UNIVERSITY OF WASHINGTON

HUSKY STADIUM

TRANSPORTATION MANAGEMENT PLAN UPDATE

FINAL ENVIRONMENTAL IMPACT STATEMENT

NOVEMBER 2018

UNIVERSITY *of* WASHINGTON
CAPITAL PLANNING & DEVELOPMENT

PUBLIC NOTICE
UNIVERSITY OF WASHINGTON

Pursuant to the provisions of WAC 197-11-455, 197-11-510 and WAC 478-324-140, the University of Washington hereby provides public notice of the:

AVAILABILITY OF A FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)

Project Name: Husky Stadium Transportation Management Plan
Proponent: University of Washington – Seattle Campus

Description of Proposal: The University is updating the Husky Stadium Transportation Management Plan (TMP). The University's goal is to prepare a TMP that accommodates a maximum crowd of 70,000 people; modifies mode goals and operational logistics for hosting smaller events than football games (e.g. UW Commencement, other athletic events, etc.); maximizing alternatives modes of transportation to reach stadium events; allows flexibility to incorporate future development in transit options (i.e. opening of new light rail stations); and recognizes and accounts for special challenges presented by weekday football games. Two alternatives were analyzed in the Environmental Impact Statement – Proposed TMP Alternative 1 (the Action) and the No Action alternative.

Location of Proposal: Seattle Campus, Husky Stadium is located in the East Campus adjacent to Montlake Boulevard and the University of Washington Link Light Rail station.

Lead Agency: University of Washington

EIS Availability: The Final EIS covers all elements of the environment relevant to the project and can be found online at: https://cpd.uw.edu/programs/sepa. A copy will be available in Suzzallo library.

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Date: November 9, 2018

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FINAL

ENVIRONMENTAL IMPACT STATEMENT

for the

UNIVERSITY of WASHINGTON

Husky Stadium Transportation Management Plan Update

University of Washington

Capital Planning and Development Office

The Final Environmental Impact Statement (Final EIS) for the University of Washington *Husky Stadium Transportation Management Plan Update* has been prepared in compliance with the State Environmental Policy Act (SEPA) of 1971 (Chapter 43.21C, Revised Code of Washington); the SEPA Rules, effective April 4, 1984, as amended (Chapter 197-11, Washington Administrative Code); and rules adopted by the University of Washington implementing SEPA (478-324 WAC). Preparation of this Final EIS is the responsibility of the University's Capital Planning and Development Office. The Capital Planning and Development Office and the University's SEPA Advisory Committee have determined that this document has been prepared in a responsible manner using appropriate methodology and they have directed the areas of research and analysis that were undertaken in preparation of this Final EIS. This document is not an authorization for an action, nor does it constitute a decision or a recommendation for an action; in its final form, it will accompany the *Proposed Action* and will be considered in making the final decisions on the proposal.

Date of Draft EIS Issuance .... **May 18, 2018**

Date of Final EIS Issuance .... **November 9, 2018**

Information added subsequent to the issuance of the Draft EIS is shaded to ease in the identification of added information.

PROJECT TITLE

University of Washington Husky Stadium Transportation Management Plan Update

PROPONENT/APPLICANT

University of Washington

LOCATION

Husky Stadium is located in the East Campus area of the University of Washington Campus and is generally bounded by Snohomish Lane South, Alaska Airline Arena and the Nordstrom Tennis Center to the north; the Women's Softball Field and an outdoor practice facility to the east; the E15 and E12 parking areas to the south; and, Montlake Boulevard NE to the west

PROPOSED ACTION

The Proposed Action is an update to the Husky Stadium Transportation Management Plan (TMP Update) which was originally developed in 1986. The TMP Update responds to changes in the transportation infrastructure surrounding the stadium, changes in event scheduling, and responds to changes in technology and mode choice.

EIS ALTERNATIVES

For the purposes of environmental review, two alternatives are analyzed in this Draft EIS, including the No Action Alternative and Alternative 1 – Proposed TMP Update.

No Action Alternative

Under the No Action Alternative, the proposed TMP Update would not occur and the existing TMP would remain in effect for Husky Stadium. This alternative would not meet the University's goals and objectives.

Alternative 1 – Proposed TMP Update

The proposed TMP Update is intended to continue to effectively move stadium attendees into alternatives to cars, with priority on transit, high capacity vehicles, biking and walking, in order to decrease congestion and parking impacts associated with Husky Stadium football games and other events at the Stadium. The proposed TMP Update reflects changes in the transportation system occurring subsequent to the 1986 TMP, including transportation options available through Sound Transit Link Light Rail, new trends (including car share and Transportation Network Companies such as Uber and Lyft), and changes in the availability and cost of charter shuttle buses. This alternative would meet the University's goals and objectives.

LEAD AGENCY	University of Washington, Capital Planning & Development
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PURPOSE OF THIS EIS	This EIS is intended to address the potential for significant adverse environmental impacts that could occur as a result of the Proposed Action. The SEPA environmental review process is designed to be used along with other decision-making factors to provide a comprehensive review of the proposal (WAC 197-11-055). The purpose of SEPA is to ensure that environmental values are given appropriate deliberation, along with other considerations.

FINAL ACTION

The decision by the Board of Regents, after consideration of environmental impacts and mitigation, to approve the TMP Update.

PERMITS AND APPROVALS

Preliminary investigation indicates that the following permits and/or approvals could be required or requested for the Proposed Actions. Additional permits/approvals may be identified during the review process.

University of Washington

- Approval and adoption of the TMP Update.

Agencies with Jurisdiction

- ***City of Seattle***
  - Approval by the City Council

EIS AUTHORS AND PRINCIPAL CONTRIBUTORS

The *Husky Stadium Transportation Management Plan Update* EIS has been prepared under the direction of University of Washington Capital Planning & Development, and analyses were provided by the following consulting firms:

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PREVIOUS ENVIRONMENTAL DOCUMENTS

Per WAC 191-11-635, this EIS incorporates by reference the following environmental document:

- University of Washington 2018 Seattle Campus Master Plan EIS

LOCATION OF BACKGROUND INFORMATION

Background material and supporting documents are located at the office of:

University of Washington
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University Facilities Building
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DATE OF FINAL EIS ISSUANCE

November 9, 2018

AVAILABILITY OF THE DRAFT AND FINAL EIS

The Draft and Final EIS have been distributed to agencies, organizations and individuals noted on the Distribution List contained in **Appendix A** to this document. Copies of the Draft and Final EIS are also available for review at University Capital Planning & Development (University Facilities Building), on the University's Online Public Information Center (http://cpd.uw.edu/uw-seattle), and at the following University and Seattle Public Libraries:

University of Washington

- Suzzallo Library
- Architecture and Urban Planning (Gould Hall)

Seattle Public Libraries

- Downtown Central Library (1000 Fourth Avenue)
- University District Branch (5009 Roosevelt Way NE)
- Montlake Branch (2300 24th Avenue E)

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CHAPTER 1

Summary

CHAPTER 1
SUMMARY

1.1 INTRODUCTION

This chapter, along with the **Fact Sheet**, provides project facts, contact information and a brief summary of the Environmental Impact Statement (EIS) for the University of Washington *Husky Stadium Transportation Management Plan Update (TMP Update).* **Chapter 1** contains an overview of the proposal and environmental impacts identified for the EIS Alternatives. Please see **Chapter 2** of this Final EIS for a more detailed description of the Proposed Action and alternatives and **Chapter 3** for a detailed description of the affected environment, environmental impacts, mitigation measures, and significant unavoidable adverse impacts. Information added subsequent to the issuance of the Draft EIS is shaded to ease in the identification of added information.

1.2 SUMMARY OF ALTERNATIVES

No Action Alternative

Under the No Action Alternative, the proposed *TMP Update* would not occur and the existing TMP would remain in effect for Husky Stadium. Under the No Action Alternative, objectives of the proposed *TMP Update* would not be achieved including objectives related to weekday event management, addressing future changes in the transportation system (including expansion transit service), adopting modes and operational goals related to smaller events, flexibility to meet transit goals and changing infrastructure, and reduced dependence on event charter coaches. This alternative would not meet the University's goals and objectives.

Alternative 1 – Proposed TMP Update

The proposed *TMP Update* is intended to continue to effectively move stadium attendees into alternatives to cars, with priority on transit, high capacity vehicles, biking and walking, in order to decrease congestion and parking impacts associated with Husky Stadium football games and other events at the Stadium. The proposed *TMP Update* reflects changes in the transportation system occurring subsequent to the 1986 TMP, including transportation options available through Sound Transit Link Light Rail, new trends (including car share and Transportation Network Companies such as Uber and Lyft), and changes in the availability and cost of charter shuttle buses.

The proposed *TMP Update* includes strategies associated with the following components:

- Transit;
- Pedestrian;
- Bicycle and Bike Share;
- General Purpose Vehicles;
- Shared Use Transportation;
- Boats;
- Parking; and,
- Outreach and Education.

Alternative 1 would meet the University's goals and objectives.

1.3 SUMMARY OF THE PROPOSAL AND IMPACTS

The following highlights key aspects of the proposed *TMP Update* and potential for impacts in question and answer format. This summary is not intended to be a substitute for the complete discussion on transportation conditions that is contained in **Chapter 3** and the Transportation Discipline Report (Transpo Group, November 2018) in **Appendix B**.

Q1. ***Why is the University of Washington Updating the Husky Stadium TMP?***

A1. The Update to the Husky Stadium TMP is proposed to respond to ongoing and planned changes in the transportation systems surrounding and serving the stadium occurring subsequent to the 1986 TMP.

Q2. ***Why is an EIS being prepared for the Husky Stadium TMP Update?***

A2. Consistent with the intent of the Washington State Environmental Policy Act (SEPA), an EIS is being prepared for the Husky Stadium TMP Update to ensure that environmental values are considered during decision-making, and provide a mechanism for public review and input.

Q3. ***Will there be any impacts to pedestrian circulation during Husky Stadium events under the proposed TMP Update?***

A3. The number of pedestrians accessing Husky Stadium under the proposed *TMP Update* would not increase from current conditions and would be less than assumed under the 1986 Husky Stadium TMP[1], thus there would be no potential for impacts associated with increased pedestrian volumes during Husky Stadium events.

Additionally, the pedestrian infrastructure in the vicinity of Husky Stadium has improved subsequent to the 1986 TMP, including construction of the pedestrian bridge connecting the Link light rail University of Washington Station with Central Campus, and improved

[1] *Current stadium capacity of 71,150 is less than stadium capacity of 72,200 in 1986; stadium capacity was reduced as part of the 2012 renovation to accommodate suites and other amenities.*

pedestrian plaza in front of the stadium. The other pedestrian bridges over Montlake Boulevard connecting East Campus (including Husky Stadium) to Central Campus, and the Montlake Boulevard sidewalk system continue to provide pedestrian connections to the stadium.

The 2017 pedestrian flow analysis conducted for this EIS indicates that there would be no pedestrian volume impacts under the proposed *TMP Update*.

Q4. ***Will there be any impacts to <u>bicycle circulation</u> during Husky Stadium events under the proposed TMP Update?***

A4. Compared to the current TMP, the bicycle environment under the proposed *TMP Update* would reflect a focus on intercepting bicyclists at more locations to minimize conflicts with other modes (vehicles, pedestrians, etc.). A bike valet would continue to be provided to help promote biking to Husky Stadium football games. In addition, bike share would be managed to minimize conflicts during Husky Stadium events with operations at University of Washington Station. There would be no bicycle impacts under the proposed *TMP Update*.

Q5. ***Will <u>transit operations</u> change under the proposed TMP Update?***

A5. An intent of the proposed *TMP Update* is to increase use of transit (including bus transit and light rail) and reduce vehicle and charter bus trips to stadium events. Transit capacity associated with current and planned bus and light rail systems servicing the stadium is sufficient to meet increased ridership, and no impacts to bus transit and light rail is anticipated.

Q6. ***How will strategies for <u>managing vehicle trips</u> change under the proposed TMP Update?***

A6. The existing 1986 TMP has a 72 percent auto mode goal, with a focus on managing vehicle traffic around Husky Stadium, as well as reducing reliance on automobiles; currently 37 to 42 percent of Husky Stadium attendees arrive and depart via autos.

The proposed *TMP Update* includes a non-auto mode goal that increases over time as regional transit and infrastructure improvements are implemented, as well as strategies to increase efficiency of vehicle movement. Under the proposed *TMP Update*, intersection operation in the vicinity of the stadium would improve compared to conditions under the current TMP.

Q7. ***What will <u>parking conditions</u> be like under the proposed TMP Update?***

A7. With proposed *TMP Update* measures to reduce reliance on automobiles, the demand for parking would be similarly reduced. Parking during Husky football games under the proposal would continue to be managed by University of Washington's Transportation

Services and Athletics. There would be no adverse parking impacts associated with the proposed *TMP Update*.

CHAPTER 2

Description of Proposed Action and Alternatives

CHAPTER 2
PROJECT DESCRIPTION

This chapter of the Final Environmental Impact Statement (FEIS) describes the Proposed Actions (Alternative 1) for the University of Washington Husky Stadium Transportation Management Plan Update (*TMP Update*) Project. A description of the No Action Alternative is also provided in this chapter. A detailed description of the affected environment, environmental impacts, mitigation measures, and significant unavoidable adverse impacts is provided in **Chapter 3** of this FEIS. Information added subsequent to the issuance of the Draft EIS is shaded to ease in the identification of added information.

2.1 PROJECT SUMMARY

The proposed Husky Stadium *TMP Update* updates a plan developed in 1986 (1986 TMP). It responds to ongoing changes in the transportation infrastructure surrounding Husky Stadium and responds to changes in technology and mode choice. In addition, it considers future investments in the transportation system that will influence key elements of the *TMP Update*. The *TMP Update* is not intended to address transportation to and from other Seattle Campus events/activities or venues. Transportation management strategies for other University events and activities are detailed in the University of Washington (UW) TMP.

The proposed *TMP Update* is intended to continue to effectively move stadium attendees into alternatives to cars, with priority on transit, high capacity vehicles, biking and walking, in order to decrease congestion and parking impacts on the surrounding community. The proposed *TMP Update* reflects changes in the transportation system occurring subsequent to the 1986 TMP, including transportation options available through Sound Transit Link Light Rail, new trends (including car share and Transportation Network Companies such as Uber and Lyft), and changes in the availability and cost of charter shuttle buses. The proposed *TMP Update* also reflects recent changes in football game scheduling, including weekday night games.

2.2 HUSKY STADIUM HISTORY (1920-Present)

As shown in **Figure 2-2**, Husky Stadium is located in the southeast portion of the University of Washington's Seattle campus, east of Montlake Boulevard NE and west of Union Bay. The original Husky Stadium was constructed in 1920 with a seating capacity of approximately 30,000; the stadium replaced Denny Field in the northeast portion of campus as the home field for Husky football.

Source: University of Washington, 2016.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-1
Campus Map

Since original construction in 1920, Husky Stadium has been renovated and expanded several times[1], including a 1987 renovation with the North Deck addition that expanded the seating capacity from approximately 58,000 to approximately 72,200, and the latest renovation in 2011-2012 that resulted in a total seating capacity of approximately 70,150.[2] The latest renovation project included a new concourse, press box, football offices, suites, and concession stands/restrooms. The track that had enclosed the playing field was removed and the field was lowered by approximately four feet to allow seating closer to the field.

Husky Stadium serves as the practice facility and game facility for the Husky football team. As such, it is used frequently for a variety of football related activities. Unlike other event facilities in the City of Seattle, Husky Stadium has not historically been utilized to host multiple types of events. The facility is configured to primarily accommodate Husky football events. However, Husky Stadium can host other types of events; for example, Husky Stadium hosts University of Washington commencement.

Husky Stadium is currently configured with upper bowl and lower bowl seating areas. The lower bowl can be accessed from the main concourse level. With this initial access, up to approximately 42,000 seats can be utilized. Access to the upper bowl, which increases the total the stadium capacity to approximately 71,150, can be restricted. Based on University of Washington internal operations, the large events are defined as attendance greater than 42,000 and the smaller events are considered events less than or equal to 42,000 attendees

2.3 HUSKY STADIUM TMP HISTORY (1986-2017)

The February 1986 University of Washington *Stadium Expansion Parking Plan and Transportation Management Program* and subsequent 1986 *Operational Supplement* (referred collectively as the 1986 TMP), documented the strategies and specific steps for mitigating transportation impacts on the surrounding community with the 1987 Husky Stadium expansion (planned addition of north upper deck); with the north upper deck addition, stadium capacity increased from approximately 58,500 to approximately 72,200. The focus of the 1986 TMP was to accommodate a sellout crowd of 72,200 attendees with less reliance on parking in residential areas near campus. The key to accomplishing this goal

[1] *Renovations in 1935 (approximately 10,000 additional seats), 1950 (approximately 15,000 additional seats), 1968 (approximately 3,000 additional seats), 1987, and 2012*.

[2] *Stadium capacity reduced from the previous 72,200 capacity to accommodate suites and other amenities*.

was to provide incentives for taking transit and carpooling by providing pricing incentives, expanding transit, and providing a limited amount of additional on-campus parking.

The University of Washington Husky Stadium transportation management history highlights are summarized as follows:

- **1986-1987** – The University of Washington and City of Seattle agree upon a Transportation Management Plan (1986 TMP) to mitigate impacts of proposed added stadium capacity (north upper deck) on the surrounding community; stadium capacity increases from 58,500 to 72,200. The 1986 TMP established a park-and-ride system and transit use goal of 16 percent. The 1986 TMP detailed event traffic management lane configurations, parking locations and subsidized transit procedures.

- **2007** – The University of Washington contracts with Metro to provide approximately 150 buses per game to meet demand. Bus ridership to Husky Stadium reaches 32 percent.

- **2008** – The Federal Transit Administration (FTA) declares that public transit operators such as Metro cannot operate sporting event shuttles if a private provider is available (FTA Charter Rule). A waiver from this requirement is adopted with a 2016 expiration.

- **2010** – The University of Washington hosts its first weekday game.[3] Metro buses are unavailable for weekday night game shuttle service due to regular service obligations.

- **2011-2012** – Husky Stadium undergoes renovation with home games played at Century Link Field. The 1986 TMP does not apply to games at Century Link Field, with fans paying full bus fare to and from games.

- **2012** – Renovated Husky Stadium reopens; due primarily to the addition of box suites, stadium capacity reduced from 72,200 to 70,150. The University of Washington is relieved (exception) of paying the full bus fare for fans during the 2013 through 2015 seasons. The subsidized bus fare exception is extended through the 2019 season to allow TMP updates work accessing the impact of light rail to ridership patterns.

- **2016** – The University of Washington Station (Link Light Rail) opens near Husky Stadium.

[3] *The Pacific 12 Conference requires that each team host a weekday night game two out of every three years.*

- **2017** – With the expiration of the exemption to the FTA Charter Rule, the University of Washington utilizes a hybrid Metro/private charter approach to providing bus service to Husky Stadium.

- **2017** - The University of Washington initiates collection of game day ridership data associated with light rail.

2.4 1986 TRANSPORTATION MANAGEMENT PROGRAM

As indicated earlier in this chapter, the goals of the 1986 Transportation Management Program (1986 TMP) was to accommodate a sellout crowd of 72,200 with less reliance on parking in the residential areas near campus, and to expedite post-game traffic. The 1986 TMP provides incentives for people to take transit, carpool or other alternative modes, and provide a limited amount of additional parking on-campus. The major parts of the transit program were Transit Scrip Service, Expanded Transit Service, and the Discount Carpool Program. Provisions for Ride Matching, Boat Transportation, Traffic Control, and Parking are also included.

- **Transit Scrip Program** - A major goal of the 1986 TMP was to encourage football game attendees to take public transportation to the stadium. To help achieve this goal, reduced transit rider cost was to be accomplished by providing each football game ticket purchaser with a transit scrip that allowed free transit rides to and from the game.

- **Transit Service** – Provisions for Transit service in the 1986 TMP is divided into three areas as listed below.

  - <u>Husky Special Service</u> – Husky Special Service relates to service added by Metro on four existing routes. Transit scrip provided by the University of Washington was intended to be accepted on these routes.

  - <u>Regular Metro Service</u> – Although no increase in the number of buses on other regular Metro routes is provided, the University-issued transit scrip was intended to be valid on regular Metro routes as well as “Husky Special” service.

  - <u>Park-and-Ride Service with Transit Scrip</u> – The objective was to designate park-and-ride lots and routes that provide the shortest travel times to the stadium, and arrange for additional buses at the lots on game days. Post-game buses intended to load immediately following the game and dispatch before congestion builds (within 20-30 minutes).

- **Discount Carpool Program** - The carpool discount parking program relates to changes in the parking rate schedule to encourage more carpools (vehicles with three or more persons); the change in parking rates includes a lower parking fee for vehicles with three or more persons. The initial rate schedule was adjusted as needed to achieve the goal of the carpool program (average of 2.7 persons per car) and provide operating revenue for the other parts of the Transportation Plan.

- **Ride Matching** - The University of Washington, as well as Metro's Commuter Services, operate ride-matching services in King County. These services aid the formation of carpools by matching origins and destinations of trips. Applications for free ride matching services were to be mailed to all season ticket holders with their football tickets, along with an explanation of the service. Attendees who purchase individual tickets at the University of Washington Athletic Department were also to be given applications for this service at the time of purchase.

- **Boat Transport** - The University of Washington provides moorage for up to 200 private boats and approximately 13 charter boats for Husky football games. The 1986 TMP indicates that the University of Washington would encourage full use of the available moorage through marketing and promotions. The utilization of boat moorage for football games is typically weather related, with lower use on stormy weather days.

  The 1986 TMP includes discussion on water taxis - boats capable of carrying over 100 passengers that could link the University with areas on the east side of Lake Washington and South Lake Union.

- **Traffic Control** - The 1986 TMP included few changes to the already well-developed pregame traffic control plan. The additional automobiles and buses expected for a sellout game would be distributed by trip origin and time of arrival similar to those systems in place prior to the 1986 TMP. The pre- and postgame systems for signs, traffic flow, pedestrian flow, emergency vehicle access and staffing levels implemented would be similar to previous systems.

- **Parking Program** - The goals of the parking program were three-fold: 1) to provide additional University controlled parking for the general public; 2) to provide close in parking for Tyee Club members; and, 3) to encourage people to park in areas compatible with their existing traffic flow destination.

2.5 CHANGED CONDITIONS

Over the approximately 30 years since the drafting of the 1986 TMP, changes in the overall transportation environment have occurred that relate to the TMP. These include changes associated with the, the regulatory environment (FTA Charter Rules), an increase in public transit service, transportation providers (Transportation Network Companies), and transportation infrastructure improvements (Sound Transit Light Rail).

- **FTA Charter Rules** – In 2008, the Federal Transit Administration (FTA) declared that public transit operators such as Metro cannot operate sporting event shuttles if a private provider is available (FTA Charter Rule). A waiver from this requirement is adopted with a 2016 expiration; a subsequent extension of the waiver through the 2019 season is granted.

- **Metro Service** – Metro bus service demands on non-university routes has increased steadily since 1986, resulting in less Metro bus availability to meet game day bus service demand.

- **Transportation Network Companies** – Over the last decade, an increasing number of fans have utilized transportation network companies (Uber, Lyft, etc.). The University of Washington currently coordinates directly with Uber and Lyft regarding drop-off and pick-up zones to direct operations away from Husky Stadium.

- **Sound Transit Light Rail** – Sound Transit's University of Washington Station opened in 2016; the Station is located adjacent to Husky Stadium. An estimated 8,100 to 10,200 fans traveled to Husky Stadium via Sound Transit light rail for the first three games of the 2017 season.

2.6 HUSKY STADIUM TMP UPDATE OBJECTIVES

As indicated earlier in this chapter, the University of Washington is proposing an update to the 1986 TMP that responds to ongoing changes in the transportation infrastructure surrounding Husky Stadium and considers planned investments in the transportation system that will influence key elements of the Plan. The University of Washington has identified the following Objectives for the proposed *TMP Update*.

- Develop a TMP that includes **forward-looking strategies** that continue to effectively move stadium attendees into alternatives to cars, with priority on transit, high capacity vehicles, biking and walking, in order to decrease congestion and parking impacts on the surrounding community.

  - Promote transportation choices available through expanding transit options, such as Sound Transit Link light rail and RapidRide.

  - Incorporate strategies that acknowledge newer trends in transportation (e.g. car share, ride share, bike share) and focus on decreasing automobile use and minimizing impacts related to this mode.

- Develop **weekday** event management strategies, including strategies to meet the unique challenges of weekday football games (as of 2018, one weekday game per season is required two out of every three years).
- Build a flexible structure for annual operating plans that can address **future changes** in the transportation system (e.g. SR 520 improvements, proposed second bascule bridge, bus route changes prompted by One Center City).
- Increase **flexibility** regarding the use of special-event-only transit service, in favor of other transit service options, in order to decrease congestion on roadways surrounding the stadium, reduce dependence on curb space in the U-District to stage buses, and address general issues with availability.
- Provide the **accountability tools** to achieve outcomes and report to stakeholders.

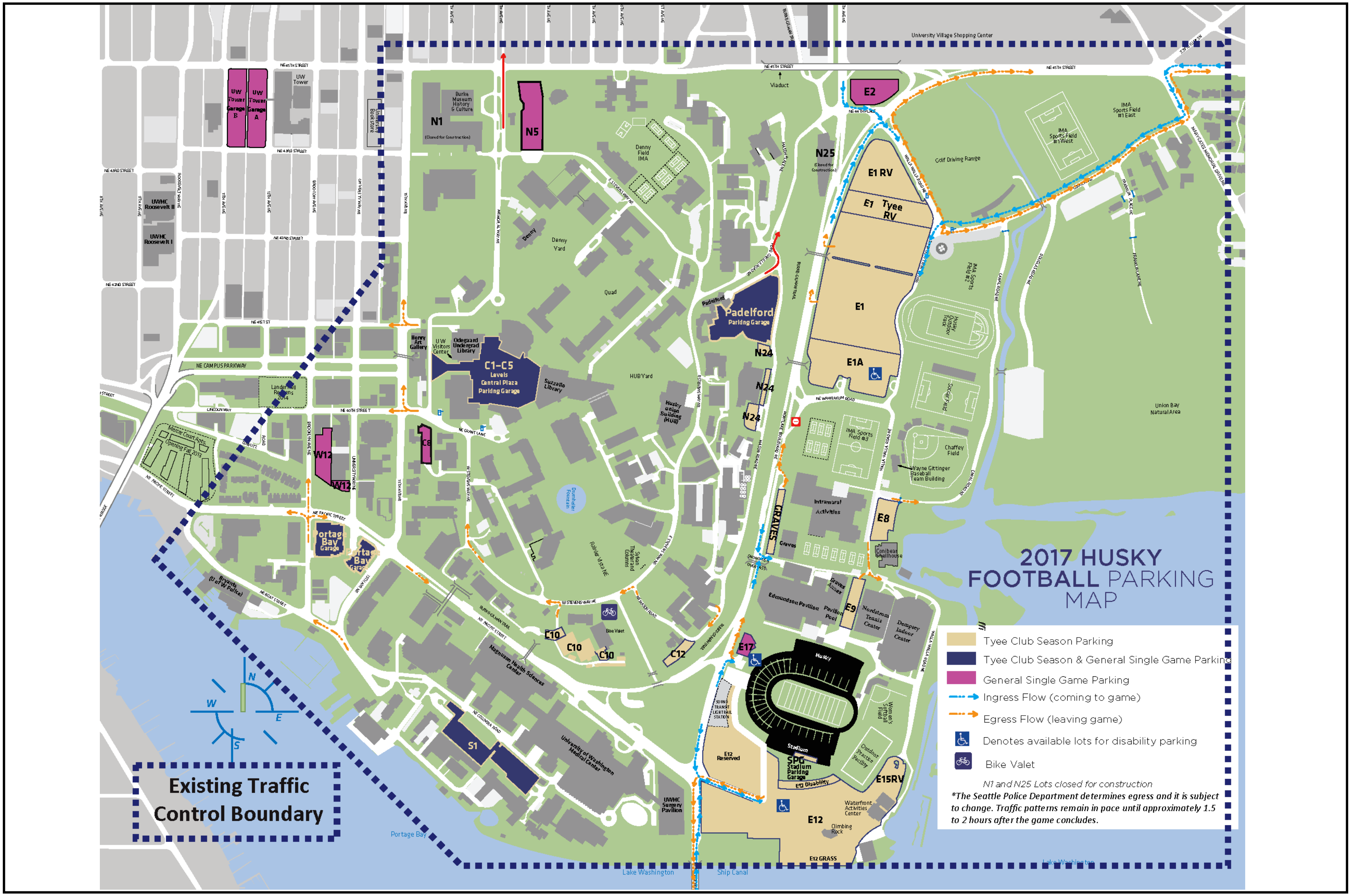
2.7 HUSKY STADIUM TMP UPDATE

Introduction/Overview

The proposed *TMP Update* responds to ongoing changes in the transportation infrastructure surrounding the stadium, responds to changes in the transportation regulatory environment, considers planned investments in the transportation system that will influence transportation in the Stadium area, as well as providing strategies for efficient movement of vehicles/bicycles/pedestrians before and after events. **Figure 2-2** illustrates the Husky Stadium traffic control boundary, illustrating the core area on campus where traffic control is implemented during large stadium events.

The proposed *TMP Update* includes eight programmatic components, each one providing strategies to support the success of the overall TMP program; the *TMP Update* components include Transit, Pedestrian, Bicycle and Bike Share, General Purpose Vehicles, Shared-use Transportation (e.g., Transportation Network Companies and Car Share), Boats, Parking Management, and Outreach and Education. The strategies may be implemented one at a time, or in combination with other strategies. The University of Washington Department of Athletics may choose among these strategies or potentially other, yet to be identified strategies, as a way of limiting vehicle trips and encouraging the use of multimodal transportation options.

University of Washington Husky Stadium Transportation Management Plan Update
Final Environmental Impact Statement



Source: Transpo Group, 2018.

EA Engineering, Science, and Technology, Inc., PBC

Figure 2-2
Husky Stadium Traffic Control Boundary

As an element of the proposed *TMP Update*, the University of Washington commits to monitoring and reporting on the Husky Stadium performance related to the established goals. The University of Washington would also conduct an annual survey and provide the results to the Stadium TMP Technical Advisory Group, which is comprised by representatives of the University of Washington, City of Seattle departments, Washington State Department of Transportation, King County Metro, Sound Transit, and any other necessary governmental agencies. The University of Washington would also prepare an annual operations plan identifying the specific operational elements of the *TMP Update*. This Operations Plan would be informed by the Stadium TMP Technical Advisory Group. The Operations Plan would be informed by the results of the previous year's intercept survey and would address *TMP Update* strategies as necessary to achieve the performance goals outlined in the plan.

The proposed *TMP Update* is not intended to address transportation to and from other Campus events/activities or venues. Transportation for other University events or activities is specified in the University of Washington TMP.

TMP Update Components

The proposed eight *TMP Update* components (Transit, Pedestrian, Bicycle and Bike Share, General Purpose Vehicles, Shared-Use Transportation, Boats, Parking Management, and Outreach and Education) are described as follows.

Transit

The transit component of the *TMP Update* identifies strategies to maintain and enhance use of transit by event attendees across the region. Currently, the University supports transit ridership to regular season football games using private carriers, and contracted service from Metro. Event patrons may also use available regular public transit service provided by King County Metro, and Sound Transit. Event level congestion around the University of Washington Husky Stadium makes transit a desirable choice for attending football games.

The University of Washington Husky Stadium enjoys excellent transit service due to its proximity to the University of Washington Link light rail Station as well as Montlake Triangle and Stevens Way which accommodates King County Metro, Community Transit[4] and Sound Transit bus service. Before and after events, transit service is an effective choice for transporting event patrons to and from the stadium. Maintaining non-event related transit function traveling through the area during events is also important to maintain.

[4] *Community Transit currently provide service only on weekdays with limited service during the peak commute times.*

Sound Transit's Link light rail was extended to the University of Washington in March of 2016. The Northgate Link Extension, opening in 2021, includes the University District Station at NE 43rd Street and Brooklyn Ave NE. Light rail service will further expand in 2023, including service to Overlake and Bellevue and in 2024 to Lynnwood, Federal Way, Des Moines, and Downtown Redmond. As compared to the current bus transit serving these areas, Link light rail affords a frequent, reliable, high capacity trip with extended service hours. Light rail also operates in a separate right of way and is not subject to roadway congestion. The opening of the University of Washington Station in 2016 resulted in increased use of transit for accessing the University District and events at Husky Stadium. King County Metro in partnership with the City of Seattle will also offer more frequent service with expanded hours through four RapidRide lines that will serve the University District.

The Transit Component of the proposed *TMP Update* includes strategies to maximize use of transit by event attendees to reduce congestions, and reduce/replace private shuttles with emerging public transit (see **Appendix B** – Transportation Discipline Report for details on the transit strategies included in the proposed *TMP Update*).

Pedestrian

All attendees of Husky Stadium events are pedestrians at some point during their travel. The University of Washington provides a network of pedestrian paths throughout the campus with connections to the local street and trail networks across the campus. In addition, there is an expansive pedestrian plaza in front of Husky Stadium with convenient, pedestrian scale, connections to the Burke Gilman Trail, University of Washington Station, and campus and future RapidRide stops. A grade separated pedestrian bridge over Montlake Boulevard provides additional, access over arterial streets and is accessible by elevator. This grade separated connection along with three other pedestrian bridges over Montlake Boulevard, provide high capacity, unimpeded access to the stadium from the core of the University of Washington campus and Burke-Gilman Trail. Additionally, new and enhanced connections for pedestrians and bicycles are planned to connect the stadium to areas south of the Montlake Cut via a second bascule bridge. A new trail connection to the Eastside along the SR 520 floating bridge opened in 2017.

The Pedestrian Component of the proposed *TMP Update* includes strategies to protect and improve upon the pedestrian-oriented stadium area, improve wayfinding to and from Husky Stadium and transportation destinations, enhance quality and security of pathways, and manage vehicular and pedestrian movement around the University of Washington Station (see **Appendix B** – Transportation Discipline Report for details on the pedestrian strategies included in the proposed *TMP Update*).

Bicycle and Bike Share

The number of Husky football fans cycling to the Stadium is currently limited; however, bike use is accommodated through the existing bicycle facilities and valet bicycle parking.[5] Additionally, the City of Seattle is implementing a bike share program[6] that provides additional opportunities for biking to the Stadium. The Bicycle Component of the proposed *TMP Update* includes strategies to minimize bike share parking in pedestrian pathways, reduce bicycle conflicts with other modes, encourage safe access to events by bicycle, and provide bike incentives for employees who work at the Stadium (see **Appendix B** – Transportation Discipline Report for details on the bicycle strategies included in the proposed *TMP Update*).

General Purpose Vehicles Access/Circulation/Management

While the desire of the University of Washington is to continue to decrease the use of general purpose automobiles to access events, active management of this mode is critical to maintaining a safe and reliable transportation system for non-event commuters. The General Purpose Vehicle Component of the proposed *TMP Update* includes strategies to encourage use of alternative modes, increase average auto-occupancy, minimize non-game auto travel near the Stadium, maintain reliable freight and emergency service access to the Stadium/hospitals, and coordinate with Seattle Department of Transportation regarding message signs, and manual intersection control/road closures to effectively direct vehicles in and out of the Stadium area (see **Appendix B** – Transportation Discipline Report for details on the general purpose vehicle access/circulation strategies included in the proposed *TMP Update*).

Shared-Use Transportation

Shared-use transportation includes a range of methods for providing flexible travel options through the sharing of transportation resources including cars and bikes. Shared-use automobile options are expanding and emerging including transportation network companies (TNCs) like Lyft and Uber and car share like Car2Go, Reach Now and ZipCar which provide short-term, one directional and unplanned use of vehicles without the responsibility for parking or returning the vehicles. To better manage TNC vehicle access in the stadium

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[5] *University of Washington Transportation Services provides free bicycle valet services on football game days. The valet is located on Rainier Vista at Stevens Way, just off the Burke-Gilman Trail. The valet opens 3-hours before kickoff and Transportation Services staff maintain bike security during the game. Post-game, bicycles are picked up within one hour after the game ends.*

[6] *Bike share, a program where people can rent bicycles for short trips, is being implemented by the City on an experimental basis. Bike share parking is not limited to defined areas. Bike share can become a viable option for attending events as people have a range of options to get to the game and are free to make decisions at the spur of the moment for trips to and from an event.*

area, the University of Washington provides a designated TNC drop-off/pick-up zone on game days along Okanogan Lane in Central Campus. The intent of the shared-use transportation strategies are to minimize impacts of TNC vehicles with other congestion on the street system near the Stadium.

The Transportation Network Companies and Car Share Component of the proposed *TMP Update* includes strategies to support expansion of higher occupancy mobility options for TNCs and car share, actively manage TNC activity by designating drop-off and pick-up areas, and define additional TNC strategies to further minimize congestion (see **Appendix B** – Transportation Discipline Report for details on the transportation network company and car share strategies included in the proposed *TMP Update*).

Boats

The University of Washington is one of three schools in the country to bring fans to the stadium by boat and the use of Husky Harbor is a unique and popular form of transportation to Husky Stadium on game day. As of the 2018 season, all dock space was sold out for every game for both charter boats and private boats. Approximately 150 boats dock on game days and all dock space is utilized around the Waterfront Activities Center (WAC) and Conibear Shellhouse. In addition, water taxi service is also provided for boats that anchor in Union Bay and up to 1,000 people per game are transported from their boat to the shore. Private charter boats also dock in Husky Harbor and a maximum of five private charter boats (carrying between 100 – 350 people) can fit in the designated dock space for charter boats.

The Boat Component of the proposed *TMP Update* includes strategies to manage boat reservations/permitting to minimize conflicts between vessels and ensure sufficient space, coordinate with the Seattle Fire Department to provide land and water coverage during events, support water taxi services for anchored boats, and promote boating as an option for transportation to games (see **Appendix B** – Transportation Discipline Report for details on boat strategies included in the proposed *TMP Update*).

Parking

Husky Stadium manages its parking supply in a variety of ways to reduce vehicle impacts in area neighborhoods. Parking pricing is used to incentivize carpools with three or more passengers. Parking strategies are intended to maintain game day on-site parking needs and minimize parking impacts on adjacent neighborhoods. Each season, new signs are posted in area neighborhoods identifying game dates and associated parking restrictions. Additionally, the University of Washington actively manages primary campus parking lots on game days, including parking lots E1, E12, Padelford Garage, and Central Plaza Garage.

The Parking Component of the proposed *TMP Update* includes strategies related to increased carpool incentives, parking pricing, and continued monitoring of available parking as development occurs as part of the 2018 Seattle Campus Master Plan to adjust tailgating locations as necessary to provide additional parking capacity to minimize potential for parking spillover into neighborhoods (see **Appendix B** – Transportation Discipline Report for details on parking strategies included in the proposed *TMP Update*).

Outreach and Education

Outreach and education is essential for encouraging and supporting travel behavior choices that help meet TMP Update goals. The Outreach and Education Component of the proposed *TMP Update* includes strategies to communicate upcoming event schedules, provide criteria for open source and real-time information, marketing for non-auto related travel, encourage multi-modal trip changing such as bus to bike, educate employees on non-auto options, and work with off-site parking providers adjacent to transit stations to provide parking information (see **Appendix B** – Transportation Discipline Report for details on the outreach and education strategies included in the proposed *TMP Update*).

2.8 EIS ALTERNATIVES

For the purposes of environmental review, the no action and one proposed *TMP Update* project alternative are analyzed in this EIS. The No Action and Alternative 1 (Proposed *TMP Update*) are described below.

No Action

Under the No Action Alternative, the proposed *TMP Update* would not occur and the existing TMP would remain in effect for Husky Stadium. Under the No Action Alternative, objectives of the proposed *TMP Update* would not be achieved including objectives related to addressing future changes in the transportation system (including SR 520 improvements), and reduced dependence on event charter coaches.

This alternative would not meet the University's goals and objectives

Alternative 1 – Proposed TMP Update

The proposed *TMP Update* is intended to continue to effectively move stadium attendees into alternatives to cars, with priority on transit, high capacity vehicles, biking and walking, in order to decrease congestion and parking impacts associated with Husky Stadium football games and other events at the Stadium. The proposed *TMP Update* reflects changes in the transportation system occurring subsequent to the 1986 TMP, including transportation options available through Sound Transit Link Light Rail, new trends (including car share and Transportation Network Companies such as Uber and Lyft), and changes in the availability and cost of charter shuttle buses.

The proposed *TMP Update* includes strategies associated with the following components[7]:

- Transit.
- Pedestrian.
- Bicycle and Bike Share.
- General Purpose Vehicles.
- Shared-Use Transportation.
- Boats.
- Parking Management.
- Outreach and Education.

Alternative 1 would meet the University's goals and objectives.

2.9 BENEFITS AND DISADVANTAGES OF DEFERRING IMPLEMENTATION OF THE PROPOSAL

The benefits of deferring approval of the Proposed Actions and implementation of the Husky Stadium *TMP Update* include the deferral of:

- Public funds utilized to implement the *TMP Update*.

The disadvantages of deferring approval of the Proposed Actions and implementation of the *TMP Update* include the deferral of:

- The opportunity to respond to ongoing changes in the transportation system serving Husky Stadium.
- The opportunity to address mode and operational goals for smaller events.

[7] *Refer to Section 2.7 of this chapter for discussion on the TMP Update Components.*

CHAPTER 3

Affected Environment, Impacts, Mitigation Measures, and Significant Unavoidable Adverse Impacts

3.1 TRANSPORTATION

This section of the Final EIS describes the existing transportation system serving Husky Stadium and the current TMP strategies for each mode and evaluates the potential impacts to the transportation system with implementation of the proposed *TMP Update*.

The Transportation Discipline Report (Transpo Group, November 2018) includes data, methods and analysis results to support this section of the EIS. The transportation system analysis encompasses the various transportation modes utilized by attendees at Stadium events. This report is included as **Appendix B** of this EIS.

The *TMP Update* reflects an evolving and more aggressive non-auto mode share, as compared to the existing conditions. This evolving goal is proposed in response to improvements in the regional transit system, which will provide additional capacity in the future, and is intended to continue to decrease traffic and parking impacts to the surrounding community on event days.

The following section is presented by transportation mode. A discussion of the Affected Environment and impact analysis of the Alternatives is contained within the modal sections. Cumulative and secondary impacts as well as disclosure of any significant and unavoidable impacts. Information added subsequent to the issuance of the Draft EIS is shaded to ease in the identification of added information.

3.1.1 SUMMARY OF ANALYSIS

Transit

Affected Environment

Approximately 35 to 37 percent of Husky football game attendees use transit to access the game as determined by the 2016 weekday and 2017 travel mode surveys, respectively. Transit access to the events includes bus and light rail service as well as use of private shuttles and contracted Metro service on weekends. The weekend football game private shuttles serve park-and-rides in Kirkland, Bellevue, Federal Way, Renton, Ballard, Northgate, and Shoreline. No additional service is provided on weekdays given the existing commuter transit demands and the inability to operate private shuttles efficiently with existing traffic congestion.

Pre- and post-game peak hour conditions were evaluated for 14 screenlines around the stadium to understand the current transit capacity compared to transit demands with a football game during a weekday and weekend. Screenlines where existing demand exceeds capacity is interpreted to mean that attendees are not served during the peak hour and may have a longer wait time to access transit. The analysis reflects a 7 p.m. game/event start for weekday and weekend conditions, which represents a worst-case time period with more limited service resulting in less transit capacity. Event start times vary and transit capacity may be higher during other periods (during afternoon commute periods, for example). The existing conditions analysis shows that based on current mode splits transit demand exceeds the peak hour capacity along the following screenlines:

Weekday

- SR 520 travelling westbound during the pre-game (arrival) conditions
- SR 520 travelling eastbound, Montlake Boulevard southbound, NE 45th Street west of I-5 westbound and 25th Avenue NE northbound during the post-game (departure) conditions

Weekday

- Light rail south of the stadium travelling northbound, NE 45th Street west of I-5 eastbound, Roosevelt Way NE southbound and NE 45th Street at Roosevelt Way NE westbound during the pre-game (arrival) conditions
- SR 520 travelling eastbound, light rail south of the stadium southbound, NE 40th Street westbound, NE 45th Street west of I-5 westbound, 11th Avenue NE northbound and NE 45th Street at Roosevelt Way NE westbound during the post-game (departure) conditions

As described above, the limitations on peak hour capacity means patrons may have longer wait times. It is not uncommon that demands for large events are served over a period of 2- to 3-hours and is currently seen the existing Husky Stadium and other Seattle venues such as KeyArena, Safeco Field and Century Link Field. The weekday one-hour screenline analysis indicates that approximately 185 people using transit are not accommodated during the pre-game peak hour and 2,550 people during the post-game peak hour. On the weekends, approximately 990 people are not accommodated during the pre-game peak hour and 3,220 people during the post-game peak hour. Although the analysis shows some riders are not accommodated during the one peak hour, the game day transit demands are served within 2-hours consistent with other venues in Seattle. Delays for transit passengers are not unique to Husky Stadium and this is an expectation that people have when traveling to these types of events. The use of transit is driven by other factors such as the cost of driving, traffic congestion and convenience to the stadium.

The weekday and weekend pre-game analysis reflects the period between 1- and 2-hours prior to kick-off when the highest event transit demand is anticipated to occur (i.e., 45 percent of transit users arrive). The weekday and weekend post-game analysis reflects the period between 2- and 3-hours after kick-off when event transit departures would be highest. The average length of a football game is approximately 3-hours, which means that transit departures begin to increase around 1-hour prior to the end of the game (i.e., after halftime and around the 3rd quarter). Depending on the nature of the event, this time period may extend later in the evening; however, a general decreasing departure rate is typical. The post-game evaluation represents the time period beginning 1-hour prior to the end of the game; therefore, with the 2-hour window noted above beginning before the game ends, all transit demands are served within 1-hour after the game ends.

Impacts

No Action Alternative

The No Action Alternative would continue the existing TMP including the use of private shuttles on weekends. Transit is expected to expand dramatically by 2035 including Link light rail and RapidRide that will serve the stadium. The existing UW special shuttle service would become redundant with some of the planned transit improvements. For example, rather than private shuttles service to Shoreline, attendees could be accommodated by the planned light rail extension to Lynnwood by 2023 with two stops in Shoreline. Federal Way will be served by the light rail extension in 2024. The planned improvements will increase transit coverage and capacity for the Puget Sound Region over the next 15- to 20-years.

The No Action Alternative screenline analysis assumes that without updating the TMP the existing average transit mode split would be maintained even with increases in planned transit capacity. A transit mode split of 35 percent on weekdays and 33 percent on weekends is assumed for attendees of a Husky football game. The evaluation considers 60,000 attendees for 2019, 2025, and 2035 conditions. These years coincide with key milestones in the expansion of the transit system. The transit screenline analysis shows:

- **2019** – The One City Center (OCC) improvements do not change the screenline transit capacities in the study area. With increases in background transit demand, the 2019 conditions would be the same as existing conditions for weekday pre- and post-event and weekend pre-event. However, increases in background transit demand by 2019 would results in two additional screenlines (Eastlake Avenue southbound and 25th Avenue NE northbound) where demand would be higher than capacity for the weekend post-event condition.

  Increases in background transit ridership also results in additional riders not accommodated within the peak hour for pre- and post-event conditions. During the weekday conditions, transit riders not accommodated within the peak hour would be 450 people during the pre-event peak hour and 3,100 people during the post-event peak hour. On the weekends, approximately 1,150 people would not be accommodated during the pre-event peak hour and 3,670 people would not be accommodated during the post-game peak hour. These transit riders would travel outside the peak hour to access the game and are accommodated within the 2-hour peak period.

- **2025** – Key transit improvements in 2025 include the extension of Link light rail to Redmond, Federal Way and Lynnwood and the University-to-University (UW Bothell) RapidRide. The weekend pre- and post-event transit demand would be fully accommodated within the peak hour while only the SR 520 screenline would be over capacity during the weekday pre- and post-event condition. The number of riders not accommodated within the one-hour peak period reduces for 2025 weekday conditions with the increase in transit capacity. Approximately 800 to 1,460 riders may not be accommodated during the peak hour for weekday conditions. These transit riders would travel outside the peak hour to access the game similar to current conditions and would be served within a 2-hour peak period.
- **2035** – By 2035, transit capacities will generally increase, primarily due to the Link light rail expansion, except for along the SR 520 corridor where transit service will decrease. In addition, it is anticipated that background transit demand will increase. For the weekday conditions, the analysis shows that the screenlines where transit demand would exceed capacity are the same as existing conditions (i.e., SR 520 westbound during the pre-event conditions and SR 520 eastbound, NE 45th Street west of I-5 westbound, NE 45th Street at Roosevelt westbound and 25th Avenue NE northbound during the post-event conditions exceeding capacity). The weekend 2035 No Action Alternative conditions would improve compared to existing conditions with only the NE 45th Street west of I-5 northbound screenline exceeding capacity during the pre-event condition and NE 45th Street west of I-5 southbound during the post-event condition.

  The increase in transit capacity by 2035 would result in the number of riders not served during the peak hour generally decreasing compared to current conditions. During the weekday conditions, approximately 495 people using transit would not be accommodated during the pre-event peak hour and approximately 1,765 during the post-event period. On the weekends, the number of riders not accommodated within the peak hour for pre- and post-event conditions in 2035 would be substantially reduced with less than 175 riders.

The analysis of the peak hour shows that the transit demand may not be fully accommodated during a one-hour period along some screenlines; however, it is anticipated that game day transit demands are served within 2-hours consistent with existing conditions and other venues in Seattle. The post-game evaluation represents the time period beginning 1-hour prior to the end of the game; therefore, with the 2-hour window noted above beginning before the game ends, all transit demands are served within 1-hour after the game ends.

Alternative 1

The Transit Component of the proposed *TMP Update* includes strategies to maximize use of transit by event attendees to reduce congestions, and reduce/replace private shuttles with emerging public transit (see **Appendix B** – Transportation Discipline Report for details on the transit strategies included in the proposed *TMP Update*).

The proposed *TMP Update* includes a progressively increasing non-auto mode split. The transit analysis assumes changes in travel mode to achieve this goal would generally mean an increase in the transit mode split. Compared to the No Action Alternative, the Alternative 1 transit screenline analysis shows:

- **2019** – Weekday and weekend Alternative 1 conditions in 2019 are anticipated to be consistent with the impacts of the No Action Alternative.

- **2025** – For the Alternative 1 weekday condition, capacity would be exceeded along one additional screenline (pre-event: NE 45th Street west of I-5 eastbound) compared to the No Action Alternative. The number of riders not served within the Alternative 1 weekday peak hour would increase by approximately 200 people for pre-event conditions and 400 people for post-event conditions compared to the No Action Alternative. For the weekend conditions, capacity would be exceeded along three additional screenlines (pre-event: 25th Avenue NE southbound and post-event: SR 520 eastbound and 25th Avenue NE northbound). The number of riders not served within the Alternative 1 weekend peak hour would increase by approximately 160 people for pre-event conditions and 870 people for post-event conditions compared to the No Action Alternative. All transit demand is anticipated to be served by 1-hour after the event.

- **2035** – For the weekday condition, capacity would be exceeded along two additional screenlines (pre-event: NE 45th Street west of I-5 eastbound and post-event: Montlake Boulevard southbound). The number of riders not served within the Alternative 1 weekday peak hour would increase by approximately 400 people for pre-event conditions and 800 people for post-event conditions compared to the No Action Alternative. For the weekend conditions, capacity would be exceeded at three additional screenlines (pre-event: 25th Avenue NE southbound and post-event: SR 520 eastbound and 25th Avenue NE northbound).

  The increase in transit capacity by 2035 would result in the number of riders not served during the peak hour generally decreasing when compared to current conditions. The number of riders not served within the Alternative 1 weekend peak hour would increase by approximately 185 people for pre-event conditions and 900 people for post-event conditions compared to the No Action Alternative. The increase in ridership not served relative to the No Action Alternative is due to the assumption analyzed in Alternative 1 of eliminating all Special Service. The proposed *TMP Update* includes a Special Service transition plan and additional strategies to implement if needed to meet the performance goals. The transition plan is intended to address how the UW would evaluate changes to Special Service considering transportation infrastructure improvements surrounding Husky Stadium and with new technology and mode choices. In addition, it considers future investments in the regional transportation system. The TMP provides a framework for how UW Special Service would be transitioned. The annual evaluation of UW Special Service is intended to demonstrate that there would be no significant impacts with the reduction or elimination of UW Special Service.

Riders not accommodated would result in travel outside the peak hour to meet transit demand, consistent with existing conditions. The peak hour evaluated for the post-event condition is approximately 1-hour prior to the end of the game. The evaluation shows that for the large events, transit riders are served within 2-hours of the pre- and post-event period consistent with the No Action Alternative and existing conditions and other Seattle venues. Delays for transit passengers is an expectation that people have when traveling to these types of events. Given when the peak hour occurs for the post-event condition (i.e., 1-hour prior to the end of the game), this means that with Alternative 1, all transit demand is served within 1-hour post-event, which meets the performance goal to have the transportation return to "normal" conditions within 45- to 60-minutes after the event ends.

For the post-game condition, the analysis assumes 60 percent of the transit users leave the game 1-hour before the game ends based on Sound Transit data. The transit background ridership is based on the timeframe corresponding to the 1-hour period before the game ends. Background ridership is generally lower during the post-game period because games/events occur either on a weekend or late night. The behavior of attendees depends on weather, opponent, game score and various factors that cannot be controlled by UW Athletics. Annual monitoring will allow for reporting and adjustments to TMP strategies to address any issues relative to varying departure times.

Pedestrians

Affected Environment

Approximately 15 to 25 percent of Husky football game attendees walk to the game as determined by the 2017 weekend and 2016 weekday travel mode surveys, respectively. Most attendees of Husky Stadium events are pedestrians at some point during their travel and all depend on safe pathways and crossings to get to and from the stadium. American Disabilities Act (ADA) access is provided in and around the Stadium. Accommodations are made for ADA access, including parking in multiple lots around the Stadium and access via the southwest entrance.

A pedestrian flow analysis was conducted for 4 crossings of Montlake Boulevard for the weekday pre-game and weekend pre- and post-game conditions. In total, the 4 crossings of Montlake Boulevard provide a maximum pedestrian capacity of approximately 158,000 people per hour (assumed at Level of Service (LOS) E). The current peak hour pre-game pedestrian demand for the four crossings is approximately 11,700 people per hour during the weekday pre-game event conditions and 13,100 people per hour during the weekend event (Husky football game) pre-game conditions, and 12,300 people per hour during the weekend event post-game conditions. For the existing weekday and weekend conditions with a Husky game, all crossings along Montlake Boulevard have LOS A conditions except the Pacific Place/Montlake Boulevard NE intersection south leg crossing during the weekday Husky game. The south leg crossing of the Pacific Place/ Montlake Boulevard NE intersection operates at LOS E during the weekday pre-game, weekend pre-game and weekend post-game conditions.

Impacts

No Action Alternative

The pedestrian environment in the immediate vicinity of Husky Stadium under 2035 conditions would generally be consistent with current conditions. The grade-separated pedestrian bridge over Montlake Boulevard would continue to provide safe, high-capacity, unimpeded access to the stadium from the UW campus and Burke-Gilman Trail. Conditions in the pedestrian plaza in front of Husky Stadium may become more congested as ridership at the University of Washington Station increases. Event signage would continue to be used to minimize pedestrian conflicts with other modes by directing attendees along designated pathways to the stadium entrances. UW growth-related development would include constructing pedestrian improvements consistent with the UW campus master plan vision, prioritizing and promoting non-auto travel modes.

A 2035 pedestrian flow analysis was conducted for the No Action alternative conditions. The pedestrian analysis showed that for the weekday and weekend conditions with a Husky game in 2035, all 4 Montlake crossings in the vicinity of Husky Stadium are anticipated to operate at LOS A during weekend and weekday events under current mode splits, with the exception of the south leg of the NE Pacific Place/Montlake Boulevard intersection, which would continue to operate at LOS E. All other crossings are forecasted to operate at LOS A, which shows there is available capacity for pedestrian traffic to shift to other crossings.

Alternative 1

The Pedestrian Component of the proposed *TMP Update* includes strategies to protect and improve upon the pedestrian-oriented stadium area, improve wayfinding to and from Husky Stadium and transportation destinations, enhance quality and security of pathways, and manage vehicular and pedestrian movement around the University of Washington Station (see **Appendix B** – Transportation Discipline Report for details on the strategies included in the proposed *TMP Update*).

It is anticipated that the pedestrian environment in the immediate vicinity of Husky Stadium would be the same for Alternative 1 and the No Action Alternative. As transit use increases with the expansion of regional Link light rail service, it is likely that the pedestrian plaza would become more congested during post-game conditions as attendees access the University of Washington Station. In addition, pedestrian traffic accessing transit west of the stadium could also increase. Alternative 1 provides a strategy to manage pedestrian densities at the top of the station as well as providing pedestrian event signage to key routes to disperse people to their destinations more efficiently.

In addition, as transit expands with services such as RapidRide, pedestrians would disperse through the transportation network to access transit. The surrounding transportation network is well connected with pedestrian facilities to access transit and other modes.

All Montlake Boulevard crossings evaluated are anticipated to operate at LOS A conditions with the exception of the south approach leg of the NE Pacific Place/Montlake Boulevard intersection under weekday event conditions, which would degrade from LOS E to LOS F. It is anticipated that as this crossing becomes crowded, pedestrians would shift to nearby crossing locations that are anticipated to have additional capacity. Overall, the total pedestrian count is well under total capacity levels for the Montlake Boulevard crossings analyzed. As part of the annual operations plan included in the proposed TMP Update, wayfinding could be provided to help direct pedestrians away from the NE Pacific Place/Montlake Boulevard south approach crossing to other crossings with available capacity.

Based on the results of the analysis completed, no significant adverse impacts are anticipated.

Bicycles

Affected Environment

Approximately 1 percent of husky football game attendees bicycle based on the 2017 weekend and 2016 weekday travel mode surveys. This percentage includes bike share and personal/private bikes.

During Husky football games, the UW Athletics provides a bike valet service to store and manage bicycles during events. Bike share users do not use this system because no locks are necessary for those bikes. There are some issues with bike share parking occurring in pedestrian areas.

The existing UW bicycle system includes designated streets and pathways as well as end-of-trip facilities such as short-term bicycle parking, secured and covered bicycle parking, and the football game day bike valet. The existing bicycle network near or serving Husky Stadium includes protected and unprotected bicycle lanes, shared lanes, greenways, and trails. The new pedestrian and bicycle bridge to the Link light rail University of Washington Station improves travel between the Burke-Gilman Trail and the Montlake area; however, on game days the use of the bike valet is intended to limit use of the bridge by bicyclists to minimize conflicts with pedestrians. The Montlake Bridge and I-5 represent longstanding barriers to bicycle travel.

Impacts

No Action Alternative

The No Action Alternative would continue to provide similar strategies as implemented today. During football games, the UW Athletics bike valet services would continue to be provided. It is likely that without having strategies that directly address bike share, there would continue to be issues with conflicts between bike share parking and pedestrian areas. These would be managed as the issues are identified, similar to the process that occurs today.

Alternative 1

The Bicycle Component of the proposed *TMP Update* includes strategies to minimize bicycle share parking in pedestrian pathways, reduce bicycle conflicts with other modes, encourage safe access to events by bicycle, and provide bicycle incentives for employees who work at the Stadium (see **Appendix B** – Transportation Discipline Report for details on the bicycle strategies included in the proposed *TMP Update*).

The bicycle environment under the proposed *TMP Update* strategies would focus on intercepting bicyclists at more locations to minimize conflicts with other modes that are occurring today and would continue to occur under the No Action Alternative. The bike valet would continue to be provided to help promote biking to the game. In addition, bike share would be proactively managed and intercepted external to the stadium plaza to minimize conflicts with Husky Stadium and University of Washington Station pedestrians. An annual review of the bike valet location(s) would occur and plans would be presented in the annual operations plan.

Based on the results of the analysis completed, no significant adverse impacts are anticipated.

Vehicles

Affected Environment

The current TMP has been successful in achieving an auto mode of approximately 37 to 46 percent, consisting of general purpose vehicles and transportation network companies (TNCs) such as Uber and Lyft. UW Athletics maintains a game day traffic control plan, provides discount pricing for carpooling, and provides additional transit service in an effort to decrease auto use.

Sixteen study intersections were selected to provide an understanding of pre-game intersection operations under weekend conditions. Due to a limited data set for weekday event conditions, four intersections were evaluated for this time period. The analysis shows during the weekday PM peak hour under typical conditions with an event at Husky Stadium, two study intersections along Montlake Boulevard at NE Pacific Place and NE Pacific Street are currently operating at LOS D, the intersection of 25th Avenue NE/NE 44th Street/Pend Oreille Road is operating at LOS E, and the 15th Avenue NE/NE 45th Street intersection is operating at LOS C. Traffic volume data available for weekday conditions with and without an event show that during the event weekday PM peak period, the volumes with an event are less than that without an event. This is due in part to the advanced communication that the UW undertakes to allow for alternative work schedules to reduce the level of background traffic during the typical weekday period. During the weekend peak hour conditions with a game at Husky Stadium, one intersection (7th Avenue NE/NE 45th Street) operates at LOS E and three intersections (25th Avenue NE/NE 55th Street, Union Bay Place/NE 45th Place/Mary Gates Memorial Drive NE/NE 45th Street and Montlake Boulevard NE/IMA Exit) operate at LOS F.

During Husky football games, UW Athletics manages TNCs through signage and geofencing that directs drop-off and pick-up functions along Okanogan Lane. TNCs entering or exiting the pick-up/drop-off area are routed via 15th Avenue NE in an effort to reduce congestion along Montlake Boulevard and in the immediate vicinity of the stadium.

Impacts

No Action Alternative

Traffic congestion in the area is expected to increase due to general background growth for both the weekday and weekend game day conditions. In the future due to the increase in background traffic, the weekday intersection operations along Montlake Boulevard at the NE Pacific Place and NE Pacific Street intersections are forecast to degrade from LOS D under existing conditions to LOS F under the 2035 No Action Alternative conditions. The remaining two study intersections are both forecast to operate at LOS D. During the weekend conditions, five intersections are forecast to operate at LOS F, one intersection at LOS D, and the balance of the study intersections are forecast to operate at LOS C or better.

The No Action Alternative would continue to provide similar strategies as implemented today such as managing the TNCs through signage, geofencing, police officer traffic management and a drop-off/pick-up area.

Alternative 1

The General Purpose Vehicle Component of the proposed *TMP Update* includes strategies to encourage use of alternative modes, increase average auto-occupancy, minimize non-game auto travel near the Stadium, maintain reliable freight and emergency service access to the Stadium/hospitals, and coordinate with Seattle Department of Transportation regarding message signs, and manual intersection control/road closures to effectively direct vehicles in and out of the Stadium area. The proposed *TMP Update* also includes strategies for transportation network companies (TNCs) and car share, including strategies to support expansion of higher occupancy mobility options for TNCs and car share, actively manage TNC activity by designating drop-off and pick-up areas, and define additional TNC strategies to further minimize congestion (see **Appendix B** – Transportation Discipline Report for details on strategies for general purpose vehicles and TNCs that are included in the proposed *TMP Update*).

With the increase in the non-auto goal (i.e., transit, pedestrians, bicycle, boat) noted in the proposed *TMP Update*, event related general purpose traffic volumes are expected to decrease as compared to the existing conditions. This would result in a decrease of event related congestion within the study area. The increased non-auto goal is phased in the future, tied to investments and implementation of the various Link light rail expansion projects. On-going revisions to the traffic control plans at key intersections around the stadium would occur on an annual basis as those plans can be informed by background growth in traffic unrelated to the Stadium events. TNCs would continue to be managed during events.

Based on the results of the analysis completed, no significant adverse impacts are anticipated.

Parking

Affected Environment

The existing TMP parking program has three goals: (1) to provide additional University-controlled parking for the general public, (2) to provide close-in parking for the Tyee Club members, and (3) to encourage people to park in areas compatible with their exiting traffic flow destinations. A discount carpool parking program is provided for vehicles with three or more passengers. This is done to encourage higher average vehicle occupancies and reduce the volume of single-occupant vehicles (currently 2% of the mode split). Attendees are encouraged to park in campus-provided parking, and signage is placed within surrounding neighborhoods to discourage game-related parking.

The UW also actively manages the on-campus parking for game days. Most campus parking facilities are available for game day parking, and University of Washington Transportation Services (UWTS) manages to the parking demand that occurs on game day. The 2017 weekend travel mode survey showed over 3,000 vehicles parked on-campus. Specific data was not available for the 2016 weekday game; however, the vehicle mode split for this game was less than the weekend condition, so it is anticipated that parking on-campus for the weekday is less than or similar to the weekend condition. With approximately 11,000 spaces managed by UWTS and UW Athletics on games days, parking demand is such that not all campus parking is typically used for the games.

Some parking associated with the Husky Stadium does occur off-campus. The 2017 weekend travel mode survey showed approximately 2,000 vehicles parked off-campus in retail and neighborhood parking, which is a decrease in off-campus parking compared to the previous year. Each season, game dates are posted on parking restriction signs in neighborhoods to manage impacts to the neighborhood.

Impacts

No Action Alternative

The existing TMP parking program would remain the same as existing conditions under the No Action Alternative. Signs would continue to be posted within the neighborhood restricting parking on game days. With light rail expansion within the region, additional transit options may result in a decrease in driving to the games; however, this was not assumed in the analysis.

Growth in the parking demand in the area would be related to growth on campus and the surrounding area as well as additional projects occurring in the area. The campus parking demand growth would generally occur during the weekday midday period, which typically does not coincide with event times for the Husky Stadium. Weekday games are in the evenings and the largest percentage of activities occurs on the weekends, when the campus population is lower. With approximately 3,000 vehicles parked on-campus for a game, consistent with existing conditions, it is unlikely there would be a parking shortfall with a reduced supply and campus growth given that Husky Stadium events are typically on weekends or weekday evenings.

The existing on-street temporary game day parking restrictions would remain on weekends under the No Action Alternative, and conditions would be consistent with the Affected Environment section. Weekday parking restrictions would continue as they have in the past but would be limited to once a year; 2 out of every 3 years.

Alternative 1

The Parking Component of the proposed *TMP Update* includes strategies related to increased carpool incentives, parking pricing, and continued monitoring of available parking as development occurs as part of the 2018 Seattle Campus Master Plan to adjust tailgating locations as necessary to provide additional parking capacity to minimize potential for parking spillover into neighborhoods (see **Appendix B** – Transportation Discipline Report for details on parking strategies included in the proposed *TMP Update*).

With the increase in the non-auto goal noted in the proposed *TMP Update*, event-related parking demands are expected to decrease as compared to the existing conditions. This would result in a higher percentage of parking being accommodated within the campus parking infrastructure. This coupled with continued enforcement of the RPZ areas would result in a decrease on the parking impacts to the surrounding neighborhoods.

Secondary and Cumulative Impacts

Secondary and cumulative impacts on the area transportation system are included in the analysis of direct impacts. The mitigation identified includes the preparation of an annual operations plan. This plan would address the operational elements such as TNC management strategies, traffic control, bicycle operations/facilities, and parking management plans.

3.1.2 Mitigation Measures

The alternatives analysis finds there would be no adverse transportation system impacts requiring additional mitigation under the proposed *TMP Update*. The *TMP Update* would mitigate for short-term effects of the Husky Stadium events.

UW Athletics will prepare an annual operations plan identifying the specific operational elements of the TMP. The operations plan will address TMP strategies to achieve the performance goals outlined in the TMP considering the results of the previous year's intercept survey and observed operations, the football season schedule, and changes to the background transportation infrastructure or service.

3.1.3 Significant Unavoidable Adverse Impacts

Events at Husky Stadium cause temporary increases in travel demands; however, these increases would not be a result of the proposed *TMP Update*. The proposed *TMP Update* reflects a more aggressive non-auto goal, which would decrease the auto traffic levels associated with each event. The proposed *TMP Update* eliminates the requirement to operate a large network of special service from park-and-rides. This decrease in auto and private shuttle traffic would reduce the frequency of vehicle-pedestrian conflicts. Given the potential travel patterns for pedestrians accessing the stadium, the analysis shows that there is sufficient capacity within the system to accommodate the peak demand.

The transit capacity analysis shows that there is sufficient capacity through the planned Link light rail transit, RapidRide and regular service to accommodate future transit demand with the proposed *TMP Update*. Consistent with existing conditions, there would continue to be transit demands accommodated outside the peak one-hour period. It is anticipated that these demands would be accommodated within 2-hours of the start and end times of large events.

There are no significant unavoidable adverse impacts associated with this proposal.

CHAPTER 4

Draft EIS Comment Letters and Responses

CHAPTER 4
COMMENT LETTERS AND RESPONSES

This chapter of the Final Environmental Impact Statement (FEIS) for the University of Washington *Husky Stadium Transportation Management Plan Update (TMP Update)* contains comments received on the Draft Environmental Impact Statement (DEIS), and provides responses to the comments.

Seven letters with comments on the DEIS and the analysis of environmental impacts were received during the public comment period. Each letter is included in this section of the FEIS. Comment letters/numbers appear in the margins of the comment letters and are cross-referenced to the corresponding responses. Responses are provided directly after each comment letter.

The following comment letters on the DEIS were received:

<u>Agencies and Organizations</u>

Letter 1 - King County Metro Department of Transportation
Letter 2 - Seattle Department of Transportation
Letter 3 - Sound Transit
Letter 4 - Laurelhurst Community Club
Letter 5 - Ravenna-Bryant Community Association
Letter 6 - Ravenna Springs Community Council

<u>Individuals</u>

Letter 7 - Jeffrey Leppo and Robin McManamin

King County
Department of Transportation
Metro Transit Division
Service Development
201 South Jackson Street
KSC-TR-0426
Seattle, WA 98104-3856

June 18, 2018

Julie Blakeslee, Environmental and Land Use Planner
University of Washington Capital Planning and Development
Box 359446
Seattle, WA 98195-9446

UW Husky Stadium TMP Update Draft Environmental Impact Statement

Dear Ms. Blakeslee:

Thank you for the opportunity to review and comment on the Husky Stadium Transportation Management Plan (TMP) Draft Environmental Impact Statement (DEIS). Transit is a key element of the TMP for Husky Stadium, and the stadium area will continue to be a major transit hub with multiple bus routes serving the Link light rail station, UW Medical Center, the University of Washington and Husky Stadium.

Bus stops surrounding Husky Stadium currently attract about 6,000 boardings on an average weekday. Looking to the future service networks envisioned in METRO CONNECTS and the City of Seattle's Transit Master Plan, Husky Stadium will be served by up to four new RapidRide routes in the future, in addition to Link and other all-day bus routes. We expect 1
20,000-30,000 daily boardings near Husky Stadium by 2040.

Metro appreciates UW's efforts to involve Metro staff early in the TMP planning process, and we look forward to continued coordination to ensure its success. We recommend that the UW measure progress in meeting the traffic management and mode split goals outlined in the TMP, and we encourage the use of that progress information to adjust the operations plan during annual updates. That information will play a key role in identifying the most effective strategies to increase access to transit and alternative modes and to ensure event traffic is being efficiently cleared.

We recommend adding information in the Final EIS about state of the art events management, microtransit, Transportation Network Companies (TNCs), and strategies UW could use to 2
increase occupancy of TNC vehicles. Additionally, we recommend analyzing how the increasing mode share of Uber, Lyft, and taxi service will impact traffic and transit travel times during Husky stadium events. To estimate travel demand and the demand for bus and light rail 3

service, we recommend adding information about where fans are coming from today as a baseline to determine needs and gaps. 4

We look forward to working with you as you develop the Final EIS. Please contact Sunny Knott, Transit Planner, at Sunny.Knott@kingcounty.gov or by phone at 206-477-5812 to coordinate planning efforts or for clarification of any issues.

Sincerely,

Katie Chalmers for Bill Bryant

Bill Bryant, Managing Director
Service Development
Metro Transit Division

cc: Harold Taniguchi, Director, King County Department of Transportation (KCDOT)
Laurie Brown, Deputy Director, KCDOT
Rob Gannon, General Manager, Metro Transit Division, KCDOT
Chris Arkills, Government Relations Manager, KCDOT
Sunny Knott, Transit Planner, Service Development, Metro Transit Division

Response to King County Department of Transportation (Letter 1)

Comment 1

Thank you for your comment.

Comment 2

The TMP on pages 10 and 11 in the "Transit" Section and page 18 in the "Shared-Use Transportation" section describes the current state of management strategies and potential strategies that would be used to manage these modes. As documented in both the TMP and Draft EIS, as well as this Final EIS (page 2-10), annual monitoring would be conducted for the TMP goal and performance metrics by mode and used as input in the annual operations plan. New strategies would be incorporated into the annual operations plan, as appropriate, to meet the TMP goals.

Comment 3

The TMP recognizes the impacts TNC and taxi have on traffic and transit travel times. On page 18 on the TMP, it states "The primary intent of the shared-use transportation strategies is to minimize impacts of car-share and ride-share Transportation Network Companies (TNC) vehicles (both congestion and drop-off/pick-up conflicts) on the street system near the stadium."

The TMP (page 7) and Final EIS (page 2-12) have been updated to describe potential performance measures and data that may be collected to help inform development of the annual operations plan. As described in the TMP, this may include observations and counts for TNCs and other modes. The annual operations plan will make adjustments to the TNC strategies to minimize impacts on the adjacent street system.

Comment 4

Trip distribution of attendees based on zip code data are described on page 53 of the Transportation Discipline Report (**Appendix B**).

Seattle
Department of
Transportation

June 18, 2018

Julie Blakeslee, Environmental and Land Use Planner
University of Washington Capital Planning and Development
Box 352205
Seattle, WA 98195-5200

SUBJECT: Comments on DEIS for Husky Stadium Transportation Management Plan Update

Dear Ms Blakeslee:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) and related documents dated May 2018. The purpose of the EIS process is to inform and disclose the impacts associated with the updating of the current Transportation Management Plan (TMP). The proposed TMP modifies mode share goals and operational standards to allow Husky Stadium to host additional non-football game events, and to phase out the current requirement to provide charter shuttle buses. Further, the revised TMP will permanently remove the transit scrip requirement. Below are SDOT's comments. 1

Transit: The DEIS provides a high-level analysis of both alternatives considered ("No Action" and "Alternative 1"); however, additional detail is needed to properly disclose the impacts and potential mitigation associated with discontinuing the special service routes to Husky Stadium. These private shuttles currently provide a one seat ride with direct access to the stadium, serving Shoreline, Kingsgate, South Kirkland, Eastgate, South Renton, Federal Way and several locations within Seattle (Northgate, Lake City and Ballard). As the UW seeks to change current charter service arrangement and discontinue it over time, further analysis is needed to understand how markets currently relying on these services can be accommodated by other quality, convenient, and frequent transit service. For example, what is the proposed strategy to be advanced between the time charter service is discontinued and light rail extension is completed? 2

Additionally, the DEIS does not include enough information to allow us to understand the operational impact of different event scenarios for the stadium including weekend games (pre and post), weekday games and other types of non- football game events. We would like to work with you to clarify this analysis and make sure it is included in the Final EIS. 3

Transportation Network Companies: We would like additional analysis related to the current and anticipated use of Transportation Network Companies (TNC) by attendees, including circulation, queuing, and passenger load/unload. TNC demand and use to Husky Stadium events is expected to increase significantly. 4

Transportation Management Plan: The proposal seeks to clarify what types of stadium events trigger activation of a TMP. Further clarification and analysis may be needed regarding the type and number of events, and anticipated attendance including non-UW related events. We support the intent to clarify thresholds when different TMP elements are required to be activated and what measures apply. 5

SDOT supports creation of a new TMP structure that includes more detailed performance goals and that
allows for flexibility to adjust strategies over time via an Annual Operations Plan to achieve those goals.
An annual survey would then be used to assess performance and modify the TMP, if needed. These
performance goals should include: reduced attendee automobile rates, increased HOV/transit use, and
refined operating standards to ensure impacts to all transportation operations and modes near the
stadium are well managed. The proposed operational standard for traffic control is not sufficient to 6
meet these broader multi-modal performance goals. For example, time for transit users (including light
rail, regular bus service and supplemental game day service) to exit the stadium area should also be
included. We would like to work with UW to identify additional measures and further evaluate how
those operational goals can be achieved.

Identifying and implementing mode share goals is key to the success of the TMP and we support the
proposal to update those goals. However, it appears that proposed mode share goals in the DEIS are less
restrictive than actual mode share Husky Stadium has demonstrated it can achieve since the opening of
the U-Link station. Proposed automobile use goals should match or be below existing automobile mode
split as a starting point, with the intent that it will be further reduced over time. Those proposed mode 7
share goals should be adjusted over time to reflect planned transit increases.

We look forward to working with UW staff to ensure full disclosure of the anticipated impacts as well as identification of potential strategies, operating standards, aimed at mitigating these impacts.

Sincerely,

Cristina VanValkenburgh, Acting Director
Transit and Mobility Division, Seattle Department of Transportation

CC: Mark Bandy, Transportation Operations Division Director, Seattle Department of Transportation

Response to Seattle Department of Transportation (Letter 2)

Comment 1

Thank you for your comments.

Comment 2

A transition plan for special service shuttles is included in the TMP (page 12) and Final EIS (page 3.1-5). The transition plan is intended to address how the UW Special Service may evolve with changes in the transportation infrastructure surrounding Husky Stadium and with new technology and mode choices. UW Special Service will be evaluated annually to determine if there are potential Special Service routes that could be eliminated. For eliminating Special Service routes, the UW will consider: (1) Special Service routes with lower ridership and/or where service might be considered redundant with other transit service, (2) public transit capacity and operations, and (3) the ability to accommodate potential mode shifts on public transit. The TMP describes that if eliminating Special Service will result in not achieving the TMP goals or cause insufficient rider capacity on the public transit service then actions could be taken. Actions could include implementing additional TMP measures, working with the transit agencies to explore supplemental transit service, and/or not eliminating the Special Service.

Comment 3

The Draft EIS includes evaluation of weekday and weekend pre- and post-game conditions for transit. The Transportation Discipline Report (**Appendix B**) and Final EIS have been updated to include an evaluation of weekend post-game conditions as well as a more detailed analysis of non-football game events (page 3.1-5 and 3.1-6). We appreciate working with SDOT on this topic.

Comment 4

The Transportation Discipline Report (**Appendix B**) has been updated to add more quantitative analysis of TNCs based on available data. The passenger load and unload area currently accommodates the TNC demands. On page 18 on the Draft TMP, it states "The primary intent of the shared-use transportation strategies is to minimize impacts of car-share and ride-share Transportation Network Companies (TNC) vehicles (both congestion and drop-off/pick-up conflicts) on the street system near the stadium."

Comment 5

The TMP (Table 1) and Final EIS (page 2-3) have been updated to clarify the type and number of events, and attendance levels for University and non-University events.

Comment 6

The TMP has been updated to include performance measures (see discussion in Chapter 1 of the TMP under the Performance Goal section).

Comment 7

Recognizing that mode splits may vary based on attendances, opponent, weather, etc., the TMP non-auto mode share goal was developed based on a review of the last 5-years of intercept survey mode splits for Husky Stadium. The data shows some variation in achievements with fluctuation up and down; therefore, rather than setting the goal on only 2017 data the initial 2019 goal in the proposed TMP is within the range of observed data.

SOUNDTRANSIT

June 18, 2018

Julie Blakeslee
Environmental and Land Use Planner, SEPA Responsible Official
Capital Planning & Development
University of Washington
Box 359446
Seattle, WA 98195-9446

Re: Husky Stadium Transportation Management Plan – Draft Environmental Impact Statement

Dear Ms. Blakeslee:

Thank you for the opportunity to comment on the Husky Stadium
Transportation Management Plan – Draft Environmental Impact Statement
(EIS). At Sound Transit, we are grateful for the effort the University of
Washington has taken to update Husky Stadium's Transportation 1
Management Plan to reflect updated transit and transportation infrastructure
investments and be ready to adapt as the system evolves.

On behalf of Sound Transit, I would like to make a few comments about the Draft EIS:

- **Correct Table 5 referring to seated capacity of Link light rail car.** Table 5 on page
  21 of the DRAFT Transportation Discipline Report currently states that seated 2
  capacity of a Link light rail car is 135. That number should be updated to 74, which is the actual seated capacity of one Link light rail car.

- **Consider accessibility issues and accommodations for people with disabilities in relevant sections of the Draft EIS.** While we appreciate how the Draft EIS is
  organized with respect to the various modal environments, it is noteworthy that none 3
  of them reference or emphasize accommodations for people traveling to events at Husky Stadium that may have disability or mobility limitations. Please consider addressing this important user group in the Transit, Pedestrians, and Parking sections of Chapter 3 of the Draft EIS.

- **Commitment to working together as Sound Transit system expands.** It is gratifying to see in the Draft EIS that more than 10,000 fans traveled to Husky Stadium using Sound Transit light during the 2017 season. We anticipate that number
  will grow in the 2018 season and especially as the Sound Transit system expands. We 4
  commit to working productively to help the University of Washington achieve the goals identified in the Husky Stadium Transportation Management Plan.

Central Puget Sound Regional Transit Authority • Union Station
401 S. Jackson St., Seattle, WA 98104-2826 • Reception: (206) 398-5000 • FAX: (206) 398-5499
www.soundtransit.org

Sound Transit looks forward to continuing as an active and engaged partner in getting people to and from events at Husky Stadium, and supporting the University of Washington's transportation planning efforts to do so in sustainable ways. Please let us know if you have any questions about our comments to the Husky Stadium Transportation Management Plan – Draft Environmental Impact Statement or if you would like to discuss further how the University of Washington and Sound Transit can collaborate. 5

Sincerely,

Matt Shelden, AICP
Director
Office of Planning & Innovation

cc: Trinity Parker, Manager, Regional Government & Community Relations
Alex Krieg, Sr Manager, Planning & Integration

Response to Sound Transit
(Letter 3)

Comment 1

Thank you for your comments.

Comment 2

Comment noted. Table 5 in the Transportation Discipline Report has been updated to show the seated capacity of the light rail car to be 74 seats.

Comment 3

The Transportation Discipline Report (**Appendix B**) notes in the Transit discussion on page 21, "A grade-separated and elevator and escalator-accessible bridge connects the Stadium and Link light rail station across Montlake Boulevard to the Montlake Triangle transit stops and the land bridge that connects to transit stops on Stevens Way and to the main campus." In addition on page 31 under the pedestrian discussion (and page 3.1-6 of this Final EIS), it is noted that ADA access is provided in and around the Stadium. Accommodations are made for ADA access including parking in multiple lots around the stadium and access via the southwest entrance.

The Final Transportation Discipline Report (**Appendix B**) has been updated to provide some additional references to ADA access.

Comment 4

Thank you for your comment.

Comment 5

Thank you for your comment. UW Athletics and Sound Transit currently partner on the transit strategies and will continue to work together on the annual operations plan and work together at the game day command post.

Laurelhurst Community Club

Serving Seattle's Laurelhurst Community since 1920

June 18, 2018

Julie Blakeslee
Environmental and Land Use Planner
Office of Capital Planning and Development
Attention: University of Washington Husky Stadium Management Plan
PO Box 352205
Seattle, WA 98195-2205
jblakesl@uw.edu

Re: Draft Environmental Impact Study on the University of Washington Husky Stadium Transportation Management Plan Update

Dear Julie:

The Laurelhurst Community Club (LCC) has reviewed the Draft Environmental Impact Study for the University of Washington (The University) proposed changes in its Transportation Management Plan for Husky Stadium large events, called the TMP Modernization Project. The proximity and livability of LCC's adjacent neighborhood residents, and the viability of the small business community are intrinsically linked to what occurs for Special Events and sports games at Husky Stadium. Bordering the University of Washington directly, the Laurelhurst Community is a long-term stakeholder in the CUCAC process, and is a party of record by the City of Seattle's Major Institution Municipal Code (SMC 23.69.032) for the U WA's Master Plan. The TMP proposed changes are governed by RCW 43.21C.030 and SMC 23.54.016, and will affect our neighborhood.

Laurelhurst Community Club offers the following comments on the new University of Washington Draft EIS for the Husky Stadium TMP, dated May, 2018

The geography of the Laurelhurst neighborhood is a peninsula. The mobility and egress on the arterials, especially to NE 45th Street, and subsequently to the major highways of SR520 and Interstate -5, is essential to maintain the safety and livability of its residents and its businesses. The phenomenon of being "locked in" is very real on football game days for its 3200 residents who must monitor "game times" to plan their lives. While some residents do attend the large special events, the majority of them do not. Instead, they must navigate the adverse impacts of road closures, work around the inability to access local businesses, find the Light Rail cars already full, endure the refusal from ride share drivers who cannot get to their home, and driving widely in circuitous routes in their vehicles during these events which can last about 5 hours in duration. 1

The operative TMP required by the City of Seattle (The City) has been in place since 1986-87 when the University increased its seating capacity by 13,000 seats. The City program required that the University achieve a 16% transit goal of the attendees of the 72,500 stadium. The University has provided subsidized bus service for attendees, almost exclusively using Metro buses, but then switching to private coaches and school buses when federal policies on transit use by non-public users changed.
After the City Council-required transit subsidizes by the University was implemented, the use of 2
cars at Special Events, were dramatically reduced and sustained. The mode change from a 72% reliance on automobiles in 1986, to 48% in 2016, and at one game in 2017 (with a kick off time at 7:45pm), private cars, Uber, Lyft, (TNC's), was 43% arrival by car. Tools such as increasing parking rates, providing Park N Ride shuttle service, U passes, and chartering private bus service have been an effective method to achieve the reduction in vehicles in the Husky Stadium area. It would appear (from the chart data supplied on Figures 4 and 5) that arrival by automobile remains at about 42+%, regardless whether they are carpool (#1), ride share (#2) or SOV (#3).

Because of the shift in transportation modes, LCC agrees that the 1987 TMP should be
evaluated, and a new one implemented. However, this TMP DEIS falls short its proposed tools to 3
further reduce the use of cars at special events:

1. The DEIS includes only two alternatives, and should offer more than one alternative:
The two are the existing 1987 TMP, or the Alternative 1, "Proposed TMP Update" .
The "Alternative 1" includes many non-specific tools for reducing the total vehicles at Husky 4
Stadium on Special Event days, relying on public transit to accommodate its growth, and drive the reduction of auto use. The other "alternative" is the existing, which is now 31 years old.

Despite the fact that the types of auto mode is changing, the total number of vehicles remains high. Mobility around the Husky Stadium is more gridlocked than in the past, with the
University's own development (more buildings, more on-campus residents, more students and 5
staff). The adjacent local residential streets are lined with cars on both sides for miles with attendees of the University's Special Events, in addition to the daily students and employees.

On page 60 , Chapter 4. "Impacts of Alternative 1", lists 10 potential transit strategies for enhancing the future use of transit on special event days :

1. "Incorporate" Sound Transit event service.............
2. Promote education about transit service......................
3. Provide information .. to try new transit service
4. Work with King County Metro......................
5. Work with partner agencies to improve pedestrian and bike access...... 6
6. Manage areas around U of WA..........
7. Work with transit agencies ....
8. Encourage employees....not to use autos..
9. Provide information about ride-match.......for employees
10. Provide supplemental transit service as necessary to achieve non-auto commute goals.

There are no real rider incentives on the list except #10 (notably last), nor for subsidizing transit, nor a continuation of the 124 shuttle system trips to the outlying Park and Rides.

Perhaps another "alternative" could be included in the DEIS that would offer more tangible incentives to achieve a real reduction in the use of cars at the special events.
For example, Seattle Children's Hospital offers Metro pass subsidies to incentivize its employees, as well as it hires patrols to curb spillover parking impacts of its institution into adjacent neighborhoods. 7

2. In evaluating the TMP the other MAJOR change noted is that game times, and days of the week have changed substantially since the Existing TMP of 1987 was formed.
Because of the media broadcast contracts, (which are financially important as a revenue base for the University's athletic program), the start times for games on Saturdays range from noon to as late as 8:15pm. In addition, the broadcast requirement of 2 weekday game times, every 3 years, held during the pm peak commute time is at the busiest time at the busiest interchange in Seattle. The Thursday and Friday night games are at prime time, causing major gridlock during the weekday pm peak commute from all directions in getting to the game, except for the Apple Cup. 8

In the future, because of various start times, and not the 1987 "Saturday noon" kick-offs, the dark and rainy days of the fall season, may be a major roadblock to being able to achieve much further reduction in car use. In addition, the predictable 124 subsidized transit shuttles to the Park and Rides, and the direct bus service to outlying areas (page 16 in the report) service for an average of 8,380 stadium attendees, may still be needed to maintain and shift to transit ridership. Because of the off-peak game times, the University **<u>cannot rely solely on public transit.</u>** King County transit service normally drops late at night, and will discourage transit users on late kick-off weekday and weekend games without a subsidy, and be a roadblock to reducing auto use. 9

LCC requests that the University provide real alternatives with financial incentives, to further reduce the use of automobiles, and not be permitted to eliminate the transit subsidizes for special events. Every 1% change in the non-automobile transportation mode is 700 people. With an average of 2-person carpools, that is 350 fewer cars on game days on the roads. 10

3. Capacity and bus stop location on public transit systems

Transit use jumped from 16% in 1987 to 31% in 2016, which now includes all bus and Light Rail riders. LCC strongly supports the transit-centered policies in its future TMP, but has strong concerns about putting all of the burden of its impacts upon the public's ability to use public transportation on their special event days. 11

The DEIS does not include a comprehensive analysis of the past transit incentive programs. The U-Pass program (or any transit subsidy programs) for students and all employees past and present, and information about the results of the subsidized bus fares, and expenses for providing charter bus service, and game day expenses shown as a percent of total ticket revenue would provide for a more informative EIS. Some of these incentive programs are still operating, and with the University population growing in its 2018 Master Plan by 20% on the Main Campus, these tools may have to be maintained, and not cut, to reduce auto use, especially since housing costs are very high in Seattle. nearer to campus, and staff and students will have longer commuting distances. 12

A. The DEIS also states that **Sound Transit Light Rail** will be a key mode to reduce vehicular congestion in the area around the stadium.
The Light Rail normally operates three cars per train, and states that it can add a 4th car in the future.
They are designed to normally carry 74 people sitting, and 74 people standing, totally 148
passengers. For heavy demand times, riders can be maxed in at 194 people per car. With 194
times three cars per run, it totals 582 people moved every 6 or 10 minutes. Sound Transit has
ordered enough to add 1 more car for 2022 operations, so that adds another 194 people per run 13
for special events.
(DEIS , Table 5 , on page 21).
Assuming the "best case option", that means that every 6 minutes (optimal) from 2018-2021,
582 people times 10 runs (an hour after the game) will transport 5,820 attendees maximum for at
least three or more years.
The DEIS admits that transit capacity is exceeded on special event days taking over two hours to
clear under optimal conditions, and offers no mitigation**. This is not acceptable for an
"improved" TMP.**

In 2020, with a fourth car added, 776 maximum people can take the Light Rail for 10 runs (an
hour) after the game for a total of 7760 attendees. That will continue to be about 11% of all
attendees (70,138) due to the Light Rail capacity constraints on the system itself.
The assumption of special event users using Light Rail also assumes a best-case scenario in *that
no other riders are in the cars for normal commuting*. Special Event users would both not find
enough space in cars when Northgate and points north come on line, and displace that mode for
its regular Light Rail users. The analysis in the DEIS also does not factor in that existing Sound
Transit ridership grew 17% from 2016-2017 on existing routes, further reducing special event 14
day capacity. When the route expands northward to the University District and Northgate in
2021, and to other locations when funding is available, the capacity **<u>at</u>** the Husky Stadium stop
must include the predicted load factors of regular users in order to predict how much real
capacity will be available on special event days. **It cannot assume empty cars to board.**

The further assumption of Light Rail service to even Lynnwood, and certainly to Everett (Table
3) is aggressive, and should be re-visited in 2023, or later, when the funding and a real timeline
is in place for the expansion lines. **It is premature to rely on these lines before they are even** 15
funded, and before the University discontinues its current transit subsidies.

B. **King County Metro** has been the primary provider of the transit mode transportation to the
Special Events. Since the City mandated the 1987 TMP, due to the additional 13,000 seats, the
University was then required to provide subsidized bus service, and free fares for ticketholders,
especially the return fares. The program was a huge success, and transit ridership shifted from
16% to 31%, almost doubling, and reducing vehicular congestion in the surrounding 16
neighborhoods.
Since that time, policy changes at the federal level will no longer allow the University to hiring
public, Metro buses for sporting events, so private charters have substituted at a higher cost to
the University.
The new TMP Modernization suggests that now all game attendees will pay their own
transportation fees, and use regular bus routes. However, the weekend service for Metro is 17
greatly reduced, and will not be able to serve all the demand in a timely matter.

With overall transit ridership increasing in the Puget Sound region, LCC has concerns that the
University is relying almost exclusively on public transit to solve the original problem of
reducing the impacts of autos on the congested roadways around its Main Campus and the
further spillover of parking into nearby neighborhoods.
There is not enough capacity in existing transit options by its own admission in its optimistic
report that states that an "Unavoidable Adverse Impact" (page 75) is indeed that it would take 2 18
hours after an event to clear the demand for transit ! That will be "one and done" for many transit
users waiting at odd hours to catch a bus or train in bad weather, or at 11:30pm after a late game.
However the DEIS presses on by stating that:
"There are no significant unavoidable adverse impacts associated with this proposal". (Ch3,1-11)
LCC disagrees with that statement, based on fact, and requests that the Park and Ride shuttle
subsidizes remain until transit capacity increases significantly with more capacity and longer
hours. Otherwise, more autos will be incentivized.

C. **The location of the new bus stop on SR513 (Montlake Blvd), north of the Link Light Rail
is a traffic blockade nightmare and must be moved**. The bus stop was originally begun in
early 2016 as a test for a lesser used bus route #78, but now it used by #65, #61, Seattle
Childrens' Hospital, and Microsoft's Connector shuttles. The frequency and deeper capacity has
reduced the very busy Montlake Blvd north to one lane when transit stops, without an off the 19
road pull-out for loading.

This stop should either be re-located to the NE Pacific Ave triangle, or the State, County and
City should work with the University to create a "pull-out" for transit asap, instead of retaining
the current bus stop, creating unsafe conditions and congestion on SR513 (Montlake Blvd NE).

4. Ride Share and Car Share options
The University noted that the new TMP includes a specific drop off / pick up location for Uber,
Lyft and other ride share vehicles, away from Montlake Blvd to reduce some of the congestion.
(Figure 22 on page 39) While the ride share mode is important, it requires vehicles coming,
AND going, from the Husky Stadium on special event days. Ride shares still add to the vehicular
congestion, and is no real help in the TMP, except that its users do not need to pay for parking.
LCC supports the University's plan for future of ride share programs in terms of locations- 20
entrance and egress, and locating it **away** from event congestion modes.

Car share-Recently, LCC has been working with Safe Montlake Passage and the University to
establish a car sharing program to reduce two-way car trips.
This program is being studied to operate by 2019, which would be a new way to reduce trip
generation. LCC supports this program to be located near Husky Stadium.

5. Pedestrians
The Alternative 1 states that pedestrians would not increase (not certain how this data was
ascertained with a 20% planned increase of 2018 Main Campus Master Plan).
Pedestrians attending special events is about 15%. Without detailed information, the
assumption is that pedestrians primarily include the students, staff and faculty who are attending 21
from close proximity, and nearby sports fans who live in adjacent neighborhoods usually walk.
(From Laurelhurst, for example, it is a 35-45-minute walk from the average home).

The rest of this statistic may be skewed because many Special Events attendees park in the adjacent neighborhoods, and then walk to Husky Stadium. They may categorize themselves as "walkers" for any University survey, but they leave their cars in surrounding neighborhood streets, then finish their trip on foot.
Thus, the traffic study 's"walking" data may not be a true reflection of the percentage of "automobile" mode, which was 33% in 2016. On game days , it is obvious to witness thee 22
massive influx of cars lining both sides of residential streets in Laurelhurst, Montlake, Portage Bay, Ravenna, and Bryant. Thus, in fact, they are auto travelers, and not actual "walkers" at all. The reality is that even the University Village has to hire extra security to police their parking from special event attendees, which impacts their businesses and add to their expenses.
LCC requests that the University include a "count" of vehicles parked in the 5 adjacent neighborhoods to get real data about automobiles vs. walkers to evaluate its TMP goal of the reduction in the use of auto transport to game days.

In addition, the pedestrian experience could be made safer with better sidewalks along Montlake Blvd, its section of NE 45th St and Mary Gates Memorial Dr. The cracked and low curb sidewalks are not in good repair, and the low curb does not provide a safe barricade from traffic.

23

In addition, low lighting along Wahkiakum Lane set on a 90 minute timer for game day night egress, would make safer passage for pedestrians.

6. Boat

The DEIS omits the potential for greater use of water transport for game days. Arriving by boat to the University's Special Events offers a unique, and relatively congestion-free mode of transport. In the past 8 years, this mode has been used by about 3.5-5% of the total. Boaters can anchor, raft up or arrive by large charter, such as Argosy. The University has docking space available, shuttles to anchored boats, and a dock for unloading large charter boats.
Currently, the rides are short, but perhaps on special event days, larger charters could also run 24
from Kenmore, Kirkland (already does), Bellevue, Mercer Island and Renton.
Even raising the amount of boating attendees by 2%, that reduces vehicular traffic by 1400 from other modes, and cuts down on vehicular congestion on roads already at capacity.

LCC requests that the University provide an in-depth study of enhancing boating options in the EIS to investigate more large boat charter or foot ferry options for special event days.

7. Bikes

The bicycle mode has been the least used for Special Events because it usually transports a single person, and generally riding alone to a sporting event has not been as popular. LCC supports the plans in the DEIS to includes plans from the University to intercept bikes, away from the 25
pedestrians, and store them safely to ensure that this mode is both convenient and safe for users and promote a greater use of biking to major events.

8. The impacts from the CMP 2018 growth in population

The DEIS falls short on incorporating the future impacts from its Campus Master Plan 2018. 26
The University is planning to add 20% more in population at the main campus. In addition, it is

asking for 12 million square feet with the potential build out of 6 million square feet over the
next 10 years on the same main campus location.
The unprecedented rapid planned growth will put further pressure on the capabilities for the
transportation system in such a small urban footprint, situated at the crossroads of two major
highways. 26,
The University currently operates with a SOV rate of about 20%. Even reducing the SOV rate to
18% of the 13,324 who use their cars, there will be 2,400 more vehicles squeezing into already cont.
congested roads in the next ten years. This CMP growth will also have an effect on the
magnitude of Special Event attendance. More "Huskies" in all roles will fill more seats than ever
before, as much as 20% additional fans.

The Campus Master Plan has proposed building new structures on the existing parking lots on its
East Campus. This part of the campus has provided parking for the Special Events, both north
and south of Husky Stadium since its inception. With a CMP proposed build-out for 750,000
square feet on the East Campus, the parking would disappear into a few underground facilities,
perhaps relocated elsewhere. Much of the East Campus is situated on a prior garbage dump, 27
called the Montlake Fill for 40 years. Thus, it is unlikely able to be "dug out" for any parking, as
the contaminated fill is toxic and unstable, and can contain pockets of methane gas and medical
waste.

With the plan to build on East Campus E-1 lot in the CMP 2018, the "tailgating" spaces would
be reduced. Building 3/4 million square feet over the parking which is close to the stadium. The
five adjacent neighborhoods mentioned above will then be more gridlocked, will probably house
the "tailgaters". Some people must drive for any number of reasons, so there will always need to
be parking which should be provided by the host of the Special Events. 28

LCC requests that the DEIS Alternative 1, or another alternative, include a comprehensive study
of the displaced, or elimination of parking on the East Campus sites. The RPC program
mentioned in the DEIS is very limited in Laurelhurst to only 3 blocks, and that program should
possible be studied to be expanded to ensure mobility for residents in adjacent neighborhoods.

Summary

LCC requests that the University develop a more incentivized tool kit in the EIS for its new
TMP, with higher transit goals, and actionable programs for non-automobile modes. The
University has not demonstrated in the DEIS that its 124 subsidized shuttle service to the Park
and Rides, and its use of private bus coaches should be eliminated . Simply stating "no impacts" 29
in the DEIS on the roads, or on transit is not a reality. The proposed TMP Alternative 1, should
not exclusively rely upon dumping excess attendees to the University's special events onto the
public, under capacity, existing transit modes.
The predicted two hour waiting times, post event will discourage future transit users, and create
overcrowding at transit stops, and spill into adjacent neighborhoods. This would be in direct 30
opposition to result intended by the required TMP in 1987 by the City Council.
The Sound Transit Light Rail and King County Metro systems are increasing their own ridership
every year, and the University is increasing its population at the same time. Thus, using only the
public transit system on special event days will not be adequate, and instead, create adverse 31
impacts on nearby neighborhoods. Mitigation measures should be required for at least 7 more
years to match the potential transit capacity, and know more about the growth impacts from the
University's Campus Master Plan 2018.

A better EIS would include a stepped program every 7 years for analysis including both of these growth vs. capacity factors. 32

The Laurelhurst Community Club requests that these recommendations be included in the EIS and the SEPA review for the Husky Stadium TMP Modernization Project. 33

Thank you for including our comments,

Sincerely,

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Response to Laurelhurst Community Club
(Letter 4)

Comment 1

The comments regarding the Laurelhurst neighborhood's proximity to Husky Stadium, and traffic conditions during football game days, are noted.

Section 3.1 of the Draft EIS and Chapter 2 of the Transportation Discipline Report (included as **Appendix B** to the Draft EIS and to this Final EIS) include discussion on current transportation conditions in the vicinity of Husky Stadium (including conditions in the Laurelhurst neighborhood).

Comment 2

Thank you for your comment and background summary.

Comment 3

Comments related to the shift in transportation modes and need to further reduce use of cars are noted.

Comment 4

Comments noted. The scope of the Husky Stadium TMP Update EIS is based on provisions of the WAC related to SEPA, including EIS alternatives (see Response to Letter 7, comment 2 for a detailed discussion regarding EIS scope).

The WAC defines the purpose and type of alternatives appropriate for analysis in an EIS. WAC 197-11-440(5)(a) states that "*reasonable alternatives shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation.*" WAC 197-11-440(5)(b) indicates that "*the word reasonable is intended to limit the number and range of alternatives, as well as the amount of detailed analysis for each alternative.*"

As indicated in Chapter 2 of the Draft EIS and this Final EIS, the University of Washington has identified the following Objectives for the proposed *TMP Update*.

- Develop a TMP that includes **forward-looking strategies** that continue to effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts on the surrounding community.
    - Promote transportation choices available through expanding transit options, such as Sound Transit Link light rail and RapidRide.

    - Incorporate strategies that acknowledge newer trends in transportation (e.g. car share, ride share, bike share).
- Develop **weekday** event management strategies, including strategies to meet the unique challenges of weekday football games (as of 2018, one weekday game per season is required two out of every three years).
- Build a flexible structure for annual operating plans that can address **future changes** in the transportation system (e.g. SR 520 improvements, proposed second bascule bridge, bus route changes prompted by One Center City).
- Increase **flexibility** regarding the use of special-event-only transit service, in favor of other transit service options, in order to decrease congestion on roadways surrounding the stadium, reduce dependence on curb space in the U-District to stage buses, and address general issues with availability.
- Provide the **accountability tools** to achieve outcomes and report to stakeholders.

Consistent with the Objectives identified for the *TMP Update*, the proposed *TMP Update* includes seven programmatic Components (transit, pedestrian, bicycle, vehicles, etc.), with each Component providing a menu of Strategies to support the success of the *TMP Update*. Additionally, the University of Washington has committed to monitoring and reporting on performance of the *TMP Update* and identifying appropriate Strategies to meet established goals. Thus, a range of identified *TMP Update* Strategies would be implemented, allowing focus on those Strategies that prove to be most effective.

Because the proposed *TMP Update* was formulated to meet the project Objectives[1] and provides a menu of Strategies that can be employed to reduce general vehicle trips to Husky Stadium events, other alternatives are not considered in this EIS because they would not meet the project Objectives at a lower environmental cost.

Comment 5

The comments related to total number of vehicles accessing Husky Stadium events being high and parking issues are noted. As indicted in Chapter 2 (Description of Proposed Action and Alternatives), a primary objective of the proposed *TMP Update* includes "*effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts on the surrounding community*."

Increases in traffic volumes under future conditions is attributed to growth in background traffic as the Stadium attendance levels will not change. Husky Stadium football weekday games occur two out of every three years. All other football events are weekend and

[1] *Objectives defined, in part, based on public input during the EIS scoping process and coordination with transportation agencies (the City of Seattle, Sound Transit, King County Metro, and the UW Stadium Technical Advisory Committee)*

outside of peak periods. The proposed *TMP Update* has a goal of high non-auto use and will therefore decrease auto traffic related to the Stadium.

Comment 6

On page 70 of the Transportation Discipline Report (**Appendix B**), employee incentives strategies are described. UW Athletics provides ORCA cards for Stadium staff and employees are encourage to utilize their UPASS to access the events.

As described on page 87 of the Transportation Discipline Report (**Appendix B**), an Operations Plan will be prepared annually and will provide more specific documentation on TMP strategies that will be utilized to achieve the performance goals. This plan will be drafted by the UW Athletics in coordination with representatives from the area transportation and public safety agencies.

Additionally, a transition plan for special service shuttles is included in the TMP (page 12) and EIS providing an understanding of how transit service to Husky Stadium events will change over time as future transit improvements are completed.

Comment 7

The comments related to METRO pass subsidies and parking patrols are noted. The UPASS is a subsidized transit pass for employees. Please also refer to the response to Comment 6 of this letter.

Comment 8

The comments related to the recent football schedule change to Saturday starting times and Thursday/Friday evening games to accommodate TV scheduling are noted. As indicated in Chapter 2 (Description of Proposed Action and Alternatives), a primary objective of the proposed *TMP Update* includes "*effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts on the surrounding community*", and to "*develop weekday event management strategies, including strategies to meet the unique challenges of weekday football games*".

The only change is the addition of one weekday game two out of every three years. As noted on page 44 of the UW Husky Stadium TMP Transportation Discipline Report, the 2016 weekday event had 15 to 20 percent less traffic in the study area than non-event days due to the University of Washington's planning strategies similar to stated strategies in the "Outreach and Education" section on page 24 of the TMP.

Comment 9

The proposed TMP includes monitoring to assess achievement of the goals. The monitoring results will be used in preparing the Operations Plan. With the annual Operations Plan, adjustments will be made to the TMP strategies used including transit strategies to help achieve the goals.

It is understood that there may need to be special service or supplemental service to achieve the mode split goals. A transition plan is included in the Husky Stadium TMP outlining how potential elimination of Special Service will be evaluated by route.

Comment 10

The comment related to EIS alternatives is noted. Please refer to response to Comment 4 of this letter, for detail on alternatives evaluated in the Draft EIS.

As indicated in Chapter 2 of the DEIS and this FEIS, a primary objective of the proposed *TMP Update* is to "effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts in the surrounding community". The proposed *TMP Update* provides a range of strategies to achieve this goal. Additionally, the University of Washington has committed to monitoring and reporting on the performance of the *TMP Update* and identifying strategies to meet the established goals. This range of identified *TMP Update* strategies would be implemented allowing focus on those strategies that prove to be the most effective.

Please also refer to the response to Comment 9 of this letter.

Comment 11

The comment indicating support for transit-centered policies, along with concerns about the public's ability to efficiently use public transportation on special event days is noted. This concern will also be considered by the UW with the TMP Advisory Committee at each annual review of the survey, monitoring, and draft operations plan.

Comment 12

The University of Washington has a separate TMP from Husky Stadium that addresses transportation conditions associated with campus operations. The Husky Stadium TMP is focused on reducing auto use for events at the Stadium. Current University of Washington programs are not assumed to change with the proposed Husky Stadium TMP. In addition, it is not assumed that with the Husky Stadium TMP that incentive programs would be cut for employees or others. The main change with the TMP is to transition from the use of charter buses (UW Special Service) to other transit options as more regional service comes online (e.g. ST Link, Metro Rapid Ride, etc.)

Comment 13

The EIS evaluation shows a worst-case scenario. If Husky Stadium is not meeting the goals set forth within the TMP then additional strategies will need to be implemented. As described on page 87 of the Final Transportation Discipline Report (**Appendix B**), "To respond to ongoing changes in the transportation system in the coming years, the UW Athletics will prepare an annual operations plan identifying the specific operational elements of the TMP. The operations plan will address TMP strategies to achieve the performance goals outlined in this TMP considering the results of the previous year's intercept survey and observed operations, the football season schedule, and changes to the background transportation infrastructure or service. This plan will be drafted by the UW Athletics in coordination with representatives from the area transportation and public safety agencies."

Comment 14

Please refer to the response to Comments 8 and 13 of this letter.

Comment 15

Please refer to the response to Comment 13 of this letter.

Comment 16

The comment related to the increase in transit ridership since 1987 is noted. As described in Chapter 2 of the EIS, the latest renovation in 2011-2012 resulted in a total seating capacity of approximately 70,150 eliminating 2,050 seats to provide suites and amenities. The proposed *TMP update* does not change this seating capacity.

The University has been relieved from subsidizing transit fares for the last several years due to the success it has had in achieving its TMP goals. The proposed *TMP Update* seeks to utilize available transit service and/or work with Sound Transit and Metro on supplemental service. This could reduce reliance on charter buses (UW Special Service), which have less capacity to serve attendees than public transit. UW Athletics will conduct monitoring and prepare an annual Operations Plan with the strategies to meet the TMP goals. The TMP includes a Special Service Transition Plan that is intended to address how UW Special Service may evolve with changes in the transportation infrastructure surrounding Husky Stadium and with new technology and mode choices. For eliminating of Special Service routes, the UW will consider: (1) Special Service routes with lower ridership and/or where service might be considered redundant with other transit service, (2) public transit capacity and operations, and (3) the ability to accommodate potential mode shifts on public transit. The TMP states that if eliminating Special Service will result in not achieving the TMP goals or cause insufficient rider capacity on the public transit service then actions could be taken. Actions could include implementing additional TMP measures, working with the transit agencies to explore supplemental transit service, and/or not eliminating the Special Service.

Comment 17

UW Athletics coordinates with both King County Metro and Sound Transit on game day service. This coordination will continue with the proposed TMP as part of the development of the annual operations plan described on page 87 of the Final Transportation Discipline Report (**Appendix B**).

Comment 18

Please refer to the response to Comment 13 of this letter.

Comment 19

The closure of stops is led by the transit agencies including temporary closures on game days. This northbound transit stop along Montlake Boulevard NE at NE Pacific Place is typically managed on game days with a temporary closure.

The One City Center (OCC) project includes changes to the transit stops at the Montlake Triangle. The current proposed option by SDOT includes moving the northbound Montlake Boulevard NE stop south and providing transit signal priority to facilitate transit turning from the curb to NE Pacific Place.

The University of Washington will pass along your comments to SDOT.

Comment 20

Thank you for your comment regarding LCC working with Safe Montlake Passage and the University of Washington to establish a car share program.

Comment 21

The Husky Stadium capacity is not changing as a result of the proposed TMP. Attendees are pedestrians at some point in their journey; therefore, with no change in Stadium capacity the overall number of pedestrians does not change.

Increases in traffic volumes under future conditions is attributed to growth in background traffic as the Stadium attendance levels will not change. Husky Stadium football weekday games occur two out of every three years. All other football events are weekend and outside of peak periods. The proposed *TMP Update* has a goal of high non-auto use and will therefore decrease auto traffic related to the Stadium.

Comment 22

The Draft EIS indicates that there is Husky Stadium-related parking within the neighborhood as described on page 3.1-10. In addition, the Husky Stadium TMP survey includes a map of the areas surrounding the Stadium and asks attendees where they parked including if they parked in the neighborhood or at University Village.

See also the response to Comment 5 of this letter.

Comment 23

As noted on page 78 of the Draft Transportation Discipline Report (**Appendix B** of the Draft EIS), the proposed *TMP Update* states "3. Work to enhance the quality and security of pathways adjacent to the Stadium through maintenance of paths, quality lighting, event signage, and other investments."

Comment 24

Husky Harbor is a unique and popular form of transit to Husky Stadium on game day. For the 2018 season, all dock space was sold out for every game for both charter boats and private boats. Approximately 150 boats dock on game days and all dock space is utilized around the Waterfront Activities Center (WAC) and Conibear Shellhouse. In addition, water taxi service is also provided for boats that anchor in Union Bay and up to 1,000 people per game are transported from their boat to land by this service.

Private charter boats also dock in Husky Harbor. A maximum of five private charter boats (that carry 100 - 350 passenger each) can fit in the designated dock space for charter boats. In addition, operations allow the UW to accommodate more charter boat drop-offs as well. Unfortunately, there has not been an increased demand for private charter boats. These private charter boats operate to generate a profit, so the limited number that occur on game day is likely due to a lack of demand that does not offset the high cost of operating a charter boat. Weather and game times also play a significant factor. Late season games are not as well attended by boaters if weather is bad due to the potential for unsafe travel conditions.

Comment 25

The comment related to support of measures proposed to increase convenience and safety for bikers traveling to events at Husky Stadium is noted.

Comment 26

The comment regarding increased campus population under the University of Washington 2018 Campus Master Plan is noted.

Section 3.15 of the *University of Washington 2018 Campus Master Plan Draft EIS* (October 2016) and Final EIS (July 2017) provides detailed analysis of transportation conditions associated with up to 6.0 million gsf of new building development on the Seattle campus. For the purpose of EIS environmental review, five action alternatives and a no action alternative were analyzed, including a range of new building development in the East Campus Sector. Section 3.15 of the *University of Washington 2018 Campus Master Plan Draft* and *Final EIS* includes discussion on the Transportation Management Plan (TMP) that provides strategies for limiting traffic, parking, bicycles, pedestrian, and transit impacts associated with new development on campus under the 2018 Campus Master Plan.

Because of the unique nature of transportation conditions associated with stadium events, a separate TMP process has been established for Husky Stadium events and the proposed *TMP Update* is proposed consistent with this process.

The Transportation Discipline Report (**Appendix B**) analyzes transportation conditions under two event levels; lower bowl only events with 42,000 people or less and upper/lower bowl events with greater than 42,000 people. The largest event that the proposed *TMP Update* contemplates is Husky football games, which based on a review of the last five seasons (2013 – 2017), had an average of approximately 52,000 people and an 85^{th} – percentile attendance level of approximately 60,000 people. The impact analysis conducted for the Draft EIS included consideration of a larger event with 60,000 people consistent with the 85^{th} – percentile attendance level for football games.

To the extent that future development consistent with the *University of Washington 2018 Campus Master Plan* occurs on campus, some additional attendance at Husky Stadium events could occur. However, as indicated in Chapter 5 of the Transportation Discipline Report (**Appendix B**), increased attendance above the 85^{th} – percentile event analyzed for the Draft EIS is not anticipated to result in additional transportation impacts.

In addition, as noted on pages 53, 63 and 66 of the Final Transportation Discipline Report (**Appendix B**), the modal analyses (transit, pedestrian, vehicle) take into account increases in demand as a result of the University of Washington Seattle 2018 Campus Master Plan (CMP) in the background conditions.

Comment 27

The comment regarding potential future development in the East Campus under the *University of Washington 2018 Campus Master Plan* is noted. The *University of Washington*

2018 Campus Master Plan identifies a 10-year conceptual plan vision for development of the campus, including the East Campus. Potential future development under the 10-year conceptual plan is intended to be focused in the south portion of the East Campus and existing parking lots to the north of Husky Stadium, such as the E1 lot would remain.

As noted on page 69 of the Final Transportation Discipline Report (**Appendix B**), the parking analysis take into account increases in demand as a result of the University of Washington Seattle 2018 Campus Master Plan (CMP) in the background conditions as well as the potential decrease in parking supply.

<u>Comment 28</u>

As noted in the response to Comment 27, the 10-year conceptual plan that is identified in the *University of Washington 2018 Campus Master Plan* would focus potential future development in south portion of the East Campus and existing parking lots to the north of the Stadium such as the E1 and E18 lots would remain. No specific development project has been identified for the E1 and E18 parking lots.

Please also refer to the response to Comment 27 of this letter.

<u>Comment 29</u>

The TMP and EIS have been updated to include a transition plan. The EIS evaluates a worst case scenario; it is not anticipated that all Special Service would be eliminated at one time. Please also refer to the response to Comment 16 of this letter.

<u>Comment 30</u>

UW Athletics will continue to monitor the TMP goal and performance metric and adjustments will be made to transit strategies through the annual operations plan to achieve the TMP goal. Please also refer to page 3.1-5 of this FEIS for additional details on the peak hour analysis.

<u>Comment 31</u>

As noted on page 57 of the Final Transportation Discipline Report (**Appendix B**), Transit growth assumed for this analysis is consistent with Seattle 2035, the City Comprehensive Plan, transit growth rate of 1 percent per year. The analysis includes background transit users from the University of Washington Seattle 2018 Campus Master Plan (CMP).

Comment 32

Please refer to the response to Comments 16 and 31 of this letter.

Comment 33

Thank you for your comment. Your comment is noted.

June 11, 2018 **Sent via email**

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Re: Husky Stadium Transportation Master Plan Draft Environmental Impact Statement

Dear Ms. Blakeslee and Councilmember Johnson,

Thank you for the opportunity to comment on the University of Washington's Husky Stadium Transit Master Plan Draft Environmental Impact Statement (TMP EIS). I and all Ravenna-Bryant Community Association (RBCA) board members believe that the City and Major Institutions play important roles in partnering with neighborhoods impacted by their plans. Neighborhoods make up this vibrant and growing city and working together is especially important at a time when the change is at such a rapid pace with impacts that will be felt by generations to come.

The Husky Stadium TMP EIS (1) does not include additional street-level pedestrian safety measures, (2) relies solely on the Burke-Gilman Trail (BGT) to meet increasing pedestrian needs, and (3) does not include either pedestrian or motor vehicle considerations north of NE 45th Street though the impact of Husky games is felt in all directions. These are significant shortcomings of the TMP EIS. 1

Safe and sufficient pedestrian access from the north is lacking in the TMP EIS

With dramatic increases in housing development north of Husky Stadium (500 units proposed on 25th and 3 planned/completed apartment buildings on Union Bay Place), the light rail station located at Husky Stadium, and sporting events at the stadium, the BGT will not be sufficient. The University of Washington's Major Institution Overlay (MIO) as shown in Figure 16 extends north of NE 45th Street. Figure 23 shows that the University is aware that fans park in our neighborhood north of the University Village urban center. Even so, the key pedestrian facilities shown in the EIS are limited to accessing the Burke-Gilman Trail (BGT). *This is not sufficient for the number of people accessing Husky stadium by foot from the north.* 2

The Husky Stadium TMP EIS fails to take into account its unique location in an urban center and the nearby Link Light Rail station. The Husky Stadium area is part of the University District Urban Center. Developing pedestrian and transit-oriented neighborhoods is one of the goals of Seattle's Urban Village strategy. In addition to the sports arena, Husky Stadium is the site of a major transit hub providing people who live in the area and who visit the stadium with access to the light rail system. As part of the Urban Center and as the site of a major transit hub, *Husky Stadium needs to have better pedestrian access at all times including during games at the stadium and at night.* 3

Safe pedestrian access from the north to and from the stadium and the light rail station is lacking in the TMP EIS. Providing a sidewalk that is within the parking lot, on the east side of the current fence along Montlake Boulevard, would provide a buffer for pedestrians walking along Montlake that is currently lacking. A pedestrian pathway in the parking lot along Montlake Boulevard would prevent pedestrians from walking through a dimly lit parking lot and, instead, place them along a road. In addition to providing a better physical walking path, people walking on sidewalks next to busy roads are safer since there are more "eyes on the street", especially at night. Better pedestrian infrastructure is needed along Montlake Blvd and the North-Stadium parking lots where people currently walk to the games and where new apartments are being developed. 4

The TMP EIS should not rely solely on the Burke-Gilman Trail to meet increasing pedestrian needs. The BGT does not have protected pedestrian access (separated from people biking) and is largely unsafe for pedestrians to navigate the ever-increasing flow of bicyclists. In addition, there is no lighting along the BGT making it dangerous at night, in early morning, and even late winter afternoon especially for women. 5

Figure 16 of the EIS shows that there are four pedestrian overpasses from the BGT to the east side of Montlake Boulevard. No pedestrian access is shown along Montlake Boulevard at street level or 25th Avenue NE and there is no direct, safe way to cross from Montlake Boulevard directly north up 25th Avenue NE. Pedestrians are forced to head east and then west again, increasing the likelihood that those in a hurry may bolt across Montlake Boulevard in an unsafe manner. To make this street more consistent with the City's Vision Zero policy, better connections need to be made between Montlake and 25th Avenue NE for pedestrians. 6

Furthermore, for several blocks on NE 50th St. there is no sidewalk on the south side of the street. Husky Stadium-bound pedestrians walk on the asphalt roadway en masse. Cars driving eastbound travel on the same road as unprotected pedestrians. The EIS should consider cones, sawhorses, etc. to protect them and propose that the UW contribute to providing sidewalks for their Husky pedestrian traffic flow. 7

<u>**Motor vehicle traffic impacts are not mitigated**</u>

The TMP EIS identifies several component elements and envisions annual plans on each of its various elements; however, it fails to call out existing troublesome situations. 8

RBCA has raised the below issues over the years. We urge the University to address them in the plan and in its environmental analysis. 8, cont.

After Husky events, vehicles traveling to I-5 is problematic and will be affected by the upcoming NE 65th Street road revisions. After major Husky events, 25th Ave NE is a one-way arterial from Husky Stadium northbound to NE 75th Street. NE 65th Street and NE 75th Street direct westbound traffic to I-5 using both northerly lanes. Meanwhile, vehicles cut through neighborhood residential streets at a fast clip. The City plans to reduce the lanes for moving 9
traffic east of 25th Ave NE and west of 20th Ave. NE to one moving lane in each direction. That will have a constrictive effect insofar as motorists anticipate a merger further west. The TMP EIS must anticipate this occurrence, pose alternatives to further reduce people driving cars, keep traffic flowing on these key arterials, and work to reduce the volume of cut-through traffic.

35th Avenue NE changes need consideration: The City is making changes to 35th Ave NE. This may necessitate an adjustment in directing traffic at intersection with NE 45th Street. 10

Without police directing traffic, neighbors at NE 60th St and 25th Ave NE can be effectively blocked after Husky events. This intersection is the sole access and exit to an enclave of residences are west of 25th Ave NE. After major Husky events, 25th Ave NE is congested with motor vehicles traveling north leaving the area. We appreciate that there was a 11
police officer guiding traffic after UW's recent commencement ceremony and look forward to similar traffic alleviating activities in this area after all major events, including games.

Please take these comments about the lack of safe, efficient pedestrian access to Husky Stadium under consideration during the TMP EIS process. As a good neighbor, we encourage 12
the University to work with the City and neighborhoods who have ideas for how to make better pedestrian connections.

The BGT should not be the only pedestrian infrastructure in the area to allow safe pedestrian and bicycle access from the north. Additionally, the lack of safe street-level pedestrian and bicycle routes from Husky Stadium and light rail station is a major weakness 13
of the TMP EIS. **Finally, the lack of consideration for current motor vehicle traffic will extend an ongoing issue. All of these issues will be exacerbated by population growth.**

On behalf of the RBCA board,

Inga Manskopf, President
Ravenna-Bryant Community Association

Response to Ravenna-Bryant Community Association (Letter 5)

Comment 1

The proposed TMP would not change the Husky Stadium attendance levels and would reduce the auto trips of Stadium events with the proposed goal to increase the non-auto mode split and decrease auto use. Pedestrian needs of the Stadium are anticipated to be similar to existing conditions since the overall attendance level will not change. The Stadium relies on all of the pedestrian facilities surrounding the facility not solely the Burke-Gilman Trail. The focus of the pedestrian capacity analysis was at the Montlake Boulevard East crossings where the pedestrian volumes attributed to the Stadium are highest.

Comment 2

The goal of the proposed *TMP Update* is to reduce the transportation and parking impacts on the surrounding neighborhoods by increasing the non-auto mode split for attendees accessing the Stadium. Please also refer to the response to Comment 1 of this letter.

Comment 3

Please refer to the response to Comment 2 of this letter.

Comment 4

The Final Transportation Discipline Report (**Appendix B**) documents pedestrian improvement strategies on page 78. The following strategies address the safety, lighting and wayfinding concerns noted in the comment.

1. Protect and improve upon the pedestrian-oriented Stadium area. Make all transportation choices, policies and improvements supportive of the pedestrian environment and experience.
2. Improve event signage to and from Husky Stadium and transportation destinations, concentrating efforts on directing attendees along key pedestrian routes.
3. Work to enhance the quality and security of pathways adjacent to the Stadium through maintenance of paths, quality lighting, event signage, and other investments.
4. Minimize vehicular traffic in the area around the University of Washington Link Station area at pre- and post-game time.
5. Manage pedestrians in the area around the University of Washington Link Station, including reducing conflicts with other modes and improving efficiency for accessing the station.

6. Work with SDOT, SPD, and UWPD to monitor and control key unsignalized intersections and access to parking to reduce pedestrian/vehicle conflicts at those locations and accommodate high pedestrian flows.

Comments regarding infrastructure in the Montlake Boulevard right-of-way have been forwarded to SDOT.

<u>Comment 5</u>

Please refer to the responses to Comments 2 and 4 of this letter.

<u>Comment 6</u>

The referenced figure (Figure 16) does not specifically show street level crossings. There are street level crossings along Montlake Boulevard at NE Pacific Street and NE Pacific Place as well as Walla Walla Road/NE 44th Street. The most direct access to 25th Avenue NE is facilitated by the Walla Walla Road/NE 44th Street crossing. SPD provides traffic control at these locations to facilitate pedestrian crossings and vehicle movements. At this time, there are no other designated street level crossings of Montlake Boulevard for SPD to facilitate safe crossings. In addition, pedestrians travelling north-south are accommodated on the Burke Gilman Trail.

The proposed *TMP Update* includes preparing an annual operations plan that would review and refine the locations where SPD provides traffic control.

<u>Comment 7</u>

The existing sidewalk extends on the south side of NE 50th Street between 35th Avenue NE and 33rd Avenue NE. Based on coordination with SDOT staff, the first phase of the University Village project will fund pedestrian facilities on NE 50th Street between 30th Avenue NE and 33rd Avenue NE. University Village is also working on permitting for a new garage at NE 47th Street and as part of mitigation for this project, additional funding towards improvements along NE 50th Street may be provided.

<u>Comment 8</u>

The proposed *TMP Update* would not change the Husky Stadium attendance levels and would reduce auto trips of Stadium events with the proposed goal to increase the non-auto mode split and decrease auto use.

<u>Comment 9</u>

The proposed *TMP Update* would not change the Husky Stadium attendance levels and would reduce the auto trips of Stadium events with the proposed goal to increase the non-auto mode split and decrease auto use. UW Athletics works with SPD to develop a traffic control plan to clear the area of event-related traffic in a timely manner and diminish the duration of congestion.

Page 81 of the Final Transportation Discipline Report (**Appendix B**) lists the following potential vehicle improvement strategies associated with Husky Stadium events:

1. Provide a broad communication and outreach campaign in advance of events to deter Single Occupancy Vehicle (SOV) travel and encourage use of non-auto modes.
2. Accommodate routes for freight and emergency services to access UW and Seattle Children's hospitals.
3. Coordinate with SDOT on the use of dynamic message signs to route vehicles to parking and facilitate egress from the stadium area.
4. Work with SDOT and SPD to develop annual plans for intersection control and road closures to direct vehicles in and out of the stadium area.
5. Set parking pricing to incentive high occupancy vehicles.

These strategies are aimed at reducing auto use, minimizing effects on the neighborhood, and managing game day traffic.

<u>Comment 10</u>

As described on page 87 of the Final Transportation Discipline Report (**Appendix B**), "To respond to ongoing changes in the transportation system in the coming years, the UW Athletics will prepare an annual operations plan identifying the specific operational elements of the TMP. The operations plan will address TMP strategies to achieve the performance goals outlined in this TMP considering the results of the previous year's intercept survey and observed operations, the football season schedule, and changes to the background transportation infrastructure or service. This plan will be drafted by the UW Athletics in coordination with representatives from the area transportation and public safety agencies."

<u>Comment 11</u>

Thank you for your comment. The University will continue to work with SPD to guide traffic and access for our neighbors. Please also refer to the response to Comment 10 of this letter.

<u>Comment 12</u>

The comment regarding the consideration of Draft EIS comments and continuing to work with the City and neighborhoods is noted and are appreciated.

<u>Comment 13</u>

Thank you for your comment. Please also refer to the responses to Comments 1 -12 of this letter.

Ravenna Springs Community Council

June 15, 2018

Ms. Julie Blakeslee
Environmental & Land Use Planner
jblakesl@uw.edu

Dear Ms. Blakeslee:

Thanks for the thorough work in the draft EIS on Husky Stadium Transportantion Management. This letters references figures 8 and 9 which illustrate daily traffic patterns and boarding locations near Husky stadium.

We, The Ravenna Springs Community Council, offer a simple adjustment which can be implemented soon that will help traffic flow not only on game days but every day of the week.

Suggestion: Close the Montlake Blvd NE Stop and direct riders to the stop at NE Pacific Pl. & NE Pacific Street.

The main merits of this change are:

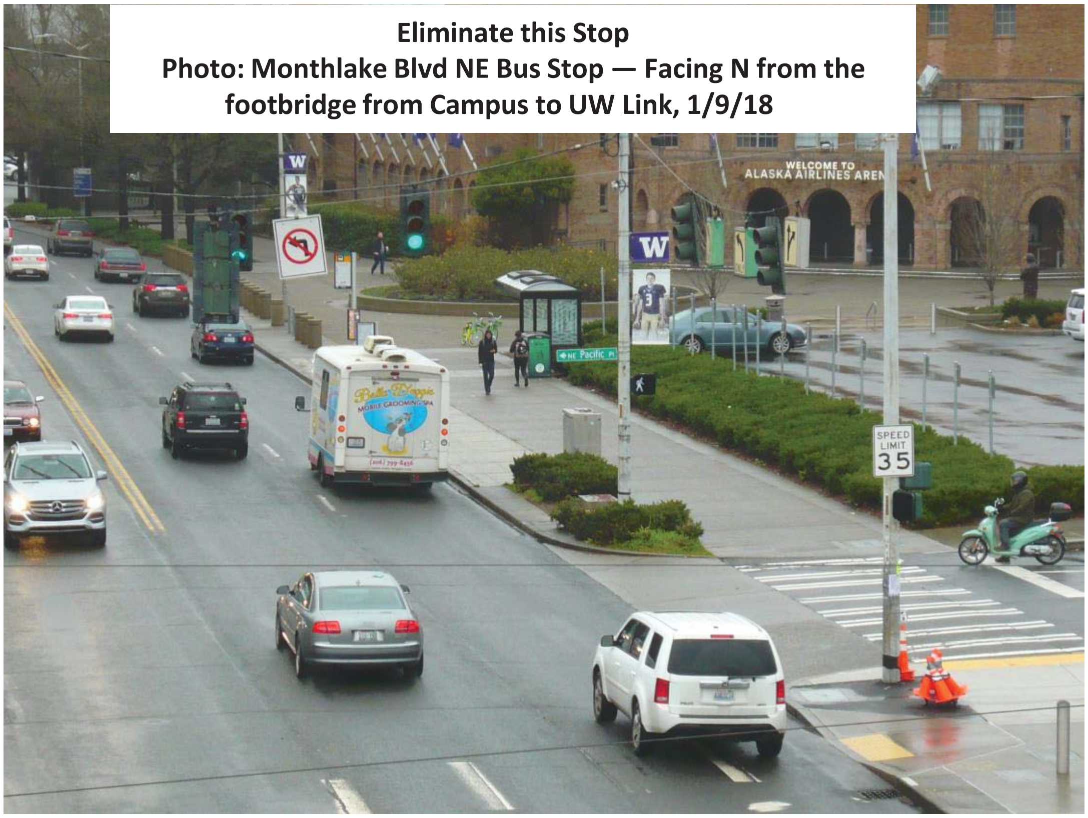
- Traffic flows improve.
- The chance of accidents as drivers maneuver around buses is eliminated.
- Riders can reach the stop safely & easily footbridge and elevator. 1
- It uses an existing stop.
- Metro can approve this change under its discretionary authority (It doesn't require a vote of any King County Council committee or the King County Council.)

Please let us know when there are any meetings or hearings about this suggestion so we can appear and support this sensible idea in person.

Sincerely,

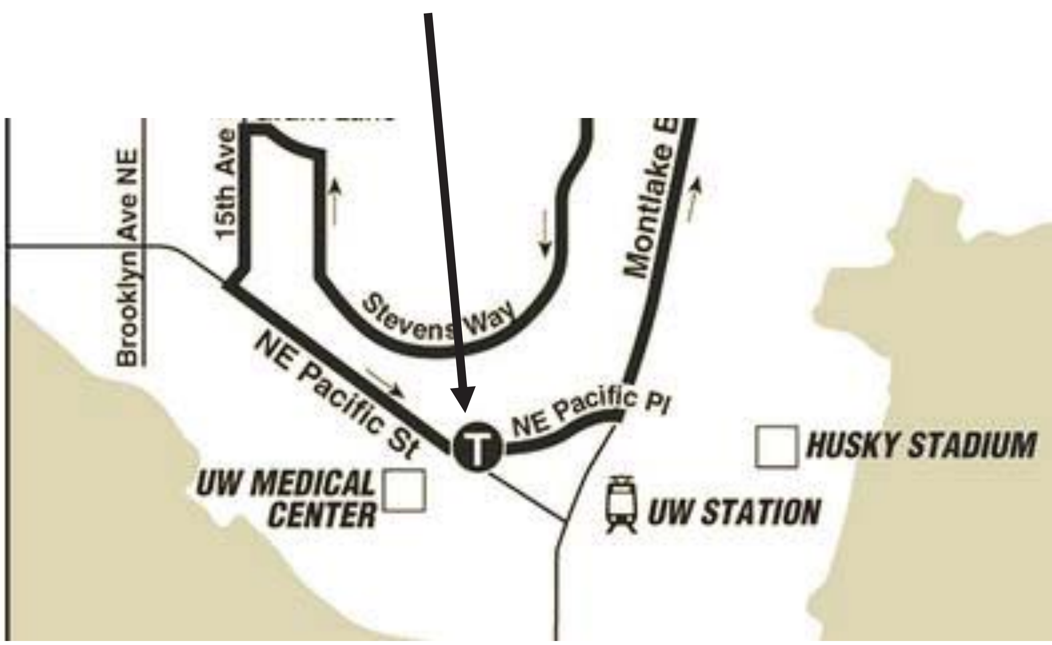
(signed) John Perkins

Ravenna Springs Community Council
Northeast Transit Action Project
qrisk-johnperkins@yahoo.com



Eliminate this Stop
Photo: Monthlake Blvd NE Bus Stop — Facing N from the footbridge from Campus to UW Link, 1/9/18

Direct riders to use the NE Pacific Place stop.



Response to Ravenna Springs Community Council (Letter 6)

<u>Comment 1</u>

The closure of stops is led by the transit agencies including temporary closures on game days. This northbound transit stop along Montlake Boulevard NE at NE Pacific Place is typically managed on game days with a temporary closure.

The One City Center (OCC) project includes changes to the transit stops at the Montlake Triangle. The current proposed option by SDOT includes moving the northbound Montlake Boulevard NE stop south and providing transit signal priority to facilitate transit turning from the curb to NE Pacific Place.

The University of Washington will pass along your comments to SDOT.

Julie Blakeslee
University of Washington
Box 352205
Seattle, WA 98195-2205

June 4, 2018

Re: Comments on the Husky Stadium TMP Update Draft EIS

Dear Ms. Blakeslee:

I am writing to you to provide my written comments on the draft EIS for the Husky Stadium TMP Update. Your consideration of my comments is appreciated.

By way of brief background, my family of five lives directly east of UW campus and Husky Stadium. We have lived in a present location for 25 years. I genuinely acknowledge and appreciate all the innumerable benefits that UW brings to Seattle and region, including through its very fine sports programs. Within general bounds of reason, I also accept that many of the secondary costs of UW's many benefits (*e.g.,* crushingly adverse transportation impacts) fall disproportionately on those of us that are neighbors to UW. Specific as to Husky Stadium, I have learned to live with the ongoing reality that for significant periods of time on football game days, we are either confined to our home or precluded from reaching our home due to the traffic impacts on the surrounding streets and neighborhoods.

My comments after reading the draft EIS are as follows:

1. The draft EIS is wholly inadequate. To my surprise, given the capabilities and reputation of UW, there is little to no content in the draft. The authors of the Draft EIS appear to have made no attempt to adequately, let alone rigorously, analyze the existing transportation environment or the likely impacts of Husky Stadium transportation management choices, updated or otherwise. 1

2. The draft EIS unreasonably cramps the scope, purpose and need of the EIS to focus only on the incremental effects of either keeping the TMP as it is or making modest changes that UW wishes to undertake. This is a classic unlawful SEPA/NEPA strategy in attempting to narrow the scope of the action to avoid consideration of the true impacts. 2

3. The draft EIS is inadequate in failing to examine a reasonable range of alternatives. The heart of any EIS is its identification and comparison of a reasonable range of alternatives to help inform public review and decision-making. It is certainly possible for the no action alternative and the proposed action to be the only reasonable alternatives for a given proposal, but such circumstances are very rare. No explanation has been provided to justify only the two narrow options analyzed as the only reasonable options. No explanation has been provided of the alternatives considered and eliminated, or why it was unreasonable to carry such alternatives forward for detailed analysis (*e.g.,* what is unreasonable about considering a bus pullout in front of Husky Stadium). There are, in fact, a myriad of additional transportation management measures and actions that are reasonable and could be effective in reducing the obvious and extreme transportation impacts to the neighborhood resulting from Husky football traffic. 3

4. As disappointing as the draft EIS is from start to finish, the most crushing deficiency is this sentence in Section 3.1.2, which dismisses without analysis any discussion of mitigation: "The alternatives analysis finds there would be no adverse transportation system impacts requiring additional mitigation under the proposed TMP Update." Really? There is no possible way for UW to undertake an honest "hard look" in its EIS at its Husky Stadium TMP and conclude that there is no need for additional mitigation of transportation impacts. 4

In sum, despite the high regard in which I hold UW, as best I can determine, UW has predetermined that it is only willing to undertake a small set of extremely modest changes to its TMP. To accomplish this – which is to say, *to entirely avoid grappling with the real issues* – the very adverse and significant impacts on transportation, which are disproportionately borne by the surrounding neighborhoods, resulting from game day traffic – UW is manipulating the SEPA process so that it only looks at the incremental difference between the existing plan (which is inadequate and antiquated) and a slightly modified plan (which is no worse, but also little better). In doing so, UW apparently believes it can ignore the full scope of present day adverse impacts and the full scope of TMP changes that are reasonably warranted and practicable. 5

Response to Jeffrey Leppo and Robin McManamin (Letter 7)

<u>Comment 1</u>

Comment noted. Section 3.1 (Transportation) of the *Husky Stadium TMP Update* Draft EIS, which is based on the detailed Transportation Discipline Report (Transpo Group, September 2018) provided in **Appendix B**, provides analysis of existing and *TMP Update* conditions related to transit, pedestrians, bicycle, vehicles, parking, and secondary/cumulative conditions. The scope and approach employed for the transportation analysis is based on comments received during the November 2017 SEPA EIS Scoping process, as well as on coordination with the City of Seattle, Sound Transit, King County Metro, and the UW Stadium Technical Advisory Committee.

<u>Comment 2</u>

The scope of the Husky Stadium TMP Update EIS is based on provisions of the Washington Administration Code (WAC) related to the State Environmental Policy Act (SEPA).

Consistent with WAC 197-11-360, the University of Washington, as SEPA lead agency, determined that the proposed Husky Stadium TMP Update has the potential for probable significant adverse environmental impact, and issued a Determination of Significance (DS) resulting in the preparation of an Environmental Impact Statement (EIS). WAC 197-11-400 states that "*the primary purpose of an environmental impact statement is to ensure that SEPA policies are an integral part of the ongoing programs and actions of state and local government*". WAC 197-11-400(2) states that "*EISs shall be concise, clear, and to the point, and shall be supported by the necessary environmental analysis*".

In November 2017, the University of Washington initiated the EIS scoping process consistent with WAC 197-11-408; an intent of the EIS scoping process is to narrow the scope of the EIS to the probable significant adverse impacts and reasonable alternatives. A Notice of Determination of Significance (DS) indicating that an EIS would be prepared and eliciting public comments on the elements of the environment and alternatives to be evaluated in the EIS was published on November 27, 2018 with a 21-day public comment period. Seven letters were received during the scoping process regarding relevant topics in the Husky Stadium TMP Update and EIS. During the EIS scoping process, the University of Washington also coordinated with the City of Seattle, Sound Transit, King County Metro, and the UW Stadium Technical Advisory Committee regarding scope, alternatives and methodology.

At the conclusion of the EIS scoping process, the University of Washington determined that Transportation is the element of the environment with the potential for significant impacts, and that transportation conditions associated with the proposed *TMP Update* (Alternative 1) and the No Action Alternative would be evaluated.

Comment 3

Comments noted. As indicated in response to comment 2 of this letter, the scope of the Husky Stadium TMP Update EIS is based on provisions of the WAC related to SEPA, including EIS alternatives.

The WAC defines the purpose and type of alternatives appropriate for analysis in an EIS. WAC 197-11-440(5)(a) states that "*reasonable alternatives shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation.*" WAC 197-11-440(5)(b) indicates that "*the word reasonable is intended to limit the number and range of alternatives, as well as the amount of detailed analysis for each alternative.*"

As indicated in Chapter 2 of the Draft EIS and this Final EIS, the University of Washington has identified the following Objectives for the proposed *TMP Update*.

- Develop a TMP that includes **forward-looking strategies** that continue to effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts on the surrounding community.
  - Promote transportation choices available through expanding transit options, such as Sound Transit Link light rail and RapidRide.
  - Incorporate strategies that acknowledge newer trends in transportation (e.g. car share, ride share, bike share).
- Develop **weekday** event management strategies, including strategies to meet the unique challenges of weekday football games (as of 2018, one weekday game per season is required two out of every three years).
- Build a flexible structure for annual operating plans that can address **future changes** in the transportation system (e.g. SR 520 improvements, proposed second bascule bridge, bus route changes prompted by One Center City).
- Increase **flexibility** regarding the use of special-event-only transit service, in favor of other transit service options, in order to decrease congestion on roadways surrounding the stadium, reduce dependence on curb space in the U-District to stage buses, and address general issues with availability.
- Provide the **accountability** tools to achieve outcomes and report to stakeholders.

Consistent with the Objectives identified for the *TMP Update*, the proposed *TMP Update* includes seven programmatic Components (transit, pedestrian, bicycle, vehicles, etc.), with each Component providing a menu of Strategies to support the success of the *TMP Update*. Additionally, the University of Washington has committed to monitoring and reporting on performance of the *TMP Update* and identifying appropriate Strategies to meet established goals. Thus, a range of identified *TMP Update* Strategies would be implemented, allowing focus on those Strategies that prove to be most effective.

Because the proposed *TMP Update* was formulated to meet the project Objectives[2] and provides a menu of Strategies that can be employed to reduce general vehicle trips to Husky Stadium events, other alternatives are not considered in this EIS because they would not meet the project Objectives at a lower environmental cost.

Comment 4

Comment noted. The proposed *TMP Update* does not directly affect Husky Stadium seating capacity, amount of parking, number or size of Stadium events, or the transportation infrastructure surrounding Husky Stadium (e.g. light rail). Rather, the proposed *TMP Update* is intended to respond to changes in the transportation infrastructure in the vicinity of the Stadium (e.g. light rail and bus transit), and changes in day/time of Husky Stadium events (e.g. weekday football games) occurring subsequent to establishment of the Husky Stadium TMP in 1986 by providing a new menu of transportation management strategies. The proposed *TMP Update* represents mitigation intended to effectively move stadium attendees into alternatives to cars in order to decrease congestion and parking impacts on the surrounding community.

Section 3.1 of the Draft EIS (Transportation) compares transportation conditions associated with transit, pedestrians, bicycles, vehicles, and parking with the menu of strategies under the proposed *TMP Update* (Alternative 1) with conditions under the existing TMP (No Action). As indicated in Section 3.1 of the Draft EIS, compared to existing TMP conditions, there are no transportation impacts anticipated with implementation of the proposed menu of strategies to decrease congestion under the proposed *TMP Update* (Alternative 1), and no additional mitigation is warranted.

UW Athletics works with SPD to develop a traffic control plan to clear the area of event-related traffic in a timely manner and diminish the duration of congestion.

Page 81 of the Final Transportation Discipline Report (**Appendix B**) lists the following potential vehicle improvement strategies associated with Husky Stadium events:

1. Provide a broad communication and outreach campaign in advance of events to deter Single Occupancy Vehicle (SOV) travel and encourage use of non-auto modes.
2. Accommodate routes for freight and emergency services to access UW and Seattle Children's hospitals.

[2] *Objectives defined, in part, based on public input during the EIS scoping process and coordination with transportation agencies (the City of Seattle, Sound Transit, King County Metro, and the UW Stadium Technical Advisory Committee)*

3. Coordinate with SDOT on the use of dynamic message signs to route vehicles to parking and facilitate egress from the stadium area.
4. Work with SDOT and SPD to develop annual plans for intersection control and road closures to direct vehicles in and out of the stadium area.
5. Set parking pricing to incentive higher occupancy vehicles.

These strategies are aimed at reducing auto use, minimizing effects on the neighborhood, and managing game day traffic.

<u>Comment 5</u>

Comment noted; although it is unclear in the comment what represents "the real issues." Husky Stadium has been in its current location since 1920, and has included seating capacity of approximately 70,000 since 1987[3]. As indicated in response to Comment 4 of this letter, the proposed *TMP Update* does not directly affect Husky Stadium seating capacity, amount of parking, number or size of Stadium events, or the transportation infrastructure surrounding Husky Stadium (i.e. light rail). Rather, the proposed *TMP Update* is intended to respond to changes in the transportation infrastructure in the vicinity of the Stadium, and changes in day/time of Husky Stadium events (i.e. weekday football games) occurring subsequent to establishment of the Husky Stadium TMP in 1986 by providing a new menu of transportation management strategies intended to decrease congestion and parking impacts on the surrounding community.

[3] *The 1987 North Deck addition expanded seating capacity from 58,000 to approximately 72,200. The 2012 renovation resulted in a reduction of total seating capacity to approximately 70,150*.

APPENDIX A

Distribution List

Name
AGENCIES/ORGANIZATIONS
SEPA Public Info Center City of Seattle Dept. of Construction & Inspections
Harold Scoggins Fire Chief Seattle Fire Department
Director Seattle Dept. of Transportation
Cristina VanValkenburgh Seattle Dept. of Transportation
Ann Sutphin Seattle Dept. of Transportation
John Shaw Seattle Dept. of Construction and Inspections
Seattle Police Department
Captain Eric Sano Traffic Section Commander Seattle Police Department
SEPA Coordinator Seattle Public Utilities
Dept. of Ecology SEPA Unit Environmental Review Section
Patty Hayes Director Seattle & King County-Public Health
Trinity Parker Regional Government and Comm. Relations Sound Transit
James Irish Environmental Manager Sound Transit Link
Craig Kenworthy, Executive Director Puget Sound Clean Air Agency
Roberta Baker Seattle Department of Construction & Inspections
Andrew Glass Hastings Seattle Department of Transportation
Bill Bryant King County Metro Transit
Alex Krieg Sound Transit
Sunny Knott Senior Transportation Planner King County Metro
Gary Kriedt Senior Environmental Planner King County Dept of Transportation
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Name
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Hester Serebrin, Policy Director Transportation Choices
Isabel Tinoco Fisheries Director Muckleshoot Tribe
NEIGHBORHOOD GROUPS
Chris Leman Eastlake Community Council
Jeannie Hale Laurelhurst Community Club
Bryan Haworth Montlake Community Club
Northeast District Council
Inga Manskopf Ravenna Bryant Community Association c/o Ravenna-Eckstein Community Center
Joan Kelday Ravenna Springs Community Council
John Perkins Ravenna Springs Community Council
Matt Hoehnen Roosevelt Neighbors' Alliance
View Ridge Community Club
Wallingford Community Council
President Wedgewood Community Council
University District Community Council
Dirk Farrell Roosevelt Neighborhood Association
Mark Crawford The U District Partnership
Greater University Chamber of Commerce
Ruedi Risler University Park Community Club
Pete Delaunay Portage Bay/Roanoke Park Community Council

Name
CUCAC
Timmy Bendis Eastlake Community Council - CUCAC
Doug Campbell University District Partnership - CUCAC
Kay Kelly Laurelhurst Community Club - CUCAC
Tomitha Blake Montlake Community Club - CUCAC
John Gaines Portage Bay Roanoke Park Community Council - CUCAC
Eric Larson Roosevelt Neighbors Alliance - CUCAC
Amanda Winters Roosevelt Neighborhood Association - CUCAC
Matthew Fox c/o University District Community Council -CUCAC
Barbara Quinn University Park Community Club - CUCAC
Brian O'Sullivan Wallingford Community Council - CUCAC
Kerry Kahl U.W. At Large Representative - CUCAC
Ashley Emery U.W Faculty Senate Representative - CUCAC
Tom Wallace Suzzallo and Allen Libraries
Downtown Central Library
University Branch Public Library
Montlake Branch Public Library
Northeast Branch Public Library
UNIVERSITY OF WASHINGTON
Sally J Clark Regional Affairs
Julie Blakeslee University Environ/Land Use Planner
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Doug Gallucci Environmental Programs Office/SEPA Advisory Committee
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Frieda Taub Aquatic & Fisheries Sciences/SEPA Advisory Committee
Jane Koenig Environmental Health/SEPA Advisory Committee
Anne Eskridge Director Transportation Services
John Viinson, Chief of Police
Andrew Sang
NEWSPAPERS
Seattle Times
UW Today
UW Daily
Daily Journal of Commerce
INDIVIDUALS
Jeffrey Leppo & Robin McManamin

APPENDIX B

Transportation Discipline Report

FINAL Transportation Discipline Report

HUSKY STADIUM TRANSPORTATION MANAGEMENT PLAN FINAL EIS

Prepared for
University of Washington

November 2018

Prepared by:

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1.17346.00

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Chapter 1. Introduction

This document summarizes the technical analysis conducted in support of the transportation element of the Environmental Impact Statement (EIS) prepared for the proposed Husky Stadium Transportation Management Plan (TMP). This chapter provides an overview of the project and analysis approach. Further details are provided in subsequent chapters specific to key transportation elements.

Report Organization

This report is organized into the following sections:

- **Chapter 1 Introduction** – outlines project background, description of alternatives, and overall approach and scope of the transportation analysis completed for the project.
- **Chapter 2 Affected Environment** – documents the existing 2017 transportation conditions focusing on the transportation elements noted above.
- **Chapter 3 Impacts of No Action Alternative** – describes the No Action transportation conditions for the elements noted above under the existing TMP.
- **Chapter 4 Impacts of Alternative 1** – describes the potential effects of the proposed TMP Update on the identified transportation elements. Transportation impacts are determined by comparing Alternative 1 to the No Action Alternative.
- **Chapter 5 Secondary and Cumulative Impacts** – describes potential secondary and cumulative impacts that could occur with the proposed TMP Update.
- **Chapter 6 Mitigation** – describes the potential transportation mitigation measures to mitigate Alternative 1-related impacts. This also outlines the framework of the proposed annual operations plan to be prepared by UW Athletics.
- **Chapter 7 Significant and Unavoidable Adverse Impacts** – documents potential adverse transportation-related impacts that could not be fully mitigated with the proposed TMP Update.

Background

The proposed TMP updates the TMP approved in 1986, responds to ongoing changes in the transportation infrastructure surrounding Husky Stadium, and considers planned investments in the transportation system that will influence event attendee travel mode choices. The proposed TMP does not address transportation to and from other campus events/activities or venues, which is specified in the University of Washington (UW) TMP. The key objectives of the proposed TMP update include the following:

- Develop a TMP that includes forward-looking strategies that continue to effectively move stadium attendees out of cars into alternative transportation modes to decrease congestion and parking impacts.
    - Promote transportation choices available through expanding transit options such as Sound Transit Link light rail and METRO CONNECTS.
    - Incorporate strategies that acknowledge newer trends in transportation (e.g., car share, ride share, bike share).
- Develop weekday event management strategies (including unique challenges of weekday football games required twice every 3 years).
- Build a flexible structure for annual operating plans that can address future changes in the transportation system (e.g., SR 520 improvements, proposed second bascule bridge, bus route changes prompted by One Center City, and expanding Metro transit).

- Increase flexibility on the use of special service to decrease congestion on roadways surrounding the stadium, reduce dependence on curb space in the U-District, and address general issues with availability.
- Provide the accountability tools to achieve outcomes and report to stakeholders.

Study Approach and Area

The scope of the transportation analysis conducted for the EIS has been based on information from comments received during the November 2017 State Environmental Policy Act (SEPA) scoping period and coordination with the City of Seattle, Sound Transit, King County Metro, and the Stadium Technical Committee. The following transportation elements are evaluated in this report:

- Transit
- Pedestrians
- Bicycles
- Vehicles
- Parking

The TMP also addresses strategies for arrival and departure via boat. There are no changes anticipated because of the TMP for the boat mode that would result in impacts; therefore, no additional analysis is provided within this Transportation Discipline Report.

Husky Stadium event start times vary based on television schedules and other factors governed by the PAC-12 Conference. This evaluation considers both weekday and weekend conditions and focuses on the time periods for each mode where the TMP has the most impact. Husky Stadium events currently occur on both weekdays and weekends; therefore, there is no non-event condition and both weekday and weekend conditions are reflective of a game day. Table 1 provides a summary of the analysis conducted for each of the transportation elements noted above.

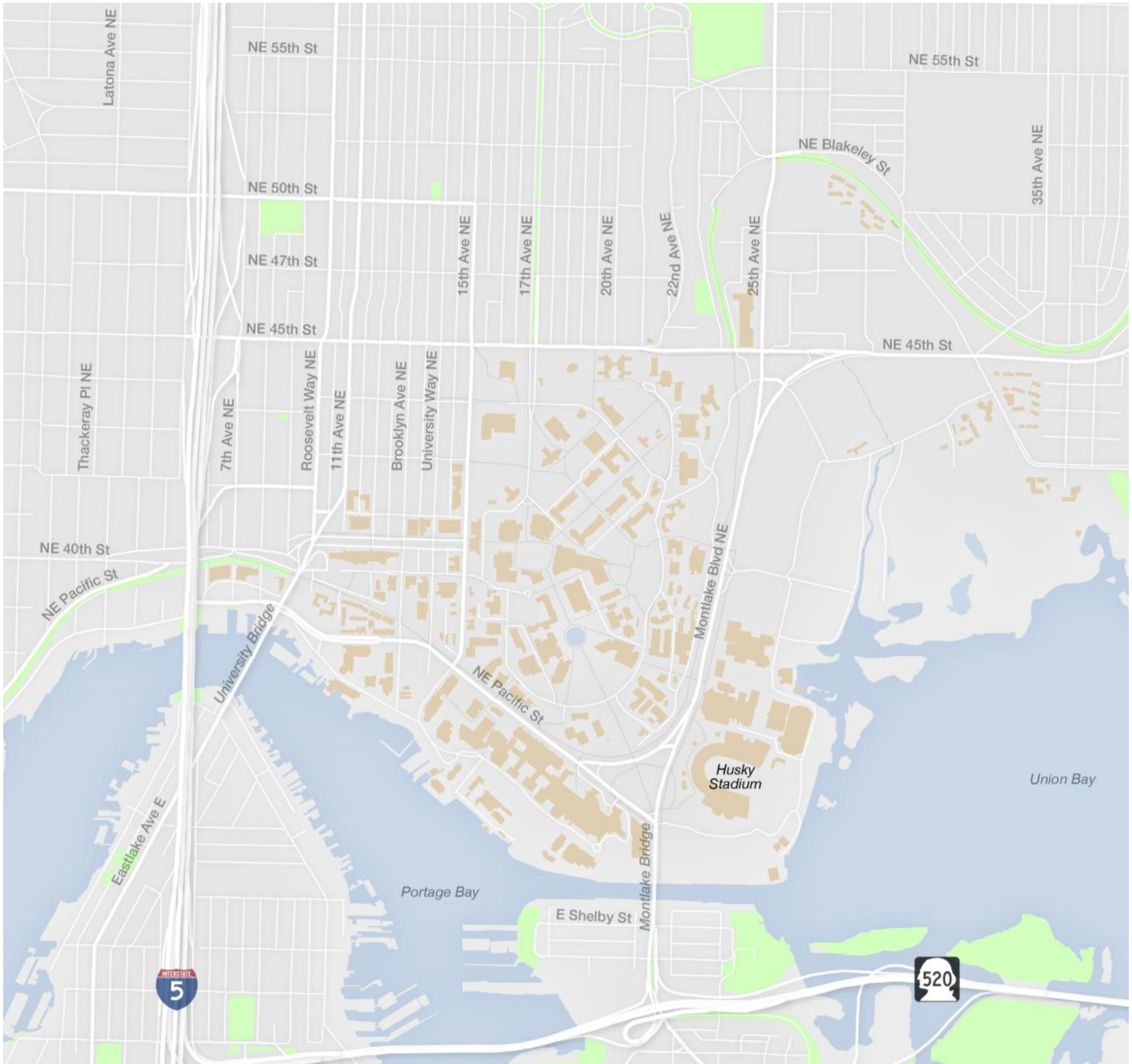
Table 1. Transportation Analysis – Scope and Summary

Element	Horizon Year[1]	Time Periods	Analysis Conducted	Additional Information
Transit	Existing, 2019, 2025, 2035	Weekday and Weekend Pre/Post-Event Conditions	Transit Capacity at Screenlines	A more rigorous analysis is conducted for transit including the number of horizon years and time periods because the successful implementation of the proposed TMP and conformance with the goals would increase transit ridership.
Pedestrians	Existing, 2035	Weekday and Weekend Pre- and Post-Event Conditions	Quality of Pedestrian Environment Pedestrian Flow Analysis along Key Facilities	Pedestrian flow analysis was conducted for pre- and post-event. Pre-event conditions would represent the highest period of background pedestrian volume combined with event pedestrians in the study area. Post event conditions are not anticipated to overlap with peak hour background pedestrian traffic conditions.
Bicycles	Existing, 2035	Weekday and Weekend Pre-Event Conditions	Quality of Bicycle Environment	-
Vehicles	Existing, 2035	Weekday and Weekend Pre-Event Conditions	Traffic Volumes Traffic Operations Emergency Service Freight Routing	The vehicle analysis focuses on pre-event conditions. The transportation system near the stadium is managed during post event conditions to manage pedestrian and vehicle conflicts and prioritize egress of vehicles from the immediate area. Management of the system would continue.
Parking	Existing, 2035	Weekday and Weekend Conditions	Parking Demand and Neighborhood Parking Impacts	-

1. The horizon years are consistent with the TMP goal anticipated horizons.

The study area (shown in Figure 1) is focused on the Husky Stadium vicinity where the effects of stadium traffic and changes under the proposed TMP Update goals would occur. This includes roadways and intersections directly adjacent to the stadium and most effected by event traffic conditions. The study area generally extends between I-5 and Montlake Boulevard NE to the east and west and 45th Street and SR 520 to the north and south.

Figure 1. Study Area



Alternatives Evaluated

It is anticipated that the proposed TMP Update would be effective by fall of 2019. The Husky Stadium TMP alternatives are evaluated for the horizon years noted in Table 1. The 2035 horizon year is consistent with the City of Seattle's 2015 *Seattle 2035*; the City's current Comprehensive Plan represents an approximately 20-year planning horizon when most of the anticipated transportation investments in the study area would be complete. The interim horizon years are consistent with anticipated completion of key transit improvements in the region. The following two alternatives are evaluated with consideration of weekday and weekend conditions:

- **No Action Alternative** – represents continuation of the existing TMP.
- **Alternative 1 – Proposed TMP Update** – updates the TMP to meet the objectives outlined in the Background section of this chapter. The update would take advantage of local and regional investments in transit rather than subsidizing private service.

History and Context

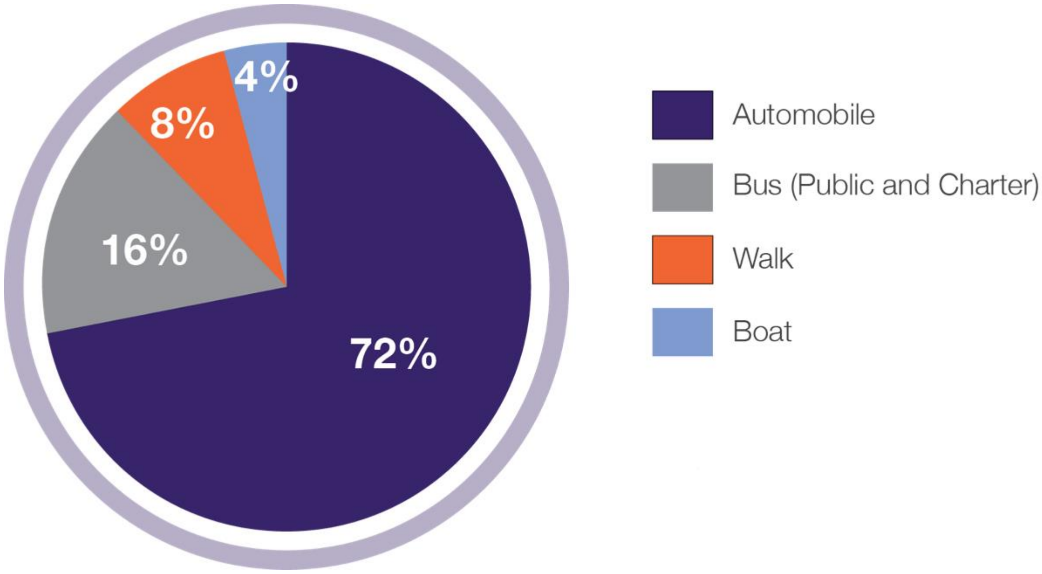
The 1986 *University of Washington Stadium Expansion Parking Plan* and *Transportation Management Program Stadium Expansion Parking Plan* and *Transportation Management Program Operational Supplement* documented plans for mitigating transportation impacts on the surrounding community with Husky Stadium expansion done at that time. The focus of the 1986 TMP was to accommodate a sellout crowd of 72,200 attendees, with less reliance on parking in the residential areas near campus. The keys to accomplishing this goal included the following:

- Providing incentives for taking transit, carpooling, or alternatives modes to games by mandating "free" to customers (i.e., UW pays) transit scrip for all ticket purchasers.
- Expanding transit service.
- Providing discount pricing for carpools.
- Providing additional on-campus parking.

There was a secondary goal to expedite postgame traffic traveling on SR 520 and I-5.

Figure 2 shows the TMP mode split goal established in the 1986 plan, which were implemented starting with the 1987 season. Goals were identified for automobile, bus, walk, and boating trips. The TMP goals are representative of game day arrival patterns.

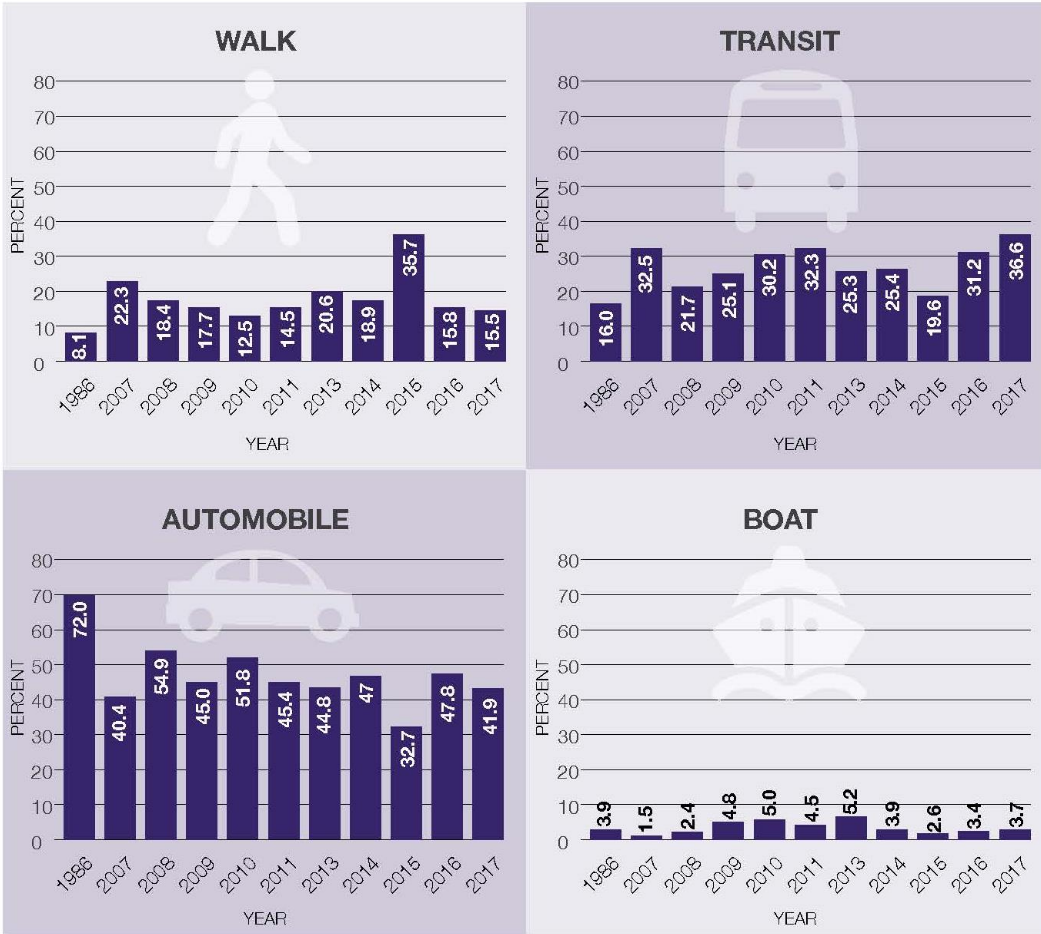
Figure 2. Husky Stadium 1986 TMP Mode Split Goals



Since 1986, UW has subsidized transit service. A subsidy of transit scrip has been waived since 2013; however, UW underwrites private and contracted shuttle service for events. King County Metro Transit service has expanded, and the University Link light rail has opened. As a result, transit access to the stadium has improved and, as shown on Figure 3, the 16 percent transit goal has not only been met, but far exceeded. The UW conducts an annual attendee intercept survey as part of the monitoring and reporting process. The survey is conducted in the Fall of each year at a game against a PAC-12 opponent, to capture a high attendance event.

Figure 3 illustrates the recent historical game day mode splits. As shown in Figure 3, in 2007 transit ridership to the game reached approximately 32 percent. During this period, UW paid King County Metro to provide more than 150 additional coaches per game to meet transit demand. However, in 2008, the Federal Transit Administration (FTA) declared that public transit operators cannot operate sporting event shuttles if a private transit provider is available. A waiver was adopted to allow King County Metro to continue providing service to the games, but this waiver expired in 2016. In March 2016, light rail transit opened near the stadium, resulting in increased use of transit to get to the game reaching an all-time high of 35 percent.

Figure 3. Husky Stadium Game Day Historical Modes of Travel (Arrival)



Performance Goal

The proposed TMP Update identifies goals for different time periods and event attendance levels to address both the demand management and operational objectives. Table 2 summarizes the transportation demand management goal for transit, pedestrian, bike, and boat modes (hereafter known as "non-auto") by stadium event attendance level and type on weekends and weekdays. The demand management goals for football games were based on current achievement and consideration of future transportation improvements. The goals for non-football UW and non-UW events were assumed to be consistent with football events for higher attendance levels (i.e., greater than 42,000). For attendance levels between 15,000 and 24,000 and 24,000 and 42,000, the goal is targeted such that the median size event has pre-event auto trips no greater than a 60,000-attendee football game under the existing TMP. The median event size is 19,000 attendees for event between 15,000 and 24,000 people and 33,000 attendees for event between 24,000 and 42,000 people.

The second goal targets subsiding, (substantially reducing) all traffic control measures (e.g., detours and lane closures) within 45 to 60 minutes after the end of weekday and weekend stadium events. The analysis of the impacts of the proposed TMP Update is based on the future non-auto mode split goal.

The TMP includes annual monitoring/reporting on the performance goals and preparation of an annual operations plan identifying specific TMP strategies to achieve the performance goals. In addition to conducting surveys to determine performance on the two TMP goals, additional data will be collected to evaluate the effectiveness of the TMP/Annual Operations Plan and provide information on revisions to the plan for the following year. Performance measures and data that may be collected includes time to clear the Stadium plaza, pedestrian queuing at near-by transit stops, game day ridership, TNC vehicle counts, observed operational issues, and post-event traffic volumes.

Table 2. Non-Auto Mode Split TMP Goal

Football Events								
	Target Year							
	2019		1-yr following opening of Northgate Link (estimated at 2021)		1-yr following opening of Lynnwood Link (estimated at 2024)		1-yr following opening of Everett Link service (estimated at 2025)	
Attendance Level	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
N/A	61%	52%	63%	54%	65%	58%	67%	62%
Non-Football UW-Events & Non-UW Events								
	Target Year							
	2019		1-yr following opening of Northgate Link (estimated at 2021)		1-yr following opening of Lynnwood Link (estimated at 2024)		1-yr following opening of Everett Link service (estimated at 2025)	
Attendance Level	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
15,000 – 24,000	35%	30%	37%	32%	39%	34%	41%	36%
24,000 - 42,000	47%	36%	49%	38%	51%	40%	53%	42%
42,000 +	61%	52%	63%	54%	65%	58%	67%	62%

Husky Stadium Transportation Management Plan, July 2018
N/A = Not applicable, goal applies to all football events regardless of attendance.

Event Size, Frequency and Timing

Unlike other event facilities in Seattle, Husky Stadium has not historically been used to host multiple event types since most of the year it is occupied by the football team. While football games and practices will remain the primary function of the stadium, one of the objectives of the TMP is to provide the flexibility for some additional non-football events.

The analysis considers three event ranges at Husky Stadium. The stadium is configured with upper bowl and lower bowl seating areas. The lower bowl accommodates up to 42,000 seats and the full stadium capacity is 70,000 seats (seats reduced to 70,000 from 72,000 in 2012). The TMP defines larger events as attendance greater than 42,000 attendees and smaller events as between 15,000 and 24,000 attendees and 24,000 and 42,000 attendees. The largest event that the TMP contemplates is Husky football games, which based on a review of the last five seasons (2013-2017), has had an average attendance of approximately 52,000 people and an 85th-percentile[1] attendance level of approximately 60,000 people. Table 3 summarizes the size, frequency and timing of Husky Stadium events under the current and proposed TMP.

[1] This represents the attendance level such that only 15 percent of the games (or five games) in the last five seasons had higher attendance.

Table 3. Husky Stadium TMP Possible Events and Frequency

	Current TMP		Proposed TMP[1]		
	Football / UW Events	Non-UW Events	Football	Non-Football UW Events	Non-UW Events
	Frequency[2]				
	No Limit	No Limit (>24,000 requires City Council Approval)	Per NCAA	Up to 8 total events per year	
Attendance Level	Timing[2]				
15,000 – 24,000	-	-	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events
24,000 – 42,000	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events
42,000 +	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events	Weekday and Weekend Events	Weekend Events Only

1. Husky Stadium Transportation Management Plan, July 2018
2. Frequency and timing applies to events between 24,000 and 70,000 attendees for the current and proposed TMP. There are no frequency or timing limitations on events with less than 24,000 attendees.

As shown in Table 3, the proposed TMP would limit non-football UW and non-UW events to up to 8 total per year. In addition, larger non-UW events would only occur on weekends. The primary alternatives impact analysis considers a larger event with 60,000 people consistent with the 85th-percentile attendance level for a football game, with discussion on the potential difference in impacts with smaller events of 15,000 to 42,000 attendees.

Event Transportation Demands

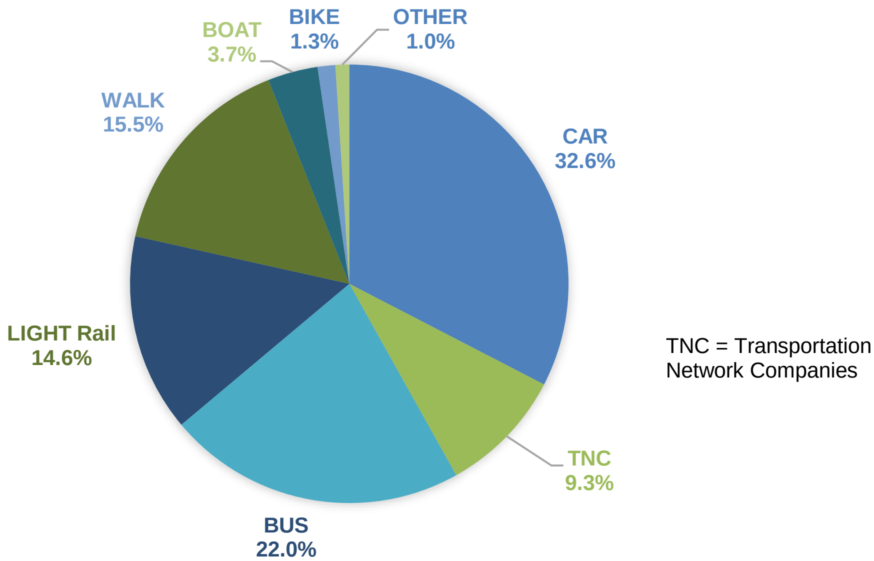
People travel to Husky Stadium via personal vehicles (car and RV), transportation network companies (TNCs) (e.g., Uber/Lyft), foot, bicycle, boat, and transit (bus and light rail). This section describes the mode splits, travel patterns, and trip generation for Husky Stadium.

Mode Splits and AVO

The proposed TMP Update establishes performance goals for non-auto trips. Trips by mode are determined by applying the performance goal as well as consideration of existing weekend and weekday mode splits and average vehicle occupancy (AVO).

The existing weekend event mode splits for the event transportation demands is based on the *University of Washington Stadium Expansion Parking Plan Transportation Management Report – 2017 Report* (2017 Report). The data collection survey for the 2017 Report was conducted by UW Transportation Services (UWTS) on Saturday, October 7, 2017, during the University of California-Berkeley versus UW game. The survey of game attendees began at 4:30 p.m., and the game kick-off time was at 7:45 p.m. In addition, the UWTS collects data on bus and Link light rail ridership, campus vehicle parking, bike valet parking, parking citations from Seattle Police Department, boat passengers and stadium parking lot counts. Additional detail related to the survey is provided in the 2017 Report. Figure 4 summarizes the observed mode splits for the weekend game.

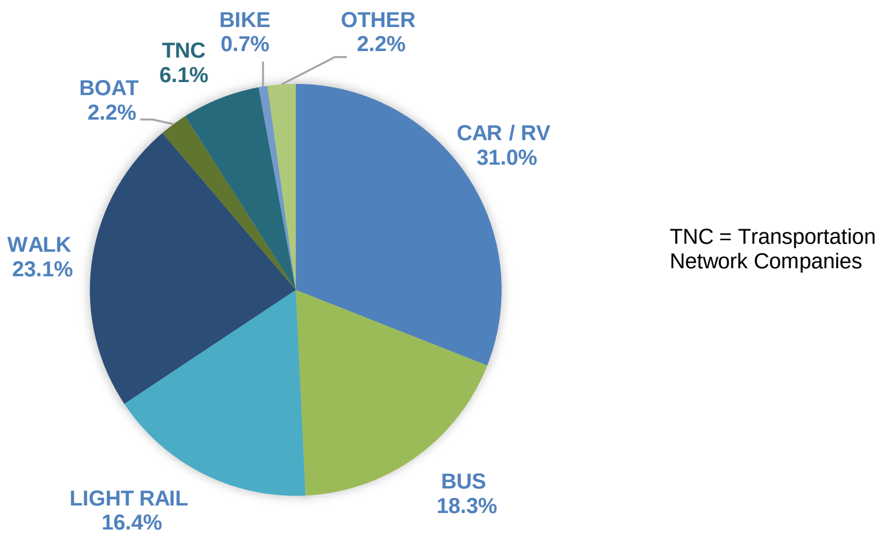
Figure 4. 2017 Husky Game Weekend Arrival Travel Mode Splits



The 2017 Report indicated that most people who traveled to the game by vehicle carpooled, with only 2.4 percent driving alone. For those arriving by private auto, the 2017 AVO was 3.1 person per vehicle.

The existing weekday event mode splits is based on the data collection survey conducted by UWTS on Friday, September 30, 2016, during the Stanford University versus UW game, with a kick-off time of 6:00 p.m. Figure 5 summarizes the observed mode splits for the weekday game.

Figure 5. 2016 Husky Game Weekday Arrival Travel Mode Splits



Similar to the weekend event, weekday survey results indicated that most people who traveled to the game by vehicle carpooled, with approximately 4.4 percent driving alone. For those arriving by private auto, the 2016 AVO was 3 people per vehicle.

Arrival and Departure Patterns

The evaluation by mode considers a peak hour analysis during the pre-event (arrival) and/or post-event (departure) periods. A review of stadium ticket scans, Sound Transit pre- and post-event ridership and consideration of other similar event venues. The ticket scans and Sound Transit data show a peak arrival of 45 percent of attendees during the peak hour and a peak departure of 60 percent during the peak hour. Considering other stadiums/venues in Seattle, the Seattle Arena Final EIS, May 2015 showed approximately 30 percent arrival for events in South Downtown during the peak hour based on data collected during both a Seattle Mariners and Sounders FC game and approximately 20 percent arrival during the peak hour for events at KeyArena. Arrivals to these large event venues typically occur over a 2- to 3-hour period.

Husky Stadium arrivals and departures will vary based on the type of event. Tailgating during footballs games will influence arrivals with attendees likely to arrival early and potential stay after the game pending weather, game outcome and end time. Husky Stadium opens approximately 90 minutes prior to kick-off, with only special ticketed attendees entering before this time. Given the timing of the gates opening, the ticket scans likely overestimate the concentration of arrivals in a one-hour period and underestimates early arrivals, especially with attendees coming to the area to tailgate or participate in pre-game activities. For the purposes of understanding peak hour demands, this study assumes 45 percent of arrivals occurring during the pre-event peak hour and 60 percent of departures occurring during the post-event peak hour for a football game.

15,000 – 42,000 Event Demands

There is no existing data for Husky Stadium for smaller events so data collected at KeyArena as part of the *Seattle Center Arena Renovation Project Draft Environmental Impact Statement*, April 2018 was reviewed. The assumptions were based on KeyArena concerts representative of a non-UW event. The analysis assumes an AVO of 2.4 for personal vehicles and 2.0 for TNCs. A pre-event peak arrival of 50 percent and post-event departure of 90 percent are also assumed.

Trip Generation by Mode

Based on the travel mode split goals, AVO and arrival patterns, estimated peak hour trip generation by auto and non-auto mode were determined for a football game with 60,000 attendees. In addition, peak hour trip generation was also estimated for two non-UW events with 19,000 and 33,000 attendees, which represent median event sizes for the two smaller size event categories. Table 4 provides a summary of the trip generation by auto and non-auto mode. Appendix A provides a more detailed trip generation summary.

Table 4. Husky Game Estimated Trip Generation with Proposed TMP Update

		Weekday			Weekend		
			Peak Hour Trips[2]			Peak Hour Trips[2]	
Time Period	**Mode**	**Mode Split Goal[1]**	**Pre-Event**	**Post-Event**	**Mode Split Goal[1]**	**Pre-Event**	**Post-Event**
Football Event with 60,000 Attendees							
No Action Alternative	Non-Auto	-	16,470	21,960	-	14,040	18,720
	Auto[4]	-	3,780	5,040	-	4,635	6,180
Alternative 1[4]							
2019	Non-Auto	61%	16,470	21,960	52%	14,040	18,720
	Auto[3]	39%	3,780	5,040	48%	4,635	6,180
1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Non-Auto	63%	17,010	22,680	54%	14,580	19,440
	Auto[3]	37%	3,600	4,800	46%	4,590	6,120
1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Non-Auto	65%	17,550	23,400	58%	15,660	20,880
	Auto[3]	35%	3,420	4,560	42%	4,050	5,400
1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Non-Auto	67%	18,090	24,120	62%	16,740	22,320
	Auto[3]	33%	3,195	4,260	38%	3,645	4,860
Non-UW Event with 19,000 Attendees (non-UW event)							
Alternative 1[4]							
2019	Non-Auto	35%	3,350	6,365	30%	2,850	5,415
	Auto[3]	65%	2,700	5,130	70%	2,900	5,510
1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Non-Auto	37%	3,550	6,745	32%	3,050	5,795
	Auto[3]	63%	2,600	4,940	68%	2,850	5,415
1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Non-Auto	39%	3,750	7,125	34%	3,250	6,175
	Auto[3]	61%	2,500	4,750	66%	2,750	5,225
1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Non-Auto	41%	3,950	7,505	36%	3,550	6,745
	Auto[3]	59%	2,450	4,655	64%	2,650	5,035
Non-UW Event with 33,000 Attendees							
Alternative 1[4]							
2019	Non-Auto	47%	7,750	14,725	36%	5,950	11,305
	Auto[3]	53%	3,750	7,125	64%	4,600	8,740
1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Non-Auto	49%	8,050	15,295	38%	6,250	11,875
	Auto[3]	51%	3,600	6,840	62%	4,450	8,455
1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Non-Auto	51%	8,550	16,245	40%	6,600	12,540
	Auto[3]	49%	3,450	6,555	60%	4,350	8,265
1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Non-Auto	53%	8,750	16,625	42%	6,900	13,110
	Auto[3]	47%	3,350	6,365	58%	4,200	7,980

1. No Action Alternative assumes a mode split consistent with current conditions. The Alternative 1 mode split is based on proposed TMP Update goal.
2. Peak hour trips represent vehicle demands for Car/RV and TNC and person trips for non-auto modes. Trips are based on application of estimated pre-game 45 percent peak hour arrival and post-game 60 percent peak hour departure for all modes.
3. Auto trips are based on application of existing average vehicle occupancy (AVO), which is approximately 3 persons per vehicle cars and 2 persons per vehicle for TNCs.
4. Represents Alternative 1 assuming modes splits consistent with goals the proposed TMP goals by event size.

As shown in Table 4, with the proposed performance goals (Alternative 1), the auto mode pre- and post-event peak hour vehicle trip demands would decrease compared to the No Action Alternative for Alternative 1 with a 60,000-attendee football event. This decrease in vehicle trips will result in less vehicle and parking impacts in the surrounding stadium transportation system. The non-auto trips would increase and the proposed TMP Update strategies focus on accommodating these trips within the existing and future transportation system.

The proposed performance goals for non-UW events with19,000 and 33,000-attendees also results in fewer auto trips in the pre-event condition compared to the No Action Alternative. As noted previously, the goal for these events was set such that the pre-event vehicular impact would be no greater than a 60,000-attendee football game under the No Action trip generation. The post-event condition would generate higher vehicular traffic than a football game because the percent of attendees departing at one time could be higher depending on the nature of the event. It is anticipated that post-event conditions would occur outside of the peak hours when background traffic is limited. The traffic would be managed to meet the clearance time performance goals.

Chapter 2. Affected Environment

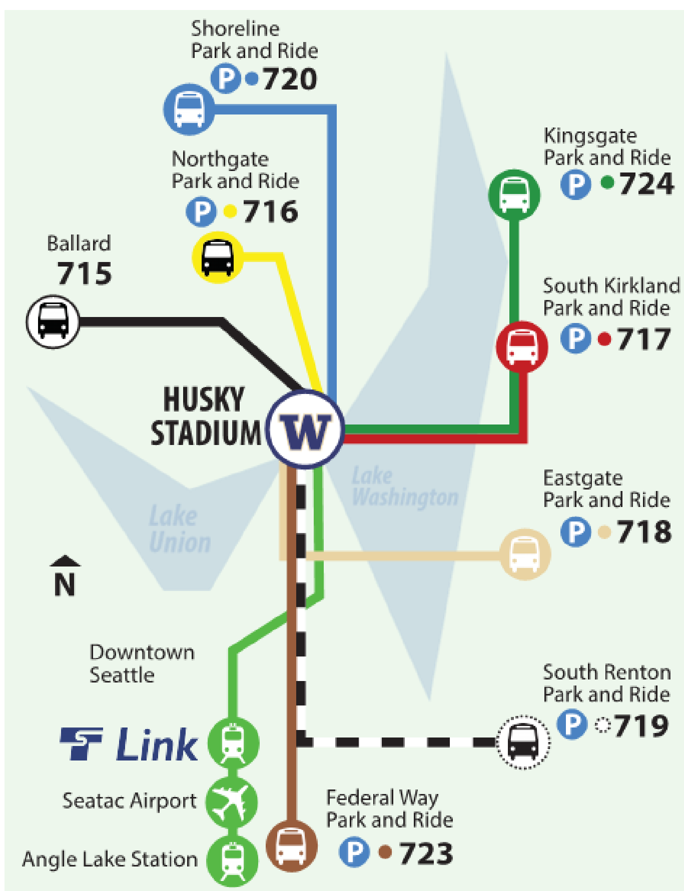
This chapter provides an overview of the existing transportation system Husky Stadium and the current TMP strategies for each mode. The transportation is described by mode, including transit, walking, bicycle, and vehicles. In addition, parking serving the stadium is discussed.

Transit

The existing TMP relies on transit to support access to Husky Stadium events while reducing congestion. The existing TMP (1986) identified as a goal that 16 percent of all attendees would arrive using transit. Since the existing TMP was developed, transit service has changed dramatically. Most notably, the extension of Link light rail with a station adjacent to the stadium opened in 2016. The 2016 weekday and 2017 weekend travel surveys for a Husky game indicated an approximately 35 to 37 percent transit mode split.

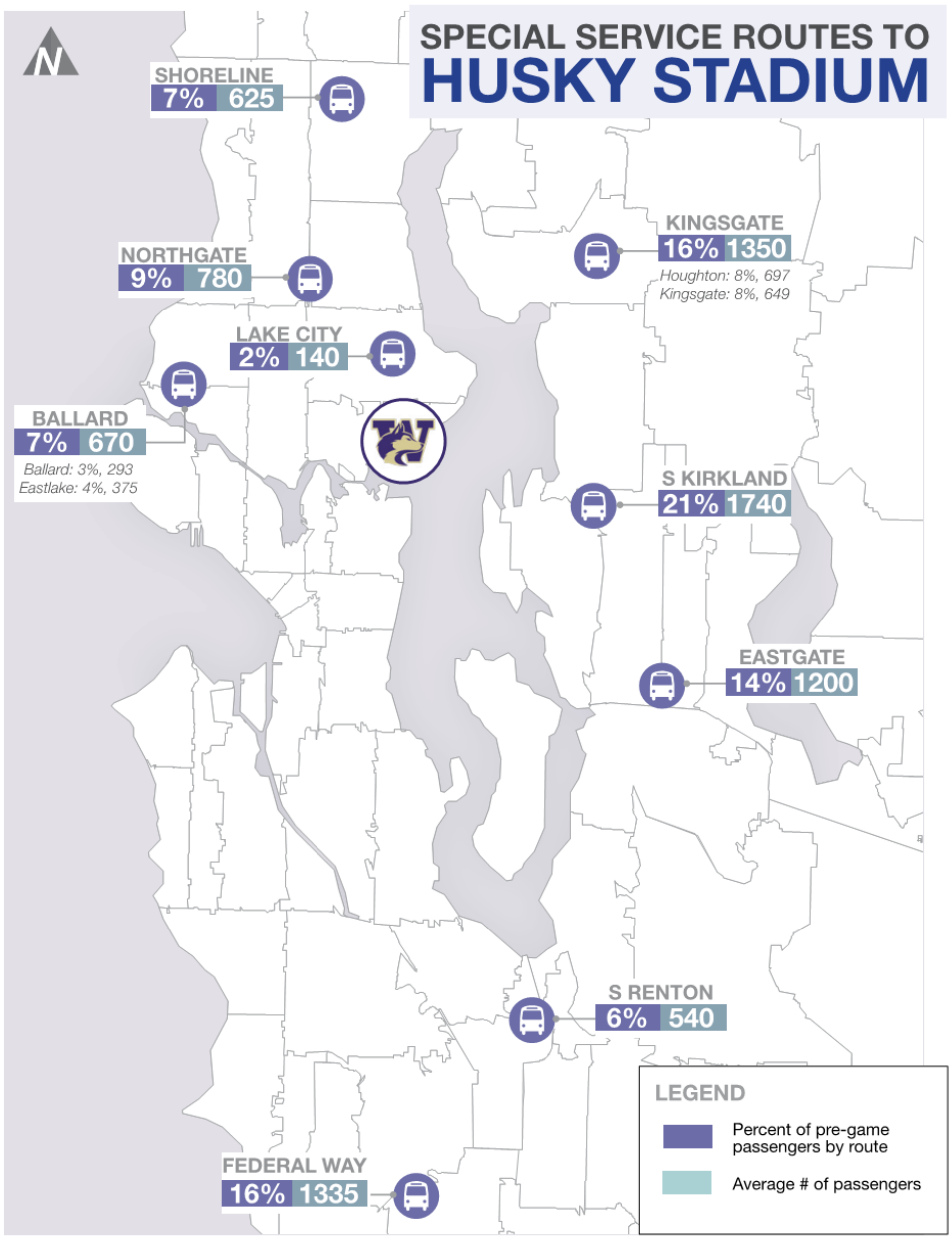
Transit access to the events on weekends includes use of private shuttles and contracted Metro service. These private shuttles operate for weekend football games and serve park-and-rides in Kirkland, Bellevue, Federal Way, Renton, Ballard, Northgate, and Shoreline (see Figure 6). This service operates two and a half hours prior to kickoff and provides return trips after games. In 2017, the Shoreline and Northgate service was operated by private carriers while the other Husky Stadium service was operated by King County Metro and paid for by UW Athletics. In 2017, there were an average of 124 shuttles providing service to the UW stadium.

Figure 6. Existing Husky Stadium Park & Ride Shuttle Service



The private and paid shuttles provide direct access (a one seat ride) to the stadium. These shuttles charge passengers $7 for this service; however, the service is partially underwritten by the UW. The number and proportion of riders using these shuttles from their park-and-ride destinations are shown in Figure 7. Suburban destinations, including Kirkland (Kingsgate and South Kirkland), Bellevue (Eastgate), Renton, and Federal Way, account for almost 75 percent of this service.

Figure 7. Special Service Routes to Husky Stadium



Besides the UW Athletics paying for special bus service, there is also regular King County Metro bus service and Sound Transit bus and Link light rail service during weekend events. Community Transit does not operate on weekends, and in general their weekday service to this area is limited or less frequent.

No additional service is provided on weekdays given the existing commuter transit demands and the inability to operate private shuttles efficiently with existing traffic congestion. Because the University of

Washington is a major activity hub, regular, weekday transit service around the stadium and campus is robust.

Transit routes and the assumed walkshed are noted in Figure 8. Transit stops and associated routes in and around the Montlake Triangle are noted in Figure 9.

Figure 8. Existing Weekday Transit Network Near Husky Stadium

Source: University of Washington.

This figure reflects typical weekday and peak service. In the evening, regular light rail transit service provided by Sound Transit and King County Metro is reduced in frequency. Many bus routes are peak only and would not support an evening or weekend event.

Near Husky Stadium, passengers can access transit around the Mountlake Triangle area, including stops on Pacific Place and Pacific Street. Additional stops are located north of the plaza on Montlake Avenue. Other transit stops are located along Stevens Way within the campus. The at-grade crossings to transit are ADA accessible. A grade-separated and elevator and escalator-accessible bridge connects the Stadium and Link light rail station across Montlake Boulevard to the Montlake Triangle transit stops and the land bridge that connects to transit stops on Stevens Way and to the main campus. Boarding locations or transit stops for boarding private and Metro shuttles in 2017 are shown in Figure 9. King County Metro post-game routes as well as routes using private charters are labeled in blue or yellow below. Walking routes between Husky Stadium and each boarding location are shown in red.

Figure 9. Post-Game Boarding Locations

Source: King County Metro

Transit Screenline Analysis

Fourteen screenlines (see Figure 10) were analyzed around the stadium to understand how existing transit capacity compares to existing weekday and weekend Husky football game transit demand. Screenlines are imaginary lines drawn across corridors to capture transit operations (capacity and demand) to and from the stadium. Each screenline (see Figure 10) is evaluated by direction for the pre- and post-game condition.

The existing conditions analysis reflects a 7 p.m. game/event start for weekday and weekend conditions, which represents a worst-case time period with more limited service resulting in less transit capacity. Event start times vary and transit capacity may be higher during other periods such as during afternoon commute periods, for example.

Figure 10. Transit Screenline Locations

The specific transit routes crossing each screenline were based on current transit service as noted in Table 5.

Table 5. Existing Weekday and Weekend Transit Routes (During Events) at Screenlines

Screenline Number	Screenline	Weekday Routes[1]	Weekend Routes[1]
1	SR 520 EB SR 520 WB	167, 252, 255, 257, 268, 271, 277, 311, 540, 541, 542, 545, 555, 556	255, 271, 545, + Event Related Shuttles
2	Montlake Boulevard NB Montlake Boulevard SB	43, 48	48
3	Light Rail (South of Stadium) NB Light Rail (South of Stadium) SB	10 Minute Headways with 3 car trains. Post games operate an extra train for one hour following the end of the game to increase frequency and clear platforms	10 Minute Headways with 3 car trains. Post games operate an extra train for one hour following the end of the game to increase frequency and clear platforms
4	Light Rail (North of Stadium) NB Light Rail (North of Stadium) SB	NA	NA
5	Eastlake Avenue NB Eastlake Avenue SB	49, 70	49, 70
6	NE 40th Street EB NE 40th Street WB	31/32, 26	31/32
7	NE 45th Street, West of I-5 EB NE 45th Street, West of I-5 WB	44	44
8	Roosevelt Way NE SB	65/67, 984	65/67
9	11th Avenue NE NB	65/67, 74	65/67
10	15th Avenue NE NB 15th Avenue NE SB	541, 556, 70, 542, 543	45, 70
11	NE 45th Street at Roosevelt Way NE EB NE 45th Street at Roosevelt Way NE WB	44, 167, 197, 586, 810 821, 850, 860, 870, 888	44
12	25th Avenue NE NB 25th Avenue NE SB	372	372
13	NE 45th Street East of Mary Gates Drive NE NB NE 45th Street East of Mary Gates Drive NE SB	31/32, 65/67, 75, 78	31/32, 65/67, 75
14	Light Rail (North of Brooklyn Station) NB Light Rail (North of Brooklyn Station) SB	NA	NA

NA = Not applicable, stations and screenlines evaluated in the future and do not currently exist.
1.Assumes weekday evening service and frequency.

Capacity

Capacity was estimated for transit buses assuming current bus frequency for evening periods and a load factor of 1.5, as noted in Table 6. Rail car capacity was provided by Sound Transit. As noted in the table, the number of light rail cars operating is assumed to be 3 cars today and 4 cars in the future with current off-peak headways of 10-minutes shortening to 4- and 5- minutes in the future depending on the peak.

Table 6. Transit Capacity

Type	Seated Capacity (per bus or rail car)	Load Factor[1]	Assumed Capacity (passengers per bus or rail car)[2]
40-foot standard bus	40	1.5	60
60-foot articulated	60	1.5	90
Link light rail car	74	NA	200[1]

Source: King County Metro and Sound Transit
NA means Not Applicable
Note: Currently RapidRide does not serve the University of Washington, when it does it is assumed to operate with 60' coaches and a capacity of 90 passengers.
1. Based on coordination with King County Metro and Sound Transit, buses and light rail typically accommodate additional standing passengers above what is seated. Metro provided a load factor and Sound Transit provided a car capacity.
2. Assumes a portion of passengers will be accommodated through standing. Light rail has a larger standing capacity than bus. The light rail load factor considers a maximum capacity after a sporting event and is not "crush" load.

Using the capacity identified in Table 6 for transit and applying the frequency of service (trips per hour) for evening service, transit capacities were defined at each of the screenlines in aggregate. These are summarized in Table 7. The transit capacities are conservative assuming both pre- and post-game service is outside of the peak hours. It is possible that pre-game conditions could occur during the peak transit service periods resulting in more frequent service and additional capacity.

Table 7. Existing Weekday and Weekend Evening Screenline Capacity

Screenline Number	Screenline	Weekday Passenger Capacity per Hour (Pre- and Post-Event)	Weekend Passenger Capacity per Hour (Pre- and Post-Event)
1	SR 520 EB SR 520 WB	2,430 3,150	3,240 3,150
2	Montlake Boulevard NB Montlake Boulevard SB	630 630	540 540
3	Light Rail (South of Stadium) NB Light Rail (South of Stadium) SB	6,000 6,000	3,600 3,600
4	Light Rail (North of Stadium) NB Light Rail (North of Stadium) SB	NA NA	NA NA
5	Eastlake Avenue NB Eastlake Avenue SB	870 870	690 690
6	NE 40th Street EB NE 40th Street WB	540 420	240 240
7	NE 45th Street, West of I-5 EB NE 45th Street, West of I-5 WB	630 630	450 450
8	Roosevelt Way NE SB	1,350	360
9	11th Avenue NE NB	900	360
10	15th Avenue NE NB 15th Avenue NE SB	1,140 1,140	600 600
11	NE 45th Street at Roosevelt Way NE EB NE 45th Street at Roosevelt Way NE WB	930 1,410	450 450
12	25th Avenue NE NB 25th Avenue NE SB	540 630	360 350
13	NE 45th Street East of Mary Gates Drive NE NB NE 45th Street East of Mary Gates Drive NE SB	1,290 1,290	960 960
14	Light Rail (North of Brooklyn Station) NB Light Rail (North of Brooklyn Station) SB	NA NA	NA NA

NA = Not applicable, stations and screenlines evaluated in the future and do not currently exist.
1.Assumes weekday evening service and frequency and load capacity as noted in Table 6.

Demand

Existing non-game-related background transit volumes were based on light rail counts and bus service average passenger count (APC) data (Fall 2017) provided by King County Metro and Sound Transit. Weekday event transit demands were based on the Friday, September 30, 2016 football game versus Stanford University with an attendance of approximately 63,733. Weekend event transit demands were based on the Saturday, October 7, 2017 football game versus the University of California-Berkeley with an attendance of approximately 52,777. Based the weekday and weekend intercept surveys, on average over a third (35 to 37 percent) of attendees use transit for travel to the games. Of the transit passengers, close to 40 to 50 percent indicated they arrived by light rail and 50 to 60 percent arrived by bus.

As discussed in Chapter 1, the peak hour arrival is approximately 45 percent (pre-game) and the peak hour departure is approximately 60 percent (post-game). This arrival pattern is consistent with Link light rail ridership increases provided by Sound Transit and illustrated on Figure 11. Appendix A provides detail on the transit demands for the weekday and weekend game conditions.

Figure 11. Sound Transit Observed Increase in Light Rail Ridership at University of Washington Station on Weekend Game Day

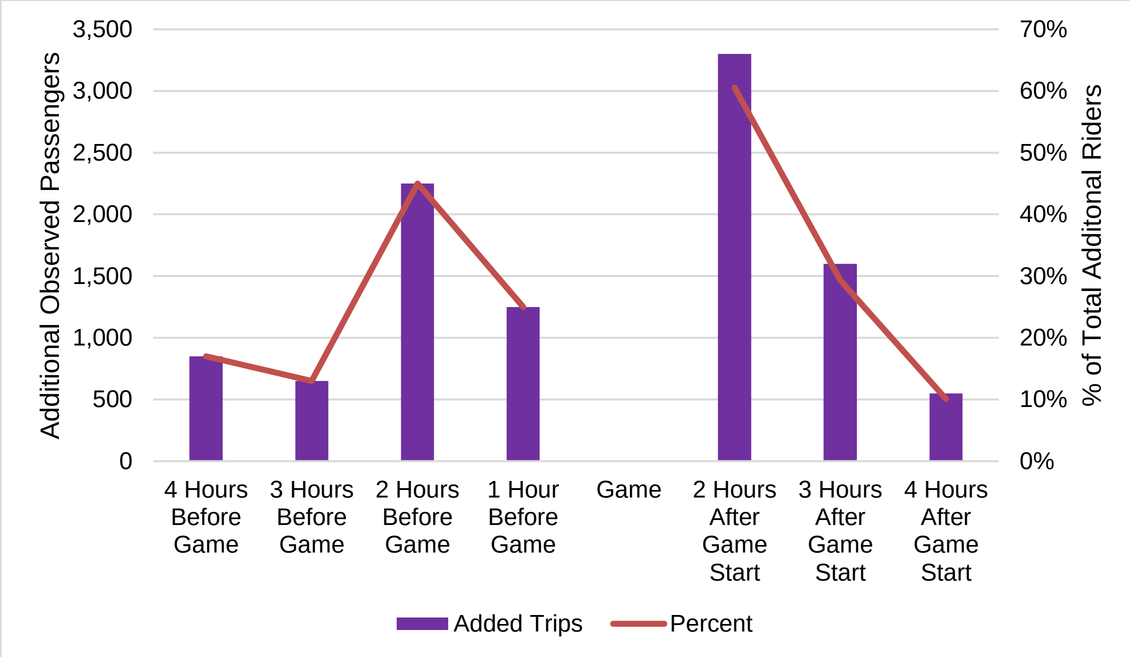
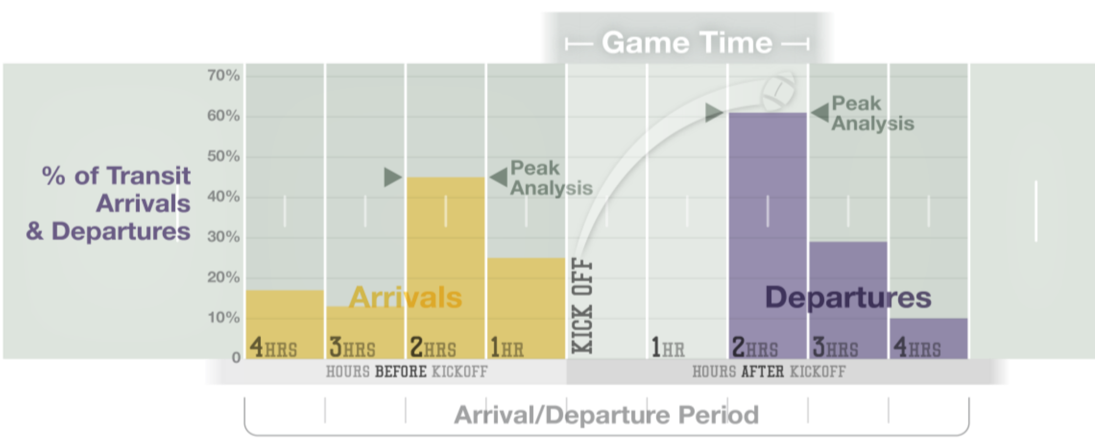


Figure 12 illustrates the transit analysis periods that were evaluated for the pre- and post-game conditions. The weekday and weekend pre-game analysis reflects the period between 1- and 2-hours prior to kick-off when the highest event transit demand is anticipated to occur (i.e., 45 percent of transit users arrive). The weekday and weekend post-game analysis reflects the period between 2- and 3-hours after kick-off when event transit departures would be highest (approximately 60 percent). The average length of a football game is approximately 3-hours, which means that transit departures begin to increase around 1-hour prior to the end of the game (i.e., after halftime and around the 3rd quarter). Depending on the nature of the event, this time period may extend later in the evening; however, a general decreasing departure rate is typical.

Figure 12. Transit Arrival and Departure Analysis Period



Trip Distribution

Distribution of trips to transit routes reflect current operations/service, distribution patterns to park-and-rides, and zip code data from the stadium intercept survey. A general distribution pattern for transit is assumed to be 36 percent from the east including the northeast areas of King County, 15 percent from the west 19 percent from the north and 29 percent from the south including portions of south east king county (for example Renton and Mercer Island). With development of light rail, specifically to Redmond and the Eastside, these percentages are expected to shift with more patrons utilizing light rail from the south. Appendix E provides more detailed trip distribution data.

Analysis

Table 8 summarizes weekday pre- and post-game transit capacity and demand along the 14 study screenlines. As described previously, there is no additional transit service on the weekday.

Table 8. Existing Weekday Peak Hour Pre-Game and Post-Game Transit Screenline Demand & Capacity

Screenline Number	Screenline	Capacity (Passengers per Hour)	Arrival Demand (Passengers per Hour)	Departure Demand (Passengers per Hour)
1	SR 520 EB	2,430	830	**4,235**
	SR 520 WB	3,150	**3,335**	805
2	Montlake Boulevard NB	630	350	70
	Montlake Boulevard SB	630	280	**655**
3	Light Rail (South of Stadium) NB	6,000	4,250	405
	Light Rail (South of Stadium) SB	6,000	445	5,620
4	Light Rail (North of Stadium) NB	NA	NA	NA
	Light Rail (North of Stadium) SB	NA	NA	NA
5	Eastlake Avenue NB	870	550	210
	Eastlake Avenue SB	870	140	595
6	NE 40th Street EB	540	275	90
	NE 40th Street WB	420	165	415
7	NE 45th Street, West of I-5 EB	630	575	145
	NE 45th Street, West of I-5 WB	630	370	**950**
8	Roosevelt Way NE SB	1350	440	70
9	11th Avenue NE NB	900	330	830
10	15th Avenue NE NB	1,140	160	410
	15th Avenue NE SB	1,140	255	70
11	NE 45th Street at Roosevelt Way NE EB	930	570	140
	NE 45th Street at Roosevelt Way NE WB	1,410	390	970
12	25th Avenue NE NB	540	360	**940**
	25th Avenue NE SB	630	515	85
13	NE 45th Street East of Mary Gates Drive NE NB	1,290	415	500
	NE 45th Street East of Mary Gates Drive NE SB	1,290	210	150
14	Light Rail (North of Brooklyn Station) NB	NA	NA	NA
	Light Rail (North of Brooklyn Station) SB	NA	NA	NA

NA = Not applicable, stations and screenlines evaluated in the future and do not exist
Bold indicates screenlines that do not have capacity to meet demand in the single hour evaluated. The residual demand is accommodated with existing service within 2-hours.

The transit system is not designed to fully accommodate within one-hour infrequent events such as Husky football games. Table 8 as well as 0 and Figure 14 illustrate capacity is currently exceeded at one screenline (SR 520 westbound) during the pre-game peak hour and four locations (SR 520 eastbound, Montlake Boulevard southbound, NE 45th Street west of I-5 westbound and 25th Avenue NE northbound during the post-game peak hour. These transit demands are accommodated within a 2-hour period, which is not uncommon for large events.

Figure 13. Existing Weekday Peak Hour Pre-Game Arrival Transit Demand and Capacity

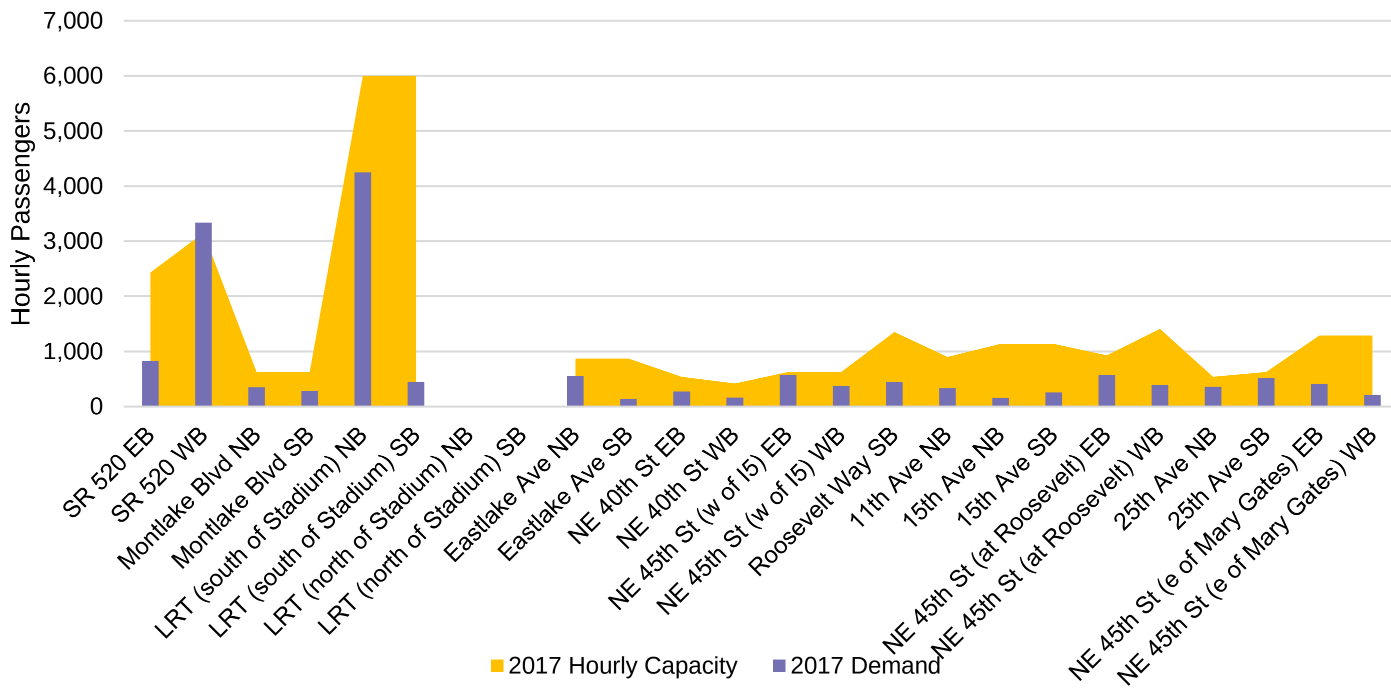
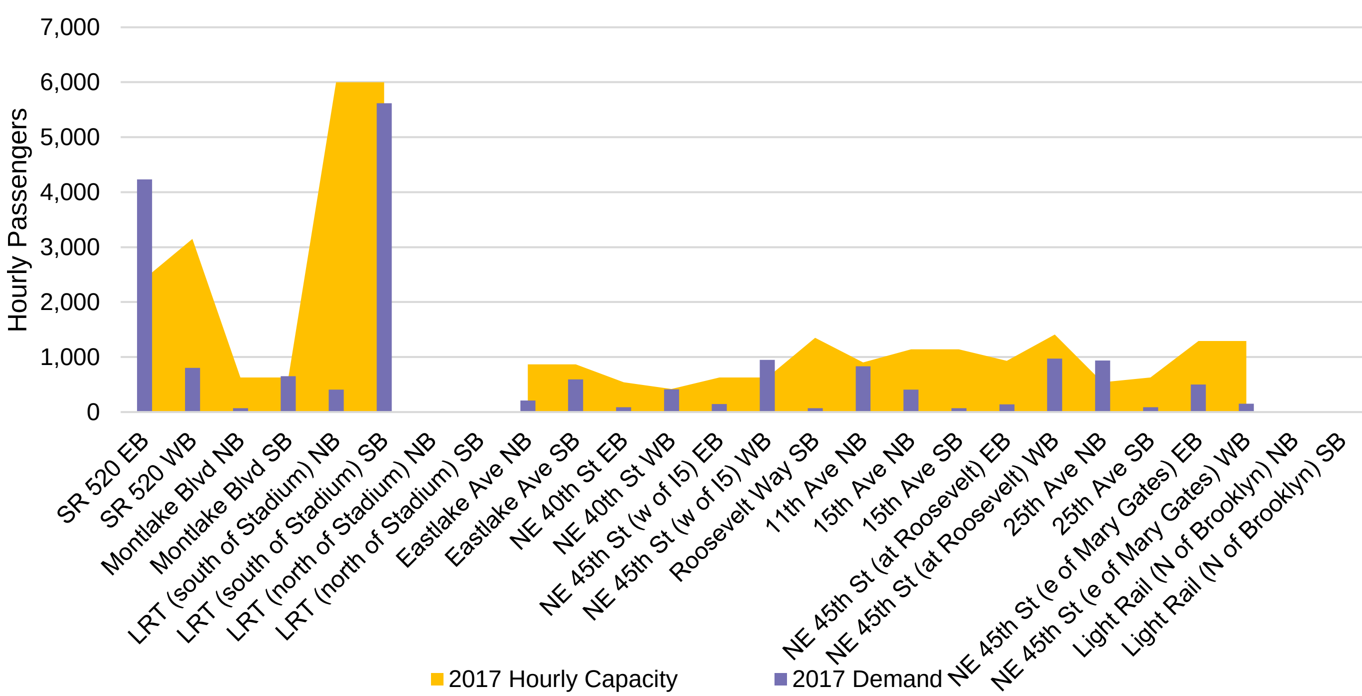


Figure 14. Existing Weekday Peak Hour Post-Game Departure Transit Demand and Capacity



During weekend events, transit capacity is a combination of regular weekend bus service and special game day shuttles. Table 9, Figure 15 and Figure 16 summarizes transit demand and capacity for weekend event arrivals and departures. As shown in Table 9, Figure 15 and Figure 16, capacity is exceeded at four screenlines in the pre-game peak hour and eight screenlines during the post-game peak hour.

Table 9. Existing Weekend Peak Hour Pre-Game and Post-Game Transit Screenline Demand & Capacity

Screenline Number	Screenline	Capacity (Passengers per Hour)	Arrival Demand (Passengers per Hour)	Departure Demand (Passengers per Hour)
1	SR 520 EB	3,240	120	**3,530**
	SR 520 WB	3,150	2,660	130
2	Montlake Boulevard NB	540	330	50
	Montlake Boulevard SB	540	70	445
3	Light Rail (South of Stadium) NB	3,600	**4,180**	335
	Light Rail (South of Stadium) SB	3,600	370	**5,545**
4	Light Rail (North of Stadium) NB	NA	NA	NA
	Light Rail (North of Stadium) SB	NA	NA	NA
5	Eastlake Avenue NB	690	565	225
	Eastlake Avenue SB	690	235	690
6	NE 40th Street EB	240	305	120
	NE 40th Street WB	240	150	**400**
7	NE 45th Street, West of I-5 EB	450	**555**	125
	NE 45th Street, West of I-5 WB	450	110	**690**
8	Roosevelt Way NE SB	360	**495**	125
9	11th Avenue NE NB	360	210	**705**
10	15th Avenue NE NB	900	185	435
	15th Avenue NE SB	900	380	195
11	NE 45th Street at Roosevelt Way NE EB	450	**555**	125
	NE 45th Street at Roosevelt Way NE WB	450	110	**690**
12	25th Avenue NE NB	660	75	660
	25th Avenue NE SB	660	490	60
13	NE 45th Street East of Mary Gates Drive NE NB	960	405	490
	NE 45th Street East of Mary Gates Drive NE SB	960	395	330
14	Light Rail (North of Brooklyn Station) NB	NA	NA	NA
	Light Rail (North of Brooklyn Station) SB	NA	NA	NA

NA = Not applicable, stations and screenlines evaluated in the future and do not exist
Bold indicates screenlines that do not have capacity to meet demand in the single hour evaluated. The residual demand is accommodated with existing service within 2-hours.

Figure 15. Existing Weekend Peak Hour Pre-Game Arrival Transit Demand and Capacity

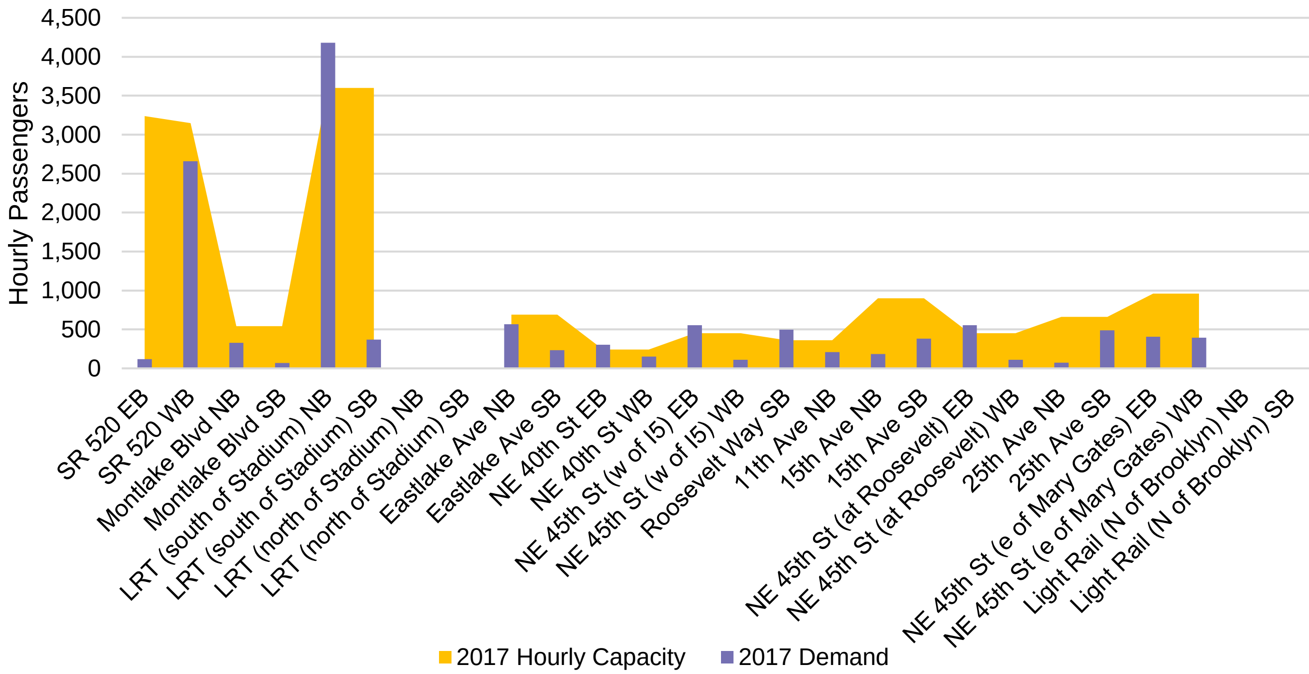
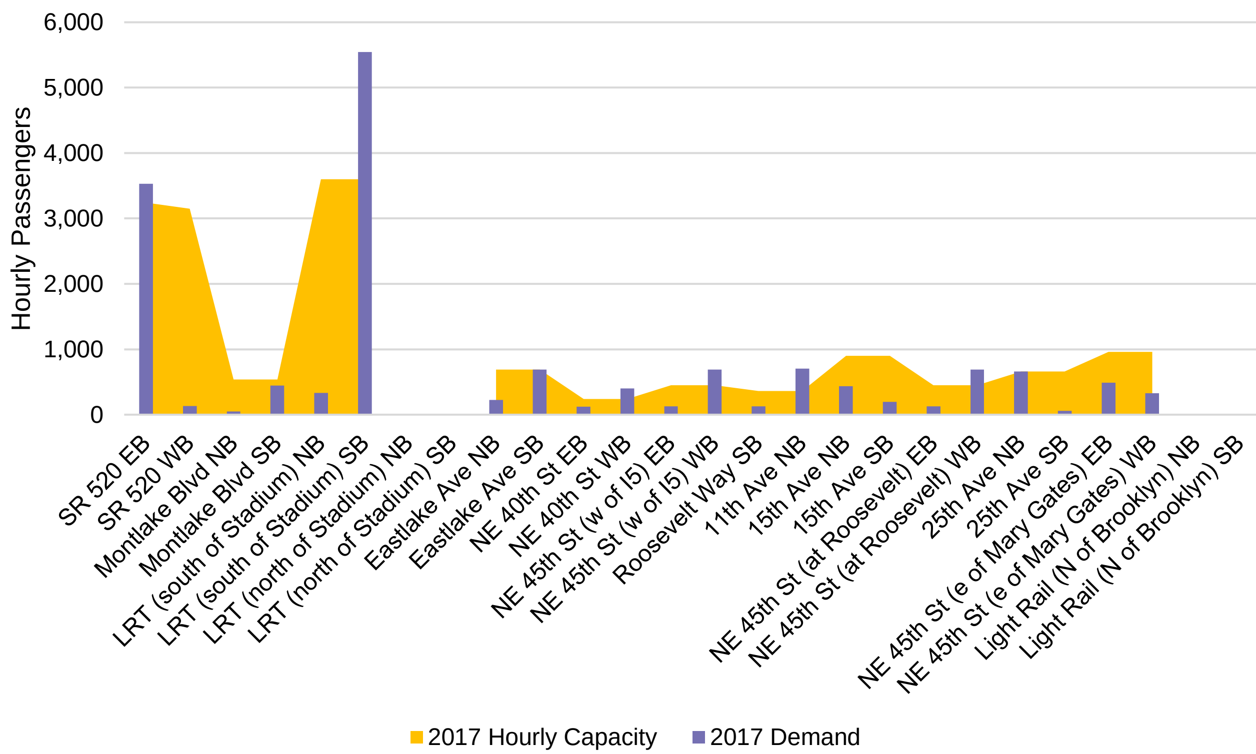


Figure 16. Existing Weekend Peak Hour Post-Game Departure Transit Demand and Capacity



Another way to consider these demands and the limitations of capacity would be to consider how many people cannot get to the event or leave from the event within the peak hour. The longer patrons must wait the higher the potential they may consider another mode.

Based on the existing screenline analysis on weekdays, as many as 450 people using transit are not accommodated within the peak hour pre-game and 3,100 people are not accommodated within the peak hour post-game. On the weekends, 1,150 people are not accommodated within the peak hour pre-game and 3,670 are not accommodated within the peak hour post-game. The evaluation shows that all transit demand would be accommodated within a 2-hour window for pre- and post-game conditions. Because these are large events, people expect these types of delays and would likely still use transit. The post-game evaluation represents the time period beginning 1-hour prior to the end of the game; therefore, with the 2-hour window noted above beginning before the game ends, all transit demands are served within 1-hour after the game ends.

Events like Husky football games are infrequent events, with 7 or 8 games per year. As part of the PAC 12 football conference, the University of Washington has been hosting competitive college football games since 1920. As large events, attendees and the general public anticipate some level of delay in transportation and area operations. The system is not designed to meet this level of demand daily. It is not uncommon that demands for large events are served over a period of 2- to 3-hours and is currently seen the existing Husky Stadium and other Seattle venues such as KeyArena, Safeco Field and Century Link Field.

The use of special service routes and the additional private coaches results in the need for layover space near the campus and adds to the overall congestion around the Mountlake Triangle in front of Husky Stadium. These constraints also temporarily effect transit access that is not related to events but need to use Montlake Boulevard and NE Pacific Street.

Pedestrians

The existing 1986 TMP has an 8 percent goal for walking and provides protocol for managing pedestrian flow. The management of pedestrians includes channeling pedestrians across Montlake Boulevard at the existing crossings at NE Pacific Street and NE Pacific Place. A wide pedestrian walkway is provided along Montlake Boulevard in front of Husky Stadium, with hedges to prevent pedestrians from crossing at other points along the street.

Conditions have changed since the current TMP was prepared, and the majority of pedestrian movements now occur via the four pedestrian bridges over Montlake Boulevard. The Seattle Police Department (SPD) and University of Washington Police Department (UWPD) assist with managing pedestrian flows at the Montlake Boulevard intersections at Parking Lot E-12, NE Pacific Place, and Walla Walla Road.

Quality of Environment

Approximately 15 percent of Husky game attendees walk to the game based on the 2017 travel model survey. Most attendees of Husky Stadium events are pedestrians at some point during their travel and all depend on safe pathways and crossings to get to and from the stadium. The UW provides a network of pedestrian paths throughout the campus with connections to the local public street and trail networks across the campus. Sidewalks are provided throughout the study area and along the streets adjacent to the stadium. All the study intersections have crosswalks on at least one leg. ADA access is also accommodated in and around the stadium and provisions are reviewed on an annual basis. The southwest entrance to the Stadium provides ADA access.

In addition, there is an expansive pedestrian plaza in front of Husky Stadium with convenient, pedestrian-scale connections to the Burke-Gilman Trail, Link light rail University of Washington Station, campus, and anticipated for the future King County Metro RapidRide. A grade-separated pedestrian bridge over

Montlake Boulevard provides additional access over arterial streets and is accessible by elevator. This grade-separated connection, along with three other pedestrian bridges over Montlake Boulevard, provide high-capacity, unimpeded access to the stadium from the core of the University of Washington campus and Burke-Gilman Trail. Event signage is used to minimize pedestrian conflicts with other modes by directing attendees along designated pathways to the stadium entrances.

New and enhanced connections for pedestrians and bicycles are planned to connect the stadium to areas south of the Montlake Cut via a second bascule bridge. A new trail connection to the Eastside along SR 520 opened in 2017. Figure 17 illustrates the key pedestrian facilities serving Husky Stadium.

Figure 17. Key Pedestrian Facilities Serving Husky Stadium

Source: University of Washington 2018.

As discussed previously, Husky Stadium event start times vary based on television schedules and other factors governed by the PAC-12 Conference. Some of the event start times are in the evening. Qualitative observations of the pedestrian lighting levels around Husky Stadium were conducted in January 2018. Overall, the pedestrian facilities are well lit and there are no areas without lighting. There are a few areas of lower pedestrian lighting levels, as highlighted on Figure 18. These areas with lower lighting levels are generally close to Lake Washington and the Union Bay Natural Area.

Figure 18. Areas of Low Pedestrian Lighting near Husky Stadium

As shown in Figure 18, areas along Walla Walla Road, Canal Road NE, and NE Clark Road near Lake Washington and the Union Bay Natural Area have lower lighting levels than within the E1, E8, and E12 parking areas closer to Husky Stadium. Pedestrian volumes are generally low in these areas that are not near parking or transit.

Pedestrian Flow Analysis

Volumes

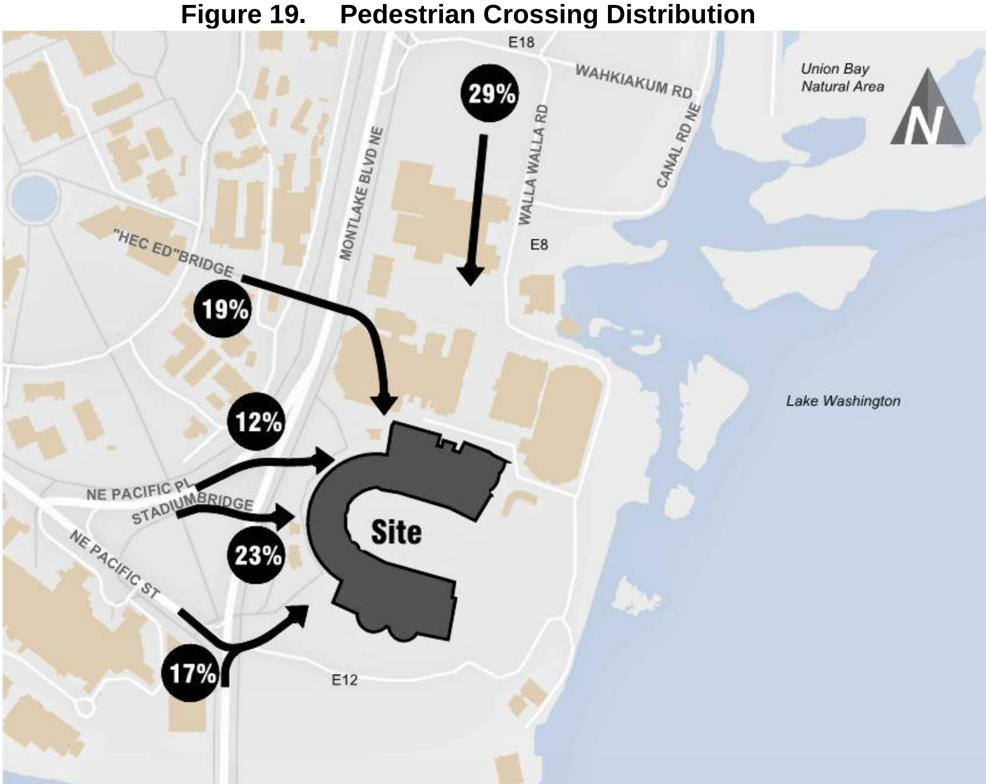
Pre-game pedestrian counts were taken at four key intersections and pedestrian bridges to assess weekday and weekend conditions. Post-game pedestrian counts were taken at the same locations for the weekend condition; there is no post-game weekday pedestrian counts available. Data were collected during a University of Washington football game on Saturday, October 7, 2017, for weekend conditions and during the football game on Friday, September 30, 2016 for weekday conditions. These time periods reflect a peak, saturation condition and a maturation of use for the Link light rail University of Washington Station for the current service level. As will be discussed, several system expansions are underway that will change the light rail transit activity levels and associated pedestrian levels in the future.

The pedestrian count crossing locations included the following:

1. Hec Ed Pedestrian Bridge (above-grade crossing)
2. NE Pacific Place/Montlake Boulevard intersection (at-grade crosswalk at south approach of signalized intersection)
3. Husky Stadium Pedestrian Bridge (above-grade crossing)
4. NE Pacific Street/Montlake Boulevard intersection (at-grade crosswalk at north approach of signalized intersection)

A distribution of pedestrian volumes at crossings in the vicinity of Husky Stadium is shown below in Figure 19. The distribution percentages are based on weekend and weekday event count data recorded. Weekday count data was collected before the Friday, September 30, 2016 football game versus Stanford University, with a 6:00 p.m. start time. Weekend count data was collected on Saturday, October 7, 2017 football game versus the University of California-Berkeley, with a 7:45 p.m. start time and 11 p.m. end time. The weekday and weekend pedestrian distribution are similar.

Figure 19. Pedestrian Crossing Distribution

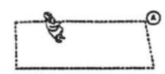
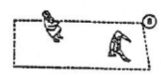
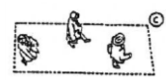
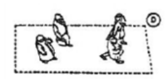


As shown in Figure 19, approximately 23 percent of attendees cross Montlake Boulevard at the Husky Stadium Pedestrian Bridge, with between 16 and 18 percent of attendees at the Snohomish Lane (“Hec Ed”) Pedestrian Bridge, Montlake Boulevard NE/NE Pacific Place intersection, and Montlake Boulevard NE/NE Pacific Street intersection. Approximately 26 percent of attendees cross Montlake Boulevard NE at a location north of the Snohomish Lane (“Hec Ed”) Pedestrian bridge, including the Pend Oreille Road intersection, Whatcom Lane Pedestrian Bridge, and the Wahkiakum Lane Pedestrian Bridge. Pedestrian volumes crossing Montlake Boulevard and the resulting pedestrian level of service are described below.

Crossing Analysis

Pedestrian capacity across Montlake Boulevard was determined from the Walkway LOS, as defined in the Transit Cooperative Highway Research Program (TCRP) Report 165: *Transit Capacity and Quality of Service Manual, 3rd Edition*. Capacity was calculated for each crossing location using the pedestrian space and walk speed metrics shown in Table 10 to determine the crossing level of service (LOS). Capacity is determined based on characteristics of each crossing along the Montlake Boulevard screenline, including crossing width, crossing distance, signal timing, and presence of a pedestrian bridge. Pedestrian crossing LOS metrics are defined in TCRP Report 165 and were applied to each crossing to calculate the possible capacity for each LOS of A to F, where LOS A represents low density of people in the crosswalk and LOS F represents a high density of people in the crosswalk. Based on the metrics shown in Table 10, the pedestrian crossings along Montlake Boulevard were assigned a LOS grade, and aggregated to a single LOS grade over the Montlake Boulevard screenline. Table 10 describes the characteristics of each pedestrian LOS grade.

Table 10. Pedestrian Walkway Level of Service

LOS	Pedestrian Space (ft^2/person)	Average Speed (ft/min)	Walkway Characteristics	Illustration
A	≥ 35	260	Walking speeds freely selected; conflicts with other pedestrians unlikely.	
B	25–35	250	Walking speeds freely selected; pedestrians respond to presence of others.	
C	15–25	240	Walking speeds freely selected; passing is possible in unidirectional streams; minor conflicts for reverse or cross movement.	
D	10–15	225	Freedom to select walking speed and pass others is restricted; high probability of conflicts for reverse or cross movements.	
E	5–10	150	Walking speeds and passing ability are restricted for all pedestrians; forward movement is possible only by shuffling; reverse or cross movements are possible only with extreme difficulty; volumes approach limit of walking capacity.	
F	< 5	< 150	Walking speeds are severely restricted; frequent, unavoidable contact with others; reverse or cross movements are virtually impossible; flow is sporadic and unstable.	

Source: TCRP Report 165*: Transit Capacity & Quality of Service Manual*, *3rd Edition*; *Highway Capacity Manual*
ft^2/person = square feet per person; ft/min = feet per minute

Additional field characteristics used to determine capacity for each pedestrian crossing included crossing area, walk time, and flash-don't-walk time where applicable. A combined walk and flash-don't-walk time per hour was determined for each crossing location based on existing signal timing data at the intersection for at-grade crosswalk locations. Pedestrian bridges were assumed to be unconstrained for the hour, as pedestrians are not limited to crossing during walk and flash-don't-walk times. The existing field characteristics described above, and walkway level of service factors shown in Table 10 were used to create a density of people per hour at each crossing for each level of service between LOS A and LOS F.

The maximum saturation flow or a theoretical capacity was assumed to be LOS E for each crossing location analyzed. This results in up to 158,475 people per hour total maximum capacity for the four crossings studied on Montlake Boulevard. Weekday event pedestrian counts were collected before the Friday, September 30, 2016 football game versus Stanford University with a start time of 6:00 p.m. and attendance of approximately 63,733. The September 30, 2016 game attendance was 63,733, the highest recorded attendance at a Husky Stadium home football game dating to the 2013 season[2]. There is no data available for the weekday post-game condition. Weekend event pedestrian counts were collected before and after the Saturday, October 7, 2017 football game versus the University of California-Berkeley with a start time of 7:45 p.m., end time of 11 p.m. and attendance of approximately 52,777. Table 11 summarizes pedestrian volumes and level of service for existing conditions.

Table 11. Existing Pedestrian Volumes and Level of Service

	Weekday Event[1]			Weekend Event[2]		
Pedestrian Crossing Location	**Pedestrian Volumes (People per hour)**	**Capacity (People per hour)**	**LOS**	**Pedestrian Volume (People per hour)**	**Capacity (People per hour)**	**LOS**
Pre-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	2,938	< 36,000	A	2,894	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	3,290	< 6,600	E	5,018	< 6,600	E
Husky Stadium Pedestrian Bridge	4,198	< 99,000	A	3,216	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	1,277	< 16,875	A	1,973	< 16,875	A
Total	**11,703**	**< 158,475**	**A**	**13,101**	**< 158,475**	**A**
Post-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	No data available.			2,415	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	No data available.			4,635	< 6,600	E
Husky Stadium Pedestrian Bridge	No data available.			3,084	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	No data available.			2,135	< 16,875	A
Total	No data available.			12,269	**< 158,475**	A

1. Friday, September 30, 2016, football game vs. Stanford University, 6:00 p.m. start.
2. Saturday, October 7, 2017, football game vs. University of California-Berkeley, 7:45 p.m. start.

As shown in Table 11, for the existing weekday and weekend event conditions, the Montlake Boulevard crossing locations would operate at LOS A conditions with the exception of the south approach leg of the Montlake Boulevard/NE Pacific Place intersection under weekday and weekend event conditions, which operates at LOS E. It is anticipated that as this crossing becomes crowded, pedestrians would utilize nearby crossing locations, as other crossings in the area operate at LOS A. Overall, the total pedestrian count is under total capacity levels for the combined crossing locations analyzed.

Bicycle

The existing TMP does not have any specific goals or strategies identified to enhance and promote bicycle usage. Approximately 1 percent of attendees bicycle to the game based on the 2017 survey. This percentage includes free floating bike share and personal/private bikes.

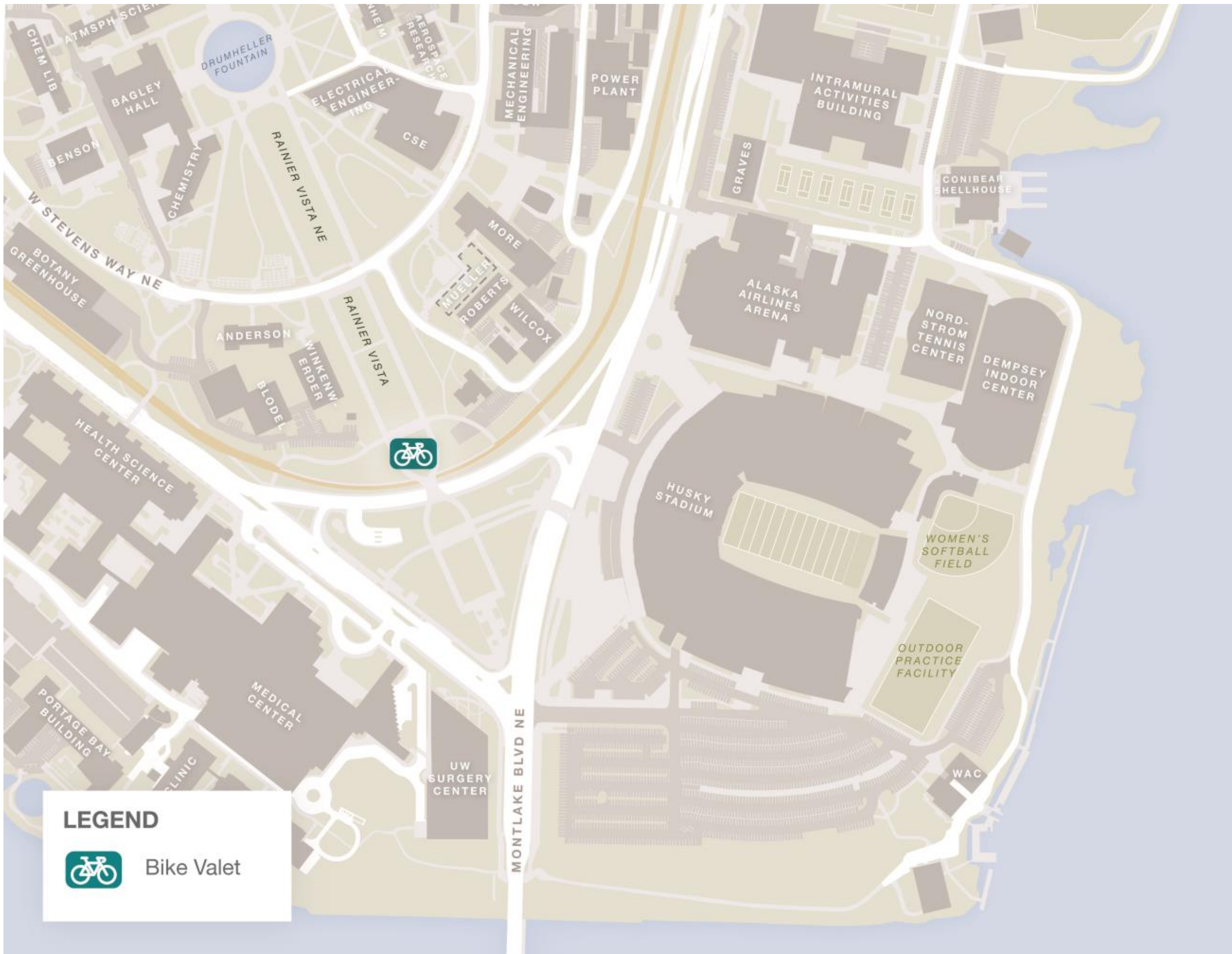
Quality of Environment

During events, the UW Athletics provides a bike valet service to store and manage bicycles during events. Bike share users do not use this system because no locks are necessary for those bikes. The UW Athletics has implemented the bike valet on Rainier Vista near the junction with the Burke-Gilman Trail

[2] University of Washington Athletics Attendance Summary, 2013-2017.

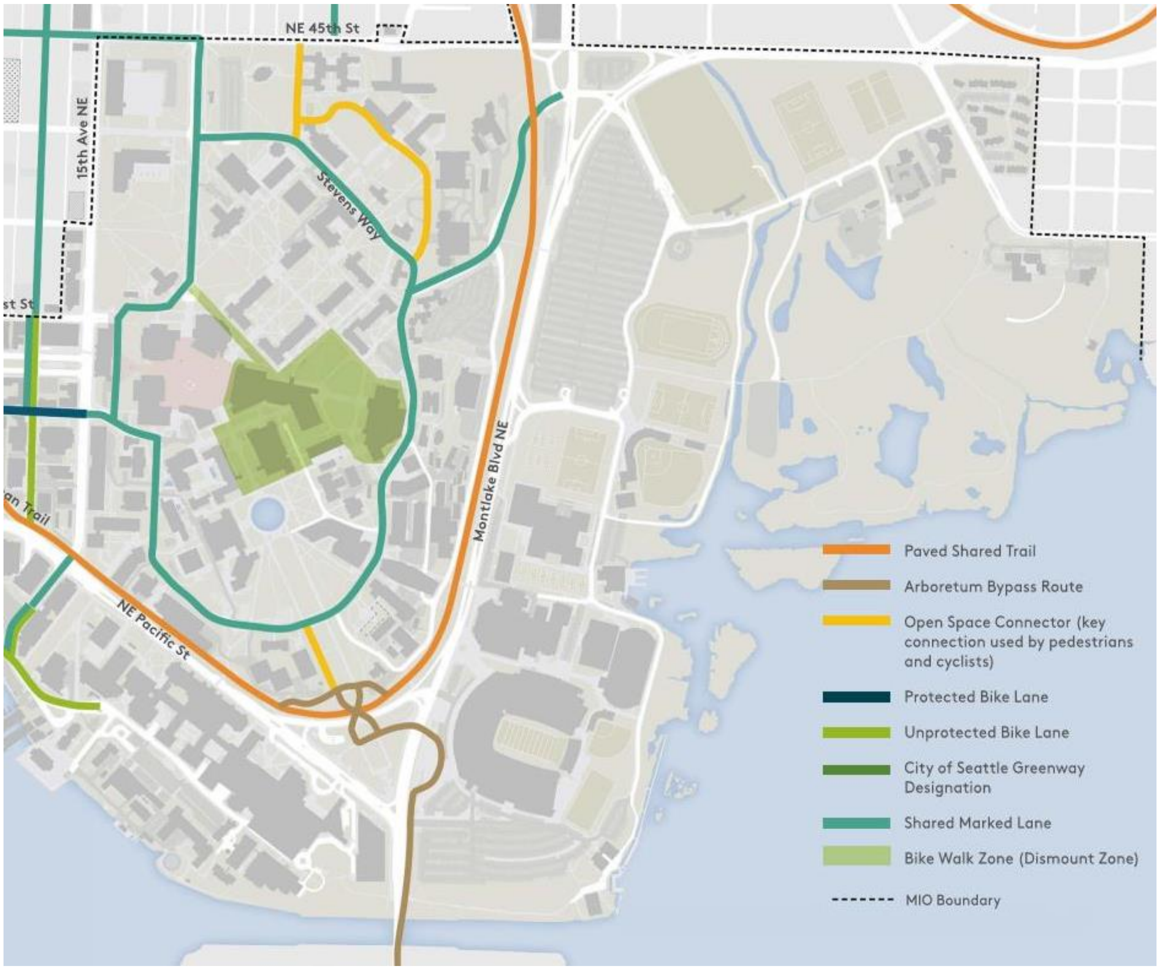
and Stevens Way (see Figure 20). This location was identified to intercept commuters from the Burke-Gilman Trail and limit the bicycle activity in the stadium and light rail station plaza area, where there is a larger concentration of pedestrian activity.

Figure 20. Bike Valet Location



The existing UW bicycle system includes designated streets and pathways as well as end-of-trip facilities such as short-term bicycle parking, secured and covered bicycle parking, and the game day bike valet. Figure 21 shows the existing bicycle network near or serving Husky Stadium, including protected and unprotected bicycle lanes, shared lanes, greenways, and trails. The new pedestrian and bicycle bridge to the Link light rail University of Washington Station improves travel between the Burke-Gilman Trail and the Montlake area; however, on game days the use of the bike valet is intended to limit use of the bridge by bicyclists to minimize conflicts with pedestrians. The Montlake Bridge and I-5 represent longstanding barriers to bicycle travel.

Figure 21. Existing Bicycle Facilities



Source: University of Washington 2018.

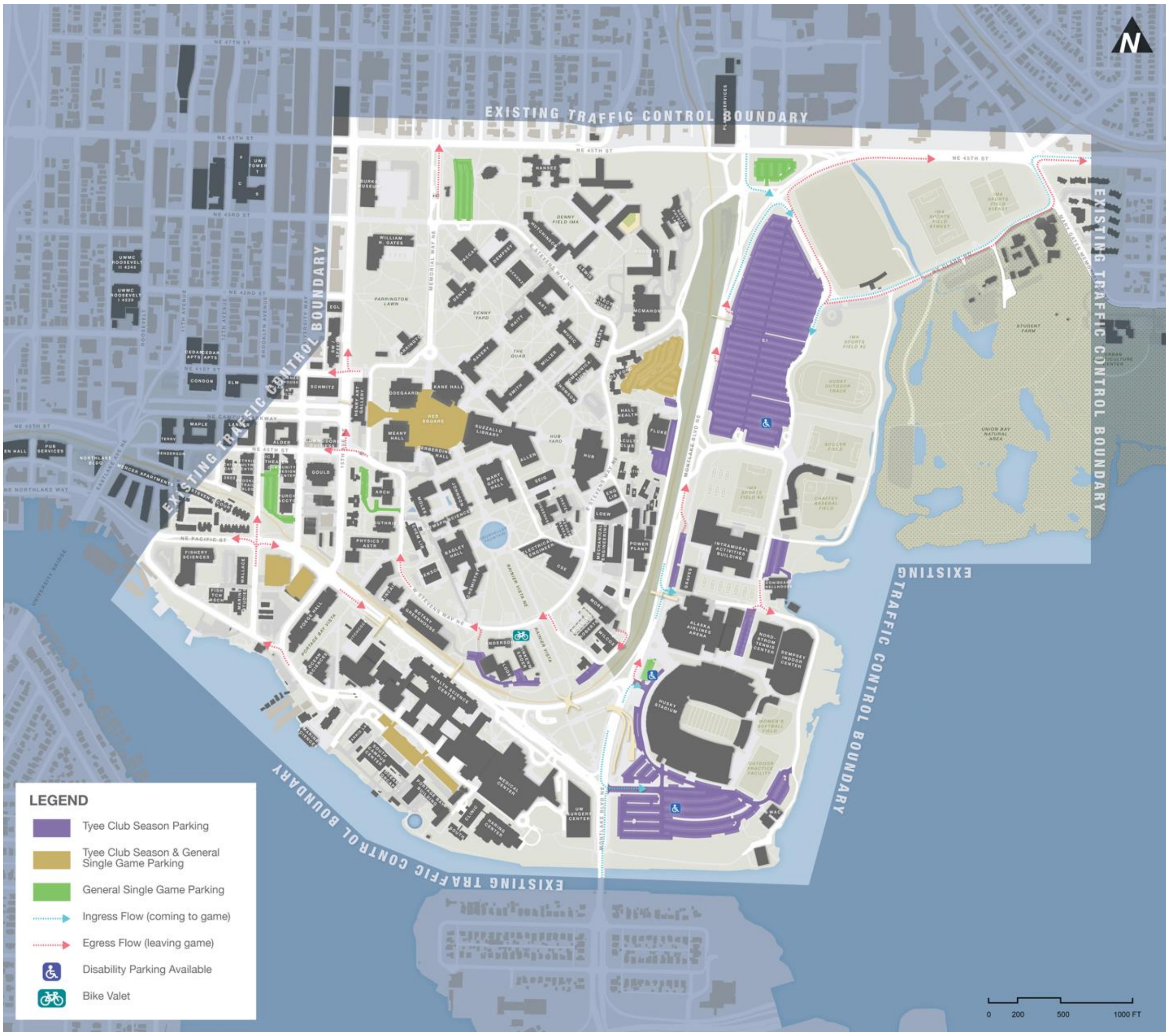
In addition to existing bicycle facilities in the vicinity of Husky Stadium, the implementation of bicycle share organizations promotes non-motorized travel to and from stadium events. The proposed TMP provides strategies to address bike share company operations.

Vehicles

The existing TMP has a 72 percent automobile mode goal, and much of the strategies are aimed at managing vehicle traffic in and around Husky Stadium as well as reducing reliance on automobiles. UW Athletics maintains a game day traffic control plan, provides discount pricing for carpooling, and provides additional transit service in an effort to decrease auto use. The current TMP has been successful in achieving an auto mode of approximately 43 percent, consisting of general purpose vehicles and TNCs.

The Husky Stadium area is bounded by Montlake Boulevard to the west, SR 520 to the south, Union Bay to the east, and NE 45th Street to the north. It is primarily served by Montlake Boulevard, which is a north-south principal arterial. Regional access to the stadium is provided via SR 520 to the south, with interchanges along Montlake Boulevard, and I-5 to the west, with interchanges along NE 45th Street. The SPD and UWPD provide traffic control on games days between NE Pacific Place and NE 45th Street and 15th Avenue NE and Montlake Boulevard, as illustrated in Figure 22. In addition, SPD provides traffic control at the NE 75th Street/25th Avenue NE intersection.

Figure 22. Existing Husky Stadium Traffic Control Boundary



Traffic Volumes

Existing weekend event peak hour traffic volumes were collected at 16 locations on Saturday, October 7, 2017, during the UW versus University of California-Berkeley game that had a scheduled kick-off time of 7:45 p.m. Data were collected between 5 p.m. and 8 p.m. to capture peak traffic arriving to the game. The October 7, 2017 game attendance was 52,777 people[3].

Existing weekday event peak hour traffic volumes were collected on Friday, September 30, 2016, during the UW versus Stanford University game that had a scheduled kick-off time of 6:00 p.m. Data was collected between 4:00 p.m. and 6:00 p.m. to capture traffic arriving to the game as well as PM peak period background traffic. The September 30, 2016 game attendance was 63,733, the highest recorded attendance at a Husky Stadium home football game dating to the 2013 season[4]. The 2016 weekday

[3] University of Washington Athletics Attendance Summary, 2017.
[4] University of Washington Athletics Attendance Summary, 2013-2017.

game counts were only collected at four study intersection locations: 15th Avenue NE/NE 45th Street, 25th Avenue NE/Pend Oreille Road NE, Montlake Boulevard NE/NE Pacific Place, and Montlake Boulevard NE/NE Pacific Street. Weekday games are infrequent occurring 2 out of every 3-years. A comparison of weekday non-event and weekday game intersection turning movements at the four study intersections shows that weekday PM peak hour game traffic was 15 to 20 percent lower than on a non-event weekday. Given the overall lower traffic in the study area on weekday game days, the evaluation of weekday traffic operation focuses on the four locations where traffic counts are available for weekday game day conditions.

As shown below, operations under all weekday event scenarios were evaluated at these four locations where weekday event counts are available.

Appendix B provides the existing traffic counts for the weekday and weekend PM peak hours.

Traffic Operations

Sixteen study intersections were selected to provide an assessment of pre-game intersection operations under weekend event conditions (see Table 12). Four study intersections were evaluated under weekday event conditions due to data availability from the September 30, 2016 game described above.

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). For signalized locations, LOS is measured in average delay per vehicle and is reported for the intersection as a whole. At side-street stop-controlled intersections, LOS is measured in average delay per vehicle during the peak hour of traffic and is reported for the worst operating approach of the intersection. Traffic operations for an intersection can be described alphabetically with a range of levels of service (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix C contains a detailed explanation of LOS criteria and definitions.

Weekday PM peak hour traffic operations for weekday and weekend existing 2017 conditions were evaluated at the study intersections based on the procedures identified in the *Highway Capacity Manual* (HCM) and were evaluated using the *Synchro 9* software program. Pedestrian and bicycle volumes were accounted for when evaluating the operations of the intersections. In addition, the SR 520/Montlake Boulevard interchange improvements were also included.

The City of Seattle's Comprehensive Plan does not define an LOS standard for individual intersections; however, the City generally recognizes LOS E and F as poor operations for signalized locations and LOS F for unsignalized locations. Furthermore, the City does not define specific standards around event venues such as CenturyLink, Safeco Field, Husky Stadium, or KeyArena, but recognize that higher levels of congestions will occur during pre- and post-event periods. Intersection operations for existing (2017) weekday PM peak hour conditions and existing (2017) weekend evening peak hour conditions are summarized in Table 12. Detailed LOS worksheets for each intersection analyzed are included in Appendix D.

Table 12. Existing 2017 Weekday and Weekend Peak Hour Intersection LOS Summary

Intersection	Traffic Control	Weekday Event PM Peak Hour			Weekend Event Evening Peak Hour		
		LOS	Delay	WM	LOS	Delay	WM
1. 25th Avenue NE/NE 55th Street	Signal	-	-	-	F	250	-
2. 5th Avenue NE/NE 45th Street	Signal	-	-	-	C	28	-
3. 7th Avenue NE/NE 45th Street[4]	Signal	-	-	-	E	80	-
4. 15th Avenue NE/NE 45th Street	Signal	C	34	-	C	23	-
5. Union Bay Place/NE 45th Place/ Mary Gates Memorial Drive NE/NE 45th Street[4]	Signal	-	-	-	F	92	-
6. Montlake Boulevard NE/NE 45th Street[4]	Signal	-	-	-	C	27	-
7. 25th Avenue NE/NE 44th Street/Pend Oreille Road NE	Signal	E	62	-	C	35	-
8. Montlake Boulevard NE/NE 44th Street[4]	Signal	-	-	-	A	8	-
9. Montlake Boulevard NE/25th Avenue NE[4]	Signal	-	-	-	B	14	-
10. Montlake Boulevard NE/Wahkiakum Road	Side-Street Stop	-	-	-	C	17	WB
11. Montlake Boulevard NE/IMA Exit	Side-Street Stop	-	-	-	F	62	WB
12. Montlake Boulevard NE/IMA Entrance	Side-Street Stop	-	-	-	C	22	SBL
13. Montlake Boulevard NE/NE Pacific Place[4]	Signal	D	37	-	C	26	-
14. Montlake Boulevard NE/NE Pacific Street[4]	Signal	D	53	-	D	55	-
15. Montlake Boulevard NE/SR 520 WB Ramps[4]	Signal	-	-	-	B	17	-
16. Montlake Boulevard NE/SR 520 EB Ramps/E Lake Washington Boulevard[4]	Signal	-	-	-	C	25	-

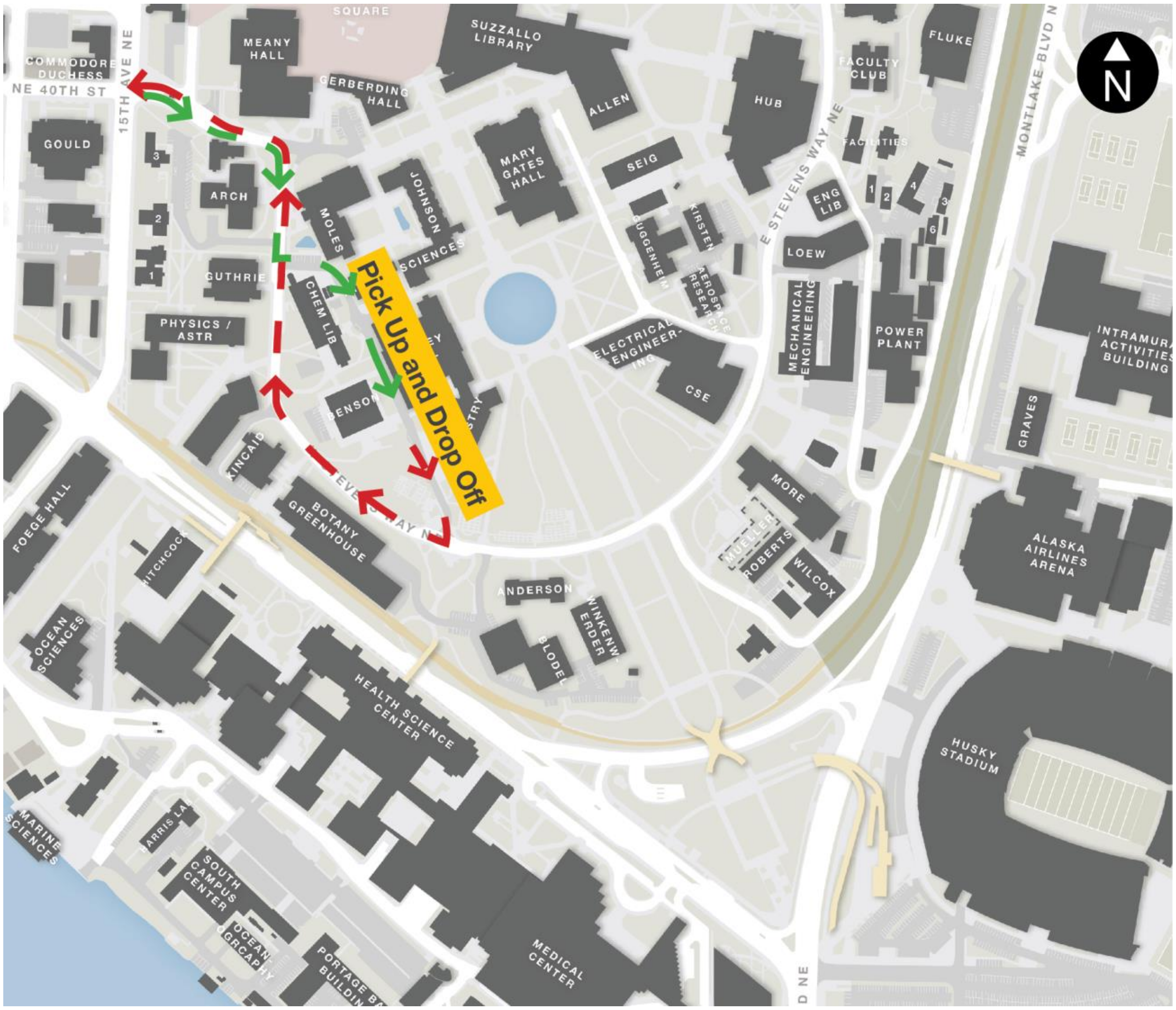
1. Level of Service (A – F) as defined by the 2010 HCM, Transportation Research Board unless otherwise noted.
2. Average delay per vehicle in seconds.
3. WM Is Worst Movement reported for unsignalized intersections where WB = westbound approach, SBL = southbound left-turn movement.
4. Evaluated in HCM 2000. HCM 2010 methodology does not support more than four approaches or non-standard phasing.

As shown in Table 12, during the weekday PM peak hour with a game at Husky Stadium, one intersection evaluated is anticipated to operate at LOS E. During the weekend peak hour conditions with a game at Husky Stadium, one intersection is anticipated to operate at LOS E and three intersections are anticipated to operate at LOS F.

Transportation Network Companies (TNC)

Transportation Network Companies (TNCs, e.g., Uber or Lyft) represent approximately 6 to 9 percent of arrivals to weekday and weekend football events, as described in Chapter 1. In addition to Uber and Lyft trips, these arrivals include Uber Pool and Lyft Line ride share trips. Uber Pool and Lyft Line connect multiple riders from different origins with similar destinations to create a shared ride with lower cost to the riders. TNC arrivals and departures from Husky Stadium are managed through signage and geofencing that directs drop-off and pick-up functions along Okanogan Lane. Figure 23 shows the TNC drop-off/pick-up location that was in place for the 2017 football season. UW also has agreements with TNCs on operations and provide a police officer at the TNC drop-off/pick-up area to manage traffic flows and minimize impacts to the adjacent street system. There is proactive communication between UW, police officers and the TNC companies on operations and potential adjustments to improve or remedy conditions.

Figure 23. Existing TNC Drop-off/Pick-up Location



As shown in Figure 23, TNCs entering or exiting the pick-up/drop-off area are routed via 15th Avenue NE. TNC vehicles entering the designated loading area are directed to enter Okanogan Lane via Stevens Way NE. Drop-off and pick-up traffic is directed southbound on Okanogan Lane and exiting onto Stevens Way NE with right-turns only. Vehicles access Stevens Way NE via 15th Avenue NE at the NE 40th Street/W Stevens Way NE intersection.

Observations of TNC loading activity were conducted during the Saturday, October 7, 2017 football game with a start time of 7:45 p.m. The game lasted approximately three hours, concluding at approximately 11 p.m. Video observations at the TNC loading area were conducted from 5 p.m. to 12 a.m. to capture pre-game drop-off and post-game pick-up activity. Table 13 summarizes average duration of TNC vehicles in the loading area for the pre- and post-game condition. There were a few vehicles that were observed to remain in the loading area for approximately 20-minutes during pre-game; however, these appeared to be the driver waiting for the next customer to make contact.

Table 13. TNC Observation Summary

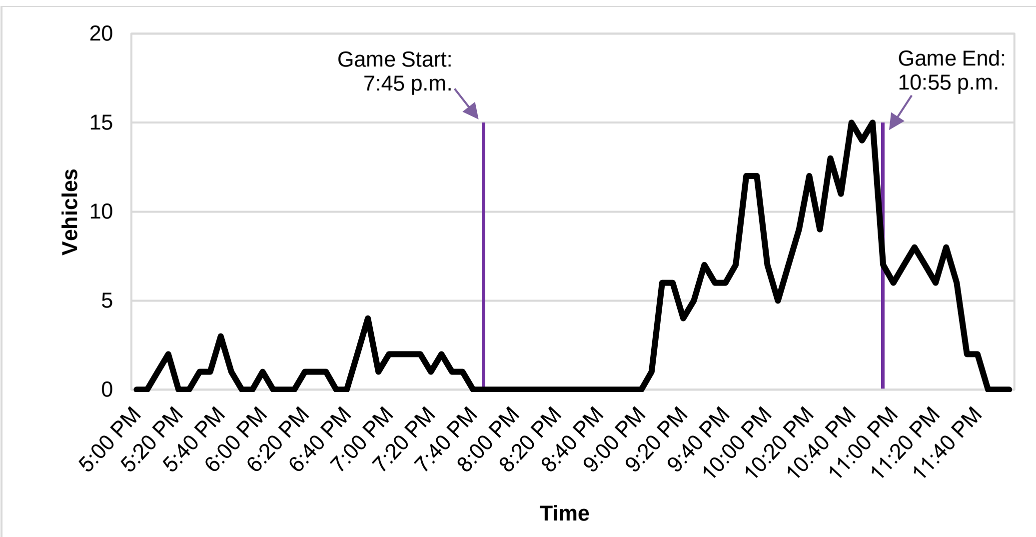
Observation Period	Predominant Activity Type	Average Vehicle Duration in Loading Area (mm:ss)[1]
Pre-game (5:00 p.m. to 7:50 p.m.)	Drop-off	2:17
Post-game (10:55 p.m. to 12:00 a.m.)	Pick-up	0:33

Transpo Group, July 2018

As shown in Table 13, the average duration of TNC vehicles in the loading area was approximately 2 minutes during pre-game and 30 seconds post-game.

Figure 24 shows the loading activity for the pre- and post-game condition in 5-minute intervals to provide an understanding the number of vehicles in the loading area. During the pre-game condition, the number of TNC vehicles within the loading area was less than 5 vehicles at one time and under post-game conditions the number of vehicles within the loading area was 15 vehicles at one time. The loading area along Okanogan Lane is over 600-feet. Assuming vehicle lengths of approximately 25-feet, the maximum vehicle queue length for loading during the 5-minute interval is 375-feet, which is fully accommodated within the existing loading area.

Figure 24. Vehicles in TNC Loading Area per 5-minute Intervals



Emergency Service

UW Athletics coordinates with the nearby facilities to alert them of Husky Stadium events. Key facilities include Children's Hospital and UW Medical Center. Traffic control is provided at key locations to facilitate ingress and egress and minimize impacts on the surrounding street system.

Freight Routing

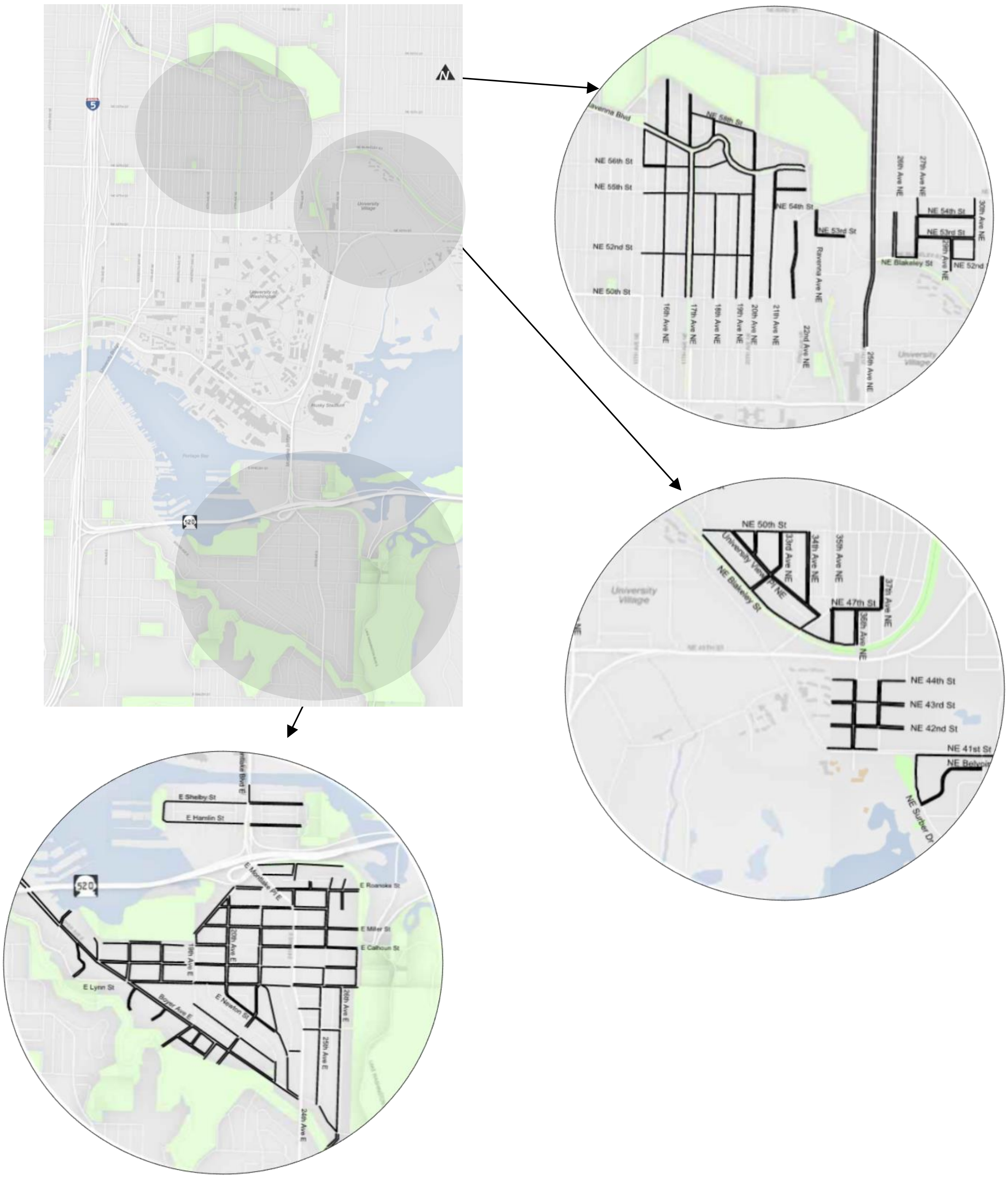
The *Seattle Freight Master Plan* includes designation of a network prioritized for use by freight. This plan identifies NE 45th Street, Pacific Street, Montlake Avenue, and the Roosevelt Way/11th Avenue NE as Truck Streets. NE Pacific Street and Montlake Boulevard south of NE Pacific Street are designated as major truck routes, while Roosevelt Way/11th Avenue NE are designated as minor truck routes. Communication is provided for game days such that non-essential freight deliveries within the study area can be avoided on game days and freight travelling through the study area could be rerouted. For freight delivery within the study area that must occur on game days and cannot avoid pre-game or post-game conditions, traffic control is provided at key locations to facilitate vehicle ingress and egress in the area of the Stadium.

Parking

The existing TMP parking program has three goals: (1) to provide additional University-controlled parking for the general public, (2) to provide close-in parking for the Tyee Club members, and (3) to encourage people to park in areas compatible with their exiting traffic flow destinations. A discount carpool parking program is provided for vehicles with three or more passengers. Attendees are encouraged to park in campus-provided parking, and signage is placed within surrounding neighborhoods to discourage game-related parking.

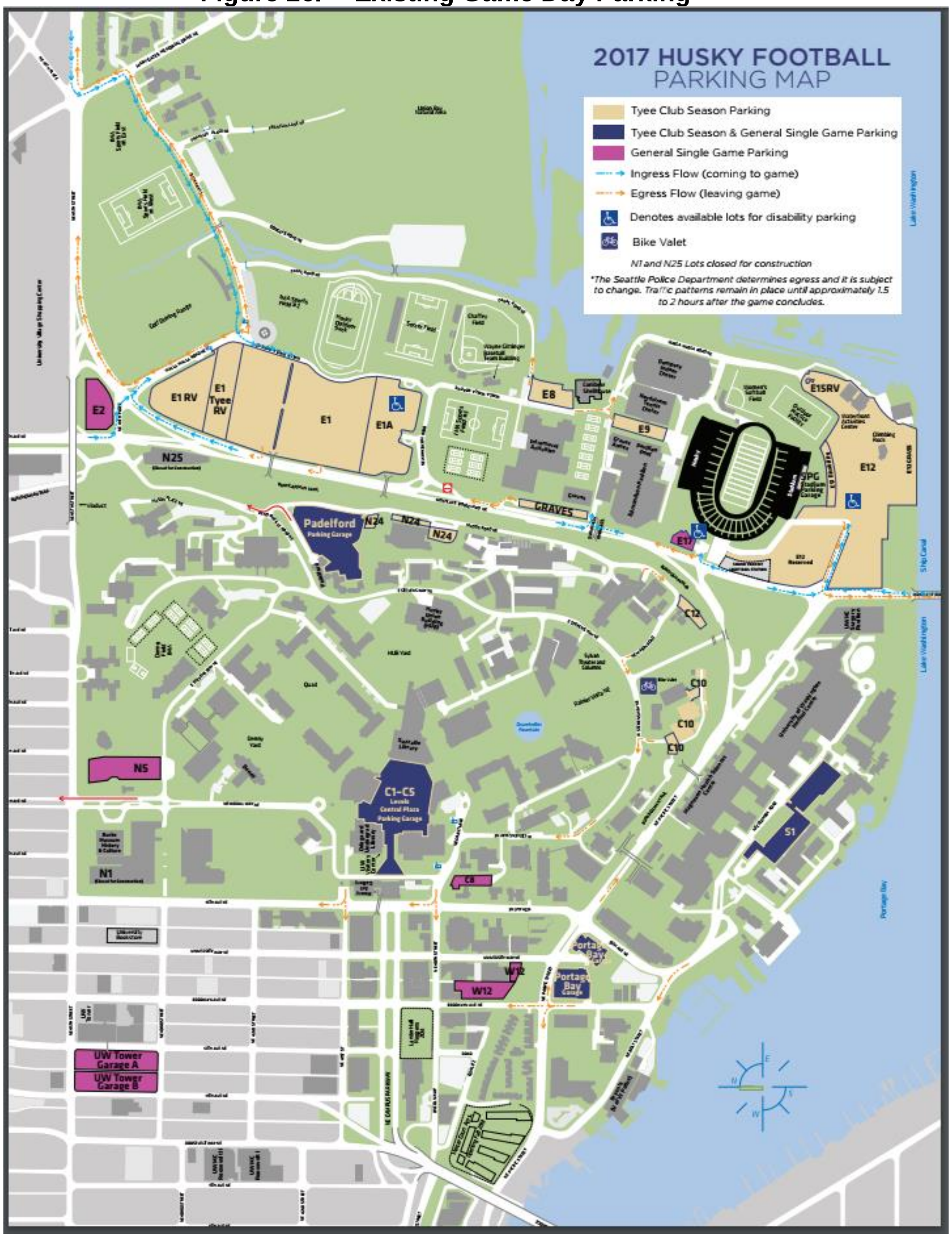
Each season, game dates are posted on parking restriction signs in neighborhoods. The location where neighborhood parking is managed is shown in 0. These residential permit zones (RPZs) aim to minimize the neighborhood parking impacts of the Husky Stadium football games and are along streets where game day parking may otherwise occur without the restrictions.

Figure 25. Existing Managed Neighborhood On-Street Parking



The UW also actively manages the on-campus parking for game days, as shown in Figure 26. As shown below, on-campus gameday parking is divided into two categories: Tyee Club Season Parking and General Single Game Parking. Tyee Club Season Parking includes surface lots east of Montlake Boulevard NE. General single game parking includes some surface lots on campus, as well as the Padelford and C1-C5 (central) garages. Both garages are shared between season ticket holder and single game parking.

Figure 26. Existing Game Day Parking



Source: UWTS

Campus parking of approximately 11,000 spaces is managed by UWTS and UW Athletics on game days. Management includes signage and staff to direct vehicles to available parking, designated parking lots for RV parking, and staffing to direct vehicles in the parking lots to maximize available space. Accommodations are made for ADA accessible parking in multiple lots around the stadium and access via the southwest entrance. Most campus parking facilities are available for game day parking, and UWTS manages to the parking demand that occurs on game day. Parking demand is such that not all campus parking is typically used for the games. Signage and event staff are relocated as parking areas fill to direct vehicles to appropriate parking facilities.

With approximately 11,000 spaces managed by UWTS and UW Athletics on games days, parking demand is such that not all campus parking is typically used for the games. The 2017 weekend travel mode survey showed approximately 5,300 vehicles parked on game day. Approximately 60 percent or over 3,000 vehicles parked on-campus and the remaining parked off-campus. The intercept survey indicated that the number of vehicles parked in the neighborhood areas surrounding the stadium decreased between 2017 and 2016.

Weekday games are limited to one game, two out of every three years as directed by the PAC-12 Conference. Specific parking data was not available for the 2016 weekday game; however, the vehicle mode split for this game was less than the weekend condition indicating parking on- and off-campus for the weekday is likely less than the weekend condition. As noted previously, the City provides special game-day neighborhood parking management through their restricted permit zone (RPZ) program.

Chapter 3. Impacts of No Action Alternative

This chapter describes the future transportation conditions considering the No Action Alternative, the metric against which impacts of Alternative 1 are measured.

The No Action Alternative represents continuation of the existing TMP, including the existing mode splits described in Chapter 1. The No Action Alternative evaluation is based on a weekday and weekend Husky football games with 60,000 attendees representing an 85th-percentile attendance level.

As described in Chapter 1, the modal analysis was conducted for the 2035 horizon year consistent with *Seattle 2035* and the performance goal for the proposed TMP Update. In addition, given the changes anticipated to the transit system over the next 15- to 20-year, the 2019 and 2025 horizon years are considered for the transit analysis.

Transit

Transit service is expected to expand dramatically by 2035. The existing TMP includes use of private shuttles and paid/subscription Metro service for Husky Stadium events. The additional shuttle service will become redundant with some future with planned transit improvements, for example private shuttles to Shoreline could be served by light rail extensions to Lynnwood opening in 2023 that has two stops serving Shoreline and subscription service to Federal Way that will be served by light rail extension to Federal Way in 2024. Since 2013, UW Athletics has been granted a temporary exception for paid/ subscription Metro service TMP based on good transit performance (i.e., exceeding the current 16 percent TMP transit goal).

Planned Improvements

Changes to the transit system are anticipated to occur incrementally; therefore, the 2019, 2025 and 2035 horizon years were considered in the transit analysis.

By 2019, as part of the OCC project, modifications to the transit system effecting the Husky Stadium area include:

- King County Route 255 will exit SR 520 onto Montlake Boulevard and stop in front of the University of Washington Stadium Station for improved light rail access.
- Sound Transit Route 545 will exit SR 520 onto Montlake Boulevard and stop in front of the University of Washington Stadium Station for improved light rail access.

Key improvements by 2025 are related to Link light rail, which will provide reliable, frequent and high capacity transit service. The improvements include:

- Extension north of the University of Washington Station at Husky Stadium to Northgate in 2021, and Lynnwood in 2024.
- Beginning in 2021 with the extension to Northgate, Link will operate with four-car trains in each direction and with 6-minute headways in peak periods and 10-minute headways in non-peak times. Beginning in 2023 with the extension to Redmond, headways will decrease to 4 minutes in the peak periods and 5 minutes in non-peak times.[5]
- The light rail transit spine that connects the University to Downtown Seattle and Seattle-Tacoma International airport will be extended south to Federal Way in 2024.
- An additional light rail connection will be extended east to Bellevue and Redmond in 2024.

Additional transit improvements by 2035 include:

[5] Email communication with Trinity Parker, Sound Transit, January 2018.

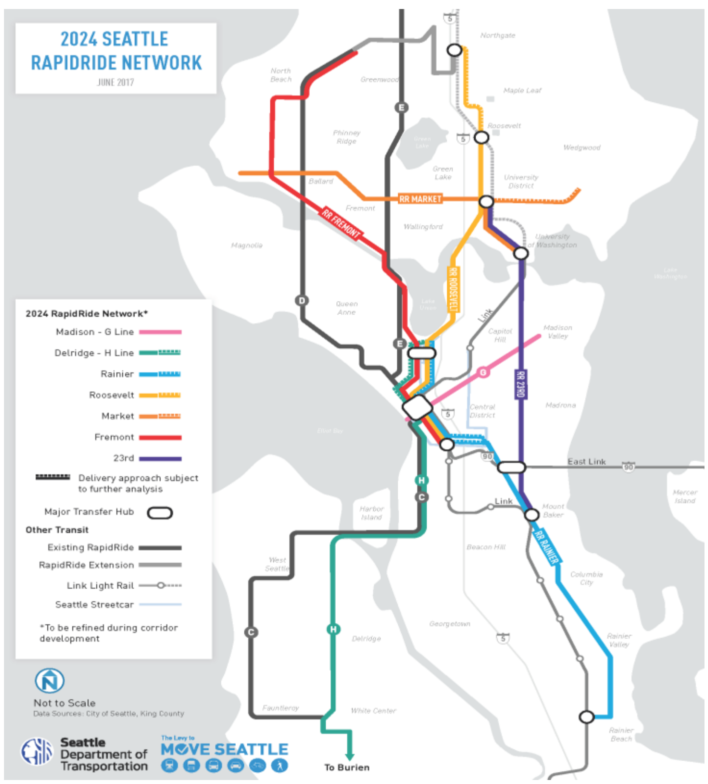
- There will be an extension from Lynnwood to Everett around 2036.
- The Link light rail from Federal Way will extend to Tacoma in 2030.
- Within Seattle, light rail will be extended farther west to Ballard in 2035 and West Seattle in 2030.

These Link light rail extensions are funded through the Sound Transit ST2 and ST3 ballot measures.

Bus service is also expected to change as a way to feed light rail and also to increase overall frequency and reliability of bus transit through the implementation of RapidRide. Figure 27 illustrates the 2024 planned RapidRide expansion. RapidRide is a show-up-and-go service with headways of 10-minutes or less. RapidRide provides a bus rapid transit premium service with branded coaches, real-time information at stations, and potential for off-board fare payment and all door boarding. The development of RapidRide also includes speed and reliability system improvements such as operating in exclusive bus lanes or queue jumps and with signal priority in some locations. In the study area, the following four RapidRide routes are expected by 2024:

- NE Market Street to NE 45th Street connecting the University District and Ballard by 2022
- Roosevelt Way connecting the University District to downtown on 11th Avenue NE and Roosevelt Way by 2021
- NE 23rd Street connecting the University District to the Central District along 23rd Avenue and Montlake Boulevard by 2024
- Service between University District and UW Bothell by 2024 via 25th Avenue and Lake City Way.

Figure 27. 2024 RapidRide Line City of Seattle Expansion



These RapidRide Lines will be developed as collaborations between the City of Seattle and King County Metro. In addition to the bus and light rail changes described above, by 2024, with the opening of Lynnwood Link light rail, Community Transit will no longer directly serve the University or Downtown Seattle.

Other investments that may enhance transit travel to the area include the completion of the SR 520 "Rest of the West," which includes a second bascule bridge across the Montlake Cut, high-occupancy vehicle (HOV) lanes on SR 520 between Montlake and I-5, and a revise transit station on SR 520 at Montlake Boulevard. These investments are fully funded and expected to be completed by 2028 and will improve transit travel.

Transit will transform in Seattle over the next 20 years with these investments, providing dramatically expanded access to frequent and reliable service and attracting new riders.

Table 14 provides a summary of the service anticipated to be crossing each of the screenlines in the study area by 2035. Consistent with the existing conditions analysis, a 7 p.m. start time is assumed for the game for both the weekday and weekend condition. The 2025 service would be consistent with 2035 conditions except for some of the Link light rail extensions that occurring in a later period as noted above. The 2019 service for each screenline is consistent with existing conditions.

Table 14. 2035 Weekday and Weekend Transit Routes at Screenlines

Screenline Number	Screenline	Weekday Routes[1, 2] (Pre- and Post-Event)	Weekend Routes[1, 2] (Pre- and Post-Event)
1	SR 520 EB SR 520 WB	2516, 2998, 3101, 540, 542, 554	2516, 2998, 3101, 540, 542, 554
2	Montlake Boulevard NB Montlake Boulevard SB	1063, 3122	1063, 3122
3	Light Rail (South of Stadium) NB Light Rail (South of Stadium) SB	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms
4	Light Rail (North of Stadium) NB Light Rail (North of Stadium) SB	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms
5	Eastlake Avenue NB Eastlake Avenue SB	1013, 1064, 3123	1013, 1064, 3123
6	NE 40th Street EB NE 40th Street WB	1994, 1018	1994, 1018
7	NE 45th Street, West of I-5 EB NE 45th Street, West of I-5 WB	1012	1012
8	Roosevelt Way NE SB	1013	1013
9	11th Avenue NE NB	1013	1013
10	15th Avenue NE NB 15th Avenue NE SB	1002	1002
11	NE 45th Street at Roosevelt Way NE EB NE 45th Street at Roosevelt Way NE WB	1012, 542	1012, 542
12	25th Avenue NE NB 25th Avenue NE SB	1009	1009
13	NE 45th Street East of Mary Gates Drive NE NB NE 45th Street East of Mary Gates Drive NE SB	1007, 1012, 1019, 3122, 3208	1007, 1012, 1019, 3122, 3208
14	Light Rail (North of Brooklyn Station) NB Light Rail (North of Brooklyn Station) SB	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms	5 Minute Headways with 4 car trains. Post games operate an extra train for one hour at the end of the game to increase frequency and clear platforms

NA = Not applicable, stations and screenlines evaluated in the future and do not currently exist.
1.Assumes weekday evening service and frequency.
2. Routing from METRO CONNECTS 2025 Plan

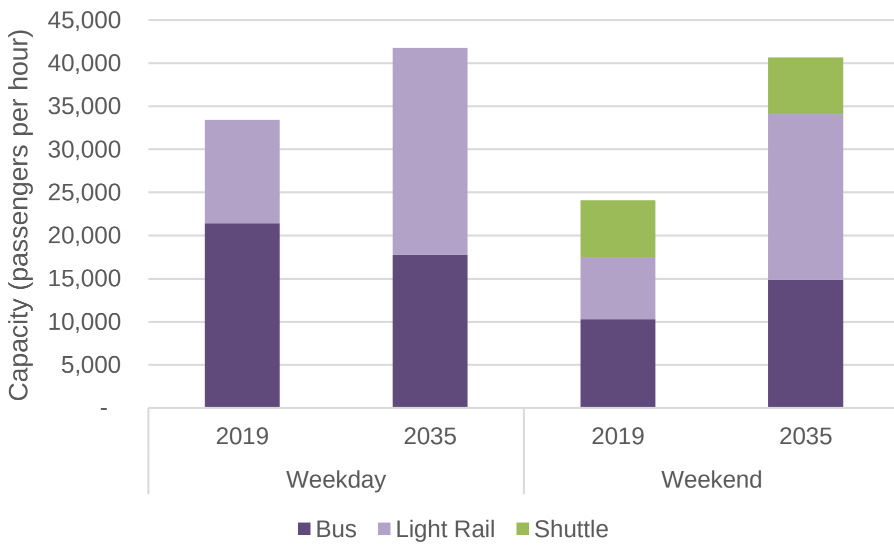
Screenline Analysis

The 14 screenlines evaluated as part of the existing conditions were evaluated for the No Action Alternative.

Capacity

The overall transit capacity for 2019 conditions is anticipated to be similar to existing conditions. Overall increase in transit service available for the aggregated screenlines in the study area is summarized in Figure 28. The 2025 screenline capacity would be slightly less than 2035 conditions without some of the Link light rail extensions. On weekdays overall transit capacity at the aggregated screenline level is expected to increase by 25 percent in 2035 compared to 2019 conditions. On weekends, if all shuttles were maintained, the increase in transit capacity would be 69 percent compared to 2019 conditions due to the anticipated increases in weekend service by KC Metro and Sound Transit. While event capacity and demand are not anticipated to change in the No Action Alternative, future transit capacity would accommodate an increase in transit patrons.

Figure 28. Study Area No Action Alternative Total Transit Screenline Capacity



It is noted for the SR 520 screenlines in 2035 the capacity would decrease in the No Action Alternative under weekday conditions. This decrease in capacity is related to service changes that are anticipated in the future that would result in less transit capacity. There are no Special Service shuttles on weekdays; therefore, these are not assumed in the analysis of event conditions for the weekday No Action Alternative. The transit capacities are conservative assuming both pre- and post-game service is outside of the peak service hours. It is possible that pre-game conditions could occur during the peak transit service periods resulting in more frequent service and increased capacity.

Demand

Transit growth assumed for this analysis is consistent with Seattle 2035, the City Comprehensive Plan, transit growth rate of 1 percent per year. The analysis includes background transit users from the University of Washington Seattle 2018 Campus Master Plan (CMP). Background transit riders for weekday and weekend pre- and post-event conditions were determined by applying a growth rate of 1 percent per year to existing non-event transit ridership and the event transit demand for the peak hour was added.

The existing TMP would remain in place under the No Action Alternative and without other measures it is assumed the transit mode split would remain consistent with recent surveys. The analysis assumes a future mode split of 35 percent on weekdays and 33 percent on weekends consistent with the average transit use on game days over approximately 5-years. While transit mode split is assumed to remain consistent with current conditions, the analysis assumes that with the extensions of light rail in ST2 and ST3, more patrons (as high as 60 percent) would use light rail to access games.

Trip Distribution

Distribution of trips to transit routes reflect current operations/service, distribution patterns to park-and-rides, and zip code data from the stadium intercept survey. The 2019 transit trip distribution is anticipated to be consistent with existing conditions.

In 2025 and 2035, new Link light rail service would change the transit distribution pattern. ZIP code data for Husky Stadium weekend game attendees suggest 20 percent of patrons will live within areas served by future light rail.

With the availability of new light rail connections to the east and south, a general distribution pattern for transit in 2035/2025 would be 31 percent from the east including the north east areas of King County, 17 percent from the west, 17 percent from the north, and 35 percent from the south, including portions of south east King County (for example Bellevue, Mercer Island, Redmond, and Renton) that would have access to frequent and reliable light rail. With expansion of transit services, some Husky Stadium additional service and private shuttles may no longer be needed for access to events; however, this service is assumed in the No Action Alternative because it is required by the current TMP.

Analysis

Appendix E provides the 2019 and 2025 screenline transit analysis.

Overall, in 2019 the OCC improvements do not change the screenline transit capacities in the study area and with increases in background transit demand, the 2019 conditions would be the same as existing conditions for weekday pre- and post-event and weekend pre-event. However, increases in background transit demand by 2019 would results in two additional screenlines (Eastlake Avenue southbound and 25th Avenue NE northbound) where demand would be higher than capacity for the weekend post-event condition.

Increases in background transit ridership also results in additional riders not accommodated within the peak hour for pre- and post-event conditions. During the weekday conditions, transit riders not accommodated within the peak hour would be 450 people during the pre-event peak hour and 3,100 people during the post-event peak hour. On the weekends, approximately 1,150 people would not be accommodated during the pre-event peak hour and 3,670 people would not be accommodated during the post-game peak hour. These transit riders would travel outside the peak hour to access the game and are accommodated within the 2-hour peak period.

In 2025, with key transit improvements like the extension of Link light rail to Redmond, Federal Way and Lynnwood and the University-to-University (UW Bothell) RapidRide the weekend pre- and post-event transit demand would be fully accommodated within the peak hour and only the SR 520 screenline would be over capacity during the weekday pre- and post-event condition. The number of riders not accommodated within the one-hour peak period reduces for 2025 weekday conditions with the increase in transit capacity. Approximately 800 to 1,460 riders may not be accommodated during the peak hour for weekday conditions. These transit riders would travel outside the peak hour to access the game similar to current conditions and would be served within a 2-hour peak period.

Table 15, Figure 29 and Figure 30 summarizes the 2035 No Action Alternative weekday pre- and post-game arrival and departure demand and capacity along the 14 screenlines surrounding the Husky Stadium service area.

Table 15. 2035 No Action Alternative Weekday Peak Hour Pre-Game and Post-Game Transit Screenline Demand & Capacity

Screenline Number	Screenline	Capacity (passengers per hour)	Arrival Demand (passengers per hour)	Departure Demand (passengers per hour)
1	SR 520 EB	1,920	995	**2,950**
	SR 520 WB	1,920	**2,415**	965
2	Montlake Boulevard NB	660	325	85
	Montlake Boulevard SB	660	335	660
3	Light Rail (South of Stadium) NB	12,000	7,990	3,900
	Light Rail (South of Stadium) SB	12,000	3,900	9,400
4	Light Rail (North of Stadium) NB	12,000	3,900	6,940
	Light Rail (North of Stadium) SB	12,000	6,160	3,900
5	Eastlake Avenue NB	1,200	545	250
	Eastlake Avenue SB	1,200	165	565
6	NE 40th Street EB	720	270	110
	NE 40th Street WB	720	195	415
7	NE 45th Street, West of I-5 EB	540	500	175
	NE 45th Street, West of I-5 WB	540	445	**880**
8	Roosevelt Way NE SB	540	85	85
9	11th Avenue NE NB	540	395	395
10	15th Avenue NE NB	360	190	280
	15th Avenue NE SB	360	155	85
11	NE 45th Street at Roosevelt Way NE EB	900	515	165
	NE 45th Street at Roosevelt Way NE WB	900	465	**935**
12	25th Avenue NE NB	540	430	**900**
	25th Avenue NE SB	540	450	100
13	NE 45th Street East of Mary Gates Drive NE NB	1,500	495	530
	NE 45th Street East of Mary Gates Drive NE SB	1,500	205	180
14	Light Rail (North of Brooklyn Station) NB	12,000	3,900	6,940
	Light Rail (North of Brooklyn Station) SB	12,000	6,160	3,900

NA = Not applicable, stations and screenlines evaluated in the future and do not exist
Bold screenline demand do not have capacity to meet demand in the single hour and there will be residual demand. This demand would be accommodated within a 2-hour period.
The analysis does not include additional trains to accommodate increases in event demand.
Includes current private shuttles and subscription bus service.

Figure 29. 2035 No Action Alternative Weekday Pre-Game Arrival Transit Demand and Capacity

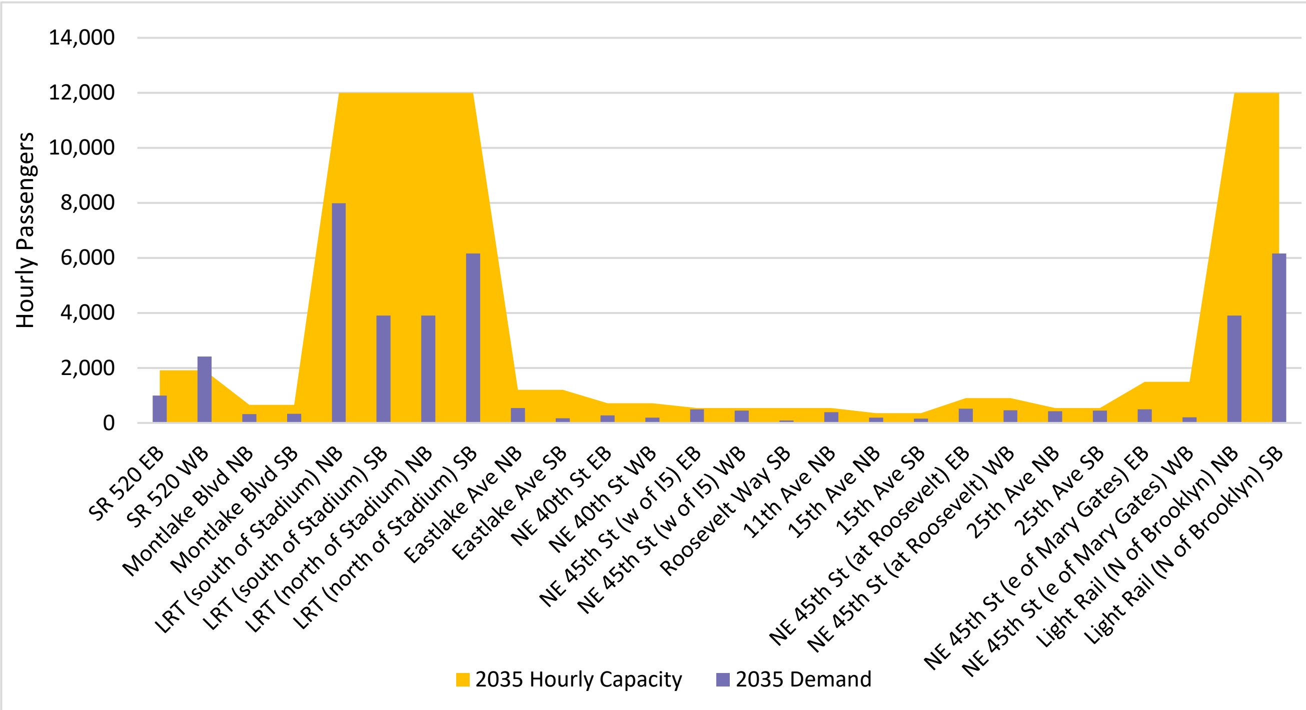
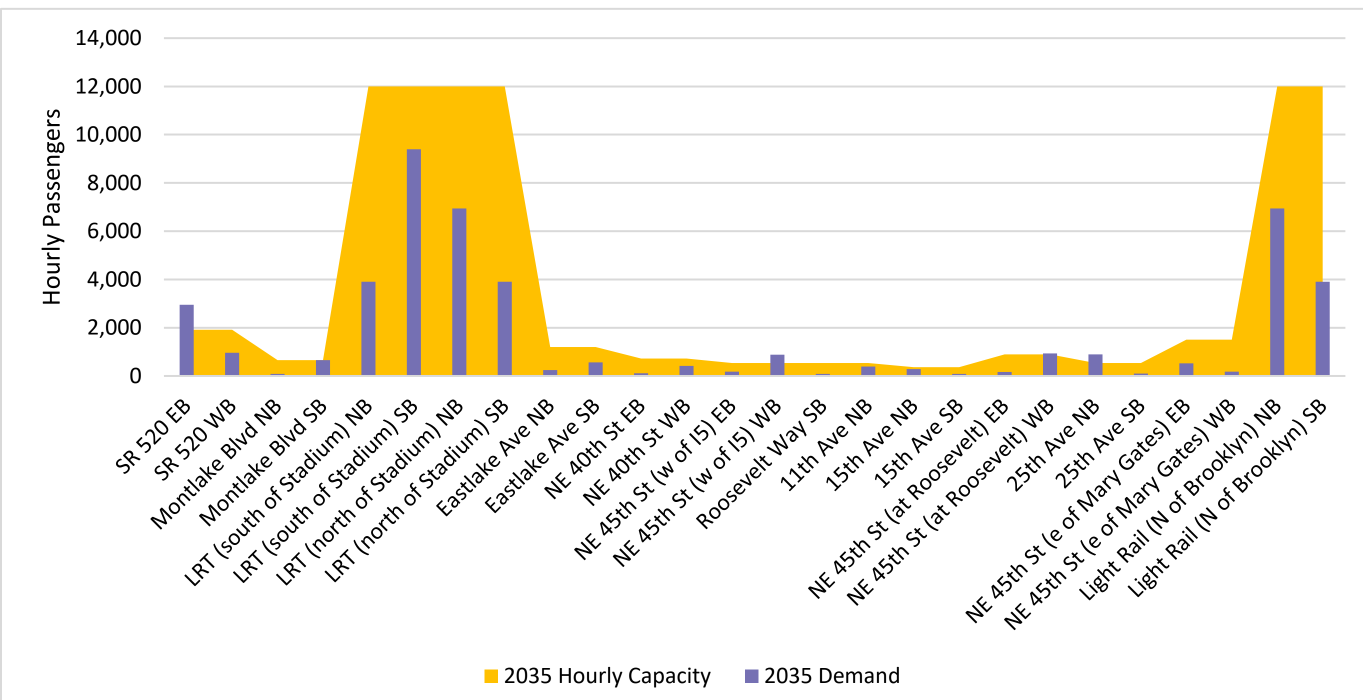


Figure 30. 2035 No Action Alternative Weekday Post-Game Departure Transit Demand and Capacity



As shown in Table 15, Figure 29 and Figure 30, the weekday games capacity is exceeded at one screenline (SR 520) pre-game and four screenlines post-game. Link light rail is not exceeded given the higher capacity.

Table 16, Figure 31, and Figure 32 summarize weekend arrival and departure demand and capacity along the 14 screenlines surrounding the Husky Stadium service area.

Table 16. 2035 No Action Weekend One-Hour Event Transit Screenline Pre-Game Arrival and Post-Game Departure Demand & Capacity

Screenline Number	Screenline	Capacity (passenger per hour)	Arrival Demand (passenger per hour)	Departure Demand (passenger per hour)
1	SR 520 EB	4,620	145	1,930
	SR 520 WB	4,620	1,485	155
2	Montlake Boulevard NB	480	285	60
	Montlake Boulevard SB	480	85	385
3	Light Rail (South of Stadium) NB	9,600	5,755	1,950
	Light Rail (South of Stadium) SB	9,600	1,950	7,075
4	Light Rail (North of Stadium) NB	9,600	1,950	4,765
	Light Rail (North of Stadium) SB	9,600	4,045	1,950
5	Eastlake Avenue NB	840	545	270
	Eastlake Avenue SB	840	280	650
6	NE 40th Street EB	720	295	145
	NE 40th Street WB	720	180	380
7	NE 45th Street, West of I-5 EB	360	**450**	150
	NE 45th Street, West of I-5 WB	360	130	**535**
8	Roosevelt Way NE SB	360	150	150
9	11th Avenue NE NB	360	250	250
10	15th Avenue NE NB	660	220	305
	15th Avenue NE SB	660	300	235
11	NE 45th Street at Roosevelt Way NE EB	720	475	150
	NE 45th Street at Roosevelt Way NE WB	720	130	565
12	25th Avenue NE NB	660	90	525
	25th Avenue NE SB	660	395	70
13	NE 45th Street East of Mary Gates Drive NE NB	1,320	485	520
	NE 45th Street East of Mary Gates Drive NE SB	1,320	420	395
14	Light Rail (North of Brooklyn Station) NB	9,600	1,950	4,765
	Light Rail (North of Brooklyn Station) SB	9,600	4,045	1950

NA = Not applicable, stations and screenlines evaluated in the future and do not exist
Bold screenline demand do not have capacity to meet demand in the single hour and there will be residual demand. This demand would be accommodated within a 2-hour period.
The analysis does not include additional trains to accommodate increases in event demand.
Includes current private shuttles and subscription bus service.

Figure 31. 2035 No Action Alternative Weekend Pre-Game Arrivals Transit Demand and Capacity

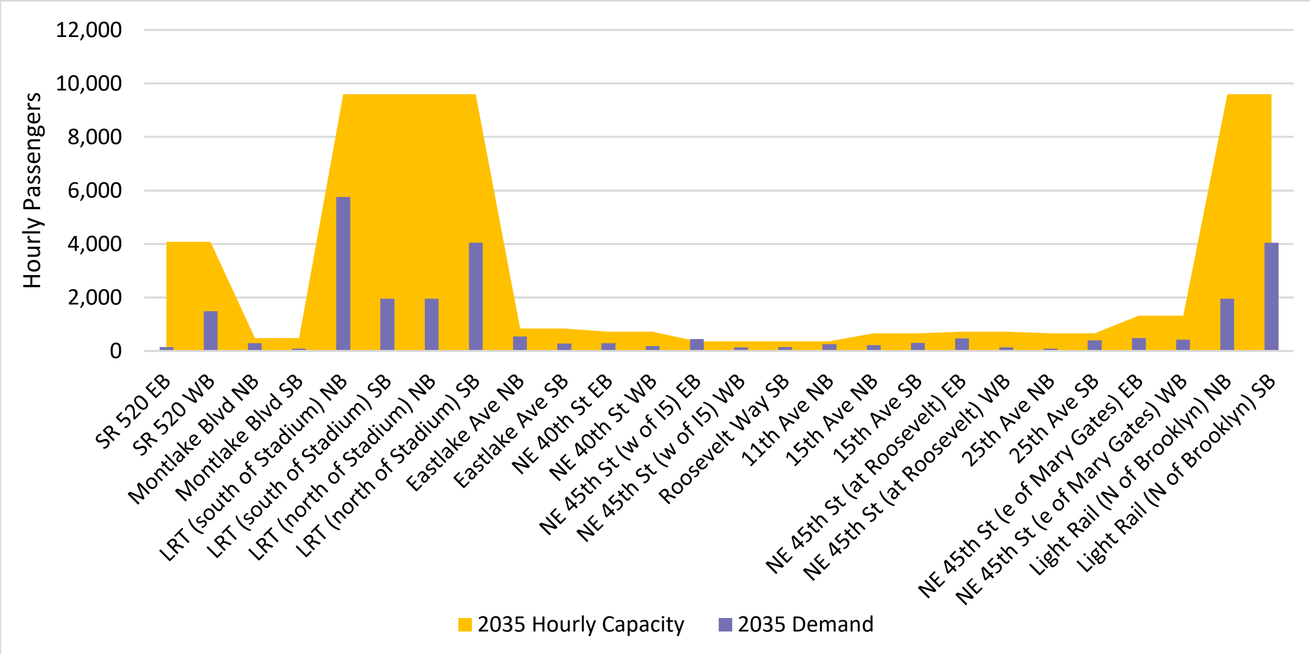
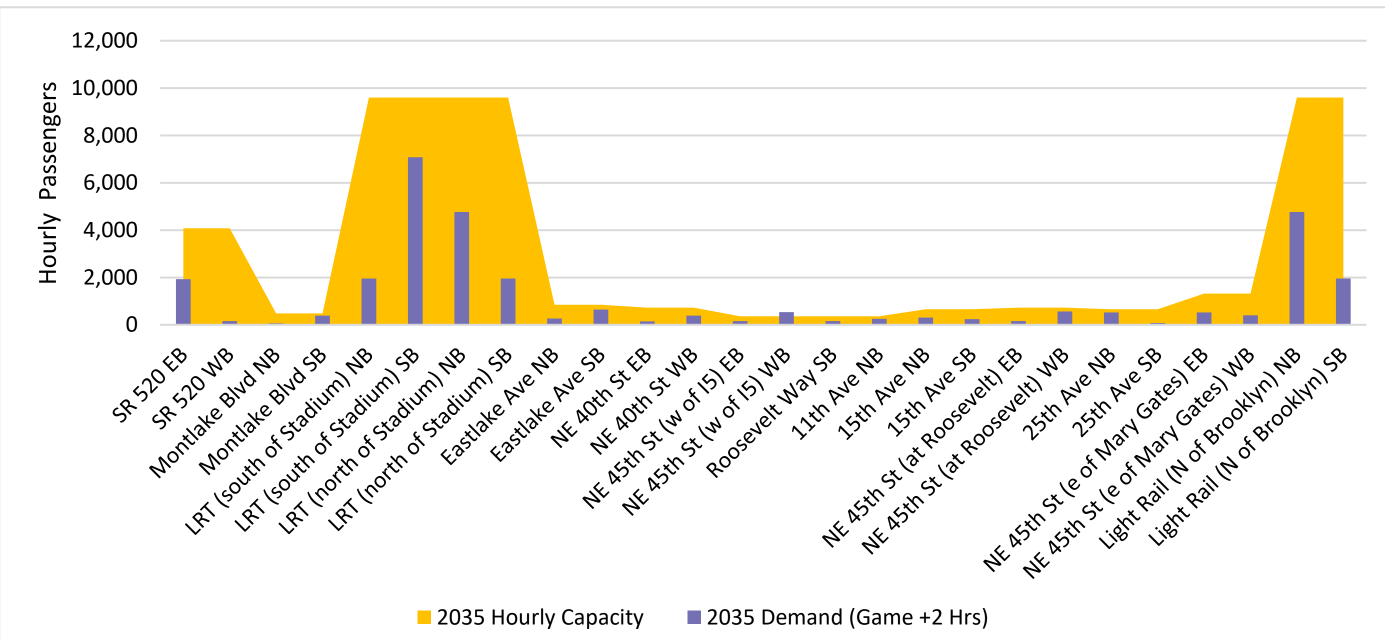


Figure 32. No Action Alternative Weekend Post-Game Departures Transit Demand and Capacity



Overall on weekends the 2035 No Action Alternative transit demands would generally be accommodated with the increase in transit capacity anticipated. As shown in Table 16, Figure 31, and Figure 32, during the weekday games capacity at screenlines would only be exceeded along NE 45th west of I-5 during the pre- and post-game conditions. It is anticipated that all the transit demand would be accommodated within a 2-hour period, which is common and typically expected for larger events. Consistent with existing conditions, the post-game evaluation represents the time period beginning 1-hour prior to the end of the game; therefore, with the 2-hour window beginning before the game ends, all transit demands are served within 1-hour after the game ends. This also coincides with the hourly TNC activity presented in the previous section.

Another way to under transit impacts of the No Action Alternative is to review how many people cannot be accommodated within the peak hour. Longer wait times could deter transit use and may also require additional management in the stadium pedestrian plaza to facilitate access to transit.

Based on the screenline analysis for a game that is generally full on a weekday, as many as 495 people using transit would not be accommodated within the peak hour, which is slightly higher than existing conditions. During the weekday post-game condition, 1,765 people would not be accommodated within the peak hour, which is less than existing conditions. On the weekends, 90 people pre-game and 175 people post-game would not be accommodated in the peak hour, which is substantially lower than existing conditions.

The transit analysis of the peak hour condition shows that the transit demand may not be fully accommodated during a one-hour period along some screenlines; however, it is anticipated that game day transit demands are served within 2-hours consistent with existing conditions and other venues in Seattle.

Pedestrians

Under the No Action Alternative, a goal of 8 percent walking would be maintained, and pedestrian flows would continue to be managed based on the current TMP. This would include SPD assisting with pedestrian flow management at the Montlake Boulevard intersections with Parking Lot E-12, NE Pacific Place, and Walla Walla Road.

Quality of Environment

The pedestrian environment in the immediate vicinity of Husky Stadium under 2035 conditions would generally be consistent with current conditions. The grade-separated pedestrian bridge over Montlake Boulevard would continue to provide high-capacity, unimpeded access to the stadium from the UW campus and Burke-Gilman Trail. Conditions in the pedestrian plaza in front of Husky Stadium may become more congested as additional pedestrian access the Link light rail University of Washington Station. Station platform capacity is limited to the existing facilities at the University of Washington Station, and the pedestrian plaza area may experience constraints with surging pedestrian volumes for stadium events. Event signage would continue to be used to minimize pedestrian conflicts with other modes by directing attendees along designated pathways to the stadium entrances. UW growth-related development would include constructing pedestrian improvements consistent with the UW campus master plan vision, prioritizing and promoting non-auto travel modes.

Move Seattle, the City's 10-year strategic vision, includes pedestrian improvements as part of multimodal corridors like Roosevelt Avenue to Eastlake Avenue, 23rd Avenue E Corridor, and NW Market Street to NE 45th Street Improvements. These changes would include improved sidewalks along a corridor connecting to the UW network via Montlake Boulevard. Phase 4 of the 23rd Avenue East Corridor Improvements will reach the transportation network just south of the Montlake Cut.

When light rail is operational north of the University of Washington Station, transit patrons will be able to travel to the north and south. This is anticipated to increase the percentage of fans riding Link. Similar to current conditions after games, Sound Transit and event staff are needed to manage escalator, elevator, and platform access for the post-game crowd.

In addition, planned pedestrian improvements in the District would work in conjunction with transit additions, including increased King County Metro services and the development of the Sound Transit Link light rail extensions. Green Streets proposed by the City of Seattle to promote a pedestrian environment are identified on NE 43rd Street, NE 42nd Street, and Brooklyn Avenue NE.

As stated in Chapter 2, Affected Environment, pedestrian lighting is present in all areas of the Husky Stadium vicinity, with lower lighting on pathways closer to the natural areas of Lake Washington. Pedestrian volumes are generally low in areas with lower lighting levels because these pathways connect with the water and areas to the east where parking is limited.

Pedestrian Flow Analysis

Volumes

Pre-game pedestrian conditions were evaluated at four crossing locations adjacent to the stadium on Montlake Boulevard NE to provide an understanding of weekday and weekend conditions. A growth rate of 0.5 percent per year was applied to the baseline 2019 to project 2035 weekday and weekend No Action conditions, with the exception of volumes on NE 45th Street, where a 1.0 percent per year growth rate was applied. This growth rate is based on a review of the *Seattle 2035* travel demand model anticipated growth between the base year and 2035 conditions. Pedestrian growth from the 2018 CMP preferred alternative was also taken into account, based on pedestrian volumes presented in the CMP Transportation Discipline Report. Table 17 provides a summary of 2035 No Action weekday and weekend pre-game pedestrian traffic volumes for the eight crossing locations serving Husky Stadium. Pedestrian volumes crossing Montlake Boulevard are described below.

Crossing Analysis

Pedestrian capacity across Montlake Boulevard was determined from the walkway LOS. As described in Chapter 2, Affected Environment, the maximum capacity at the four crossing locations studied can accommodate up to 158,475 people per hour. The pedestrian volumes crossing the Montlake Boulevard screenline are summarized below in Table 17.

Table 17. No Action 2035 Montlake Boulevard Screenline Pedestrian Volumes and Level of Service

	Weekday Event[1]			Weekend Event[2]		
Pedestrian Crossing Location	**Number of Pedestrians (people per hour)**	**Capacity (People per hour)**	**LOS**	**Number of Pedestrians (people per hour)**	**Capacity (People per hour)**	**LOS**
Pre-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	3,668	< 36,000	A	3,599	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	4,108	< 6,600	E	6,241	< 6,600	E
Husky Stadium Pedestrian Bridge	5,658	< 99,000	A	4,000	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	1,721	< 16,875	A	2,454	< 16,875	A
Total	**15,155**	**< 158,475**	**A**	**16,293**	**< 158,475**	**A**
Post-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	No data available.			2,642	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	No data available.			5,070	< 6,600	E
Husky Stadium Pedestrian Bridge	No data available.			3,374	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	No data available.			2,336	< 16,875	A
Total	No data available.			**13,421**	**< 158,475**	**A**

1. Based on counts from Friday, September 30, 2016, football game vs. Stanford University, 6:00 p.m. start.
2. Based on counts from Saturday, October 7, 2017, football game vs. University of California-Berkeley, 7:45 p.m. start.

Table 17 shows that in the weekday and weekend conditions with a Husky game in 2035, the Montlake Boulevard crossing locations would operate at LOS A conditions with the exception of the south approach leg of the Montlake Boulevard/NE Pacific Place intersection under weekday event conditions, which operates at LOS E. It is anticipated that as this crossing becomes crowded, pedestrians would utilize nearby crossing locations, as other crossings in the area operate at LOS A. Overall, the total pedestrian count is well under total capacity levels for the crossing locations analyzed.

Bicycles

The No Action Alternative would continue to provide limited strategies addressing bicycle travel.

Quality of Environment

During events, the UW Athletics bike valet services would continue to be provided. Bike share would not be accommodated within the valet. It is likely that without having strategies that directly address bike share, there would continue to be issues with conflicts between bike share parking and pedestrian areas.

Based on Seattle Department of Transportation’s (SDOT) *2017–2021 Bicycle Implementation Plan*, additional protected bicycle lanes and Neighborhood Greenways are planned for implementation between 2017 and 2021, contributing to the vision for a connected and integral bicycle network outlined in SDOT’s adopted April 2014 *Seattle Bicycle Master Plan (BMP)*. The BMP includes approximately 100 miles of protected bicycle lanes and 250 miles of neighborhood greenways, contributing to the growing bicycle culture evident throughout Seattle. Improvement projects to the existing bicycle network surrounding Husky Stadium are described below.

In the immediate vicinity of Husky Stadium, the Montlake Boulevard protected bike lane between NE Pacific Place and E Roanoke Street anticipated in 2021 would provide a completely protected bicycle connection from the SR 520 Bridge trail to the stadium. Other planned bicycle network improvements would increase connectivity to the stadium by providing access to multiple modes and/or addressing missing links. Some of the key bicycle improvements include the 15th Avenue NE bicycle lane from NE 47th Street to Cowen Place NE by 2018, NE 40th Street bicycle lane from Woodland Park Avenue N to 7th Avenue NE by 2019, and Link light rail Northgate Station trail and protected bicycle lanes by 2020. Protected bicycle lanes have also been identified on 15th Avenue NE adjacent to campus in the *Bicycle Master Plan* that are not yet been identified in the *Bicycle Implementation Plan*.

Vehicles

The existing TMP auto goal of 72 percent is already surpassed, with a current auto mode of approximately 43 percent consistent of general purpose vehicles and TNCs. It is anticipated that under the No Action Alternative, the existing vehicle management strategies would continue to be implemented and the auto goal would be achieved.

Planned Improvements

Multimodal improvements including intersection, intelligent transportation systems (ITS), transit enhancements, and bicycle facilities are planned as part of *Move Seattle*. Key corridors, including in this program, that could affect vehicle travel to Husky Stadium include the NW Market Street/NE 45th Street Transit Improvement Project, 23rd Avenue NE Corridor Improvements (Phase 4), and Roosevelt Way to Downtown complete streets. In addition, the SR 520 Bridge Replacement Program “Rest of the West” improvements that are fully funded between I-5 and Lake Washington would be completed by 2028. These projects include the Montlake interchange, eastbound SR 520 bridge, a second Montlake Boulevard bascule bridge, as well as the Portage Bay Bridge and Roanoke interchange.

There would also be expansion of the light rail system that could result in modes shifts with less attendees driving to the game. The analysis conservatively assumes that the vehicle mode split would remain consistent with current conditions (i.e., 43 percent).

Traffic Volumes

Background traffic volumes for the No Action Alternative during the weekday PM peak hour were forecast based on growth rates consistent with the approved *U District Urban Design Environmental Impact Statement* (EIS) and U District Rezone.

The Seattle travel demand model is only for weekday conditions. Weekend 2035 traffic volumes with the No Action condition were based on applying a growth rate of 0.5 percent per year to the baseline 2019 traffic volumes, with the exception of traffic along NE 45th Street. Volumes on and adjacent to NE 45th Street were grown at a rate of 1 percent per year to forecast 2035 conditions. This growth rate is consistent with the weekday forecasted traffic growth from the *U District Urban Design EIS* and U District Rezone.

Under the No Action Alternative, weekend condition, a game of 60,000 attendees is assumed. Existing weekend traffic counts for game day represent an attendance level of 52,777 people[6]. The potential increase in vehicle traffic associated with 60,000 attendees was forecasted by increasing traffic volumes associated with the 52,777-attendance level proportionally. The 2035 No Action Alternative weekday and

[6] University of Washington Athletics Attendance Summary, 2017.

weekend traffic volumes are provided in Appendix B. 2035 No Action Alternative conditions assume current TMP non-auto mode split levels of 54 percent non-auto mode split goal for a weekend event and 63 percent non-auto mode split goal for a weekday event, with forecast 2035 volumes.

Traffic Operations

Consistent with Chapter 2, Affected Environment, 16 study intersections were evaluated for the weekday and weekend 2035 No Action Alternative pre-game conditions. Weekday PM peak hour traffic operations for weekday and weekend baseline 2035 conditions were evaluated at the study intersections based on the procedures discussed in Chapter 2. As noted previously, the City of Seattle's Comprehensive Plan does not define an LOS standard for individual intersections; however, the City generally recognizes LOS E and F as poor operations for signalized locations and LOS F for unsignalized locations. No Action intersection operations for the weekday PM peak hour and weekend evening peak hour conditions are summarized in Table 18. Detailed LOS worksheets for each intersection analyzed are included in Appendix D.

Table 18. No Action Alternative 2035 Weekday and Weekend PM Peak Hour Intersection LOS Summary

Intersection	Traffic Control	Weekday (Current Mode Split)			Weekend (Current Mode Split)		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
1. 25th Avenue NE/NE 55th Street	Signal	-	-	-	B	16	-
2. 5th Avenue NE/NE 45th Street	Signal	-	-	-	D	38	-
3. 7th Avenue NE/NE 45th Street[4]	Signal	-	-	-	F	137	-
4. 15th Avenue NE/NE 45th Street	Signal	D	42	-	C	26	-
5. Union Bay Place/NE 45th Place/ Mary Gates Memorial Drive NE/NE 45th Street[4]	Signal	-	-	-	F	96	-
6. Montlake Boulevard NE/NE 45th Street[4]	Signal	-	-	-	C	27	-
7. 25th Avenue NE/NE 44th Street/Pend Oreille Road NE	Signal	D	36	-	F	135	-
8. Montlake Boulevard NE/NE 44th Street[4]	Signal	-	-	-	A	9	-
9. Montlake Boulevard NE/25th Avenue NE[4]	Signal	-	-	-	B	18	-
10. Montlake Boulevard NE/Wahkiakum Road	Side-Street Stop	-	-	-	C	17	WB
11. Montlake Boulevard NE/IMA Exit	Side-Street Stop	-	-	-	F	83	WB
12. Montlake Boulevard NE/IMA Entrance	Side-Street Stop	-	-	-	C	22	SBL
13. Montlake Boulevard NE/NE Pacific Place[4]	Signal	F	80	-	C	26	-
14. Montlake Boulevard NE/NE Pacific Street[4]	Signal	F	89	-	F	84	-
15. Montlake Boulevard NE/SR 520 WB Ramps[4]	Signal	-	-	-	C	21	-
16. Montlake Boulevard NE/SR 520 EB Ramps/E Lake Washington Boulevard[4]	Signal	-	-	-	C	23	-

Note: Signal timing splits were optimized for all future 2035 analysis scenarios.
1. Level of Service (A – F) as defined by the 2010 *Highway Capacity Manual* (HCM), Transportation Research Board unless otherwise noted.
2. Average delay per vehicle in seconds.
3. WM = Worst Movement, which was reported for unsignalized intersections where WB = westbound approach, SBL = southbound left-turn movement.
4. Evaluated in HCM 2000. HCM 2010 methodology does not support more than four approaches or non-standard phasing.

As shown in Table 18, during the 2035 weekday PM peak hour with an event at Husky Stadium, the Montlake Boulevard NE/NE Pacific Place and Montlake Boulevard NE/NE Pacific Street intersections are anticipated to operate at LOS F and the 15th Avenue NE/NE 45th Street and 25th Avenue NE/NE 44th Street/Pend Oreille Road NE intersections are anticipated to operate at LOS D+. During the 2035 weekend peak hour conditions with a game at Husky Stadium, five intersections are anticipated to operate at LOS F.

Transportation Network Companies (TNC)

Under No Action Alternative, TNC activity would continue to be managed through signage and geofencing directing TNC vehicles to a drop-off and pick-up area. TNC activity, including Uber Pool and Lyft Line trips, may increase under the No Action Alternative. With the current mode split maintained, increases attributed to Uber Pool and Lyft Line would increase vehicle occupancy and overall TNC vehicle trips would not increase. The University of Washington would continue to monitor TNC activity using existing strategies.

Emergency Service

UW Athletics would continue to coordinate with the nearby facilities (e.g. UW and Seattle Children's Hospital) to alert them of Husky Stadium events. Key facilities include Children's Hospital and UW Medical Center. Traffic control is provided at key locations to facilitate ingress and egress and minimize impacts on the surrounding street system. The No Action Alternative is not anticipated to change the timing or frequency of events associated with Husky Stadium; therefore, no impacts to emergency services are anticipated, similar to current conditions.

Freight Routing

Communication would continue to be provided for game days such that non-essential freight deliveries within the study area could be avoided on game days and freight travelling through the study area could be re-routed. For freight delivery within the study area that must occur on game days and cannot avoid pre-game or post-game conditions, traffic control would be provided at key locations to facilitate vehicle ingress and egress in the area of Husky Stadium. The No Action Alternative is not anticipated to change the timing or frequency of events associated with the stadium; therefore, freight would be similar to current conditions with no significant impacts.

Parking

The existing TMP parking program would remain the same as existing conditions under the No Action Alternative. Signs would continue to be posted within the neighborhood restricting parking on game days. With light rail expansion within the region, additional transit options may result in a decrease in driving to the games.

The UW 2018 CMP contemplates a reduction in campus parking supply with future development, which could result in a decrease in overall parking supply of approximately 420 parking spaces[7]. Parking would continue to be managed by UWTS and UW Athletics for Husky Stadium events. The parking management would allow for vehicles wanting to park on-campus to be accommodated.

Growth in the parking demand in the area would be related to growth on campus and the surrounding area as well as additional projects occurring in the area. The campus parking demand growth would generally occur during the weekday midday period, which typically does not coincide with event times for the Husky Stadium. Weekday games are in the evenings and the largest percentage of activities occurs on the weekends, when the campus population is lower.

The No Action Alternative assumes the existing mode splits would be maintained. With approximately 3,000 vehicles parked on-campus for a game, consistent with existing conditions, it is unlikely there would be a parking shortfall with a reduced supply and campus growth given that Husky Stadium events are typically on weekends or weekday evenings.

The existing on-street temporary game day parking restrictions would remain on weekends under the No Action Alternative, and conditions would be consistent with Chapter 2, Affected Environment. Weekday parking restrictions would continue as they have in the past but would be limited to once a year; 2 out of every 3 years.

[7] Reflects Alternative 1 per the *University of Washington 2018 Seattle Campus Master Plan, Final Transportation Discipline Report*, July 5, 2017

Chapter 4. Impacts of Alternative 1 – Proposed TMP Update

This chapter describes the future transportation conditions for the 2035 horizon year considering the Alternative 1 – Proposed TMP Update, to the Husky Stadium TMP.

Alternative 1 represents the proposed TMP Update with the progressive goal and elimination of required shuttle/additional transit service. The attendance level and time periods evaluated are consistent with the No Action Alternative. Analysis results are compared to the No Action Alternative to identify potential impacts of Alternative 1. Impacts of the TMP for a partial stadium event of approximately 42,000 attendees or less are also discussed.

Transit

Under Alternative 1, the TMP lists the following 10 potential transit strategies associated with Husky Stadium events:

1. Incorporate Sound Transit's event service (i.e. extended service hours, additional trains such as gap trains or more cars during event arrival and departure where feasible) into the annual operations plans.
2. Promote education programs (i.e., information and materials to educate attendees how to access the Stadium by transit) and real-time information tools that offer a range of transit choices, emphasizing links to alternative transportation modes.
3. Provide information and incentives for patrons to try new transit services as they come on-line such as RapidRide and Link light rail extensions.
4. Work with King County Metro, Sound Transit, Community Transit, SDOT (and future transit service providers) to optimize transit operations during peak event periods.
5. Work with partner agencies to improve pedestrian and bicycle access to Link and RapidRide stations.
6. Manage the areas around University of Washington Station for customers to reduce conflicts between pedestrians and bicyclists.
7. Work with the transit agencies to promote and facilitate advance transit ticket sales.
8. Encourage employees who work at Husky Stadium to use non-general-purpose-auto modes of travel.
9. Provide information about ride-match opportunities for stadium event employees.
10. Provide supplemental transit service as necessary to achieve non-auto commute goals. Stage buses proximate to the stadium entrance post-event in order to expedite the egress of attendees from the stadium area.

As a conservative estimate of impacts to the transit system, the transit analysis assumes elimination of all the UW Special Service with the proposed TMP for all time periods; however, the TMP includes a special service transition plan. The transition plan is intended to address how the UW would evaluate changes to Special Service considering the transportation infrastructure improvements surrounding Husky Stadium and with new technology and mode choices. In addition, it considers future investments in the regional transportation system. The TMP provides a framework for how UW Special Service would be transitioned. The annual evaluation of UW Special Service is intended to demonstrate that there would be no significant impacts with the reduction or elimination of UW Special Service.

This supplemental analysis required at the time of the proposed Special Service changes and documented in an annual Operations Plan, will allow the analysis to consider existing data reflecting current transit ridership and service on-line. As outlined in the TMP, the UW Special Service will be evaluated yearly to determine if there are potential Special Service routes that may be eliminated. The elimination of Special Service routes would consider: (1) Special Service routes with lower ridership and/or where service might be considered redundant with other transit service, (2) public transit capacity and operations, and (3) the ability to accommodate potential mode shifts on public transit. The TMP says that if eliminating Special Service will result in not achieving the TMP goals or cause insufficient rider capacity on the public transit service then actions could be taken such as implementing additional TMP measures, working with the transit agencies to explore supplemental transit service, and/or not eliminating the special service. This analysis will be presented to the TMP Technical Advisory Committee as part of the annual operations plan review process. This analysis will demonstrate that no significant impacts are generated by the reduction in special transit service. Additional strategies will be identified if impacts to pedestrian queuing or wait times are identified.

Table 19 provides an example of how Special Service could evolve in the future with additional LINK light rail and RapidRide service. This example of Special Service transition is for illustrative purposes only and the actual elimination or reduction of Special Service will be based on yearly analysis as outlined in the TMP. As noted previously, the changes to Special Service will consider ridership, redundancy with other transit service, transit capacity and operations and the ability to accommodate potential mode shifts.

Table 19. Example of Special Service Transition

UW Special Service Route	Buses[1]	2017 Riders[2]	2018	2019	2020	2021	2022	2023	2024	2025 - 2035	Beyond
Shoreline	14	566				**Special Service Shuttle to Northgate**			**Lynnwood Light Rail**		
Northgate	18	682				**Northgate Light Rail**					
Eastgate	22	1,625						**Bellevue Light Rail**			
Kingsgate / Houghton	20	1,845									
South Kirkland	23	2,168									
South Renton	19	538	**SeaTac/Tukwila Light Rail**					**Bellevue Light Rail**			
Federal Way	28	1,706	**Special Service Shuttle to Angle Lake**						**Federal Way Light Rail**		
Ballard	8	535				**RapidRide**					
Sand Point	5	427							**RapidRide**		
Light Rail Transit & Bus Rapid Transit Opening						*North-gate*			*Redmond, Federal Way and Lynnwood U to U (Bothell) RapidRide*	*Tacoma Dome, West Seattle and Ballard*	
Total	**157**	**10,092**									

Note: This summary is for illustrative purposes, actual transition of Special Service will be based on yearly evaluations and current data. Gray shading indicates discontinued Special Service.
1. Based on bus count from 2017 game versus Washington State University.
2. Ridership based on highest post-game count for 2017.

Screenline Analysis

The screenline analysis for the No Action Alternative and Alternative 1 were compared to identify impacts. The transit analysis assumptions for Alternative 1 are generally consistent with the No Action Alternative The following describes differences in capacity and demand for Alternative 1.

Capacity

Transit capacity for Alternative 1 would be consistent with the No Action Alternative except shuttle service would be eliminated for the weekend condition. As noted in the discussion of the No Action Alternative, there is no shuttle service for weekday games so transit capacity. The elimination of shuttle service would only impact the weekend condition resulting in an approximately 27 percent reduction in capacity in 2019 and an approximately 7 percent reduction in capacity in 2035.

Demand

Appendix A provides an understanding of weekday and weekend transit demand with the Alternative 1 proposed non-auto performance goal. Alternative 1 would result in higher transit demand than both existing and No Action Alternative conditions. The transit mode splits assumed are 36 percent in 2019, 39 percent in 2025, and 43 percent in 2035 for weekday conditions and 33 percent in 2019, 37 percent in 2025, and 41 percent in 2035 for weekend conditions.

Analysis

Appendix E provides the detailed 2019 and 2025 transit analysis. The 2019 weekday and weekend Alternative 1 conditions are anticipated to be consistent with the impacts of the No Action Alternative. For 2025 Alternative 1 weekday conditions, capacity would be exceeded along one additional screenline (pre-event: NE 45th Street west of I-5 eastbound) compared to the No Action Alternative. The number of riders not served within the Alternative 1 weekday peak hour would increase by approximately 200 people for pre-event conditions and 400 people for post-event conditions compared to the No Action Alternative. For the weekend conditions, hourly capacity would be exceeded along three additional screenlines (pre-event: 25th Avenue NE southbound and post-event: SR 520 eastbound and 25th Avenue NE northbound). The number of riders not served within the Alternative 1 weekend peak hour would increase by approximately 160 people for pre-event conditions and 870 people for post-event conditions compared to the No Action Alternative. However, all transit demand is anticipated to be served within a 2-hour period. As noted in the previous section, egress patterns show departures prior to the completion of the game that was observed.

Table 20, Figure 33, and Figure 34 summarize Alternative 1 weekday arrival and departure demand. A comparison to the No Action Alternative is provided in Table 20.

Table 20. 2035 Weekday Peak Hour Pre-Game and Post-Game Transit Screenline Demand & Capacity

Screenline Number	Screenline	Capacity (passengers per hour)		Pre-Game Arrival Demand (passengers per hour)		Post-Game Departure Demand (passengers per hour)	
		No Action	Alternative 1	No Action	Alternative 1	No Action	Alternative 1
1	SR 520 EB	1,920	1,920	995	995	**2,950**	**3,420**
	SR 520 WB	1,920	1,920	**2,415**	**2,770**	965	965
2	Montlake Boulevard NB	660	660	325	380	85	85
	Montlake Boulevard SB	660	660	335	335	660	**730**
3	Light Rail (South of Stadium) NB	12,000	12,000	7,990	8,785	3,900	3,900
	Light Rail (South of Stadium) SB	12,000	12,000	3,900	3,900	9,400	10,475
4	Light Rail (North of Stadium) NB	12,000	12,000	3,900	3,900	6,940	7,570
	Light Rail (North of Stadium) SB	12,000	12,000	6,160	6,630	3,900	3,900
5	Eastlake Avenue NB	1,200	1,200	545	605	250	250
	Eastlake Avenue SB	1,200	1,200	165	165	565	645
6	NE 40th Street EB	720	720	270	305	110	110
	NE 40th Street WB	720	720	195	195	415	460
7	NE 45th Street, West of I-5 EB	540	540	500	**565**	175	175
	NE 45th Street, West of I-5 WB	540	540	445	445	**880**	**970**
8	Roosevelt Way NE SB	540	540	85	85	85	85
9	11th Avenue NE NB	540	540	395	395	395	395
10	15th Avenue NE NB	360	360	190	190	280	300
	15th Avenue NE SB	360	360	155	165	85	85
11	NE 45th Street at Roosevelt Way NE EB	900	900	515	590	165	165
	NE 45th Street at Roosevelt Way NE WB	900	900	465	465	**935**	**1,035**
12	25th Avenue NE NB	540	540	430	430	**900**	**1,000**
	25th Avenue NE SB	540	540	450	525	100	100
13	NE 45th Street East of Mary Gates Drive NE NB	1,500	1,500	495	495	530	540
	NE 45th Street East of Mary Gates Drive NE SB	1,500	1,500	205	215	180	180
14	Light Rail (North of Brooklyn Station) NB	12,000	12,000	3,900	3,900	6,940	7,570
	Light Rail (North of Brooklyn Station) SB	12,000	12,000	6,160	6,630	3,900	3,900

NA = Not applicable, stations and screenlines evaluated in the future and do not exist
Screenlines **Bolded** do not have capacity to meet demand in the single hour and there will be residual demand spilling over to other hours
Appendix A provides background data and analysis spreadsheets supporting the transit screenline analysis.
Does not assume additional trains.

As shown in Table 20, for weekday pre-game arrival conditions demand would exceed capacity at one additional screenline (NE 45th Street, West of I-5 EB) under Alternative 1 conditions compared to the No Action Alternative conditions. During the weekday post-game departure conditions, one additional screenline (Montlake Boulevard SB) exceeds capacity under Alternative 1 conditions compared to the No Action Alternative.

Figure 33. Alternative 1 Weekday Pre-Game Arrival Transit Demand and Capacity

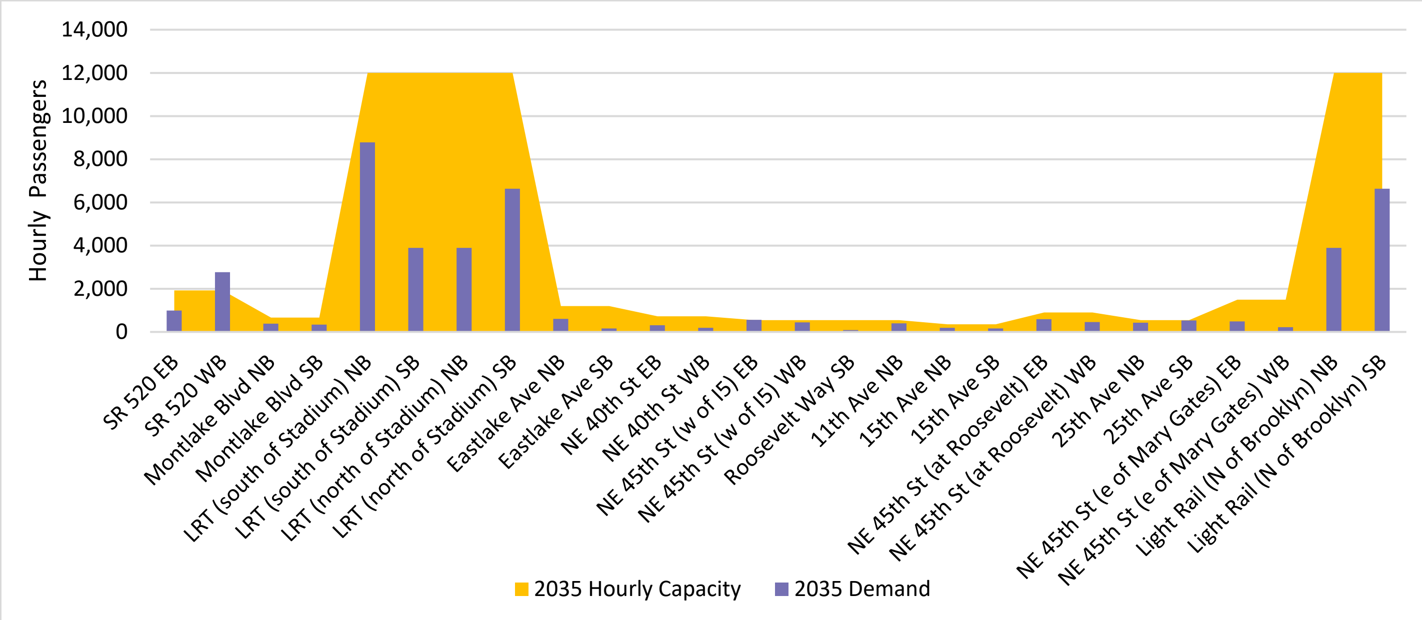


Figure 34. Alternative 1 Weekday Post-Game Departure Transit Demand and Capacity

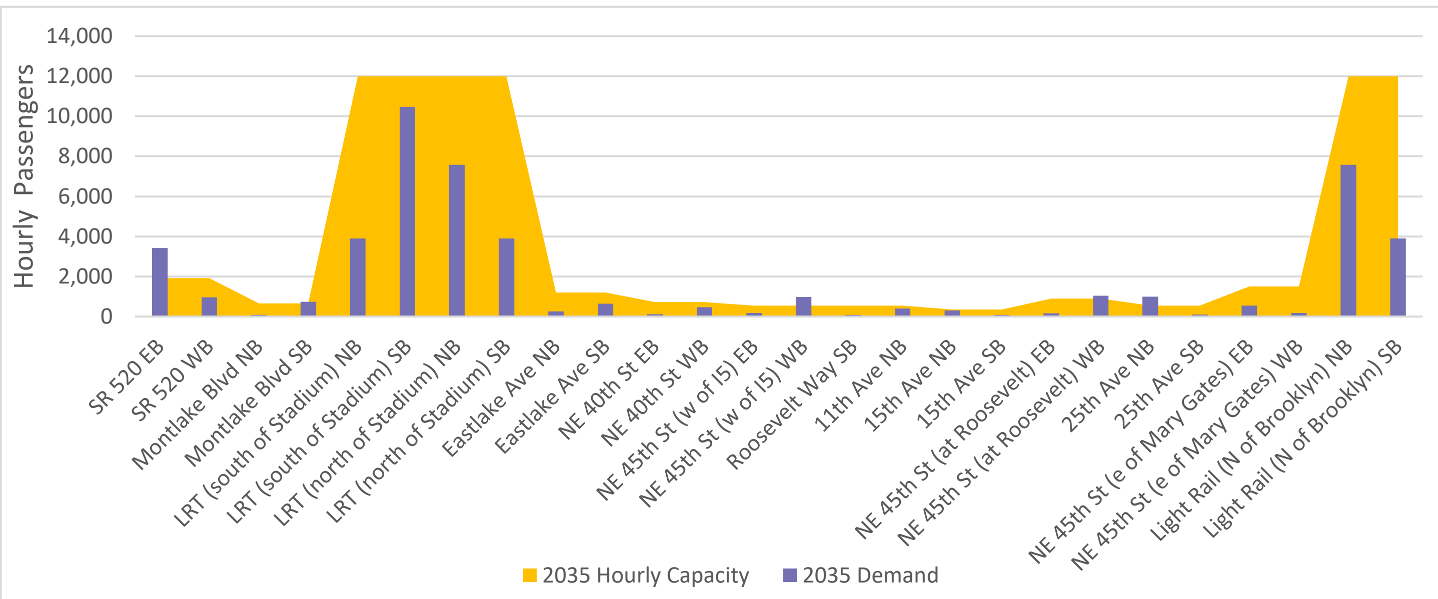


Figure 33 and Figure 34 during the weekday games under Alternative 1 conditions capacity is exceeded at two screenlines for weekday pre-game conditions and three screenlines for weekend post-game conditions. Riders not accommodated results in travel outside the peak hour to meet transit demand consistent with existing conditions. The Alternative 1 analysis shows that for the large events transit riders are served within 2-hours of the pre- and post-event period consistent with the No Action Alternative and existing conditions and other Seattle venues. Delays for transit passengers is an expectation that people have when traveling to these types of events.

Table 21, Figure 35 and Figure 36 summarize Alternative 1 weekday arrival and departure demand. A comparison to the No Action Alternative is provided in Table 21.

Table 21. 2035 Weekend Peak Hour Pre-Game and Post-Game Transit Screenline Demand & Capacity

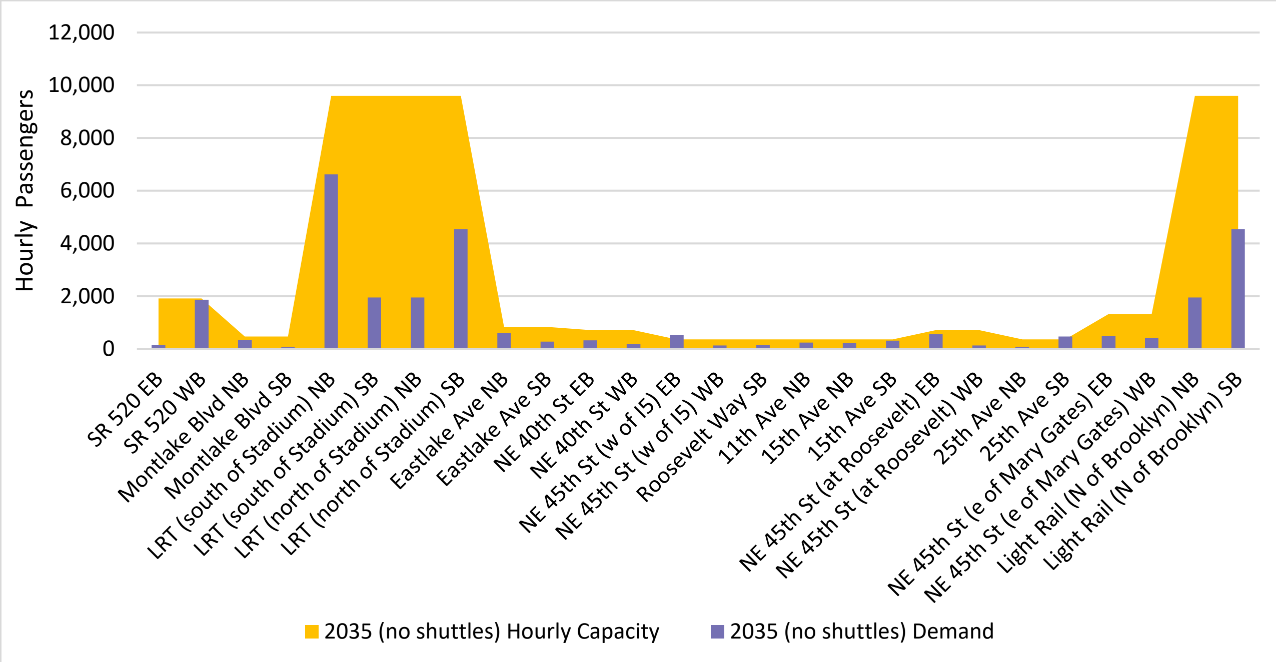
Screenline Number	Screenline	Capacity (passengers per hour)		Pre-Game Arrival Demand (passengers per hour)		Post-Game Departure Demand (passengers per hour)	
		No Action	Alternative 1	No Action	Alternative 1	No Action	Alternative 1
1	SR 520 EB	4,080	1,920	145	145	1,930	**2,445**
	SR 520 WB	4,080	1,920	1,485	1,865	155	155
2	Montlake Boulevard NB	480	480	285	340	60	60
	Montlake Boulevard SB	480	480	85	85	385	460
3	Light Rail (South of Stadium) NB	9,600	9,600	5,755	6,620	1,950	1,950
	Light Rail (South of Stadium) SB	9,600	9,600	1,950	1,950	7,075	8,235
4	Light Rail (North of Stadium) NB	9,600	9,600	1,950	1,950	4,765	5,450
	Light Rail (North of Stadium) SB	9,600	9,600	4,045	4,550	1,950	1,950
5	Eastlake Avenue NB	840	840	545	610	270	270
	Eastlake Avenue SB	840	840	280	280	650	740
6	NE 40th Street EB	720	720	295	330	145	145
	NE 40th Street WB	720	720	180	180	380	430
7	NE 45th Street, West of I-5 EB	360	360	**450**	**520**	150	150
	NE 45th Street, West of I-5 WB	360	360	130	130	**535**	**630**
8	Roosevelt Way NE SB	360	360	150	150	150	150
9	11th Avenue NE NB	360	360	250	250	250	250
10	15th Avenue NE NB	660	360	220	220	305	325
	15th Avenue NE SB	660	360	300	315	235	235
11	NE 45th Street at Roosevelt Way NE EB	720	720	475	555	150	150
	NE 45th Street at Roosevelt Way NE WB	720	720	130	130	565	675
12	25th Avenue NE NB	660	360	90	90	525	**635**
	25th Avenue NE SB	660	360	395	**475**	70	70
13	NE 45th Street East of Mary Gates Drive NE NB	1,320	1,320	485	485	520	525
	NE 45th Street East of Mary Gates Drive NE SB	1,320	1,320	420	425	395	395
14	Light Rail (North of Brooklyn Station) NB	9,600	9,600	1,950	1,950	4,765	5,450
	Light Rail (North of Brooklyn Station) SB	9,600	9,600	4,045	4,550	1,950	1,950

NA = Not applicable, stations and screenlines evaluated in the future and do not exist

Screenlines **Bolded** do not have capacity to meet demand in the single hour and there will be residual demand spilling over to other hours
Appendix A provides background data and analysis spreadsheets supporting the transit screenline analysis.

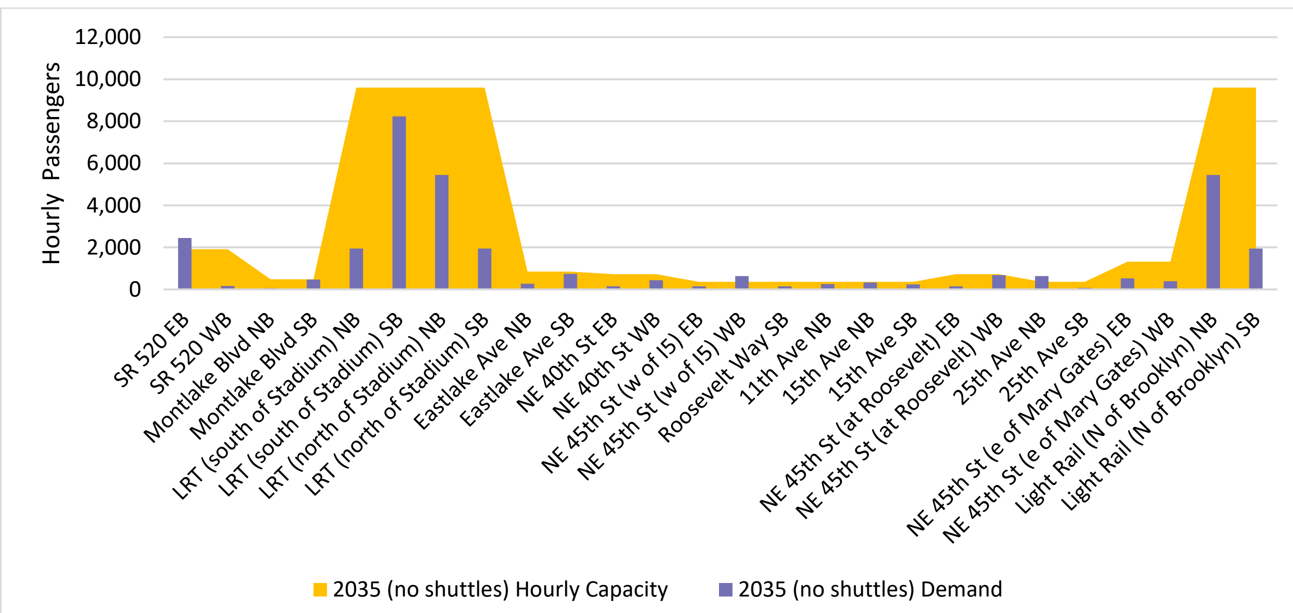
As shown in the table, comparing Alternative 1 to the No Action Alternative, weekend pre-game arrival demand exceeds capacity for one additional screenline. Weekend post-game demand exceeds capacity at 2 additional screenlines under Alternative 1 compared to No Action Alternative conditions.

Figure 35. Alternative 1 Weekend Event Pre-Game Arrivals Transit Demand and Capacity



Note: Assumes no special service.

Figure 36. Alternative 1 Weekend Event Post-Game Departures Transit Demand and Capacity

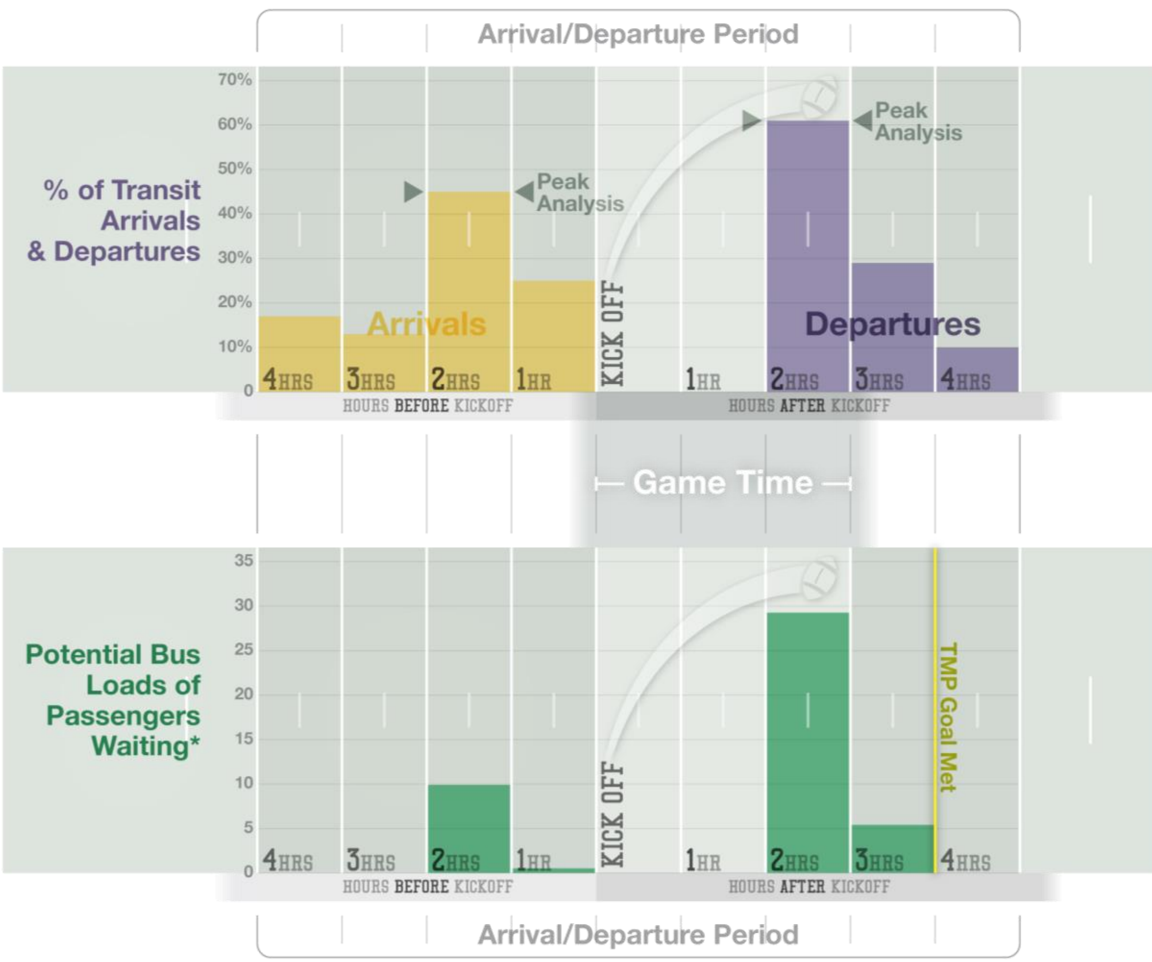


Note: Assumes no special service.

The number of riders not served within the Alternative 1 weekday peak hour would increase by approximately 400 people for pre-event conditions and 800 people for post-event conditions compared to the No Action Alternative. The number of riders not served within the Alternative 1 weekend peak hour would increase by approximately 185 people for pre-event conditions and 900 people for post-event conditions compared to the No Action Alternative.

In comparison to existing conditions, the increase in transit capacity by 2035 would generally result in fewer riders having to wait for transit outside of the peak hour compared to existing conditions. As described previously, riders not accommodated results in travel outside the peak hour to meet transit demand consistent with existing conditions. The analysis of Alternative 1 transit demand for pre- and post-event period is consistent with the No Action Alternative and existing conditions and other Seattle venues. Delays for transit passengers is an expectation that people have when traveling to these types of events. Figure 37 illustrates the arrival and departure of transit riders and the time period where the transit analysis was conducted. As shown in the figure, the post-game transit analysis was conducted 1-hour prior to the end of an average game (i.e., 3-hours) because this is when transit departures are highest. The second portion of Figure 37 shows potential passengers waiting for service in terms of bus loads. The figure illustrates that although passengers are waiting for service during the peak analysis, there would be a substantial decrease in passengers waiting when the game ends (i.e., 3-hours after kick-off) and then 4-hours after kick-off (or 1-hour post-game) there would be no passengers waiting. Alternative 1 would meet the performance goal to return the transit/transportation system to “normal” conditions within 45- to 60-minutes post game.

Figure 37. Alternative 1 2035 Weekday Transit Arrivals and Departures Compared to Potential Passengers Waiting



Note: Game time is an average based on University of Washington football game lengths over the past 10-year period. Percentage of transit arrivals and departures is based Sound Transit observed increase in transit patrons compared to typical use during this period. Potential bus loads are based on a capacity of 90 riders per bus.

For the post-game condition, the analysis assumes 60 percent of the transit users leave the game 1-hour before the game ends based on the Sound Transit data. The transit background ridership is based on the timeframe corresponding to the 1-hour period before the game ends. Background ridership is generally lower during the post-game period because it occurs either on a weekend or late night. The behavior of attendees depends on weather, opponent, game score and various factors that cannot be controlled by Husky Athletics. Annual monitoring will allow for reporting and adjustments to TMP strategies to address any issues relative to varying departure times.

Pedestrians

Under Alternative 1, the TMP lists the following six potential pedestrian improvement strategies associated with Husky Stadium events:

1. Protect and improve upon the pedestrian-oriented Stadium area. Make all transportation choices, policies and improvements supportive of the pedestrian environment and experience.
2. Improve event signage to and from Husky Stadium and transportation destinations, concentrating efforts on directing attendees along key pedestrian routes.
3. Work to enhance the quality and security of pathways adjacent to the Stadium through maintenance of paths, quality lighting, event signage, and other investments.
4. Minimize vehicular traffic in the area around the University of Washington Link Station area at pre- and post-game time.
5. Manage pedestrians in the area around the University of Washington Link Station, including reducing conflicts with other modes and improving efficiency for accessing the station.
6. Work with SDOT, SPD, and UWPD to monitor and control key unsignalized intersections and access to parking to reduce pedestrian/vehicle conflicts at those locations and accommodate high pedestrian flows.
7. Work with Sound Transit and King County Metro to manage pedestrian wait times and queuing within the Husky Stadium plaza and at transit stops.
8. Coordinate with Sound Transit to define pedestrian flow protocols to safely maximize the light rail train capacity.
9. Work with SPD and UWPD to safely manage crowds around the Stadium.

The following measures analyze the quality of pedestrian environment and pedestrian flow volumes under Alternative 1.

Quality of Environment

It is anticipated that the pedestrian environment in the immediate vicinity of Husky Stadium would be the same for Alternative 1 and No Action Alternative. As transit use increases with the expansion of regional Link light rail service, it is likely that the pedestrian plaza would become more congested during post-game conditions as attendees access the University of Washington Station. Alternative 1 provides a strategy to manage pedestrian densities at the top of the station as well as providing pedestrian event signage to key routes to disperse people to their destinations more efficiently.

In addition, as transit expands with services such as RapidRide, pedestrians would disperse through the transportation network to access transit. The surrounding transportation network is well connected with pedestrian facilities to connect people to transit and other modes.

As stated in the Affected Environment and No Action Alternative discussions in Chapter 2 and 3, respectively, pedestrian lighting is present in all areas of the Husky Stadium vicinity. Alternative 1 would not change pedestrian lighting, and no impacts are anticipated.

Pedestrian Flow Analysis

Volumes

The No Action Alternative and Alternative 1 pre-game pedestrian conditions were compared at the seven key pedestrian crossings for the weekday and weekend conditions. The weekend pedestrian volumes are the same from the No Action Alternative and Alternative 1 conditions since the TMP would not change the event attendance levels. Pedestrian volumes associated with a 60,000-person game on a weekday were forecasted based on the proportional increase in pedestrians observed for the weekend game conditions. Additional pedestrian volumes due to increased transit service between the baseline 2019 analysis year and the No Action Alternative 2035 conditions were added to the Montlake Boulevard crossing locations and distributed based on existing travel patterns. Table 22 provides a comparison of 2035 No Action Alternative and Alternative 1 weekday and weekend pre-game pedestrian traffic volumes for the four study locations serving Husky Stadium.

Table 22. Comparison of 2035 Alternatives Pedestrian Volumes

Pedestrian Crossing Location	No Action Weekday Event[1] (people per hour)	Alternative 1 Weekday Event (people per hour)	No Action Weekend Event[2] (people per hour)	Alternative 1 Weekend Event[3] (people per hour)
Pre-Game				
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or Hec Ed bridge	3,668	4,321	3,599	4,106
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	4,108	4,739	6,241	7,119
Husky Stadium Pedestrian Bridge	5,658	6,464	4,000	4,562
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	1,721	1,966	2,454	2,799
Post-Game				
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or Hec Ed bridge	No data available.		2,642	3,156
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	No data available.		5,070	6,057
Husky Stadium Pedestrian Bridge	No data available.		3,374	4,030
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	No data available.		2,336	2,790

1. Estimated based on Thursday, October 12, 2017 weekday PM peak hour counts.
2. Estimated based on Saturday, October 7, 2017, game vs. University of California-Berkeley, 7:45 p.m. start.
3. Assumes 60,000 attendees.

In addition to the pedestrian levels shown in Table 22, it is anticipated that there would be additional background pedestrian volumes due to increased transit service by 2035 conditions. The additional pedestrian volumes from transit were added to the Montlake Boulevard crossing locations. The additional volumes represent a conservative estimate of additional pedestrians crossing Montlake Boulevard associated with increased bus transit ridership, as additional light rail riders would not need to cross Montlake Boulevard from the below-ground Husky Stadium Station. These estimates are conservative as pedestrians added to the crossing locations may also cross Montlake Boulevard at additional locations north of the stadium, but all were assumed to cross at the four locations listed above and distributed based on existing travel patterns. Also, it was assumed that all additional transit riders associated with the increased non-auto mode split goal would cross Montlake Boulevard at these four studied locations.

Crossing Analysis

As described in Chapter 2, Affected Environment, the maximum saturation flow along the Montlake Boulevard screenline would be 158,475 people per hour, representing maximum LOS E conditions. Table 23 summarizes the pedestrian volumes anticipated using all facilities along Montlake Boulevard.

Table 23. 2035 Alternative 1 Montlake Boulevard Pedestrian Volumes and Level of Service

	Weekday Event[1]			Weekend Event[2]		
Pedestrian Crossing Location	**Pedestrian Count (People per hour)**	**Capacity (People per hour)**	**LOS**	**Pedestrian Count (People per hour)**	**Capacity (People per hour)**	**LOS**
Pre-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge	4,321	< 36,000	A	4,106	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)	4,739	< 6,600	E	7,119	< 6,600	F
Husky Stadium Pedestrian Bridge	6,464	< 99,000	A	4,562	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)	1,966	< 16,875	A	2,799	< 16,875	A
Pre-Game Total	**15,155**	**< 158,475**	**A**	**18,586**	**< 158,475**	**A**
Post-Game						
Snohomish Lane Pedestrian Bridge (at Alaska Airlines Arena) or “Hec Ed” bridge		No data available.		3,156	< 36,000	A
NE Pacific Place/Montlake Boulevard intersection (south approach leg)		No data available.		6,057	< 6,600	E
Husky Stadium Pedestrian Bridge		No data available.		4,030	< 99,000	A
NE Pacific Street/Montlake Boulevard intersection (north approach leg)		No data available.		2,790	< 16,875	A
Post-Game Total				**16,033**	**< 158,475**	**A**

1. Based on counts from Friday, September 30, 2016, football game vs. Stanford University, 6:00 p.m. start.
2. Based on counts from Saturday, October 7, 2017, football game vs. University of California-Berkeley, 7:45 p.m. start.

As shown in Table 23, pedestrian volumes at all 2035 weekday and weekend event scenarios are well below the capacity of 158,475 people per hour. All locations are anticipated to operate at LOS A conditions with the exception of the south approach leg of the Montlake Boulevard/NE Pacific Place intersection, which operates at LOS F under weekend event pre-game conditions and LOS E under weekday pre-game and weekend post-game conditions. It is anticipated that as this crossing becomes crowded, pedestrians would utilize nearby crossing locations, as other crossings in the area operate well with additional capacity remaining. Overall, the total pedestrian count is well under total capacity levels for the crossing locations analyzed. There would be no pedestrian volume impacts with Alternative 1. As part of the annual operations included in the proposed TMP, wayfinding could be provided to help direct pedestrians away from the Montlake Boulevard/NE Pacific Place south approach crossing to other crossings with available capacity.

Bicycles

Under Alternative 1, the TMP lists the following seven potential bicycle improvement strategies associated with Husky Stadium events:

1. Through signage and advance information, direct cyclists to parking at key intercept locations. This includes bike share users to reduce bicycle conflicts with other modes in the immediate vicinity of the stadium.

2. Provide at least one bicycle valet parking location per large event.
3. Work with bike share providers to manage flow and supply during events.
4. Enhance bicycle parking at strategic locations by providing fixed covered, locker, or cage parking and/or provide temporary bicycle parking during game days through mobile or stationary bicycle facilities.
5. Provide open source event information that can be integrated with bike share apps to provide real-time information and historic data (as available from bike share providers) to those traveling to and from Husky Stadium events.
6. Proactively intercept and manage the bike share users prior to the primary stadium and Link station plaza area to collect and redistribute the bike share bikes to locations away from the core plaza area.
7. Offer incentives for employees to bicycle to work, such as bike-share membership or free bike share trip codes.

Quality of Environment

It is anticipated that the bicycle environment under Alternative 1's proposed TMP strategies would focus on intercepting bicyclists at more locations to minimize conflicts with other modes that are currently occurring and would continue to occur with the No Action Alternative. The bike valet would continue to be provided to help promote biking to the game. In addition, bike share would be proactively managed and intercepted to minimize conflicts within Husky Stadium and University of Washington Station. There would be no bicycle impacts with Alternative 1.

Vehicles

Under Alternative 1, the TMP lists the following four potential vehicle improvement strategies associated with Husky Stadium events:

1. Provide a broad communication and outreach campaign in advance of events to deter Single Occupancy Vehicle (SOV) travel and encourage use of non-auto modes by both attendees and the general campus community.
2. Accommodate routes for freight and emergency services to access UW and Seattle Children's hospitals.
3. Coordinate with SDOT on the use of dynamic message signs to route vehicles to parking and facilitate egress from the stadium area.
4. Work with SDOT, SPD and UWPD to develop annual plans for intersection control and road closures to direct vehicles in and out of the stadium area.
5. Set parking pricing to incentive higher occupancy vehicles.

Traffic Volumes

Traffic volumes for Alternative 1 would include forecast 2035 volumes adjusted for future mode split goals under the proposed TMP. Future 2035 non-auto mode split goals include a 62 percent non-auto mode split for a weekend event scenario and a 67 percent non-auto mode split for a weekday event scenario. Alternative 1 weekday game day forecasts were determined using the forecast methodology described under the No Action Alternative and are based on counts at four study intersections collected during the September 30, 2016 Friday evening UW versus Stanford University game. The Alternative 1 weekend forecasts are the same as the No Action forecasts but reflect a higher non-auto mode split goal of 62 percent at one year following the opening of the Everett Link light rail extension. These weekday forecasts and weekend traffic volumes are provided in Appendix B.

Traffic Operations

Table 24 summarizes the intersection operations for the Alternative 1 weekday and weekend conditions. Detailed LOS worksheets for each intersection analyzed are included in Appendix D.

Table 24. Comparison of 2035 PM Peak Hour Intersection LOS Summary

Intersection	Traffic Control	Weekday Event PM Peak Hour (67% Non-Auto Mode Split Goal)			Weekend Event Evening Peak Hour (62% Non-Auto Mode Split Goal)		
		LOS	Delay	WM	LOS	Delay	WM
1. 25th Avenue NE/NE 55th Street	Signal	-	-	-	B	16	-
2. 5th Avenue NE/NE 45th Street	Signal	-	-	-	D	37	-
3. 7th Avenue NE/NE 45th Street[4]	Signal	-	-	-	F	137	-
4. 15th Avenue NE/NE 45th Street	Signal	C	35	-	C	25	-
5. Union Bay Place/NE 45th Place/ Mary Gates Memorial Drive NE/NE 45th Street[4]	Signal	-	-	-	F	87	-
6. Montlake Boulevard NE/NE 45th Street[4]	Signal	-	-	-	C	26	-
7. 25th Avenue NE/NE 44th Street/Pend Oreille Road NE	Signal	D	35	-	D	45	-
8. Montlake Boulevard NE/NE 44th Street[4]	Signal	-	-	-	A	8	-
9. Montlake Boulevard NE/25th Avenue NE[4]	Signal	-	-	-	B	19	-
10. Montlake Boulevard NE/Wahkiakum Road	Side-Street Stop	-	-	-	C	19	WB
11. Montlake Boulevard NE/IMA Exit	Side-Street Stop	-	-	-	F	80	WB
12. Montlake Boulevard NE/IMA Entrance	Side-Street Stop	-	-	-	C	20	SBL
13. Montlake Boulevard NE/NE Pacific Place[4]	Signal	E	74	-	C	27	-
14. Montlake Boulevard NE/NE Pacific Street[4]	Signal	E	72	-	D	39	-
15. Montlake Boulevard NE/SR 520 WB Ramps[4]	Signal	-	-	-	C	20	-
16. Montlake Boulevard NE/SR 520 EB Ramps/E Lake Washington Boulevard[4]	Signal	-	-	-	C	23	-

Note: Signal timing splits were optimized for all future 2035 analysis scenarios.
1. Level of Service (A – F) as defined by the 2010 *Highway Capacity Manual* (HCM), Transportation Research Board unless otherwise noted.
2. Average delay per vehicle in seconds.
3. MW = Worst movement, which are reported for unsignalized intersections where WB = westbound approach, SBL = southbound left-turn movement.
4. Evaluated in HCM 2000. HCM 2010 methodology does not support more than four approaches or non-standard phasing.

As shown in Table 24, under Alternative 1 for the weekend conditions no additional impacts are anticipated in comparison to the weekend No Action Alternative, since intersection operations would reflect a higher non-auto mode split goal under the proposed TMP. Under Alternative 1 for the weekday event conditions, two of the four intersections evaluated are anticipated to operate at LOS E, improving from LOS F under the No Action Alternative conditions. Alternative 1 weekday event conditions reflect a 2035 non-auto mode split goal of 67 percent.

This intersection operations analysis does not adjust for the Alternative 1 TMP strategies; however, the strategies aim to minimize the impacts of a game by providing communication to decrease background traffic in the area through encouraging use of non-auto modes.

Post-game impacts to the study intersections are anticipated to be less since background traffic volumes would be less. In addition, one of the goals of the TMP is for the post-game activity to subside 45 to 60 minutes after the game. ITS infrastructure would assist in optimizing the transportation system and facilitate the egress.

Transportation Network Companies (TNC)

Under Alternative 1, the TMP lists the following five potential shared-use transportation strategies associated with Husky Stadium events:

1. Support the expansion of higher occupancy mobility options for TNCs (such as Uber Pool), through preferred pick-up/drop-off locations.
2. Define methods for appropriately managing TNCs such as implementing geofencing technology or “venues” functions.
3. Designate pick-up and drop-off locations away from the activity center to reduce conflicts with pedestrians and vehicles. Specific locations will be reviewed annually, and any changes will be outlined in the operations plan.
4. Designate staging area(s) if pickup and drop-off locations are not able to accommodate demands.
5. Implement temporary wayfinding to direct event attendees to the designated areas, via routes that are designed to accommodate the pedestrian flows.
6. Work with car-share companies to identify designated parking areas to accommodate vehicles.

No significant differences in the TMP strategies for weekday or weekend games are anticipated. Although overall TNC activity may expand under future conditions, with the increase in higher capacity vehicles such as Uber Pool and Lyft Line, overall TNC vehicle trips would not increase. The University of Washington would monitor TNC activity and work to manage impacts during events.

Emergency Service

Alternative 1 would increase the frequency of events associated with Husky Stadium; therefore, there could be the potential for additional impacts to emergency services. UW Athletics would continue to alert the nearby facilities of Husky Stadium events with Alternative 1. Initially, manual traffic control would likely continue to be provided at key locations to facilitate ingress and egress and minimize impacts on the surrounding street system; however, as the City implements ITS infrastructure, this could replace manual control.

Freight Routing

Alternative 1 would increase the frequency of events with Husky Stadium; therefore, impacts to freight could increase. Communication would continue to be provided for game days such that non-essential freight deliveries within the study area could be avoided on game days and freight travelling through the study area could be re-routed. For freight delivery within the study area that must occur on game days and cannot avoid pre-game or post-game conditions, traffic control would be provided, or ITS infrastructure would be available at key locations to facilitate vehicle ingress and egress in the Stadium vicinity.

There would be no adverse impacts with Alternative 1.

Parking

Under Alternative 1, the TMP lists the following four potential parking management improvement strategies associated with Husky Stadium events:

1. Monitor carpool user rates and change the rates as needed to incentivize more riders per vehicle.
2. Develop designated carpool parking areas with closer access to the stadium to incentivize that mode choice.
3. Set parking prices to incentivize transit use.

4. Continue to monitor available parking as new academic development occurs on campus. Campus parking should be maximized, and tailgating areas adjusted as necessary to prevent parking spillover into the neighborhoods.
5. Work with off-site parking providers with surplus capacity (e.g. SeaTac Airport) adjacent to transit stations to provide information to fans about convenient and competitive parking options.
6. Continue to explore alternatives to tailgating that do not require a personal vehicle.
7. Provide open source real-time parking information related to events for application developers.

With the Alternative 1 TMP strategies and the goal to increase non-auto trips, it is anticipated that parking demand would be less than the No Action Alternative during both the weekday and weekend conditions. It is anticipated as parking demand increases a higher percentage of parking demand would be accommodated within the campus parking infrastructure.

The existing on-street temporary game day parking restrictions would remain under Alternative 1, and impacts would be consistent with the No Action Alternative.

There would be no adverse parking impacts requiring mitigation with Alternative 1.

15,000 to 42,000-Attendee Event

As noted in the introduction to the TDR, the proposed TMP defines large events as attendance greater than 42,000 attendees and small events as less than or equal to 42,000 attendees. The primary alternatives impact analysis considers a large event with 60,000 people. With a decrease in event size, the transportation impacts identified in this document would be similar to or less than disclosed in the primary analysis of larger events.

TMP Performance Goal

The TMP performance goal would apply to the smaller events (15,000 to 42,000-attendees) as well as the larger events. As describe in Chapter 1, the goals for non-football University and non-UW events were assumed to be consistent with football events for higher attendance levels (i.e., greater than 42,000). For University (non-football) and non-UW events, a lower goal is proposed for events with 15,000 to 24,000 and 24,000 to 42,000-attendees. The goal for events of these sizes has been set such that the median size events (19,000 and 33,000 attendees) has pre-event auto trips no greater than a 60,000-attendee football game under the existing TMP. Therefore, impacts relative to these two events sizes would be no greater than the No Action Alternative pre-event condition.

Transit

A smaller event would create a lesser pre-event demand on the transit system then evaluated in this EIS for the larger event (see Chapter 1 Table 4 for estimated non-auto trip generation and Appendix A for detailed transit trip generation). A review of the screenlines shows that with the lower expectation for transit use, transit is adequate transit capacity under 2019, 2025 and 2035 conditions to accommodate pre-event arrivals for smaller non-UW event. Post event conditions for non-UW event may result in a higher surge of departures than typical for a football game. An analysis of the transit screenlines for the post event conditions shows that with the anticipated future transit infrastructure and the surge in departures, there could be 2- to 3- routes where demand would take 1- to 2-hours to serve rather than 1-hour after the event.

Planning for the smaller event will rely on the nature of the event and the likely travel patterns for the event attendees. Given the size and frequency of these events and considering the results of the analysis for the smaller events, no supplemental service is anticipated to be required during the pre-event condition. The event specific operations plan would need to consider whether supplemental service such as longer trains or gap trains or other TMP strategies would be needed to support the post event condition. With additional TMP strategies and no supplemental service, effects to Montlake Boulevard due to staging of buses would not occur.

Pedestrian

The screenline analysis conducted for the larger event did not identify any capacity issues within the pedestrian system surrounding the Stadium. Signalized or grade-separated crossings provide connections to areas west of the Stadium. Sidewalks are provided north and south of the stadium on 25th Avenue NE. Given the reduction in pedestrians associated with the smaller event ranges noted, no additional mitigation measures are necessary.

Bicycles

Strategies identified for the larger event should be considered for the smaller events. This includes elements such as the bicycle parking as well as the additional coordination with the bike share programs to manage the bicycle parking in the plaza area outside of Husky Stadium.

Vehicles

As described in Chapter 1, a review of median size events at 19,000 and 33,000-attendees results in fewer auto trips in the pre-event condition compared to the No Action Alternative. As noted previously, the goal for these events was set such that the pre-event vehicular impact would be no greater than a 60,000-attendee football game under the existing TMP. The post-event condition would generate higher vehicular traffic than a football game because the percent of attendees departing at one time is higher. It is anticipated that post-event conditions would occur outside of the peak hours when background traffic is limited. The traffic would be managed to meet the clearance time performance goals.

Elements such as traffic control are expected to be in place, but the area under the control of SPD or UWPD could be less depending on the event size. This operational detail will be coordinated with UWPD and SPD in advance of an event.

Parking

Overall parking demands associated with the event would be less than that evaluated for the larger event. On-campus parking will be managed by UW Transportation Services regardless of the event size. Strategies such as carpool parking prices would be in effect for events within the ranges identified.

Chapter 5. Secondary and Cumulative Impacts

Secondary and cumulative impacts on the area transportation system are included in the analysis of direct impacts in Chapters 3 and 4. The analysis considers up to 60,000 people, which is representative of an 85th-percentile attendance level based on the 2013-2017 Husky Football seasons. This represents the attendance level such that only 15 percent of the games (or five games) in the last five seasons had higher attendance. The maximum attendance level in the last five seasons was 63,733 people or only 6 percent higher than evaluated as part of the Alternatives analysis. This increase in attendance is not anticipated to result in additional transportation impacts. If necessary, mitigation for other larger or less frequent non-football events would be addressed through the annual operational plan.

Chapter 6. Mitigation

The alternatives analysis finds there would be no adverse transportation system impacts requiring additional mitigation under the proposed TMP Update. The TMP incorporates the annual operations plan that would address specific TMP measures for managing event demands related to football, non-football UW events and non-UW events.

The analysis demonstrates that there is sufficient capacity in the public transit system to accommodate the projected increase in ridership within 60-minutes of the event end that has similar characteristics to football. The duration to “clear” an event is similar between the No Action and Alternative 1 scenarios. The analysis shows that the peak demand can be accommodated within 2 hours from when the egress from the stadium starts. For non-football events that may have higher post-event surges, additional TMP strategies may be needed to accommodate transit demands. However, the frequency of these events is low. The specific strategies would be determined based on the anticipated attendance of the event. These strategies would be implemented as part of the annual operations plan. Impacts in other areas such as area congestion and neighborhood parking would be less with the proposed TMP, as it identifies more aggressive non-auto vehicle goals.

The pedestrian analysis indicates that the Montlake Boulevard/NE Pacific Place crossing would be more crowded than other crossings. As part of the annual operations plan, wayfinding could be provided to help direct pedestrians away from the Montlake Boulevard/NE Pacific Place south approach crossing to other crossings with available capacity.

To respond to ongoing changes in the transportation system in the coming years, the UW Athletics will monitor and report on achievement of the TMP goals through the preparation of annual report. This annual report will include attendee surveys to determine performance on the TMP goals, additional data will be collected to evaluate the effectiveness of the TMP/Annual Operations Plan and provide information on revisions to the plan for the following year. Additional data will be collected that includes time to clear the Stadium plaza, pedestrian queuing at near-by transit stops, game day ridership, TNC vehicle counts, observed operational issues, and post-event traffic volumes. In addition, the University will prepare an annual operations plan identifying the specific operational elements of the TMP. The operations plan will address TMP strategies to achieve the performance goals outlined in this TMP considering the results of the previous year’s intercept survey and observed operations, the football season schedule, and changes to the background transportation infrastructure or service. This plan will be drafted by the UW Athletics in coordination with representatives from the area transportation and public safety agencies. The Operations Plan will be provided to the Stadium TMP Technical Advisory Group for review and comment. Elements addressed in the annual Operations Plan include the following:

- Traffic control locations
- Transit operations plan including loading/unloading areas and layover areas on-campus
- Game day operations staff on the plaza to facilitate access to transit and other modes
- Community communication plan
- Parking management
- Bicycle management (including bike valet location(s) and bike share management)
- TNC management
- Husky Harbor management
- Plaza (Stadium/Link Station area) management strategies for all modes

As part of the transition from the existing special service that is anticipated to occur as regional transit improvements come on-line, the UW will complete additional analysis identifying the proposed changes to the special service levels and confirming that no significant impacts are anticipated related to this change. Evaluation of Special Service routes will consider: (1) Special Service routes with lower ridership and/or where service might be considered redundant with other transit service, (2) public transit capacity and operations, and (3) the ability to accommodate potential mode shifts on public transit. The TMP advisory committee will be provided with this additional analysis through the review process for the annual operations plan.

Chapter 7. Significant and Unavoidable Adverse Impacts

Events at Husky Stadium have significant and unavoidable short-term adverse effects on the transportation system on game days and cause temporary increases in travel demands; however, these increases would not be a result of the proposed TMP. The proposed TMP eliminates a requirement to operate a large network of special service from area park-and-rides. Instead the transit capacity analyses show that there is sufficient capacity through the LRT, RapidRide, and regular transit service to accommodate the event traffic. The analysis shows a short period of higher congestion on those routes within a 2-hour period of the event start and a 2-hour period following the primary egress of the event.

Appendix A: Trip Generation

Trip Generation for Football and Events with >42,000 Attendees

Existing Conditions

	Attendance[1]	Car/RV AVO[1]	TNC AVO[2]	Estimated Percent[3] Pre-Game Arrival	Post-Game Departure
2016 Weekday	63,733	3.0	2.0	45%	60%
2017 Weekend	52,777	3.1	2.1	45%	60%

Notes: AVO = average vehicle occupancy and TNC = transportation network companies (i.e., Uber, Lyft)
1. Based on 2016 Mode Split data collection during Standford game on September 30, 2016 for weekday conditions and *University of Washington Stadium Expansion Parking Plan Transportation Management Report – 2017 Report* with data from the Cal game on October 7, 2017 for the weekend conditions.
2 No AVO was collected for TNC. The evaluation assumes that the AVO is consistent with the car/RV survey data less the driver.
3. Assumed based on a review of ticket scans and Sound Transit Link light rail ridership and a review of other stadium/venues in Seattle.

Future Attendance Assumed 60,000 (85th-percentile attendance level)

Performance Goal

Timing	Non-Auto Mode Split Weekday	Weekend
2019 (anticipated year of updated TMP implementation)	61%	52%
1-Year Following Opening of Northgate Link light rail Transit (estimated opening 2021)	63%	54%
1-Year Following Opening of Lynnwood Link light rail Transit (estimated opening 2024)	65%	58%
1-Year Following Opening of Everett Link light rail Transit (estimated opening 2035)	67%	62%

Note: Non-Auto = transit, pedestrian, bike, boat, and other

Husky Stadium Estimate Trip Generation

		Weekday					Weekend				
			Person	Total	Peak Hour Trips[3]		Mode	Person	Total	Peak Hour Trips[3]	
Time Period	**Mode**	**Mode Split[1]**	**Trips**	**Auto Trips[2]**	**Pre-Event**	**Post-Event**	**Split[1]**	**Trips**	**Auto Trips[2]**	**Pre-Event**	**Post-Event**
Existing	Transit	34.7%	22,100		9,945	13,260	36.6%	19,300		8,685	11,580
	Pedestrian	23.1%	14,700		6,615	8,820	15.5%	8,200		3,690	4,920
	Bike	0.7%	400		180	240	1.3%	700		315	420
	Boat/Other	4.4%	2,800		1,260	1,680	4.7%	2,500		1,125	1,500
	Total Non-Auto	**63%**	**40,000**		**18,000**	**24,000**	**58%**	**30,700**		**13,815**	**18,420**
	Car/RV	31.0%	19,700	6,600	2,970	3,960	32.6%	17,200	5,500	2,475	3,300
	TNC	6.1%	3,900	2,000	900	1,200	9.3%	4,900	2,300	1,035	1,380
	Total Auto	**37%**	**23,600**	**8,600**	**3,870**	**5,160**	**42%**	**22,100**	**7,800**	**3,510**	**4,680**
	Total	**100%**	**63,600**	**8,600**	**21,870**	**29,160**	**100%**	**52,800**	**7,800**	**17,325**	**23,100**
No Action Alternative	Transit	36%	21,600		9,720	12,960	33%	19,800		8,910	11,880
	Pedestrian	20%	12,000		5,400	7,200	14%	8,400		3,780	5,040
	Bike	1%	600		270	360	1%	600		270	360
	Boat/Other	4%	2,400		1,080	1,440	4%	2,400		1,080	1,440
	Total Non-Auto	**61%**	**36,600**		**16,470**	**21,960**	**52%**	**31,200**		**14,040**	**18,720**
	Car/RV	33%	19,800	6,600	2,970	3,960	37%	22,200	7,200	3,240	4,320
	TNC	6%	3,600	1,800	810	1,080	11%	6,600	3,100	1,395	1,860
	Total Auto	**39%**	**23,400**	**8,400**	**3,780**	**5,040**	**48%**	**28,800**	**10,300**	**4,635**	**6,180**
	Total	**100%**	**60,000**	**8,400**	**20,250**	**27,000**	**100%**	**60,000**	**10,300**	**18,675**	**24,900**
Alternative 1 - 2019	Transit	36%	21,600		9,720	12,960	33%	19,800		8,910	11,880
	Pedestrian	20%	12,000		5,400	7,200	14%	8,400		3,780	5,040
	Bike	1%	600		270	360	1%	600		270	360
	Boat/Other	4%	2,400		1,080	1,440	4%	2,400		1,080	1,440
	Total Non-Auto	**61%**	**36,600**		**16,470**	**21,960**	**52%**	**31,200**		**14,040**	**18,720**
	Car/RV	33%	19,800	6,600	2,970	3,960	37%	22,200	7,200	3,240	4,320
	TNC	6%	3,600	1,800	810	1,080	11%	6,600	3,100	1,395	1,860
	Total Auto	**39%**	**23,400**	**8,400**	**3,780**	**5,040**	**48%**	**28,800**	**10,300**	**4,635**	**6,180**
	Total	**100%**	**60,000**	**8,400**	**20,250**	**27,000**	**100%**	**60,000**	**10,300**	**18,675**	**24,900**
Alternative 1: 1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Transit	37%	22,200		9,990	13,320	35%	21,000		9,450	12,600
	Pedestrian	21%	12,600		5,670	7,560	14%	8,400		3,780	5,040
	Bike	1%	600		270	360	1%	600		270	360
	Boat/Other	4%	2,400		1,080	1,440	4%	2,400		1,080	1,440
	Total Non-Auto	**63%**	**37,800**		**17,010**	**22,680**	**54%**	**32,400**		**14,580**	**19,440**
	Car/RV	31%	18,600	6,200	2,790	3,720	36%	21,600	7,000	3,150	4,200
	TNC	6%	3,600	1,800	810	1,080	10%	6,000	2,900	1,305	1,740
	Total Auto	**37%**	**22,200**	**8,000**	**3,600**	**4,800**	**46%**	**27,600**	**9,900**	**4,455**	**5,940**
	Total	**100%**	**60,000**	**8,000**	**20,610**	**27,480**	**100%**	**60,000**	**9,900**	**19,035**	**25,380**

Husky Stadium Estimate Trip Generation

		Weekday					Weekend				
Time Period	**Mode**	**Mode Split[1]**	**Person Trips**	**Total Auto Trips[2]**	**Peak Hour Trips[3] Pre-Event**	**Peak Hour Trips[3] Post-Event**	**Mode Split[1]**	**Person Trips**	**Total Auto Trips[2]**	**Peak Hour Trips[3] Pre-Event**	**Peak Hour Trips[3] Post-Event**
Alternative 1: 1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Transit	39%	23,400		10,530	14,040	37%	22,200		9,990	13,320
	Pedestrian	21%	12,600		5,670	7,560	15%	9,000		4,050	5,400
	Bike	1%	600		270	360	1%	600		270	360
	Boat/Other	4%	2,400		1,080	1,440	5%	3,000		1,350	1,800
	Total Non-Auto	**65%**	**39,000**		**17,550**	**23,400**	**58%**	**34,800**		**15,660**	**20,880**
	Car/RV	29%	17,400	5,800	2,610	3,480	33%	19,800	6,400	2,880	3,840
	TNC	6%	3,600	1,800	810	1,080	9%	5,400	2,600	1,170	1,560
	Total Auto	**35%**	**21,000**	**7,600**	**3,420**	**4,560**	**42%**	**25,200**	**9,000**	**4,050**	**5,400**
	Total	**100%**	**60,000**	**7,600**	**20,970**	**27,960**	**100%**	**60,000**	**9,000**	**19,710**	**26,280**
Alternative 1: 1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Transit	43%	25,800		11,610	15,480	41%	24,600		11,070	14,760
	Pedestrian	20%	12,000		5,400	7,200	15%	9,000		4,050	5,400
	Bike	1%	600		270	360	1%	600		270	360
	Boat/Other	3%	1,800		810	1,080	5%	3,000		1,350	1,800
	Total Non-Auto	**67%**	**40,200**		**18,090**	**24,120**	**62%**	**37,200**		**16,740**	**22,320**
	Car/RV	28%	16,800	5,600	2,520	3,360	30%	18,000	5,800	2,610	3,480
	TNC	5%	3,000	1,500	675	900	8%	4,800	2,300	1,035	1,380
	Total Auto	**33%**	**19,800**	**7,100**	**3,195**	**4,260**	**38%**	**22,800**	**8,100**	**3,645**	**4,860**
	Total	**100%**	**60,000**	**7,100**	**21,285**	**28,380**	**100%**	**60,000**	**8,100**	**20,385**	**27,180**

1. Existing conditions based on 2016 Mode Split data collection during Standford game on September 30, 2016 for weekday conditions and *University of Washington Stadium Expansion Parking Plan Transportation Management Report – 2017 Report* with data from the Cal game on October 7, 2017 for the weekend conditions.
2. Auto trips are based on application of existing average vehicle occupancy (AVO).
3. Peak hour trips represent vehicle demands for Car/RV and TNC. Trips are based on application of estimated arrival and departure percentages.

Trip Generation for Non-Football UW-Events & Non-UW Events - 15,000 - 24,000 Attendees

Key Assumptions

			Estimated Percent[1]	
	Car AVO[1]	TNC AVO[2]	Pre-Event Arrival	Post-Event Departure
	2.4	2	50%	95%
	2.4	2	50%	95%

Notes: AVO = average vehicle occupancy and TNC = transportation network companies (i.e., Uber, Lyft)
1. There is no existing data for non-football events at Husky Stadium. The assumptions are based on data collected at two KeyArena concerts as part of the *Seattle Center Arena Renovation Project Draft Environmental Impact Statement*, April 2018.
2 No AVO was collected for TNC. The evaluation assumes that the AVO is consistent with the car AVO.

Future Attendance Assumed 19,000 (median event size)

Performance Goal	Non-Auto Mode Split	
Timing	**Weekday**	**Weekend**
2019 (anticipated year of updated TMP implementation)	35%	30%
1-Year Following Opening of Northgate Link light rail Transit (estimated opening 2021)	37%	32%
1-Year Following Opening of Lynnwood Link light rail Transit (estimated opening 2024)	39%	34%
1-Year Following Opening of Everett Link light rail Transit (estimated opening 2035)	41%	36%

Note: Non-Auto = transit, pedestrian, bike, boat, and other

Trip Generation Summary

Time Period	Mode	Weekday					Weekend				
		Mode Split[1]	Person Trips	Total Auto Trips[1]	Peak Hour Trips[2] Pre-Event	Peak Hour Trips[2] Post-Event	Mode Split[1]	Person Trips	Total Auto Trips[1]	Peak Hour Trips[2] Pre-Event	Peak Hour Trips[2] Post-Event
Alternative 1 - 2019	Transit	19%	3,600		1,800	3,420	19%	3,600		1,800	3,420
	Pedestrian	13%	2,500		1,250	2,375	8%	1,500		750	1,425
	Bike	1%	200		100	190	1%	200		100	190
	Boat/Other	2%	400		200	380	2%	400		200	380
	Total Non-Auto	**35%**	**6,700**		**3,350**	**6,365**	**30%**	**5,700**		**2,850**	**5,415**
	Car/RV	54%	10,300	4,300	2,150	4,085	54%	10,300	4,300	2,150	4,085
	TNC	11%	2,100	1,100	550	1,045	16%	3,000	1,500	750	1,425
	Total Auto	**65%**	**12,400**	**5,400**	**2,700**	**5,130**	**70%**	**13,300**	**5,800**	**2,900**	**5,510**
	Total	**100%**	**19,100**	**5,400**	**6,050**	**11,495**	**100%**	**19,000**	**5,800**	**5,750**	**10,925**
Alternative 1: 1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Transit	20%	3,800		1,900	3,610	20%	3,800		1,900	3,610
	Pedestrian	14%	2,700		1,350	2,565	9%	1,700		850	1,615
	Bike	0%	-		-	-	1%	200		100	190
	Boat/Other	3%	600		300	570	2%	400		200	380
	Total Non-Auto	**37%**	**7,100**		**3,550**	**6,745**	**32%**	**6,100**		**3,050**	**5,795**
	Car/RV	53%	10,100	4,200	2,100	3,990	53%	10,100	4,200	2,100	3,990
	TNC	10%	1,900	1,000	500	950	15%	2,900	1,500	750	1,425
	Total Auto	**63%**	**12,000**	**5,200**	**2,600**	**4,940**	**68%**	**13,000**	**5,700**	**2,850**	**5,415**
	Total	**100%**	**19,100**	**5,200**	**6,150**	**11,685**	**100%**	**19,100**	**5,700**	**5,900**	**11,210**
Alternative 1: 1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Transit	22%	4,200		2,100	3,990	21%	4,000		2,000	3,800
	Pedestrian	14%	2,700		1,350	2,565	9%	1,700		850	1,615
	Bike	0%	-		-	-	1%	200		100	190
	Boat/Other	3%	600		300	570	3%	600		300	570
	Total Non-Auto	**39%**	**7,500**		**3,750**	**7,125**	**34%**	**6,500**		**3,250**	**6,175**
	Car/RV	51%	9,700	4,000	2,000	3,800	51%	9,700	4,000	2,000	3,800
	TNC	10%	1,900	1,000	500	950	15%	2,900	1,500	750	1,425
	Total Auto	**61%**	**11,600**	**5,000**	**2,500**	**4,750**	**66%**	**12,600**	**5,500**	**2,750**	**5,225**
	Total	**100%**	**19,100**	**5,000**	**6,250**	**11,875**	**100%**	**19,100**	**5,500**	**6,000**	**11,400**
Alternative 1: 1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Transit	23%	4,400		2,200	4,180	23%	4,400		2,200	4,180
	Pedestrian	15%	2,900		1,450	2,755	10%	1,900		950	1,805
	Bike	0%	-		-	-	1%	200		100	190
	Boat/Other	3%	600		300	570	3%	600		300	570
	Total Non-Auto	**41%**	**7,900**		**3,950**	**7,505**	**37%**	**7,100**		**3,550**	**6,745**
	Car/RV	49%	9,300	3,900	1,950	3,705	49%	9,300	3,900	1,950	3,705
	TNC	10%	1,900	1,000	500	950	14%	2,700	1,400	700	1,330
	Total Auto	**59%**	**11,200**	**4,900**	**2,450**	**4,655**	**63%**	**12,000**	**5,300**	**2,650**	**5,035**
	Total	**100%**	**19,100**	**4,900**	**6,400**	**12,160**	**100%**	**19,100**	**5,300**	**6,200**	**11,780**

1. Auto trips are based on application of existing average vehicle occupancy (AVO).
2. Peak hour trips represent vehicle demands for Car and TNC. Trips are based on application of estimated arrival and departure percentages.

Trip Generation for Non-Football UW-Events & Non-UW Events - 24,000 - 42,000 Attendees

Key Assumptions

	Car AVO[1]	TNC AVO[2]	Estimated Percent[1] Pre-Event Arrival	Post-Event Departure
	2.4	2	50%	95%
	2.4	2	50%	95%

Notes: AVO = average vehicle occupancy and TNC = transportation network companies (i.e., Uber, Lyft)
1. There is no existing data for non-football events at Husky Stadium. The assumptions are based on data collected at two KeyArena concerts as part of the *Seattle Center Arena Renovation Project Draft Environmental Impact Statement* , April 2018.
2 No AVO was collected for TNC. The evaluation assumes that the AVO is consistent with the car AVO.

Future Attendance Assumed 33,000 (median event size)

Performance Goal		
	Non-Auto Mode Split	
Timing	**Weekday**	**Weekend**
2019 (anticipated year of updated TMP implementation)	47%	36%
1-Year Following Opening of Northgate Link light rail Transit (estimated opening 2021)	49%	38%
1-Year Following Opening of Lynnwood Link light rail Transit (estimated opening 2024)	51%	40%
1-Year Following Opening of Everett Link light rail Transit (estimated opening 2035)	53%	42%

Note: Non-Auto = transit, pedestrian, bike, boat, and other

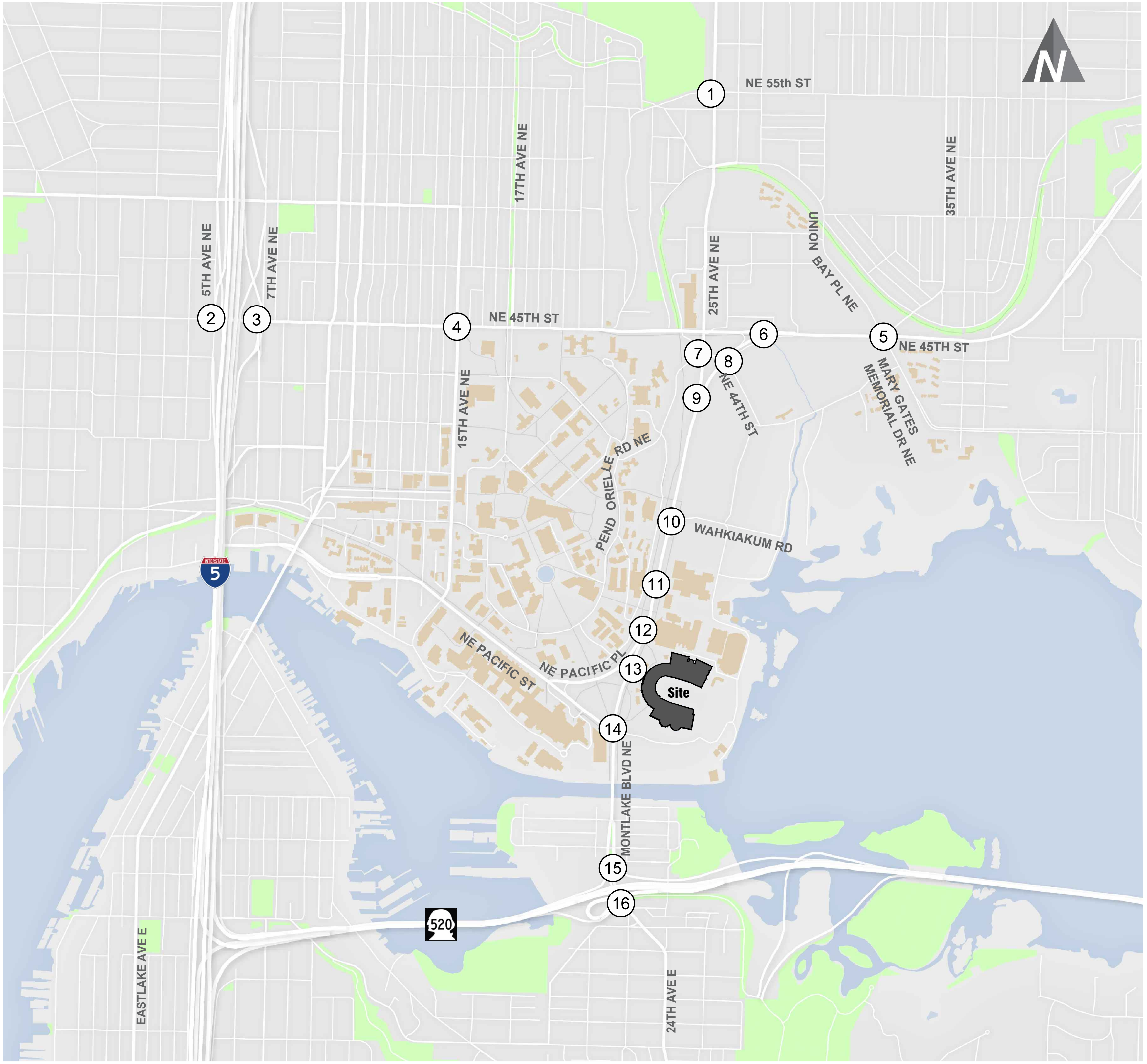
Husky Stadium Estimate Trip Generation

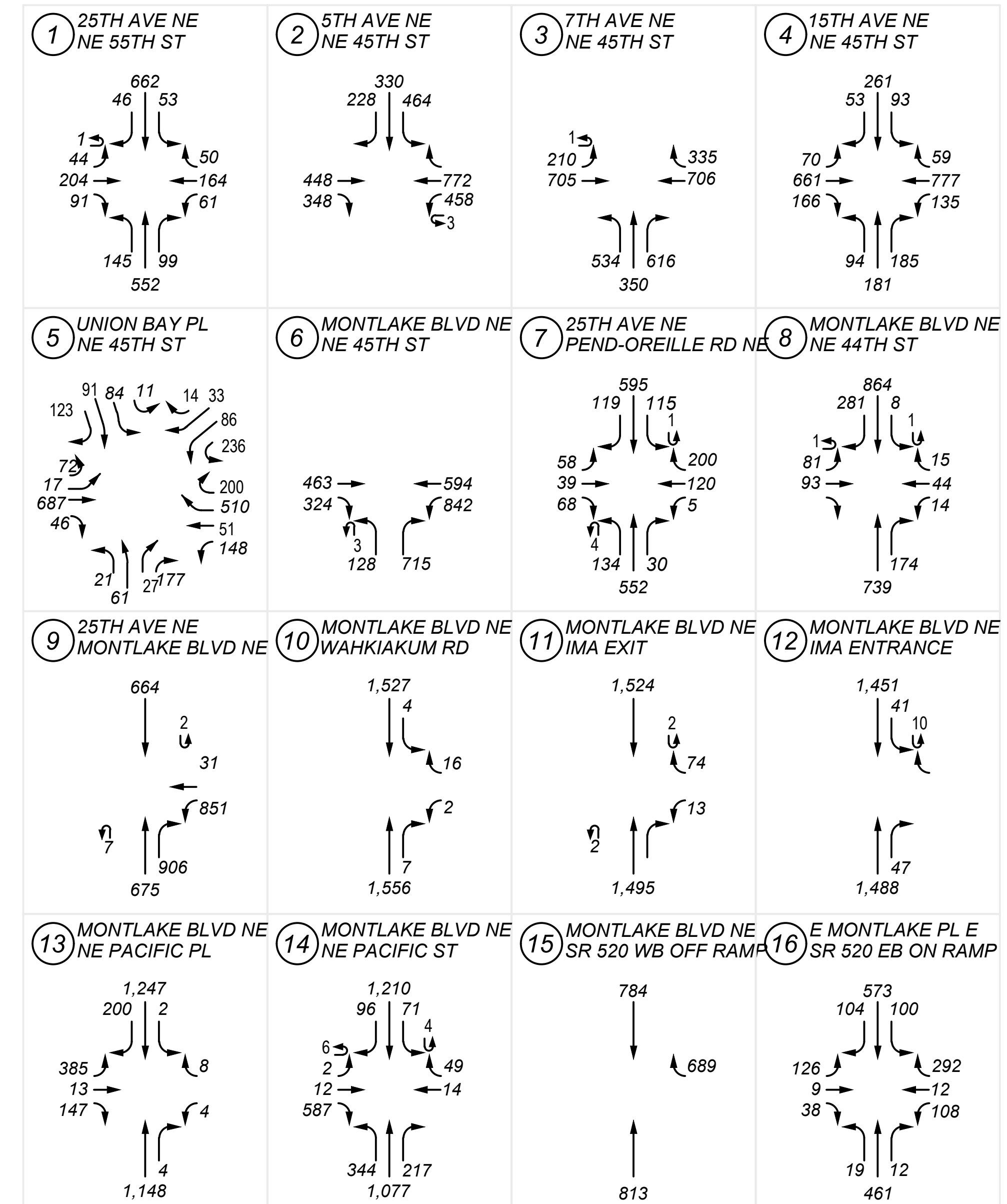
Trip Generation Summary

		Weekday					Weekend				
		Mode	Person	Total Auto	Peak Hour Trips[2]		Mode	Person	Total Auto	Peak Hour Trips[2]	
Time Period	**Mode**	**Split[1]**	**Trips**	**Trips[1]**	**Pre-Event**	**Post-Event**	**Split[1]**	**Trips**	**Trips[1]**	**Pre-Event**	**Post-Event**
Alternative 1 - 2019	Transit	26%	8,600		4,300	8,170	23%	7,600		3,800	7,220
	Pedestrian	17%	5,600		2,800	5,320	10%	3,300		1,650	3,135
	Bike	1%	300		150	285	1%	300		150	285
	Boat/Other	3%	1,000		500	950	2%	700		350	665
	Total Non-Auto	**47%**	**15,500**		**7,750**	**14,725**	**36%**	**11,900**		**5,950**	**11,305**
	Car/RV	44%	14,500	6,000	3,000	5,700	50%	16,500	6,900	3,450	6,555
	TNC	9%	3,000	1,500	750	1,425	14%	4,600	2,300	1,150	2,185
	Total Auto	**53%**	**17,500**	**7,500**	**3,750**	**7,125**	**64%**	**21,100**	**9,200**	**4,600**	**8,740**
	Total	**100%**	**33,000**	**7,500**	**11,500**	**21,850**	**100%**	**33,000**	**9,200**	**10,550**	**20,045**
Alternative 1: 1-Year Following Opening of Northgate Light Rail Transit (estimated opening 2021)	Transit	27%	8,900		4,450	8,455	24%	7,900		3,950	7,505
	Pedestrian	18%	5,900		2,950	5,605	10%	3,300		1,650	3,135
	Bike	1%	300		150	285	1%	300		150	285
	Boat/Other	3%	1,000		500	950	3%	1,000		500	950
	Total Non-Auto	**49%**	**16,100**		**8,050**	**15,295**	**38%**	**12,500**		**6,250**	**11,875**
	Car/RV	43%	14,200	5,900	2,950	5,605	48%	15,800	6,600	3,300	6,270
	TNC	8%	2,600	1,300	650	1,235	14%	4,600	2,300	1,150	2,185
	Total Auto	**51%**	**16,800**	**7,200**	**3,600**	**6,840**	**62%**	**20,400**	**8,900**	**4,450**	**8,455**
	Total	**100%**	**32,900**	**7,200**	**11,650**	**22,135**	**100%**	**32,900**	**8,900**	**10,700**	**20,330**
Alternative 1: 1-Year Following Opening of Lynnwood Light Rail Transit (estimated opening 2024)	Transit	28%	9,200		4,600	8,740	25%	8,300		4,150	7,885
	Pedestrian	19%	6,300		3,150	5,985	11%	3,600		1,800	3,420
	Bike	1%	300		150	285	1%	300		150	285
	Boat/Other	4%	1,300		650	1,235	3%	1,000		500	950
	Total Non-Auto	**52%**	**17,100**		**8,550**	**16,245**	**40%**	**13,200**		**6,600**	**12,540**
	Car/RV	41%	13,500	5,600	2,800	5,320	47%	15,500	6,500	3,250	6,175
	TNC	8%	2,600	1,300	650	1,235	13%	4,300	2,200	1,100	2,090
	Total Auto	**49%**	**16,100**	**6,900**	**3,450**	**6,555**	**60%**	**19,800**	**8,700**	**4,350**	**8,265**
	Total	**101%**	**33,200**	**6,900**	**12,000**	**22,800**	**100%**	**33,000**	**8,700**	**10,950**	**20,805**
Alternative 1: 1-Year Following Opening of Everett Light Rail Transit (estimated opening 2035)	Transit	29%	9,600		4,800	9,120	27%	8,900		4,450	8,455
	Pedestrian	19%	6,300		3,150	5,985	11%	3,600		1,800	3,420
	Bike	1%	300		150	285	1%	300		150	285
	Boat/Other	4%	1,300		650	1,235	3%	1,000		500	950
	Total Non-Auto	**53%**	**17,500**		**8,750**	**16,625**	**42%**	**13,800**		**6,900**	**13,110**
	Car/RV	39%	12,900	5,400	2,700	5,130	45%	14,900	6,200	3,100	5,890
	TNC	8%	2,600	1,300	650	1,235	13%	4,300	2,200	1,100	2,090
	Total Auto	**47%**	**15,500**	**6,700**	**3,350**	**6,365**	**58%**	**19,200**	**8,400**	**4,200**	**7,980**
	Total	**100%**	**33,000**	**6,700**	**12,100**	**22,990**	**100%**	**33,000**	**8,400**	**11,100**	**21,090**

1. Auto trips are based on application of existing average vehicle occupancy (AVO).
2. Peak hour trips represent vehicle demands for Car and TNC. Trips are based on application of estimated arrival and departure percentages.

Appendix B: Intersection Turning Movements



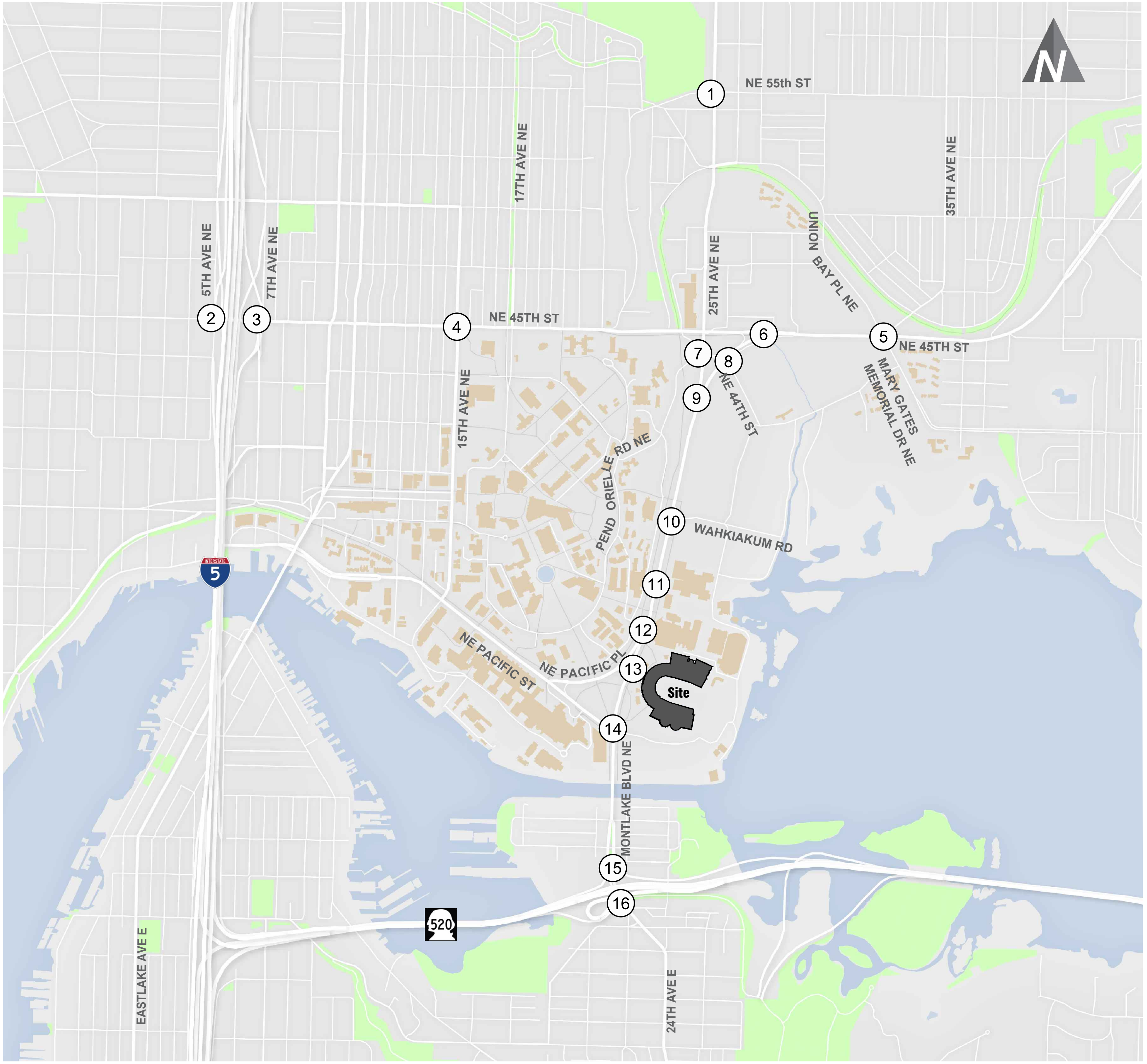


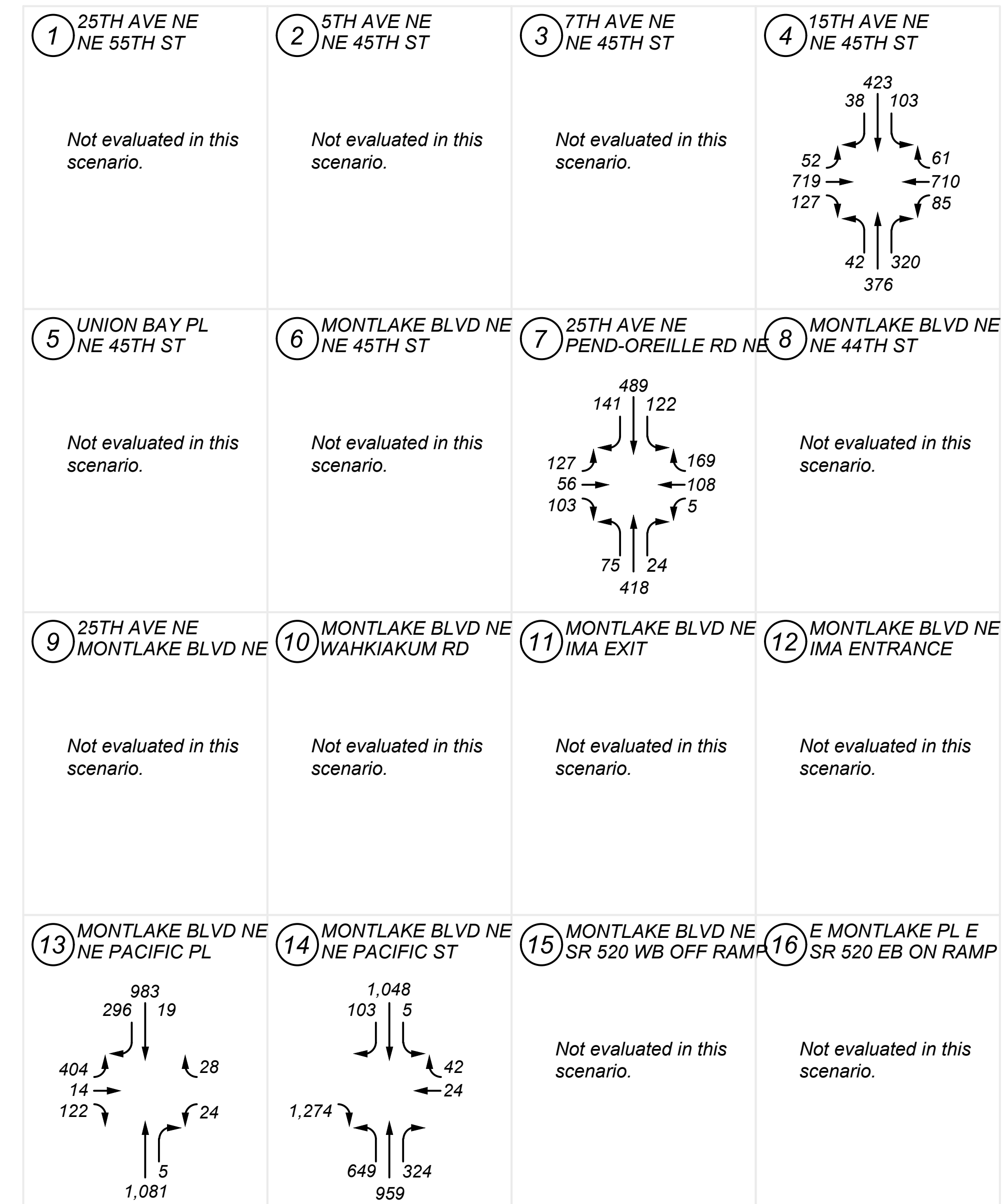
2035 Alternative 1 Weekend Evening Peak Hour Traffic Volumes (Event)

Husky Stadium TMP and EIS

May 16, 2018 - 11:27am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: 2035 Alt 1 Weekend Event

FIGURE
B-6





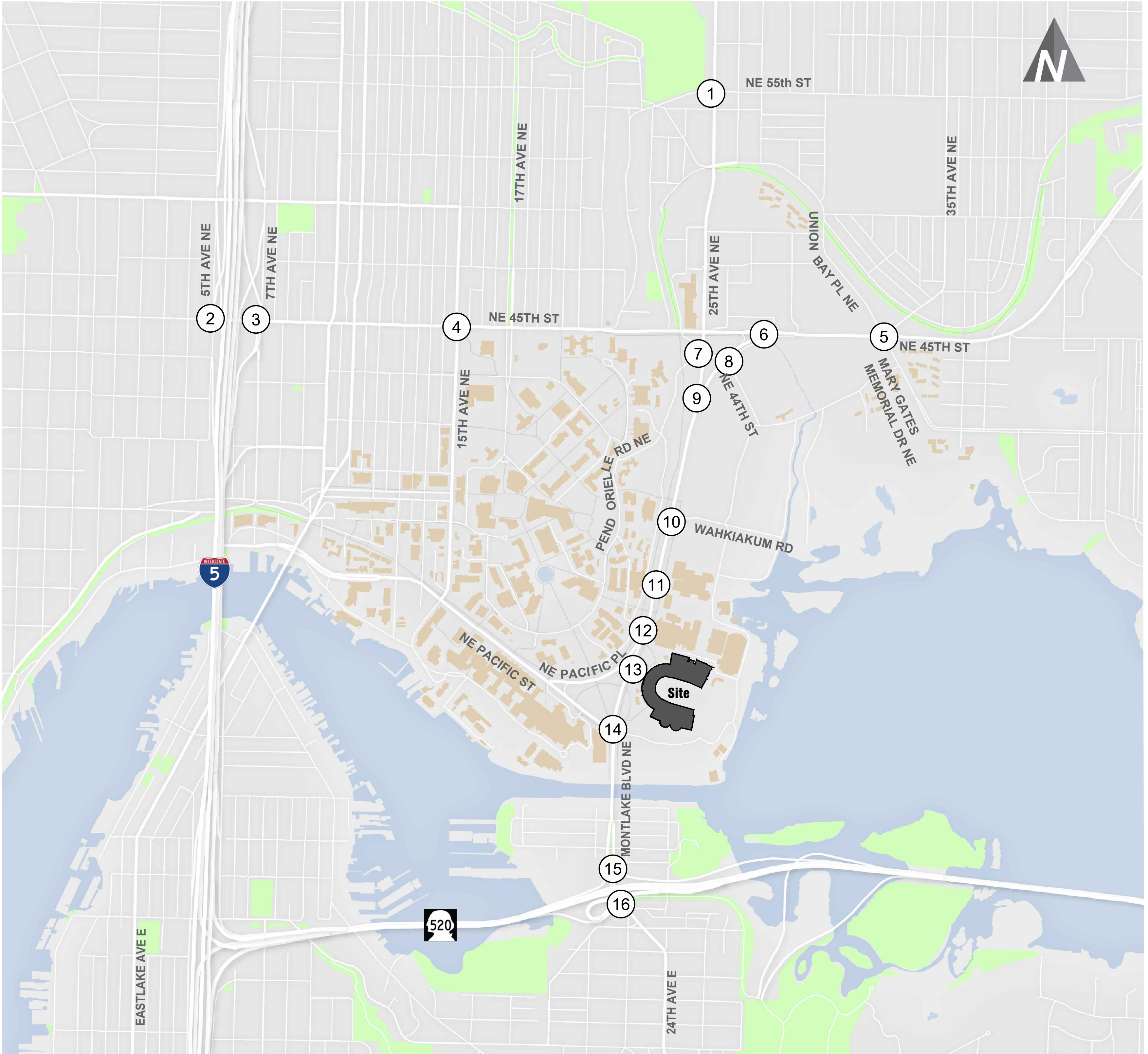
2035 Alternative 1 Weekday PM Peak Hour Traffic Volumes (Event)

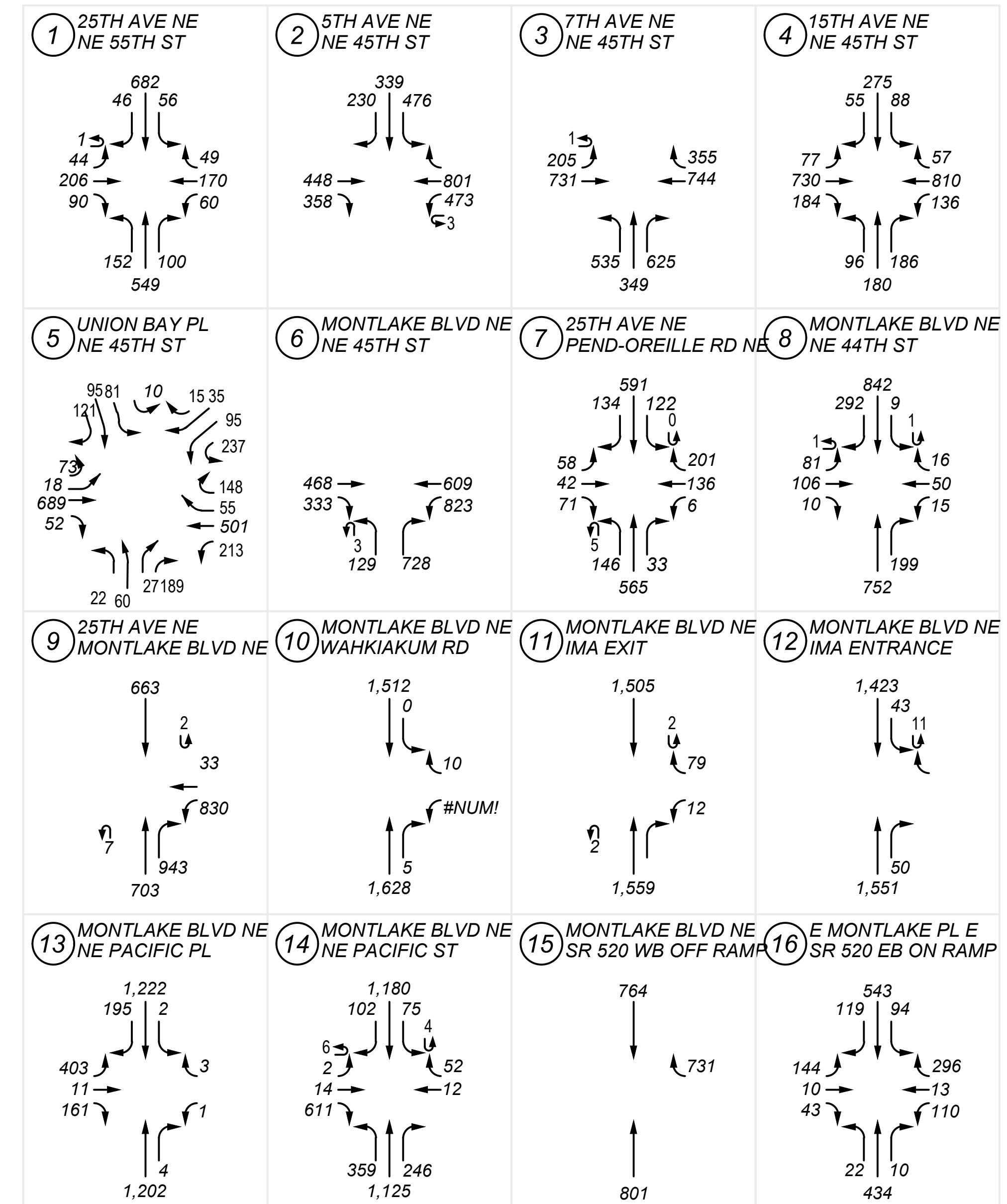
Husky Stadium TMP and EIS

FIGURE
B-5

transpogroup

May 16, 2018 - 11:15am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: 2035 Alt 1 Weekday event





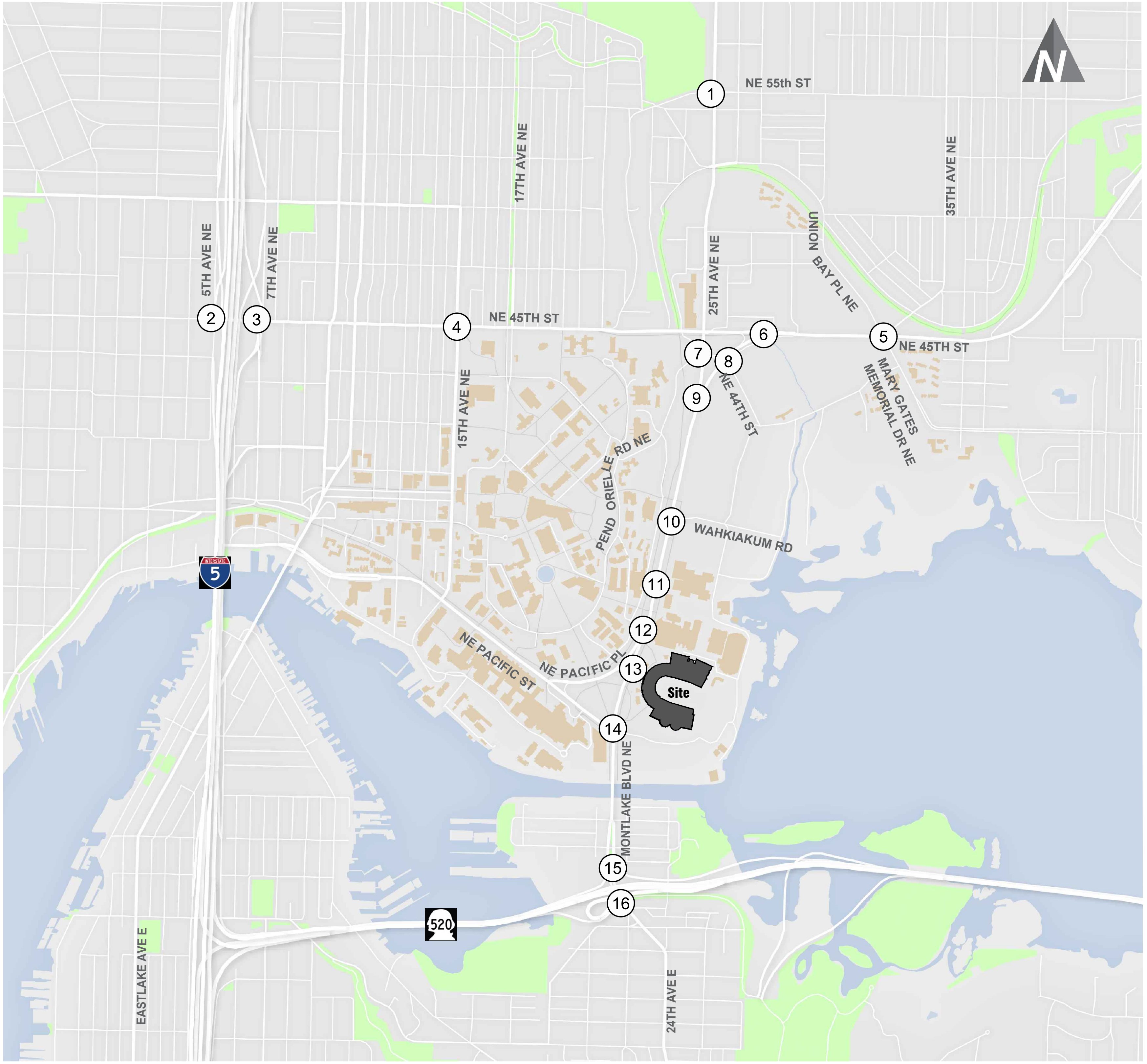
2035 No Action Alternative Weekend Evening Peak Hour Traffic Volumes (Event)

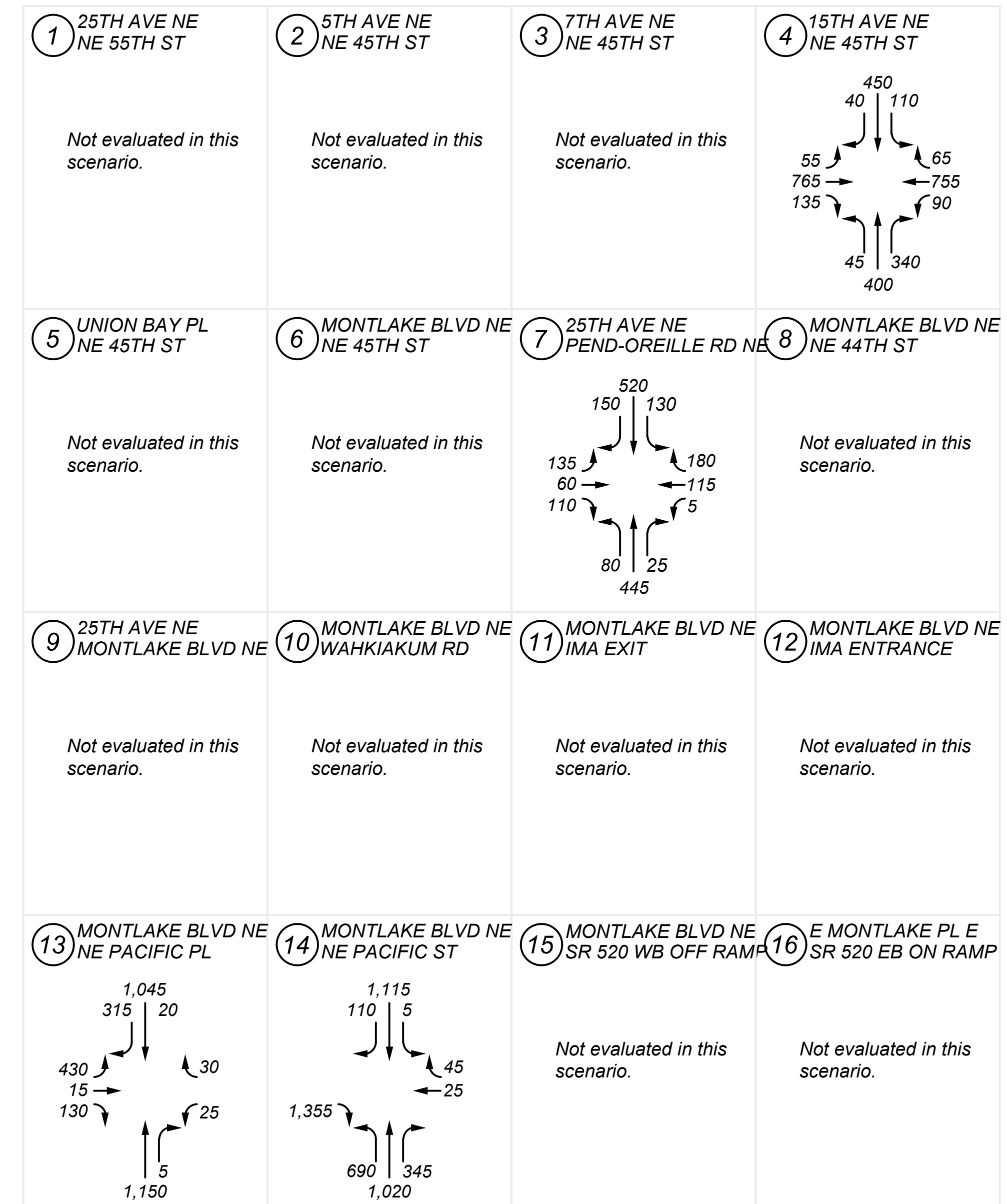
Husky Stadium TMP and EIS

FIGURE
B-4

transpogroup

May 16, 2018 - 11:43am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: 2035 NA weekend event





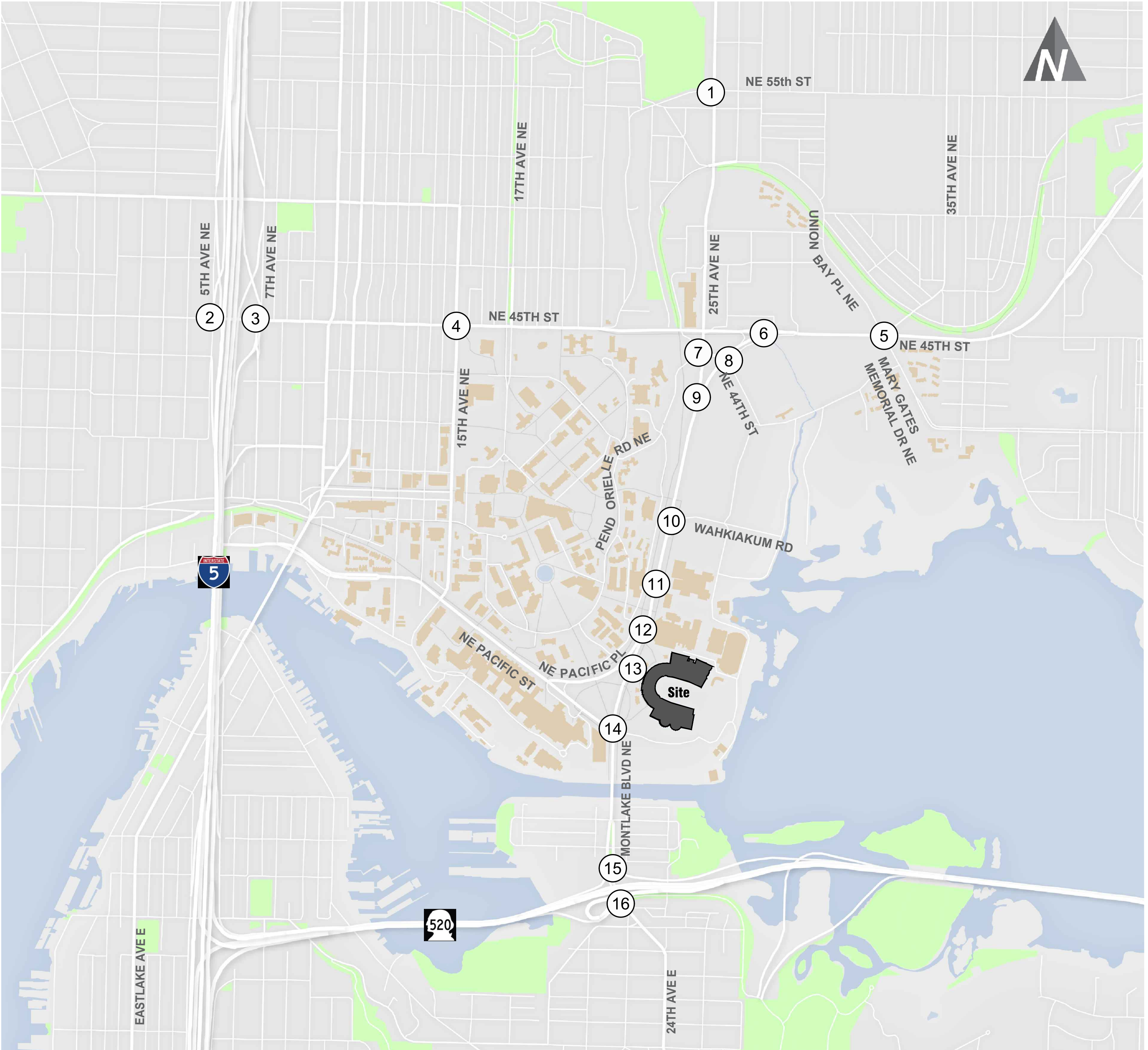
2035 No Action Alternative Weekday PM Peak Hour Traffic Volumes (Event)

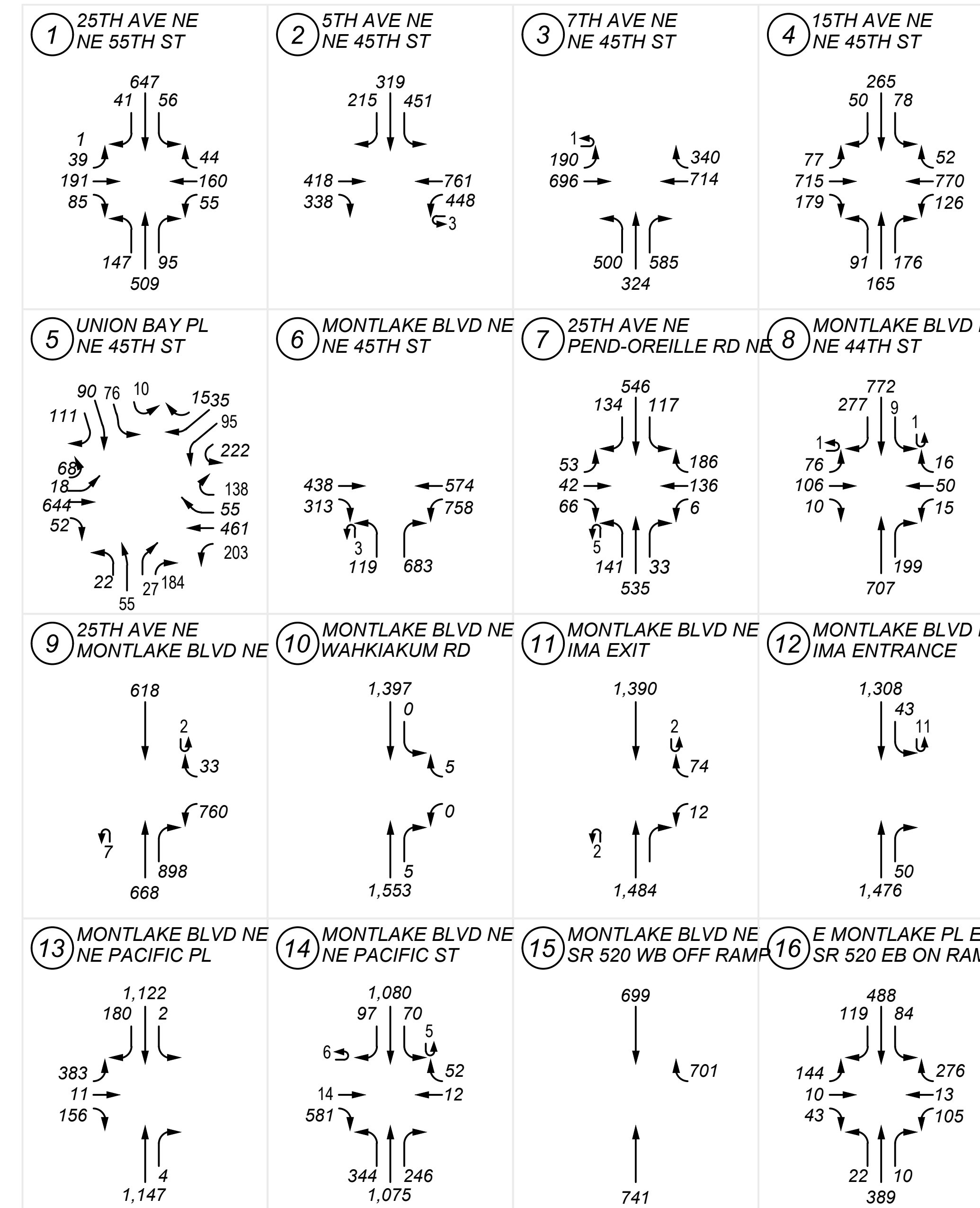
Husky Stadium TMP and EIS

transpogroup

FIGURE
B-3

May 16, 2018 - 11:08am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: 2035 NA weekday event





2017 Weekend Evening Peak Hour Traffic Volumes (Event)

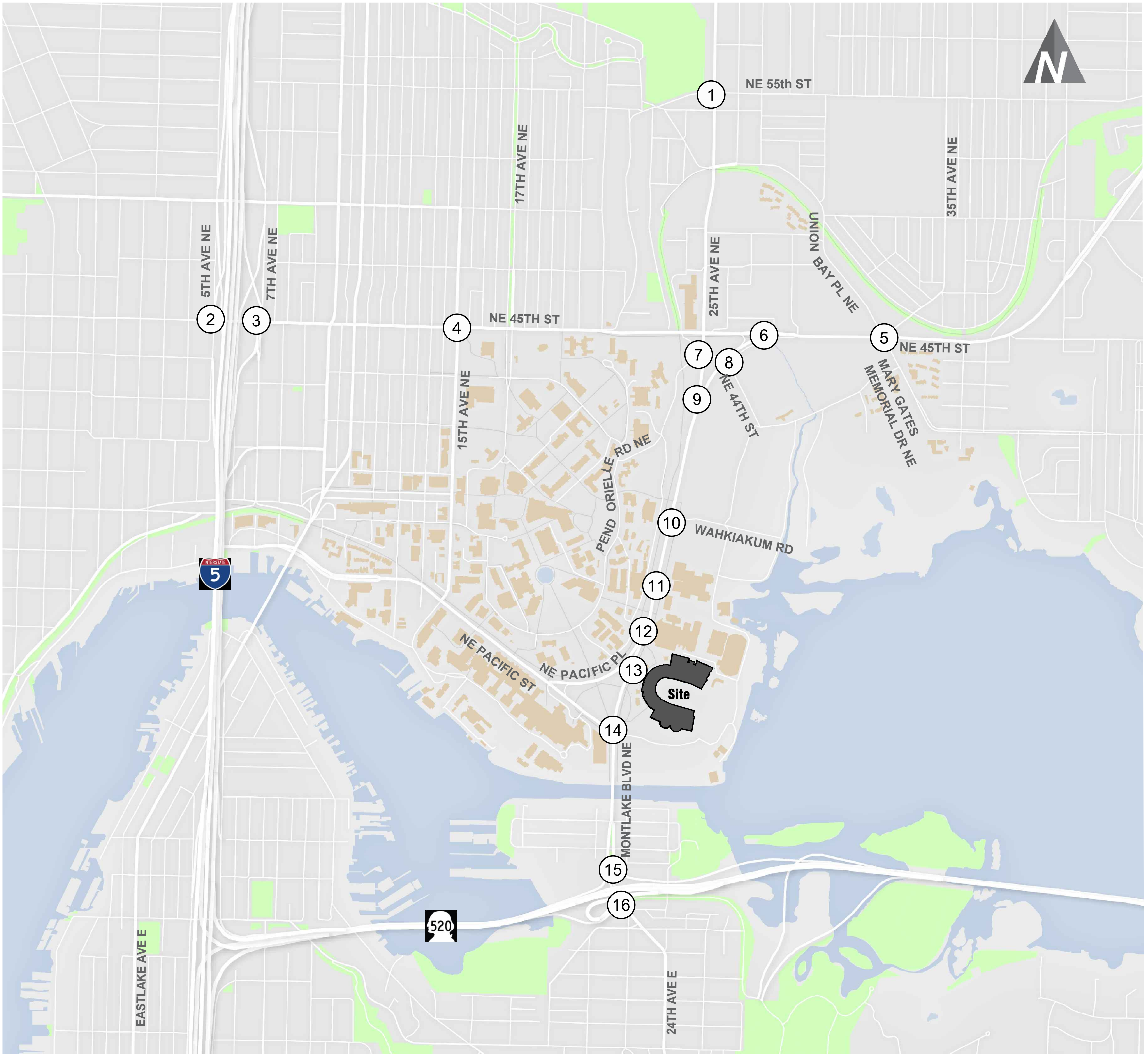
Husky Stadium TMP and EIS

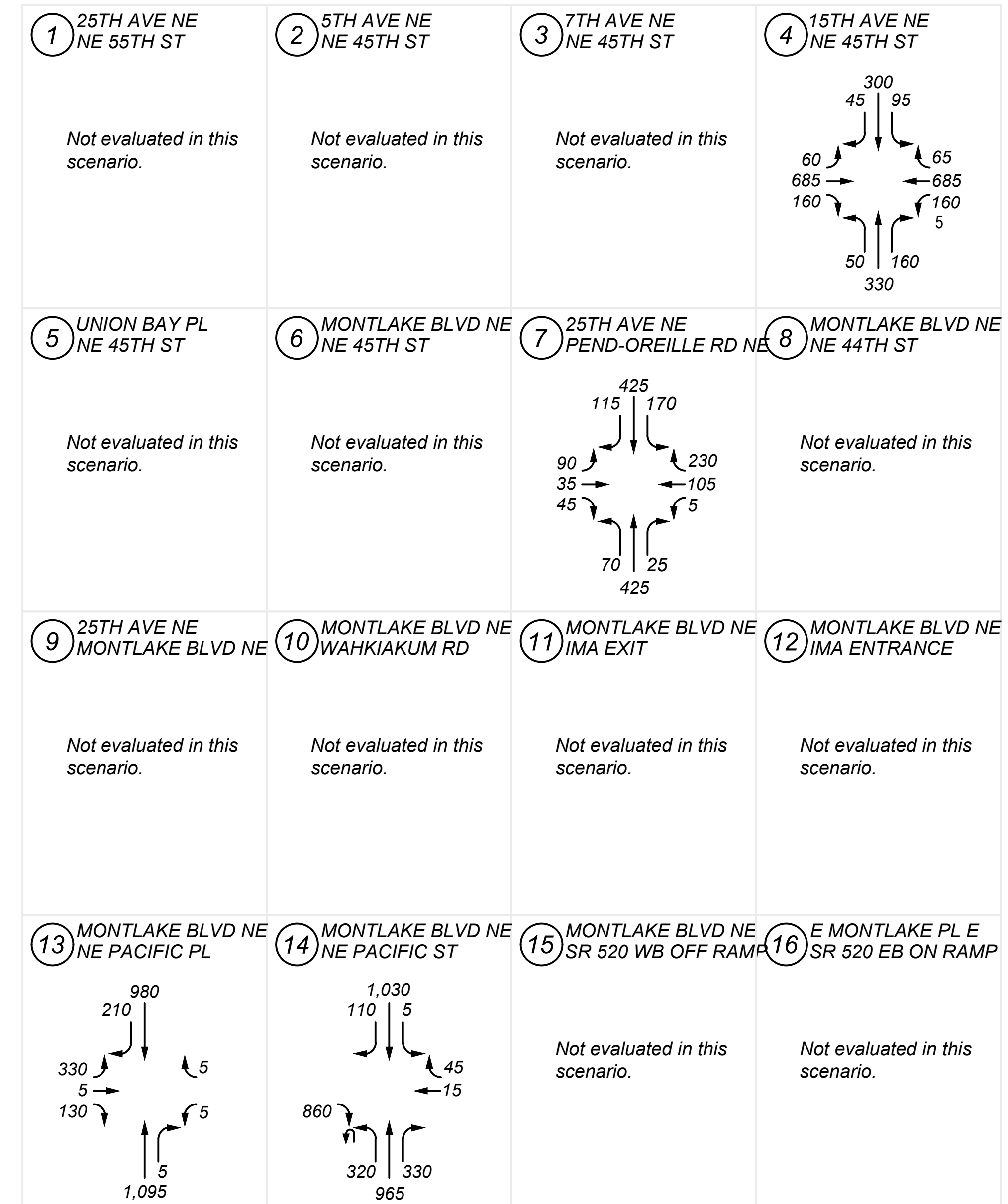
transpogroup

FIGURE

B-2

May 16, 2018 - 10:28am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: (2) 2017 Weekend Event





2017 Weekday PM Peak Hour Traffic Volumes (Event)

Husky Stadium TMP and EIS

FIGURE
B-1

transpogroup

May 16, 2018 - 10:59am francescal M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\Graphics\Graphics- 17346.dwg Layout: 2017 weekday event

Appendix C: LOS Definitions

Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.
1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.
1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix D: LOS Worksheets

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	1	44	204	91	61	164	50	145	552	99	53	662
Future Volume (veh/h)	1	44	204	91	61	164	50	145	552	99	53	662
Number		5	2	12	1	6	16	3	8	18	7	4
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.99		0.97	0.99		0.97	1.00		0.97	1.00	
Parking Bus, Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1900	1900	1900	1900	1881	1900	1900	1881	1900	1900	1881
Adj Flow Rate, veh/h		46	215	96	64	173	53	153	581	104	56	697
Adj No. of Lanes		0	2	0	0	1	0	0	2	0	0	2
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
Percent Heavy Veh, %		0	0	0	1	1	1	1	1	1	1	1
Cap, veh/h		165	690	292	147	358	98	262	1011	191	129	1520
Arrive On Green		0.33	0.33	0.33	0.33	0.33	0.33	0.36	0.36	0.36	0.53	0.53
Sat Flow, veh/h		293	2106	892	242	1092	298	343	1893	357	123	2847
Grp Volume(v), veh/h		191	0	166	290	0	0	361	0	477	402	0
Grp Sat Flow(s),veh/h/ln		1748	0	1544	1633	0	0	956	0	1636	1501	0
Q Serve(g_s), s		0.0	0.0	5.3	2.4	0.0	0.0	14.1	0.0	15.1	1.3	0.0
Cycle Q Clear(g_c), s		4.9	0.0	5.3	8.7	0.0	0.0	23.6	0.0	15.1	16.4	0.0
Prop In Lane		0.24		0.58	0.22		0.18	0.42		0.22	0.14	
Lane Grp Cap(c), veh/h		641	0	506	603	0	0	589	0	874	865	0
V/C Ratio(X)		0.30	0.00	0.33	0.48	0.00	0.00	0.61	0.00	0.55	0.46	0.00
Avail Cap(c_a), veh/h		641	0	506	603	0	0	589	0	874	865	0
HCM Platoon Ratio		1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	0.00	0.00	0.82	0.00	0.82	1.00	0.00
Uniform Delay (d), s/veh		16.3	0.0	16.5	17.5	0.0	0.0	18.2	0.0	14.6	9.1	0.0
Incr Delay (d2), s/veh		1.2	0.0	1.7	0.2	0.0	0.0	3.9	0.0	2.0	1.8	0.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		2.8	0.0	2.5	4.2	0.0	0.0	6.3	0.0	7.3	4.7	0.0
LnGrp Delay(d),s/veh		17.5	0.0	18.2	17.7	0.0	0.0	22.1	0.0	16.6	10.9	0.0
LnGrp LOS		B		B	B			C		B	B	
Approach Vol, veh/h			357			290			838			801
Approach Delay, s/veh			17.8			17.7			19.0			10.9
Approach LOS			B			B			B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		25.8		39.2		25.8		39.2
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		21.3		34.7		21.3		34.7
Max Q Clear Time (g_c+I1), s		7.3		18.4		10.7		25.6
Green Ext Time (p_c), s		2.4		2.5		2.1		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	46
Future Volume (veh/h)	46
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.97
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	48
Adj No. of Lanes	0
Peak Hour Factor	0.95
Percent Heavy Veh, %	1
Cap, veh/h	107
Arrive On Green	0.53
Sat Flow, veh/h	201
Grp Volume(v), veh/h	399
Grp Sat Flow(s),veh/h/ln	1670
Q Serve(g_s), s	9.5
Cycle Q Clear(g_c), s	9.5
Prop In Lane	0.12
Lane Grp Cap(c), veh/h	891
V/C Ratio(X)	0.45
Avail Cap(c_a), veh/h	891
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	9.3
Incr Delay (d2), s/veh	1.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	4.7
LnGrp Delay(d),s/veh	10.9
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	0	448	348	3	458	772	0	0	0	0	464	330
Future Volume (veh/h)	0	448	348	3	458	772	0	0	0	0	464	330
Number	5	2	12		1	6	16				7	4
Initial Q (Qb), veh	0	0	0		0	0	0				0	0
Ped-Bike Adj(A_pbT)	1.00		0.96		1.00		1.00				1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900		1881	1881	0				1881	1881
Adj Flow Rate, veh/h	0	462	359		472	796	0				351	518
Adj No. of Lanes	0	2	0		2	2	0				1	2
Peak Hour Factor	0.97	0.97	0.97		0.97	0.97	0.97				0.97	0.97
Percent Heavy Veh, %	0	1	1		1	1	0				1	1
Cap, veh/h	0	862	667		597	2413	0				412	560
Arrive On Green	0.00	0.46	0.46		0.12	0.45	0.00				0.23	0.23
Sat Flow, veh/h	0	1976	1456		3476	3668	0				1792	2434
Grp Volume(v), veh/h	0	439	382		472	796	0				351	400
Grp Sat Flow(s),veh/h/ln	0	1787	1551		1738	1787	0				1792	1881
Q Serve(g_s), s	0.0	17.6	17.7		13.2	14.3	0.0				18.8	20.8
Cycle Q Clear(g_c), s	0.0	17.6	17.7		13.2	14.3	0.0				18.8	20.8
Prop In Lane	0.00		0.94		1.00		0.00				1.00	
Lane Grp Cap(c), veh/h	0	819	711		597	2413	0				412	433
V/C Ratio(X)	0.00	0.54	0.54		0.79	0.33	0.00				0.85	0.92
Avail Cap(c_a), veh/h	0	819	711		886	2413	0				412	433
HCM Platoon Ratio	1.00	1.00	1.00		0.67	0.67	1.00				1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00		0.09	0.09	0.00				1.00	1.00
Uniform Delay (d), s/veh	0.0	19.4	19.5		42.5	12.8	0.0				36.9	37.6
Incr Delay (d2), s/veh	0.0	0.7	0.8		0.4	0.0	0.0				19.4	27.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0				0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	8.8	7.7		6.4	7.1	0.0				11.5	14.1
LnGrp Delay(d),s/veh	0.0	20.1	20.3		42.9	12.9	0.0				56.3	65.5
LnGrp LOS		C	C		D	B					E	E
Approach Vol, veh/h		821				1268						1104
Approach Delay, s/veh		20.2				24.0						63.8
Approach LOS		C				C						E

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	21.7	50.3		28.0		72.0		
Change Period (Y+Rc), s	4.5	4.5		5.0		4.5		
Max Green Setting (Gmax), s	25.5	37.5		23.0		67.5		
Max Q Clear Time (g_c+I1), s	15.2	19.7		22.9		16.3		
Green Ext Time (p_c), s	1.9	11.7		0.0		21.1		

Intersection Summary	
HCM 2010 Ctrl Delay	36.8
HCM 2010 LOS	D

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	228
Future Volume (veh/h)	228
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.97
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	235
Adj No. of Lanes	0
Peak Hour Factor	0.97
Percent Heavy Veh, %	1
Cap, veh/h	253
Arrive On Green	0.23
Sat Flow, veh/h	1099
Grp Volume(v), veh/h	353
Grp Sat Flow(s),veh/h/ln	1651
Q Serve(g_s), s	20.9
Cycle Q Clear(g_c), s	20.9
Prop In Lane	0.67
Lane Grp Cap(c), veh/h	380
V/C Ratio(X)	0.93
Avail Cap(c_a), veh/h	380
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	37.7
Incr Delay (d2), s/veh	31.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	12.8
LnGrp Delay(d),s/veh	69.2
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

Movement	EBU	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NER
Lane Configurations									
Traffic Volume (vph)	1	210	705	706	335	534	350	616	60
Future Volume (vph)	1	210	705	706	335	534	350	616	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Lane Util. Factor		1.00	0.95	0.95		0.97	0.95	0.95	1.00
Frpb, ped/bikes		1.00	1.00	0.96		1.00	1.00	0.99	1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.95		1.00	0.95	0.85	0.86
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (prot)		1787	3574	3272		3467	1696	1499	1596
Flt Permitted		0.11	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (perm)		206	3574	3272		3467	1696	1499	1596
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.95
Adj. Flow (vph)	1	216	727	728	345	551	361	635	63
RTOR Reduction (vph)	0	0	0	57	0	0	16	143	0
Lane Group Flow (vph)	0	217	727	1016	0	551	510	327	63
Confl. Peds. (#/hr)		41			41			1	
Confl. Bikes (#/hr)					2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	3%
Turn Type	custom	Prot	NA	NA		Split	NA	Perm	custom
Protected Phases		5	2	6		4	4		1
Permitted Phases	5							4	2
Actuated Green, G (s)		36.5	60.1	24.5		25.5	25.5	25.5	62.5
Effective Green, g (s)		36.5	60.1	24.5		25.5	25.5	25.5	62.5
Actuated g/C Ratio		0.36	0.60	0.24		0.26	0.26	0.26	0.62
Clearance Time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Vehicle Extension (s)		3.0	4.0	4.0		4.0	4.0	4.0	1.0
Lane Grp Cap (vph)		75	2147	801		884	432	382	1045
v/s Ratio Prot			0.20	c0.31		0.16	c0.30		0.00
v/s Ratio Perm		c1.05						0.22	0.04
v/c Ratio		2.89	0.34	1.27		0.62	1.18	0.86	0.06
Uniform Delay, d1		31.8	10.0	37.8		33.0	37.2	35.5	7.3
Progression Factor		0.78	0.70	0.93		1.00	1.00	1.00	1.00
Incremental Delay, d2		873.2	0.3	130.1		3.3	102.4	21.1	0.0
Delay (s)		898.1	7.3	165.4		36.3	139.7	56.6	7.3
Level of Service		F	A	F		D	F	E	A
Approach Delay (s)			212.0	165.4			77.6		
Approach LOS			F	F			E		

Intersection Summary			
HCM 2000 Control Delay	137.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.3%	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 (veh/h)	70	661	166	135	777	59	94	181	185	93	261	53
Future Volume (veh/h)	70	661	166	135	777	59	94	181	185	93	261	53
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.89	1.00		0.79	1.00		0.87
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1863	1863	1900	1810	1810	1900	1900	1900	1900
Adj Flow Rate, veh/h	73	689	173	141	809	61	98	189	193	97	272	55
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	6	6	2	2	2	5	5	5	0	0	0
Cap, veh/h	92	1284	322	171	1761	133	123	301	213	123	503	99
Arrive On Green	0.11	0.98	0.98	0.10	0.53	0.53	0.07	0.17	0.17	0.07	0.17	0.17
Sat Flow, veh/h	1707	2617	656	1774	3302	249	1723	1719	1217	1810	2929	575
Grp Volume(v), veh/h	73	448	414	141	433	437	98	189	193	97	165	162
Grp Sat Flow(s),veh/h/ln	1707	1703	1571	1774	1770	1781	1723	1719	1217	1810	1805	1700
Q Serve(g_s), s	4.2	1.0	1.0	7.8	15.1	15.1	5.6	10.2	15.5	5.3	8.3	8.8
Cycle Q Clear(g_c), s	4.2	1.0	1.0	7.8	15.1	15.1	5.6	10.2	15.5	5.3	8.3	8.8
Prop In Lane	1.00		0.42	1.00		0.14	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	92	836	771	171	944	950	123	301	213	123	310	292
V/C Ratio(X)	0.80	0.54	0.54	0.83	0.46	0.46	0.80	0.63	0.91	0.79	0.53	0.56
Avail Cap(c_a), veh/h	171	836	771	266	944	950	207	301	213	199	310	292
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.83	0.83	0.83	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.1	0.5	0.5	44.4	14.4	14.4	45.7	38.2	40.4	45.9	37.7	37.9
Incr Delay (d2), s/veh	4.9	2.1	2.2	4.8	1.2	1.2	4.5	3.1	36.3	4.2	0.9	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.7	0.7	4.1	7.7	7.7	2.8	5.1	7.3	2.8	4.2	4.2
LnGrp Delay(d),s/veh	49.0	2.5	2.7	49.1	15.6	15.6	50.2	41.4	76.7	50.1	38.6	39.3
LnGrp LOS	D	A	A	D	B	B	D	D	E	D	D	D
Approach Vol, veh/h		935			1011			480			424	
Approach Delay, s/veh		6.2			20.3			57.4			41.5	
Approach LOS		A			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	57.8	10.8	22.0	13.6	53.6	11.1	21.7
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	10.0	44.5	11.0	17.5	15.0	39.5	12.0	16.5
Max Q Clear Time (g_c+I1), s	6.2	17.1	7.3	17.5	9.8	3.0	7.6	10.8
Green Ext Time (p_c), s	0.0	4.7	0.0	0.0	0.0	4.7	0.0	1.1

Intersection Summary	
HCM 2010 Ctrl Delay	25.1
HCM 2010 LOS	C

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	72	17	687	46	200	510	51	148	21	61	27	177
Future Volume (vph)	72	17	687	46	200	510	51	148	21	61	27	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.86		0.86	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.90	1.00	0.99		0.96	1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	0.98		0.85	1.00	1.00	0.85	
Flt Protected	0.95	0.95	1.00	1.00	0.95	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1767	3539	1430	1740	4726		1313	1715	1802	1508	
Flt Permitted	0.95	0.24	1.00	1.00	0.34	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	444	3539	1430	617	4726		1313	1715	1802	1508	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	18	708	47	206	526	53	153	22	63	28	182
RTOR Reduction (vph)	0	0	0	31	0	2	0	105	0	0	160	0
Lane Group Flow (vph)	74	18	708	16	206	592	0	33	20	65	50	0
Confl. Peds. (#/hr)	16	15		22	22		16	15	12		15	16
Confl. Bikes (#/hr)											1	1
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%	0%	0%	0%	0%
Turn Type	Prot	pm+pt	NA	Perm	Perm	NA		Perm	Split	NA	Perm	
Protected Phases	1	1 9	6			2			4	4		
Permitted Phases		6		6	2			2			4	
Actuated Green, G (s)	9.4	54.5	48.5	48.5	33.6	33.6		33.6	21.1	21.1	21.1	
Effective Green, g (s)	9.4	50.5	48.5	48.5	33.6	33.6		33.6	21.1	21.1	21.1	
Actuated g/C Ratio	0.07	0.36	0.34	0.34	0.24	0.24		0.24	0.15	0.15	0.15	
Clearance Time (s)	5.5		5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.5		2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	117	264	1208	488	145	1118		310	254	267	224	
v/s Ratio Prot	0.04	c0.01	c0.20			0.13			0.01	c0.04		
v/s Ratio Perm		0.02		0.01	c0.33			0.02			0.03	
v/c Ratio	0.63	0.07	0.59	0.03	1.42	0.53		0.11	0.08	0.24	0.22	
Uniform Delay, d1	64.6	30.7	38.5	31.1	54.2	47.3		42.4	52.1	53.4	53.2	
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	9.4	0.1	2.1	0.1	224.6	1.8		0.7	0.0	0.2	0.2	
Delay (s)	74.0	30.8	40.6	31.3	278.8	49.1		43.1	52.1	53.6	53.4	
Level of Service	E	C	D	C	F	D		D	D	D	D	
Approach Delay (s)			42.8			98.7				53.4		
Approach LOS			D			F				D		

Intersection Summary			
HCM 2000 Control Delay	86.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	142.0	Sum of lost time (s)	31.5
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	11	84	91	123	236	86	33	14
Future Volume (vph)	11	84	91	123	236	86	33	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5			5.5	5.5	
Lane Util. Factor		0.95	0.95			1.00	0.88	
Frpb, ped/bikes		1.00	0.98			1.00	1.00	
Flpb, ped/bikes		1.00	1.00			1.00	1.00	
Frt		1.00	0.92			1.00	0.85	
Flt Protected		0.95	1.00			0.95	1.00	
Satd. Flow (prot)		1681	1593			1787	2814	
Flt Permitted		0.95	1.00			0.95	1.00	
Satd. Flow (perm)		1681	1593			1787	2814	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	11	87	94	127	243	89	34	14
RTOR Reduction (vph)	0	0	32	0	0	0	39	0
Lane Group Flow (vph)	0	89	198	0	0	332	9	0
Confl. Peds. (#/hr)	15	16		12	16	22	12	16
Confl. Bikes (#/hr)								
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%
Turn Type	Split	Split	NA		Prot	Prot	Prot	
Protected Phases	3	3	3		7	7	8	
Permitted Phases								
Actuated Green, G (s)		24.2	24.2			20.2	26.2	
Effective Green, g (s)		24.2	24.2			20.2	26.2	
Actuated g/C Ratio		0.17	0.17			0.14	0.18	
Clearance Time (s)		5.5	5.5			5.5	5.5	
Vehicle Extension (s)		2.0	2.0			2.5	2.5	
Lane Grp Cap (vph)		286	271			254	519	
v/s Ratio Prot		0.05	c0.12			c0.19	0.00	
v/s Ratio Perm								
v/c Ratio		0.31	0.73			1.31	0.02	
Uniform Delay, d1		51.6	55.8			60.9	47.4	
Progression Factor		1.00	1.00			1.00	1.00	
Incremental Delay, d2		0.2	8.1			163.7	0.0	
Delay (s)		51.8	63.9			224.6	47.4	
Level of Service		D	E			F	D	
Approach Delay (s)			60.5			202.2		
Approach LOS			E			F		

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	463	324	842	594	131	715
Future Volume (vph)	463	324	842	594	131	715
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	0.88
Frpb, ped/bikes	1.00	0.92	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1479	3467	1881	1787	2814
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1479	3467	1881	1787	2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	487	341	886	625	138	753
RTOR Reduction (vph)	0	80	0	0	0	46
Lane Group Flow (vph)	487	261	886	625	138	707
Confl. Peds. (#/hr)		36	36		5	
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	NA	Perm	Split	NA	Prot	pt+ov
Protected Phases	3		1	1	2	1 2
Permitted Phases		3				
Actuated Green, G (s)	30.2	30.2	71.0	71.0	15.3	90.8
Effective Green, g (s)	30.2	30.2	71.0	71.0	15.3	90.8
Actuated g/C Ratio	0.23	0.23	0.55	0.55	0.12	0.70
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.5	3.5	0.2	0.2	3.0	
Lane Grp Cap (vph)	838	343	1893	1027	210	1965
v/s Ratio Prot	0.13		0.26	c0.33	c0.08	0.25
v/s Ratio Perm		c0.18				
v/c Ratio	0.58	0.76	0.47	0.61	0.66	0.36
Uniform Delay, d1	44.3	46.5	18.0	20.1	54.8	7.9
Progression Factor	1.00	1.00	1.00	1.00	0.91	0.87
Incremental Delay, d2	1.1	9.9	0.8	2.7	7.0	0.1
Delay (s)	45.4	56.4	18.8	22.7	56.8	7.0
Level of Service	D	E	B	C	E	A
Approach Delay (s)	49.9			20.4	14.7	
Approach LOS	D			C	B	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (veh/h)	58	39	68	5	120	200	4	134	552	30	1	115
Future Volume (veh/h)	58	39	68	5	120	200	4	134	552	30	1	115
Number	3	8	18	7	4	14		5	2	12		1
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0		0
Ped-Bike Adj(A_pbT)	1.00		0.91	0.94		0.86		1.00		0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1900	1827	1900		1900	1900	1900		1900
Adj Flow Rate, veh/h	62	41	72	5	128	213		143	587	32		122
Adj No. of Lanes	1	2	0	0	2	0		1	2	0		1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94		0.94	0.94	0.94		0.94
Percent Heavy Veh, %	8	8	8	4	4	4		0	0	0		0
Cap, veh/h	120	334	271	32	249	169		168	2135	116		148
Arrive On Green	0.04	0.20	0.20	0.05	0.05	0.05		0.09	0.61	0.61		0.08
Sat Flow, veh/h	1675	1671	1354	21	1795	1220		1810	3476	189		1810
Grp Volume(v), veh/h	62	41	72	133	0	213		143	304	315		122
Grp Sat Flow(s),veh/h/ln	1675	1671	1354	1816	0	1220		1810	1805	1860		1810
Q Serve(g_s), s	4.0	2.6	5.8	0.0	0.0	18.0		10.1	10.2	10.2		8.6
Cycle Q Clear(g_c), s	4.0	2.6	5.8	9.2	0.0	18.0		10.1	10.2	10.2		8.6
Prop In Lane	1.00		1.00	0.04		1.00		1.00		0.10		1.00
Lane Grp Cap(c), veh/h	120	334	271	392	0	169		168	1109	1142		148
V/C Ratio(X)	0.52	0.12	0.27	0.34	0.00	1.26		0.85	0.27	0.28		0.82
Avail Cap(c_a), veh/h	120	334	271	392	0	169		912	1109	1142		689
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33		1.00	1.00	1.00		1.00
Upstream Filter(I)	1.00	1.00	1.00	0.98	0.00	0.98		0.83	0.83	0.83		0.91
Uniform Delay (d), s/veh	45.6	42.6	43.9	57.8	0.0	62.0		58.1	11.6	11.6		58.7
Incr Delay (d2), s/veh	3.9	0.2	0.5	0.2	0.0	155.6		3.8	0.5	0.5		3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0
%ile BackOfQ(50%),veh/ln	2.0	1.2	2.2	4.3	0.0	13.4		5.3	5.2	5.4		4.5
LnGrp Delay(d),s/veh	49.4	42.8	44.5	58.0	0.0	217.6		61.9	12.1	12.1		62.6
LnGrp LOS	D	D	D	E		F		E	B	B		E
Approach Vol, veh/h		175			346				762			
Approach Delay, s/veh		45.8			156.3				21.5			
Approach LOS		D			F				C			

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	15.2	84.3	8.0	22.5	16.6	82.9		30.5
Change Period (Y+Rc), s	4.5	4.5	3.0	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	49.5	41.0	5.0	18.0	65.5	25.0		26.0
Max Q Clear Time (g_c+I1), s	10.6	12.2	6.0	20.0	12.1	15.9		7.8
Green Ext Time (p_c), s	0.2	4.4	0.0	0.0	0.0	3.2		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	44.6
HCM 2010 LOS	D

Notes

Movement	SBT	SBR
Lane Configurations	↑↑	
Traffic Volume (veh/h)	595	119
Future Volume (veh/h)	595	119
Number	6	16
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.98
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900
Adj Flow Rate, veh/h	633	127
Adj No. of Lanes	2	0
Peak Hour Factor	0.94	0.94
Percent Heavy Veh, %	0	0
Cap, veh/h	1803	361
Arrive On Green	0.60	0.60
Sat Flow, veh/h	2989	599
Grp Volume(v), veh/h	382	378
Grp Sat Flow(s),veh/h/ln	1805	1782
Q Serve(g_s), s	13.8	13.9
Cycle Q Clear(g_c), s	13.8	13.9
Prop In Lane		0.34
Lane Grp Cap(c), veh/h	1089	1075
V/C Ratio(X)	0.35	0.35
Avail Cap(c_a), veh/h	1089	1075
HCM Platoon Ratio	1.00	1.00
Upstream Filter(I)	0.91	0.91
Uniform Delay (d), s/veh	13.0	13.0
Incr Delay (d2), s/veh	0.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	7.1
LnGrp Delay(d),s/veh	13.8	13.8
LnGrp LOS	B	B
Approach Vol, veh/h	882	
Approach Delay, s/veh	20.6	
Approach LOS	C	

Timer

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	1	81	93	10	14	44	15	0	739	174	1	8
Future Volume (vph)	1	81	93	10	14	44	15	0	739	174	1	8
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	4.5		4.5			
Lane Util. Factor		0.95	0.95			0.95	1.00		0.95			
Frpb, ped/bikes		1.00	0.99			1.00	0.98		0.98			
Flpb, ped/bikes		1.00	1.00			0.99	1.00		1.00			
Frt		1.00	0.99			1.00	0.85		0.97			
Flt Protected		0.95	1.00			0.99	1.00		1.00			
Satd. Flow (prot)		1627	1680			3526	1586		3387			
Flt Permitted		0.72	0.98			0.84	1.00		1.00			
Satd. Flow (perm)		1225	1650			3009	1586		3387			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1	84	97	10	15	46	16	0	770	181	1	8
RTOR Reduction (vph)	0	0	4	0	0	0	14	0	8	0	0	0
Lane Group Flow (vph)	0	77	111	0	0	61	2	0	943	0	0	0
Confl. Peds. (#/hr)		2		29	29		2	11		29		29
Confl. Bikes (#/hr)							1			1		
Heavy Vehicles (%)	5%	5%	5%	5%	0%	0%	0%	1%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		Perm	NA	Perm		NA		Perm	Perm
Protected Phases			2			2			1			
Permitted Phases	2	2			2		2				1	1
Actuated Green, G (s)		13.2	13.2			13.2	13.2		107.8			
Effective Green, g (s)		13.2	13.2			13.2	13.2		107.8			
Actuated g/C Ratio		0.10	0.10			0.10	0.10		0.83			
Clearance Time (s)		4.5	4.5			4.5	4.5		4.5			
Vehicle Extension (s)		2.0	2.0			2.0	2.0		0.2			
Lane Grp Cap (vph)		124	167			305	161		2808			
v/s Ratio Prot									c0.28			
v/s Ratio Perm		0.06	c0.07			0.02	0.00					
v/c Ratio		0.62	0.67			0.20	0.01		0.34			
Uniform Delay, d1		56.0	56.3			53.6	52.5		2.6			
Progression Factor		0.75	0.75			1.00	1.00		0.91			
Incremental Delay, d2		0.6	0.7			0.1	0.0		0.3			
Delay (s)		42.9	43.0			53.7	52.5		2.7			
Level of Service		D	D			D	D		A			
Approach Delay (s)			42.9			53.4			2.7			
Approach LOS			D			D			A			

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations	↑↑	↱
Traffic Volume (vph)	864	281
Future Volume (vph)	864	281
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.5	4.5
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.96
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3572	1540
Flt Permitted	0.94	1.00
Satd. Flow (perm)	3374	1540
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	900	293
RTOR Reduction (vph)	0	44
Lane Group Flow (vph)	909	249
Confl. Peds. (#/hr)		11
Confl. Bikes (#/hr)		
Heavy Vehicles (%)	1%	1%
Turn Type	NA	Perm
Protected Phases	1	
Permitted Phases		1
Actuated Green, G (s)	107.8	107.8
Effective Green, g (s)	107.8	107.8
Actuated g/C Ratio	0.83	0.83
Clearance Time (s)	4.5	4.5
Vehicle Extension (s)	0.2	0.2
Lane Grp Cap (vph)	2797	1277
v/s Ratio Prot		
v/s Ratio Perm	0.27	0.16
v/c Ratio	0.32	0.19
Uniform Delay, d1	2.6	2.3
Progression Factor	1.23	2.58
Incremental Delay, d2	0.3	0.3
Delay (s)	3.5	6.1
Level of Service	A	A
Approach Delay (s)	4.1	
Approach LOS	A	

Intersection Summary

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	851	31	7	675	906	2	0	664
Future Volume (vph)	851	31	7	675	906	2	0	664
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5			4.5
Lane Util. Factor	0.97			0.95	0.88			0.95
Frpb, ped/bikes	1.00			1.00	0.98			1.00
Flpb, ped/bikes	1.00			1.00	1.00			1.00
Frt	0.99			1.00	0.85			1.00
Flt Protected	0.95			1.00	1.00			1.00
Satd. Flow (prot)	3463			3572	2747			3574
Flt Permitted	0.95			0.95	1.00			0.95
Satd. Flow (perm)	3463			3390	2747			3408
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	877	32	7	696	934	2	0	685
RTOR Reduction (vph)	4	0	0	0	573	0	0	0
Lane Group Flow (vph)	905	0	0	703	361	0	0	687
Confl. Peds. (#/hr)					3		3	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	NA	Perm	Perm		NA
Protected Phases	1			2				2
Permitted Phases			2		2	2		
Actuated Green, G (s)	30.9			25.1	25.1			25.1
Effective Green, g (s)	30.9			25.1	25.1			25.1
Actuated g/C Ratio	0.48			0.39	0.39			0.39
Clearance Time (s)	4.5			4.5	4.5			4.5
Vehicle Extension (s)	0.2			2.0	2.0			2.0
Lane Grp Cap (vph)	1646			1309	1060			1316
v/s Ratio Prot	c0.26							
v/s Ratio Perm				c0.21	0.13			0.20
v/c Ratio	0.55			0.54	0.34			0.52
Uniform Delay, d1	12.1			15.5	14.1			15.3
Progression Factor	0.84			1.00	1.00			2.41
Incremental Delay, d2	1.3			0.2	0.1			0.0
Delay (s)	11.4			15.7	14.2			37.0
Level of Service	B			B	B			D
Approach Delay (s)	11.4			14.8				37.0
Approach LOS	B			B				D

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	16	1556	7	4	1527
Future Vol, veh/h	2	16	1556	7	4	1527
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	1	1
Mvmt Flow	2	17	1638	7	4	1607

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2454	823	0	0	1645	0
Stage 1	1642	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.12	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.21	-
Pot Cap-1 Maneuver	26	321	-	-	394	-
Stage 1	146	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	24	321	-	-	394	-
Mov Cap-2 Maneuver	129	-	-	-	-	-
Stage 1	146	-	-	-	-	-
Stage 2	364	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	275	394	-
HCM Lane V/C Ratio	-	-	0.069	0.011	-
HCM Control Delay (s)	-	-	19.1	14.2	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Vol, veh/h	13	74	2	1495	0	2	0	1524
Future Vol, veh/h	13	74	2	1495	0	2	0	1524
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	-	-	-	0
Grade, %	0	-	-	0	-	-	-	0
Peak Hour Factor	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	1	1	1	1
Mvmt Flow	14	78	2	1574	0	2	0	1604

Major/Minor	Minor1		Major1			Major2		
Conflicting Flow All	2384	787	1604	0	-	1573	-	-
Stage 1	1578	-	-	-	-	-	-	-
Stage 2	806	-	-	-	-	-	-	-
Critical Hdwy	6.8	6.9	6.42	-	-	6.42	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.51	-	-	2.51	-	-
Pot Cap-1 Maneuver	29	339	136	-	0	143	0	-
Stage 1	158	-	-	-	0	-	0	-
Stage 2	405	-	-	-	0	-	0	-
Platoon blocked, %				-				-
Mov Cap-1 Maneuver	29	339	136	-	-	112	-	-
Mov Cap-2 Maneuver	29	-	-	-	-	-	-	-
Stage 1	158	-	-	-	-	-	-	-
Stage 2	405	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	79.8	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	131	-
HCM Lane V/C Ratio	-	0.699	-
HCM Control Delay (s)	-	79.8	-
HCM Lane LOS	-	F	-
HCM 95th %tile Q(veh)	-	3.9	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	0	0	1488	47	10	41	1451
Future Vol, veh/h	0	0	1488	47	10	41	1451
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	-	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	1	1	1	1
Mvmt Flow	0	0	1550	49	10	43	1511

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	-	799	0	0	1598	1599	0
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	6.42	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.51	2.21	-
Pot Cap-1 Maneuver	0	333	-	-	138	410	-
Stage 1	0	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	-	333	-	-	296	296	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	296	-
HCM Lane V/C Ratio	-	-	-	0.179	-
HCM Control Delay (s)	-	-	0	19.8	-
HCM Lane LOS	-	-	A	C	-
HCM 95th %tile Q(veh)	-	-	-	0.6	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	385	13	147	4	0	8	0	1148	4	2	1247	200
Future Volume (vph)	385	13	147	4	0	8	0	1148	4	2	1247	200
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	4.0			4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.83		1.00	1.00			1.00		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		0.87	1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.85			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1295		1570	1615			3603		1787	3574	1481
Flt Permitted	0.75	1.00		0.60	1.00			1.00		0.15	1.00	1.00
Satd. Flow (perm)	1360	1295		990	1615			3603		280	3574	1481
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	410	14	156	4	0	9	0	1221	4	2	1327	213
RTOR Reduction (vph)	0	16	0	0	6	0	0	0	0	0	0	92
Lane Group Flow (vph)	410	154	0	4	3	0	0	1225	0	2	1327	121
Confl. Peds. (#/hr)			118	118			21		159	159		21
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		D.Pm	NA			NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	38.3	38.3		38.3	38.8			62.7		62.7	62.7	62.7
Effective Green, g (s)	38.3	38.3		38.3	38.8			62.7		62.7	62.7	62.7
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.57		0.57	0.57	0.57
Clearance Time (s)	4.5	4.5		4.5	4.0			4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	3.0			0.2		0.2	0.2	0.2
Lane Grp Cap (vph)	473	450		344	569			2053		159	2037	844
v/s Ratio Prot		0.12			0.00			0.34			c0.37	
v/s Ratio Perm	c0.30			0.00						0.01		0.08
v/c Ratio	0.87	0.34		0.01	0.01			0.60		0.01	0.65	0.14
Uniform Delay, d1	33.5	26.5		23.5	23.1			15.4		10.2	16.2	11.1
Progression Factor	1.00	1.00		1.00	1.00			2.11		1.00	1.00	1.00
Incremental Delay, d2	14.8	0.2		0.0	0.0			1.0		0.1	1.6	0.4
Delay (s)	48.3	26.7		23.5	23.1			33.5		10.4	17.8	11.4
Level of Service	D	C		C	C			C		B	B	B
Approach Delay (s)		42.0			23.2			33.5			16.9	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.0%	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	607	0	14	49	344	1077	217	75	1210	96
Future Volume (vph)	0	0	607	0	14	49	344	1077	217	75	1210	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0		6.0	5.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes			1.00		1.00	0.59	1.00	0.95		1.00	1.00	0.86
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt			0.85		1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)			2707		1900	951	3502	3337		1787	3574	1378
Flt Permitted			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)			2707		1900	951	3502	3337		1787	3574	1378
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	646	0	15	52	366	1146	231	80	1287	102
RTOR Reduction (vph)	0	0	514	0	0	49	0	18	0	0	0	64
Lane Group Flow (vph)	0	0	132	0	15	3	366	1359	0	80	1287	38
Confl. Peds. (#/hr)	142					142	74		102	102		74
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type			Perm		NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases					3!		4 5	1 5		7!	1	
Permitted Phases			4			3						1
Actuated Green, G (s)			22.4		5.6	5.6	46.4	65.0		6.0	41.0	41.0
Effective Green, g (s)			22.4		5.6	5.6	46.4	58.0		6.0	41.0	41.0
Actuated g/C Ratio			0.20		0.05	0.05	0.42	0.53		0.05	0.37	0.37
Clearance Time (s)			7.0		5.0	5.0				6.0	5.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0				2.0	0.2	0.2
Lane Grp Cap (vph)			551		96	48	1477	1759		97	1332	513
v/s Ratio Prot					c0.01		c0.10	c0.41		c0.04	c0.36	
v/s Ratio Perm			0.05			0.00						0.03
v/c Ratio			0.24		0.16	0.06	0.25	0.77		0.82	0.97	0.07
Uniform Delay, d1			36.7		49.9	49.7	20.5	20.7		51.5	33.8	22.3
Progression Factor			1.00		1.00	1.00	0.92	0.97		0.98	1.40	1.00
Incremental Delay, d2			0.1		0.3	0.2	0.0	1.8		33.0	15.3	0.2
Delay (s)			36.7		50.2	49.9	18.9	21.9		83.4	62.6	22.5
Level of Service			D		D	D	B	C		F	E	C
Approach Delay (s)		36.7			49.9			21.3			60.9	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	WBR	NBL	NBT	NBR2	SBL	SBT	SBR	NWR
Lane Configurations								
Traffic Volume (vph)	689	200	813	30	30	584	200	30
Future Volume (vph)	689	200	813	30	30	584	200	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.5	4.5	4.0	4.5		4.0
Lane Util. Factor	0.88	0.97	0.95	1.00	1.00	0.91		1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Frt	0.85	1.00	1.00	0.85	1.00	0.96		0.86
Flt Protected	1.00	0.95	1.00	1.00	0.95	1.00		1.00
Satd. Flow (prot)	2814	3467	3574	1599	1787	4922		1611
Flt Permitted	1.00	0.95	1.00	1.00	0.95	1.00		1.00
Satd. Flow (perm)	2814	3467	3574	1599	1787	4922		1611
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	741	215	874	32	32	628	215	33
RTOR Reduction (vph)	407	0	0	13	0	44	0	0
Lane Group Flow (vph)	334	215	874	19	32	799	0	33
Confl. Peds. (#/hr)					66			
Confl. Bikes (#/hr)							5	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	2%
Turn Type	custom	Prot	NA	Perm	Prot	NA		Prot
Protected Phases	3 1	5	2		1	6		4
Permitted Phases				2		3		
Actuated Green, G (s)	21.8	14.5	66.3	66.3	8.2	73.6		5.4
Effective Green, g (s)	21.8	14.5	66.3	66.3	8.2	73.6		5.4
Actuated g/C Ratio	0.20	0.13	0.60	0.60	0.07	0.67		0.05
Clearance Time (s)		4.0	4.5	4.5	4.0	4.5		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	557	457	2154	963	133	3293		79
v/s Ratio Prot	c0.12	c0.06	c0.24		0.02	0.13		c0.02
v/s Ratio Perm				0.01		0.03		
v/c Ratio	0.60	0.47	0.41	0.02	0.24	0.24		0.42
Uniform Delay, d1	40.1	44.2	11.5	8.8	48.0	7.2		50.8
Progression Factor	1.00	0.92	0.84	1.00	1.29	0.54		1.00
Incremental Delay, d2	1.8	0.8	0.6	0.0	0.5	0.0		3.5
Delay (s)	42.0	41.2	10.2	8.8	62.4	3.9		54.3
Level of Service	D	D	B	A	E	A		D
Approach Delay (s)			16.1			6.1		
Approach LOS			B			A		

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	60.3%	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)	126	9	38	108	12	292	19	461	12	100	573	104
Future Volume (vph)	126	9	38	108	12	292	19	461	12	100	573	104
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	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	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	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1729	1503	1805	1900	1615	3467	3554		1787	3574	1561
Flt Permitted	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1715	1729	1503	1805	1900	1615	3467	3554		1787	3574	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	131	9	40	112	12	304	20	480	12	104	597	108
RTOR Reduction (vph)	0	0	37	0	0	182	0	1	0	0	0	43
Lane Group Flow (vph)	69	71	3	113	13	122	20	492	0	104	597	65
Confl. Peds. (#/hr)			14	14			21		50	50		21
Confl. Bikes (#/hr)						1			1			5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA	Perm	Split	NA	custom	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4	4 1	6	2		1	5	
Permitted Phases			3			4						5
Actuated Green, G (s)	7.9	7.9	7.9	12.8	12.8	28.1	5.0	60.5		10.8	66.3	66.3
Effective Green, g (s)	7.9	7.9	7.9	12.8	12.8	28.1	5.0	60.5		10.8	66.3	66.3
Actuated g/C Ratio	0.07	0.07	0.07	0.12	0.12	0.26	0.05	0.55		0.10	0.60	0.60
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0		2.0	0.2		2.0	0.2	0.2
Lane Grp Cap (vph)	123	124	107	210	221	412	157	1954		175	2154	940
v/s Ratio Prot	0.04	c0.04		c0.06	0.01	0.08	0.01	c0.14		c0.06	c0.17	
v/s Ratio Perm			0.00									0.04
v/c Ratio	0.56	0.57	0.03	0.54	0.06	0.30	0.13	0.25		0.59	0.28	0.07
Uniform Delay, d1	49.4	49.4	47.5	45.8	43.2	33.0	50.4	12.9		47.5	10.4	9.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.18	0.58	0.46
Incremental Delay, d2	3.5	3.9	0.0	2.6	0.1	0.4	0.1	0.3		3.5	0.3	0.1
Delay (s)	52.8	53.3	47.5	48.5	43.4	33.4	50.5	13.2		59.7	6.4	4.3
Level of Service	D	D	D	D	D	C	D	B		E	A	A
Approach Delay (s)		51.8			37.6			14.7			12.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.7%	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 (veh/h)	52	719	127	85	710	61	42	376	320	103	423	38
Future Volume (veh/h)	52	719	127	85	710	61	42	376	320	103	423	38
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.81	1.00		0.82	1.00		0.69	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1845	1845	1900	1667	1667	1900	1759	1759	1900
Adj Flow Rate, veh/h	55	757	134	89	747	64	44	396	337	108	445	40
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	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
Percent Heavy Veh, %	5	5	5	3	3	3	14	14	14	8	8	8
Cap, veh/h	69	1004	178	113	1222	105	56	521	323	133	1139	102
Arrive On Green	0.08	0.72	0.72	0.06	0.38	0.38	0.04	0.33	0.33	0.08	0.37	0.37
Sat Flow, veh/h	1723	2807	497	1757	3203	274	1587	1583	982	1675	3053	272
Grp Volume(v), veh/h	55	463	428	89	408	403	44	396	337	108	242	243
Grp Sat Flow(s),veh/h/ln	1723	1719	1585	1757	1752	1725	1587	1583	982	1675	1671	1654
Q Serve(g_s), s	3.1	16.7	16.7	5.0	18.8	18.8	2.8	22.4	32.9	6.3	10.6	10.8
Cycle Q Clear(g_c), s	3.1	16.7	16.7	5.0	18.8	18.8	2.8	22.4	32.9	6.3	10.6	10.8
Prop In Lane	1.00		0.31	1.00		0.16	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	69	615	567	113	669	658	56	521	323	133	623	617
V/C Ratio(X)	0.79	0.75	0.75	0.79	0.61	0.61	0.79	0.76	1.04	0.81	0.39	0.39
Avail Cap(c_a), veh/h	103	615	567	123	669	658	111	521	323	151	623	617
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70	0.70	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	11.5	11.5	46.1	24.9	25.0	47.9	30.0	33.6	45.3	23.0	23.0
Incr Delay (d2), s/veh	8.9	5.9	6.4	2.7	0.4	0.4	8.7	5.8	61.6	22.2	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	8.5	7.9	2.5	9.1	9.0	1.3	10.6	14.4	3.8	4.9	5.0
LnGrp Delay(d),s/veh	54.4	17.5	18.0	48.8	25.3	25.4	56.5	35.8	95.2	67.5	23.1	23.2
LnGrp LOS	D	B	B	D	C	C	E	D	F	E	C	C
Approach Vol, veh/h		946			900			777			593	
Approach Delay, s/veh		19.8			27.7			62.7			31.2	
Approach LOS		B			C			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	42.6	11.9	37.4	10.4	40.3	7.5	41.8
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	6.0	35.1	9.0	32.9	7.0	34.1	7.0	34.9
Max Q Clear Time (g_c+I1), s	5.1	20.8	8.3	34.9	7.0	18.7	4.8	12.8
Green Ext Time (p_c), s	0.0	4.0	0.0	0.0	0.0	4.1	0.0	3.7

Intersection Summary			
HCM 2010 Ctrl Delay			34.5
HCM 2010 LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱			↑↱		↰	↑↱		↰	↑↑	
Traffic Volume (veh/h)	127	56	103	5	108	169	75	418	24	122	489	141
Future Volume (veh/h)	127	56	103	5	108	169	75	418	24	122	489	141
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.83	0.94		0.76	1.00		0.88	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1900	1792	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	127	56	103	5	108	169	75	418	24	122	489	141
Adj No. of Lanes	1	2	0	0	2	0	1	2	0	1	2	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	8	8	8	6	6	6	1	1	1	1	1	1
Cap, veh/h	203	470	347	32	324	194	94	1843	105	146	1497	426
Arrive On Green	0.07	0.28	0.28	0.06	0.06	0.06	0.05	0.54	0.54	0.08	0.57	0.57
Sat Flow, veh/h	1675	1671	1234	27	1748	1047	1792	3409	195	1792	2629	748
Grp Volume(v), veh/h	127	56	103	113	0	169	75	218	224	122	330	300
Grp Sat Flow(s),veh/h/ln	1675	1671	1234	1775	0	1047	1792	1787	1816	1792	1787	1591
Q Serve(g_s), s	8.3	3.5	9.2	0.0	0.0	22.4	5.8	8.9	9.0	9.4	13.7	14.0
Cycle Q Clear(g_c), s	8.3	3.5	9.2	8.4	0.0	22.4	5.8	8.9	9.0	9.4	13.7	14.0
Prop In Lane	1.00		1.00	0.04		1.00	1.00		0.11	1.00		0.47
Lane Grp Cap(c), veh/h	203	470	347	526	0	194	94	966	982	146	1018	906
V/C Ratio(X)	0.63	0.12	0.30	0.21	0.00	0.87	0.79	0.23	0.23	0.83	0.32	0.33
Avail Cap(c_a), veh/h	293	639	472	608	0	243	237	966	982	339	1018	906
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.00	0.96	0.85	0.85	0.85	0.84	0.84	0.84
Uniform Delay (d), s/veh	42.3	37.4	39.4	57.5	0.0	64.0	65.6	16.8	16.8	63.4	15.9	16.0
Incr Delay (d2), s/veh	3.2	0.1	0.5	0.1	0.0	19.7	4.7	0.5	0.5	4.0	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	1.6	3.2	3.7	0.0	7.6	3.0	4.5	4.7	4.8	6.9	6.4
LnGrp Delay(d),s/veh	45.5	37.5	39.9	57.5	0.0	83.7	70.3	17.3	17.3	67.3	16.6	16.8
LnGrp LOS	D	D	D	E		F	E	B	B	E	B	B
Approach Vol, veh/h		286			282			517			752	
Approach Delay, s/veh		41.9			73.2			25.0			24.9	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	15.9	80.2	13.4	30.5	11.9	84.2		43.9
Change Period (Y+Rc), s	4.5	4.5	3.0	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	26.5	46.5	18.0	32.5	18.5	54.5		53.5
Max Q Clear Time (g_c+I1), s	11.4	11.0	10.3	24.4	7.8	16.0		11.2
Green Ext Time (p_c), s	0.1	3.2	0.2	1.6	0.0	3.2		2.7

Intersection Summary		
HCM 2010 Ctrl Delay		35.0
HCM 2010 LOS		D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	404	14	122	24	0	28	0	1081	5	19	983	296
Future Volume (vph)	404	14	122	24	0	28	0	1081	5	19	983	296
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	4.0			4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.51		1.00	0.99			1.00		1.00	1.00	0.10
Flpb, ped/bikes	1.00	1.00		0.58	1.00			1.00		0.88	1.00	1.00
Frt	1.00	0.87		1.00	0.85			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	812		838	1276			3522		1562	3539	155
Flt Permitted	0.74	1.00		0.62	1.00			1.00		0.20	1.00	1.00
Satd. Flow (perm)	1349	812		546	1276			3522		332	3539	155
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	412	14	124	24	0	29	0	1103	5	19	1003	302
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	110
Lane Group Flow (vph)	412	138	0	24	19	0	0	1108	0	19	1003	192
Confl. Peds. (#/hr)			3000	3000			1227		1427	1427		1227
Confl. Bikes (#/hr)						1			8			4
Heavy Vehicles (%)	4%	4%	4%	25%	25%	25%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		D.Pm	NA			NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	34.7	34.7		34.7	35.2			76.3		76.3	76.3	76.3
Effective Green, g (s)	34.7	34.7		34.7	35.2			76.3		76.3	76.3	76.3
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.64		0.64	0.64	0.64
Clearance Time (s)	4.5	4.5		4.5	4.0			4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	3.0			0.2		0.2	0.2	0.2
Lane Grp Cap (vph)	390	234		157	374			2239		211	2250	98
v/s Ratio Prot		0.17			0.01			0.31			0.28	
v/s Ratio Perm	c0.31			0.04						0.06		c1.24
v/c Ratio	1.06	0.59		0.15	0.05			0.49		0.09	0.45	1.96
Uniform Delay, d1	42.6	36.6		31.7	30.4			11.6		8.4	11.1	21.9
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	61.2	2.4		0.2	0.1			0.8		0.8	0.6	466.5
Delay (s)	103.9	39.0		31.9	30.5			12.4		9.3	11.7	488.3
Level of Service	F	D		C	C			B		A	B	F
Approach Delay (s)		87.6			31.1			12.4			120.4	
Approach LOS		F			C			B			F	

Intersection Summary			
HCM 2000 Control Delay	73.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.67		
Actuated Cycle Length (s)	120.0	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	0	1274	0	24	42	649	959	324	5	1048	103
Future Volume (vph)	0	0	1274	0	24	42	649	959	324	5	1048	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0		6.0	5.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes			1.00		1.00	0.46	1.00	0.77		1.00	1.00	0.46
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt			0.85		1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)			2682		1696	662	3367	2578		1736	3471	712
Flt Permitted			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)			2682		1696	662	3367	2578		1736	3471	712
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	1300	0	24	43	662	979	331	5	1069	105
RTOR Reduction (vph)	0	0	198	0	0	42	0	18	0	0	0	65
Lane Group Flow (vph)	0	0	1102	0	24	1	662	1292	0	5	1069	40
Confl. Peds. (#/hr)	1277					1277	896		992	992		896
Confl. Bikes (#/hr)									11			
Heavy Vehicles (%)	6%	6%	6%	12%	12%	12%	4%	4%	4%	4%	4%	4%
Turn Type			Prot		NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases			9		3!		4 5	1 5		7!	1	
Permitted Phases						3						1
Actuated Green, G (s)			92.0		6.7	6.7	106.1	105.0		12.2	79.2	79.2
Effective Green, g (s)			92.0		6.7	6.7	106.1	98.0		12.2	79.2	79.2
Actuated g/C Ratio			0.44		0.03	0.03	0.51	0.47		0.06	0.38	0.38
Clearance Time (s)			7.0		5.0	5.0				6.0	5.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0				2.0	0.2	0.2
Lane Grp Cap (vph)			1180		54	21	1709	1208		101	1315	269
v/s Ratio Prot			c0.41		0.01		0.20	c0.50		0.00	0.31	
v/s Ratio Perm						0.00						0.06
v/c Ratio			0.93		0.44	0.07	0.39	1.07		0.05	0.81	0.15
Uniform Delay, d1			55.6		99.3	98.1	31.5	55.5		92.9	58.3	42.7
Progression Factor			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2			13.1		2.1	0.5	0.1	46.8		0.1	5.6	1.2
Delay (s)			68.7		101.4	98.6	31.6	102.3		93.0	63.8	43.9
Level of Service			E		F	F	C	F		F	E	D
Approach Delay (s)		68.7			99.6			78.6			62.2	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	71.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	209.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	1	44	206	90	60	170	49	152	549	100	56	682
Future Volume (veh/h)	1	44	206	90	60	170	49	152	549	100	56	682
Number		5	2	12	1	6	16	3	8	18	7	4
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.99		0.97	0.99		0.97	1.00		0.97	1.00	
Parking Bus, Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1900	1900	1900	1900	1881	1900	1900	1881	1900	1900	1881
Adj Flow Rate, veh/h		46	217	95	63	179	52	160	578	105	59	718
Adj No. of Lanes		0	2	0	0	1	0	0	2	0	0	2
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
Percent Heavy Veh, %		0	0	0	1	1	1	1	1	1	1	1
Cap, veh/h		166	701	291	145	369	96	262	976	188	128	1496
Arrive On Green		0.33	0.33	0.33	0.33	0.33	0.33	0.36	0.36	0.36	0.53	0.53
Sat Flow, veh/h		293	2119	881	235	1115	290	342	1839	354	122	2818
Grp Volume(v), veh/h		191	0	167	294	0	0	357	0	486	413	0
Grp Sat Flow(s),veh/h/ln		1746	0	1546	1640	0	0	898	0	1637	1464	0
Q Serve(g_s), s		0.0	0.0	5.3	2.3	0.0	0.0	15.2	0.0	15.5	1.6	0.0
Cycle Q Clear(g_c), s		4.9	0.0	5.3	8.8	0.0	0.0	25.2	0.0	15.5	17.1	0.0
Prop In Lane		0.24		0.57	0.21		0.18	0.45		0.22	0.14	
Lane Grp Cap(c), veh/h		646	0	512	610	0	0	557	0	869	840	0
V/C Ratio(X)		0.30	0.00	0.33	0.48	0.00	0.00	0.64	0.00	0.56	0.49	0.00
Avail Cap(c_a), veh/h		646	0	512	610	0	0	557	0	869	840	0
HCM Platoon Ratio		1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	0.00	0.00	0.96	0.00	0.96	1.00	0.00
Uniform Delay (d), s/veh		16.2	0.0	16.3	17.4	0.0	0.0	19.2	0.0	14.8	9.4	0.0
Incr Delay (d2), s/veh		1.2	0.0	1.7	0.2	0.0	0.0	5.4	0.0	2.5	2.1	0.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		2.8	0.0	2.5	4.3	0.0	0.0	6.6	0.0	7.6	4.8	0.0
LnGrp Delay(d),s/veh		17.4	0.0	18.0	17.6	0.0	0.0	24.6	0.0	17.3	11.4	0.0
LnGrp LOS		B		B	B			C		B	B	
Approach Vol, veh/h			358			294			843			825
Approach Delay, s/veh			17.7			17.6			20.4			11.3
Approach LOS			B			B			C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		26.0		39.0		26.0		39.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		21.5		34.5		21.5		34.5
Max Q Clear Time (g_c+I1), s		7.3		19.1		10.8		27.2
Green Ext Time (p_c), s		2.5		2.6		2.2		2.1

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	46
Future Volume (veh/h)	46
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.97
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	48
Adj No. of Lanes	0
Peak Hour Factor	0.95
Percent Heavy Veh, %	1
Cap, veh/h	103
Arrive On Green	0.53
Sat Flow, veh/h	195
Grp Volume(v), veh/h	412
Grp Sat Flow(s),veh/h/ln	1671
Q Serve(g_s), s	10.0
Cycle Q Clear(g_c), s	10.0
Prop In Lane	0.12
Lane Grp Cap(c), veh/h	887
V/C Ratio(X)	0.46
Avail Cap(c_a), veh/h	887
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	9.5
Incr Delay (d2), s/veh	1.7
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	5.0
LnGrp Delay(d),s/veh	11.2
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	0	448	358	3	473	801	0	0	0	0	476	339
Future Volume (veh/h)	0	448	358	3	473	801	0	0	0	0	476	339
Number	5	2	12		1	6	16				7	4
Initial Q (Qb), veh	0	0	0		0	0	0				0	0
Ped-Bike Adj(A_pbT)	1.00		0.96		1.00		1.00				1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900		1881	1881	0				1881	1881
Adj Flow Rate, veh/h	0	462	369		488	826	0				359	534
Adj No. of Lanes	0	2	0		2	2	0				1	2
Peak Hour Factor	0.97	0.97	0.97		0.97	0.97	0.97				0.97	0.97
Percent Heavy Veh, %	0	1	1		1	1	0				1	1
Cap, veh/h	0	842	670		613	2413	0				412	564
Arrive On Green	0.00	0.45	0.45		0.12	0.45	0.00				0.23	0.23
Sat Flow, veh/h	0	1950	1477		3476	3668	0				1792	2452
Grp Volume(v), veh/h	0	445	386		488	826	0				359	409
Grp Sat Flow(s),veh/h/ln	0	1787	1545		1738	1787	0				1792	1881
Q Serve(g_s), s	0.0	18.1	18.2		13.7	15.0	0.0				19.3	21.4
Cycle Q Clear(g_c), s	0.0	18.1	18.2		13.7	15.0	0.0				19.3	21.4
Prop In Lane	0.00		0.96		1.00		0.00				1.00	
Lane Grp Cap(c), veh/h	0	811	701		613	2413	0				412	433
V/C Ratio(X)	0.00	0.55	0.55		0.80	0.34	0.00				0.87	0.95
Avail Cap(c_a), veh/h	0	811	701		886	2413	0				412	433
HCM Platoon Ratio	1.00	1.00	1.00		0.67	0.67	1.00				1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00		0.09	0.09	0.00				1.00	1.00
Uniform Delay (d), s/veh	0.0	19.9	19.9		42.3	13.0	0.0				37.1	37.9
Incr Delay (d2), s/veh	0.0	0.8	0.9		0.4	0.0	0.0				21.5	31.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0				0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.1	7.9		6.6	7.4	0.0				12.0	14.9
LnGrp Delay(d),s/veh	0.0	20.7	20.8		42.7	13.0	0.0				58.6	69.5
LnGrp LOS		C	C		D	B					E	E
Approach Vol, veh/h		831				1314						1130
Approach Delay, s/veh		20.7				24.1						67.2
Approach LOS		C				C						E

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	22.1	49.9		28.0		72.0		
Change Period (Y+Rc), s	4.5	4.5		5.0		4.5		
Max Green Setting (Gmax), s	25.5	37.5		23.0		67.5		
Max Q Clear Time (g_c+I1), s	15.7	20.2		23.5		17.0		
Green Ext Time (p_c), s	2.0	11.8		0.0		21.9		

Intersection Summary	
HCM 2010 Ctrl Delay	38.1
HCM 2010 LOS	D

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	230
Future Volume (veh/h)	230
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.97
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	237
Adj No. of Lanes	0
Peak Hour Factor	0.97
Percent Heavy Veh, %	1
Cap, veh/h	249
Arrive On Green	0.23
Sat Flow, veh/h	1084
Grp Volume(v), veh/h	362
Grp Sat Flow(s),veh/h/ln	1655
Q Serve(g_s), s	21.5
Cycle Q Clear(g_c), s	21.5
Prop In Lane	0.66
Lane Grp Cap(c), veh/h	381
V/C Ratio(X)	0.95
Avail Cap(c_a), veh/h	381
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	37.9
Incr Delay (d2), s/veh	35.2
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	13.6
LnGrp Delay(d),s/veh	73.2
LnGrp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

Movement	EBU	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NER
Lane Configurations									
Traffic Volume (vph)	1	205	731	744	355	535	349	625	60
Future Volume (vph)	1	205	731	744	355	535	349	625	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Lane Util. Factor		1.00	0.95	0.95		0.97	0.95	0.95	1.00
Frpb, ped/bikes		1.00	1.00	0.96		1.00	1.00	0.99	1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.95		1.00	0.95	0.85	0.86
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (prot)		1787	3574	3271		3467	1695	1499	1596
Flt Permitted		0.11	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (perm)		212	3574	3271		3467	1695	1499	1596
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.95
Adj. Flow (vph)	1	211	754	767	366	552	360	644	63
RTOR Reduction (vph)	0	0	0	57	0	0	16	136	0
Lane Group Flow (vph)	0	212	754	1076	0	552	511	341	63
Confl. Peds. (#/hr)		41			41			1	
Confl. Bikes (#/hr)					2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	3%
Turn Type	custom	Prot	NA	NA		Split	NA	Perm	custom
Protected Phases		5	2	6		4	4		1
Permitted Phases	5							4	2
Actuated Green, G (s)		35.5	60.1	25.5		25.5	25.5	25.5	62.5
Effective Green, g (s)		35.5	60.1	25.5		25.5	25.5	25.5	62.5
Actuated g/C Ratio		0.36	0.60	0.26		0.26	0.26	0.26	0.62
Clearance Time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Vehicle Extension (s)		3.0	4.0	4.0		4.0	4.0	4.0	1.0
Lane Grp Cap (vph)		75	2147	834		884	432	382	1045
v/s Ratio Prot			0.21	c0.33		0.16	c0.30		0.00
v/s Ratio Perm		c1.00						0.23	0.04
v/c Ratio		2.83	0.35	1.29		0.62	1.18	0.89	0.06
Uniform Delay, d1		32.2	10.1	37.2		33.0	37.2	35.9	7.3
Progression Factor		0.78	0.73	0.90		1.00	1.00	1.00	1.00
Incremental Delay, d2		842.8	0.3	138.6		3.3	103.3	25.5	0.0
Delay (s)		868.1	7.6	172.4		36.3	140.6	61.4	7.3
Level of Service		F	A	F		D	F	E	A
Approach Delay (s)			196.4	172.4			79.3		
Approach LOS			F	F			E		

Intersection Summary			
HCM 2000 Control Delay	136.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.8%	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 (veh/h)	77	730	184	136	810	57	96	180	186	88	275	55
Future Volume (veh/h)	77	730	184	136	810	57	96	180	186	88	275	55
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.89	1.00		0.79	1.00		0.87
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1863	1863	1900	1810	1810	1900	1900	1900	1900
Adj Flow Rate, veh/h	80	760	192	142	844	59	100	188	194	92	286	57
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	6	6	2	2	2	5	5	5	0	0	0
Cap, veh/h	100	1300	328	172	1781	124	125	294	207	117	479	93
Arrive On Green	0.12	0.99	0.99	0.10	0.54	0.54	0.07	0.17	0.17	0.06	0.16	0.16
Sat Flow, veh/h	1707	2613	660	1774	3324	232	1723	1719	1210	1810	2933	568
Grp Volume(v), veh/h	80	495	457	142	449	454	100	188	194	92	173	170
Grp Sat Flow(s),veh/h/ln	1707	1703	1571	1774	1770	1787	1723	1719	1210	1810	1805	1696
Q Serve(g_s), s	4.6	0.3	0.3	7.9	15.8	15.8	5.7	10.2	15.8	5.0	8.9	9.3
Cycle Q Clear(g_c), s	4.6	0.3	0.3	7.9	15.8	15.8	5.7	10.2	15.8	5.0	8.9	9.3
Prop In Lane	1.00		0.42	1.00		0.13	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	100	847	781	172	948	957	125	294	207	117	295	277
V/C Ratio(X)	0.80	0.58	0.58	0.83	0.47	0.47	0.80	0.64	0.94	0.79	0.59	0.61
Avail Cap(c_a), veh/h	171	847	781	248	948	957	190	294	207	181	295	277
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.82	0.82	0.82	0.73	0.73	0.73	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.6	0.1	0.1	44.3	14.4	14.4	45.7	38.6	40.9	46.1	38.7	38.9
Incr Delay (d2), s/veh	4.5	2.4	2.6	7.1	1.2	1.2	7.0	3.6	44.7	5.1	2.1	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.6	0.6	4.2	7.9	8.0	3.0	5.1	7.9	2.7	4.6	4.6
LnGrp Delay(d),s/veh	48.1	2.6	2.8	51.4	15.7	15.7	52.7	42.2	85.6	51.2	40.8	41.9
LnGrp LOS	D	A	A	D	B	B	D	D	F	D	D	D
Approach Vol, veh/h		1032			1045			482			435	
Approach Delay, s/veh		6.2			20.5			61.9			43.4	
Approach LOS		A			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	58.1	10.5	21.6	13.7	54.2	11.2	20.8
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	10.0	45.9	10.0	17.1	14.0	41.9	11.0	16.1
Max Q Clear Time (g_c+I1), s	6.6	17.8	7.0	17.8	9.9	2.3	7.7	11.3
Green Ext Time (p_c), s	0.0	5.2	0.0	0.0	0.0	5.3	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	25.6
HCM 2010 LOS	C

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	73	18	689	52	213	501	55	148	22	60	27	189
Future Volume (vph)	73	18	689	52	213	501	55	148	22	60	27	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.86		0.86	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.90	1.00	0.99		0.96	1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	0.98		0.85	1.00	1.00	0.85	
Flt Protected	0.95	0.95	1.00	1.00	0.95	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1766	3539	1430	1742	4718		1313	1715	1802	1508	
Flt Permitted	0.95	0.25	1.00	1.00	0.32	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	459	3539	1430	588	4718		1313	1715	1802	1508	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	75	19	710	54	220	516	57	153	23	62	28	195
RTOR Reduction (vph)	0	0	0	36	0	2	0	105	0	0	166	0
Lane Group Flow (vph)	75	19	710	18	220	586	0	33	21	64	57	0
Confl. Peds. (#/hr)	16	15		22	22		16	15	12		15	16
Confl. Bikes (#/hr)											1	1
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%	0%	0%	0%	0%
Turn Type	Prot	pm+pt	NA	Perm	Perm	NA		Perm	Split	NA	Perm	
Protected Phases	1	1 9	6			2			4	4		
Permitted Phases		6		6	2			2			4	
Actuated Green, G (s)	8.1	55.0	48.0	48.0	34.4	34.4		34.4	21.1	21.1	21.1	
Effective Green, g (s)	8.1	51.0	48.0	48.0	34.4	34.4		34.4	21.1	21.1	21.1	
Actuated g/C Ratio	0.06	0.36	0.34	0.34	0.24	0.24		0.24	0.15	0.15	0.15	
Clearance Time (s)	5.5		5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.5		2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	100	267	1196	483	142	1142		318	254	267	224	
v/s Ratio Prot	0.04	c0.01	c0.20			0.12			0.01	0.04		
v/s Ratio Perm		0.02		0.01	c0.37			0.03			c0.04	
v/c Ratio	0.75	0.07	0.59	0.04	1.55	0.51		0.11	0.08	0.24	0.25	
Uniform Delay, d1	66.0	30.4	38.9	31.5	53.8	46.6		41.8	52.1	53.4	53.5	
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	25.5	0.1	2.2	0.1	278.9	1.7		0.7	0.1	0.2	0.2	
Delay (s)	91.5	30.4	41.1	31.7	332.7	48.2		42.5	52.2	53.5	53.7	
Level of Service	F	C	D	C	F	D		D	D	D	D	
Approach Delay (s)			44.7			113.5				53.6		
Approach LOS			D			F				D		

Intersection Summary			
HCM 2000 Control Delay	96.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	142.0	Sum of lost time (s)	31.5
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	10	81	95	121	237	95	35	15
Future Volume (vph)	10	81	95	121	237	95	35	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5			5.5	5.5	
Lane Util. Factor		0.95	0.95			1.00	0.88	
Frpb, ped/bikes		1.00	0.98			1.00	1.00	
Flpb, ped/bikes		1.00	1.00			1.00	1.00	
Frt		1.00	0.92			1.00	0.85	
Flt Protected		0.95	1.00			0.95	1.00	
Satd. Flow (prot)		1681	1596			1787	2814	
Flt Permitted		0.95	1.00			0.95	1.00	
Satd. Flow (perm)		1681	1596			1787	2814	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	84	98	125	244	98	36	15
RTOR Reduction (vph)	0	0	31	0	0	0	41	0
Lane Group Flow (vph)	0	86	200	0	0	342	10	0
Confl. Peds. (#/hr)	15	16		12	16	22	12	16
Confl. Bikes (#/hr)								
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%
Turn Type	Split	Split	NA		Prot	Prot	Prot	
Protected Phases	3	3	3		7	7	8	
Permitted Phases								
Actuated Green, G (s)		24.2	24.2			19.7	26.7	
Effective Green, g (s)		24.2	24.2			19.7	26.7	
Actuated g/C Ratio		0.17	0.17			0.14	0.19	
Clearance Time (s)		5.5	5.5			5.5	5.5	
Vehicle Extension (s)		2.0	2.0			2.5	2.5	
Lane Grp Cap (vph)		286	271			247	529	
v/s Ratio Prot		0.05	c0.13			c0.19	0.00	
v/s Ratio Perm								
v/c Ratio		0.30	0.74			1.38	0.02	
Uniform Delay, d1		51.5	55.9			61.1	47.0	
Progression Factor		1.00	1.00			1.00	1.00	
Incremental Delay, d2		0.2	8.8			196.2	0.0	
Delay (s)		51.7	64.7			257.4	47.0	
Level of Service		D	E			F	D	
Approach Delay (s)			61.1			230.1		
Approach LOS			E			F		

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	468	333	823	609	3	129	728
Future Volume (vph)	468	333	823	609	3	129	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	0.95	1.00	0.97	1.00		1.00	0.88
Frpb, ped/bikes	1.00	0.92	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		0.99	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	3610	1479	3467	1881		1764	2814
Flt Permitted	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	3610	1479	3467	1881		1764	2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	493	351	866	641	3	136	766
RTOR Reduction (vph)	0	80	0	0	0	0	43
Lane Group Flow (vph)	493	271	866	641	0	139	723
Confl. Peds. (#/hr)		36	36			5	
Confl. Bikes (#/hr)							2
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%	1%
Turn Type	NA	Perm	Split	NA	Perm	Prot	pt+ov
Protected Phases	3		1	1		2	1 2
Permitted Phases		3			2		
Actuated Green, G (s)	30.6	30.6	70.9	70.9		15.0	90.4
Effective Green, g (s)	30.6	30.6	70.9	70.9		15.0	90.4
Actuated g/C Ratio	0.24	0.24	0.55	0.55		0.12	0.70
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.5	3.5	0.2	0.2		3.0	
Lane Grp Cap (vph)	849	348	1890	1025		203	1956
v/s Ratio Prot	0.14		0.25	c0.34			0.26
v/s Ratio Perm		c0.18				0.08	
v/c Ratio	0.58	0.78	0.46	0.63		0.68	0.37
Uniform Delay, d1	44.0	46.5	17.9	20.4		55.2	8.1
Progression Factor	1.00	1.00	1.00	1.00		0.94	0.96
Incremental Delay, d2	1.1	10.8	0.8	2.9		8.8	0.1
Delay (s)	45.1	57.3	18.7	23.3		60.5	7.9
Level of Service	D	E	B	C		E	A
Approach Delay (s)	50.2			20.7		16.0	
Approach LOS	D			C		B	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	58	42	71	6	136	201	5	146	565	33	122	591
Future Volume (vph)	58	42	71	6	136	201	5	146	565	33	122	591
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5			4.5			4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.95			0.95			1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96			0.91			1.00	0.99		1.00	0.99
Flpb, ped/bikes	0.99	1.00			1.00			1.00	1.00		1.00	1.00
Frt	1.00	0.91			0.91			1.00	0.99		1.00	0.97
Flt Protected	0.95	1.00			1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1649	2916			2891			1805	3561		1805	3472
Flt Permitted	0.25	1.00			0.95			0.06	1.00		0.95	1.00
Satd. Flow (perm)	440	2916			2749			110	3561		1805	3472
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	62	45	76	6	145	214	5	155	601	35	130	629
RTOR Reduction (vph)	0	63	0	0	188	0	0	0	3	0	0	15
Lane Group Flow (vph)	62	58	0	0	177	0	0	160	633	0	130	757
Confl. Peds. (#/hr)	63		22	22		63		25		34	34	
Confl. Bikes (#/hr)										2		
Heavy Vehicles (%)	8%	8%	8%	4%	4%	4%	0%	0%	0%	0%	0%	0%
Turn Type	D.P+P	NA		Perm	NA		custom	Prot	NA		Prot	NA
Protected Phases	3	8			4			5	2		1	6
Permitted Phases	4			4			5					
Actuated Green, G (s)	19.8	22.8			15.8			69.2	80.4		13.3	24.5
Effective Green, g (s)	19.8	22.8			15.8			69.2	80.4		13.3	24.5
Actuated g/C Ratio	0.15	0.18			0.12			0.53	0.62		0.10	0.19
Clearance Time (s)	3.0	4.5			4.5			4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0			2.0			0.2	3.0		2.0	0.2
Lane Grp Cap (vph)	104	511			334			58	2202		184	654
v/s Ratio Prot	c0.02	0.02							0.18		0.07	c0.22
v/s Ratio Perm	c0.07				0.06			c1.46				
v/c Ratio	0.60	0.11			0.53			2.76	0.29		0.71	1.16
Uniform Delay, d1	49.5	45.1			53.6			30.4	11.5		56.5	52.8
Progression Factor	1.00	1.00			1.57			1.63	0.63		1.10	0.99
Incremental Delay, d2	8.9	0.1			0.7			832.8	0.3		8.9	86.4
Delay (s)	58.3	45.2			84.9			882.5	7.6		70.9	138.5
Level of Service	E	D			F			F	A		E	F
Approach Delay (s)		49.6			84.9				183.4			128.7
Approach LOS		D			F				F			F

Intersection Summary			
HCM 2000 Control Delay	134.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.02		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	134
Future Volume (vph)	134
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	143
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	25
Confl. Bikes (#/hr)	
Heavy Vehicles (%)	0%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	1	81	106	10	15	50	16	0	752	199	1	9
Future Volume (vph)	1	81	106	10	15	50	16	0	752	199	1	9
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	4.5		4.5			
Lane Util. Factor		0.95	0.95			0.95	1.00		0.95			
Frpb, ped/bikes		1.00	0.99			1.00	0.98		0.97			
Flpb, ped/bikes		1.00	1.00			0.99	1.00		1.00			
Frt		1.00	0.99			1.00	0.85		0.97			
Flt Protected		0.95	1.00			0.99	1.00		1.00			
Satd. Flow (prot)		1627	1684			3532	1586		3369			
Flt Permitted		0.71	0.98			0.83	1.00		1.00			
Satd. Flow (perm)		1217	1657			2959	1586		3369			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1	84	110	10	16	52	17	0	783	207	1	9
RTOR Reduction (vph)	0	0	3	0	0	0	15	0	10	0	0	0
Lane Group Flow (vph)	0	77	125	0	0	68	2	0	980	0	0	0
Confl. Peds. (#/hr)		2		29	29		2	11		29		29
Confl. Bikes (#/hr)							1			1		
Heavy Vehicles (%)	5%	5%	5%	5%	0%	0%	0%	1%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		Perm	NA	Perm		NA		Perm	Perm
Protected Phases			2			2			1			
Permitted Phases	2	2			2		2				1	1
Actuated Green, G (s)		14.2	14.2			14.2	14.2		106.8			
Effective Green, g (s)		14.2	14.2			14.2	14.2		106.8			
Actuated g/C Ratio		0.11	0.11			0.11	0.11		0.82			
Clearance Time (s)		4.5	4.5			4.5	4.5		4.5			
Vehicle Extension (s)		2.0	2.0			2.0	2.0		0.2			
Lane Grp Cap (vph)		132	180			323	173		2767			
v/s Ratio Prot									c0.29			
v/s Ratio Perm		0.06	c0.08			0.02	0.00					
v/c Ratio		0.58	0.70			0.21	0.01		0.35			
Uniform Delay, d1		55.1	55.8			52.8	51.6		2.9			
Progression Factor		0.83	0.83			1.00	1.00		0.93			
Incremental Delay, d2		3.9	8.4			0.1	0.0		0.3			
Delay (s)		49.4	54.7			52.9	51.6		3.0			
Level of Service		D	D			D	D		A			
Approach Delay (s)			52.7			52.7			3.0			
Approach LOS			D			D			A			

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	842	292
Future Volume (vph)	842	292
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.5	4.5
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.96
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3571	1540
Flt Permitted	0.94	1.00
Satd. Flow (perm)	3364	1540
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	877	304
RTOR Reduction (vph)	0	49
Lane Group Flow (vph)	887	255
Confl. Peds. (#/hr)		11
Confl. Bikes (#/hr)		
Heavy Vehicles (%)	1%	1%
Turn Type	NA	Perm
Protected Phases	1	
Permitted Phases		1
Actuated Green, G (s)	106.8	106.8
Effective Green, g (s)	106.8	106.8
Actuated g/C Ratio	0.82	0.82
Clearance Time (s)	4.5	4.5
Vehicle Extension (s)	0.2	0.2
Lane Grp Cap (vph)	2763	1265
v/s Ratio Prot		
v/s Ratio Perm	0.26	0.17
v/c Ratio	0.32	0.20
Uniform Delay, d1	2.8	2.5
Progression Factor	1.07	1.97
Incremental Delay, d2	0.3	0.3
Delay (s)	3.3	5.2
Level of Service	A	A
Approach Delay (s)	3.8	
Approach LOS	A	

Intersection Summary

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	830	33	7	703	943	2	0	663
Future Volume (vph)	830	33	7	703	943	2	0	663
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5			4.5
Lane Util. Factor	0.97			0.95	0.88			0.95
Frpb, ped/bikes	1.00			1.00	0.98			1.00
Flpb, ped/bikes	1.00			1.00	1.00			1.00
Frt	0.99			1.00	0.85			1.00
Flt Protected	0.95			1.00	1.00			1.00
Satd. Flow (prot)	3462			3573	2748			3574
Flt Permitted	0.95			0.95	1.00			0.95
Satd. Flow (perm)	3462			3391	2748			3408
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	856	34	7	725	972	2	0	684
RTOR Reduction (vph)	4	0	0	0	583	0	0	0
Lane Group Flow (vph)	886	0	0	732	389	0	0	686
Confl. Peds. (#/hr)					3		3	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	NA	Perm	Perm		NA
Protected Phases	1			2				2
Permitted Phases			2		2	2		
Actuated Green, G (s)	30.0			26.0	26.0			26.0
Effective Green, g (s)	30.0			26.0	26.0			26.0
Actuated g/C Ratio	0.46			0.40	0.40			0.40
Clearance Time (s)	4.5			4.5	4.5			4.5
Vehicle Extension (s)	0.2			2.0	2.0			2.0
Lane Grp Cap (vph)	1597			1356	1099			1363
v/s Ratio Prot	c0.26							
v/s Ratio Perm				c0.22	0.14			0.20
v/c Ratio	0.55			0.54	0.35			0.50
Uniform Delay, d1	12.7			14.9	13.6			14.6
Progression Factor	0.84			1.00	1.00			2.45
Incremental Delay, d2	1.3			0.2	0.1			0.0
Delay (s)	12.0			15.1	13.7			35.9
Level of Service	B			B	B			D
Approach Delay (s)	12.0			14.3				35.9
Approach LOS	B			B				D

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	10	1628	5	0	1512
Future Vol, veh/h	0	10	1628	5	0	1512
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	1	1
Mvmt Flow	0	11	1714	5	0	1592

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2512	859	0	0	-	-
Stage 1	1716	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	-	-
Pot Cap-1 Maneuver	24	304	-	-	0	-
Stage 1	133	-	-	-	0	-
Stage 2	410	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	24	304	-	-	-	-
Mov Cap-2 Maneuver	120	-	-	-	-	-
Stage 1	133	-	-	-	-	-
Stage 2	410	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	304	-
HCM Lane V/C Ratio	-	-	0.035	-
HCM Control Delay (s)	-	-	17.3	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Vol, veh/h	12	79	2	1559	0	2	0	1505
Future Vol, veh/h	12	79	2	1559	0	2	0	1505
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	-	-	-	0
Grade, %	0	-	-	0	-	-	-	0
Peak Hour Factor	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	1	1	1	1
Mvmt Flow	13	83	2	1641	0	2	0	1584

Major/Minor	Minor1		Major1			Major2		
Conflicting Flow All	2441	821	1584	0	-	1641	-	-
Stage 1	1645	-	-	-	-	-	-	-
Stage 2	796	-	-	-	-	-	-	-
Critical Hdwy	6.8	6.9	6.42	-	-	6.42	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.51	-	-	2.51	-	-
Pot Cap-1 Maneuver	27	322	141	-	0	129	0	-
Stage 1	146	-	-	-	0	-	0	-
Stage 2	410	-	-	-	0	-	0	-
Platoon blocked, %				-				-
Mov Cap-1 Maneuver	27	322	141	-	-	97	-	-
Mov Cap-2 Maneuver	27	-	-	-	-	-	-	-
Stage 1	146	-	-	-	-	-	-	-
Stage 2	410	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	83.3	0	0.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	132	-
HCM Lane V/C Ratio	-	0.726	-
HCM Control Delay (s)	-	83.3	-
HCM Lane LOS	-	F	-
HCM 95th %tile Q(veh)	-	4.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	0	0	1551	50	11	43	1423
Future Vol, veh/h	0	0	1551	50	11	43	1423
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	-	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	1	1	1	1
Mvmt Flow	0	0	1616	52	11	45	1482

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	-	834	0	0	1667	1668	0
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	6.42	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.51	2.21	-
Pot Cap-1 Maneuver	0	316	-	-	124	386	-
Stage 1	0	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	-	316	-	-	270	270	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	270	-
HCM Lane V/C Ratio	-	-	-	0.208	-
HCM Control Delay (s)	-	-	0	21.8	-
HCM Lane LOS	-	-	A	C	-
HCM 95th %tile Q(veh)	-	-	-	0.8	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	403	11	161	1	0	3	0	1202	4	2	1222	195
Future Volume (vph)	403	11	161	1	0	3	0	1202	4	2	1222	195
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	4.0			4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.83		1.00	1.00			1.00		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		0.87	1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.85			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1286		1577	1615			3603		1787	3574	1481
Flt Permitted	0.76	1.00		0.59	1.00			1.00		0.13	1.00	1.00
Satd. Flow (perm)	1368	1286		972	1615			3603		243	3574	1481
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	429	12	171	1	0	3	0	1279	4	2	1300	207
RTOR Reduction (vph)	0	15	0	0	2	0	0	0	0	0	0	91
Lane Group Flow (vph)	429	168	0	1	1	0	0	1283	0	2	1300	116
Confl. Peds. (#/hr)			118	118			21		159	159		21
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		D.Pm	NA			NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	39.6	39.6		39.6	40.1			61.4		61.4	61.4	61.4
Effective Green, g (s)	39.6	39.6		39.6	40.1			61.4		61.4	61.4	61.4
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.56		0.56	0.56	0.56
Clearance Time (s)	4.5	4.5		4.5	4.0			4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	3.0			0.2		0.2	0.2	0.2
Lane Grp Cap (vph)	492	462		349	588			2011		135	1994	826
v/s Ratio Prot		0.13			0.00			0.36			c0.36	
v/s Ratio Perm	c0.31			0.00						0.01		0.08
v/c Ratio	0.87	0.36		0.00	0.00			0.64		0.01	0.65	0.14
Uniform Delay, d1	32.8	25.9		22.6	22.2			16.7		10.8	16.9	11.6
Progression Factor	1.00	1.00		1.00	1.00			1.65		1.00	1.00	1.00
Incremental Delay, d2	15.1	0.2		0.0	0.0			0.9		0.2	1.7	0.4
Delay (s)	48.0	26.1		22.6	22.2			28.3		11.0	18.6	12.0
Level of Service	D	C		C	C			C		B	B	B
Approach Delay (s)		41.4			22.3			28.3			17.6	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	633	0	12	52	359	1125	246	4	75	1180
Future Volume (vph)	0	0	633	0	12	52	359	1125	246	4	75	1180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0			6.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95			1.00	0.95
Frpb, ped/bikes			1.00		1.00	0.59	1.00	0.94			1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00			0.96	1.00
Frt			0.85		1.00	0.85	1.00	0.97			1.00	1.00
Flt Protected			1.00		1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)			2707		1900	951	3502	3318			1718	3574
Flt Permitted			1.00		1.00	1.00	0.95	1.00			0.25	1.00
Satd. Flow (perm)			2707		1900	951	3502	3318			452	3574
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	673	0	13	55	382	1197	262	4	80	1255
RTOR Reduction (vph)	0	0	475	0	0	52	0	20	0	0	0	0
Lane Group Flow (vph)	0	0	198	0	13	3	382	1439	0	0	84	1255
Confl. Peds. (#/hr)	142					142	74		102		102	
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type			Perm		NA	Perm	Prot	NA		custom	Prot	NA
Protected Phases					3!		4 5	1 5			7!	1
Permitted Phases			4			3				7		
Actuated Green, G (s)			32.4		5.6	5.6	56.4	55.0			16.0	31.0
Effective Green, g (s)			32.4		5.6	5.6	56.4	48.0			16.0	31.0
Actuated g/C Ratio			0.29		0.05	0.05	0.51	0.44			0.15	0.28
Clearance Time (s)			7.0		5.0	5.0					6.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0					2.0	0.2
Lane Grp Cap (vph)			797		96	48	1795	1447			65	1007
v/s Ratio Prot					c0.01		0.11	c0.43				c0.35
v/s Ratio Perm			c0.07			0.00					c0.19	
v/c Ratio			0.25		0.14	0.06	0.21	0.99			1.29	1.25
Uniform Delay, d1			29.5		49.9	49.7	14.7	30.9			47.0	39.5
Progression Factor			1.00		1.00	1.00	0.91	1.00			0.87	1.29
Incremental Delay, d2			0.1		0.2	0.2	0.0	21.6			196.6	117.6
Delay (s)			29.6		50.1	49.9	13.3	52.5			237.6	168.5
Level of Service			C		D	D	B	D			F	F
Approach Delay (s)		29.6			49.9			44.4				162.0
Approach LOS		C			D			D				F

Intersection Summary			
HCM 2000 Control Delay	84.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	102
Future Volume (vph)	102
Ideal Flow (vphpl)	1900
Total Lost time (s)	5.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.86
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1378
Flt Permitted	1.00
Satd. Flow (perm)	1378
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	109
RTOR Reduction (vph)	78
Lane Group Flow (vph)	31
Confl. Peds. (#/hr)	74
Heavy Vehicles (%)	1%
Turn Type	Perm
Protected Phases	
Permitted Phases	1
Actuated Green, G (s)	31.0
Effective Green, g (s)	31.0
Actuated g/C Ratio	0.28
Clearance Time (s)	5.0
Vehicle Extension (s)	0.2
Lane Grp Cap (vph)	388
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.08
Uniform Delay, d1	29.0
Progression Factor	1.00
Incremental Delay, d2	0.3
Delay (s)	29.3
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	WBR	NBL	NBT	NBR2	SBL	SBT	SBR	NWR
Lane Configurations								
Traffic Volume (vph)	731	200	601	30	30	564	200	30
Future Volume (vph)	731	200	601	30	30	564	200	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.5	4.5	4.0	4.5		4.0
Lane Util. Factor	0.88	0.97	0.95	1.00	1.00	0.91		1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Frt	0.85	1.00	1.00	0.85	1.00	0.96		0.86
Flt Protected	1.00	0.95	1.00	1.00	0.95	1.00		1.00
Satd. Flow (prot)	2814	3467	3574	1599	1787	4916		1611
Flt Permitted	1.00	0.95	1.00	1.00	0.95	1.00		1.00
Satd. Flow (perm)	2814	3467	3574	1599	1787	4916		1611
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	786	215	646	32	32	606	215	33
RTOR Reduction (vph)	466	0	0	13	0	40	0	0
Lane Group Flow (vph)	320	215	646	19	32	781	0	33
Confl. Peds. (#/hr)					66			
Confl. Bikes (#/hr)							5	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	2%
Turn Type	custom	Prot	NA	Perm	Prot	NA		Prot
Protected Phases	3 1	5	2		1	6		4
Permitted Phases				2		3		
Actuated Green, G (s)	21.9	11.7	66.2	66.2	8.4	76.4		5.4
Effective Green, g (s)	21.9	11.7	66.2	66.2	8.4	76.4		5.4
Actuated g/C Ratio	0.20	0.11	0.60	0.60	0.08	0.69		0.05
Clearance Time (s)		4.0	4.5	4.5	4.0	4.5		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	560	368	2150	962	136	3414		79
v/s Ratio Prot	c0.11	c0.06	c0.18		0.02	0.13		c0.02
v/s Ratio Perm				0.01		0.03		
v/c Ratio	0.57	0.58	0.30	0.02	0.24	0.23		0.42
Uniform Delay, d1	39.8	46.8	10.6	8.8	47.8	6.1		50.8
Progression Factor	1.00	0.95	0.87	1.00	1.41	0.31		1.00
Incremental Delay, d2	1.4	2.3	0.3	0.0	0.3	0.0		3.5
Delay (s)	41.2	46.6	9.6	8.9	67.5	1.9		54.3
Level of Service	D	D	A	A	E	A		D
Approach Delay (s)			18.5			4.4		
Approach LOS			B			A		

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	55.9%	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)	144	10	43	110	13	296	22	434	10	94	543	119
Future Volume (vph)	144	10	43	110	13	296	22	434	10	94	543	119
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	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	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	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1729	1519	1805	1900	1615	3467	3558		1787	3574	1560
Flt Permitted	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1715	1729	1519	1805	1900	1615	3467	3558		1787	3574	1560
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	150	10	45	115	14	308	23	452	10	98	566	124
RTOR Reduction (vph)	0	0	41	0	0	168	0	1	0	0	0	51
Lane Group Flow (vph)	79	81	4	115	14	140	23	461	0	98	566	73
Confl. Peds. (#/hr)			14	14			21		50	50		21
Confl. Bikes (#/hr)						1			1			5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA	Perm	Split	NA	custom	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4	4 1	6	2		1	5	
Permitted Phases			3			4						5
Actuated Green, G (s)	9.6	9.6	9.6	13.2	13.2	28.1	4.6	58.8		10.4	64.6	64.6
Effective Green, g (s)	9.6	9.6	9.6	13.2	13.2	28.1	4.6	58.8		10.4	64.6	64.6
Actuated g/C Ratio	0.09	0.09	0.09	0.12	0.12	0.26	0.04	0.53		0.09	0.59	0.59
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0		2.0	0.2		2.0	0.2	0.2
Lane Grp Cap (vph)	149	150	132	216	228	412	144	1901		168	2098	916
v/s Ratio Prot	0.05	c0.05		c0.06	0.01	0.09	0.01	c0.13		c0.05	c0.16	
v/s Ratio Perm			0.00									0.05
v/c Ratio	0.53	0.54	0.03	0.53	0.06	0.34	0.16	0.24		0.58	0.27	0.08
Uniform Delay, d1	48.0	48.1	45.9	45.5	42.9	33.4	50.8	13.7		47.7	11.1	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.28	0.44	0.10
Incremental Delay, d2	1.8	2.1	0.0	2.5	0.1	0.5	0.2	0.3		3.3	0.3	0.2
Delay (s)	49.9	50.2	46.0	48.0	43.0	33.9	51.0	14.0		64.3	5.2	1.2
Level of Service	D	D	D	D	D	C	D	B		E	A	A
Approach Delay (s)		49.1			37.9			15.7			11.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.9%	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 (veh/h)	55	765	135	90	755	65	45	400	340	110	450	40
Future Volume (veh/h)	55	765	135	90	755	65	45	400	340	110	450	40
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.81	1.00		0.82	1.00		0.69	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1845	1845	1900	1667	1667	1900	1759	1759	1900
Adj Flow Rate, veh/h	58	805	142	95	795	68	47	421	358	116	474	42
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	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
Percent Heavy Veh, %	5	5	5	3	3	3	14	14	14	8	8	8
Cap, veh/h	73	1026	181	105	1225	105	58	515	318	134	1127	99
Arrive On Green	0.06	0.49	0.49	0.06	0.38	0.38	0.04	0.32	0.32	0.08	0.37	0.37
Sat Flow, veh/h	1723	2812	496	1757	3204	274	1587	1583	977	1675	3057	269
Grp Volume(v), veh/h	58	492	455	95	435	428	47	421	358	116	258	258
Grp Sat Flow(s),veh/h/ln	1723	1719	1588	1757	1752	1725	1587	1583	977	1675	1671	1655
Q Serve(g_s), s	3.3	23.8	23.8	5.4	20.4	20.4	2.9	24.4	32.5	6.8	11.5	11.7
Cycle Q Clear(g_c), s	3.3	23.8	23.8	5.4	20.4	20.4	2.9	24.4	32.5	6.8	11.5	11.7
Prop In Lane	1.00		0.31	1.00		0.16	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	73	627	580	105	670	660	58	515	318	134	616	610
V/C Ratio(X)	0.79	0.78	0.78	0.90	0.65	0.65	0.81	0.82	1.13	0.87	0.42	0.42
Avail Cap(c_a), veh/h	103	627	580	105	670	660	111	515	318	134	616	610
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70	0.70	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	22.5	22.5	46.7	25.4	25.4	47.8	31.0	33.8	45.5	23.6	23.6
Incr Delay (d2), s/veh	11.1	6.8	7.4	9.8	0.5	0.5	9.7	9.4	89.3	39.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	12.3	11.5	2.9	9.9	9.7	1.4	12.0	16.6	4.6	5.3	5.3
LnGrp Delay(d),s/veh	57.8	29.3	29.8	56.5	25.8	25.8	57.5	40.4	123.1	84.8	23.7	23.8
LnGrp LOS	E	C	C	E	C	C	E	D	F	F	C	C
Approach Vol, veh/h		1005			958			826			632	
Approach Delay, s/veh		31.2			28.9			77.2			35.0	
Approach LOS		C			C			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	42.7	12.0	37.0	10.0	41.0	7.6	41.4
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	6.0	36.5	8.0	32.5	6.0	36.5	7.0	33.5
Max Q Clear Time (g_c+I1), s	5.3	22.4	8.8	34.5	7.4	25.8	4.9	13.7
Green Ext Time (p_c), s	0.0	4.3	0.0	0.0	0.0	3.9	0.0	3.9

Intersection Summary	
HCM 2010 Ctrl Delay	42.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	60	110	5	115	180	80	445	25	130	520	150
Future Volume (veh/h)	135	60	110	5	115	180	80	445	25	130	520	150
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.83	0.95		0.76	1.00		0.88	1.00		0.84
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1900	1792	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	135	60	110	5	115	180	80	445	25	130	520	150
Adj No. of Lanes	1	2	0	0	2	0	1	2	0	1	2	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	8	8	8	6	6	6	1	1	1	1	1	1
Cap, veh/h	206	487	362	32	337	204	100	1795	100	154	1459	417
Arrive On Green	0.08	0.29	0.29	0.06	0.06	0.06	0.06	0.53	0.53	0.09	0.56	0.56
Sat Flow, veh/h	1675	1671	1243	25	1751	1059	1792	3413	191	1792	2624	749
Grp Volume(v), veh/h	135	60	110	120	0	180	80	232	238	130	352	318
Grp Sat Flow(s),veh/h/ln	1675	1671	1243	1777	0	1059	1792	1787	1817	1792	1787	1586
Q Serve(g_s), s	8.8	3.7	9.6	0.0	0.0	23.6	6.2	9.9	10.0	10.0	15.3	15.6
Cycle Q Clear(g_c), s	8.8	3.7	9.6	8.9	0.0	23.6	6.2	9.9	10.0	10.0	15.3	15.6
Prop In Lane	1.00		1.00	0.04		1.00	1.00		0.11	1.00		0.47
Lane Grp Cap(c), veh/h	206	487	362	545	0	204	100	940	955	154	994	882
V/C Ratio(X)	0.66	0.12	0.30	0.22	0.00	0.88	0.80	0.25	0.25	0.84	0.35	0.36
Avail Cap(c_a), veh/h	279	615	457	602	0	238	237	940	955	326	994	882
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.00	0.96	0.85	0.85	0.85	0.84	0.84	0.84
Uniform Delay (d), s/veh	41.7	36.4	38.5	57.1	0.0	64.0	65.3	18.1	18.1	63.0	17.2	17.2
Incr Delay (d2), s/veh	3.5	0.1	0.5	0.1	0.0	24.2	4.6	0.5	0.5	4.0	0.8	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	1.7	3.3	3.9	0.0	8.3	3.2	5.0	5.2	5.1	7.8	7.0
LnGrp Delay(d),s/veh	45.2	36.6	39.0	57.2	0.0	88.2	69.9	18.6	18.6	67.0	18.0	18.2
LnGrp LOS	D	D	D	E		F	E	B	B	E	B	B
Approach Vol, veh/h		305			300			550			800	
Approach Delay, s/veh		41.3			75.8			26.1			26.0	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	16.6	78.1	13.9	31.4	12.3	82.4		45.3
Change Period (Y+Rc), s	4.5	4.5	3.0	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	25.5	49.5	17.0	31.5	18.5	56.5		51.5
Max Q Clear Time (g_c+I1), s	12.0	12.0	10.8	25.6	8.2	17.6		11.6
Green Ext Time (p_c), s	0.1	3.4	0.2	1.3	0.0	3.4		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	36.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	430	15	130	25	0	30	0	1150	5	20	1045	315
Future Volume (vph)	430	15	130	25	0	30	0	1150	5	20	1045	315
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	4.0			4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.51		1.00	0.99			1.00		1.00	1.00	0.10
Flpb, ped/bikes	1.00	1.00		0.59	1.00			1.00		0.91	1.00	1.00
Frt	1.00	0.87		1.00	0.85			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	812		852	1276			3523		1604	3539	155
Flt Permitted	0.74	1.00		0.61	1.00			1.00		0.18	1.00	1.00
Satd. Flow (perm)	1346	812		547	1276			3523		298	3539	155
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	439	15	133	26	0	31	0	1173	5	20	1066	321
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	123
Lane Group Flow (vph)	439	148	0	26	21	0	0	1178	0	20	1066	198
Confl. Peds. (#/hr)			3000	3000			1227		1427	1427		1227
Confl. Bikes (#/hr)						1			8			4
Heavy Vehicles (%)	4%	4%	4%	25%	25%	25%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		D.Pm	NA			NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	36.9	36.9		36.9	37.4			74.1		74.1	74.1	74.1
Effective Green, g (s)	36.9	36.9		36.9	37.4			74.1		74.1	74.1	74.1
Actuated g/C Ratio	0.31	0.31		0.31	0.31			0.62		0.62	0.62	0.62
Clearance Time (s)	4.5	4.5		4.5	4.0			4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	3.0			0.2		0.2	0.2	0.2
Lane Grp Cap (vph)	413	249		168	397			2175		184	2185	95
v/s Ratio Prot		0.18			0.02			0.33			0.30	
v/s Ratio Perm	c0.33			0.05						0.07		c1.28
v/c Ratio	1.06	0.59		0.15	0.05			0.54		0.11	0.49	2.09
Uniform Delay, d1	41.5	35.2		30.2	28.9			13.2		9.4	12.6	23.0
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	1.00
Incremental Delay, d2	62.0	2.5		0.2	0.1			1.0		1.2	0.8	522.9
Delay (s)	103.5	37.7		30.4	29.0			14.2		10.6	13.3	545.9
Level of Service	F	D		C	C			B		B	B	F
Approach Delay (s)		86.9			29.6			14.2			134.8	
Approach LOS		F			C			B			F	

Intersection Summary			
HCM 2000 Control Delay	80.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.0%	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	1355	0	25	45	390	1020	345	5	1115	110
Future Volume (vph)	0	0	1355	0	25	45	390	1020	345	5	1115	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0		6.0	5.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes			1.00		1.00	0.46	1.00	0.77		1.00	1.00	0.46
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt			0.85		1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)			2682		1696	662	3367	2578		1736	3471	712
Flt Permitted			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)			2682		1696	662	3367	2578		1736	3471	712
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	1383	0	26	46	398	1041	352	5	1138	112
RTOR Reduction (vph)	0	0	198	0	0	44	0	18	0	0	0	70
Lane Group Flow (vph)	0	0	1185	0	26	2	398	1375	0	5	1138	42
Confl. Peds. (#/hr)	1277					1277	896		992	992		896
Confl. Bikes (#/hr)									11			
Heavy Vehicles (%)	6%	6%	6%	12%	12%	12%	4%	4%	4%	4%	4%	4%
Turn Type			Prot		NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases			9		3!		4 5	1 5		7!	1	
Permitted Phases						3						1
Actuated Green, G (s)			92.2		6.9	6.9	105.9	104.8		12.2	79.2	79.2
Effective Green, g (s)			92.2		6.9	6.9	105.9	97.8		12.2	79.2	79.2
Actuated g/C Ratio			0.44		0.03	0.03	0.51	0.47		0.06	0.38	0.38
Clearance Time (s)			7.0		5.0	5.0				6.0	5.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0				2.0	0.2	0.2
Lane Grp Cap (vph)			1183		55	21	1706	1206		101	1315	269
v/s Ratio Prot			c0.44		0.02		0.12	c0.53		0.00	0.33	
v/s Ratio Perm						0.00						0.06
v/c Ratio			1.00		0.47	0.07	0.23	1.14		0.05	0.87	0.16
Uniform Delay, d1			58.4		99.3	97.9	28.8	55.6		92.9	60.0	42.9
Progression Factor			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2			26.6		2.3	0.5	0.0	73.6		0.1	7.8	1.2
Delay (s)			85.0		101.6	98.5	28.9	129.2		93.0	67.8	44.1
Level of Service			F		F	F	C	F		F	E	D
Approach Delay (s)		85.0			99.6			106.9			65.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	88.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	209.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	1	39	191	85	55	160	44	147	509	95	56	647
Future Volume (veh/h)	1	39	191	85	55	160	44	147	509	95	56	647
Number		5	2	12	1	6	16	3	8	18	7	4
Initial Q (Qb), veh		0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.99		0.99	0.99		0.99	0.99		0.95	1.00	
Parking Bus, Adj		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1900	1900	1900	1900	1881	1900	1900	1881	1900	1900	1881
Adj Flow Rate, veh/h		41	201	89	58	168	46	155	536	100	59	681
Adj No. of Lanes		0	2	0	0	1	0	0	2	0	0	2
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
Percent Heavy Veh, %		0	0	0	1	1	1	1	1	1	1	1
Cap, veh/h		267	1244	537	234	655	167	92	352	92	64	509
Arrive On Green		0.61	0.61	0.61	0.61	0.61	0.61	0.51	0.51	0.51	0.25	0.25
Sat Flow, veh/h		327	2047	884	275	1077	275	45	1387	363	0	2004
Grp Volume(v), veh/h		174	0	157	272	0	0	343	0	448	389	0
Grp Sat Flow(s),veh/h/ln		1699	0	1558	1627	0	0	169	0	1626	519	0
Q Serve(g_s), s		0.0	0.0	2.9	0.0	0.0	0.0	1.5	0.0	16.5	0.0	0.0
Cycle Q Clear(g_c), s		2.6	0.0	2.9	4.5	0.0	0.0	16.5	0.0	16.5	16.5	0.0
Prop In Lane		0.24		0.57	0.21		0.17	0.45		0.22	0.15	
Lane Grp Cap(c), veh/h		1101	0	947	1056	0	0	123	0	413	196	0
V/C Ratio(X)		0.16	0.00	0.17	0.26	0.00	0.00	2.79	0.00	1.08	1.99	0.00
Avail Cap(c_a), veh/h		1101	0	947	1056	0	0	123	0	413	196	0
HCM Platoon Ratio		1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)		1.00	0.00	1.00	1.00	0.00	0.00	0.97	0.00	0.97	1.00	0.00
Uniform Delay (d), s/veh		5.5	0.0	5.6	5.9	0.0	0.0	21.8	0.0	16.0	22.9	0.0
Incr Delay (d2), s/veh		0.3	0.0	0.4	0.0	0.0	0.0	824.7	0.0	68.0	463.5	0.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		1.4	0.0	1.3	2.2	0.0	0.0	30.4	0.0	14.8	28.7	0.0
LnGrp Delay(d),s/veh		5.8	0.0	5.9	5.9	0.0	0.0	846.5	0.0	84.0	486.4	0.0
LnGrp LOS		A		A	A			F		F	F	
Approach Vol, veh/h			331			272			791			783
Approach Delay, s/veh			5.9			5.9			415.1			268.6
Approach LOS			A			A			F			F

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		21.0		44.0		21.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		39.5		16.5		39.5		16.5
Max Q Clear Time (g_c+I1), s		4.9		18.5		6.5		18.5
Green Ext Time (p_c), s		2.7		0.0		2.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	249.1
HCM 2010 LOS	F

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	41
Future Volume (veh/h)	41
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.94
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	43
Adj No. of Lanes	0
Peak Hour Factor	0.95
Percent Heavy Veh, %	1
Cap, veh/h	46
Arrive On Green	0.25
Sat Flow, veh/h	182
Grp Volume(v), veh/h	394
Grp Sat Flow(s),veh/h/ln	1666
Q Serve(g_s), s	15.0
Cycle Q Clear(g_c), s	15.0
Prop In Lane	0.11
Lane Grp Cap(c), veh/h	423
V/C Ratio(X)	0.93
Avail Cap(c_a), veh/h	423
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	23.7
Incr Delay (d2), s/veh	29.4
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	10.3
LnGrp Delay(d),s/veh	53.1
LnGrp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	0	418	338	3	448	761	0	0	0	0	451	319
Future Volume (veh/h)	0	418	338	3	448	761	0	0	0	0	451	319
Number	5	2	12		1	6	16				7	4
Initial Q (Qb), veh	0	0	0		0	0	0				0	0
Ped-Bike Adj(A_pbT)	1.00		0.96		1.00		1.00				1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00				1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900		1881	1881	0				1881	1881
Adj Flow Rate, veh/h	0	431	348		462	785	0				339	506
Adj No. of Lanes	0	2	0		2	2	0				1	2
Peak Hour Factor	0.97	0.97	0.97		0.97	0.97	0.97				0.97	0.97
Percent Heavy Veh, %	0	1	1		1	1	0				1	1
Cap, veh/h	0	828	664		564	2341	0				448	616
Arrive On Green	0.00	0.45	0.45		0.32	1.00	0.00				0.25	0.25
Sat Flow, veh/h	0	1942	1482		3476	3668	0				1792	2464
Grp Volume(v), veh/h	0	417	362		462	785	0				339	386
Grp Sat Flow(s),veh/h/ln	0	1787	1543		1738	1787	0				1792	1881
Q Serve(g_s), s	0.0	16.8	16.9		12.2	0.0	0.0				17.5	19.3
Cycle Q Clear(g_c), s	0.0	16.8	16.9		12.2	0.0	0.0				17.5	19.3
Prop In Lane	0.00		0.96		1.00		0.00				1.00	
Lane Grp Cap(c), veh/h	0	800	691		564	2341	0				448	470
V/C Ratio(X)	0.00	0.52	0.52		0.82	0.34	0.00				0.76	0.82
Avail Cap(c_a), veh/h	0	800	691		886	2341	0				448	470
HCM Platoon Ratio	1.00	1.00	1.00		2.00	2.00	1.00				1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00		0.70	0.70	0.00				1.00	1.00
Uniform Delay (d), s/veh	0.0	19.9	19.9		32.4	0.0	0.0				34.7	35.4
Incr Delay (d2), s/veh	0.0	0.6	0.7		3.3	0.3	0.0				11.3	14.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0				0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	8.4	7.3		6.0	0.1	0.0				10.1	12.0
LnGrp Delay(d),s/veh	0.0	20.5	20.7		35.7	0.3	0.0				46.0	50.1
LnGrp LOS		C	C		D	A					D	D
Approach Vol, veh/h		779				1247						1067
Approach Delay, s/veh		20.6				13.4						49.5
Approach LOS		C				B						D

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	20.7	49.3		30.0		70.0		
Change Period (Y+Rc), s	4.5	4.5		5.0		4.5		
Max Green Setting (Gmax), s	25.5	35.5		25.0		65.5		
Max Q Clear Time (g_c+I1), s	14.2	18.9		21.5		2.0		
Green Ext Time (p_c), s	2.0	10.9		1.7		21.4		

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	215
Future Volume (veh/h)	215
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.97
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	222
Adj No. of Lanes	0
Peak Hour Factor	0.97
Percent Heavy Veh, %	1
Cap, veh/h	269
Arrive On Green	0.25
Sat Flow, veh/h	1075
Grp Volume(v), veh/h	342
Grp Sat Flow(s),veh/h/ln	1658
Q Serve(g_s), s	19.5
Cycle Q Clear(g_c), s	19.5
Prop In Lane	0.65
Lane Grp Cap(c), veh/h	414
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	414
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	35.4
Incr Delay (d2), s/veh	17.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	10.9
LnGrp Delay(d),s/veh	52.4
LnGrp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

Movement	EBU	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NER
Lane Configurations									
Traffic Volume (vph)	1	190	696	714	340	500	324	585	60
Future Volume (vph)	1	190	696	714	340	500	324	585	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Lane Util. Factor		1.00	0.95	0.95		0.97	0.95	0.95	1.00
Frpb, ped/bikes		1.00	1.00	0.96		1.00	1.00	0.99	1.00
Flpb, ped/bikes		0.99	1.00	1.00		1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.95		1.00	0.95	0.85	0.86
Flt Protected		0.95	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (prot)		1761	3574	3272		3467	1694	1499	1596
Flt Permitted		0.30	1.00	1.00		0.95	1.00	1.00	1.00
Satd. Flow (perm)		549	3574	3272		3467	1694	1499	1596
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.95
Adj. Flow (vph)	1	196	718	736	351	515	334	603	63
RTOR Reduction (vph)	0	0	0	57	0	0	17	181	0
Lane Group Flow (vph)	0	197	718	1030	0	515	474	265	63
Confl. Peds. (#/hr)		41			41			1	
Confl. Bikes (#/hr)					2				
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	3%
Turn Type	custom	Prot	NA	NA		Split	NA	Perm	custom
Protected Phases		5	2	6		4	4		1
Permitted Phases	5							4	2
Actuated Green, G (s)		13.5	54.2	43.5		29.5	29.5	29.5	58.5
Effective Green, g (s)		13.5	54.2	43.5		29.5	29.5	29.5	58.5
Actuated g/C Ratio		0.14	0.54	0.44		0.29	0.29	0.29	0.58
Clearance Time (s)		4.5	4.5	4.5		4.5	4.5	4.5	3.0
Vehicle Extension (s)		3.0	4.0	4.0		4.0	4.0	4.0	1.0
Lane Grp Cap (vph)		74	1937	1423		1022	499	442	981
v/s Ratio Prot			0.20	c0.31		0.15	c0.28		0.00
v/s Ratio Perm		c0.36						0.18	0.04
v/c Ratio		2.66	0.37	0.72		0.50	0.95	0.60	0.06
Uniform Delay, d1		43.2	13.1	23.3		29.2	34.5	30.2	8.9
Progression Factor		0.74	1.54	1.54		1.00	1.00	1.00	1.00
Incremental Delay, d2		773.4	0.4	3.0		1.8	29.6	5.9	0.0
Delay (s)		805.3	20.6	39.0		31.0	64.1	36.1	9.0
Level of Service		F	C	D		C	E	D	A
Approach Delay (s)			189.6	39.0			43.8		
Approach LOS			F	D			D		

Intersection Summary			
HCM 2000 Control Delay	79.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	82.5%	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 (veh/h)	77	715	179	126	770	52	91	165	176	78	265	50
Future Volume (veh/h)	77	715	179	126	770	52	91	165	176	78	265	50
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.89	1.00		0.80	1.00		0.87
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1863	1863	1900	1810	1810	1900	1900	1900	1900
Adj Flow Rate, veh/h	80	745	186	131	802	54	95	172	183	81	276	52
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	6	6	2	2	2	5	5	5	0	0	0
Cap, veh/h	100	1322	330	160	1787	120	119	306	218	104	494	91
Arrive On Green	0.12	1.00	1.00	0.09	0.54	0.54	0.07	0.18	0.18	0.06	0.17	0.17
Sat Flow, veh/h	1707	2622	655	1774	3335	224	1723	1719	1223	1810	2968	544
Grp Volume(v), veh/h	80	484	447	131	425	431	95	172	183	81	165	163
Grp Sat Flow(s),veh/h/ln	1707	1703	1574	1774	1770	1789	1723	1719	1223	1810	1805	1707
Q Serve(g_s), s	4.6	0.0	0.0	7.3	14.7	14.7	5.4	9.1	14.5	4.4	8.4	8.8
Cycle Q Clear(g_c), s	4.6	0.0	0.0	7.3	14.7	14.7	5.4	9.1	14.5	4.4	8.4	8.8
Prop In Lane	1.00		0.42	1.00		0.13	1.00		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	100	859	794	160	948	959	119	306	218	104	300	284
V/C Ratio(X)	0.80	0.56	0.56	0.82	0.45	0.45	0.80	0.56	0.84	0.78	0.55	0.57
Avail Cap(c_a), veh/h	273	859	794	177	948	959	327	490	349	127	300	284
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.87	0.87	0.87	0.79	0.79	0.79	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.6	0.0	0.0	44.7	14.2	14.2	45.9	37.5	39.7	46.5	38.2	38.4
Incr Delay (d2), s/veh	4.8	2.3	2.5	17.2	1.2	1.2	4.5	0.6	5.1	17.5	1.2	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.6	0.6	4.3	7.4	7.5	2.7	4.4	5.2	2.7	4.3	4.3
LnGrp Delay(d),s/veh	48.3	2.3	2.5	61.9	15.4	15.4	50.4	38.1	44.8	64.0	39.5	40.2
LnGrp LOS	D	A	A	E	B	B	D	D	D	E	D	D
Approach Vol, veh/h		1011			987			450			409	
Approach Delay, s/veh		6.1			21.6			43.4			44.6	
Approach LOS		A			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	58.1	9.7	22.3	13.0	54.9	10.9	21.1
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	16.0	31.5	7.0	28.5	10.0	37.5	19.0	16.5
Max Q Clear Time (g_c+I1), s	6.6	16.7	6.4	16.5	9.3	2.0	7.4	10.8
Green Ext Time (p_c), s	0.0	4.3	0.0	1.4	0.0	5.0	0.0	1.0

Intersection Summary			
HCM 2010 Ctrl Delay			22.8
HCM 2010 LOS			C

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	68	18	644	52	203	461	55	138	22	55	27	184
Future Volume (vph)	68	18	644	52	203	461	55	138	22	55	27	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.86		0.86	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.90	1.00	0.99		0.96	1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.97	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	0.98		0.85	1.00	1.00	0.85	
Flt Protected	0.95	0.95	1.00	1.00	0.95	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1765	3539	1430	1735	4709		1313	1715	1802	1508	
Flt Permitted	0.95	0.28	1.00	1.00	0.37	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	515	3539	1430	672	4709		1313	1715	1802	1508	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	70	19	664	54	209	475	57	142	23	57	28	190
RTOR Reduction (vph)	0	0	0	35	0	2	0	96	0	0	162	0
Lane Group Flow (vph)	70	19	664	19	209	545	0	32	21	59	56	0
Confl. Peds. (#/hr)	16	15		22	22		16	15	12		15	16
Confl. Bikes (#/hr)											1	1
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%	0%	0%	0%	0%
Turn Type	Prot	pm+pt	NA	Perm	Perm	NA		Perm	Split	NA	Perm	
Protected Phases	1	1 9	6			2			4	4		
Permitted Phases		6		6	2			2			4	
Actuated Green, G (s)	8.5	57.4	49.5	49.5	35.5	35.5		35.5	21.0	21.0	21.0	
Effective Green, g (s)	8.5	53.4	49.5	49.5	35.5	35.5		35.5	21.0	21.0	21.0	
Actuated g/C Ratio	0.06	0.38	0.35	0.35	0.25	0.25		0.25	0.15	0.15	0.15	
Clearance Time (s)	5.5		5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.5		2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	105	302	1233	498	168	1177		328	253	266	223	
v/s Ratio Prot	0.04	c0.01	c0.19			0.12			0.01	0.03		
v/s Ratio Perm		0.02		0.01	c0.31			0.02			c0.04	
v/c Ratio	0.67	0.06	0.54	0.04	1.24	0.46		0.10	0.08	0.22	0.25	
Uniform Delay, d1	65.4	28.7	37.1	30.5	53.2	45.2		40.9	52.2	53.3	53.5	
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	13.5	0.1	1.7	0.1	149.8	1.3		0.6	0.1	0.2	0.2	
Delay (s)	78.8	28.7	38.8	30.7	203.1	46.5		41.5	52.2	53.5	53.8	
Level of Service	E	C	D	C	F	D		D	D	D	D	
Approach Delay (s)			41.5			82.8				53.6		
Approach LOS			D			F				D		

Intersection Summary			
HCM 2000 Control Delay	91.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	142.0	Sum of lost time (s)	31.5
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	10	76	90	111	222	95	35	15
Future Volume (vph)	10	76	90	111	222	95	35	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5			5.5	5.5	
Lane Util. Factor		0.95	0.95			1.00	0.88	
Frpb, ped/bikes		1.00	0.98			1.00	1.00	
Flpb, ped/bikes		1.00	1.00			1.00	1.00	
Frt		1.00	0.92			1.00	0.85	
Flt Protected		0.95	1.00			0.95	1.00	
Satd. Flow (prot)		1681	1599			1787	2814	
Flt Permitted		0.95	1.00			0.95	1.00	
Satd. Flow (perm)		1681	1599			1787	2814	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	78	93	114	229	98	36	15
RTOR Reduction (vph)	0	0	30	0	0	0	42	0
Lane Group Flow (vph)	0	80	185	0	0	327	9	0
Confl. Peds. (#/hr)	15	16		12	16	22	12	16
Confl. Bikes (#/hr)								
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	1%	1%
Turn Type	Split	Split	NA		Prot	Prot	Prot	
Protected Phases	3	3	3		7	7	8	
Permitted Phases								
Actuated Green, G (s)		24.3	24.3			17.3	25.2	
Effective Green, g (s)		24.3	24.3			17.3	25.2	
Actuated g/C Ratio		0.17	0.17			0.12	0.18	
Clearance Time (s)		5.5	5.5			5.5	5.5	
Vehicle Extension (s)		2.0	2.0			2.5	2.5	
Lane Grp Cap (vph)		287	273			217	499	
v/s Ratio Prot		0.05	c0.12			c0.18	0.00	
v/s Ratio Perm								
v/c Ratio		0.28	0.68			1.51	0.02	
Uniform Delay, d1		51.2	55.2			62.4	48.2	
Progression Factor		1.00	1.00			1.00	1.00	
Incremental Delay, d2		0.2	5.2			250.6	0.0	
Delay (s)		51.4	60.4			312.9	48.2	
Level of Service		D	E			F	D	
Approach Delay (s)			57.9			277.2		
Approach LOS			E			F		

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBU	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	438	313	758	574	3	119	683
Future Volume (vph)	438	313	758	574	3	119	683
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	0.95	1.00	0.97	1.00		1.00	0.88
Frpb, ped/bikes	1.00	0.92	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	3610	1479	3467	1881		1770	2787
Flt Permitted	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	3610	1479	3467	1881		1770	2787
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.92	0.94	0.94
Adj. Flow (vph)	461	329	798	604	3	127	727
RTOR Reduction (vph)	0	78	0	0	0	0	25
Lane Group Flow (vph)	461	251	798	604	0	130	702
Confl. Peds. (#/hr)		36	36				
Heavy Vehicles (%)	0%	0%	1%	1%	2%	2%	2%
Turn Type	NA	Perm	Split	NA	Perm	Prot	pt+ov
Protected Phases	3		1	1		2	1 2
Permitted Phases		3			2		
Actuated Green, G (s)	26.9	26.9	76.9	76.9		12.7	94.1
Effective Green, g (s)	26.9	26.9	76.9	76.9		12.7	94.1
Actuated g/C Ratio	0.21	0.21	0.59	0.59		0.10	0.72
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.5	3.5	0.2	0.2		3.0	
Lane Grp Cap (vph)	746	306	2050	1112		172	2017
v/s Ratio Prot	0.13		0.23	c0.32			0.25
v/s Ratio Perm		c0.17				0.07	
v/c Ratio	0.62	0.82	0.39	0.54		0.76	0.35
Uniform Delay, d1	46.9	49.3	14.1	16.0		57.1	6.6
Progression Factor	1.00	1.00	1.00	1.00		0.97	1.09
Incremental Delay, d2	1.6	16.4	0.6	1.9		16.6	0.1
Delay (s)	48.5	65.7	14.6	17.9		72.0	7.3
Level of Service	D	E	B	B		E	A
Approach Delay (s)	55.6			16.0		17.1	
Approach LOS	E			B		B	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	53	42	66	6	136	186	5	141	535	33	117	546
Future Volume (veh/h)	53	42	66	6	136	186	5	141	535	33	117	546
Number	3	8	18	7	4	14		5	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.89		1.00		0.97	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1900	1827	1900		1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	56	44	69	6	145	198		150	569	35	124	581
Adj No. of Lanes	1	2	0	0	2	0		1	2	0	1	2
Peak Hour Factor	0.95	0.95	0.95	0.94	0.94	0.94		0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	6	6	6	4	4	4		0	0	0	0	0
Cap, veh/h	135	398	356	33	312	219		175	2002	123	149	1620
Arrive On Green	0.04	0.23	0.23	0.06	0.06	0.06		0.10	0.58	0.58	0.08	0.57
Sat Flow, veh/h	1707	1703	1524	23	1793	1260		1810	3448	212	1810	2863
Grp Volume(v), veh/h	56	44	69	151	0	198		150	297	307	124	366
Grp Sat Flow(s),veh/h/ln	1707	1703	1524	1816	0	1260		1810	1805	1855	1810	1805
Q Serve(g_s), s	3.4	2.6	4.7	0.0	0.0	20.3		10.6	10.8	10.8	8.8	14.3
Cycle Q Clear(g_c), s	3.4	2.6	4.7	10.3	0.0	20.3		10.6	10.8	10.8	8.8	14.3
Prop In Lane	1.00		1.00	0.04		1.00		1.00		0.11	1.00	
Lane Grp Cap(c), veh/h	135	398	356	453	0	219		175	1048	1077	149	1021
V/C Ratio(X)	0.41	0.11	0.19	0.33	0.00	0.90		0.86	0.28	0.28	0.83	0.36
Avail Cap(c_a), veh/h	231	504	451	465	0	228		327	1048	1077	174	1021
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33		1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.98	0.00	0.98		0.77	0.77	0.77	0.91	0.91
Uniform Delay (d), s/veh	42.3	39.2	40.0	55.5	0.0	60.2		57.8	13.7	13.7	58.8	15.4
Incr Delay (d2), s/veh	2.0	0.1	0.3	0.2	0.0	32.8		3.6	0.5	0.5	20.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.3	2.0	4.9	0.0	9.1		5.5	5.5	5.7	5.3	7.4
LnGrp Delay(d),s/veh	44.3	39.3	40.3	55.6	0.0	93.0		61.4	14.2	14.2	79.3	16.3
LnGrp LOS	D	D	D	E		F		E	B	B	E	B
Approach Vol, veh/h		169			349				754			848
Approach Delay, s/veh		41.4			76.8				23.6			25.5
Approach LOS		D			E				C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	15.2	80.0	7.7	27.1	17.1	78.1		34.8
Change Period (Y+Rc), s	4.5	4.5	3.0	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	12.5	65.5	12.0	23.5	23.5	54.5		38.5
Max Q Clear Time (g_c+I1), s	10.8	12.8	5.4	22.3	12.6	16.4		6.7
Green Ext Time (p_c), s	0.0	4.4	0.0	0.3	0.0	4.3		2.4

Intersection Summary		
HCM 2010 Ctrl Delay		34.5
HCM 2010 LOS		C

Notes

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	134
Future Volume (veh/h)	134
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.98
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	143
Adj No. of Lanes	0
Peak Hour Factor	0.94
Percent Heavy Veh, %	0
Cap, veh/h	398
Arrive On Green	0.57
Sat Flow, veh/h	703
Grp Volume(v), veh/h	358
Grp Sat Flow(s),veh/h/ln	1761
Q Serve(g_s), s	14.4
Cycle Q Clear(g_c), s	14.4
Prop In Lane	0.40
Lane Grp Cap(c), veh/h	996
V/C Ratio(X)	0.36
Avail Cap(c_a), veh/h	996
HCM Platoon Ratio	1.00
Upstream Filter(I)	0.91
Uniform Delay (d), s/veh	15.4
Incr Delay (d2), s/veh	0.9
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	7.2
LnGrp Delay(d),s/veh	16.3
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer	

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	1	76	106	10	15	50	16	0	707	199	1	9
Future Volume (vph)	1	76	106	10	15	50	16	0	707	199	1	9
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	4.5		4.5			
Lane Util. Factor		0.95	0.95			0.95	1.00		0.95			
Frpb, ped/bikes		1.00	0.99			1.00	0.98		0.97			
Flpb, ped/bikes		1.00	1.00			0.99	1.00		1.00			
Frt		1.00	0.99			1.00	0.85		0.97			
Flt Protected		0.95	1.00			0.99	1.00		1.00			
Satd. Flow (prot)		1627	1684			3532	1586		3359			
Flt Permitted		0.71	0.98			0.83	1.00		1.00			
Satd. Flow (perm)		1217	1657			2959	1586		3359			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1	79	110	10	16	52	17	0	736	207	1	9
RTOR Reduction (vph)	0	0	3	0	0	0	15	0	12	0	0	0
Lane Group Flow (vph)	0	72	125	0	0	68	2	0	931	0	0	0
Confl. Peds. (#/hr)		2		29	29		2	11		29		29
Confl. Bikes (#/hr)							1			1		
Heavy Vehicles (%)	5%	5%	5%	5%	0%	0%	0%	1%	1%	1%	1%	1%
Turn Type	Perm	Perm	NA		Perm	NA	Perm		NA		Perm	Perm
Protected Phases			2			2			1			
Permitted Phases	2	2			2		2				1	1
Actuated Green, G (s)		14.2	14.2			14.2	14.2		106.8			
Effective Green, g (s)		14.2	14.2			14.2	14.2		106.8			
Actuated g/C Ratio		0.11	0.11			0.11	0.11		0.82			
Clearance Time (s)		4.5	4.5			4.5	4.5		4.5			
Vehicle Extension (s)		2.0	2.0			2.0	2.0		0.2			
Lane Grp Cap (vph)		132	180			323	173		2759			
v/s Ratio Prot									c0.28			
v/s Ratio Perm		0.06	c0.08			0.02	0.00					
v/c Ratio		0.55	0.70			0.21	0.01		0.34			
Uniform Delay, d1		54.8	55.8			52.8	51.6		2.9			
Progression Factor		0.77	0.77			1.00	1.00		0.93			
Incremental Delay, d2		2.2	8.3			0.1	0.0		0.3			
Delay (s)		44.3	51.5			52.9	51.6		2.9			
Level of Service		D	D			D	D		A			
Approach Delay (s)			48.9			52.7			2.9			
Approach LOS			D			D			A			

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	772	277
Future Volume (vph)	772	277
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.5	4.5
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.96
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3571	1540
Flt Permitted	0.94	1.00
Satd. Flow (perm)	3363	1540
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	804	289
RTOR Reduction (vph)	0	52
Lane Group Flow (vph)	814	237
Confl. Peds. (#/hr)		11
Confl. Bikes (#/hr)		
Heavy Vehicles (%)	1%	1%
Turn Type	NA	Perm
Protected Phases	1	
Permitted Phases		1
Actuated Green, G (s)	106.8	106.8
Effective Green, g (s)	106.8	106.8
Actuated g/C Ratio	0.82	0.82
Clearance Time (s)	4.5	4.5
Vehicle Extension (s)	0.2	0.2
Lane Grp Cap (vph)	2762	1265
v/s Ratio Prot		
v/s Ratio Perm	0.24	0.15
v/c Ratio	0.29	0.19
Uniform Delay, d1	2.7	2.4
Progression Factor	0.74	0.16
Incremental Delay, d2	0.2	0.3
Delay (s)	2.3	0.7
Level of Service	A	A
Approach Delay (s)	1.8	
Approach LOS	A	

Intersection Summary

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	760	33	7	668	898	2	0	618
Future Volume (vph)	760	33	7	668	898	2	0	618
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5			4.5
Lane Util. Factor	0.97			0.95	0.88			0.95
Frpb, ped/bikes	1.00			1.00	0.98			1.00
Flpb, ped/bikes	1.00			1.00	1.00			1.00
Frt	0.99			1.00	0.85			1.00
Flt Protected	0.95			1.00	1.00			1.00
Satd. Flow (prot)	3427			3572	2746			3574
Flt Permitted	0.95			0.95	1.00			0.95
Satd. Flow (perm)	3427			3390	2746			3408
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	784	34	7	689	926	2	0	637
RTOR Reduction (vph)	5	0	0	0	610	0	0	0
Lane Group Flow (vph)	813	0	0	696	316	0	0	639
Confl. Peds. (#/hr)					3		3	
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	NA	Perm	Perm		NA
Protected Phases	1			2				2
Permitted Phases			2		2	2		
Actuated Green, G (s)	33.8			22.2	22.2			22.2
Effective Green, g (s)	33.8			22.2	22.2			22.2
Actuated g/C Ratio	0.52			0.34	0.34			0.34
Clearance Time (s)	4.5			4.5	4.5			4.5
Vehicle Extension (s)	0.2			2.0	2.0			2.0
Lane Grp Cap (vph)	1782			1157	937			1163
v/s Ratio Prot	c0.24							
v/s Ratio Perm				c0.21	0.12			0.19
v/c Ratio	0.46			0.60	0.34			0.55
Uniform Delay, d1	9.8			17.7	15.9			17.3
Progression Factor	0.93			1.00	1.00			0.57
Incremental Delay, d2	0.8			0.6	0.1			0.3
Delay (s)	9.9			18.3	16.0			10.1
Level of Service	A			B	B			B
Approach Delay (s)	9.9			17.0				10.1
Approach LOS	A			B				B

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	5	1553	5	0	1397
Future Vol, veh/h	0	5	1553	5	0	1397
Conflicting Peds, #/hr	10	10	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	1	1
Mvmt Flow	0	5	1635	5	0	1471

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2392	840	0	0	-	-
Stage 1	1647	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	-	-
Pot Cap-1 Maneuver	29	313	-	-	0	-
Stage 1	145	-	-	-	0	-
Stage 2	435	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	29	308	-	-	-	-
Mov Cap-2 Maneuver	130	-	-	-	-	-
Stage 1	144	-	-	-	-	-
Stage 2	431	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	308	-
HCM Lane V/C Ratio	-	-	0.017	-
HCM Control Delay (s)	-	-	16.9	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Traffic Vol, veh/h	12	74	2	1484	0	2	0	1390
Future Vol, veh/h	12	74	2	1484	0	2	0	1390
Conflicting Peds, #/hr	1	1	0	0	1	0	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	-	-	-	0
Grade, %	0	-	-	0	-	-	-	0
Peak Hour Factor	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	1	1	1	1
Mvmt Flow	13	78	2	1562	0	2	0	1463

Major/Minor	Minor1		Major1			Major2		
Conflicting Flow All	2303	782	1463	0	-	1562	-	-
Stage 1	1566	-	-	-	-	-	-	-
Stage 2	737	-	-	-	-	-	-	-
Critical Hdwy	6.8	6.9	6.42	-	-	6.42	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.51	-	-	2.51	-	-
Pot Cap-1 Maneuver	33	341	168	-	0	145	0	-
Stage 1	161	-	-	-	0	-	0	-
Stage 2	439	-	-	-	0	-	0	-
Platoon blocked, %				-				-
Mov Cap-1 Maneuver	33	341	168	-	-	114	-	-
Mov Cap-2 Maneuver	33	-	-	-	-	-	-	-
Stage 1	161	-	-	-	-	-	-	-
Stage 2	439	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	61.7	0	0.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	148	-
HCM Lane V/C Ratio	-	0.612	-
HCM Control Delay (s)	-	61.7	-
HCM Lane LOS	-	F	-
HCM 95th %tile Q(veh)	-	3.3	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	0	0	1476	50	11	43	1308
Future Vol, veh/h	0	0	1476	50	11	43	1308
Conflicting Peds, #/hr	85	84	0	85	0	84	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	-	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	1	1	1	1
Mvmt Flow	0	0	1538	52	11	45	1363

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	-	964	0	0	1589	1675	0
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	6.9	-	-	6.42	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.51	2.21	-
Pot Cap-1 Maneuver	0	259	-	-	139	383	-
Stage 1	0	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	-	224	-	-	270	270	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	270	-
HCM Lane V/C Ratio	-	-	-	0.208	-
HCM Control Delay (s)	-	-	0	21.8	-
HCM Lane LOS	-	-	A	C	-
HCM 95th %tile Q(veh)	-	-	-	0.8	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	383	11	156	0	0	0	0	1147	4	2	1122	180
Future Volume (vph)	383	11	156	0	0	0	0	1147	4	2	1122	180
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		4.5	4.5	4.5
Lane Util. Factor	1.00	1.00						0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.83						1.00		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00						1.00		0.96	1.00	1.00
Frt	1.00	0.86						1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00						1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1287						3603		1713	3574	1481
Flt Permitted	0.76	1.00						1.00		0.16	1.00	1.00
Satd. Flow (perm)	1370	1287						3603		296	3574	1481
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	407	12	166	0	0	0	0	1220	4	2	1194	191
RTOR Reduction (vph)	0	52	0	0	0	0	0	0	0	0	0	74
Lane Group Flow (vph)	407	126	0	0	0	0	0	1224	0	2	1194	117
Confl. Peds. (#/hr)			118	118			21		159	159		21
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		D.Pm				NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	33.5	33.5						67.5		67.5	67.5	67.5
Effective Green, g (s)	33.5	33.5						67.5		67.5	67.5	67.5
Actuated g/C Ratio	0.30	0.30						0.61		0.61	0.61	0.61
Clearance Time (s)	4.5	4.5						4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0						0.2		0.2	0.2	0.2
Lane Grp Cap (vph)	417	391						2210		181	2193	908
v/s Ratio Prot		0.10						c0.34			0.33	
v/s Ratio Perm	c0.30									0.01		0.08
v/c Ratio	0.98	0.32						0.55		0.01	0.54	0.13
Uniform Delay, d1	37.9	29.5						12.4		8.3	12.3	8.9
Progression Factor	1.00	1.00						1.96		1.00	1.00	1.00
Incremental Delay, d2	37.3	0.2						0.6		0.1	1.0	0.3
Delay (s)	75.1	29.7						25.1		8.4	13.3	9.2
Level of Service	E	C						C		A	B	A
Approach Delay (s)		61.3			0.0			25.1			12.7	
Approach LOS		E			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	0	0	601	0	12	52	344	1075	246	5	70	1080
Future Volume (vph)	0	0	601	0	12	52	344	1075	246	5	70	1080
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0			6.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95			1.00	0.95
Frpb, ped/bikes			1.00		1.00	0.59	1.00	0.94			1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00			0.96	1.00
Frt			0.85		1.00	0.85	1.00	0.97			1.00	1.00
Flt Protected			1.00		1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)			2707		1900	951	3502	3307			1712	3574
Flt Permitted			1.00		1.00	1.00	0.95	1.00			0.29	1.00
Satd. Flow (perm)			2707		1900	951	3502	3307			515	3574
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	639	0	13	55	366	1144	262	5	74	1149
RTOR Reduction (vph)	0	0	401	0	0	52	0	21	0	0	0	0
Lane Group Flow (vph)	0	0	238	0	13	3	366	1385	0	0	79	1149
Confl. Peds. (#/hr)	142					142	74		102		102	
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type			Prot		NA	Perm	Prot	NA		custom	Prot	NA
Protected Phases			9		3!		4 5	1 5			7!	1
Permitted Phases						3				7		
Actuated Green, G (s)			41.0		5.6	5.6	54.4	57.0			14.0	33.0
Effective Green, g (s)			41.0		5.6	5.6	54.4	50.0			14.0	33.0
Actuated g/C Ratio			0.37		0.05	0.05	0.49	0.45			0.13	0.30
Clearance Time (s)			7.0		5.0	5.0					6.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0					2.0	0.2
Lane Grp Cap (vph)			1008		96	48	1731	1503			65	1072
v/s Ratio Prot			c0.09		0.01		0.10	c0.42				c0.32
v/s Ratio Perm						0.00					c0.15	
v/c Ratio			0.24		0.14	0.06	0.21	0.92			1.22	1.07
Uniform Delay, d1			23.7		49.9	49.7	15.7	28.2			48.0	38.5
Progression Factor			1.00		1.00	1.00	1.15	0.79			0.79	1.48
Incremental Delay, d2			0.0		0.2	0.2	0.0	8.8			172.5	47.1
Delay (s)			23.8		50.1	49.9	18.0	31.0			210.6	103.9
Level of Service			C		D	D	B	C			F	F
Approach Delay (s)		23.8			49.9			28.3				104.4
Approach LOS		C			D			C				F

Intersection Summary			
HCM 2000 Control Delay	54.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	97
Future Volume (vph)	97
Ideal Flow (vphpl)	1900
Total Lost time (s)	5.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.86
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1378
Flt Permitted	1.00
Satd. Flow (perm)	1378
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	103
RTOR Reduction (vph)	72
Lane Group Flow (vph)	31
Confl. Peds. (#/hr)	74
Heavy Vehicles (%)	1%
Turn Type	Perm
Protected Phases	
Permitted Phases	1
Actuated Green, G (s)	33.0
Effective Green, g (s)	33.0
Actuated g/C Ratio	0.30
Clearance Time (s)	5.0
Vehicle Extension (s)	0.2
Lane Grp Cap (vph)	413
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.07
Uniform Delay, d1	27.6
Progression Factor	1.00
Incremental Delay, d2	0.3
Delay (s)	27.9
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	701	741	0	0	699
Future Volume (vph)	0	701	741	0	0	699
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5			2.0
Lane Util. Factor		0.88	0.95			0.91
Frpb, ped/bikes		1.00	1.00			1.00
Flpb, ped/bikes		1.00	1.00			1.00
Frt		0.85	1.00			1.00
Flt Protected		1.00	1.00			1.00
Satd. Flow (prot)		2814	3574			5136
Flt Permitted		1.00	1.00			1.00
Satd. Flow (perm)		2814	3574			5136
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	754	797	0	0	752
RTOR Reduction (vph)	0	270	0	0	0	0
Lane Group Flow (vph)	0	484	797	0	0	752
Confl. Peds. (#/hr)				66	66	
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type		Prot	NA			NA
Protected Phases		4	2			6 4
Permitted Phases						
Actuated Green, G (s)		28.5	72.5			110.0
Effective Green, g (s)		28.5	72.5			105.5
Actuated g/C Ratio		0.26	0.66			0.96
Clearance Time (s)		4.5	4.5			
Vehicle Extension (s)		2.0	3.5			
Lane Grp Cap (vph)		729	2355			4925
v/s Ratio Prot		c0.17	c0.22			0.15
v/s Ratio Perm						
v/c Ratio		0.66	0.34			0.15
Uniform Delay, d1		36.5	8.2			0.1
Progression Factor		1.00	1.56			1.00
Incremental Delay, d2		1.8	0.4			0.0
Delay (s)		38.2	13.2			0.1
Level of Service		D	B			A
Approach Delay (s)	38.2		13.2			0.1
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.5%	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)	144	10	43	105	13	276	22	389	10	84	488	119
Future Volume (vph)	144	10	43	105	13	276	22	389	10	84	488	119
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		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.95	0.95	1.00		1.00	1.00	1.00	0.95		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	0.92
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	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1729	1561		1819	1593	1787	3545		1787	3574	1471
Flt Permitted	0.95	0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1715	1729	1561		1819	1593	1787	3545		1787	3574	1471
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	150	10	45	109	14	288	23	405	10	88	508	124
RTOR Reduction (vph)	0	0	38	0	0	254	0	1	0	0	0	59
Lane Group Flow (vph)	79	81	7	0	123	34	23	414	0	88	508	65
Confl. Peds. (#/hr)			14	14			21		50	50		21
Confl. Bikes (#/hr)						1			1			5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases			3			4						6
Actuated Green, G (s)	18.0	18.0	18.0		13.1	13.1	2.9	52.2		8.7	58.0	58.0
Effective Green, g (s)	18.0	18.0	18.0		13.1	13.1	2.9	52.2		8.7	58.0	58.0
Actuated g/C Ratio	0.16	0.16	0.16		0.12	0.12	0.03	0.47		0.08	0.53	0.53
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	2.5	2.5		2.0	2.0	2.0	2.5		2.0	2.5	2.5
Lane Grp Cap (vph)	280	282	255		216	189	47	1682		141	1884	775
v/s Ratio Prot	0.05	c0.05			c0.07		0.01	0.12		c0.05	c0.14	
v/s Ratio Perm			0.00			0.02						0.04
v/c Ratio	0.28	0.29	0.03		0.57	0.18	0.49	0.25		0.62	0.27	0.08
Uniform Delay, d1	40.3	40.4	38.7		45.8	43.6	52.8	17.2		49.1	14.3	12.9
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.31	0.44	0.03
Incremental Delay, d2	0.4	0.4	0.0		2.1	0.2	2.9	0.3		6.0	0.4	0.2
Delay (s)	40.7	40.8	38.7		47.8	43.8	55.7	17.5		70.3	6.7	0.6
Level of Service	D	D	D		D	D	E	B		E	A	A
Approach Delay (s)		40.3			45.0			19.5			13.4	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	50.9%	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 (veh/h)	30	685	160	160	685	65	50	330	160	95	300	45
Future Volume (veh/h)	30	685	160	160	685	65	50	330	160	95	300	45
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.83	1.00		0.86	1.00		0.59	1.00		0.80
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1845	1845	1900	1667	1667	1900	1759	1759	1900
Adj Flow Rate, veh/h	32	721	168	168	721	68	53	347	168	100	316	47
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	1	2	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
Percent Heavy Veh, %	5	5	5	3	3	3	14	14	14	8	8	8
Cap, veh/h	51	1110	258	176	1555	146	65	420	185	117	767	111
Arrive On Green	0.04	0.56	0.56	0.10	0.49	0.49	0.04	0.24	0.24	0.07	0.27	0.27
Sat Flow, veh/h	1723	2657	619	1757	3184	300	1587	1733	762	1675	2826	409
Grp Volume(v), veh/h	32	466	423	168	396	393	53	314	201	100	183	180
Grp Sat Flow(s),veh/h/ln	1723	1719	1556	1757	1752	1732	1587	1583	913	1675	1671	1564
Q Serve(g_s), s	1.8	18.9	18.9	9.5	15.0	15.0	3.3	18.7	21.4	5.9	9.0	9.4
Cycle Q Clear(g_c), s	1.8	18.9	18.9	9.5	15.0	15.0	3.3	18.7	21.4	5.9	9.0	9.4
Prop In Lane	1.00		0.40	1.00		0.17	1.00		0.84	1.00		0.26
Lane Grp Cap(c), veh/h	51	718	650	176	856	846	65	384	221	117	454	424
V/C Ratio(X)	0.63	0.65	0.65	0.96	0.46	0.46	0.81	0.82	0.91	0.85	0.40	0.42
Avail Cap(c_a), veh/h	276	718	650	176	856	846	302	451	260	117	454	424
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.88	0.88	0.88	0.65	0.65	0.65	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	17.1	17.1	44.8	16.9	16.9	47.6	35.8	36.8	46.0	29.8	30.0
Incr Delay (d2), s/veh	4.2	4.0	4.4	42.4	1.2	1.2	8.8	8.4	28.1	40.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.6	8.8	6.7	7.4	7.4	1.6	9.1	7.1	4.0	4.2	4.1
LnGrp Delay(d),s/veh	51.7	21.1	21.6	87.2	18.1	18.1	56.4	44.2	65.0	86.3	30.0	30.2
LnGrp LOS	D	C	C	F	B	B	E	D	E	F	C	C
Approach Vol, veh/h		921			957			568			463	
Approach Delay, s/veh		22.4			30.2			52.7			42.3	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.9	53.3	11.0	28.7	14.0	46.3	8.1	31.6
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5
Max Green Setting (Gmax), s	16.0	31.5	7.0	28.5	10.0	37.5	19.0	16.5
Max Q Clear Time (g_c+I1), s	3.8	17.0	7.9	23.4	11.5	20.9	5.3	11.4
Green Ext Time (p_c), s	0.0	4.0	0.0	0.8	0.0	4.2	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	34.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	35	45	5	105	230	70	425	25	170	425	115
Future Volume (veh/h)	90	35	45	5	105	230	70	425	25	170	425	115
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.81	0.88		0.74	1.00		0.90	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1900	1792	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	90	35	45	5	105	230	70	425	25	170	425	115
Adj No. of Lanes	1	2	0	0	2	0	1	2	0	1	2	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	8	8	8	6	6	6	1	1	1	1	1	1
Cap, veh/h	146	434	316	32	319	187	89	1889	111	160	1595	423
Arrive On Green	0.06	0.26	0.26	0.06	0.06	0.06	0.05	0.55	0.55	0.09	0.59	0.59
Sat Flow, veh/h	1675	1671	1218	27	1749	1027	1792	3406	199	1792	2684	713
Grp Volume(v), veh/h	90	35	45	110	0	230	70	222	228	170	280	260
Grp Sat Flow(s),veh/h/ln	1675	1671	1218	1776	0	1027	1792	1787	1819	1792	1787	1610
Q Serve(g_s), s	5.9	2.2	4.0	0.0	0.0	25.5	5.4	8.8	8.9	12.5	10.6	10.9
Cycle Q Clear(g_c), s	5.9	2.2	4.0	8.2	0.0	25.5	5.4	8.8	8.9	12.5	10.6	10.9
Prop In Lane	1.00		1.00	0.05		1.00	1.00		0.11	1.00		0.44
Lane Grp Cap(c), veh/h	146	434	316	488	0	187	89	991	1008	160	1062	957
V/C Ratio(X)	0.62	0.08	0.14	0.23	0.00	1.23	0.79	0.22	0.23	1.06	0.26	0.27
Avail Cap(c_a), veh/h	375	663	483	488	0	187	211	991	1008	160	1062	957
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.99	0.00	0.99	0.78	0.78	0.78	0.97	0.97	0.97
Uniform Delay (d), s/veh	44.0	39.2	39.8	57.7	0.0	65.8	65.8	15.9	15.9	63.8	13.7	13.7
Incr Delay (d2), s/veh	4.2	0.1	0.2	0.1	0.0	140.5	4.5	0.4	0.4	87.7	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	1.0	1.4	3.7	0.0	14.6	2.8	4.5	4.6	10.1	5.4	5.0
LnGrp Delay(d),s/veh	48.2	39.2	40.0	57.7	0.0	206.3	70.3	16.3	16.3	151.4	14.3	14.4
LnGrp LOS	D	D	D	E		F	E	B	B	F	B	B
Approach Vol, veh/h		170			340			520			710	
Approach Delay, s/veh		44.2			158.2			23.6			47.2	
Approach LOS		D			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	17.0	82.1	10.9	30.0	11.4	87.7		40.9
Change Period (Y+Rc), s	4.5	4.5	3.0	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	12.5	58.5	27.0	25.5	16.5	54.5		55.5
Max Q Clear Time (g_c+I1), s	14.5	10.9	7.9	27.5	7.4	12.9		6.0
Green Ext Time (p_c), s	0.0	3.1	0.2	0.0	0.0	3.1		2.6

Intersection Summary		
HCM 2010 Ctrl Delay		61.5
HCM 2010 LOS		E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	5	130	5	0	5	0	1095	5	0	980	210
Future Volume (vph)	330	5	130	5	0	5	0	1095	5	0	980	210
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	4.0			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	1.00
Frpb, ped/bikes	1.00	0.48		1.00	0.99			1.00			1.00	0.10
Flpb, ped/bikes	1.00	1.00		0.58	1.00			1.00			1.00	1.00
Frt	1.00	0.86		1.00	0.85			1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1736	747		839	1275			3523			3539	155
Flt Permitted	0.75	1.00		0.62	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1378	747		545	1275			3523			3539	155
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	337	5	133	5	0	5	0	1117	5	0	1000	214
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	77
Lane Group Flow (vph)	337	138	0	5	1	0	0	1122	0	0	1000	137
Confl. Peds. (#/hr)			3000	3000			1227		1427	1427		1227
Confl. Bikes (#/hr)			8			1			8			
Heavy Vehicles (%)	4%	4%	4%	25%	25%	25%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		D.Pm	NA			NA		Perm	NA	Perm
Protected Phases		4			8			2			2	
Permitted Phases	4			4						2		2
Actuated Green, G (s)	33.9	33.9		33.9	34.4			77.1			77.1	77.1
Effective Green, g (s)	33.9	33.9		33.9	34.4			77.1			77.1	77.1
Actuated g/C Ratio	0.28	0.28		0.28	0.29			0.64			0.64	0.64
Clearance Time (s)	4.5	4.5		4.5	4.0			4.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	3.0			0.2			0.2	0.2
Lane Grp Cap (vph)	389	211		153	365			2263			2273	99
v/s Ratio Prot		0.18			0.00			0.32			0.28	
v/s Ratio Perm	c0.24			0.01								c0.89
v/c Ratio	0.87	0.65		0.03	0.00			0.50			0.44	1.39
Uniform Delay, d1	40.9	37.9		31.2	30.6			11.3			10.7	21.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	17.4	5.5		0.0	0.0			0.8			0.6	225.4
Delay (s)	58.3	43.3		31.2	30.6			12.0			11.3	246.8
Level of Service	E	D		C	C			B			B	F
Approach Delay (s)		54.0			30.9			12.0			52.8	
Approach LOS		D			C			B			D	

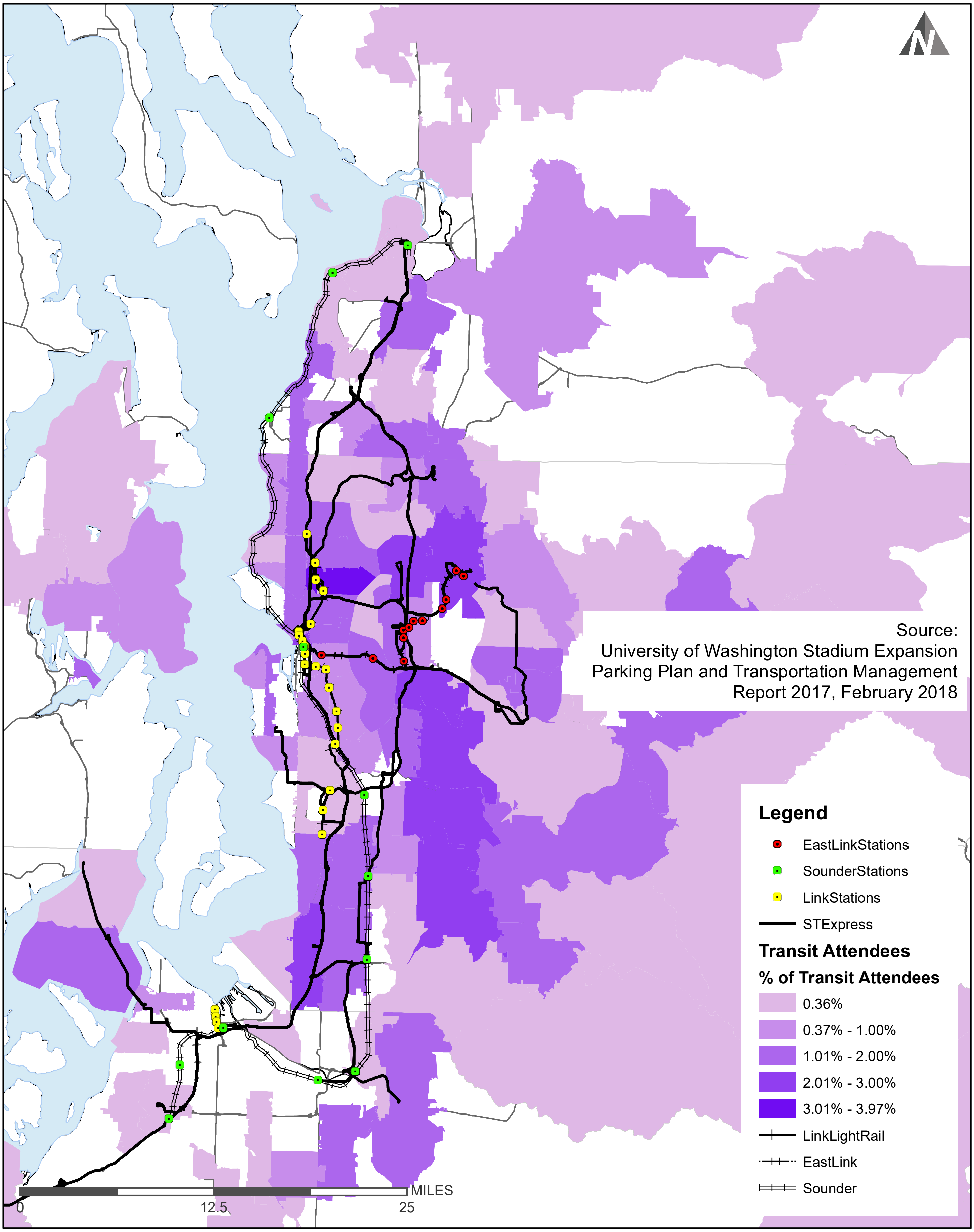
Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	860	0	15	45	320	965	330	5	1030	110
Future Volume (vph)	0	0	860	0	15	45	320	965	330	5	1030	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			7.0		5.0	5.0	7.0	5.0		6.0	5.0	5.0
Lane Util. Factor			0.88		1.00	1.00	0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes			1.00		1.00	0.46	1.00	0.77		1.00	1.00	0.46
Flpb, ped/bikes			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt			0.85		1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)			2682		1696	662	3367	2571		1736	3471	712
Flt Permitted			1.00		1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)			2682		1696	662	3367	2571		1736	3471	712
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	878	0	15	46	327	985	337	5	1051	112
RTOR Reduction (vph)	0	0	744	0	0	45	0	13	0	0	0	77
Lane Group Flow (vph)	0	0	134	0	15	1	327	1309	0	5	1051	35
Confl. Peds. (#/hr)	1227					1227	896		992	992		896
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	6%	6%	6%	12%	12%	12%	4%	4%	4%	4%	4%	4%
Turn Type			Prot		NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases			9		3!		4 5	1 5		7!	1	
Permitted Phases						3						1
Actuated Green, G (s)			31.8		6.0	6.0	119.8	165.2		1.3	66.2	66.2
Effective Green, g (s)			31.8		6.0	6.0	119.8	158.2		1.3	66.2	66.2
Actuated g/C Ratio			0.15		0.03	0.03	0.57	0.76		0.01	0.32	0.32
Clearance Time (s)			7.0		5.0	5.0				6.0	5.0	5.0
Vehicle Extension (s)			2.0		2.0	2.0				2.0	0.2	0.2
Lane Grp Cap (vph)			408		48	19	1929	1946		10	1099	225
v/s Ratio Prot			c0.05		0.01		c0.10	c0.51		0.00	c0.30	
v/s Ratio Perm						0.00						0.05
v/c Ratio			0.33		0.31	0.07	0.17	0.67		0.50	0.96	0.16
Uniform Delay, d1			79.1		99.5	98.8	21.1	12.6		103.5	70.0	51.3
Progression Factor			1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2			0.2		1.4	0.6	0.0	0.7		13.6	18.5	1.5
Delay (s)			79.2		100.8	99.3	21.1	13.3		117.1	88.5	52.8
Level of Service			E		F	F	C	B		F	F	D
Approach Delay (s)		79.2			99.7			14.8			85.2	
Approach LOS		E			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	53.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	209.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Appendix E: Transit Analysis



Distribution of Attendee Zip Codes for Light Rail & Bus Riders

UW Husky Stadium

Appendix

E

transpogroup

M:\17\1.17346.00 - UW Husky Stadium TMP and SEPA Analysis\GIS\Maps\MXD\17346_Transit_Usage.mxd

2025 - Weekend Transit Screenline Analysis

#	Screenline	No Action			Alternative 1		
		Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)	Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)
1	SR 520 EB	3540	130	1915	1920	130	2430
	SR 520 WB	3540	1665	140	1920	1880	140
2	Montlake Blvd NB	480	305	55	480	340	55
	Montlake Blvd SB	480	75	375	480	75	450
3	LRT (south of Stadium) NB	9600	3875	365	9600	4270	365
	LRT (south of Stadium) SB	9600	400	5525	9600	400	6685
4	LRT (north of Stadium) NB	9600	1465	4280	9600	1465	4965
	LRT (north of Stadium) SB	9600	3450	1465	9600	3690	1465
5	Eastlake Ave NB	840	555	245	840	590	245
	Eastlake Ave SB	840	255	625	840	255	715
6	NE 40th St EB	720	300	130	720	320	130
	NE 40th St WB	720	165	365	720	165	415
7	NE 45th St (w of I5) EB	360	470	135	360	515	135
	NE 45th St (w of I5) WB	360	120	525	360	120	620
8	Roosevelt Way SB	360	135	135	360	135	135
9	11th Ave NB	360	225	225	360	225	225
10	15th Ave NB	660	200	285	360	200	305
	15th Ave SB	660	280	210	360	290	210
11	NE 45th St (at Roosevelt) EB	720	500	135	720	545	135
	NE 45th St (at Roosevelt) WB	720	120	555	720	120	665
12	25th Ave NB	660	80	515	360	80	625
	25th Ave SB	660	430	65	360	475	65
13	NE 45th St (e of Mary Gates) EB	1200	435	470	1320	435	475
	NE 45th St (e of Mary Gates) WB	1200	390	360	1320	390	360
14	Light Rail (N of Brooklyn) NB	9600	1465	4280	9600	1465	4965
	Light Rail (N of Brooklyn) SB	9600	3450	1465	9600	3690	1465

2025 - Weekday Transit Screenline Analysis

#	Screenline	No Action			Alternative 1		
		Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)	Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)
1	SR 520 EB	1920	900	3135	1920	900	3380
	SR 520 WB	1920	2530	870	1920	2715	870
2	Montlake Blvd NB	660	345	75	660	375	75
	Montlake Blvd SB	660	305	670	660	305	705
3	LRT (south of Stadium) NB	12000	4210	440	12000	4545	440
	LRT (south of Stadium) SB	12000	480	5550	12000	480	6000
4	LRT (north of Stadium) NB	12000	2925	5805	12000	2925	6080
	LRT (north of Stadium) SB	12000	5065	2925	12000	5270	2925
5	Eastlake Ave NB	1200	560	225	1200	590	225
	Eastlake Ave SB	1200	150	600	1200	150	640
6	NE 40th St EB	810	275	95	810	295	95
	NE 40th St WB	810	180	425	810	180	450
7	NE 45th St (w of I5) EB	540	520	155	540	555	155
	NE 45th St (w of I5) WB	540	400	890	540	400	935
8	Roosevelt Way SB	540	75	75	540	75	75
9	11th Ave NB	540	355	355	540	355	355
10	15th Ave NB	360	175	275	360	175	285
	15th Ave SB	360	150	75	360	160	75
11	NE 45th St (at Roosevelt) EB	900	545	150	900	580	150
	NE 45th St (at Roosevelt) WB	900	420	950	900	420	1000
12	25th Ave NB	540	390	920	540	390	970
	25th Ave SB	540	485	90	540	520	90
13	NE 45th St (e of Mary Gates) EB	1380	450	490	1380	450	495
	NE 45th St (e of Mary Gates) WB	1380	190	160	1380	195	160
14	Light Rail (N of Brooklyn) NB	12000	2925	5805	12000	2925	6080
	Light Rail (N of Brooklyn) SB	12000	5065	2925	12000	5270	2925

2019 - Weekend Transit Screenline Analysis

#	Screenline	No Action			Alternative 1		
		Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)	Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)
1	SR 520 EB	3240	125	3805	3240	125	3805
	SR 520 WB	3150	2915	135	3150	2915	135
2	Montlake Blvd NB	540	355	50	540	355	50
	Montlake Blvd SB	540	70	470	540	70	470
3	LRT (south of Stadium) NB	3600	4185	340	3600	4185	340
	LRT (south of Stadium) SB	3600	375	5460	3600	375	5460
4	LRT (north of Stadium) NB	N/A	N/A	N/A	N/A	N/A	N/A
	LRT (north of Stadium) SB	N/A	N/A	N/A	N/A	N/A	N/A
5	Eastlake Ave NB	690	605	230	690	605	230
	Eastlake Ave SB	690	240	730	690	240	730
6	NE 40th St EB	240	325	120	240	325	120
	NE 40th St WB	240	155	425	240	155	425
7	NE 45th St (w of I5) EB	450	605	130	450	605	130
	NE 45th St (w of I5) WB	450	110	740	450	110	740
8	Roosevelt Way SB	360	530	125	360	530	125
9	11th Ave NB	360	210	750	360	210	750
10	15th Ave NB	900	190	460	900	190	460
	15th Ave SB	900	405	200	900	405	200
11	NE 45th St (at Roosevelt) EB	450	605	130	450	605	130
	NE 45th St (at Roosevelt) WB	450	110	740	450	110	740
12	25th Ave NB	660	80	710	660	80	710
	25th Ave SB	660	535	60	660	535	60
13	NE 45th St (e of Mary Gates) EB	960	410	500	960	410	500
	NE 45th St (e of Mary Gates) WB	960	410	340	960	410	340
14	Light Rail (N of Brooklyn) NB	N/A	N/A	N/A	N/A	N/A	N/A
	Light Rail (N of Brooklyn) SB	N/A	N/A	N/A	N/A	N/A	N/A

2019 - Weekday Transit Screenline Analysis

#	Screenline	No Action			Alternative 1		
		Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)	Hourly Capacity	Arrivals (Game -2 Hrs)	Departures (Game +2 Hrs)
1	SR 520 EB	2430	845	4235	2430	845	4590
	SR 520 WB	3150	3600	805	3150	3600	820
2	Montlake Blvd NB	630	375	70	630	375	70
	Montlake Blvd SB	630	285	655	630	285	695
3	LRT (south of Stadium) NB	6000	4260	405	6000	4260	415
	LRT (south of Stadium) SB	6000	455	5620	6000	455	5630
4	LRT (north of Stadium) NB	N/A	N/A	N/A	N/A	N/A	N/A
	LRT (north of Stadium) SB	N/A	N/A	N/A	N/A	N/A	N/A
5	Eastlake Ave NB	870	590	210	870	590	215
	Eastlake Ave SB	870	145	595	870	145	650
6	NE 40th St EB	540	295	90	540	295	90
	NE 40th St WB	420	170	415	420	170	445
7	NE 45th St (w of I5) EB	630	625	145	630	625	150
	NE 45th St (w of I5) WB	630	375	950	630	375	1015
8	Roosevelt Way SB	1350	475	70	1350	475	70
9	11th Ave NB	900	335	830	900	335	885
10	15th Ave NB	1140	165	410	1140	165	440
	15th Ave SB	1140	275	70	1140	275	70
11	NE 45th St (at Roosevelt) EB	930	620	140	930	620	145
	NE 45th St (at Roosevelt) WB	1410	400	970	1410	400	1040
12	25th Ave NB	540	365	940	540	365	1005
	25th Ave SB	630	560	85	630	560	85
13	NE 45th St (e of Mary Gates) EB	1290	425	500	1290	425	515
	NE 45th St (e of Mary Gates) WB	1290	225	150	1290	225	155
14	Light Rail (N of Brooklyn) NB	N/A	N/A	N/A	N/A	N/A	N/A
	Light Rail (N of Brooklyn) SB	N/A	N/A	N/A	N/A	N/A	N/A