City of Tukwila

Allan Ekberg, Mayor

INFORMATIONAL MEMORANDUM

TO: **Planning & Economic Development and Transportation & Infrastructure Committees**
FROM: **Jack Pace, DCD Director & Henry Hash, PW Director**
BY: **Lynn Miranda, Planning Supervisor and**
Cyndy Knighton, Senior Program Manager
CC: **Mayor Ekberg**
DATE: **March 13, 2020**
SUBJECT: **Tukwila International Blvd (TIB) Rechannelization Alternatives Report**

ISSUE

Update the Planning and Economic Development Committee (PED) on the City's progress towards implementing the goals and policies of the Tukwila International Boulevard (TIB) Element of the Comprehensive Plan, focusing on the rechannelization design alternatives for TIB. This alternative will be used as the basis for the draft zoning code revisions needed to implement the community's vision for the TIB District and improve safety for all users.

BACKGROUND

In 2015, Council adopted goals and policies in the TIB Element of the Tukwila Comprehensive Plan, calling for a transformation of the neighborhood into a walkable, safe, and attractive destination with TIB as a "main street." The following is a summary of actions taken to date on implementing the Plan. A more complete workprogram/timeline of work done to date can be found in Attachment A.

Improving Safety

The City has adopted and implemented several Capital Improvement Projects (CIP) over the years to improve safety along Tukwila International Boulevard, from the initial major CIP to create the Boulevard with sidewalks and improved pedestrian crossings to the addition of new Rectangular Rapid-Flashing Beacons (RFRB) for pedestrian crossings. The 2017-2018 Adopted CIP included pedestrian safety improvements on S. 140th to include a new traffic light. When the City was unsuccessful in securing grants for this project, the City in 2018 adopted a plan for the two RFRB crossings near S. 141st, which were added in the 2019-2020 Adopted CIP. There are currently two other RFRB crossings at S. 143rd and S. 151st. Additional RRFB's are being recommended to the S. 140th Traffic Light CIP in partnership with the City's traffic calming program

The City also implemented significant pedestrian safety improvements in 2018 on S. 144th between 42nd Ave S. and TIB, including new sidewalks and a pedestrian crossing as part of Tukwila Village. In 2005, speed limits were lowered from 40 to 35 miles per hour (mph) when the City took over jurisdiction of the roadway from the state in 2004.

2017

In February, the City and Congress for New Urbanism (CNU) kickstarted implementation of the Comprehensive Plan with a community workshop. In May, CNU briefed the City Council on their recommendations for implementing the City's adopted goals and policies for the TIB neighborhood. The two recommendations were to: 1) reduce the number of through-lanes on TIB and replace with on-street parking and bicycle lanes to provide parking for adjacent businesses and improve safety for all users, and; 2) revise

the zoning regulations for new development as the current zoning code regulations were adopted prior to the 2015 Comprehensive Plan update and allow new land uses and development patterns that are inconsistent with the walkable vision for TIB (Attachment B).

Regarding a reduction in lanes on TIB, the CNU report stated that "Traffic studies must be done in advance of this work, but a schematic plan was developed during the workshop" and recommended that "To build a robust main street environment, pedestrians must be able to easily cross the street to access shops on the other side. In addition to crosswalks, new RRFB's are recommended." One of these CNU recommended RRFB's was on S. 141st St, which was implemented by the City in 2019.

Staff discussed with Council the critical role of on-street parking on TIB in setting the main street character. The zoning regulations for development behind the sidewalk depend on the roadway design - with on-street parking, development regulations can be revised to require storefronts oriented to the streets without a setback, parking lots or garages located behind the buildings, and minimal driveway accesses to interrupt the pedestrian. In addition, the presence of features such as on-street parking and small building setbacks achieve an increase in safety benefits for all users as drivers travel at significantly slower speeds. Staff has also included a memo estimating the potential economic development benefits of allowing parking in the curb lane on a portion of TIB (see Attachment C).

Council also adopted a 6-month moratorium prohibiting certain auto-oriented and lodging uses in the TIB study area. With the moratorium in place, future development or redevelopment would support the vision and prevent investment in uses that were likely not going to be allowed under the planned revisions to the zoning code. Renewal of the moratorium since 2017 has allowed staff time to draft new standards, design guidelines, and alternative TIB roadway designs.

Land use and design consultants Placemakers were contracted to prepare updates to the zoning code, addressing allowable land uses, building heights and placement, and design guidelines for TIB. The Planning Commission and TIBAC reviewed preliminary Land Use Chart and Zoning Map amendments in Fall of 2017. These updates have been on hold awaiting analysis and decision on adding on-street parking and bicycle lanes (rechannelization) options for TIB.

Fehr & Peers transportation consultants were contracted to prepare rechannelization design alternatives for TIB and have to date produced three reports studying the impacts of the proposed rechannelization on TIB. The first study (September 2017) looked at existing and future traffic conditions, identified rechannelization options, and analyzed potential traffic diversions on to adjacent streets. Very preliminary cost estimates for the alternatives and mitigation were also provided. This report was presented to the Transportation and Infrastructure Committee (TIC) in November 2017. The Committee did not arrive at a recommendation but directed staff to conduct additional analysis of traffic impacts on adjacent residential streets and possible mitigation measures.

<u>2018</u>

The Fehr & Peers study was updated in January 2018 with alternative design options for TIB. In September and October 2018 staff met with the TIC, the Community Development & Neighborhood (CDN) Committee and the Council of the Whole to provide an update on the TIB Rechannelization studies and the status of the TIB zoning code revisions. Council was presented with three options for moving forward:

A. Complete the TIB zoning code changes with no changes to the configuration of TIB.
B. Allocate time & resources to fully study the rechannelization traffic impacts.
C. Option B, plus including a cost-benefit analysis of the roadway options and benefits to the community.

Council supported completing additional studies of traffic impacts and mitigation alternatives and allocated $100,000 for more detailed cost estimates of alternatives. Council recommended returning these items to CDN and TIC for further discussion.

2019
Fehr & Peers' prepared a third report building upon past analyses and Council direction. The most substantive modification to the report was a comparison of how well the alternatives achieve the community's land use and street design goals, including supporting the vision for a main street, improving pedestrian and vehicle safety, improving mobility, and minimizing local and regional impacts. A variety of design options were presented that have differing outcomes depending on the goal evaluated.

In August, a number of Planning Commissioners and Councilmembers participated in a staff-led field trip to West Seattle, Lake City Way, Bothell and Kent to view the relationship between on-street parking options and adjacent building forms and placement. A summary is included in Attachment D.

2020
A final report was delivered by Fehr & Peers summarizing the planning process to date, the alternative rechannelization options for TIB including potential impacts, mitigation, cost and extent to which they achieve the goals for the TIB District (see Attachment E).

The current moratorium on certain auto-oriented and lodging uses in the TIB district expires in July. The full set of development regulations and design guidelines implementing the TIB Vision in the Comprehensive Plan are anticipated to be completed by the end of the year (Attachment A). On March 2nd the Planning and Economic Development (PED) Committee requested the Planning Commission to review code amendments to formalize the prohibitions in the moratorium before its expiration and prior to the adoption of the full set of revised development regulations. Amending the code now would eliminate the need to extend the moratorium on these uses in July. The amendment would also serve as a placeholder for the full set of revisions to the development regulations. The Planning Commission will be considering these amendments at their April 23 meeting and forwarding their recommendation to Council.

DISCUSSION
Four design alternatives were developed for TIB, differing in the number of through lanes, bicycle facilities, on-street parking configuration, traffic calming measures intended to mitigate the potential of traffic diverting on to neighborhood streets, and ability to implement the vision for TIB as a walkable "main street" and improve pedestrian safety. The report (Attachment E) is intended to help Tukwila elected officials and the community understand the relative costs, benefits and potential impacts of the design options for implementing the community vision for Tukwila International Boulevard (TIB) and the surrounding neighborhood.

FINANCIAL IMPACT
The four rechannelization alternatives evaluated in the attached report range in cost from $1.55M for the current adopted CIP of a traffic light on S. 140th and two new RFRB's on TIB to $5.95M for a 3-lane conversion from S. 139th to S. 150th with on-street parking, bike lanes, and mitigation measures in the neighborhoods. It should be noted that these projects can be designed and constructed in phases. Funding through various grants should also be explored.

RECOMMENDATION
Staff is requesting the PED Committee review and discuss the *Summary of Design Alternatives Report* (Attachment E) at two meetings – March 16th and April 20th. The March meeting will focus on the planning

and transportation efforts to date and introduce the rechannelization alternatives. The subsequent meeting in April will focus on discussing the comparative aspects of each rechannelization alternative, including design, impacts and mitigation, ability to achieve the community's goals for TIB, and cost. The PED Committee can then determine how to move the report forward to a Council of the Whole meeting.

Due to pedestrian safety needs on TIB, the Administration recommends implementation of Alternative 1 as a baseline. Part of this alternative, the signal at S 140th Street, is in the City's Adopted CIP with proposed grant funding in 2021 and 2022. The three additional RFRB's between S 144th Street and S 152nd Street would need to be added into the CIP.

In addition, the Administration recommends proceeding with Alternative 2 (on-street parking during non-peak times) as funding is identified. Alternative 2, once implemented, provides the City an opportunity to analyze side street impacts, if any, as they occur, as well as implementing parking enforcement as necessary. The overriding concern with any traffic conversion on TIB is the potential impact to residential side streets, the additional traffic and slow-down to vehicle movement, and the costs for this conversion.

Alternative 2 provides a phased-in approach to on-street parking options. This alternative can be more easily reversed with less cost involved than the Alternative 3 or 4 solutions, if necessary, Alternative 2 also provides an opportunity to analyze the impacts of on-street parking during non-peak times to determine if in the future Alternatives 3 and 4 become an option.

ATTACHMENTS

A. TIB Neighborhood Plan Workprogram
B. Excerpt from Congress for New Urbanism (CNU) *Legacy Project – Tukwila International Boulevard*, 11 April 2017
C. Memo from Derek Speck on Economic Development Benefits of On-Street Parking, dated March 9, 2020
D. TIB As A Main Street Field Trip – Summary, July 2019
E. Tukwila International Boulevard: A Summary of the Design Alternatives Report

Attachment A

Tukwila International Boulevard (TIB) Neighborhood Plan
Work Program

Work program – 2020

1st Q

- PED forwards zoning code changes prohibiting auto-oriented and hotel/motel uses to the Planning Commission for review and public hearing
- PED consider final TIB rechannelization evaluation report

2nd Q

- PED Meeting #2 to consider final TIB rechannelization evaluation report and forwards to COW
- Planning Commission hearing and recommendation on zoning code changes prohibiting auto-oriented and hotel/motel uses
- PED considers Planning Commission recommendations re: zoning code revisions prohibiting auto-oriented and hotel/motel uses and forwards to COW
- Council hearing and decision on zoning code changes prohibiting auto-oriented and hotel/motel uses
- Council selects preliminary TIB rechannelization alternative – This date may change depending on PED/COW recommendation
- Staff finalizes draft comprehensive set of TIB zoning code revisions (incorporating rechannelization alternative) and Design Manual guidelines for public review -This date may change depending on PED/COW recommendation
- TIB zoning code revisions & design manual outreach to TIB area property owner, resident and development community - This date may change depending on PED/COW recommendation
- Prepare Draft Environmental Checklist (SEPA)
- Issue SEPA Determination

3rd Q or 4th Q (depending on PED/COW recommendation)

- City Council/Planning Commission joint work sessions on comprehensive set of TIB zoning code revisions and design manual guidelines.
- Planning Commission and City Council public hearings, deliberation, and decision on TIB zoning code revisions and design manual.

Products:

- Comprehensive Plan Map Amendment
- Zoning Code and Map Amendments
- TIB Design Manual
- Environmental Checklist and Determination

Work completed

2017

- CNU Legacy Workshop in Tukwila – February
- CNU Final Report Presentation to City Council Meeting - May
- Refined household and employment Yr. 2031 forecasts for TIB neighborhood for traffic analysis on the street modification
- Selected a consultant for the SEPA analysis of the proposed TIB Plan
- Contracted for additional transportation professional services on design standards for TIB neighborhood street standards

- Reviewed draft Land Use Chart and Zoning Map amendments with Planning Commission - August 24, 2017
- Council adopted a moratorium on certain uses in the TIB study area in September
- Briefed TIBAC on above draft amendments – October 10, 2017
- Briefed Transportation and Infrastructure Committee (11/14/17) on traffic analysis and associated capital improvement costs and obtained direction for additional analysis
- Reviewed consultant's draft street circulation improvements
- Contracted for an update to the Tukwila International Boulevard Design Manual

2018

- Contracted for additional engineering services analyzing TIB on-street parking impacts and cost
- Began creation and modification of alternative Zoning District boundaries and zoning standards based upon Planning Commission land use discussion, street designations and designs
- Drafted new street cross-sections for TIB streets and a new circulation network based on CNU engineering consultant recommendations and anticipated land uses
- Council extended moratorium on certain uses in the TIB study area in July and December.
- Updated Council on current direction and schedule for implementing TIB zoning changes and possible TIB on-street parking options. Recommended further analysis of TIB on-street parking options.
- Consultants delivered draft TIB zoning code revisions and draft of updated TIB Design Manual to staff
- Circulated draft Zoning revisions for internal review
- City unsuccessful with grant for Adopted CIP for S. 140th Street Traffic Signal pedestrian safety improvements
- Council adopted revised CIP to include pedestrian safety improvements near S. 140th of two RFRB crossings

2019

- Contracted for additional TIB rechannelization and mitigation options.
- Worked on revisions to the TIB Design Manual
- City completed CIP project of two new RFRB crossings near S. 140th in April
- Council renewed moratorium on certain uses in the TIB study area in May and December.
- Planning Commission and City Council Field Trip to view on-street parking options

TUKWILA INTERNATIONAL BOULEVARD

TIB Evolution into Diverse, Walkable, Authentic, Main Street

Boulevard Improvements

The evolution of TIB into a walkable main street may begin with two immediate changes.

The first is restriping the Boulevard from a five lane road into a three lane street. This includes the addition of new crosswalks and a protected bike lane (See page 32 for details). The second step is a change to the zoning ordinance to assure development will implement the vision. This change includes permitting greater diversity and capacity of uses while allowing incremental development in the short term (See page 42 for details).

Image Credit: Andrew von Maur

IMPLEMENTATION

Short term steps for implementation include re-striping the Boulevard and amending the zoning.

RESTRIPING PLAN

The initial step in the TIB evolution is a restriping plan for the Boulevard. Traffic studies must be done in advance of the work, but a schematic plan was developed during the workshop, shown on the next pages.

Some parts of TIB have distances as great as 2,500' without a crosswalk. This distance provides a dangerous enviroment where residents cross midblock with no protection. To build a robust main street environment, pedestrians must be able to easily cross the street to access shops on the other side. In addition to crosswalks, new RRFBs are recommended.

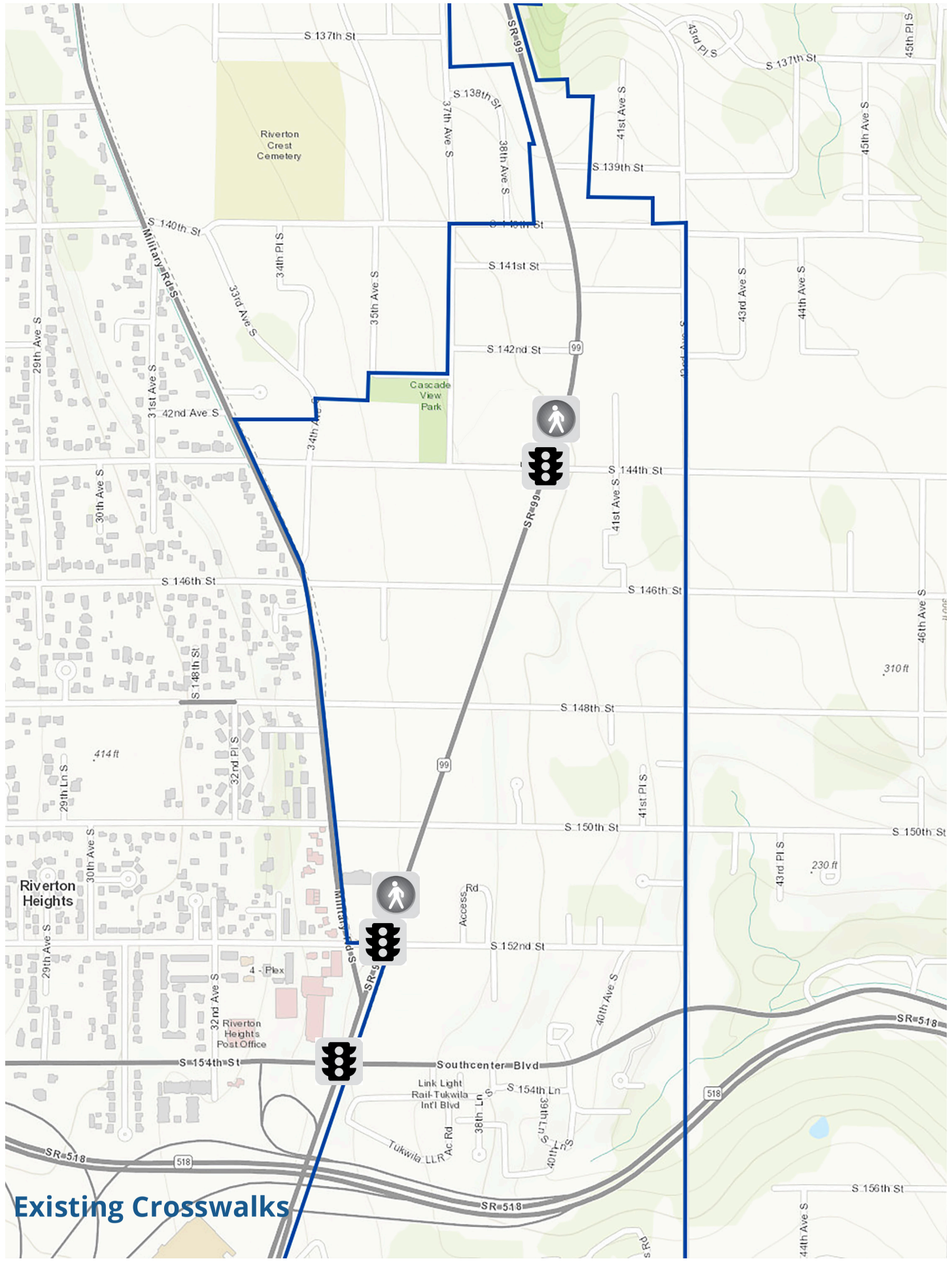
A RRFB is an amber-colored flashing light (LED) that is activated by a pedestrian before using a crosswalk. The purpose of an RRFB is to increase vehicle yielding at crosswalks. RRFBs are attached to pedestrian crossing warning signs, and are also accompanied by piano key crosswalks and advance yield makings. The beacons are usually solar powered, and flash using an irregular patten that is similar to emergency vehicle flashers on police vehicles.

KEY

Existing signal + crosswalk

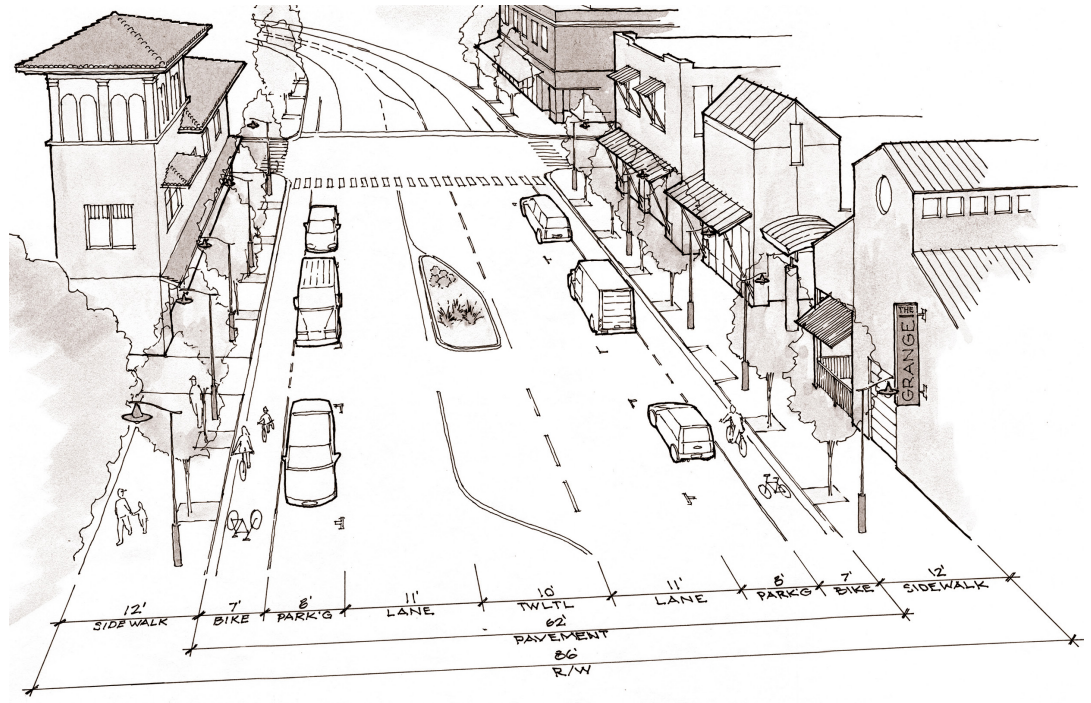
Existing RRFB

Image Credit: City of Bloomington, Indiana



(City of SeaTac, King County, BLM, ESRI, Garmin, USGS, EPA, USDA)

(© Microsoft, 2017)



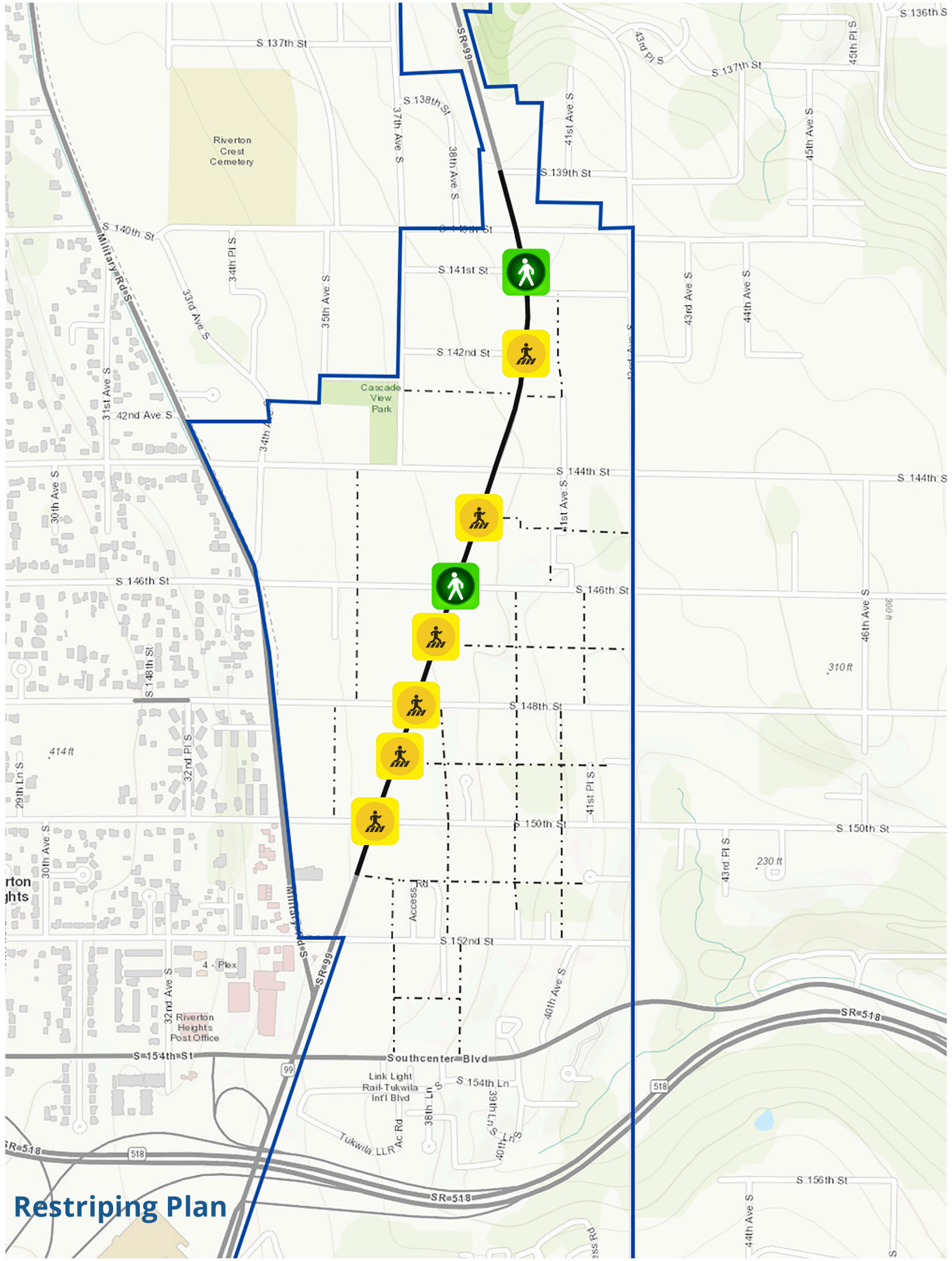
The plan to the right shows a change from 5 lanes to 3 lanes beginning with S. 139th Street in the north to S. 152nd Street at the southern end. The new street section is illustrated above, as compared to the existing conditions in the upper right image.

In addition to the restriping, new pedestrian crosswalks and signals should be added. New RRFBs should be located at S. 141st Street and S. 146th Street. New crosswalks should be added at S. 142nd, S. 148th, S. 150th, and each new east | west street as they are developed over time as shown on the plan to the right.

To assure local traffic is managed well, provide additional development opportunities, and create a bicycle and pedestrian network, new streets should be added to provide multiple routes north/south and east/west.

KEY

- New crosswalk
- New RRFB
- Restriping area
- New streets



(City of SeaTac, King County, BLM, ESRI, Garmin, USGS, EPA, USDA)

Attachment C

City of Tukwila

Allan Ekberg, Mayor

INFORMATIONAL MEMORANDUM

TO: **Mayor Ekberg**

FROM: **Derek Speck, Economic Development Administrator**

CC: **Departments of Community Development and Public Works**

DATE: **March 9, 2020**

SUBJECT: **Economic Development Benefits of On-Street Parking**

ISSUE

This memo is intended to provide an estimate of the potential economic development benefits if the City were to allow parking in the curb lane on a portion of Tukwila International Boulevard.

BACKGROUND

The City is considering whether to allow on-street parking on Tukwila International Boulevard generally between South 139th Street and South 150th Street. During the hours that parking is allowed in the "curb lane", the lanes available for vehicle travel in one direction would be reduced from two to one. Other City departments have conducted analyses of traffic impacts and costs related to the potential reduction in travel lanes. This memo is intended to provide an estimated range of the potential economic development benefits associated with such a change. This is not a full cost-benefit analysis.

DISCUSSION

There is no standard way to determine the economic development benefits of on-street parking. City staff conducted online searches for this type of information and sought consultants who can address the question. We contacted four consulting firms and spoke with three. None have answered this particular type of question in the past and they would need to conduct a significant amount of analysis in order to answer this question. Most of the standard analysis is not whether to allow on-street parking where there currently is none, it is how much to charge in order to foster the greatest economic benefit. Part of the challenge is that parking benefit economics depend on the real estate economics for each location, and those economics can change over time.

Although there is no standard methodology to address this question, staff believes there can be economic value from on-street parking because there are many examples of developers who create it when constructing new "town centers". For example, because the City does not currently allow parking on Tukwila International Boulevard, the developer of Tukwila Village chose to construct a small access road with seven parking stalls in front of Building A (currently under construction) so that there will be some visible parking in front of the retail stores.

In terms of the potential economic development benefits of on-street parking on Tukwila International Boulevard, there are different types of benefits. It is important to understand these are very general estimates only intended to provide a sense of the potential magnitude of the benefits. Staff assumed the northern end of the on-street parking was at South 130th Street instead of South 139th Street as a way of reducing the potential

of southbound traffic choosing to drive through the adjacent neighborhoods. Following are the types with estimates of value:

(1) *Additional Land Value:* One method to value additional parking in the curb lane is to assume it frees up an equivalent amount parking on the adjacent private properties. This value could benefit private property owners if they are able to provide less land for on-site parking. The economic development benefit would be the value of the land plus the cost of parking improvements. Staff estimated the raw land value by multiplying the square feet of equivalent parking area by the County Assessor's estimate of land value for properties along TIB. It is important to note this analysis is based on today's land value which reflects the economics of the neighborhood today. If the neighborhood becomes more desirable and receives more development, the land value benefit would increase.

Staff estimates this value to range from $4.2 million to $9.0 million. The range depends on whether development occurs near the lower land values toward 130th Street or the higher land values near 150th Street. The average is $6.6 million.

(2) *Additional Development Value:* Because adding parking in the curb lane is comparable to freeing up an equivalent amount of parking on the adjacent private properties, that additional private land capacity could be improved with more than just parking, it could be developed.

Staff estimates the development value based on this methodology to range from $8.5 million to $68.6 million. The range depends on whether development is single-story structures of a similar type and lot coverage that exists along most of TIB today or higher cost and amounts of development such as Tukwila Village.

Staff believes this is a very conservative estimate because it only assumes the development would occur on an amount of land equal to the amount that could be freed from parking on the private properties. It is entirely possible that a more desirable pedestrian experience would attract greater development than just the equivalent area of parking. As an example of the potential economic development benefit, a total of ten buildings of the size of the mixed-use building located at 14400 Tukwila International Boulevard could fit on one side of TIB between 144th and 150th Street. The value of nine additional buildings of that size would be approximately $260 million.

(3) Increased Business Revenue: Additional parking and on-street parking can increase sales for businesses for multiple reasons.

- *Convenience of Curbside Parking:* This concept assumes that customers prefer the convenience of parking on the street in front of a business compared to parking in a lot beside or behind the building. Even when the curbside parking is full, the business may still get more customers when they perceive a chance to get on-street parking. Staff believes this is especially important for retail and service businesses in which the customer is visiting the business for a relatively short period of time.

- *Desire for Active Spaces:* This concept assumes that customers are drawn to retail streets where there is a feeling of activity. Parking on the street in front of a business creates more activity on the street which attracts customers and makes it easier for customers to see and walk to other stores.

- *Pedestrian Experience:* This concept assumes that customers are more likely to walk on sidewalks when the experience is more desirable. On-street parking can increase the quality of the pedestrian experience by creating a feeling of protection from traffic and slowing traffic.

  Staff estimates the value of these factors range from $2.0 million to $61.9 million. The range is

based on data from Melbourne, Australia and Ft. Collins, Colorado that was provide in a presentation by Dennis Burns of Kimley-Horne.

If the various types of economic development benefits are added together, the total ranges from $14.7 million to $139.5 million. Based on current conditions, the value would be more likely to be at the lower end of the range. As the neighborhood attracts more customers and development, the value would grow to the higher end of the range. If the parking is not well managed, the benefits will tend toward the low estimate. The better the parking is managed, the more the benefits will tend toward the high estimate.

Value of Economic Development Benefits		
	Low	**High**
Additional Land and Improvements	$ 4,200,000	$ 9,000,000
Additional Development	$ 8,500,000	$ 68,600,000
Additional Business Revenue	$ 2,000,000	$ 61,900,000
	$ 14,700,000	$ 139,500,000

CAVEATS

- The benefits shown in this memo assume the City wants a pedestrian friendly, "main street" type of neighborhood along Tukwila International Boulevard. Some types of businesses and other stakeholders may not desire a "main street" type of neighborhood and would see greater value by having a road that carries more and faster traffic. For example, fast food restaurants or warehouse/distribution companies would prefer the current road configuration.
- The benefits shown above only reflect one time economic benefits, not annual revenue and costs. There would be costs to install, manage and enforce parking. Additional development would also bring annual revenue and costs for city services.
- The business revenue and additional development benefits assume the City implements a parking management program with effective policies and enforcement.
- The analysis assumes on-street parking with South 130th Street as the northern terminus, not South 139th Street.

CONSIDERATIONS

- If the City allows on-street parking, one important opportunity would be to use parking revenues to make additional improvements in the neighborhood. Those could be managed by the City through a "parking benefit district" or through a "business improvement district" in which local businesses manage parking enforcement and other community programs such as marketing and safety.
- There can be other benefits to using the curb side travel lane for purposes besides parking. This "curb lane real estate" can provide parking for bikes, car share, electric vehicles, and loading zones. To the extent these uses are allowed, they would reduce the amount of parking included in this analysis.
- As development grows along Baker Boulevard in the Southcenter District. The City may need to implement a parking management program for that neighborhood and there may be economies of scale with parking on TIB.

OTHER FINANCIAL BENEFITS AND COSTS

It is important to note that this memo does not include other financial benefits such as:

Attachment C

(1) Parking revenue if the City implements a charge for on-street parking. This can be a very significant benefit to the City and businesses on TIB.
(2) City tax revenue related to the increased business sales and development.
(3) It is important to note that this memo does not include the costs to provide on-street parking such as signs, painting, and ongoing parking management.

SUMMARY

If the City has a vision for Tukwila International Boulevard to develop into a pedestrian friendly, walkable, "main street" type of neighborhood with an active street front and more office and multi-family residential development, on street parking can contribute to that goal. Based on conservative methodology, staff estimates the economic development value between $14.7 and $139.5 million.

ATTACHMENTS

Spreadsheets: Economic Development Value of On-Street Parking

Attachment C

Economic Development Benefit of On-Street Parking

Retail Sales (Melbourne Model)

Number of Stalls	367	452
Square Feet Per Stall	200	200
Retail Sales per Hour Per Square Foot	$ 0.19	$ 0.19
Hours of Operation Per Day	$ 10	$ 10
Days per Year	$ 360	$ 360
Total Annual Retail Sales	$ 50,257,584	$ 61,855,488

Retail Sales (Ft Collins Model)

Number of Stalls	367	452
Retail Sales Per Stall Per Day	$ 15	$ 60
Days per Year	$ 360	$ 360
Total Annual Retail Sales	$ 1,983,852	$ 9,766,656

Notes:

(1) Melbourne and Ft. Collins retails sales data was taken from presentation at International Parking Institute conference by Dennis Burns of Kimley-Horn and Michael Klein of Klein & Associates.

(2) In this method, square feet per stall is estimated at 200 instead of 330 in order to not include the space for drive aisle access.

Attachment D

TIB As Main Street – Field Trip
SUMMARY

A key goal of the Comprehensive Plan's Tukwila International Boulevard (TIB) Element is to transition TIB from a regional-serving highway to a "main street" that serves the neighborhood and improves safety. Implementation of the City's vision for TIB started with a Congress for New Urbanism (CNU) community workshop in 2017. CNU's final report and recommendations were given to the City Council and included a discussion of the role of on-street parking in setting the main street character and development parameters for the neighborhood. Staff soon began revising the development regulations, zoning districts, and the design manual for TIB and exploring how to make TIB a "complete street".

> "*Streetscape – the visual elements of a street, including the road, adjoining buildings, sidewalks, street furniture, trees, and open spaces, etc. that combine to form the street's character.*"

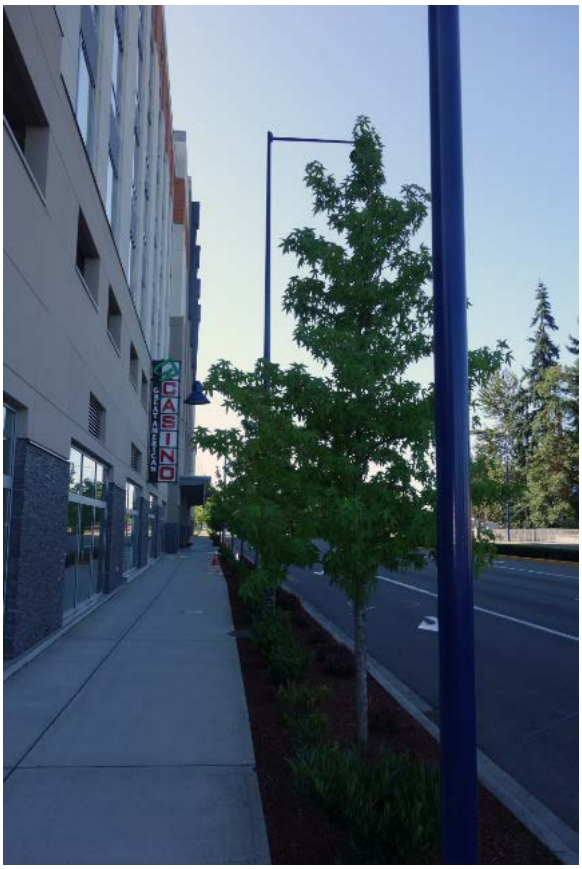
Changes to TIB's streetscape, specifically adding on-street parking, is an important piece in the CNU recommendations for transitioning to a walkable "main street." As alternatives, costs, and mitigation measures were being evaluated, staff organized a field trip for the City Council and Planning Commission to see neighborhood commercial streets in nearby cities with configurations similar to those being considered for TIB in order to experience the relationship between buildings with a variety of uses and the adjacent street design. On Saturday July 20, 2019, several City of Tukwila Planning Commissioners and City Councilmembers participated in the half-day field trip visiting the following locations:

- Pacific Highway S., Des Moines WA, Between 216th and Kent Des Moines Road
  - See examples of redevelopment with no on-street parking.
    - Lake City Way, between 115th St and 130th St.
  - See examples of variable time parking and all-hours on-street parking
- Downtown Bothell
  - See examples of parking/frontage road separated from travel lanes

The following are photo examples of streetscapes seen during the field trip.

Attachment D

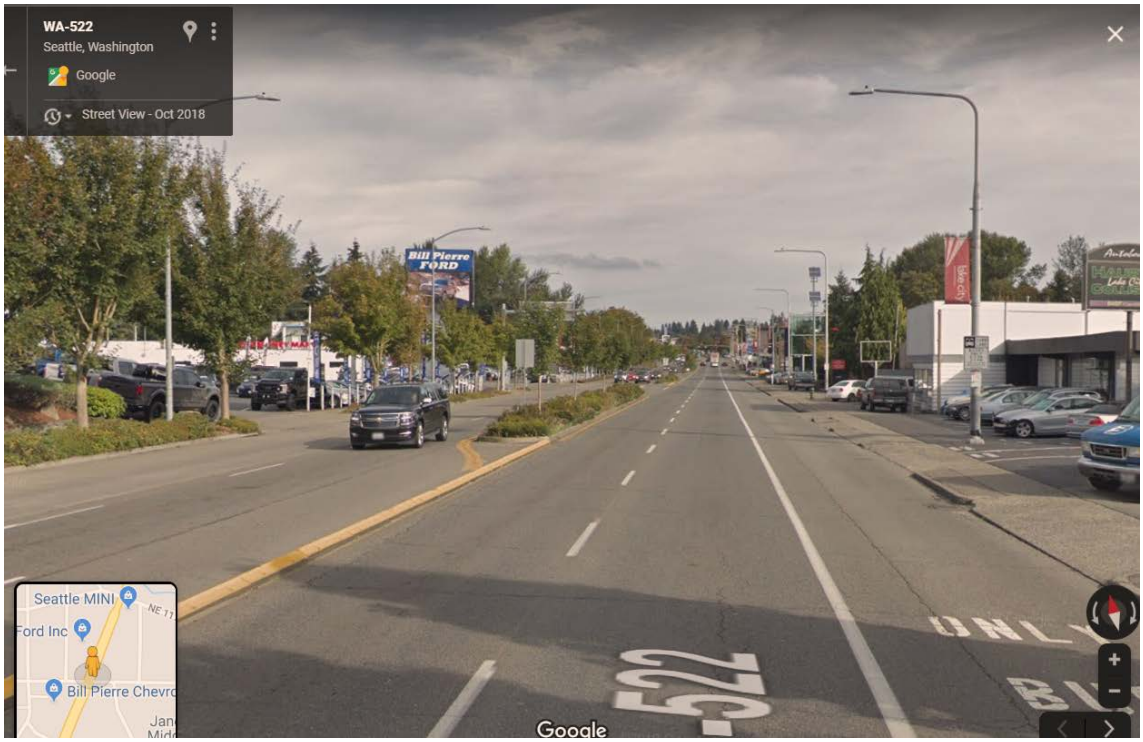
Des Moines, WA
Pacific Highway South, between Kent Des Moines Road and S. 216th St.



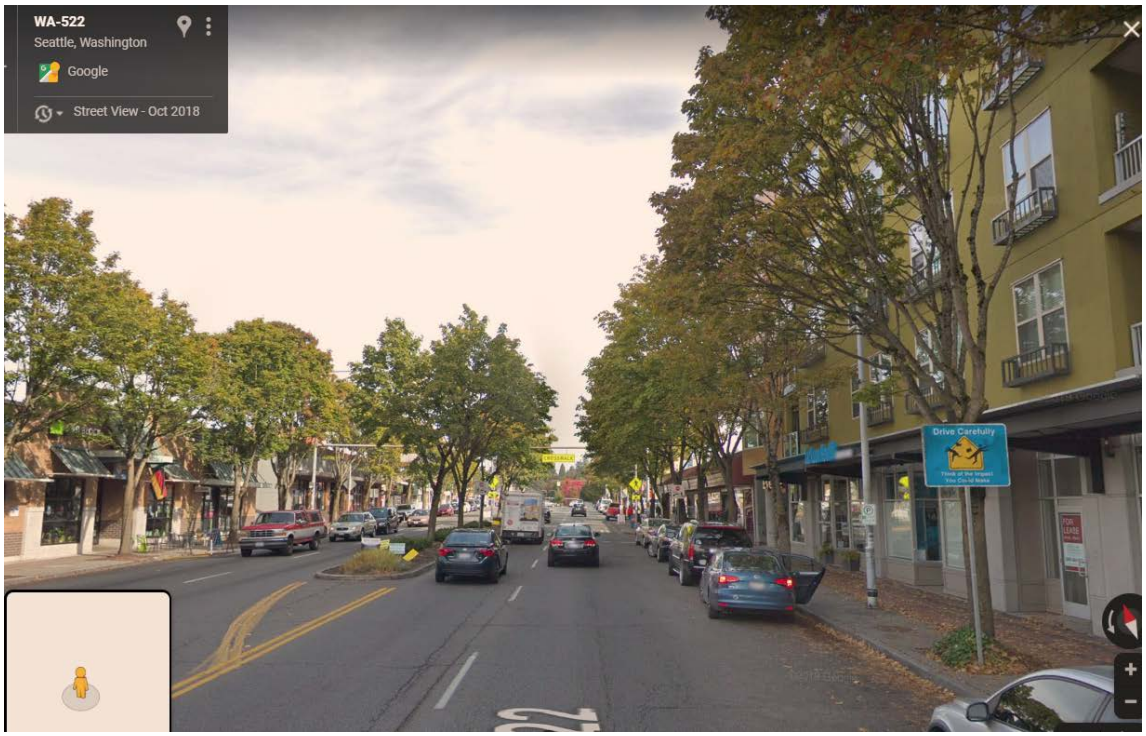
Redevelopment brought to back of sidewalk with no on-street parking.

Attachment D

Lake City Way, Seattle
NE 115th Street to NE 130th Street



Lake City Way & NE 115th St: Variable on-street parking on NB lane. Bus lane during peak commuting times, 2hr parking max 9am-3pm. 2 travel lanes SB.



Lake City Way & NW 125th St: Permanent on-street parking both sides, both directions. 2 travel lanes each direction with landscaping.

Attachment D

Bothell, WA
Bothell Way & NE 183rd Street

5-lane cross-section with service lane (travel lane & parking) on both sides.

View of the service lane with on-street parking, auto travel lane, and bike sharrows.

Attachment E

Tukwila International Boulevard:
A Summary of the Design Alternatives

Tukwila International Boulevard:

Summary of Design Alternatives

Prepared for:
City of Tukwila

March 9, 2020

SE19-0699

FEHR PEERS

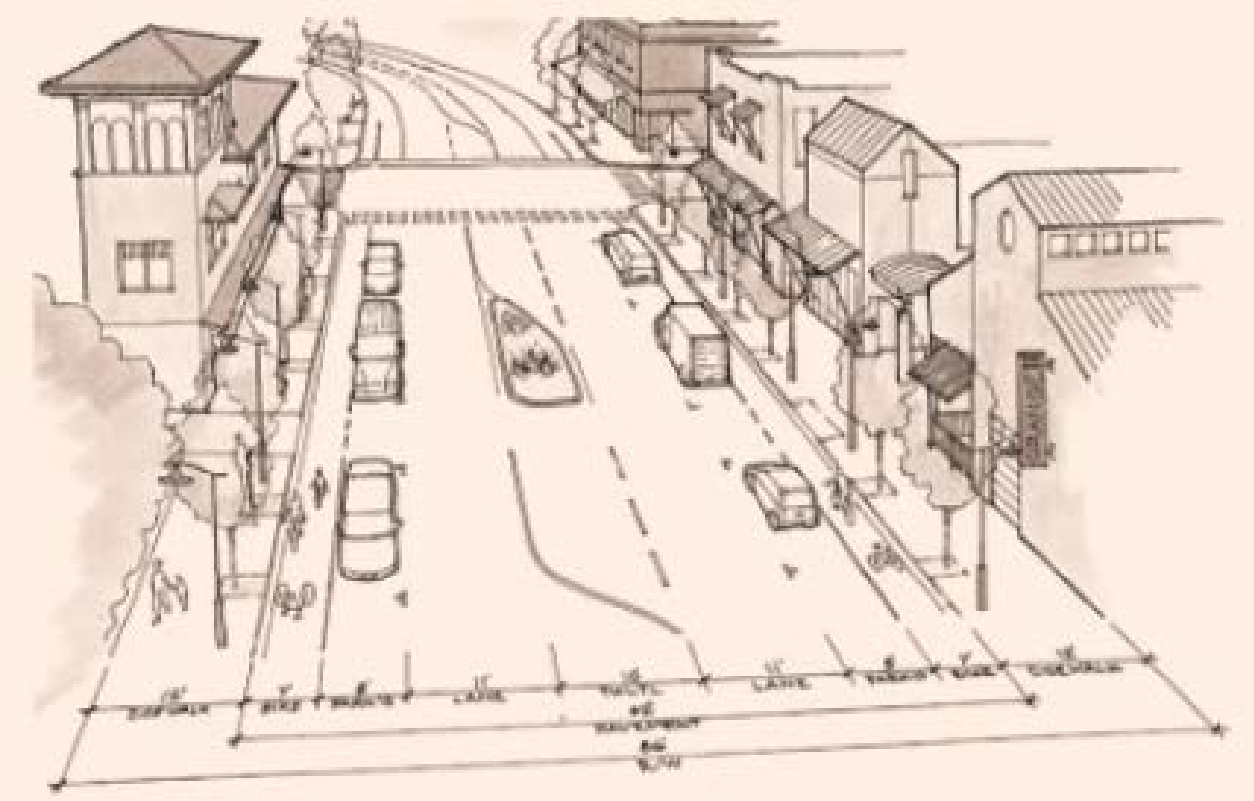
Table of Contents

Appendices

List of Figures

List of Tables

Executive Summary



Purpose

This document is intended to help Tukwila elected officials and the community understand the design options for implementing the community vision for Tukwila International Boulevard (TIB) and the surrounding neighborhood. The final design alternative selected will serve as the foundation for future municipal and community investment.

Summary

Since 1989-1990 when the City of Tukwila annexed what has become known as Tukwila International Boulevard (TIB), there has been community interest in "revitalizing" the corridor, transitioning it from its previous role as a pass-through regional highway, to a "main street" that is the "walkable, safe, visually and economically vibrant, and South King County's premier community-based center for cultural and commercial activity.

In 2015, based on community input, the City Council adopted the Tukwila International Boulevard Element of the Comprehensive Plan. In 2017, the City conducted a significant community outreach effort, with help from consultants for the Congress for New Urbanism. With the Main Street vision in mind and

evaluation criteria identified, the City then engaged traffic consultants to develop and analyze various corridor alternatives. Four roadway alternatives emerged from that effort:

1. Limited Improvements
2. Off-peak Parking
3. Reconfiguration with Neighborhood Traffic Calming
4. Extended Reconfiguration with Buffered Bicycle Lanes

These alternatives offer a combination of design elements and choices: lane width, number of through lanes, bicycle facilities or not, the configuration of on-street parking; pedestrian safety enhancements; the need for neighborhood mitigation to address potential cut-through traffic; and the range of options likely to stimulate local economic development. Based on traffic modelling, each alternative is anticipated to maintain an acceptable operation on TIB and minimize negative impacts on adjacent residential streets. Each option also represents a different implementation cost to the City, and each will affect traffic volumes on regional highways differently.

To evaluate the alternatives various criteria were identified, stemming from the City's vision for TIB defined in the Comprehensive Plan. Two additional factors to consider are the cost to the City for implementing the alternative, plus the fact that all alternatives would impact the traffic flow on TIB. The elements of the alternatives can be phased in as appropriate. The evaluation matrix follows:

Review Criteria	Alternative 1: Limited Improvements	Alternative 2: Off-peak Parking	Alternative 3: Reconfiguration with Neighborhood Traffic Calming	Alternative 4: Extended Reconfiguration with Buffered Bicycle Lanes
Supports City's "main street" vision with commercial shopping district	○	◉	●	●
Improves safety for all users	◉	◉	●	●
Catalyzes economic development and creation of community "nodes"	○	◉	●	●
Minimizes impacts to neighborhoods	●	●	◉	◉

Key: ● *Supports* ◉ *Partially supports* ○ *Does not support*

Cost Estimates				
Alternative 1 Improvements	Common to all alternatives			
S 140th Street Traffic Signal	$1,316,250	$1,316,250	$1,316,250	$1,316,250
Pedestrian Crossing/Safety Improvements (3 RRFBs)	$234,000	$234,000	$234,000	$234,000
Alternative-Specific Improvements				
Additional Improvements	$0	$330,000	$4,400,000	$2,770,000
Total Cost	**$1,550,250**	**$1,880,250**	**$5,950,250**	**$4,320,250**

Source: KPG. All costs are in 2019 dollars

This evaluation matrix suggests that Alternatives 3 and 4 support the TIB Vision of a walkable main street to the greatest degree, but are also the highest cost alternatives with the greatest impact to the current traffic flow on TIB. These alternatives support pedestrian and bicycle safety as well as advance the economic development potential on TIB. The cost of these alternatives range from $4.3 million to $6.0 million.

Alternatives 1 and 2, do not fully advance the community vision for TIB as a multimodal, walkable "main street" that stimulates community economic development due to the lack of permanent on-street parking. Alternative 2 does allow for on-street parking during non-peak times, which would provide some economic benefit. These two alternatives do provide pedestrian safety improvements with additional RRFB's and a Traffic Signal on S. 140th Street., These alternatives allow TIB to accommodate current and forecasted traffic volumes and would generate the least impact on adjacent neighborhoods from possible cut-through traffic. Alternatives 1 and 2 are the least expensive, at $1.5 million and $1.9 million.

Installation of the improvements identified in Alternative 1 (to be included in Alternatives 2, 3, and 4) will require that the cost of a traffic study, included in the totals for all alternatives). The installation of the traffic signal and Rectangular Rapid Flashing Beacons could be phased, pending the results of a traffic study.

City Council Next Steps

In the first quarter of 2020, the City Council will review the analysis of the four final TIB rechannelization options. In 2nd quarter of 2020, Council is anticipated to select a preliminary alternative which will be incorporated into the overall TIB District Plan and associated zoning and land use code revisions that will be used for public outreach, review and consideration.

Background

This document is intended to help Tukwila elected officials and the community understand the design options for implementing the community vision for Tukwila International Boulevard (TIB) and the surrounding neighborhood. The final design alternative selected will serve as the foundation for future municipal and community investment.

TIB in the Past

Tukwila International Boulevard (TIB) is one segment in a significant and historic corridor in the Puget Sound area. Previously designated as, and often still referred to as, "Highway 99" and "Pacific Highway," TIB preceded I-5 as the main north-south route in the Puget Sound area. It was a state highway surrounded by unincorporated King County when most of the initial development occurred along and around it. The roadway area annexed to Tukwila in 1989-1990, and upon community mandate, the revitalization of the area became one of the City's priorities.

TIB District Study Area

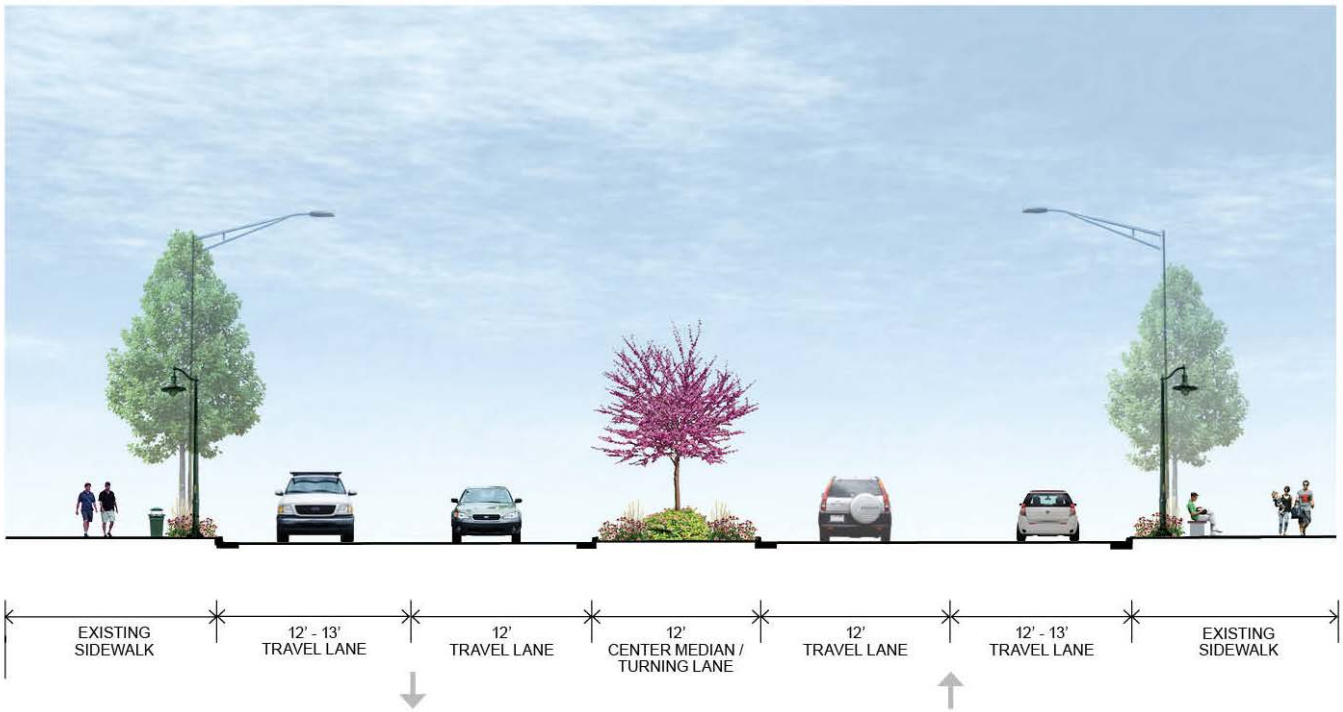
The City identified the following study area boundaries for its analysis: from approximately South 138th Street on the north to South 160th Street on the south, and from Military Road and Tukwila International Boulevard on the west to 42nd Avenue South on the east. (*See **Figure 1**, Tukwila International Boulevard District Boundary*.) Uses adjacent to TIB in the study area include commercial, multifamily developments, single family neighborhoods, and the Tukwila International Boulevard light rail station (TIBS). North of the TIB District is primarily an area comprising the City's manufacturing industrial center, containing a mix of industrial and commercial uses. South and west of the TIB District is the City of SeaTac, and farther south on International Boulevard is SeaTac International Airport.

TIB Today

The current configuration of the 1.5-mile study corridor on TIB is a five-lane cross section generally with two northbound lanes, two southbound lanes, and a two-way center left-turn lane (**Figure 2**). TIB is characterized by wide travel lanes, no on-street parking or bicycle lanes. Some intersections are signalized which facilitates vehicular traffic and east/west pedestrian crossings and four Rectangular Rapid Flashing Beacons (RRFB) crossings exist to also facilitate east/west pedestrian movement. These roadway characteristics were developed to prioritize roadway capacity and facilitate the efficient flow of vehicular traffic through the area but also to provide visible pedestrian crossing locations. Community members have expressed their desire for TIB to connect the residents and businesses and foster a healthy, sustainable and desirable neighborhood.

Figure 1. Tukwila International Boulevard District Boundary

Figure 2. Cross Section, Existing



Community Vision

TIB is one of the highest priorities for redevelopment in the City. Its multicultural flavor and available land provide opportunities, while safety concerns, difficult pedestrian connections, limited retail opportunities and market perceptions are challenges. By building a complete neighborhood, promoting the District's diversity and multicultural community, and leveraging the area's excellent transit access and opportunities for redevelopment, the TIB neighborhood has the opportunity to become South King County's premier community-based center for cultural and commercial activity. Facilitating a strong "main street" culture will help local businesses thrive and will catalyze other economic development along the corridor.

Since the 1994 Tukwila Comprehensive Plan first adopted a vision for Tukwila International Boulevard, the City and community have been considering how to realize that vision. Since that time, there has been significant public and private investment along the corridor, and the City conducted several research efforts to evaluate the community and economic role that TIB plays, as well as its potential to better serve the community. As part of the Comprehensive Plan update process in 2015, the City and community engaged in an intensive public involvement program to refine the vision. Out of this effort, a new vision for the TIB District was crafted and adopted by the City Council:

> *The vision for the Tukwila International Boulevard District is an area that is a complete neighborhood with a thriving, multicultural residential and business community with vibrant places to live, work, shop, and play for everyone. The District is a safe and walkable destination with an authentic, main street character that is connected to other destinations. There is an emphasis on self-sustaining, living wage employment opportunities within the District.*

Recent Planning

In February 2017, the City and the Congress for New Urbanism (CNU) held a community workshop to build on established community goals and identify the placemaking and redevelopment actions necessary to realize the TIB "main street" vision.

In May 2017, CNU provided a summary of the workshop and briefed the City Council on the two major short-term actions that, if undertaken, would implement the community's vision of a neighborhood commercial shopping district on TIB and improve safety for pedestrians, bicyclists, and vehicles:

1. *Land Use: Update the zoning code, including setbacks, building heights, and permitted land uses.*

Actions Taken to Date: Since the 2017 community workshop, staff has been reviewing draft land use and zoning modifications needed to realize the TIB vision and have reviewed proposed changes with the Planning Commission and the Tukwila International Boulevard Advisory Committee (TIBAC). In September 2017, the City Council adopted a moratorium on certain land uses that would be inconsistent with fostering the safe, walkable neighborhood envisioned by the community. These uses included auto-oriented commercial uses, as well as hotels and motels which in the past had been a major contributor of crime in the area. This moratorium has been extended multiple times and is currently set to expire in July 2020.

2. *Transportation: Change the TIB street design to reduce through-lanes to two rather than four, allow for on-street parking and bicycle lanes, and add more crosswalks.*

Actions Taken to Date: A series of reports have been prepared by consulting transportation engineers, Fehr & Peers and KPG, on possible design options for the TIB roadway, evaluating traffic operations, possible impacts and mitigation, cost, and the extent to which rechannelization of the corridor would support the City's vision. This process and results are presented in this report.

In September 2017, Fehr & Peers completed an evaluation of traffic operations on TIB and how rechannelizing the corridor to align with the City's vision would impact traffic. This analysis showed that due to the high volume of peak directional traffic on TIB, rechannelization would cause significant congestion and queuing and likely cause drivers to seek alternate parallel routes through the surrounding neighborhood. The data collected for this analysis and technical assessments of the options are included in the report in *Appendix 1*.

In March 2019, Fehr & Peers completed additional traffic analysis using supplemental speed and volume data that was collected along TIB and parallel roadways. This deliverable also provided additional descriptions and information about potential traffic calming measures that could be installed as part of this effort. This supplemental information is included as *Appendix 2*.

Preliminary cost estimates for each of the design options presented in this report were developed to provide an additional metric on which to evaluate the alternatives. KPG's memo is included as *Appendix 3*.

In July 2019, the Planning Commission and City Council were invited to participate in a field trip to observe how providing similar street rechannelization alternatives to those being considered by the City have modified the character of the roadway in several nearby communities.

TIB Rechannelization Alternatives

This report builds on several years of transportation and traffic analysis completed on the rechannelization of TIB. Four design alternatives were ultimately identified to implement various "complete street" options for TIB. Design choices presented in this report include combinations of choices:

- Various lane widths, number of through lanes, bicycle facilities, parking configurations
- Pedestrian safety enhancements
- Neighborhood mitigations
- Options to stimulate local economic development

Another important factor to consider is the capital outlay required to set the vision in motion, as well as whether the project should be phased in over time. The final design alternative selected will provide the foundation for future municipal and community investment.

The four alternatives for TIB evaluated include:

1. Limited Improvements
2. Off-peak Parking
3. Reconfiguration with Neighborhood Traffic Calming
4. Extended Reconfiguration with Buffered Bicycle Lanes

Alternative 1 provides minimal improvements including new traffic signal and RRFB protected pedestrian crossings. This alternative would not reconfigure the number of travel lanes.

Alternative 2 (Off-peak Parking), Alternative 3 (Reconfiguration with Neighborhood Traffic Calming), and Alternative 4 (Extended Reconfiguration with Buffered Bicycle Lanes) are design alternatives that would include the proposed limited improvements, as well as remove a travel lane in each direction (for all, or part of, the day) to accommodate on-street parking and bicycle lanes and address other elements of the community vision.

A map of the areas along TIB that are affected and a cross section of the roadway for each alternative are provided in the sections that follow.

Evaluation Metrics

Each alternative has been evaluated on the basis of its likeliness to support the overall community vision and project criteria:

- Advances the City's vision of TIB as a "Main Street" with a neighborhood-serving commercial shopping district
- Improves safety for all users (pedestrians, bicyclists, vehicles) along the corridor

- Minimizes impacts to surrounding neighborhoods resulting from TIB traffic diverting through adjacent neighborhoods
- Catalyzes economic development

Additional final considerations are the project cost and the potential for the project improvements to benefit the local economy. The City prepared an economic analysis to evaluate the impact of on-street parking. In addition, it is important to note that elements of the various Alternatives could be phased in over time.

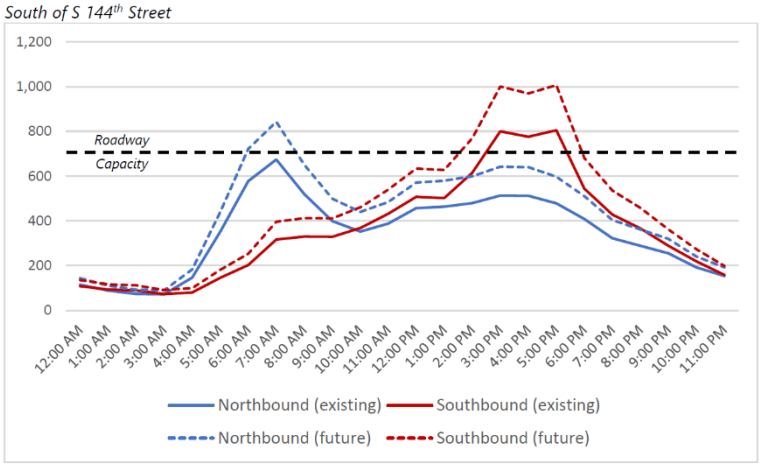
Each alternative discussion includes a summary of "pros and cons," as well as discussion that will help City officials and the public consider the merits of the various alternatives.

Traffic Volumes and Impacts of Rechannelization

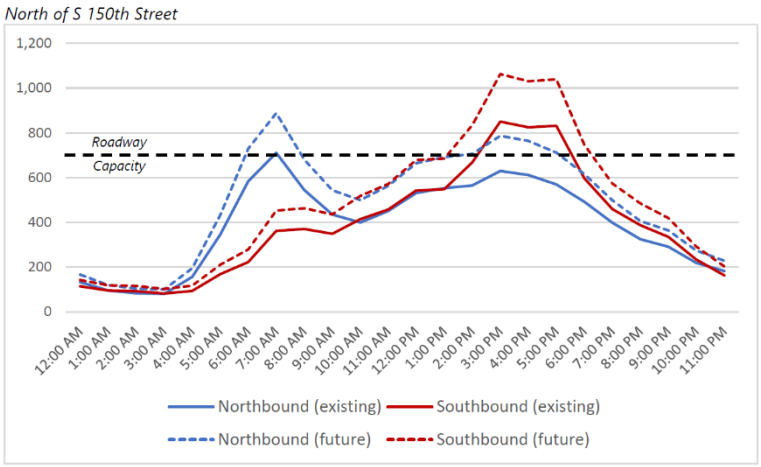
The City's traffic model was utilized to project impacts of potential channelization changes as well as address the impacts of regional and local growth to TIB operations. The traffic model is the best available tool to study the impacts of growth in traffic volumes and predict how drivers will modify their behavior. To study the impacts of proposed channelization changes, the model included the predicted regional grown in traffic volumes in the Puget Sound area as well as considered the potential growth in the TIB District.

Weekday Volumes on Tukwila International Boulevard

South of S 144th Street



North of S 150th Street



The figures to the right show the fluctuation in traffic flow throughout the day by direction of travel, both for existing conditions and projected future conditions. Each travel lane has a maximum capacity of approximately 700 vehicles per hour, which is shown as the *Roadway Capacity* on the figures. The volumes shown are the total demand for capacity based on the existing conditions.

For most of the day, three lanes on TIB are adequate to accommodate the full demand in both existing and future conditions. Providing capacity for the peak hours is the challenge. Once the capacity of TIB is reached, driver behavior changes, with motorists often looking for less congested, or faster alternate

routes. How and where the drivers decide to divert is often very fluid and should be monitored to determine the best options to mitigate negative impacts. For this study, all four alternatives will result in some modification of driver behavior although each alternative will result in different impacts to both drivers and adjacent streets.

Traffic Considerations

Traffic operations, as related to congestion, queuing, and operating speeds, were not used as an evaluation metric as the four alternatives are anticipated to operate with acceptable level of service on TIB. Alternatives 3 and 4 will likely require periods of adjustment during which traffic volumes will redistribute to alternate routes. Travel speeds through the corridor are also anticipated to be slower under all the design alternatives, so this was also not evaluated. However, it should be noted that slower traffic speeds on TIB will improve safety for all users.

Since the current and forecasted peak hour traffic volumes on TIB exceed the capacity of a three-lane roadway, each of the design alternatives is designed to minimize potential cut-through traffic that could shift onto nearby local streets. Each alternative uses a different approach to encourage “through drivers” currently using TIB to utilize I-5 or other regional routes rather than utilizing local parallel routes, such as Military Road S and 42nd Avenue S.

While the alternative selected may increase traffic on regional roadways, that impact is not a weighted factor in the City’s decision-making. The TIB plan seeks to implement the adopted City of Tukwila community priorities identified in the 2017 City Comprehensive Plan.

Alternative 1: Limited Improvements

This alternative would keep TIB largely as it is today. It would not change the cross-section or configuration – although it adds a new traffic signal at S 140th Street and three new pedestrian-activated Rectangular Rapid Flashing Beacons (RRFBs) at S 146th, 148th, and 150th (**Figure 3**). These improvements are listed in the City's Capital Improvement Plan and would require a traffic study prior to installation. The cross section of the roadway would be the same as shown in **Figure 2**.

The alternative provides no on-street parking or designated bicycle facilities. Traffic speed and volumes would remain largely as they are today, with the exception of intermittent stops to provide passage of pedestrians and the RRFBs.

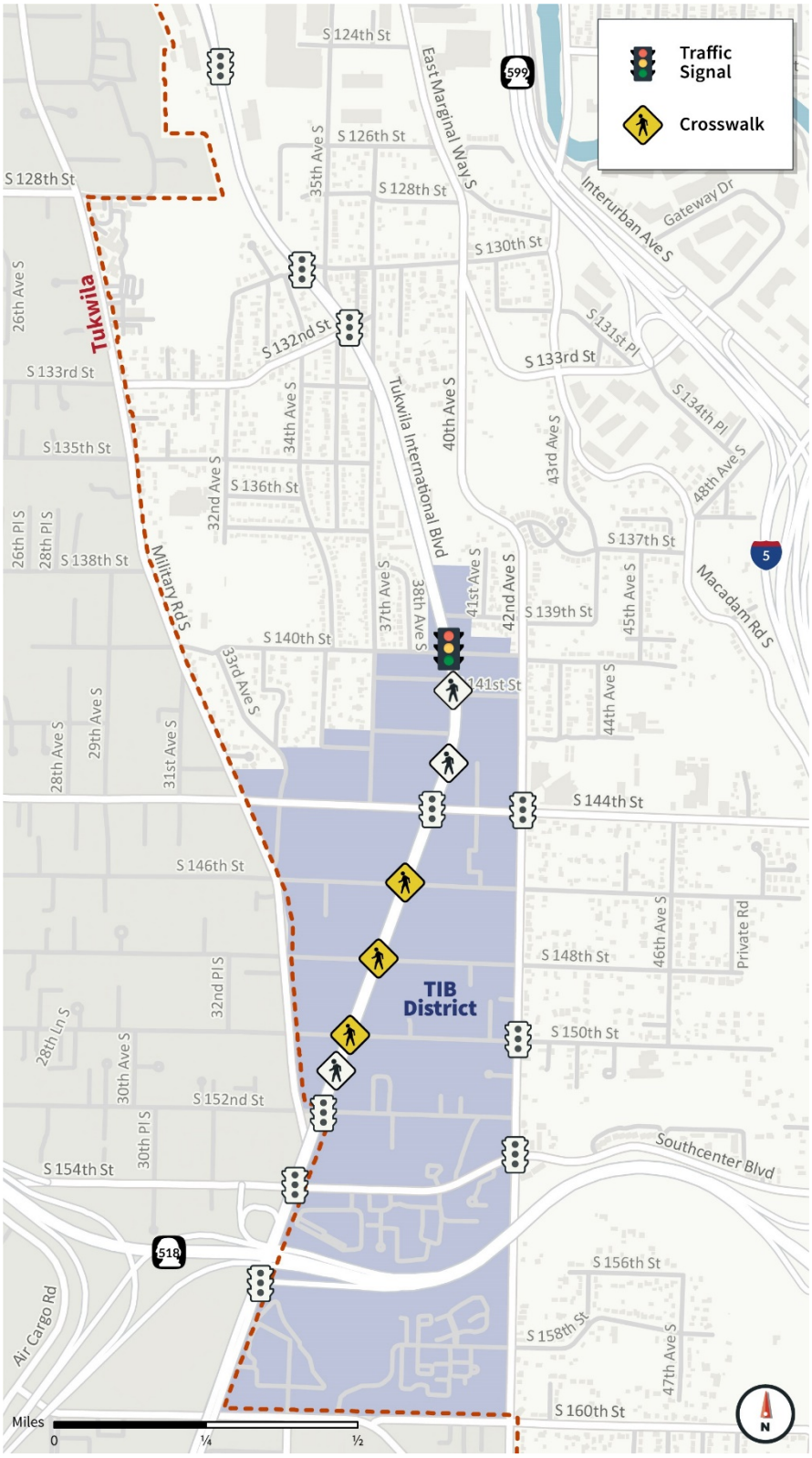
This alternative does not include any improvements to bicycle facilities along TIB.

Project Highlights

- No changes to cross-section or roadway configuration
- New traffic signal at S 140th Street
- Add signalized crosswalks at S 146th Street, S 148th Street, and S 150th Street

COST ESTIMATE: Up to $1.6 million (including the cost of a technical signal analysis report, which would also be required for installation of these improvements in Alternatives 2, 3, and 4)

Figure 3. Proposed Improvements, Alternative 1



Analysis

This is the least expensive alternative, however, it only minimally supports the City's vision of transforming TIB from a regional arterial to a local "main street" that encourages all modes of travel and improves safety for all users. Since no on-street parking is provided, more frontage roads could be installed to provide parking as the parcels along the corridor redevelop. Alternatively, parking could occur between the sidewalk and building via frontage roads. The addition of driveways to access frontage roads would interrupt the pedestrian and bicycle experience. This alternative may discourage redevelopment as property owners would need to use potentially buildable area for parking lots or driveways. Buildings would not likely be located at the back of sidewalk to create a continuous active street front. It is unlikely that the corridor would redevelop into a neighborhood commercial shopping district consistent with the community's vision. Under this option, it is not feasible to add bike lanes along TIB, so there would be no bicycle safety benefits. Due to these circumstances, it is unlikely that walking and biking activity along the corridor would increase significantly in the future, although the installation of RRFB crosswalks would enhance safety by increasing the visibility of pedestrians crossing the roadway.

Since this alternative does not alter the corridor's configuration, there are no impacts to the neighborhood or regional travel. Traffic volumes are projected to increase on TIB over time, and the corridor is projected to be able to accommodate traffic volumes forecasted to the year 2030.

PRO

- TIB would accommodate current and forecasted traffic volumes and meet City's existing level of service standard.
- Least expensive option.
- No new impacts to adjacent neighborhoods.
- Improved pedestrian safety with additional RRFB's and S. 140th Street Traffic Signal.

CON

- Does not advance community vision of a main street or enhance the development of commercial nodes supported by pedestrian access.
- Does not provide on-street parking on TIB
- Will likely result in more small frontage roads, which is not an ideal land use
- No additional bicycle safety benefits

Alternative 2: Off-Peak Parking

This alternative would provide on-street parking on TIB between S 139th Street and S 152nd Street only during off-peak demand periods when traffic volumes are less than 700 vehicles per hour. This area is shown in the area highlighted in **Figure 4**. This alternative would provide on-street parking for adjacent businesses during off-peak travel demand periods. This volume threshold was determined based on a previous simulation analysis which was completed for the City in September 2017 (see *Appendix 1*). Alternative 1 improvements would be included in this alternative following completion of a traffic study.

During peak travel demand periods, TIB would continue to operate with two travel lanes in at least one direction, and parking would not be allowed in the peak direction of travel. (**Figure 5**). Analysis of existing and future travel volumes (provided in *Appendix 2*) indicates that weekday parking restrictions during peak travel times would be necessary to provide sufficient capacity for the traffic demand along TIB - reducing driver incentive to divert on to parallel streets. The estimated parking restriction time periods are shown in **Table 1**.

Table 1: Periods Requiring Parking Restrictions (Weekdays Only)

	AM Peak Period		PM Peak Period	
	Northbound	**Southbound**	**Northbound**	**Southbound**
2019 Existing	7-8AM	-	-	3-6PM
2030 Future	6-9AM	-	3-6PM	2-7PM

With current traffic volumes, it would be necessary to require parking restrictions on weekdays for approximately one hour in the northbound direction and three hours in the southbound direction during the AM and PM peak periods, respectively. By 2030, northbound restrictions would need to be in effect for three hours in the morning and evening, and southbound restrictions would need to be in effect for five hours in the evening. The City would need to monitor traffic volumes periodically (annually or biennially) to adjust the restriction periods as traffic volumes increase. Due to lower traffic volumes on the weekends, on-street parking could be allowed in both directions today and in 2030.

Project Highlights

- Includes limited improvements identified in Alternative 1
- Provides on-street parking between S 139th Street and S 152nd Street during off-peak demand periods
- During peak demand periods, parking is not allowed in the peak direction of travel

COST ESTIMATE: Up to $1.9 million plus additional resources to enforce the parking restrictions to ensure the off-peak parking lane is open during peak travel demand periods. This amount includes the $1.6 million required for installation of Alternative 1 improvements and the cost of the required traffic study.

Figure 4. Proposed Improvements, Alternative 2

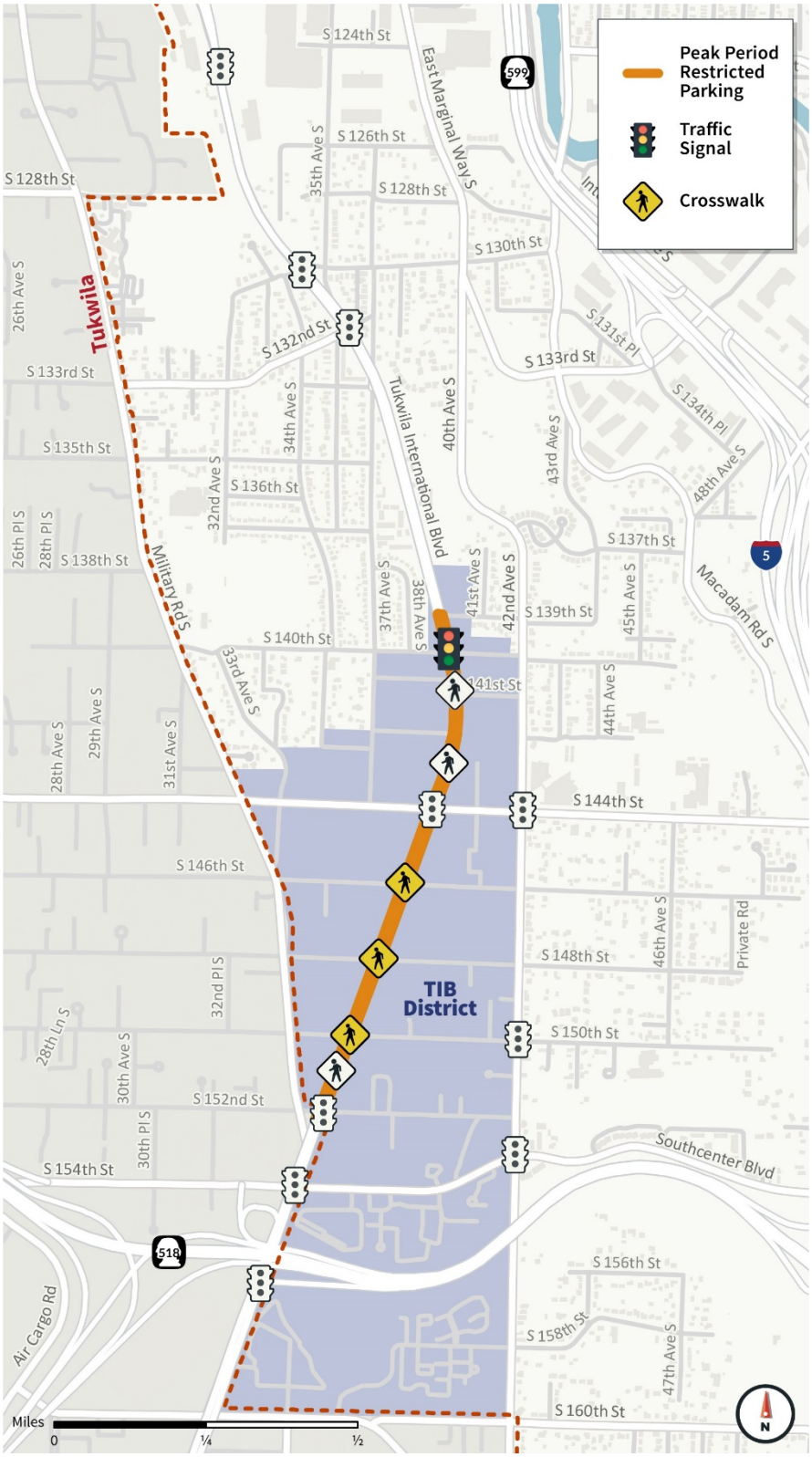
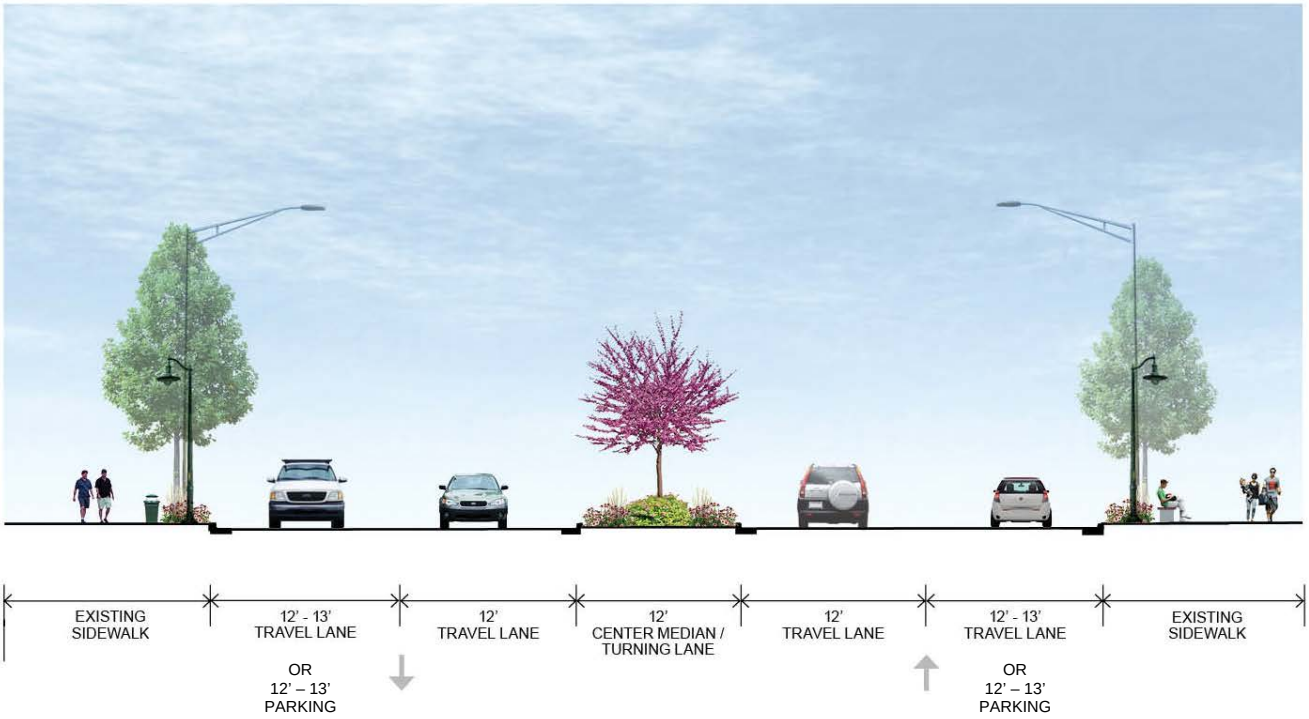


Figure 5. Cross Section, Alternative 2

Tukwila International Boulevard, between S 139th Street and S 152nd Street (parking lane availability based on peak hour travel demand)



Analysis

This alternative provides some benefits in support of the community's vision for TIB but does not significantly advance that vision. It does provides more support for the community's vision than Alternative 1, but not as much as Alternatives 3 and 4. It partially improves safety for vehicles and pedestrians during off-peak hours, as studies have shown that on-street parking is an effective traffic calming measure. The addition of on-street parking would reduce travel speeds along the corridor and could reduce the potential severity of collisions along the corridor. However, benefits would not be realized during the peak traffic periods. Installation of RRFB crosswalks would enhance safety by increasing the visibility of pedestrians in crosswalks.

This alternative is the second least expensive to implement and would have the fewest impacts on the surrounding neighborhood and regional travel since two travel lanes would be maintained during peak demand periods as there would be no enticement to cut through adjacent neighborhoods. The travel patterns for residents and regional travelers would not be impacted by this alternative, and the corridor would be able to accommodate current and forecasted traffic volumes.

Since the on-street parking would not be permanent, it would not be possible to install bicycle lanes, so there would be no bicycle safety benefits, and pedestrians would still need to cross four or more active travel lanes when parking is restricted. This alternative maintains maximum vehicular mobility during the

weekday commute periods when travel demand is highest while providing on-street parking during the midday and weekends when travel demand is lower. However, the City would need to regularly enforce the parking restrictions to ensure that the parking lane is open during the peak travel demand periods.

PRO

- TIB can accommodate current and forecasted traffic volumes and meet City's existing level of service standard.
- Safety benefits from on-street parking during most of the day.
- Least expensive design alternative.
- No impacts to adjacent neighborhoods.
- Improved pedestrian safety with additional RRFB's and S. 140th Street Traffic Signal.

CON

- Does not significantly advance community vision.
- City assumes enforcement burden or contracts out for service.
- No additional bicycle safety benefits.

Alternative 3: Reconfiguration with Neighborhood Traffic Calming

This design alternative would provide all-day on-street parking on TIB between S 139th Street and S 152nd Street by revising the outside travel lane in each direction. Bicycle lanes would also be installed along this section of TIB as shown in **Figure 6**. **Figure 7** shows sample cross sections for Alternative 3 between S 139th St and S 152nd St. This cross section is the same for Alternative 4.

Based on a traffic simulation analysis, the reduced capacity would cause some drivers to divert to parallel local roadways to avoid congestion on TIB. 42nd Avenue S and Military Road S would be the primary alternative routes used based on a travel time analysis.

In order to mitigate the speed and volume increases on neighborhood roadways within Tukwila, a variety of traffic calming devices would need to be installed as part of this alternative. Since Military Road S is outside the City of Tukwila jurisdiction, the City would need to coordinate with the City of SeaTac on implementing mitigation measures on their facility. The following treatments are example of traffic calming applications that could be effective in reducing excessive speeds while still maintaining full access for residents:

- Traffic circles
- Speed cushions/lumps
- Raised crosswalks
- Chicanes

The possible locations of these devices are shown on **Figure 7**. They are described in more detail in *Appendix 2*. Under this alternative, the City would need to monitor the effectiveness of the traffic calming measures on maintaining desired speeds and volumes on parallel local roadways. When warranted and accepted by the public, additional measures (such as traffic diverters) may need to be installed.

Project Highlights

- Includes limited safety improvements identified in Alternative 1, as directed by traffic study.
- Provides all-day on-street parking and bicycle lanes between S 139th Street and S 152nd Street.
- Installs traffic calming measures on surrounding neighborhood streets to discourage traffic from diverting.

COST ESTIMATE: $4.4 to $6.0 million. This amount includes the $1.6 million required for Alternative 1 improvements and the required traffic study.

Figure 6. Proposed Improvements, Alternative 3

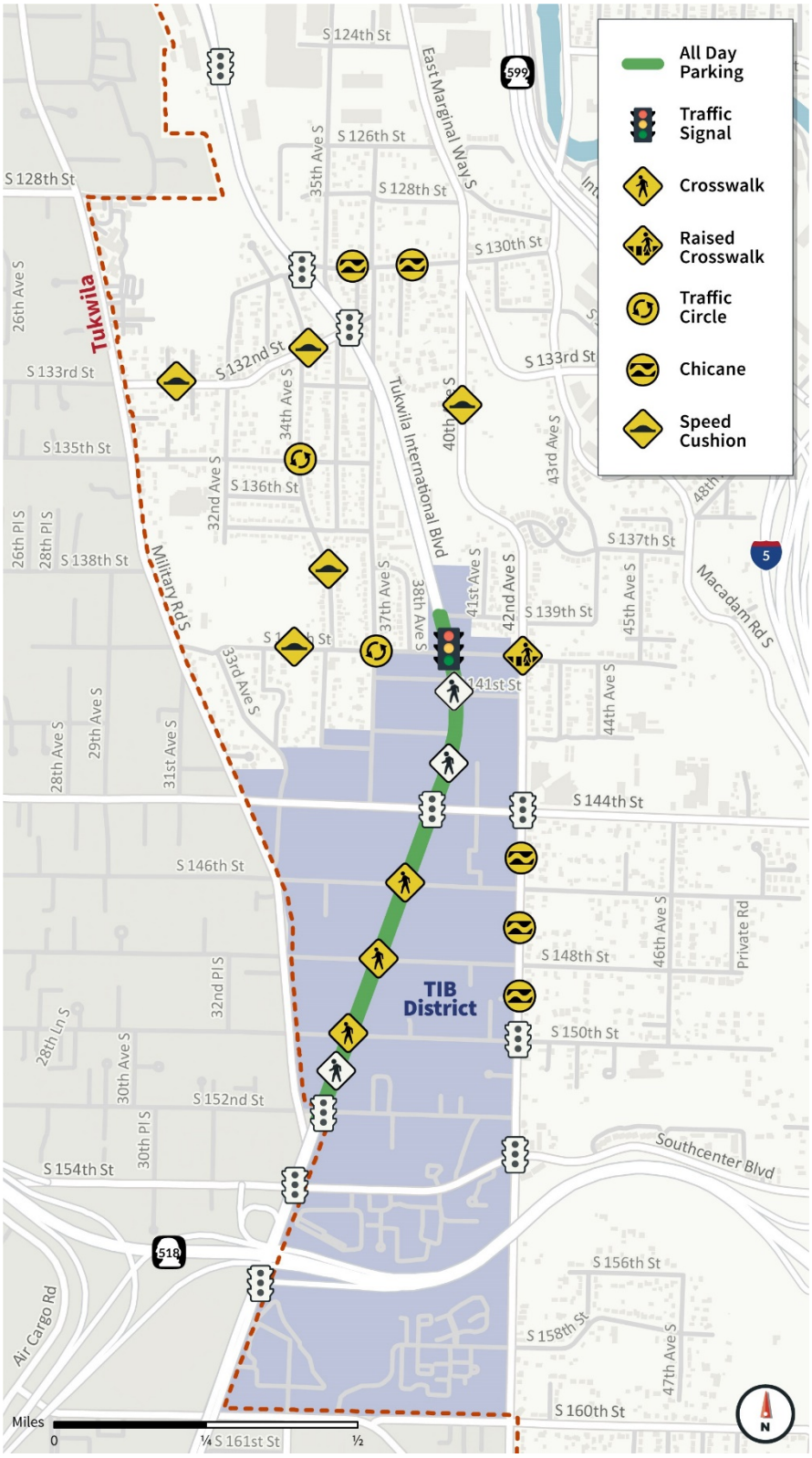
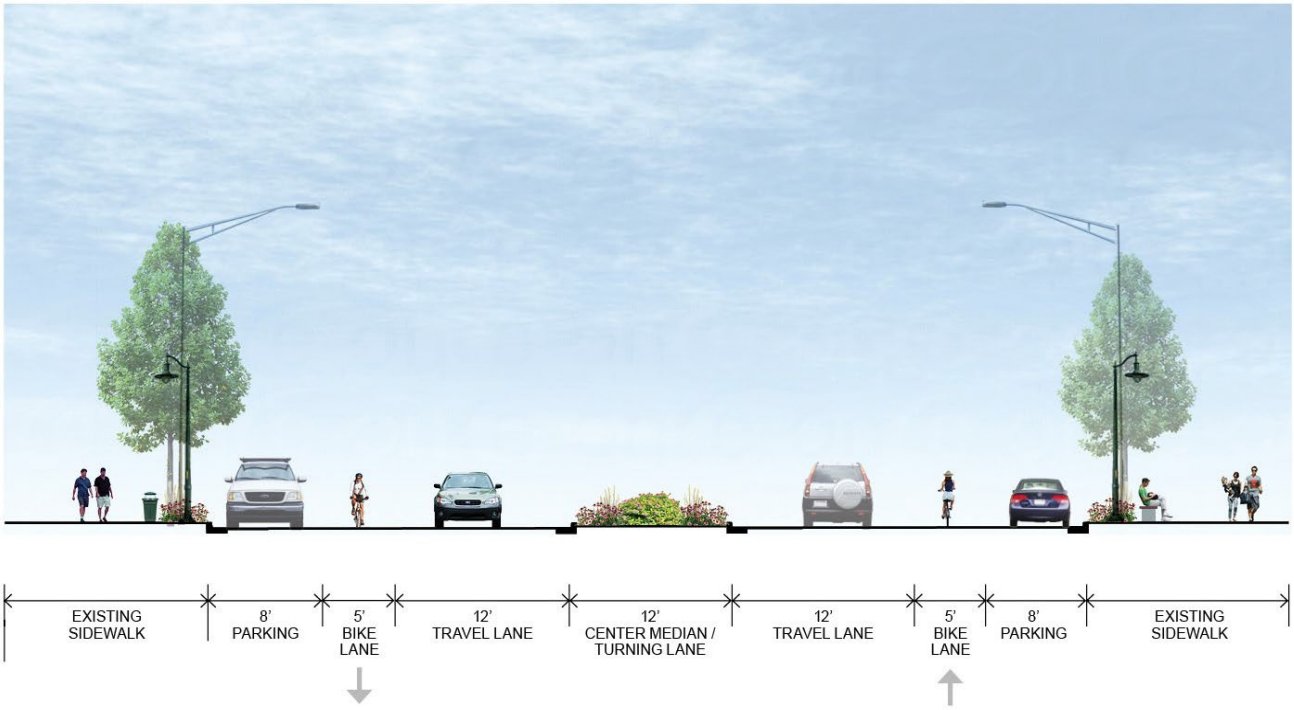


Figure 7. Cross Section, Alternative 3

Tukwila International Boulevard, between S 139th St and S 152nd St.



Analysis

Along with Alternative 4, this alternative best meets the recommendations identified from the CNU public workshops in support of adding on-street parking and bicycle lanes, improving pedestrian and bicycle safety, and transitioning TIB to a "main street." This reconfiguration would reduce capacity on TIB, with the largest impact being felt during peak travel periods. The capacity reduction would likely cause some drivers to divert to 42nd Avenue S, Military Road S, and other neighborhood routes to avoid congestion on TIB. The City would need to monitor the effectiveness of the traffic calming measures to maintain desired speeds and volumes on these parallel local roadways. When warranted and if accepted by the public, additional measures (such as traffic diverters) may need to be installed.

Alternative 3 is the most expensive option but aligns most closely with the community's vision for TIB and limits the extent of configuration changes along TIB. The traffic calming measures on the surrounding neighborhood streets would be effective in reducing excessive speeds while still maintaining full access for residents. However, traffic calming measures could impact neighbors and may not fully address the negative impacts of additional cut-through traffic. Some of these impacts are arguably positive, such as reduced traffic noise as a result of motor vehicles travelling more slowly (on TIB), but they could also be perceived as inconveniences (additional congestion where the roadway drops a lane). Careful messaging would be necessary to residents and property owners on these roadways to articulate the project benefits and what the City is doing to minimize impacts.

PRO

- Best advances community vision for TIB.
- Safety benefits from on-street parking.
- Bicycle safety benefits.
- Local traffic can be accommodated on TIB and impacts to neighborhood streets mitigated through new traffic calming treatments.

CON

- Most expensive option.
- Likely increases in traffic volumes and speeds on surrounding streets despite traffic calming.
- Neighbors potentially affected by installation of traffic calming devices.
- Regional traffic must shift to alternate routes on the regional network.

Alternative 4: Extended Reconfiguration with Buffered Bicycle Lanes

This alternative would provide all-day on-street parking on TIB between S 139th Street and S 152nd Street by replacing a travel lane in each direction with on-street parking and bicycle lanes (Alternative 3). Additionally, the travel lanes between S 139th Street the 12400 Block of TIB would be replaced with buffered bicycle lanes but no on-street parking would be provided. The entire project area is highlighted in **Figure 8**. **Figure 9** shows a sample cross section in Alternative 4 between the 12400 Block and S 139th St. South of S 139th St. the cross section is the same as provided in Alternative 3.

Project Highlights

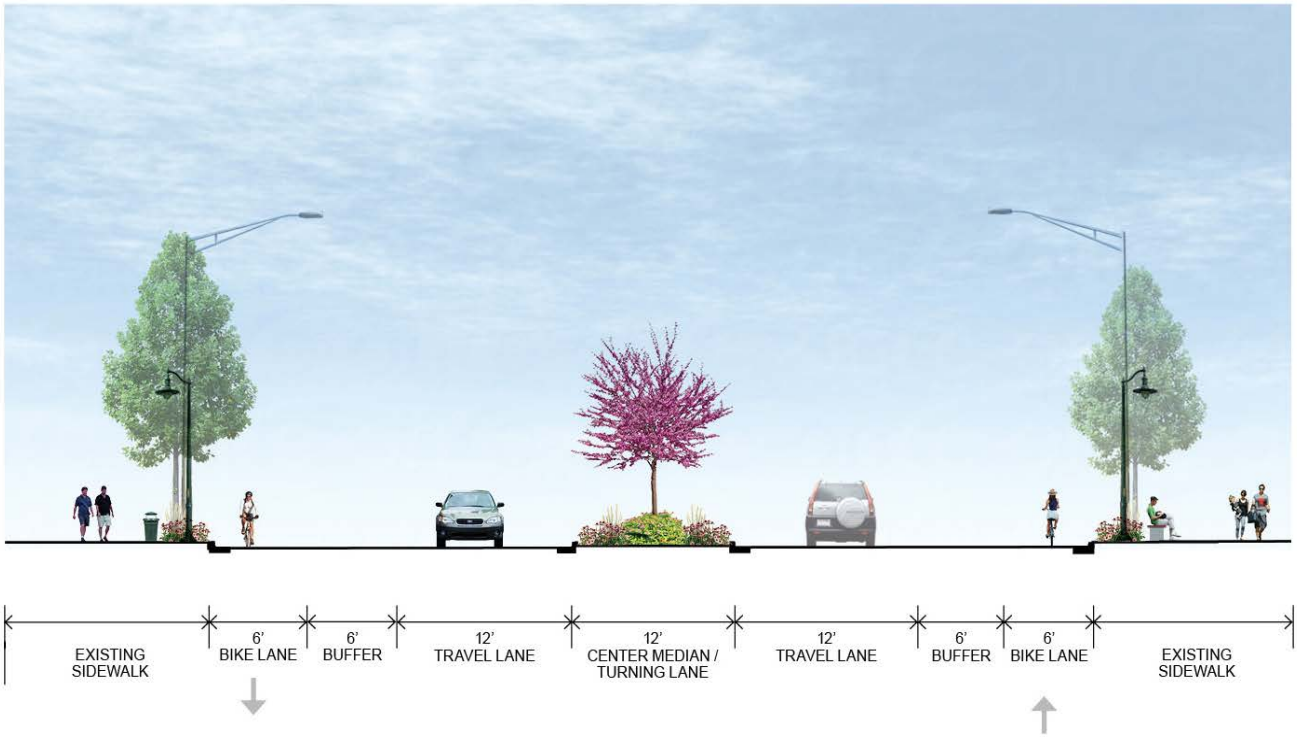
- Includes limited safety improvements identified in Alternative 1, as directed by a traffic study.
- Provide all-day on-street parking between S 139th Street and S 152nd Street.
- Add bike lanes between 12400 Block and S 152nd Street.

COST ESTIMATE: $2.8 to $4.3 million. This amount includes the $1.6 million required for Alternative 1 improvements.

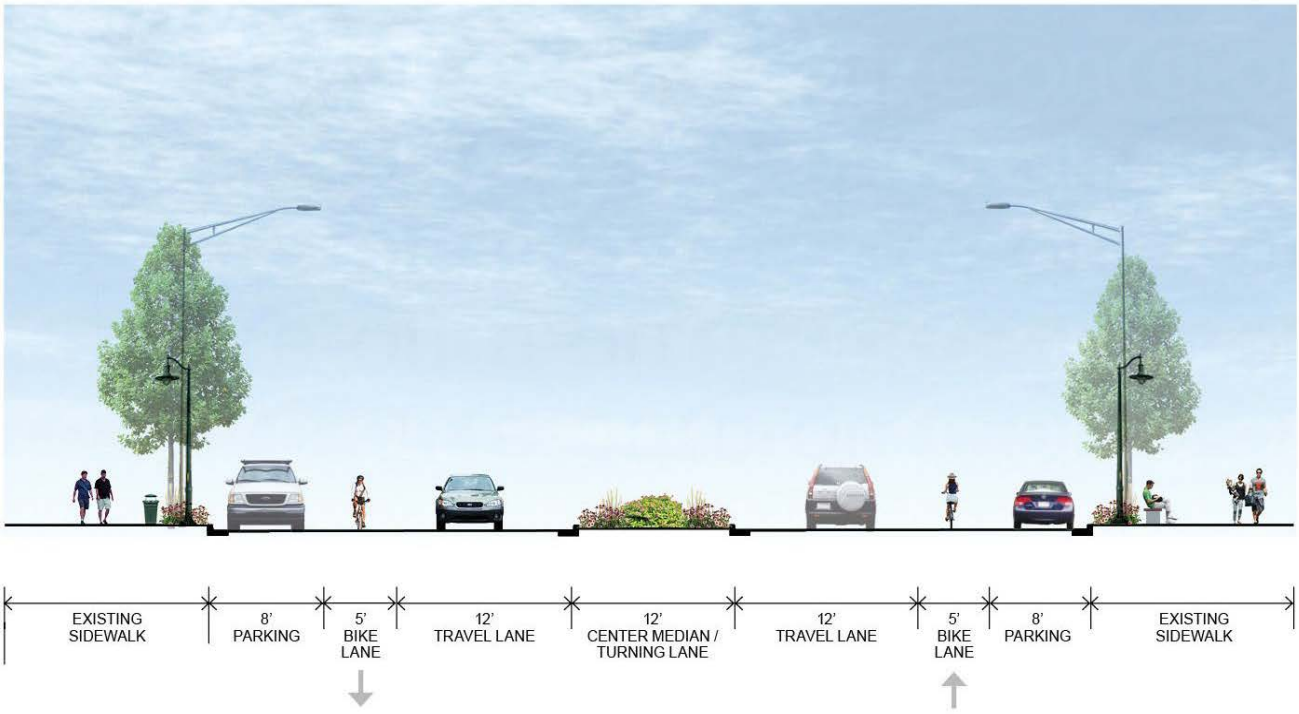
Figure 8. Proposed Improvements, Alternative 4

Figure 9. Cross Section, Alternative 4

Tukwila International Boulevard, north of 139th



Tukwila International Boulevard, south of 139th



Analysis

Along with Alternative 3, Alternative 4 provides maximum benefit along TIB by supporting the community vision of TIB as a "main street" and a neighborhood commercial shopping district. Both alternatives provide on-street parking throughout the entire day, bicycle lanes, and improved pedestrian crossing facilities, which provide safety benefits.

While extending the roadway reconfiguration north to the 12400 Block is not necessary to achieve the community's vision, it would make 42nd Avenue S and Military Road S less attractive cut-through routes as the lane reductions on TIB would start much further north. Minimal impacts to adjacent neighborhoods or businesses are anticipated, as regional traffic is more likely to be carried on other regional routes (I-5, SR 599, or SR 509) instead of local streets.

Alternative 4 is less costly to implement than Alternative 3 and requires less (or potentially no) traffic calming measures on neighborhood streets compared to Alternative 3. However, extending the reconfiguration north of S 139th Street does not provide direct benefit to the adjacent land uses along TIB since there are fewer businesses, and the demand for on-street parking and pedestrian amenities is less in this section. As such, the City would have to carefully message this project to explain the purpose of the reconfiguration north of S 139th Street. The installation of wide, buffered bicycle lanes is a benefit to anyone who bicycles along the corridor. A future project could provide connections to the Green River multi-use trail.

PRO

- Advances community vision and is consistent with recommendations emerging from CNU-led public involvement process
- Safety benefits from on-street parking
- Extended bicycle facilities and safety benefits
- Better encourages regional traffic to shift to alternate routes on the regional network
- A less expensive design option
- Local traffic can be accommodated on TIB and surrounding roadways

CON

- An increase in traffic volumes and speeds on surrounding streets
- Traffic volumes and speeds on surrounding streets will need to be monitored for increases and mitigated

Evaluation Summary

The four alternatives have been evaluated in **Table 2** using the previously identified criteria.

Table 2: Evaluation Matrix

Review Criteria	Alternative 1: Limited Improvements	Alternative 2: Off-peak Parking	Alternative 3: Reconfiguration with Neighborhood Traffic Calming	Alternative 4: Extended Reconfiguration with Buffered Bicycle Lanes
Supports City's "main street" vision with commercial shopping district	○	◉	●	●
Improves safety for all users[1]	◉	◉	●	●
Catalyzes economic development and creation of community "nodes"	○	◉	●	●
Minimizes impacts to neighborhoods	●	●	◉	◉

Key: ● *Supports* ◉ *Partially supports* ○ *Does not support*

[1]Alternative 1 is included in Alternatives 2-4.

Two additional factors are the project cost and the impact to TIB traffic operations. Also, it is important to note that elements of the various alternatives could be phased in over time.

The budget estimates for construction of each of alternative are summarized in **Table 3**. All alternatives include the limited improvements in Alternative 1, which would be installed at the appropriate time following completion of a traffic study.

Table 3: Cost Estimates

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Limited Improvements included in all Alternatives				
140th Signal Installation	$1,316,250			
Pedestrian Crossing/Safety Investments	$234,000			
Alternative Specific Improvement Costs				
Additional Improvements	$0	$330,000	$4,400,000	$2,770,000
Total Cost	**$1,550,250**	**$1,880,250**	**$5,950,250**	**$4,320,250**

Source: KPG. All costs are in 2019 dollars

Appendices

Appendix 1: Tukwila International Boulevard Rechannelization Study (January 2018)

Tukwila International Boulevard Rechannelization Study

Prepared for:
City of Tukwila

January 2018

SE17-0561

FEHR PEERS

Table of Contents

Chapter 1. **Introduction**

The City of Tukwila is considering a rechannelization project on Tukwila International Boulevard (TIB) between S 144th Street and S 152nd Street. The current configuration of the ½ mile corridor is a 5-lane cross section with 2 northbound lanes, 2 southbound lanes, and a two-way left turn lane. The proposed project would remove a travel lane in each direction to allow for on-street parking and striped bicycle lanes. In addition, new mid-block pedestrian crossings could be constructed along the corridor and the rechannelization would decrease the required crossing distance and associated risk for pedestrians. The rechannelization is intended to increase the mobility and safety foster an attractive and inviting environment for all users of TIB. This type of project is sometimes referred to as a "road diet" since the number of travel lanes are reduced.

The potential effects of reducing the number of travel lanes on TIB were first analyzed using microsimulation software to evaluate vehicular operations and second with the City's travel demand model to investigate potential traffic diversion. The microsimulation analysis focuses on the TIB corridor and reports changes in travel time, queuing, and intersection level of service (LOS) for existing and future conditions. The diversion analysis explores the alternative routes that drivers could use to avoid TIB and traffic calming measures the City could implement to reduce diversion onto residential streets.

This report is organized as follows:

- *Chapter 1. Introduction*
- *Chapter 2. Existing Conditions:* This chapter documents existing conditions along the study section of the TIB corridor and includes vehicular volumes, travel times, field observations, and travel behavior data.
- *Chapter 3. Microsimulation Analysis:* This chapter discusses the development and validation of the microsimulation model and the analysis results for the project under both existing and future demand scenarios.
- *Chapter 4. Diversion Analysis:* This chapter provides an analysis of potential traffic diversion due to the project and a suite of traffic calming strategies that could be used by the City to mitigate impacts on residential streets.
- *Chapter 5. Design Options:* This chapter outlines a series of design options that can reduce the significance of the traffic congestion and/or diversion related to the road diet. Pros and cons of each option are described.

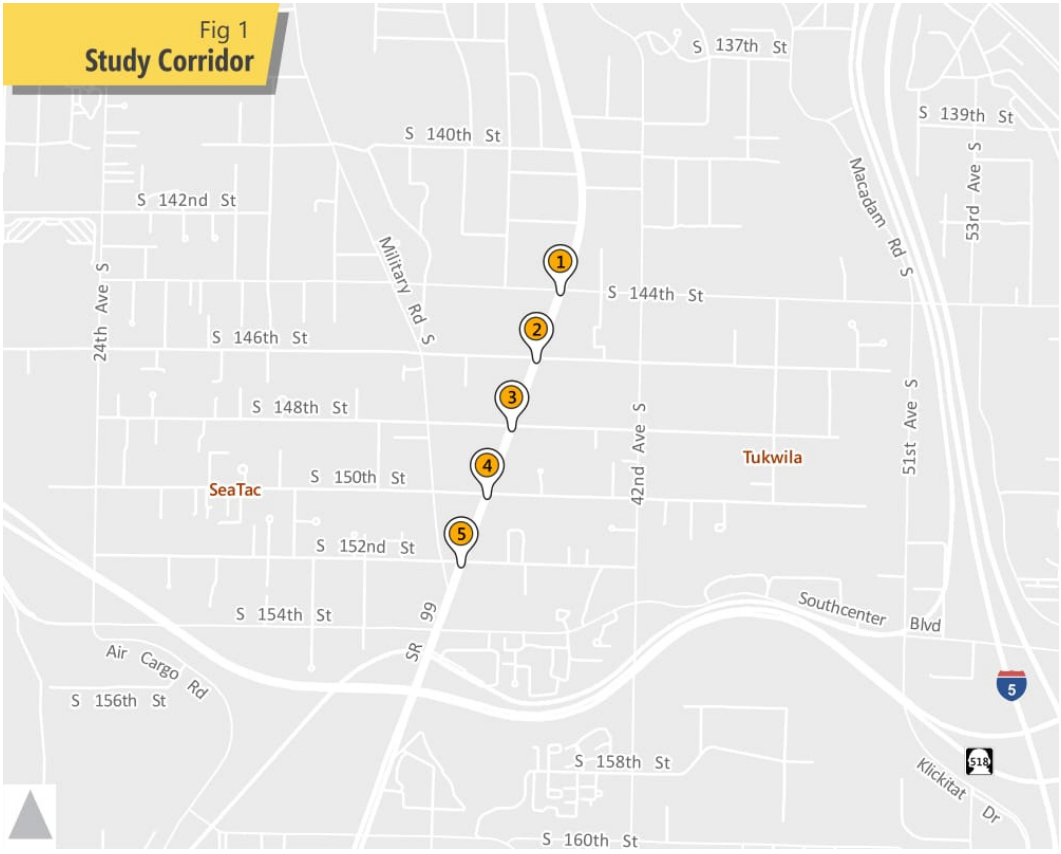
- *Chapter 6. Conclusion:* This chapter summarizes the results from the microsimulation and diversion analyses and recommends further actions the City consider related to the rechannelization project.

Chapter 2. **Existing Conditions**

Existing travel behavior data (intersection traffic counts, corridor travel time, and origin-distribution travel data) and corridor infrastructure data (lane geometries, pedestrian crossing locations, and traffic signal timings) were collected along the study corridor during May 2017. The study corridor, shown in **Figure 1**, includes the following intersections along Tukwila International Boulevard.

1. S 144th Street
2. S 146th Street
3. S 148th Street
4. S 150th Street
5. S 152nd Street

The intersections at S 144th Street and S 152nd Street are signalized while the other three intersections are side-street stop-controlled. There is one mid-block signalized crossing for pedestrians between S 150th Street and S 152nd Street that is activated with a push button.



The following information was not only used to understand current operating conditions along the TIB corridor, but also to calibrate and validate the microsimulation travel model. Since traffic volumes are higher during the evening peak hour than the morning peak hour, the data collection effort and subsequent analyses focused on the evening peak period. Traffic volumes collected during the City's Comprehensive Plan Update in 2010 show that the morning peak hour volumes on TIB are 40% lower than the evening peak hour volumes. The significantly lower volumes in the morning suggest that any impacts from the proposed rechannelization would be substantially less during the morning than in the evening.

2.1 Intersection Traffic Counts

Traffic counts at the five study intersections along the corridor were collected on May 15th during the PM peak period between 4:00 and 6:00 PM and included vehicular, pedestrian, and bicycle volumes. The peak hour at all intersections occurred between 4:15 and 5:15 PM. There were approximately 700 northbound vehicles and 900 southbound vehicles that travelled along Tukwila International Boulevard during the peak hour. The number of observed bicycle users was less than five at any of the approaches at all study intersections and the number of pedestrians crossing TIB at the unsignalized locations was also minimal. The traffic counts are included in Appendix A.

The 2017 traffic volumes at the two signalized intersections were compared with the intersection volumes collected for the Comprehensive Plan update. Since those counts were collected, volumes have increased by 10 to 15% in the study corridor with the majority of increases occurring on TIB (as opposed to the east-west streets crossing TIB). The cause of the increased volumes could be spillover from congested regional routes since limited land use development has occurred near the study corridor in the last decade.

2.2 Travel Times

Travel time data along the study corridor was collected using advanced sensors that track the unique identifiers of internet connected devices (cell phones, GPS devices, and Bluetooth electronics). A sensor was placed at each end of the corridor and using paired device IDs the travel time can be estimated for each device that travelled through the corridor.

A total of 81 southbound pairs and 60 northbound pairs were collected between 4:00 and 6:00 PM. 3 minutes was determined to be an appropriate threshold to separate vehicles that travelled through the corridor from those that stopped at a destination along TIB. Approximately 65% of southbound trips and 55% of northbound trips met this criteria for pass-through travel. **Table 1** summarizes the travel time data for these trips.

Table 1: Observed Travel Time Summary

Direction	Northbound	Southbound
Total Observed Pairs (Pass-through and Local)	60	81
Pass-through Observed Pairs (<3 minutes travel time)	34 (56%)	52 (64%)
Average Observed Travel Time (minutes)	1:45	1:45
Average Observed Travel Speed (mph)	18 mph	18 mph
Observed Travel Time Standard Deviation (minutes)	0:40	0:35

Source: Fehr & Peers.

The average travel time both northbound and southbound through the study corridor is approximately 1 minute 45 seconds which corresponds with an average travel speed of 18 mph. The fastest observed travel time was less than 1 minute in each direction with an average travel of approximately 40 mph northbound and 50 mph southbound. Vehicles that were able to travel through the corridor at this speed likely had green lights at both ends of the corridor and did not need to slow down. The traffic signals at S 144th Street and S 152nd Street are operated by the Cities of Tukwila and SeaTac and do not have coordinated timing plans. If the traffic signals were coordinated, higher vehicle speeds northbound and southbound on TIB throughout the study corridor could likely be achieved.

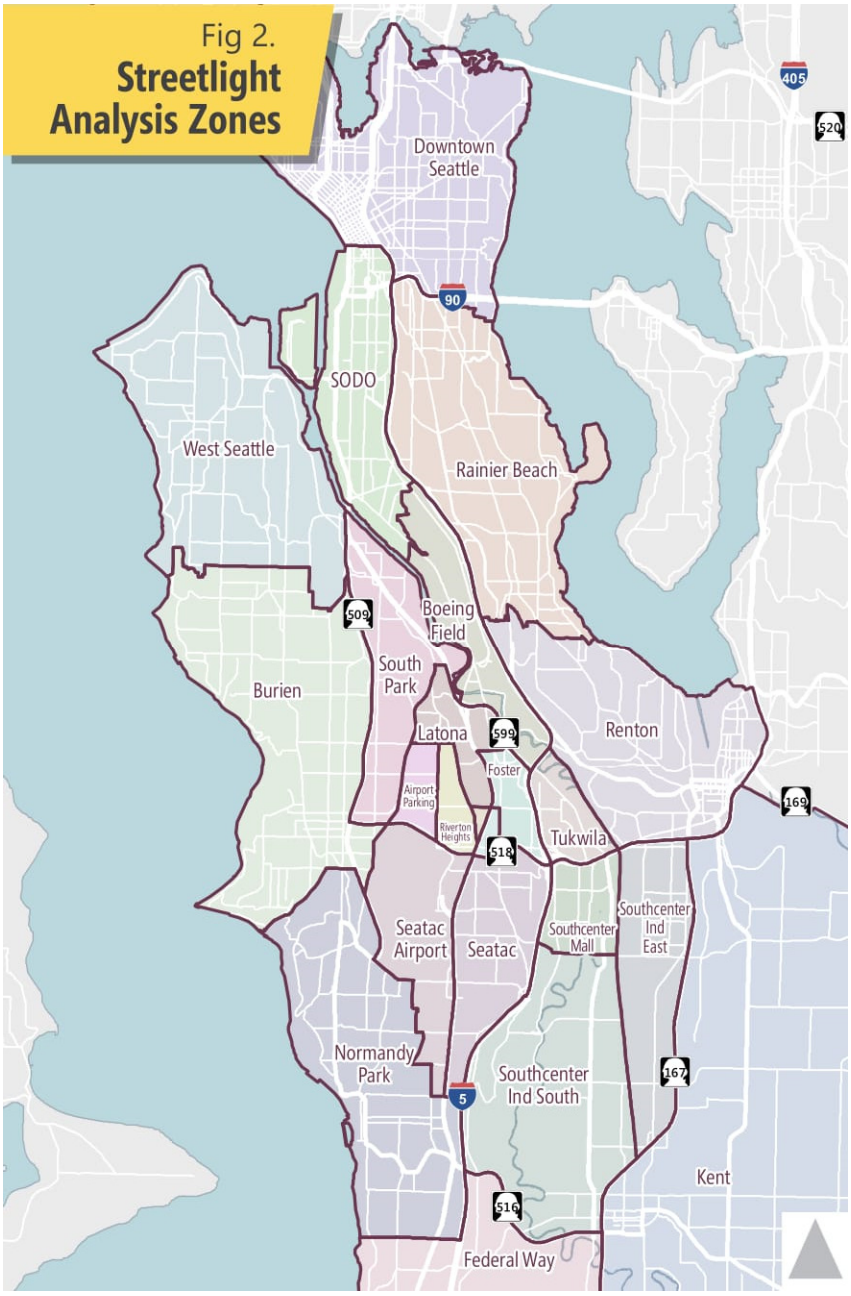
2.3 Field Observations

Fehr & Peers conducted field observations on May 30th during the PM peak hour to verify intersection geometry, traffic signal timing and phasing, pedestrian volumes, vehicular travel behavior, and any existing congestion and queuing throughout the corridor. During our observations, there was no recurring or sustained congestion at any of the signalized or unsignalized intersections along the corridor. While vehicle queues were present at the traffic signals, there was sufficient green time to serve all of the queued demand at each of the approaches and most vehicles were able to travel through the intersection during one cycle. The available storage in the turn pockets was also sufficient to store the existing demand without spilling back into the through lanes.

At the side-street stop-controlled intersections there were sufficient gaps in traffic for vehicles to enter on to and exit from TIB. There was also no sustained congestion or queuing at the driveways along TIB to any of the local businesses. The vehicle compliance rate at the signalized mid-block pedestrian crossing between S 150th Street and S 152nd Street was also very high. The observed demand at this crossing location was approximately 40 pedestrians per hour.

2.4 Travel Behavior Data

Origin-distribution (OD) data for vehicles travelling on TIB through the study corridor was collected from Streetlight travel behavior data. Streetlight aggregates and normalizes travel behavior data from a wide variety of internet connected devices (cell phones, GPS devices, connected cars, fitness trackers, and commercial fleet management systems) to generate an OD matrix that represents average travel conditions within a study area.



A custom zone system was developed for this project which is shown in **Figure 2**. The zone system uses smaller zones closer to the study corridor and larger, more aggregate zones further away.

The Streetlight data provides a summary of average travel patterns from data collected between April 2016 and March 2017, the most recent months available. The data was filtered to personal (not commercial) vehicle trips occurring on a Tuesday, Wednesday, or Thursday between 3:00 and 6:00 PM. Only vehicle trips which travelled on TIB within the study corridor were recorded and analyzed.

The Streetlight OD data was used to characterize the origin and destination location of travelers on TIB as well as to estimate the percentage of pass-through trips during the

PM peak period. The analysis zones were aggregated by approximate distance from the study corridor to calculate how far away driver's origins and destinations are. The results are shown in **Table 2**.

Table 2: Origin and Destination Distance from TIB

Distance from Study Corridor	Trip Origins	Trip Destinations
< 1 mile	33%	25%
< 5 miles	26%	31%
< 10 miles	17%	16%
< 20 miles	10%	16%
> 20 miles	13%	13%

Source: Fehr & Peers.

According to the Streetlight data only 60% of the driver's origins or destinations are within 5 miles of the study corridor. For 40% of drivers on TIB, their origin or destination is more than 5 miles from the study corridor and for almost 15% of drivers, their trip starts or ends more than 20 miles away. This pattern of travel behavior is more consistent with a regional roadway than a local arterial.

The percentage of pass-through trips was estimated by calculating the number of trips that do not start or end within one mile of the study corridor. Approximately 45% of trips fall into this category, with the largest trip pairs occurring between SeaTac and Central Seattle. The Streetlight data and travel time data suggest that approximately 50% of the travel through the study corridor on TIB is pass-through and that 40% of trips start or end more than five miles from the study corridor.

Chapter 3. Microsimulation Analysis

A microsimulation model of the TIB study corridor was developed using PTV's Vissim software (version 9.00-06). For congested and oversaturated conditions, a microsimulation analysis is preferable to a static analysis (using Synchro software for example) because microsimulation better captures the interaction of closely spaced intersections along a corridor. The primary metrics used to evaluate the proposed rechannelization project are changes in travel time, vehicular queuing, and intersection LOS along the study corridor.

The following four scenarios were evaluated using the microsimulation model:

- 2017 Existing
- 2030 Baseline
- 2017 with Project
- 2030 with Project

When reporting results from Vissim, 10 different simulation runs with different random seeds are used. Each simulation run includes a 15 minute loading period and four 15-minute analysis periods. Detailed LOS and queuing results for each scenario are included in Appendix B.

3.1 Existing Scenario

The existing conditions PM peak hour model was calibrated and validated using the collected travel data described in the Existing Conditions chapter. The model also included the transit stops and scheduled arrivals for King County Metro Routes 124 and 128 which have 15 minute and 30 minute headways respectively. Intersection geometries and signal timings at each of the study intersections were confirmed during field observations and the vehicular and pedestrian volumes at each study location were taken directly from the observed counts. However, the westbound approach at S 144th Street was closed due to construction activity when counts were collected, so the missing turning movements were estimated from the available 2010 count data and increased based on the observed growth rate at adjacent intersections along TIB.

The microsimulation model was calibrated to match existing travel volumes, travel times, and observed queues. The model is considered validated when each of these metrics are within an acceptable range of the observed values.

Table 3 shows the intersection LOS results calculated using the HCM 2010 methodology and the percent demand served at each of the study intersections. For signalized intersections, the LOS grade is determined using the average control delay for the entire intersection while at side-street stop-controlled locations the average control delay for the worst movement is used. The percent demand served is calculated using the observed hourly demand at each location and the number of vehicles that were served in the microsimulation model. Acceptable values are greater than 95%. As shown in the table, the model is serving 100% of the demand at each study intersection.

Table 3: 2017 Existing – Intersection LOS and Demand served

Study Intersection	Intersection Control	LOS / Average Control Delay (sec)	Percent Served / Demand (veh)
1. TIB / S 144th St	Signal	D / 40	100% / 2,282
2. TIB / S 146th St	Side-street stop	C / 21	100% / 1,846
3. TIB / S 148th St	Side-street stop	C / 17	100% / 1,709
4. TIB / S 150th St	Side-street stop	C / 17	100% / 1,762
5. TIB / S 152nd St	Signal	C / 30	100% / 2,030

Source: Fehr & Peers.

Table 4 shows a comparison of corridor travel time and average speed calculated from the microsimulation model with observed data. The model's estimate are within an acceptable range of 15% of the observed values. The average travel speed through the corridor is less than 20 mph.

Table 4: 2017 Existing – Corridor Travel Time

Direction	Observed (minutes) / Average Speed (mph)	Modeled (minutes) / Average Speed (mph)	Percent Difference
Northbound	1:45 / 18 mph	01:55 / 18 mph	9%
Southbound	1:45 / 18 mph	01:50 / 19 mph	5%

Source: Fehr & Peers.

Table 5 shows the average and maximum northbound and southbound queue lengths at the two signalized intersections along TIB. Theses calculated values from the microsimulation model are measured in vehicles and are consistent with observed conditions. The average queue lengths during the PM peak hour at all four approaches is not greater than five vehicles.

Table 5: 2017 Existing – Intersection Queuing

Intersection	Northbound: Average / Maximum Queue Lengths (veh)	Southbound: Average / Maximum Queue Lengths (veh)
1. TIB / S 144th St	2 vehicles / 9 vehicles	5 vehicles / 17 vehicles
5. TIB / S 152nd St	2 vehicles / 10 vehicles	3 vehicles / 14 vehicles

Source: Fehr & Peers.

Based on the comparison of results from the microsimulation model with collected data and observed conditions, the model is considered validated to existing conditions.

3.2 Future Baseline

Travel conditions along the study corridor were evaluated for future 2030 conditions using the City's travel demand model to forecast changes in traffic demand volumes. The land use in the City's model near the study corridor was updated based on adjustments provided by City staff. The updated land use forecast includes approximately 800 new housing units and 700 new jobs by 2030. Compared with the 2010 estimates in the model, these represent a 40% increase in residential land use and a 55% increase an employment along the study corridor.

The resulting 2030 intersection forecasts are between 20% and 25% higher than the 2017 existing counts. The northbound and southbound volumes on TIB through the corridor increase by approximately 200 vehicles per hour in each direction. The study corridor geometry and signal timing data in the 2030 Baseline scenario are consistent with the existing conditions model.

Table 6 summarizes the intersection LOS and demand served for the 2030 Baseline scenario. As shown in the table, all intersections operate at LOS D or better and 100% of the vehicular demand is served at the signalized intersections. Compared with existing conditions, average intersection delay increased by approximately five seconds per vehicle at the two signalized intersections.

Table 7 shows the corridor travel time and average speed estimates calculated from the microsimulation model. Compared with the existing conditions model, travel times increase by approximately five seconds in each direction with no significant change in average travel speed.

Table 8 shows the average and maximum northbound and southbound queue lengths at the two signalized intersections along TIB. Compared with existing conditions, the average queue lengths increased by one to two vehicles while the maximum queue increased by at most five vehicles.

Table 6: 2030 Baseline – Intersection LOS and Demand served

Study Intersection	Intersection Control	LOS / Average Control Delay (sec)	Percent Served / Demand (veh)
1. TIB / S 144th St	Signal	D / 44	100% / 2,690
2. TIB / S 146th St	Side-street stop	D / 26	99% / 2,240
3. TIB / S 148th St	Side-street stop	C / 24	99% / 2,140
4. TIB / S 150th St	Side-street stop	D / 26	99% / 2,160
5. TIB / S 152nd St	Signal	D / 36	100% / 2,520

Source: Fehr & Peers.

Table 7: 2030 Baseline – Corridor Travel Time

Direction	Travel Time (minutes) / Average Speed (mph)
Northbound	02:00 / 18 mph
Southbound	01:55 / 18 mph

Source: Fehr & Peers.

Table 8: 2030 Baseline – Intersection Queuing

Intersection	Northbound: Average / Maximum Queue Lengths (veh)	Southbound: Average / Maximum Queue Lengths (veh)
1. TIB / S 144th St	3 vehicles / 13 vehicles	6 vehicles / 20 vehicles
5. TIB / S 152nd St	3 vehicles / 12 vehicles	5 vehicles / 19 vehicles

Source: Fehr & Peers.

The results for the 2030 Baseline scenario show that there is sufficient capacity along the study corridor to accommodate increased growth while maintaining the same operating conditions that exist currently. Vehicular delay, corridor travel time, and queue lengths are all relatively consistent with the results from the 2017 Existing scenario.

3.3 Project Scenarios

The proposed rechannelization along TIB removes one travel lane in each direction and adds bicycle lanes and on-street parking while preserving the two-way left turn lane for accessing businesses along the corridor. Three additional signalized mid-block pedestrian crossings, similar to the existing crossing

between S 150th Street and S 152nd Street, are also proposed. This rechannelization was evaluated under both 2017 and 2030 demand conditions.

Table 9 shows the resulting intersection LOS and demand served at each study intersection for the rechannelization scenario using 2017 and 2030 demand volumes. Under both scenarios, the delay significantly increases at S 144th Street and the demand served falls to approximately 85% with 2030 demand. The total southbound demand at S 144th Street increases to 1,100 vehicles in the 2030 forecast and this demand greatly exceeds the capacity of single traffic lane, which is assumed to be approximately 600 vehicles per hour. While only two intersections operate at LOS F in the 2017 scenario, four of the five are overcapacity and operate with LOS F conditions in the 2030 scenario.

Table 9: 2017 and 2030 Project – Intersection LOS and Demand Served

Study Intersection	2017: LOS / Average Delay (sec)	2017: Pct. Served / Demand (veh)	2030: LOS / Average Delay (sec)	2030: Pct. Served / Demand (veh)
1. TIB / S 144th St	F / >150	90% / 2,282	F / >150	83% / 2,690
2. TIB / S 146th St	D / 25	90% / 1,846	F / >120	82% / 2,240
3. TIB / S 148th St	C / 23	91% / 1,709	F / >120	84% / 2,140
4. TIB / S 150th St	F / 53	92% / 1,762	F / >120	84% / 2,160
5. TIB / S 152nd St	D / 42	95% / 2,030	E / 75	86% / 2,520

Source: Fehr & Peers.

Table 10 shows the travel time results on TIB between S 144th Street and S 152nd Street for the 2017 and 2030 demand scenarios. In the 2017 scenario, travel times only increase by 20 to 30 seconds with the average speed decreasing by 1 to 2 mph compared with existing conditions. These results show that once vehicles enter the study corridor, vehicular travel speeds are similar to existing conditions. However, the excessive southbound delay experienced by drivers before entering the corridor (more than 8 minutes) is not included in these travel times. Under the 2030 conditions, the travel time for southbound vehicles within the study corridor more than doubles and drivers experience more than 10 minutes of additional delay before even entering the corridor.

Table 10: 2017 and 2030 Project – Corridor Travel Time

Direction	2017: Travel Time (min.) / Speed (mph)	2030: Travel Time (min.) / Speed (mph)
Northbound	02:15 / 16 mph	04:35 / 8 mph
Southbound	02:05 / 17 mph	02:50 / 12 mph

Source: Fehr & Peers.

Table 11 shows the average and maximum queue lengths for the northbound and southbound approaches at the two signalized intersections. Southbound queues longer than 50 vehicles at S 144th Street extend past S 140th Street and northbound queues longer than 20 vehicles at S 152nd Street will spillback into the intersection at Southcenter Boulevard. Consistent with the results shown in the previous tables, the rechannelization has a significant impact on southbound travelers on TIB. Under both 2017 and 2030 scenarios, the average southbound queue at S 144th Street (during the entire PM peak hour) is longer than 50 vehicles. In the 2017 scenario, the maximum northbound queue at S 152nd will spill back into the intersection at Southcenter Boulevard. By 2030, the average queue length would also spillback to this intersection. Within the study corridor on TIB, average vehicles queues are approximately 10 vehicles long in 2017 but are four to seven times longer by 2030. The maximum southbound queue at S 152nd Street extends almost the entire length of the study corridor on TIB in the 2030 scenario.

Table 11: 2017 and 2030 Project – Intersection Queuing

Intersection	2017 NB: Avg. / Max Queue Lengths	2017 SB: Avg. / Max Queue Lengths	2030 NB: Avg. / Max Queue Lengths	2030 SB: Avg. / Max Queue Lengths
1. TIB / S 144th St	5 veh / 24 veh	>50 veh / >50 veh	38 veh / 60 veh	>50 veh / >50 veh
5. TIB / S 152nd St	6 veh / >20 veh	12 veh / 36 veh	>20 veh / >20 veh	79 veh / 104 veh

Source: Fehr & Peers.

3.4 Demand Sensitivity Tests

Fehr & Peers performed additional sensitivity tests to determine the volume of traffic that would need to shift to an alternative route for the performance on TIB in the 2030 Project scenario to be similar to performance in the 2017 Existing scenario.

If approximately 450 southbound vehicles and 350 northbound vehicles per hour were to shift to alternate routes, the intersection LOS, travel time and queuing along TIB would be similar to existing conditions. This volume is approximately 50% of the demand travelling through the study corridor today, and represents the estimated pass-through volume: non-local traffic that does not have an origin or destination near the study corridor.

Chapter 4. Diversion Analysis

The results from the microsimulation analysis show that under both 2017 and 2030 demand scenarios, TIB will be overcapacity with the rechannelization, especially in the southbound direction during the PM peak hour. The high traffic volumes coupled with the single lane will result in significant delays, even under existing conditions, and as a result, drivers will likely divert to alternate routes including 42nd Avenue S, Military Road S, and Interstate 5 (I-5). Of particular concern to the City is the potential for parallel residential streets (42nd Avenue S and 51st Avenue S) to see significant increases in traffic due to the rechannelization. Based on the available 2010 counts, the daily volumes on these nearby residential streets are 75 to 85% lower than the daily volumes on TIB.

4.1 Traffic Diversion

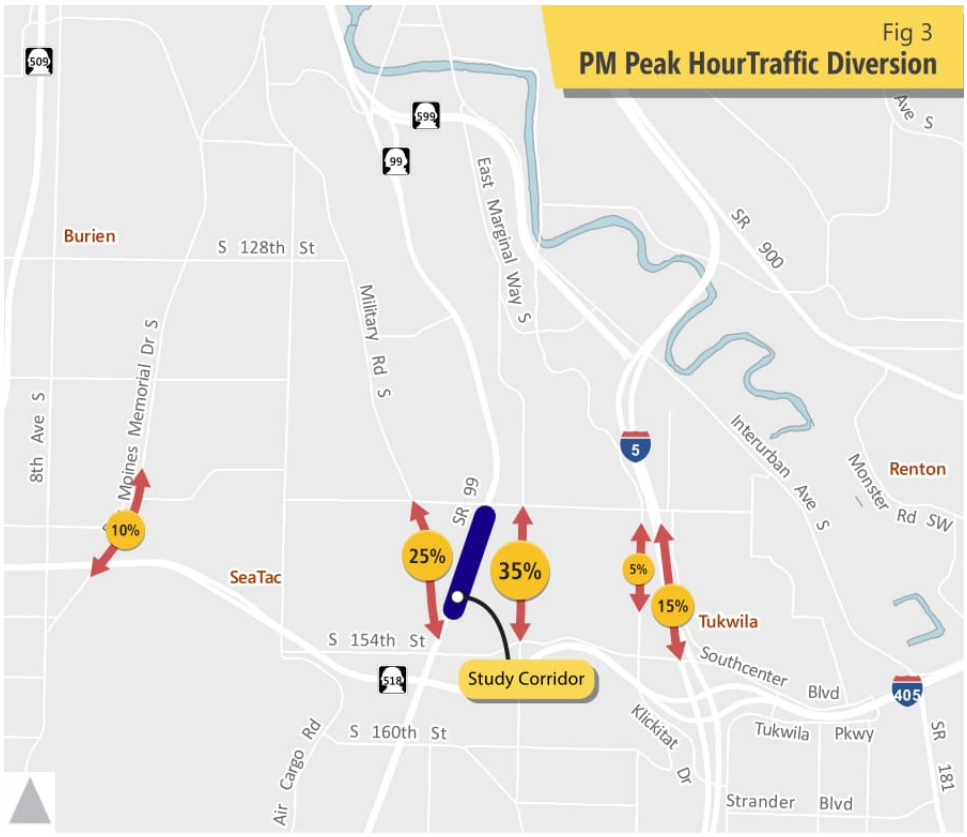
The City's travel demand model was used to assess what facilities traffic is likely to divert to in response to the increased congestion along TIB after the rechannelization. The results were estimated from the 2030 model scenario since regional facilities are likely to be more congested in the future and this would result in more drivers choosing to divert from TIB to local streets, rather than choose the congested I-5 route, for example. **Figure 3** shows which parallel facilities drivers chose as alternatives to TIB.

The results from the model show that a majority of trips avoiding congestion on TIB (approximately 65%) choose to divert to streets within the City of Tukwila. Specifically, the results indicate the following distribution to the main north-south streets in the area:

- Military Road S (25%)
- 42nd Avenue S (35%)
- Macadam Road/51st Avenue S (5%)

Approximately 10% of diverted trips used Des Moines Memorial Drive S via S 133rd Street and 15% of diverted trips used I-5 via State Route 599. The remaining 10% of diverted trips use a combination of SR 509, 1st Avenue S, 8th Avenue S, or 24th Avenue S.

If approximately 800 vehicle trips are diverted during the PM peak hour, this would result in an increase of 280 vehicles on 42nd Avenue S and 200 vehicles on Military Road S. Based on the forecasted intersection volumes from the City's Comprehensive Plan, this would increase the traffic on 42nd Avenue S by 40% and on Military Road S by 30% in 2030.



4.2 Traffic Calming Toolbox

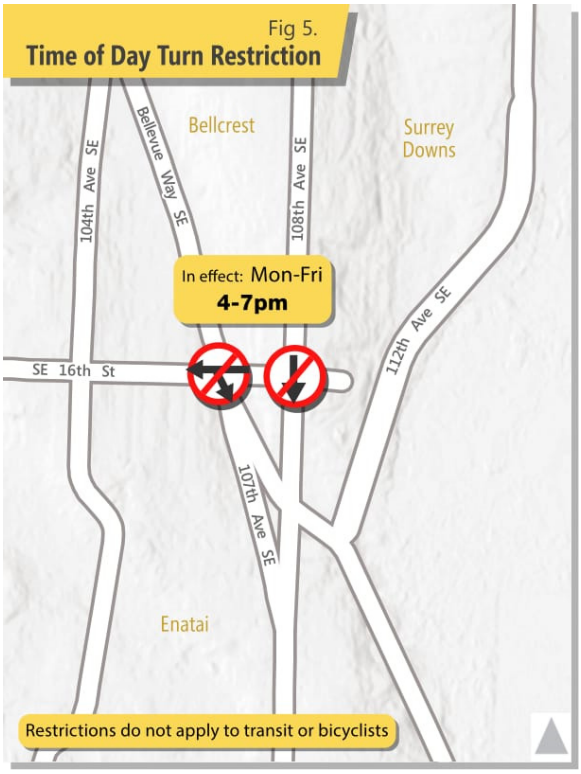
One common strategy to combat diversion of regional traffic onto local streets is to employ traffic calming. The *Urban Street Design Guide* from the National Association of City Transportation Engineers (NACTO) provides a blueprint for designing streets that are safer, more livable, and economically vibrant. The guide provides strategies for how cities can reduce vehicular travel speeds/volumes through physical changes to a roadway or psychological changes to how drivers perceive a roadway. The six images in **Figure 4** from NACTO's guide show some of the commonly used strategies for calming traffic on urban streets. These approaches work by introducing vertical or horizontal deflections into the roadway, narrowing a vehicle's travel way, or increasing the likelihood of vehicles yielding to pedestrians and bicyclists on the street. The effectiveness of these strategies in reducing vehicle speeds range from approximately 5-15%. The percentage reduction in traffic volumes due to the implementation of these traffic calming measures would be less than the percent reduction in travel speeds.

The diversion of traffic from the rechannelization of TIB onto parallel roadways could be partially mitigated using any of these traffic calming strategies to decrease the travel speeds on the nearby roadways. However, since drivers would be saving over 5 minutes of travel time compared with travelling through the TIB corridor, the traffic calming measures would need to decrease the average travel speed by over 50% on

42nd Avenue S and Military Road S to remove the travel time advantages of these facilities. The current speed limits of the roads are 30mph and 35mph, respectively. The combinations of measures that would be required to reduce the travel speed to 15mph for 8 blocks would likely be impractical on a minor arterial/collector street. In general, the common traffic calming measures shown in Figure 4 are designed to encourage vehicles to travel at the posted speed limit rather than to dramatically reduce speeds to a level less than is typically seen on a residential street.

To significantly discourage traffic diverting from TIB, more significant countermeasures would be required, likely in addition to some of the traffic calming strategies documented above. Strategies cities use to

explicitly deter cut through traffic involve the prohibition of certain traffic movements at key locations along the corridor. Two different approaches that would prohibit northbound and southbound through trips would be intersection diverters or short one-way travel segments. The implementation of these mitigations could be less expensive than other traffic calming treatments since the installations would be limited to key intersections or segments of Military Road or 42nd Avenue S near the vicinity of S 144th Street. Special consideration would need to be provided for transit vehicles to ensure that existing or planned traffic routes could still be accommodated. Some cities have had limited success with signage that restricts movements for all vehicles except bicycles and buses, but regular enforcement is required for this strategy to be successful.



An example of a current pilot study in Bellevue is shown in **Figure 5** where there are time of day restrictions in place on 108th Avenue SE, a collector arterial street (not dissimilar to 42nd Avenue S) to deter traffic from Downtown Bellevue traveling through a residential area and encouraging traffic to stay on regional routes like Bellevue Way or 112th Avenue SE. Like in Tukwila, the degree of diversion is partially dependent on traffic congestion on the adjacent freeway (I-405 in this case). In discussions with Bellevue staff, this approach has been successful in reducing traffic on 108th Avenue SE, but there still tends to be a substantial violation rate of people making the prohibited movements. This violation has frustrated area residents who view the treatment as unsuccessful even though overall volumes have decreased.

Chapter 5. **Alternative Design Options**

Based on the results of the traffic operations and diversion analysis, it is clear that reducing the number of travel lanes on TIB without addressing the southbound PM peak hour congestion or potential diversion to other streets would result in an unacceptable outcome. Working with Tukwila staff, our team identified three potential options to reduce the width of TIB while mitigating or redirecting the traffic congestion and diversion impacts. The options are listed below:

1) Road diet between 144th Street and 152nd Street with traffic calming mitigation on 42nd Avenue S
2) Road diet between 116th Street (SR 599) and 152nd Street
3) Hybrid road diet between 144th Street and 152nd Street with two southbound and one northbound lane

Characteristics of each option are described below.

Road Diet with Traffic Calming on 42nd Avenue S

This option would maintain the general road diet design described in Chapter 1 (one travel lane in each direction with turn lanes at intersections) between 144th and 152nd Street. To address the likely traffic diversion onto 42nd Avenue S, traffic calming measures are recommended to ensure vehicles travel at a reasonable speed. Given the residential nature of the street and the proximity to Foster High School, we recommend a targeted speed of 25mph on 42nd Avenue S. There are a number of traffic calming devices that can encourage lower speeds, including chokers, and chicanes as shown in the previous section. Below is a picture of a low-cost chicane in Bellevue that is used to manage speed (note that only one car at a time can comfortably pass through the chicane, which is also coupled with a speed cushion. In addition to traffic calming on 42nd Avenue S, traffic calming on Military Road may also be prudent, however, this traffic calming would need to be coordinated with the City of SeaTac.

[insert picture]

After talking with Tukwila staff, more restrictive traffic calming measures that would prohibit certain movements through physical barriers (half street closures, diagonal diverters) were not selected due their impacts to all users throughout the day. There is the potential for time-of-day movement restrictions, but

as noted in the previous chapter, these require occasional enforcement to be successful, which is a draw of police resources.[1]

Benefits:

- Implements the rechannelization as originally designed
- Provides opportunities for mid-block crossings
- Slows down vehicles on 42nd Avenue S (and potentially Military Road), may slightly reduce diversion

Drawbacks:

- Does not reduce the substantial southbound delays at 144th Street
- Diversion to 42nd Avenue and Military Road will still be an option for people who wish to save time and avoid the southbound delay at 144th Street

Extended Road Diet between 116th Street and 152nd Street

As noted earlier, as much as half of the traffic on TIB during the PM peak hour is regional traffic that does not have an origin or destination in the City of Tukwila. The largest share of this traffic is travel between Seattle and the Sea-Tac Airport area. The idea behind this option is to discourage regional traffic from using TIB by beginning the road diet at 116th Street, which is also the southbound onramp to SR 599. By constraining capacity at SR 599, southbound regional trips will be encouraged to use SR 599 and I-5 rather than TIB. Any bottleneck associated with the reduced southbound capacity would be concentrated at this intersection, where there is much more capacity to divert traffic (and reduce overall delays for travelers along TIB) to SR 599.

While this option has advantages for Tukwila, it presents a less-desirable option for the regional travelers who would need to eventually merge on the congested I-5 south corridor. Travelers who are on TIB to access areas in SeaTac or Burien will be inconvenienced with a potentially longer and less direct path, unless they are willing to sit through congestion at the 116th Street intersection. This option also shifts the diversion/congestion problem from Tukwila to WSDOT. In discussions with City staff, there was some concern that regional partners might be less willing to support funding/grant applications for this and other Tukwila projects if they are negatively impacted from the rechannelization.

[1] Some cities have investigated whether traffic safety enforcement cameras can be used to issue citations for people violating movement restrictions. However, current Washington Law clearly limits the use of such cameras to the following conditions:(i) Intersections of two arterials with traffic control signals that have yellow change interval durations in accordance with RCW 47.36.022, which interval durations may not be reduced after placement of the camera; (ii) railroad crossings; and (iii) school speed zones. Using the cameras for other purposes would require a change to the law.

One other downside to this option is that it would require a substantial area of rechannelization, along which there are large stretches without any adjacent land uses or developable parcels to capitalize on the improved streetscape. The costs of fully implementing this rechannelization are likely to be higher than other options due to the length of the corridor.

Benefits:

- More likely to reduce diversion issues within Tukwila
- Better location to divert traffic that would likely result in less delay than the lane drop at 144th Street
- May allow for some additional redevelopment potential north of 144th Street

Drawbacks:

- May be substantially more costly to implement due to the length of the corridor
- Sections of TIB would likely not benefit from the rechannelization because there are no adjacent land uses
- Other cities and regional partners may not be as supportive of funding city projects if they feel they are negatively impacted by this project
- Shifts traffic to the congested I-5 corridor

Hybrid Road Diet between 144th Street and 152nd Street

This option focuses on preserving the southbound capacity while still achieving the general goals of the rechannelization of TIB. In general, this design would feature two southbound lanes and a single northbound lane, with a turn lane at key intersections like 144th and 152nd Street. The benefit of this configuration is that it avoids the PM peak hour congestion and diversion issues since two southbound lanes are preserved. Given that the AM peak hour is of substantially lower magnitude and duration, an additional northbound lane is not needed to maintain adequate operations.

Some downsides of this design option include greater difficulty in accommodating mid-block crossings since a median island is not feasible without eliminating on-street parking or other amenities. The additional southbound lane may also result in higher off-peak speeds, making the road somewhat less desirable to walk or bicycle along. In addition, to accommodate the turn lanes at the intersections, the crossing distances would be larger under this option than the other two options, although still less than today's condition.

Chapter 6. **Conclusion**

The rechannelization of Tukwila International Boulevard between S 144th Street and S 152nd Street to remove one northbound and southbound travel lane and to install bicycle lanes and on-street parking would result in significant congestion for southbound vehicles entering the corridor under both 2017 and 2030 demand scenarios. The existing demand for vehicles travelling through the entire study corridor on TIB exceeds 700 vehicles in both directions during the PM peak hour. This demand is forecasted to increase by over 20% by 2030 due to new residential and commercial development near the study corridor. Removing a travel lane in each direction results in overcapacity conditions, especially for southbound drivers at S 144th Street. Delay, travel times, and vehicular queuing increase substantially in both 2017 and 2030 scenarios and would likely result in drivers choosing parallel routes as alternatives to TIB.

The travel time data and Streetlight OD data provide information on travel behavior for drivers currently using TIB. An analysis of the data suggests that at least 50% of existing travel on the roadway is pass-through trips. These trips represent non-local travel: trips that pass through the corridor without stopping or those not related to nearby residential or commercial land uses. Popular origins and destinations are SeaTac and Central Seattle. Since 2010, the traffic volumes on TIB have increased by 10% to 15% despite limited land use development near the study corridor. The increases in traffic volumes are likely due to spillover from congested regional routes as drivers seek less congested alternatives. If the existing volume of pass-through travel, approximately 800 vehicle trips during the PM peak hour, were to shift to alternative routes, the TIB corridor could accommodate the growth in traffic from planned development with the rechannelization and operate with a similar quality of service to that experienced today.

The traffic calming measures that would need to be implemented to prevent traffic from diverting onto 42nd Avenue S and Military Road S after the rechannelization of Tukwila International Boulevard would need to reduce vehicle speeds by at least 50%, compared with posted speed limits. This is beyond the range of effectiveness of most common traffic calming treatments and would require average travel speeds of 15mph on these facilities which would significantly impact local residents who live along these streets.

Alternatives to traffic calming measures are physical barriers or turn restrictions that prevent vehicles from using these parallel routes as alternatives to TIB: intersection diverters or short one-way segments. The most effective locations for installation of these preventative measures would likely be in the vicinity of S 144th Street. While these barriers occupy a small area, they are still an inconvenience for residents who are accustomed to traversing the area on Military Road or 42nd Avenue S.

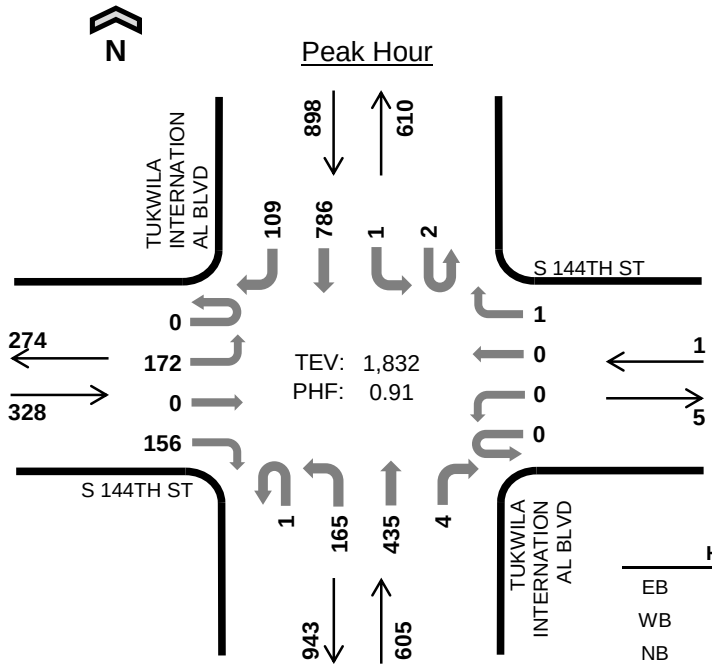
If the proposed rechannelization is pursued, the City could further investigate the optimal design and placement of these devices which would prevent cut-through traffic while maintaining as much connectivity

as possible for local residents as well as students travelling to Foster High School or Thorndyke Elementary School. As part of a larger outreach program to promote this project, the City could also consider a temporary installation of the lane conversion on TIB to bicycle lanes and traffic calming devices on nearby streets to demonstrate to the local community how the project would be implemented and its potential benefits to all users. This "tactical urbanism" approach would also allow the City to quickly assess traffic operations conditions before and after implementation of the project.

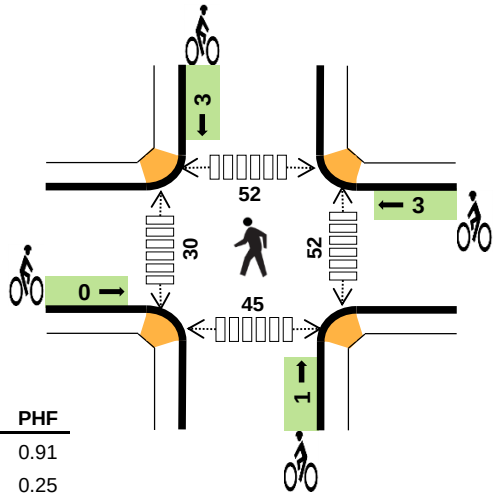
The proposed rechannelization of TIB would necessitate a change in usage and perception for this facility. While the route today serves a high percentage of regional pass-through traffic, the reduction in vehicular capacity would likely limit the facility's usage to local residents and employees. Even with the existing travel demand, a significant volume of trips would shift to alternate parallel routes to avoid the increased congestion along TIB. However, the removal of two travel lanes would allow for the installation of bicycle lanes and on-street parking which would contribute to a more amenable environment for all users.

Appendix A:
Traffic Counts

TUKWILA INTERNATIONAL BLVD
S 144TH ST



Date: Thu, May 18, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	2.4%	0.91
WB	0.0%	0.25
NB	2.0%	0.93
SB	1.8%	0.89
TOTAL	2.0%	0.91

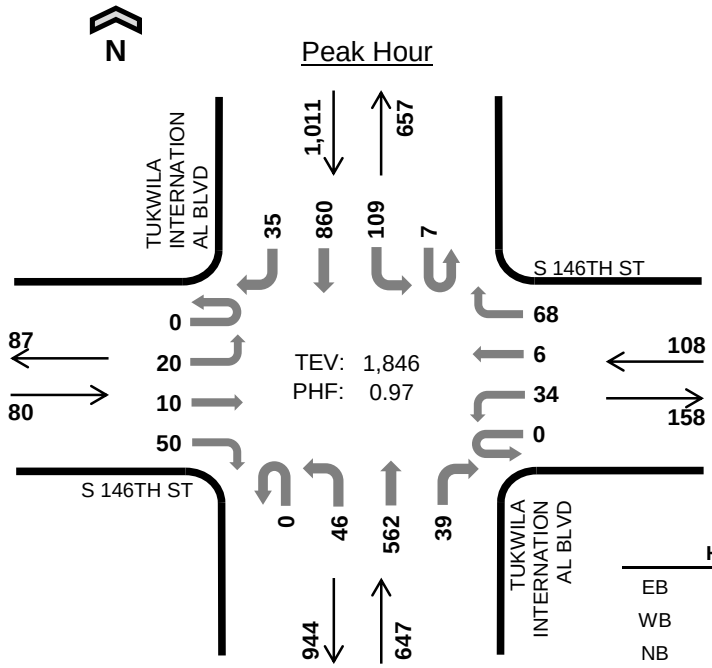
Two-Hour Count Summaries

Interval Start	S 144TH ST Eastbound				S 144TH ST Westbound				TUKWILA INTERNATIONAL BLVD Northbound				TUKWILA INTERNATIONAL BLVD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	33	0	46	0	0	1	2	0	39	91	2	1	0	176	24	415	0
4:15 PM	**0**	**47**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**45**	**117**	**0**	**1**	**0**	**225**	**26**	**501**	0
4:30 PM	**0**	**29**	**0**	**39**	**0**	**0**	**0**	**0**	**0**	**43**	**89**	**0**	**0**	**1**	**199**	**28**	**428**	0
4:45 PM	**0**	**41**	**0**	**42**	**0**	**0**	**0**	**0**	**0**	**41**	**107**	**4**	**0**	**0**	**179**	**24**	**438**	1,782
5:00 PM	**0**	**55**	**0**	**35**	**0**	**0**	**0**	**1**	**1**	**36**	**122**	**0**	**1**	**0**	**183**	**31**	**465**	**1,832**
5:15 PM	0	35	0	47	0	1	1	1	0	45	100	0	0	0	169	24	423	1,754
5:30 PM	0	22	1	42	0	1	1	0	1	37	93	1	0	0	182	19	400	1,726
5:45 PM	0	41	0	45	0	0	0	0	0	46	111	0	0	0	147	30	420	1,708
Count Total	0	303	1	336	0	2	3	4	2	332	830	7	3	1	1,460	206	3,490	0
Peak Hour	**0**	**172**	**0**	**156**	**0**	**0**	**0**	**1**	**1**	**165**	**435**	**4**	**2**	**1**	**786**	**109**	**1,832**	**0**

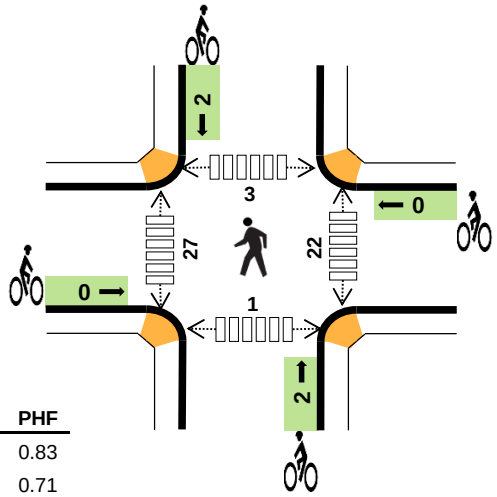
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	0	4	3	*8*	0	0	0	0	*0*	16	7	17	20	*60*
4:15 PM	**2**	**0**	**2**	**7**	***11***	**0**	**1**	**0**	**2**	***3***	**8**	**8**	**5**	**13**	*34*
4:30 PM	**2**	**0**	**2**	**5**	***9***	**0**	**0**	**0**	**1**	***1***	**17**	**10**	**7**	**10**	*44*
4:45 PM	**3**	**0**	**3**	**2**	***8***	**0**	**0**	**0**	**0**	***0***	**11**	**4**	**20**	**19**	*54*
5:00 PM	**1**	**0**	**5**	**2**	***8***	**0**	**2**	**1**	**0**	***3***	**16**	**8**	**20**	**3**	***47***
5:15 PM	0	0	2	3	*5*	0	0	0	0	*0*	6	4	9	7	*26*
5:30 PM	1	0	1	4	*6*	0	1	0	0	*1*	4	8	24	9	*45*
5:45 PM	1	0	7	3	*11*	0	0	0	0	*0*	14	7	32	15	*68*
Count Total	11	0	26	29	*66*	0	4	1	3	*8*	92	56	134	96	*378*
Peak Hour	**8**	**0**	**12**	**16**	***36***	**0**	**3**	**1**	**3**	***7***	**52**	**30**	**52**	**45**	***179***

TUKWILA INTERNATIONAL BLVD
S 146TH ST



Date: Thu, May 18, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	0.0%	0.83
WB	0.0%	0.71
NB	2.0%	0.92
SB	2.0%	0.93
TOTAL	1.8%	0.97

Two-Hour Count Summaries

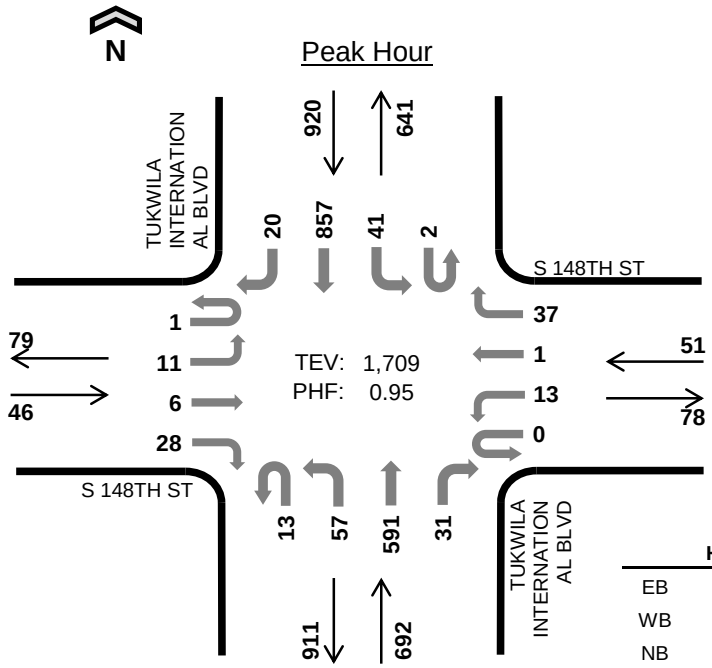
Interval Start	S 146TH ST Eastbound				S 146TH ST Westbound				TUKWILA INTERNATIONAL BLVD Northbound				TUKWILA INTERNATIONAL BLVD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	4	4	11	0	5	5	17	0	13	129	11	0	25	207	7	438	0
4:15 PM	**0**	**8**	**1**	**15**	**0**	**8**	**1**	**9**	**0**	**13**	**152**	**11**	**4**	**31**	**211**	**10**	**474**	0
4:30 PM	**0**	**4**	**3**	**11**	**0**	**9**	**3**	**16**	**0**	**8**	**118**	**8**	**1**	**24**	**237**	**9**	**451**	0
4:45 PM	**0**	**3**	**3**	**17**	**0**	**9**	**2**	**13**	**0**	**9**	**149**	**10**	**0**	**27**	**197**	**8**	**447**	1,810
5:00 PM	**0**	**5**	**3**	**7**	**0**	**8**	**0**	**30**	**0**	**16**	**143**	**10**	**2**	**27**	**215**	**8**	**474**	**1,846**
5:15 PM	0	2	6	11	0	7	3	22	0	11	148	13	0	31	190	9	453	1,825
5:30 PM	0	4	3	17	0	2	7	16	0	9	155	10	0	37	191	10	461	1,835
5:45 PM	0	2	3	9	0	6	7	25	0	13	165	6	1	36	161	8	442	1,830
Count Total	0	32	26	98	0	54	28	148	0	92	1,159	79	8	238	1,609	69	3,640	0
Peak Hour	**0**	**20**	**10**	**50**	**0**	**34**	**6**	**68**	**0**	**46**	**562**	**39**	**7**	**109**	**860**	**35**	**1,846**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

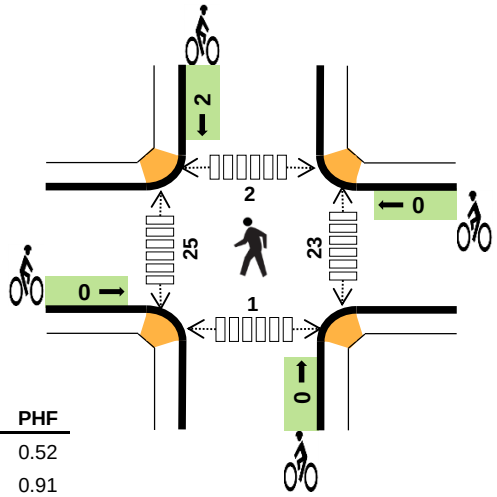
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	4	2	*6*	0	0	2	0	*2*	5	11	3	1	*20*
4:15 PM	**0**	**0**	**3**	**7**	***10***	**0**	**0**	**0**	**2**	***2***	**3**	**5**	**1**	**1**	*10*
4:30 PM	**0**	**0**	**2**	**5**	***7***	**0**	**0**	**0**	**0**	***0***	**7**	**10**	**0**	**0**	*17*
4:45 PM	**0**	**0**	**4**	**6**	***10***	**0**	**0**	**0**	**0**	***0***	**6**	**7**	**2**	**0**	*15*
5:00 PM	**0**	**0**	**4**	**2**	***6***	**0**	**0**	**2**	**0**	***2***	**6**	**5**	**0**	**0**	***11***
5:15 PM	0	0	2	4	*6*	0	0	2	0	*2*	6	6	0	1	*13*
5:30 PM	0	0	1	5	*6*	0	0	0	1	*1*	3	5	1	1	*10*
5:45 PM	0	0	7	3	*10*	0	0	0	0	*0*	2	11	0	0	*13*
Count Total	0	0	27	34	*61*	0	0	6	3	*9*	38	60	7	4	*109*
Peak Hour	**0**	**0**	**13**	**20**	***33***	**0**	**0**	**2**	**2**	***4***	**22**	**27**	**3**	**1**	***53***

Mark Skaggs: (425) 250-0777 mark.skaggs@idaxdata.com

TUKWILA INTERNATIONAL BLVD
S 148TH ST



Date: Thu, May 18, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	0.0%	0.52
WB	0.0%	0.91
NB	2.2%	0.95
SB	1.5%	0.95
TOTAL	1.7%	0.95

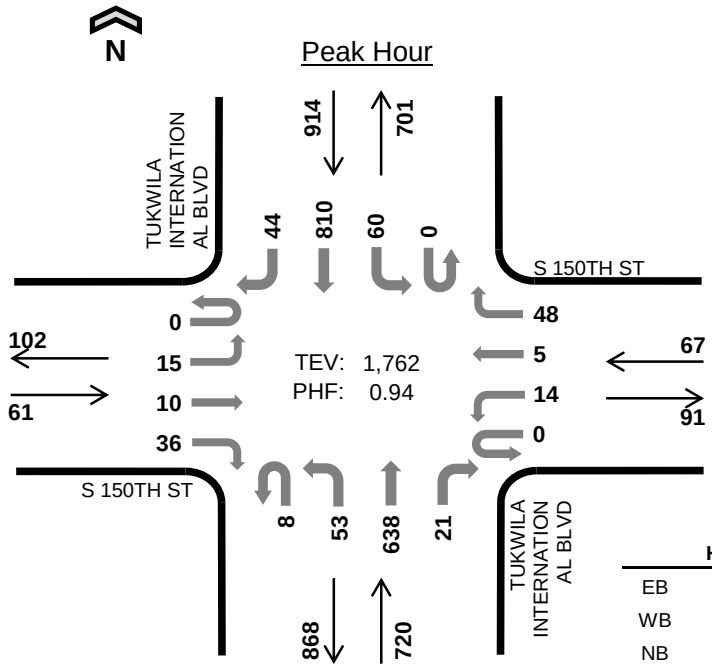
Two-Hour Count Summaries

Interval Start	S 148TH ST Eastbound				S 148TH ST Westbound				TUKWILA INTERNATIONAL BLVD Northbound				TUKWILA INTERNATIONAL BLVD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	5	3	6	0	3	1	8	5	13	130	4	0	15	204	6	403	0
4:15 PM	**0**	**2**	**0**	**5**	**0**	**5**	**0**	**8**	**1**	**10**	**164**	**6**	**0**	**13**	**208**	**5**	**427**	0
4:30 PM	**1**	**3**	**0**	**5**	**0**	**2**	**1**	**9**	**4**	**19**	**119**	**8**	**0**	**12**	**224**	**6**	**413**	0
4:45 PM	**0**	**2**	**2**	**4**	**0**	**3**	**0**	**11**	**3**	**13**	**154**	**9**	**1**	**10**	**205**	**4**	**421**	1,664
5:00 PM	**0**	**4**	**4**	**14**	**0**	**3**	**0**	**9**	**5**	**15**	**154**	**8**	**1**	**6**	**220**	**5**	**448**	**1,709**
5:15 PM	0	3	0	12	0	1	5	10	1	13	157	5	0	14	194	8	423	1,705
5:30 PM	0	6	2	12	0	4	0	11	2	7	154	6	0	7	197	7	415	1,707
5:45 PM	0	2	2	8	0	1	1	11	3	14	156	11	0	16	154	4	383	1,669
Count Total	1	27	13	66	0	22	8	77	24	104	1,188	57	2	93	1,606	45	3,333	0
Peak Hour	**1**	**11**	**6**	**28**	**0**	**13**	**1**	**37**	**13**	**57**	**591**	**31**	**2**	**41**	**857**	**20**	**1,709**	**0**

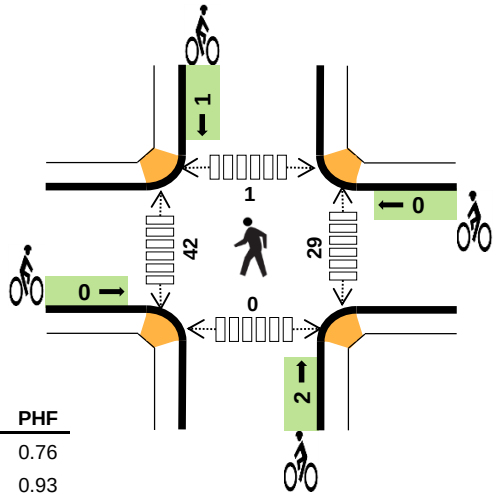
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	5	2	*7*	0	0	0	1	*1*	3	6	0	1	*10*
4:15 PM	**0**	**0**	**3**	**5**	***8***	**0**	**0**	**0**	**0**	***0***	**6**	**8**	**1**	**0**	*15*
4:30 PM	**0**	**0**	**5**	**4**	***9***	**0**	**0**	**0**	**1**	***1***	**8**	**8**	**0**	**0**	*16*
4:45 PM	**0**	**0**	**3**	**3**	***6***	**0**	**0**	**0**	**1**	***1***	**4**	**3**	**1**	**0**	*8*
5:00 PM	**0**	**0**	**4**	**2**	***6***	**0**	**0**	**0**	**0**	***0***	**5**	**6**	**0**	**1**	***12***
5:15 PM	0	0	3	4	*7*	0	0	2	0	*2*	5	6	0	0	*11*
5:30 PM	0	0	2	5	*7*	0	0	0	3	*3*	3	8	0	0	*11*
5:45 PM	0	0	7	3	*10*	0	0	0	0	*0*	5	2	0	0	*7*
Count Total	0	0	32	28	*60*	0	0	2	6	*8*	39	47	2	2	*90*
Peak Hour	**0**	**0**	**15**	**14**	***29***	**0**	**0**	**0**	**2**	***2***	**23**	**25**	**2**	**1**	***51***

TUKWILA INTERNATIONAL BLVD
S 150TH ST



Date: Thu, May 18, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	0.0%	0.76
WB	0.0%	0.93
NB	1.7%	0.93
SB	2.1%	0.95
TOTAL	1.8%	0.94

Two-Hour Count Summaries

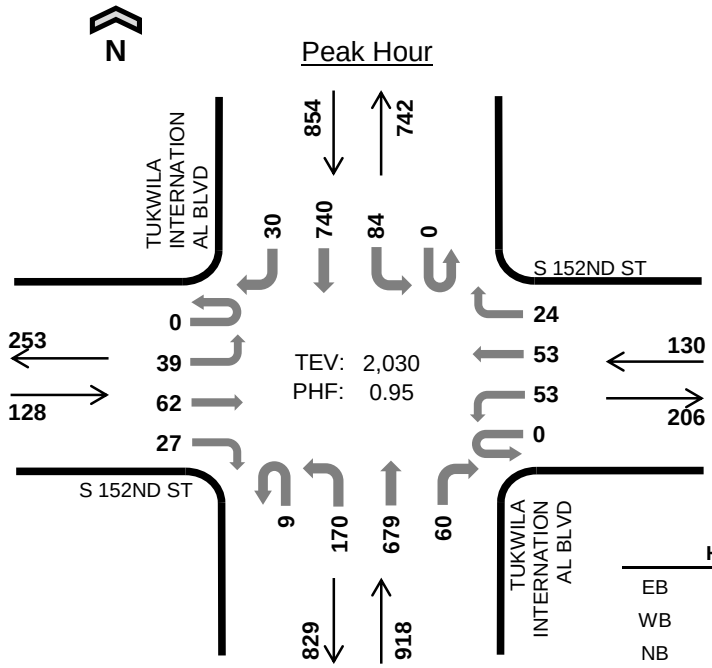
Interval Start	S 150TH ST Eastbound				S 150TH ST Westbound				TUKWILA INTERNATIONAL BLVD Northbound				TUKWILA INTERNATIONAL BLVD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	1	6	0	3	1	6	1	10	140	4	0	11	208	5	397	0
4:15 PM	**0**	**4**	**4**	**6**	**0**	**3**	**1**	**12**	**1**	**17**	**171**	**4**	**0**	**11**	**197**	**9**	**440**	0
4:30 PM	**0**	**4**	**3**	**8**	**0**	**5**	**2**	**11**	**1**	**13**	**136**	**4**	**0**	**16**	**200**	**12**	**415**	0
4:45 PM	**0**	**2**	**0**	**10**	**0**	**2**	**1**	**13**	**5**	**8**	**162**	**6**	**0**	**14**	**203**	**12**	**438**	1,690
5:00 PM	**0**	**5**	**3**	**12**	**0**	**4**	**1**	**12**	**1**	**15**	**169**	**7**	**0**	**19**	**210**	**11**	**469**	**1,762**
5:15 PM	0	4	4	7	0	3	2	8	1	20	159	7	0	18	179	11	423	1,745
5:30 PM	0	6	1	4	0	2	0	5	4	17	148	3	0	15	183	8	396	1,726
5:45 PM	0	6	3	10	0	6	1	7	2	16	164	2	0	13	155	5	390	1,678
Count Total	0	32	19	63	0	28	9	74	16	116	1,249	37	0	117	1,535	73	3,368	0
Peak Hour	**0**	**15**	**10**	**36**	**0**	**14**	**5**	**48**	**8**	**53**	**638**	**21**	**0**	**60**	**810**	**44**	**1,762**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

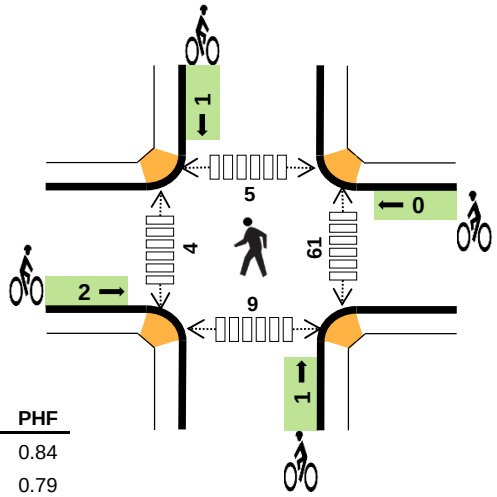
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	5	1	*6*	0	0	0	1	*1*	19	12	0	0	*31*
4:15 PM	**0**	**0**	**2**	**7**	***9***	**0**	**0**	**0**	**0**	***0***	**7**	**11**	**0**	**0**	*18*
4:30 PM	**0**	**0**	**3**	**2**	***5***	**0**	**0**	**0**	**0**	***0***	**6**	**16**	**0**	**0**	*22*
4:45 PM	**0**	**0**	**3**	**9**	***12***	**0**	**0**	**0**	**1**	***1***	**5**	**7**	**0**	**0**	*12*
5:00 PM	**0**	**0**	**4**	**1**	***5***	**0**	**0**	**2**	**0**	***2***	**11**	**8**	**1**	**0**	***20***
5:15 PM	0	0	2	5	*7*	0	0	1	0	*1*	4	10	0	1	*15*
5:30 PM	0	0	1	6	*7*	1	0	0	2	*3*	5	11	0	0	*16*
5:45 PM	0	0	8	3	*11*	0	0	0	0	*0*	0	12	0	0	*12*
Count Total	0	0	28	34	*62*	1	0	3	4	*8*	57	87	1	1	*146*
Peak Hour	**0**	**0**	**12**	**19**	***31***	**0**	**0**	**2**	**1**	***3***	**29**	**42**	**1**	**0**	***72***

Mark Skaggs: (425) 250-0777 mark.skaggs@idaxdata.com

TUKWILA INTERNATIONAL BLVD
S 152ND ST



Date: Thu, May 18, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	0.0%	0.84
WB	0.8%	0.79
NB	1.5%	0.91
SB	1.9%	0.95
TOTAL	1.5%	0.95

Two-Hour Count Summaries

Interval Start	S 152ND ST Eastbound				S 152ND ST Westbound				TUKWILA INTERNATIONAL BLVD Northbound				TUKWILA INTERNATIONAL BLVD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	10	20	7	0	11	15	6	1	40	134	10	1	19	184	16	474	0
4:15 PM	**0**	**13**	**16**	**9**	**0**	**10**	**12**	**4**	**2**	**36**	**200**	**14**	**0**	**14**	**181**	**12**	**523**	0
4:30 PM	**0**	**6**	**14**	**1**	**0**	**11**	**12**	**8**	**3**	**41**	**137**	**16**	**0**	**20**	**180**	**5**	**454**	0
4:45 PM	**0**	**11**	**16**	**10**	**0**	**15**	**19**	**7**	**1**	**48**	**165**	**12**	**0**	**21**	**186**	**10**	**521**	1,972
5:00 PM	**0**	**9**	**16**	**7**	**0**	**17**	**10**	**5**	**3**	**45**	**177**	**18**	**0**	**29**	**193**	**3**	**532**	**2,030**
5:15 PM	0	10	11	5	0	17	17	9	3	51	155	7	0	29	164	5	483	1,990
5:30 PM	0	4	7	2	0	12	19	8	2	44	169	8	0	17	161	12	465	2,001
5:45 PM	0	17	11	3	0	7	11	6	1	43	157	14	0	22	146	7	445	1,925
Count Total	0	80	111	44	0	100	115	53	16	348	1,294	99	1	171	1,395	70	3,897	0
Peak Hour	**0**	**39**	**62**	**27**	**0**	**53**	**53**	**24**	**9**	**170**	**679**	**60**	**0**	**84**	**740**	**30**	**2,030**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	4	1	*5*	0	0	0	0	*0*	11	4	2	6	*23*
4:15 PM	**0**	**0**	**4**	**6**	***10***	**0**	**0**	**1**	**0**	***1***	**22**	**0**	**0**	**1**	*23*
4:30 PM	**0**	**0**	**3**	**2**	***5***	**1**	**0**	**0**	**0**	***1***	**17**	**3**	**4**	**2**	*26*
4:45 PM	**0**	**1**	**3**	**7**	***11***	**0**	**0**	**0**	**1**	***1***	**11**	**1**	**1**	**2**	*15*
5:00 PM	**0**	**0**	**4**	**1**	***5***	**1**	**0**	**0**	**0**	***1***	**11**	**0**	**0**	**4**	***15***
5:15 PM	0	0	2	5	*7*	0	0	1	0	*1*	13	3	3	8	*27*
5:30 PM	0	0	3	4	*7*	0	0	0	0	*0*	19	1	0	4	*24*
5:45 PM	0	0	5	3	*8*	0	0	0	2	*2*	17	1	2	3	*23*
Count Total	0	1	28	29	*58*	2	0	2	3	*7*	121	13	12	30	*176*
Peak Hour	**0**	**1**	**14**	**16**	***31***	**2**	**0**	**1**	**1**	***4***	**61**	**4**	**5**	**9**	***79***

Appendix B:
Vissim Worksheets

Intersection 1 **Tukwila International Blvd/S 144th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	166	167	101%	69	10	E
	Through	405	415	102%	27	5	C
	Right Turn	63	63	99%	11	4	B
	Subtotal	634	644	102%	36	4	D
SB	Left Turn	92	88	95%	67	11	E
	Through	763	766	100%	37	4	D
	Right Turn	109	107	98%	24	4	C
	Subtotal	964	960	100%	38	3	D
EB	Left Turn	122	126	103%	57	9	E
	Through	146	155	106%	41	7	D
	Right Turn	101	100	99%	26	8	C
	Subtotal	369	380	103%	42	7	D
WB	Left Turn	78	80	103%	62	12	E
	Through	198	197	100%	49	6	D
	Right Turn	39	37	96%	32	9	C
	Subtotal	315	315	100%	50	6	D
Total		2,282	2,300	101%	40	2	D

Intersection 2 **Tukwila International Blvd/S 146th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	46	44	96%	7	4	A
	Through	562	570	101%	1	0	A
	Right Turn	39	37	94%	2	2	A
	Subtotal	647	651	101%	1	0	A
SB	Left Turn	116	117	101%	5	1	A
	Through	860	868	101%	2	1	A
	Right Turn	35	32	92%	3	2	A
	Subtotal	1,011	1,018	101%	3	1	A
EB	Left Turn	20	19	96%	21	8	C
	Through	10	9	86%	19	11	C
	Right Turn	50	43	86%	10	1	A
	Subtotal	80	71	89%	14	2	B
WB	Left Turn	34	35	101%	16	3	C
	Through	6	5	90%	15	13	B
	Right Turn	68	67	98%	10	1	A
	Subtotal	108	107	99%	12	1	B
Total		1,846	1,846	100%	3	0	A

Intersection 3 **Tukwila International Blvd/S 148th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	70	76	109%	5	2	A
	Through	591	599	101%	1	0	A
	Right Turn	31	29	92%	2	1	A
	Subtotal	692	704	102%	2	0	A
SB	Left Turn	43	46	107%	4	2	A
	Through	857	855	100%	1	1	A
	Right Turn	20	21	103%	2	1	A
	Subtotal	920	922	100%	1	1	A
EB	Left Turn	12	13	105%	17	12	C
	Through	6	5	82%	10	8	A
	Right Turn	28	25	88%	9	2	A
	Subtotal	46	42	91%	12	4	B
WB	Left Turn	13	11	85%	11	7	B
	Through	1	0	20%	0	0	A
	Right Turn	37	34	91%	10	2	A
	Subtotal	51	45	88%	11	3	B
Total		1,709	1,713	100%	2	0	A

Intersection 4 **Tukwila International Blvd/S 150th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	61	64	104%	9	3	A
	Through	638	651	102%	3	1	A
	Right Turn	21	20	96%	3	2	A
	Subtotal	720	735	102%	4	1	A
SB	Left Turn	60	60	100%	6	2	A
	Through	810	799	99%	1	0	A
	Right Turn	44	43	99%	2	1	A
	Subtotal	914	902	99%	1	0	A
EB	Left Turn	15	14	93%	12	8	B
	Through	10	9	85%	14	7	B
	Right Turn	36	34	93%	10	2	B
	Subtotal	61	56	92%	12	2	B
WB	Left Turn	14	16	111%	15	4	B
	Through	5	6	114%	17	17	C
	Right Turn	48	49	103%	10	2	B
	Subtotal	67	70	105%	12	2	B
Total		1,762	1,764	100%	3	0	A

Vissim Post-Processor **Tukwila International Blvd Road Diet**
Average Results from 20 Runs **2017 No Build**
Volume and Delay by Movement **PM Peak Hour**

Intersection 5 **Tukwila International Blvd/S 152nd St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	179	180	101%	54	4	D
	Through	679	696	103%	22	3	C
	Right Turn	60	59	98%	6	2	A
	Subtotal	918	936	102%	27	2	C
SB	Left Turn	84	79	93%	59	9	E
	Through	740	739	100%	26	4	C
	Right Turn	30	29	97%	26	11	C
	Subtotal	854	846	99%	29	4	C
EB	Left Turn	39	38	98%	43	11	D
	Through	62	69	110%	52	5	D
	Right Turn	27	31	114%	36	12	D
	Subtotal	128	138	108%	45	6	D
WB	Left Turn	53	55	104%	42	11	D
	Through	53	54	101%	45	10	D
	Right Turn	24	24	100%	13	8	B
	Subtotal	130	132	102%	39	7	D
Total		2,030	2,052	101%	30	2	C

Intersection 1 **Tukwila International Blvd/S 144th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	166	169	102%	102	18	F
	Through	405	417	103%	42	6	D
	Right Turn	63	61	97%	28	8	C
	Subtotal	634	647	102%	57	9	E
SB	Left Turn	92	72	78%	964	68	F
	Through	763	569	75%	930	51	F
	Right Turn	109	77	70%	932	66	F
	Subtotal	964	718	74%	934	54	F
EB	Left Turn	122	130	106%	54	6	D
	Through	146	148	102%	44	6	D
	Right Turn	101	98	97%	32	8	C
	Subtotal	369	376	102%	44	4	D
WB	Left Turn	78	82	105%	62	7	E
	Through	198	196	99%	47	8	D
	Right Turn	39	35	90%	29	12	C
	Subtotal	315	312	99%	48	8	D
Total		2,282	2,053	90%	361	26	F

Intersection 2 **Tukwila International Blvd/S 146th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	46	45	98%	12	8	B
	Through	562	569	101%	7	5	A
	Right Turn	39	38	96%	6	4	A
	Subtotal	647	652	101%	7	5	A
SB	Left Turn	116	92	79%	7	2	A
	Through	860	705	82%	4	1	A
	Right Turn	35	25	73%	4	4	A
	Subtotal	1,011	822	81%	4	1	A
EB	Left Turn	20	19	93%	25	10	D
	Through	10	8	84%	16	8	C
	Right Turn	50	45	91%	17	5	C
	Subtotal	80	72	90%	19	6	C
WB	Left Turn	34	35	103%	21	7	C
	Through	6	5	83%	23	28	C
	Right Turn	68	68	100%	18	8	C
	Subtotal	108	108	100%	20	8	C
Total		1,846	1,654	90%	7	2	A

Intersection 3 **Tukwila International Blvd/S 148th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	70	72	103%	9	3	A
	Through	591	600	102%	4	1	A
	Right Turn	31	28	89%	4	1	A
	Subtotal	692	700	101%	4	1	A
SB	Left Turn	43	39	90%	9	3	A
	Through	857	712	83%	3	1	A
	Right Turn	20	17	85%	4	2	A
	Subtotal	920	767	83%	3	1	A
EB	Left Turn	12	13	108%	23	12	C
	Through	6	6	103%	18	17	C
	Right Turn	28	27	95%	15	4	B
	Subtotal	46	46	100%	19	7	C
WB	Left Turn	13	11	84%	20	10	C
	Through	1	0	30%	1	4	A
	Right Turn	37	33	89%	12	2	B
	Subtotal	51	44	87%	13	3	B
Total		1,709	1,557	91%	4	1	A

Intersection 4 **Tukwila International Blvd/S 150th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	61	66	107%	15	6	B
	Through	638	645	101%	5	1	A
	Right Turn	21	20	96%	3	3	A
	Subtotal	720	731	102%	5	1	A
SB	Left Turn	60	51	84%	9	4	A
	Through	810	678	84%	9	12	A
	Right Turn	44	35	80%	7	8	A
	Subtotal	914	764	84%	9	12	A
EB	Left Turn	15	12	79%	35	39	D
	Through	10	9	89%	25	22	C
	Right Turn	36	35	98%	53	89	F
	Subtotal	61	56	92%	49	75	E
WB	Left Turn	14	16	114%	23	19	C
	Through	5	5	94%	19	20	C
	Right Turn	48	54	113%	16	5	C
	Subtotal	67	75	112%	19	7	C
Total		1,762	1,626	92%	9	8	A

Intersection 5 **Tukwila International Blvd/S 152nd St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	179	184	103%	55	5	D
	Through	679	690	102%	32	6	C
	Right Turn	60	61	101%	5	2	A
	Subtotal	918	935	102%	35	4	D
SB	Left Turn	84	71	85%	86	13	F
	Through	740	638	86%	47	11	D
	Right Turn	30	25	83%	48	27	D
	Subtotal	854	734	86%	50	11	D
EB	Left Turn	39	40	102%	48	5	D
	Through	62	67	108%	53	6	D
	Right Turn	27	28	104%	29	12	C
	Subtotal	128	135	105%	47	5	D
WB	Left Turn	53	53	99%	52	8	D
	Through	53	53	101%	40	11	D
	Right Turn	24	26	107%	18	11	B
	Subtotal	130	132	101%	42	6	D
Total		2,030	1,935	95%	42	5	D

Intersection 1 **Tukwila International Blvd/S 144th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	170	166	98%	76	13	E
	Through	570	569	100%	30	5	C
	Right Turn	80	77	96%	17	6	B
	Subtotal	820	812	99%	38	4	D
SB	Left Turn	100	97	97%	77	6	E
	Through	890	899	101%	40	2	D
	Right Turn	110	108	98%	30	6	C
	Subtotal	1,100	1,104	100%	43	3	D
EB	Left Turn	120	123	103%	55	6	E
	Through	170	172	101%	46	10	D
	Right Turn	100	99	99%	33	8	C
	Subtotal	390	394	101%	45	6	D
WB	Left Turn	100	101	101%	72	14	E
	Through	220	221	101%	58	7	E
	Right Turn	60	55	92%	39	14	D
	Subtotal	380	377	99%	59	9	E
Total		2,690	2,687	100%	44	3	D

Intersection 2 **Tukwila International Blvd/S 146th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	50	47	95%	10	5	A
	Through	740	731	99%	1	0	A
	Right Turn	40	38	94%	2	1	A
	Subtotal	830	816	98%	2	0	A
SB	Left Turn	120	123	103%	7	2	A
	Through	1,030	1,038	101%	3	1	A
	Right Turn	50	50	100%	4	2	A
	Subtotal	1,200	1,211	101%	3	1	A
EB	Left Turn	30	27	89%	22	7	C
	Through	10	8	82%	18	6	C
	Right Turn	50	45	91%	11	2	B
	Subtotal	90	80	89%	16	3	C
WB	Left Turn	40	38	96%	20	5	C
	Through	10	9	94%	26	18	D
	Right Turn	70	67	96%	11	2	B
	Subtotal	120	115	96%	15	2	B
Total		2,240	2,222	99%	4	0	A

Intersection 3 **Tukwila International Blvd/S 148th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	80	87	108%	6	2	A
	Through	770	762	99%	1	0	A
	Right Turn	40	38	94%	3	1	A
	Subtotal	890	886	100%	2	0	A
SB	Left Turn	40	43	109%	5	2	A
	Through	1,040	1,035	99%	1	0	A
	Right Turn	30	29	96%	2	1	A
	Subtotal	1,110	1,107	100%	1	0	A
EB	Left Turn	10	10	99%	24	10	C
	Through	10	8	81%	19	9	C
	Right Turn	40	41	103%	10	2	B
	Subtotal	60	59	99%	15	3	B
WB	Left Turn	30	27	91%	17	5	C
	Through	10	9	92%	14	6	B
	Right Turn	40	37	91%	11	4	B
	Subtotal	80	73	91%	15	4	B
Total		2,140	2,125	99%	2	0	A

Intersection 4 **Tukwila International Blvd/S 150th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	80	82	102%	10	4	B
	Through	820	814	99%	3	1	A
	Right Turn	20	20	100%	4	3	A
	Subtotal	920	916	100%	4	1	A
SB	Left Turn	60	63	104%	4	2	A
	Through	1,000	987	99%	1	0	A
	Right Turn	40	39	98%	2	1	A
	Subtotal	1,100	1,089	99%	1	0	A
EB	Left Turn	20	18	89%	22	10	C
	Through	10	10	102%	26	13	D
	Right Turn	40	35	88%	13	5	B
	Subtotal	70	63	90%	17	6	C
WB	Left Turn	10	10	102%	21	12	C
	Through	10	10	95%	22	17	C
	Right Turn	50	53	106%	10	2	B
	Subtotal	70	73	104%	13	2	B
Total		2,160	2,141	99%	3	0	A

Vissim Post-Processor **Tukwila International Blvd Road Diet**
Average Results from 20 Runs **2030 No Build**
Volume and Delay by Movement **PM Peak Hour**

Intersection 5 **Tukwila International Blvd/S 152nd St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	240	246	103%	70	12	E
	Through	850	841	99%	24	3	C
	Right Turn	70	70	101%	7	3	A
	Subtotal	1,160	1,158	100%	33	3	C
SB	Left Turn	90	89	99%	68	12	E
	Through	910	899	99%	34	3	C
	Right Turn	40	38	94%	31	12	C
	Subtotal	1,040	1,026	99%	37	4	D
EB	Left Turn	60	62	104%	50	10	D
	Through	70	75	108%	50	8	D
	Right Turn	30	34	112%	33	17	C
	Subtotal	160	171	107%	47	8	D
WB	Left Turn	70	68	97%	50	5	D
	Through	60	62	103%	48	8	D
	Right Turn	30	30	100%	14	5	B
	Subtotal	160	160	100%	44	4	D
Total		2,520	2,514	100%	36	3	D

Intersection 1 **Tukwila International Blvd/S 144th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	170	161	95%	118	15	F
	Through	570	549	96%	58	11	E
	Right Turn	80	76	96%	40	7	D
	Subtotal	820	786	96%	68	11	E
SB	Left Turn	100	63	63%	1081	97	F
	Through	890	559	63%	1046	98	F
	Right Turn	110	67	61%	1026	95	F
	Subtotal	1,100	689	63%	1047	98	F
EB	Left Turn	120	117	98%	66	25	E
	Through	170	167	98%	80	49	E
	Right Turn	100	99	99%	68	55	E
	Subtotal	390	383	98%	71	40	E
WB	Left Turn	100	102	102%	65	14	E
	Through	220	221	100%	52	4	D
	Right Turn	60	53	89%	34	8	C
	Subtotal	380	375	99%	54	5	D
Total		2,690	2,233	83%	362	27	F

Intersection 2 **Tukwila International Blvd/S 146th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	50	48	96%	26	14	D
	Through	740	711	96%	26	19	D
	Right Turn	40	37	92%	24	16	C
	Subtotal	830	796	96%	26	18	D
SB	Left Turn	120	84	70%	41	25	E
	Through	1,030	746	72%	46	32	E
	Right Turn	50	33	66%	46	50	E
	Subtotal	1,200	863	72%	45	32	E
EB	Left Turn	30	25	82%	312	329	F
	Through	10	7	74%	241	338	F
	Right Turn	50	42	84%	380	369	F
	Subtotal	90	74	82%	344	342	F
WB	Left Turn	40	35	88%	208	164	F
	Through	10	9	86%	138	158	F
	Right Turn	70	60	86%	206	156	F
	Subtotal	120	104	86%	205	160	F
Total		2,240	1,836	82%	57	16	F

Intersection 3 **Tukwila International Blvd/S 148th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	80	78	97%	16	9	C
	Through	770	750	97%	9	12	A
	Right Turn	40	38	95%	10	13	A
	Subtotal	890	866	97%	10	12	A
SB	Left Turn	40	29	73%	44	20	E
	Through	1,040	760	73%	55	20	F
	Right Turn	30	21	71%	43	21	E
	Subtotal	1,110	811	73%	54	20	F
EB	Left Turn	10	6	59%	605	678	F
	Through	10	8	77%	556	625	F
	Right Turn	40	28	70%	958	662	F
	Subtotal	60	41	69%	925	666	F
WB	Left Turn	30	26	85%	57	13	F
	Through	10	10	96%	45	36	E
	Right Turn	40	36	90%	46	57	E
	Subtotal	80	71	89%	51	36	F
Total		2,140	1,789	84%	48	14	E

Intersection 4 **Tukwila International Blvd/S 150th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	80	78	97%	28	9	D
	Through	820	794	97%	6	2	A
	Right Turn	20	21	105%	4	3	A
	Subtotal	920	892	97%	8	2	A
SB	Left Turn	60	47	78%	40	10	E
	Through	1,000	730	73%	64	10	F
	Right Turn	40	28	70%	59	13	F
	Subtotal	1,100	804	73%	62	10	F
EB	Left Turn	20	16	78%	746	504	F
	Through	10	8	75%	911	554	F
	Right Turn	40	27	67%	1052	563	F
	Subtotal	70	50	71%	974	562	F
WB	Left Turn	10	11	112%	68	49	F
	Through	10	9	92%	48	49	E
	Right Turn	50	56	113%	31	17	D
	Subtotal	70	77	110%	41	23	E
Total		2,160	1,823	84%	58	16	F

Intersection 5 **Tukwila International Blvd/S 152nd St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	240	227	94%	106	15	F
	Through	850	801	94%	81	18	F
	Right Turn	70	65	93%	64	21	E
	Subtotal	1,160	1,093	94%	85	15	F
SB	Left Turn	90	68	75%	102	18	F
	Through	910	660	72%	69	8	E
	Right Turn	40	29	72%	74	24	E
	Subtotal	1,040	756	73%	72	8	E
EB	Left Turn	60	61	101%	49	12	D
	Through	70	73	104%	52	7	D
	Right Turn	30	31	103%	31	9	C
	Subtotal	160	164	103%	48	8	D
WB	Left Turn	70	72	103%	57	9	E
	Through	60	61	101%	50	7	D
	Right Turn	30	33	109%	24	8	C
	Subtotal	160	165	103%	49	7	D
Total		2,520	2,178	86%	75	6	E

Appendix 2: Supplemental Traffic Analysis and Traffic Calming Descriptions (March 2019)

2019 Volume and Speed Data Collection

Traffic volumes and speeds were collected in January 2019 over an entire week at the following ten locations:

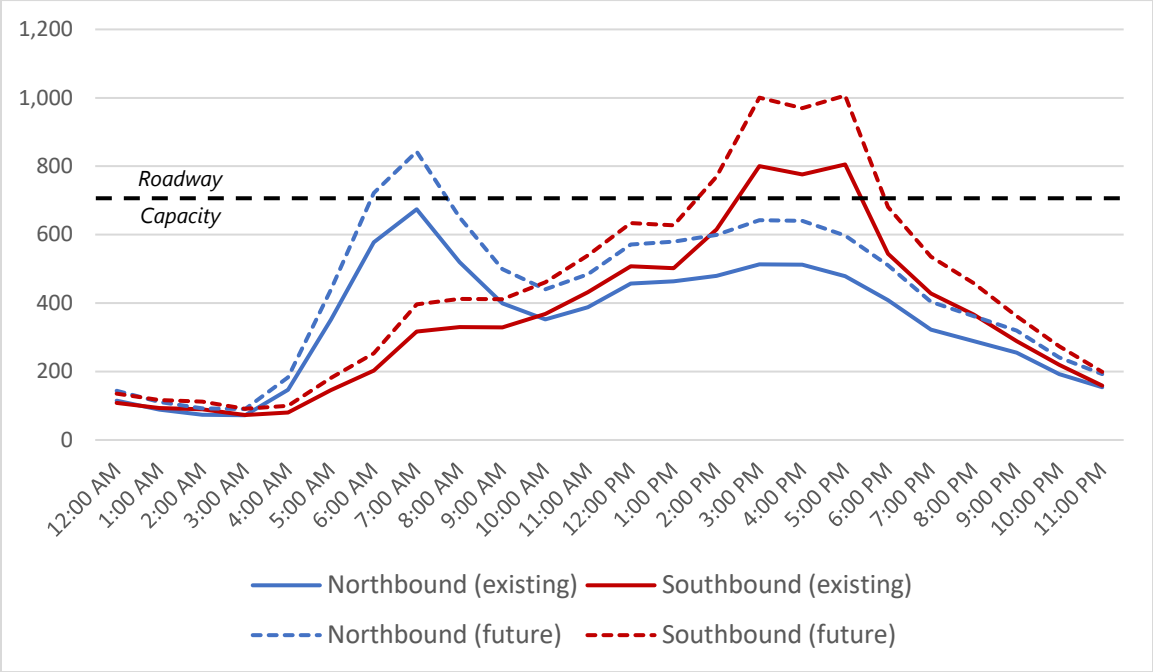
1. Tukwila International Boulevard north of S 126th Street
2. Tukwila International Boulevard north of S 139th Street
3. Tukwila International Boulevard south of S 144th Street
4. Tukwila International Boulevard north of S 150th Street
5. 42nd Avenue S north of S 139th Street
6. 42nd Avenue S south of S 144th Street
7. 42nd Avenue S north of S 150th Street
8. Military Road S north of S 140th Street
9. Military Road S south of S 144th Street
10. Military Road S north of S 150th Street

The graphs on the following pages show the daily northbound and southbound traffic volume profiles on Tukwila International Boulevard at S 144th Street and S 150th Street for both existing and future conditions.

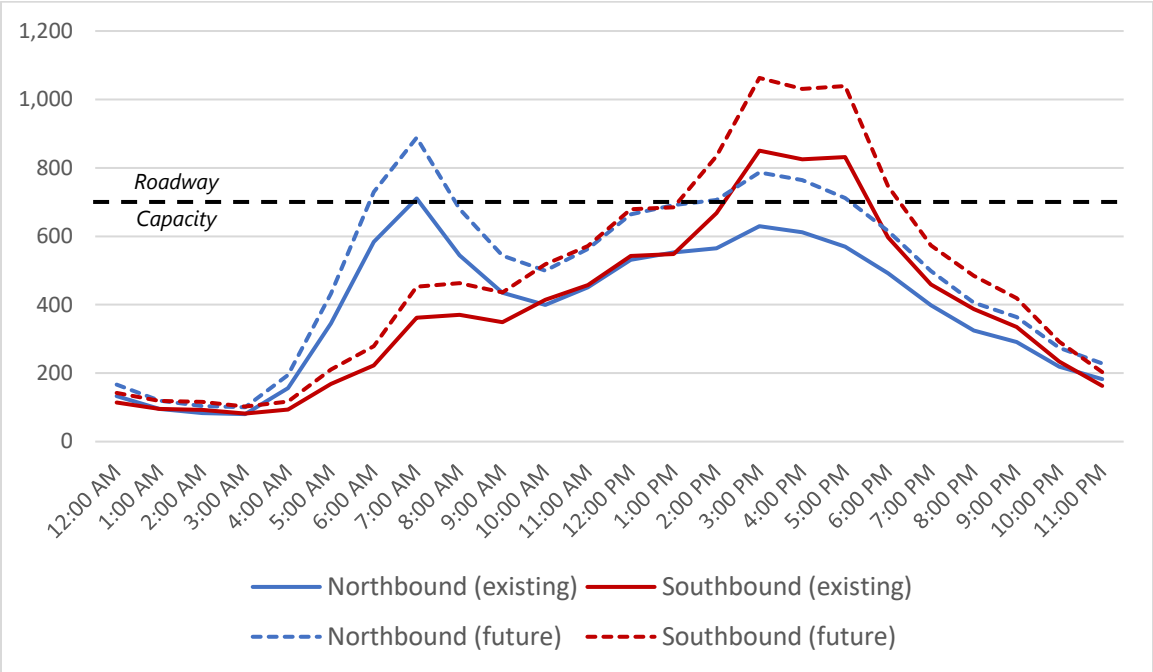
The approximate capacity of TIB under the rechannelization scenario (700 vph) is also shown as a dashed line. Weekday and weekend volumes are shown separately. The future volume profile was estimated by increasing the existing counts by 25 percent.

Weekday Volumes on Tukwila International Boulevard

South of S 144th Street

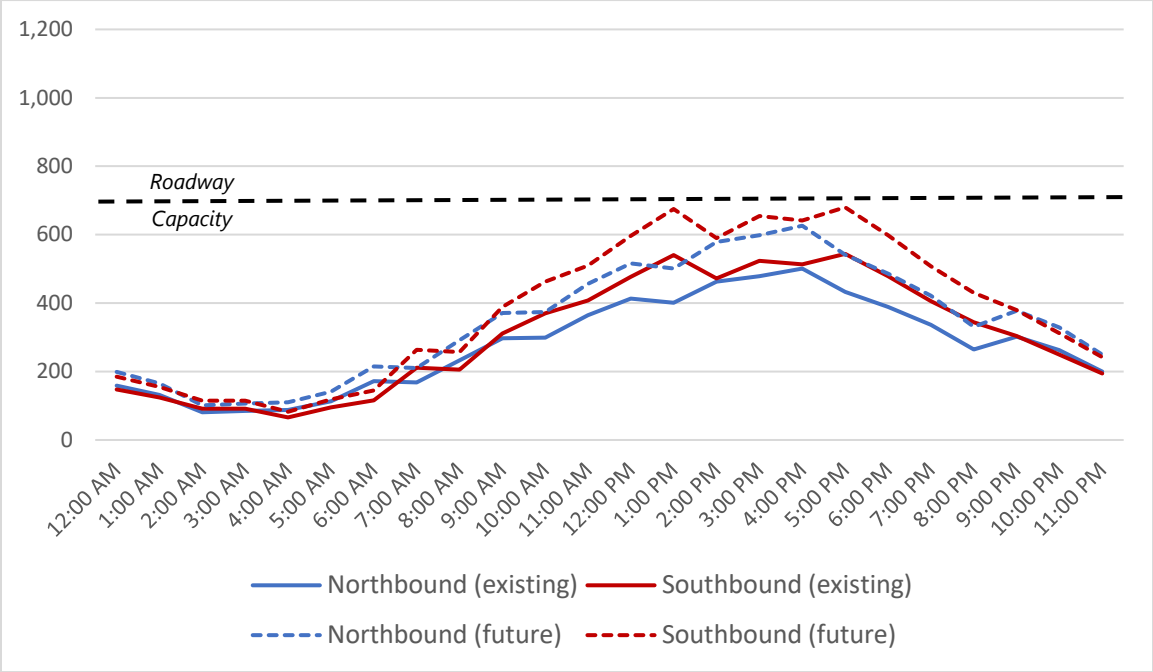


North of S 150th Street

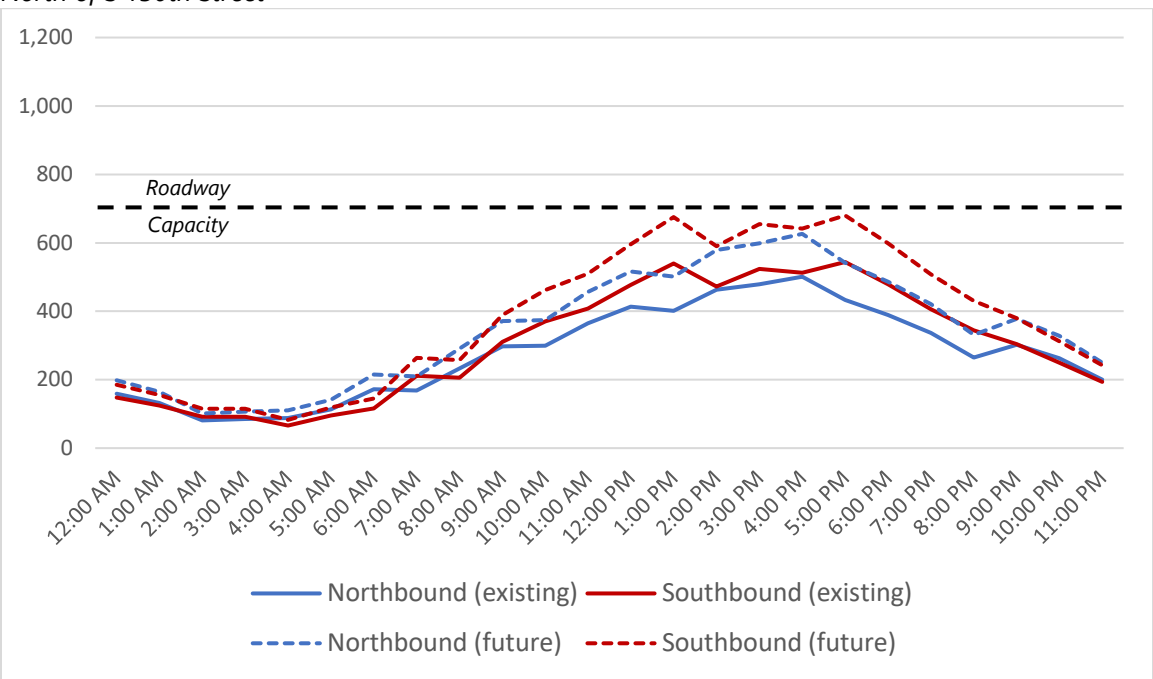


Saturday Volumes on Tukwila International Boulevard

South of S 144th Street



North of S 150th Street



Speed Data

The following table summarizes the daily 85th percentile travel speeds (mph) for the northbound and southbound directions for weekdays and weekends at all data collection locations.

Existing (2019) 85th Percentile Travel Speeds

Study Location	Weekday (Tue-Thu)		Weekend (Sat-Sun)	
	Northbound	Southbound	Northbound	Southbound
1. TIB north of S 126th St	47	50	48	51
2. TIB north of S 139th St	46	47	48	49
3. TIB south of S 144th St	37	36	38	37
4. TIB north of S 150th St	39	37	39	39
5. 42nd Ave S north of S 139th St	36	36	37	36
6. 42nd Ave S south of S 144th St	32	32	34	32
7. 42nd Ave S north of S 150th St	33	32	35	34
8. Military Rd S north of S 140th St	39	39	40	40
9. Military Rd S south of S 144th St	32	33	33	33
10. Military Rd S north of S 150th St	34	35	34	35

This analysis looked at both weekday speeds (Tuesday through Thursday) and weekend speeds (Saturday and Sunday.) Speeds at each location were relatively consistent throughout the day as well as across different days of the week, with only minor fluctuations. There was also little variation in the speed data northbound and southbound on all segments. Speeds along northern segments of Tukwila International Boulevard were consistently 10-15 mph faster than those observed to the south. Along TIB between S 144th Street and S 152nd Street, observed speeds were approximately 5 mph faster than on 42nd Avenue S and Military Road S.

Volume Data

The tables on the following page show the average weekday and weekend volumes in each direction for the study locations as well as the AM and PM peak hour volumes. Overall, daily volumes on the weekend are between 10-30 percent lower than average daily weekday volumes and there are no discernable AM or PM peak hours on the weekend compared with the typical commute pattern evident during the week. The peak hour directional volumes on TIB are between 700 and 900 vehicles per hour (vph). The peak hour directional volumes on 42nd Avenue S and Military Road S are much lower by comparison and are between 100 to 300 vph.

Existing (2019) Daily Traffic Volumes

Study Location	Weekday (Tue-Thu)		Weekend (Sat-Sun)	
	Northbound	Southbound	Northbound	Southbound
1. TIB north of S 126th St	7,646	7,370	5,324	5,255
2. TIB north of S 139th St	8,609	7,234	5,469	5,367
3. TIB south of S 144th St	8,288	8,583	6,638	7,286
4. TIB north of S 150th St	9,386	9,263	7,821	8,146
5. 42nd Ave S north of S 139th St	1,246	1,334	933	896
6. 42nd Ave S south of S 144th St	2,774	2,467	2,149	1,730
7. 42nd Ave S north of S 150th St	3,343	3,141	2,655	2,255
8. Military Rd S north of S 140th St	3,712	3,753	3,376	3,276
9. Military Rd S south of S 144th St	2,541	3,024	2,212	2,723
10. Military Rd S north of S 150th St	3,845	3,778	3,901	3,885

Existing (2019) Peak Hour Traffic Volumes

Study Location	AM Peak Hour (7-8AM)		PM Peak Hour (4-5PM)	
	Northbound	Southbound	Northbound	Southbound
1. TIB north of S 126th St	827	226	396	857
2. TIB north of S 139th St	879	247	469	809
3. TIB south of S 144th St	674	317	513	776
4. TIB north of S 150th St	711	362	612	825
5. 42nd Ave S north of S 139th St	113	77	82	158
6. 42nd Ave S south of S 144th St	242	124	194	300
7. 42nd Ave S north of S 150th St	272	164	226	349
8. Military Rd S north of S 140th St	219	181	297	331
9. Military Rd S south of S 144th St	153	154	185	248
10. Military Rd S north of S 150th St	186	196	285	303

Traffic Diversion Analysis

The results from our previous microsimulation analysis suggest that under a rechannelization scenario, the volume on TIB would need be to less than approximately 700 vph in each direction for the intersection operations and corridor travel time on TIB to be consistent with how the corridor operates today. Our diversion analysis indicated that approximately 35% of diverted volumes would use 42nd Avenue S and 25% would use Military Road S as alternatives to TIB under the rechannelization scenario.

The table shows estimates of how weekday traffic volumes in the peak direction would change on Military Road S and 42nd Avenue S before and after implementation of a rechannelization on TIB. Estimates for 2030 are also provided by increasing the existing volumes by 25%, consistent with growth estimates from the City's travel model.

	Military Rd S north of S 150th St		**42nd Ave S north of S 150th St**	
	Northbound (AM)	**Southbound (PM)**	**Northbound (AM)**	**Southbound (PM)**
2019 Existing				
Volume Before	190	300	270	350
Volume After	190	330	270	400
Difference	*0*	*30*	*0*	*50*
Percent Change	*0%*	*10%*	*0%*	*14%*
2030 Future				
Volume Before	240	380	340	440
Volume After	290	470	410	560
Difference	*50*	*90*	*70*	*120*
Percent Change	*21%*	*24%*	*21%*	*27%*

Under the existing scenario, only traffic in the southbound direction during the PM peak period on TIB would need to shift to alternate routes in order to reduce the volumes below 700 vph. The volumes that are estimated to divert to Military Road S and 42nd Avenue S are less 50 vph, which would increase the volumes on these facilities by 10-15 percent. In the future scenario, traffic from TIB would need to divert during both the AM and PM peak hours and the volumes increases on the two parallel routes would be between 50 and 120 vph, or approximately 20-25 percent.

In addition to the increased volumes on the two parallel facilities, another impact to these facilities would be an increase in overall travel speed as drivers shift from TIB. Travel speeds on TIB are 10-15 mph faster than those on Military Road S and 42nd Avenue S and it is likely that drivers would attempt to maintain their previous travel speeds while diverting. The land use along these two parallel routes

is primarily residential and the increases in both traffic volumes and travel speeds would impact these residents and potentially increase the rate and severity of collisions that occur along these corridors.

This analysis did not show any impacts on the weekend from the rechannelization on TIB.

Traffic Calming Measures

This section describes the potential traffic calming strategies that could be used to mitigate the speed and volume increases from diverted traffic onto 42nd Avenue S and Military Road S.

Chicanes

A chicane is a series of alternating curves or lane shifts that force a motorist to steer back and forth instead of traveling a straight path.[1] They have been proven to be effective at reducing both traffic speed and volumes, and they are relatively affordable. Chicanes are considered appropriate on roadways with speed limits of 35 mph or less.[2] Chicanes do not affect driveway access, though street sweeping may need to be done manually. On 42nd Avenue S and Military Road S, one pair of chicanes per block is recommended. The cost can range from $5,000-$25,000 per pair depending on materials selected. Tukwila could consider chicanes at a low, medium, and high level of effort.

- Lowest level of effort – a temporary chicane marked with paint and delineators. While this is the least expensive option (~$5-10k), more motorists will choose not to obey the markings.
- Medium level of effort – a temporary or permanent chicane that uses planters and paint.
- Highest level of effort – a permanent chicane with curb. Costs vary greatly but will be significantly cheaper if the curb does not impact existing storm drain facilities. Drainage retrofitting and landscaping may represent a major component of the cost.

Lowest Level of Effort

Temporary chicanes in Bend, OR. Source: Bend Bikes[3]

Medium Level of Effort

Temporary chicanes in Philadelphia. Source: Gary Toth[4]

Highest Level of Effort

Permanent chicane in Austin, TX. Source: LADOT[5]

[1] https://www.ite.org/pub/?id=29df6928-0059-96b7-cfb7-c79b3585a17d
[2] https://www.ite.org/pub/?id=29df6928-0059-96b7-cfb7-c79b3585a17d
[3] https://www.bendbikes.org/nw15street/chicanes/
[4] https://www.pps.org/article/top-down-meets-bottom-up-on-philadelphia-streets
[5] http://bike.lacity.org/anatomy-of-a-bicycle-friendly-street-chicanes/

Raised Crosswalks

Raised crosswalks, also known as speed tables, are long, raised speed humps with a flat section in the middle and ramps on the ends. Raised crosswalks have been shown to reduce speeds and divert 20 percent of average traffic volumes when a series are implemented. They have also been shown to reduce the average crash rate by 45 percent.[6] Raised crosswalks encourage motorists to yield to pedestrians because they increase pedestrian visibility and force motorists to slow down before going over the speed table. Speed humps are a similar traffic calming treatment, which are more effective at reducing speeds – studies have shown that average speeds between humps are reduced between 20 and 25 percent.[7] However, speed humps are often not popular with residents due to noise concerns. For this reason, speed humps are not recommended on 42nd Avenue S and Military Road S. While neither roadway currently has any mid-block crosswalks, raised crosswalks could be an effective traffic calming treatment on 42nd Avenue S between S 144th Street and S 142nd Street in front of Foster High School.

Example of a raised crosswalk. Source: Scott Batson
https://safety.fhwa.dot.gov/speedmgt/ePrimer_modules/module3pt2.cfm

The cost typically ranges from $2,500-$8,000 per crosswalk, but costs will vary based on the width of the road, drainage conditions, and the type of material used – asphalt is cheaper than brickwork, stamped asphalt, and other materials.

Raised Intersections

Raised intersections are very similar to raised crosswalks, but they are flat raised areas covering entire intersections that have ramps on all approaches. They are typically installed at signalized or all-way stop controlled intersections with high pedestrian crossing demand, and they are considered appropriate on roadways with speed limits 35 mph or less.

[6] https://www.ite.org/pub/?id=2c8edbfb-0c48-b1f3-c506-9e8e72dd3992
[7] https://www.ite.org/pub/?id=2c815e39-bb70-72a3-4e31-0356ae6af6b0

Raised intersections make entire intersections more pedestrian-friendly and increase the likelihood that a driver yields to a pedestrian. While raised intersections are likely to reduce through movement speeds at intersections, reduction in mid-block speeds are typically less than 10 percent.[8] They are also fairly expensive at $15,000-$100,000 each. The City could consider a raised intersection on 42nd Avenue S at S 144th Street near Foster High School in conjunction with raised crosswalks between S 144th Street and S 142nd Street.

Example of a raised intersection. Source: NACTO https://nacto.org/publication/urban-street-design-guide/intersections/minor-intersections/raised-intersections/

Bulb Outs

Bulb outs, also known as curb extensions or chokers, extend the sidewalk or curb line into the street, resulting in a narrower roadway section. If located at an intersection, it is called a corner extension or bulb out, and if located midblock, it is referred to as a choker. They are appropriate for roadways of any speed limit and a variety of functional classifications, i.e. arterials, collectors, and local streets. They encourage lower vehicular speeds by funneling traffic through the pinch point, but they are not thought to be effective for volume reduction.[9] They are also fairly expensive at $15,000-$100,000 each. Drainage may represent a significant cost. The City could consider installing bulb outs and chokers along 42nd Avenue S and Military Road S.

Traffic Diverters

Traffic diverters are barriers built at intersections that prevent certain through and/or turning movements. They can be placed across both lanes of traffic as a full diverter or across one lane of traffic as a semi-diverter, though they should be designed to be passable for pedestrians and cyclists. They can be designed to allow emergency vehicle access with mountable curbs, gaps between bollards, removable delineators, etc. One traffic diverter per roadway is recommended. However, diverters are generally considered appropriate on roadways with speed limits 25 mph or less[10], so this may be less

[8] https://www.ite.org/pub/?id=2c3e7d2b-0d3a-93b9-af9d-99dce352e79d
[9] https://www.ite.org/pub/?id=2a288a67-0a3d-00d2-9e87-c82b9ebd6171
[10] https://www.ite.org/pub/?id=2a33066a-c570-9a6a-64b7-8856c5906c10

appropriate for Military Road S. The cost can range from $5,000-$50,000 each depending on the amount of material needed and drainage needs at the site. Tukwila could consider diverters at a low, medium, and high level of effort.

- Lowest level of effort – a temporary diverter marked with paint and delineators. While this is the least expensive option (~$5-10k), more motorists will choose not to obey the markings.
- Medium level of effort – a temporary or permanent chicane that uses planters and paint. Even with signage about traffic violation fees, some motorists will risk a ticket and continue to use the roadway.
- Highest level of effort – an island with mountable curb. Costs vary greatly but will be significantly cheaper if the curb does not impact existing storm drain facilities. Drainage retrofitting and landscaping may represent a major component of the cost.

Lowest Level of Effort

Temporary traffic diverters in Seattle. Source: Chris Sullivan/KIRO Radio[11]

Medium Level of Effort

Bollard traffic diverters in Berkeley, CA. Source: R Kehlmann[12]

Highest Level of Effort

A more permanent traffic diverter. Source: Flickr - VeloTraffic (2010)[13]

References for Cost Estimates

- https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures/
- http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf
- https://www.fhwa.dot.gov/publications/research/safety/01102/01102.pdf

[11] http://mynorthwest.com/710694/traffic-diverters-getting-mixed-reaction/?
[12] http://berkeleyplaques.org/e-plaque/traffic-diverters/?cat=39
[13] http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=41

Appendix 3: Preliminary Budget Evaluation Memo (October 2019)

APPENDIX

To: City of Tukwila, Fehr & Peers

From: KPG

Date: 10/22/2019

Re: Tukwila International Boulevard On-Street Parking/Rechannelization – Preliminary Budget Evaluation

Project No: 19075 (KPG)

The purpose of this document is to provide a preliminary budget evaluation and comparison for the Tukwila International Boulevard (TIB) Rechannelization alternatives.

BASELINE PROJECTS

The current Capital Improvement Program (CIP) identifies a new signal at S 140th St and TIB. This project is in conjunction with the two Rapid Response Flashing Beacons (RRFB) at S 141st St that were installed in 2019. Projects that could support the safety and placemaking goals identified in the City of Tukwila Comprehensive plan, specifically Chapter 8 – Tukwila International Boulevard District, are RRFB installations at existing intersections as identified in Table 1. The RRFB installations at existing intersections identified in the Baseline Projects do not include ADA improvements or curb bulbs to shorten crossing distances across TIB using curb bulbs because of the current vehicle use of the outside lane. A table showing Baseline Projects has been provided in Table 4 for these projects that could be implemented separately or with any of the rechannelization options.

Table 1: Baseline Projects for All Alternatives

IMPROVEMENT	LOCATION
New Signal System	S 140th St
Rapid Response Flashing Beacons (RRFB) at Existing Intersections	S 150th St, S 148th St, S 146th St

TUKWILA INTERNATIONAL BOULEVARD RECHANNELIZATION

The purpose of this section is to provide a preliminary budget evaluation and comparison for the three Tukwila International Boulevard (TIB) Rechannelization options presented in Fehr & Peers' Report *Tukwila International Boulevard Rechannelization Study*. These options include:

1. Rechannelization between S 139th Street and S 152nd Street with traffic calming mitigation on side streets
    a. Installation of on-street parking and bike lanes with pedestrian improvements and traffic mitigation.
2. Rechannelization between 12400 block and S 152nd Street
    a. Installation of on-street parking and bike lanes with pedestrian improvements between S 139th Street and S 152nd Street.
    b. Installation of protected bike lanes between S 139th Street and 12400 block.
3. Implementation of off-peak parking in outside lanes of TIB between S 139th Street and S 152nd Street
    a. Installation of parking signage to enforce peak hour parking restrictions

The purpose of the rechannelization of TIB is to slow traffic down, provide on-street parking for adjacent commercial uses, and improve safety for bicyclists and pedestrians.

Additionally, the preliminary budget evaluations for Option 1 and Option 2 incorporate pedestrian safety measures beyond those identified in the Baseline Projects. The additional pedestrian safety measures strengthen the projects to better satisfy the goals for transitioning TIB from a highway to a "main street;" goals from the City of Tukwila Comprehensive plan, specifically Chapter 8 – Tukwila International Boulevard District.

OPTION 1

Option 1 would add on-street parking and bike lanes to TIB only from S 152nd St to S 139th St (Figure 1). The existing outside lanes would be converted to 8' parallel parking with a 5' bike lane, while maintaining one travel lane in each direction and the center turn lane. North of S 139th St the road configuration would be unchanged.

As part of this option, due to the modification of the outside lane, the existing traffic signal at S 144th St would need to be upgraded to meet current ADA requirements, including installation of separate push button pedestals at least 10-feet from the existing button location, and audible push button assemblies. The ADA upgrades at this intersection could be combined with the installation of curb bulbs. No improvements to the vehicle traffic signal heads or vehicle detection equipment are anticipated to be required.

Improved pedestrian facilities along TIB have been identified by the City through their public outreach and their TIB Subarea Plan. The rechannelization presents an opportunity to improve pedestrian crossing distances, pedestrian awareness, and connectivity throughout the corridor. The budget estimate incorporates additional **pedestrian improvements** provided in Table 2:

Table 2: Additional Pedestrian Improvements

TECHNIQUE	LOCATION
Curb Bulbs at existing Mid-Block Crossings	TIB: between 152nd – 150th between 144th – 142nd between 142nd – 141st S 141st St
Curb Bulbs at New Rapid Response Flashing Beacons (RRFB) Locations	S 150th St, S 148th St, S 146th St

As noted in the Fehr & Peers report, traffic diversion is anticipated to occur as a result of the rechannelization limits with Option 1. Preliminary traffic mitigation/calming techniques and their locations have been identified based on similar regional applications and through collaboration with the City of Tukwila and Fehr & Peers in order to establish a project budget. Techniques and locations are tabulated in Table 3 and shown on Figure 3. These measures represent reasonable assumptions for budget purposes; however, the specific techniques, number of installations, and specific locations would need to be developed through a public outreach process and coordination with other City departments.

Various traffic calming techniques are described in the Fehr & Peers Report. For budgeting purposes, we have assumed a combination of lower cost techniques (speed humps/cushions) and higher cost techniques (chicanes, traffic circles) will be implemented to mitigate predicted traffic diversion.

Table 3: Preliminary Traffic Mitigation Locations

TECHNIQUE	LOCATION
Chicane (Offset Curb Extensions) Roadway	S 130th St – TIB to 40th Ave S 42nd Ave S – S 144th St to S 150th St
Mini Roundabout	S 140th St & 37th Ave S
Traffic Circle	S 135th St & 34th Ave S
Speed Humps/Tables/Cushions	40th Ave S: between 137th – 132nd 34th Ave S: between 137th – 140th S 132nd St: between 34th – 32nd S 133rd St: between 32nd – Military Rd S 140th St: between 33rd Pl – 35th
Raised Crosswalk	S 137th St & 37th Ave S S 140th St & 42nd Ave S S 142th St & 37th Ave S

Before and after traffic studies, including volume and speed counts, are estimated to cost $35,000 and are recommended and included in the budget estimate as part of the traffic diversion/calming techniques line item. The traffic studies will allow the City to monitor changes in traffic volumes and speeds on adjacent residential streets in order to determine if additional mitigation measures are necessary.

Option 1 is anticipated to impact to the surrounding neighborhoods which may require substantial public outreach in the neighborhoods. We have included a public outreach budget of $140,000 to satisfy general outreach efforts regarding the TIB rechannelization and mitigation for Option 1. These efforts may include a series of focus group meetings for traffic mitigation, mailers, website updates, and community open house meetings prior to implementing the rechannelization of TIB.

Table 4, below, summarizes the key budget items. See the attached Option 1 Preliminary Budget Estimate for a detailed budget estimate for the improvements identified in Option 1.

OPTION 2

Option 2 is identical to Option 1 on TIB from S 152nd St to S 139th St but with the addition of extending the limits of the restriping of the outside lane to provide a protected bike lane from S 139th St to the 12400 Block (Figure 2). Traffic signal improvements at S 144th St would still be required due to the modification and repurposing of the outside lane of TIB. Parking demand currently decreases outside of the commercial district, north of S 139th St, which allows the outside lane to transition from a parking lane to a 6’ buffer and 6’ bike lane. If parking demand increases due to development north of S 139th St, the protected bike lanes may be converted to 8’ parallel parking and a 5’ bike lane.

The rechannelization in Option 2 presents an opportunity to improve pedestrian crossing distances, pedestrian awareness, and connectivity throughout the corridor. The budget estimate for Option 2 incorporates the same pedestrian improvements as outlined in Option 1.

According to the Fehr & Peers analysis, this option reduces, but may not eliminate the need for additional traffic calming mitigation in adjacent residential neighborhoods since drivers are anticipated to stay on or divert to regional facilities such as SR 599 and I-5. Before and after

traffic counts are still recommended and are included in the budget estimate. The traffic counts will allow the City to monitor changes in traffic volumes and speeds on adjacent residential streets in order to determine if additional mitigation measures are necessary. We have included a budget allowance of $100,000 in the event minor additional measures are required as a result of implementing this configuration.

Option 2 is anticipated to reduce the impacts to the surrounding neighborhood resulting in lesser public outreach compared to Option 1. We have included a public outreach budget of $95,000 to satisfy general outreach efforts regarding the TIB rechannelization for Option 2. These efforts may include an open house, mailers, and website updates. Table 4, below, summarizes the key budget items. See the attached Option 2 Preliminary Budget Estimate for a detailed budget estimate for the improvements identified in Option 2.

OPTION 3

Option 3 adds on-street parking in the outside lanes during non-peak hours between S 139th Street and S 152nd Street. During periods of peak demand, the roadway will function exactly as it does today, eliminating the need for additional mitigation. This will require the installation of applicable parking signage and an increased effort by law enforcement to monitor and enforce parking users and their time limitations. The costs included in this memorandum do not include the operational costs associated with the additional enforcement required to enforce the parking restrictions. Additional costs for towing of illegally parked vehicles is also not included. Enforcement, if timed parking restrictions are implemented, including towing and impounding of vehicles, is a policy decision to be provided by the Council should Option 3 be selected.

Option 3 allows the City to study the traffic behaviors during the non-peak hours while the travel lanes are reduced. The traffic behaviors could be considered prior to implementing a more permanent solution such as Option 1 or 2.

Option 3 does not allow the installation of curb bulbs as described in Options 1 and 2 because vehicle use of the outside lanes during peak travel times would result in curb bulbs extending into the lane. Pedestrian safety improvements implemented in Option 3 can include enhanced crossing awareness in the form of RRFB's and channelization at existing intersections. The crossing enhancements would be similar to the existing crossings throughout the TIB corridor which consists of crosswalk markings, median refuge island, and RRFBs.

Option 3 only changes the use of TIB for selected periods of time throughout the day, resulting in lesser public outreach need compared to other rechannelization options. We have included a public outreach budget of $23,500 to satisfy general outreach efforts regarding the TIB plan for Option 3. These efforts may include mailers and website updates.

Before and after traffic counts are recommended to monitor traffic patterns and inform future rechannelization options based on data collected after the outside lane conversion has been implemented.

Table 4, below, summarizes the key budget items. See the attached Option 3 Preliminary Budget Estimate for a detailed budget estimate for the improvements identified in Option 3.

SUMMARY

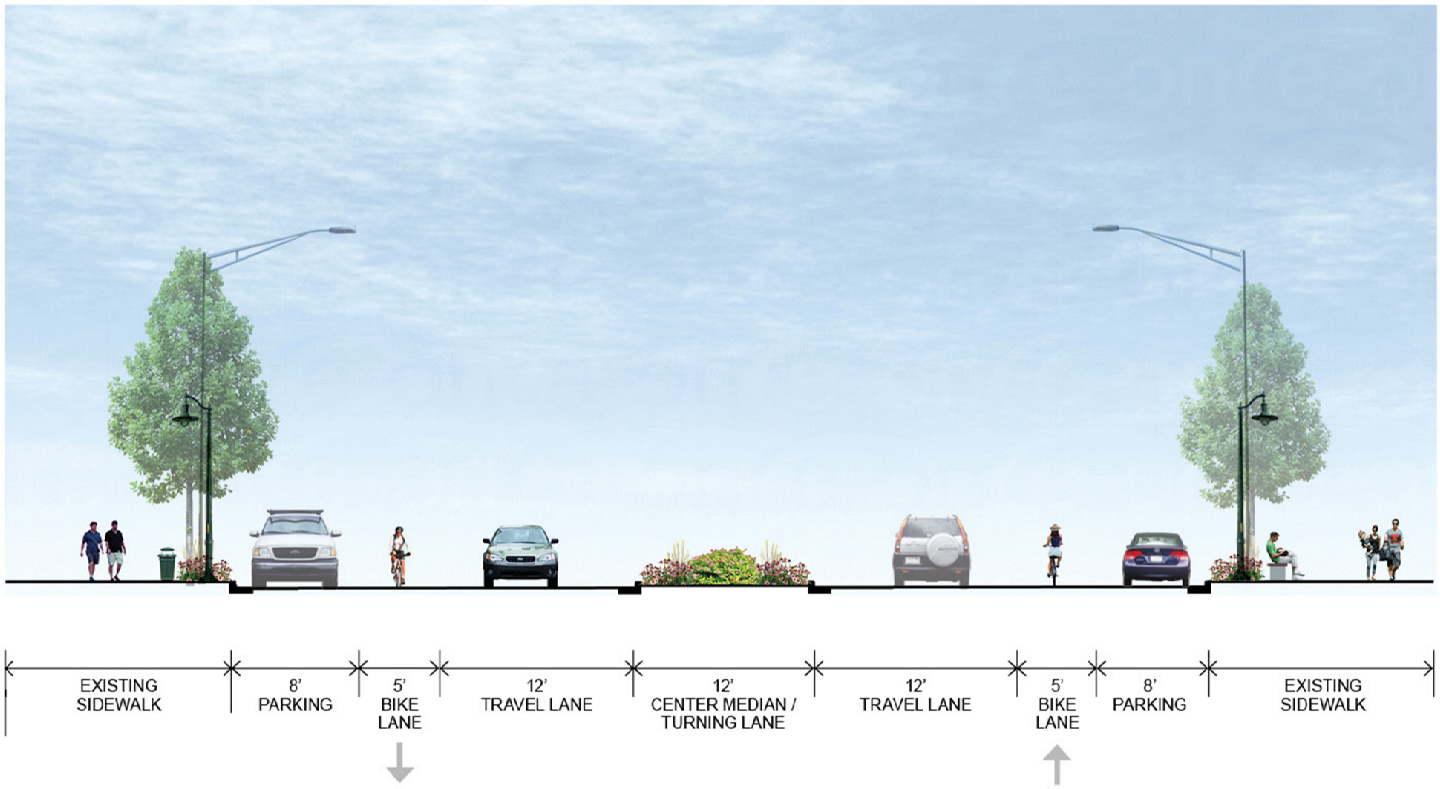
Option 1 would require significant phasing, public outreach, and funding to address the anticipated traffic diversion. Option 1 is estimated to require the largest budget. Option 2 could achieve the same goals as Option 1, is expected to reduce the traffic diversion impacts to the adjacent neighborhoods and is estimated to require a lower budget than Option 1. Options 1 and 2 provide the City with an opportunity transition TIB from a highway to a main street by providing on-street parking for adjacent business, spurring redevelopment throughout the corridor, and improving pedestrian safety by slowing down traffic speeds. Option 3 provides a low-cost solution that could be monitored and studied prior to implementation of a more permanent solution such as Options 1 or 2. Option 3 would require additional enforcement to monitor and enforce the parking limitations, which is not included in the budgets shown below. A Preliminary Budget Summary is provided in Table 4 with detailed breakdown and assumptions on the following pages.

Table 4: Preliminary Budget* Summary

		Option 1	Option 2	Option 3
	Baseline Projects	**RECHAN FROM S 152ND ST - S 139TH ST**	**RECHAN FROM S 152ND ST - 12400 BLOCK**	**CONVERTIBLE OUTSIDE LANE**
ITEM	**Total Cost**	**Total Cost**	**Total Cost**	**Total Cost**
Rechannelization/On-Street Parking & Bicycle Lanes	-	$ 360,000.00	$ 540,000.00	$ 260,000.00
144th Signal Improvements	-	$ 300,000.00	$ 300,000.00	-
140th Signal Installation	$ 1,316,250.00	-	-	-
Pedestrian Crossing/Safety Improvements	$ 234,000.00	$ 1,700,000.00	$ 1,700,000.00	-
Traffic Mitigation/Calming Techniques	-	$ 2,040,000.00	$ 230,000.00	$ 70,000.00
TOTAL	**$ 1,550,250.00**	**$ 4,400,000.00**	**$ 2,770,000.00**	**$ 330,000.00**

Note: Total cost is subject to change based upon public outreach and final design of rechannelization, pedestrian improvements, public outreach and traffic mitigation/calming techniques.
***Budget provided is based on 2019 dollars**

Figure 1: Typical Section 1



Tukwila International Blvd
Between 152nd - 139th (Looking North)

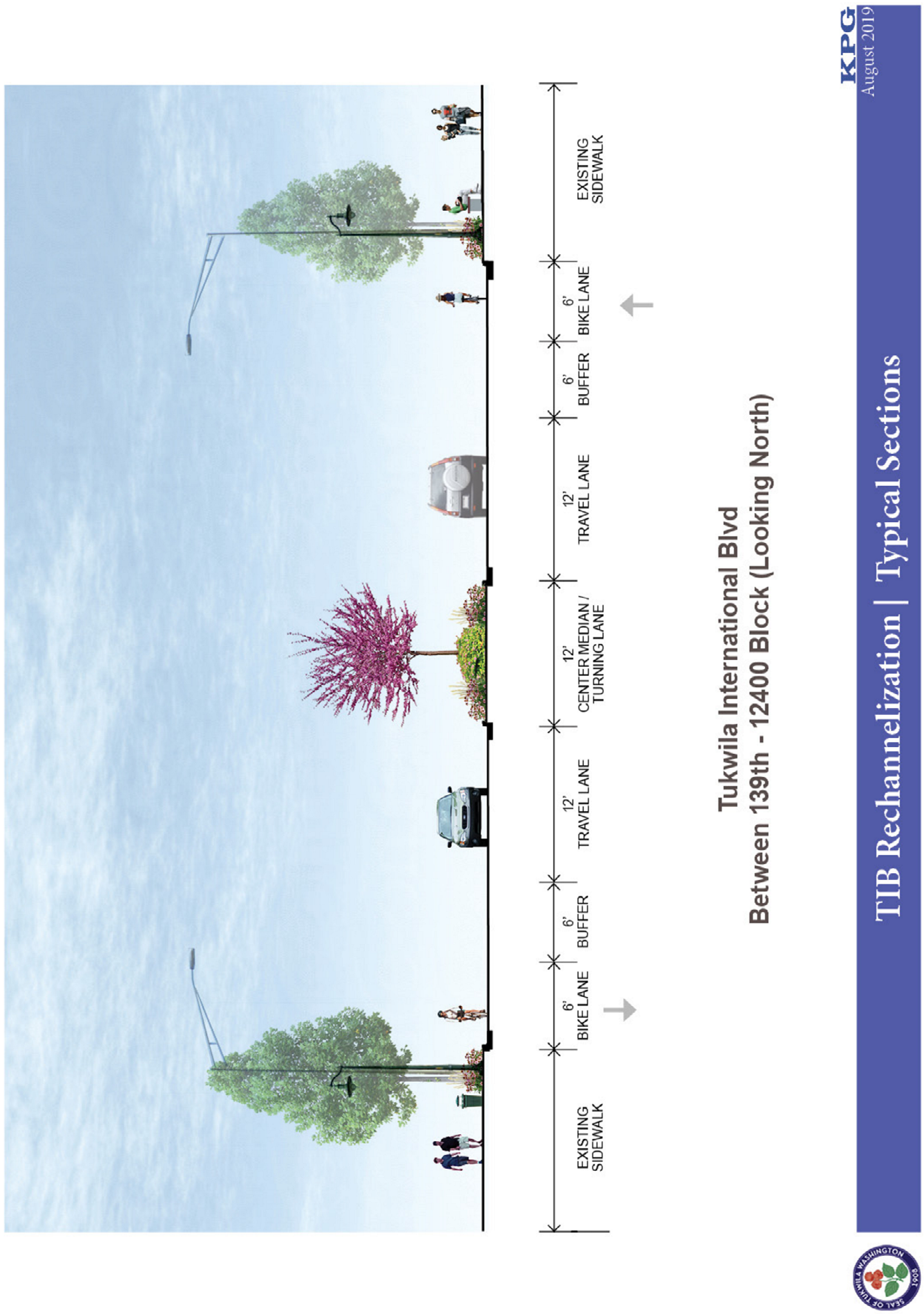


Figure 2: Typical Section 2