

Traffic and Transportation Technical Report

FAIRHAVEN HIGHLANDS

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Introduction

The analyses of traffic and parking impacts associated with the proposed development alternatives proposed for the Fairhaven Highlands residential project were conducted according to City of Bellingham procedures for impact review under the State Environmental Policy Act (SEPA). Impacts are defined as the conditions that would occur with the proposed development [*Alternative 1 (2005 Application)*, *Alternative 2 (Enhanced Buffer Alternative)*, *Alternative 3 (Split Site Alternative)*, and *Alternative 4 (Additional Single Family Alternative)*] as compared with the conditions without the proposed project (*No-Action*). The traffic analysis focuses on the traffic impacts occurring during the peak morning and afternoon commute periods, also known as the weekday AM and PM peak hours. The weekday AM and PM peak hours were selected since they reflect the time periods when the combined effect of project and background traffic volumes are highest and thus the impacts of the proposed project are arguably the greatest.

Project Location and Description

The project site is located east of and abutting Chuckanut Drive, and is currently undeveloped. Figure 1 illustrates the site vicinity.

The Fairhaven Highlands project would develop a total of 739 residential units that are expected to be constructed and fully occupied by 2022. This report evaluates several alternatives for the proposed development. Each alternative would also include approximately 4,000 sf of supporting clubhouse type facilities (meeting rooms, storage, etc.). This component of the development is not anticipated to generate trips in addition to those associated with the residential units.

The No-Action alternative provides a baseline for comparing each of the development alternatives. The No-Action alternative assumes that the project site would remain undeveloped.

The following summarizes the primary components identified as part of each development *Alternative*:

Alternative 1A (2005 Application) would include the following components:

- Develop 181 single-family units
- Develop 558 townhouse/condominium units
- A single site access would be provided via a new intersection approach to the existing Chuckanut Drive/Viewcrest Road intersection.

Alternative 1B is consistent with *Alternative 1A*, including the development of the same mix of land-uses. The key difference included in *Alternative 1B* relative to *Alternative 1A* is that *Alternative 1B* includes the widening of the Padden Creek Bridge, and associated improvements at the 12th Street/Hawthorn Road intersection.

Alternative 1C is consistent with *Alternative 1A*, including the development of the same mix of land-uses. The key difference included in *Alternative 1C* relative to *Alternative 1A* is that *Alternative 1C* includes the construction of a new arterial connection through the project site connecting to 24th Street to the east of the project site.

Alternative 2A (Enhanced Buffer Alternative) would include the following components:

- Develop 17 single-family units
- Develop 722 townhouse/condominium units
- A single site access would be provided via a new intersection approach to the existing Chuckanut Drive/Viewcrest Road intersection

Alternative 2F is consistent with *Alternative 2A*, including the development of the same mix of land-uses. The key differences included in *Alternative 2F* relative to *Alternative 2A* are that *Alternative 2F* includes two site access locations along Chuckanut Drive at 16th Street and Viewcrest Road, and the emergency access road proposed between the north and south portions of the project site would be improved to a full street.

Alternative 3D (Split Site Alternative) would include the following components:

- Develop 17 single-family units
- Develop 722 townhouse/condominium units
- Construction of a new arterial connection through the project site connecting to 24th Street to the east of the project site
- Access to the site would be provided via two locations along Chuckanut Drive at 16th Street and Viewcrest Road

Alternative 4F (Additional Single Family Alternative) would include the following components:

- Develop 51 single-family units
- Develop 688 townhouse/condominium units
- Access to the site would be provided via two locations along Chuckanut Drive at 16th Street and Viewcrest Road

Study Approach

The study area and technical methodologies were identified in advance through coordination with City of Bellingham staff. The study area includes adjacent roadways and the following eleven study intersections:

- I-5 NB Ramps/Old Fairhaven Parkway
- I-5 SB Ramps/Old Fairhaven Parkway
- 30th Street/Old Fairhaven Parkway
- 24th Street/Old Fairhaven Parkway
- 12th Street/Old Fairhaven Parkway
- 12th Street/Harris Avenue
- Chuckanut Drive/Hawthorn Road
- Chuckanut Drive/16th Street
- Chuckanut Drive/Viewcrest Road
- Chuckanut Drive/Old Samish Road
- 32nd Street/Old Samish Road

Both the weekday AM and PM peak hour conditions were included in the analysis, since they represent the time periods when surrounding street system traffic is at its highest, and thus, cumulative traffic conditions with the addition of project traffic would be greatest.

It is noted that, near schools, localized congestion may occur for time periods associated with school events, as well as before and after school. Observations show that traffic volumes during these periods are lower than those observed during the weekday AM and PM peak hours.

This study reviews the affected street system, traffic volumes and operations, traffic safety, transit, non-motorized facilities, and parking conditions associated with the site, as well as the surrounding neighborhood. The following sections document existing conditions, future no-action conditions, and project impacts, as well as identifying potential mitigation measures, where appropriate.

Although it is anticipated that the project would proceed in phases, the analysis of project impacts assumes full build-out of the proposed project (2022).

The analysis of future, 2022 conditions, assumes the completion of the funded projects within the study area identified in the City of Bellingham's Six-Year Transportation Improvement Program and Comprehensive Plan.

Affected Environment

The following section documents the existing transportation network and conditions in the vicinity of the proposed project, including the existing street system, traffic volumes, traffic operations, transit service and facilities, non-motorized facilities, current safety conditions, and parking conditions. The project study area and project site are illustrated in Figure 1.

Roadway Network

This section summarizes the physical characteristics of the existing roadways in the project vicinity. In general, the roadway network serving the proposed project site is made up of two-lane arterials providing local access, and connecting with downtown Bellingham to the north, and I-5 to the east.

Old Fairhaven Parkway (SR 11) is a three-lane east/west primary arterial with a posted speed limit of 35 miles per hour (mph). Left-turn lanes are provided at key intersections with a two-way left-turn lane provided between intersections. This roadway connects I-5 to the east with the Fairhaven business district to the west and is a designated truck route. Sidewalks and bike lanes are provided along both sides of the roadway and the City of Bellingham's bike route map designates the roadway as a "marked bicycle route" (City of Bellingham, April 2004).

Chuckanut Drive (SR 11) is a two-lane secondary arterial with a posted speed limit of 35 mph to the south of Fairhaven Park. Between Fairhaven Park and the Padden Creek Bridge, the posted speed limit is 25 mph. To the south of the intersection with Old Fairhaven Parkway, Chuckanut Drive crosses Padden Creek via a 30 foot wide, 300 foot long bridge. Chuckanut Drive connects Bellingham with Burlington to the south. Sidewalks are provided along both sides of the roadway to the north of the intersection with Hawthorn Road. To the south of the intersection of Hawthorn Road paved shoulders are provided along both sides of the roadway. The City of Bellingham's bike route map designates the roadway as an "unmarked bicycle route" between Old Fairhaven Parkway and Old Samish Road.

Viewcrest Road is a two-lane residential collector street with a posted speed limit of 25 mph. This street mainly provides access between Chuckanut Drive and the residential neighborhoods to the west. No sidewalks or shoulders are provided. The City of Bellingham's bike route map designates Viewcrest Road as "other bicycle route". This means that the roadway is not specifically maintained as a bike route – i.e. bike lanes and shoulders are not provided for bicycle use and roadway sweeping occurs less frequently than on roadways designated as "marked" or "un-marked" bicycle routes.

Old Samish Road is a two-lane residential collector roadway with a posted speed limit of 25 mph. The roadway consists of two 11 foot travel lanes. No sidewalks or shoulders are provided. The City's bike route map designates this roadway as an "other bicycle route".

Figure 1. Site Vicinity

24th Street is a two-lane collector street to the north of Old Fairhaven Pkwy. To the south it is identified as a proposed collector street. The roadway consists of two travel lanes which vary between 8 and 12 feet depending on location. An intermittent sidewalk is provided along the east side of the street. To the north of Old Fairhaven Pkwy, 24th Street is classified as an un-marked bicycle route.

30th Street is a two-lane collector street with a posted speed limit of 25mph. The roadway consists of two 9 foot travel lanes. No sidewalks or shoulders are provided. The City's bike route map designates this roadway as an "other bicycle route".

Existing Traffic Volumes

Traffic volume data were compiled for the study area to characterize traffic conditions during the weekday AM and PM peak hours. The weekday AM and PM peak hours represent traffic conditions during the hour of highest traffic volumes and congestion in the site vicinity.

With the exception of the 32nd Street/Old Samish Road intersection, which was counted during January 2009, the existing weekday AM and PM peak hour traffic volumes for the study intersections were counted during May and June of 2007 when both Western Washington University and the local schools were in session. The 2007 traffic volumes were increased ~~using by~~ an annual growth rate of 1.5 percent to represent ~~current conditions~~ existing traffic volumes. The peak hour traffic volumes were rounded to the nearest five vehicles. Existing weekday AM and PM peak hour traffic volumes at study intersections are shown in Figure 2.

Figure 2. Existing Weekday AM and PM Peak Hour Traffic Volumes

Traffic Operations

A level of service (LOS) analysis was conducted at each study intersection for the weekday AM and PM peak hours. The intersections were analyzed using Synchro 7 for both the signalized and unsignalized intersections within the study area. This software program is based on methodologies presented in the *Highway Capacity Manual*¹. LOS values range from LOS A, indicating good operating conditions with little or no delay, to LOS F, indicating extreme congestion and long vehicle delays. LOS is measured in terms of average delay per vehicle and is reported for the intersection as a whole for signalized intersections. ~~Delays at U~~Unsignalized intersections are reported in terms of average delay by movement. A more detailed explanation of LOS criteria is provided in Appendix A.

When a project application is submitted, the project becomes vested under the policies which are in effect at that time. As such, the proposed project is vested under the transportation policies which are documented in the 1995 Bellingham Comprehensive Plan. The Plan states that the City of Bellingham had adopted a LOS E standard for arterial streets, with exceptions for locations identified in the Plan which fall below the LOS E standard, and for which there are no feasible mitigation measures. For facilities which fall into this category, the City has determined that LOS F is acceptable. Within the study area, 12th Street between Hawthorne Road and Old Fairhaven Parkway is identified as a facility where LOS F is acceptable.

The Washington State Department of Transportation (WSDOT) has an LOS standard of D for roadways under its jurisdiction that would be affected by traffic generated by the proposed development

Table 1 summarizes the existing weekday AM and PM peak hour LOS at each study intersection. At signalized study intersections, the signal timing and phasing information provided by the City was used to calculate intersection LOS and delay under existing conditions. This approach is likely conservative as signalized intersections typically have the ability to adjust key signal timing parameters to reflect traffic patterns on the given day of the traffic counts. This would result in signal timing which better serves the vehicle demands used in the analysis, which would likely result in improved intersection operations. The LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

¹ Transportation Research Board, 2000.

Table 1. Weekday AM and PM Peak Hour Intersection LOS Summary - Existing

Intersection	AM Peak Hour			PM Peak Hour		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	B	13.9	0.59	B	12.5	0.64
30th St/Old Fairhaven Pkwy	B	13.7	0.64	B	17.19	0.70
24th St/Old Fairhaven Pkwy	E	41.1	SBT/L	F	87.9	SBT/L
12th St/Harris Ave	B	11.1	0.26	B	12.8	0.44
12th St/Old Fairhaven Pkwy	B	18.8	0.44	B	18.5	0.44
Chuckanut Dr/Hawthorn Rd	B	19.2	0.55	C	21.2	0.63
Chuckanut Dr/16th St	A	9.4	WB	B	10.2	WB
Chuckanut Dr/Viewcrest Rd	A	9.4	EB	B	10.3	EB
Chuckanut Dr/Old Samish Rd	A	9.6	WBL	B	10.5	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	9.1	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

As Table 1 shows, all intersections currently operate at LOS D or better with the exception of I-5 NB Ramps/Old Fairhaven Parkway during the weekday AM and PM peak hours, and the 24th Street/Old Fairhaven Parkway. It should be noted that both of these intersections currently operate with two-way stop-control on the minor, side-street approaches, and that although the side-street stop-controlled approaches currently operates at LOS E/F, the free flow (Old Fairhaven Parkway) approaches currently operate with minimal delay. The longer delays associated with side-street operations can be attributed to the high traffic volumes on Old Fairhaven Parkway and the relative difficulty of finding acceptable gaps in the traffic streams to turn into. The side street volumes on the NB I-5 off-ramp and 24th Street approach to Old Fairhaven Parkway currently exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition.

Traffic Safety

An analysis of historical collision data was conducted at the study intersections, as well as the roadway segments near the project site. Data was obtained from the City of Bellingham for the full three years between January 2005 and December 2007, the most recent time period for which data were available. A summary of the total number and average annual collisions at each study intersection is provided in Table 3, and for the roadway segments adjacent to the project site is provided in Table 4.

As shown in Table 3, historical collision rates at study intersections are relatively low, and do not appear to present any specific traffic safety concern. The intersection at Old Fairhaven Parkway and 30th Street had the greatest number of collisions over the three year period, one of which included a fatality, and the highest collision rate per million entering vehicles. The predominant collision type at this intersection was rear-end type collisions, which are common at signalized intersections in urban settings. The fatal collision involved a collision between a vehicle and non-motorized road user. The City of Bellingham does not have specific thresholds to identify either an intersection as a High Accident Location (HAL). However, intersections experiencing an accident rate of more than 1.0 accident per million entering vehicles (MEV) are typically earmarked for continued evaluation and potential improvements. As shown in Table 3, all study intersections experienced an accident rate below 1.0 collision per million entering vehicles, with the exception of 32nd St/Old Samish Road, which experienced an accident rate of approximately two collisions per million entering vehicles. This rate is equivalent to, and is the result of can be attributed to the and reflects the relatively low traffic volumes volume of total entering vehicles at this intersection.

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Table 2. Intersection Collision Data Summary

	Number of Collisions			Total Collisions	Annual Average	Average/MEV ¹
	2005	2006	2007			
I-5 NB Ramps/Old Fairhaven Pkwy	0	1	1	2	0.7	0.15
I-5 SB Ramps/Old Fairhaven Pkwy	0	1	2	3	1.0	0.14
30th St/Old Fairhaven Pkwy	6	6 ²	6	18	6.0	0.84
24th St/Old Fairhaven Pkwy	1	1	0	2	0.7	0.10
12th St/Old Fairhaven Pkwy	1	1	3	5	2.3	0.42
12th St/Harris Ave	0	0	3	3	1.0	0.22
Chuckanut Dr/Hawthorn Rd	0	1	1	2	0.7	0.17
Chuckanut Dr/62th St	1	1	1	3	1.0	0.2500
Chuckanut Dr/Viewcrest Rd	0	0	1	1	0.3	0.21
Chuckanut Dr/Old Samish Rd	1	0	0	1	0.3	0.20
32nd St/Old Samish Rd	1	1	1	3	1.0	2.01

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1. Million entering vehicles
 2. Includes one fatality

Historical collision rates on nearby roadway segments are below statewide average accident rates relatively low for applicable roadway classifications, and do not appear to present any specific traffic safety concern. The majority of the roadway segment accidents involved side-swipe collisions or rear-end collisions, which is consistent with multi-lane roadways. The 2006 fatality reported along 30th Street was a result of excess speed and resulted in the driver being charged with vehicular homicide. Since the collision, active speed signs have been installed along this roadway segment.

Table 3. Roadway Collision Data Summary

	Number of Collisions			Total Collisions	Annual Average	Average/MVM ¹
	2005	2006	2007			
Old Fairhaven Pkwy						
12th St - 24th St	2	1	3	6	2.0	0.31
24th St - 30th St	2	1	0	3	1.0	0.07
30th St - I-5	4	0	2	6	2.0	0.04
30th St						
Old Fairhaven Pkwy - Old Samish Rd	0	1 ²	2	3	1.0	0.75
12th St						
Harris Ave - Old Fairhaven Pkwy	0	0	2	2	0.7	0.04
Old Fairhaven Pkwy - Hawthorn Rd	1	1	0	2	0.7	0.02
Chuckanut Dr						
Hawthorn Rd - Old Samish Rd	1	2	1	4	1.3	1.16

1. Million vehicle miles travelled

2. Includes one fatality

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Currently emergency vehicle access to the Edgemoor neighborhood and the project site is provided predominantly via 12th Street, across the Padden Creek Bridge. However, the bridge only provides two travel lanes which may not provide sufficient space for non-emergency vehicles to make way for the passage of emergency vehicles. In addition, should the bridge become impassable, while two other routes into the neighborhood are available (via Harris Avenue and 4th Street, or 30th Street and Old Samish Road), these alternate routes would likely increase emergency response times.

Transit Service

Transit service in the area is provided by the Whatcom Transportation Authority (WTA). No existing route provides service directly adjacent to the project site. Route 105 provides weekday service between downtown Bellingham and Fairhaven Park with one hour headways. The southbound route turns off of Chuckanut Drive at Hawthorn Place, loops around Fairhaven Middle School, and turns north onto Chuckanut Drive at Willow Road to continue the northbound route.

Non-Motorized Facilities

There are a number of pedestrian and bicycle facilities in the vicinity of the proposed project. Sidewalks exist on many of the study area roadways, but are not present along Chuckanut Drive south of Hawthorn Road, or in the vicinity of the I-5 ramps where only paved shoulders are provided. Crosswalks with push-button activation are located at all signalized study intersections. There are also two mid-block pedestrian crosswalks with refuge islands on Old Fairhaven Parkway between 24th Street and 30th Street (at about 28th Street) and between 20th Street and 16th Street (at about 19th Street), as well as a crosswalk on the eastbound approach to the unsignalized intersection at Old Fairhaven Parkway and 14th Street.

Bicycle facility classifications for each of the project roadways were summarized previously in the Street Network section. In addition to these roadway-specific routes, the six-mile Interurban Trail is located adjacent to the eastern boundary of the project site. The Interurban Trail is a primary off-street trail corridor which provides non-motorized connectivity between downtown Bellingham and Larrabee State Park. Sections of the trail are managed by the City of Bellingham Parks Department, Whatcom County Parks and Larrabee State Park. The City's Bike Route map classifies the Interurban Trail as a "bicycle-friendly trail", the most desirable type of route for cyclists within the City, as it is separated from vehicular traffic with the exception of a few roadway crossings. Pedestrians and cyclists access the trail from points where the trail intersections with the City's roadway network, including Old Fairhaven Parkway near 20th Street to the north of the project site and at Highline Road or Larrabee State Park to the south of the project site.

Impacts of the Project Alternatives

This section of the technical report describes the expected traffic and parking conditions within the study area for each of the project alternatives. The impacts associated with the project alternatives are evaluated for a horizon year of 2022.

No-Action

This section of the technical report describes expected traffic and parking conditions within the study area without the development of the proposed project. *No-Action* assumes that the proposed project site would remain unchanged from existing conditions, and provides a baseline for comparing each of the development alternatives. The transportation analysis for *No-Action* was conducted for the weekday AM and PM peak hour conditions in the year 2022, consistent with the year of potential build-out of *Alternatives 1, 2, 3 and 4*.

Planned Improvements

This section summarizes the planned improvements identified within the study area, based on planning research and conversations with the City of Bellingham, Whatcom County and Washington State Department of Transportation (WSDOT). The review of potential transportation improvements provides an overview of how the street system may look and feel to drivers, pedestrians, and bicyclists within the horizon timeline.

Street System

The City of Bellingham's Six-Year Transportation Improvement Program (May, 2008) lists 22 transportation projects that are planned for construction before 2014. None of these would affect intersection capacity within project study area.

WSDOT currently has no funded improvement projects identified for the study area. However, the recently completed Fairhaven to Slater I-5 Master Plan identifies ramp and ramp intersection improvements at the Old Fairhaven Parkway/I-5 ramp intersections. These would include lengthening the ramps to fix existing acceleration and deceleration deficiencies, and improving the traffic control, signal timing and channelization at the ramp terminal intersections with new signals or roundabouts.

The City of Bellingham's 2005 Comprehensive Plan identifies a new roadway connection between Chuckanut Drive and Old Fairhaven Parkway. The City's future traffic models have been prepared both without and with this connection. The Fairhaven Highlands project, as proposed, could construct a portion of this connection extending from Chuckanut Drive to 24th Street through the project site. The new roadway connection is included in the analysis of *Alternatives 1C, 2A, and 3D*. There is no current proposal to construct this connection without the proposed Fairhaven Highlands development.

The 2005 Comprehensive Plan identified widening the Padden Creek Bridge to eliminate the bottleneck at the narrow bridge on SR 11. The bridge widening is included in *Alternative 1B*. There are no plans to widen the bridge without the proposed project.

Transit Facilities

In 2005, WTA completed a six-year strategic planning process, which included a review of proposed changes to transit service. At this time, there are no proposed transit service changes within the project study area.

Non-Motorized Facilities

The City of Bellingham's Six-Year Transportation Improvement Program (May, 2008) lists 22 transportation projects that are planned for construction before 2014. Although several of these include projects pedestrian and/or bike improvements, none of them are located within the project study area.

Traffic Volumes

No-Action traffic volume forecasts at study area intersections for the year 2022 were developed by applying a 1.5 percent annual growth rate to existing traffic volumes to account for increases in general background traffic volumes. This rate is consistent with historical data and future City model projections. In addition to the background growth rate, traffic from specific projects under development in the site vicinity (called "pipeline" projects) are also added to the forecast 2022 volumes. These pipeline traffic volumes account for the traffic that would be generated by projects that have been approved for construction or are currently under construction. The City maintains a listing of all projects that are in the approval process or are under construction within the project area. At the time traffic volume data was collected, the following "pipeline" projects were identified as either under construction or currently approved and are therefore included in the study (sizes and numbers of units are approximate):

- 1140 10th (SW Corner 10th & McKenzie): 60 condo units, with 20,000 sf commercial.
- Waldron and Young Buildings, 1308 12th (NW Corner 12th & McKenzie): 23 units, with 10,000 sf commercial.
- 1307 McKenzie: 4-plex to 5-plex and/or add 350 sf office.
- 1108 11th: 13,000 sf office building.
- 800 Harris (SE corner 8th & Harris): approx. 80 Units, with 20,000 sf commercial.
- 1314 Old Fairhaven Parkway: 6 office/residential loft units.
- 1602 12th: approximately 5,200 sf office, with 10 units in 4-story building

Trip generation for each of the above projects was calculated using standard industry practices, based on the proposed land use for each project. Pipeline project trips were then assigned to the study intersections according to the specific location of each project and trips were distributed to the roadway network based on the distribution from the City of Bellingham's travel demand model.

The use of both pipeline project traffic volumes and the background growth rate at the study area intersections likely provide a conservative estimate for 2022 *No-Action* traffic volumes. The 2022 *No-Action* weekday AM and PM peak hour traffic volumes are illustrated in Figure 3.

Figure 3. *No-Action* Weekday Peak Hour Traffic Volumes

Traffic Operations

Weekday peak hour intersection levels of service (LOS) were calculated for each of the study intersections for *No-Action*. The intersection LOS analysis inputs (cycle length, number of lanes, phasing, etc.) remained unchanged from those used for the LOS analysis of existing conditions. Table 4 provides a summary of weekday AM and PM peak hour levels of service, delays, and v/c ratios at study intersections for *No-Action*. The LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Table 4. Weekday AM and PM Peak Hour Intersection LOS Summary – No Action

Intersection	Existing			No-Action		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	B	13.9	0.59	C	22.1	0.80
30th St/Old Fairhaven Pkwy	B	13.7	0.64	C	22.4	0.81
24th St/Old Fairhaven Pkwy	E	41.1	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.1	0.26	B	11.7	0.37
12th St/Old Fairhaven Pkwy	B	18.8	0.44	B	19.2	0.59
Chuckanut Dr/Hawthorn Rd	B	19.2	0.55	C	25.1	0.71
Chuckanut Dr/16th St	A	9.4	WB	A	9.7	WB
Chuckanut Dr/Viewcrest Rd	A	9.4	EB	A	9.7	EB
Chuckanut Dr/Old Samish Rd	A	9.6	WBL	A	9.9	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.8	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	B	12.5	0.64	C	23.6	0.87
30th St/Old Fairhaven Pkwy	B	17.19	0.70	C	32.7	0.90
24th St/Old Fairhaven Pkwy	F	87.9	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	12.8	0.44	B	15.4	0.64
12th St/Old Fairhaven Pkwy	B	18.5	0.44	C	21.4	0.65
Chuckanut Dr/Hawthorn Rd	C	21.2	0.63	C	27.2	0.77
Chuckanut Dr/16th St	B	10.2	WB	B	10.7	WB
Chuckanut Dr/Viewcrest Rd	B	10.3	EB	B	10.8	EB
Chuckanut Dr/Old Samish Rd	B	10.5	WBL	B	11.3	WBL
32nd St/Old Samish Rd	A	9.1	SB	A	9.3	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

Intersection levels of service within the study area are expected to change at a number of study intersections between existing conditions and the No-Action conditions Alternative. However, as shown in Table 4, the majority of study area intersections are expected to continue to operate at LOS C or better. The changes are the result of a combination of factors, including background traffic growth and the addition of pipeline project traffic.

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The following list summarizes the study intersections that would continue to operate poorly under No-Action conditions and the study intersections where the LOS is expected to degrade to LOS E or F between the Existing conditions and the No-Action conditions Alternative.

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I-5 NB Ramps/Old Fairhaven Pkwy. This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. This is the result of increased background and pipeline traffic volumes.

24th Street/Old Fairhaven Pkwy. The stop-controlled side-street approaches to this intersection would continue to operate at LOS F during the weekday PM peak hour, and would degrade from LOS E to LOS F during the weekday AM peak hour. This reduction in LOS can be attributed to increases in background traffic volumes and the addition of pipeline traffic volumes which access I-5 via Old Fairhaven Pkwy. These increases along Old Fairhaven Pkwy reduce the number of gaps available for vehicles entering from the side-street stop-controlled approaches. To put this in perspective, approximately 4,420 between approximately 1,900 and 2,000 vph are forecast on Old Fairhaven Parkway during the weekday PM peak hour. The northbound and southbound minor approaches would each serve between approximately 35 and 75 vph, each approach reflecting less than five percent of the total volume approaching the intersection in the weekday PM peak hour.

Traffic Safety

Increases in traffic volumes on study area roadways and intersections due to background and pipeline project traffic growth that would occur by 2022 may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based in increases in traffic volumes. However, the number, or rate of collisions, could increase, especially at congested locations as traffic volumes increase at study intersections.

Increases in traffic volumes within the study area are also anticipated to result in increases in emergency response times in 2022.

Transit Service

As stated in the *Planned Improvements* portion of this section, no changes to transit service within the study area are anticipated by 2022. Without the development of the proposed project little growth in transit ridership in the vicinity of the project site is anticipated relative to existing levels. The existing transit service is expected to accommodate the anticipated growth in transit ridership.

Non-Motorized Facilities

As stated in the *Planned Improvements* portion of this section, no changes to the non-motorized facilities within the study area are anticipated by 2022. Without the development of the proposed project little growth in non-motorized travel is anticipated within the study area relative existing levels. The existing non-motorized facilities are expected to accommodate anticipated growth.

Alternative 1A (2005 Application)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 1A*.

Alternative 1A would include the following components:

- Develop 181 single-family units
- Develop 558 townhouse/condominium units
- A single site access would be provided via a new intersection approach to the existing Chuckanut Drive/Viewcrest Road intersection.

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 1A*. However, *Alternative 1A* includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

Project traffic impacts are measured using trip generation and distribution determined by assigning anticipated project-generated traffic to the local roadway network. In order to estimate the proposed project's trip generation, weekday daily, and weekday AM and PM peak hour vehicle trip rates for the residential components were used. Vehicle trip rates were based on information from the ITE *Trip Generation*, 7th Edition (2004). Specifically, the Single-Family Detached Housing (LU 210) and Residential Condominium/Townhouse (LU 230) were used as they best represent the proposed mix of land uses. The proposed and existing trip generation is summarized in Table 5. A summary of the trip generation for each *Alternative* is included in Appendix D.

Table 5. 2022 New Trip Generation – Alternative 1A

	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached	1,730	34	102	136	115	68	183
Residential Townhouse/Condominium	3,270	35	170	205	165	81	246
Total	5,000	69	272	341	280	149	429

As shown in Table 5, *Alternative 1A* is anticipated to generate approximately 5,000 weekday daily trips. During the weekday AM peak hour, *Alternative 1A* would generate approximately 341 trips. During the weekday PM peak hour *Alternative 1A* would generate approximately 429 trips.

Distribution and Assignment

The trip distribution patterns used for this analysis were based on a combination of output from the City of Bellingham travel demand model and travel time data collected during the weekday PM peak hour along study roadways. The model takes into account the planned land uses, surrounding existing land uses that would act as attractions or generators, and the surrounding transportation facilities. Figure 4 illustrates the resulting residential trip distribution patterns for the proposed project. In general, the distribution suggested approximately 34 percent of project traffic would travel to/from the north on I-5, 30 percent to/from the north on 12th Street, 5 percent to/from the south on I-5. The remaining approximately 31 percent would travel on local surface streets. The resulting assignment of project trips for *Alternative 1A* is shown in Figure 5.

Figure 4. Project Trip Distribution - *Alternative 1A*

Figure 5. 2022 Project Trip Assignment - *Alternative 1A*

Traffic Volume Impacts

Peak hour traffic volumes for *Alternative 1A* were developed by assigning the project-generated trips to study intersections according to the project trip distribution shown in Figure 4. The assigned *Alternative 1A* project trips were then added to *No-Action* peak hour traffic volumes. The resulting 2022 weekday AM and PM peak hour traffic volumes for *Alternative 1A* are illustrated in Figure 6. These volumes were then compared with *No-Action* traffic volumes. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

Table 6 illustrates the percent impact of traffic generated by *Alternative 1A* at the study area intersections during weekday AM and PM peak hours.

Table 6. 2022 PM Peak Hour Percent Project Impact – *Alternative 1A*

Intersection	No-Action	Project Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	101	1,316	8.3%	7.7%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	137	1,972	7.5%	6.9%
30th St/Old Fairhaven Pkwy	1,920	141	2,061	7.3%	6.8%
24th St/Old Fairhaven Pkwy	1,525	111	1,636	7.3%	6.8%
12th St/Harris Ave	1,010	146	1,156	14.5%	12.6%
12th St/Old Fairhaven Pkwy	1,655	285	1,940	17.2%	14.7%
Chuckanut Dr/Hawthorn Rd	1,155	290	1,445	25.1%	20.1%
Chuckanut Dr/16th St	265	297	562	112.1%	52.8%
Chuckanut Dr/Viewcrest Rd*	260	341	601	131.2%	56.7%
Chuckanut Dr/Old Samish Rd	315	44	359	14.0%	12.3%
32nd St/Old Samish Rd	130	34	164	26.2%	20.7%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	74	1,724	4.5%	4.3%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	176	2,596	7.3%	6.8%
30th St/Old Fairhaven Pkwy	2,525	180	2,705	7.1%	6.7%
24th St/Old Fairhaven Pkwy	2,045	141	2,186	6.9%	6.5%
12th St/Harris Ave	1,720	184	1,904	10.7%	9.7%
12th St/Old Fairhaven Pkwy	1,985	360	2,345	18.1%	15.4%
Chuckanut Dr/Hawthorn Rd	1,460	362	1,822	24.8%	19.9%
Chuckanut Dr/16th St	455	374	829	82.2%	45.1%
Chuckanut Dr/Viewcrest Rd*	470	429	899	91.3%	47.7%
Chuckanut Dr/Old Samish Rd	520	55	575	10.6%	9.6%
32nd St/Old Samish Rd	160	43	203	26.9%	21.2%

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection

As shown in Table 6, at all study area intersections which do not provide access to the project site, traffic generated by *Alternative 1A* would increase total entering traffic volumes by up to approximately 110 percent traffic during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a

daily basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact. The following intersections would experience a project traffic impact greater than 10 percent:

- Chuckanut Dr/16th St (up to 112.1%)
- 32nd St/Old Samish Rd (up to 26.9%)
- Chuckanut Dr/Hawthorn Rd (up to 25.1%)
- 12th St/Old Fairhaven Pkwy (up to 18.1%)
- 12th St/Harris Ave (up to 14.5%)
- Chuckanut Dr/Old Samish Rd (up to 14.0%)

The project traffic impact at the Chuckanut Dr/16th St is greater than at the other study intersections due to the assignment of project traffic through this intersection, combined with the relatively low *No-Action* traffic volumes.

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 74 trips (4.5 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 362 trips (24.8 percent) at the intersection of Chuckanut Dr/Hawthorn Rd during the weekday PM peak hour.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 1A*, as described in the following section.

Figure 6. 2022 With-Project Traffic Volumes - *Alternative 1A*

Traffic Operations Impacts

Traffic operations impacts include the consideration of changes in operations of study area intersections. Table 7 provides a summary of *Alternative 1A* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided. The LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Table 7. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 1A

Intersection	No-Action			Alternative 1A		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	28.1	0.88
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	24.8	0.84
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.8	0.45
12th St/Old Fairhaven Pkwy	B	19.2	0.59	C	20.5	0.67
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	E	59.4	0.90
Chuckanut Dr/16th St	A	9.7	WB	B	11.9	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	15.0	EB
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.5	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.9	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	42.9	0.98
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	44.3	0.98
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	18.8	0.70
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	30.8	0.82
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	F	82.8	0.93
Chuckanut Dr/16th St	B	10.7	WB	B	13.8	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	D	28.8	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	12.0	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.4	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection

Two of the study intersections will continue to operate at LOS F without or with *Alternative 1A*. Project impacts to these locations are summarized below in terms of traffic volume impacts. When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts. The side street volumes on the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels

of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition.

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1A* would increase total traffic through this intersection by approximately 101 vehicles during the weekday AM peak hour, and by approximately 74 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1A* would increase traffic volumes through this intersection by approximately 111 vehicles during the weekday AM peak hour, and by approximately 141 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 1A* would cause the level of service at the following intersections to degrade:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 12th St/Old Fairhaven Pkwy (LOS B to LOS C – AM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS E – AM peak hour, LOS C to LOS F – PM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS D – PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

Chuckanut Dr/Hawthorn Rd – This intersection is forecast to operate at LOS E during the weekday AM peak hour with *Alternative 1A*, compared to LOS C for *No-Action*. During the weekday PM peak hour the intersection is forecast to operate at LOS F with *Alternative 1A*, compared to LOS C with *No-Action*. Average intersection delays at this intersection would increase by approximately 34 seconds during the weekday AM peak hour, and by approximately 55 seconds during the weekday PM peak hour. This is the result of the addition of approximately 290 project trips representing a 25.1 percent increase in total traffic during the weekday AM peak hour, and 362 project trips representing a 24.8 percent increase in total traffic during the weekday PM peak hour.

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

Site Access Operations

A single site access is proposed as a fourth leg to the existing Chuckanut Drive/Viewcrest Road intersection. In addition to this primary access, two emergency vehicle access points are also planned for the site, one located on the northeast via an extension to 22nd Street and one located on Chuckanut Drive north of Viewcrest Road. These two access points would be restricted and would only be used by emergency vehicles.

Site access operations were analyzed during 2022 weekday AM and PM peak hour conditions, using the same methodology described for the off-site study intersection analysis. It is anticipated that the site access would operate at LOS B during the weekday AM peak hour and LOS D during the weekday PM peak hour. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site. For example, as shown on Figure 6, during the weekday PM peak hour, 244 southbound left-turns are forecast from Chuckanut Drive into the project site, while only 19 westbound left-turns are forecast exiting the project site onto Chuckanut Drive. The LOS D reported above as the worst movement for this intersection is for the westbound left-turn movement. Vehicles making the southbound to eastbound left-turn are not required to stop, and are only required to yield to northbound through vehicles. Conversely, vehicles making the westbound to southbound left-turn must stop, and then yield to the northbound and southbound through movements, northbound and southbound left-turn movements, eastbound right-turn movement, and maybe the eastbound through- and left-turn movements. Therefore, although the number of vehicles making this movement is significantly lower, significantly fewer gaps are available, resulting in higher vehicle delay.

Traffic signal warrants were also evaluated at the two-way stop-controlled Chuckanut Drive/Viewcrest Road intersection to determine if a signal would be appropriate at the proposed access. These warrants test whether a full traffic signal would be ~~needed~~ justified to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions; however, neither of the evaluated warrants are met. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the site ~~driveway access~~ intersection. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Increases in traffic volumes on study area roadways and intersections due to *Alternative 1A* may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based in increases in traffic volumes. The number, or rate of collisions, could increase, especially at congested locations, as a result of increased volumes at study intersections.

Increases in traffic volumes associated with *Alternative 1A* may also result in increases in emergency response times, due to higher delays at study intersections and higher volume to capacity ratios on study roadways. Also, the potential for a higher occurrence of collisions, may increase the frequency with which the Padden Creek Bridge is impassable, sometimes resulting in increased emergency response times to the neighborhood, as emergency vehicles are required to use the alternate routes into the Edgemoor neighborhood. Emergency vehicle access connections to the project site are proposed from Chuckanut Drive and from Old Fairhaven Parkway via 22nd Street.

Transit Impacts

It is not anticipated that existing transit service in the study area would be modified, or new transit service would be added to serve the proposed project site. Existing transit service within the study area is expected to accommodate the increase in transit ridership associated with *Alternative 1A*. *Alternative 1A* would not degrade any existing transit facilities. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 1A*.

Non-Motorized Travel Impacts

The analysis of traffic impacts assumed no significant use of non-motorized travel modes in order to assure that project impacts to traffic operations were not underestimated. This is a commonly accepted approach in evaluating traffic impacts under SEPA, and is intended to assure that conservative analysis results are reflected.

There is potential for an increase in the use of non-motorized travel modes associated with *Alternative 1A*. The on-site roadway/circulation system provides for internal pedestrian facilities and bicycle connections. The Interurban Trail provides the proximate opportunity for either walkers or bicyclists to access Bellingham to the north and Larrabee State Park to the south. In addition, *Alternative 1A* would not degrade any existing facilities, but would enhance non-motorized facilities along the Chuckanut Drive project frontage through the provision of a sidewalk and bike lane.

Existing non-motorized facilities within the study area are expected to accommodate the portion of *Alternative 1A* trip generation that is expected to walk or bike to the project site. Thus, no significant adverse impacts to non-motorized facilities or operations are expected to occur as a result of *Alternative 1A*.

Alternative 1B (2005 Application)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 1B*.

Alternative 1B is consistent with *Alternative 1A*, including the development of the same mix of land-uses. The key difference included in *Alternative 1B* relative to *Alternative 1A* is the inclusion of the widening of the Padden Creek Bridge, and associated improvements at the 12th Street/Hawthorn Road intersection.

Street System

In addition to the frontage improvements along Chuckanut Drive included as part of *Alternative 1A*, *Alternative 1B* also includes the widening of the Padden Creek Bridge, and associated improvements at the 12th Street/Hawthorn Road intersection.

Specifically, the bridge would be widened to provide four travel lanes, two in the northbound direction and two in the southbound direction. In addition, bike lanes and improved pedestrian facilities would also be provided along both sides of the roadway. At the 12th Street/Hawthorn Road intersection to the south of the bridge an exclusive southbound right-turn lane would be provided along 12th Street, and an exclusive north-eastbound right-turn lane would be provided along Hawthorn Road.

Traffic Generation

Project trip generation for *Alternative 1B* would be the same as documented for *Alternative 1A*. As shown in Table 5, *Alternative 1B* is anticipated to generate approximately 5,000 weekday daily trips. During the weekday AM peak hour, *Alternative 1B* would generate approximately 341 trips. During the weekday PM peak hour *Alternative 1B* would generate approximately 429 trips. A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The proposed widening of the Padden Creek Bridge as part of *Alternative 1B* is anticipated to improve intersection operations at the signalized intersections at either end of the bridge, and improve operations across the bridge itself. However, due to short length of the roadway segment which would be widened, and the associated changes in travel times, a significant change in travel patterns is not anticipated as a result of this improvement. Therefore, the forecast traffic volumes were assumed to be consistent with those developed for *Alternative 1A*.

In addition, the trip distribution patterns for *Alternative 1B* were assumed to remain unchanged from those documented for *Alternative 1A*. Figure 4 illustrates the resulting residential trip distribution patterns for *Alternative 1B*. Figure 5 shows the resulting assignment of project trips. In general, the distribution suggested approximately 34 percent of project traffic would travel to/from the north on I-5, 30 percent to/from the north on 12th Street, 5 percent to/from the south on I-5. The remaining approximately 31 percent would travel on local surface streets.

Traffic Volume Impacts

Traffic volume impacts associated with *Alternative 1B* would be consistent with those identified in Table 6 for *Alternative 1A*. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

As shown in Table 6, at study area intersections which do not provide access to the project site, traffic generated by *Alternative 1B* would account for up to approximately twenty-seven percent of the total entering traffic during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily

basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 110 percent. The following intersections would experience a project traffic impact greater than 10 percent:

- Chuckanut Dr/16th St (up to 112.1%)
- 32nd St/Old Samish Rd (up to 26.9%)
- Chuckanut Dr/Hawthorn Rd (up to 25.1%)
- 12th St/Old Fairhaven Pkwy (up to 18.1%)
- 12th St/Harris Ave (up to 14.5%)
- Chuckanut Dr/Old Samish Rd (up to 14.0%)

The project traffic impact at the Chuckanut Dr/16th St is greater than at the other study intersections due to the assignment of project traffic through this intersection, combined with the relatively low *No-Action* traffic volumes.

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 74 trips (4.5 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 141 trips (6.9 percent) at the intersection of 24th Street/Old Fairhaven Pkwy during the weekday PM peak hour.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 1B*, as described in the following section.

Traffic Operations Impacts

Table 8 provides a summary of *Alternative 1B* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided.

Traffic operations associated with *Alternative 1B* are consistent with those presented in Table 7 for *Alternative 1A*, with the exception of the 12th Street/Hawthorn Road intersection which would be improved as part of the widening of the Padden Creek Bridge. The LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Table 8. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 1B

Intersection	No-Action			Alternative 1B		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	28.1	0.88
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	24.8	0.84
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.8	0.45
12th St/Old Fairhaven Pkwy	B	19.2	0.59	C	20.5	0.67
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	C	33.8	0.82
Chuckanut Dr/16th St	A	9.7	WB	B	11.9	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	15.0	EB
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.5	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.9	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	42.9	0.98
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	44.3	0.98
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	18.8	0.70
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	30.8	0.82
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	C	22.9	0.74
Chuckanut Dr/16th St	B	10.7	WB	B	13.8	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	D	28.8	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	12.0	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.4	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection

Two of the study intersections will continue to operate at LOS F without or with *Alternative 1B*. Project impacts to these locations are summarized below in terms of traffic volume impacts. The side street volumes on the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition.

~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1B* would increase

total traffic through this intersection by approximately 101 vehicles during the weekday AM peak hour, and by approximately 74 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1B* would increase traffic volumes through this intersection by approximately 111 vehicles during the weekday AM peak hour, and by approximately 141 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 1B* would cause the level of service at the following intersections to degrade:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 12th St/Old Fairhaven Pkwy (LOS B to LOS C – AM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS D – PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

The intersection improvements identified for the Chuckanut Dr/Hawthorne Rd intersection would improve intersection operations with *Alternative 1B* relative to *Alternative 1A*. During the weekday AM peak hour, with project intersection operations would improve from LOS E to LOS C, and from LOS F to LOS C during the weekday PM peak hour.

Site Access Operations

Site access operations associated with *Alternative 1B* would be consistent with those identified for *Alternative 1A*. It is anticipated that the site access would operate at LOS B during the weekday AM peak hour and LOS D during the weekday PM peak hour. The LOS worksheets for the site access analysis are included in Appendix B. As is the case for *Alternative 1A*, MUTCD signal warrants would not be met at the site access on Viewcrest Road.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic Safety Impacts

Traffic safety impacts associated with *Alternative 1B* would be generally consistent with those identified for *Alternative 1A*.

The widening of the Padden Creek Bridge and the associated improvements at the Chuckanut Dr/Hawthorn Rd intersection would provide additional capacity and are anticipated to improve operations and reduce conflicts. Therefore, the improvements could result in improved traffic safety.

Increases in traffic volumes associated with *Alternative 1B* may also result in increases in emergency response times, due to higher delays at study intersections and higher volume to capacity ratios on study roadways. However, the widening of the Padden Creek Bridge as part of *Alternative 1B* is anticipated to improve access and response times to the Edgemoor neighborhood and the project site. The provision of four-travel lanes across the bridge would provide additional space for non-emergency vehicles to make way for the passage of emergency vehicles. In addition, the likelihood of the bridge becoming impassible would be greatly reduced. Emergency vehicle access connections to the project site are proposed from Chuckanut Drive and from Old Fairhaven Parkway via 22nd Street.

Transit Impacts

Transit impacts associated with *Alternative 1B* would be consistent with those identified for *Alternative 1A*. It is not anticipated that existing transit service in the study area would be modified, or new transit service would be added to serve the proposed project site. Existing transit service within the study area is expected to accommodate the increase in transit ridership associated with *Alternative 1B*. *Alternative 1B* would not degrade any existing transit facilities. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 1B*.

Non-Motorized Impacts

Non-motorized impacts associated with *Alternative 1B* would be generally consistent with those identified for *Alternative 1A*. However, the widening of the Padden Creek Bridge including bike lanes and improved pedestrian facilities would provide a positive impact to non-motorized road users.

Alternative 1C (2005 Application)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 1C*.

Alternative 1C is consistent with *Alternative 1A*, including the development of the same mix of land-uses. The key difference included in *Alternative 1C* relative to *Alternative 1A* is that *Alternative 1C* includes the construction of a new roadway connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway through the project site.

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 1C*. However, a new roadway connection through the project site would be constructed as part of *Alternative 1C*. The new roadway would provide a connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway. *Alternative 1C* also includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

Project trip generation for *Alternative 1C* would be the same as documented for *Alternatives 1A and 1B*. As shown in Table 5, *Alternative 1C* is anticipated to generate approximately 5,000 weekday daily trips. During the weekday AM peak hour, *Alternative 1C* would generate approximately 341 trips. During the weekday PM peak hour *Alternative 1C* would generate approximately 429 trips. A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The trip distribution patterns used for this analysis were based on a combination of output from the City of Bellingham travel demand model and travel time data. The model takes into account the planned land uses, surrounding existing land uses that would act as attractions or generators, and the surrounding transportation facilities. Figure 7 illustrates the resulting residential trip distribution patterns for the proposed project. In general, the distribution suggested approximately 34 percent of project traffic would travel to/from the north on I-5, 30 percent to/from the north on 12th Street, 5 percent to/from the south on I-5. The remaining approximately 31 percent would travel on local surface streets.

The trip distribution and assignment patterns would be essentially the same as those described for the other alternatives. However, immediately adjacent to the project site some changes in the assignment of project traffic, and the reassignment of existing trips would occur as a result of the new roadway ~~would provide a~~ connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway. The resulting assignment of project trips for *Alternative 1C* is illustrated in Figure 8.

Traffic Volume Impacts

Peak hour traffic volumes for *Alternative 1C* were developed by assigning the project-generated trips to *No-Action* weekday AM and PM peak hour traffic volumes at the study intersections. 2022 weekday AM and PM peak hour traffic volumes for *Alternative 1C* are illustrated in Figure 9. These volumes were then compared with the *No-Action* traffic volumes. Table 9 illustrates the percent impact of traffic generated by *Alternative 1C* at the study area intersections during weekday AM and PM peak hours. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

Figure 7. Project Trip Distribution - Alternative 1C

Figure 8. 2022 Project Trip Assignment - Alternative 1C

Figure 9. 2022 With-Project Traffic Volumes - Alternative 1C

At those study intersection not in the immediate vicinity of the project site, traffic volume impacts associated with *Alternative 1C* would be generally consistent with those identified in Table 6 for *Alternatives 1A* and *1B*.

As shown in Table 9, at study area intersections which do not provide access to the project site, traffic generated by *Alternative 1C* would increase total entering traffic volumes by up to approximately thirteen percent during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 13 percent. The following intersection would experience a project traffic impact greater than 10 percent:

- 12th St/Harris Ave (up to 12.9%)

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 74 trips (4.5 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 330 trips (16.1 percent) at the intersection of 24th St/Old Fairhaven Pkwy intersection during the weekday PM peak hour.

The construction of the 24th Street connection through the project site as part of *Alternative 1C* would result in the reassignment of the traffic currently using the Chuckanut Drive to the north of the project site, and the 30th Street corridor. This is shown in Table 9, as results in a reduction in trips at the following intersections relative to *Alternative 1A*:

- 12th St/Harris Ave
- 12th St/Old Fairhaven Pkwy
- Chuckanut Dr/Hawthorn Dr
- Chuckanut Dr/Viewcrest Rd

This shift in traffic also results in a corresponding increase in traffic volumes at the intersection 24th St/Old Fairhaven Parkway intersection.

Table 9. 2022 PM Peak Hour Percent Project Impact - Alternative 1C

Intersection	No-Action	Project ² Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	101	1,316	8.3%	7.7%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	137	1,972	7.5%	6.9%
30th St/Old Fairhaven Pkwy	1,920	136	2,056	7.1%	6.6%
24th St/Old Fairhaven Pkwy ¹	1,525	309	1,834	20.3%	16.8%
12th St/Harris Ave	1,010	130	1,140	12.9%	11.4%
12th St/Old Fairhaven Pkwy	1,655	34	1,689	2.1%	2.0%
Chuckanut Dr/Hawthorn Rd	1,155	-11	1,144	-1.0%	-1.0%
Chuckanut Dr/16th St ¹	265	138	403	52.1%	34.2%
Chuckanut Dr/Viewcrest Rd ¹	260	213	473	81.9%	45.0%
Chuckanut Dr/Old Samish Rd	315	15	330	4.8%	4.5%
32nd St/Old Samish Rd	130	0	130	0.0%	0.0%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	74	1,724	4.5%	4.3%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	176	2,596	7.3%	6.8%
30th St/Old Fairhaven Pkwy	2,525	180	2,705	7.1%	6.7%
24th St/Old Fairhaven Pkwy ¹	2,045	330	2,375	16.1%	13.9%
12th St/Harris Ave	1,720	162	1,882	9.4%	8.6%
12th St/Old Fairhaven Pkwy	1,985	-1	1,984	-0.1%	-0.1%
Chuckanut Dr/Hawthorn Rd	1,460	-18	1,442	-1.2%	-1.2%
Chuckanut Dr/16th St ¹	455	78	533	17.1%	14.6%
Chuckanut Dr/Viewcrest Rd ¹	470	305	775	64.9%	39.4%
Chuckanut Dr/Old Samish Rd	520	32	552	6.2%	5.8%
32nd St/Old Samish Rd	160	0	160	0.0%	0.0%

1. Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and 24th St/Old Fairhaven Pkwy intersections and a new intersection with Chuckanut Drive in the vicinity of 16th Street.

2. Includes the impact of background traffic shift to the new 24th Street Connection

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 1C*, as described in the following section.

Traffic Operations Impacts

Table 10 provides a summary of *Alternative 1C* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided. LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Two of the study intersections will continue to operate at LOS F without or with *Alternative 1C*. The side street volumes on the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best

characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition. Project impacts to these locations are summarized below in terms of traffic volume impacts.

~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1C* would increase total traffic through this intersection by approximately 101 vehicles during the weekday AM peak hour, and by approximately 74 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 1C* would increase traffic volumes through this intersection by approximately 214 vehicles during the weekday AM peak hour and by approximately 270 vehicles during the weekday PM peak hour.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 1C* would cause the level of service at the following intersections to change:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS B – AM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS C – PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

Table 10. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 1C

Intersection	No-Action			Alternative 1C		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	28.1	0.88
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	23.2	0.83
24th St/Old Fairhaven Pkwy*	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.5	0.44
12th St/Old Fairhaven Pkwy	B	19.2	0.59	B	19.6	0.58
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	B	19.5	0.64
Chuckanut Dr/16th St	A	9.7	WB	B	10.6	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	12.2	WBL
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.1	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.8	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	42.9	0.98
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	44.4	0.96
24th St/Old Fairhaven Pkwy*	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	18.6	0.70
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	22.1	0.66
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	C	21.9	0.71
Chuckanut Dr/16th St	B	10.7	WB	B	11.4	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	C	21.8	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	11.8	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.3	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and 24th St/Old Fairhaven Pkwy intersections

As shown in Table 10, the addition of project traffic increases average vehicle delays at study intersections, which is typical when intersection volumes increase. Those intersections where intersection delays decrease with *Alternative 1C* can be attributed to decreases in background traffic volumes associated with the new roadway connection through the project site included with this *Alternative*.

At the majority of locations, intersection operations for *Alternative 1C* would be consistent with those reported for *Alternatives 1A* and *1B*. The exceptions are the 24th Street/Old Fairhaven Parkway intersection, which would continue to operate at LOS F during both the weekday AM and PM peak hours, but which would operate with increased side-street vehicle delays with *Alternative 1C*, due to additional traffic on the southern approach to the intersection. However, the Chuckanut Drive/12th Street/Hawthorn Road intersection would improve from LOS E to LOS B during the weekday AM peak hour, and from LOS F to LOS C during the weekday PM peak hour relative to *Alternative 1A*, the result of lower traffic volumes with *Alternative 1C*, due to

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shifts in both background and project traffic from Chuckanut Drive to the 24th Street connection.

Site Access Operations

Access to the project site would be provided via two locations. A site access is proposed as a fourth leg to the existing Chuckanut Drive/Viewcrest Road intersection. In addition, access would also be provided via a new roadway connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway.

Site access operations were analyzed during 2022 weekday AM and PM peak hour conditions, using the same methodology described for the off-site study intersection analysis. It is anticipated that the Chuckanut Drive/Viewcrest Road intersection would operate at LOS C or better during both the weekday AM and PM peak hours. However, the side-street approaches to the 24th Street/Old Fairhaven Parkway intersection are forecast to operate at LOS F during both the weekday AM and PM peak hours. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic signal warrants were also evaluated at the two-way stop-controlled Chuckanut Drive/Viewcrest Road intersection and at 24th Street/~~old~~ Old Fairhaven Parkway to determine if a signal would be ~~appropriate~~ warranted at either location. These warrants test whether a full traffic signal would be needed to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions. Neither of the evaluated warrants are met at Chuckanut Drive/Viewcrest Road. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the ~~site~~ driveway Chuckanut Drive/Viewcrest Road intersection. Both the eight- and four-hour warrants are met at 24th Street/Old Fairhaven Parkway, indicating that a traffic signal might be appropriate there. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Changes in traffic volumes on study area roadways and intersections due to *Alternative 1C* may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based in increases in traffic volumes. However, the number, or rate of collisions, could change, especially at congested locations as a result of changes in traffic volumes at study intersections.

The shifts in traffic associated with the 24th Street connection through the project site may result in improved traffic safety along the 30th Street corridor and Chuckanut Drive to the north of the project site as a result of lower traffic volumes associated with *Alternative 1C*. However, traffic volumes along the 24th Street corridor to the south of Old Fairhaven Parkway are anticipated to increase significantly relative to *No-Action*, this

may result in an increase in the occurrence of traffic collisions along this roadway segment. In addition, the 24th Street connection would create a new crossing of the Interurban Trail.

The lower traffic volumes on Chuckanut Drive and 12th Street to the north of the project site as a result of the 24th Street connection would likely improve emergency vehicle access and response times to the Edgemoor neighborhood and the project site. In addition, the 24th Street connection would provide a new arterial connection to the project site and the Edgemoor neighborhood for use at times when the Padden Creek Bridge is impassible. An emergency vehicle access to the project site is proposed from Chuckanut Drive.

Transit Impacts

The 24th Street connection through the project site could encourage changes to the existing transit service within the study area, or the addition of new transit service through the project site. This could result in an increase in transit ridership associated with *Alternative 1C* relative to *Alternatives 1A* and *1B* as a result of improved accessibility to transit service.

It is not anticipated that *Alternative 1C* would degrade any existing transit facilities, but could result in enhancements to existing transit service in the study area. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 1C*.

Non-Motorized Impacts

Non-motorized impacts associated with *Alternative 1C* would be consistent with those identified for *Alternative 1A*. In addition, the 24th Street connection to Old Fairhaven Parkway would provide an alternative to Chuckanut Drive for pedestrians and bicyclists.

Alternative 2A (Enhanced Buffer Alternative)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 2A*.

Alternative 2A would include the following components:

- Develop 17 single-family units
- Develop 722 townhouse/condominium units
- A single site access would be provided via a new intersection approach to the existing Chuckanut Drive/Viewcrest Road intersection

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 2A*. However, *Alternative 2A* includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with

associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

The underlying trip generation methodology, assumptions, and resulting trip generation rates used to estimate traffic generated by *Alternative 2A* are consistent with those used for *Alternative 1*.

Table 11. 2022 New Trip Generation - *Alternative 2A*

	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached	160	5	16	21	11	6	17
Residential Townhouse/Condominium	4,230	43	208	251	204	100	304
Total	4,390	48	224	272	215	107	321

As shown in Table 11, *Alternative 2A* is anticipated to generate approximately 4,390 weekday daily trips. During the weekday AM peak hour, *Alternative 2A* would generate approximately 272 trips. During the weekday PM peak hour *Alternative 2A* would generate approximately 321 trips. For comparison purposes this represents a decrease in trips relative to *Alternative 1* (approximately 610 fewer daily trips, with 68 fewer trips during the weekday AM peak hour, and 108 fewer trips during the weekday PM peak hour), the same trip generation as *Alternative 3*, and a decrease in trips relative to *Alternative 4* (approximately 130 fewer daily trips, with 15 fewer trips during the weekday AM peak hour, and 9 fewer trips during the weekday PM peak hour). A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The trip distribution patterns for *Alternative 2A* would be the same as those documented for *Alternative 1A* (Figure 4). Figure 10 illustrates the resulting residential trip assignment for *Alternative 2A*.

Figure 10. 2022 Project Trip Assignment - *Alternative 2A*

Traffic Volume Impacts

Peak hour traffic volumes for *Alternative 2A* were developed by assigning the project-generated trips to *No-Action* weekday AM and PM peak hour traffic volumes at the study intersections. 2022 weekday AM and PM peak hour traffic volumes for *Alternative 2A* are illustrated in Figure 11. These volumes were then compared with the *No-Action* traffic volumes. Table 12 illustrates the percent impact of traffic generated by *Alternative 2A* at the study area intersections during weekday AM and PM peak hours. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

As shown in Table 12, at study area intersections not providing access to the project site, traffic generated by *Alternative 2A* would increase total entering traffic volumes by up to approximately ninety percent during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 90 percent. The following intersections would experience a project traffic impact greater than 10 percent:

- Chuckanut Dr/~~12th-16th~~ St (up to 89.4%)
- 32nd St/Old Samish Rd (up to 20.8%)
- Chuckanut Dr/Hawthorn Rd (up to 20.1%)
- 12th St/Old Fairhaven Pkwy (up to 13.8%)
- 12th St/Harris Ave (up to 11.6%)
- Chuckanut Dr/Old Samish Rd (up to 11.1%)

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The project traffic impact at the Chuckanut Dr/16th St is greater than at the other study intersections due to the assignment of project traffic through this intersection, combined with the relatively low *No-Action* traffic volumes.

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 54 trips (3.3 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 105 trips (5.1 percent) at the intersection of 24th St/Hawthorn Rd during the weekday PM peak hour.

Figure 11. 2022 with Project Traffic Volumes - *Alternative 2A*

Table 12. 2022 PM Peak Hour Percent Project Impact - Alternative 2A

Intersection	No-Action	Project Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	84	1,299	6.9%	6.5%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	112	1,947	6.1%	5.8%
30th St/Old Fairhaven Pkwy	1,920	114	2,034	5.9%	5.6%
24th St/Old Fairhaven Pkwy	1,525	89	1,614	5.8%	5.5%
12th St/Harris Ave	1,010	117	1,127	11.6%	10.4%
12th St/Old Fairhaven Pkwy	1,655	228	1,883	13.8%	12.1%
Chuckanut Dr/Hawthorn Rd	1,155	232	1,387	20.1%	16.7%
Chuckanut Dr/16th St	265	237	502	89.4%	47.2%
Chuckanut Dr/Viewcrest Rd*	260	272	532	104.6%	51.1%
Chuckanut Dr/Old Samish Rd	315	35	350	11.1%	10.0%
32nd St/Old Samish Rd	130	27	157	20.8%	17.2%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	54	1,704	3.3%	3.2%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	132	2,552	5.5%	5.2%
30th St/Old Fairhaven Pkwy	2,525	135	2,660	5.3%	5.1%
24th St/Old Fairhaven Pkwy	2,045	105	2,150	5.1%	4.9%
12th St/Harris Ave	1,720	139	1,859	8.1%	7.5%
12th St/Old Fairhaven Pkwy	1,985	271	2,256	13.7%	12.0%
Chuckanut Dr/Hawthorn Rd	1,460	273	1,733	18.7%	15.8%
Chuckanut Dr/16th St	455	280	735	61.5%	38.1%
Chuckanut Dr/Viewcrest Rd*	470	322	792	68.5%	40.7%
Chuckanut Dr/Old Samish Rd	520	42	562	8.1%	7.5%
32nd St/Old Samish Rd	160	33	193	20.6%	17.1%

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection

The traffic volume impacts for *Alternative 2A* are generally lower than those identified for *Alternatives 1A* and *1B* (less than five percent lower) and are generally consistent with those reported for *Alternative 4F* (less than one percent lower). This can be attributed to the lower project trip generation for *Alternative 2A* relative to the other *Alternatives*.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 2A*, as described in the following section.

Traffic Operations Impacts

Table 13 provides a summary of *Alternative 2A* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided. LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Two of the study intersections will continue to operate at LOS F without or with *Alternative 2A*. The side street volumes on Old Fairhaven Parkway at the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high

traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition. Project impacts to these locations are summarized below in terms of traffic volume impacts. ~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 2A* would increase total traffic through this intersection by approximately 84 vehicles during the weekday AM peak hour, and by approximately 54 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 2A* would increase traffic volumes through this intersection by approximately 89 vehicles during the weekday AM peak hour, and by approximately 105 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 2A* would cause the level of service at the following intersections to degrade:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 12th St/Old Fairhaven Pkwy (LOS B to LOS C – AM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS D – AM peak hour, LOS C to LOS E – PM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS C – PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

Chuckanut Dr/Hawthorn Rd – this intersection is forecast to operate at LOS E during the weekday PM peak hour with *Alternative 2A*, compared to LOS C for *No-Action*. Average intersection delay at this intersection would increase by approximately 37 seconds during the weekday PM peak hour. This is the result of the addition of approximately 273 project trips representing an 18.7 percent increase in total traffic.

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

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Table 13. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 2A

Intersection	No-Action			Alternative 2A		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	26.6	0.86
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	24.0	0.84
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.3	0.44
12th St/Old Fairhaven Pkwy	B	19.2	0.59	C	20.1	0.65
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	D	39.3	0.83
Chuckanut Dr/16th St	A	9.7	WB	B	11.4	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	13.4	EB
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.4	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.9	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	36.5	0.96
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	40.4	0.96
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	17.8	0.69
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	27.5	0.77
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	E	64.2	0.89
Chuckanut Dr/16th St	B	10.7	WB	B	12.8	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	C	22.6	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	11.8	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.4	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection

As shown in Table 13, the addition of project traffic increases average vehicle delays at study intersections, which is typical when intersection volumes increase.

At the majority of study intersections, intersection operations for *Alternative 2A* would be better than those reported for *Alternative 1A* and *Alternative 1B*, with reductions in intersection delays of up to approximately 20 seconds, and lower than those reported for *Alternative 4F*, with reduction in intersection delays of up to approximately four seconds. The exceptions are those intersections which are reported to operate at LOS F, which experience larger reductions in vehicle delays relative to the other Alternatives. However, as stated previously, when an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts. This can be attributed to the lower project trip generation for *Alternative 2A*.

The Chuckanut Dr/Hawthorn Rd intersection would operate at a better LOS with *Alternative 2A* than with *Alternative 1A*, but a worse LOS than *Alternative 1B*. This can be

attributed to the *Alternative 2A* generating fewer trips than *Alternatives 1A* and *1B*, and the improvements at the Chuckanut Dr/Hawthorn Rd intersection included with *Alternative 1B*. This intersection would operate at the same LOS with *Alternative 2A* as with *Alternative 4F*, but with slightly lower vehicle delays (less than approximately 4 seconds).

The Chuckanut Drive/Viewcrest Rd intersection would operate at a better LOS with *Alternative 2A* than with *Alternatives 1A* and *1B*, improving from LOS C to LOS B during the weekday AM peak hour, and improving from LOS D to LOS C during the weekday PM peak hour. All study intersections would operate at the same LOS with *Alternative 2A* as with *Alternative 4F*.

Site Access Operations

Access to the project site would be provided via two locations. A site access is proposed as a fourth leg to the existing Chuckanut Drive/Viewcrest Road intersection. In addition to this primary access, an emergency vehicle access point is also planned for the site, located on Chuckanut Drive north of Viewcrest Road. This access point would be restricted and would only be used by emergency vehicles.

Site access operations were analyzed during 2022 weekday AM and PM peak hour conditions, using the same methodology described for the off-site study intersection analysis. It is anticipated that the Chuckanut Drive/Viewcrest Road intersection would operate at LOS C or better during both the weekday AM and PM peak hours. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic signal warrants were also evaluated at the two-way stop-controlled Chuckanut Drive/Viewcrest Road intersection to determine if a signal would be appropriate at the proposed access. These warrants test whether a full traffic signal would be needed to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions; however, neither of the evaluated warrants are met. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the site driveway intersection. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Increases in traffic volumes on study area roadways and intersections due to *Alternative 2A* may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based in increases in traffic volumes. The number, or rate of collisions, could increase, especially at congested locations.

Increases in traffic volumes associated with *Alternative 2A* may also result in increases in emergency response times, due to higher delays at study intersections and higher volume to capacity ratios on study roadways. Also, the potential for a higher occurrence of collisions, may increase the frequency with which the Padden Creek Bridge is impassable, resulting in increased emergency response times to the neighborhood, as emergency vehicles are required to use the alternate routes into the Edgemoor neighborhood. An emergency vehicle access to the project site is proposed from Chuckanut Drive.

Alternative 2A would add fewer vehicles to study area roadways and intersections than *Alternatives 1A, 1B, and 4F*, therefore *Alternative 2A* which may result in a lower increase in the occurrence of traffic collisions than these *Alternatives*.

Transit Impacts

It is not anticipated that existing transit service in the study area would be modified, or new transit service would be added to serve the proposed project site. Existing transit service within the study area is expected to accommodate the increase in transit ridership associated with *Alternative 2A*. *Alternative 2A* would not degrade any existing facilities. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 2A*. The increase in transit ridership associated with *Alternative 2A* would likely be smaller than for *Alternatives 1A, 1B, and 4F* due to the lower trip generation for *Alternative 2A*.

Non-Motorized Travel Impacts

The analysis of traffic impacts assumed no significant use of non-motorized travel modes in order to assure that project impacts to traffic operations were not underestimated. This is a commonly accepted approach in evaluating traffic impacts under SEPA, and is intended to assure that conservative analysis results are reflected.

There is potential for an increase in the use of non-motorized travel modes associated with *Alternative 2A*. The on-site roadway/circulation system provides for internal pedestrian facilities and bicycle connections. The Interurban Trail provides the proximate opportunity for either ~~walkers-pedestrians~~ or bicyclists to access Bellingham to the north and Larrabee State Park to the south. In addition, *Alternative 2A* would ~~not degrade any existing facilities, but would~~ enhance non-motorized facilities along the Chuckanut Drive project frontage through the provision of a sidewalk and bike lane.

Existing non-motorized facilities within the study area are expected to accommodate the portion of *Alternative 2A* trip generation that is expected to walk or bike to the project site. Thus, no significant adverse impacts to non-motorized facilities or operations are expected to occur as a result of *Alternative 2A*. The increase in non-motorized travel associated with *Alternative 2A* would likely be smaller than for *Alternatives 1A and 4F* due to the lower trip generation for *Alternative 2A*.

Alternative 2F (Enhanced Buffer Alternative)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 2F*.

Alternative 2F is consistent with *Alternative 2A*, including the development of the same mix of land-uses. The key differences included in *Alternative 2F* relative to *Alternative 2A* are that *Alternative 2F* includes two site access locations along Chuckanut Drive at 16th Street and Viewcrest Road, and the emergency access road proposed between the north and south portions of the project site would be improved to constructed as a full street.

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 2F*. However, *Alternative 2F* includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

Project trip generation for *Alternative 2F* would be the same as documented for *Alternative 2A*. As shown in Table 11, *Alternative 2F* is anticipated to generate approximately 4,390 weekday daily trips. During the weekday AM peak hour, *Alternative 2F* would generate approximately 272 trips. During the weekday PM peak hour *Alternative 2F* would generate approximately 321 trips. A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The trip distribution and assignment patterns would remain unchanged from those described for *Alternative 1A*. The resulting assignment of project trips for *Alternative 2F* is illustrated in Figure 12.

Traffic Volume Impacts

With the exceptions of the site access intersections, traffic volume impacts associated with *Alternative 2F* are consistent with those identified in Table 12 for *Alternative 2A*. 2022 weekday AM and PM peak hour traffic volumes for *Alternative 2F* are illustrated in Figure 13. These volumes were then compared with the *No-Action* traffic volumes. Table 14 illustrates the percent impact of traffic generated by *Alternative 2F* at the study area intersections during weekday AM and PM peak hours. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

As shown in Table 14, at study area intersections not providing access to the project site, traffic generated by *Alternative 2F* would increase total entering traffic volumes by up to approximately 100 percent during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily basis and have been

documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 100 percent. The following intersections would experience a project traffic impact greater than 10 percent:

- Chuckanut Dr/16th St (up to 98.1%)
- 32nd St/Old Samish Rd (up to 20.8%)
- Chuckanut Dr/Hawthorn Rd (up to 20.1%)
- 12th St/Old Fairhaven Pkwy (up to 13.8%)
- 12th St/Harris Ave (up to 11.6%)
- Chuckanut Dr/Old Samish Rd (up to 11.1%)

The project traffic impact at the Chuckanut Dr/16th St is greater than at the other study intersections due to the assignment of project traffic through this intersection, combined with the relatively low *No-Action* traffic volumes.

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 54 trips (3.3 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 105 trips (5.1 percent) at the intersection of 24th St/Hawthorn Rd during the weekday PM peak hour.

Table 14. 2022 PM Peak Hour Percent Project Impact - Alternative 2F

Intersection	No-Action	Project Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	84	1,299	6.9%	6.5%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	112	1,947	6.1%	5.8%
30th St/Old Fairhaven Pkwy	1,920	114	2,034	5.9%	5.6%
24th St/Old Fairhaven Pkwy	1,525	89	1,614	5.8%	5.5%
12th St/Harris Ave	1,010	117	1,127	11.6%	10.4%
12th St/Old Fairhaven Pkwy	1,655	228	1,883	13.8%	12.1%
Chuckanut Dr/Hawthorn Rd	1,155	232	1,387	20.1%	16.7%
Chuckanut Dr/16th St	265	260	525	98.1%	49.5%
Chuckanut Dr/Viewcrest Rd*	260	113	373	43.5%	30.3%
Chuckanut Dr/Old Samish Rd	315	35	350	11.1%	10.0%
32nd St/Old Samish Rd	130	27	157	20.8%	17.2%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	54	1,704	3.3%	3.2%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	132	2,552	5.5%	5.2%
30th St/Old Fairhaven Pkwy	2,525	135	2,660	5.3%	5.1%
24th St/Old Fairhaven Pkwy	2,045	105	2,150	5.1%	4.9%
12th St/Harris Ave	1,720	139	1,859	8.1%	7.5%
12th St/Old Fairhaven Pkwy	1,985	271	2,256	13.7%	12.0%
Chuckanut Dr/Hawthorn Rd	1,460	273	1,733	18.7%	15.8%
Chuckanut Dr/16th St	455	308	763	67.6%	40.4%
Chuckanut Dr/Viewcrest Rd*	470	135	605	28.7%	22.3%
Chuckanut Dr/Old Samish Rd	520	42	562	8.1%	7.5%
32nd St/Old Samish Rd	160	33	193	20.6%	17.1%

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and Chuckanut Dr/16th St intersections

The traffic volume impacts for *Alternative 2F* are consistent with those identified in Table 14 for *Alternative 2A*. The exception is the Chuckanut Drive/Viewcrest Road intersection, where project traffic volumes are lower with *Alternative 2F* relative to *Alternative 2A* due to the provision of a second access along Chuckanut Drive.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 2F*, as described in the following section.

Figure 12. 2022 Project Trip Assignment - *Alternative 2F*

Figure 13. 2022 with Project Traffic Volumes – *Alternative 2F*

Traffic Operations Impacts

Table 15 provides a summary of *Alternative 2F* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided.

Traffic operations with *Alternative 2F* are consistent with those presented in Table 13 for *Alternative 2A*, with the exception of the Chuckanut Drive/Viewcrest Road intersection. LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Two of the study intersections will continue to operate at LOS F without or with *Alternative 2F*. The side street volumes on Old Fairhaven Parkway at the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition. Project impacts to these locations are summarized below in terms of traffic volume impacts. ~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 2F* would increase total traffic through this intersection by approximately 84 vehicles during the weekday AM peak hour, and by approximately 54 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 2F* would increase traffic volumes through this intersection by approximately 89 vehicles during the weekday AM peak hour, and by approximately 105 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 2F* would cause the level of service at the following intersections to degrade:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 12th St/Old Fairhaven Pkwy (LOS B to LOS C – AM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS D – AM peak hour, LOS C to LOS E – PM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS C – PM peak hour)

- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

Chuckanut Dr/Hawthorn Rd – this intersection is forecast to operate at LOS E during the weekday PM peak hour with *Alternative 2F*, compared to LOS C for No-Action. Average intersection delay at this intersection would increase approximately 37 seconds during the weekday PM peak hour. This is the result of the addition of approximately 273 project trips representing an 18.7 percent increase in total traffic.

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

Table 15. Weekday AM and PM Peak Hour Intersection LOS Summary – *Alternative 2F*

Intersection	No-Action			Alternative 2F		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	26.6	0.86
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	24.0	0.84
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.3	0.44
12th St/Old Fairhaven Pkwy	B	19.2	0.59	C	20.1	0.65
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	D	39.3	0.83
Chuckanut Dr/16th St	A	9.7	WB	B	11.2	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	11.6	WBL
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.4	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.9	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	36.5	0.96
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	40.4	0.96
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	17.8	0.69
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	27.5	0.77
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	E	64.2	0.89
Chuckanut Dr/16th St	B	10.7	WB	B	12.3	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	C	15.3	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	11.8	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.4	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and Chuckanut Dr/16th St intersections

As shown in Table 15, the addition of project traffic increases average vehicle delays at study intersections, which is typical when intersection volumes increase. The provision of a second access along Chuckanut Drive with *Alternative 2F* results in improved

intersection operations at the Chuckanut Drive/Viewcrest Road intersection relative to *Alternative 2A*.

Site Access Operations

Access to the project site is proposed to be provided by two locations along Chuckanut Drive at 16th Street and Viewcrest Road.

Site access operations were analyzed for 2022 weekday AM and PM peak hour conditions, using the same methodology applied to the off-site study intersections. It is anticipated that both site access locations would operate at LOS C during the weekday AM and PM peak hours. The Chuckanut Drive/Viewcrest Road intersection would operate with lower vehicle delays with *Alternative 2F* than with *Alternative 2A*. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic signal warrants were also evaluated at the two-way stop-controlled Chuckanut Drive/Viewcrest Road and Chuckanut Drive/16th Street intersections to determine if a signal would be appropriate at the proposed accesses. These warrants test whether a full traffic signal would be needed to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions; however, neither of the evaluated warrants are met at either location. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the site driveway intersections. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Traffic safety impacts associated with *Alternative 2F* would be generally consistent with those identified for *Alternative 2A*. However, the provision of a second access at Chuckanut Drive/16th Street would reduce project traffic volumes at the Chuckanut Drive/Viewcrest Road intersection. This may result in improved traffic safety at this intersection relative to *Alternative 2A*. Conversely, the additional turning traffic at the increase in turning movements the proposed access at Chuckanut Drive/16th Street intersection could result in a higher collision rate at this location. However, since the existing collision rate at this intersection Chucknut Drive/16th Street is currently very low, so it is unlikely that the increase resulting from project traffic would result in a significant cause a major safety issue impact. Increase in collisions at 16th Street due increased turning movements.

Increases in traffic volumes associated with *Alternative 2F* may also increase emergency response times, due to higher delays at study intersections and higher volume to capacity ratios on study roadways. Also, the potential for a higher occurrence of collisions, may increase the frequency with which the Padden Creek Bridge is impassable, resulting in

increased emergency response times to the neighborhood, as emergency vehicles are required to use the alternate routes into the Edgemoor neighborhood.

Transit Impacts

Transit impacts associated with *Alternative 2F* would be consistent with those identified for *Alternative 2A*. It is not anticipated that existing transit service in the study area would be modified, or new transit service would be added to serve the proposed project site. Existing transit service within the study area is anticipated to accommodate the increase in transit ridership associated with *Alternative 2F*. *Alternative 2F* would not degrade any existing facilities. Thus, no significant impacts to transit are facilities or operations are expected as a result of *Alternative 2F*.

Non-Motorized Travel Impacts

Non-motorized impacts associated with *Alternative 2F* would be consistent with those identified for *Alternative 2A*. Existing transit service within the study area is anticipated to accommodate the increase in transit ridership associated with *Alternative 2F*. *Alternative 2F* would not degrade any existing facilities. Thus, no significant impacts to transit are facilities or operations are expected as a result of *Alternative 2F*.

Alternative 3D (Split Site Alternative)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 3D*.

Alternative 3D (Split Site Alternative) would include the following components:

- Develop 17 single-family units
- Develop 722 townhouse/condominium units
- Construction of a new arterial connection through the project site connecting to 24th Street to the east of the project site
- Access to the site would be provided via two locations along Chuckanut Drive at 16th Street and Viewcrest Road

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 3D*. However, a new roadway connection through the project site would be constructed as part of *Alternative 3D*. The new roadway would provide a connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway. *Alternative 3D* also includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

The underlying trip generation methodology, assumptions, and resulting trip generation rates used to estimate traffic generated by *Alternative 3D* are consistent with those used for *Alternative 1*.

Table 16. 2022 New Trip Generation - *Alternative 3D*

	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached	160	5	16	21	11	6	17
Residential Townhouse/Condominium	4,230	43	208	251	204	100	304
Total	4,390	48	224	272	215	107	321

As shown in Table 16, *Alternative 3D* is anticipated to generate approximately 4,390 weekday daily trips. During the weekday AM peak hour, *Alternative 3D* would generate approximately 272 trips. During the weekday PM peak hour *Alternative 3D* would generate approximately 321 trips. For comparison purposes this is identical to *Alternative 2*, and represents a decrease in trips relative to *Alternative 1* (approximately 610 fewer daily trips, with 68 fewer trips during the weekday AM peak hour, and 108 fewer trips during the weekday PM peak hour), and a decrease in trips relative to *Alternative 4* (approximately 130 fewer daily trips, with 15 fewer trips during the weekday AM peak hour, and 9 fewer trips during the weekday PM peak hour). A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The trip distribution patterns for *Alternative 3D* would be the same as those documented for *Alternative 1C*. Figure 14 illustrates the resulting residential trip assignment for *Alternative 3D*.

Traffic Volume Impacts

Peak hour traffic volumes for *Alternative 3D* were developed by assigning the project-generated trips to *No-Action* weekday AM and PM peak hour traffic volumes at the study intersections. 2022 weekday AM and PM peak hour traffic volumes for *Alternative 3D* are illustrated in Figure 14. These volumes were then compared with the *No-Action* traffic volumes. Table 17 illustrates the percent impact of traffic generated by *Alternative 3D* at the study area intersections during weekday AM and PM peak hours. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

As shown in Table 17, at study area intersections not providing access to the project site, traffic generated by *Alternative 3D* would increase total entering traffic volumes by up to approximately ten percent during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 10 percent. The following intersection would experience a project traffic impact greater than 10 percent:

- 12th St/Harris Ave (up to 10.3%)

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 54 trips (3.3 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 202 trips (9.9 percent) at the intersection of 24th St/Old Fairhaven Pkwy during the weekday PM peak hour.

Figure 14. 2022 Project Trip Assignment - *Alternative 3D*

Figure 15. 2022 with Project Traffic Volumes - *Alternative 3D*

Table 17. 2022 PM Peak Hour Percent Project Impact - Alternative 3D

Intersection	No-Action	Project Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	84	1,299	6.9%	6.5%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	112	1,947	6.1%	5.8%
30th St/Old Fairhaven Pkwy	1,920	109	2,029	5.7%	5.4%
24th St/Old Fairhaven Pkwy	1,525	266	1,791	17.4%	14.9%
12th St/Harris Ave	1,010	104	1,114	10.3%	9.3%
12th St/Old Fairhaven Pkwy	1,655	-1	1,654	-0.1%	-0.1%
Chuckanut Dr/Hawthorn Rd	1,155	-38	1,117	-3.3%	-3.4%
Chuckanut Dr/16th St	265	53	318	20.0%	16.7%
Chuckanut Dr/Viewcrest Rd	260	106	366	40.8%	29.0%
Chuckanut Dr/Old Samish Rd	315	12	327	3.8%	3.7%
32nd St/Old Samish Rd	130	0	130	0.0%	0.0%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	54	1,704	3.3%	3.2%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	132	2,552	5.5%	5.2%
30th St/Old Fairhaven Pkwy	2,525	135	2,660	5.3%	5.1%
24th St/Old Fairhaven Pkwy	2,045	262	2,307	12.8%	11.4%
12th St/Harris Ave	1,720	122	1,842	7.1%	6.6%
12th St/Old Fairhaven Pkwy	1,985	-57	1,928	-2.9%	-3.0%
Chuckanut Dr/Hawthorn Rd	1,460	-58	1,402	-4.0%	-4.1%
Chuckanut Dr/16th St	455	53	508	11.6%	10.4%
Chuckanut Dr/Viewcrest Rd	470	169	639	36.0%	26.4%
Chuckanut Dr/Old Samish Rd	520	9	529	1.7%	1.7%
32nd St/Old Samish Rd	160	0	160	0.0%	0.0%

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1-2 Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and 24th St/Old Fairhaven Pkwy intersections and a new intersection with Chuckanut Drive in the vicinity of 16th Street
 2-1 Includes the impact of background traffic shift to new 24th Street Connection

The traffic volume impacts for *Alternative 3D* are generally lower than those identified for *Alternative 1C* (less than five percent lower). This can be attributed to the lower project trip generation for *Alternative 3D* relative to *Alternative 1C*.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 3D*, as described in the following section.

Traffic Operations Impacts

Table 18 provides a summary of *Alternative 3D* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided. LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Two of the study intersections will continue to operate at LOS F without or with *Alternative 3D*. The side street volumes on Old Fairhaven Parkway at the NB I-5 off-

-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition. Project impacts to these locations are summarized below in terms of traffic volume impacts. ~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 3D* would increase total traffic through this intersection by approximately 84 vehicles during the weekday AM peak hour, and by approximately 54 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 3D* would increase traffic volumes through this intersection by approximately 171 vehicles during the weekday AM peak hour, and by approximately 202 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 3D* would cause the level of service at the following intersections to change:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS B – AM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS C – PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

Table 18. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 3D

Intersection	No-Action			Alternative 3D		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	26.6	0.86
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	22.7	0.83
24th St/Old Fairhaven Pkwy*	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.1	0.43
12th St/Old Fairhaven Pkwy	B	19.2	0.59	B	19.4	0.57
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	B	19.2	0.62
Chuckanut Dr/16th St*	A	9.7	WB	A	9.8	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	11.0	WBL
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.1	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.8	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	36.5	0.96
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	40.0	0.94
24th St/Old Fairhaven Pkwy*	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	17.7	0.69
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	21.3	0.63
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	C	20.7	0.70
Chuckanut Dr/16th St*	B	10.7	WB	B	10.1	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	C	14.6	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	11.7	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.3	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd, Chuckanut Dr/16th St, and 24th St/Old Fairhaven Pkwy intersections

As shown in Table 18, the addition of project traffic increases average vehicle delays at study intersections, which is typical when intersection volumes increase. Those intersections where intersection delays decrease with *Alternative 3D* can be attributed to decreases in background traffic volumes associated with the 24th Street connection through the project site included with this Alternative.

Study intersection operations for *Alternative 3D* would be better than those reported for *Alternative 1C*, with reductions in intersections delays of up to approximately six seconds. However, all study intersections would operate at the same levels of service with *Alternative 3D* as with *Alternative 1C*. This can be attributed to the lower project trip generation for *Alternative 3D* relative to *Alternative 1C*.

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~~All study intersections would operate at the same levels of service with *Alternative 3D* as with *Alternative 1C*.~~

Site Access Operations

Access to the project site would be provided via three locations. Two access locations are proposed along Chuckanut Drive at 16th Street and Viewcrest Road. In addition, access would also be provided via a new roadway connection between Chuckanut Drive and 24th Street to the south of Old Fairhaven Parkway.

Site access operations were analyzed during 2022 weekday AM and PM peak hour conditions, using the same methodology described for the off-site study intersection analysis. It is anticipated that the site access locations along Chuckanut Drive would operate at LOS C or better during both the weekday AM and PM peak hours. However, the side-street approaches to the 24th Street/Old Fairhaven Parkway intersection are forecast to operate at LOS F during both the weekday AM and PM peak hours. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic signal warrants were also evaluated at Chuckanut Drive/Viewcrest Road, Chuckanut Drive/16th Street, and 24th Street/Old Fairhaven Parkway to determine if a signal would be appropriate at any of these locations. These warrants test whether a full traffic signal would be needed to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions. Neither of the evaluated warrants are met at Chuckanut Drive/Viewcrest Road or Chuckanut Drive/16th Street. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the site driveway intersections. Both the eight- and four-hour warrants are met at 24th Street/Old Fairhaven Parkway, indicating that a traffic signal may be appropriate there. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Changes in traffic volumes on study area roadways and at study intersections ~~are~~ ~~associated with~~ *Alternative 3D* may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based on increases in traffic volumes. The number, ~~or rate of~~ collisions, could change, especially at congested locations.

The shifts in traffic associated with the 24th Street connection through the project site may result in improved traffic safety along the 30th Street corridor and Chuckanut Drive to the north of the project site as a result of lower traffic volumes associated with *Alternative 3D*. However, traffic volumes along the 24th Street corridor to the south of Old Fairhaven Parkway are anticipated to increase significantly relative to *No-Action*, this may result in an increase in the occurrence of traffic collisions along this roadway segment. In addition, the 24th Street connection would create a new crossing of the Interurban Trail.

The lower traffic volumes on Chuckanut Drive and 12th Street to the north of the project site as a result of the 24th Street connection would likely improve emergency vehicle access and response times to the Edgemoor neighborhood and the project site. In addition, the 24th Street connection would provide a new arterial connection to the project site and the Edgemoor neighborhood for use at times when the Padden Creek Bridge is impassible.

Alternative 3D would add fewer vehicles to study area roadways and intersections than *Alternative 1C*, therefore *Alternative 3D* may result in a lower increase the occurrence of traffic collisions than *Alternative 1C*.

Transit Impacts

The 24th Street connection through the project site could encourage changes to the existing transit service within the study area, or the addition of new transit service through the project site. This could result in an increase in transit ridership associated with *Alternative 3D* similar to *Alternatives 2A* and *2F* as a result of improved accessibility to transit service.

Alternative 3D would not degrade any existing transit facilities, but could result in enhancements to existing transit service in the study area. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 3D*.

Non-Motorized Travel Impacts

The analysis of traffic impacts assumed no significant use of non-motorized travel modes in order to assure that project impacts to traffic operations were not underestimated. This is a commonly accepted approach in evaluating traffic impacts under SEPA, and is intended to assure that conservative analysis results are reflected.

There is potential for an increase in the use of non-motorized travel modes associated with *Alternative 3D*. The on-site roadway/circulation system provides for internal pedestrian facilities and bicycle connections. The Interurban Trail provides the proximate opportunity for either walkers or bicyclists to access Bellingham to the north and Larrabee State Park to the south. *Alternative 3D* would not degrade any existing facilities, but would enhance non-motorized facilities along the Chuckanut Drive project frontage through the provision of a sidewalk and bike lane. In addition, the 24th Street connection to Old Fairhaven Parkway would provide an alternative to Chuckanut Drive for pedestrians and bicyclists.

Existing non-motorized facilities within the study area are expected to accommodate the portion of *Alternative 3D* trip generation that is expected to walk or bike to the project site. Thus, no significant adverse impacts to non-motorized facilities or operations are expected to occur as a result of *Alternative 3D*. The increase in non-motorized travel associated with *Alternative 3D* would likely be smaller than for *Alternative 1C* due to the lower trip generation for *Alternative 3D*.

Alternative 4F (Enhanced Buffer Plan with Additional Single Family Units)

This section documents traffic conditions within the study area if development were to occur according to *Alternative 4F*.

Alternative 4F (Additional Single Family Alternative) would include the following components:

- Develop 51 single-family units
- Develop 688 townhouse/condominium units
- Access to the site would be provided via two locations along Chuckanut Drive at 16th Street and Viewcrest Road

Street System

No off-site modifications to street channelization or intersection control are proposed as part of *Alternative 4F*. However, *Alternative 4F* includes improvements to the project frontage along Chuckanut Drive. The frontage improvements include the construction of northbound and southbound left-turn lanes at the Viewcrest Road intersection with associated tapers and transitions. Curb, gutter, and sidewalk, and a bike lane are also proposed to be constructed along the Chuckanut Drive project frontage. In addition, a bus pullout is also proposed to the north of the Viewcrest Road intersection.

Traffic Generation

The underlying trip generation methodology, assumptions, and resulting trip generation rates used to estimate traffic generated by *Alternative 4F* are consistent with those used for *Alternative 1*.

Table 19. 2022 New Trip Generation – *Alternative 4F*

	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached	490	11	34	45	32	19	52
Residential Townhouse/Condominium	4,030	41	200	241	196	96	292
Total	4,520	52	234	286	228	116	344

As shown in Table 19, *Alternative 4F* is anticipated to generate approximately 4,520 weekday daily trips. During the weekday AM peak hour, *Alternative 4F* would generate approximately 286 trips. During the weekday PM peak hour *Alternative 4F* would generate approximately 344 trips. For comparison purposes this represents a decrease in trips relative to *Alternative 1* (approximately 480 fewer daily trips, with 53 fewer trips during the weekday AM peak hour, and 85 fewer trips during the weekday PM peak hour), and an increase in trips relative to *Alternatives 2 and 3* (approximately 130 additional daily trips, with 15 additional trips during the weekday AM peak hour, and 9 additional trips during the weekday PM peak hour). A summary of the trip generation for each *Alternative* is included in Appendix D.

Distribution and Assignment

The trip distribution and assignment patterns would remain unchanged from those described for *Alternatives 1A, 2A, and 2F*. The resulting assignment of project trips for *Alternative 4F* is illustrated in Figure 16.

Traffic Volume Impacts

Peak hour traffic volumes for *Alternative 4F* were developed by assigning the project-generated trips to *No-Action* weekday AM and PM peak hour traffic volumes at the study intersections. 2022 weekday AM and PM peak hour traffic volumes for *Alternative 4F* are illustrated in Figure 16. These volumes were then compared with the *No-Action* traffic volumes. Table 20 illustrates the percent impact of traffic generated by *Alternative 4F* at the study area intersections during weekday AM and PM peak hours. A summary of the traffic volume impacts for each *Alternative* is included in Appendix E.

As shown in Table 20, at study area intersections not providing access to the project site, traffic generated by *Alternative 4F* would increase total entering traffic volumes by up to approximately 100 percent during the weekday AM and PM peak hours at off-site study intersections. Peak hour traffic volumes typically vary on a daily basis and have been documented to fluctuate by between 5 and 10 percent, yet the fluctuation is usually unnoticeable from a driver's perspective.

The intersections immediately adjacent to project site would experience the greatest traffic impact, ranging up to approximately 100 percent. The following intersections would experience a project traffic impact greater than 10 percent:

- Chuckanut Dr/12th St (up to 103.4%)
- 32nd St/Old Samish Rd (up to 21.9%)
- Chuckanut Dr/Hawthorn Rd (up to 21.2%)
- 12th St/Old Fairhaven Pkwy (up to 14.6%)
- 12th St/Harris Ave (up to 12.2%)
- Chuckanut Dr/Old Samish Rd (up to 11.7%)

The project traffic impact at the Chuckanut Dr/16th St is greater than at the other study intersections due to the assignment of project traffic through this intersection, combined with the relatively low *No-Action* traffic volumes.

During the weekday AM and PM peak hours, the project impact at the most congested intersections range from 57 trips (3.5 percent) at the I-5 NB Ramps/Old Fairhaven Pkwy intersection during the weekday PM peak hour, to 112 trips (5.5 percent) at the intersection of 24th St/Hawthorn Rd during the weekday PM peak hour.

Figure 16. 2022 Project Trip Assignment - *Alternative 4F*

Figure 17. 2022 with Project Traffic Volumes - *Alternative 4F*

Table 20. 2022 PM Peak Hour Percent Project Impact - Alternative 4F

Intersection	No-Action	Project Traffic	With-Project Traffic	Project Impact	Project Share
AM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,215	88	1,303	7.2%	6.8%
I-5 SB Ramps/Old Fairhaven Pkwy	1,835	117	1,952	6.4%	6.0%
30th St/Old Fairhaven Pkwy	1,920	119	2,039	6.2%	5.8%
24th St/Old Fairhaven Pkwy	1,525	95	1,620	6.2%	5.9%
12th St/Harris Ave	1,010	123	1,133	12.2%	10.9%
12th St/Old Fairhaven Pkwy	1,655	241	1,896	14.6%	12.7%
Chuckanut Dr/Hawthorn Rd	1,155	245	1,400	21.2%	17.5%
Chuckanut Dr/16th St	265	274	539	103.4%	50.8%
Chuckanut Dr/Viewcrest Rd*	260	119	379	45.8%	31.4%
Chuckanut Dr/Old Samish Rd	315	37	352	11.7%	10.5%
32nd St/Old Samish Rd	130	28	158	21.5%	17.7%
PM Peak Hour					
I-5 NB Ramps/Old Fairhaven Pkwy	1,650	57	1,707	3.5%	3.3%
I-5 SB Ramps/Old Fairhaven Pkwy	2,420	141	2,561	5.8%	5.5%
30th St/Old Fairhaven Pkwy	2,525	144	2,669	5.7%	5.4%
24th St/Old Fairhaven Pkwy	2,045	112	2,157	5.5%	5.2%
12th St/Harris Ave	1,720	148	1,868	8.6%	7.9%
12th St/Old Fairhaven Pkwy	1,985	289	2,274	14.6%	12.7%
Chuckanut Dr/Hawthorn Rd	1,460	291	1,751	19.9%	16.6%
Chuckanut Dr/16th St	455	329	784	72.3%	42.0%
Chuckanut Dr/Viewcrest Rd*	470	143	613	30.4%	23.3%
Chuckanut Dr/Old Samish Rd	520	45	565	8.7%	8.0%
32nd St/Old Samish Rd	160	35	195	21.9%	17.9%

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd intersection and a new intersection with Chuckanut Drive in the vicinity of 16th Street

The traffic volume impacts for *Alternative 4F* are generally lower than those identified for *Alternatives 1A* and *1B* (less than approximately three percent lower) and are generally consistent with those reported for *Alternatives 2A* and *2F* (less than one percent higher). This can be attributed to the project trip generation for *Alternative 4F* relative to the other *Alternatives*.

Intersection operations were evaluated to determine whether additional measures would be needed to mitigate impacts of *Alternative 4F*, as described in the following sections.

Traffic Operations Impacts

Traffic operations impacts include the consideration of changes in operations of study area intersections. Table 21 provides a summary of *Alternative 4F* weekday AM and PM peak hour levels of service. For purposes of comparison, *No-Action* levels of service are also provided. The LOS worksheets are included in Appendix B. A summary table comparing the LOS results for each of the development alternatives is included in Appendix C.

Two of the study intersections will continue to operate at LOS F without or with *Alternative 4F*. The side street volumes on Old Fairhaven Parkway the NB I-5 off-ramp and 24th Street are forecast to exceed the available capacity as a result of high traffic volumes along Old Fairhaven Parkway. At these levels of side street congestion, calculated vehicle delay values become increasingly inaccurate. This is due to the sensitivity of the vehicle delay equation for stop controlled movements at an unsignalized intersection and, as a result, vehicle delay exponentially increases. Thus, operations in this situation are best characterized as LOS F and delay is truncated at greater than 100.0 seconds to indicate this condition. Project impacts to these locations are summarized below in terms of traffic volume impacts. ~~When an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.~~

I-5 NB Ramps/Old Fairhaven Pkwy - This intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 4F* would increase total traffic through this intersection by approximately 88 vehicles during the weekday AM peak hour, and by approximately 57 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays.

24th St/Old Fairhaven Pkwy - The side-street stop-controlled approaches to this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours. *Alternative 4F* would increase traffic volumes through this intersection by approximately 95 vehicles during the weekday AM peak hour, and by approximately 112 vehicles during the weekday PM peak hour. This results in a corresponding increase in average vehicle delays for vehicles on the stop-controlled side-street approaches as the number of gaps in through traffic decreases.

During the weekday AM and PM peak hours, the addition of traffic generated by *Alternative 4F* would cause the level of service at the following intersections to degrade:

- I-5 SB Ramps/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 30th St/Old Fairhaven Pkwy (LOS C to LOS D – PM peak hour)
- 12th St/Old Fairhaven Pkwy (LOS B to LOS C – AM peak hour)
- Chuckanut Dr/Hawthorn Rd (LOS C to LOS D – AM peak hour, LOS C to LOS E – PM peak hour)
- Chuckanut Dr/Viewcrest Rd (LOS A to LOS B – AM peak hour, LOS B to LOS C – weekday PM peak hour)
- Chuckanut Dr/Old Samish Rd (LOS A to LOS B – AM peak hour)

Chuckanut Dr/Hawthorn Rd –This intersection is forecast to operate at LOS E during the weekday PM peak hour with *Alternative 4F*, compared to LOS C for *No-Action*. Average intersection delay at this intersection would increase by approximately 40 seconds during the weekday PM peak hour. This is the result of the addition of approximately 291 project trips representing a 16.6 percent increase in total traffic.

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The remaining study intersections would operate at the same level of service as with *No-Action* during the weekday AM and PM peak hours.

Table 21. Weekday AM and PM Peak Hour Intersection LOS Summary - Alternative 4F

Intersection	No-Action			Alternative 4F		
	LOS ¹	Delay ²	V/C ³ or WM ⁴	LOS	Delay	V/C or WM
AM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	22.1	0.80	C	26.8	0.86
30th St/Old Fairhaven Pkwy	C	22.4	0.81	C	24.3	0.84
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	11.7	0.37	B	13.4	0.44
12th St/Old Fairhaven Pkwy	B	19.2	0.59	C	20.2	0.65
Chuckanut Dr/Hawthorn Rd	C	25.1	0.71	D	42.5	0.84
Chuckanut Dr/16th St	A	9.7	WB	B	11.4	WB
Chuckanut Dr/Viewcrest Rd*	A	9.7	EB	B	11.6	WBL
Chuckanut Dr/Old Samish Rd	A	9.9	WBL	B	10.4	WBL
32nd St/Old Samish Rd	A	8.8	SB	A	8.9	SB
PM Peak Hour						
I-5 NB Ramps/Old Fairhaven Pkwy	F	>100.0	NBL	F	>100.0	NBL
I-5 SB Ramps/Old Fairhaven Pkwy	C	23.6	0.87	D	37.7	0.96
30th St/Old Fairhaven Pkwy	C	32.7	0.90	D	41.3	0.97
24th St/Old Fairhaven Pkwy	F	>100.0	SBT/L	F	>100.0	SBT/L
12th St/Harris Ave	B	15.4	0.64	B	18.0	0.69
12th St/Old Fairhaven Pkwy	C	21.4	0.65	C	28.4	0.78
Chuckanut Dr/Hawthorn Rd	C	27.2	0.77	E	67.9	0.90
Chuckanut Dr/16th St	B	10.7	WB	B	12.5	WB
Chuckanut Dr/Viewcrest Rd*	B	10.8	EB	C	15.5	WBL
Chuckanut Dr/Old Samish Rd	B	11.3	WBL	B	11.8	WBL
32nd St/Old Samish Rd	A	9.3	SB	A	9.4	SB

1. Level of service

2. Delay reported in average seconds per vehicle

3. Volume to capacity ratio for signalized intersections

4. Worst movement for stop-controlled intersections

* Access to the project site is provided via the Chuckanut Dr/Viewcrest Rd and Chuckanut Dr/16th St intersections

As shown in Table 21, the addition of project traffic increases delay at the majority of study intersections, which is typical when intersection volumes increase.

At the majority of study intersections, intersection operations for *Alternative 4F* would be better than those reported for *Alternatives 1A* and *Alternative 1B*, with reductions in intersection delays of up to approximately 17 seconds, but worse than those reported for *Alternatives 2A* and *2F*, with increases in intersection delays of up to approximately four seconds. The exceptions are those intersections which are reported to operate at LOS F. As stated previously, when an intersection reaches LOS F, vehicle delay calculations are sensitive and may not provide a reliable measure of project impacts.

The Chuckanut Dr/Hawthorn Rd intersection would operate at a better LOS with *Alternative 4F* than with *Alternative 1A*, but a worse LOS than *Alternative 1B*. This can be attributed to the lower trip generation for *Alternative 4F* than *Alternatives 1A* and *1B*, and

the improvements at the Chuckanut Dr/Hawthorn Rd intersection included with *Alternative 1B*. This intersection would operate at the same LOS with *Alternative 4F* as with *Alternatives 2A* and *2F*, but with slightly higher vehicle delays (less than approximately 4 seconds).

The Chuckanut Drive/Viewcrest Rd intersection would operate at a better LOS with *Alternative 4F* than with *Alternatives 1A* and *1B*, improving from LOS C to LOS B during the weekday AM peak hour, and improving from LOS D to LOS B during the weekday PM peak hour. All study intersections would operate at the same LOS with *Alternative 4F* as with *Alternatives 2A* and *2F*.

Site Access Operations

Access to the project site is proposed to be provided by two locations along Chuckanut Drive at 16th Street and Viewcrest Road.

Site access operations were analyzed during 2022 weekday AM and PM peak hour conditions, using the same methodology described for the off-site study intersection analysis. It is anticipated that both site access locations would operate at LOS B during both the weekday AM and PM peak hours. The LOS worksheets for the site access analysis are included in Appendix B.

It should be noted that the LOS reported above for the site access intersection reflects the worst operating movement at the site access intersection. However, as described previously, this does not necessarily coincide with the movement with the highest assignment of project trips to/from the project site.

Traffic signal warrants were also evaluated at the two-way stop-controlled Chuckanut Drive/Viewcrest Road and Chuckanut Drive/16th Street intersections to determine if a signal would be appropriate at the proposed accesses. These warrants test whether a full traffic signal would be needed to serve traffic, and are defined in the MUTCD. The “eight-hour” and “four-hour” warrants (Warrants 1 and 2) were evaluated for 2022 with-project conditions; however, neither of the evaluated warrants are met at either location. This indicates that at the time of opening, a full traffic signal would not be warranted based on traffic volumes expected at the site driveway intersections. The detailed signal warrant worksheets are included in Appendix F.

Traffic Safety Impacts

Increases in traffic volumes on study area roadways and intersections due to *Alternative 4F* may result in higher occurrences of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based in increases in traffic volumes. The number, or rate of collisions, could increase, especially at congested locations.

Increases in traffic volumes associated with *Alternative 4F* may also result in increases in emergency response times, due to higher delays at study intersections and higher volume to capacity ratios on study roadways. Also, the potential for a higher occurrence of collisions, may increase the frequency with which the Padden Creek Bridge is impassable, resulting in increased emergency response times to the neighborhood, as

emergency vehicles are required to use the alternate routes into the Edgemoor neighborhood.

Based on the increases in traffic volumes associated with *Alternative 4F*, the increase in the occurrence of traffic collision would likely fall between the increases associated with *Alternatives 1A* and *1B*, and *Alternatives 2A* and *2F*.

Transit Impacts

It is not anticipated that existing transit service in the study area would be modified, or new transit service would be added to serve the proposed project site. Existing transit service within the study area is expected to accommodate the increase in transit ridership associated with *Alternative 4F*. *Alternative 4F* would not degrade any existing transit facilities. Thus, no significant adverse impacts to transit facilities or operations are expected to occur as a result of *Alternative 4F*. Based on the trip generation estimate for *Alternative 4F*, impacts to transit facilities or operations would likely fall between the impacts associated with *Alternatives 1A* and *1B*, and *Alternatives 2A* and *2F*.

Non-Motorized Travel Impacts

The analysis of traffic impacts assumed no significant use of non-motorized travel modes in order to assure that project impacts to traffic operations were not underestimated. This is a commonly accepted approach in evaluating traffic impacts under SEPA, and is intended to assure that conservative analysis results are reflected.

There is potential for an increase in the use of non-motorized travel modes associated with *Alternative 4F*. The on-site roadway/circulation system provides for internal pedestrian facilities and bicycle connections. The Interurban Trail provides the proximate opportunity for either walkers or bicyclists to access Bellingham to the north and Larrabee State Park to the south. ~~In addition, *Alternative 4F* would not degrade any existing facilities, but would enhance non-motorized facilities along the Chuckanut Drive project frontage through the provision of a sidewalk and bike lane.~~

Existing non-motorized facilities within the study area are expected to accommodate the portion of *Alternative 4F* trip generation that is expected to walk or bike to from the project site. *Alternative 4F* would not degrade any existing facilities, but would provide enhanced non-motorized facilities along the Chuckanut Drive project frontage. Thus, no significant adverse impacts to non-motorized facilities or operations are expected to occur as a result of *Alternative 4F*. Based on the trip generation estimate for *Alternative 4F*, impacts to non-motorized facilities or operations would likely fall between the impacts associated with *Alternatives 1A* and *1B*, and *Alternatives 2A* and *2F*.

Construction Impacts

Specific construction plans for Fairhaven Highlands have not been prepared at this time. Therefore, it is difficult to estimate the number of truck trips per day or the specific types of vehicles that would be used. The duration of the construction activity would vary depending on the type and level of activity.

Construction activity would include possible hauling of export materials off-site and delivery of construction materials. All construction access is planned from Chuckanut Drive. Construction access from 24th Street is not proposed. The roadways which are proposed to be used by construction traffic are classified as arterials. Therefore, they should be adequate to accommodate the construction traffic.

Overall, the level of construction traffic during peak travel periods and on an average weekday would be significantly lower than the number of project-generated trips with the build-out of any of the development *Alternatives*.

Area Transportation Impacts

Additional traffic generated by the *Alternatives* is anticipated to cause two additional study intersections to degrade to LOS E or F with the project. Also, the addition of project traffic volumes at those intersections which already operate at LOS E or F with *No-Action* may increase delays during the weekday AM and PM peak hours. The following list identifies the impact of the project at these intersections;

- **I-5 NB Ramps/Old Fairhaven Pkwy** - this intersection would continue to operate at LOS F during both the weekday AM and PM peak hours without or with the project *Alternatives*.
- **24th St/Old Fairhaven Pkwy** - this intersection would continue to operate at LOS F during both the weekday AM and PM peak hour without or with the project *Alternatives*.
- **Chuckanut Dr/Hawthorn Rd** - this intersection would degrade to LOS E during the weekday AM peak hour with project *Alternative 1A*, and during the weekday PM peak hour with *Alternatives 2A, 2F and 4F*, and would degrade to LOS F during the weekday PM peak hour with *Alternative 1A*.

Secondary and Cumulative Impacts

Due to the nature of the transportation analysis conducted for the Fairhaven Highlands, secondary and cumulative impacts have been addressed as part of the primary analysis documented above.

Mitigation Measures

The impacts of the development each *Alternative* summarized above could be mitigated through implementation of the following improvements;

- **I-5 NB Ramps/Old Fairhaven Pkwy** – installation of a traffic signal at this intersection would improve intersection operations to LOS D or better during the weekday AM and PM peak hours with the project *Alternatives*.
- **24th St/Old Fairhaven Pkwy** - installation of a traffic signal at this intersection would improve intersection operations to LOS B or better during the weekday AM and PM peak hours with the project *Alternatives*.

- **Chuckanut Dr/Hawthorn Rd** – construction of a southbound right-turn lane to the south of the Padden Creek Bridge would improve intersection operations to LOS C during both the weekday AM and PM peak hours with *Alternatives 1A, 2A, 2F, and 4F*.
- 24th Street Connection/Interurban Trail – grade separation of the intersection between the proposed 24th Street Connection and the Interurban Trail would minimize potential impacts at this intersection with *Alternatives 1C and 3D*.



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Potentially Unavoidable Adverse Impacts

Traffic generated by the development *Alternatives* would not cause unavoidable adverse impacts at study intersections.

Appendix A: LOS DEFINITIONS

Appendix B: LOS WORKSHEETS

Appendix C: LOS SUMMARY

Appendix D: TRIP GENERATION WORKSHEETS

Appendix E: TRAFFIC VOLUME SUMMARY

Appendix F: TRAFFIC SIGNAL WARRANTS