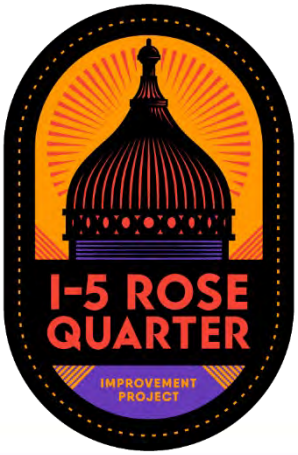
TRAFFIC ANALYSIS SUPPLEMENTAL TECHNICAL REPORT

Oregon Department of Transportation

September 26, 2022



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Contents

I-5 ROSE QUARTER IMPROVEMENT PROJECT

Tables

Figures

Executive Summary

This Traffic Analysis Supplemental Technical Report provides the traffic analysis results of the 2045 Revised Build Alternative and compares those with the updated traffic analysis results of the 2045 No-Build Alternative. The 2045 Revised Build Alternative design elements on the freeway segments are similar to those in the Build Alternative with continuous auxiliary lanes in both northbound and southbound directions and 12-foot right shoulders. The 2045 Revised Build Alternative would provide narrower median shoulders when compared to the Build Alternative but wider than those in the 2045 No-Build Alternative. Freeway and weaving segment lengths and traffic volumes in the 2045 Revised Build Alternative would be similar to those proposed in the Build Alternative. The minor differences are not expected to cause a substantive difference to the expected mainline operational benefits identified in the 2019 Traffic Analysis Technical Report.

The 2045 Revised Build Alternative would also include changes to the I-5 southbound off-ramp (exit ramp) terminal connecting to N Williams Avenue at N Wheeler Avenue and a new local street connection of NE Hancock Street to N Flint Avenue. Compared to the 2045 No-Build Alternative, there are no changes to the location of I-5 northbound exit ramp to NE Weidler Street or to the I-5 southbound on-ramp (entrance ramp) from N Wheeler Avenue. The traffic volumes on the local streets in the 2045 Revised Build Alternative are higher than those forecast for the 2045 No-Build Alternative. The most substantial change in traffic volumes would be experienced on N Williams Avenue from N Ramsay Way to N Broadway as higher traffic volumes from the I-5 southbound exit ramp would be connecting to eastbound N Weidler Street and continuing northbound on N Williams Avenue or connecting to N Broadway. Traffic volumes would decrease on southbound N Vancouver Avenue at N Broadway due to relocation of the exit ramp and the improved local street connectivity.

Bike volumes for both the 2045 No-Build and 2045 Revised Build Alternative have been updated to reflect higher baseline bicycle volumes. These updates are based on additional existing bicycle counts provided by the City of Portland and an anticipated increase in bicycle mode share as forecast in the City of Portland's Central City 2035 Comprehensive Plan mode share target for bikes within the Central City.

2045 Revised Build Alternative – Freeway Analysis

The 2045 Revised Build Alternative would improve traffic operations at all freeway segments including the four weaving segments below in both the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) analysis periods when compared to the 2045 No-Build Alternative:

- I-5 NB between the I-84 entrance ramp and NE Weidler Street exit ramp

- I-5 NB between the N Broadway entrance ramp and I-405 exit ramp
- I-5 SB between I-405 entrance ramp and N Broadway exit ramp
- I-5 SB between the NE Weidler/Williams on-ramp and I-84 exit ramp

2045 Revised Build Alternative – Local Street Analysis

Traffic operations for local street intersections under the 2045 No-Build and 2045 Revised Build Alternative were updated and evaluated using both Synchro and Vissim analysis. The traffic analysis using Synchro indicates that under the 2045 Revised Build Alternative, all intersections would operate at acceptable[1] Level of Service (LOS) with the exception of N Broadway and N Victoria Avenue in the AM peak hour (8-9 AM), which would operate at LOS E. Compared to the 2045 No-Build, the 2045 Revised Build Alternative shows LOS would improve at the intersection of N Broadway and N Vancouver Avenue from a LOS F to a LOS A in AM peak hour and from LOS E to LOS B in the PM peak hour. Both ramp terminal intersections, at I-5 southbound exit ramp and NE Williams Avenue and at I-5 northbound exit ramp and NE Weidler Street, would continue to meet the Highway Design Manual (HDM) mobility target (v/c of 0.75 or lower) during both the AM and PM peak hours.

Vissim microsimulation analysis results indicate that under the 2045 Revised Build Alternative all intersections would operate at LOS D or better in the AM and PM peak hours and LOS of several intersections would improve compared to the 2045 No-Build condition. The I-5 northbound exit ramp at the intersection of NE Weidler Street/NE Victoria Avenue will operate at LOS E in the 2045 No-Build Alternative in both the AM and PM peak hours. In comparison, under the 2045 Revised Build Alternative this intersection will operate at LOS C in both peak hours. In the 2045 No-Build Alternative, the I-5 southbound exit ramp at the intersection of N Broadway/N Vancouver Avenue will operate at LOS F in the PM peak hour, compared to LOS D in the 2045 Revised Build Alternative at the N Wheeler/N Williams & N Ramsay Way intersection.

Vissim results indicate that 95th percentile queue lengths on the I-5 northbound and southbound exit ramps would be reduced in the 2045 Revised Build Alternative compared to the 2045 No-Build Alternative and will not exceed the proposed ramp storage length approaching both ramp terminals. In the 2045 No-Build Alternative, queuing on eastbound N Weidler Street is approximately 450 feet east of the NW Lovejoy Street and NW Broadway intersection during the PM peak hour and queuing on westbound N Broadway during the AM

[1] *City of Portland operational target: LOS D for signalized intersections and LOS E for unsignalized intersections. n.d. Portland Policy Document. TRN-10.27 - Traffic Capacity Analysis for Land Use Review Cases. Available: https://www.portlandoregon.gov/citycode/article/41049*

peak hour extends to MLK Boulevard. In the 2045 Revised Build Alternative, eastbound queuing on N Weidler Street in the PM peak hour is less than in the 2045 No-Build Alternative and westbound queuing on N Broadway is similar during the AM peak hour but extends beyond MLK Jr. Boulevard during the PM peak hour.

Bike delays and travel times were also evaluated for the 2045 No-Build and 2045 Revised Build Alternatives. Both alternatives serve a similar volume of bikes in both the AM and PM peak hours but with considerably more delay in 2045 No-Build for key movements. In the AM peak hour, southbound bikes on N Vancouver Avenue experience over 2 minutes of delay in the 2045 No-Build Alternative compared to approximately 25 seconds of delay in the 2045 Revised Build Alternative. In the PM peak hour, northbound bikes on N Williams Avenue experience 90 seconds of delay crossing NE Weidler Street and 2 minutes of delay crossing N Broadway, compared to approximately 30 seconds at both locations in the 2045 Revised Build Alternative. Bicycle travel times for the 2045 Revised Build Alternative are generally within +/- 30 seconds of the travel times for the 2045 No-Build Alternative, except for the eastbound travel time during the AM peak hour which is approximately 45 seconds longer. Compared to the 2045 No-Build Alternative, the 2045 Revised Build Alternative includes vehicular demand volume differences and a protected eastbound bike signal phase at the NE Weidler and N Vancouver Avenue intersection. Refinements to signal timing within the project area may shorten bicycle travel times and will be further evaluated during design.

Transit travel times were evaluated for bus routes and streetcar routes. Southbound and westbound bus service travel times are 30 seconds to over a 1 minute shorter in the 2045 Revised Build Alternative AM peak hours. Northbound and eastbound bus service travel times are approximately 30 seconds longer compared to the 2045 No-Build Alternative. During the PM peak period, northbound and southbound bus service travel times are approximately 20 to 45 seconds longer compared to the 2045 No-Build condition. Eastbound and westbound bus routes for the 2045 Revised Build Alternative are generally within +/- 20 seconds of the travel times for the 2045 No-Build Alternative. Westbound Streetcar travel times in the 2045 Revised Build Alternative are shortened by over 30 seconds in both the AM and PM peak hours compared to 2045 No-Build. Eastbound Streetcar travel times are generally within 30 seconds of the 2045 No-Build travel times except during the AM peak hour, where the eastbound travel time is approximately 45 seconds longer.

Compared to the 2045 No-Build Alternative, there is an additional traffic signal at the N Williams Avenue and NE Hancock Street intersection that affects northbound routes in the 2045 Revised Build Alternative. The southbound bus only lane on N Vancouver Avenue between N Broadway and NE Weidler Street is also removed in the 2045 Revised Build Alternative, which

affects southbound routes. The relocation of the I-5 southbound exit ramp traffic to the N Wheeler Avenue and N Ramsay Way intersection adds considerably more traffic to N Williams Avenue, which reduces the amount of green time available for eastbound transit routes on NE Weidler Street. Refinements to signal timing within the project area may shorten bus and Streetcar service travel times and will be further evaluated during design.

1.0 INTRODUCTION

The I-5 Rose Quarter Improvement Project (Project) Environmental Assessment (EA) was released in February 2019. The Federal Highway Administration (FHWA) published a Finding of No Significant Impact (FONSI) and Revised EA (REA) for the Build Alternative on November 6, 2020. Since the issuance of the FONSI, the Oregon Department of Transportation (ODOT) has made changes to the design of the proposed Build Alternative to create a Revised Build Alternative and re-evaluated the changes in the context of the FONSI/REA. At the conclusion of the re-evaluation, FHWA and ODOT agreed that the design changes require additional analyses beyond what was presented in the REA, and FHWA rescinded the FONSI on January 18, 2022. This technical report supplements the 2019 Traffic Analysis Technical Report (ODOT) with an evaluation of the Traffic Analysis impacts of the 2045 Revised Build Alternative compared to the 2045 No-Build Alternative and Build Alternative.

2.0 BUILD ALTERNATIVE DESIGN CHANGES

Changes to the Build Alternative include modification to the highway cover design and changes associated with advancements in other elements of the project design, some of which require expansion of the Project Area. This section describes the highway cover design changes and design changes that resulted from advancements in project engineering. The evaluation of these changes is presented in Section 6.2 of this supplemental technical report.

2.1 DESIGN PROCESS

Through 2021, ODOT facilitated an Independent Highway Cover Assessment, as directed by the Oregon Transportation Commission, that engaged the Project's advisory committees and community members in a series of collaborative workshops to explore the design opportunities for the highway cover. The purpose of the Independent Highway Cover Assessment was to understand stakeholder goals and objectives within the Project Area, generate potential highway cover scenarios, and assess the impacts and benefits of these scenarios. The Independent Highway Cover Assessment team worked directly with local community members from the historic Albina neighborhood to understand how the highway cover design concepts might best serve the historic Albina community. The Project's Historic Albina Advisory Board (HAAB), Executive Steering Committee (ESC) and the Community Oversight Advisory Board (COAC) also provided input as part of the Independent Highway Cover Assessment process. These sessions explored potential opportunities for economic development in the Albina community and the highway cover design concepts.

In July 2021, Oregon Governor Brown convened a series of meetings with Project stakeholders and community organizations to discuss the design concepts developed in the Independent Highway Cover Assessment. In August 2021, the HAAB—as supported by the ESC and the COAC, and through the Governor-led process—recommended "Hybrid 3" as the preferred highway cover design concept (Figure 1). The Hybrid 3 highway cover design concept represents a proposed community solution to maximize developable space on a single highway cover. The Hybrid 3 highway cover design concept maintains the commitment for the Project to create opportunities for the local community to grow wealth through business ownership and long-term career prospects through the Project's Disadvantaged Business Enterprise and workforce program. Following the community and stakeholder recommendations, in September 2021, the Oregon Transportation Commission directed ODOT to advance further evaluation of the Hybrid 3 highway cover design concept, with conditions related to the Project's funding process and other technical analyses.

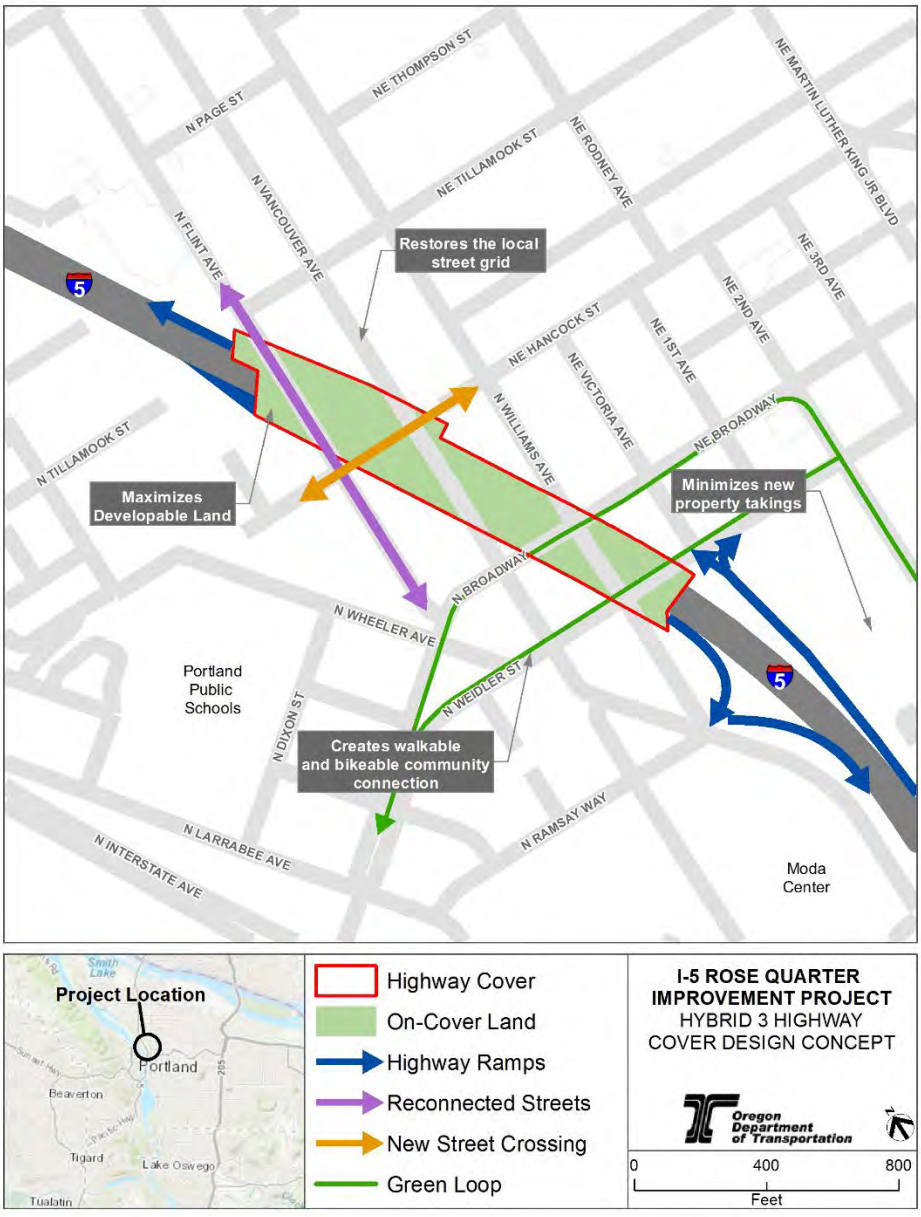
In January 2022, Governor Brown entered into a Letter of Agreement with the City of Portland, Metro, and Multnomah County that demonstrated their shared understanding and collective support for the Hybrid 3 concept as part of the Project. The Letter of Agreement specifically highlights the desire to connect the Lower Albina neighborhood, create buildable space, and enhance wealth-generating opportunities for the community, while simultaneously addressing the area's transportation needs. Additionally, the Letter of Agreement supports the development of a process to define the future development vision for what could ultimately be built on top of the highway cover upon Project completion – this process is referred to as a Community Framework Agreement. The Letter of Agreement states that the City of Portland will lead a Community Framework Agreement process and that it should be between the City of Portland, ODOT, other state agencies and local jurisdictions as necessary, with the participation of organizations that represent the Albina community and Black residents. Any future real estate or open space development on top of the cover would require executing long-term air rights and lease agreements, and that any such actions or decisions are subject at all times to applicable local, state, and federal laws including but not limited to land use and NEPA processes.

In June 2022, ODOT and the City of Portland executed an Intergovernmental Agreement (IGA), building upon the January 2022 Letter of Agreement. The IGA further states that the City will lead the future highway cover land use, programming and development processes and development of a Community Framework Agreement, in consultation with the ODOT to ensure the highway, local streets and resulting land parcels within the Project are coordinated. As such, ODOT would construct the highway cover as part of the Project and the City of Portland would lead the process to define what is ultimately built on the new land created by the Project's highway cover. In the IGA, both ODOT and the City agreed that ODOT will retain ownership of

the highway cover structure and the new developable area created on the highway cover structure upon Project completion.

The sections below describe the highway cover design changes and the design changes that resulted from advancements in project engineering and are incorporated into the Revised Build Alternative.

Figure 1 Hybrid 3 Highway Cover Design Concept



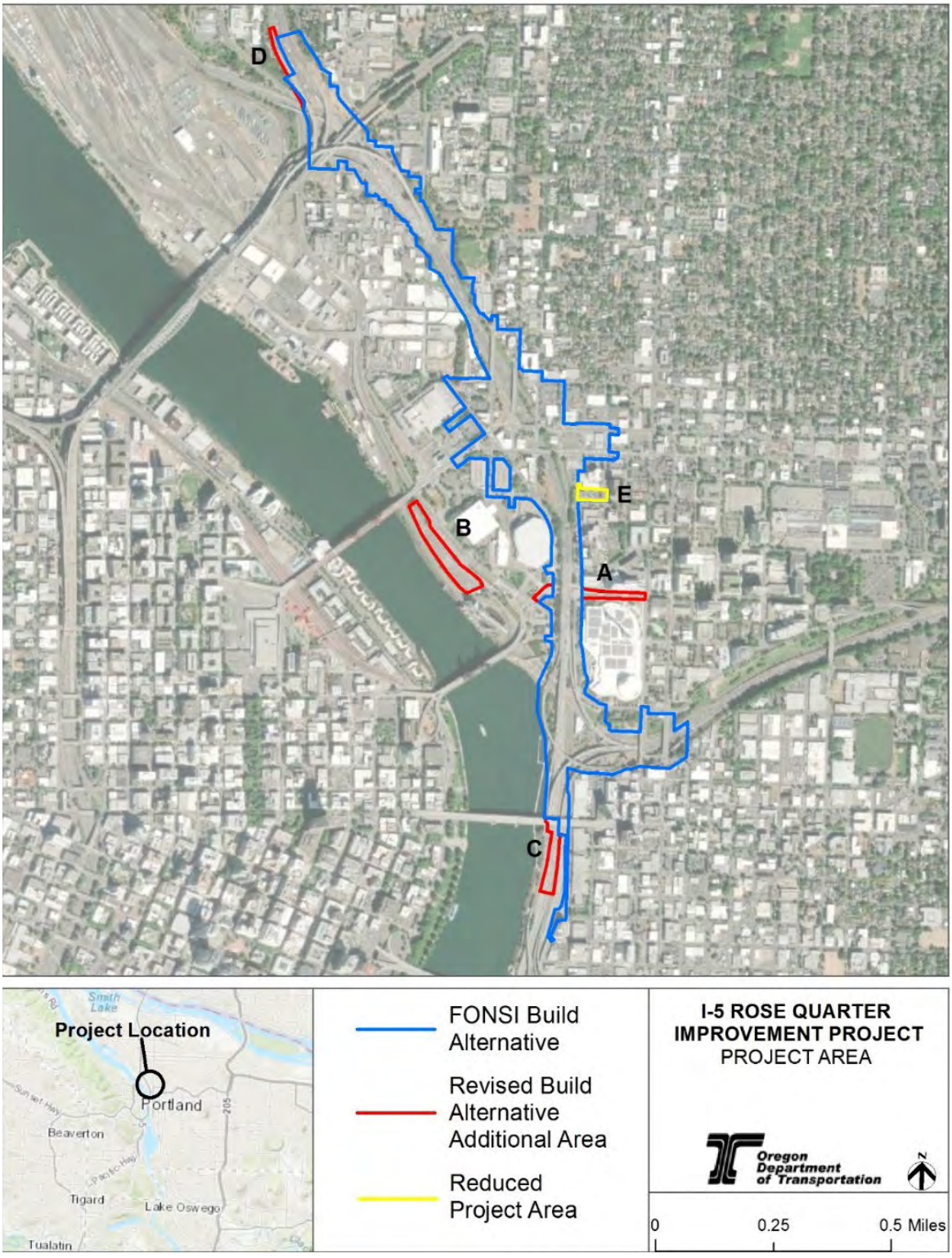
This section describes the highway cover design changes and design changes that resulted from advancements in project engineering and are incorporated into the Revised Build Alternative.

2.2 PROJECT AREA

The Project Area is defined as the area within which improvements are proposed, including where permanent modifications to adjacent parcels may occur and where potential temporary impacts from construction activities could result. As Project design information advanced, some changes required expansion of the Project Area presented in the REA and FONSI, and in one location the Project Area was reduced (Figure 2). In total, approximately 8.7 acres would be added to the Project Area. The changes are as follows, with letter references to the areas shown in Figure 2:

- A: Utility conflicts with Light Rail Transit (LRT) along NE Holladay Street between N Interstate Avenue and NE Martin Luther King Jr. Boulevard required expanding the Project Area by 1.9 acres to include additional overhead utility relocations (label A in Figure 2).
- B: An existing parking lot (known as Aegean Lot) south of N Interstate Avenue and the Broadway Bridge may be used for contractor staging during construction and is added to the Project Area (label B, Figure 2). ODOT identified this 4.3-acre construction staging area for contractor use based on its location, size, and suitability recognizing that, because of the urban setting and high-density land development in the construction area, it would be difficult for a construction contractor to find the space needed near or next to the project work areas for equipment staging, material storage, and the required co-location space for the contractor/construction personnel. This location meets all of the Project requirements: large level open space, proximity to the project work areas, and access for staging/storage of materials and equipment. Any materials stored in the area and site runoff would be subject to the same regulations as required throughout the project site.
- C: The southern end of the Project Area is expanded by 2.4 acres to include the portion of I-5 south of the Burnside Bridge proposed for a retrofit of the existing bridge rail, restriping the existing freeway, and installation of new guide signs (label C, Figure 2).
- D: At the northernmost end of the Project Area, a 1.1-acre area of ODOT right of way along the I-5 shoulders is now included in the Project Area for fiber optic conduit (label D, Figure 2).E: In one location, the Project Area was reduced by 1.0 acre. A parking lot west of the intersection of NE Clackamas Street and NE 2nd Avenue is no longer needed for the Project due to the removal of the Clackamas Bicycle and Pedestrian Crossing (label E, Figure 2).

Figure 2 Previous and Current Project Area.



2.3 I-5 MAINLINE IMPROVEMENTS CHANGES

The Build Alternative included relocation of the I-5 southbound on-ramp at N Wheeler Avenue to N/NE Weidler Street at N Williams Avenue via the new Weidler/Broadway/Ramsay highway cover, construction of auxiliary lanes and full shoulders (12 feet in width) on I-5 between I-405 and I-84 in both directions, and associated improvements to I-5 through the Project Area. The Revised Build Alternative includes the following changes to those elements of the Build Alternative:

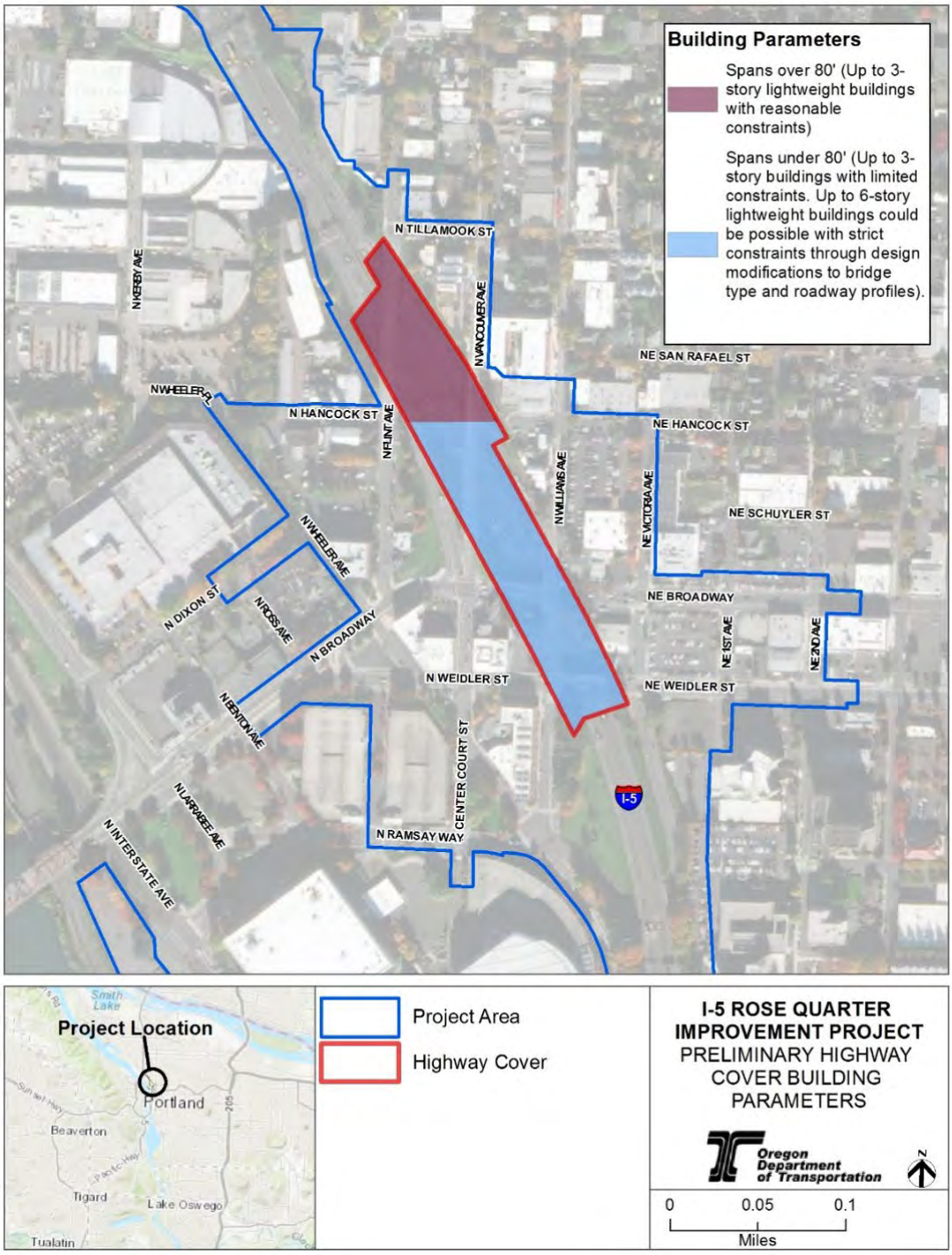
- Move the I-5 southbound exit ramp termini from N Broadway to N Williams Avenue at NE Wheeler Avenue.
- Reduce the freeway median shoulder through the entire Project Area, from 12 feet to 8 feet (4 to 5 feet within highway cover). The outside shoulder width of 12 feet remains unchanged.
- Relocate Noise Wall 24 from N Commercial Avenue near Harriet Tubman Middle School to attach to Walls 1 and 2 along the east edge of I-5.
- Keep the I-5 southbound entrance ramp from NE Wheeler Avenue/N Williams Avenue/ N Ramsay Way on the existing alignment rather than relocate it to parallel N Williams Avenue.
- On I-5 south of the Burnside Bridge: retrofit existing bridge rail, restripe freeway in both the northbound and southbound directions, and install new guide signs on an existing sign structure in the southbound direction.

2.4 HIGHWAY COVER CHANGES

The Build Alternative included the construction of two highway cover structures over I-5 for roadway crossings and other purposes. The Revised Build Alternative , based on Hybrid 3 (see Figure 1), includes the following changes to the highway covers:

- Provide one continuous highway cover over I-5 rather than separate covers at the existing N Flint Avenue, NE Weidler Street, NE Broadway, N Williams Avenue, and the N Vancouver Avenue overcrossings.
- Expand the limits of the highway cover by approximately 35 feet to the west, and approximately 400 feet to the north.
- Design and construct the highway cover to accommodate multi-story buildings. Due to span length and site constraints, design would constrain building size, location, type, and use on portions of the cover (Figure 3). Generally, buildings up to three stories could be accommodated throughout the highway cover. Buildings of up to six stories could be accommodated where span lengths are shorter than 80 feet with strict design constraints.

Figure 3 Building Parameters on the Cover



Future development on the highway cover would follow a community process according to the City-led Community Framework Agreement, as described in Section 2.1. ODOT anticipates this process could continue past completion of cover construction.

As part of the Project, ODOT anticipates programming interim uses on the highway cover for the time period between Project completion and when the City-led development process would be implemented. Upon Project completion, the added surface space created by the highway cover over I-5 could provide an opportunity for new and modern bicycle facilities, making the area more connected, walkable and bike friendly. It could also provide opportunity for various potential types of public spaces, to be precisely determined during the Project's final design phase and through robust community engagement, consisting of one or more of the following types of uses:

- Landscaped areas for active and passing recreation and/or to provide a buffer, backdrop and visual comfort, such as gardens, lawns or planter beds.
- Plazas and hardscaped open space for active and passive recreation, such as courts, plazas, splash pads, picnic areas, and community gathering spaces.
- Interpretive signage, historical markers, landmarks and other areas of historical recognition and narrative such as art pieces and other historical signage/kiosks and pavement focused on the historic Albina community.
- Temporary and lightweight vertical features to support episodic, mobile commercial activities such as a food market shed, eating pavilion, food carts, or picnic venues.

These features may be removed upon implementation of the development determined by the community process or may be incorporated into that development.

2.5 RELATED LOCAL SYSTEM MULTIMODAL IMPROVEMENTS CHANGES

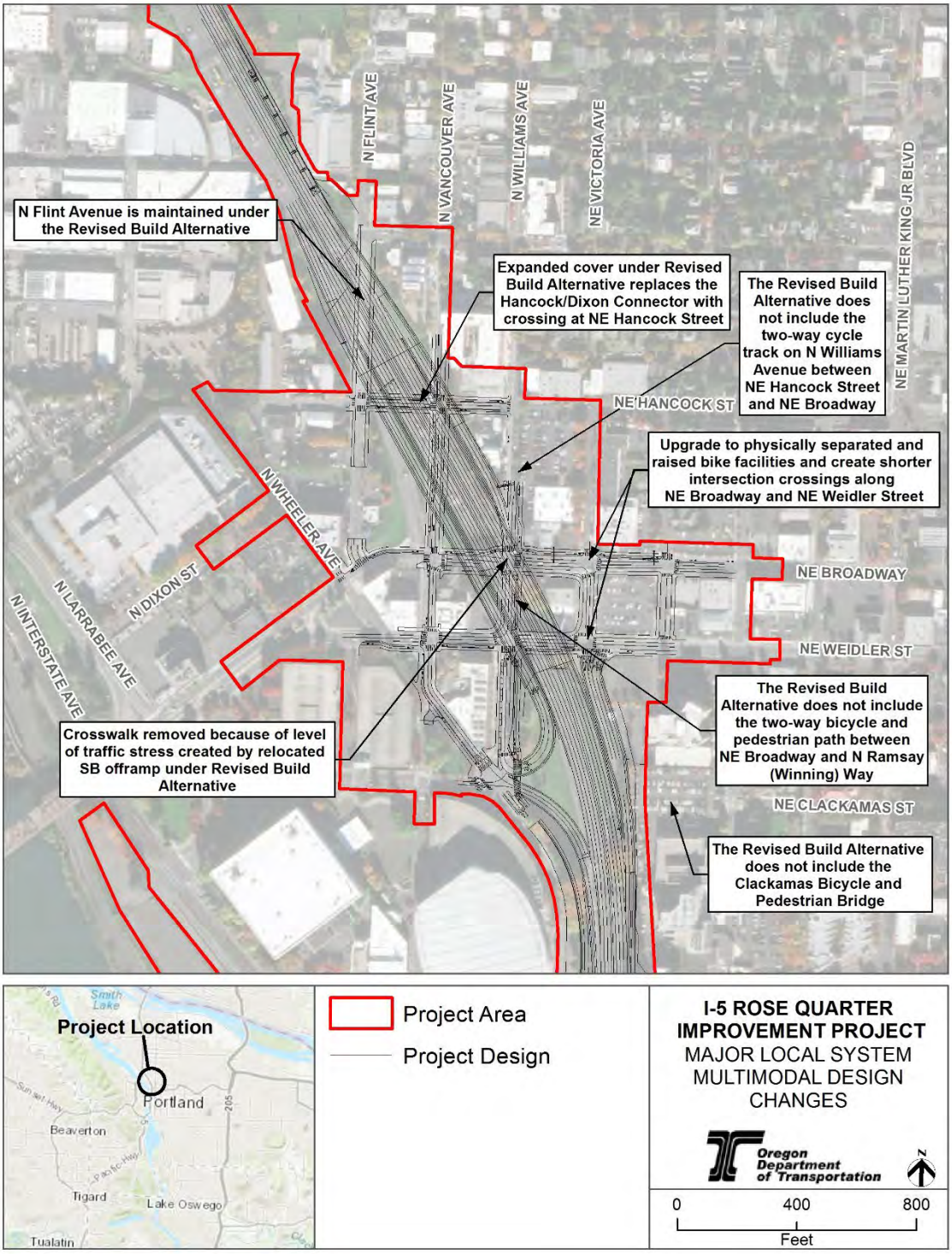
The Build Alternative included construction of a new bicycle and pedestrian bridge over I-5 at NE Clackamas Street and other local street improvements. The Revised Build Alternative includes the following changes to these improvements to accommodate the Hybrid 3 design concept and related changes in traffic patterns (see Figure 4 below):

- Remove the Clackamas Bicycle and Pedestrian Crossing from the Build Alternative.
- Construct wider sidewalks and bike lanes at sidewalk level and physically separated from the roadway with a curb and provide protected bike signal phases at multiple intersections along NE Broadway and NE Weidler Street.
- Connect N Flint Avenue across I-5 from NE Tillamook Street to N Hancock Street and terminate it at N Broadway.
- Remove the NE Hancock Street overcrossing of I-5 from N Williams Avenue to N Dixon Street as proposed in the Build Alternative. NE Hancock Street would be extended across I-5

and reconnect to NE Hancock Street west of N Flint Avenue as part of the expanded highway cover.

- Remove the two-way cycle track on N Williams Avenue between NE Hancock Street and NE Broadway and a two-way bicycle and pedestrian path between NE Broadway and N Ramsay Way from the design and instead convert the on-road bike lane to a protected bike lane, with a transition to the existing on-road bike lane south at or near NE Hancock Street.
- Close the crosswalk across NE Broadway on the west side of N Williams Avenue and the crosswalk across N Williams north of N Weidler Street.

Figure 4 Major Local System Multimodal Design Changes



3.0 REGULATORY FRAMEWORK

The regulatory framework is the same as was evaluated in the 2019 Traffic Analysis Technical Report.

4.0 METHODOLOGY AND DATA SOURCES

The methodology and data sources are the same as those described in the 2019 Traffic Analysis Technical Report with the exception of the methodology used to develop future bicycle volumes and the methodology used to calculate 95th percentile queue length.

Bike volumes were updated based on additional existing bicycle counts provided by City of Portland and an anticipated increase in bicycle mode share target within Central City described in the City of Portland's Central City 2035 Comprehensive Plan.

The methodology for calculating the 95th percentile queue length has been updated for improved accuracy. Vissim queue counters were used to record the maximum queue length for each signal cycle length interval. The 95th percentile queue length was calculated for each of the 10 simulation runs based on these "cycle length maximum queues". The resulting values were then averaged. 95th percentile queue length is reported for the I-5 southbound and I-5 northbound exit ramps, the eastbound approach of N Weidler at N Larrabee Avenue, and the westbound approach of NE Broadway at NE Victoria Avenue.

To provide comparable results in this Traffic Analysis Supplemental Technical Report, these changes in methodology were applied to both the 2045 No-Build Alternative and 2045 Revised Build Alternative models. Also, both the 2045 No-Build Alternative and 2045 Revised Build Alternative models have been refined to provide a more comprehensive local street and bike network. To better understand the potential impacts in the local street network and address specific design elements of the Revised Build Alternative, the following modifications have been made:

- Add the N Wheeler Avenue connection north of N Broadway
- Connect N Ramsay Way between N Larrabee Avenue and N Wheeler Avenue
- Add the U-turn movement from N Broadway and N Weidler Street
- Connect the local bike network

Also, bike and pedestrian crossing have been updated to reflect more detailed assumptions that were refined as the design has progressed at each intersection. Detailed bike and

pedestrian crossing assumptions are presented in section 6.2. Therefore, both 2045 No-Build Alternative and 2045 Revised Build Alternative analysis results in this Traffic Analysis Supplemental Technical Report provide a more refined comparison of traffic operational performance between the 2045 No-Build Alternative and the 2045 Revised Build Alternative than was presented for the 2045 No-Build Alternative and the 2045 Build Alternative in the 2019 Traffic Analysis Technical Report. Due to the updated 2045 No-Build Alternative model, the 2045 No-Build Alternative traffic analysis results may differ from those documented in the 2019 Traffic Analysis Technical Report.

4.1 AREA OF POTENTIAL IMPACT

The API for the traffic analysis generally corresponds to the Project Area shown in Figure 2, except along N Broadway, where the API extends west to N Larrabee Avenue. This extension is the same as shown in the Area of Potential Impact in the 2019 Traffic Analysis Technical Report.

4.2 FUTURE TRAFFIC VOLUMES

As described in the 2019 Traffic Analysis Technical Report, the Metro Regional Travel Demand Models, which have a detailed system of the City of Portland roadway network, were used to forecast future demand for the horizon year 2045. Metro maintains travel demand models for the base (year 2015) and future conditions (year 2040). The 2040 travel demand model integrates planned transportation projects and land use changes in the metro area to generate future volume forecasts. The 2040 travel demand model used for the 2019 Traffic Analysis Technical Report incorporated transportation projects identified in the financially constrained list in the 2014 Regional Transportation Plan (RTP). For this analysis, the 2040 travel demand model was reviewed to determine if it is consistent with the current 2018 RTP. As documented in the List of Reasonably Foreseeable Future Actions Report (Appendix A), there were no new projects in the 2018 RTP that would influence the future traffic demand in the I-5 corridor and its surrounding roadway network when compared to the 2014 RTP; therefore, the travel demand models used in the development of future traffic volumes incorporated into the 2019 Traffic Analysis Technical Report are still valid to be used for this analysis.

ODOT is in the initial planning stages for the Regional Mobility Pricing Project (RMPP), which evaluates congestion pricing on I-5 through and beyond the Rose Quarter project area. RMPP is not included in the financially constrained projected list included in the 2018 Regional Transportation Plan (RTP) and is therefore not included in Metro's regional travel demand model which was used for volume development for the I-5 Rose Quarter Improvement Project. The traffic analysis results of this Supplemental Report do not include the Regional Mobility Pricing Project. However, the RMPP project team has completed separately a sensitivity analysis to look at the cumulative impacts of RMPP and the I-5 Rose Quarter Improvement

Project. The results of this analysis are summarized in Appendix D and included in this report for information only.

To develop the 2045 forecast volumes for the No-Build and Revised Build Alternatives, the volume growth from the 2015 base year and the 2040 future year was used to calculate an annual growth rate using a straight-line growth method. This growth rate was applied to the 5-year increment between 2040 and 2045 to extend the demand model for the Project's horizon year. The 2045 Revised Build Alternative model was developed by:

1. Updating the 2045 No-Build Alternative model with the widened I-5 freeway segment between the I-84 and I-405 interchanges
2. Incorporating the newly proposed roadway network adjustments (i.e., relocation of I-5 southbound ramp terminal to N Wheeler Avenue, extension of NE Hancock Avenue to N Flint Avenue, maintain N Flint Avenue in its current location) and updating intersection lane configurations

Comparing 2045 No-Build Alternative and 2045 Revised Build Alternative travel demand models, ODOT investigated trip changes within and outside of the Project Area to identify trip pattern changes between the No-Build and Revised Build Alternatives for 2045. Within the Project Area, the travel demand model shows trips on I-5 would be 5 to 14 percent higher under the Revised Build Alternative during peak hours when compared to the No-Build Alternative. Outside of the Project Area, trip differences were evaluated at several central city bridges. Trip differences between 2045 No-Build and 2045 Revised Build Alternative are inconsequential beyond the API limits with no substantive traffic volume changes beyond the Traffic Analysis API anticipated.

4.3 ASSESSMENT OF IMPACTS

4.3.1 Traffic Operations Performance Measures, Mobility Target, and Standards

The traffic operations performance measures (v/c, LOS, delay, 95th percentile queue and travel times), Oregon Highway Plan (OHP) mobility target, HDM mobility standards, and the City of Portland LOS Standards for local intersections are the same as those described in the 2019 Traffic Analysis Technical Report. The mobility target and standards have not changed since 2019.

4.3.2 Traffic Operations Software

The traffic operations software is the same as those described in the 2019 Traffic Analysis Technical Report.

Highway Capacity Software (HCS) was used to evaluate basic freeway segments, merge, diverge, and weaving operations. HCS is a deterministic analysis tool for freeway operations by implementing the Highway Capacity Manual (HCM) methodologies for basic weaving, merging, and diverging freeway segments. For the 2019 Traffic Analysis Technical Report, a traffic microsimulation software called Vissim was used to supplement the freeway analysis. Comparing the 2045 Revised Build Alternative to the Build Alternative, the locations of the merge and diverge ramp junctions and the lengths of weaving segments between entrance ramps and off-ramps are relatively the same as well as the peak hour volumes along the mainline segments and the on-and off-ramps. As a result, the prior Vissim freeway mainline analysis methodologies and results presented in the 2019 Traffic Analysis Technical Report including lane-by-lane speed were determined to still be valid. Thus, Vissim modeling of the freeway operations for the 2045 Revised Build Alternative was not updated as part of this Traffic Analysis Supplemental Technical Report.

Vissim modeling, however, was updated to analyze local street traffic operations including ramp terminal intersections and reporting delays; 95th percentile queues; and bus, streetcar, and bike travel times. Vissim can model and quantify performance of individual pedestrians, bicycles, automobiles, trucks, buses, and streetcars and provide performance measure results that account for modal interactions, up and/or downstream congestion, and capacity limitations that can result from queues extending beyond the storage provided at each intersection. Therefore, Vissim quantifies overall intersection delays more realistically than typical equation based HCM methods such as Synchro. In addition, the intersection LOS is computed from a microsimulation analysis, which is not HCM compliant. As a result, the intersection LOS is reported as an “estimated LOS”.

Synchro software was used to supplement Vissim modeling to report the intersection v/c ratio, delay and LOS as measurements of performance. Synchro is a deterministic analysis and signal optimization tool that uses the general characteristics of an intersection to evaluate how it would operate based on the HCM methodologies. Ramp terminal intersection v/c ratios are used to compare to the OHP traffic mobility targets for the 2045 No-Build Alternative and to compare to the Highway Design Manual (HDM) design standards for the 2045 Revised Build Alternative. The intersections not associated with the highway ramp terminals are subject to City of Portland standards of LOS D for signalized intersections and LOS E for unsignalized intersections (City of Portland n.d.).

5.0 AFFECTED ENVIRONMENT

The affected environment is the same as that evaluated in the 2019 Traffic Analysis Technical Report.

6.0 ENVIRONMENTAL CONSEQUENCES

6.1 NO-BUILD ALTERNATIVE

6.1.1 Direct Impacts

The No-Build Alternative would have the same direct impacts in all freeway segments as described in the 2019 Traffic Analysis Technical Report. The 2045 No-Build Alternative freeway operations are summarized in Table 5 and Table 6 in Section 6.2.2.1 and show that the I-5 northbound weave segment between the I-84 entrance ramp and the NE Weidler Street exit ramp would exceed the OHP mobility target of a v/c ratio of 0.99 in the second AM and PM peak hours (7:00-8:00 AM and 4:00-5:00 PM) and also would exceed the OHP mobility target of a v/c ratio of 1.1 in the first AM peak hour (8:00-9:00 AM). The I-5 southbound weave between the NE Weidler Street entrance ramp and the I-84 exit ramp would exceed the OHP mobility target of a v/c ratio of 0.99 in the second AM peak hour (7:00-8:00 AM).

As described under section 4.0, the local street analysis for the 2045 No-Build Alternative has been updated with revised bike volumes and a more refined bike and local street network. Therefore, the local street 2045 No-Build Alternative analysis results differ from those presented in the 2019 Traffic Analysis Technical Report. Table 1 and Table 2 show the updated 2045 No-Build Alternative Synchro analysis results and Table 3 and Table 4 present the updated 2045 No-Build Vissim analysis results.

Synchro analysis results show that all intersections will operate at a LOS D or better in both the AM and PM peak hours with the exception of the N Broadway/N Vancouver/I-5 southbound exit ramp intersection which would operate at LOS F and E in the AM and PM peak hour respectively. The v/c ratio at this intersection exceeds the OHP mobility target of 0.85 for ramp terminal intersections for both the AM and PM peak hours. Detailed HCM reports from Synchro are provided in Appendix B.

Table 1 Synchro Analysis Results: 2045 No-Build Alternative 8:00 AM - 9:00 AM

ID	Intersection	2045 No-Build		
		v/c	Delay (sec)	LOS
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	**1.08**	93.0	**F**
2	N/NE Broadway & N Williams Ave	0.68	13.3	B
3	NE Broadway & NE Victoria Ave	0.63	12.0	B
4	NE Broadway & NE 2nd Ave	0.48	9.9	A
5	NE Weidler St & NE 2nd Ave	0.40	8.4	A

ID	Intersection	2045 No-Build		
		v/c	Delay (sec)	LOS
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	0.61	52.7	D
7	N/NE Weidler St & N Williams Ave	0.31	3.7	A
8	N Weidler St & N Vancouver Ave	0.50	9.4	A
9	N Broadway & N Benton Ave	0.41	11.4	B
10	N Broadway & N Larrabee Ave	0.55	18.9	B
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	0.45	9.9	A
12	N Williams Ave & NE Hancock	0.33	14.2	B
13	N Vancouver Ave & NE Hancock St	-	-	-

*Note: **Red** = v/c exceeds OHP mobility target for ramp terminals or LOS below D for signalized local intersections.*

Table 2 Synchro Analysis Results: 2045 No-Build Alternative 5:00 PM - 6:00 PM

ID	Intersection	2045 No-Build		
		v/c	Delay (sec)	LOS
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	**0.95**	55.2	**E**
2	N/NE Broadway & N Williams Ave	0.58	13.6	B
3	NE Broadway & NE Victoria Ave	0.53	9.4	A
4	NE Broadway & NE 2nd Ave	0.40	10.0	A
5	NE Weidler St & NE 2nd Ave	0.41	11.6	B
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	0.61	17.5	B
7	N/NE Weidler St & N Williams Ave	0.47	4.4	A
8	N Weidler St & N Vancouver Ave	0.63	14.0	B
9	N Broadway & N Benton Ave	0.48	20.5	C
10	N Broadway & N Larrabee Ave	0.66	27.3	C
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	0.40	12.2	B
12	N Williams Ave & NE Hancock	0.21	14.8	B
13	N Vancouver Ave & NE Hancock St	-	-	-

*Note: **Red** = v/c exceeds OHP mobility target for ramp terminals or LOS below D for signalized local intersections.*

As shown below, the Vissim analysis results indicate that all intersections would operate at a LOS D or better in the AM peak hour except for the NE Weidler St/NE Victoria Avenue/I-5

northbound exit ramp intersection, which would operate at LOS E. During the PM peak hour, all intersections are expected to operate at a LOS D or better except for the I-5 southbound and I-5 northbound exit ramp intersections, which would operate at LOS F and LOS E, respectively.

Vissim can model and quantify performance of individual pedestrians, bicycles, automobiles, trucks, buses, and streetcars and provide performance measure results that account for modal interactions, up and/or downstream congestion, and capacity limitations that can result from queues extending beyond the storage provided at each intersection. Therefore, Vissim quantifies overall intersection delays more realistically than typical deterministic equation based HCM methods such as Synchro. Detailed Vissim intersection results for the first and second AM and PM peak hours for all movements are provided in Appendix C.

Table 3 Vissim Analysis Results: 2045 No-Build Alternative 8:00 AM - 9:00 AM

ID	Intersection	2045 No-Build Delay (sec)	2045 No-Build LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	43.8	D
2	N/NE Broadway & N Williams Ave	16.3	B
3	NE Broadway & NE Victoria Ave	38.9	D
4	NE Broadway & NE 2nd Ave	27.7	C
5	NE Weidler St & NE 2nd Ave	7.1	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	66.1	**E**
7	N/NE Weidler St & N Williams Ave	3.6	A
8	N Weidler St & N Vancouver Ave	12.9	B
9	N Broadway & N Benton Ave	14.2	B
10	N Broadway & N Larrabee Ave	12.1	B
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	37.2	D
12	N Williams Ave & NE Hancock	11.2	B
13	N Vancouver Ave & NE Hancock St	N/A	N/A

*Note: **Red** = LOS below D for signalized local intersections. *LOS is non HCM compliant*

Table 4 Vissim Analysis Results: 2045 No-Build Alternative 5:00 PM - 6:00 PM

ID	Intersection	2045 No-Build Delay (sec)	2045 No-Build LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	87.6	**F**
2	N/NE Broadway & N Williams Ave	15.4	B
3	NE Broadway & NE Victoria Ave	28.1	C
4	NE Broadway & NE 2nd Ave	11.4	B
5	NE Weidler St & NE 2nd Ave	9.2	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	75.4	**E**
7	N/NE Weidler St & N Williams Ave	17.8	B
8	N Weidler St & N Vancouver Ave	28.1	C

ID	Intersection	2045 No-Build Delay (sec)	2045 No-Build LOS*
9	N Broadway & N Benton Ave	17.9	B
10	N Broadway & N Larrabee Ave	43.4	D
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	28.5	C
12	N Williams Ave & NE Hancock	10.9	B
13	N Vancouver Ave & NE Hancock St	N/A	N/A

*Note: **Red** = LOS below D for signalized local intersections. *LOS is non HCM compliant*

6.1.2 Indirect Impacts

The No-Build Alternative would have the same indirect impacts as described in the 2019 Traffic Analysis Technical Report.

6.2 REVISED BUILD ALTERNATIVE

6.2.1 Short-term Construction Impacts

The short-term impacts of the Revised Build Alternative would be similar to those described in the 2019 Traffic Analysis Technical Report with two exceptions, the overall construction and transportation disruptions occurring in phases for up to 4-8 years, which is greater than the previous assumption of up to 4 years and the closure of N Williams Avenue. This increase in duration is based on the construction of a larger single continuous highway cover, which would require additional construction stages and phases. N Williams Avenue between N Wheeler Avenue and NE Weidler Street would be closed for the majority of the highway cover construction. The complete closure of N Williams Avenue during construction of the new highway cover and the relocation the southbound exit ramp on N Williams Avenue would have a greater impact on transit, bicyclists, pedestrians and vehicles traveling on this section of N Williams Avenue.

For each construction phase, the project would develop a traffic management plan to identify lane and road closures and develop detour plans, as necessary. Also, for each phase of the project, maintenance of traffic strategies would be developed to ensure safe accommodation of pedestrians, bicyclists, transit, and vehicle users while providing a safe construction work zone. Detours plans are anticipated for pedestrians, bicycles, vehicles, and buses as ramp and local streets closures would be needed in order to construct highway ramp improvements, the highway cover structure, and reconstruct sections of local roads. The Project would coordinate with TriMet, City of Portland, and Portland Streetcar to identify traffic management strategies

that minimize durations of disruptions of transit service and minimize out-of-direction pedestrian and bicycle detours.

As described above in the Project Area Changes section, an existing parking lot south of N Interstate Avenue and the Broadway Bridge may be used for contractor staging during construction of the Project. The parking lot will be used primarily for storage of staging equipment and materials for multiple construction activities including those required during night operations. This yard would also serve as the main location to store materials that are procured early, such as drilled shaft permanent casings, pipe piles, and sign bridges. Furthermore, this yard could provide needed space for fabrication of concrete form work, welding of miscellaneous materials for the job, equipment maintenance and repair. The lot would also be used to house temporary job site trailers and used for contractor parking for multiple staff and subcontractors.

Access to the contractor staging site would be through existing truck routes including Interstate Avenue, N Broadway and N Weidler Street which could provide adequate access to the entire project site including connections to I-5 ramps. The temporary truck trips are consistent with the type of commercial and industrial uses that currently operate within the area and the volume of trips that would be generated by the construction activities will be fairly consistent with the prior uses of the site. The site has been used for similar construction and staging operations and is assumed to be used as part of the construction operations for the duration of the project.

6.2.2 Direct Impacts

6.2.2.1 Future Freeway Traffic Operations

This section describes 2045 Revised Build Alternative freeway traffic operations based on the HCS analysis results for the two AM peak hours (7:00-9:00 AM) and PM peak hours (4:00-6:00 PM).

In the 2045 Revised Build Alternative, the I-5 northbound weave segment between the I-84 entrance ramp and Weidler exit ramp and the I-5 southbound weave segment between the Weidler entrance ramp and I-84 exit ramp are expected to operate over the HDM design standard of a v/c ratio of 0.75 in the 7:00-9:00 AM and 4:00-6:00 PM peak hours. The HDM design standard is more stringent than the 2045 No-Build Alternative mobility target of a v/c ratio of 0.99 in the second AM and PM peak hours and a v/c ratio of 1.1 in the AM and PM peak hours because it is designated for design purposes. Although the 2045 Revised Build Alternative v/c ratios exceed HDM design standards, it is expected to substantially improve highway operations compared to the 2045 No-Build Alternative. The HCS analysis results comparing the 2045 No-Build and Revised Build Alternatives in the second AM and PM peak hours (7-8 AM and 4-5 PM) and in the first AM and PM peak hours (8-9 AM and 5-6 PM) are presented in Table 5

and Table 6, respectively. The v/c ratios that exceed OHP mobility targets in the 2045 No-Build Alternative and HDM mobility standards in the 2045 Revised Build Alternative are highlighted.

Table 5 HCS Analysis Results: 2045 No-Build Alternative and 2045 Revised Build Alternative Second (7:00 – 8:00) AM and (4:00 – 5:00) PM Peak Hour

			2045 No-Build Alternative			2045 Revised Build Alternative		
Direction	Location	Analysis Type	V/C	Volume Density (pc/mi/ln)	LOS	V/C	Volume Density (pc/mi/ln)	LOS
I-5 NB	I-84 Entrance ramp to Weidler Exit ramp	Weaving	**1.16** **(1.02)**	* (*)	F (F)	**0.89** **(0.78)**	41.1 (34.2)	E (D)
	Weidler Exit ramp To Broadway Entrance ramp	Basic Section	0.91 (0.79)	42.5 (36.6)	E (E)	0.72 (0.64)	33.5 (29.6)	D (D)
	Broadway Entrance ramp to I-405 Exit ramp	Weaving	0.92 (0.78)	36.9 (31.6)	E (D)	0.72 (0.63)	30.6 (26.9)	D (C)
	Greeley Exit ramp	Diverge	0.75 (0.72)	32.4 (30.6)	D (D)	0.53 (0.50)	21.8 (20.7)	C (C)
I-5 SB	I-405 Entrance ramp To Broadway Exit ramp	Weaving	0.73 (0.64)	32.1 (25.5)	D (C)	0.70 (0.62)	34.5 (28.7)	D (D)
	Broadway Exit ramp to Weidler Entrance ramp	Basic Section	0.94 (0.70)	44.1 (32.8)	E (D)	0.70 (0.56)	33.0 (26.3)	D (D)
	Weidler Entrance ramp to I-84 Exit ramp	Weaving	**1.03** (0.81)	* (34.7)	F (D)	**0.95** **(0.79)**	42.3 (30.9)	E (D)
	Morrison Exit ramp	Diverge	0.81 (0.61)	33.3 (24.9)	D (C)	0.58 (0.46)	23.7 (18.8)	C (C)

Notes: HCS = Highway Capacity Software; HDM = Highway Design Manual; LOS = Level of Service;
OHP= Oregon Highway Plan; pc/mi/ln = passenger car per mile per lane; v/c = volume-to-capacity ratio LOS is based on the calculated volume density and not based on v/c ratio shown.
Orange *= v/c ratio exceeds OHP mobility target of 0.99 for the 2045 No-Build second peak hour.*
Red *= v/c ratio exceeds HDM mobility target of 0.75 for the Revised Build peak hour.*
** = Volume density not reported (demand exceeds capacity).*

Table 6 HCS Analysis Results: 2045 No-Build and Revised Build Alternative First (8:00 – 9:00) AM and (5:00 – 6:00) PM Peak Hour

			2045 No-Build Alternative			2045 Revised Build Alternative		
Direction	Location	Analysis Type	V/C	Volume Density (pc/mi/ln)	LOS	V/C	Volume Density (pc/mi/ln)	V/C
I-5 NB	I-84 Entrance ramp to Weidler Exit ramp	Weaving	**1.16** (1.02)	* (*)	F (F)	**0.89** **(0.81)**	41.1 (36.1)	E (E)
	Weidler Exit ramp to Broadway Entrance ramp	Basic Section	0.91 (0.82)	42.5 (38.1)	E (E)	0.72 (0.66)	33.5 (30.8)	D (D)
	Broadway Entrance ramp to I-405 Exit ramp	Weaving	0.92 (0.82)	36.9 (33.3)	E (D)	0.72 (0.66)	30.6 (28.2)	D (D)
	Greeley Exit ramp	Diverge	0.75 (0.75)	32.4 (31.9)	D (D)	0.53 (0.53)	21.8 (21.5)	C (C)
I-5 SB	I-405 Entrance ramp To Broadway Exit ramp	Weaving	0.73 (0.67)	32.1 (26.8)	D (C)	0.70 (0.65)	34.5 (30.4)	D (D)
	Broadway Exit ramp to Weidler Entrance ramp	Basic Section	0.94 (0.73)	44.1 (34.1)	E (D)	0.70 (0.59)	33.0 (27.5)	D (D)
	Weidler Entrance ramp To I-84 Exit ramp	Weaving	1.03 (0.84)	* (36.7)	F (E)	**0.95** **(0.82)**	42.3 (32.9)	E (D)
	Morrison Exit ramp	Diverge	0.81 (0.64)	33.3 (26.0)	D (C)	0.58 (0.48)	23.7 (19.7)	C (C)

Notes: HCS = Highway Capacity Software; HDM = Highway Design Manual; LOS = Level of Service; OHP = Oregon Highway Plan; pc/mi/ln = passenger car per mile per lane; v/c = volume-to-capacity ratio LOS is based on the calculated volume density and not based on v/c ratio shown.

Orange *= v/c ratio exceeds OHP mobility target of 1.1 for the 2045 No-Build peak hour.*

Red *= v/c ratio exceeds HDM mobility target of 0.75 for the Revised Build peak hour.*

** = Volume density not reported (demand exceeds capacity).*

Comparing to the Build Alternative, the freeway operations improvements in the 2045 Revised Build Alternative are similar as the locations of the merge and diverge ramp junctions and the lengths of weaving segments between entrance ramps and exit ramps are relatively the same and the peak hour volumes along the mainline segments and the on-and exit ramps are similar.

6.2.2.2 Future Local Street Traffic Operations

This section describes the 2045 No-Build Alternative and 2045 Revised Build Alternative traffic operations for the local street intersections using Synchro and Vissim. Comparison to the Build

Alternative is not provided as only the 2045 No-Build and Revised Build models have been refined with updates in the bike volume forecast, detailed bike and pedestrian crossing assumptions and more refined local street network.

Synchro is a deterministic analysis and signal optimization tool that was used to obtain intersection v/c ratio and LOS results to compare to ODOT HDM mobility standards due to the limitations of providing v/c ratios from microsimulation. Vissim was used to model the operations of motor vehicles, transit, pedestrians, and bicycles and evaluate demand served, delay, travel time, and queuing. Vissim quantifies overall intersection delays more realistically than typical equation based HCM methods such as Synchro by accounting for modal interactions, up and/or downstream congestion, and capacity limitations that can result from queues extending beyond the storage provided at each intersection.

Compared to the 2045 No-Build Alternative, the 2045 Revised Build Alternative would include higher traffic volume demand as well as bike and pedestrian improvements that would include protected bike and ped phases at locations with exclusive turning lanes and Lead Pedestrian Intervals (LPIs) at selected locations with permissive pedestrian phases. Also, the local street network in the 2045 Revised Build Alternative would accommodate physically separated and raised bike facilities along N/NE Broadway and N/NEE Weidler Street, as well as along N Williams Avenue.

The analysis of the 2045 Revised Build Alternative is based on the following key bike/pedestrian crossing assumptions at locations with conflicting bike/pedestrian and vehicular movements:

- Protected bike crossings
  - EB/WB at N Broadway and N Larrabee Avenue (included in 2045 No-Build)
  - EB at N Weidler Street and N Vancouver Avenue
  - WB at N/NE Broadway and N Williams Avenue (included in 2045 No-Build)
  - WB at N Broadway and N Vancouver Avenue (included in 2045 No-Build)
  - NB at N Williams Avenue/N Wheeler Avenue and N Ramsay Way (included in 2045 No-Build)
  - NB at N/NE Weidler Street and N Williams Avenue
  - NB at N Williams Avenue and N/NE Hancock Street
  - SB at N Broadway and N Vancouver Avenue
  - SB at N Weidler Street and N Vancouver Avenue
  - SB at N Williams Avenue/N Wheeler Avenue and N Ramsay Way (included in 2045 No-Build)

- Protected pedestrian crossings
  - N Weidler Street and N Vancouver Avenue (south and east legs)
  - N/NE Weidler Street and N Williams Avenue (east leg)
  - NE Broadway and NE Victoria Avenue (west leg)
  - N/NE Broadway and N Williams Avenue (north leg)
  - N Broadway and N Vancouver Avenue (south leg)
  - N Williams Avenue/N Wheeler Avenue and N Ramsay Way (all crossings in 2045 Revised Build, northwest and west crossings in 2045 No-Build)
- Permitted pedestrian crossings with LPI
  - NE Weidler Street and I-5 NB exit ramp (north leg)
  - NE Broadway and NE Victoria Avenue (north leg)
- Closed pedestrian crossings
  - N/NE Weidler Street and N Williams Avenue (north leg)
  - N/NE Broadway and N Williams Avenue (west leg)

These two potential pedestrian crossing closures are located on City of Portland facilities and would require City Engineer's approval during the design phase.

Synchro Analysis Results

Synchro software was used for the analysis of the local street intersection operations to supplement the Vissim analysis. The Synchro analysis results are presented in Table 7 and Table 8 for the AM (8:00-9:00 AM) and PM (5:00-6:00 PM) peak hours, with locations that exceed v/c mobility standards for ramp terminal intersections and LOS operational targets for local streets highlighted. Detailed HCM reports from Synchro are provided in Appendix B.

Table 7 Synchro Analysis Results: Future Conditions 8:00 AM - 9:00 AM

ID	Intersection	2045 No-Build Alternative			2045 Revised Build Alternative		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	**1.08**	93.0	**F**	0.61	9.0	A
2	N/NE Broadway & N Williams Ave	0.68	13.3	B	0.86	28.8	C
3	NE Broadway & NE Victoria Ave	0.63	12.0	B	0.69	78.9	**E**
4	NE Broadway & NE 2nd Ave	0.48	9.9	A	0.47	10.0	A
5	NE Weidler St & NE 2nd Ave	0.40	8.4	A	0.46	3.5	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	0.61	52.7	D	0.66	14.0	B
7	N/NE Weidler St & N Williams Ave	0.31	3.7	A	0.50	29.2	C
8	N Weidler St & N Vancouver Ave	0.50	9.4	A	0.67	21.8	C
9	N Broadway & N Benton Ave	0.41	11.4	B	0.48	9.1	A
10	N Broadway & N Larrabee Ave	0.55	18.9	B	0.68	40.7	D
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	0.45	9.9	A	0.53	15.5	B
12	N Williams Ave & N/NE Hancock	0.33	14.2	B	0.50	16.1	B
13	N Vancouver Ave & NE Hancock St	-	-	-	0.24	13.0	B

*Note: **Red** = v/c exceeds OHP/HDM mobility target for ramp terminals or LOS below D for signalized local intersections.*

Table 8 Synchro Analysis Results: Future Conditions 5:00 PM - 6:00 PM

ID	Intersection	2045 No-Build Alternative			2045 Revised Build Alternative		
		V/C	DELAY (SEC)	LOS	V/C	DELAY (SEC)	LOS
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	**0.95**	55.2	**E**	0.46	17.2	B
2	N/NE Broadway & N Williams Ave	0.58	13.6	B	0.88	43.7	D
3	NE Broadway & NE Victoria Ave	0.53	9.4	A	0.59	24.6	C
4	NE Broadway & NE 2nd Ave	0.40	10.0	A	0.36	10.6	B
5	NE Weidler St & NE 2nd Ave	0.41	11.6	B	0.49	3.3	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	0.61	17.5	B	0.70	18.3	B

ID	Intersection	2045 No-Build Alternative			2045 Revised Build Alternative		
		V/C	DELAY (SEC)	LOS	V/C	DELAY (SEC)	LOS
7	N/NE Weidler St & N Williams Ave	0.47	4.4	A	0.74	20.9	C
8	N Weidler St & N Vancouver Ave	0.63	14.0	B	0.63	16.2	B
9	N Broadway & N Benton Ave	0.48	20.5	C	0.48	8.5	A
10	N Broadway & N Larrabee Ave	0.66	27.3	C	0.62	28.7	C
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	0.40	12.2	B	0.57	15.6	B
12	N Williams Ave & N/NE Hancock	0.21	14.8	B	0.58	25.5	C
13	N Vancouver Ave & NE Hancock St	-	-	-	0.18	10.0	B

*Note: **Red** = v/c exceeds OHP/HDM mobility target for ramp terminals or LOS below D for signalized local intersections.*

As shown in Table 7 and Table 8, the I-5 southbound ramp terminal intersection at N Broadway and N Vancouver Avenue would exceed the OHP mobility target in the 2045 No-Build Alternative, but when relocated in the 2045 Revised Build Alternative, the N Wheeler/ N Williams and I-5 southbound entrance and exit ramp terminal intersection would meet the HDM mobility target during both the AM and PM peak hours. In the 2045 Revised Build Alternative, all intersections would operate at LOS D or better in both the AM and PM peak hours with the exception of NE Broadway and NE Victoria Avenue, which would operate at LOS E in the AM peak hour.

As previously discussed, the 2045 Revised Build Alternative considers higher traffic volume demand and pedestrian signal phasing that differs from that considered in the 2045 No-Build Alternative. At NE Broadway and NE Victoria Avenue, the 2045 Revised Build Alternative would include a protected pedestrian crossing on the west leg of the intersection, which is required by the current MUTCD, that would reduce the amount of green time available for the heavy northbound left-turn movement from the existing configuration. The 2045 No-Build Alternative analysis assumed a permitted pedestrian crossing, providing more green time for the northbound left-turn movement.

It should be noted that there are limitations with modeling separate bike and pedestrian only phases in Synchro, and that the analysis does not consider surrounding congestion or the full impacts of signal progression and queue spillback between intersections. Vissim analysis results below considered effects of queuing and congestion of adjacent intersections.

Vissim Analysis Results

This section describes 2045 Revised Build Alternative local street traffic operations using delay and LOS results from the Vissim analysis for the AM (7:00-9:00 AM) and PM (4:00-6:00 PM) peak periods, with results provided for the peak and shoulder hours. This section also describes 95th Percentile queue lengths for the I-5 northbound and southbound exit ramps, eastbound queues on N Broadway from N Larrabee Avenue, and westbound queues on NE Broadway from NE Victoria Avenue. The Vissim analysis results are presented in Table 9, Table 10, Table 11, and Table 12. Detailed output showing volume, delay, and queue lengths for all movements at intersections are included in Appendix C.

In the 2045 Revised Build Alternative, the results of the Vissim analysis indicate that during the AM and PM peak hours, all intersections are expected to operate at LOS D or better. In comparison, there are multiple intersections in the 2045 No-Build Alternative that would operate at LOS E or F during the AM and PM peak hours. While most intersections in the 2045 Revised Build Alternative would operate at LOS D or better, intersection delays at some locations, particularly in the PM peak would be higher than the 2045 No-Build Alternative. This is primarily due to the higher volume of served vehicles in the 2045 Revised Build Alternative on the I-5 mainline that would be provided by the 2045 Revised Build Alternative and the re-routing of certain vehicular movements.

Although overall vehicular intersection delay is expected to be higher at some locations in the 2045 Revised Build Alternative compared to the 2045 No-Build Alternative, the 2045 Revised Build condition would be better at balancing pedestrian safety and the delays of all modes with the addition of separate dedicated signal phases for bicycles, protected phases for pedestrians, and the use of Leading Pedestrian Intervals (LPIs) for permissive pedestrian crossings.

The Vissim analysis indicates that the I-5 northbound exit ramp at the intersection of NE Weidler Street/NE Victoria Avenue LOS would operate at LOS E in the 2045 No-Build Alternative in both the AM (8:00-9:00 AM) and PM (5:00-6:00 PM) peak hours. In comparison, under the 2045 Revised Build Alternative this intersection would operate at LOS C in both peak hours. In the 2045 No-Build Alternative, the I-5 southbound exit ramp at the intersection of N Broadway/N Vancouver Avenue would operate at LOS F in the PM (5:00-6:00 PM) peak hour, compared to LOS D in the 2045 Revised Build Alternative at the N Wheeler/N Williams & N Ramsay Way intersection.

Table 9 Vissim Analysis Results: Future Conditions 7:00 AM - 8:00 AM

ID	Intersection	2045 No-Build Alternative		2045 Revised Build Alternative	
		Delay (sec)	LOS*	Delay (sec)	LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	42.0	D	7.8	A
2	N/NE Broadway & N Williams Ave	14.8	B	13.9	B
3	NE Broadway & NE Victoria Ave	30.5	C	27.2	C
4	NE Broadway & NE 2nd Ave	16.7	B	8.5	A
5	NE Weidler St & NE 2nd Ave	6.6	A	6.6	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	48.5	D	27.0	C
7	N/NE Weidler St & N Williams Ave	3.6	A	20.2	C
8	N Weidler St & N Vancouver Ave	10.9	B	16.3	B
9	N Broadway & N Benton Ave	12.7	B	11.5	B
10	N Broadway & N Larrabee Ave	10.5	B	9.0	A
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	28.2	C	16.8	B
12	N Williams Ave & NE Hancock	11.4	B	13.7	B
13	N Vancouver Ave & NE Hancock St	—	—	4.3	A

Red *= LOS exceeds the City's operational target for local streets. *LOS is non HCM compliant*

Table 10 Vissim Analysis Results: Future Conditions 8:00 AM - 9:00 AM

ID	Intersection	2045 No-Build Alternative		2045 Revised Build Alternative	
		DELAY (SEC)	LOS*	DELAY (SEC)	LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	43.8	D	8.2	A
2	N/NE Broadway & N Williams Ave	16.3	B	13.5	B
3	NE Broadway & NE Victoria Ave	38.9	D	38.0	D
4	NE Broadway & NE 2nd Ave	27.7	C	20.2	C
5	NE Weidler St & NE 2nd Ave	7.1	A	7.2	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	66.1	**E**	24.0	C
7	N/NE Weidler St & N Williams Ave	3.6	A	19.8	B
8	N Weidler St & N Vancouver Ave	12.9	B	19.9	B
9	N Broadway & N Benton Ave	14.2	B	13.4	B

ID	Intersection	2045 No-Build Alternative		2045 Revised Build Alternative	
		Delay (sec)	LOS*	Delay (sec)	LOS*
10	N Broadway & N Larrabee Ave	12.1	B	11.1	B
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	37.2	D	18.0	B
12	N Williams Ave & NE Hancock	11.2	B	14.5	B
13	N Vancouver Ave & NE Hancock St	—	—	5.0	A

Red *= LOS exceeds the City's operational target for local streets. *LOS is non HCM compliant*

Table 11 Vissim Analysis Results: Future Conditions 4:00 PM - 5:00 PM

ID	Intersection	2045 No-Build Alternative		2045 Revised Build Alternative	
		Delay (sec)	LOS*	Delay (sec)	LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	70.0	**E**	12.1	B
2	N/NE Broadway & N Williams Ave	13.4	B	20.1	C
3	NE Broadway & NE Victoria Ave	23.1	C	56.0	**E**
4	NE Broadway & NE 2nd Ave	10.2	B	41.8	D
5	NE Weidler St & NE 2nd Ave	9.8	A	8.3	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	52.4	D	21.7	C
7	N/NE Weidler St & N Williams Ave	13.8	B	33.4	C
8	N Weidler St & N Vancouver Ave	22.3	C	25.9	C
9	N Broadway & N Benton Ave	13.4	B	11.6	B
10	N Broadway & N Larrabee Ave	28.7	C	22.3	C
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	22.4	C	34.9	C
12	N Williams Ave & NE Hancock	10.8	B	22.7	C
13	N Vancouver Ave & NE Hancock St	---	---	8.9	A

Red *= LOS exceeds the City's operational target for local streets. *LOS is non HCM compliant*

Table 12 Vissim Analysis Results: Future Conditions 5:00 PM - 6:00 PM

ID	Intersection	2045 No-Build Alternative		2045 Revised Build Alternative	
		DELAY (SEC)	LOS*	DELAY (SEC)	LOS*
1	N Broadway & N Vancouver Ave (existing I-5 SB exit ramp)	87.6	**F**	11.4	B
2	N/NE Broadway & N Williams Ave	15.4	B	20.4	C
3	NE Broadway & NE Victoria Ave	28.1	C	54.1	D
4	NE Broadway & NE 2nd Ave	11.4	B	33.0	C
5	NE Weidler St & NE 2nd Ave	9.2	A	8.9	A
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	75.4	**E**	23.9	C
7	N/NE Weidler St & N Williams Ave	17.8	B	35.2	D
8	N Weidler St & N Vancouver Ave	28.1	C	30.8	C
9	N Broadway & N Benton Ave	17.9	B	16.6	B
10	N Broadway & N Larrabee Ave	43.4	D	37.4	D
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	28.5	C	41.9	D
12	N Williams Ave & NE Hancock	10.9	B	28.3	C
13	N Vancouver Ave & NE Hancock St	---	---	8.9	A

Red *= LOS exceeds the City's operational target for local streets. *LOS is non HCM compliant*

Future Conditions 95th Percentile Queue Length, feet

This section reports 95th percentile queues at the I-5 southbound and northbound exit ramps, the eastbound approach of N Weidler at N Larrabee Avenue, and the westbound approach of NE Broadway at NE Victoria Avenue based on the calculated 95th percentile queue lengths. The methodology for calculating the 95th percentile queue length has been updated for improved accuracy. Vissim queue counters were used to record the maximum queue length for each signal cycle length interval. The 95th percentile queue length was calculated for each of the 10 simulation runs based on these "cycle length maximum queues". The resulting values were then averaged. The 95th percentile queue lengths are shown in Table 13 for the AM peak period and Table 14 for the PM peak period.

Table 13 Future Conditions AM Peak Period 95th Percentile Queue Length, feet

Intersection Movement	2045 No-Build		2045 Revised Build Alternative	
	Storage Length	Queue Length	Storage Length	Queue Length
I-5 SB exit ramp at N Broadway & N Vancouver Ave (2045 No-Build)	1,000*	250	—	—
I-5 SB exit ramp at NE Wheeler Ave & N Ramsay Way (Revised Build)	—	—	2,000*	310
I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	760*	>760***	900*	500
N Weidler St at N Larrabee Ave (eastbound approach)	2,000**	195	2,000**	260
NE Broadway at NE Victoria Ave (westbound approach)	1,000**	1,070	1,000**	1,110

**Storage length represents the full length of the ramp from stop bar to striped gore.*
***Distance to NW Lovejoy Street and MLK Boulevard.*
****Queue exceeds the length of the ramp and mixes with I-5 mainline queues.*

Table 14 Future Conditions PM Peak Period 95th Percentile Queue Length, feet

Intersection Movement	2045 No-Build		2045 Revised Build Alternative	
	Storage Length	Queue Length	Storage Length	Queue Length
I-5 SB exit ramp at N Broadway & N Vancouver Ave (2045 No-Build)	1,000*	>1,000***	—	—
I-5 SB exit ramp at NE Wheeler Ave & N Ramsay Way (Revised Build)	—	—	2,000*	815
I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	760*	>760***	900*	585
N Weidler St at N Larrabee Ave (eastbound approach)	2,000**	1,520	2,000**	1,030
NE Broadway at NE Victoria Ave (westbound approach)	1,000**	280	1,000**	1,390

**Storage length represents the full length of the ramp from stop bar to striped gore.*
***Distance to NW Lovejoy Street and MLK Boulevard.*
****Queue exceeds the length of the ramp and mixes with I-5 mainline queues.*

In the updated 2045 No-Build Alternative, queuing on the southbound I-5 exit ramp exceeds the available storage in PM peak hour, while queuing on the northbound I-5 exit ramp exceeds

the available storage in both peak hours. It should be noted that when queues exceed the length of the ramp it becomes difficult to differentiate ramp queuing from mainline queuing, but queue spillback from the ramps does contribute to additional mainline congestion. The northbound I-5 exit ramp is a single lane exit in the 2045 No-Build Alternative and only has a single right-turn lane to eastbound NE Weidler Street. While this movement is considered "free-flow", vehicles must yield to bikes and pedestrians which contributes to queuing that blocks the northbound through movement. Queuing on the southbound I-5 exit ramp in the 2045 No-Build Alternative is the result of queue spillback on N Vancouver Avenue between N Broadway and NE Weidler Street as well as limited green time available at the ramp terminal intersection. Queuing on eastbound N Weidler Street is approximately 450 feet east of the NW Lovejoy Street and NW Broadway intersection during the PM peak hour and queuing on westbound N Broadway during the AM peak hour extends to MLK Jr. Boulevard.

In the 2045 Revised Build Alternative, queues on the northbound and southbound I-5 exit ramps would not exceed the available storage in the AM and PM peak hours. The northbound I-5 exit ramp is a two-lane exit in the 2045 Revised Build Alternative and includes a signalized dual right-turn lane to eastbound NE Weidler Street, which improves off-ramp queuing. The relocation of the southbound I-5 exit ramp also improves queuing in the 2045 Revised Build Alternative, with improved queue spill back on N Williams Avenue and additional green time for exit ramp traffic. Eastbound queues on N Weidler Street in the PM peak hour would be less than in the 2045 No-Build Alternative. Westbound queues on N Broadway would be similar during the AM peak hour but would extend beyond MLK Jr. Boulevard during the PM peak hour. There are additional signal phases at the N Broadway and NE Victoria Avenue intersection in the Revised Build Alternative that provide for protected pedestrian crossing on the west leg of the intersection. The reduced green time for westbound N Broadway, coupled with changes to downstream traffic patterns due to the relocation of the southbound I-5 exit ramp result in increased queuing on westbound N Broadway in the PM peak hour.

6.2.2.3 Future Local Street Bike Conditions

Bicycle Analysis (delay)

Bicycle delay through the signalized intersections were analyzed in Vissim for all dedicated bike lanes and are shown in Table 15 and Table 16 for the AM and PM peak hours. As shown below, the updated 2045 No-Build and 2045 Revised Build Alternatives are serving a similar volume of bikes in both the AM and PM peak hours but with considerably more delay in 2045 No-Build Alternative for key movements. In the AM peak hour, southbound bikes on N Vancouver Avenue are expected to experience over 2 minutes of delay in the 2045 No-Build Alternative due to the minimal amount of green time allowed for N Vancouver Avenue. In comparison, southbound bikes in the 2045 Revised Build Alternative would experience approximately 25

seconds of delay due to the removal of the I-5 southbound exit ramp and the additional green time allotted to N Vancouver Avenue. It should also be noted that southbound to westbound bikes in the 2045 No-Build Alternative would use Flint Avenue, resulting in less volume served at the N Vancouver Avenue intersection compared to the 2045 Revised Build Alternative (approximately 600 bikes vs. 1,660 bikes).

In the PM peak hour, northbound bikes on N Williams Avenue are expected to experience 90 seconds of delay crossing NE Weidler Street and 2 minutes of delay crossing N Broadway in the 2045 No Build Alternative compared to approximately 30 seconds at both locations in the 2045 Revised Build Alternative. The reconfiguration of the intersection of N Wheeler/N Williams and I-5 SB ramp terminal intersection between the two alternatives would add additional signal phases that would result in greater delays for northbound bikes in the PM peak hour in the 2045 Revised Build Alternative compared to the 2045 No-Build Alternative (approximately 60 seconds vs 30 seconds). Refinements to signal timing and signal progression within the project area may reduce bicycle delays and will be further evaluated during design. Both No-Build and Revised Build alternatives would serve high volume of bikes in both the eastbound (approximately 810) and in the northbound directions (approximately 1420 bikes). Bike storage design and operations refinements will be considered during the design phase.

Table 15 Future Conditions Bicycle Delay– 8:00 AM - 9:00 AM

ID	Intersection	Movement	2045 No-Build Alternative		2045 Revised Build Alternative	
			Volume Served	Delay (sec)	Volume Served	Delay (sec)
1	NBroadway & N Vancouver Ave (existing I-5 SB exit ramp)	WB Bike	294	15.0	296	0.8
		SB Bike	604	125.2	1663	25.4
2	N/NE Broadway & N Williams Ave	WB Bike	306	44.3	307	34.3
		NB Bike	94	12.7	92	15.7
3	NE Broadway & NE Victoria Ave	WB Bike	307	9.1	305	40.3
4	NE Broadway & NE 2nd Ave	WB Bike	306	23.6	306	16.0
5	NE Weidler St & NE 2nd Ave	EB Bike	96	12.0	98	17.2
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	EB Bike	99	15.6	100	40.6
7	N/NE Weidler St & N Williams Ave	EB Bike	99	3.5	148*	0.6
		NB Bike	93	31.6	93	16.0
8	N Weidler St & N Vancouver Ave	EB Bike	147	29.2	146	34.5
9	N Broadway & N Benton Ave	SB Bike	569	44.1	599	12.5
		WB Bike	1407	16.3	1409	14.1
		EB Bike	147	1.3	146	3.8
10	N Broadway & N Larrabee Ave	WB Bike	1390	54.0	1404	31.7
		EB Bike	147	21.4	147	30.8
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	NB Bike	47	29.3	48	46.2
		SB Bike	523	93.8	601	18.4

**Includes EB to NB bikes that must cross the intersection before traveling NB on N Williams Avenue.*

Table 16 Future Conditions Bicycle Delay – 5:00 PM - 6:00 PM

ID	Intersection	Movement	2045 No-Build Alternative		2045 Revised Build Alternative	
			Volume Served	Delay (sec)	Volume Served	Delay (sec)
1	NBroadway & N Vancouver Ave (existing I-5 SB exit ramp)	WB Bike	68	18.7	68	11.5
		SB Bike	498	16.9	108	10.8
2	N/NE Broadway & N Williams Ave	WB Bike	100	52.7	99	37.2
		NB Bike	1316	122.5	1404	26.5
3	NE Broadway & NE Victoria Ave	WB Bike	100	13.0	99	43.9
4	NE Broadway & NE 2nd Ave	WB Bike	100	14.6	100	14.0
5	NE Weidler St & NE 2nd Ave	EB Bike	96	14.7	98	2.3
6	I-5 NB exit ramp at NE Weidler St & NE Victoria Ave	EB Bike	97	13.4	97	41.0
7	N/NE Weidler St & N Williams Ave	EB Bike	97	6.1	804*	52.3
		NB Bike	1383	89.8	1420	31.6
8	N Weidler St & N Vancouver Ave	EB Bike	810	45.3	813	38.8
		SB Bike	47	17.5	49	9.5
9	N Broadway & N Benton Ave	WB Bike	129	14.1	125	6.5
		EB Bike	803	1.5	823	0.6
10	N Broadway & N Larrabee Ave	WB Bike	129	17.7	126	21.5
		EB Bike	813	61.4	830	32.9
11	N Wheeler/N Williams & N Ramsay Way & I-5 SB Ramps	NB Bike	725	31.8	724	61.4
		SB Bike	46	13.8	49	28.3

**Includes EB to NB bikes that must cross the intersection before traveling NB on N Williams Avenue.*

Bike Travel Time

Bike travel times going westbound and eastbound on N/NE Broadway and N/NE Weidler Street from west of N Larrabee Avenue to east of NE 2nd Avenue were also evaluated using the Vissim simulated travel times for both the 2045 No-Build Alternative and 2045 Revised Build Alternative. The bike travel time segments are shown in Figure 5 and summarized in Table 17 for the AM and PM peak hours.

Figure 5 Bike Travel Time Routes

As shown below in Table 17, bicycle travel times for the 2045 Revised Build Alternative would generally be within +/- 30 seconds of the travel times for the 2045 No-Build Alternative, except for the eastbound travel time during the AM peak hour which would be approximately 45 seconds longer in the 2045 Revised Build Alternative. Compared to the 2045 No-Build Alternative, the 2045 Revised Build Alternative would include vehicular demand volume differences, the rerouting of the I-5 southbound exit ramp traffic onto N Williams Avenue, and a protected eastbound bike signal phase at the NE Weidler and N Vancouver Avenue intersection. Refinements to signal timing

within the project area may shorten bicycle travel times and will be further evaluated during design.

Table 17 Future Conditions Bicycle Travel Time, minutes

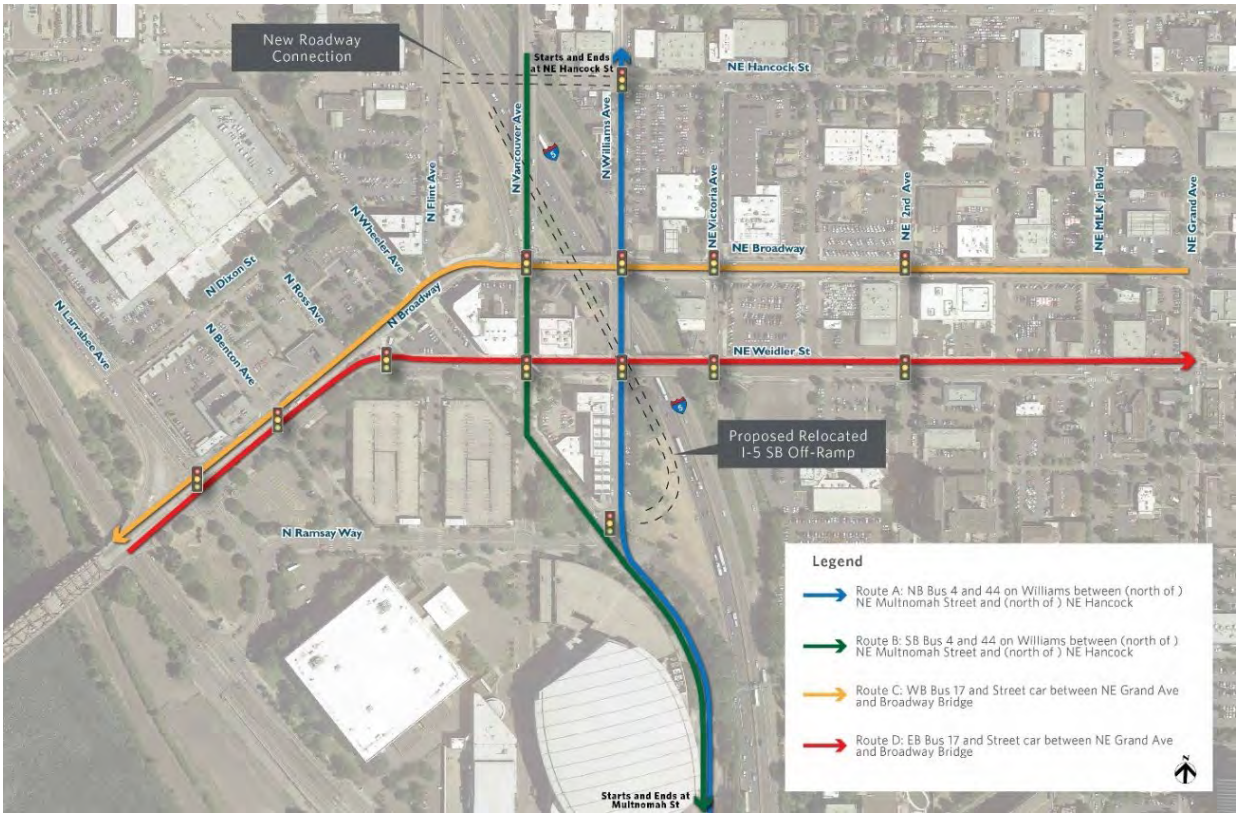
	7-8 AM		8-9 AM		4-5 PM		5-6 PM	
Direction	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build
Bike Westbound	4.5	4.2	5.0	4.7	4.2	4.5	4.5	4.8
Bike Eastbound	3.6	4.3	3.6	4.4	4.2	4.4	4.9	4.7

6.2.2.4 Future Local Street Transit Conditions

Bus Travel Time

Bus service travel times from the Vissim simulation results were used to assess bus operations under future conditions for the AM and PM peak periods. Three bus lines traverse the local intersections within the Project API and travel times were captured for the routes shown in Figure 6. Bus 4 and Bus 44 travel on N Williams Avenue and N Vancouver Avenue between NE Multnomah Street and NE Hancock Street and Bus 17 travels on N/NE Broadway from NE Grand Avenue to the Broadway Bridge west of N Larrabee Avenue.

Figure 6 Bus and Streetcar Travel Time Routes



As shown below in Table 18, southbound and westbound bus service travel times are expected to be considerably shorter in the 2045 Revised Build Alternative AM peak hours. With the removal of the I-5 southbound exit ramp at the N Broadway and N Vancouver Avenue intersection, there would be less congestion on N Vancouver Avenue between N Broadway and NE Weidler Street and more green time would be provided for southbound traffic on N Vancouver Avenue, resulting in less queuing and delay compared to the 2045 No-Build Alternative condition. Northbound and eastbound bus service travel times are approximately 20 to 35 seconds longer compared to the 2045 No-Build Alternative.

During the PM peak period, northbound and southbound bus service travel times are approximately 20 to 45 seconds longer compared to the 2045 No-Build Alternative. As previously noted, the 2045 Revised Build Alternative would include an additional traffic signal at the N Williams Avenue and NE Hancock Street intersection that would affect northbound routes. The current design assumption is that a traffic signal is needed at this location to accommodate a diagonal bike crossing. Options for transitions to tie into existing bike facilities north of N Broadway will be further evaluated during design. The relocation of the exit ramp traffic to the N Wheeler Avenue and N Ramsay Way intersection would also add considerably more traffic to the northbound bus route on N Williams Avenue, affecting service travel times.

The southbound bus only lane on N Vancouver Avenue between N Broadway and NE Weidler Street would also be removed in the 2045 Revised Build Alternative, which would affect southbound routes. Eastbound and westbound bus routes for the 2045 Revised Build Alternative would generally be within +/- 20 seconds of the travel times for the 2045 No-Build Alternative.

Refinements to signal timing and signal progression within the project area may shorten bus service travel times and will be further evaluated during design. The addition of transit signal priority, bus only lanes, bus queue jumps, and bus stop consolidation will also be evaluated as potential mitigation during design.

Table 18 Future Conditions Bus Travel Time, minutes

	7-8 AM		8-9 AM		4-5 PM		5-6 PM	
Direction	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build
Bus 4 and 44 NB	3.5	4.1	3.5	4.0	3.6	4.2	3.7	4.4
Bus 4 and 44 SB	3.4	2.9	4.0	2.8	2.8	3.2	2.9	3.2
Bus 17 WB	4.3	3.4	5.1	3.7	4.7	4.6	4.9	4.6
Bus 17 EB	3.0	3.6	3.3	3.6	3.9	4.1	4.6	4.7

Streetcar Travel Time

Streetcar service travel times from the Vissim simulation results were used to assess Streetcar operations under future conditions for the AM and PM peak periods. The travel time routes for both the westbound and eastbound streetcar are reported between NE Grand Avenue and the Broadway Bridge west of N Larrabee Avenue (see Figure 6). As shown below in Table 19, westbound Streetcar travel times in the 2045 Revised Build Alternative are expected to be shorter compared to 2045 No-Build, particularly during the AM and PM peak hours. Eastbound Streetcar travel times would generally be within 30 seconds of the 2045 No-Build travel times except during the AM peak hour, where the eastbound travel time would be approximately 45 seconds longer than the 2045 No-Build Alternative. Compared to the 2045 No-Build Alternative, the 2045 Revised Build Alternative would include vehicular demand volume differences and the rerouting of the I-5 southbound exit ramp traffic onto N Williams Avenue, which would reduce the amount of green time available for eastbound traffic on NE Weidler Street. Refinements to signal timing within the project area may shorten Streetcar service travel times and would be further evaluated during design.

Table 19 Future Conditions Streetcar Travel Time, minutes

	7-8 AM		8-9 AM		4-5 PM		5-6 PM	
Direction	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build	2045 No-Build	2045 Revised Build
Westbound Streetcar	4.1	3.7	4.3	3.7	4.4	4.3	5.0	4.5
Eastbound Streetcar	3.3	3.7	3.2	3.9	4.7	5.1	5.7	6.1

6.2.3 Indirect Impacts

There would be no additional indirect impacts under the 2045 Revised Build Alternative that those disclosed in the 2019 Traffic Analysis Technical Report. Similar to the Build Alternative, the 2045 Revised Build Alternative would have indirect impacts for event access to the Moda Center due to the relocation of the existing I-5 southbound exit ramp terminal. Potential mitigations in the traffic operations including wayfinding signage to guide traffic from the proposed Williams Ave/Wheeler Avenue/Ramsay Way southbound exit ramp to access the Moda Center and traffic signal adjustments would be necessary. During the design phase, traffic analysis of the ingress conditions would be performed to identify specific mitigation and develop event traffic management plan to accommodate the additional traffic volumes during both event ingress and egress conditions.

6.3 CUMULATIVE EFFECTS

The cumulative impact analysis considered the Project's impacts combined with other past, present, and reasonably foreseeable future actions that would result in the environmental impacts in the Project Area. The travel demand model for this project is based on the 2014 Metro Regional Transportation Plan (RTP) and changes from the 2014 and 2018 RTP have been evaluated and reviewed. There are no changes in the projects considered for the RFFA list and therefore there are no updates on the trip generation, travel demand, or modeling used in the traffic analysis of the Project. Therefore, the cumulative impacts of the 2045 Revised Build Alternative would be the same as those reported in the 2019 Traffic Analysis Technical Report.

6.4 CONCLUSION

The traffic analysis presented in this supplemental report include the following results for the Revised Build Alternative:

- Traffic operations would improve at all highway segments including the four weaving segments between I-84 and I-405 in both the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) analysis periods when compared to the 2045 No-Build Alternative.
- Both ramp terminal intersections, at I-5 southbound exit ramp and NE Williams Avenue and at I-5 northbound exit ramp and NE Weidler Street, would continue to meet the Highway Design Manual (HDM) mobility target (v/c of 0.75 or lower) during both the AM and PM peak hours.
- It a All intersections would operate at acceptable Level of Service (LOS) of D or better with the exception of NE Broadway and NE Victoria Avenue in the AM peak hour (8-9 AM), which would operate at LOS E using Synchro analysis results.
- All intersections would operate at LOS D or better in the AM and PM peak hours using Vissim analysis results.
- 95th percentile queue lengths on the I-5 northbound and southbound exit ramps would be reduced in the 2045 Revised Build Alternative compared to the 2045 No-Build Alternative and would not exceed the proposed ramp storage length approaching both ramp terminals.
- Eastbound queuing on N Weidler Street in the PM peak hour would be less than in the 2045 No-Build Alternative and westbound queuing on N Broadway would be similar during the AM peak hour but would extend beyond MLK Jr. Boulevard during the PM peak hour.
- Bike delays in the eastbound and westbound direction would be shorter compared to those in the No-Build Alternative.
- Bicycle travel times would generally be within +/- 30 seconds of the travel times for the 2045 No-Build Alternative, except for the eastbound travel time during the AM peak hour which would be approximately 45 seconds longer.
- Streetcar travel times in the westbound direction would be shorter compared to the No-Build Alternative and would be longer in the eastbound direction compared to No-Build Alternative.
- Bus travel times would be shorter in the southbound and westbound routes during the AM peak period compared to the No-Build and would be longer in the northbound and eastbound routes. During the PM peak period, Revised Build Alternative bus travel times would be shorter in the westbound direction and would be longer in the northbound, southbound and eastbound routes compared to the No-Build Alternative.

7.0 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Mitigation measures would be the same as reported in the 2019 Traffic Analysis Transportation Technical report.

8.0 PREPARERS

NAME	DISCIPLINE	EDUCATION	YEARS OF EXPERIENCE
Jeremy Jackson	Traffic Engineer	B.S. in Civil Engineering	17
Joe Kirkland	Traffic Engineer	B.S. in Civil Engineering	7
Simon Eng	Traffic Engineer	B.S. in Civil Engineering	35

9.0 REFERENCES

City of Portland. n.d. Portland Policy Document. TRN-10.27 - Traffic Capacity Analysis for Land Use Review Cases. Available: https://www.portlandoregon.gov/citycode/article/41049

Metro. 2014. Regional Transportation Plan. Available: https://www.oregonmetro.gov/sites/default/files/2015/05/29/RTP-2014-final.PDF

Metro. 2018 Regional Transportation Plan. Available:

https://www.oregonmetro.gov/sites/default/files/2018/07/02/draft2018RTP_publicreviewweb.pdf

ODOT (Oregon Department of Transportation). 1999. Oregon Highway Plan, an Element of the Oregon Transportation Plan. Originally Adopted March 18, 1999, Including Amendments through May 2015. Available: http://www.oregon.gov/ODOT/Planning/Documents/OHP.pdf.

ODOT. 2012b. ODOT Highway Design Manual. Available: https://www.oregon.gov/ODOT/Engineering/Pages/Hwy-Design-Manual.aspx

ODOT. 2020. Analysis Procedure Manual. Version 2. Transportation Development Division Planning Section, Transportation Planning Analysis Unit, Salem, Oregon. Available: https://www.oregon.gov/odot/Planning/Pages/APM.aspx

ODOT. 2019. Traffic Technical Report. I-5 Rose Quarter Improvement Project. Prepared for the Oregon Department of Transportation. Portland, Oregon. January. Available:

https://i5rosequarter.oregon.gov/Documents/I5RQ_Traffic-Technical-Report_010819.pdf

TRB (Transportation Research Board). 2010. HCM 2010: Highway Capacity Manual. Washington D.C.

City of Portland. 2020. Portland 2035 Transportation System Plan

https://www.portland.gov/transportation/planning/tsp-document-downloads

City of Portland. 2012 Central City 2035 N/NE Quadrant Plan

https://www.portland.gov/sites/default/files/2020-01/complete-adopted-plan_lores_0.pdf

Appendix A: List of Reasonably Foreseeable Future Actions

REASONABLY FORESEEABLE FUTURE ACTIONS COMPARISON

Date:	Tuesday June 15, 2022
Project:	K19071 I-5 Rose Quarter Improvement Project
To:	Steve Drahota
From:	Brian Bauman
Subject:	Reasonably Foreseeable Future Actions Comparison

1.0 INTRODUCTION

Reasonably Foreseeable Future Actions (RFFAs) having the potential to contribute to a cumulative effect with the Build Alternative for the I-5 Rose Quarter Improvement Project (Project) were identified in 2019 technical reports supporting the Project's Environmental Assessment (EA) and the Finding of No Significant Impact (FONSI) and Revised EA. The purpose of this memo is to review the RFFAs documented in the 2019 technical reports and update them based on changes in plans for future development in the Project vicinity. The updated RFFAs presented herein are used in the assessment of cumulative environmental effects of the Project's Revised Build Alternative presented in the I-5 Rose Quarter Improvement Project Supplemental EA.

2.0 RFFA ASSESSMENT

As part of the cumulative impacts analysis included in the 2019 technical reports, ODOT considered planned and programmed projects in the Project Area and surrounding areas that are likely to be implemented by 2045 to be reasonably foreseeable. Future (2045) traffic conditions were interpolated from Metro's regional travel demand model which is built on population and employment growth forecasts adopted by the Metro Council and the financially constrained project list included in the 2014 Regional Transportation Plan (RTP). This updated RFFA compares projects included in the most recent 2018 RTP that may contribute to a cumulative effect with the Project with the RFFAs documented in the 2019 technical reports.

2.1 LAND USE ASSUMPTIONS – LAND USE AND ASSUMPTIONS FOR RFFAS

The RFFAs included in the 2019 technical reports include City-owned parcels proposed for redevelopment (East/West parking garages, Benton surface parking lot, Phase II Entertainment Lot); improvements to the Veterans Memorial Coliseum, Moda Center, Annex lot plus building; and private redevelopment (Vulcan/Thunderbird site west of N Interstate and the Weston-owned site at N Larrabee and N Broadway). In addition to these actions, public entities such as the Portland Water Bureau, TriMet, Metro/Oregon Convention Center, Portland Public Schools, and Multnomah County plan to undertake improvement projects within the area before 2045.

Both the 2014 and 2018 RTPs support the implementation of the 2040 Growth Concept, which is the region's adopted land use and transportation strategy for managing growth and building healthy, equitable communities and a strong economy. The RFFAs listed above were included in both the 2014 RTP and the 2018 RTP and are the only projects that may have an impact on traffic within the I-5 Rose Quarter Improvement Project Area. Additional assumptions can be found in Appendix M Attachment 3 (Page 77) of the 2018 RTP dated December 6th, 2018.

For the 2019 Traffic Analysis Technical Report and the Traffic Analysis Supplemental Technical Report, the Project team utilized the regionally adopted population and employment numbers associated with Metroscope and the Regional Travel Demand Model as the baseline for travel demand development in conjunction with Metro. Additionally, the adopted I-5 Rose Quarter Project in the RTP was coordinated with the updates to the Comprehensive Plan and Zoning designations in the NNE quadrant plan covering the project study area. It should be noted that the comprehensive plan and zoning designations in the study area were designated primarily General Commercial (GC) which allows for the maximum density. While there have been changes or additional detail to proposed developments in the Project Area, these do not change the underlying assumptions of build-out of those parcels in accordance with the applicable comprehensive plan designations.

Since the FONSI and Revised EA were released in 2020, the Portland Public School's Long Range Facility Plan lists Harriet Tubman Middle School (HTMS) as under consideration for relocation (PPS 2021) and funding for the relocation is provided to the Oregon Department of Administrative Services in Oregon House Bill 5202, Section 323 which was signed by Governor on April 4, 2022. The relocation of HTMS is a new RFFA for purposes of cumulative analyses for the Supplemental EA. The middle school occupies approximately 2.2 acres zoned Commercial Mixed Use and 0.13 acres zoned Open Space. After the school use of the existing building relocates, re-use of the land and building could include several potential outcomes, and it is not possible to predict how the land will be used. In the event the buildings are demolished, and

the site is redeveloped under the current zoning, the 2.2-acre Commercial Mixed Use 3 portion could support a large-scale mixed-use building with 6-7 stories including retail, office, residential, institutional, and limited industrial uses. There is a minimum residential density requirement of 1 unit per 1,000 square feet of site area, which would translate to a minimum of approximately 95 residential units.

2.2 TRANSPORTATION ASSUMPTIONS – FREEWAY VOLUMES AND 2019 ASSUMPTIONS

The Interstate Bridge Replacement Project is included in the 2014 RTP financially constrained project list and is in Metro's regional travel demand model. The Interstate Bridge Replacement Project remained in the financially constrained list in the 2018 RTP (See Table 4 in Appendix M of the 2018 RTP dated December 6th, 2018, on Page 13). Tolling was assumed as a part of the Interstate Bridge Replacement Project (Appendix M of the 2018 RTP on Page 13). No other major projects have been completed or incorporated into the RTP that would affect travel volumes, therefore there are no changes to the RFFAs in the updated Transportation Technical Report.

Tolling projects under the Oregon Toll Program were not on the 2014 or 2018 RTP financially constrained list and, therefore, were not included as part of the future modeling scenarios in the 2019 Traffic Analysis Technical Report. Tolling is currently in an environmental review process for a portion of I-205, as well as in a planning phase for I-5 and other portions of I-205. In 2018, the planning and environmental phases of the tolling project were added to the RTP, but consistent with federal guidance on reasonably foreseeable actions, these projects are not included as RFFAs for the Supplemental EA because the ROW and design phases are not included in the RTP and the regional travel demand model.

2.3 TRANSPORTATION ASSUMPTIONS – LOCAL STREET VOLUMES AND 2019 ASSUMPTIONS

As a part of the multi-modal traffic modelling work, the 2019 Traffic Analysis Technical Report included additional network refinement and operational detail based on input from the City of Portland, including elements of the Central City in Motion project. The primary change was lane reallocations on Broadway. These changes were incorporated in the 2018 RTP, and thus the change is consistent with that plan. The Broadway Multi-Modal Corridor project is project #11646 in the 2018 RTP. No other projects have been completed or incorporated into the RTP that would affect travel volumes, therefore there are no changes to the RFFAs in the Traffic Analysis Supplemental Technical Report.

3.0 FINDINGS

The RFFAs identified for the 2019 technical reports to support the cumulative impacts analysis of the Project Build Alternative were reviewed to determine if updates were needed to assess traffic and cumulative impacts of the Revised Build Alternative. The 2014 and 2018 RTPs were also reviewed and compared. No projects were added to or removed from the RFFA list that would affect traffic impacts, volumes, or performance in the project area. The relocation of HTMS may impact future use of the existing site; however, neither the relocations nor the RFFAs have resulted in updates that would result in any changes to trip generation, travel demand or to modeling used in the evaluation of the Project.

Appendix B: Synchro Model Intersection Results

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	60	25	75	0	20	275	0	590	220	5	970	5
Future Volume (vph)	60	25	75	0	20	275	0	590	220	5	970	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.0		4.0	4.0		4.0	3.5	4.0	4.0	3.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97		1.00	0.99		1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1715	1810	1486		1810	1516		3438	1538	1719	3438	1538
Flt Permitted	0.75	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1362	1810	1486		1810	1516		3438	1538	1719	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	26	79	0	21	289	0	621	232	5	1021	5
RTOR Reduction (vph)	0	0	71	0	0	212	0	0	72	0	0	3
Lane Group Flow (vph)	63	26	8	0	21	77	0	621	160	5	1021	2
Confl. Peds. (#/hr)	3		7	7		3	27		25	25		27
Confl. Bikes (#/hr)									33			634
Turn Type	Perm	NA	custom	Perm	NA	Perm		NA	custom	Prot	NA	custom
Protected Phases		4			8			6	16!	5!	2	16
Permitted Phases	4		5	8		8	6					
Actuated Green, G (s)	8.8	8.8	6.7		18.6	18.6		20.6	30.8	6.7	30.0	30.8
Effective Green, g (s)	8.8	8.8	6.7		18.8	18.8		21.1	31.3	5.7	30.8	31.6
Actuated g/C Ratio	0.12	0.12	0.10		0.27	0.27		0.30	0.44	0.08	0.44	0.45
Clearance Time (s)	4.0	4.0	3.0		4.2	4.2		4.5	4.0	3.0	4.8	4.0
Vehicle Extension (s)	1.0	1.0	0.5		1.0	1.0		0.5	3.0	0.5	0.5	3.0
Lane Grp Cap (vph)	170	226	141		483	404		1030	683	139	1504	690
v/s Ratio Prot		0.01			0.01			0.18	0.10	0.00	c0.30	0.00
v/s Ratio Perm	c0.05		0.01			c0.05						
v/c Ratio	0.37	0.12	0.05		0.04	0.19		0.60	0.23	0.04	0.68	0.00
Uniform Delay, d1	28.3	27.3	29.0		19.1	19.9		21.1	12.1	29.8	15.8	10.7
Progression Factor	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	0.1		0.0	0.1		0.7	0.2	0.0	1.0	0.0
Delay (s)	28.8	27.4	29.0		19.1	20.0		21.8	12.3	29.9	16.8	10.7
Level of Service	C	C	C		B	C		C	B	C	B	B
Approach Delay (s)		28.7			20.0			19.2			16.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.4	Sum of lost time (s)	19.5
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	25	10	15	10	5	55	530	80	5	955	40
Future Volume (vph)	10	25	10	15	10	5	55	530	80	5	955	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.5		4.0	4.8	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	0.99		1.00	0.98		1.00	0.98	
Flpb, ped/bikes		0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1716		1711	1703		1719	3315		1719	3353	
Flt Permitted		0.95		0.76	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1650		1361	1703		1719	3315		1719	3353	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	26	11	16	11	5	58	558	84	5	1005	42
RTOR Reduction (vph)	0	8	0	0	4	0	0	4	0	0	2	0
Lane Group Flow (vph)	0	40	0	16	12	0	58	638	0	5	1045	0
Confl. Peds. (#/hr)	23		4	4		23	33		25	25		33
Confl. Bikes (#/hr)									28			696
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		18.4		18.4	18.4		6.2	89.7		1.1	84.3	
Effective Green, g (s)		18.4		18.4	18.4		6.2	89.7		1.1	84.3	
Actuated g/C Ratio		0.15		0.15	0.15		0.05	0.74		0.01	0.69	
Clearance Time (s)		4.0		4.0	4.0		4.0	4.5		4.0	4.8	
Vehicle Extension (s)		1.0		1.0	1.0		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		249		205	257		87	2443		15	2322	
v/s Ratio Prot					0.01		c0.03	0.19		0.00	c0.31	
v/s Ratio Perm		c0.02		0.01								
v/c Ratio		0.16		0.08	0.05		0.67	0.26		0.33	0.45	
Uniform Delay, d1		44.9		44.4	44.1		56.7	5.2		59.9	8.4	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1		0.1	0.0		13.9	0.3		4.7	0.6	
Delay (s)		45.0		44.4	44.2		70.7	5.5		64.7	9.0	
Level of Service		D		D	D		E	A		E	A	
Approach Delay (s)		45.0			44.3			10.9			9.2	
Approach LOS		D			D			B			A	

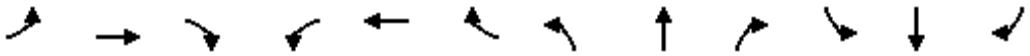
Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	121.7	Sum of lost time (s)	12.8
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	SBT	SER	SER2
Lane Configurations					
Traffic Volume (vph)	505	750	255	855	310
Future Volume (vph)	505	750	255	855	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	4.5	4.9
Lane Util. Factor	*0.52	*0.52	0.95	*0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.84
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	1.00	1.00
Satd. Flow (prot)	890	1843	3438	3167	1184
Flt Permitted	0.95	0.99	1.00	1.00	1.00
Satd. Flow (perm)	890	1843	3438	3167	1184
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	532	789	268	900	326
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	335	986	268	900	326
Confl. Peds. (#/hr)	5			9	9
Confl. Bikes (#/hr)					178
Heavy Vehicles (%)	5%	5%	5%	14%	14%
Bus Blockages (#/hr)	0	5	0	0	0
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		6	4	3	
Permitted Phases	6				3
Actuated Green, G (s)	27.7	27.7	9.2	19.1	19.1
Effective Green, g (s)	28.4	28.4	10.1	19.5	19.1
Actuated g/C Ratio	0.41	0.41	0.14	0.28	0.27
Clearance Time (s)	4.7	4.7	4.4	4.9	4.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	361	747	496	882	323
v/s Ratio Prot			c0.08	c0.28	
v/s Ratio Perm	0.38	0.54			0.28
v/c Ratio	0.93	1.32	0.54	1.02	1.01
Uniform Delay, d1	19.8	20.8	27.8	25.2	25.4
Progression Factor	0.53	0.57	1.00	1.00	1.00
Incremental Delay, d2	27.6	151.5	1.2	35.5	52.4
Delay (s)	38.1	163.3	29.0	60.8	77.9
Level of Service	D	F	C	E	E
Approach Delay (s)		131.6	29.0		
Approach LOS		F	C		

Intersection Summary			
HCM 2000 Control Delay	93.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

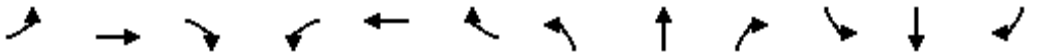
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1255	970	0	250	0	0	0	0
Future Volume (vph)	0	0	0	0	1255	970	0	250	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.6		4.0				
Lane Util. Factor					*0.87	0.88		0.91				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		1.00				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		1.00				
Satd. Flow (prot)					3149	2504		4940				
Flt Permitted					1.00	1.00		1.00				
Satd. Flow (perm)					3149	2504		4940				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1321	1021	0	263	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1321	1021	0	263	0	0	0	0
Confl. Peds. (#/hr)			24	24			2		55	55		2
Confl. Bikes (#/hr)						138			29			
Turn Type					NA	custom		NA				
Protected Phases					2			4				
Permitted Phases						6	4					
Actuated Green, G (s)					47.7	34.1		13.5				
Effective Green, g (s)					48.3	34.1		13.7				
Actuated g/C Ratio					0.69	0.49		0.20				
Clearance Time (s)					4.6	4.6		4.2				
Vehicle Extension (s)					3.0	3.0		2.0				
Lane Grp Cap (vph)					2172	1219		966				
v/s Ratio Prot					c0.42			c0.05				
v/s Ratio Perm						c0.41						
v/c Ratio					0.61	0.84		0.27				
Uniform Delay, d1					5.8	15.6		23.9				
Progression Factor					0.72	0.98		0.96				
Incremental Delay, d2					1.1	6.0		0.1				
Delay (s)					5.3	21.3		23.0				
Level of Service					A	C		C				
Approach Delay (s)		0.0			12.2			23.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

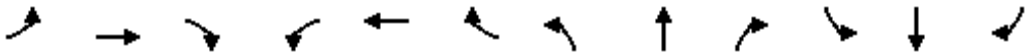
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1490	20	710	45	0	0	0	25
Future Volume (vph)	0	0	0	0	1490	20	710	45	0	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		3.8	4.0				4.0
Lane Util. Factor					0.86		0.95	0.95				1.00
Frpb, ped/bikes					1.00		1.00	1.00				0.98
Flpb, ped/bikes					1.00		1.00	1.00				1.00
Frt					1.00		1.00	1.00				0.86
Flt Protected					1.00		0.95	0.96				1.00
Satd. Flow (prot)					6199		1633	1648				1535
Flt Permitted					1.00		0.95	0.96				1.00
Satd. Flow (perm)					6199		1633	1648				1535
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1568	21	747	47	0	0	0	26
RTOR Reduction (vph)	0	0	0	0	0	0	16	14	0	0	0	18
Lane Group Flow (vph)	0	0	0	0	1589	0	440	324	0	0	0	8
Confl. Peds. (#/hr)	28		11	11		28	6		2	2		6
Confl. Bikes (#/hr)						97						
Turn Type					NA		Prot	NA				Perm
Protected Phases					2		1 4	4				
Permitted Phases												4
Actuated Green, G (s)					31.5		29.9	29.9				21.4
Effective Green, g (s)					32.1		26.1	30.1				21.6
Actuated g/C Ratio					0.46		0.37	0.43				0.31
Clearance Time (s)					4.6			4.2				4.2
Vehicle Extension (s)					3.0			2.0				2.0
Lane Grp Cap (vph)					2842		608	708				473
v/s Ratio Prot					c0.26		c0.27	0.20				
v/s Ratio Perm												0.01
v/c Ratio					0.56		0.72	0.46				0.02
Uniform Delay, d1					13.8		18.9	14.2				16.8
Progression Factor					0.70		0.96	0.60				1.00
Incremental Delay, d2					0.7		1.7	0.1				0.0
Delay (s)					10.4		19.8	8.6				16.8
Level of Service					B		B	A				B
Approach Delay (s)		0.0			10.4			15.0			16.8	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

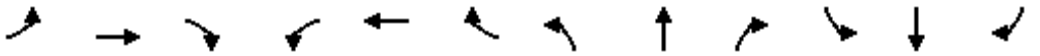
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	15	1310	50	55	130	0	0	5	145
Future Volume (vph)	0	0	0	15	1310	50	55	130	0	0	5	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5			4.5			4.5	
Lane Util. Factor					0.91			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.97	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.87	
Flt Protected					1.00			0.99			1.00	
Satd. Flow (prot)					4885			1775			1526	
Flt Permitted					1.00			0.86			1.00	
Satd. Flow (perm)					4885			1540			1526	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	16	1379	53	58	137	0	0	5	153
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	0	1445	0	0	195	0	0	154	0
Confl. Peds. (#/hr)	20		20	20		20	18		18	18		18
Confl. Bikes (#/hr)						110						
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			4	
Permitted Phases				2			4					
Actuated Green, G (s)					46.9			14.1			14.1	
Effective Green, g (s)					46.9			14.1			14.1	
Actuated g/C Ratio					0.67			0.20			0.20	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					0.2			3.0			3.0	
Lane Grp Cap (vph)					3272			310			307	
v/s Ratio Prot											0.10	
v/s Ratio Perm					0.30			c0.13				
v/c Ratio					0.44			0.63			0.50	
Uniform Delay, d1					5.4			25.6			24.8	
Progression Factor					1.00			0.91			1.00	
Incremental Delay, d2					0.4			3.8			1.3	
Delay (s)					5.8			27.2			26.1	
Level of Service					A			C			C	
Approach Delay (s)		0.0			5.8			27.2			26.1	
Approach LOS		A			A			C			C	

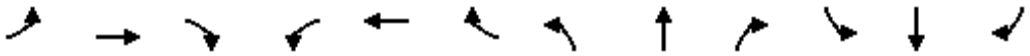
Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



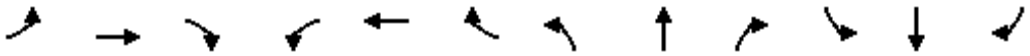
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	355	260	0	0	0	0	0	0	875	740	0
Future Volume (vph)	0	355	260	0	0	0	0	0	0	875	740	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0							3.6	4.0	
Lane Util. Factor		0.91	1.00							0.91	0.91	
Frpb, ped/bikes		1.00	0.95							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	0.98	
Satd. Flow (prot)		4940	1463							1564	3209	
Flt Permitted		1.00	1.00							0.95	0.98	
Satd. Flow (perm)		4940	1463							1564	3209	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	374	274	0	0	0	0	0	0	921	779	0
RTOR Reduction (vph)	0	0	148	0	0	0	0	0	0	226	71	0
Lane Group Flow (vph)	0	374	126	0	0	0	0	0	0	327	1076	0
Confl. Peds. (#/hr)	18		19	19		18	14					14
Confl. Bikes (#/hr)			23									
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type		NA	Perm							Prot	NA	
Protected Phases		6								8	4	
Permitted Phases			6									
Actuated Green, G (s)		20.5	20.5							40.9	40.9	
Effective Green, g (s)		21.0	21.0							41.4	41.4	
Actuated g/C Ratio		0.30	0.30							0.59	0.59	
Clearance Time (s)		4.5	4.5							4.1	4.5	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1482	438							924	1897	
v/s Ratio Prot		0.08								0.21	c0.34	
v/s Ratio Perm			c0.09									
v/c Ratio		0.25	0.29							0.35	0.57	
Uniform Delay, d1		18.6	18.8							7.4	8.8	
Progression Factor		1.00	1.00							0.64	0.65	
Incremental Delay, d2		0.4	1.7							0.1	0.1	
Delay (s)		19.0	20.4							4.8	5.8	
Level of Service		B	C							A	A	
Approach Delay (s)		19.6			0.0			0.0			5.5	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	11.1
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



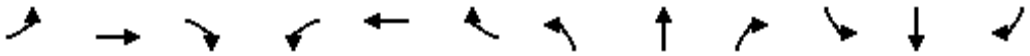
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1030	0	0	0	0	0	50	10	0	0	0
Future Volume (vph)	200	1030	0	0	0	0	0	50	10	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.93			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4847						3438	1426			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4847						3438	1426			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	211	1084	0	0	0	0	0	53	11	0	0	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	10	0	0	0
Lane Group Flow (vph)	0	1266	0	0	0	0	0	53	1	0	0	0
Confl. Peds. (#/hr)	27		49	49		27	31		20	20		31
Confl. Bikes (#/hr)			6						24			
Bus Blockages (#/hr)	0	5	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						4				
Permitted Phases	2								4			
Actuated Green, G (s)		52.4						8.9	8.9			
Effective Green, g (s)		52.9						9.1	9.1			
Actuated g/C Ratio		0.76						0.13	0.13			
Clearance Time (s)		4.5						4.2	4.2			
Vehicle Extension (s)		0.2						0.5	0.5			
Lane Grp Cap (vph)		3662						446	185			
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.26							0.00			
v/c Ratio		0.35						0.12	0.01			
Uniform Delay, d1		2.8						26.9	26.5			
Progression Factor		0.81						1.00	1.00			
Incremental Delay, d2		0.2						0.0	0.0			
Delay (s)		2.5						27.0	26.5			
Level of Service		A						C	C			
Approach Delay (s)		2.5			0.0			26.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
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)	15	1025	0	0	0	0	0	740	765	0	0	0
Future Volume (vph)	15	1025	0	0	0	0	0	740	765	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.99			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		4933						3223	1421			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		4933						3223	1421			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	16	1079	0	0	0	0	0	779	805	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	346	0	0	0
Lane Group Flow (vph)	0	1083	0	0	0	0	0	779	459	0	0	0
Confl. Peds. (#/hr)	29		44	44		29	9		2	2		9
Confl. Bikes (#/hr)			6									
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	12%	12%	12%	5%	5%	5%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		6						8				
Permitted Phases	6								8			
Actuated Green, G (s)		42.5						18.1	18.1			
Effective Green, g (s)		43.0						19.0	19.0			
Actuated g/C Ratio		0.61						0.27	0.27			
Clearance Time (s)		4.5						4.9	4.9			
Vehicle Extension (s)		3.5						3.9	3.9			
Lane Grp Cap (vph)		3030						874	385			
v/s Ratio Prot								0.24				
v/s Ratio Perm		0.22							c0.32			
v/c Ratio		0.36						0.89	1.19			
Uniform Delay, d1		6.7						24.5	25.5			
Progression Factor		0.59						1.00	1.00			
Incremental Delay, d2		0.3						11.6	109.3			
Delay (s)		4.2						36.1	134.8			
Level of Service		A						D	F			
Approach Delay (s)		4.2			0.0			86.3			0.0	
Approach LOS		A			A			F			A	

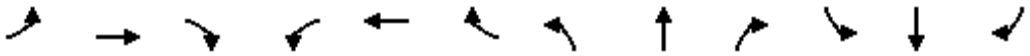
Intersection Summary			
HCM 2000 Control Delay	52.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1550	100	0	0	0	0	55	15	10	10	0
Future Volume (vph)	130	1550	100	0	0	0	0	55	15	10	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5			4.5	
Lane Util. Factor		0.86						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.97			1.00	
Flt Protected		1.00						1.00			0.98	
Satd. Flow (prot)		6116						1748			1757	
Flt Permitted		1.00						1.00			0.88	
Satd. Flow (perm)		6116						1748			1578	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	1632	105	0	0	0	0	58	16	11	11	0
RTOR Reduction (vph)	0	7	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1867	0	0	0	0	0	71	0	0	22	0
Confl. Peds. (#/hr)	9		29	29		9	20		11	11		20
Confl. Bikes (#/hr)			7									
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		48.2						12.8			12.8	
Effective Green, g (s)		48.2						12.8			12.8	
Actuated g/C Ratio		0.69						0.18			0.18	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		0.5						0.5			0.5	
Lane Grp Cap (vph)		4211						319			288	
v/s Ratio Prot								c0.04				
v/s Ratio Perm		0.31									0.01	
v/c Ratio		0.44						0.22			0.08	
Uniform Delay, d1		4.9						24.4			23.7	
Progression Factor		1.52						1.00			0.92	
Incremental Delay, d2		0.2						0.1			0.0	
Delay (s)		7.7						24.5			21.9	
Level of Service		A						C			C	
Approach Delay (s)		7.7			0.0			24.5			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
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 (veh/h)	10	10	0	0	0	180	10	455	10	0	0	0
Future Volume (Veh/h)	10	10	0	0	0	180	10	455	10	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	0	0	0	189	11	479	11	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								498				
pX, platoon unblocked	0.99	0.99		0.99	0.99	0.99				0.99		
vC, conflicting volume	696	512	0	512	506	484	0			490		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686	501	0	501	495	473	0			479		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	98	100	100	100	67	99			100		
cM capacity (veh/h)	237	459	1076	459	463	579	1604			1056		

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	22	189	501
Volume Left	11	0	11
Volume Right	0	189	11
cSH	312	579	1604
Volume to Capacity	0.07	0.33	0.01
Queue Length 95th (ft)	6	35	1
Control Delay (s)	17.4	14.2	0.2
Lane LOS	C	B	A
Approach Delay (s)	17.4	14.2	0.2
Approach LOS	C	B	

Intersection Summary				
Average Delay	4.5			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	EBR2	NBT	SET	SER
Lane Configurations						
Traffic Volume (vph)	50	120	60	10	915	80
Future Volume (vph)	50	120	60	10	915	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.6	5.6
Lane Util. Factor	1.00	0.88		1.00	0.95	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	1719	2707		1810	3438	1538
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	1719	2707		1810	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	126	63	11	963	84
RTOR Reduction (vph)	0	91	0	0	0	0
Lane Group Flow (vph)	53	98	0	11	963	84
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	Perm	Prot		NA	NA	custom
Protected Phases		4				2
Permitted Phases	4			3	2	
Actuated Green, G (s)	5.1	5.1		0.9	34.9	34.9
Effective Green, g (s)	5.1	5.1		0.9	34.9	34.9
Actuated g/C Ratio	0.09	0.09		0.02	0.62	0.62
Clearance Time (s)	5.0	5.0		5.0	5.6	5.6
Vehicle Extension (s)	0.5	0.5		1.5	0.5	0.5
Lane Grp Cap (vph)	155	244		28	2123	950
v/s Ratio Prot		c0.04				0.05
v/s Ratio Perm	0.03			c0.01	c0.28	
v/c Ratio	0.34	0.40		0.39	0.45	0.09
Uniform Delay, d1	24.1	24.3		27.5	5.7	4.4
Progression Factor	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4		3.3	0.7	0.2
Delay (s)	24.6	24.7		30.8	6.4	4.6
Level of Service	C	C		C	A	A
Approach Delay (s)	24.6			30.8	6.3	
Approach LOS	C			C	A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	15.6
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	120	235	35	0	25	235	0	1135	280	15	905	20
Future Volume (vph)	120	235	35	0	25	235	0	1135	280	15	905	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.0		4.0	4.0		4.0	3.5	4.0	4.0	3.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.89		1.00	0.97		1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1845	1399		1845	1528		3505	1568	1752	3505	1568
Flt Permitted	0.75	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1360	1845	1399		1845	1528		3505	1568	1752	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	247	37	0	26	247	0	1195	295	16	953	21
RTOR Reduction (vph)	0	0	35	0	0	201	0	0	0	0	0	0
Lane Group Flow (vph)	126	247	2	0	26	46	0	1195	295	16	953	21
Confl. Peds. (#/hr)	12		18	18		12	50		30	30		50
Confl. Bikes (#/hr)									364			84
Turn Type	Perm	NA	custom	Perm	NA	Perm		NA	custom	Prot	NA	custom
Protected Phases		4			8			6	16!	5!	2	16
Permitted Phases	4		5	8		8	6					
Actuated Green, G (s)	20.6	20.6	6.1		20.3	20.3		47.8	57.4	6.1	56.6	57.4
Effective Green, g (s)	20.6	20.6	6.1		20.5	20.5		48.3	57.9	5.1	57.4	58.2
Actuated g/C Ratio	0.19	0.19	0.06		0.19	0.19		0.44	0.52	0.05	0.52	0.53
Clearance Time (s)	4.0	4.0	3.0		4.2	4.2		4.5	4.0	3.0	4.8	4.0
Vehicle Extension (s)	1.0	1.0	0.5		1.0	1.0		0.5	3.0	0.5	0.5	3.0
Lane Grp Cap (vph)	253	343	77		342	283		1532	821	80	1820	825
v/s Ratio Prot		c0.13			0.01			c0.34	0.19	0.01	c0.27	0.01
v/s Ratio Perm	0.09		0.00			c0.03						
v/c Ratio	0.50	0.72	0.03		0.08	0.16		0.78	0.36	0.20	0.52	0.03
Uniform Delay, d1	40.3	42.2	49.4		37.2	37.8		26.6	15.4	50.7	17.5	12.5
Progression Factor	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	6.2	0.1		0.0	0.1		2.4	0.3	0.4	0.1	0.0
Delay (s)	40.9	48.4	49.4		37.2	37.9		29.0	15.7	51.2	17.7	12.6
Level of Service	D	D	D		D	D		C	B	D	B	B
Approach Delay (s)		46.2			37.8			26.4			18.1	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.5	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	25	25	30	10	25	10	95	930	145	50	900	20
Future Volume (vph)	25	25	30	10	25	10	95	930	145	50	900	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.5		4.0	4.8	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.94		1.00	0.95		1.00	0.95		1.00	0.99	
Flpb, ped/bikes		0.96		0.87	1.00		1.00	1.00		1.00	1.00	
Frt		0.95		1.00	0.96		1.00	0.98		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1542		1523	1679		1752	3251		1752	3467	
Flt Permitted		0.92		0.68	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1438		1087	1679		1752	3251		1752	3467	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	26	26	32	11	26	11	100	979	153	53	947	21
RTOR Reduction (vph)	0	17	0	0	8	0	0	6	0	0	1	0
Lane Group Flow (vph)	0	67	0	11	29	0	100	1126	0	53	967	0
Confl. Peds. (#/hr)	117		124	124		117	74		50	50		74
Confl. Bikes (#/hr)									370			72
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		30.0		30.0	30.0		10.3	79.4		6.3	75.1	
Effective Green, g (s)		30.0		30.0	30.0		10.3	79.4		6.3	75.1	
Actuated g/C Ratio		0.23		0.23	0.23		0.08	0.62		0.05	0.59	
Clearance Time (s)		4.0		4.0	4.0		4.0	4.5		4.0	4.8	
Vehicle Extension (s)		1.0		1.0	1.0		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		336		254	392		140	2013		86	2030	
v/s Ratio Prot					0.02		c0.06	c0.35		0.03	0.28	
v/s Ratio Perm		c0.05		0.01								
v/c Ratio		0.20		0.04	0.07		0.71	0.56		0.62	0.48	
Uniform Delay, d1		39.5		38.0	38.3		57.5	14.2		59.8	15.3	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1		0.0	0.0		13.4	1.1		8.9	0.8	
Delay (s)		39.6		38.0	38.3		70.9	15.3		68.7	16.1	
Level of Service		D		D	D		E	B		E	B	
Approach Delay (s)		39.6			38.2			19.8			18.8	
Approach LOS		D			D			B			B	

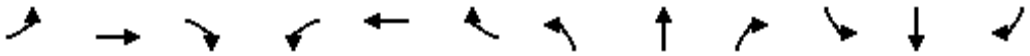
Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	128.2	Sum of lost time (s)	12.8
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	SBT	SER	SER2
Lane Configurations					
Traffic Volume (vph)	405	515	355	930	410
Future Volume (vph)	405	515	355	930	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	4.5	4.9
Lane Util. Factor	*0.52	*0.52	0.95	*0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.94
Flpb, ped/bikes	0.98	0.99	1.00	1.00	1.00
Frt	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	0.99	1.00	1.00	1.00
Satd. Flow (prot)	890	1868	3505	3343	1412
Flt Permitted	0.95	0.99	1.00	1.00	1.00
Satd. Flow (perm)	890	1868	3505	3343	1412
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	426	542	374	979	432
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	268	700	374	979	432
Confl. Peds. (#/hr)	26			25	25
Confl. Bikes (#/hr)					22
Heavy Vehicles (%)	3%	3%	3%	8%	8%
Bus Blockages (#/hr)	0	5	0	0	0
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		6	4	3	
Permitted Phases	6				3
Actuated Green, G (s)	27.3	27.3	9.6	19.1	19.1
Effective Green, g (s)	28.0	28.0	10.5	19.5	19.1
Actuated g/C Ratio	0.40	0.40	0.15	0.28	0.27
Clearance Time (s)	4.7	4.7	4.4	4.9	4.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	356	747	525	931	385
v/s Ratio Prot			c0.11	0.29	
v/s Ratio Perm	0.30	0.37			c0.31
v/c Ratio	0.75	0.94	0.71	1.05	1.12
Uniform Delay, d1	18.0	20.2	28.3	25.2	25.4
Progression Factor	0.33	0.37	1.00	1.00	1.00
Incremental Delay, d2	12.6	19.4	8.0	44.0	83.3
Delay (s)	18.5	26.8	36.3	69.2	108.7
Level of Service	B	C	D	E	F
Approach Delay (s)		24.5	36.3		
Approach LOS		C	D		

Intersection Summary			
HCM 2000 Control Delay	55.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

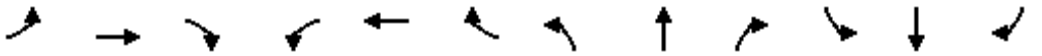
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	900	850	20	540	0	0	0	0
Future Volume (vph)	0	0	0	0	900	850	20	540	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.6		4.0				
Lane Util. Factor					*0.87	0.88		0.91				
Frpb, ped/bikes					1.00	0.98		1.00				
Flpb, ped/bikes					1.00	1.00		1.00				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		1.00				
Satd. Flow (prot)					3210	2691		5024				
Flt Permitted					1.00	1.00		1.00				
Satd. Flow (perm)					3210	2691		5024				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	947	895	21	568	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	67	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	947	895	0	522	0	0	0	0
Confl. Peds. (#/hr)			147	147			15		265	265		15
Confl. Bikes (#/hr)						30			421			
Turn Type					NA	custom	Perm	NA				
Protected Phases					2			4				
Permitted Phases						6	4					
Actuated Green, G (s)					45.4	36.6		15.8				
Effective Green, g (s)					46.0	36.6		16.0				
Actuated g/C Ratio					0.66	0.52		0.23				
Clearance Time (s)					4.6	4.6		4.2				
Vehicle Extension (s)					3.0	3.0		2.0				
Lane Grp Cap (vph)					2109	1407		1148				
v/s Ratio Prot					c0.30							
v/s Ratio Perm						c0.33		0.10				
v/c Ratio					0.45	0.64		0.45				
Uniform Delay, d1					5.8	11.9		23.2				
Progression Factor					0.89	1.05		1.05				
Incremental Delay, d2					0.6	2.0		0.1				
Delay (s)					5.8	14.6		24.5				
Level of Service					A	B		C				
Approach Delay (s)		0.0			10.1			24.5			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
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)	0	0	0	0	1035	20	680	150	0	0	0	35
Future Volume (vph)	0	0	0	0	1035	20	680	150	0	0	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		3.8	4.0				4.0
Lane Util. Factor					0.86		0.95	0.95				1.00
Frpb, ped/bikes					0.99		1.00	1.00				0.94
Flpb, ped/bikes					1.00		1.00	1.00				1.00
Frt					1.00		1.00	1.00				0.86
Flt Protected					1.00		0.95	0.97				1.00
Satd. Flow (prot)					6292		1665	1698				1495
Flt Permitted					1.00		0.95	0.97				1.00
Satd. Flow (perm)					6292		1665	1698				1495
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1089	21	716	158	0	0	0	37
RTOR Reduction (vph)	0	0	0	0	0	0	16	14	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1110	0	421	423	0	0	0	37
Confl. Peds. (#/hr)	101		39	39		101	42		66	66		42
Confl. Bikes (#/hr)						48						
Turn Type					NA		Prot	NA				Perm
Protected Phases					2		1 4	4				
Permitted Phases												4
Actuated Green, G (s)					31.9		29.5	29.5				21.1
Effective Green, g (s)					32.5		25.7	29.7				21.3
Actuated g/C Ratio					0.46		0.37	0.42				0.30
Clearance Time (s)					4.6			4.2				4.2
Vehicle Extension (s)					3.0			2.0				2.0
Lane Grp Cap (vph)					2921		611	720				454
v/s Ratio Prot					c0.18		c0.25	c0.25				
v/s Ratio Perm												0.02
v/c Ratio					0.38		0.69	0.59				0.08
Uniform Delay, d1					12.2		18.8	15.4				17.4
Progression Factor					0.65		0.56	0.55				1.00
Incremental Delay, d2					0.4		1.3	0.4				0.0
Delay (s)					8.3		11.8	9.0				17.4
Level of Service					A		B	A				B
Approach Delay (s)		0.0			8.3			10.4			17.4	
Approach LOS		A			A			B			B	

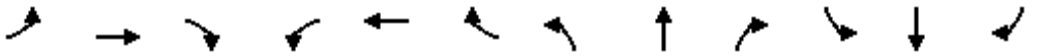
Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	20	965	55	20	200	0	0	15	70
Future Volume (vph)	0	0	0	20	965	55	20	200	0	0	15	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.5			4.5			4.5	
Lane Util. Factor					0.91			1.00			1.00	
Frpb, ped/bikes					0.99			1.00			0.94	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.89	
Flt Protected					1.00			1.00			1.00	
Satd. Flow (prot)					4949			1828			1547	
Flt Permitted					1.00			0.97			1.00	
Satd. Flow (perm)					4949			1782			1547	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	21	1016	58	21	211	0	0	16	74
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	0	0	0	1090	0	0	232	0	0	76	0
Confl. Peds. (#/hr)	39		33	33		39	55		33	33		55
Confl. Bikes (#/hr)						44						
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			4	
Permitted Phases				2			4					
Actuated Green, G (s)					44.7			16.3			16.3	
Effective Green, g (s)					44.7			16.3			16.3	
Actuated g/C Ratio					0.64			0.23			0.23	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					0.2			3.0			3.0	
Lane Grp Cap (vph)					3160			414			360	
v/s Ratio Prot											0.05	
v/s Ratio Perm					0.22			c0.13				
v/c Ratio					0.34			0.56			0.21	
Uniform Delay, d1					5.9			23.7			21.7	
Progression Factor					1.00			0.92			1.00	
Incremental Delay, d2					0.3			1.6			0.3	
Delay (s)					6.2			23.4			22.0	
Level of Service					A			C			C	
Approach Delay (s)		0.0			6.2			23.4			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

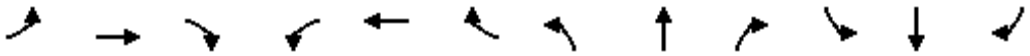


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	845	250	0	0	0	0	0	0	960	730	0
Future Volume (vph)	0	845	250	0	0	0	0	0	0	960	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0							3.6	4.0	
Lane Util. Factor		0.91	1.00							0.91	0.91	
Frpb, ped/bikes		1.00	0.72							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	0.98	
Satd. Flow (prot)		5036	1129							1595	3257	
Flt Permitted		1.00	1.00							0.95	0.98	
Satd. Flow (perm)		5036	1129							1595	3257	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	889	263	0	0	0	0	0	0	1011	768	0
RTOR Reduction (vph)	0	0	71	0	0	0	0	0	0	232	9	0
Lane Group Flow (vph)	0	889	192	0	0	0	0	0	0	375	1163	0
Confl. Peds. (#/hr)	67		44	44		67	140		16	16		140
Confl. Bikes (#/hr)			327									
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type		NA	Perm							Prot	NA	
Protected Phases		6								8	4	
Permitted Phases			6									
Actuated Green, G (s)		20.7	20.7							34.2	40.7	
Effective Green, g (s)		21.2	21.2							34.7	41.2	
Actuated g/C Ratio		0.30	0.30							0.50	0.59	
Clearance Time (s)		4.5	4.5							4.1	4.5	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	
Lane Grp Cap (vph)		1525	341							790	1916	
v/s Ratio Prot		c0.18								0.23	c0.30	
v/s Ratio Perm			0.17								0.06	
v/c Ratio		0.58	0.56							0.47	0.61	
Uniform Delay, d1		20.7	20.5							11.6	9.2	
Progression Factor		1.00	1.00							0.70	0.74	
Incremental Delay, d2		1.6	6.6							0.8	0.5	
Delay (s)		22.3	27.1							8.9	7.3	
Level of Service		C	C							A	A	
Approach Delay (s)		23.4			0.0			0.0			7.9	
Approach LOS		C			A			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	11.1	
Intersection Capacity Utilization	59.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

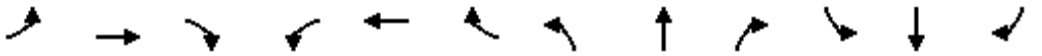
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	460	1345	0	0	0	0	0	100	15	0	0	0
Future Volume (vph)	460	1345	0	0	0	0	0	100	15	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.55			
Flpb, ped/bikes		0.97						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4801						3505	864			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4801						3505	864			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	484	1416	0	0	0	0	0	105	16	0	0	0
RTOR Reduction (vph)	0	51	0	0	0	0	0	0	13	0	0	0
Lane Group Flow (vph)	0	1849	0	0	0	0	0	105	3	0	0	0
Confl. Peds. (#/hr)	115		120	120		115	95		120	120		95
Confl. Bikes (#/hr)			68						304			
Bus Blockages (#/hr)	0	5	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA						NA	Perm			
Protected Phases		2						4				
Permitted Phases	2								4			
Actuated Green, G (s)		49.5						11.8	11.8			
Effective Green, g (s)		50.0						12.0	12.0			
Actuated g/C Ratio		0.71						0.17	0.17			
Clearance Time (s)		4.5						4.2	4.2			
Vehicle Extension (s)		0.2						0.5	0.5			
Lane Grp Cap (vph)		3429						600	148			
v/s Ratio Prot								c0.03				
v/s Ratio Perm		0.39							0.00			
v/c Ratio		0.54						0.17	0.02			
Uniform Delay, d1		4.6						24.8	24.1			
Progression Factor		0.56						1.00	1.00			
Incremental Delay, d2		0.5						0.1	0.0			
Delay (s)		3.1						24.8	24.1			
Level of Service		A						C	C			
Approach Delay (s)		3.1			0.0			24.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	4.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
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)	35	1325	0	0	0	0	0	795	580	0	0	0
Future Volume (vph)	35	1325	0	0	0	0	0	795	580	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.96			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		5006						3252	1401			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		5006						3252	1401			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	1395	0	0	0	0	0	837	611	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	333	0	0	0
Lane Group Flow (vph)	0	1420	0	0	0	0	0	837	279	0	0	0
Confl. Peds. (#/hr)	149		215	215		149	35		22	22		35
Confl. Bikes (#/hr)			95									
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	11%	11%	11%	3%	3%	3%
Turn Type	Perm	NA						NA	Perm			
Protected Phases		6						8				
Permitted Phases	6								8			
Actuated Green, G (s)		40.5						20.1	20.1			
Effective Green, g (s)		41.0						21.0	21.0			
Actuated g/C Ratio		0.59						0.30	0.30			
Clearance Time (s)		4.5						4.9	4.9			
Vehicle Extension (s)		3.5						3.9	3.9			
Lane Grp Cap (vph)		2932						975	420			
v/s Ratio Prot								c0.26				
v/s Ratio Perm		0.28							0.20			
v/c Ratio		0.48						0.86	0.66			
Uniform Delay, d1		8.4						23.1	21.4			
Progression Factor		0.36						1.00	1.00			
Incremental Delay, d2		0.5						9.7	8.0			
Delay (s)		3.5						32.8	29.4			
Level of Service		A						C	C			
Approach Delay (s)		3.5			0.0			31.4			0.0	
Approach LOS		A			A			C			A	

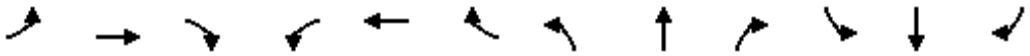
Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1500	205	0	0	0	0	20	15	10	20	0
Future Volume (vph)	200	1500	205	0	0	0	0	20	15	10	20	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5			4.5	
Lane Util. Factor		0.86						1.00			1.00	
Frpb, ped/bikes		0.96						0.99			1.00	
Flpb, ped/bikes		0.99						1.00			1.00	
Frt		0.98						0.94			1.00	
Flt Protected		0.99						1.00			0.98	
Satd. Flow (prot)		5917						1727			1812	
Flt Permitted		0.99						1.00			0.93	
Satd. Flow (perm)		5917						1727			1707	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	211	1579	216	0	0	0	0	21	16	11	21	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1988	0	0	0	0	0	35	0	0	32	0
Confl. Peds. (#/hr)	59		153	153		59	62		2	2		62
Confl. Bikes (#/hr)			101									
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		45.8						15.2			15.2	
Effective Green, g (s)		45.8						15.2			15.2	
Actuated g/C Ratio		0.65						0.22			0.22	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		0.5						0.5			0.5	
Lane Grp Cap (vph)		3871						375			370	
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.34									0.02	
v/c Ratio		0.51						0.09			0.09	
Uniform Delay, d1		6.3						21.9			21.9	
Progression Factor		1.71						1.00			1.17	
Incremental Delay, d2		0.4						0.0			0.0	
Delay (s)		11.2						21.9			25.7	
Level of Service		B						C			C	
Approach Delay (s)		11.2			0.0			21.9			25.7	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
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 (veh/h)	5	0	0	0	0	95	5	620	25	0	0	0
Future Volume (Veh/h)	5	0	0	0	0	95	5	620	25	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	0	0	0	0	100	5	653	26	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								498				
pX, platoon unblocked	0.88	0.88		0.88	0.88	0.88				0.88		
vC, conflicting volume	776	689	0	676	676	666	0			679		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	682	583	0	569	569	557	0			572		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	79	100			100		
cM capacity (veh/h)	252	373	1082	381	380	467	1617			881		

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	5	100	684
Volume Left	5	0	5
Volume Right	0	100	26
cSH	252	467	1617
Volume to Capacity	0.02	0.21	0.00
Queue Length 95th (ft)	2	20	0
Control Delay (s)	19.6	14.8	0.1
Lane LOS	C	B	A
Approach Delay (s)	19.6	14.8	0.1
Approach LOS	C	B	

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	47.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	EBR2	NBT	SET	SER
Lane Configurations						
Traffic Volume (vph)	105	240	20	10	735	240
Future Volume (vph)	105	240	20	10	735	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.6	5.6
Lane Util. Factor	1.00	0.88		1.00	0.95	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	1752	2760		1845	3505	1568
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	1752	2760		1845	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	111	253	21	11	774	253
RTOR Reduction (vph)	0	83	0	0	0	0
Lane Group Flow (vph)	111	191	0	11	774	253
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Perm	Prot		NA	NA	custom
Protected Phases		4				2
Permitted Phases	4			3	2	
Actuated Green, G (s)	10.2	10.2		0.9	34.1	34.1
Effective Green, g (s)	10.2	10.2		0.9	34.1	34.1
Actuated g/C Ratio	0.17	0.17		0.01	0.56	0.56
Clearance Time (s)	5.0	5.0		5.0	5.6	5.6
Vehicle Extension (s)	0.5	0.5		1.5	0.5	0.5
Lane Grp Cap (vph)	293	463		27	1965	879
v/s Ratio Prot		c0.07				0.16
v/s Ratio Perm	0.06			c0.01	c0.22	
v/c Ratio	0.38	0.41		0.41	0.39	0.29
Uniform Delay, d1	22.5	22.6		29.7	7.5	7.0
Progression Factor	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2		3.6	0.6	0.8
Delay (s)	22.8	22.8		33.3	8.1	7.8
Level of Service	C	C		C	A	A
Approach Delay (s)	22.8			33.3	8.0	
Approach LOS	C			C	A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	15.6
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	100	65	80	0	30	250	0	715	245	5	1135	120
Future Volume (vph)	100	65	80	0	30	250	0	715	245	5	1135	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97		1.00	0.96		1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1845	1514		1845	1501		3505	1568	1752	3505	1568
Flt Permitted	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	1845	1514		1845	1501		3505	1568	1752	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	68	84	0	32	263	0	753	258	5	1195	126
RTOR Reduction (vph)	0	0	64	0	0	135	0	0	0	0	0	0
Lane Group Flow (vph)	105	68	20	0	32	128	0	753	258	5	1195	126
Confl. Peds. (#/hr)	12		18	18		12	50		30	30		50
Confl. Bikes (#/hr)									364			84
Turn Type	Prot	NA	Perm	Prot	NA	Perm		NA	custom	Prot	NA	custom
Protected Phases	7	4		3	8			6!	16 7!	5 15!	2	16
Permitted Phases			4			8						
Actuated Green, G (s)	12.6	32.7	32.7		15.6	15.6		92.5	24.0	1.4	98.3	6.9
Effective Green, g (s)	13.1	33.2	33.2		16.1	16.1		93.0	24.5	1.9	98.8	7.4
Actuated g/C Ratio	0.09	0.24	0.24		0.12	0.12		0.66	0.18	0.01	0.71	0.05
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5		4.5			4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0		1.0	1.0		0.5			0.5	0.5
Lane Grp Cap (vph)	163	437	359		212	172		2328	274	23	2473	82
v/s Ratio Prot	0.06	0.04			0.02			0.21	c0.16	0.00	c0.34	c0.08
v/s Ratio Perm			0.01			c0.09						
v/c Ratio	0.64	0.16	0.06		0.15	0.75		0.32	0.94	0.22	0.48	1.54
Uniform Delay, d1	61.2	42.3	41.3		55.8	60.0		10.0	57.0	68.3	9.2	66.3
Progression Factor	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.09	0.52	0.86
Incremental Delay, d2	6.4	0.1	0.0		0.1	14.3		0.4	38.4	1.6	0.6	289.1
Delay (s)	67.6	42.4	41.3		55.9	74.3		10.4	95.4	75.9	5.4	346.1
Level of Service	E	D	D		E	E		B	F	E	A	F
Approach Delay (s)		52.3			72.3			32.1			38.0	
Approach LOS		D			E			C			D	

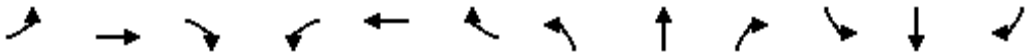
Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	25	15	15	15	10	10	755	30	5	1230	40
Future Volume (vph)	10	25	15	15	15	10	10	755	30	5	1230	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.89		1.00	0.87		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		0.93		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.96		1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1437		1752	1514		1752	3455		1752	3477	
Flt Permitted		0.92		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1341		1752	1514		1752	3455		1752	3477	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	26	16	16	16	11	11	795	32	5	1295	42
RTOR Reduction (vph)	0	14	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	39	0	16	17	0	11	826	0	5	1336	0
Confl. Peds. (#/hr)	117		124	124		117	74		50	50		74
Confl. Bikes (#/hr)									370			72
Turn Type	Perm	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4											
Actuated Green, G (s)		7.2		3.3	15.0		2.9	108.4		3.1	108.6	
Effective Green, g (s)		7.7		3.8	15.5		3.4	108.9		3.6	109.1	
Actuated g/C Ratio		0.06		0.03	0.11		0.02	0.78		0.03	0.78	
Clearance Time (s)		4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		1.0		3.0	3.0		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		73		47	167		42	2687		45	2709	
v/s Ratio Prot				c0.01	0.01		c0.01	0.24		0.00	c0.38	
v/s Ratio Perm		c0.03										
v/c Ratio		0.53		0.34	0.10		0.26	0.31		0.11	0.49	
Uniform Delay, d1		64.4		66.9	56.0		67.1	4.5		66.6	5.5	
Progression Factor		1.00		1.00	1.00		1.40	1.13		1.02	1.06	
Incremental Delay, d2		3.7		4.3	0.3		1.2	0.3		0.4	0.6	
Delay (s)		68.1		71.2	56.3		94.9	5.4		68.1	6.5	
Level of Service		E		E	E		F	A		E	A	
Approach Delay (s)		68.1			61.8			6.6			6.7	
Approach LOS		E			E			A			A	

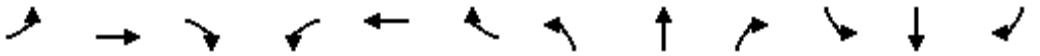
Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	690	1150	0	0	0	0	0	300	0
Future Volume (vph)	0	0	0	690	1150	0	0	0	0	0	300	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.97	0.95						1.00	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				3400	3470						1845	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				3400	3470						1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	726	1211	0	0	0	0	0	316	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	726	1211	0	0	0	0	0	316	0
Confl. Peds. (#/hr)				26								
Confl. Bikes (#/hr)						43						
Bus Blockages (#/hr)	0	0	0	0	5	0	0	0	0	0	0	0
Turn Type				Prot	NA						NA	
Protected Phases				6	2						4	
Permitted Phases												
Actuated Green, G (s)				41.5	45.9						15.1	
Effective Green, g (s)				42.0	46.4						15.6	
Actuated g/C Ratio				0.60	0.66						0.22	
Clearance Time (s)				4.5	4.5						4.5	
Vehicle Extension (s)				3.0	3.0						3.0	
Lane Grp Cap (vph)				2040	2300						411	
v/s Ratio Prot				0.21	c0.35						c0.17	
v/s Ratio Perm												
v/c Ratio				0.36	0.53						0.77	
Uniform Delay, d1				7.1	6.1						25.5	
Progression Factor				0.74	0.70						0.92	
Incremental Delay, d2				0.4	0.7						8.3	
Delay (s)				5.7	5.0						31.7	
Level of Service				A	A						C	
Approach Delay (s)		0.0			5.3			0.0			31.7	
Approach LOS		A			A			A			C	

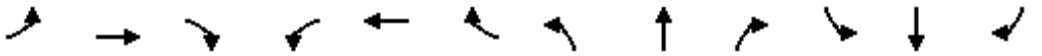
Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1535	920	305	295	0	0	0	0
Future Volume (vph)	0	0	0	0	1535	920	305	295	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	0.88		0.91				
Frpb, ped/bikes					1.00	0.95		1.00				
Flpb, ped/bikes					1.00	1.00		0.99				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.98				
Satd. Flow (prot)					5036	2611		3245				
Flt Permitted					1.00	1.00		0.98				
Satd. Flow (perm)					5036	2611		3245				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1616	968	321	311	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1616	968	0	632	0	0	0	0
Confl. Peds. (#/hr)			147	147			15		265	265		15
Confl. Bikes (#/hr)						30			421			
Turn Type					NA	custom	Perm	NA				
Protected Phases					2			4				
Permitted Phases						6	4					
Actuated Green, G (s)					43.7	22.5		17.3				
Effective Green, g (s)					44.2	23.0		17.8				
Actuated g/C Ratio					0.63	0.33		0.25				
Clearance Time (s)					4.5	4.5		4.5				
Vehicle Extension (s)					3.0	3.0		2.0				
Lane Grp Cap (vph)					3179	857		825				
v/s Ratio Prot					c0.32							
v/s Ratio Perm						c0.37		0.19				
v/c Ratio					0.51	1.13		0.77				
Uniform Delay, d1					7.0	23.5		24.2				
Progression Factor					0.11	0.57		0.96				
Incremental Delay, d2					0.2	63.1		3.5				
Delay (s)					0.9	76.5		26.8				
Level of Service					A	E		C				
Approach Delay (s)		0.0			29.2			26.8			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	28.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

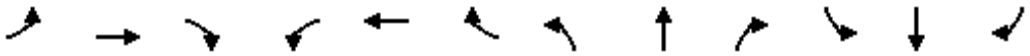
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1565	10	865	55	0	0	0	30
Future Volume (vph)	0	0	0	0	1565	10	865	55	0	0	0	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0				4.0
Lane Util. Factor					0.86		0.97	1.00				1.00
Frpb, ped/bikes					1.00		1.00	1.00				0.96
Flpb, ped/bikes					1.00		1.00	1.00				1.00
Frt					1.00		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					6330		3400	1845				1539
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					6330		3400	1845				1539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1647	11	911	58	0	0	0	32
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1658	0	911	58	0	0	0	32
Confl. Peds. (#/hr)	101		39	39		101	42		66	66		42
Confl. Bikes (#/hr)						48						
Turn Type					NA		Prot	NA				Perm
Protected Phases					2		3	8				
Permitted Phases												8
Actuated Green, G (s)					21.5		14.5	36.5				36.5
Effective Green, g (s)					22.0		15.0	37.0				37.0
Actuated g/C Ratio					0.31		0.21	0.53				0.53
Clearance Time (s)					4.5		4.5	4.5				4.5
Vehicle Extension (s)					3.0		0.2	2.0				2.0
Lane Grp Cap (vph)					1989		728	975				813
v/s Ratio Prot					c0.26		c0.27	c0.03				
v/s Ratio Perm												0.02
v/c Ratio					0.83		1.25	0.06				0.04
Uniform Delay, d1					22.3		27.5	8.0				7.9
Progression Factor					1.30		1.67	2.30				1.00
Incremental Delay, d2					3.9		123.0	0.0				0.0
Delay (s)					33.0		168.8	18.4				8.0
Level of Service					C		F	B				A
Approach Delay (s)		0.0			33.0			159.8			8.0	
Approach LOS		A			C			F			A	

Intersection Summary			
HCM 2000 Control Delay	78.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

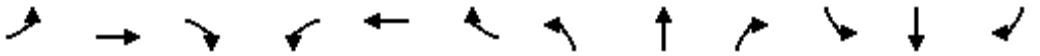
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	15	1390	55	35	135	0	0	25	150
Future Volume (vph)	0	0	0	15	1390	55	35	135	0	0	25	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0			4.0	
Lane Util. Factor					0.91			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.94	
Flpb, ped/bikes					1.00			0.99			1.00	
Frt					0.99			1.00			0.88	
Flt Protected					1.00			0.99			1.00	
Satd. Flow (prot)					4976			1810			1535	
Flt Permitted					1.00			0.91			1.00	
Satd. Flow (perm)					4976			1658			1535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	16	1463	58	37	142	0	0	26	158
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	0	0	0	1532	0	0	179	0	0	160	0
Confl. Peds. (#/hr)	39		33	33		39	55		33	33		55
Confl. Bikes (#/hr)						44						
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			4	
Permitted Phases				2			4					
Actuated Green, G (s)					45.3			15.7			15.7	
Effective Green, g (s)					45.8			16.2			16.2	
Actuated g/C Ratio					0.65			0.23			0.23	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					0.2			3.0			3.0	
Lane Grp Cap (vph)					3255			383			355	
v/s Ratio Prot											0.10	
v/s Ratio Perm					0.31			c0.11				
v/c Ratio					0.47			0.47			0.45	
Uniform Delay, d1					6.0			23.2			23.1	
Progression Factor					1.00			1.05			1.00	
Incremental Delay, d2					0.5			0.8			0.9	
Delay (s)					6.5			25.2			24.0	
Level of Service					A			C			C	
Approach Delay (s)		0.0			6.5			25.2			24.0	
Approach LOS		A			A			C			C	

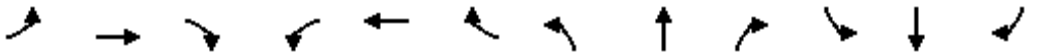
Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



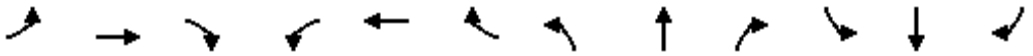
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱							↰	↑↑	
Traffic Volume (vph)	0	580	260	0	0	0	0	0	0	25	965	0
Future Volume (vph)	0	580	260	0	0	0	0	0	0	25	965	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.91	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	1.00							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		5036	1568							1752	3470	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		5036	1568							1752	3470	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	611	274	0	0	0	0	0	0	26	1016	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	611	274	0	0	0	0	0	0	26	1016	0
Confl. Peds. (#/hr)	67		44	44		67	140		16	16		140
Confl. Bikes (#/hr)			327									
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type		NA	custom							Prot	NA	
Protected Phases		6 9	16							8	4	
Permitted Phases												
Actuated Green, G (s)		32.4	17.3							9.6	28.6	
Effective Green, g (s)		32.9	17.8							10.1	29.1	
Actuated g/C Ratio		0.47	0.25							0.14	0.42	
Clearance Time (s)			4.5							4.5	4.5	
Vehicle Extension (s)			3.0							3.0	3.0	
Lane Grp Cap (vph)		2366	398							252	1442	
v/s Ratio Prot		c0.12	c0.17							0.01	c0.29	
v/s Ratio Perm												
v/c Ratio		0.26	0.69							0.10	0.70	
Uniform Delay, d1		11.2	23.6							26.0	16.9	
Progression Factor		1.07	1.36							1.19	1.30	
Incremental Delay, d2		0.1	4.8							0.2	1.4	
Delay (s)		12.0	37.0							31.1	23.4	
Level of Service		B	D							C	C	
Approach Delay (s)		19.8			0.0			0.0			23.6	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



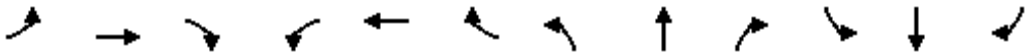
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	415	0	0	0	0	0	410	475	0	0	0
Future Volume (vph)	190	415	0	0	0	0	0	410	475	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						1.00	0.88			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		0.93						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4576						1845	2760			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4576						1845	2760			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	200	437	0	0	0	0	0	432	500	0	0	0
RTOR Reduction (vph)	0	143	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	494	0	0	0	0	0	432	500	0	0	0
Confl. Peds. (#/hr)	115		120	120		115	95		120	120		95
Confl. Bikes (#/hr)			68						304			
Bus Blockages (#/hr)	0	5	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						4 8	8			
Permitted Phases	2											
Actuated Green, G (s)		10.2						35.1	16.3			
Effective Green, g (s)		10.7						35.6	16.8			
Actuated g/C Ratio		0.15						0.51	0.24			
Clearance Time (s)		4.5							4.5			
Vehicle Extension (s)		0.2							0.5			
Lane Grp Cap (vph)		699						938	662			
v/s Ratio Prot								c0.23	c0.18			
v/s Ratio Perm		0.11										
v/c Ratio		0.71						0.46	0.76			
Uniform Delay, d1		28.2						11.0	24.7			
Progression Factor		1.27						1.00	1.00			
Incremental Delay, d2		5.8						0.1	4.4			
Delay (s)		41.4						11.2	29.1			
Level of Service		D						B	C			
Approach Delay (s)		41.4			0.0			20.8			0.0	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
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)	15	875	0	0	0	0	0	905	925	0	0	0
Future Volume (vph)	15	875	0	0	0	0	0	905	925	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	0.88			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		5017						3252	2561			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		5017						3252	2561			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	16	921	0	0	0	0	0	953	974	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	937	0	0	0	0	0	953	974	0	0	0
Confl. Peds. (#/hr)	149		215	215		149	35		22	22		35
Confl. Bikes (#/hr)			95									
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	11%	11%	11%	3%	3%	3%
Turn Type	Perm	NA						NA	Prot			
Protected Phases		6						8	8			
Permitted Phases	6											
Actuated Green, G (s)		18.1						39.9	39.9			
Effective Green, g (s)		18.6						40.4	40.4			
Actuated g/C Ratio		0.27						0.58	0.58			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.5						3.9	3.9			
Lane Grp Cap (vph)		1333						1876	1478			
v/s Ratio Prot								0.29	c0.38			
v/s Ratio Perm		0.19										
v/c Ratio		0.70						0.51	0.66			
Uniform Delay, d1		23.2						8.9	10.1			
Progression Factor		0.75						1.00	1.00			
Incremental Delay, d2		2.6						1.0	2.3			
Delay (s)		20.0						9.8	12.4			
Level of Service		C						A	B			
Approach Delay (s)		20.0			0.0			11.1			0.0	
Approach LOS		C			A			B			A	

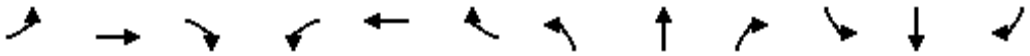
Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1660	10	0	0	0	0	40	10	25	10	0
Future Volume (vph)	130	1660	10	0	0	0	0	40	10	25	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		1.00						0.97			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		4995						1787			1776	
Flt Permitted		1.00						1.00			0.77	
Satd. Flow (perm)		4995						1787			1423	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	1747	11	0	0	0	0	42	11	26	11	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	1895	0	0	0	0	0	45	0	0	37	0
Confl. Peds. (#/hr)	59		153	153		59	62		2	2		62
Confl. Bikes (#/hr)			101									
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		53.0						8.0			8.0	
Effective Green, g (s)		53.5						8.5			8.5	
Actuated g/C Ratio		0.76						0.12			0.12	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		0.5						0.5			0.5	
Lane Grp Cap (vph)		3817						216			172	
v/s Ratio Prot								0.03				
v/s Ratio Perm		0.38									c0.03	
v/c Ratio		0.50						0.21			0.22	
Uniform Delay, d1		3.1						27.7			27.7	
Progression Factor		0.66						1.00			0.91	
Incremental Delay, d2		0.3						0.2			0.2	
Delay (s)		2.4						27.9			25.5	
Level of Service		A						C			C	
Approach Delay (s)		2.4			0.0			27.9			25.5	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

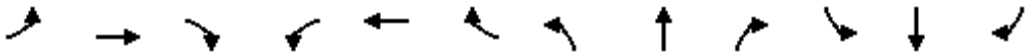
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	0	0	65	125	0	500	10	0	0	0
Future Volume (vph)	10	0	0	0	65	125	0	500	10	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		1.00			0.91			1.00				
Flt Protected		0.95			1.00			1.00				
Satd. Flow (prot)		1752			1680			1840				
Flt Permitted		0.50			1.00			1.00				
Satd. Flow (perm)		922			1680			1840				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	0	0	0	68	132	0	526	11	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	11	0	0	200	0	0	537	0	0	0	0
Turn Type	Perm	NA			NA			NA				
Protected Phases		2			2			4				
Permitted Phases	2						4					
Actuated Green, G (s)		13.7			13.7			32.3				
Effective Green, g (s)		14.2			14.2			32.8				
Actuated g/C Ratio		0.20			0.20			0.47				
Clearance Time (s)		4.5			4.5			4.5				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		187			340			862				
v/s Ratio Prot					c0.12			c0.29				
v/s Ratio Perm		0.01										
v/c Ratio		0.06			0.59			0.62				
Uniform Delay, d1		22.5			25.3			14.0				
Progression Factor		0.02			1.00			0.85				
Incremental Delay, d2		0.1			2.6			0.3				
Delay (s)		0.6			27.8			12.1				
Level of Service		A			C			B				
Approach Delay (s)		0.6			27.8			12.1			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
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)	0	10	0	5	60	0	0	0	0	0	300	0
Future Volume (vph)	0	10	0	5	60	0	0	0	0	0	300	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0						4.0	
Lane Util. Factor		1.00			1.00						1.00	
Frt		1.00			1.00						1.00	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		1845			1838						1845	
Flt Permitted		1.00			0.97						1.00	
Satd. Flow (perm)		1845			1798						1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	11	0	5	63	0	0	0	0	0	316	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	11	0	0	68	0	0	0	0	0	316	0
Turn Type		NA		Perm	NA						NA	
Protected Phases		2			2						4	
Permitted Phases				2						4		
Actuated Green, G (s)		5.6			5.6						55.4	
Effective Green, g (s)		6.1			6.1						55.9	
Actuated g/C Ratio		0.09			0.09						0.80	
Clearance Time (s)		4.5			4.5						4.5	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		160			156						1473	
v/s Ratio Prot		0.01									c0.17	
v/s Ratio Perm					c0.04							
v/c Ratio		0.07			0.44						0.21	
Uniform Delay, d1		29.3			30.3						1.7	
Progression Factor		1.00			1.95						1.00	
Incremental Delay, d2		0.2			1.9						0.3	
Delay (s)		29.5			61.1						2.0	
Level of Service		C			E						A	
Approach Delay (s)		29.5			61.1			0.0			2.0	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	EBR2	WBR2	NBT	SET	SER
Lane Configurations							
Traffic Volume (vph)	0	80	20	885	10	995	230
Future Volume (vph)	0	80	20	885	10	995	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.88		0.88	1.00	0.95	1.00
Frt		0.85		0.85	1.00	1.00	0.85
Flt Protected		1.00		1.00	1.00	1.00	1.00
Satd. Flow (prot)		2760		2760	1845	3505	1568
Flt Permitted		1.00		1.00	1.00	1.00	1.00
Satd. Flow (perm)		2760		2760	1845	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	84	21	932	11	1047	242
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	105	0	932	11	1047	242
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot		Prot	NA	NA	custom
Protected Phases	4	1		6			2
Permitted Phases					3	2	
Actuated Green, G (s)		11.5		51.0	5.1	55.0	55.0
Effective Green, g (s)		12.0		51.5	5.6	55.5	55.5
Actuated g/C Ratio		0.13		0.54	0.06	0.58	0.58
Clearance Time (s)		4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)		0.5		1.5	1.5	0.5	0.5
Lane Grp Cap (vph)		348		1494	108	2045	915
v/s Ratio Prot		0.04		c0.34			0.15
v/s Ratio Perm					c0.01	c0.30	
v/c Ratio		0.30		0.62	0.10	0.51	0.26
Uniform Delay, d1		37.7		15.1	42.4	11.8	9.7
Progression Factor		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2		2.0	0.2	0.9	0.7
Delay (s)		37.9		17.1	42.5	12.7	10.5
Level of Service		D		B	D	B	B
Approach Delay (s)					42.5	12.3	
Approach LOS					D	B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	95.1	Sum of lost time (s)	17.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	135	130	75	0	25	230	0	1150	280	20	860	100
Future Volume (vph)	135	130	75	0	25	230	0	1150	280	20	860	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00		0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96		1.00	0.95		1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1845	1513		1845	1495		3505	1568	1752	3505	1568
Flt Permitted	0.95	1.00	1.00		1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	1845	1513		1845	1495		3505	1568	1752	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	142	137	79	0	26	242	0	1211	295	21	905	105
RTOR Reduction (vph)	0	0	61	0	0	136	0	0	0	0	0	0
Lane Group Flow (vph)	142	137	18	0	26	106	0	1211	295	21	905	105
Confl. Peds. (#/hr)	12		18	18		12	50		30	30		50
Confl. Bikes (#/hr)									364			84
Turn Type	Prot	NA	Perm	Prot	NA	Perm		NA	custom	Prot	NA	custom
Protected Phases	7	4		3	8			6!	16 7!	5 15!	2	16
Permitted Phases			4			8						
Actuated Green, G (s)	13.2	31.5	31.5		13.8	13.8		91.1	40.2	4.9	99.5	22.5
Effective Green, g (s)	13.7	32.0	32.0		14.3	14.3		91.6	40.7	5.4	100.0	23.0
Actuated g/C Ratio	0.10	0.23	0.23		0.10	0.10		0.65	0.29	0.04	0.71	0.16
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5		4.5			4.5	4.5
Vehicle Extension (s)	1.0	1.0	1.0		1.0	1.0		0.5			0.5	0.5
Lane Grp Cap (vph)	171	421	345		188	152		2293	455	67	2503	257
v/s Ratio Prot	c0.08	0.07			0.01			c0.35	c0.19	0.01	c0.26	0.07
v/s Ratio Perm			0.01			c0.07						
v/c Ratio	0.83	0.33	0.05		0.14	0.69		0.53	0.65	0.31	0.36	0.41
Uniform Delay, d1	62.0	45.0	42.2		57.2	60.7		12.8	43.4	65.5	7.7	52.4
Progression Factor	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.10	1.63	1.22
Incremental Delay, d2	26.5	0.2	0.0		0.1	10.5		0.9	2.4	0.9	0.4	0.4
Delay (s)	88.5	45.2	42.2		57.4	71.3		13.7	45.8	72.7	12.9	64.5
Level of Service	F	D	D		E	E		B	D	E	B	E
Approach Delay (s)		61.7			69.9			20.0			19.4	
Approach LOS		E			E			B			B	

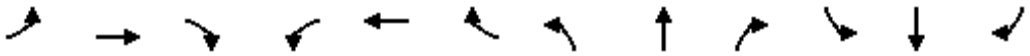
Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	25	15	50	0	20	15	10	1170	40	15	930	80
Future Volume (vph)	25	15	50	0	20	15	10	1170	40	15	930	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.81			0.86		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.91			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1247			1475		1752	3463		1752	3437	
Flt Permitted		0.90			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1136			1475		1752	3463		1752	3437	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	26	16	53	0	21	16	11	1232	42	16	979	84
RTOR Reduction (vph)	0	39	0	0	15	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	56	0	0	22	0	11	1273	0	16	1061	0
Confl. Peds. (#/hr)	117		124	124		117	74		50	50		74
Confl. Bikes (#/hr)									370			72
Turn Type	Perm	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4											
Actuated Green, G (s)		10.5			10.5		1.1	112.3		3.7	114.9	
Effective Green, g (s)		11.0			11.0		1.6	112.8		4.2	115.4	
Actuated g/C Ratio		0.08			0.08		0.01	0.81		0.03	0.82	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		1.0			3.0		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		89			115		20	2790		52	2833	
v/s Ratio Prot					0.02		0.01	c0.37		c0.01	0.31	
v/s Ratio Perm		c0.05										
v/c Ratio		0.63			0.19		0.55	0.46		0.31	0.37	
Uniform Delay, d1		62.5			60.3		68.8	4.2		66.5	3.1	
Progression Factor		1.00			1.00		0.76	1.18		1.09	0.86	
Incremental Delay, d2		10.3			0.8		15.3	0.5		1.2	0.4	
Delay (s)		72.8			61.2		67.6	5.4		73.3	3.0	
Level of Service		E			E		E	A		E	A	
Approach Delay (s)		72.8			61.2			6.0			4.1	
Approach LOS		E			E			A			A	

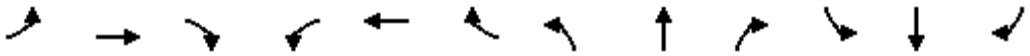
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	890	0	0	0	0	0	220	0
Future Volume (vph)	0	0	0	440	890	0	0	0	0	0	220	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.97	0.95						1.00	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				3400	3470						1845	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				3400	3470						1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	463	937	0	0	0	0	0	232	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	463	937	0	0	0	0	0	232	0
Confl. Peds. (#/hr)				26								
Confl. Bikes (#/hr)						43						
Bus Blockages (#/hr)	0	0	0	0	5	0	0	0	0	0	0	0
Turn Type				Prot	NA						NA	
Protected Phases				6	2						4	
Permitted Phases												
Actuated Green, G (s)				38.5	41.5						19.5	
Effective Green, g (s)				39.0	42.0						20.0	
Actuated g/C Ratio				0.56	0.60						0.29	
Clearance Time (s)				4.5	4.5						4.5	
Vehicle Extension (s)				3.0	3.0						3.0	
Lane Grp Cap (vph)				1894	2082						527	
v/s Ratio Prot				0.14	c0.27						c0.13	
v/s Ratio Perm												
v/c Ratio				0.24	0.45						0.44	
Uniform Delay, d1				7.9	7.7						20.4	
Progression Factor				2.02	2.09						0.92	
Incremental Delay, d2				0.3	0.6						2.6	
Delay (s)				16.3	16.7						21.4	
Level of Service				B	B						C	
Approach Delay (s)		0.0			16.5			0.0			21.4	
Approach LOS		A			B			A			C	

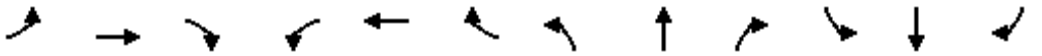
Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	945	860	385	525	0	0	0	0
Future Volume (vph)	0	0	0	0	945	860	385	525	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	0.88		0.91				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.99				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.98				
Satd. Flow (prot)					5036	2602		3268				
Flt Permitted					1.00	1.00		0.98				
Satd. Flow (perm)					5036	2602		3268				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	995	905	405	553	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	995	905	0	958	0	0	0	0
Confl. Peds. (#/hr)			147	147			15		265	265		15
Confl. Bikes (#/hr)						30			421			
Turn Type					NA	custom	Perm	NA				
Protected Phases					2			4				
Permitted Phases						6	4					
Actuated Green, G (s)					38.5	20.5		22.5				
Effective Green, g (s)					39.0	21.0		23.0				
Actuated g/C Ratio					0.56	0.30		0.33				
Clearance Time (s)					4.5	4.5		4.5				
Vehicle Extension (s)					3.0	3.0		2.0				
Lane Grp Cap (vph)					2805	780		1073				
v/s Ratio Prot					c0.20							
v/s Ratio Perm						c0.35		0.29				
v/c Ratio					0.35	1.16		0.89				
Uniform Delay, d1					8.6	24.5		22.3				
Progression Factor					0.67	1.01		0.77				
Incremental Delay, d2					0.2	80.8		7.3				
Delay (s)					6.0	105.6		24.5				
Level of Service					A	F		C				
Approach Delay (s)		0.0			53.4			24.5			0.0	
Approach LOS		A			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	43.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

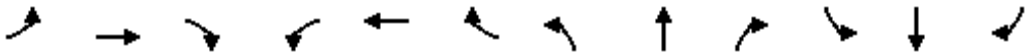
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	920	15	860	160	0	0	0	25
Future Volume (vph)	0	0	0	0	920	15	860	160	0	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0				4.0
Lane Util. Factor					0.86		0.97	1.00				1.00
Frpb, ped/bikes					1.00		1.00	1.00				0.97
Flpb, ped/bikes					1.00		1.00	1.00				1.00
Frt					1.00		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					6300		3400	1845				1544
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					6300		3400	1845				1544
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	968	16	905	168	0	0	0	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	984	0	905	168	0	0	0	26
Confl. Peds. (#/hr)	101		39	39		101	42		66	66		42
Confl. Bikes (#/hr)						48						
Turn Type					NA		Prot	NA				Perm
Protected Phases					2		3	8				
Permitted Phases												8
Actuated Green, G (s)					15.5		19.5	42.5				42.5
Effective Green, g (s)					16.0		20.0	43.0				43.0
Actuated g/C Ratio					0.23		0.29	0.61				0.61
Clearance Time (s)					4.5		4.5	4.5				4.5
Vehicle Extension (s)					3.0		0.2	2.0				2.0
Lane Grp Cap (vph)					1440		971	1133				948
v/s Ratio Prot					c0.16		c0.27	c0.09				
v/s Ratio Perm												0.02
v/c Ratio					0.68		0.93	0.15				0.03
Uniform Delay, d1					24.7		24.3	5.7				5.3
Progression Factor					0.83		0.76	0.12				1.00
Incremental Delay, d2					2.6		12.8	0.0				0.0
Delay (s)					23.0		31.3	0.7				5.3
Level of Service					C		C	A				A
Approach Delay (s)		0.0			23.0			26.5			5.3	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

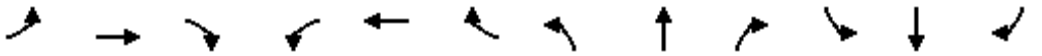
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	20	810	30	30	200	0	0	10	100
Future Volume (vph)	0	0	0	20	810	30	30	200	0	0	10	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0			4.0	
Lane Util. Factor					0.91			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.92	
Flpb, ped/bikes					1.00			0.99			1.00	
Frt					0.99			1.00			0.88	
Flt Protected					1.00			0.99			1.00	
Satd. Flow (prot)					4988			1818			1497	
Flt Permitted					1.00			0.95			1.00	
Satd. Flow (perm)					4988			1737			1497	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	21	853	32	32	211	0	0	11	105
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	0	0	0	903	0	0	243	0	0	87	0
Confl. Peds. (#/hr)	39		33	33		39	55		33	33		55
Confl. Bikes (#/hr)						44						
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			4	
Permitted Phases				2			4					
Actuated Green, G (s)					45.6			15.4			15.4	
Effective Green, g (s)					46.1			15.9			15.9	
Actuated g/C Ratio					0.66			0.23			0.23	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					0.2			3.0			3.0	
Lane Grp Cap (vph)					3284			394			340	
v/s Ratio Prot											0.06	
v/s Ratio Perm					0.18			c0.14				
v/c Ratio					0.27			0.62			0.26	
Uniform Delay, d1					5.0			24.3			22.2	
Progression Factor					1.00			0.93			1.00	
Incremental Delay, d2					0.2			2.6			0.4	
Delay (s)					5.2			25.3			22.6	
Level of Service					A			C			C	
Approach Delay (s)		0.0			5.2			25.3			22.6	
Approach LOS		A			A			C			C	

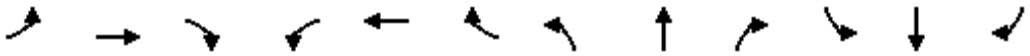
Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



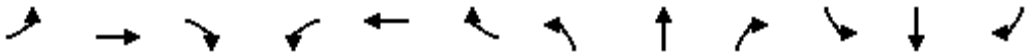
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱							↰	↑↑	
Traffic Volume (vph)	0	1060	280	0	0	0	0	0	0	45	615	0
Future Volume (vph)	0	1060	280	0	0	0	0	0	0	45	615	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0							4.0	4.0	
Lane Util. Factor		0.91	1.00							1.00	0.95	
Frpb, ped/bikes		1.00	1.00							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		5036	1568							1752	3470	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		5036	1568							1752	3470	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1116	295	0	0	0	0	0	0	47	647	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1116	295	0	0	0	0	0	0	47	647	0
Confl. Peds. (#/hr)	67		44	44		67	140		16	16		140
Confl. Bikes (#/hr)			327									
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type		NA	custom							Prot	NA	
Protected Phases		6 9	16							8	4	
Permitted Phases												
Actuated Green, G (s)		38.1	16.5							6.9	22.9	
Effective Green, g (s)		38.6	17.0							7.4	23.4	
Actuated g/C Ratio		0.55	0.24							0.11	0.33	
Clearance Time (s)			4.5							4.5	4.5	
Vehicle Extension (s)			3.0							3.0	3.0	
Lane Grp Cap (vph)		2776	380							185	1159	
v/s Ratio Prot		c0.22	c0.19							0.03	c0.19	
v/s Ratio Perm												
v/c Ratio		0.40	0.78							0.25	0.56	
Uniform Delay, d1		9.0	24.7							28.8	19.1	
Progression Factor		0.93	1.05							0.99	0.98	
Incremental Delay, d2		0.4	9.2							0.7	0.6	
Delay (s)		8.9	35.2							29.3	19.3	
Level of Service		A	D							C	B	
Approach Delay (s)		14.4			0.0			0.0			19.9	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



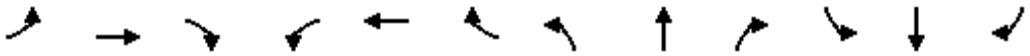
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	350	755	0	0	0	0	0	560	580	0	0	0
Future Volume (vph)	350	755	0	0	0	0	0	560	580	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						1.00	0.88			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		0.96						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4721						1845	2760			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4721						1845	2760			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	368	795	0	0	0	0	0	589	611	0	0	0
RTOR Reduction (vph)	0	125	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1038	0	0	0	0	0	589	611	0	0	0
Confl. Peds. (#/hr)	115		120	120		115	95		120	120		95
Confl. Bikes (#/hr)			68						304			
Bus Blockages (#/hr)	0	5	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						4 8	8			
Permitted Phases	2											
Actuated Green, G (s)		18.0						37.5	17.0			
Effective Green, g (s)		18.5						38.0	17.5			
Actuated g/C Ratio		0.26						0.54	0.25			
Clearance Time (s)		4.5							4.5			
Vehicle Extension (s)		0.2							0.5			
Lane Grp Cap (vph)		1247						1001	690			
v/s Ratio Prot								c0.32	c0.22			
v/s Ratio Perm		0.22										
v/c Ratio		0.83						0.59	0.89			
Uniform Delay, d1		24.3						10.7	25.3			
Progression Factor		0.44						1.00	1.00			
Incremental Delay, d2		6.2						0.6	12.7			
Delay (s)		16.9						11.3	38.0			
Level of Service		B						B	D			
Approach Delay (s)		16.9			0.0			24.9			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
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)	45	1290	0	0	0	0	0	975	620	0	0	0
Future Volume (vph)	45	1290	0	0	0	0	0	975	620	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	0.88			
Frpb, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		5008						3252	2561			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		5008						3252	2561			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	47	1358	0	0	0	0	0	1026	653	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1405	0	0	0	0	0	1026	653	0	0	0
Confl. Peds. (#/hr)	149		215	215		149	35		22	22		35
Confl. Bikes (#/hr)			95									
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	11%	11%	11%	3%	3%	3%
Turn Type	Perm	NA						NA	Prot			
Protected Phases		6						8	8			
Permitted Phases	6											
Actuated Green, G (s)		26.2						31.8	31.8			
Effective Green, g (s)		26.7						32.3	32.3			
Actuated g/C Ratio		0.38						0.46	0.46			
Clearance Time (s)		4.5						4.5	4.5			
Vehicle Extension (s)		3.5						3.9	3.9			
Lane Grp Cap (vph)		1910						1500	1181			
v/s Ratio Prot								c0.32	0.26			
v/s Ratio Perm		0.28										
v/c Ratio		0.74						0.68	0.55			
Uniform Delay, d1		18.6						14.8	13.6			
Progression Factor		1.01						1.00	1.00			
Incremental Delay, d2		1.4						2.6	1.9			
Delay (s)		20.2						17.4	15.5			
Level of Service		C						B	B			
Approach Delay (s)		20.2			0.0			16.7			0.0	
Approach LOS		C			A			B			A	

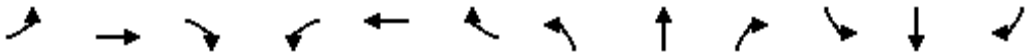
Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1535	180	0	0	0	0	30	15	15	20	0
Future Volume (vph)	200	1535	180	0	0	0	0	30	15	15	20	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						0.99			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.95			1.00	
Flt Protected		0.99						1.00			0.98	
Satd. Flow (prot)		4848						1751			1801	
Flt Permitted		0.99						1.00			0.84	
Satd. Flow (perm)		4848						1751			1541	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	211	1616	189	0	0	0	0	32	16	16	21	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	2006	0	0	0	0	0	34	0	0	37	0
Confl. Peds. (#/hr)	59		153	153		59	62		2	2		62
Confl. Bikes (#/hr)			101									
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		55.0						6.0			6.0	
Effective Green, g (s)		55.5						6.5			6.5	
Actuated g/C Ratio		0.79						0.09			0.09	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		0.5						0.5			0.5	
Lane Grp Cap (vph)		3843						162			143	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.41									c0.02	
v/c Ratio		0.52						0.21			0.26	
Uniform Delay, d1		2.6						29.4			29.5	
Progression Factor		0.68						1.00			1.07	
Incremental Delay, d2		0.4						0.2			0.3	
Delay (s)		2.1						29.6			31.9	
Level of Service		A						C			C	
Approach Delay (s)		2.1			0.0			29.6			31.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

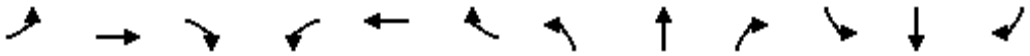
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	0	0	50	75	5	665	20	0	0	0
Future Volume (vph)	10	0	0	0	50	75	5	665	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		1.00			0.92			1.00				
Flt Protected		0.95			1.00			1.00				
Satd. Flow (prot)		1752			1696			1837				
Flt Permitted		0.67			1.00			1.00				
Satd. Flow (perm)		1230			1696			1837				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	0	0	0	53	79	5	700	21	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	11	0	0	132	0	0	726	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases	2						4					
Actuated Green, G (s)		5.5			5.5			28.5				
Effective Green, g (s)		6.0			6.0			29.0				
Actuated g/C Ratio		0.09			0.09			0.41				
Clearance Time (s)		4.5			4.5			4.5				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		105			145			761				
v/s Ratio Prot					c0.08							
v/s Ratio Perm		0.01						0.40				
v/c Ratio		0.10			0.91			0.95				
Uniform Delay, d1		29.5			31.7			19.9				
Progression Factor		0.91			1.00			0.59				
Incremental Delay, d2		0.4			48.8			3.7				
Delay (s)		27.2			80.6			15.5				
Level of Service		C			F			B				
Approach Delay (s)		27.2			80.6			15.5			0.0	
Approach LOS		C			F			B			A	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
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)	0	10	0	5	50	0	0	0	0	0	220	0
Future Volume (vph)	0	10	0	5	50	0	0	0	0	0	220	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0						4.0	
Lane Util. Factor		1.00			1.00						1.00	
Frt		1.00			1.00						1.00	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		1845			1837						1845	
Flt Permitted		1.00			0.97						1.00	
Satd. Flow (perm)		1845			1788						1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	11	0	5	53	0	0	0	0	0	232	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	11	0	0	58	0	0	0	0	0	232	0
Turn Type		NA		Perm	NA						NA	
Protected Phases		2			2						4	
Permitted Phases				2						4		
Actuated Green, G (s)		5.3			5.3						55.7	
Effective Green, g (s)		5.8			5.8						56.2	
Actuated g/C Ratio		0.08			0.08						0.80	
Clearance Time (s)		4.5			4.5						4.5	
Vehicle Extension (s)		3.0			3.0						3.0	
Lane Grp Cap (vph)		152			148						1481	
v/s Ratio Prot		0.01									c0.13	
v/s Ratio Perm					c0.03							
v/c Ratio		0.07			0.39						0.16	
Uniform Delay, d1		29.6			30.4						1.6	
Progression Factor		1.00			1.14						1.00	
Incremental Delay, d2		0.2			0.7						0.2	
Delay (s)		29.8			35.3						1.8	
Level of Service		C			D						A	
Approach Delay (s)		29.8			35.3			0.0			1.8	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	EBR2	WBR2	NBT	SET	SER
Lane Configurations							
Traffic Volume (vph)	10	240	105	1130	10	740	155
Future Volume (vph)	10	240	105	1130	10	740	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.88		0.88	1.00	0.95	1.00
Frt	1.00	0.85		0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00	1.00
Satd. Flow (prot)	1752	2760		2760	1845	3505	1568
Flt Permitted	0.95	1.00		1.00	1.00	1.00	1.00
Satd. Flow (perm)	1752	2760		2760	1845	3505	1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	253	111	1189	11	779	163
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	364	0	1189	11	779	163
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Prot		Prot	NA	NA	custom
Protected Phases	4	1		6			2
Permitted Phases					3	2	
Actuated Green, G (s)	6.2	14.9		70.4	5.2	51.0	51.0
Effective Green, g (s)	6.7	15.4		70.9	5.7	51.5	51.5
Actuated g/C Ratio	0.07	0.16		0.74	0.06	0.54	0.54
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	0.5		1.5	1.5	0.5	0.5
Lane Grp Cap (vph)	123	446		2053	110	1894	847
v/s Ratio Prot	c0.01	c0.13		c0.43			0.10
v/s Ratio Perm					c0.01	0.22	
v/c Ratio	0.09	0.82		0.58	0.10	0.41	0.19
Uniform Delay, d1	41.4	38.6		5.5	42.4	12.9	11.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	10.5		1.2	0.1	0.7	0.5
Delay (s)	41.8	49.0		6.7	42.5	13.6	11.7
Level of Service	D	D		A	D	B	B
Approach Delay (s)					42.5	13.3	
Approach LOS					D	B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	95.3	Sum of lost time (s)	17.0
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix C: Vissim Model Intersection Results

Table 20 Future No-Build Alternative 8-9 AM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	10	9	7.2	68	12	675	597	11.2
	1001		EBT	10	10	8.3	47	12			
	1001	WB	WBT	0	0	0.0	106	31			
	1001		WBR	180	179	11.2	138	29			
	1001	NB	NBL	10	6	2.8	2	7			
	1001		NBT	455	383	1.5	0	0			
	1001		NBR	10	10	1.5	0	0			
NE Broadway St & N Williams Ave	1008	WB	WBT	1255	1175	13.9	287	20	2,475	2,309	16.3
	1008		WBR	970	896	16.9	285	0			
	1008	NB	NBL	0	0	0.0	119	18			
	1008		NBT	250	239	25.5	137	0			
NE Broadway St & N Vancouver Ave/I-5 SB Ramp	1009	SB	SBL	855	600	81.2	276	48	2,675	2,240	43.8
	1009		SBT	255	248	31.0	141	16			
	1009		SBR	310	211	71.3	223	54			
	1009	WB	WBL	505	493	26.9	278	27			
	1009		WBT	750	688	19.5	278	27			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	590	609	7.2	262	90	1,970	1,818	12.1
	1010		EBR	220	218	42.3	508	105			
	1010	SB	SBL	0	2	81.5	19	10			
	1010		SBT	20	19	84.5	65	11			
	1010	WB	WBL	5	2	86.5	26	25			
	1010		WBT	970	811	0.9	123	73			
	1010		WBR	5	2	38.0	21	12			
	1010	NB	NBL	60	58	62.4	150	36			
	1010		NBT	25	26	61.6	80	15			
	1010		NBR	75	71	6.2	93	25			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & N Vancouver Ave	1055	EB	EBT	355	371	14.6	195	45	2,230	1,968	12.9
	1055		EBR	260	260	11.7	228	32			
	1055	SB	SBL	875	627	5.6	279	16			
	1055		SBT	740	710	18.9	276	16			
NE Wheeler Ave & N Ramsey Way	1067	EB	EBL	50	42	33.8	160	49	1,235	1,221	37.2
	1067		EBT	120	120	35.5	160	49			
	1067		EBR	60	56	46.1	160	49			
	1067	SB	SBL	915	906	39.4	305	12			
	1067		SBT	80	80	11.3	137	51			
	1067	NB	NBT	10	18	30.6	64	15			
NE Weidler St & N Williams Ave	1068	EB	EBL	200	182	2.4	179	0	1,290	1,051	3.6
	1068		EBT	1030	818	3.0	178	58			
	1068	NB	NBT	50	48	19.7	62	0			
	1068		NBR	10	2	21.5	70	8			
NE Broadway St & N Benton Ave	1098	EB	EBL	55	54	67.1	172	41	1,740	1,579	14.2
	1098		EBT	530	544	2.8	199	42			
	1098		EBR	80	83	2.6	204	42			
	1098	SB	SBL	10	7	56.0	116	23			
	1098		SBT	25	24	58.3	116	23			
	1098		SBR	10	12	24.6	121	23			
	1098	WB	WBL	5	3	72.7	24	11			
	1098		WBT	955	788	15.2	388	92			
	1098		WBR	40	35	26.5	391	92			
	1098	NB	NBL	15	16	61.7	63	13			
	1098		NBT	10	10	44.3	63	12			
	1098		NBR	5	5	70.7	63	12			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Broadway St & NE Victoria Ave	2001	SB	SBR	25	24	50.4	61	0	2,290	2,128	38.9
	2001	WB	WBT	1490	1485	45.3	530	0			
	2001		WBR	20	21	47.9	530	45			
	2001	NB	NBL	710	564	22.1	272	0			
	2001		NBT	45	33	27.4	272	12			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	15	10	7.0	57	13	2,545	2,029	66.1
	2091		EBT	1025	813	0.8	57	13			
	2091	NB	NBT	740	586	113.8	3470	2418			
	2091		NBR	765	620	52.5	375	110			
NE Weidler St & NE 2nd Ave	2247	EB	EBL	130	102	8.8	236	39	1,870	1,512	7.1
	2247		EBT	1550	1248	6.1	236	39			
	2247		EBR	100	78	3.6	240	39			
	2247	SB	SBL	10	6	13.8	57	15			
	2247		SBT	10	11	30.1	57	15			
	2247	NB	NBT	55	57	24.4	98	18			
	2247		NBR	15	10	9.5	103	18			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	5	6	19.2	137	34	1,710	1,669	27.7
	2248		SBR	145	142	15.0	139	32			
	2248	WB	WBL	15	11	16.5	539	14			
	2248		WBT	1310	1301	28.8	539	14			
	2248		WBR	50	49	47.7	539	14			
	2248	NB	NBL	55	58	30.2	196	43			
	2248		NBT	130	102	22.0	196	43			

Table 21 Future No-Build Alternative 5-6 PM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	5	4	6.9	41	1	750	681	10.9
	1001		EBT	0	0	0.0	20	1			
	1001	WB	WBT	0	0	0.0	66	26			
	1001		WBR	95	93	10.9	103	24			
	1001	NB	NBL	5	2	4.2	0	0			
	1001		NBT	620	563	2.3	0	0			
	1001		NBR	25	19	2.5	0	0			
NE Broadway St & N Williams Ave	1008	WB	WBT	900	881	11.2	262	26	2,320	2,176	15.4
	1008		WBR	860	801	14.5	284	0			
	1008	NB	NBL	20	18	26.8	192	42			
	1008		NBT	540	478	24.0	225	0			
NE Broadway St & N Vancouver Ave/I-5 SB Ramp	1009	SB	SBL	930	669	125.7	4048	4228	2,615	1,766	87.6
	1009		SBT	355	393	116.2	542	251			
	1009		SBR	410	304	85.3	319	205			
	1009	WB	WBL	405	400	39.1	258	19			
	1009		WBT	515	0	0.0	0	0			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	1135	1099	64.7	1782	959	2,770	2,587	43.4
	1010		EBR	280	256	67.1	1086	734			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	25	26	69.5	85	18			
	1010	WB	WBL	15	11	45.7	51	11			
	1010		WBT	905	791	1.5	194	64			
	1010		WBR	20	17	32.6	62	24			
	1010	NB	NBL	120	121	85.1	220	12			
	1010		NBT	235	233	38.7	210	11			
	1010		NBR	35	33	21.3	80	42			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & N Vancouver Ave	1055	EB	EBT	845	818	38.6	371	14	2,785	2,446	28.1
	1055		EBR	250	238	16.5	336	50			
	1055	SB	SBL	960	714	30.0	319	7			
	1055		SBT	730	677	17.5	316	7			
NE Wheeler Ave & N Ramsey Way	1067	EB	EBL	105	85	52.1	172	33	1,350	1,277	28.5
	1067		EBT	240	233	26.3	172	33			
	1067		EBR	20	19	23.0	172	33			
	1067	SB	SBL	735	712	30.9	273	26			
	1067		SBT	240	210	14.2	199	43			
	1067	NB	NBT	10	18	21.9	69	12			
NE Weidler St & N Williams Ave	1068	EB	EBL	460	397	20.4	289	0	1,920	1,613	17.8
	1068		EBT	1345	1126	13.8	288	8			
	1068	NB	NBT	100	90	55.4	156	0			
	1068		NBR	15	0	0.0	77	13			
NE Broadway St & N Benton Ave	1098	EB	EBL	95	94	50.0	291	32	2,265	2,090	17.9
	1098		EBT	930	896	13.5	271	45			
	1098		EBR	145	137	7.0	276	45			
	1098	SB	SBL	25	24	62.4	151	28			
	1098		SBT	25	25	53.4	151	28			
	1098		SBR	30	31	25.6	156	28			
	1098	WB	WBL	50	45	90.3	129	44			
	1098		WBT	900	781	12.1	347	91			
	1098		WBR	20	14	13.1	350	91			
	1098	NB	NBL	10	7	66.7	45	23			
	1098		NBT	25	28	48.3	110	34			
	1098		NBR	10	7	70.3	110	34			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Broadway St & NE Victoria Ave	2001	SB	SBR	35	33	45.5	79	0	1,920	1,835	28.1
	2001	WB	WBT	1035	1035	35.2	379	0			
	2001		WBR	20	17	45.0	379	70			
	2001	NB	NBL	680	620	15.8	282	0			
	2001		NBT	150	130	24.5	282	15			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	35	25	12.7	273	20	2,735	2,398	75.4
	2091		EBT	1325	1107	6.3	273	20			
	2091	NB	NBT	795	721	125.5	4974	1063			
	2091		NBR	580	545	58.0	334	93			
NE Weidler St & NE 2nd Ave	2247	EB	EBL	200	164	10.3	293	20	1,970	1,716	9.2
	2247		EBT	1500	1317	8.6	293	20			
	2247		EBR	205	171	6.8	297	20			
	2247	SB	SBL	10	11	24.9	71	17			
	2247		SBT	20	19	36.1	71	17			
	2247	NB	NBT	20	19	23.4	55	14			
	2247		NBR	15	14	8.0	60	14			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	15	12	13.8	73	14	1,345	1,294	11.4
	2248		SBR	70	68	7.1	81	21			
	2248	WB	WBL	20	19	7.6	377	114			
	2248		WBT	965	955	11.3	377	114			
	2248		WBR	55	57	13.6	377	114			
	2248	NB	NBL	20	19	22.4	184	42			
	2248		NBT	200	165	12.1	184	42			

Table 22 Future No-Build Alternative 7-8 AM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	8	7	7.1	61	15	559	557	11.4
	1001		EBT	8	8	8.4	40	15			
	1001	WB	WBT	0	0	0.0	110	28			
	1001		WBR	149	147	11.4	140	28			
	1001	NB	NBL	8	7	2.6	0	0			
	1001		NBT	378	379	1.6	0	0			
	1001		NBR	8	10	1.3	0	0			
NE Broadway St & N Williams Ave	1008	WB	WBT	1042	1013	12.8	291	22	2,055	2,029	14.8
	1008		WBR	805	800	14.5	278	0			
	1008	NB	NBL	0	0	0.0	112	22			
	1008		NBT	208	218	25.3	134	0			
NE Broadway St & N Vancouver Ave/I-5 SB Ramp	1009	SB	SBL	710	665	72.1	285	55	2,221	2,115	42.0
	1009		SBT	212	206	30.6	143	11			
	1009		SBR	257	241	60.5	191	35			
	1009	WB	WBL	419	398	25.0	269	16			
	1009		WBT	623	606	16.5	269	16			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	490	493	7.7	304	121	1,636	1,603	10.5
	1010		EBR	183	176	37.1	424	196			
	1010	SB	SBL	0	1	85.7	17	16			
	1010		SBT	17	15	77.2	76	28			
	1010	WB	WBL	4	2	82.0	25	3			
	1010		WBT	805	783	0.8	104	70			
	1010		WBR	4	3	35.5	25	13			
	1010	NB	NBL	50	47	61.0	157	42			
	1010		NBT	21	20	58.5	77	14			
	1010		NBR	62	65	5.9	84	15			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & N Vancouver Ave	1055	EB	EBT	295	300	14.9	205	23	1,851	1,768	10.9
	1055		EBR	216	205	9.9	193	78			
	1055	SB	SBL	726	677	4.7	271	19			
	1055		SBT	614	586	16.5	268	19			
NE Wheeler Ave & N Ramsey Way	1067	EB	EBL	42	34	34.9	139	33	1,025	968	28.2
	1067		EBT	100	98	27.2	139	33			
	1067		EBR	50	43	25.6	139	33			
	1067	SB	SBL	759	707	30.0	298	20			
	1067		SBT	66	71	9.3	105	27			
	1067	NB	NBT	8	16	31.1	68	15			
NE Weidler St & N Williams Ave	1068	EB	EBL	166	165	2.6	166	0	1,071	1,015	3.6
	1068		EBT	855	809	3.0	165	51			
	1068	NB	NBT	42	40	18.7	63	0			
	1068		NBR	8	1	16.1	69	9			
NE Broadway St & N Benton Ave	1098	EB	EBL	46	44	67.9	191	54	1,443	1,422	12.7
	1098		EBT	440	447	2.5	185	50			
	1098		EBR	66	65	2.6	190	50			
	1098	SB	SBL	8	8	56.1	107	27			
	1098		SBT	21	20	52.4	107	27			
	1098		SBR	8	8	20.6	112	27			
	1098	WB	WBL	4	3	87.3	31	19			
	1098		WBT	793	768	12.9	315	35			
	1098		WBR	33	35	17.4	318	35			
	1098	NB	NBL	12	11	57.6	59	12			
	1098		NBT	8	10	52.0	57	18			
	1098		NBR	4	3	53.3	57	18			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Broadway St & NE Victoria Ave	2001	SB	SBR	21	18	39.4	53	0	1,901	1,869	30.5
	2001	WB	WBT	1237	1216	38.0	530	0			
	2001		WBR	17	15	36.9	530	39			
	2001	NB	NBL	589	586	14.9	263	0			
	2001		NBT	37	34	23.0	263	16			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	12	9	5.0	56	28	2,112	2,072	48.5
	2091		EBT	851	796	0.8	56	28			
	2091	NB	NBT	614	616	77.6	1814	2181			
	2091		NBR	635	650	38.9	302	92			
NE Weidler St & NE 2nd Ave	2247	EB	EBL	108	100	8.4	244	31	1,552	1,522	6.6
	2247		EBT	1287	1268	5.8	244	31			
	2247		EBR	83	84	3.3	248	31			
	2247	SB	SBL	8	6	13.5	50	17			
	2247		SBT	8	9	29.0	50	17			
	2247	NB	NBT	46	44	23.5	97	15			
	2247		NBR	12	10	11.0	102	15			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	4	6	15.0	135	27	1,419	1,408	16.7
	2248		SBR	120	117	12.9	136	27			
	2248	WB	WBL	12	10	10.8	504	31			
	2248		WBT	1087	1094	16.4	504	31			
	2248		WBR	42	40	20.0	504	31			
	2248	NB	NBL	46	44	27.2	203	49			
	2248		NBT	108	99	19.9	203	49			

Table 23 Future No-Build Alternative 4-5 PM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	5	4	6.9	42	1	720	692	10.8
	1001		EBT	0	0	0.0	21	1			
	1001	WB	WBT	0	0	0.0	70	25			
	1001		WBR	91	89	10.8	106	22			
	1001	NB	NBL	5	4	6.9	35	53			
	1001		NBT	595	573	2.9	19	38			
	1001		NBR	24	22	3.3	19	38			
NE Broadway St & N Williams Ave	1008	WB	WBT	864	856	8.8	253	22	2,227	2,167	13.4
	1008		WBR	826	798	11.8	280	0			
	1008	NB	NBL	19	19	26.1	192	39			
	1008		NBT	518	495	23.5	201	0			
NE Broadway St & N Vancouver Ave/I-5 SB Ramp	1009	SB	SBL	893	726	97.2	452	158	2,511	1,802	70.0
	1009		SBT	341	380	86.7	311	46			
	1009		SBR	394	314	77.5	226	42			
	1009	WB	WBL	389	382	30.3	232	25			
	1009		WBT	494	0	0.0	0	0			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	1090	1110	36.0	808	128	2,660	2,601	28.7
	1010		EBR	269	272	48.7	639	178			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	24	22	67.2	65	19			
	1010	WB	WBL	14	11	41.3	39	18			
	1010		WBT	869	805	1.5	187	51			
	1010		WBR	19	17	30.1	53	20			
	1010	NB	NBL	115	116	79.8	218	13			
	1010		NBT	226	216	37.8	216	11			
	1010		NBR	34	31	8.4	69	19			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & N Vancouver Ave	1055	EB	EBT	811	807	33.0	362	15	2,674	2,495	22.3
	1055		EBR	240	240	13.7	259	64			
	1055	SB	SBL	922	770	19.5	301	10			
	1055		SBT	701	679	15.8	298	10			
NE Wheeler Ave & N Ramsey Way	1067	EB	EBL	101	84	45.1	148	29	1,296	1,279	22.4
	1067		EBT	230	231	24.4	148	29			
	1067		EBR	19	17	24.9	148	29			
	1067	SB	SBL	706	703	21.4	246	41			
	1067		SBT	230	226	14.7	188	66			
	1067	NB	NBT	10	18	22.7	65	16			
NE Weidler St & N Williams Ave	1068	EB	EBL	442	406	15.6	284	0	1,843	1,667	13.8
	1068		EBT	1291	1169	11.4	283	6			
	1068	NB	NBT	96	92	36.1	99	0			
	1068		NBR	14	0	0.0	66	0			
NE Broadway St & N Benton Ave	1098	EB	EBL	91	86	44.5	266	40	2,175	2,103	13.4
	1098		EBT	893	913	6.7	226	53			
	1098		EBR	139	140	5.0	231	53			
	1098	SB	SBL	24	20	55.5	125	19			
	1098		SBT	24	24	51.9	125	19			
	1098		SBR	29	31	22.6	130	19			
	1098	WB	WBL	48	40	83.3	116	15			
	1098		WBT	864	794	11.1	312	78			
	1098		WBR	19	16	13.2	315	78			
	1098	NB	NBL	10	9	63.0	45	16			
	1098		NBT	24	25	47.6	83	21			
	1098		NBR	10	6	46.6	83	21			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Broadway St & NE Victoria Ave	2001	SB	SBR	34	32	38.0	67	0	1,844	1,812	23.1
	2001	WB	WBT	994	980	30.6	284	0			
	2001		WBR	19	16	39.7	284	51			
	2001	NB	NBL	653	648	11.0	287	0			
	2001		NBT	144	137	21.3	287	10			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	34	27	11.4	280	13	2,626	2,480	52.4
	2091		EBT	1272	1137	6.7	280	13			
	2091	NB	NBT	763	764	83.3	2822	2199			
	2091		NBR	557	553	38.0	325	71			
NE Weidler St & NE 2nd Ave	2247	EB	EBL	192	176	10.8	310	26	1,891	1,767	9.8
	2247		EBT	1440	1342	9.3	310	26			
	2247		EBR	197	188	7.2	314	26			
	2247	SB	SBL	10	13	24.1	65	14			
	2247		SBT	19	18	35.2	65	14			
	2247	NB	NBT	19	19	23.8	58	13			
	2247		NBR	14	13	7.9	62	13			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	14	13	12.7	64	13	1,290	1,265	10.2
	2248		SBR	67	63	6.6	68	17			
	2248	WB	WBL	19	18	9.2	271	61			
	2248		WBT	926	924	9.6	271	61			
	2248		WBR	53	53	11.5	271	61			
	2248	NB	NBL	19	19	23.6	180	33			
	2248		NBT	192	175	13.2	180	33			

Future 24 Future Revised Build Alternative 8-9 AM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	10	10	51.3	76	20	710	647	14.5
	1001	WB	WBT	65	62	29.7	218	20			
	1001		WBR	125	122	30.6	218	20			
	1001	NB	NBL	0	0	0.0	289	44			
	1001		NBT	500	446	7.3	289	44			
	1001		NBR	10	8	8.8	289	44			
NE Broadway St & N Williams Ave	1008	WB	WBT	1535	1404	9.2	249	17	3,055	2,769	13.5
	1008		WBR	920	839	15.2	284	18			
	1008	NB	NBL	305	249	17.7	225	31			
	1008		NBT	295	279	26.1	225	18			
NE Broadway St & N Vancouver Ave	1009	SB	SBT	300	300	29.6	292	34	2,140	1,951	8.2
	1009	WB	WBL	690	632	3.9	183	42			
	1009		WBT	1150	1020	4.6	182	17			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	715	713	10.6	357	125	2,495	2,335	11.1
	1010		EBR	245	241	16.3	235	47			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	30	29	58.7	83	17			
	1010	WB	WBL	5	4	25.7	29	11			
	1010		WBT	1135	1004	3.0	269	23			
	1010		WBR	120	102	25.7	161	52			
	1010	NB	NBL	100	97	43.5	182	28			
	1010		NBT	65	63	37.7	133	37			
	1010		NBR	80	82	6.6	78	25			
NE Weidler St & N Vancouver Ave	1055	EB	EBT	580	587	14.1	239	46	1,830	1,775	19.9
	1055		EBR	260	247	66.7	351	56			
	1055	SB	SBL	25	22	14.8	265	15			
	1055		SBT	965	919	11.2	265	15			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Wheeler Ave & N Ramsey Way/I-5 SB Ramp	1067	EB	EBL	0	0	0.0	103	20	2,220	2,002	18.0
	1067		EBT	80	77	33.3	103	20			
	1067		EBR	20	20	39.0	103	20			
	1067	WB	WBR	885	739	20.8	365	59			
	1067	SB	SBL	995	958	14.9	272	8			
	1067		SBT	230	198	12.9	226	46			
	1067	NB	NBT	10	10	44.6	48	0			
NE Weidler St & N Williams Ave	1068	EB	EBL	190	186	9.9	164	33	1,490	1,353	19.8
	1068		EBT	415	423	9.7	158	33			
	1068	NB	NBT	410	347	18.6	432	38			
	1068		NBR	475	397	36.2	259	72			
NE Broadway St & N Benton Ave	1098	EB	EBL	10	11	54.9	112	94	2,160	1,993	13.4
	1098		EBT	755	755	7.9	270	38			
	1098		EBR	30	27	7.3	275	38			
	1098	SB	SBL	10	6	28.0	89	14			
	1098		SBT	25	22	33.5	89	14			
	1098		SBR	15	17	16.7	94	14			
	1098	WB	WBL	5	4	53.0	31	11			
	1098		WBT	1230	1077	15.2	533	37			
	1098		WBR	40	34	24.4	536	37			
	1098	NB	NBL	15	15	41.2	53	13			
	1098		NBT	15	17	29.4	67	18			
	1098		NBR	10	7	33.7	67	18			
NE Broadway St & NE Victoria Ave	2001	SB	SBR	30	28	15.1	42	8	2,525	2,303	38.0
	2001	WB	WBT	1565	1522	48.1	561	14			
	2001		WBR	10	11	78.0	561	14			
	2001	NB	NBL	865	695	17.8	295	23			
	2001		NBT	55	47	16.0	295	23			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	15	14	12.9	287	21	2,720	2,317	24.0
	2091		EBT	875	807	11.9	287	21			
	2091	NB	NBT	905	738	43.3	442	328			
	2091		NBR	925	758	18.3	188	19			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & NE 2nd Ave	2247	EB	EBL	130	112	8.1	302	32	1,885	1,638	7.2
	2247		EBT	1660	1444	6.5	302	32			
	2247		EBR	10	6	6.5	306	32			
	2247	SB	SBL	25	22	6.3	64	20			
	2247		SBT	10	12	28.1	64	20			
	2247	NB	NBT	40	35	25.3	73	7			
	2247		NBR	10	8	10.3	78	7			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	25	22	27.2	168	32	1,805	1,738	20.2
	2248		SBR	150	151	19.8	169	32			
	2248	WB	WBL	15	12	5.2	542	21			
	2248		WBT	1390	1356	19.5	542	21			
	2248		WBR	55	49	40.7	541	25			
	2248	NB	NBL	35	34	30.3	167	54			
	2248		NBT	135	113	17.8	167	54			
N Vancouver Ave & NE Hancock St	2249	EB	EBT	10	10	31.2	47	22	375	378	5.0
	2249		EBR	0	0	0.0	47	22			
	2249	WB	WBL	5	1	4.6	62	12			
	2249		WBT	60	60	5.6	62	12			
	2249	SB	SBT	300	307	4.0	135	38			
	2249		SBR	0	0	0.0	135	38			

Table 25 Future Revised Build Alternative 5-6 PM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	10	10	24.5	67	12	825	749	28.3
	1001	WB	WBT	50	45	75.1	246	60			
	1001		WBR	75	73	73.8	246	60			
	1001	NB	NBL	5	5	23.4	491	47			
	1001		NBT	665	598	19.5	491	47			
	1001		NBR	20	18	21.5	491	47			
NE Broadway St & N Williams Ave	1008	WB	WBT	945	885	11.0	238	26	2,715	2,487	20.4
	1008		WBR	860	794	24.6	304	13			
	1008	NB	NBL	385	315	25.9	275	10			
	1008		NBT	525	494	26.7	275	18			
NE Broadway St & N Vancouver Ave	1009	SB	SBT	220	222	25.4	225	54	1,550	1,417	11.4
	1009	WB	WBL	440	404	12.2	219	38			
	1009		WBT	890	791	7.1	191	39			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	1150	1141	49.9	1126	736	2,775	2,668	37.4
	1010		EBR	280	274	63.4	982	764			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	25	24	67.2	72	17			
	1010	WB	WBL	20	19	80.4	99	61			
	1010		WBT	860	776	3.0	234	41			
	1010		WBR	100	91	36.0	175	18			
	1010	NB	NBL	135	138	71.2	215	12			
	1010		NBT	130	132	43.2	201	9			
	1010		NBR	75	73	14.9	79	15			
NE Weidler St & N Vancouver Ave	1055	EB	EBT	1060	1044	30.7	364	19	2,000	1,954	30.8
	1055		EBR	280	276	46.2	283	44			
	1055	SB	SBL	45	42	31.4	268	14			
	1055		SBT	615	592	23.8	268	14			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Wheeler Ave & N Ramsey Way/I-5 SB Ramp	1067	EB	EBL	10	9	54.2	215	22	2,390	2,155	41.9
	1067		EBT	240	231	28.0	215	22			
	1067		EBR	105	102	25.6	215	22			
	1067	WB	WBR	1130	937	45.0	576	37			
	1067	SB	SBL	740	721	46.7	292	20			
	1067		SBT	155	144	31.4	262	35			
	1067	NB	NBT	10	10	48.8	47	0			
NE Weidler St & N Williams Ave	1068	EB	EBL	350	343	37.9	297	16	2,245	2,027	35.2
	1068		EBT	755	738	30.4	290	16			
	1068	NB	NBT	560	467	31.4	468	19			
	1068		NBR	580	481	44.2	398	87			
NE Broadway St & N Benton Ave	1098	EB	EBL	10	12	62.7	186	117	2,370	2,259	16.6
	1098		EBT	1170	1161	17.7	304	20			
	1098		EBR	40	37	8.3	309	20			
	1098	SB	SBL	25	24	60.0	159	34			
	1098		SBT	15	15	46.8	159	34			
	1098		SBR	50	51	21.8	164	34			
	1098	WB	WBL	15	13	74.3	62	18			
	1098		WBT	930	839	10.6	357	119			
	1098		WBR	80	73	12.5	360	119			
	1098	NB	NBL	0	0	0.0	0	0			
	1098		NBT	20	22	48.9	101	41			
	1098		NBR	15	14	50.3	101	41			
NE Broadway St & NE Victoria Ave	2001	SB	SBR	25	24	14.8	42	8	1,980	1,824	54.1
	2001	WB	WBT	920	889	86.4	541	20			
	2001		WBR	15	13	190.7	541	20			
	2001	NB	NBL	860	763	24.2	277	4			
	2001		NBT	160	136	4.5	277	4			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	45	38	15.3	303	16	2,930	2,654	23.9
	2091		EBT	1290	1179	12.2	303	16			
	2091	NB	NBT	975	865	42.4	712	434			
	2091		NBR	620	572	20.8	176	29			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & NE 2nd Ave	2247	EB	EBL	200	184	7.2	491	60	1,995	1,833	8.9
	2247		EBT	1535	1414	8.0	491	60			
	2247		EBR	180	161	12.1	495	60			
	2247	SB	SBL	15	14	23.9	70	13			
	2247		SBT	20	18	33.9	70	13			
	2247	NB	NBT	30	28	23.6	68	10			
	2247		NBR	15	15	10.5	72	10			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	10	14	13.6	85	27	1,200	1,152	33.0
	2248		SBR	100	95	8.4	87	27			
	2248	WB	WBL	20	18	9.2	518	54			
	2248		WBT	810	788	40.8	518	54			
	2248		WBR	30	25	67.4	519	53			
	2248	NB	NBL	30	28	22.4	183	43			
	2248		NBT	200	185	13.0	183	43			
N Vancouver Ave & NE Hancock St	2249	EB	EBT	10	9	33.9	39	11	285	287	8.9
	2249		EBR	0	0	0.0	39	11			
	2249	WB	WBL	5	2	32.6	93	23			
	2249		WBT	50	48	33.8	93	23			
	2249	SB	SBT	220	228	2.5	107	31			
	2249		SBR	0	0	0.0	107	31			

Table 26 Future Revised Build Alternative 7-8 AM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	8	8	50.3	73	27	589	581	13.7
	1001	WB	WBT	54	49	29.4	165	17			
	1001		WBR	104	102	31.1	165	17			
	1001	NB	NBL	0	0	0.0	285	52			
	1001		NBT	415	416	6.9	285	52			
	1001		NBR	8	7	7.3	285	52			
NE Broadway St & N Williams Ave	1008	WB	WBT	1274	1256	9.4	245	35	2,536	2,517	13.9
	1008		WBR	764	758	15.9	287	13			
	1008	NB	NBL	253	253	19.1	225	30			
	1008		NBT	245	252	24.8	225	25			
NE Broadway St & N Vancouver Ave	1009	SB	SBT	249	249	28.5	260	45	1,777	1,757	7.8
	1009	WB	WBL	573	567	3.9	198	45			
	1009		WBT	955	940	4.7	214	43			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	593	601	7.6	201	67	2,070	2,070	9.0
	1010		EBR	203	205	14.2	199	44			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	25	21	55.4	61	13			
	1010	WB	WBL	4	3	18.8	34	14			
	1010		WBT	942	940	2.8	257	25			
	1010		WBR	100	93	21.2	131	35			
	1010	NB	NBL	83	81	37.6	139	36			
	1010		NBT	54	57	32.3	119	29			
	1010		NBR	66	70	5.6	70	11			
NE Weidler St & N Vancouver Ave	1055	EB	EBT	481	490	11.9	201	31	1,519	1,533	16.3
	1055		EBR	216	217	47.1	300	75			
	1055	SB	SBL	21	18	15.9	255	15			
	1055		SBT	801	807	10.8	255	15			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Wheeler Ave & N Ramsey Way/I-5 SB Ramp	1067	EB	EBL	0	0	0.0	112	38	1,843	1,850	16.8
	1067		EBT	66	65	34.4	112	38			
	1067		EBR	17	15	34.2	112	38			
	1067	WB	WBR	735	728	19.7	340	43			
	1067	SB	SBL	826	830	13.3	266	13			
	1067		SBT	191	202	11.5	192	27			
	1067	NB	NBT	8	10	51.7	47	0			
NE Weidler St & N Williams Ave	1068	EB	EBL	158	153	9.6	190	45	1,236	1,250	20.2
	1068		EBT	344	355	9.4	183	45			
	1068	NB	NBT	340	344	17.9	427	30			
	1068		NBR	394	399	35.9	276	90			
NE Broadway St & N Benton Ave	1098	EB	EBL	8	9	41.4	58	41	1,791	1,784	11.5
	1098		EBT	627	637	6.4	220	28			
	1098		EBR	25	23	4.3	225	28			
	1098	SB	SBL	8	6	24.4	71	18			
	1098		SBT	21	19	30.7	71	18			
	1098		SBR	12	12	13.3	76	18			
	1098	WB	WBL	4	4	39.0	39	19			
	1098		WBT	1021	1014	13.2	470	42			
	1098		WBR	33	30	17.8	474	42			
	1098	NB	NBL	12	11	38.7	47	20			
	1098		NBT	12	13	28.5	54	16			
	1098		NBR	8	6	28.5	54	16			
NE Broadway St & NE Victoria Ave	2001	SB	SBR	25	24	12.4	41	15	2,096	2,074	27.2
	2001	WB	WBT	1299	1289	32.5	535	39			
	2001		WBR	8	10	56.1	535	39			
	2001	NB	NBL	718	707	18.5	287	20			
	2001		NBT	46	45	15.7	287	20			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	12	12	11.5	284	31	2,257	2,228	27.0
	2091		EBT	726	741	12.7	284	31			
	2091	NB	NBT	751	728	49.3	484	418			
	2091		NBR	768	746	19.6	220	37			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & NE 2nd Ave	2247	EB	EBL	108	104	7.3	287	39	1,564	1,552	6.6
	2247		EBT	1378	1377	6.1	287	39			
	2247		EBR	8	6	5.6	290	39			
	2247	SB	SBL	21	20	6.0	54	11			
	2247		SBT	8	10	26.7	54	11			
	2247	NB	NBT	33	29	24.3	66	18			
	2247		NBR	8	6	8.3	71	18			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	21	20	23.5	138	25	1,499	1,483	8.5
	2248		SBR	125	124	14.2	140	25			
	2248	WB	WBL	12	10	3.5	305	55			
	2248		WBT	1154	1155	6.3	305	55			
	2248		WBR	46	43	9.8	308	55			
	2248	NB	NBL	29	29	31.1	156	37			
	2248		NBT	112	103	17.8	156	37			
N Vancouver Ave & NE Hancock St	2249	EB	EBT	8	8	35.7	41	17	311	314	4.3
	2249		EBR	0	0	0.0	41	17			
	2249	WB	WBL	4	0	4.5	69	22			
	2249		WBT	50	49	5.3	69	22			
	2249	SB	SBT	249	258	3.1	123	32			
	2249		SBR	0	0	0.0	123	32			

Table 27 Future Revised Build Alternative 4-5 PM

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
N Williams Ave & NE Hancock St	1001	EB	EBL	10	9	23.7	61	13	792	727	22.7
	1001	WB	WBT	48	44	65.9	223	49			
	1001		WBR	72	70	65.7	223	49			
	1001	NB	NBL	5	5	16.1	429	54			
	1001		NBT	638	583	14.5	429	54			
	1001		NBR	19	17	15.9	429	54			
NE Broadway St & N Williams Ave	1008	WB	WBT	907	869	12.4	243	26	2,607	2,455	20.1
	1008		WBR	826	777	24.6	297	10			
	1008	NB	NBL	370	326	22.7	284	11			
	1008		NBT	504	484	25.1	284	16			
NE Broadway St & N Vancouver Ave	1009	SB	SBT	211	211	25.1	247	56	1,487	1,407	12.1
	1009	WB	WBL	422	408	14.0	209	39			
	1009		WBT	854	788	7.6	203	32			
NE Broadway St & N Larrabee Ave	1010	EB	EBT	1104	1120	20.4	624	56	2,665	2,622	22.3
	1010		EBR	269	271	44.1	491	47			
	1010	SB	SBL	0	0	0.0	0	0			
	1010		SBT	24	24	68.7	75	17			
	1010	WB	WBL	19	18	85.8	60	16			
	1010		WBT	826	773	2.8	182	44			
	1010		WBR	96	91	35.8	177	51			
	1010	NB	NBL	130	132	71.0	212	11			
	1010		NBT	125	118	42.8	201	8			
	1010		NBR	72	74	7.9	77	16			
NE Weidler St & N Vancouver Ave	1055	EB	EBT	1018	1016	23.2	346	31	1,920	1,914	25.9
	1055		EBR	269	272	46.7	313	51			
	1055	SB	SBL	43	43	28.6	272	12			
	1055		SBT	590	582	20.7	272	12			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Wheeler Ave & N Ramsey Way/I-5 SB Ramp	1067	EB	EBL	10	9	55.2	180	37	2,295	2,150	34.9
	1067		EBT	230	234	17.4	180	37			
	1067		EBR	101	96	16.3	180	37			
	1067	WB	WBR	1085	941	42.2	595	27			
	1067	SB	SBL	710	708	33.9	277	10			
	1067		SBT	149	151	30.7	217	46			
	1067	NB	NBT	10	10	52.9	47	0			
NE Weidler St & N Williams Ave	1068	EB	EBL	336	327	33.0	289	11	2,156	2,025	33.4
	1068		EBT	725	733	30.5	283	11			
	1068	NB	NBT	538	476	27.5	460	21			
	1068		NBR	557	489	43.6	383	98			
NE Broadway St & N Benton Ave	1098	EB	EBL	10	10	58.5	63	65	2,274	2,224	11.6
	1098		EBT	1123	1144	9.1	285	42			
	1098		EBR	38	41	6.2	290	42			
	1098	SB	SBL	24	20	54.7	132	26			
	1098		SBT	14	13	50.5	132	26			
	1098		SBR	48	50	18.7	136	26			
	1098	WB	WBL	14	13	65.2	51	15			
	1098		WBT	893	831	10.3	335	119			
	1098		WBR	77	71	11.5	338	119			
	1098	NB	NBL	0	0	0.0	0	0			
	1098		NBT	19	19	44.8	93	34			
	1098		NBR	14	13	54.6	93	34			
NE Broadway St & NE Victoria Ave	2001	SB	SBR	24	23	14.6	41	10	1,901	1,808	56.0
	2001	WB	WBT	883	880	93.6	524	52			
	2001		WBR	14	14	210.6	524	52			
	2001	NB	NBL	826	749	20.1	278	13			
	2001		NBT	154	143	4.3	278	13			
NE Weidler St & NE Victoria Ave/I-5 NB Ramp	2091	EB	EBL	43	41	13.9	303	15	2,812	2,620	21.7
	2091		EBT	1238	1185	12.7	303	15			
	2091	NB	NBT	936	849	35.3	544	439			
	2091		NBR	595	545	21.0	194	28			

Intersection	Node	Approach	Movement	Movement					Intersection		
				Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)	Max Queue (feet)	Std. Dev. (feet)	Volume Demand (vph)	Volume Served (vph)	Vehicle Delay (sec)
NE Weidler St & NE 2nd Ave	2247	EB	EBL	192	172	6.7	493	60	1,915	1,793	8.3
	2247		EBT	1474	1394	7.4	493	60			
	2247		EBR	173	156	10.9	496	60			
	2247	SB	SBL	14	13	25.4	88	37			
	2247		SBT	19	18	36.0	88	37			
	2247	NB	NBT	29	30	23.9	63	12			
	2247		NBR	14	11	8.6	68	12			
NE Broadway St & NE 2nd Ave	2248	SB	SBT	10	13	16.0	80	20	1,153	1,113	41.8
	2248		SBR	96	91	7.4	81	20			
	2248	WB	WBL	19	18	10.6	485	135			
	2248		WBT	778	765	52.4	485	135			
	2248		WBR	29	24	94.7	483	133			
	2248	NB	NBL	29	30	23.1	183	38			
	2248		NBT	192	173	13.8	183	38			
N Vancouver Ave & NE Hancock St	2249	EB	EBT	10	9	39.1	35	12	274	276	8.9
	2249		EBR	0	0	0.0	35	12			
	2249	WB	WBL	5	3	32.4	97	19			
	2249		WBT	48	45	31.8	97	19			
	2249	SB	SBT	211	220	2.6	94	21			
	2249		SBR	0	0	0.0	94	21			

Appendix D: Regional Mobility Pricing Project /Rose Quarter Regional Travel Demand Model Sensitivity Test Results Summary

Memorandum

Date	July 21, 2022
To	I-5 Rose Quarter Improvement Project Team
From	Regional Mobility Pricing Project Team
Subject	RMPP/RQ Regional Travel Demand Model Sensitivity Test Results Summary

1 Purpose

This memo provides a summary of regional travel demand model (RTDM) results in the vicinity of the I-5 Rose Quarter Improvement Project (RQ Project) for different future model scenarios in 2045. Specifically, this review looked at the impacts that the RQ Project and the Regional Mobility Pricing Project (RMPP) could have on each other. This sensitivity analysis also was prepared to further address issues identified by the RQ Project team in response to stakeholder questions received during the 2019 Environmental Assessment public comment period for the RQ Project.

The Portland Metro RTDM was used to provide high level traffic analysis and comparisons to better understand the relationship between the two projects. The RQ Project would include construction of additional auxiliary lanes and shoulders on I-5 between I-84 and I-405. The RMPP would apply pricing (tolls) on all lanes of I-5 and I-205 to manage traffic congestion.

2 Methodology/Assumptions

Four model scenarios were evaluated in 2045 and compared to assess potential changes in conditions with and without RMPP and with and without the RQ Project improvements. Table 1 shows major projects that were included for each scenario. Scenarios with RQ Project improvements are called No Build while scenarios without RMPP are called No Action.

The RMPP (Action) scenarios include preliminary modeling toll rate assumptions developed for the Initial Congestion Pricing Concept (ICPC). The ICPC scenario was developed to address congestion in 2045 baseline (No Action) conditions. These assume construction of the RQ Project and other (constrained) projects in the Regional Transportation Plan that have been identified as reasonably likely to be funded by 2045. The RMPP toll rate assumptions will be updated/refined as the project is developed further.

The ICPC toll rate assumptions are assumed to be variable by time of day based on an hourly schedule, not dynamically priced as a function of congestion. No adjustments or modifications were made to the toll rate assumptions to account for RQ Project Build/No Build status. The toll rate assumptions were held constant between the two model scenarios that include the RMPP.

Table 1. Scenarios Compared in 2045

	Baseline Scenarios for RMPP		Additional Scenarios for Sensitivity Test	
	RMPP No Action w/ RQ Build	RMPP ICPC w/ RQ Build	RMPP No Action w/ RQ No Build	RMPP ICPC w/ RQ No Build
I-205 Toll Project	✓	✓	✓	✓
I-205 Improvements Project	✓	✓	✓	✓
IBR Program Toll	✓	✓	✓	✓
IBR Program Improvements	✓	✓	✓	✓
Rose Quarter Improvement Project	✓	✓	x	x
RMPP Initial Congestion Pricing Concept	x	✓	x	✓

3 Limitations

Specific results from the RTDM scenarios are expected to differ from the RQ Project technical analysis, as different methodologies, assumptions, and tools are applied in each project. RMPP project results are also expected to change as more detailed and refined analysis will be performed during later project phases.

Regional travel demand models do not supersede or replace the need for more refined traffic operations analysis currently being conducted by the RQ project team. The RTDM forecasts are generally not appropriate for directly predicting future traffic conditions at specific locations. They are best used to support planning decision-making by providing relative comparisons between scenarios and high-level indicators of potential changes in key performance measures.

The RMPP's ICPC was not designed to eliminate traffic congestion in the Rose Quarter but was designed to manage demand and congestion along the I-5 and I-205 corridors in the Portland metro area, assuming the RQ Project improvements have been constructed on I-5. Either updating the project objectives or the baseline assumptions could change the assumed/applied toll rates of the RMPP.

The analysis presented is limited to consideration of results on the I-5 mainline and does not include evaluation of potential changes in traffic conditions on other nearby roadways in the area around the RQ Project.

4 Results

Tables 2 and 3 show the peak hour model volumes on I-5 between I-405 and I-84 for each of the four scenarios. All model scenarios reflect average weekday conditions in 2045. While the number of trips on I-5 increases under a RQ Project build scenario for all four conditions analyzed (two in the AM and two in

the PM), the model network changes indicate that most of these trips are rerouting from other roadways that are alternatives to I-5. This reflects the model reacting to changed conditions to increase the efficiency of the network by transferring trips to I-5 and away from a more congested alternatives such as I-405 and/or surface streets near I-5.

Table 2. 2045 Average Weekday Traffic Volumes on I-5 between I-405 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,948	5,634	3,938	4,179
SB	4,605	5,190	3,356	3,931

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,487	5,121	3,425	3,327
SB	5,624	5,710	4,370	4,071

Source: Metro Regional Travel Demand Model

Table 3. 2045 Average Weekday Traffic Volumes on I-5 between I-84 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,711	5,437	4,150	4,519
SB	4,328	4,884	3,531	3,900

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	4,839	5,534	4,160	4,129
SB	5,046	5,547	4,297	4,236

Source: Metro Regional Travel Demand Model

Both the RQ Project build and the RMPP ICPC would be expected to result in changes in traffic volumes, circulation patterns, and traffic operations on I-5 and other roadways near the RQ Project area. RQ Project improvements are expected to increase the driver's ability to safely navigate the roadway near the junctions of I-5, I-405, and I-84. The RMPP is expected to manage demand to help prevent traffic flow breakdowns with their associated social, economic, and environmental costs. Both of these projects support improved traffic flow and reduced congestion on I-5. While additional analysis would be needed to fully understand the expected changes in traffic operations, looking at relative differences in speeds from the RTDM can provide insights for these projects.

Table 4 and 5 below show the RTDM forecast vehicle speeds during peak hours on I-5 between I-405 and I-84 for each of the four scenarios. All model scenarios reflect average weekday conditions in 2045. It should be noted that small differences in speeds (less than a few miles per hour) are negligible and should not be viewed as a substantive difference between scenarios.

Table 4. 2045 Average Weekday Traffic Speed (in mph) on I-5 between I-405 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	22	33	39	44
SB	39	37	45	44

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	31	39	43	46
SB	31	35	42	45

Source: Metro Regional Travel Demand Model

Table 5. 2045 Average Weekday Traffic Speed (in mph) on I-5 between I-84 and Broadway/Weidler Interchange

8-9 AM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	14	32	27	41
SB	38	39	44	44

5-6 PM	RMPP No Action		RMPP ICPC	
	RQ No Build	RQ Build	RQ No Build	RQ Build
NB	14	33	27	44
SB	33	36	41	44

Source: Metro Regional Travel Demand Model

The RQ Project would not construct any improvements to I-5 southbound between I-405 and Broadway/Weidler interchange; the added auxiliary lane and shoulder in the southbound direction begins south of the southbound Broadway exit. RTDM traffic speed results in this section show limited changes when comparing RQ No-Build and RQ Build in the RMPP ICPC. A more detailed traffic operations analysis is needed to incorporate additional operational factors such as downstream queuing impacts. However, some trends can be identified.

In general, most freeway facilities tend to operate with maximum vehicle flow when average speeds are between 40 mph and 50 mph. Speeds below 40 mph usually indicate a freeway with congestion that negatively impacts its ability to efficiently move vehicles and that can lead to major flow breakdowns. To achieve speeds above 50 mph, the freeway is not likely to be carrying all traffic that it could. The analysis indicates that speeds between 40mph and 50 mph are achieved on all roadway segments only where both the RMPP and the RQ Project improvements are in place.

Table 6 shows the number of hours per day that congestion can be expected to be experienced on I-5 for each of four scenarios and shows the complementary effect with both strategies in place. All model scenarios reflect average weekday conditions in 2045.

Table 6. 2045 Daily Number of Hours with Congestion on I-5 between I-84 and I-405

		RMPP No Action		RMPP ICPC	
		RQ No Build	RQ Build	RQ No Build	RQ Build
Between **I-405** and Broadway/Weidler Interchange	NB	13	6	7	0
	SB	6	8	0	0
Between **I-84** and Broadway/Weidler Interchange	NB	15	13	12	0
	SB	12	7	0	0

Note: Congestion defined when the ratio of hourly model volume to roadway capacity exceeds 0.8.

Source: Metro Regional Travel Demand Model

5 Summary of Findings

The following observations were made based on comparing the RTDM results for 2045 scenarios:

- Both the RQ Project and RMPP Initial Congestion Pricing Concept (ICPC) were needed to reduce congestion below the congestion threshold (0.80 V/C) for all hours and directions of travel.
- RMPP ICPC could reduce peak hour volumes/demand on I-5 by approximately 1,000 vehicles per hour or more in each direction near the Rose Quarter.
- The RQ Project and RMPP ICPC are each expected to reduce the duration and severity of congestion on I-5 near the Rose Quarter.
- RMPP ICPC is comparatively more effective at improving speeds to above 40 mph.
- RMPP ICPC toll rate assumptions would need to be refined if RQ Project improvements are not constructed. Otherwise, severe congestion would remain on northbound I-5 near I-84.
- For a more refined operational analysis, post-processing of the RTDM results is necessary.