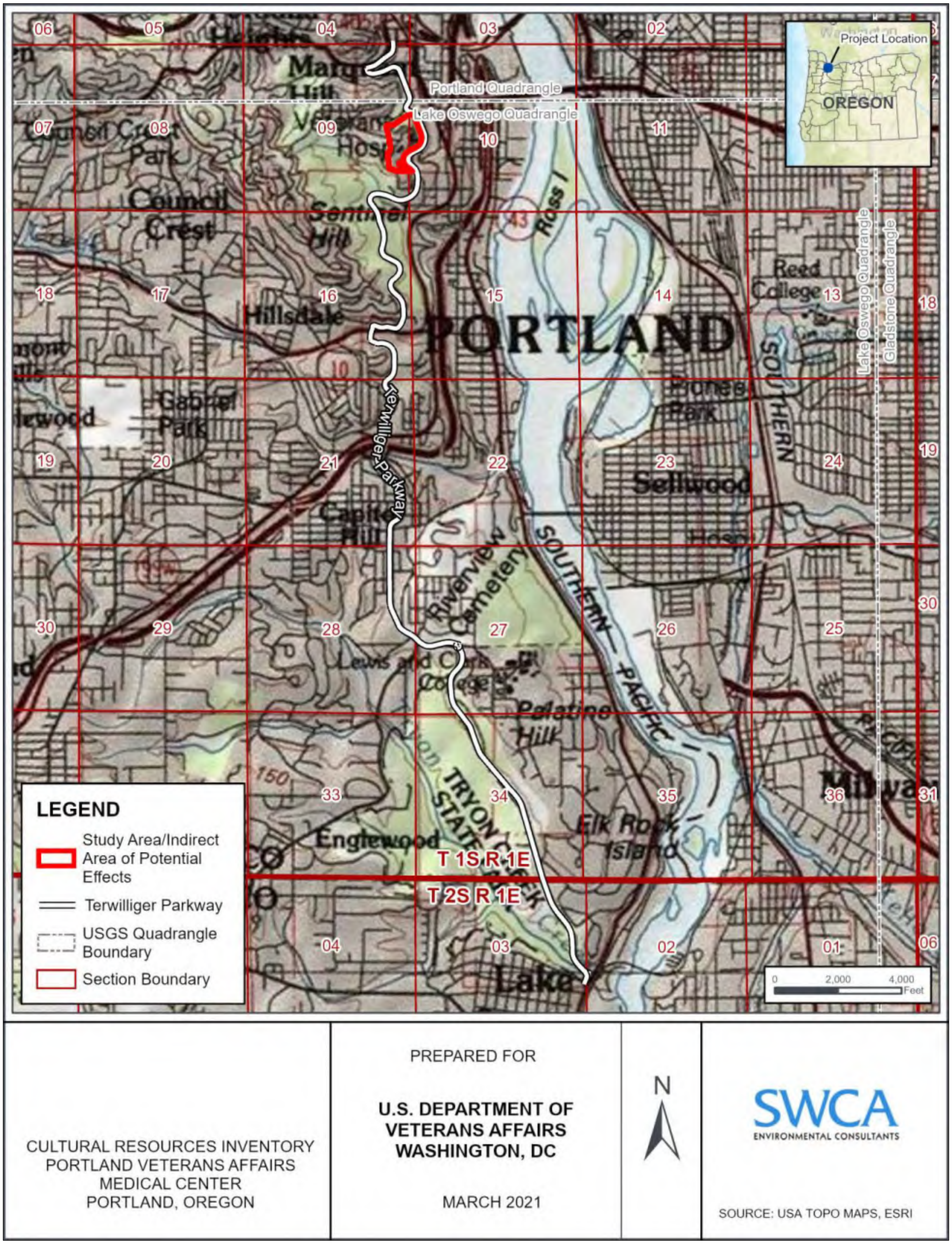


Figure 1-2. Topographic Map of the Study Area and Terwilliger Parkway

Figure 1-3. Aerial Imagery Showing the Study Area (Indirect Area of Potential Effects) and Terwilliger Parkway

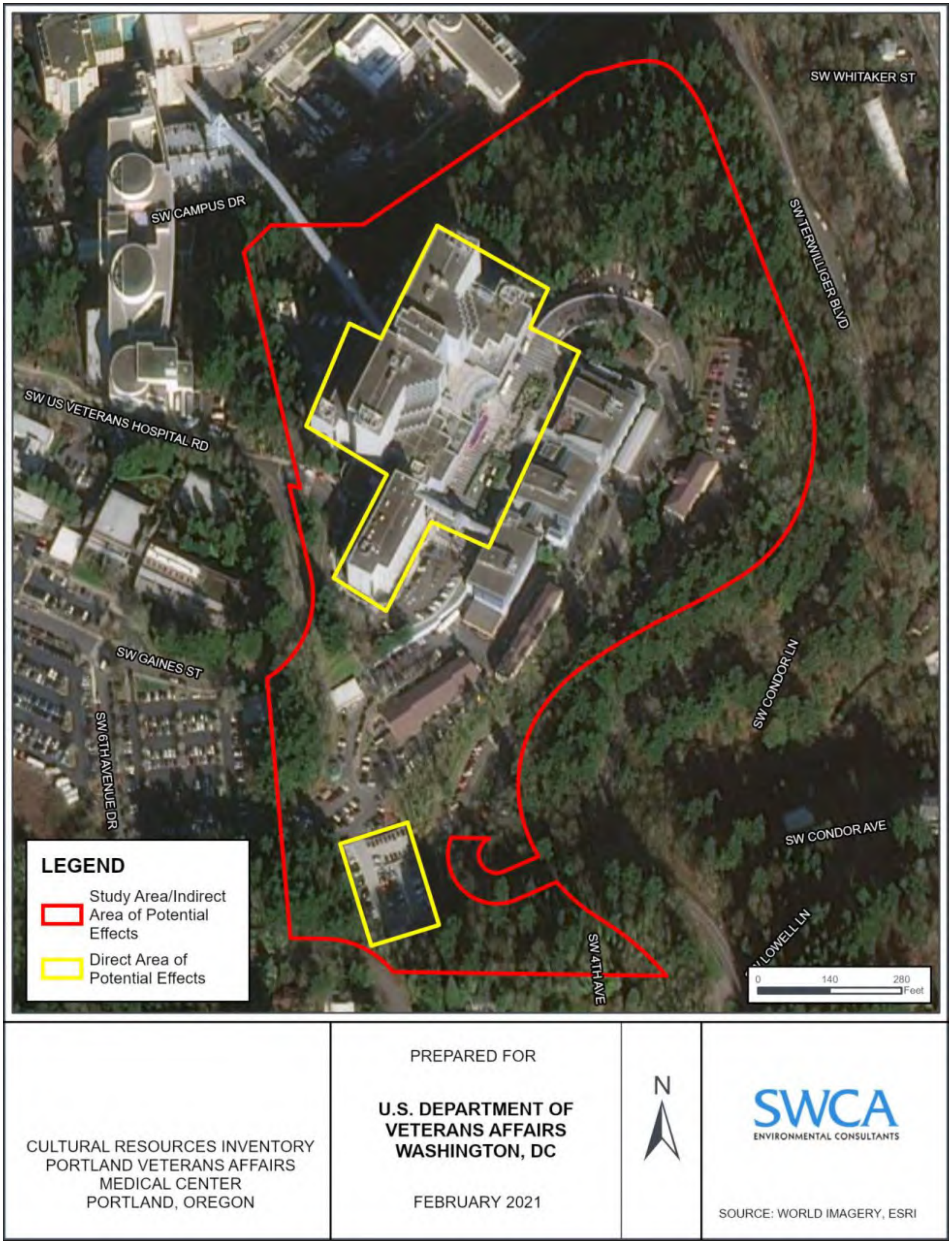


Figure 1-4. Aerial Imagery Showing the Study Area (Indirect Area of Potential Effects) and Direct Area of Potential Effects

2.0 Regulatory Context

The proposed Phase 1 projects (undertaking) is subject to NHPA Section 106, as amended, and its implementing regulations in 36 CFR 800, which requires federal agencies to consider the impacts of their undertakings on the integrity of historic properties either listed or eligible for listing in the National Register of Historic Properties (NRHP). A historic property, as defined in 36 CFR 800.16(l)(1), is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP as maintained by the Secretary of the Interior. Further, under Section 106, the federal agency must consult with and seek comment from the State Historic Preservation Officer and/or the Tribal Historic Preservation Officer, as applicable, and consult with any affected or potentially affected Native American tribe.

The proposed project actions of addressing seismic deficiencies at three buildings (Buildings 100, 101, and 102) on the Portland VAMC campus may have the potential to affect historic properties and cultural resources listed in or determined eligible for the NRHP. This cultural resources report will recommend one of the following findings of effect:

- No historic properties affected (36 CFR 800.4(d)(1)) (either no historic properties were identified in the APE or historic properties identified in the APE would not be affected)
- No adverse effect (36 CFR 800.5(b)) (historic properties identified in the APE would be affected but not adversely)
- Adverse effect to historic properties (36 CFR 800.5(d)(2)) (historic properties identified in the APE would be affected adversely)

2.1 National Register Evaluation Criteria

Cultural resources identified during the survey were evaluated for NRHP eligibility using the following guidelines established by the National Park Service in the National Register Bulletin, *How to Apply the National Register Criteria for Evaluation* (NPS 1997).

To be individually eligible for listing in the NRHP, a property must be significant within a historic context. To evaluate significance and integrity, the following five things must be determined:

1. The facet of prehistory or history of the local area, state, or nation that the property represents
2. Whether the facet of history is significant
3. Whether it is a type of property that has relevance and importance in illustrating the historic context
4. How the property illustrates that history
5. Whether the property possesses the physical features necessary to convey the aspect of history with which it is associated (NPS 1997:44)

According to the National Register Bulletin (NPS 1997), the significance (Items 1–3 above) of a resource within its historic context should first be established and must relate to one or more of the following:

A. Under Criterion A, properties are eligible for the NRHP if they are associated with events that have made a significant contribution to the broad patterns of our history.

B. Under Criterion B, properties are eligible for the NRHP if they are associated with the lives of persons significant in our past (persons whose activities are demonstrably important within a local, state, or national context).

C. Under Criterion C, properties are eligible for the NRHP if they embody the distinctive characteristics of a type, period, or method of construction, or represent the works of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (are part of a district). Discrete features, a particular building for example, may best be documented under this criterion, though collections of resources may also have significance under Criterion C for architecture or engineering association.

D. Under Criterion D, properties are eligible for the NRHP if they have yielded, or may be likely to yield, information important in history. To be eligible under Criterion D, the property must have, or have had, information to contribute to our understanding of human history and that information must be considered "important." Though this is most commonly applied to archaeological sites, buildings, structures, and objects may be eligible under Criterion D if they are the principal source of information (NPS 1997:21).

According to the National Register Bulletin (NPS 1997), integrity (Items 4 and 5 above) is the ability of a property to convey its significance. To be eligible for the NRHP, a property must not only be significant under one or more of the NRHP criteria (A–D above), but it must also have integrity. The evaluation of integrity is grounded in an understanding of a property's physical features and how they relate to its significance. Historic properties either retain integrity (that is, convey their significance) or they do not. To retain integrity, a property will always possess several, and usually most, of the seven aspects of integrity, which are:

1. *Location* is the place where the historic property was constructed or the place where the historic event occurred.
2. *Design* is the combination of elements that create the form, plan, space, structure, and style of a property.
3. *Setting* is the physical environment of a historic property.
4. *Materials* are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
5. *Workmanship* is the physical evidence of crafts of a particular culture or people during any given period in history or prehistory.
6. *Feeling* is the property's expression of the aesthetic or historic sense of a particular period of time.
7. *Association* is the direct link between an important historic event or person and a historic property (NPS 1997:44–45).

3.0 Environmental and Cultural Background

3.1 Geology and Soils

The Portland VAMC campus is located within the lower Willamette Basin geological region. The geologic foundation of the Willamette Valley ties in with the geology of the Coast Range. Prior to the accretion of the then island archipelago of the Coast Range to the North American plate, the Willamette Valley was part of the older continental shelf. After the accretion, the east edge of the arc (the Willamette Valley) subsided as a forearc basin between the newly formed Coast Range and the older Cascade Mountains. From the Eocene through the Pliocene (roughly 56–2 million years ago), the basin was the location for deposition of marine and terrestrial deposits eroded into the ocean (Alt and Hyndman 1978; Burbank and Anderson 2001; Conlon et al. 2005; Orr et al. 1992).

Much of the land in the area was shaped by the Missoula floods, which occurred between about 19,000 and 13,000 years ago. There appear to have been at least 89 of these sudden and destructive floods caused by repeated failures of ice dams on the Clark Fork River in northern Idaho, allowing the glacial Lake Missoula to suddenly release its waters to sweep across eastern Washington and down the Columbia River. In the Portland area, the floodwaters peaked at approximately 121 m (400 feet) and swept through the gap in the Tualatin Mountains at Lake Oswego northwesterly into the Tualatin Valley. Other flood channels were probably created by the subsequent ebb and flow of floodwaters into and out of the Tualatin Valley to the east through the “Rock Creek gap” between the Tualatin Valley and the Willamette River. Lacustrine sands and gravels have been mapped at Onion Flat at the northern end of the gap, and sand and gravel fans at Wilsonville are situated at the southern end of the gap. The lowermost course of the Tualatin River bottom is in the Wapato Lake Valley, which is defined by Missoula flood sediments (Benito and O’Conner 2003; O’Conner et al. 2001:21; Schlicker and Deacon 1967:9, 83; Schlicker and Finlayson 1979:25).

Soils within the Willamette Valley are generally characterized as part of the mesic (soils with a mean annual soil temperature between 46 and 59 degrees Fahrenheit [8–15 degrees Celsius]) temperature regime and xeric (climates with moist, cool winters and dry, warm summers) moisture regime. The oldest surface associated with the present drainage system is at least 5,250 years old and could be as old as 34,410 years (Parsons et al. 1970). On the floor of the Willamette Valley are soils formed in the Willamette silts, which were deposited by the great Pleistocene Missoula floods, and in alluvium from Coast Range and Cascade Range drainages. Soil development, texture, and drainage are specific to geomorphic surfaces expressed in the valley (U.S. Department of Agriculture 2009).

According to the Natural Resources Conservation Service mapped soils data, soils within the study area consist entirely of Goble series soils (Natural Resources Conservation Service 2001). The Goble series consists of moderately deep, well drained soils that formed in silty loess over old alluvium deposits. Within the study area, these soils occur on slopes that range between 3 and 60 percent. The surface layer is typically a brown silt loam up to 38 cm (15 inches) thick. Underlying soils are a yellowish-brown silty clay loam evident up to 51 cm below the surface (20 inches below the surface) (Natural Resources Conservation Service 2001).

3.2 Pre-Contact Archaeology

Previous archaeological investigations have demonstrated the presence of humans in the Willamette Valley for at least 10,000 years (Aikens 1993), although the period from ca. 6,000 years before present (B.P.) onward is the most archaeologically visible. Evidence of Paleoindians—the earliest widely accepted inhabitants of the Northwest Coast and environs—is extremely rare in the Willamette Basin.

Evidence of the Early Archaic period (ca. 8000 to 6000 B.P.) is also sparse, but Early Archaic sites are known in the Willamette Basin (Louis Berger & Associates, Inc. 1986). During this period, populations of the Willamette Valley continued to practice a mobile hunter-gatherer lifestyle, and both large and small game was important to the inhabitants’ diet. Evidence from sites such as the Hannavan Creek Site in the southern Willamette Valley suggests the exploitation of plant resources was becoming more important in this period, as fragments of ground stone implements for grinding plant resources along with camas roasting pits have been found (Aikens 1993; Pettigrew 1990). Characteristics of the Early Archaic period include the presence of the willow-leaf-shaped Cascade point. Toward the end of this period, thick, large, side-notched points appear, reminiscent of Northern Side-Notched style points from the Columbia Plateau and Great Basin (Aikens 1993).

Sites of the Middle Archaic period (ca. 6000 to 1700 B.P.) provide evidence of the earliest extensive use of the Willamette Basin floodplain, including in the Middle Willamette Basin (Louis Berger & Associates, Inc. 1986). At this time, Native American groups occupied semisubterranean pit houses in permanent winter villages, exploited and stored a wide array of food items, and had developed burial practices.

The Late Archaic period represents the development of what are known as the Willamette Basin cultures and dates from around 1700 B.P. to the time of European contact, just over 200 years ago. Populations in the region generally increased, with a shift to larger, semipermanent villages concentrated in major stream valleys, along the shores of lakes and other wetlands, and on prairies. Subsistence patterns were similar to those in the Middle Archaic period, but fishing became more important. The most important vegetable resources were camas, tarweed, and wapato. Local and regional exchange networks developed to provide resources that were not locally available, such as obsidian and coastal goods. Small triangular and stemmed points were very abundant during the Late Archaic period, marking the inception of the bow and arrow. The same styles continued to be made into the ethnographic/historic period. Late Archaic sites are more numerous than sites from previous time periods and are more widely distributed over the landscape; archaeological evidence from this time period shows more regional stylistic variation and implies a growing population.

3.3 Traditional Lifeways

Historically, the Kalapuya occupied almost all the Willamette Valley and were divided into 13 bands or “tribes” at the time of Euro-American contact. The Tualatin/Atfalati was the dominant band in and around the study area (Zenk 1990). The Kalapuya were linked by ties of language and culture, but each band, and its component village groups, was politically independent. The size of individual Kalapuyan bands is uncertain. Boyd (1990) has estimated that there were about 16,000 Kalapuya prior to the onset of European diseases in the late eighteenth century and about 8,500 at the time of the Lewis and Clark Expedition (1805–1806).

During the winter months, the Tualatin occupied permanent villages around the shores of lakes and other wetlands, and also on prairies. The villages consisted of clusters of rectangular houses occupied by one or more families. The house walls were banked on the outside with dirt to provide additional insulation, and the floors were excavated to a depth of 0.6 to 3.3 m (2–11 feet) (Zenk 1990).

During the drier part of the year, families moved out of the villages and lived in temporary camps near resource-gathering areas; these temporary camps were often nothing more than shelter in a grove of trees or brush wind breaks (Zenk 1990). The most important vegetable resources to the Kalapuya were camas, tarweed, and wapato. The Kalapuya burned the grasslands every year to maintain an open environment, a practice that was probably started thousands of years earlier and created the prairie and oak savanna that was characteristic of the valley (Beckham 1977). Plant resources of secondary importance gathered by the Kalapuya included hazelnuts and various berries. Game resources used by the Kalapuya included small mammals, black-tailed and mule deer, elk, and black bear. Other foods included lamprey, grasshopper, and certain types of caterpillar. Grasshoppers were gathered from the burned-over prairies, and caterpillars were either pit-roasted or boiled (Zenk 1976, 1990).

The Kalapuyan way of life was greatly affected by European presence in North America, even before Euro-Americans began to settle in the Willamette Valley. In the 1770s, a smallpox epidemic devastated the Native American population of western Oregon, with an estimated mortality rate of 30 percent or more. Further epidemics struck the area through the mid-nineteenth century, with an outbreak of malaria in the 1830s killing an estimated 90 percent of the total Kalapuyan population (Boyd 1990). By 1840, approximately 600 Kalapuya remained (Boyd 1990). Efforts to move the Kalapuya onto reservations began in 1851, but treaties remained unresolved until 1854 (Coan 1921; Mackey 1974). During this time, Joel Palmer was appointed Superintendent of Indian Affairs for the Oregon Territory and negotiated treaties with Tribes of the Willamette Valley. By 1856 all but a few Kalapuya were moved onto the Grand Ronde and Siletz Reservations (Mackey 1974; Zenk 1990). The remaining Kalapuya remained in the Willamette Valley, and traveled between the reservations and their former homelands. The last generation of Kalapuya speakers was gone prior to the 1950s. Kalapuyan descendants are generally considered part of the Confederated Tribes of the Grand Ronde, which includes a community of Tribes of the Kalapuya, Molalla, Umpqua, Shasta, and Rogue River Indians (Mackey 1974; Zenk 1990).

3.4 Historical Background

Early explorations of the Pacific Northwest coast were conducted by the Spanish, English, and Russians, including the expeditions of James Cook and George Vancouver of the British Royal Navy. Cook's expedition of 1776–1779 was the first to recognize the potential for trade in Northwest furs. In 1778, he traded with the Nuu-chah-nulth (formerly known as Nootka) people of what is now known as Vancouver Island. After this time, trading vessels appeared in ever-increasing numbers along the Northwest Coast. Vancouver's expedition of 1791–1795 was the first to travel a meaningful distance up the Columbia River. Despite the exploration of the Pacific Northwest coast for many decades, the existence of a large river in the vicinity had never been proven by Europeans. In 1792, Vancouver sailed in search of the river; upon locating the mouth of the Columbia River, he dispatched Lieutenant William Broughton to enter it. Broughton was the first European to ascend the Columbia River as far as the mouth of the Sandy River, east of modern-day Portland (Carey 1971).

In the years between Broughton's ascent of the Columbia River and the passage of the Lewis and Clark Expedition in 1805–1806, the sheltered bay just inside the mouth of the Columbia became a frequent resting point for ships on the trading line between North America, Hawaiʻi, and Canton, and the value of pelts obtained on the Columbia River became widely known (Carey 1971). These early explorations opened the area for fur trapping, with the Pacific Fur Company, North West Company, and, eventually, the Hudson's Bay Company (HBC) each establishing a presence along the Columbia River. After 1821, the HBC dominated trade in the Northwest, initially from their headquarters at Fort George (near present-day Astoria), and after 1824 from their headquarters at Fort Vancouver. Although settlement of the areas along the Columbia and Willamette Rivers began soon after Fort Vancouver was established, most Euro-American settlers (aside from Methodist missionaries who settled at Champoeg) were HBC retirees who had married Native women and had chosen to remain in the area. Although the vast majority of these French-Canadian retirees were expected to return to Canada under the terms of their employment, Chief Factor John McLoughlin allowed them to remain, and many settled in the area now known as French Prairie, along the Willamette River in northern Marion County, Oregon (Carey 1971).

Throughout the first decades of the nineteenth century, political control over the Pacific Northwest remained unclear, as the United States, Great Britain, Spain, and Russia all claimed the area. The remoteness of the region, however, made actual enforcement of those claims extremely difficult. As the nineteenth century progressed, it became clear that Spanish influence in the western hemisphere was in a sharp decline and that the area was too remote for Russia to exert any meaningful pressure there. Both countries formally gave up their claims by treaty (Spain in 1819 and Russia in 1824, although Russia's ability to enforce any claims was regarded as null well before this date) (Carey 1971).

The remaining claimants, Great Britain and the United States, were engaged in a war between 1812 and 1815, which was brought to a close by the Treaty of Ghent. That treaty, however, failed to resolve outstanding border disputes in western North America. The subsequent Treaty of 1818 attempted to address some of these issues, including defining the boundaries of the Oregon Country (bounded on the west by the Pacific Ocean, on the east by the Rocky Mountains, on the south by the 42nd parallel, and on the north at 54 degrees, 40 minutes north latitude), as well as attempting to define control over the Oregon Territory. The treaty adopted a condition of "joint occupancy" for a period of 10 years, with neither nation claiming exclusive control. In this way, the issue remained unresolved for nearly 30 years, as the 10-year lifespan of the provision was extended twice, in 1828 and 1838, and finally superseded by the provisions of the Oregon Treaty (officially titled the "Treaty between Her Majesty and the United States of America, for the Settlement of the Oregon Boundary") in 1846, establishing the boundary at the 49th parallel, with Great Britain retaining control to the north of that line and the United States to the south (Corning 1956). At that time, the Oregon Country included all the future states of Oregon, Washington, and Idaho, and portions of the future states of Montana and Wyoming. North of the 49th parallel, as defined by the treaty, was British Canada.

During the 1840s, a dramatic increase in immigration took place, largely by Americans who came to the area with the intent to settle the land, unlike the HBC men, who were British subjects and initially came for trade. Beginning in 1841, a massive migration of Americans occurred along the Oregon Trail, generally departing from Missouri, and crossing to The Dalles, from which point they traveled down the Columbia River or traveled overland to the Willamette Valley (Bergquist 1957). The early settlers claimed the most desirable farming locations in the foothills of the Coast and Cascade Ranges, which had access to spring water, friable and easily plowed soils, and nearby forests, which supplied the wood used by the settlers to construct their homes (Bowen 1978).

The pattern of Euro-American settlement in the Willamette Valley generally progressed from north to south. Most settlements were made under the Provisional and Donation Land Claim (DLC) Acts. The DLC Act of 1850 entitled many settlers within Oregon Territory (which at the time included present-day Washington State) to claim up to 640 acres of land (Bergquist 1957). The number of acres granted depended upon the marital status of the claimants and their date of settlement. By the time the act expired in 1855, over 7,000 DLC patent applications covering approximately 2.5 million acres had been filed and grants were issued for the next 15 years within Oregon and Washington Territories (Johansen and Gates 1957).

The Tualatin Plains area was among the first areas to be settled and converted for use as farmland, beginning in the early 1840s. This open plain, crisscrossed by creeks and already cleared by Native annual burns, was an attractive area to early settlers because of the ready state of the land for farming and the relatively easy access to the markets at Oregon City and, by the late 1840s, the fast-growing community at Portland. The earliest claims were to the south of the current study area, along the larger rivers and tributaries of the Willamette River (such as the Tualatin River) and close to the established roads leading to Oregon City and Portland. At the time Portland was only reachable by water or (after 1849) along the difficult Portland–Tualatin Valley Plank Road, which descended a canyon into the lowlands south of Portland (now Canyon Road) (Corning 1956).

As these lands filled up, the next to be claimed were those somewhat farther to the north and west, made more attractive by the increasing reach and improving conditions of the road network. By 1854, it was reported by a contemporary witness that nearly all the Willamette Valley had been claimed, though the extent to which his definition of the Willamette Valley reached the far margins and foothills of the surrounding mountain ranges is unclear. Certainly, by that time the lands in the Tualatin Plains had been taken up, and farms and small farming communities had been firmly established (Bourke and DeBats 1995).

3.5 History and Land Development in the Study Area

The study area sits in the Southwest Hills neighborhood, at the southern extent of the Tualatin Range. The Portland VAMC is located just south of the Oregon Health and Science University. Prior to the construction of the first incarnation of the Veterans Hospital in 1927, there was very little development within the study area beyond moderate logging. A review of 1852 General Land Office (GLO) maps identified early trails connecting the study area and both direct and indirect APE to Portland to the north and farmlands in the Tualatin Plain to the west. The east-west trail rises out of the Tualatin Plain and bisects the study area, and both the direct and indirect APE, then continues downslope, intersecting with the north-south trail along the bank of the Willamette River. While the trail crosses through the study area, connecting farmlands to the growing city of Portland, there is no other evidence of development within the study area and indirect APE itself (Figure 3-1). Though development within the study area was initially minimal, the study area has been part of a history of land claims by prominent figures in Portland history.

3.5.1 William Johnson and Portland's First House

In 1841 William Johnson became the first permanent European settler in the region of what is now Portland. Johnson, a veteran of the War of 1812, came to the region after the war and began a fur trapping career for the North West Company (later merged with HBC). The cabin he built stood next to the Willamette River, east and downhill from the study area. The log cabin measured 35 feet by 15 feet with a lean-to. It is recognized as having been the first house in Portland. Sometime in the mid-1840s Johnson abandoned his cabin due to annual flooding, moving further up the bluff, somewhere between his old cabin and the study area (Mapes 2020).

3.5.2 Elizabeth and Finice Caruthers

Elizabeth Caruthers and her son Finice arrived in the Portland area in 1847 under a shroud of mystery. Ten years after her death in 1857, she would become the center of intrigue, scandal, and one of the most significant U.S. Supreme Court cases in history.

Born in Tennessee, in an undetermined year, Elizabeth Caruthers' early history is not clear. In 1816 she married a man named Joe Thomas of St. Louis Missouri and later gave birth to her only child; a son named Finice. Beyond Finice's birth, it is not known what life events occurred for Elizabeth between 1816 and 1847. It is known that she arrived in Portland in 1847, a self-proclaimed widow, and purchased the small piece of land abandoned by William Johnson along the Willamette River (City of Portland 2020).

In 1850, Elizabeth solicited the services of a surveyor to establish a claim under the DLC Act. She and her son claimed 640 acres of land stretching from the banks of the Willamette River to the top of the hills in the west. They built their home 1 mile northeast of the study area, approximately where the Highway 26 bridge now spans Interstate 5 (Mapes 2020). The project APE sits within the western half of her land claim.

In 1856, Finice went into business with the prominent Portland investor Stephen Coffin. The growing city population had begun to experience trouble with water pollution. The two men established the Pioneer Water Works to provide clean water to the city. The water was sourced from a creek on Finice's land, then known as Caruthers Creek, which drained the hills through what is now Marquam Gulch park, discharging into the Willamette. Through a series of purchases over the following decades, the Pioneer Water Works would be absorbed into what is now the Portland Water Bureau (MacColl and Stein 1988).

Neighbors at the time described the mother and son as pleasant people who kept to themselves. Finice was viewed as a loner, but very keen on civic involvement. Elizabeth never remarried and her son never married either. Elizabeth Caruthers died in 1857 and Finice died soon after in 1860, neither leaving behind a will or heir (Mapes 2020), which triggered a fight over the ownership of the land.

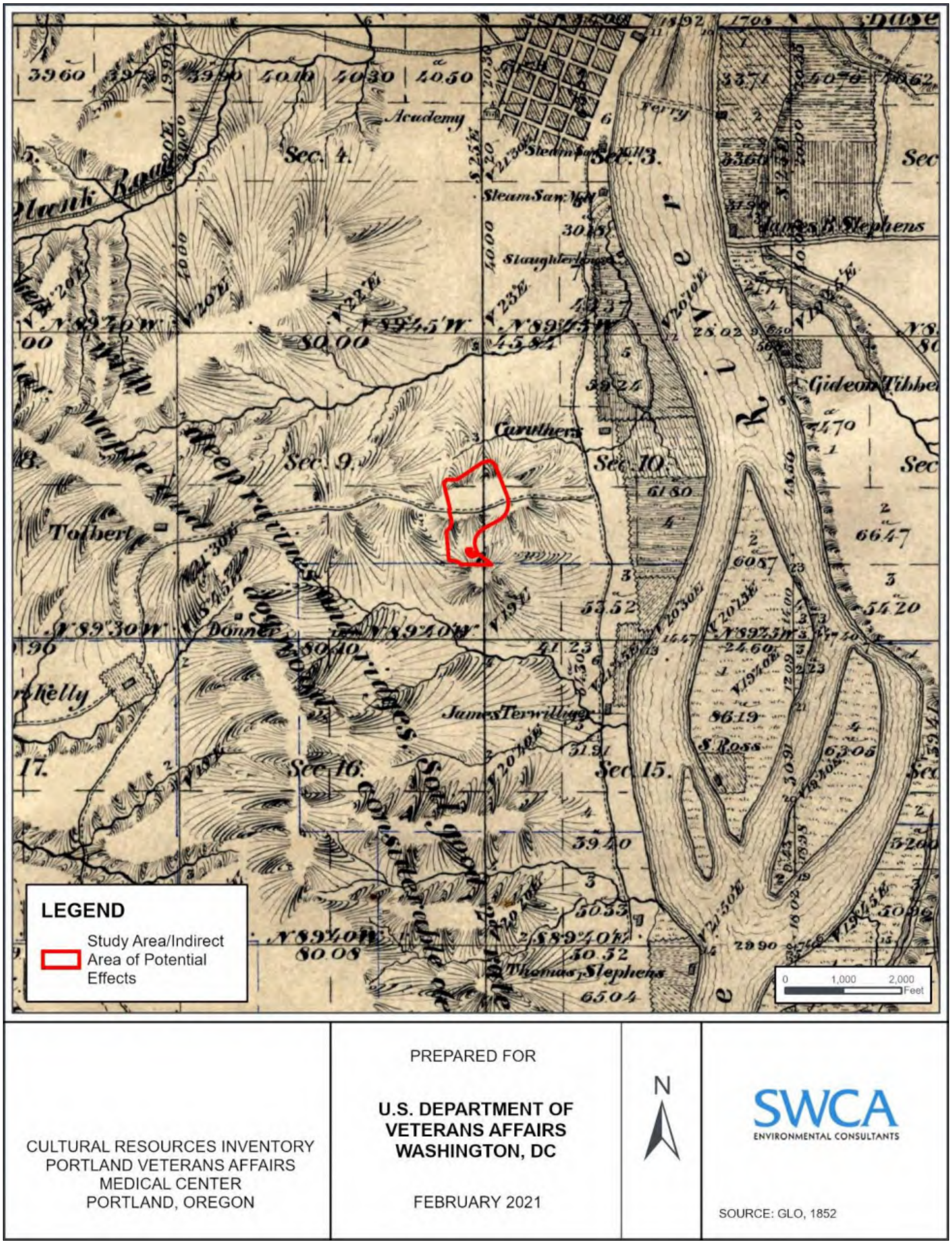


Figure 3-1. GLO Map of 1852 Cadastral Survey

3.5.2.1 U.S. Supreme Court Ruling

In 1868, the 640 acres of land owned by the Caruthers was valued over $500,000, the equivalent of nearly $10 million in today's money (CPI Inflation Calculator 2020). Given the value, it is unsurprising that after Finice's death, portions of the land were fraudulently claimed, bought, and sold with each claim and sale challenged in court. Those desiring the property decided the best way to claim the land was to challenge Elizabeth Caruthers' ownership rights. It was suggested that being a single woman, Ms. Caruthers had no right to purchase, let alone own, land. The case made it all the way to the U.S. Supreme Court, which, in a landmark decision, ruled that, married or not, a woman had the same property rights as a man (City of Portland 2020).

3.5.2.2 Joe Nixon

While the challenge to Elizabeth's legal ownership was resolved, the drama surrounding the land went on to create one of the greatest spectacles of the time. In 1871 news swept through Portland about the discovery of a very much alive Joe Thomas of St. Louis, Missouri. Joe claimed to be the 91-year-old father of the late Finice Caruthers and, as such, the clear legal inheritor of the Caruthers' lands. He presented a backstory describing how and when he met Elizabeth Caruthers, their marriage, and the birth of Finice. He further declared his intent to sell the property to Owen Wade and George A. Pease for the sum of $8,000 (The Albany Register 1870). It is not clear when doubts began about his story, but by later the same year, 1871, he was standing trial for perjury (The State Rights Democrat 1871).

Finally, in an affidavit in 1873, Joe "Thomas" confessed. His real name was Joe Nixon, and he was, by his best account, somewhere around 60 years old. In his confession he stated that he was a poor farmer from Kentucky who had come to St. Louis for better opportunities. These opportunities did not present themselves and Joe soon found himself begging on the streets. While panhandling in St. Louis, he was approached by Owen Wade and presented with the opportunity to earn $7,000 to $8,000. Joe went on to detail how Owen persuaded him to pose as the long thought dead father of Finice Caruthers. In light of his confession, the sale was deemed invalid (The Oregon City Enterprise 1873).

3.5.3 Land Development

The Tualatin Hills separate the Tualatin Plain to the west from the Willamette Basin to the east. Historical development in the region was largely limited to farmland in the Tualatin Plain and along the banks of the Willamette River. Neighborhoods downslope to the east rapidly grew and displaced farmland in the early 1900s as the population of Portland expanded.

By the turn of the nineteenth to twentieth century, a great deal of the Caruthers' property, which includes both the direct and indirect APE, was legally owned by the Oregon & Washington Railroad and prominent Portland publisher Sam Jackson. However, nearly 50 years since the death of Finice, challengers continued in their attempts to gain rights to the property. In 1903, a person claiming the name of William H. Caruthers of Florida would run a weekly ad in the Portland newspapers offering a reward for anyone able to produce the will of Finice, no questions asked (Morning Oregonian 1903). In 1912, Judge Philip Augustus Marquam, another prominent figure in Portland, purchased 240 acres of the Caruthers' land (The Sunday Oregonian 1912). In 1917, the heirs of Henry Ploch brought a lawsuit claiming a part of the land was theirs but were denied by the courts the following year (Morning Oregonian 1918).

Neighborhoods began to grow in the area during the early 1900s. Two main roads were established during this period, Broadway Drive and Terwilliger Boulevard. The latter would provide access to the Oregon Medical School and the Portland Veterans Hospital. Terwilliger Boulevard was renamed Terwilliger Parkway and continues to provide access to the hospitals.During this period, the region was being heavily developed with neighborhoods to the northeast and Marquam Gulch being filled downhill (Figures 3-2 and 3-3). The neighborhood is now the Southern Portland Historic District, bounded by SW Barbur Boulevard to the west, SW Arthur Street to the north, Interstate 5 to the east, and SW Gaines Street to the south.

3.5.3.1 Portland Veterans Hospital

In 1919, a combination of 108 acres of land was donated to the University of Oregon Medical School, 20 acres from the Oregon & Washington Railroad & Navigation Company and 88 acres from Sam Jackson. The land, atop what is now Marquam Hill, included portions of the study area. The University of Oregon Medical School established a medical campus on the north peak of the hill. In 1927, the Oregon Medical School and Sam Jackson donated 25 acres of land on Marquam Hill to the U.S. Veterans Bureau to establish a new Veterans Hospital. Ground was broken in 1927 and construction began in 1928. By December of that year, 13 structures had been built to form the campus. The buildings were large, rectangular, and made of brick (Figures 3-4 and 3-5). The two campuses became the most predominant features on Marquam Hill (Figure 3-6).

In the mid-1970s, the VA determined a major upgrade to the facility was necessary and would include the demolition of most of the existing structures. New building construction began in 1981 and construction of the main building, Building 100, began the following year. The main building was dedicated in 1987 (The Oregonian 1987) and the new facility officially opened its doors in 1988. Demolition of the remaining buildings began in 1988 with the exception of Buildings 6 and 16. The two buildings are the only remaining structures associated with the original veteran’s hospital. Both buildings have been significantly remodeled and neither are eligible for the NRHP. The parking garage structure, Building 108, was completed in 1990.

Figure 3-2. Early Development on Marquam Hill, 1920

Note: Marquam Hill is north of the study area.
Source: City of Portland City Auditor - Archives & Records Management, Accession No. A2004-002.74.

Figure 3-3. A 1932 Photograph of the Marquam Gulch Fill Project

Note: The study area is located on the peak at center. Notice the Terwilliger Boulevard streetlights along the ridge at the right.
Source: City of Portland City Auditor - Archives & Records Management, Accession No. A2000-025.549.

Figure 3-4. A 1935 Photograph of the Veterans Hospital

Note: Photograph view is north along SW US Veterans Hospital Road. Note the original corner of Building 6 at left.
Source: City of Portland City Auditor - Archives & Records Management, Accession No. A2004-002.71.

Figure 3-5. Aerial View of the Veterans Hospital in 1930

Note: View to the southwest.
Source: City of Portland City Auditor - Archives & Records Management, Accession No. A2004-002.2501.

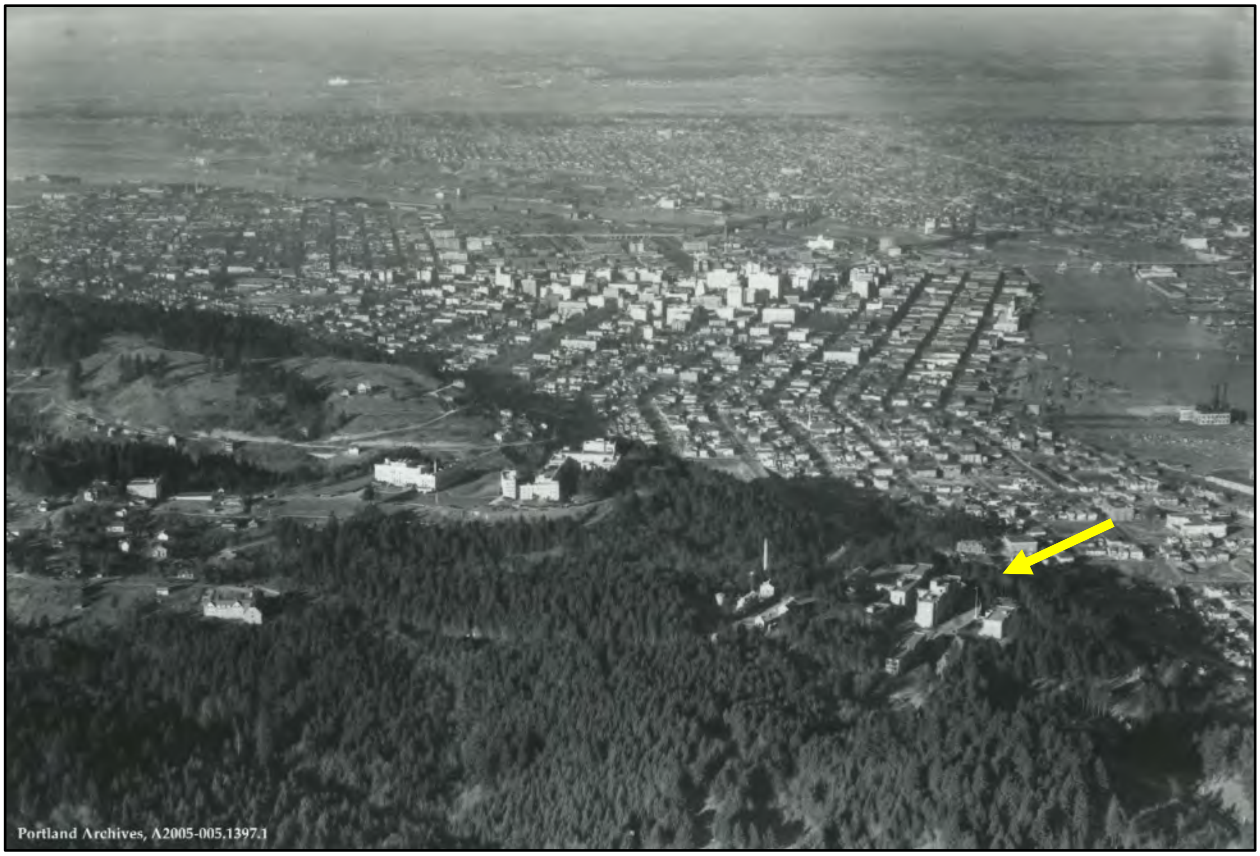


Figure 3-6. Aerial View of Marquam Hill in 1937

Note: The study area is indicated by the arrow. View to the northeast.
Source: City of Portland City Auditor - Archives & Records Management, Accession No. A2005.005.1397.1.

4.0 Literature Review

4.1 Previous Cultural Resources Investigations

Background research for this project was conducted using the Oregon Archaeological Records Remote Access (OARRA) online database. These records indicate that there have been nine cultural resources investigations previously conducted within 1 mile of the Portland VAMC campus (Table 4-1). Only two reports overlap the Portland VAMC campus (Ames et al. 1992; Schwab Engineering and Management 2018). Ames et al. (1992) provides a general synopsis of the archaeology and pre-contact sites in the Willamette Basin. Within this report, no pre-contact sites were identified within a mile of the study area. Cultural resource surveys have largely been conducted along the river and throughout urban areas north of the Portland VAMC campus. This is likely due to the study area's steep terrain that has led to development being focused downhill, along the river, and within urban Portland. Schwab Engineering and Management (2018) conducted a built environment investigation on the Portland VAMC campus, which included on-site documentation of structures, background research, and recommendations of mitigation. The nearest wider cultural resource investigation was conducted along SW Barbur Boulevard just 0.1 miles east from the Portland VAMC campus for the installation of the US Sprint Fiber Optic Cable running from Eugene, Oregon, to Seattle, Washington (Minor and Beckham 1987). Miner and Beckham's (1987) investigation consisted of a pedestrian survey; they did not identify any cultural resources within 1 mile of the Portland VAMC campus.

Table 4-1. Previous Cultural Resources Investigations within Approximately 1 Mile of the Study Area (Indirect APE)

SHPO No.	Methods	Survey Project *Citation*	Distance from the Portland VAMC Campus	Resources within 1 Mile of the Portland VAMC Campus
622	Literature review, pedestrian survey	Report of Archaeological Reconnaissance of Ross Island, Multnomah County *Bogue et al. 1974*	0.85 mile E	None
8292	Literature review, vehicular reconnaissance, pedestrian survey	Cultural Resources Survey for the US Sprint Fiber Optic Cable Project Eugene, Oregon to Seattle, Washington *Minor and Beckham 1987*	0.1 mile E	None
16744	Literature review, pedestrian survey	Cultural Resources Inventory of the Proposed FTV Western Build *Sharp et al. 1998*	0.27 mile NE	Lithic scatter, historic debris scatter
20025	Literature review	Archaeological Context Statement – Portland Basin *Ames et al. 1992*	Overlaps	None
20862	Literature review, pedestrian survey	Archaeological Survey of Bridge 09254D, Multnomah County. *Cabebe 2006*	0.88 mile N	None
22560	Literature review, pedestrian survey, subsurface survey	Cultural Resource Survey and Evaluation of the I-5 SW Iowa Street Viaduct Project (MP298.2), Multnomah County *Ruiz and Connolly 2009*	0.48 mile SE	Historic debris, demolition pile
22741	Sonar survey	NOAA Hydrographic Surveys H11854 – H11859 *Dasler 2009*	0.73 mile E	Capsized barge and related debris
22958	Literature review, pedestrian survey	Portland – Milwaukie Light Rail Project Archaeological Resources Reconnaissance Study *Reese and Boynton 2008*	0.48 mile N	Historic and pre-contact artifacts
23623	Literature review, pedestrian survey	Cultural Resources Study of the 4310 SW Macadam Avenue Property, Portland, Multnomah County, Oregon *Roulette et al. 2010*	0.6 mile SE	None

SHPO No.	Methods	Survey Project *Citation*	Distance from the Portland VAMC Campus	Resources within 1 Mile of the Portland VAMC Campus
N/A	Literature review, pedestrian survey	CLIN 4-11 Preliminary Findings Report Cultural and Historic Resources *Schwab Engineering and Management 2018*	Overlaps	Buildings 6, 16, and stone site walls

4.2 Previously Recorded Archaeological Sites

OARRA records show that 16 archaeological resources have been recorded within 1 mile of the study area and indirect APE (Table 6-1). These sites are concentrated downslope and along the river. The documented archaeological sites are primarily historic-period sites with only one of the 16 sites (35MU232) associated with pre-contact materials. The site is described as a mix of historic-period refuse scatter and pre-contact shell midden. No archaeological resources have been previously recorded within the study area and indirect APE.

Table 4-2. Archaeological Sites within Approximately 1 Mile of the Study Area (Indirect APE)

SHPO No.	Type	Description	NRHP Eligibility	Distance from the Study Area/Indirect APE
35MU115	Historic-period site	Privies and artifacts	Unevaluated	0.75 mile NW
35MU116	Historic-period site	Keist and House site	Not eligible	0.85 mile S
35MU129	Historic-period site	Privy	Not eligible	0.69 mile NE
35MU199	Historic-period site	Iowa street trestle site	Not eligible	0.98 mile S
35MU200	Historic-period site	Slavin road demolition pile	Not eligible	0.9 mile S
35MU220	Historic-period site	Brick lined shaft	Not eligible	0.69 mile N
35MU222	Historic-period site	Buried rail line	Unevaluated	0.69 mile NE
35MU223	Historic-period site	Buried rail line	Unevaluated	0.69 mile N
35MU226	Historic-period site	Refuse scatter	Eligible	0.61 mile N
35MU230	Historic-period site	Refuse scatter	Unevaluated	0.6 mile N
35MU232	Historic-period and pre-contact site	Refuse scatter and shell midden	Unevaluated	0.54 mile NE
35MU233	Historic-period site	Refuse scatter	Eligible	0.56 mile SE
35MU237	Historic-period site	Brick lined sewer shaft	Unevaluated	0.67 mile N
35MU262	Historic-period site	Artifacts (glass, metal, ceramic, brick)	Unevaluated	0.67 mile N
35MU267	Historic-period site	Refuse, possible dump site	Unevaluated	0.51 mile NE
35MU289	Historic-period site	Remnants of industrial building	Not eligible	0.60 mile SE

4.3 Portland Veterans Affairs Medical Center Campus Historic Property Inventories

In 2018, a built environment survey of the Portland VAMC campus was conducted to determine if the proposed seismic upgrades may impact potentially contributing historic resources within the study area and indirect APE (Schwab Engineering and Management 2018). Schwab Engineering and Management (2018) contracted by the Portland VA, recorded Buildings 6, 16, and 41 as existing structures on the campus greater than 50 years old. They also recorded stone masonry site retaining walls as another campus structure over 50 years old (Schwab Engineering and Management 2018). However, upon further research, the authors concluded Building 41 was not over 50 years old, but likely constructed in the mid-1970s. Their report recommends Buildings 6, 16, and the stone site walls not eligible for the NRHP and a finding of no historic properties affected for the undertaking. On November 16, 2020, SHPO concurred with these recommended findings. As of winter 2021, there are no historic properties eligible or listed on the NRHP on the Portland VAMC campus.

4.4 Historic Properties Near the Portland Veterans Affairs Medical Center Campus

The Southern Portland Historic District is located within a quarter mile of the Portland VAMC campus to the northeast. Many of the buildings within this district are listed on the NRHP. There are no NRHP-listed properties within the Portland VAMC campus; however, Terwilliger Parkway is located adjacent to the Portland VAMC campus.

Terwilliger Parkway, also known as SW Terwilliger Boulevard, is a 2.5-mile forest road located adjacent to the Portland VAMC campus and included in the indirect APE (study area). Terwilliger Boulevard was initially proposed as a part of the Olmsted Portland Park Plan. The plan was conceived by the newly formed Park Board in 1901. The primary goal of the plan was to build a park system serving the growing population of Portland. The Park Board contracted an architecture firm to develop the beautification plan. In 1903 a principle of the firm, John Charles Olmsted, was tasked with the reconnaissance of the region and including advising the board in matters of land acquisition, administration, governance, and parkways (Orloff 2021).

The parkway was named for James Terwilliger, one of the first permanent residents of Portland who owned much of the land in the area. In 1914 the road officially opened as Terwilliger Parkway. Terwilliger Parkway is 36 feet wide, consisting of a two-lane road, a pedestrian sidewalk adjacent to the roadway, and a lighting system. The road is surrounded by native forest and scenic views and serves as a main access road to the Portland VAMC campus. Terwilliger Parkway became listed in the NRHP in March 2021. The NRHP nomination form describes Terwilliger Parkway as having three contributing resources (1921 comfort station, Elk Point Viewpoint, and Terwilliger Parkway itself), as well as one non-contributing resource (Eagle Point Viewpoint).

There have been numerous alterations to Terwilliger Parkway over the last century. Alterations to the parkway consist of overgrown vegetation along forest portions, repaving, replacement of capitals and glass globes on light poles, and replacement of a wood trestle bridge. The nomination form states despite the above-listed alterations, the parkway retains integrity of location, design, setting, feeling, and association. Terwilliger Parkway satisfies Criterion A (NPS 1997) because the resource is associated with events that made a significant contribution to broad patterns of our history regarding historical city infrastructure development plans within the city of Portland. The parkway may also satisfy Criterion B (NPS 1997) being associated with prominent figures in local and regional the history. However, further research would be required to confirm that the association with Olmstead holds local and regional importance.

5.0 Cultural Resource Expectations

Review of available archaeological, historical, and geological data collected from the project vicinity shows that there is low potential for encountering significant pre-contact cultural resources and historic-period cultural resources in the study area due to the natural and cultural settings. Construction of the original hospital required significant excavation to establish a level grade, effectively removing the cultural horizon of soils. Buildings 6 and 16 are the only remaining structures associated with the original hospital and are not involved in the proposed upgrades. The buildings receiving upgrades are all under 50 years old. The project location has experienced historical development primarily associated with the hospital. The steep terrain was a limiting factor in pre-contact and historical occupation of the hill. Prior to the development of the hospital and the construction of Terwilliger Parkway in 1914, access to the hill would have been difficult and settlement impractical. However, SW Terwilliger Boulevard itself has been recently listed on the NRHP.

There are no known pre-contact sites within the study area, direct APE, and indirect APE. The land downhill along the river to the east and north was occupied by the displaced Native population during the early development of Portland. There is no known historical development prior to the hospital, although it was noted that William Johnson had abandoned his riverside cabin and resettled further up the hill to an unknown location in the 1840s. Pre-contact and historic-period resources would likely have been lost during the construction of the original Veterans hospital. Further, the planned activities are focused on buildings constructed in 1982. The inadvertent discovery of precontact or historic cultural resources remains a remote possibility.

6.0 Methods

All fieldwork was performed by SWCA archaeological staff and supervised by archaeologists who meet the Secretary of Interior's Standards and Guidelines for Archaeological and Historic Preservation, (48 *Federal Register* 44716 and 36 CFR Part 61). All field notes and photographs are on file at the SWCA Portland office, under internal Project Number 61303.00.

The field crew consisted of SWCA cultural resources specialist Colin Christiansen, who set out to document all previously unrecorded historic-period aboveground structures and any archaeological features present within the study area by conducting a controlled pedestrian reconnaissance survey of the study area. Christiansen attempted to walk across the entire 28.58-acre study area, with paths spaced no more than 20 m apart, depending on the topography and development. All newly identified cultural resources that met the 50-year age criterion within the study area were documented and photographed in the field. All cultural resources were recorded during field investigation according to current VA and SHPO guidelines, and all resources were mapped using a global positioning system (GPS) unit of a Samsung tablet with Collector software. All resources, if applicable, were recorded on appropriate SHPO forms. Observations about topography, vegetation, surface visibility, and disturbances were recorded in the project field notebook.

While conducting this survey, Christiansen also photographed and took notes on areas within the campus proposed to undergo changes, per the project's proposed undertaking and future phases. Buildings and structures that are part of Phase I projects but are contemporary in age (under 50 years old), were photographed in the field and will be discussed in the final report. Only exteriors of buildings were photographed due to COVID-19 restrictions and project scope.

Christiansen also preemptively surveyed areas associated with Phase II and III projects and analyzed for possible impacts to historic resources by taking photographs of and field notes on the locations these phases are proposed to take place. Christiansen took photographs from each cardinal direction from the center of the proposed construction areas and overview shots towards the construction areas to record possible impacts to historic resources. These construction areas consist of the area for the construction of a new specialty care building (Building 110), and the construction of two new parking structures (Buildings 111 and 112), improvements and upgrades for the Energy Center, and the remaining structural and non-structural seismic upgrades with renovation and modernization of Buildings 100 and 101. Additionally, Christiansen took photographs of all demolition areas to assess possible impacts to historic resources. Phase II and III projects propose to demolish Trailer 1 and Buildings T-41 and T-51.

7.0 Results

On December 1 and December 2, 2020, Colin Christiansen conducted a controlled reconnaissance survey of the Portland VAMC campus. Weather conditions were cool with temperatures in the mid-50s Fahrenheit and partly cloudy skies. Christiansen's pedestrian survey was oriented to maximize the amount of surface area covered, and thus the direction varied according to the topography and campus development within the study area. Most survey paths followed the outlines of buildings and structures. Survey paths in open areas to the north and east followed the contour of the slopes. Because Buildings 6, 16, and 41, and the stone masonry walls were previously recorded in 2018 and determined not eligible for the NRHP, Christiansen did not formally document these structures, and instead focused on the current proposed undertaking (Phase I) and took photographs for possible future proposed undertakings of Phase II and III projects (Schwab Engineering and Management 2018).

7.1 Archaeological Review

SWCA formulated expectations for the archaeological sensitivity of the study area based on review of the background information presented above, including the geomorphology and hydrology of the study area; the pre-contact and historic-period context of the vicinity, with information on the types, ages, and contents of previously recorded sites; and consideration of disturbances that may have impacted archaeological resources (e.g., road and building construction, utilities, and landscaping).The proposed undertaking will not affect previously undisturbed sediments within the direct APE as the Portland VAMC campus has been significantly altered through time. The direct APE was judged to have a low probability for buried historic-period cultural material and low probability for buried pre-contact cultural materials.

7.2 Phase I Projects

7.2.1 Buildings 100, 101, and 102

Buildings 100, 101, and 102 will undergo seismic retrofit and aesthetic redesign (Schwab Engineering and Management 2018). Buildings 100, 101, and 102 have not previously been significantly modified or remodeled since their construction in 1982. The style of Buildings 100 and 101 resembles Streamline Modern Art Deco with geometric features that are bold yet smooth (Figures 7-1 to 7-19). Fenestration of the buildings is minimalist with blue-tinted windows that blend into the structure. The buildings stand on concrete foundations painted blue and their façades are made up of light blue tile. The shared main entry is composed of a reddish-brown concrete that gives the visual impression of granite (Figure 7-4). The outward appearance of these structures predominately remains as it did at the time of construction. One minor but notable modification is the addition of a small, metal and glass vestibule to the rear entrance of Building 100 (Figure 7-8).

The top of Building 102 will undergo a remodel. SW US Veterans Hospital Road runs over the top of the building, providing access to the main entrances to the hospital. The road rises to the top of Building 102 from the northeast end, runs parallel to Building 100, and continues uphill to the Oregon Health and Science University. There is a plaza centered on the roof (Figures 7-18 and 7-19), running the length of the building and a loop providing access for traffic approaching from the west. The remodel will relocate the road, replacing the current plaza, to run between two new plazas on either side (Schwab Engineering and Management 2018). Building 102 is a relatively non-descript parking structure. Its design is almost exclusively utilitarian. Vestibules on parking levels 1 and 2 appear to be of more recent design.

7.2.2 Parking Structure, Building 108

Building 108, a parking structure, will be vertically expanded by adding two levels (Schwab Engineering and Management 2018). It is located on the south end of the campus and was constructed in 1990. It is a utilitarian structure made of steel and concrete (Figures 7-20 to 7-23). The original construction includes pilings and other structural elements that were built to accommodate vertical expansion, such as the work planned (Figure 7-22). These structures are exposed on the building’s northern end anmound ready for work to continue.

Figure 7-1. Main Campus Overview

Note: View to the south.

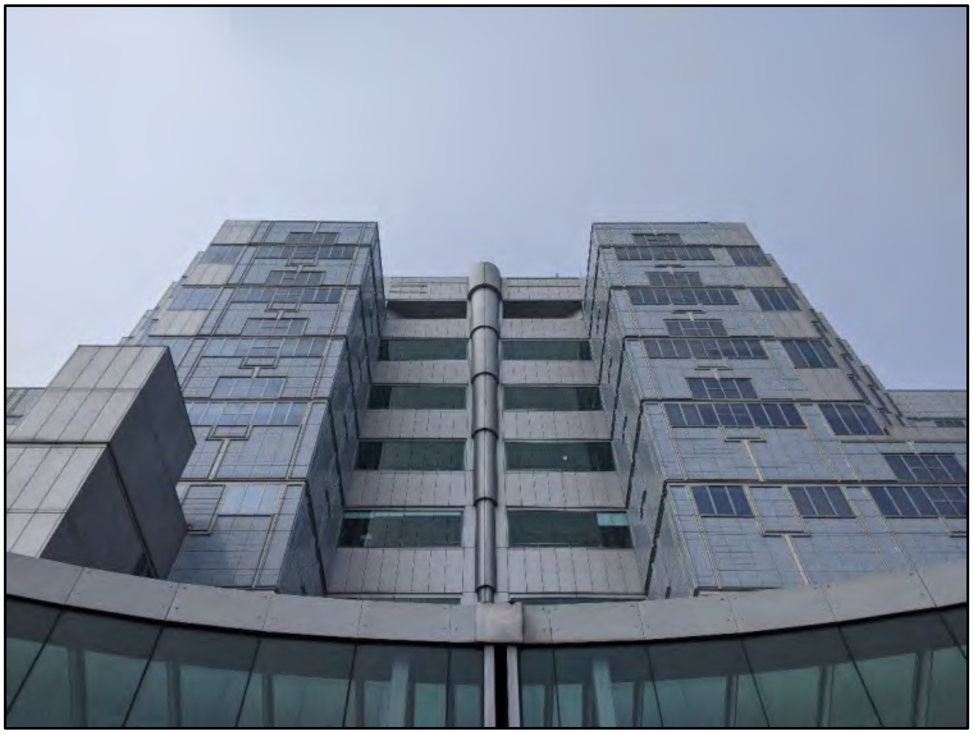


Figure 7-2. Upper Portion of Building 100

Note: View to the west.

Figure 7-3. Main Entrance

Note: View to the southwest.

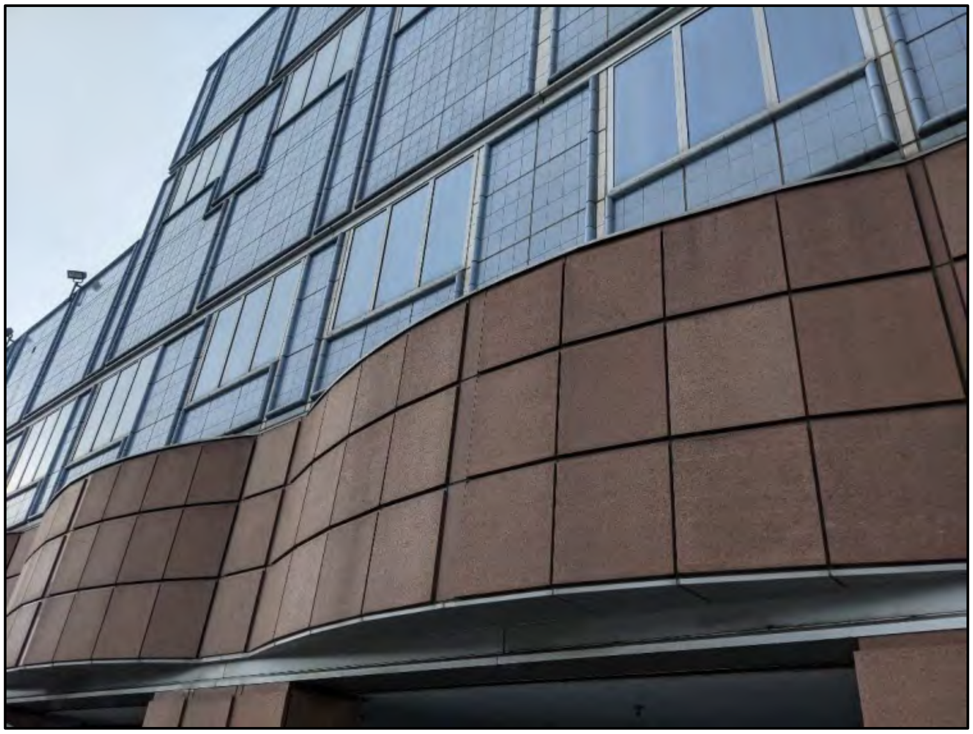


Figure 7-4. Building 100 Eastern Facade

Note: View to the southwest.

Figure 7-5. Northwest Corner of Building 100

Note: View to the south.

Figure 7-6. Rear of Building 100 and Skybridge to the Oregon Health and Science University

Note: View to the south.

Figure 7-7. Loading Dock, Rear of Building 100

Note: View to the southeast.

Figure 7-8. Building 100 Rear Entrance Vestibule

Note: View to the east.

Figure 7-9. Building 101

Note: View to the north.

Figure 7-10. Building 101 Entrance

Note: View to the southwest.

Figure 7-11. Rear of Building 101

Note: View to the northeast.

Figure 7-12. Overview of Buildings 100 and 101

Note: View to the northwest.

Figure 7-13. Common Space Behind Building 101

Note: View to the south.

Figure 7-14. Modern Gazebo Located South of Building 101

Note: View to the southwest.

Figure 7-15. Building 102 Entrance

Note: View to the south.

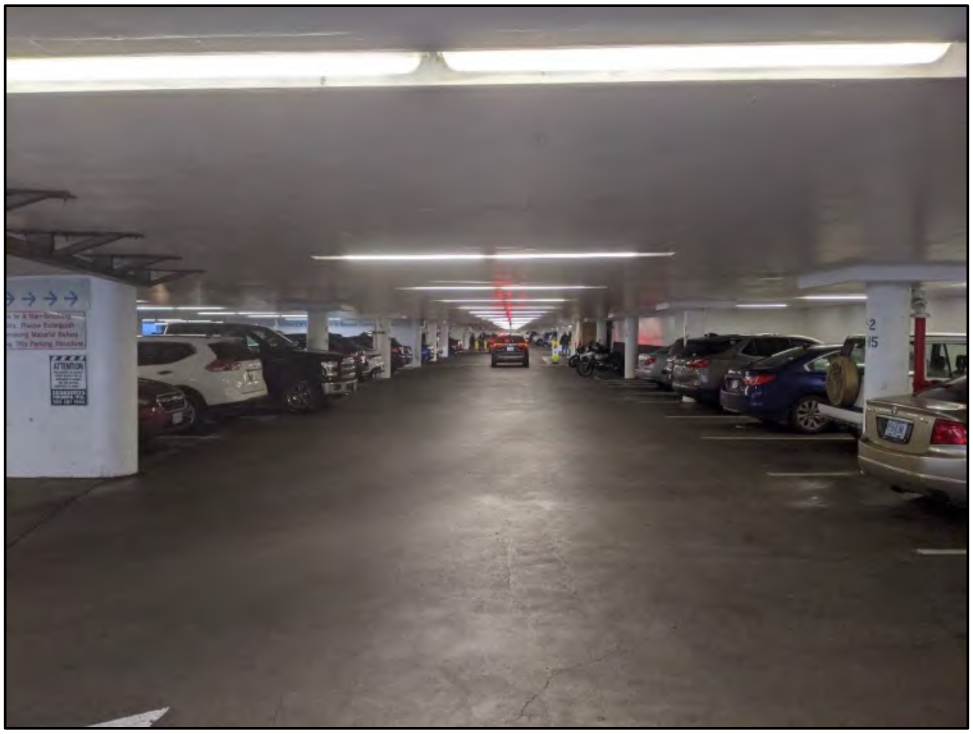


Figure 7-16. Parking Level 2 of Building 102

Note: View to the south.

Figure 7-17. Building 102 Parking Level 2 Entrance Vestibule

Note: View to the west.

Figure 7-18. Central Plaza Atop Building 102

Note: View to the north.

Figure 7-19. Central Plaza Atop Building 102

Note: View to the northwest.

Figure 7-20. Building 108

Note: View to the southwest.

Figure 7-21. Parking Structure, Building 108

Note: Building is at south end of campus. View to the northwest.

Figure 7-22. Parking Structure, Building 108

Note: Pilings for future vertical expansion. View to the southwest.

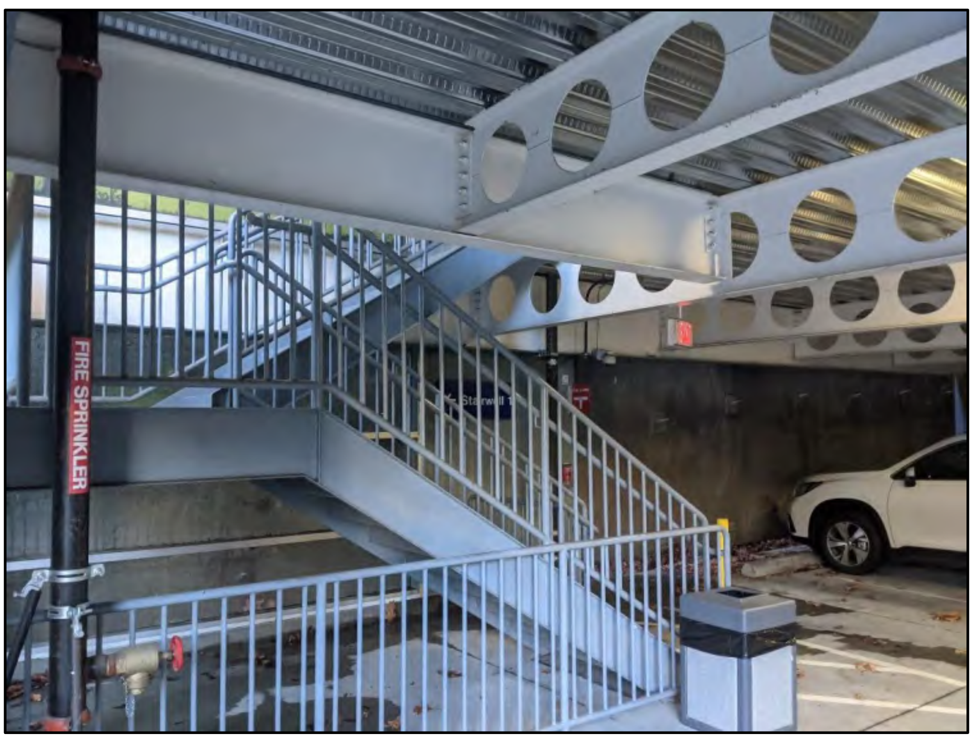


Figure 7-23. Building 108 Stairwell

Note: View to the south.

7.3 Phase II and III Projects

7.3.1 Trailer 1; Buildings T-41, T-51, 110, 111, 112; and the Energy Center

Phase II and III projects are not part of the current proposed undertaking. However, SWCA staff preemptively conducted background research and field investigations for these Phases. Trailer 1 and Buildings T-41 and T-51 (Figures 7-24 to 7-42) are scheduled for demolition to make way for the construction of Buildings 110 and 111. Trailer 1 is a triple-wide modular structure with brown siding (Figure 7-27). The structure has no permanent foundation, resting on concrete and lumber (Figure 7-29). Building T-41 is a single-story, rectangular, brick structure identified as the grounds shop. It has an entrance and a garage door on the eastern side. The structure is relatively modern and shows no sign of modification to its original form. It was likely constructed in the mid-1970s (Schwab Engineering and Management 2018). Building T-51 is a large, two-story structure with brown corrugated metal siding and roof. The structure possesses no style or features of historic value (Figure 7-32). Upgrades to the Energy Center (Figures 7-33 and 7-34), located near the proposed construction of Building 111, are also proposed under Phases II and III projects. The proposed Building 112 parking structure will be located near Building 16 and on the current location of Parking Lot 4 (Figures 7-35 and 7-36).

Figure 7-24. Building T-41

Note: View to the southeast.

Figure 7-25. Building T-41

Note: View to the southwest.

Figure 7-26. Path Behind Building T-41

Note: View to the west.

Figure 7-27. Trailer 1

Note: View to the northeast.

Figure 7-28. Trailer 1

Note: View to the southeast.

Figure 7-29. Foundation of Trailer 1

Note: View to the west.

Figure 7-30. Southern End of Building T-51

Note: View to the northwest.

Figure 7-31. Building T-51 Western Facade

Note: View to the north.

Figure 7-32. Building T-51

Note: View to the northwest.

Figure 7-33. Energy Center Entrance

Note: View to the south.

Figure 7-34. Energy Center Loading Dock

Note: View to the east.

Figure 7-35. Parking Lot 4

Note: View to the east.

Figure 7-36. Parking Lot 4

Note: View to the southeast.

Figure 7-37. Lower section of Parking Lot 5

Note: View to the north.

Figure 7-38. Upper southern section of Parking Lot 5

Note: View to the south.

Figure 7-39. SW US Veterans Hospital Road

Note: Showing entrance from SW Terwilliger Boulevard. View to the southeast.

Figure 7-40. SW US Veterans Hospital Road

Note: View to the north.

Figure 7-41. SW US Veterans Hospital Road at North End of Campus

Figure 7-42. Overview of Terwilliger Parkway

Note: View to the southeast.

8.0 Conclusions and Recommendations

The proposed undertaking seeks to address seismic deficiencies and construct updates to buildings and parking lots as part of Phase I at the Portland VAMC campus. Phase I will consist of seismic upgrades to Building 100, 101, and 102; replacement of the façades of Buildings 100 and 101; improvements and realignment of the plaza and roadway for Building 102; and construction of two additional parking levels of Building 108. No ground disturbance is proposed for the current undertaking in previously undisturbed sediments. Based on the previously conducted cultural resources investigations on the Portland VAMC campus, the direct APE is at a low risk for inadvertently discovering pre-contact cultural resources and a low risk for uncovering historic-period cultural resources. The construction of the original hospital removed much of the hilltop soil; therefore, planned ground disturbing activity will not likely encounter any pre-contact soil horizons. However, SWCA recommends a project-related inadvertent discovery plan be created for the project, outlining procedures on what to do and who to contact if there is an inadvertent discovery as a result of any project-related minor ground-disturbing activities in previously disturbed sediments during construction.

No structures are currently listed as properties eligible for the NRHP (as listed by SHPO) within the direct or indirect APE on the Portland VAMC campus. The only structures identified to be 50 years or older were recorded by Schwab Engineering and Management (2018): Buildings 6, 16, and the stone masonry walls within the campus. However, these structures have been determined not eligible for the NRHP with Oregon SHPO concurrence.

While the proposed undertaking may increase traffic or cause delays on Terwilliger Parkway, there is no direct impact to the resource. The increased traffic or delays will not present negative impacts to the parkway. The historical significance of the parkway satisfies Criterion A within the National Register Criteria for Evaluation. The parkway derives its Criterion A significance through association with events, The Olmsted Portland Park Plan and the City Beautiful Movement. While the NRHP form for the parkway listing does not specify, the parkway may also possess Criterion B significance through association with prominent individuals whose specific contributions can be identified and documented, Frederick Law Olmsted Jr. and John Charles Olmsted. However, further research is required to establish those associations.

Regarding Criterion C, the parkway has undergone numerous maintenance activities since the early 1900s and traffic has steadily increased on the historic-period road over time. The road surface does not represent any distinctive characteristics of a type, period, materials, or method of construction. Nor does the road represent the work of a master with artistic value.

Regarding Criterion D, the decades of maintenance referenced above has likely eliminated any potential to yield new information about the parkway development. Important information may have been in the form of past materials used for surfacing. However, those materials were likely removed during resurfacing projects.

While Terwilliger Boulevard's listing includes the pedestrian paths and lighting along its route near the APE, it should be noted that the indirect affect is limited to vehicular traffic and confined to the physical road surface. There are no planned activities that impact the integrity of location, design, setting, feeling, and association of Terwilliger Parkway. The NRHP listed resource is within the Indirect APE, however the potential affects do not propose a risk to the Criterion A and Criterion B aspects of the resource. Additionally, there are no Criterion C or Criterion D considerations. Therefore, the Terwilliger Parkway NRHP listing will not be affected by the proposed undertaking.

Further, because the Portland VAMC campus underwent major upgrades over the past decades, most notably demolishing most existing structures in the mid-1970s and replacing them with new structures in 1981, all other structures on the campus, besides Buildings 6, 16, and stone masonry walls, are modern. Based on the background research and the reconnaissance survey, the proposed undertaking will not negatively impact historic properties. Therefore, SWCA recommends a finding of **no historic properties affected** (36 CFR 800.5(b)) for both direct and indirect effects.

9.0 Interested and Affected Parties of the Undertaking

It is the VA's responsibility to initiate NHPA-Section 106 and government-to-government consultation with the SHPO and Native American tribes whose lands may be affected by the action or who may attach religious and cultural significance to affected properties. This consultation process must provide a reasonable opportunity to identify their concerns with the proposed undertaking and to request their concurrence with the finding of no historic properties affected and no historic preservation mitigation is necessary. VA will send consultation letters to SHPO and the Tribes listed in Table 9-1.

Table 9-1. Interested and Affected Parties of the Undertaking

Affiliation	Contact	Address	Email and Phone Number
Government to Government Contacts			
Oregon State Historic Preservation Office	John Pouley, State Archaeologist	725 Summer Street NE, Suite C, Salem, OR 97301	john.pouley@oregon.gov 503-480-9164
Confederated Tribes of Siletz Indians of Oregon	The Honorable Delores Pigsley, Tribal Chairman	PO Box 549 Siletz, OR 97380	dpigsley@msn.com 541-444-2532
Confederated Tribes of the Grand Ronde Community of Oregon	The Honorable Cheryle A. Kennedy, Tribal Council Chairwoman	9615 Grand Ronde Road, Grand Ronde, OR 97347-0038	cheryle.kennedy@grandronde.org 503-879-2352 cc Mr. Michaeol Karnosh Michael.karnosh@grandronde.org
Confederated Tribes of the Grand Ronde Community of Oregon	Mr. Michael Karnosh, Ceded Lands Department Manager	9615 Grand Ronde Road, Grand Ronde, OR 97347-0038	Michael.karnosh@grandronde.org
Confederated Tribes of the Umatilla Indian Reservation	The Honorable Kathryn Brigham, Chair, Board of Trustees	Nixyáawii Governance Center 46411 Timíne Way, Pendleton, OR 97801	KatBrigham@ctuir.org 541-429-7030 or 541-429-7374
Confederated Tribes of the Warm Springs Reservation of Oregon	The Honorable Raymond Tsumpti, Sr. Chairman	PO Box C Warm Springs, OR 97761	raymond.tsumpti@wstribes.org 541-533-3257 Cc Mr. Robert A Brunoe Robert.brunoe@ctwsbnr.org
Confederated Tribes of the Warm Springs Reservation of Oregon	Mr. Robert A. Brunoe, THPO/Branch of Natural Resources General Manager	PO Box C Warm Springs, OR 97761	Robert.brunoe@ctwsbnr.org 541-553-2001
Cowlitz Indian Tribe	The Honorable Philip Jarju, Chairman	PO Box 2547 Longview, OR 98632-8594	pharju@cowlitz.org 360-352-5630 or 360-577-8140

Affiliation	Contact	Address	Email and Phone Number
Nez Perce Tribe	The Honorable (Mr). Shannon Wheeler, Chairman	P.O. Box 305, Lapwai, ID 83540-0305	nptec@nexperce.org 208-843-7342 Cc Mr. Pat Baird keithb@nexperce.org
NHPA-Section 106 Contacts			
Confederated Tribes of Siletz Indians of Oregon	Mr. Robert Kentta, Cultural Resources Director	PO Box 549 Siletz, OR 97380	rkentta@ctsi.nsn.us
Confederated Tribes of the Grand Ronde Community of Oregon	Mr. Briece Edwards, Manager Historic Preservation Office	9615 Grand Ronde Road, Grand Ronde, OR 97347-0038	Briece.edwards@grandronde.org or thpo@grandronde.org 503-879-2084
Confederated Tribes of the Umatilla Indian Reservation	Ms. Teara Farrow-Ferman,	46411 Timíne Way, Pendleton, OR 97801	tearafarrowfurman@ctuir.org 541-276-3447
Confederated Tribes of the Warm Springs Reservation of Oregon	Mr. Christian Nauer	PO Box C Warm Springs, OR 97761	Christian.nauer@ctwsbnr.org Cc Mr. Robert Brunoe Robert.brunoe@ctwsbnr.org
Cowlitz Indian Tribe	Mr. James Gordon, Cultural Resources	PO Box 2547 Longview, OR 98632-8594	jgordon@cowlitz.org 360-353-9997 Cc jwalker@cowlitz.org
Cowlitz Indian Tribe	Archaeologist		Jwalker@cowlitz.org
Nez Perce Tribe	Mr. Pat Baird, Cultural Resources	PO Box 305 Lapwai, ID 83540-0305	keithb@nezperc.org 208-843-2253

10.0 References

Aikens, M. C. (1993). Archaeology of Oregon. U.S. Department of Interior, Bureau of Land Management, Portland, Oregon.

Albany Register, The. (1870). Item about the father of Finice Caruthers. 8 October. Available at: https://oregonnews.uoregon.edu/lccn/sn84022643/1870-10-08/ed-1/seq-2/#words=Caruthers+Finice. Accessed November 25, 2020.

Alt, D., and D. W. Hyndman. (1978). Roadside Geology of Oregon. Mountain Press Publishing, Missoula, Montana.

Ames, K. M., Y. Hajda, D. Davis, M. Parchman, and T. Hickey. (1992). Archaeological Context Statement Portland Basin. Portland State University, Portland, Oregon.

Beckham, S. D. (1977). The Indians of Western Oregon: This Land Was Theirs. Arago Books, Coos Bay, Oregon.

Benito, G., and J. E. O'Connor. (2003). Number and Size of Last-Glacial Missoula Floods in the Columbia River Valley Between the Pasco Basin, Washington, and Portland, Oregon. *Geological Society of America Bulletin* 155(5):624–638.

Bergquist, J. M. (1957). The Oregon Donation Act and the National Land Policy. *Oregon Historical Quarterly* 58(1):17–35.

Bogue, R., R. McGilvre, and R. Wiggin. (1974). Report of Archaeological Reconnaissance of Ross Island, Multnomah County. Portland State University, Portland, Oregon.

Bourke, P., and D. A. DeBats. (1995). Washington County: Politics and Community in Antebellum America. Johns Hopkins University Press, Baltimore.

Bowen, W. A. (1978). The Willamette Valley: Migration and Settlement on the Oregon Frontier. University of Washington Press, Seattle.

Boyd, R. (1990). Demographic History of Western Oregon since 1846. In *Handbook of North American Indians, Volume 7: Northwest Coast*, edited by W. P. Suttles, pp. 180–188. Smithsonian Institution, Washington, D.C.

Burbank, D. W., and R. S. Anderson. (2001). Tectonic Geomorphology. Blackwell Science Press, Malden, Massachusetts.

Cabebe, T. E. (2006). Archaeological Survey of Bridge 09254D, Multnomah County. University of Oregon Museum of Natural and Cultural History, Eugene.

Carey, C. H. (1971). General History of Oregon through Early Statehood. Binford and Mort, Portland, Oregon.

City of Portland. (2020). Elizabeth Caruthers Park. Available at: https://www.portland.gov/parks/elizabeth-caruthers-park. Accessed December 8, 2020.

Coan, C. F. (1921). The First Stage of Federal Indian Policy in the Pacific Northwest: 1849-1852. *Oregon Historical Quarterly* 23(1):46–89.

Conlon, T. D., K. C. Wozniak, D. Woodcock, N. B. Herrera, B. J. Fisher, D. S. Morgan, K. K. Lee, and S. R. Hinkle. (2005). Ground Water Hydrology of the Willamette Basin, Oregon. Scientific Investigations Report 2005-5168. U.S. Geological Survey. Available at: http://pubs.usgs.gov/sir/2005/5168/.

Corning, H. M. (1956). Dictionary of Oregon History. Binford and Mort, Portland, Oregon.

CPI Inflation Calculator. (2020). $500,000 in 1870 → 2021. Official Inflation Data, Alioth Finance. Available at: https://www.officialdata.org/us/inflation/1870?amount=500000. Accessed January 27, 2021.

Dasler, J. L. (2009). NOAA Hydrographic Surveys H11854 - H22859 Descriptive Report. David Evans and Associates, Inc., Portland, Oregon.

Johansen, D. O., and C. M. Gates. (1957). Empire of the Columbia: A History of the Pacific Northwest. Harper and Row, New York.

Louis Berger and Associates, Inc. (1986). Phase II Archaeological Survey, Federal Correctional Institution Complex, Sheridan, Oregon. Prepared for U.S. Department of Justice, Federal Bureau of Prisons, Washington DC.

MacColl, E. K., and H. H. Stein. (1988). Merchants, Money, and Power: the Portland Establishment, 1843-1913. Georgian Press. Available at: https://archive.org/details/merchantsmoneypo00macc/page/58/mode/2up. Accessed November 20, 2020.

Mackey, H. (1974). The Kalapuyas: A Sourcebook on the Indians of the Willamette Valley. Mission Mill Museum Association Inc., Salem, Oregon.

Mapes, G. (2020). William Johnson (1784-1848). Oregon Encyclopedia. Available at: https://www.oregonencyclopedia.org/articles/johnson-william/#.YBbW8TSSkuU. Accessed December 9, 2020.

Minor, R., and S. D. Beckham. (1987). Cultural Resources Survey for the US Sprint Fiber Optic Cable Project Eugene, Oregon to Seattle, Washington. Heritage Research Associates, Eugene, Oregon.

Morning Oregonian. (1918). Claim to $5,000,000 Property is Denied. 5 November:20. Available at: https://oregonnews.uoregon.edu/lccn/sn83025138/1918-11-05/ed-1/seq-20/#words=Caruthers+Finice. Accessed March 4, 2021.

Natural Resources Conservation Service. (2001). Goble Series. Available at: https://soilseries.sc.egov.usda.gov/osdname.aspx. Accessed November 28, 2020.

National Park Service (NPS). (1997). How to Apply the National Register Criteria for Evaluation. Government Publication Office, Washington, D.C. Available at: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf. Accessed March 23, 2020.

O'Connor, J. E., A. Sarna-Wojkicki, K. C. Wozniak, D. J. Polette, and R. J. Fleck. (2001). Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon. Professional Paper 1620. U.S. Geological Survey, Reston, Virginia.

Oregon City Enterprise, The. (1873). The Joe Thomas ("Wrestling Joe.") Fraud. 18 July. Available at: https://oregonnews.uoregon.edu/lccn/sn94052321/1873-07-18/ed-1/seq-1/#words=Joe+Nixon+Wrestling. Accessed November 23, 2020.

Oregonian, The. (1987). History of the VA Hospital. 14 December:B2. Available at: http://nl.newsbank.com/nl-search/we/Archives?p_product=HA-ORGB&p_theme=histpaper&p_action=keyword. Accessed November 10, 2020.

Orloff, Chet. (2021). Olmsted Portland Park Plan. Available at: https://www.oregonencyclopedia.org/articles/olmsted_portland_park_plan/#.YF43iU6SkuU. Accessed March 25, 2021.

Orr, E. L., W. N. Orr, and E. M. Baldwin. (1992). Geology of Oregon. Kendall/Hunt Publishing, Dubuque, Iowa.

Parsons, R. B., C. A. Balster, and A. O. Ness. (1970). Soil Development and Geomorphic Surfaces, Willamette Valley, Oregon. *Soil Science Society of America* 34:485–491.

Pettigrew, R. M. (1990). Prehistory of the Lower Columbia and Willamette Valley. In *Handbook of North American Indians, Volume 7: Northwest Coast*, edited by W. P. Suttles, pp. 518–529. Smithsonian Institution, Washington, D.C.

Reese, J., and M. J. Boynton. (2008). Portland - Milwaukie Light Rail Project Archaeological Resources Reconnaissance Study. Archaeological Investigations Northwest, Inc., Portland, Oregon.

Roulette, Bill R. (2010). Cultural Resources Study of the 4310 SW Macadam Avenue Property, Portland, Multnomah County, Oregon. Portland State University, Portland, Oregon.

Ruiz, C. L., and T. Connolly. (2009). Cultural Resource Survey and Evaluation of the I-5 SW Iowa Street Viaduct Project (MP 298.2) Multnomah County. Museum of Natural and Cultural History, University of Oregon, Eugene.

Schlicker, H. G., and R. J. Deacon. (1967). Engineering Geology of the Tualatin Valley Region, Oregon. Bulletin 60. State of Oregon Department of Geology and Mineral Industries, Portland.

Schlicker, H. G., and C. T. Finlayson. (1979). Geology and Geologic Hazards of Northwestern Clackamas County, Oregon. Bulletin 99. State of Oregon Department of Geology and Mineral Industries, Salem.

Schwab Engineering and Management. (2018). Cultural and Historic Resources VA Portland Health Care System Preliminary Findings Report.

Sharp, N. D., T. P. Fulton, P. A. Fulton, and K. E. Juell. (1998). Cultural Resources Inventory of the Proposed FTV Western Build. Northwest Archaeological Associates, Inc, Seattle, Washington.

State Rights Democrat, The. (1871). Pacific Coasters item about "Wrestling Joe." 17 November. Available at: https://oregonnews.uoregon.edu/lccn/sn84022644/1871-11-17/ed-1/seq-2/#words=Caruthers+Finice. Accessed November 27, 2020.

Sunday Oregonian, The. (1912). Transportation Opens Fine Vista Where Pioneers Made Happy Homes. 23 June:17. Available at: https://oregonnews.uoregon.edu/lccn/sn83045782/1912-06-23/ed-1/seq-17/#words=Caruthers+Finice. Accessed November 24, 2020.

U.S. Department of Agriculture. (2009). Ecological Subregions of the United States. Available at: https://www.fs.fed.us/land/pubs/ecoregions/ch24.html. Accessed November 20, 2020.

Zenk, H. B. (1976). Contributions to Tualatin Ethnography: Subsistence and Ethnobiology. Master's Thesis. Portland State University, Portland, Oregon.

Zenk, H. B. (1990). Kalapuyans. In *Handbook of North American Indians, Volume 7: Northwest Coast*, edited by W. P. Suttles, pp. 547–553. Smithsonian Institution, Washington, D.C.

H Appendix H: Oregon State Historic Preservation Office (SHPO) Correspondence

VA | U.S. Department of Veterans Affairs

VA PORTLAND HEALTH CARE SYSTEM
3710 SW U.S. Veterans Hospital Rd.
Portland, OR 97239

February 3, 2022

John Pouley, State Archaeologist
State Historic Preservation Office
Oregon Parks & Recreation Department
725 Summer Street NE, Suite C
Salem, OR 97301

SUBJECT: Initiation of Section 106 Consultation for the VA Portland Health Care System Portland Campus – Multnomah County, Oregon

Dear Mr. Pouley,

Pursuant to Section 106 of the National Historic Preservation Act (54 USC 306108), the U.S. Department of Veterans Affairs (VA) is initiating section 106 consultation with the Oregon State Historic Preservation Office (SHPO) for the referenced projects at the VA Portland Health Care System Portland Campus (Portland VA Medical Center [VAMC] campus). These projects will be implemented over six or more years to seismically upgrade, renovate, modernize, and expand the existing Portland VAMC facilities, primarily within its existing footprint (proposed action). The proposed action is needed because the Portland VAMC facilities do not meet VA design criteria and seismic and physical security standards. Further, the proposed improvements would enhance patient and employee safety and meet the current and growing healthcare needs of Portland-area Veterans. The Portland VAMC campus is located at 3710 SW U.S. Veterans Hospital Road in Portland, Multnomah County, Oregon.

Undertaking

The Portland VAMC has defined the undertaking as the following:

- Design and construction for required seismic upgrades and improvements to Building 102 (underground parking garage that supports the road in front of Buildings 100 and 101) including a new water tank and realignment of the associated plaza and roadway to address physical security concerns.
- Design and construction for a complete seismic upgrade to Building 100 (main hospital building) and nearby Building 101 (research and administration building) including the replacement of the façade on both buildings. B100 improvements would include a new service elevator.
- Demolition of Building T-41, Building T-51, and Trailer 1 to provide space for the new construction and site layout.
- Design and construction of two additional parking levels at Building 108 (existing parking structure) to add approximately 150 parking spaces. An elevator extension would serve the top two floors.
- Design and construction of Building 111 (parking garage), an approximately 650-space parking structure in the area south of Building 101.
- Design and construction of Building 110, an approximately 325,000 gross square foot Specialty Care Building.

VA PORTLAND HEALTH CARE SYSTEM
3710 SW U.S. Veterans Hospital Rd.
Portland, OR 97239

- Energy plant improvements and upgrades such as boilers, chillers, cooling towers, and the electrical distribution system.
- Remaining structural and non-structural seismic upgrades, including HVAC upgrades, and the full renovation and modernization of Buildings 100 and 101.

Area of Potential Effect

Pursuant to the NHPA and its implementing regulations (36 CFR 800) an area of potential effects (APE) is defined as a geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 CFR 800.16(d)). The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

The Portland VAMC has determined the APE consists of the entire Portland VAMC campus, including footprints of existing buildings and parking locations as well as construction around the perimeter of each location, and a section of the historic roadway, SW Terwilliger Boulevard. Although there will be no physical impacts to SW Terwilliger Boulevard or outside of the Portland VAMC campus, it is included in the APE for the potential visual effects due to its relatively close location to the campus and the potential for increased traffic on the roadway due to the undertaking. The APE encompasses possible foot traffic of construction workers, material staging areas, and utility corridors within the immediate perimeter of the buildings. Minimal ground disturbance is proposed for the current undertaking in previously undisturbed sediments. See Figures 1-4 for a topographic map of the Portland VAMC campus boundary, aerial imagery showing the campus and surrounding area, a map of the APE, and a depiction of proposed projects on the campus.

Identification of Historic Properties

Background research for this project was conducted using the Oregon Archaeological Records Remote Access (OARRA) online database. These records indicate that there have been nine cultural resources investigations previously conducted within 1 mile of the Portland VAMC campus. Only two reports overlap the Portland VAMC campus boundaries. OARRA records show that 16 archaeological resources have been recorded within 1 mile of the APE. These sites are concentrated downslope and along the Willamette River. The documented archaeological sites are primarily historic-period sites with only one of the 16 sites (35MU232) associated with pre-contact materials. The site is described as a mix of historic-period refuse scatter and pre-contact shell midden. No archaeological resources have been previously recorded within the APE.

In 2018, a built environment survey of the Portland VAMC campus was conducted to determine if the proposed seismic upgrades may impact potentially contributing historic resources within the APE. Wiss, Janney, Elstner Associates, Inc. (WJE) completed an evaluation of the Portland VAMC to identify any historic properties on the campus and recorded Buildings 6 and 16 as existing structures on the campus greater than 50 years old. They also recorded stone masonry site retaining walls as another campus structure over 50 years old and noted that Building 41 was likely constructed in the mid-1970s.

VA PORTLAND HEALTH CARE SYSTEM
3710 SW U.S. Veterans Hospital Rd.
Portland, OR 97239

Their report recommends Buildings 6, 16, and the stone site walls not eligible for the National Register of Historic Places (NRHP). On September 30, 2020, pursuant to Section 110 of NHPA, VA Federal Preservation Office transmitted the report to your office, with a finding that there are no properties eligible for the NRHP at the Portland VAMC. On November 16, 2020, SHPO concurred with these recommended findings. On this basis, there are no historic properties eligible for the NRHP within the Portland VAMC campus. In March 2021, SW Terwilliger Boulevard was listed on the NRHP.

Determination and Findings of Effect

The proposed undertaking seeks to address seismic deficiencies and construct updates to buildings and parking lots; demolish two existing buildings and a trailer; design and construct two additional parking levels at Building 108; design and construct a new Specialty Care Building and adjacent parking garage; and upgrade the energy plant. VA received SHPO concurrence in 2020 that there are no historic properties on the VAMC campus.

Minimal ground disturbance is proposed for the current undertaking in previously undisturbed sediments. Based on the previously conducted cultural resources investigations on the Portland VAMC campus, the VAMC campus is at a low risk for inadvertently discovering pre-contact cultural resources and a low risk for uncovering historic-period cultural resources; however, a project-related Inadvertent Discovery Plan will be created for the project. Should previously unidentified historic or culturally significant items be discovered during project construction, the construction contractor would immediately cease work in the area of the discovery until VA, a qualified archaeologist, OR SHPO, and the consulting Tribes are contacted to properly identify and curate discovered items in accordance with applicable state and federal law(s). Should human remains be identified during ground-disturbing activities, all work in the vicinity of the discovery would cease immediately, and the VA project representative would contact the Multnomah County coroner to evaluate any human remains. Should ground disturbance be proposed in areas outside of the campus for the VAMC projects proposed, further Section 106 consultation with SHPO and Native American Tribes will be required.

A traffic impact study was completed by LRS Federal with support from Jacobs Engineering in 2022 to analyze the potential future traffic operation performance within and surrounding the Portland VAMC campus. In addition to SW Terwilliger Boulevard, minor access roads to the campus and intersections surrounding the campus were assessed through traffic counts and intersection level of service ratings. A baseline scenario for future traffic conditions, assuming the proposed action would not occur, was used to evaluate the potential impacts from the proposed construction projects. A copy of this report can be provided, if necessary.

The proposed action could result in minor impacts to existing conditions with the projected increased traffic, but it would not be the primary cause of the projected growth, increases in average daily trips (ADT), or failing level of service (LOS) on the adjacent roadways in the project area. As such, the projected 2030 no-build scenario would result in an estimated 10,831 ADT on SW Terwilliger Boulevard. The proposed

VA PORTLAND HEALTH CARE SYSTEM
3710 SW U.S. Veterans Hospital Rd.
Portland, OR 97239

action is projected to result in a maximum of approximately 746 new trips on SW Terwilliger Boulevard, which would account for only 6.89% of the projected ADT in 2030. On this basis, VA believes that the proposed action would have negligible impacts on SW Terwilliger Boulevard traffic in 2030 and will not affect the roadway's eligibility under Criterion A, or its integrity.

The Portland VAMC and SW Terwilliger Boulevard are separated by steep, wooded slopes with a fairly dense understory (Figure 5). The wooded area surrounding the VAMC campus will not be disturbed, providing a visual buffer between the roadway and the campus, limiting the views of the new construction. Further, under the proposed action, building heights would still be within the range of other buildings that exist on the campus. Therefore, the changes proposed to the VAMC campus will not detract from the aesthetics of the scenic roadway. Therefore, SW Terwilliger Boulevard's eligibility determination would not be affected by the proposed undertaking.

Finally, the Portland VAMC campus has underwent major upgrades over the past decades; notably demolishing most existing structures in the mid-1970s and replacing them with new structures in 1981. All other structures on the campus, besides Buildings 6, 16, and stone masonry walls, are of recent construction.

Therefore, pursuant to 36 CFR 800.5(b), the Portland VAMC finds that the undertaking will result in no adverse effect to historic properties, both above and below ground, and requests the SHPO's concurrence on this finding per 36 CFR Part 800. Please address correspondence to Mr. Patrick Read, CFM Environmental Engineer, with the subject line "Portland VAMC Section 106". If you have questions or desire additional information, please contact Mr. Read via email at Patrick.read@va.gov or via phone at 202-891-9713. Thank you for your assistance with this undertaking.

Sincerely,

Darwin G. Goodspeed, Director
Portland Health Care System
Department of Veterans Affairs

CC: Héctor M. Abreu-Cintrón, VA Federal Preservation Officer

Figure 1. Topographic Map Depicting the Portland VAMC Boundary

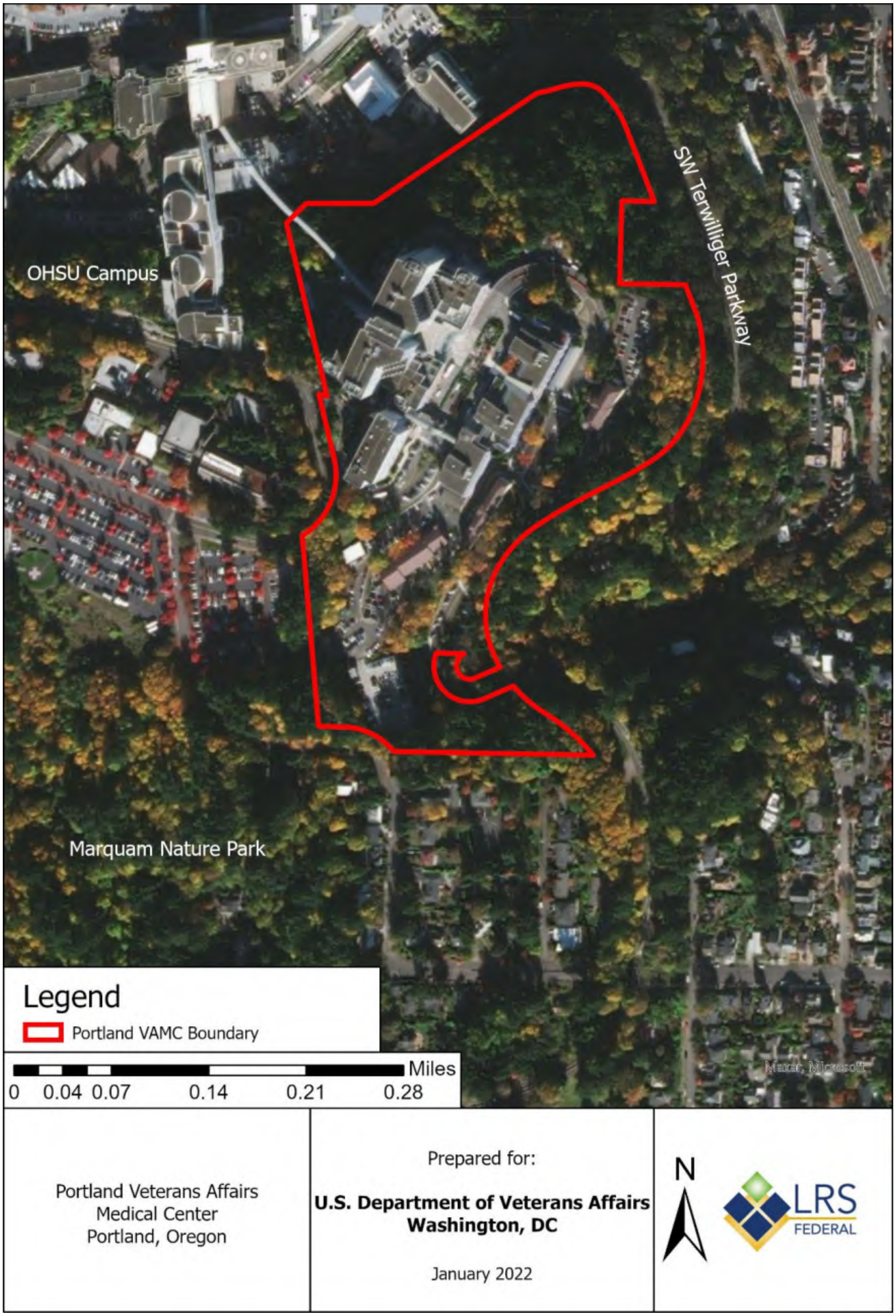


Figure 2. Aerial Imagery Depicting the Portland VAMC Boundary and Surrounding Area

VA PORTLAND HEALTH CARE SYSTEM
3710 SW U.S. Veterans Hospital Rd.
Portland, OR 97239

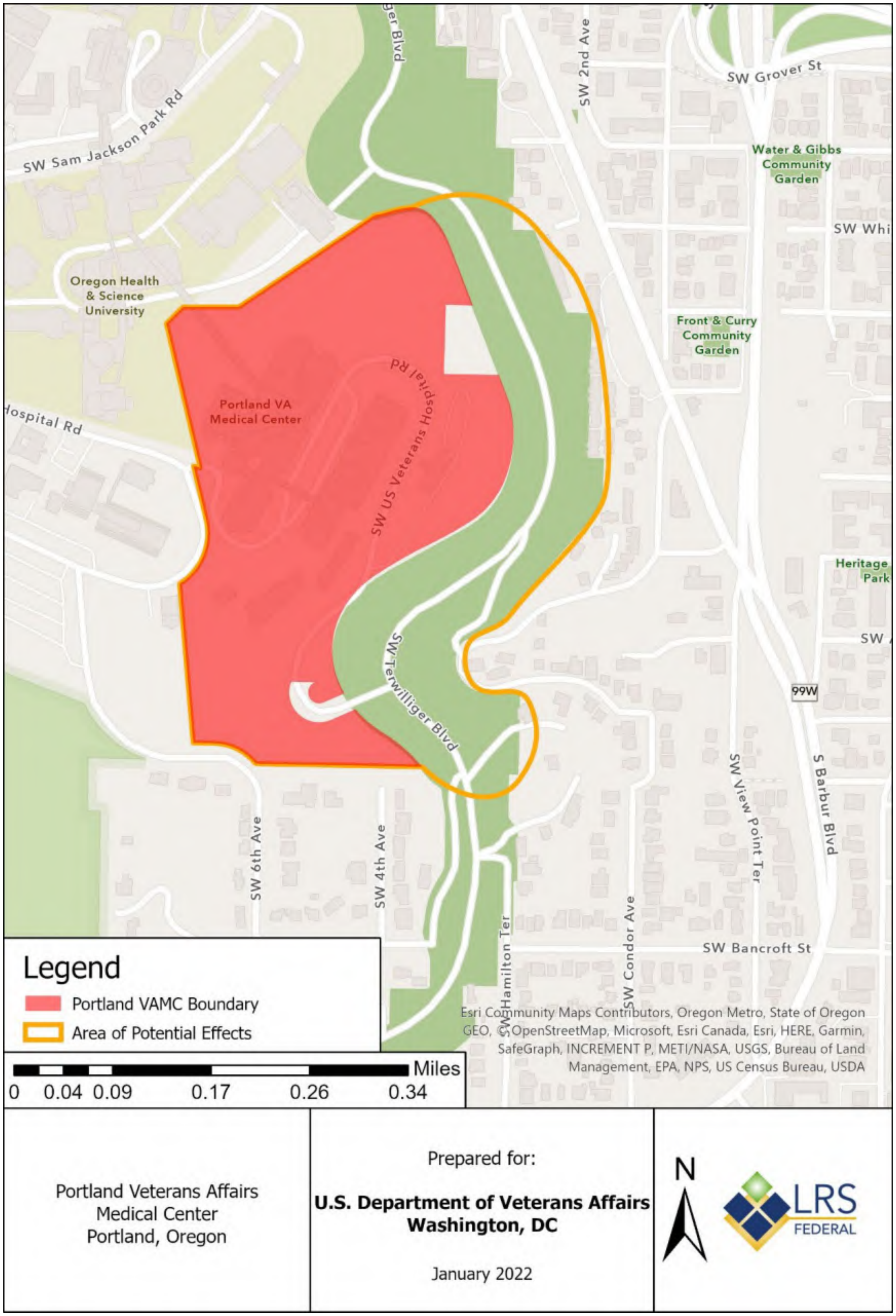


Figure 3. Map Depicting the Portland VAMC Boundary and Area of Potential Effects

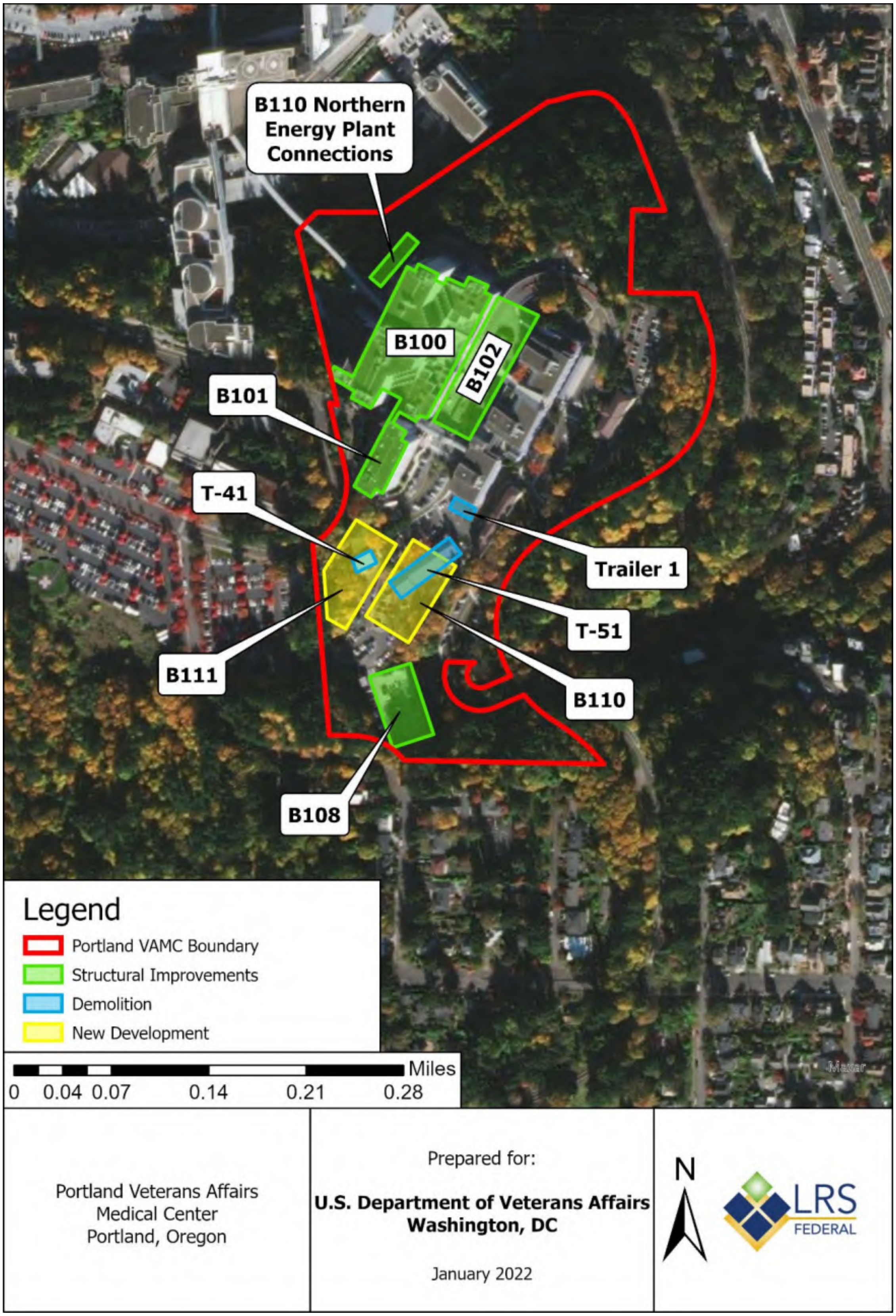


Figure 4. Depiction of Proposed Projects at the Portland VAMC Campus

Figure 5. View of SW Terwilliger Boulevard, facing southeast. This picture shows the dense woods and steep slopes lining the roadway.

Oregon
Kate Brown, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

March 7, 2022

Mr. Doug Pulak
Department of Veterans Affairs
Office of Construction and Facilities Management
810 Vermont Avenue, NW
Washington, DC 20420

RE: SHPO Case No. 20-1151
US Dept of Veterans Affairs, Seismic and Renovation Multiple Buildings
Seismic and renovations
3710 SW US Veterans Hospital Road, Portland, Multnomah County

Dear Mr. Pulak:

Thank you for submitting information for the undertaking referenced above. We concur that the Portland VAMC is not eligible for listing in the National Register of Historic Places (NRHP); this includes all structures built since the 1980s as well as Buildings 6, 16, 41, and the stone masonry walls. We also concur that the Terwilliger Parkway is eligible and was listed in the NRHP in 2021. Overall, we concur that there will be no adverse effect to historic properties for this undertaking. This letter refers to built environment resources only. Comments pursuant to a review for archaeological resources will be sent separately.

Based on the information provided, this concludes consultation with our office under Section 106 of the National Historic Preservation Act (per 36 CFR Part 800) for built environment resources. If the undertaking design or effect changes or if additional historic properties are identified, further consultation with our office will be necessary before proceeding with the proposed undertaking. Additional consultation regarding this case must be sent through Go Digital. In order to help us track the undertaking accurately, reference the SHPO case number above in all correspondence.

If you have not already done so, be sure to consult with all appropriate Native American tribes and interested parties regarding the proposed undertaking.

Please contact our office if you have any questions, comments, or need additional assistance.

Sincerely,

Jessica Gabriel
Architectural Historian, Compliance Specialist
(503) 871-9480
Jessica.Gabriel@oprd.oregon.gov

cc: Alec Bennett, Department of Veterans Affairs

Oregon

Kate Brown, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

November 16, 2020

Mr. Doug Pulak
Department of Veterans Affairs
Office of Construction and Facilities Management
Washington, DC 20420

RE: SHPO Case No. 20-1151
US Dept of Veterans Affairs, Seismic and Renovation Multiple Buildings
Seismic and renovations
3710 SW US Veterans Hospital Road, Portland, Multnomah County

Dear Mr. Pulak:

We have reviewed the materials submitted on the project referenced above, and we concur with the determination that Buildings 6, 16 and 41, as well as the stone masonry walls at the Portland VA Medical Center are not eligible for listing in the National Register of Historic Places. We also concur that there will be no historic properties affected for this undertaking.

This concludes the requirement for consultation with our office under Section 106 of the National Historic Preservation Act (per 36 CFR Part 800) for above-ground historic properties. Local regulations, if any, still apply and review under local ordinances may be required. Please feel free to contact me if you have any questions, comments or need additional assistance.

Sincerely,

Jason Allen, M.A.
Historic Preservation Specialist
(503) 986-0579
jason.allen@oregon.gov

cc: Alec Bennett, Department of Veterans Affairs