- AGENDA

BOTHELL PLANNING COMMISSION

VIRTUAL MEETING

Bothell City Hall, 18415 101st Avenue NE
July 15, 2020, 6:00 PM

Public Notice: Pursuant to Governor Inslee's Stay Home, Stay Healthy Proclamation 20-25 extension to August 1, 2020, and in an effort to curtail the spread of the COVID-19 virus, this Planning Commission meeting will be conducted remotely. We encourage members of the public to attend and participate in the meeting remotely, as described in more detail below.

- Watch the meeting LIVE online
- Watch the meeting live on BCTV Cable Access Channels 21/26 (must have Frontier/Comcast Cable)
- Listen to the meeting live by phone: +1-510-338-9438 USA Toll – Access code: 126 802 4416
- **If you are going to attend the meeting in person you are encouraged to contact Michael Kattermann at Michael.kattermann@bothellwa.gov by 3:00 PM. (day of the meeting)**
- **If you want to provide public comments/testimony or would like to submit written comments please email Michael Kattermann at Michael.kattermann@bothellwa.gov by 3:00 PM. (day of the meeting)**

Planning Commission meetings are also recorded and available the next day on the City of Bothell YouTube Channel.

1. CALL TO ORDER

2. PUBLIC COMMENTS
   If you wish to comment (either in writing or orally) please submit your comments or request to michael.kattermann@bothellwa.gov prior to 3PM (day of meeting). Persons making oral comments will be allowed 3 minutes to speak via phone. All comments will be made part of the record.

3. APPROVAL OF MINUTES
   None

4. NEW BUSINESS

5. PUBLIC HEARINGS
   a. Limited Parking Reductions & Height Allowances Code Amendments
   b. Canyon Park Subarea Plan Update - Continued from July 8

6. STUDY SESSION
   a. Canyon Park Subarea Plan Update - Continued from July 8

7. OLD BUSINESS

8. REPORTS FROM STAFF

9. REPORTS FROM MEMBERS

10. ADJOURNMENT

Projected Schedule of Land Use Items

City Council (CC) meetings, shown in **bold**, start at 6 p.m. unless otherwise noted**.**
Planning Commission (PC) meetings, shown in *italics*, start at 6 p.m. unless otherwise noted.
Other Board meetings shown in normal text, start at 6 p.m. unless otherwise noted.
Meetings are held in the **City Hall building at 18415 101st Avenue NE** unless otherwise noted.
<u>For planning purposes only: schedule subject to change without notice</u>

JULY 2020

Monday	Tuesday	Wednesday	Thursday	Friday
		1 *Canyon Park Subarea Plan Update Study Session* *Limited Parking Reductions & Height Allowances Code Amendments Study Session*	2	3
6	7	8 *Canyon Park Subarea Plan Update Public Hearing*	9	10
13	14 **Canyon Park Subarea Plan Update Study Session**	15 *Canyon Park Subarea Plan Update cont'd public hearing* *Limited Parking Reductions & Height Allowances Code Amendments Public Hearing & Recommendation*	16	17
20	21 **Downtown Historic Preservation Code Amendments Public Hearing & Action** **Title 22 Code Amendments Public Hearing & Action**	22	23	24
27	28 Landmark Preservation Board	29	30	31
Aug 3	Aug 4	Aug 5 *<u>Possible</u> continuation of July 15th public hearing(s)*		

Limited Parking Reductions & Height Allowances Code Amendments Public Hearing & Recommendation

MEMORANDUM
Community Development Department

City of Bothell

DATE: July 15, 2020

TO: Planning Commission

FROM: Dave Boyd, Senior Planner

SUBJECT: Limited Parking Reduction and Height Allowance Code Amendments Public Hearing

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Purpose/Action

The purpose of this public hearing is to consider Limited Parking Reductions & Height Allowances Code Amendments to comply with State law regarding parking minimums to certain types of developments near frequent transit service and provide height incentives for affordable and/or senior housing within the heights analyzed in the Downtown Subarea Planned Action Environmental Impact Study.

This packet includes proposed code amendments and findings for consideration and potential recommendation at the July 15 public hearing.

Background

At the July 1 study session, staff presented background information on the two parts of these proposed code amendments, as summarized below with some of the feedback received.

<u>Limited parking reductions:</u> The Washington State Legislature passed HB 1923 in 2019 and HB 2343 in 2020, which, among other things, established upper limits to the minimum parking requirements jurisdictions could place on affordable, senior/disabled and market rate housing within one quarter mile of frequent transit stops. Because of the way the legislation is worded, some, but not all, of the areas in Bothell where these could apply are in compliance, so there is a need to amend the code to fully comply with State law, and an opportunity to consider reductions that would encourage affordable housing. Comments and questions from the July 1 study session include:

1. Interest in extending beyond the State guidelines on one hand, while providing a base level of parking, on the other hand
2. Cost of parking studies to qualify for reductions
3. Differing opinions on whether to apply reductions based on walking distance versus a ¼ mile radius

<u>Height allowances:</u> State law addresses the need for affordable housing, and the Bothell Housing Strategy recommends exploring incentives to encourage affordable housing. The Downtown Plan initially proposed and studied the environmental impacts of building heights that were taller and in some cases allowed more floors than what was eventually adopted. These potential code amendments would add *incentives* for affordable housing

projects by allowing additional height, within the limits analyzed in the downtown environmental studies. Comments and questions from the July 1 study session include:

1. Interest in creating housing to serve lower income levels than possible with our current market-based affordable housing requirements
2. Interest in feedback from prospective tenants and community organizations that serve those populations

Both of these code amendments are related to a proposed affordable senior housing development on one of the surplus City properties, Block A (former Bothell Ski & Bike and adjacent property), but could also apply more broadly. That site is under contract to Imagine Housing, who have indicated that these amendments are necessary for their development, and would need to be adopted by early September for the project to be eligible to apply for required funding and approvals.

Analysis: Limited Parking Reductions
See the July 1 memo for the full Washington Department of Commerce summary of the new parking requirements in the three categories listed below:

1. Housing for ***very low-income or extremely low-income individuals*** near frequent transit service.

2. Housing for ***seniors or people with disabilities*** near frequent transit service.

3. For ***market rate multifamily housing units*** near frequent transit service.

All of the multifamily-zoned districts in Downtown meet the State regulations in 1 and 3 above. The lowest parking requirement available citywide for senior housing is two-thirds of a space per unit for Specialized Senior Housing. Outside of Downtown, there are currently no zones that would meet the parking allowances for any of these new state requirements, though some of the proposed Canyon Park requirements would.

Currently there are two general areas of the city with bus service meeting the levels specified in these new state requirements, along the SR 522 corridor (mostly Downtown) and Canyon Park / Thrasher's Corner. As bus service is increased, through the proposed new Bus Rapid Transit lines in Sound Transit 3, additional areas will qualify (though the spacing of BRT stations may create some reductions). See the July 1 memo for a map of current bus stops with four stops per hour for 12 hours per day.

Rather than trying to tailor parking requirements to fit the areas within ¼ mile of current frequent bus stops through rezones or overlays, the recommended approach is to provide for parking exceptions to comply with these new state provisions, with applicants requesting the exceptions and providing parking studies to demonstrate how they would meet the requirements. That way, the provisions will not need to be changed as bus service changes, and it will be the responsibility of the applicant to analyze bus service, street parking capacity and required parking for staff and guests based on their proposed developments.

See Attachment 1, Exhibit A, for an annotated version of the proposed code amendments.

In response to Planning Commission input at the July 1 study session, the proposed code amendments both provide an applicant the option to apply for the lower of the State-allowed parking levels, with justification through a parking study, and establish a baseline of required parking for senior and disabled housing. After further analysis and consideration of Planning Commission input on application of the ¼ mile rule, staff proposes applying the parking reductions to a ¼ mile radius in order to have the exceptions apply to a larger area and simplify the application and review of the requirement.

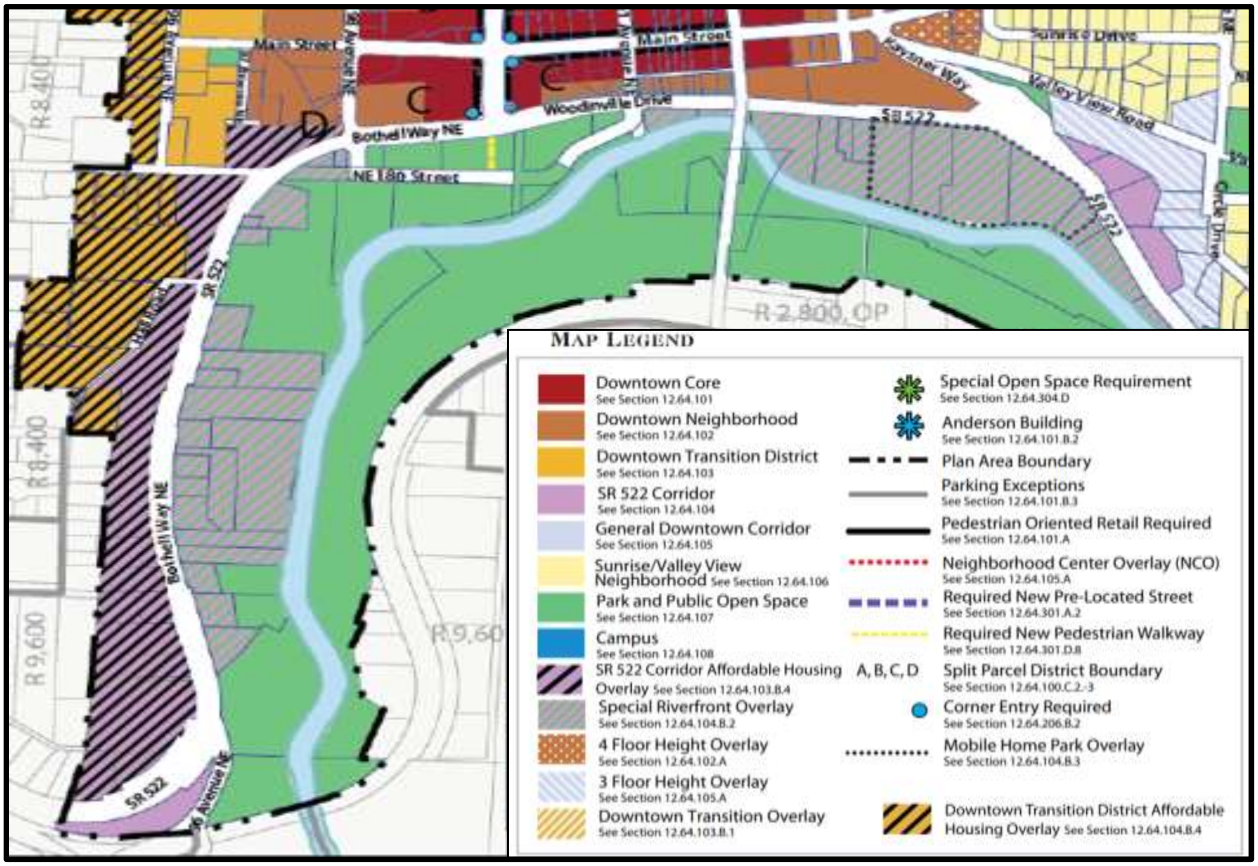
For senior and disabled housing, State law prohibits minimum parking requirements for the residents, with some exceptions, but does allow a minimum for staff and guests. Bothell's citywide parking requirements for multifamily developments call for one guest space for every 5 dwelling units, or 0.20 spaces per unit. Imagine Housing had a similar recent project in Totem Lake that provided about 0.055 spaces per unit for guests and about 0.022 spaces per unit for staff. The proposed exception in Attachment 1 for senior and disabled housing sets 0.3 spaces per unit as a baseline to accommodate staff and guests, and allows an applicant to request a reduction to that level with a parking study that also takes into account the availability of on-street parking. That would allow Imagine Housing to provide a parking study and move forward with their proposal to provide about 0.5 spaces per unit.

For very low- (50% of area median income – AMI) and extremely low-income (30% of AMI) housing and market rate housing meeting the different State criteria for proximity to frequent transit service, applicants could apply for reduction in their required parking to 0.75 spaces per unit or 1 space per bedroom, as justified by a parking study, with the lower limit requiring greater justification. This would create an incentive for both of these housing types in areas well-served by transit. For market rate housing, a higher level of transit service is required to apply the reduction, so it will apply to a smaller area. For low income housing, the level of service required to qualify for the reduction is less, so it would apply to a broader area.

Analysis: Height Allowances

See the July 1 memo and the Findings in Attachment 1 for the policy basis and initial analysis for allowing height bonuses for affordable housing.

Since the immediate impetus of these amendments is to facilitate the Imagine Housing proposal, the proposal is limited to the portion of the SR 522 Corridor district without the recently established affordable housing overlay. In the future, such bonuses could be expanded to other districts and even layered onto affordable housing overlays.



Detail of Downtown Districts Map

Affordability considerations: The proposed height allowances amendments would provide a "bonus floor" for affordable housing. The recently established affordable housing overlays have limits on the percentage and affordability levels based on the increased market value produced by the capacity increase. As a voluntary incentive, the height bonus can be applied to a higher percentage of units at lower affordability levels.

One rationale for the percentage of affordable units to require would be the number of units added by the additional floor. In the case of the Imagine Housing project, that amounts to nearly 30% of the new total. On the other hand, to achieve greater affordability and higher percentages of units, these incentives are only likely to be used by affordable housing developers using various types of public financing, which will require all of their units to be affordable at specified levels. For this reason, staff proposes that to get the height bonus, all of the project's units must be affordable.

To provide some flexibility to developers, like Imagine Housing, who may not have all of their financing in hand, staff proposes an average affordability level of 50 percent of AMI.

That would allow developers to provide a mix of units at affordability levels between 30% and 60% AMI, the range targeted by affordable housing bond programs. The proposed amendments encourage, but do not require, developments with a range of affordability levels.

Staff proposes allowing one additional floor of housing, with heights up to the 54 feet that was analyzed in the PAEIS, for affordable housing projects meeting these standards in portions of the SR 522 Corridor district that does not already have an affordable housing overlay. In the future, it could be expanded to include other districts and layered onto existing affordable housing overlays, but that would require more time to analyze than is available in the timeframe for these amendments. An incremental approach will allow the Imagine Housing project to proceed and provide time to evaluate how this incentive program may work for other sites in the portion of the district without the affordable housing overlay.

In response to interest by commissioners in getting feedback from prospective tenants and community organizations providing affordable housing and related services, staff did extensive outreach in the development of the Housing Strategy in 2015. Several focus groups were convened to get feedback on a range of issues. Affordable housing providers gave input on both development issues and the needs of their tenants. Social service providers gave input on special needs tenants, including seniors and those with disabilities.

Action

Staff is including draft Findings for Planning Commission consideration if the Commission is prepared to make a recommendation after the hearing. If not, the hearing should be continued to August 5.

Attachment

1. Draft Findings, Conclusions and Recommendation, including an annotated version of the proposed code amendments as Exhibit A to the Findings.

DRAFT Planning Commission Findings, Conclusions and Recommendations for Limited Parking Reduction and Height Allowance Code Amendments

Findings

1. The City of Bothell plans under the Growth Management Act (GMA), as contained within the Revised Code of Washington 36.70A.

2. Bothell adopted a Comprehensive Plan termed the *"Imagine Bothell…"* Comprehensive Plan under Council Ordinance 1557 on July 15th 1994. The *"Imagine Bothell…"* Comprehensive Plan has been amended numerous times since original adoption.

3. Regulations to implement the Comprehensive Plan were created under ordinance 1629. The implementing regulations have been amended numerous times.

4. The proposed Code amendments were initiated by City Council on February 4, 2020 in response to State mandates regarding affordable, senior/disabled and market rate housing near frequent transit service, and to facilitate an affordable senior housing development on a parcel the City is in the process of selling.

Public Notice

5. Public notice was provided via the July 2020 edition of the *"Imagine Bothell..."* notice. Every month the Community Development Department prepares and distributes the *Imagine Bothell…* notice, which describes upcoming hearings and meetings concerning amendments to the City comprehensive plan and development regulations. The detailed notice normally runs four to five pages, and contains the names of staff contacts should the reader desire more information. The *Imagine Bothell…* notice is distributed as follows;
   - E-mailed or sent via U.S. Mail to approximately 200+ individuals who have expressed current or past interest in City land use issues;
   - Published in the legal advertising section of Seattle Times, the City's official newspaper of record, as well as the Bothell-Kenmore Reporter;
   - Posted on 12 freestanding notice boards located throughout the City (each of which includes a plastic bin in which extra copies of the notice are placed);

- Posted at Bothell City Hall, the Bothell Post Office, the Bothell Regional Library and the Canyon Park Shopping Center; and
- Placed on the City of Bothell website.

6. The public notice provisions of State Law RCW 36.70A.035 and BMC Title 11 Chapter 19 have been followed.

Process

7. The Planning Commission conducted a study session on the proposed Code amendments on July 1, 2020 and a public hearing on July 15, 2020.

8. Community Development planning staff prepared draft code amendments to amend portions of BMC Chapters 12.07 Affordable Housing; 12.16 Parking, Loading, Transit Access and Pedestrian Circulation; and Section 12.64.104 SR 522 Corridor District Requirements to provide for State-mandated parking requirements and affordable housing incentives.

9. All review drafts were made available to the public through two different methods:

   A. Planning Commission packets for the upcoming Wednesday hearing were available on the City of Bothell webpage and via email from staff; and
   B. Extra copies of the Planning Commission packet were available at all public hearings.

10. No exhibits were received during the public hearing process.

11. In accordance with Section 365-195-620 of the Washington Administrative Code (WAC), copies of these proposed Code amendments will be transmitted to the state Department of Commerce, and other state agencies for their review on or before completion of the Planning Commission's recommendation.

12. The SEPA Responsible Official will issue a SEPA Threshold Determination for the proposed Code amendment upon completion of the Planning Commission's recommendation.

Requested Amendments

13. Amend BMC Chapters 12.07 Affordable Housing; 12.16 Parking, Loading, Transit Access and Pedestrian Circulation; and Section 12.64.104 SR 522 Corridor District Requirements to provide for State-mandated parking requirements and affordable housing incentives.

Applicable Comprehensive Plan Goals and Policies

14. The Transportation Element of the *Imagine Bothell…*Comprehensive Plan has Goals and Policies that support the community's commitment to transit oriented development, including:

    TR-G4 Encourage walking, bicycling, ridesharing and taking transit in order reduce congestion and greenhouse gas emissions, improve mobility and overall public health, and improve mobility choices for people with special transportation needs.

    TR-P21 Support a public transit system that will provide the majority of residences, businesses and community facilities with frequent and convenient transit service.

    TR-P23 Improve accessibility to transit facilities for all users including persons with special transportation needs such as the disabled, elderly, youth and low-income populations.

15. The *Imagine Bothell…*Comprehensive Plan’s Housing and Human Services Element includes the following Goal and Policy, providing the basis for affordable housing incentives:

    HHS-G3 To ensure opportunities exist throughout the community for housing affordable to all economic segments of the population.

    HHS-P17 Consider market incentives to encourage and/or require affordable housing to meet the needs of people who work and desire to live in Bothell.

    The Bothell Housing Strategy provides further detail:

    Consider multiple approaches to linking increased development capacity with providing affordable housing. Could include standards for providing affordable housing with actions such as rezones that result in increased development capacity, and voluntary developer incentives, especially near existing and planned transportation and employment centers. Encourage use of multiple (layered) incentives to maximize affordability.

    Specific examples include “Height and other incentives that increase development capacity.”

Specific Planning Commission Findings

16. Providing additional parking reduction exceptions for certain developments near frequent transit service will conform with new State regulations and promote City goals to support affordable, senior/disabled and transit-oriented housing development.

17. Providing a voluntary incentive for affordable housing will facilitate development of a City surplus parcel and potential future affordable housing

projects, promoting City goals, policies and strategies for affordable and special needs housing.

Proposed regulations

18. The proposed code amendments would amend BMC Chapters 12.07 Affordable Housing; 12.16 Parking, Loading, Transit Access and Pedestrian Circulation; and Section 12.64.104 SR 522 Corridor District Requirements, and are included as Exhibit 2 to these Findings.

19. **Public testimony** (none to date)

20. **List of exhibits** (none to date)

Conclusions

1. **Implementation of adopted Comprehensive Plan policies**

   The proposed Code amendments further the goals and policies contained in the *Imagine Bothell…* Comprehensive Plan.

2. **Promotion of the public interest**

   The proposed Code amendments promote the public interest by supporting transit-oriented development for affordable, senior/disabled and market-rate housing, and by providing voluntary incentives for low income housing.

Recommendation

1. Based upon these findings and conclusions, the Planning Commission recommends the City Council approve Code amendments to BMC Chapters 12.07 Affordable Housing; 12.16 Parking, Loading, Transit Access and Pedestrian Circulation; and Section 12.64.104 SR 522 Corridor District Requirements.

Kevin Kiernan, Chair, Planning Commission

DRAFT Limited Parking Reduction & Height Allowance Code Amendments

Proposed code amendments are included below, with new language in red underline & deleted language in ~~red strikethrough~~. Hyperlinks are in blue underline & skipped sections are indicated by three asterisks: * * *. Explanatory notes are included in text boxes like this one & are not part of the proposed code. For clarity & context, amendments to the Downtown Subarea Regulations in Chapter 12.64 are included first, followed by amendment to Chapter 12.16.

12.64.104 SR 522 Corridor District Requirements

The added note (**S**) in the Chart Legend below establishes the additional height allowed for affordable housing projects.

Chart Legend

---: not permitted	n/a: not applicable as indicated	not required: these elements are not required as indicated
permitted: these elements are allowed by right unless otherwise specified in BMC 12.64.201 Building Use		
required: these are required elements of all new development as indicated.		
(**C1**): City-wide conditions for manufactured homes apply		
(**R**): exceptions apply for development in the special riverfront overlay, see Special SR 522 Requirements		
(**S**): 5 floors and 54 feet for qualifying affordable housing projects (see BMC 12.64.104.C)		
D & CS & S: Design & Constructions Standards & Specifications		

A. *District Charts.*

The added note below for maximum height references the bonus height for affordable housing in the Chart Legend above. Remainder of table section included for context.

12.64.200 Site Development Regulations	District Requirements
12.64.201 Building Use	
A. Retail	
1. Pedestrian Oriented Retail	---
2. Neighborhood Center Retail	---
3. Business & Personal Services	permitted
4. Auto-Oriented Retail	permitted
5. Corner Store Retail	permitted

12.64.200 Site Development Regulations	District Requirements
B. Civic & Cultural	permitted
C. Office	permitted
D. Lodging	permitted
E. Residential	
1. Multi-Family w/ Common Entry	permitted
2. Multi-Family w/ Individual Entry	permitted
3. Detached Single Family Housing	permitted
4. Manufactured Homes	conditional; (**C1**)
5. Home Occupation	permitted
12.64.202 Building Height	
minimum height	1 floor & 20 feet
maximum height	4 floors & 45 feet; (**R**) (**S**)
12.64.203 Special Height Regulations	
Abutting Residential Only Zones	n/a
Across the Street from Residential Only Zones	n/a
Special Height Requirement	not required
12.64.204 Building Orientation	
required or not required	not required
12.64.205 Public Frontage	
required or not required	required
12.64.206 Private Frontage	
1) Shop-Front	permitted
2) Corner Entry	permitted
3) Arcade	permitted
4) Grand Portico	permitted
5) Forecourt	permitted
6) Grand Entry	permitted
7) Stoop	permitted
8) Porch	---
9) Front Door	---
10) Edge Treatment: Fenced	permitted
11) Edge Treatment: Terraced	permitted
12) Edge Treatment: Flush	permitted

12.64.200 Site Development Regulations	District Requirements
12.64.207 Front Yard Setback	
minimum / maximum	15 ft / no max
12.64.208 Side Yard Setback	
min w/ living space windows (or adj to s.f. homes)	10 ft
min w/out living space windows	5 ft
12.64.209 Rear Yard Setback	
minimum setback	10 ft
12.64.210 Special Setback Regulations	
minimum setback	25 ft
12.64.211 Alley Setback	
minimum setback	5 ft
12.64.212 Frontage Coverage	
minimum percentage covered	60%
12.64.213 Build-to-Corner	
required or not required	not required
12.64.214 Maximum Building Length	
maximum	180 ft
12.64.215 Special Building Length Limit	
Corner	n/a
Mid-Block	n/a
12.64.216 Space Between Buildings	
	30 ft

* * *

12.64.400 Parking Regulations	District Requirements
12.64.401 Parking Types	
A. Surface Parking Lot - Front	---
B. Surface Parking Lot - Side	permitted
C. Surface Parking Lot - Rear	permitted
D. Surface Parking Lot - Exposed	permitted
E. Parking Structure - Exposed	permitted
F. Parking Structure - Wrapped: Ground Level	permitted
G. Parking Structure - Wrapped: All Levels	permitted
H. Parking Structure - Partially Submerged Podium	permitted
I. Parking Structure - Underground	permitted

12.64.402 Provision of Parking				
12.64.201 Building Use	**Minimum Parking Requirements**	**Permitted Maximum Parking in a Surface Lot**	**Shared Parking Reduction**	**Special Condition Requirements**
1 - Retail:				
a) Pedestrian Oriented Retail (Except Eating and Drinking Establishments)	1 vehicle space per 400 sf *	1 vehicle space per 250 sf *	10% reduction allowed for shared-use parking	On-site, or off-site within 800 feet, or cash-in-lieu *
Pedestrian Oriented - eating and drinking establishments	1 vehicle space per 400 sf	1 vehicle space per 200 sf	No reductions	On-site, or off-site within 800 feet, or cash-in-lieu *
b) Neighborhood Center Retail	1 vehicle space per 400 sf	1 vehicle space per 250 sf	No reductions	On-site
c) Auto-Oriented Retail	1 vehicle space per 400 sf	1 vehicle space per 250 sf	No reductions	On-site
d) Corner Store Retail	1 vehicle space per 400 sf	1 vehicle space per 250 sf	No reductions	On-site, or on street within 200 feet, or cash-in-lieu *
2 - Civic & Cultural				
	1 vehicle space per 500 sf	1 vehicle space per 250 sf	10% reduction allowed for shared-use parking	On-site, or off-site within 800 feet, or cash-in-lieu *
3 - Office				
	1 vehicle space per 500 sf	1 vehicle space per 300 sf	10% reduction allowed for shared-use parking	On-site, or off-site within 800 feet, or cash-in-lieu *
4 - Lodging				
	1 vehicle space per bedroom	1 vehicle space per bedroom	No reductions	On-site, or off-site within 100 ft
5 - Residential (All)				
	1 vehicle space per bedroom or 2.2 spaces per unit, whichever is less*	1 vehicle space per bedroom	10% reduction allowed for shared-use parking	On-site, or off-site within 100 ft

See BMC 12.64.402(D) for description of cash-in-lieu fee option

***** If the formula results in a fraction, the minimum number of parking spaces shall be rounded to the nearest whole number, with fractions of 0.50 or greater rounded up and fractions below 0.50 rounding down.

The added note and reference below establishes the new State parking minimums.

Reductions for transit and green buildings are allowed pursuant to BMC 12.16.110.B.1 and 2 and C-E.

*   *   *

The amendment below reflects conversion of the code to an online version, from the original print version with all special requirements on one page.

B. *Special SR 522 Corridor Requirements.* All Special Requirements in~~on~~ this section~~page~~ apply to development in the SR 522 Corridor.

* * *

4. *SR 522 Corridor Affordable Housing Overlay.*

a. *Applicability.* All developments within the SR 522 Corridor District Affordable Housing Overlay creating five (5) or more new dwelling units; or 2,100 or more gross square feet of climate-controlled nonresidential floor area shall provide for affordable housing units within the development.

b. The provisions of Chapter 12.07 BMC apply to the affordable housing units required by this section, except as expressly provided within this section.

The amendments to (c)(i) and (c)(ii) below are only to adapt to proposed amendments to 12.07.015 (definitions), and do not change the requirements themselves.

c. Minimum Requirements:

(i) At least five percent (5%) of the number of new dwelling units created within a development, if owner-occupied housing, shall be affordable to moderate-income households, and if renter-occupied housing, shall be affordable to low-income households, as defined in BMC 12.07.015(A).

(ii) Provision of owner-occupied affordable housing for moderate-income households, or renter-occupied affordable housing for low-income households, as defined in BMC 12.07.015(A)~~(1)~~, with an area not less than 5% of the gross climate-controlled nonresidential floor area of the project, or payment of $11.20 per gross square foot of climate-controlled nonresidential floor area of the project. The City Council may revise this payment rate from time to time to reflect changes in relevant conditions, such as land values and housing costs.

The added section below establishes the voluntary incentive and conditions.

5. *SR 522 Corridor Affordable Housing Voluntary Incentive.* A development that satisfies all of the following conditions may build up to five (5) floors and 54 feet:

a. Applicability: Any development within the SR 522 Corridor District outside of the Affordable Housing Overlay.

b. Affordable Housing:

i. All of the dwelling units created within a development are affordable to low-income households, as defined in BMC 12.07.015.A.2.

ii. The provisions of Chapter 12.07 BMC apply to the affordable housing units created under this section, except as expressly provided within this section.

iii. A mix of affordability levels including housing for very low- and extremely low-income households, as defined in BMC 12.07.015.A.3 and 4, is encouraged.

* * *

12.16.110 Transit, rideshare and green building provisions.

A. All land uses for which the majority of the parking demand is generated by employees who remain on site for at least six hours each day shall be required to reserve one parking space for rideshare parking for every 20 required parking spaces, up to a maximum of 20 rideshare spaces, as follows:

1. The parking spaces shall be located convenient to the primary employee entrance;

2. Reserved areas shall have markings and signs indicating that the space is reserved between the hours of 6:00 a.m. and 9:00 a.m., 12:00 noon and 1:00 p.m., and at all other shift changes; and

3. Parking in reserved areas shall be limited to vanpools and carpools established through rideshare programs and to vehicles meeting minimum rideshare qualifications set by the employer.

The added phrase below separates the current transit reductions, which were factored into the downtown parking requirements and therefore do not apply downtown, from the new state-mandated parking exceptions, which apply citywide.

B. Outside the Downtown Subarea, ~~T~~the community development director may reduce the number of required off-street parking spaces when one or more scheduled transit routes provide service within 660 feet of the site. The amount of reduction shall be based on the number of scheduled transit runs between 7:00 a.m. and 9:00 a.m. and 4:00 p.m. and 6:00 p.m. each business day up to a maximum reduction as follows:

1. For land uses of the type described in subsection A of this section, four percent for each run up to a maximum of 40 percent. Buildings attaining at least minimum green building certification under the Leadership in Energy and Environmental Design (LEED), National Green Building Standard, Built Green (Three Star level or higher), or other certification program as approved by the community development director qualify for an additional reduction of two percent for each run up to a maximum additional reduction of eight percent. Development in downtown districts that do not have parking requirements based on this chapter do not qualify for the base transit reductions, but may qualify for the additional green building reduction; and

2. For land uses other than those described in subsection A of this section, two percent for each run up to a maximum of 20 percent. Buildings attaining at least minimum green building certification under the Leadership in Energy and Environmental Design (LEED), National Green Building Standard, Built Green (Three Star level or higher), or other certification program as approved by the community development director qualify for an additional reduction of two percent for each run up to a maximum additional reduction of four percent. Development in downtown districts that do not have parking requirements based on this chapter do not qualify for the base transit reductions, but may qualify for the additional green building reduction.

The added sections below establish the new State-mandated parking requirements as exceptions.

C. For housing units that are affordable to very low-income or extremely low-income individuals, as defined in BMC 12.07. 015.A.3 and 4, located within 1/4 mile of a transit stop that receives transit service at least two times per hour for twelve or more hours per day, an applicant may apply for an exception allowing minimum parking requirements to be reduced at least to one parking space per bedroom or .75 space per unit, as justified through a parking study taking into account projected parking demand and availability of on-street parking within 800 feet of the project.

D. For housing units that are specifically for seniors or people with disabilities, as defined in BMC 11.02.110 "S." except for purposes of this exception senior shall be defined as 55 years and older, that are located within 1/4 mile of a transit stop that receives transit service at least four times per hour for twelve or more hours per day, an applicant may apply for an exception allowing minimum parking requirements to be reduced to no lower than .3 space per unit, to account for staff and guest parking, as justified through a parking study taking into account projected parking demand and availability of on-street parking within 800 feet of the project.

E. For market rate multifamily housing units that are located within 1/4 mile of a transit stop that receives transit service from at least one route that provides service at least four times per hour for twelve or more hours per day, an applicant may apply for an exception allowing minimum parking requirements to be reduced at least to one parking space per bedroom or .75 space per unit, as justified through a parking study taking into account projected parking demand and availability of on-street parking within 800 feet of the project.

~~C~~F. All uses which are located on an existing transit route and are required under the computation for required off-street parking spaces in BMC 12.16.030 to provide more than 200 parking spaces may be required to provide transit shelters, bus turnout lanes or other transit improvements as a condition of permit approval. Uses which reduce required parking under subsection B of this section shall provide transit shelters if transit routes adjoin the site. Adjoining uses which meet these criteria may coordinate in the provision of transit shelters.

~~D~~G. Any development application to which this section applies shall complete and submit to the city all necessary agreements with transit agencies, rideshare programs, or other information required by this section prior to the issuance of any building permits associated with the development.

~~E~~H. Any applicant for a development permit for other than a short plat or construction of a single-family residence shall inquire of the transit agency for the area in which the development would be located as to whether the agency desires a transit stop on the street or streets immediately adjacent to the development, or within the development itself. The applicant shall provide to the community development department a letter from the agency stating whether or not a transit stop is desired, and if so, whether the agency desires to construct and maintain a shelter at the stop. When a transit agency determines that a transit stop is warranted, the development shall incorporate the transit stop into the overall site design, including construction of a direct pedestrian connection from the transit stop to the development; construction of a pull-out, if desired by the transit agency; designation of land for a shelter, if the transit agency desires to construct a shelter; and installation of landscaping adjacent to the transit stop, in accordance with the transit agency's landscaping standards.

* * *

12.07.015 Definitions.

The following definitions are listed in alphabetical order for the purpose of these affordable housing regulations, and shall apply to the administration of this chapter. In addition, except as otherwise provided in this section, those definitions as contained in Chapter 11.02 BMC are adopted and incorporated into this section by reference.

A. "Affordable housing" and "affordable unit" mean a dwelling unit(s) reserved for occupancy by eligible households and having monthly housing expenses to the occupant no greater than 30 percent of a given monthly household income, adjusted for household size, as follows:

The following amendment is to conform to the subsequent, new definitions.

1. *Moderate Income*. ~~For owner-occupied housing,~~ 80 percent of the area median income~~, and for renter-occupied housing, 60 percent of the area median income, and for renter-occupied housing, 60 percent of the area median income~~.

The added definitions below establish the new categories needed for the voluntary incentive and the new State-mandated parking requirements.

2. *Low Income.* 60 percent of area median income.

3. *Very Low Income*. 50 percent of area median income.

4. *Extremely Low Income*. 30 percent of the area median income.

5. Pursuant to the authority of RCW 36.70A.540, the city finds that the higher income levels specified in the definition of affordable housing in this chapter, rather than those stated in the definition of "low-income households" in RCW 36.70A.540, are needed to address local housing market conditions in the city.

B. "Area median income" means the median family income for the Seattle-Bellevue, WA Metro Fair Market Rent (FMR) Area as most recently determined by the Secretary of Housing and Urban Development (HUD) under Section 8(f)(3) of the United States Housing Act of 1937, as amended. In the event that HUD no longer publishes median family income figures for the Seattle-Bellevue, WA HUD Metro FMR Area, the city may estimate the median income in such manner as the city shall determine.

C. "Eligible household" means one or more adults and their dependents who certify that their annual household income does not exceed the applicable percent of the area median income, adjusted for household size, and who certify that they meet all qualifications for eligibility, including any requirements for recertification on income eligibility.

D. "Housing expense" means, in the case of renter-occupied housing, rent, tenant-paid utilities, one parking space, and other tenant expenses required for the dwelling unit; and in the case of owner-occupied housing, mortgage, mortgage insurance, property taxes, property insurance, and homeowner's dues. (Ord. 2255 § 1, 2018).

12.07.020 Location of affordable housing programs.

A. Downtown Subarea:

1. Within the Downtown Transition District Affordable Housing Overlay, affordable housing is required as provided in BMC 12.64.103(B)(3).

2. Within the SR 522 Corridor District Affordable Housing Overlay, affordable housing is required as provided for in BMC 12.64.104(B)(4).

The added subsection below establishes area where the new voluntary incentive for affordable housing projects applies and references the applicable code subsection.

3. Within the SR 522 Corridor District outside the Affordable Housing Overlay, voluntary affordable housing incentives are available as provided in BMC 12.64.104(B)(5).

12.07.030 General affordable housing requirements.

The provisions of this chapter shall apply to all affordable housing units required by, or allowed through, any chapter of the Bothell Municipal Code, except as otherwise provided by this code.

The amendments below distinguish between developments within and affordable housing overlay where a percentage of the units are required to be affordable and those using voluntary incentives, where all of the units are affordable.

A. *Threshold for Compliance.*

1. For Affordable Housing Overlays: All developments creating five or more new dwelling units shall provide for affordable dwelling units within the development or provide other methods of creating affordable housing as provided in BMC 12.07.050. Adjacent developments by the same developer will be considered as a single development for the purpose of applying the threshold for compliance.

2. For Affordable Housing Incentives: All developments using voluntary incentives shall make all of the dwelling units within the development affordable.

B. *Duration of Affordability.* Affordable units that are provided under this section shall remain as affordable housing for a minimum of 50 years from the date of initial occupancy for owner-occupied affordable units and for the life of the project for renter-occupied affordable units. At the sole discretion of the director, the city may approve a shorter affordability time period for owner-occupied affordable housing, not to be less than 30 years, in order to meet federal financial underwriting guidelines.

The amendments below distinguish between developments with a mix of affordable and market-rate units and those with all affordable units.

C. *Designation of Affordable Units and Standards for Affordable Units* *in developments with a mix of affordable and market-rate units*. Prior to the issuance of any permit(s), the city shall review and approve the selection of affordable units, consistent with the following standards:

1. The affordable units shall generally be interspersed with all other dwelling units in the development.

2. The tenure (ownership or rental) of the affordable units shall be the same as the tenure of the rest of the dwelling units in the development.

3. The affordable units shall consist of a mix of number of bedrooms that is generally proportionate to the bedroom mix of units in the overall development.

4. The size (heated floor area) of the affordable housing units, if smaller than the other units in the development having the same number of bedrooms, must be approved by the director. In general, the affordable housing units may be as small as 500 square feet for a studio unit, 600 square feet for a one-bedroom unit, 800 square feet for a two-bedroom unit, 1,000 square feet for a three-bedroom unit, or 1,200 square feet for a four-bedroom unit, or 10 percent smaller than the market-rate units with the same number of bedrooms, whichever is less. However, the director has the discretion not to approve proposals for smaller units based on the criterion that rooms within the units provide adequate space for their intended use.

5. The exteriors of the affordable units shall be compatible with and comparable in quality and durability to the rest of the dwelling units in the development and shall comply with any design standards for the underlying zoning district. The interior finish, durability and quality of construction of the affordable units shall, at a minimum, be comparable to new entry level rental or ownership housing in the city.

D. *Availability* *in developments with a mix of affordable and market-rate units*. The affordable units shall be available for occupancy in a time frame comparable to the availability of the rest of the dwelling units in the development.

* * *

Canyon Park Subarea Plan Update - Continued Public Hearing

MEMORANDUM
Community Development

DATE: July 15, 2020

TO: Planning Commission

FROM: Bruce Blackburn, Senior Planner

SUBJECT: **Canyon Park Public Hearing – Subarea Plan**

Purpose
This is a continuation of the public hearing and briefings on the update of the Canyon Park Subarea Plan. Planning Commission will be considering additional information received from a staff briefing and public comment received since the previous meeting. The Commission will continue to receive public testimony and deliberate on a recommendation; however no action or recommendation on the draft plan will be requested at this meeting.

The Subarea Plan sets the Vision for Canyon Park by creating goals and policies that guide future development, capital investments, programs, and actions for the next 20 years. The focus of this meeting is to provide direction to staff about whether the goals, policies and actions adequately capture the Commission's feedback to date. The Subarea Plan provides direction for implementing zoning and development regulations that will be presented to Commission for consideration as part of the overall recommendation to the City Council.

Please note that the Draft Subarea Plan is a work in progress. Staff acknowledges that a significant amount of editing is still required and the Commission is not being asked to proof-read the document for spelling, grammar, typos, punctuation or the like. The purpose of this review with the Commission is on the adequacy of the substance of the draft.

Action
Request any additional information or clarification the Commission would desire prior to formalizing a recommendation. Continue the public hearing to a date certain – the date will be determined at the July 15th meeting.

Discussion
This is a continuation of the public hearing process for the Canyon Park Subarea Plan Update. Previous outreach efforts have focused on gathering input and ideas from Canyon Park residents, employees, property owners, business owners, and the public. This draft Subarea Plan is a reflection of that outreach, environmental analysis, professional recommendations, compliance with regional planning goals, the *Imagine Bothell…*Comprehensive Plan, and Planning Commission direction to-date.

Attachment 1 is the Draft Subarea Plan. The draft will be finalized as part of the public hearings before the City's Planning Commission and City Council and contains the following sections:

- Background
  Describes the area and provides the planning context for the subarea plan.

- Concept
  Outlines the assets, challenges, and the Community's Vision for Canyon Park and contains the Goals and Policies for the Subarea. This section also discusses the urban design framework and how the Subarea Plan addresses the challenges/vision established by the community.

- Land Use
  Identifies the land use goals and polices, land use designations, sidebar boxes which speak to important concepts and a list of actions. Included are paragraphs referring to affordable housing and commercial space, development feasibility and incentives.

- Process
  The Process section details the public engagement conducted as part of this update.

- Urban Design and Community Livability
  This section provides guidance on the appearance and layout of the subarea

- Natural Environment
  Guides how the subarea plan protects or mitigates impacts upon the environment resulting from planned growth

- Economic Development
  This chapter stresses the importance the City, Region and State places upon retaining and expanding the vital economic engine that is Canyon Park.

- Transportation
  Identifies the impacts on the transportation system and lists the needed transportation infrastructure necessary to support the planned growth. Transportation has been a major topic identified during the public engagement effort because Canyon Park's transportation network is already strained.

Highlights

To achieve the vision, the Draft Subarea Plan focuses on the following goals:

- Maintain, protect, and support Canyon Park as an **Economic Driver**.
  Ensure that Canyon Park continues to grow as the regional hub for the biomedical, life sciences, related, and other industries.

- Evolve Canyon Park into a **Multifaceted Neighborhood**.
  Maintain employment and commercial land uses while adding a more intense mix and diversity of land uses to foster holistic live/work neighborhoods.

- Protect, enhance, and leverage Canyon Park's **Robust and Healthy Natural Environment**.
  Maintain the high-quality wetland, creek, and ecological systems.

- Foster and leverage Canyon Park as a **Transportation Hub**.
  Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

- Retain the Puget Sound Regional Council (PSRC) **Regional Growth Center** (**RGC**) designation.
  Meet employment and residential growth targets to maintain PSRC Regional Growth Center designation.

Attachment 2 is an Addendum to the Draft Environmental Impact Statement (DEIS) issued December 6, 2019. The addendum provides additional information regarding land capacity; buildable lands analysis; and describes transportation impacts of the preferred land use alternative.

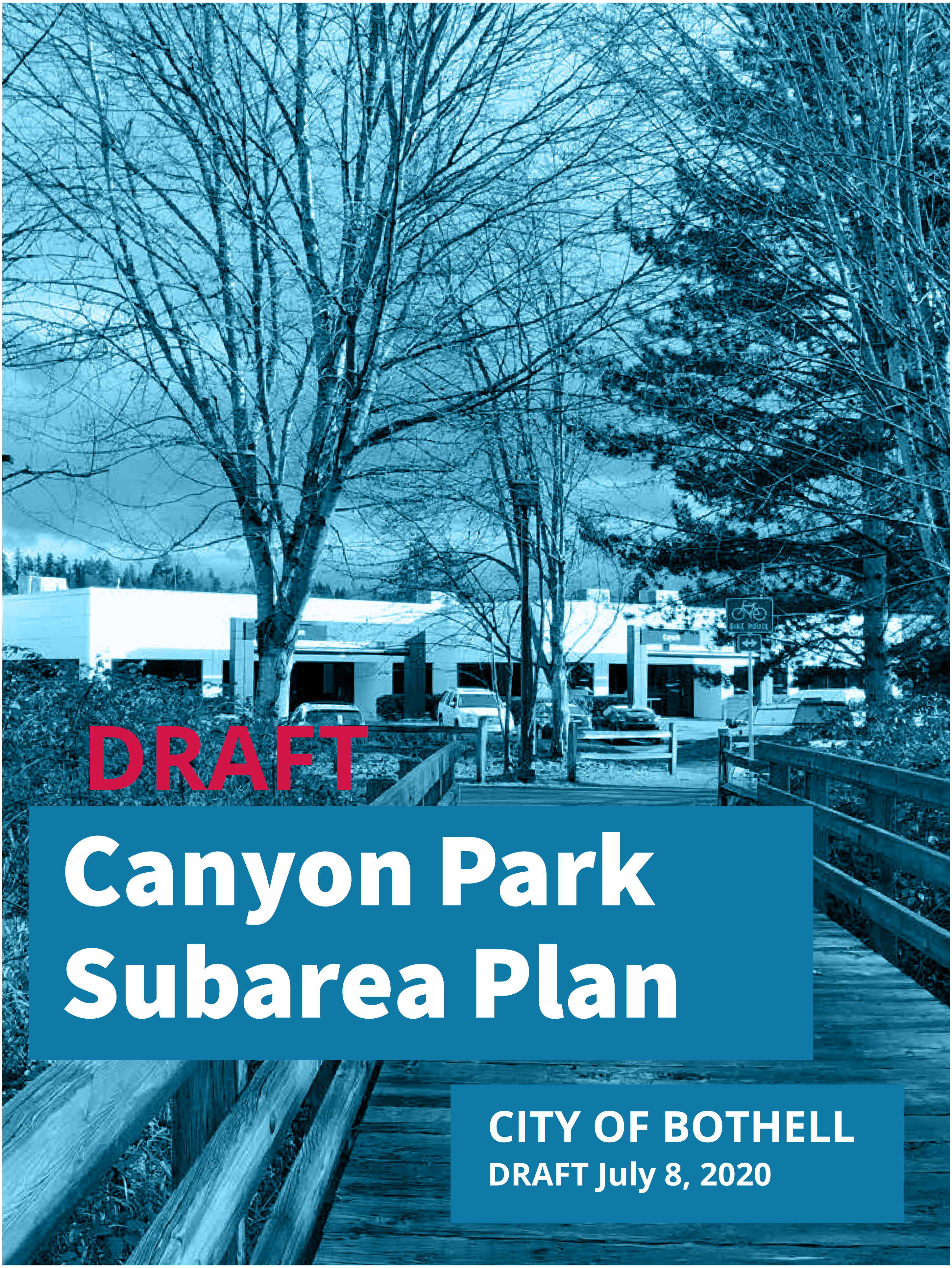
Attachments

1. Draft Canyon Park Subarea Plan
2. Addendum to Draft Environmental Impact Statement issued December 6, 2019.

More information
Additional information and background documents are available on the City's Canyon Park Web Page at: http://www.ci.bothell.wa.us/1176/Canyon-Park-Visioning

Attachment 1

Draft Subarea Plan



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Canyon Park Subarea Plan

CITY OF BOTHELL

DRAFT July 8, 2020

Acknowledgments

THANK YOU

Special thanks to the entire Canyon Park community for their attendance and active participation in Station Access Study events, meetings, and surveys.

City Council

Liam Olsen, Mayor
Mason Thompson
Davina Duerr
Jeanne Zornes
Rosemary McAuliffe
James McNeal
Tom Agnew
Andy Rheaume*

**former mayor*

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Amanda Olson
Brad Peistrup
Carston Curd,
David Vliet
Jenne Alderks
Sarah Gustafson
Patrick Cabe*
Aaron Moreau-Cook*
Jason Hampton*

**former*

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Workers of Canyon Park
Sound Transit
Community Transit
Washington State Department of Transportation (WSDOT)
Northshore School District
Canyon Park Business Owners Association (CPBOA)

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Sdfsdfsdf

Executive Summary
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The chart below identifies how the Canyon Park Subarea Plan addresses challenges in Canyon Park to achieve the Vision.

Challenge/ ***Vision element***	**Plan Direction**
Accommodate expected growth. *An Economic Driver and Multifaceted Neighborhood*	• Update development regulations to increase density near transit. • Set minimum densities to provide needed capacity. • Plan for long-term growth; be patient and wait for projects that fulfill the community's vision.
Make sure expected development is financially feasible. *An Economic Driver and Multifaceted Neighborhood*	• Use parking reductions, height increases, and other tools to make development and redevelopment more feasible. • Leverage public investment in critical infrastructure, gathering places, and trails to attract private investment.
Provide a functional transportation system. *A Transportation Hub*	• Facilitate a shift from cars to other ways of travel, recognizing that "you can't build your way out of traffic congestion" and focusing on moving people rather than individual cars. • Prioritize transit on Bothell Everett Highway and local bus routes through the business center. • Install pedestrian and bicycle infrastructure to connect transit stations and destinations. • Increase opportunities for people to live and work near transit. • Reduce vehicular trips into the business center by encouraging park-and-rides to locate south of 228th St SE and north of Maltby Rd (SR 524). • Extend streets, improve intersections, and/or update street channelization when necessary to improve overall mobility, especially if it makes transit more viable.
Foster businesses. *An Economic Driver*	• Maintain flexibility for a range of business types and sizes. • Protect most of the business park from residential development pressure by allowing only employment/commercial land uses. • Foster an innovation hub by creating places enjoyable for people (see Create people places below) that foster collaboration. • Ensure that trucks and delivery vehicles can safely reach businesses.

Challenge/ ***Vision element***	**Plan Direction**
Create places enjoyable for people. *A Multifaceted Neighborhood*	• Foster transit-oriented neighborhood centers by applying the highest intensity zones closest to transit (red to orange). • Implement design standards so that neighborhood centers develop with a unique identity and a vibrancy that attracts people. • Encourage private socializing places like restaurants, cafes, bars, and gyms. • Require private and public social gathering places with redevelopment. • Facilitate a mix of residential, employment, and retail/service/enjoyment/exercise uses to develop around-the-clock neighborhoods. • Maintain tree-lined streets with buffered sidewalks to keep the park-like character. • Connect to and make use of North Creek and associated trail. • Limit uses closest to I-405 to office/commercial to avoid air quality impacts on residences.
Maintain a high quality natural environment. *A Robust and Healthy Natural Environment*	• Work with property owners to improve stormwater management. • Reduce greenhouse gas emissions by reducing vehicular trips. • Restore/enhance high impact wetlands. • Encourage "green" building and site design to improve energy and water efficiency and detain and treat stormwater.
Be patient. *The full vision*	• Make decisions based on the long-range vision and not short-term market or other trends (e.g., residential development feasibility) with quicker results. • Allow transit improvements to take root before reconsidering the vision.

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The Canyon Park Subarea Plan provides a framework to achieve a new vision for Canyon Park. It encourages a more walkable, accessible, livable, amenity-rich, and competitive job center than previous plans. This Canyon Park Subarea Plan—proposes policies and strategies to implement this new Vision.

The plan will also satisfy regional growth goals identified in the Puget Sound Regional Council's (PSRC) 2018 Regional Centers Framework Update and VISION 2040 plan (or VISION 2050 depending on timing). Regional Growth Centers are urban areas throughout the Puget Sound designated to play a regional role in job and housing growth. They are supported by infrastructure and transportation investments.

01. Background

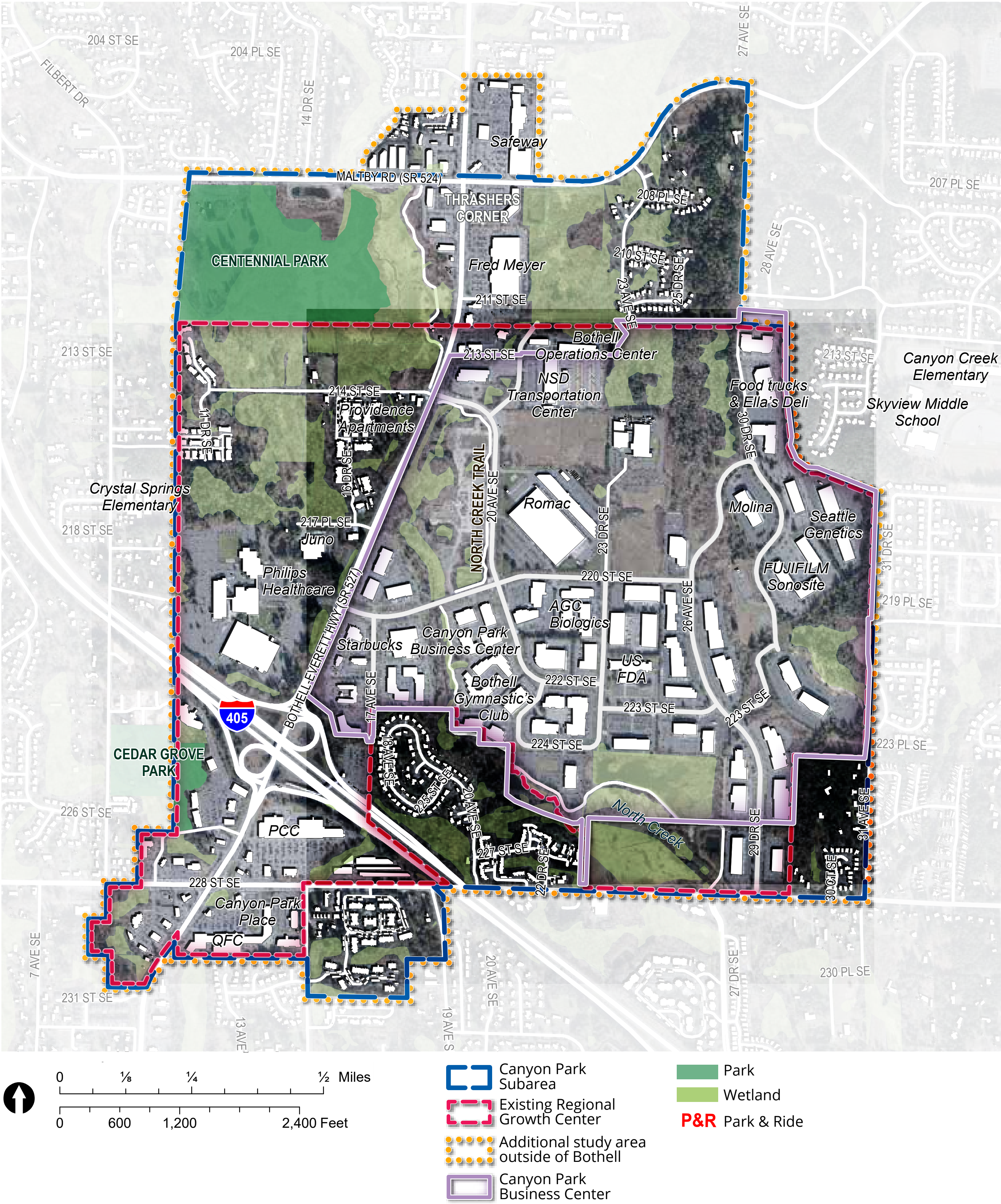
Study Area

Canyon Park has three relevant study boundaries, including:

- **Canyon Park Subarea**—the boundary used in the *Imagine Bothell...* Comprehensive Plan for neighborhood planning,
- **Regional Growth Center**—a smaller boundary developed consistent with past PSRC guidance and updated through this process to maintain a regionally designated center eligible for federal/regional transportation funding (see *PSRC Centers Framework and Growth Targets* and *Appendix A: Existing Conditions Report: Land Use Pattern's PSRC Centers Requirements* section for more information); this plan recommends updating this boundary to cover a more focused area, and
- **Additional study area outside of Bothell**—a larger boundary was developed for this plan which includes Thrasher's Corner for greater neighborhood-oriented planning.

In addition, the study area includes the "Canyon Park Business Park," a private, suburban-style business park containing a variety of companies, many of which are involved in biotechnology and housed within buildings designed to be flexible in terms of floor plans and uses.

Map 1. Canyon Park study area and boundaries



Planning Context

Imagine Bothell...Comprehensive Plan

The *Imagine Bothell...* Comprehensive Plan was initially adopted in 1996 and was recently updated in 2015. The plan implements the goals of Washington's Growth Management Act (GMA) and Puget Sound Regional Council's VISION 2040 regional growth plan and establishes a community vision for the future of Bothell. The Canyon Park Subarea plan is part of the *Imagine Bothell...* Comprehensive Plan.

The vision set forth in the plan is summarized below:

Bothell is a community which...

- Celebrates and respects its picturesque setting
- Fosters an assortment of employment, educational, recreational and cultural opportunities
- Demonstrates a commitment to sustainability
- Ensures the safety and security of community residents, employees and visitors
- Conserves scarce natural resources
- Develops and maintains a transportation system that serves land use goals and offers choices
- Invests in and protects strong neighborhoods
- Offers a range of housing options with an overall single family residential character
- Has vibrant, human-scaled and multi-modal commercial districts
- Builds an appealing and competitive business and employment hub
- Preserves historic structures
- Protects native wildlife habitats
- Offers a diversity of recreation opportunities
- Provides adequate human services to assist those in need
- Meets needs for public utilities through fiscally and environmentally practices
- Conducts efficient and high quality government services
- Works with other public agencies to achieve local and regional goals
- Fosters a commitment among residents to Bothell's present and future

For comprehensive plan policies relevant to each element see "Current Policies and Plans" sections in *Appendix A: Existing Conditions Report.*

PSRC Centers Framework and Growth Targets

Puget Sound Regional Council (PSRC) designated the 733 acre Canyon Park Regional Growth Center (RGC) in 1995 as part of the VISION 2020 regional growth strategy. The VISION 2020 strategy, updated as VISION 2040 and VISION 2050 (planning underway) directs growth to established cities, towns, and growth centers to protect natural lands and use public infrastructure efficiently. New requirements from PSRC establish minimum density thresholds or "activity units" (AU) for RGCs; each job or resident counts as one AU. To create a new RGC or redesignate an existing one, the RGC must have at least 18 AU per acre and have a planned target density of 45 AU per acre.

The existing Canyon Park RGC includes a mix of activity unit rich areas, such as the Canyon Park Business Center and the Canyon Park Place retail hub, and activity unit poor areas, like North Creek and associated wetlands, I-405/SR 527 interchange, and open space areas within the business center. As of 2018, the 733 acre RGC accounted for approximately 10,830 jobs and 1,730 residents for a total of 12,560 AU[1] and a density of 17.2 AU per acre. To achieve the required 45 AU per acre density, Canyon Park would have to add 21,000 AU within the existing RGC boundaries. Revisions to the RGC boundary to remove natural areas from the RGC and include nearby centers of activity like the southern portion of Thrashers Corner will allow Canyon Park to meet the 18 AU per acre minimum for existing density, reduce the total planned AU growth, and help meet PSRC's maximum size recommendation of 640 acres.

Separate from the RGC framework, Snohomish County growth targets require the Canyon Park Subarea to accommodate at least 4,500 new residents, not necessarily within the RGC.

For more information see *Appendix A: Existing Conditions Report: Land Use Patterns.*

1 2018 population via ESRI Business Analyst; 2017 Employment via PSRC

Community Desires

During the extensive public engagement undertaken for this effort, stakeholders, property owners, business owners, employees, residents, and community members identified:

Assets to preserve:

- Wetlands and natural areas
- Trails
- Employment opportunities
- Small businesses in Thrashers Corner and Canyon Park Place
- Investment priorities:
- Relieve traffic congestion
- New public parks
- Complete the pedestrian network
- Improve transit
- Add more restaurants and other amenities

See further public engagement summaries in the *Process* chapter.

02. Concept

Vision

The Vision for the Canyon Park Subarea described below implements policy directions of Bothell's Comprehensive Plan and is informed by results of extensive community engagement among stakeholders, business and property owners, residents, employees, the general public, and agency consultation conducted throughout the planning process. To build on the subarea's current strengths and address the challenges noted above, the Vision integrates the following elements:

- **An Economic Driver.** Canyon Park serves as a regional business hub for the life sciences and biomedical industries. It is a designated urban center and a place of innovation and growth.
- **A Multifaceted Neighborhood.** Canyon Park is a dynamic neighborhood with a diverse mix of housing, office, retail, and public space. It serves both Bothell residents and employees from throughout the region.
- **A Robust and Healthful Natural Environment.** Canyon Park is defined by its unique access to the natural environment and blend of urban wetlands, creeks, and interconnected trails.
- **A Transportation Hub.** Canyon Park is a transportation hub with infrastructure serving employees and residents commuting to and from the neighborhood as well as commuters traveling to other areas.

Canyon Park Today

Assets

Canyon Park is an established and successful employment hub for the City of Bothell and the region. The subarea's most significant strengths include:

- Home to internationally recognized businesses and research facilities, particularly in the life-sciences, biotechnology, and biomedical device sectors
- Abundance of ecologically significant natural amenities—wetlands, creeks, and wooded areas, many with pleasant walking trails and associated open spaces
- Role as a small business incubator
- Location within a growing and desirable area for housing, employment and retail
- Tree-lined streets and natural backdrop instill a park-like character
- A transportation hub with a transit park-and-ride facility, multi-directional bus rapid transit service, immediate access to I-405 and SR 527, and substantial planned transportation improvements

Challenges

Although the area has many strengths, challenges exist. Through the public engagement, visioning, and planning processes, the following themes arose:

Projected Residential and Employment Growth

- Canyon Park is critical to the City's capacity for growth in employment and housing.
- To meet PSRC Regional Growth Center criteria and Bothell's residential growth targets, the subarea must plan for approximately 8,200 new jobs (1.76 times the current number) and 4,700 new residents (3.66 times the current number) (see *Appendix A: Existing Conditions Report: PSRC Centers Requirements*).

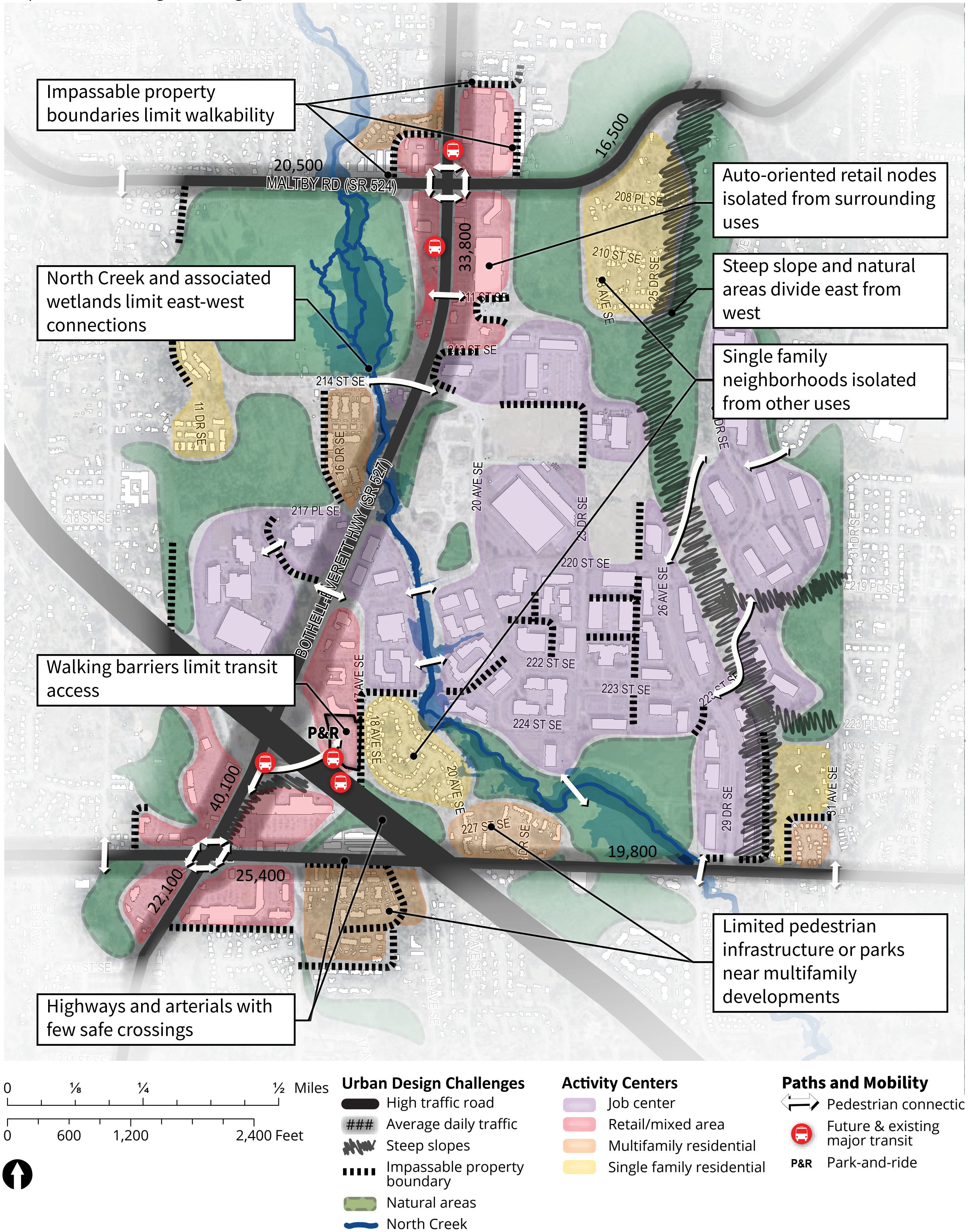
Transportation

- Transportation infrastructure is currently not keeping up with demand, and the commute to and from the area is difficult and getting worse.
- Canyon Park is at a crossroads where regional and local roadways are at capacity; increased growth both within and outside the subarea will contribute to traffic congestion unless mitigating measures are taken.
- Local transit does not adequately serve Canyon Park and the demand for the I-405 park-and-ride lot exceeds its capacity.
- Portions of the subarea, particularly existing neighborhoods and retail areas outside the business park, lack safe and comfortable places for people to walk.
- I-405, Bothell-Everett Highway, and steep slopes on the east side physically divide the subarea, discouraging pedestrian and bicycle movement.
- Many businesses are not conveniently located for transit riders.

Multifaceted Neighborhood and Employment Center

- Though the Canyon Park Subarea is an important regional growth center, its current physical configuration with large natural areas and bisecting roadways make land use and transportation efficiencies a challenge.
- The area lacks amenities and services for employees and residents (e.g., restaurants, retail, and gathering places/parks central to the business center)
- The subarea lacks a focal point of activity (i.e., a neighborhood center)
- The subarea's current auto-dominated development pattern is not conducive to a vibrant, pedestrian compatible neighborhood with a mix of uses, services, and attractions.
- Local schools need additional capacity.

Map 2. Urban Design Challenges



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Urban Design Framework

To achieve a holistic neighborhood, Canyon Park needs a “there” there that supports a biotech innovation hub, other businesses, residents, and natural area enthusiasts. The following strategies—accomplished through a combination of private development and public investment over time —will transform Canyon Park into the multifaceted place community members envision.

Foster Transit-oriented Neighborhood Centers

With improved transit options, the Canyon Park Park-and-Ride and future I-405 flyover stop will become a hub of activity. The strategies outlined in “Create places enjoyable for people” above, and described in more detail in the following Elements, will transform Canyon Park from a disjointed and auto-oriented area into holistic neighborhoods.

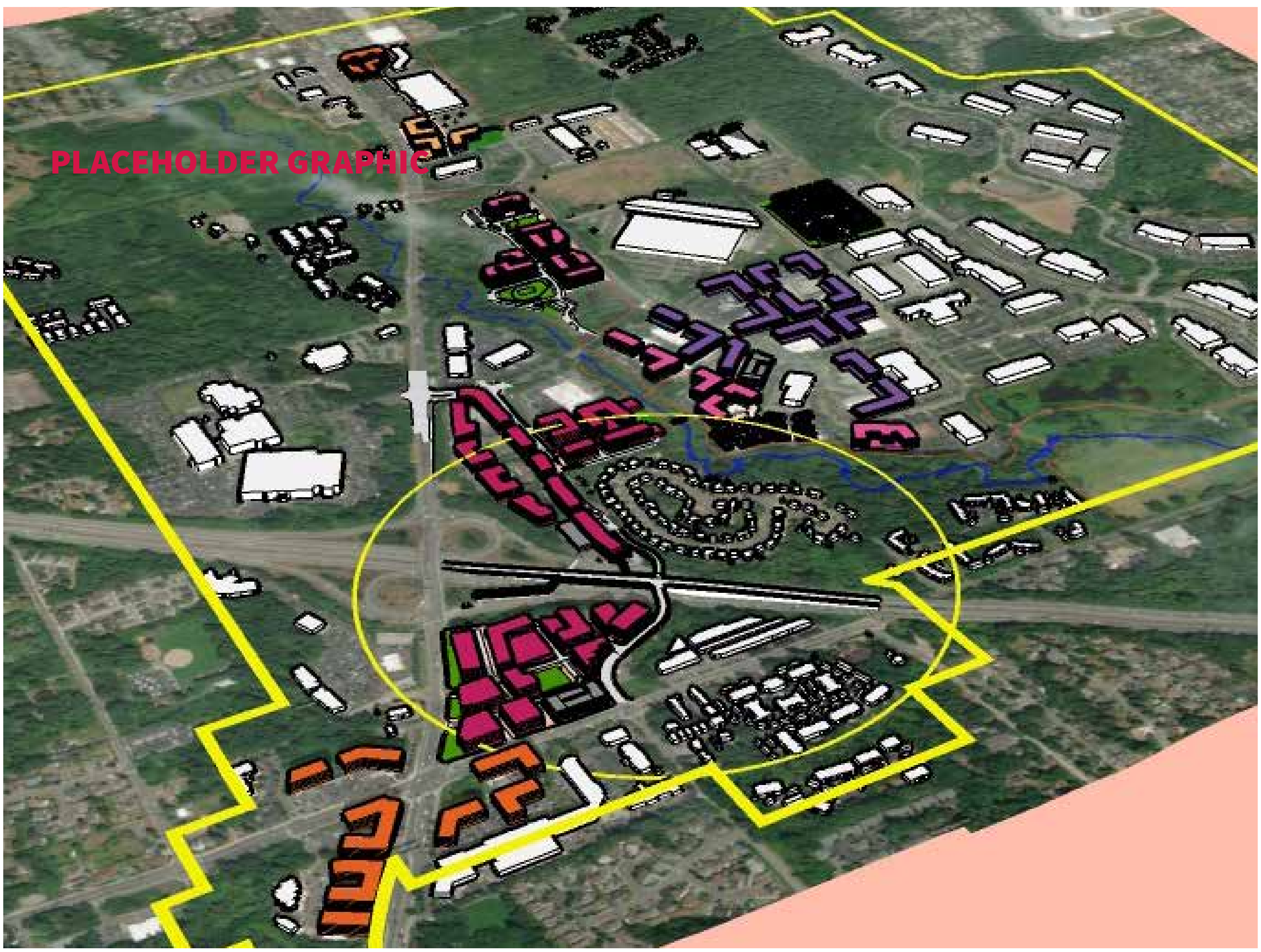

Figure 1. Long-term vision for Canyon Park with transit-oriented neighborhood centers

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Map 3. Canyon Park Concept

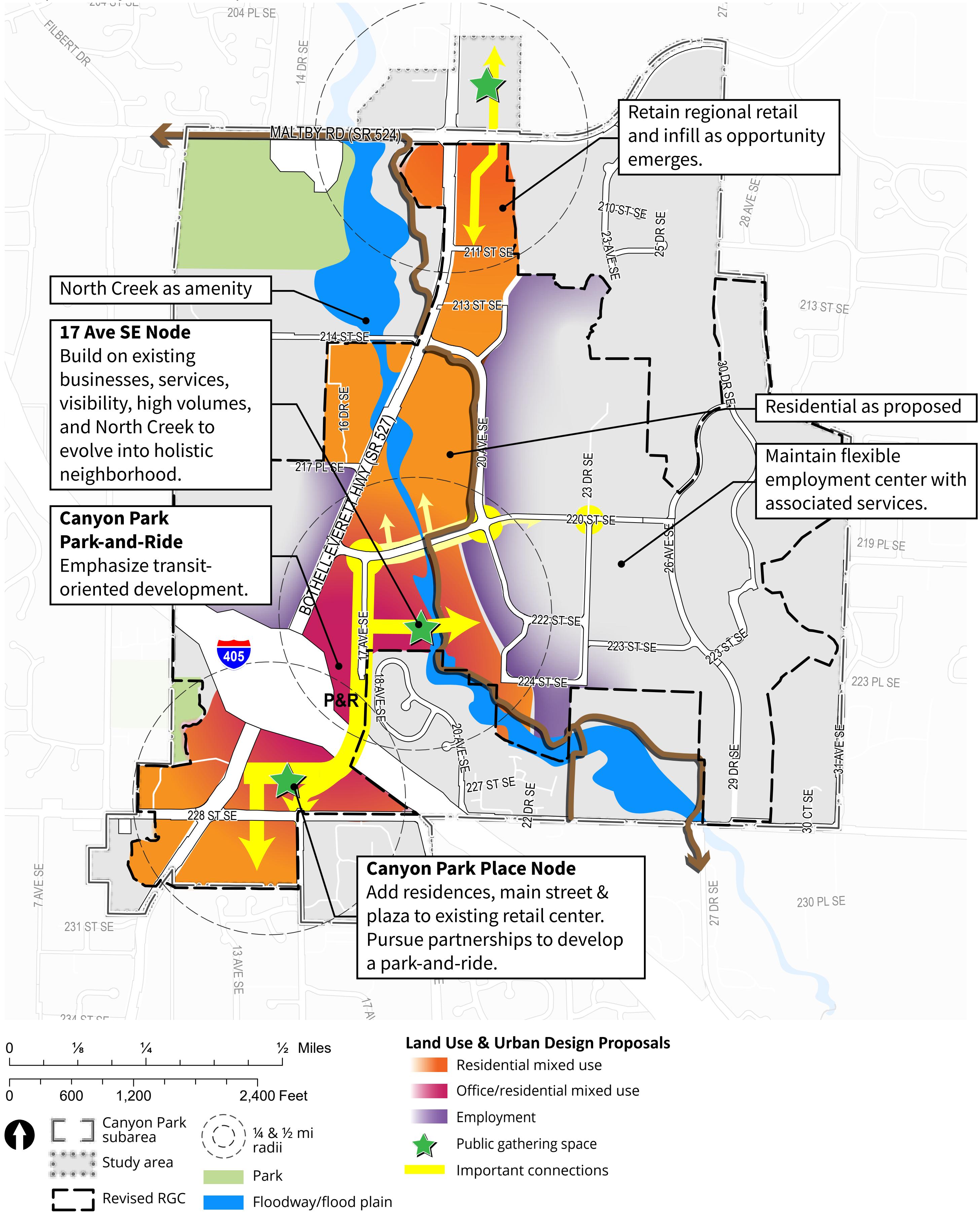

Figure 2. Pedestrian/bicycle/vehicular shared street in Kirkland

17th Ave SE Neighborhood Center

Transform from auto-oriented to people-oriented neighborhood center. 17th Ave SE is already home to businesses and services attracting many people. It is close to the much-enjoyed North Creek natural area and the North Creek Trail. Development in this node will be highly visible from Bothell Everett Highway, the transit station, and the express toll lane users on 17th Ave SE. It is currently auto-oriented, and to better meet the needs of future clientele and neighbors, will need to transform into a pedestrian-friendly, mixed-use neighborhood. This will likely happen over time with redevelopment.

New neighborhood center streets and park. 17th Ave SE and a new east-west street aligned with the existing North Creek bridge will be the crucial path that connects transit riders into the rest of the Canyon Park employment center. Development and design regulations will require new buildings on these paths to create a neighborhood main street look and feel (although ground floor uses will be more flexible than just traditional storefronts). The new east-west street will be a shared street that primarily accommodates people walking, biking, and wheeling, as well as emergency and delivery access. A gathering place on the east end of this new street will celebrate North Creek and establish this as the "heart" of the Canyon Park business center. See *Neighborhood Center Streets* and *Gathering Spaces* in the *Urban Design Urban Design & Community Livability* element.

17th Ave SE park-and-ride as future catalyst site. The existing park-and-ride is a critical piece in the 17th Ave SE node's future. People who will use the I-405 flyover stop will have to pass through it on their way into the business park. Other transit riders will go to/from their cars or transfer routes here. Despite the number of people who will be using the

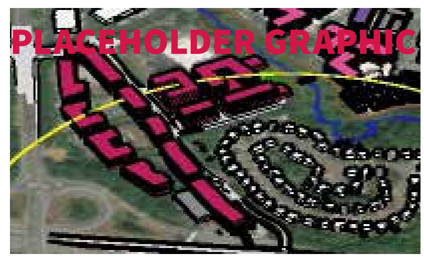

Figure 3. An example vision for the 17th Ave SE neighborhood center

Figure 4. New east-west neighborhood street connects 17th Ave SE (and the I-405 BRT) to a public plaza near the North Creek bridge

Figure 5. A redeveloped park-and-ride with public-facing ground floor and upper floor at the future I-405 pedestrian bridge would increase the sense of safety and enjoyment (Long Beach Mall)

area, the existing environment does not invite people to linger, socialize, or walk north along 17th Ave SE to explore this potential neighborhood.

Bothell and WSDOT should pursue a public-private partnership with a real estate developer to redevelop the park-and-ride. A multistory mixed-use office building, with structured parking serving as the park-and-ride, would catalyze the needed transformation into a neighborhood center. The flyover stop and 17th Ave SE will be vertically and horizontally separated. The mixed-use development will need to Include active uses, people-friendly lighting, and good visibility along that pedestrian path. Making this a comfortable and lively around-the-clock path that easily brings between from ground level to the flyover stop is critical to this node's functionality and transit desirability.

Figure 7. I-405 17th Ave SE express toll lane north side concept. (WSDOT)

Canyon Park Place Node

Transform from auto-oriented to people-oriented neighborhood center. Canyon Park Place, the lively retail area south of I-405 (pink to orange on Map 3), includes PCC, QFC, hotels, fast food, and other regional and small businesses. Though it supports viable businesses, the area is hindered by its almost exclusive auto-orientation. Businesses are surrounded by parking lots without clear paths for pedestrians or bikes. Likewise, the proximity to I-405 transit and the park-and-ride is an asset, but the pedestrian paths on Bothell Everett Highway, the I-405 access ramp, and pedestrian overpass to the park-and-ride are not comfortable or inviting. For example, people walking from PCC to the I-405 transit station have to walk along the six-lane highway on a narrow sidewalk, cross an onramp with no marked or easily visible crossing, and use a 600-foot long pedestrian overpass to reach the park-and-ride on 17th Ave SE.

Figure 6. I-405 17th Ave SE express toll lane south side long-term concept. (WSDOT)

In addition, neighborhoods just south and southeast of Canyon Park Place do not feel connected or unified with the area.

Applying minimum density regulations plus building and site design standards will encourage infill and redevelopment to transform the character into a multi-faceted neighborhood with a mix of residential and commercial. An air quality overlay around I-405 will limit land uses to office/commercial to avoid health impacts on residents and other sensitive uses (e.g., schools, daycares).

New neighborhood center streets and park. Design standards will require critical future streets, many of which generally align with existing buildings and storefronts, to act as “main streets” or at least have a strong building-to-street relationship with redevelopment. These pedestrian-oriented, lively streets will connect people to the flyover stop, retail/service and housing in Canyon Park Place, and neighborhoods to the south. A central plaza/park, mostly ringed with active ground floors, will provide a much needed social gathering space. Together, these streets and gathering places will create a true neighborhood center.

WSDOT’s long-term concept for a 17th Ave SE/15th Ave SE extension south of I-405 presents opportunities for a vastly improved pedestrian and non-motorized (and potential transit) experience reaching the flyover stop and connecting the southern and northern portions of Canyon Park. In this scenario, active ground floors could step up alongside the new roadway/ramp, maintaining a lively street front.

Potential future park-and-ride. The existing park-and-ride on 17th Ave SE is at or over capacity, many I-405 transit riders originate from outside of Canyon Park, and local transit is not yet adequate for getting transit riders to the station. Thus, while suburban environments become more supportive of transit and non-motorized travel, strategic park-and-rides can ease the transition. Though further study is needed, added park-and-ride capacity south of I-405 would likely reduce trips on Bothell Everett Highway and the need to cross I-405 into the Canyon Park business center.

A good location for a new park and ride would be south of I-405 and along the WSDOT I-405 Master Plan’s proposed 17th Ave SE extension (see Figure 7). For highest and best use of land, it should be a multistory structure with office/commercial (or residential if south of the Air Quality Overlay shown on Map 9 in the *Land Use* element) and structured parking. As mentioned above, it should activate the 17th Ave SE sidewalk, providing a safe and comfortable path to the flyover stop.

Figure 8. Sample phased redevelopment of Canyon Park Place

Figure 9. Neighborhood center streets and public and private gathering places make a lively place for people.

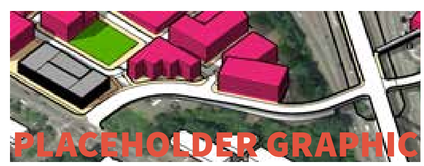

Figure 10. Development fosters a comfortable and safe path to the future I-405 BRT station

Thrasher's Corner

Think long term. The following reasons make Thrasher's Corner redevelopment a longer-term priority than the 17th Ave SE and Canyon Park Place nodes:

- Only one high capacity transit route—the Swift Green Line—serves Thrasher's Corner, whereas by the year 2024 the I-405 area will have both the Green Line and Sound Transit's I-405 BRT with multi-directional service and connections to the entire Sound Transit system.
- Fred Meyer recently invested in a major improvement of the store, meaning redevelopment in the near future is unlikely.
- South of Maltby Road, the commercial zones have wetlands located east and west, limiting the retail area's "walkshed" (i.e., the area within a 5 or 10 minute walk), and are not directly connected to the business park to the south. There is an informal parking-lot-to-parking lot drive aisle that, with improvement, could provide this connection. Until that time, this area is less important for supporting the business park with residences and retail/service amenities.
- Existing retail serves an important function as cultural anchors, described in more detail below.

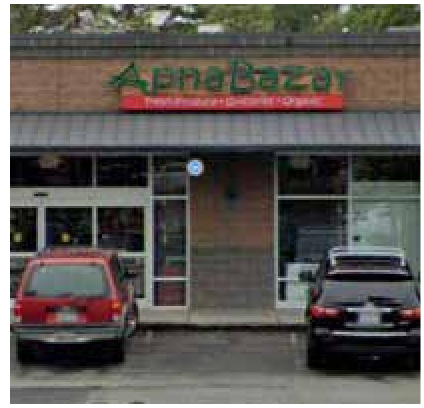

Figure 11. Grocery just outside of Canyon Park in Snohomish County serves as a cultural anchor

Foster existing retail and cultural anchors. The existing retail attracts a regional customer base and serves an important function as social gathering places, especially for racially and culturally diverse clienteles. A variety of Indian, Asian, and other people-of-color (POC)-owned groceries, restaurants, and small businesses act as cultural anchors, providing culturally-appropriate food options and comfortable social network building space. Fred Meyer reports many Indian clientele enjoy socializing while shopping in the store. Just east of the subarea is a Hindu Temple and Cultural Center, and south of the subarea are an Ananda Cultural Center and a Korean Church, all of which provide other anchors for these communities. Carefully supporting the vitality and functionality of this collection of cultural activity will increase economic vitality, build social networks, and support mental and physical health. See actions to foster POC-owned and small businesses in the *Economic Development* element and affordable commercial space recommendations in the *Land Use* and *Urban Design & Community Livability* elements.

Long-term neighborhood center. New zoning and design standards will allow infill and redevelopment with a more intense mix of uses as opportunities emerge, while keeping existing retail. A north-south route through the shopping center will be a "main street." Ground floors will be active and relate to the street, and public/private open spaces will make it an attractive place to linger and gather.

North of Maltby Rd (SR 524), unincorporated Snohomish County houses higher density residential. Snohomish County has an opportunity to support Thrasher's Corner as a neighborhood center and connect it to residents to the north and into Canyon Park. Snohomish County should consider the following to support an active and functioning neighborhood center:

- Implement block front standards like this plan's neighborhood center streets to continue the north-south "main street" north of Maltby Rd (SR 524).
- Require public space with redevelopment.
- Explore ways to achieve a significant public gathering space with redevelopment of the retail areas.
- Partner with Snohomish County and other agencies to install a pedestrian/bicycle crossing on Maltby Rd (SR 524) at the north-south neighborhood center street.

Figure 12. Residential areas along North Creek and Bothell-Everett Highway.

Other Mixed-use Neighborhood Areas

Further from major transit nodes, residential uses will continue to be allowed along North Creek and Bothell Everett Highway (orange areas in Map 3) and where residential is proposed west of 20th Ave SE between 220th St SE and 214th St SE. These areas provide additional land to help meet the residential growth targets, make use of North Creek and North Creek Trail as residential amenities, encourage mixed-use neighborhoods around existing retail, and allow the business park to gain the benefits of a greater mix, variety, and intensity of uses.

Maintain Flexible Job Centers

Flexible and functional. Development intensity will likely subside further from major transit nodes and be primarily jobs oriented (areas denoted with purple fading into grey). This area will likely not see major change in the near term though Subarea plan strategies should maintain a flexible and functional employment center while encouraging some infill and redevelopment that includes amenities.

Through-block connections. Connectivity and character will improve as redevelopment adds through-block connections—some of which will be secondary neighborhood center streets with some active ground floors and a strong building-street relationship—while maintaining the park-like setting along the existing suburban-style streets. Development will likely occur piecemeal over time, therefore, as much as possible, through-block connections are conceptually located between buildings and along property lines. This allows for some internal connections through these large blocks early, even without redevelopment.

Stricter design standards will apply to the sides of buildings facing new neighborhood center street through-block connections. These build on the existing building orientation toward internal parking lots (rather than to existing streets). In the future, building entries will continue to face these internal paths, and the existing streets will maintain their suburban, landscaped feel.

The long-term vision for the business park's streets include buffered shared-use paths on major streets and pedestrian/bicycle priority on all through-block connections.

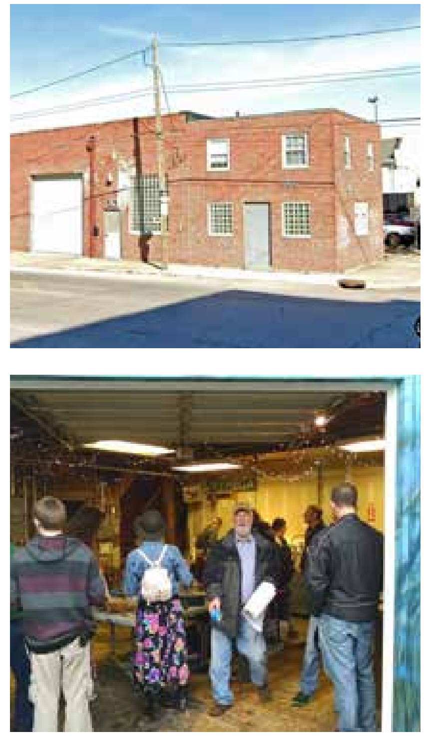

Figure 13. Examples of flexible buildings that support a range of light industrial, makers spaces, and business incubators

(Top: Google Maps, Bottom: MAKERS)

North Creek Trail

North Creek and North Creek Trail will be the central, unifying north-south element linking each piece. Bothell will construct the missing link and crossing at 220th St SE, enhance or install connections needed in the short term, and require future connections with redevelopment. These actions will allow residents and business park users to enjoy North Creek as an amenity.

Figure 14. North Creek Trail

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Goals and Policies

To achieve the vision, this plan focuses on the following goals and policies:

ED Maintain, protect, and support Canyon Park as an **Economic Driver.**

ED-1 Ensure that Canyon Park continues to grow as the regional hub for the biomedical, life sciences, related, and other industries

ED-2 Continue to support existing businesses of all sizes and provide a fertile environment for business growth.

ED-3 Protect commercial space affordability and viability in employment areas.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

ED-9 Allow building sizes and scales that support future employment capacity.

ED-10 Ensure that housing meets the needs of the local workforce.

ED-11 Continue accommodating existing and new business growth through efficient permitting services.

MN Evolve Canyon Park into a **Multifaceted Neighborhood.**

MN-1 Maintain employment and commercial land uses while adding a more intense mix and diversity of land uses to foster holistic live/work neighborhoods.

MN-2 Promote development of a diverse range of market rate and affordable housing that meets employee and residents' needs, offering excellent amenities, private open space, and gathering spaces that integrate into the neighborhood.

MN-3 Increase the number of affordable housing units in Bothell, especially near transit and jobs.

MN-4 Increase feasibility of desired development, especially affordable housing.

MN-5 Implement new public park spaces(s) with recreational uses to offer further amenities to neighborhood users.

MN-6 Invest in signature public gathering spaces to create neighborhood centers of social interaction and innovation.

MN-7 Improve access to and crossings of North Creek to make it a unifying element of Canyon Park.

MN-8 Increase the abundance and diversity of retail and service amenities that serve Canyon Park and the surrounding area, while focusing them in transit-oriented neighborhood centers.

MN-9 Locate amenities to create hotspots of social activity and build on the natural character of Canyon Park.

MN-10 Encourage development to use land efficiently.

MN-11 Apply land use and design regulations to allow and encourage transit-oriented development that creates multifaceted neighborhoods.

MN-12 Make land use decisions based on the long-range vision and not short-term market or other trends.

MN-13 Set parking standards so that development provides the "right" amount of parking for its use and context.

MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

MN-15 Phase projects for least negative impacts and greatest benefits to residents, businesses, and ecological systems.

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NE Protect, enhance, and leverage Canyon Park's robust and healthy **Natural Environment.**

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-2 Address stormwater issues through collective and individual management techniques and facilities.

NE-3 Maintain and improve recreational access to North Creek and natural areas for residents and workers, allowing for enjoyment of these natural systems.

NE-4 Enhance and improve these natural areas through volunteer programs, resource grants, and other mechanisms.

NE-5 Encourage natural drainage systems that improve stormwater infiltration and detention to reduce flooding and improve water quality.

NE-6 Mitigate transportation project impacts to ecological systems.

NE-7 Retain forest lands particularly on ridgelines and those associated with critical areas.

NE-8 Reduce buildings-related greenhouse gas emissions and encourage energy and water efficient development.

TH Foster and leverage Canyon Park as a **Transportation Hub.**

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

TH-4 Encourage the highest density land uses to locate near high capacity transit.

TH-5 Work with the private sector and agency partners to reduce commuters' dependency on single occupancy vehicles (e.g., through a transportation demand management (TDM) or commute trip reduction (CTR) program).

TH-6 Encourage options for fast, easy "last-mile" trips between transit stops and job sites/residences.

TH-7 Encourage shared parking solutions between businesses.

TH-8 Strategically expand road/intersection capacity to improve traffic flows within the subarea. Minimize business, resident, and ecological impacts to the maximum extent feasible.

TH-9 Improve street network connectivity by extending select Canyon Park streets to relieve congestion on Bothell-Everett Highway and at choke points. Minimize business, resident, and ecological impacts to the maximum extent feasible.

TH-10 Expand access to park-and-rides in Canyon Park to ease the transition from suburban, auto-oriented travel to other modes.

TH-11 Encourage catalyst redevelopment projects that support transit ridership.

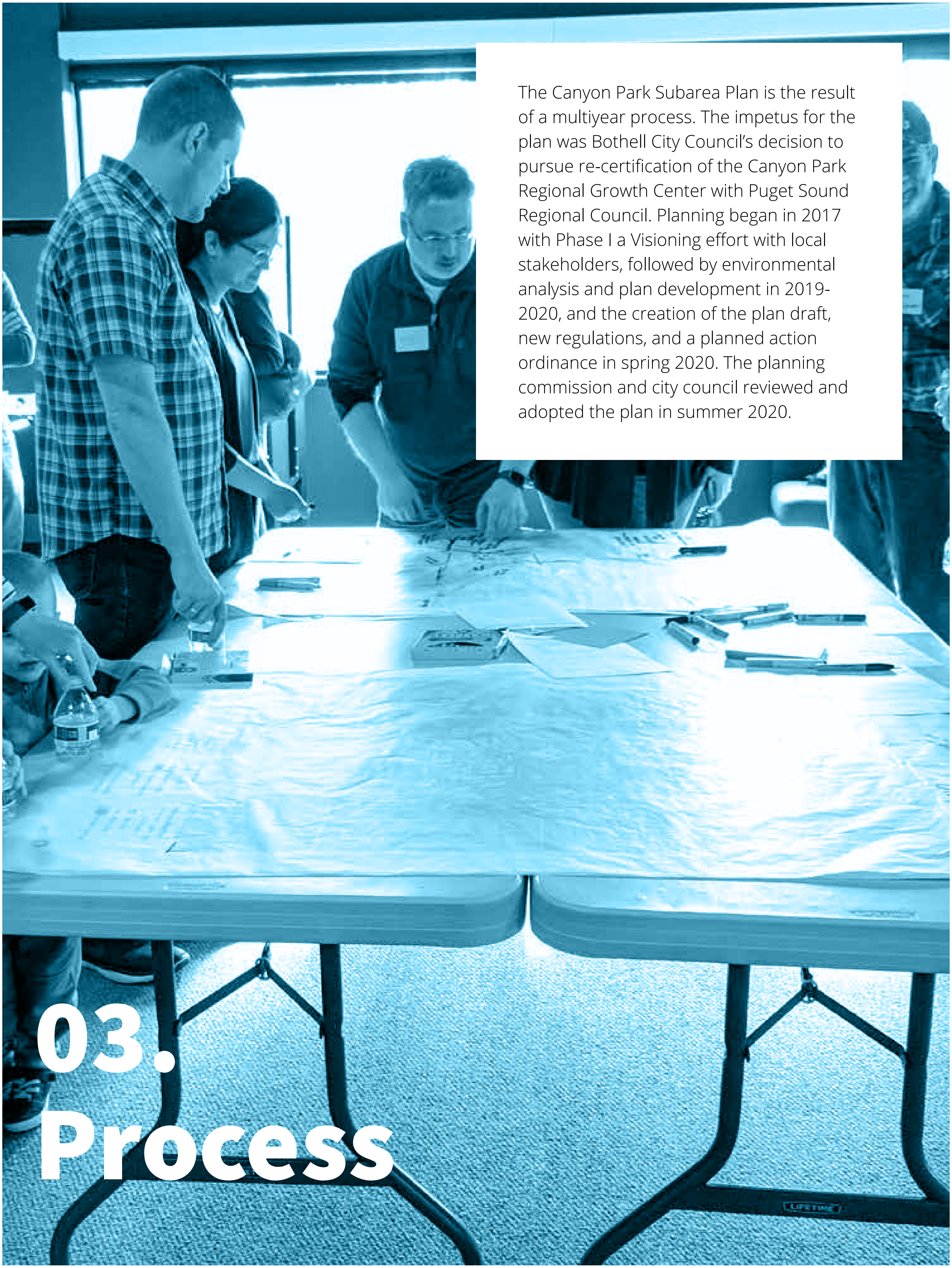
TH-12 If needed, consider updating Bothell's LOS policy to recognize "ultimate capacity" of Canyon Park corridors and better support transit and other travel modes.

RGC Retain the PSRC Regional Growth Center (**RGC**) designation.

RGC-1 Meet employment and residential growth targets to maintain PSRC Regional Growth Center designation.

RGC-2 Meet Snohomish County residential and employment growth targets.

RGC-3 Balance desired land use patterns and transportation investments and policies.



03. Process

The Canyon Park Subarea Plan is the result of a multiyear process. The impetus for the plan was Bothell City Council's decision to pursue re-certification of the Canyon Park Regional Growth Center with Puget Sound Regional Council. Planning began in 2017 with Phase I a Visioning effort with local stakeholders, followed by environmental analysis and plan development in 2019-2020, and the creation of the plan draft, new regulations, and a planned action ordinance in spring 2020. The planning commission and city council reviewed and adopted the plan in summer 2020.

Phase 1

Canyon Park Vision

To develop the Canyon Park Vision planners engaged key stakeholders, analyzed baseline economic and infrastructure conditions, and assessed the center's development potential. This led to a high-level vision for Canyon Park to become an economic driver, a multifaceted neighborhood, connected to the natural environment, and a transportation hub. This is described in further detail in the *Concept* chapter.

Phase 2

Plan Development

For Phases 2 and 3 of the project, the City worked with a consultant team to investigate land use planning, economic, demographic, transportation, urban design, environmental systems, and infrastructure current conditions and trends in the subarea, engage community members, and strategize steps forward.

Community Engagement

Informed by an early survey of Phase 1 participants, the team used a multi-pronged strategy to reach small business owners, residents, and property owners in the subarea. Two community workshops, a widely disseminated online survey, and several charrettes and focus groups provided venues tailored to different stakeholders to learn about the issues, refine the vision, and identify potential actions.

Figure 15. Community Scoping Meeting

Interagency Coordination

Regional transportation investments will be critical to support growth in Canyon Park. To coordinate planning and share information between the agencies involved in transportation in the subarea, the City hosted three Interagency Transportation Advisory Committee (ITAC) meetings with representatives from WSDOT, Sound Transit, Community Transit, Snohomish County, and Northshore School District.

Land Use Alternatives

The project team, with community input, developed alternatives to explore the impacts of different growth scenarios. Each alternative includes an estimate of new residential units and jobs added or replaced under the alternative. Transportation planning consultants performed traffic modelling and analysis on each alternative to understand the impact of adding new vehicle trips within the subarea.

NO ACTION

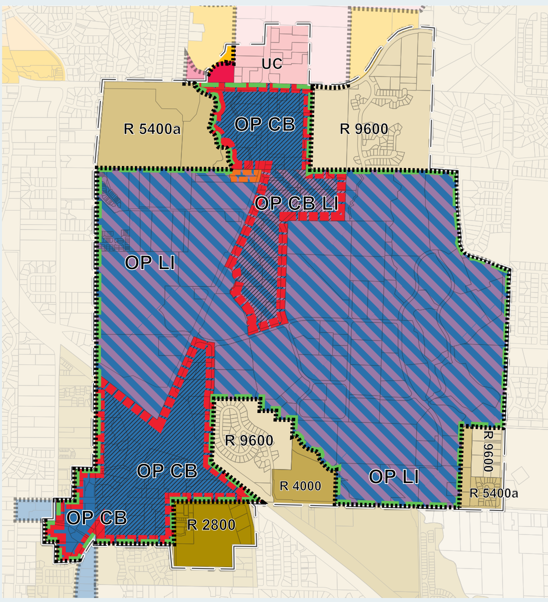


Figure 16. Canyon Park current conditions

- Assumes current regulations and planned infrastructure projects through the year 2044
- Does not meet the PSRC requirements for activity unit density or Snohomish County residential growth
- Traffic becomes significantly worse with both SR 527 and SR 524 reaching an F level of service (LOS), due to both growth within the subarea and growth in surrounding areas

New residents (net)	3,172
New jobs (net)	4,530
RGC area	733 acres
New PM peak trips	3,960

BUSINESS PLUS

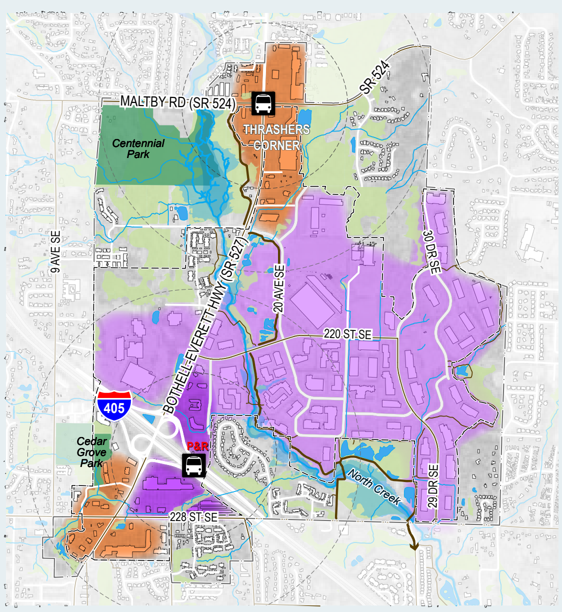


Figure 17. Business Plus concept map

- Strengthen role as an employment center for bio-tech, manufacturing, logistics, offices and other employers
- New residential and retail clusters around SR 527 on the northern and southern ends of the study area
- With significantly more new peak hour vehicle trips than the No Action alternative, all major corridors in the subarea reach LOS F

New residents (net)	4,000
New jobs (net)	17,200
RGC area	613 acres
New PM peak trips	9,060

LIVE/WORK AND MITIGATED LIVE/WORK

- Transformation to a more complex and amenity-rich environment that supports a lively 24-hour neighborhood
- New mixed-use housing prioritized
- Peak hour trips would be even higher than the business plus alternative, resulting in even more traffic delay

New residents (net)	6,700
New jobs (net)	15,100
RGC area	613 acres
New PM peak trips	10,900

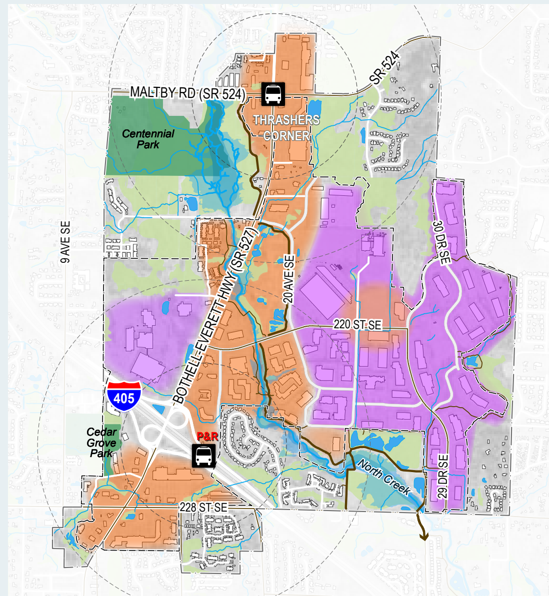


Figure 18. Live/Work concept map

PREFERRED ALTERNATIVE

- Balances the mixed retail/residential growth and employer-focused growth
- Most intense development around BRT stops; some residential development between 20th Ave SE and SR 527
- Reduces size of RGC and lowers assumptions about redevelopment intensity, leading to much lower job growth numbers

New residents (net)	6,100
New jobs (net)	7,600
RGC area	565 acres
New PM peak trips	5,820

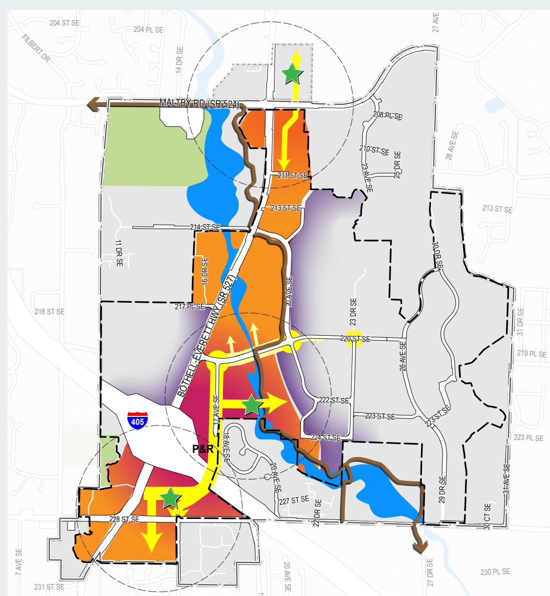


Figure 19. Preferred Alternative concept map

Environmental Analysis

The team documented potential environmental impacts of the alternatives to ensure compliance with the State Environmental Policy Act (SEPA). After a scoping period, the team assessed environmental impacts of the alternatives in the following areas:

- Natural Environment
- Land Use Patterns and Policies
- Aesthetics and Urban Design
- Socioeconomics
- Transportation and Greenhouse Gas Emissions
- Public Services
- Utilities and Stormwater

Where the team identified negative environmental impacts they proposed mitigation measures or noted if measures were not available.

Figure 20. Impacts to North Creek were analzyed

Figure 21. Traffic backed up on I-405 on-ramp

Figure 22. Proposed development in CPBC

Phase 3

Plan Draft, Development Regulations, Planned Action Ordinance

In the projects' final phase, the team worked with the Planning Commission to refine the preferred "middle ground" alternative, draft the subarea plan, finalize environmental analysis results, and draft implementing regulations including development standards and a planned action ordinance

What We Heard

2017

Open house and online interactive map/survey

- Transportation was the top concern among both workers and residents
- Other concerns:
    - Pedestrian and bike safety
    - Housing
    - Crime
    - Parks and open space
    - Wetlands protection
    - Businesses retention

Figure 23. Charrette with the project team

2017-2018

Stakeholder focus groups

Jan 2019

Survey with Phase 1 stakeholders

- Support for greater mix of uses, with residences and public amenities.
- There are a range of transportation problems.

March 2019

Community-wide survey

- Survey for the public with 333 responses.
- General support for the Phase 1 Vision.
- Wetlands and natural areas are important assets to preserve.
- Traffic is a top concern and priority for improvement.
- Other priorities include better public amenities for recreation and travel.

Figure 24. Community Scoping Meeting

April 2019

Community Scoping meeting

- Pedestrian routes are disconnected.
- Transit doesn't work for local travel.
- New housing should be located in existing retail clusters.

City Council Study Session

- Brief the Council on the Vision established by the Stakeholders
- Explain the Vision Report and provide highlights from the report
- Outline next steps

Planning Commission Study Session

- Brief the Commission on the Vision established by the Stakeholders
- Explain the Vision Report and provide highlights from the report
- Outline next steps

July 2019

Canyon Park Business Owners Association (CPBOA) focus group

- Public safety is a concern if the area is to become more residential-oriented.
- Traffic congestion isa serious problem that makes it hard to find tenants.
- Support for 20th Ave extension to Maltby Road.
- Small plazas and places for gathering/eating are needed.
- 17th Ave express toll lane ramps should trigger Park-and-Ride expansion.

Aug 2019

Interagency Transportation Advisory Committee (ITAC) #1

- Improve transit function with transit priority and adaptive signals.
- Work with employers to reduce incentives for driving with a transportation demand management (TDM) program.
- Address transit "last mile" with shuttles and bike/scooter lanes.
- Increase number of access points to Canyon Park for drivers and peds/bikes.
- No new interchanges on I-405 are likely.
- Consider a Park-and-Ride outside Canyon Park to catch commuters before they enter the most congested area.

November 2019

Planning Commission Study Session

- Briefed Commission on Action Alternatives for the DEIS
- Outlined the different growth options and sizes of the RGC
- Identified results of traffic modeling of the action alternatives being considered

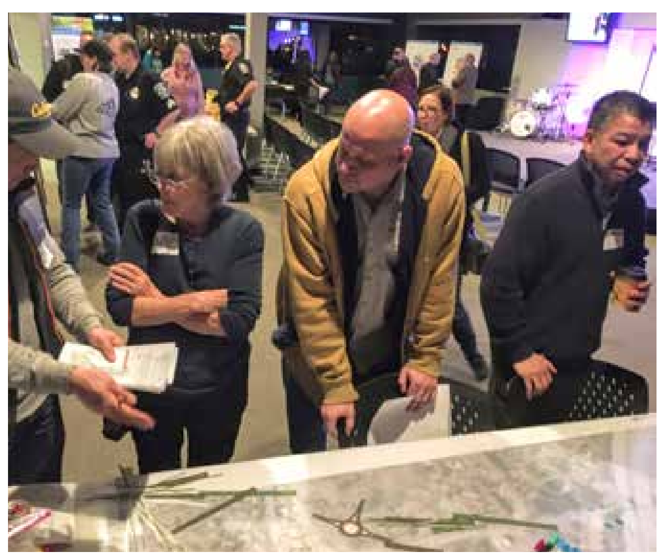


Figure 25. 9th Ave, 214th St, and 219th Pl Community Workshop

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Nov 2019

City Council Study Session

- Briefing to the City Council on potential Action Alternatives for evaluation in the DEIS
- Outlined the PSRC RGC growth minimums, sizing and other framework criteria for growth centers
- Identified upcoming process steps

Dec-Jan 2020

DEIS Public Comment Period

- Concerns:
  - 214th St SE extension
  - Appropriateness of RGC
  - Adequate and feasible mitigation
  - Stormwater detention/treatment
  - School capacity and bus flow
  - Traffic analysis – AM peak, internal streets
- Suggestions:
  - Additional/alternative street extensions
  - Curb space for deliveries and TNCs
  - Stronger ecological design with redev.
  - Support for:
  - Ped/bike connections/safety
  - Mixed use & TOD

Jan 2020

9th Ave, 214th St, and 219th Pl Community Workshop

- Concern about traffic associated with extension of 214th St SE.,
- Support for a trail connection to 214th St SE.
- Strong support for safety improvements along 9th Ave SE, especially sidewalks. Attendees also interested in options for traffic control devices, reduced speed limits, and improved signal timing.

WSDOT Meeting

- Design for new 17th Ave includes shared-use path, roundabout, new turn lanes at 17th/220th intersection.
- South side ETL ramps very long term, unlikely to occur for decades.

Planning Commission Study Session

- Briefed the Commission on the DEIS and action alternatives
- Commission interested in additional analysis of street extensions
- Support for transit and other non-single occupant vehicle movement
- Move people – Not cars
- Continue to plan for PSRC capacity requirements

Figure 26. ITAC #2 Meeting

Feb 2020

20th Ave Workshop

- Project team met with Fred Meyer and Thrasher's Corner representatives
- Support for extension of 20th Ave to Maltby Road.

ITAC #2

- Need to shift away from single-occupant-vehicle (SOV) thinking; consider changing LOS standards or measuring person-trips rather than vehicle-trips.
- Use business access and transit (BAT) or a reversible transit-only lane to improve transit speed and reliability.
- New Park-and-Ride is not a priority for most area transit agencies; would prefer to see dense activity around transit.
- Consider a ride hailing service similar to what Metro piloted in Seattle's Rainier Valley.
- Consider pull-outs for schools buses along high-traffic streets if the residential population increases.

CPBOA briefing

- Concerns raised regarding market support for additional development
- Identified continuing to need support single occupant vehicles due to a lack of transit services
- Desire to see the impacts of the three separate actions occurring in the Park (WSDOT, ST, and Subarea Plan) to be coordinated
- Concerns about the impact of modern surface water regulations upon redevelopment feasibility

Life Sciences Charrette

- Strong interest in transportation improvements:
- Buffered bicycle routes
- Pedestrian paths/trails
- Transit
- Collective shuttle
- Scooter/bike shares
- Overall transportation system
- Strong land use interests:
- Life sciences hub
- Affordable housing

Planning Commission Study Session

- Support transit priority and shift to non-SOV modes.
- Support street extensions if:
- Tied with major improvement to transit
- 9th Ave safety improvements come first
- Public safety use
- Look at the ITAC's suggestions for BAT lane and parallel transit route options.
- Support reduced parking requirements and parking management strategies.
- Support redefining LOS to be less focused on private vehicles.
- Support increased share of residential activity units.
- Support for an air-quality buffer around I-405 to prevent sensitive uses like residential, schools, day-care.

March 2020

Planning Commission Public Hearing

- Amended land use designations near the 405/527 interchange to be more office-oriented – not a good location for residential land uses
- Take advantage of the investment in Transit for the area by concentrating more intense land uses near BRT stops
- Reiterated the findings from their previous study session deliberations
- Forwarded a recommended preferred land use alternative

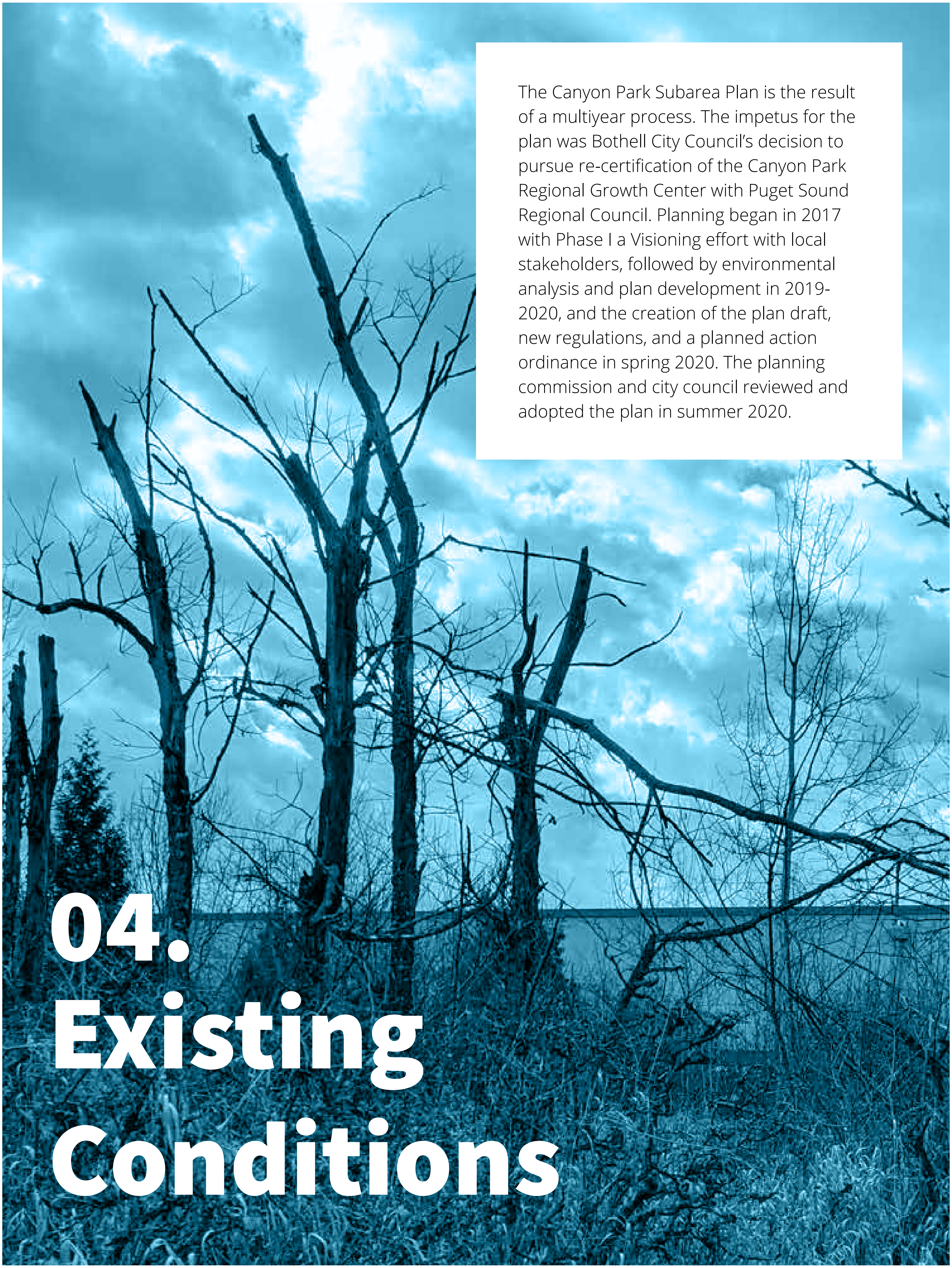
June 2020

City Council Study Session

- Briefed Council on Planning Commission Recommendation, the suite of land use designations, market analysis findings, early transportation analysis and public engagement
- Council generally supportive of the Preferred alternative recommendation and the general approach for transportation as outlined by the Commission
- Wants to understand the impacts of 'pass-through' or background traffic

Planning Commission Study Session

- Briefing on early transportation modeling results and draft subarea plan outline and sections
- Would like to see background on the public engagement process particularly for people of color. Interested in seeing more public engagement and getting additional feedback on the preferred alternative
- Interested in investigating parking maximums as a means of encouraging TDM and Transit use
- Support for the notion of being patient and waiting for land uses that support the RGC designation



04. Existing Conditions

The Canyon Park Subarea Plan is the result of a multiyear process. The impetus for the plan was Bothell City Council's decision to pursue re-certification of the Canyon Park Regional Growth Center with Puget Sound Regional Council. Planning began in 2017 with Phase I a Visioning effort with local stakeholders, followed by environmental analysis and plan development in 2019-2020, and the creation of the plan draft, new regulations, and a planned action ordinance in spring 2020. The planning commission and city council reviewed and adopted the plan in summer 2020.

Community Structure

The Canyon Park Subarea is a suburban center that supports a major employment district, a retail corridor with two distinct nodes, natural areas with a major regional creek, multifamily residential and single-family residential areas. These diverse uses are set in an auto-oriented landscape and separated from one another by roads with heavy traffic, streams and wetlands, and fenced property boundaries. Overall land use intensity is moderate, with trees, greenery, and parking lots throughout, and few buildings over two stories tall. These aspects, and the lack of any clear centers of human activity, give the area a strongly suburban feel.

The heart of Canyon Park is its job center with more than 10,000 jobs in biotech, manufacturing, logistics, government, and services, and is anchored by the 300-acre Canyon Park Business Center (CPBC). Businesses range from major corporations to small independent businesses, taking advantage of Canyon Park's easy access to I-405, proximity to Seattle and Bellevue, relatively affordable rents, and flexible building stock. Retail clusters with grocery stores, hotels, restaurants and shops are located to the north and south of the job center on Bothell Everett Highway. Multifamily and single family residential clusters are scattered throughout the subarea, isolated from other uses.

Figure 27. Bird's eye view of Canyon Park. *Imagery © Google; Map data © Google*

Zoning

Most of the land in the study area is zoned Residential-Activity Center (R-AC), with designations for office-professional, light industrial, community business, and neighborhood business uses (see figure X), however private covenants, conditions & restrictions (CC&Rs) restrict residential development in much of this area.

Zones 2 and 4 cover the job center and allow:

- Offices and light industrial development up to 100 feet
- Residential development up to 65 feet

Zones 1 and 3 cover the north and south retail nodes and allow:

- Residential, office, or mixed-use buildings up to 35 feet
- Height limit increased to 65 feet if structured parking and ground floor retail are included

Throughout the subarea high off-street parking minimums reduce development capacity, by increasing construction costs for large buildings.

- New offices must provide one parking stall for every 300 square feet of building area,
- Multifamily residential buildings must provide two stalls per dwelling unit plus guest parking.

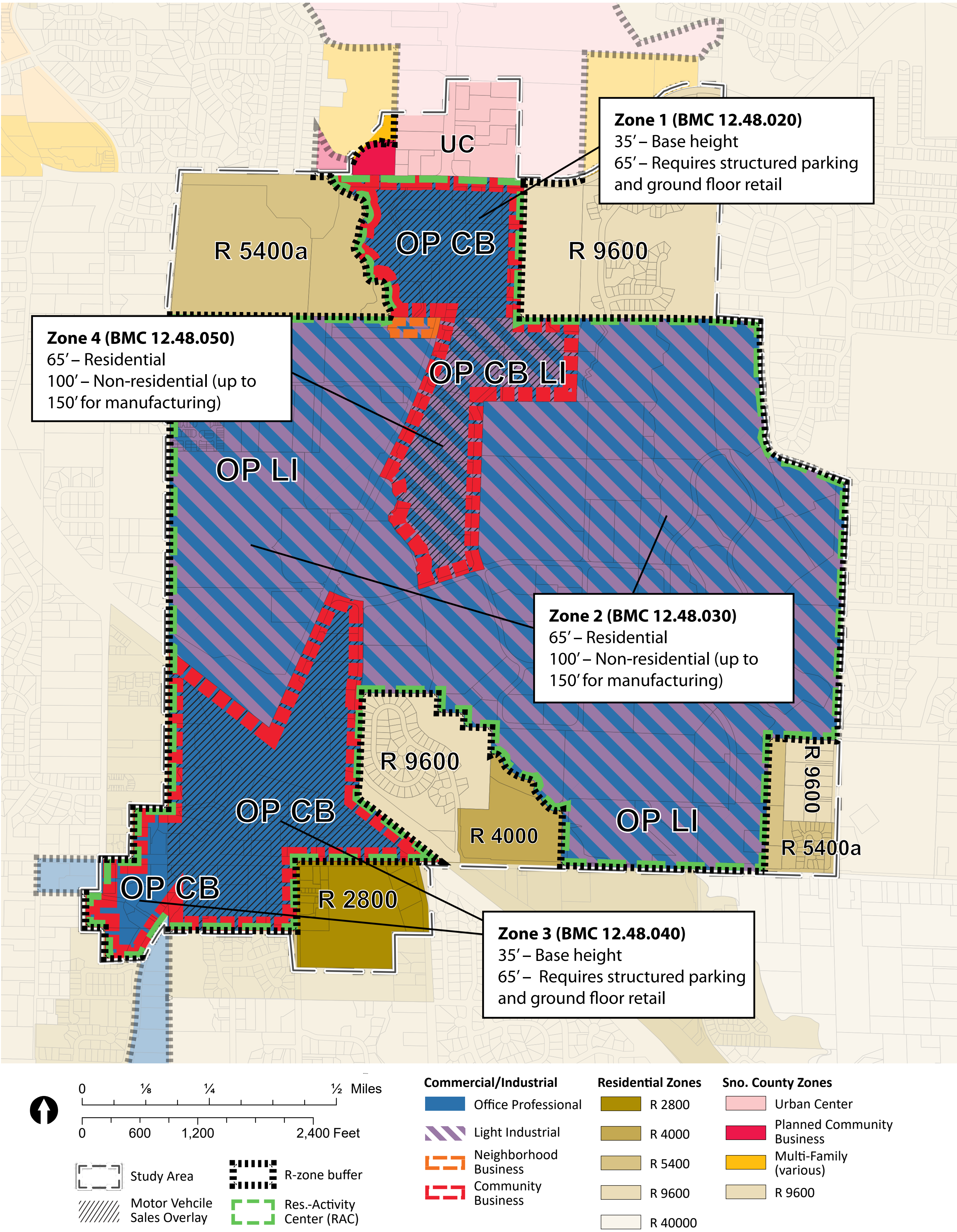
Low density residential areas outside of the Residential Activity Center zone have single-use residential zoning. The northern half of Thrashers Corner, in unincorporated Snohomish County, is zoned Urban Center which allows high-density residential and commercial development

Economic Base

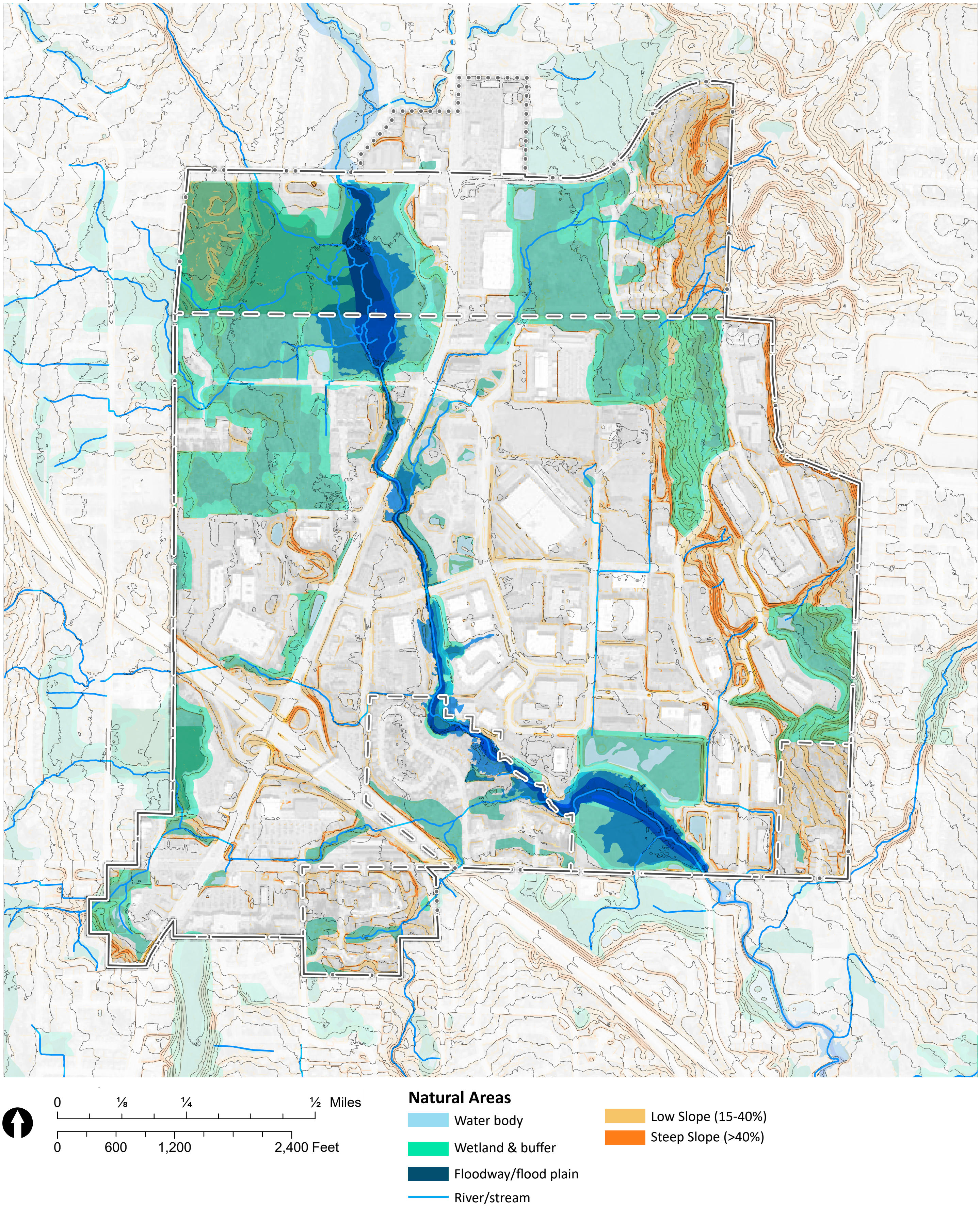
Canyon Park is characterized by relatively affordable office and flex space, good road access, and proximity to the consumer markets and research centers of Seattle and Bellevue. These factors support a highly diverse business ecosystem, with firms ranging form large multinationals, to small independent businesses and startups. Biotechnology firms are especially prevalent, creating a biotech industry cluster, in which geographically concentrated research and production firms, regulators, and related services support each other's activities. In turn, employment in the business park supports a thriving retail sector and strong residential demand.

Traffic congestion that limits freeway access and higher rents associated with redevelopment could threaten the fundamentals that underlie Canyon Park's success as a business incubator and job center. Improvement of alternatives to single-occupant-vehicle travel on freeways and strategic targeting of redevelopment will help to maintain Canyon Park's core strengths in the future.

Map 4. Existing zoning



Map 5. Natural feautres



Natural Environment

Canyon Park is located in a broad valley drained by North Creek and its tributaries, which runs from Everett Mall to the confluence with the Sammamish River near downtown Botell. North Creek and most of its tributaries support runs of Chinook, coho, sockeye, and kokanee salmon, steelhead and coastal cutthroat trout, and may also support beaver. Habitat destruction, the increase in impervious surfaces, channelization and streambank hardening, the introduction of invasive plant species, and the removal of beneficial woody debris have increased stream temperatures, reduced water quality, and increased flooding. The creek is among the most polluted in the state.

North Creek is classified as a Shoreline of the State. As such, all wetlands within 200 feet of the stream are managed under the City's Shoreline Master Program (SMP), including the large wetland complexes on the north (near Centennial Park) and south sides of the subarea. Wetlands are protected by buffer areas where development is prohibited, but these are often degraded by invasive species such as Himalayan blackberry and infrastructure intrusions. Degraded wetlands and buffers offer potentially valuable opportunities for enhancement to mitigate impacts of property development on critical areas.

Urban Design

Buildings

The design of buildings, paved and landscaped areas, and streets in Canyon Park is highly automobile-oriented. Buildings consist of four distinct types based on use which are geographically segregated:

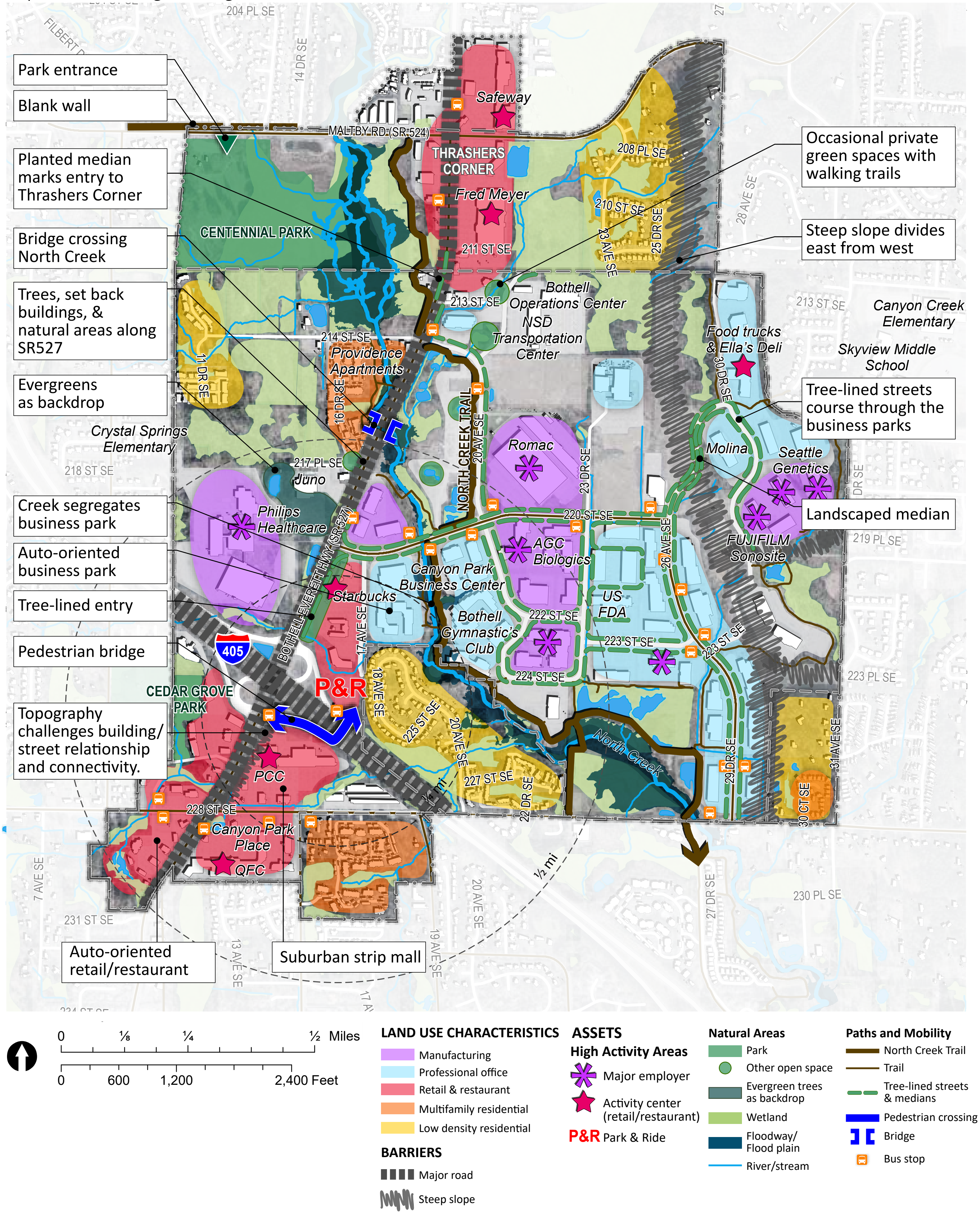
- Office/flex/manufacturing buildings in business parks,
- Retail/restaurants on arterial corridors including big box stores, strip malls, and stand alone restaurants,
- Apartment complexes,
- and detached houses.

However, buildings in the subarea generally share many qualities: one to three stories in height, constructed since 1980, and often surrounded by parking or landscaping with little relationship with the street. They are designed to be accessed from parking areas; connectivity with other nearby buildings or amenities is generally not prioritized.

Open Space

Open spaces in Canyon Park consist of parks, private landscaped areas, and natural areas. The two public parks, Centennial Park and Cedar Grove Park, are located on the subarea's western edge, are not central to any existing activity centers, and are not easily accessible from most of the

Map 6. Urban design existing conditions



subarea. Private open spaces and planted streetscapes are prevalent, but typically do not offer active recreation or encourage gathering (beyond perhaps a lunchtime work picnic). Natural areas are dispersed throughout the subarea around creeks, wetlands, and steep slopes. Many feature trails or varying levels of quality. North Creek has the potential to be a unifying feature for Canyon Park, with environmental restoration, improved trails and connectivity, and compact, strategically placed gathering places.

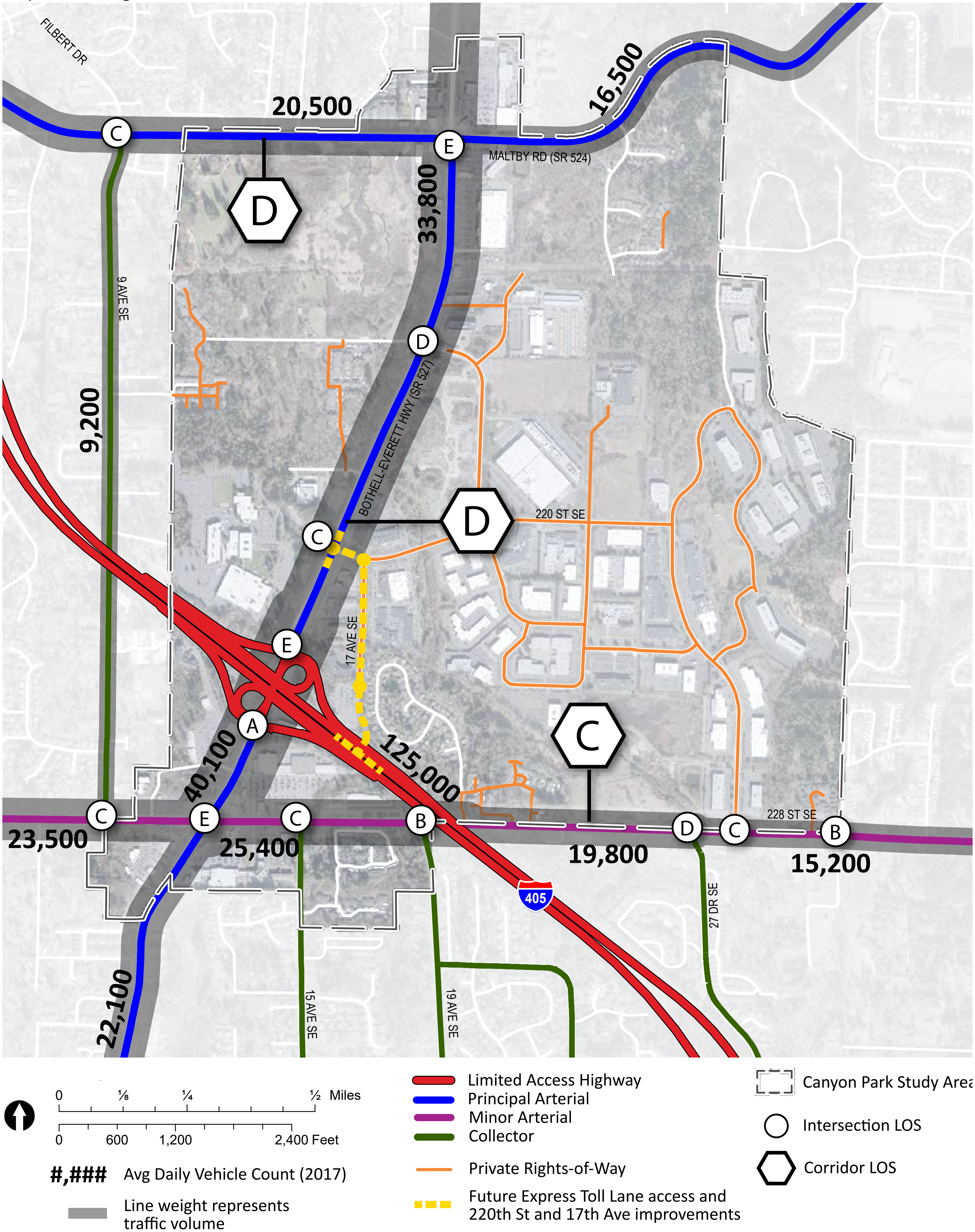
Transportation

The transportation system in Canyon Park is structured around several arterials that pass through the subarea, principally Bothell Everett Highway, which runs north-south and serves as the area's central spine. Bothell Everett Highway and other arterials are frequently congested at peak hours, especially near the interchange of Bothell Everett Highway and I-405, in the southwest of the subarea. A mix of public and private internal streets branches out from the arterials with few internal connections.

Transit service in the subarea runs primarily along arterials and is oriented around connections to I-405 express route buses accessed from the I-405 interchange and Canyon Park park-and-ride. The 306-stall park-and-ride reaches capacity early on most days. Frequent bus rapid transit (BRT) service along Bothell Everett Highway is provided by Community Transit's SWIFT Green Line. Sound Transit's STRIDE I-405 BRT lineIn the future BRT service will be provided by, which will provide greater frequency and reliability for transit trips along I-405. Several Community Transit operates several routes that travel through the CPBC, however bus frequencies and ridership are low.

North Creek Trail is a regional trail that roughly follows the creek, and is one of a number of trails that provide connections for walking and cycling in the subarea. Other trails, which are privately maintained, are of varying quality. Most roads in the subarea have sidewalks, however crosswalks are sparse, especially on arterials, and the walking environment on high-traffic roads is generally unpleasant due to noise and exposure.

Map 7. Existing traffic volumes



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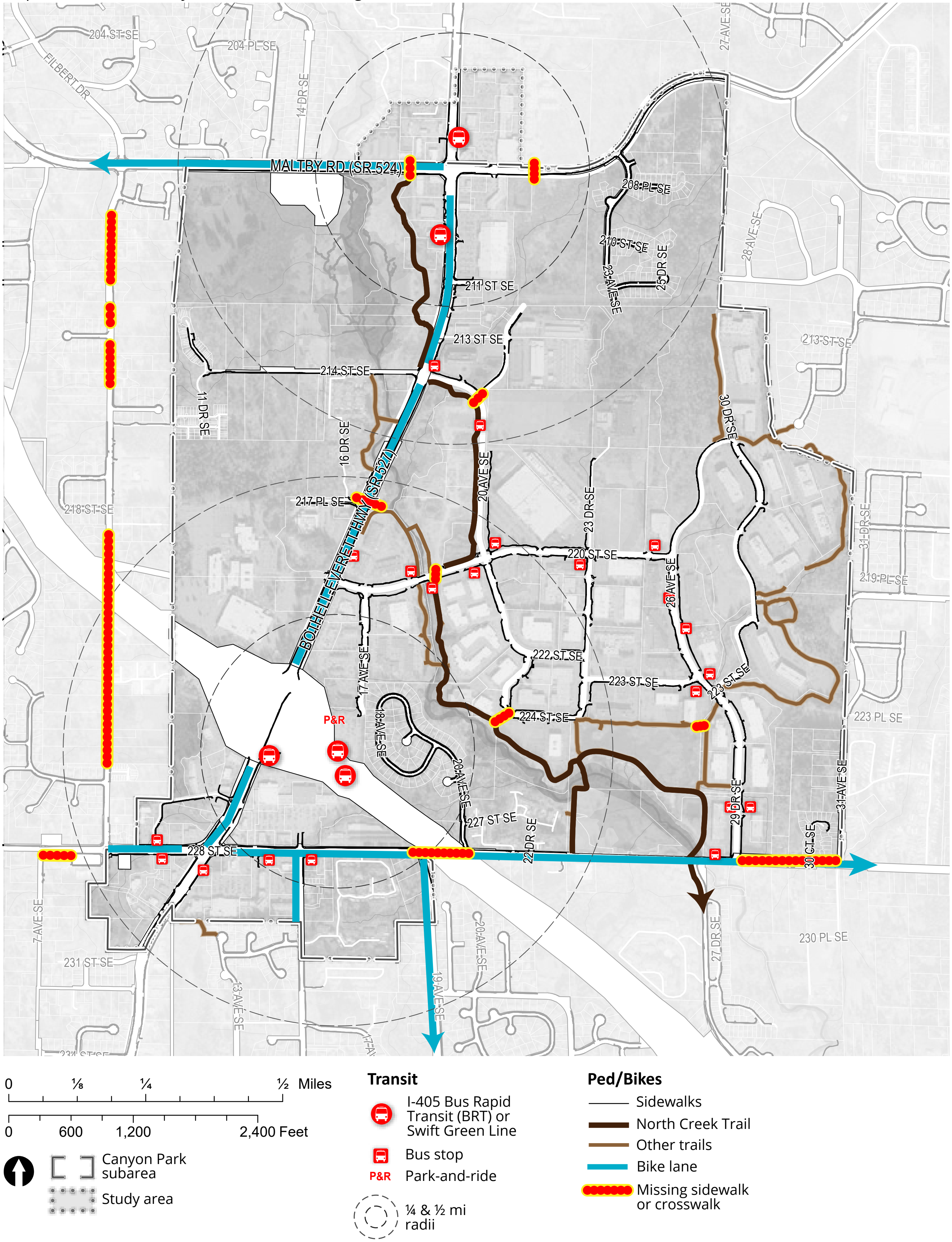
Map 8. Pedestrian, bicycle, and transit existing conditions



Utilities and Public Services

Public Facilities

There is one fire station, two public parks and a range of public and private open spaces, and several trails in the subarea. There are no schools, but Northshore School District Facilities are located nearby Canyon Creek Elementary School/ Skyview Junior High School, and Crystal Springs Elementary School.

Northshore School District and the City of Bothell have maintenance and operations facilities in the central part of the subarea, north of the CPBC. Sound Transit is currently planning a maintenance and operation facility related to the STRIDE BRT system adjacent to the district and city facilities.

Water & Stormwater

Alderwood Water and Wastewater District (District / AWWD) provides sewer and water service in Canyon Park, which is located in AWWD's North Creek Basin. The supply of water through the planning period exceeds the future demand projections through the planning period horizon by a factor of three. Sewer and water infrastructure in place to support growth in the near term within the planning area. As development occurs, new extensions and some upgrades of existing infrastructure will be necessary.

Due to the presence of the North Creek stream system in the subarea and a high level of hydrological activity, the City maintains a significant amount of storm drain pipe, culverts, catch basins, detention facilities and water quality treatment facilities in the subarea. Repairs, replacements of existing infrastructure should be coordinated with redevelopment in the subarea.

Electrical

Electric power is provided by Snohomish County Public Utility District No. 1 (PUD), which has three substations in the subarea. One 115 KV power line transverses the subarea from east to west in the northern part of the subarea, between 214th St SE and 208th St SE/Maltby Road. The PUD recently (2015) upgraded the substation in the CPBC to accommodate future development.

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Vision

Land uses integrally affect the four Vision goals—an Economic Driver, a Multifaceted Neighborhood, a Robust and Healthful Natural Environment, and a Transportation Hub. In particular, the land use vision is for Canyon Park to function as a connected set of neighborhoods with different land use mixes to reduce vehicular trips, maximize transportation efficiency, and cultivate a dynamic live/work area. The primary change from the previous Subarea Plan is to foster a more holistic neighborhood with residences, services, and employment.

05. Land Use

Land Use

Goals and Policies

ED Maintain, protect, and support Canyon Park as an **Economic Driver**.

ED-1 Ensure that Canyon Park continues to grow as the regional hub for the biomedical, life sciences, related, and other industries.

ED-2 Continue to support existing businesses of all sizes and provide a fertile environment for business growth.

ED-3 Protect commercial space affordability and viability in employment areas.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

ED-9 Allow building sizes and scales that support future employment capacity.

ED-10 Ensure that housing meets the needs of the local workforce

MN Evolve Canyon Park into a **Multifaceted Neighborhood**.

MN-1 Maintain employment and commercial land uses while adding a more intense mix and diversity of land uses to foster holistic live/work neighborhoods.

MN-2 Promote development of a diverse range of market rate and affordable housing that meets employee and residents’ needs, offering excellent amenities, private open space, and gathering spaces that integrate into the neighborhood.

MN-3 Increase the number of affordable housing units in Bothell, especially near transit and jobs.

MN-4 Increase feasibility of desired development, especially affordable housing.

MN-8 Increase the abundance and diversity of retail and service amenities that serve Canyon Park and the surrounding area, while focusing them in transit-oriented neighborhood centers.

MN-10 Encourage development to use land efficiently.

MN-11 Apply land use and design regulations to allow and encourage transit-oriented development that creates multifaceted neighborhoods.

MN-12 Make land use decisions based on the long-range vision and not short-term market or other trends.

MN-13 Set parking standards so that development provides the “right” amount of parking for its use and context.

MN-15 Phase projects for least negative impacts and greatest benefits to residents, businesses, and ecological systems.

NE Protect, enhance, and leverage Canyon Park’s **Robust and Healthy Natural Environment**.

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

TH Foster and leverage Canyon Park as a **Transportation Hub**.

TH-4 Encourage the highest density land uses to locate near high capacity transit.

RGC Retain the PSRC Regional Growth Center (**RGC**) designation.

RGC-1 Meet employment and residential growth targets to maintain PSRC Regional Growth Center designation.

RGC-2 Meet Snohomish County residential and employment growth targets.

Land Use Approach

Retain the PSRC Regional Growth Center (RGC) designation. Canyon Park is an important economic engine for Bothell, the Puget Sound Region, and Washington because it hosts national and international companies providing important contributions to life sciences, bio-medical device manufacturing, software, food industry, and other high technology products. The RGC designation validates the importance of the existing employment center and maintains competitiveness for regional transportation funding. To maintain RGC status, land use regulations must account for significant residential and job-related growth.

Orient the highest density land uses adjacent to high capacity transit. Focus investment and tailor development regulations to achieve the highest densities near the existing Canyon Park Park-and-Ride and future I-405 flyover station and Swift Green Line station at Thrasher's Corner. This approach reduces single-occupancy vehicle (i.e., car) trips and builds enough concentrated activity to support the retail, services, and amenities that create a neighborhood center. This means setting minimum residential and employment densities for future development so that precious land is not underutilized by lower density development. Reduce densities and intensities further away from those high capacity transit services. See the *Land Use Designations* section below for the purpose and intent of different zones in Canyon Park.

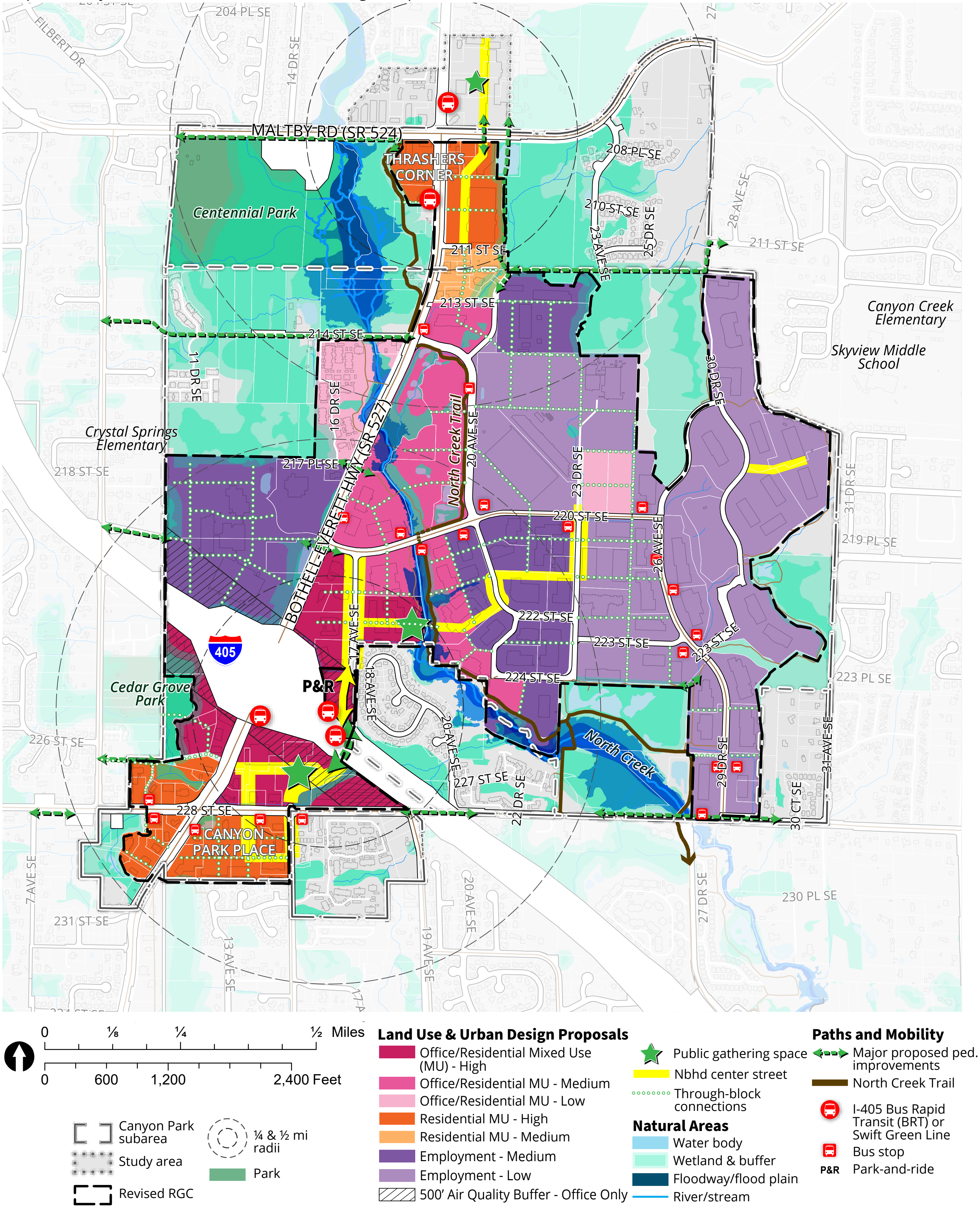
Protect the existing employment center. Retain a significant portion of the Canyon Park Subarea for accommodating high technology manufacturing, life sciences, bio-medical device, research, development, laboratories, offices, and other types of employment land uses.

Encourage support retail and service uses in neighborhood centers. Allow these complementary uses in select areas with an emphasis on clustering them along key neighborhood center streets and around public gathering spaces (see the *Concept* and *Urban Design & Community Livability* Element).

Preserve the natural features of Canyon Park. As outlined in the *15. Natural Environment* element, the natural features of this area are a defining characteristic that create a unique experience for residents and employees alike and provide valuable ecological functions.

Be patient. The City recognizes the real estate market's influence on housing and employment growth and views the real estate industry as a partner in achieving this Vision. However, the City should be patient and focus on the long-term vision, not near-term high-demand land uses.

Map 9. Canyon Park Land Use and Urban Design Proposals



Land Use Designations

The following map and land use descriptions offer a framework for applying zoning regulations within Canyon Park. These implement the approach described above, but Bothell may update them over time with changing conditions. Also see the overarching *Concept* and related actions in *Urban Design & Community Livability.*

Requirements Key. Each land use designation has tailored requirements for residential uses, active ground floors, and common and private open space. The tables below summarize the differences.

●	Required	○	Allowed
◓	Encouraged	⊗	Not allowed

What makes a "holistic" neighborhood?

A "holistic" neighborhood has multiple facets integrated into a single neighborhood:

- A balanced mix of uses where people can easily live, work, recreate, and socialize,
- High enough densities to support neighborhood destinations like restaurants, bars, groceries, and fitness centers,
- Integrated and connected buildings, streets, and public plazas/parks,
- A variety of housing types that allow for people at any stage in their life or career,
- A pleasant, walkable environment, and
- Access to multiple local and regional transportation modes.

Though residential is allowed, a primary focus of this designation is commercial/office/flex-tech/artisan space to build on the business park as an existing economic engine. Along Bothell-Everett Highway and I-405, commercial developments have the benefit of highway visibility, so branding and name recognition can be built into the architecture. It is also important to provide space for existing Canyon Park businesses to grow, given that many are surpassing their current owner-occupied buildings' capacities. Being able to expand locally allows them to maintain and expand the ties and synergies grown in Canyon Park. (Also see the Economic Development element.)

Office/Residential Mixed Use Designations

The Office/Residential Mixed Use designations should be applied to places near high capacity transit service to develop holistic neighborhoods. These areas are expected to provide residential, office, and retail or other commercial services. A mix of uses may happen vertically within a single building or horizontally amongst multiple buildings. The ground floor design should be compatible with the neighborhood center vision (see the *Urban Design & Community Livability* element's *Block Front Street Designations* section on page 66). The Office/Residential Mixed Use designations are intended to host significant employment and residential capacities, with high, medium, and low densities and intensities established generally based upon the property's distance from high capacity transit.

Requirements

Residential	Active ground floor	Parking	Public/private common usable open space	Private open space
○	● Along main streets & special corners	Lowest or no parking minimums due to proximity to transit. Potential parking maximums and limits on surface parking close to transit.	●	○ Office ◓ Residential

Office/Residential Mixed Use – High

Encourage high-intensity office mixed-use development (6+ stories) near transit and areas impacted by highway air quality and noise—while allowing residential—to make use of focused public investment and further develop a transit-oriented job center. An Air Quality Overlay prevents residential and other sensitive uses (e.g., schools, daycares) within close proximity to very heavy traffic volumes, where air pollution and health impacts are expected to be worst.

Figure 30. Examples of Office/Residential Mixed Use - High buildings

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Office/Residential Mixed Use – Medium

Encourages medium-intensity office mixed-use development (3-6 stories) to meet growth targets and transition between the high-intensity TOD and nearby job opportunities.

Figure 28. Examples of Office/Residential Mixed Use - Medium buildings

Office/Residential Mixed Use – Low

Encourages lower intensity development (1-3 stories) further from transit and focused public investments and could include “missing middle” housing that makes use of North Creek as an amenity and connects residential areas.

Figure 29. Examples of Office/Residential Mixed Use - Low buildings

Figure 31. Missing middle housing. (Opticos Design)

What is "missing middle" housing?

The term "Missing Middle" refers to a range of small to modest-scale housing types that bridge the gap between detached single-family homes and urban-scaled multifamily development. This includes duplexes, triplexes, cottage housing, townhouses, courtyard apartments, and other small-scale apartment buildings that provide diverse housing options to support walkable communities.

These types were more common in older neighborhoods, but they are called "Missing" because they have either been illegal or discouraged by zoning ordinances of the last century and/or overlooked by the applicable development community. They can be more affordable than detached single family, allow for more people to live in walkable neighborhoods, and can accommodate smaller households more efficiently.

Residential Mixed Use Designations

The Residential Mixed Use designations should be applied to places with pedestrian and non-motorized access to high capacity transit service where residences complement the employment and retail centers with a more around-the-clock and active use and benefit from a unique characteristic (e.g., North Creek as a residential amenity). These areas are expected to provide significant residential growth capacity, but also allow office, retail, and other commercial uses. Development may offer a single use within a building, a mix of uses within a single building, or a mix of uses across multiple buildings. The ground floors would help implement the vision for neighborhood center streets. High, medium, and low densities and intensities should be established generally based upon a property's distance from high capacity transit with the highest intensity uses (i.e., most residents or employees) closest to transit.

Requirements

Residential	Active ground floor	Parking	Public/private common usable open space	Private open space
●	● Along neighborhood center streets & at special corners	Lowest or no parking minimums due to proximity to transit. Potential parking maximums and limits on surface parking close to transit.	●	◓

Residential Mixed Use – High

Encourages a high intensity (6+ stories, typically apartments/condos) residential neighborhood to meet residential growth targets and make use of transit and other public investment, and nearby job opportunities.

Residential Mixed Use – Medium

Encourages a medium intensity (4-6 stories) residential neighborhood to meet residential growth targets and provide a transition between the high-intensity TOD and nearby job opportunities. This would likely include a mix of housing types, such as townhouses, multiplexes, and apartments.

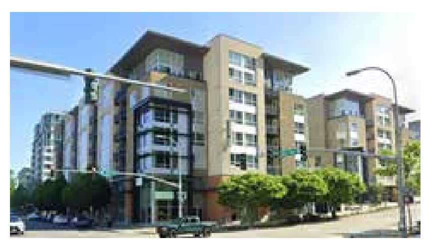


Figure 32. Examples of Residential Mixed Use - Medium (top) and Low (bottom) buildings

Employment Designations

This designation establishes exclusive employment uses with support retail and service uses focused in key places. Residential land uses should be prohibited to preserve employment capacity. Medium and low densities and intensities should be established based upon the property's distance from high capacity transit service.

Requirements

Residential	Active ground floor	Parking	Public/private common usable open space	Private open space
⊗	◒ At special corners	Low parking minimums. Potential parking maximums based on proximity to transit.	● (minimal)	○

Employment – Medium

Encourages medium intensity (3-6 story) office/flex/manufacturing to continue business park viability, reduce single-occupancy vehicle trips by locating jobs near transit and neighborhood services, and attract a talented labor force by locating near vibrant neighborhood centers and recreational opportunities. Residential not allowed to protect light industrial and incubator spaces in the business park from displacement.

Employment – Low

Allows low intensity (1-2 story) office/flex/manufacturing to continue business park viability while still locating relatively close to great transit service and nearby neighborhood centers. Residential not allowed to protect light industrial and incubator spaces in the business park from displacement.

Figure 33. Examples of Employment - Medium (top) and Low (bottom) buildings

Actions

1. Establish new zones for Canyon Park.
2. Apply new land use regulations as guided by Map 9.

Most Applicable Policy

MN-11 Apply land use and design regulations to allow and encourage transit-oriented development that creates multifaceted neighborhoods.

Affordable Housing

Importance of affordable housing. Providing housing for employees to live within or near the business park is a key consideration for retaining and attracting employers and employees to Canyon Park. The focus should be on providing affordable housing close to employment and high-capacity transit. This strategy lessens reliance on single occupant automobile travel thereby reducing impacts upon the transportation system and greenhouse gas emissions, advances social equity, and supports a more holistic neighborhood.

Mandatory affordable housing strategies. Affordable housing strategies should include requiring, incentivizing, and, in conjunction with its housing partners, funding housing affordable at low, median, and middle income levels. Mandatory housing affordability requirements should be set throughout Canyon Park. For example, require a percentage of units to be affordable to moderate income households, or for non-residential uses, a percentage of the gross floor area or pay a fee-in-lieu. (As examples, see Bothell Municipal Code's Affordable Housing provisions.)

Multifamily tax exemption. Bothell meets the qualifications for a multifamily tax exemption (MFTE) program. Under the MFTE program, if the developer or owner sets aside a certain portion of units as affordable, the value of housing improvements can be exempt from property taxes for 8 or 12 years. Affordability is defined by State statutes. A 12-year MFTE program improves financial feasibility for affordable units (see *Appendix X: Canyon Park Market Study and Proforma Analysis* for more information).

Action

1. Set minimum affordable housing requirements where height limits are increased, other development restrictions removed (e.g., former residential transition areas), and/or parking minimums are relieved.
2. Establish an MFTE program for Canyon Park.

Most Applicable Policies

MN-2 Promote development of a diverse range of market rate and affordable housing that meets employee and residents' needs, offering adequate amenities, private open space, and gathering spaces that integrate into the neighborhood.

MN-3 Increase the number of affordable housing units in Bothell, especially near transit and jobs.

MN-4 Increase feasibility of desired development, especially affordable housing.

Affordable Commercial Space

Importance of affordable commercial space. Canyon Park hosts a wide range of business types and models. Among the large international biotech firms are small, local entrepreneurial businesses, such as See Kai Run, the Bothell Gymnastics Club, small start-up companies, and people-of-color- and disadvantaged populations-owned restaurants and groceries (see *Thrasher's Corner* in the *Concept* element), who rely on lower rents. Likewise, Canyon Park life science business owners expressed a strong interest in fostering a start-up culture in Canyon Park with business incubators; a mix of rents and types of spaces benefits their recruiting ability and chances for innovation.

Remove residential development pressure. Though increasing the mix of residential and business uses is important to achieving the multifaceted neighborhood envisioned, lands should be protected for employment and commercial interests. The region is experiencing displacement of general commercial uses and small, affordable spaces from more urban areas to meet the demand for residential population growth. Thus, residential as an allowed use should be prohibited within areas with an employment designation to protect affordable commercial space. This is consistent with portions of the subarea that are subject to private Conditions, Covenants, and Restrictions (CC&Rs).

Ground floor design. Another strategy to encourage affordable commercial space with redevelopment concerns the design of the ground floor. Building a "flex-shell" that is ready-made to immediately accommodate small, start-up, or microbusinesses reduces the initial financing needs for enterprises on a tight budget. The Neighborhood Center Street section in the Urban Design and Community Livability element includes design-related actions.

Actions

1. Remove residential as an allowable use in the employment zones.
2. Apply building design standards on neighborhood center-designated streets to encourage commercial space affordability.
3. Explore partnerships with nonprofits (e.g., community land trusts, business incubators) and quasi-public entities (i.e., preservation and development authorities) to creatively expand commercial affordability options.

See additional affordable commercial space strategies in *Affordable Commercial Space Incentives* on page 59.

Figure 34. Local immigrant and people of color-owned groceries and restaurants are important places for social connection, economic opportunities, and healthy and culturally appropriate food access (Google Maps)

Figure 35. Flexible and low-rent spaces allow for diverse and community-serving businesses (e.g., Bothell Gymnastics Club) (Google Maps)

Most Applicable Policies

ED-3	Protect commercial space affordability and viability in employment areas.
ED-4	Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

Development Feasibility/ Incentives

Parking Reductions

Evolution away from car parking. As Canyon Park evolves from a suburban, auto-dominated place to transit and people-oriented neighborhoods, the demand for private car parking space will decrease. Further, structured parking is expensive to construct, and surface parking lots use land inefficiently. By reducing the number of parking stalls required, development gains financial feasibility and uses land more efficiently. In addition, less parking can have aesthetic and walkability benefits; surface parking lots can detract from a street's vibrancy and increase the distance between destinations, and more parking in general can encourage more people to drive. However, there will be a transition period during which Canyon Park will be suburban with most people using cars to commute and shop. Some consideration for a phased approach to parking reductions should be given to areas already impacted by residential parking spilling into business areas (e.g., Thrasher's Corner).

Establish appropriate parking ratios. Parking ratios should be established that encourage the type of land uses desired for Canyon Park and take advantage of the current and future significant public investment in high capacity transit services being provided to the Subarea. Parking ratios should also be established to encourage/accommodate affordable and middle income housing. In the long term, Bothell may consider setting parking maximums. Limiting new surface parking will also be important to maximize efficient land use.

Action

1. Reduce parking ratios in selected Canyon Park zones.
2. Study feasibility and potential benefits of setting parking maximums near transit.

Most Applicable Policies

MN-4 Increase feasibility of desired development, especially affordable housing.

MN-10 Encourage development to use land efficiently.

MN-13 Set parking standards so that development provides the "right" amount of parking for its use and context.

Affordable Commercial Space Incentives

The Affordable Commercial Space discussion above describes the importance of affordable commercial space for business, cultural, and societal reasons and offers some strategies to gain future affordable commercial space. This section adds some incentives to developers who consider existing businesses and future affordable commercial space.

Retention/relocation incentive. As Canyon Park evolves, redevelopment could physically displace existing businesses or rising rents may pressure some businesses to move. To support the lively and diverse business environment in Canyon Park, developers could agree to retain current businesses in the new development for a period of time or offer relocation assistance. The City, as part of developer agreements or other methods, may consider offering incentives to make this feasible.

Financial incentives for affordable space. The City could explore programs to ensure affordable office, manufacturing, and retail spaces are available. The programs could consider financial incentives (e.g., federal tax abatements equivalent of the MFTE for affordable housing), technical assistance and outreach, or the integration of office/retail affordability with density, height, or floor area ratio incentives. Because of Washington State's prohibition against using general government funds for gifts or loans to private parties, Bothell should look creatively at ways to use federal and private funds (e.g., CDBG, community lenders) to offer business support.

Action

1. Explore options to offer incentives to developers that retain current businesses or offer business relocation assistance.
2. Explore additional incentives for supporting and gaining affordable office, manufacturing, and retail space, such as exchange of height or FAR bonus for affordable commercial space.

See additional affordable commercial space strategies in *Affordable Commercial Space* on page 57.

Most Applicable Policy

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

Buffer Enhancement

Much of Canyon Park was constructed prior to the adoption of critical areas regulations and current best available science. Fortunately, buffers were established to protect wetlands, and streams were included in the development of the area. Wetland and stream buffers are of varying dimension with some being quite large and others being fairly small compared to current standards.

Future redevelopment of the area offers the opportunity to enhance these existing buffers while maximizing a site's available area. As a development incentive, a developer could be allowed to reduce a wetland/stream buffer to the edge of existing development provided the biological functions and values of the existing buffer (and associated wetland/stream) are increased.

Action

1. Establish a best available science protocol within the Bothell Critical Areas regulations where existing buffers are enhanced in exchange for a reduction in the standard buffer width. Ensure that such reduced buffers result in improved biological functions and values.

Most Applicable Policies

NE-4 Enhance and improve these natural areas through volunteer programs, resource grants, and other mechanisms.

MN-4 Increase feasibility of desired development, especially affordable housing.

MN-10 Encourage development to use land efficiently.

Best Available Science

Pursuant to the Growth Management Act, jurisdictions in Washington are required to protect the functions and values of critical areas using best available science. Buffers for wetlands and streams would be implemented consistent with the Planned Action Ordinance and City codes, including codes for nonconforming development. A key City code provision requires that development in proximity to wetland and streams be designed and constructed in accordance with mitigation sequencing, which requires the avoidance, minimization, and compensation of any adverse impacts. In more simple terms, design sensitive to the site must be employed.

Transfer of Development Rights (TDR)

Activity Unit Transfer Program

Some land uses, such as essential public facilities like the Snohomish County Public Utility District No 1 electrical substation, the Northshore School District Bus Base, or the City of Bothell maintenance shops, may not be capable of meeting minimum development levels—either floor area ratios or residential densities—because of their unique operations. To meet the PSRC RGC framework criteria obligations, Bothell should create an Activity Unit TDR program.

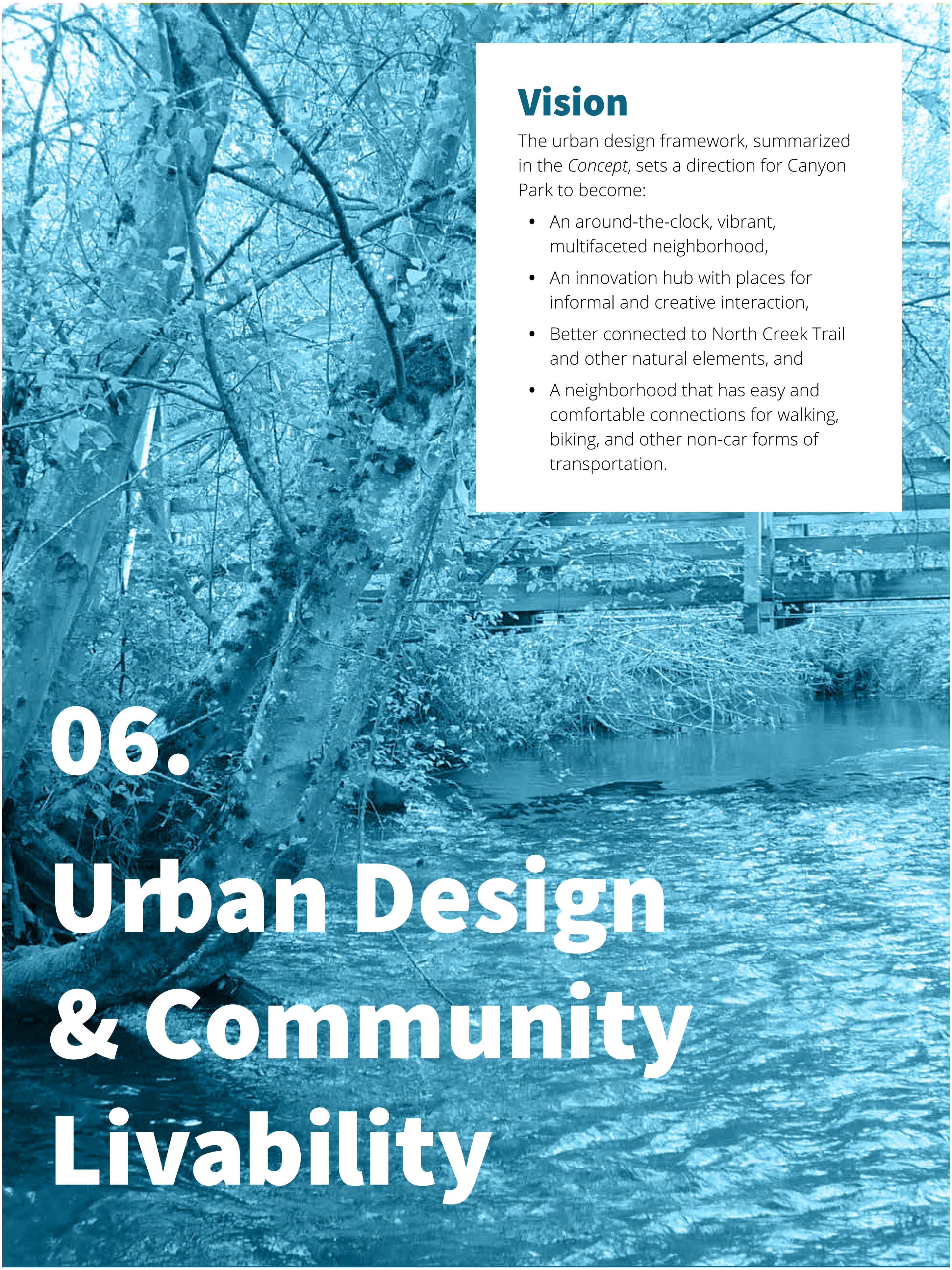
Action

1. Establish “receiving” sites in the High and Medium density designations as eligible to receive activity unit credits.
2. Create an Activity Unit-based TDR program where the City is the “holder and distributor” of these credits.
3. Encourage these credits to be used to assist affordable housing and/or affordable commercial space objectives.

Most Applicable Policies

RGC-1 Meet employment and residential growth targets to maintain PSRC Regional Growth Center designation.

RGC-2 Meet Snohomish County residential and employment growth targets.



Vision

The urban design framework, summarized in the *Concept*, sets a direction for Canyon Park to become:

- An around-the-clock, vibrant, multifaceted neighborhood,
- An innovation hub with places for informal and creative interaction,
- Better connected to North Creek Trail and other natural elements, and
- A neighborhood that has easy and comfortable connections for walking, biking, and other non-car forms of transportation.

06. Urban Design & Community Livability

Vision

The urban design framework, summarized in the Concept, sets a direction for Canyon Park to become:

- An around-the-clock, vibrant, multifaceted neighborhood,
- An innovation hub with places for informal and creative interaction,
- Better connected to North Creek Trail and other natural elements, and
- A neighborhood that has easy and comfortable connections for walking, biking, and other non-car forms of transportation.

Goals and Policies

ED Maintain, protect, and support Canyon Park as an **Economic Driver**.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

ED-9 Allow building sizes and scales that support future employment capacity.

ED-10 Ensure that housing meets the needs of the local workforce.

MN Evolve Canyon Park into a **Multifaceted Neighborhood**.

MN-2 Promote development of a diverse range of market rate and affordable housing that meets employee and residents' needs, offering excellent amenities, private open space, and gathering spaces that integrate into the neighborhood.

MN-5 Implement new public park spaces(s) with recreational uses to offer further amenities to neighborhood users.

MN-6 Invest in signature public gathering spaces to create neighborhood centers of social interaction and innovation.

MN-7 Improve access to and crossings of North Creek to make it a unifying element of Canyon Park.

MN-8 Increase the abundance and diversity of retail and service amenities that serve Canyon Park and the surrounding area, while focusing them in transit-oriented neighborhood centers.

MN-9 Locate amenities to create hotspots of social activity and build on the natural character of Canyon Park.

MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

TH Foster and leverage Canyon Park as a **Transportation Hub**.

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-11 Encourage catalyst redevelopment projects that support transit ridership.

Block Front Street Designations

Neighborhood Center Streets

The design and orientation of new buildings should foster vibrant neighborhood centers. To accomplish this, alongside land use zoning updates to create mixed-use, transit-oriented neighborhoods (see *Land Use*), Bothell will designate certain streets (existing and future at conceptual locations as identified in Map 10) as:

- **Primary neighborhood streets,** which will concentrate activity to create an urban neighborhood center character
- **Secondary neighborhood streets,** which will concentrate activity to a lesser degree, creating comfortable and safe paths for people further from transit with fewer retail/service amenities (but more activity and amenities than other streets)
- **Pedestrian/bike lanes,** which will offer attractive walkable paths and bike lanes among buildings as a means of providing walkable compact blocks. Depending on the access needs of the neighborhood center "streets," some may be treated as lanes instead of traditional vehicular-oriented streets.

These streets, especially the primary streets, will be the center of Canyon Park life and feature public gathering places, cafes, bars, fitness, ground floor work spaces that interact with the street, and comfortable places to stroll, wheel, bike, linger, play, and rest. The characteristics of these designations are described below. In short, the purpose of these streets is for redevelopment to:

- Create neighborhood centers
- Increase amenities (e.g., restaurant, retail, service, "pocket" gathering spaces, and ample sidewalks).

Figure 36. Example of a neighborhood center street in Kirkland, WA

Figure 37. Sidewalk seating contributes to a lively neighborhood center street

Figure 38. Flexible ground floor "shells" allow for a range of diverse businesses and ownership/tenant structures

Most Applicable Policies

MN-8 Increase the abundance and diversity of retail and service amenities that serve Canyon Park and the surrounding area, while focusing them in transit-oriented neighborhood centers.

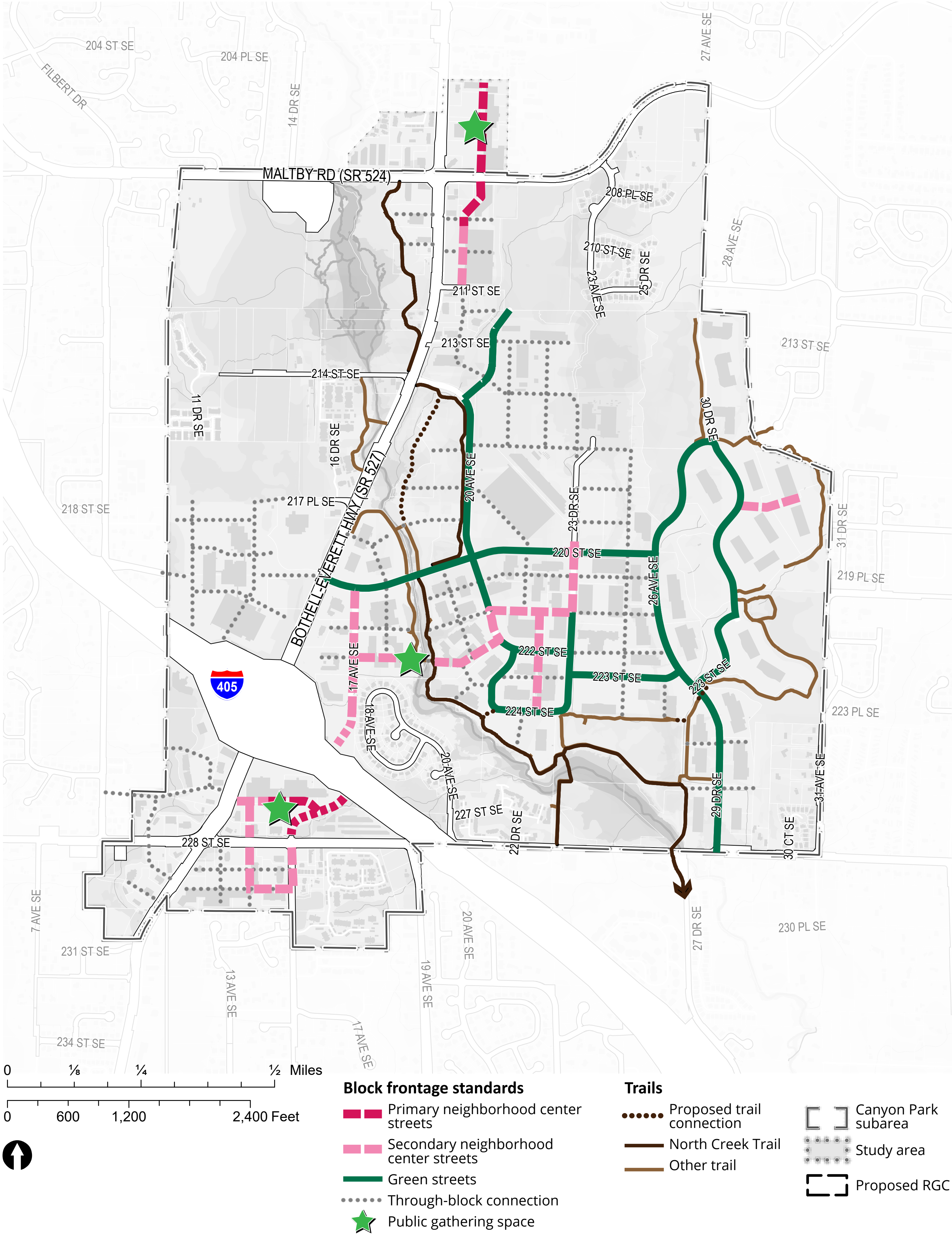
MN-9 Locate amenities to create hotspots of social activity and build on the natural character of Canyon Park.

MN-11 Apply land use and design regulations to allow and encourage transit-oriented development that creates multifaceted neighborhoods.

MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

Map 10. Preliminary draft block frontage standards map

(to be refined while drafting development regulations and design guidelines)



MN-7 Improve access to and crossings of North Creek to make it a unifying element of Canyon Park.

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

Actions

1. Apply primary and secondary neighborhood center block front design regulations to the existing and future streets identified in Map 10 (locations conceptual for future through-block connections). Focus design regulations on:

   a. Require frequent entries (e.g., every 30 feet) and adequate transparency (windows) to foster a lively street and ensure space for small businesses.

   b. Require commercial ground floors on primary neighborhood center streets, while being flexible to allow a range of viable uses (e.g., cafes/restaurants, bars, fitness centers, coworking and cooperative spaces, artisan/makers spaces/light manufacturing).

   c. Allow commercial or residential uses (where future zoning allows) on the ground floor of secondary neighborhood center streets.

   d. Encourage flexible ground floor layouts that accommodate small and growing businesses, as they expand and contract, accounting for creative models like condos and co-ownership.

   e. Require commercial ground floors to accommodate a range of business and arts uses (e.g., high enough ceilings for a restaurant's ventilation system).

   f. Set maximum retail size limits (except for grocery and hardware) or average storefront area or depth to ensure a diversity of sizes.

   g. Disallow surface parking lots along primary streets and limit it along secondary streets to side/back/beneath buildings with proper screening.

   h. Include wayfinding for pedestrian and bicycle routes.

2. Apply building and site design standards to ensure high quality, attractive new development that builds the identity of Canyon Park and incorporates Crime Prevention through Environmental Design (CPTED) principles.

Through-block Connections

The auto-orientation of development in the subarea created "superblocks," where streets are spaced 600 to 1,000 or more feet apart. Inside the street grid, parking lots with limited through-connectivity surround the buildings. Buildings tend to orient their entrances toward the parking lots, not to the formal streets.

Throughout the subarea, privately-owned through-block connections (conceptual locations marked on Map 10) will be required with redevelopment to break down large block sizes for better connectivity and pedestrian/bicycle mobility. Some future through block connections will be designated primary and secondary neighborhood center streets (dashed dark and light pink lines on Map 10). Others (grey dashed lines on Map 10) will also be required, but their design is flexible. They can feel like an alley or a shared pedestrian and vehicular street/lane (i.e., woonerf), and active ground floors will not be required. Wherever possible, they should follow property lines and meet streets at right angles. In the traditional business center, especially east of 20th Ave SE, larger floor plates may be required for business functionality and viability, so some flexibility on through-block connection spacing is important.

In short, implementation of through-block connections would:

- Increase connectivity by breaking down superblocks.
- Formalize pedestrian/bicycle paths throughout.
- Develop block fronts in a coherent and connected way with activity focused on critical paths.

Most Applicable Policies

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

MN-7 Improve access to and crossings of North Creek to make it a unifying element of Canyon Park.

MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

Action

1. Apply through-block connection standards to new Canyon Park zones to require, at a minimum, pedestrian, bicycle, and emergency and delivery vehicle paths approximately every 200 to 300 feet in mixed use zones and up to approximately 400 ft for business flexibility in employment zones.
2. Apply building and site design standards per the block frontage map and include Crime Prevention through Environmental Design (CPTED) principles (Map 10).

High Visibility Mixed-Use Corners

In some cases, secondary neighborhood streets land on key intersections that are particularly important for lending a sense of place and vitality. These corners also announce entry to a street with intrigue and invite a person to explore the street further. In strategic locations, a "high visibility corner" designation will require development to provide an active ground floor use at the corner (e.g., coffee shop) and design to create a sense of arrival.

Park-and-ride Redevelopment and Design

Why recommend parking garages? It may seem counter-intuitive that this plan recommends a new park-and-ride south of I-405 given the expectation that the area will shift from vehicular to other transportation modes. It does this to fill an interim gap while the existing park-and-ride appears to be at or over capacity, local transit options are inadequate for getting people to the station, and people have not yet shifted modes. Further study is needed, but the purpose is to encourage transit use and reduce vehicular trips in and around Canyon Park. In addition, the potential Canyon Park Place park-and-ride could offer shared parking serving both commuters and retail customers. In phased redevelopment of the area, structured parking could replace existing surface lots, serving businesses during redevelopment but then converting to shared park-and-ride and commercial use as redevelopment, with its own parking, occurs.

Park-and-rides as transit-oriented development. The existing park-and-ride on WSDOT property provides a prime catalyst site to spark the 17th Ave SE area redevelopment into a transit-oriented neighborhood. However, its design should not be a standard parking garage. Instead, it should offer a lively and safe pedestrian path to the flyover stop. Likewise, the potential park-and-ride south of I-405, if developed, should provide a similarly active and attractive path to the flyover stop. These paths are crucial extensions of the primary neighborhood center streets. If located within the I-405 air quality buffer/overlay, they would likely be multiple stories of office above structured parking. Bothell should facilitate mixed-use, transit-oriented park-and-ride redevelopments north and south of I-405 that provide pedestrian-oriented paths to the I-405 BRT flyover station.

Design for adaptability. The long-term need for these park-and-rides is unknown. As transit and other alternate mode options improve in Bothell and Snohomish County, there may be less demand for park-and-rides. Thus, the structures should be designed to easily adapt to future needs, whether they are still mobility-oriented, such as autonomous vehicle or transportation network company (e.g., Uber, Lyft) use; a light transformation to data warehousing, arts/artisan spaces, or the like; or a full transformation to shops and office-type uses.

Most Applicable Policies

TH-10 Expand access to park-and-rides in Canyon Park to ease the transition from suburban, auto-oriented travel to other modes.

TH-11 Encourage catalyst redevelopment projects that support transit ridership.

MN-11 Apply land use and design regulations to allow and encourage transit-oriented development that creates multifaceted neighborhoods.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

Actions

1. For the WSDOT property, when facilitating a public-private partnership to redevelop the property with a multistory transit-oriented development with a structured park-and-ride garage, incorporate design strategies for pedestrian-oriented paths to connect to the BRT flyover station.
2. For the Canyon Park Place property, when exploring the opportunity for a public-private partnership to redevelop with a structured park-and-ride garage (and potential multistory transit-oriented development), incorporate design strategies for pedestrian-oriented paths to connect to the BRT flyover station.
3. Apply the neighborhood center street block front designation to the future pedestrian paths connecting transit riders to the flyover stop (precise location is flexible).
4. Apply design standards that encourage developers to design parking structures so that they can adapt to other uses in the future, considering features such as floor-to-ceiling heights, future loads, spans, gradients, etc.

Gathering Spaces

Major Plazas/Parks

Associated with neighborhood center streets

Despite having two public parks and many acres of private open space, Canyon Park lacks outdoor gathering places that invite people to socialize and recreate. Existing open spaces are almost exclusively "passive" spaces, with a mix of natural and maintained landscapes that provide aesthetic and ecological benefit, but do not work well to bring people together.

Several new, more compact and active gathering spaces should be created through public-private partnerships with new development. These should integrate with neighborhood "main streets." Potential conceptual locations for gathering spaces are shown in Map 11. These would achieve two major parks/plazas:

- One near the North Creek Trail bridge that would become the heart of the 17th Ave SE neighborhood. It should integrate with the new east-west shared street, North Creek, and North Creek Trail and have active ground floors on as many sides as possible.
- One in Canyon Park Place (near PCC) that would become the heart of the transit-oriented neighborhood south of I-405.

A third location in unincorporated Snohomish County north of Canyon Park is shown as a suggestion for inclusion in any future joint planning for Thrashers Corner. It is potentially a better location than south of Maltby Rd (SR 524) due to its proximity to existing and future neighborhoods.

Most Applicable Policies

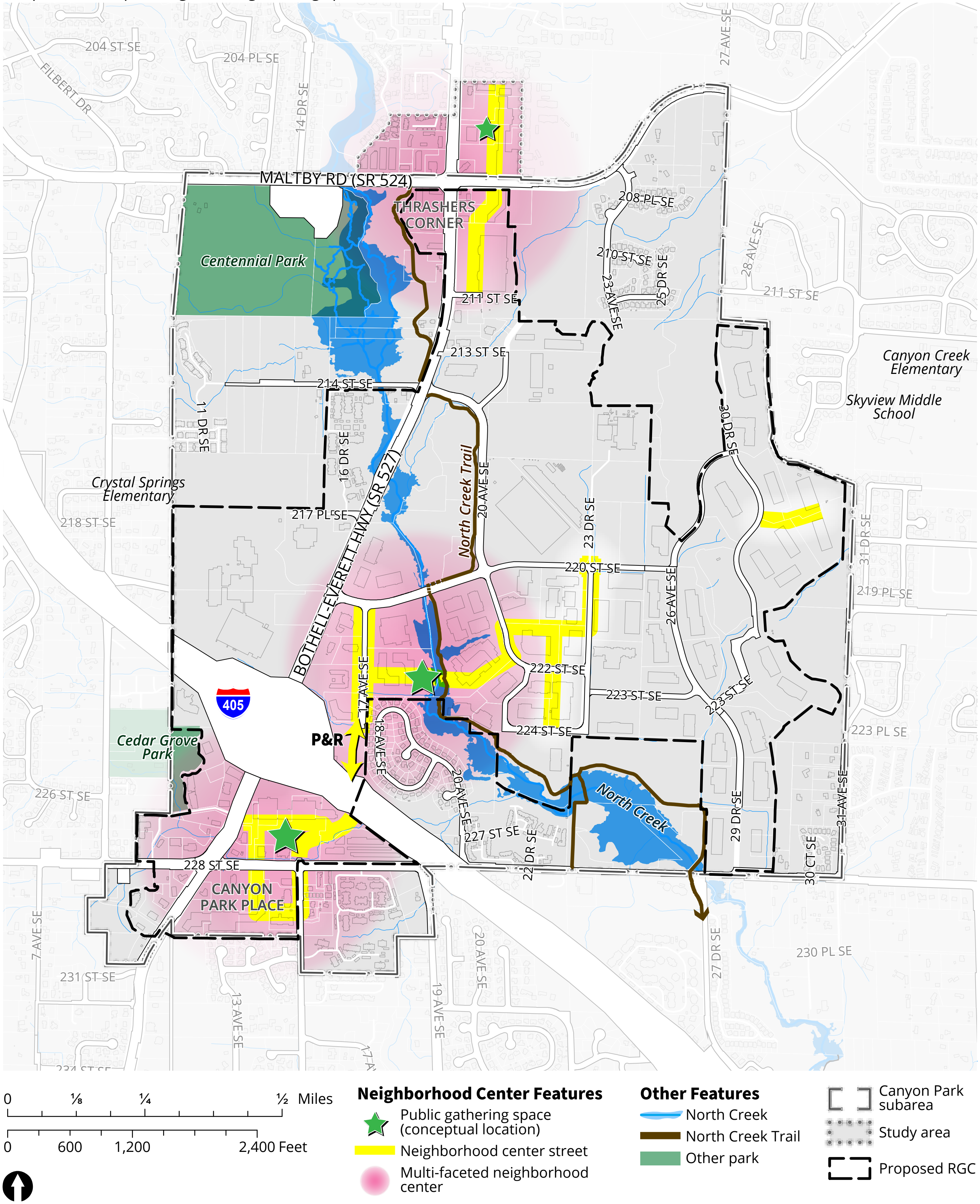
MN-5 Implement new public park spaces(s) with recreational uses to offer further amenities to neighborhood users.

MN-6 Invest in signature public gathering spaces to create neighborhood centers of social interaction and innovation.

Actions

1. Require public open space or a fee-in-lieu with redevelopment.
2. Pursue public-private partnerships to create the park/plaza with redevelopment.
3. Adopt plaza design standards that consider solar access, adequate seating, appropriate lighting, quality materials, Crime Prevention through Environmental Design (CPTED), and other human-centered design principles.

Map 11. Conceptual significant gathering space locations



Minor Parks/Plazas

Private park-like amenities with redevelopment throughout

In addition to the significant gathering spaces proposed above, minor pocket parks, widened sidewalks with seating, children's play areas, recreational opportunities for employees, special landscaped spots, and similar spaces should weave through the subarea, especially along designated neighborhood center streets. These will provide desired amenities to support an innovation hub, improve the identity of Canyon Park, and engender a holistic neighborhood that works for residents and workers. Open space standards should ensure that redevelopment includes adequate and high quality minor privately-owned, publicly accessible open spaces throughout Canyon Park.

Most Applicable Policies

MN-5 Implement new public park spaces(s) with recreational uses to offer further amenities to neighborhood users.

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

MN-2 Promote development of a diverse range of market rate and affordable housing that meets employee and residents' needs, offering excellent amenities, private open space, and gathering spaces that integrate into the neighborhood.

MN-4 Increase feasibility of desired development, especially affordable housing.

Actions

1. Apply open space standards to the new subarea zones that require private and public open space with redevelopment and guide high quality design.

Private Natural Area in Eastern Subarea

The property depicted in Figure 39 is a natural area with privately-maintained trails enjoyed by business park employees and nearby residents. The property owner is interested in the City acquiring the property for public park use. The recent PROS Plan did not identify a need for property acquisition in Canyon Park, but as the area grows, it will need more park land to meet level-of-service standards. In terms of new parks, the focus should be on locations that directly help create active neighborhood centers close to transit (green stars on Map 11). However, this parcel presents an opportunity as a long-term recreational amenity.

Figure 39. Natural area adjacent to Fujifilm Sonosite (property boundaries not shown).

Imagery © Google; Map data © Google

Most Applicable Policies

MN-5 Implement new public park spaces(s) with recreational uses to offer further amenities to neighborhood users.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

Action

1. Study the need for and benefits of this property for park land in the next PROS Plan update.

Vision

Continue to be an effective local and regional economic driver. Retain and expand Canyon Park as a business hub for the life science, biomedical device, high-technology, industry and many other businesses. Support this economic engine with workforce housing, employee services and amenities, an efficient transportation system, efficient permitting, protective land use designations, and promote a place of innovation and growth.

07. Economic Development

Goals and Policies

ED Maintain, protect, and support Canyon Park as an **Economic Driver**.

ED-1 Ensure that Canyon Park continues to grow as the regional hub for the biomedical, life sciences, related, and other industries.

ED-2 Continue to support existing businesses of all sizes and provide a fertile environment for business growth.

ED-3 Protect commercial space affordability and viability in employment areas.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

ED-9 Allow building sizes and scales that support future employment capacity.

ED-10 Ensure that housing meets the needs of the local workforce.

ED-11 Continue accommodating existing and new business growth through efficient permitting services.

MN Evolve Canyon Park into a **Multifaceted Neighborhood**.

MN-8 Increase the abundance and diversity of retail and service amenities that serve Canyon Park and the surrounding area, while focusing them in transit-oriented neighborhood centers.

MN-9 Locate amenities to create hotspots of social activity and build on the natural character of Canyon Park.

Regional Growth Center

Biotechnology cluster. Bothell has evolved into a major regional employment hub and the Canyon Park Regional Growth Center is a particularly important contributor. Canyon Park hosts a distinct biotechnology cluster, with a significant proportion of employment in the area in biotechnology and medical products manufacturing and professional/technical services, including therapeutic treatments in oncology and immunology.

Flexible buildings. A wide spectrum of businesses are located within Canyon Park. Many businesses are likely attracted by the availability of "flex" buildings that can accommodate a wide range of uses. Land use policies that promote the retention of such buildings and developing new amenities and services to support these industries and businesses is an important component of this Subarea Plan and will help the economic health of this job center.

Projected Job Growth

A market analysis undertaken as part of the FEIS conducted in 2020 anticipates the retention and expansion of this employment area with the potential of 9,000 to 13,000 additional employees housed within 2.6 to 3.8 million square feet of building as shown in Table 1 below.

A graph of the expected growth based on the 2018 PSRC econometric model is provided in the Figure below. These projections estimate employment in 2050 increasing by 85 to 121% over current employment levels, with an associated increase of about 8,900 to 12,800 jobs over the next 30 years. These scenarios assume that future growth in Canyon Park will exceed regional growth with overall employment and with service employment, with an average employment growth rate of 1.8 to 2.4% per year.

Action

1. See Land Use Action X to establish and apply employment zones to the business park and an office mixed-use zone around major transit facilities on I-405.
2. Actively engage with local businesses, educational institutions, and associations (e.g., Life Science Washington) to determine how the City might assist with economic development efforts, concerns, and new approaches.
3. Participate in King County and Snohomish County Economic Development activities, including industrial marketing and promotion, research, committee meetings, and other efforts to retain and attract business and industry to Bothell and the region.
4. Apply consistent and efficient City licensing and permitting practices and procedures.

Most Applicable Policies

ED-1 Ensure that Canyon Park continues to grow as the regional hub for the biomedical, life sciences, related, and other industries.

ED-3 Protect commercial space affordability and viability in employment areas.

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-9 Allow building sizes and scales that support future employment capacity.

ED-11 Continue accommodating existing and new business growth through efficient permitting services.

MN-12 Make land use decisions based on the long-range vision and not short-term market or other trends.

RGC-2 Meet Snohomish County residential and employment growth targets.

Figure 40. Projected Growth in Proposed Canyon Park RGC, 2017-2050 *Source: CoStars, 2020; BERK, 2020.*

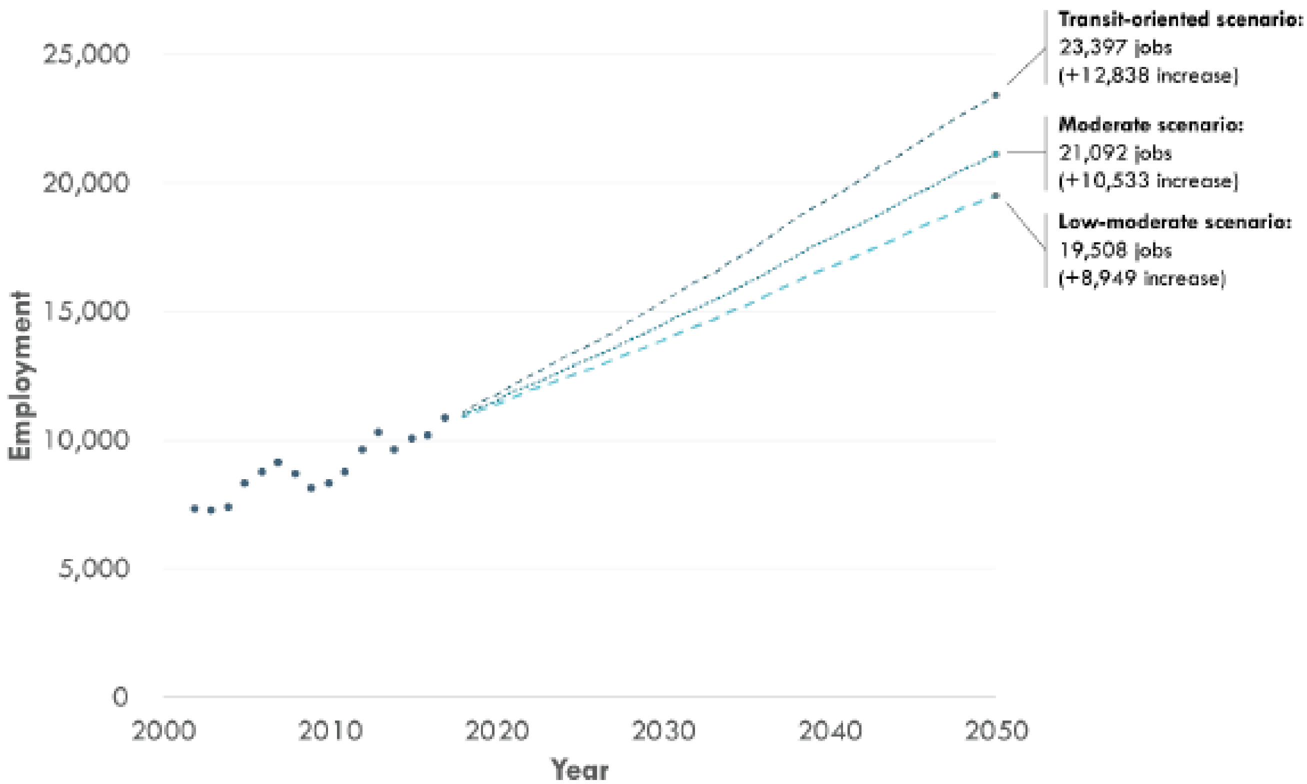


Table 1. Employment projections and estimated employment space needs in Canyon Park RGC, 2017–2050

	Low Moderate	Moderate	Transit-Oriented
Employment, 2017	**10,833**		
Projected employment increase			
2020–2030	2,519	2,965	3,614
2030–2040	2,815	3,314	4,039
2040–2050	2,785	3,278	3,995
2017–2050	**8,949**	**10,533**	**12,838**
Additional commercial floor area (high), in SF			
2020–2030	1,007,595	1,185,998	1,445,586
2030–2040	1,126,113	1,325,499	1,615,622
2040–2050	1,113,957	1,311,191	1,598,182
2017–2050	**3,579,427**	**4,213,191**	**5,135,365**
Additional commercial floor area (low), in SF			
2020–2030	755,697	889,498	1,084,190
2030–2040	844,585	994,125	1,211,716
2040–2050	835,468	983,394	1,198,637
2017–2050	**2,684,570**	**3,159,893**	**3,851,524**

Source: PSRC, 2019, BERK, 2020

Life Sciences Innovation Hub

Life science business representatives envision Canyon Park as a place of innovation, where the highest caliber scientists and technicians will be attracted to work in Canyon Park because of its unique natural setting, vibrant mixed-use environment, transportation options, and collection of top-notch longstanding and start-up biotech businesses. They will enjoy chance encounters with colleagues across different businesses in private and public social gathering places that spark new ideas and better practices.

Retail and amenity spaces. Restaurants, bars, coffee shops, fitness centers, groceries, retail, services, and other private amenity spaces will offer the types of social mixing zones and enjoyable/useful amenities the life science businesses desired. They see these places as important for both sparking innovation through social activity and attracting talent by rounding out a more multifaceted neighborhood. See Neighborhood Center Street block front designations in Urban Design and Community Livability for recommendations on locations, types of uses, design, and other requirements for active ground floor uses.

Outdoor gathering spaces. Similarly, the public and private gathering spaces envisioned with redevelopment offer the spaces that foster chance encounters that spark innovation, as well as attract talented workers to the area. See Gathering Spaces in the Urban Design and Community Livability element for more information on conceptual locations and implementation actions.

Actions

1. Continue to participate and support the Biomedical Device Innovation Zone.
2. Seek a designation of Canyon Park as a life sciences cluster and participate with the Life Science Washington, the Washington State Department of Commerce, and Snohomish Economic Alliance in promoting this designation.
3. Implement the Transportation Actions, especially those that advance transit and non-motorized options.
4. See Block Front Street Designations actions in Urban Design and Community Livability for achieving active ground floors in key locations that would allow for innovation hub-type spaces.
5. See Gathering Spaces actions in Urban Design and Community Livability for achieving signature and small public and private outdoor gathering spaces.

Most Applicable Policies

ED-6 Foster innovation hub mixing zones (e.g., gathering spaces, cafes, bars, restaurants, gyms) for informal meet-ups to spark ideas, creativity, and synergies amongst businesses.

ED-7 Encourage a vibrant neighborhood with amenities like eating/drinking establishments, open spaces, and pleasant multimodal connections to attract talent to local businesses.

Small and Entrepreneurial Business Support

Fostering a wide range of businesses is important for attracting talent to an "innovation hub" and maintaining diversity. Life sciences business representatives stressed the importance of small business incubators and maintaining a start-up vibe in the area, as these attract recent graduates from UW and beyond. Likewise, small and entrepreneurial businesses dependent on economic rents provide valuable services to the Bothell community. See background information on the importance of small businesses and cultural anchors in the Concept's Foster existing retail and cultural anchors section. The general actions above that support the Regional Growth Center should also include support for small and entrepreneurial businesses.

Affordable and appropriate ground floors. In addition to technical business support, marketing, building connections between businesses, and other economic development efforts, development regulations should encourage/require physical spaces that are affordable and ready-made for a wide range of businesses. Removing residential as an allowed use from key business park areas and setting development standards will help maintain affordability and appropriate spaces and prevent displacement of existing businesses.

Actions

1. See actions under Affordable Commercial Space in the Land Use element.
2. See actions under Neighborhood Center Streets in Urban Design and Community Livability.

Most Applicable Policies

ED-2 Continue to support existing businesses of all sizes and provide a fertile environment for business growth.

ED-3 Protect commercial space affordability and viability in employment areas.

ED-4 Encourage affordable and appropriate commercial space to support small and entrepreneurial businesses, especially on neighborhood center streets.

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

Vision

One of the four elements of the Canyon Park Vision is:

Connected to the Natural Environment. Canyon Park is defined by its unique access to the natural environment and blend of urban wetlands, creeks, and interconnected trails.

08. Natural Environment

Goals and Policies

NE Protect, enhance, and leverage Canyon Park's **Robust and Healthy Natural Environment**.

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-2 Address stormwater issues through collective and individual management techniques and facilities.

NE-3 Maintain and improve recreational access to North Creek and natural areas for residents and workers, allowing for enjoyment of these natural systems.

NE-4 Enhance and improve these natural areas through volunteer programs, resource grants, and other mechanisms.

NE-5 Encourage natural drainage systems that improve stormwater infiltration and detention to reduce flooding and improve water quality.

NE-6 Mitigate transportation project impacts to ecological systems.

NE-7 Retain forest lands particularly on ridgelines and those associated with critical areas.

NE-8 Reduce buildings-related greenhouse gas emissions and encourage energy and water efficient development.

Imagine Bothell... Comprehensive Plan

The Vision Statement which guides the Imagine Bothell... 2015 Comprehensive Plan includes the following elements

1. Celebrates and respects its picturesque setting by achieving harmony between the built and natural environments;

5. Demonstrates a commitment to the conservation of scarce natural resources through the actions of residents, businesses and public institutions;

12. Protects, preserves and enhances those features of the natural environment which are most sensitive to human activities;

Stormwater

Stormwater runoff. Impervious surfaces (those which water does not penetrate) such as parking lots, building roofs, and roadways, produce stormwater runoff when it rains. Stormwater presents two key issues:

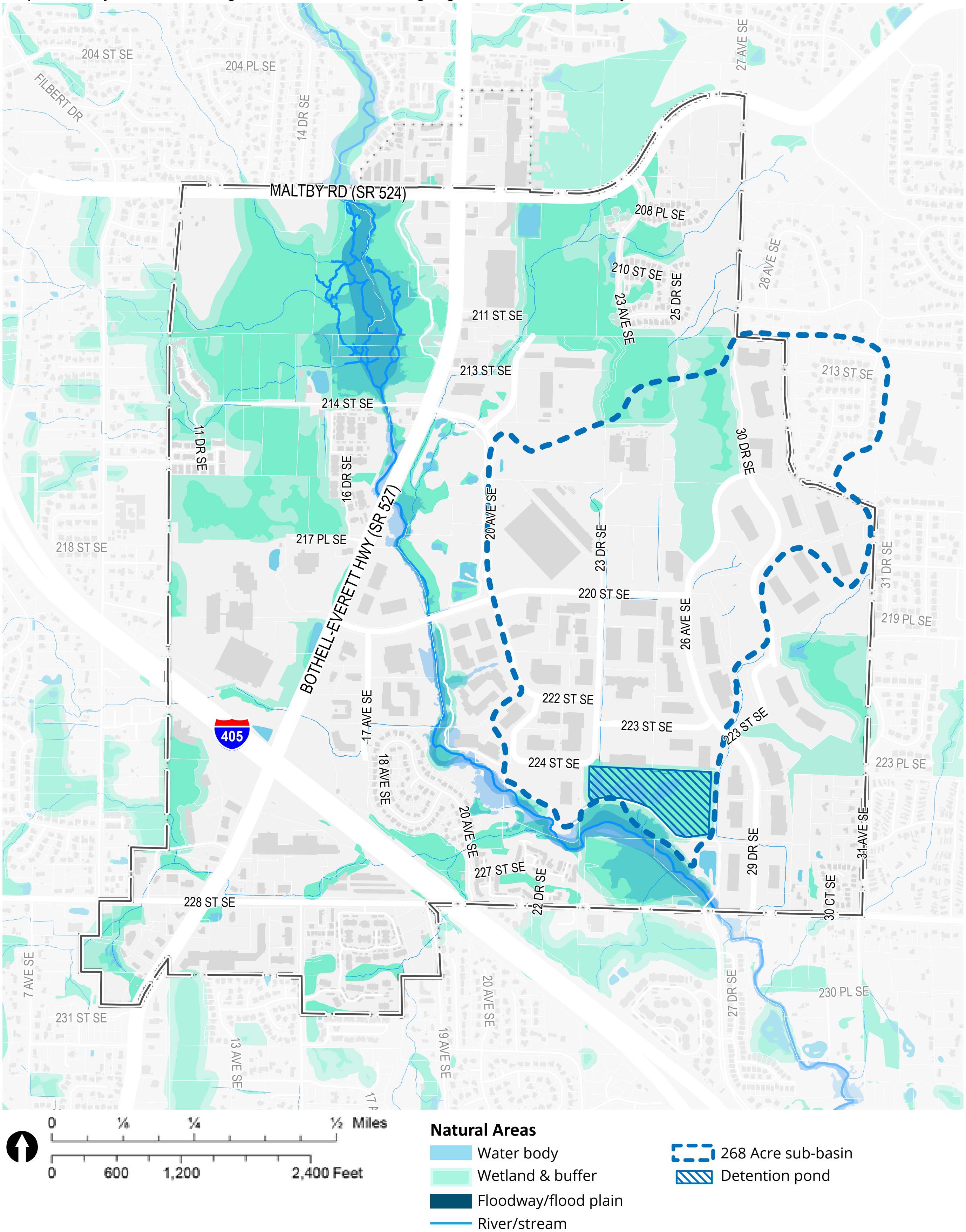
- It is a major source of pollutants in stream systems, with negative impacts on wildlife species and water quality.
- Stormwater flows can cause flooding during heavy rain events because water flows more quickly over impervious surfaces and does not absorb into the ground, causing higher peak flows.

Wetlands naturally treat stormwater by slowing currents down and allowing sediments to settle. Microorganisms treat pollutants through phytoremediation. These naturally occurring features can be recreated through green stormwater infrastructure (GSI). Low impact development (LID) techniques also reduce the quantity of stormwater by reducing impervious surfaces and capturing stormwater before it enters the public drainage system.

Detention ponds. In Canyon Park, detention ponds are used to capture stormwater before it reaches fragile stream ecosystems. The subarea is also fortunate to have intact wetlands which reduce the impact of runoff on streams. Improvements to existing stormwater detention ponds, implementation of modern GSI and LID techniques, and wetlands preservation (and enhancement associated with wetland impacts) will help improve the habitat and water quality in the North Creek system.

Current stormwater regulations. Private redevelopment must comply with current stormwater regulations. These are based on the 2013 and subsequent 2019-2024 National Pollution Discharge Elimination System (NPDES) Phase II Permit and Washington State Department of Ecology Surface Water Manual, which are uniformly applied to all new (re) development in Western Washington. Further, the City's surface water manual is applied to all new (re)development within Canyon Park.

Map 12. Canyon Park drainage sub-basin and existing regional detention facility.



Regional Stormwater Facility near 223rd St SE

An existing detention pond is located south of 223rd St SE, serving the Canyon Park Business Center and adjacent, uphill areas to the east. A functioning detention pond is an important feature for flow control. Maintaining this detention pond by, for example, excavating sediment, vegetation, and debris to re-establish the original pond bottom elevation would restore the pond's capacity to its intended design volume.

The detention pond drains an area of approximately 268 acres. To bring the existing detention pond up to current stormwater flow control standards, it would need to have 2.5 times more volume than its current design capacity. While the existing pond can be retrofitted to increase storage capacity, other approaches will very likely need to be employed to provide sufficient capacity for the entire sub-basin. Enhancements to the pond could improve water quality, flow control functions, and/or aesthetic appeal.

Potential Capacity Improvements:

1. Restore the Canyon Park Business Center detention pond to its original capacity through excavation of sediment, vegetation, and debris.
2. Conduct a field study and analyze upstream effects of raising the detention pond's High Water Line (HWL) up to one foot to add live storage capacity to the pond. This would also require adjustments to the emergency overflow system.
3. Study the feasibility of lowering the detention pond bottom to further increase storage capacity.
4. Look for opportunities upstream of the existing detention pond to add flow control measures.

Potential Water Quality Improvements:

1. Excavate existing detention pond to provide a "dead storage" zone, transforming it into a combined detention and treatment pond.
2. Consider implementing floating treatment wetlands (FTW) to enhance the benefit of dead storage.
3. Consider constructing an artificial stormwater treatment wetland to provide enhanced water quality treatment.

Action

Present options to Canyon Park Business Center for increasing stormwater detention capacity and improving stormwater runoff water quality at the existing detention pond.

Most Applicable Policies

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-2 Address stormwater issues through collective and individual management techniques and facilities.

MN-4 Increase feasibility of desired development, especially affordable housing.

Other Potential Regional Stormwater Facilities

Look for opportunities to support implementation of new stormwater facilities. For example, opportunities may exist in the elevated northeast corner of the basin where topography would allow for water detention facilities. On a sloped site, detention vaults could be incorporated into the building design, similar to the recent development near UW Bothell.

A potential site may be the cleared PUD site on the west side of 30th Dr SE. A benefit of this location is that a terraced detention vault system could do dual duty as 1) a terraced public park that connects the upper and lower business parks, 2) vaults under redevelopment, or 3) a combination of those two. This hillclimb location would be particularly useful to local bus riders using the stop directly west on 26th Ave SE.

The purpose of a new stormwater facility would be to:

1. Reduce flooding in Canyon Park by detaining water in a new joint facility.
2. Make development more feasible by reducing the cost of constructing full surface water facilities on individual properties.

Actions

1. Study the feasibility of a regional detention facility in the northeast corner of the drainage basin.
2. Present options and consider partnering with property owners for construction of new regional detention facilities.

Most Applicable Policies

NE-2 Address stormwater issues through collective and individual management techniques and facilities.

MN-4 Increase feasibility of desired development, especially affordable housing.

Low Impact Development and Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) and Low Impact Development (LID) techniques mimic natural drainage and reduce impacts of development on water and other ecological systems. In general, they reduce impervious surfaces and engineer pervious areas with plants and soil to hold, slow, and infiltrate water to reduce flooding and improve water quality. Current stormwater management regulations require new development and redevelopment to incorporate these systems as feasible. In addition, the City should seek opportunities to encourage and implement GSI/LID along streets, trails, parks, and other places.

Actions

1. Explore opportunities to implement natural drainage systems like pervious paving, bioretention cells, rain gardens, and bioswales throughout the subarea.
2. Look for upstream opportunities to insert Modular Wetlands and Filterra Units or other similar products in existing right-of-way storm drains that could treat runoff from larger areas.
3. Explore opportunities to integrate GSI into roadway improvements (see *Other Streets Design* in *Transportation*).
4. Incentivize private land owners to implement GSI and LID techniques such as rain gardens, bioretention cells, pervious pavements, and rain water harvesting.

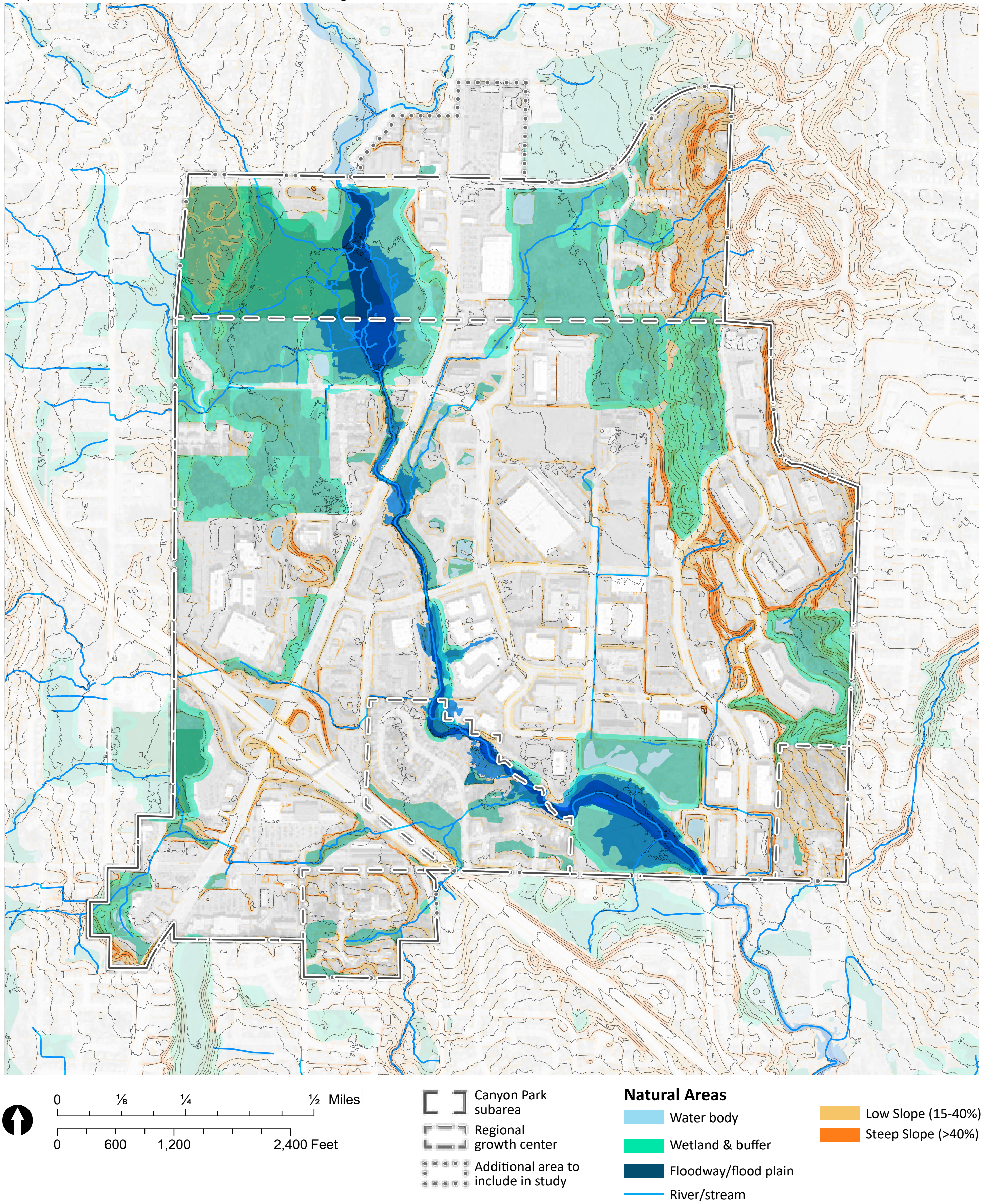
Most Applicable Policies

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-2 Address stormwater issues through collective and individual management techniques and facilities.

NE-5 Encourage natural drainage systems that improve stormwater infiltration and detention to reduce flooding and improve water quality.

Map 13. Critical areas (critical aquifer recharge areas not shown)



Wetland and Riparian Mitigation/Restoration Projects

Historically part of a rich and diverse North Creek riverine ecosystem, many of the remaining natural areas in Canyon Park have been degraded in the past 100 years through farming, the introduction of invasive species, and road and building construction, leaving opportunity for restoration and enhancement projects. Some projects have included restoration/enhancement features, such as at the Bothell Public Works Operations Center and the property bounded by North Creek, 20th Ave SE, 214th St SE, and 220th St SE.

To address the traffic impacts of growth in the subarea, this plan recommends several new roads or trail connections. With the abundance of wetlands and wetland buffers in the subarea, nearly all potential new connections or route widening would have impacts on wetlands or wetland buffers. The amount of mitigation required depends on the quality and size of the wetland area impacted. Several options are available to mitigate these impacts, both through restoration projects within the subarea, or by paying into an off-site restoration bank. If all transportation projects proposed in the subarea plan are constructed, on-site (within Canyon Park) mitigation projects may not be sufficient to mitigate all impacts, requiring a mixed strategy with both on-site mitigation and purchase of mitigation bank credits. See *Appendix E: Ecological Impact Assessment and Mitigation Cost Estimate* for more detail.

The *Imagine Bothell...* Comprehensive Plan directs Bothell to mitigate impacts on-site or locally as much as is feasible. The area needed to compensate for wetland and buffer impacts using an "on-site" (within Canyon Park) approach may be difficult to meet. The City would need to implement and manage wetland mitigation activities at multiple mitigation sites to meet the total impact generated by the needed transportation projects. A combination of strategies—the North Creek restoration and wetland rehabilitation project, potential other on-site projects, and off-site mitigation through purchase of mitigation bank credits—may be necessary to fulfill the mitigation requirements.

North Creek and Wetland Restoration

On the southern edge of the CPBC is an 11-acre parcel of land on the south shore of North Creek, between the creek and 228th St SE. This area is a flat, vegetated category II wetland that has been degraded by past use. Rehabilitation of the wetland would provide substantial ecological benefits to wildlife habitat conditions and corridors, increased and improved rearing habitat for juvenile listed Chinook salmon, increased flood water attenuation, sediment deposition, and water quality improvement

Actions

1. Rehabilitate North Creek's associated wetlands mapped in Figure X through the following actions:
   a. Create a sinuous North Creek overflow channel or complex of channels and backwaters through the wetland.
   b. Install native plants throughout wetland, riparian, and buffer areas.
   c. Install habitat features including large woody debris in the side channel(s), downed wood in the wetland, standing snags, and wildlife nest boxes.

Most Applicable Policies

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-6 Mitigate transportation project impacts to ecological systems.

Figure 41. Possible North Creek habitat restoration, wetland rehabilitation, and buffer enhancement area (yellow dashed line)

Other On-site Mitigation Options

Other smaller mitigation opportunities are present within the Canyon Park Subarea, although they do not match the areal and improved ecological function potential of the North Creek restoration area described above. Several privately owned single-family parcels could potentially provide

Figure 42. Potential mitigation opportunities (highlighted yellow) along 214th St SE   Imagery source: COBMap

Figure 43. Stream buffer mitigation opportunities along North Creek
Photos show vegetation patches dominated by invasive species like Himalayan blackberry and reed canarygrass. Overview map indicates location and orientation of photos.
(Map imagery: COB Map. Photos: Watershed Company, December 2018)

mitigation opportunities along 214th Street SE. Degraded stream buffers present along North Creek could also serve as stream buffer mitigation. Combining a number of smaller sites has some risks in terms of lower cost efficiency and the potential for agency rejection due to lower potential ecological improvement and higher risk of failure.

Action

1. Explore the feasibility and effectiveness of the other on-site mitigation opportunities identified in Figure 42 and Figure 43.
2. Evaluate opportunities to enhance some existing wetlands in the Canyon Park sub-basin in order to use other wetland or critical areas in the basin as flow control areas.

Most Applicable Policies

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-6 Mitigate transportation project impacts to ecological systems.

Critical Areas and Vegetation Conservation

Habitat Preservation and Enjoyment

Beaver habitat. Large patches of natural vegetation in Canyon Park provide homes to many wildlife species, including the North American beaver. Beaver activity was observed southeast of the Bothell-Everett Highway and 214th St SE intersection in late 2018 and may be present in the Centennial Park riverine wetland system. This is notable because of potential implications beaver dams have on associated stream and wetland systems. Beaver dams obstruct water flow, causing flooding in—and potentially expanding—wetland areas. In natural settings, this plus the stumps and downed wood caused by beavers improve habitat functions. In urban areas, however, beaver activity can result in infrastructure flooding, causing maintenance issues and increased maintenance costs. Bothell should consider ways to preserve the beaver presence while preventing damage to current and future infrastructure.

Figure 44. Beaver den in riverine wetland adjacent to Bothell-Everett Highway (Watershed Company, December 2018)

Figure 45. Beaver dam and recent cuttings in riverine wetland south of 214th St SE (Watershed Company, December 2018)

Habitat enjoyment and education. Additional and/or enhanced trails and viewpoints along wetland and stream habitats would showcase and make Canyon Park's natural systems more accessible. They would also provide the opportunity to educate about the local systems, for example, with interpretive signage showcasing spawning and migrating salmon along North Creek and bird-watching "hotspots." As the area grows, additional trail links and integration with public open space would enhance the experience of the natural environment (see *Map 14. Canyon Park Pedestrian/Bicycle Plan* in the *Transportation* element and *Gathering Spaces* in *Urban Design & Community Livability*).

Habitat maintenance. For those in the community interested in hands-on participation, an ongoing program of invasive vegetation removal within the already-established natural areas could be initiated, including replacement with native plants. This would improve the quality of habitat without the need for an expanded buffer footprint using scarce additional space. Design, permitting, and construction needs and costs for such a program would be relatively low, and timelines between conception and implementation short. Community- and volunteer-oriented weed control and replanting projects can give residents and workers a reason to get off the trail, build a sense of community, and take ownership of their surroundings.

Action

1. Consider creating development standards that allow for ongoing beaver presence and activity in the subarea.
2. Consider additional viewpoints and interpretive signage in Canyon Park in the next PROS Plan update.
3. Support existing volunteer programs and/or establish a volunteer program to remove invasive species and plant native plants.

Most Applicable Policies

NE-1 Maintain the high-quality wetland, creek, and ecological systems.

NE-3 Maintain and improve recreational access to North Creek and natural areas for residents and workers, allowing for enjoyment of these natural systems.

NE-4 Enhance and improve these natural areas through volunteer programs, resource grants, and other mechanisms.

NE-6 Mitigate transportation project impacts to ecological systems.

Tree Preservation

"Feathered edge." The *Imagine Bothell...* Comprehensive Plan Land Use Element emphasizes the preservation of trees, particularly the 'feathered edge' visual effect where trees are silhouetted against the sky as a key visual amenity for the City. The wooded hillside areas in the eastern portion of the Canyon Park Subarea contain a portion of the City's feathered edge as described in Land Use Element Policy LU-P11 and mapped in Figure 46.

Forested areas. Canyon Park also contains forested areas which stakeholders identified as key visual amenities that help differentiate Canyon Park from other growth centers. Some of the more significant forested areas include lands north and south of 214th ST SE, lands in Centennial and Cedar Grove Parks, and lands with critical areas and critical area buffers.

Figure 46. Canyon Park's "feathered edge" (Imagine Bothell... Comprehensive Plan Figure LU-5)

Action

1. Apply the city's tree retention and critical areas regulations.
2. On a case by case basis, potentially condition development to avoid the loss of vegetated areas not otherwise protected by critical area regulations such as on vegetated slopes.

Most Applicable Policy

NE-7 Retain forest lands particularly on ridgelines and those associated with critical areas.

Greenhouse Gas Emissions

Washington's primary greenhouse gas emissions sources are from transportation, buildings, and electricity. See the discussion on *Transportation Demand Management/Commute Trip Reduction* in the *Transportation* chapter, and *Building Efficiency* below.

Building Efficiency

Residential, commercial, and industrial building construction, systems, and the functions people do within them (e.g., cooking, running computers, etc) account for more than a third of greenhouse gas emissions. The systems that heat, cool, and light buildings are responsible for the bulk. Likewise, their water systems can over-use water resources. Also see the GSI and LID section above related to site design for on-site water capture and treatment.

Actions

1. Apply building design standards to encourage energy and water efficient buildings and construction, following guidance from industry standards such as the US Green Building Council LEED and International Living Future Institute (ILFI)'s Living Building Challenge.
2. Encourage solar or other alternative energy programs.

Most Applicable Policy

NE-8 Reduce buildings-related greenhouse gas emissions and encourage energy and water efficient development.

Vision

One of the four elements of the Canyon Park Vision is:

A Transportation Hub. Canyon Park is a transportation hub with infrastructure serving employees and residents commuting to and from the neighborhood, as well as commuters traveling to other areas.

09. Transportation

Goals and Policies

ED Maintain, protect, and support Canyon Park as an **Economic Driver.**

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

MN Evolve Canyon Park into a **Multifaceted Neighborhood.**

MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

TH Foster and leverage Canyon Park as a **Transportation Hub.**

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

TH-4 Encourage the highest density land uses to locate near high capacity transit.

TH-5 Work with the private sector and agency partners to reduce commuters' dependency on single occupancy vehicles (e.g., through a transportation demand management (TDM) or commute trip reduction (CTR) program).

TH-6 Encourage options for fast, easy "last-mile" trips between transit stops and job sites/residences.

TH-7 Encourage shared parking solutions between businesses.

TH-8 Strategically expand road/intersection capacity to improve traffic flows within the subarea. Minimize business, resident, and ecological impacts to the maximum extent feasible.

TH-9 Improve street network connectivity by extending select Canyon Park streets to relieve congestion on Bothell-Everett Highway and at choke points. Minimize business, resident, and ecological impacts to the maximum extent feasible.

Imagine Bothell... Comprehensive Plan

The Vision Statement which guides the Imagine Bothell... Comprehensive Plan includes the following elements:

6. Develops and maintains a transportation system which serves land use and conservation goals and offers a variety of motorized and non-motorized modes of travel, placing emphasis on each, so as to maximize individual choice.

9. Provides commercial areas which offer multiple transportation modes including walking, bicycling and a variety of transit choices; are vibrant and inviting by design; and are located and sized so as to ensure adequate selection and availability of goods and services for all Bothell residents.

TH-10 Expand access to park-and-rides in Canyon Park to ease the transition from suburban, auto-oriented travel to other modes.

TH-11 Encourage catalyst redevelopment projects that support transit ridership.

TH-12 If needed, consider updating Bothell's LOS policy to recognize "ultimate capacity" of Canyon Park corridors and better support transit and other travel modes.

Private Streets Transition to Public Policy Placeholder

The Canyon Park Business Center Owners Association (CPBCOA) and the City of Bothell are working on an agreement regarding the orderly transition of selected private roads within the Canyon Park Business Park to the City of Bothell as public rights-of-way. A policy regarding this transition will be added to the Transportation Section as additional discussion occurs with the CPBCOA.

Transportation Approach

The transportation approach relies heavily on the foundational principle that Bothell cannot build its way out of congestion.Traffic congestion is a regional and national challenge that is experienced acutely in Canyon Park. The challenge stems from historical choices about transportation and land uses that favored single occupancy vehicles (cars) over other transportation modes. Bothell can improve the roadway system and its capacity as much as possible through strategic projects that are practical and economically reasonable. However, beyond that, the order of magnitude of cost and impacts makes further capacity improvements unreasonable. The more complicated, larger-sized, and costly projects strain City resources and physically impact residents, businesses, and ecological systems. Thus, this plan recommends the following strategic actions to 1) improve roadway capacity as much as is feasible and 2) make it easier for people to choose other modes of transportation (e.g., transit, walking, biking, rolling on other device):

- Extend three streets/trails strategically to relieve future congestion, meet Bothell's current level of service (LOS) standard (LOS E corridor), and maintain and allow for more ways in/out of Canyon Park.
- Improve connections for people who are walking, biking, rolling on other devices, and using transit.
- Encourage a better land use mix, location, and densities for transit-supportive homes and jobs to reduce car trips (see the *Concept* and *Land Use* elements for more information).
- Prioritize a long-tesrm view toward improved transit.
- Accept that if the region shifts to improved transit service on Bothell-Everett Highway (SR 527), major roads in Canyon Park may experience a period of transition where roadways reach their "ultimate capacity" with greater single occupancy vehicle (SOV)/car congestion.

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Improve connectivity and relieve stress on the major corridors and three entry points to the Canyon Park Business Center through street extensions and improved paths for people outside of cars.

- **Extend 20th Ave SE northward from 213th St SE to Maltby Rd (SR 524).** This route relieves pressure on Bothell-Everett Highway and its intersections with the Canyon Park Business Center and offers an alternate route for local buses.
- **Extend 214th St SE westward to 9th Ave SE.**
    - **Option 1 (preferred):** Build a street that allows vehicular access between 9th Ave SE and Bothell-Everett Highway (SR 527) to allow local trips an alternate way in/out of the business center and thereby relieving congestion on Bothell-Everett Highway (SR 527). Because this route does not provide easier access to I-405, it is not expected to serve much regional traffic. Pedestrian and bicycle facilities would be included to further improve alternate ways of getting in/out of the business park and new neighborhood centers. This option impacts 9th Ave SE residents with an increase in traffic and wetland, stream, and associated buffers. If this option is selected, improve 9th Ave SE with ample pedestrian and bicycle facilities prior to extending 214th St SE.
    - **Option 2:** Extend a trail westward from the existing 214th St SE to 9th Ave SE. This option would not provide vehicular access but would improve pedestrian/bicycle paths to Canyon Park. A trail would have a smaller impact on the wetland, stream, and buffers than a full street and would not increase traffic on 9th Ave SE.
    - **Mitigate wetland, stream, and buffer impacts.** For either option, see the *Wetland and Riparian Mitigation/Restoration Projects* options in the *Natural Environment* element.
- **Connect 219th Pl SE to properties located northwest of the I-405/SR 527 interchange.** Improve 219th Pl SE and remove the barrier to these properties to allow employee-only vehicular access. This shortens commute trips and relieves some pressure on Bothell-Everett Highway (SR 527).
- **Add pedestrian and bicycle paths.** Construct the critical paths shown in Map 15 and require redevelopment to implement paths with their street frontage improvements over time (see *Through-block Connections* recommendations in the *Urban Design & Community Livability* element and street cross sections in *Transportation*).

Prioritize transit. Complete the planned addition of one lane to Bothell-Everett Highway (SR 527) for a total of 3 through-lanes in each direction (Project C-4 on Map 16) and, when determined feasible, provide transit signal priority (TSP) for the Swift Green Line and other routes. In the long term and pending support and a coordinated effort among regional partners—Community Transit, WSDOT, Snohomish County, City of Mill Creek, and City of Everett—for Business Access and Transit (BAT) lanes through Bothell and Snohomish County, convert the outside general purpose lanes to BAT lanes and include transit signal priority (TSP). Bothell strongly supports this long-term goal to best leverage the regional investment in a robust, functioning, and comprehensive transit system.

In the long term, consider updating Bothell's level of service (LOS) policy for Canyon Park. Prior to regional support and investment in BAT lanes on Bothell-Everett Highway (SR 527), the corridors will likely continue to meet the City's requirements (LOS E corridor). When the conversion of general purpose lanes to BAT lanes happens, more congestion is predicted as no additional reasonable road improvements can be made to increase capacity for SOVs/cars, which will impact the corridor LOS. While the initial conversion to transit may negatively affect SOV performance, the move will be necessary to encourage alternative transportation means that will allow for continued job and population growth. Transit will likely become the more attractive and efficient means of getting through congestion in the future.

The region is seeing more cities (e.g., Kirkland, Tukwila, and Bellevue) provide exceptions or changes to their LOS policies in recognition of the region's inability to construct its way out of congestion. This means longer waits at intersections and along corridors for SOVs. In the long term when BAT lanes become a realistic option, Bothell could consider updating its LOS policy to balance the need for car/SOV mobility with improved regional transit and its associated economic, community livability, and ecological sustainability benefits.

Pedestrian and Bicycle Infrastructure

Improved Pedestrian/Bicycle Connections

The quality of existing infrastructure for people walking and biking within the subarea is mixed. There are some relatively high-quality multi-use paths and sidewalks as well as roads with uncomfortable and less safe conditions. A network of public and private trails in the business park provide connections (with occasional missing links) and recreational opportunities. However, internal barriers in the subarea isolate jobs, amenities, residences, and transit stops. These limitations discourage active transportation as an alternative to driving by lengthening trips or forcing travellers to pass through unpleasant and potentially unsafe conditions to reach their destination.

Improvements in the quality of bike/pedestrian infrastructure will provide alternatives to automobiles for many trips, make transit more useful by increasing its "walkshed," and allow workers and residents to more easily enjoy the health benefits of walking and biking. Designated "neighborhood center streets" should have an excellent walking environment with the streetscape and block frontage improvements discussed in Urban Design and Livability.

Map 14 illustrates the projects that would allow people to:

- Walk/bike/roll through the subarea to access their destinations easily on routes that are safe, well connected, and efficient.
- Use "active" transportation (walking, etc) for recreation as an enjoyable, healthy option throughout the subarea.

Actions

1. **Comprehensive Plan Projects.** Complete the projects planned through the *Imagine Bothell...*Comprehensive Plan identified in Map 15:

   C-1. Install protected bike lanes and buffered sidewalks on both sides of 9th Ave SE from 228th St SE to 208th St SE (SR 524).

   C-2. Work with WSDOT to complete the eastside cycle track, sidewalks, and safe pedestrian/bike crossings on 17th Ave SE as part of WSDOT's 17th Ave SE Express Toll Lane (ETL) improvements project.

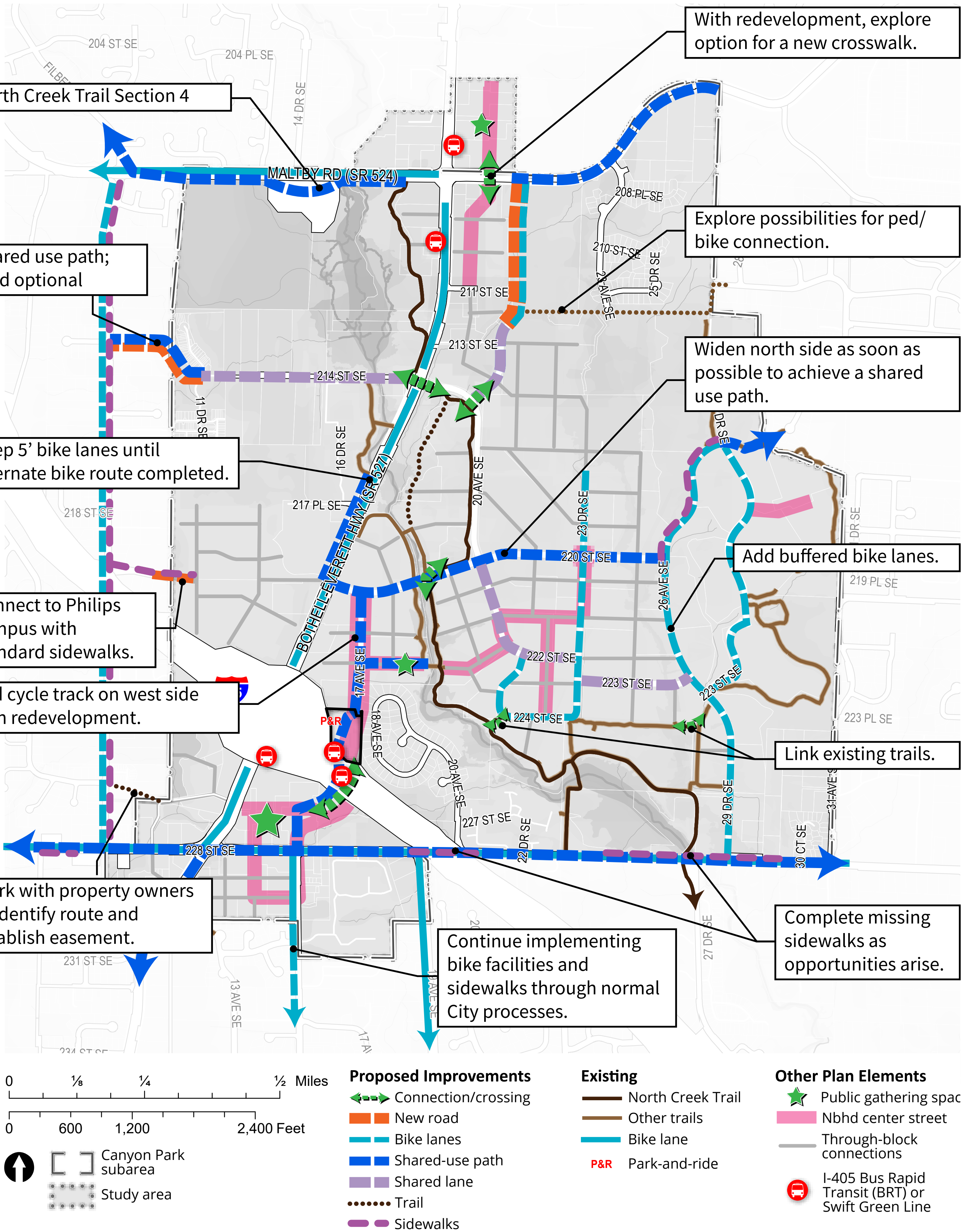
   C-3. Install a pedestrian/bicycle crossing with Rectangular Rapid Flashing Beacons (RRFB) on 220th St SE for the North Creek Trail. Extend the existing northside trail westward to 17th Ave SE to complete this missing link.

Most Applicable Policies

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

Map 14. Canyon Park Pedestrian/Bicycle Plan



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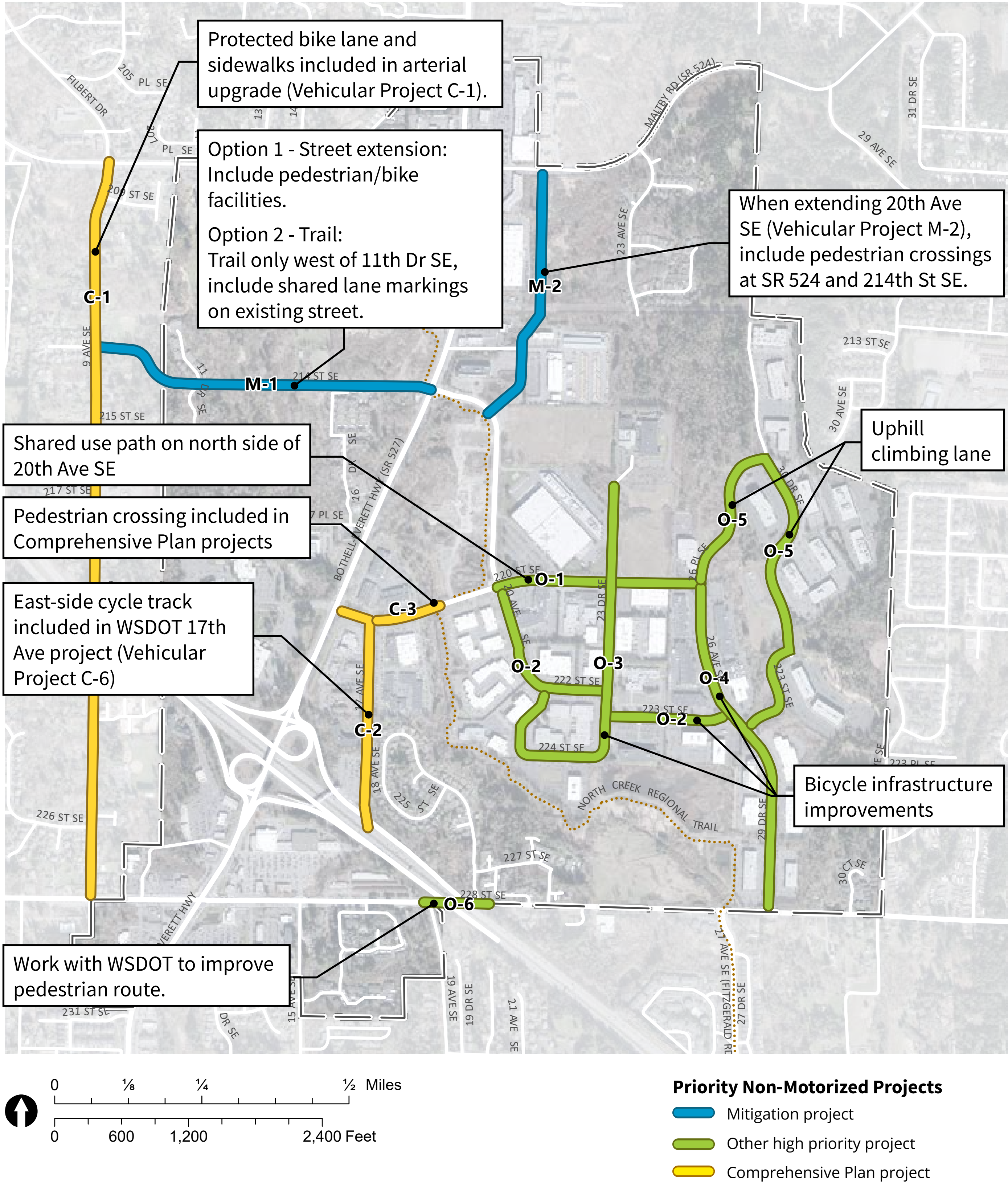
Map 15. Priority non-motorized transportation projects



2. **Mitigation projects related to concurrency corridors.** Complete the high priority pedestrian and bike mitigation projects identified on Map 15:

   M-1. As part of the 214th St SE street and/or trail extension, include pedestrian/bicycle facilities to connect 9th Ave SE and Bothell-Everett Highway (SR 527) via 214th St SE. If extending the street (Option 1), include pedestrian and bicycle facilities, such as sidewalks and bike lanes or potentially a shared use path on one side of the street if it can reduce environmental impacts. If extending a trail only, add sharrows to the existing street. This project requires right-of-way acquisition and wetland mitigation.

   M-2. Construct a new street extending 20th Ave SE to SR 524. Include pedestrian and bike facilities, add a signal at Maltby Rd (SR 524) and pedestrian-activated crosswalks at 214th St SE (or a signal if carrying transit) concurrent with the street extension. This project also requires right-of-way acquisition and wetland mitigation.

3. **Other high priority projects.** Complete the high priority pedestrian and bike projects identified on Map 15:

   O-1. Install a shared use path on the north side of 220th St SE from the existing North Creek Trail east to 26th/29th Ave SE. Also require this through street frontage improvements so that whichever comes first—funding for the project or redevelopment—the path is implemented.

   O-2. Add sharrows (shared bike/vehicular lane markings) to 20th Ave SE (between 220th and 222nd), 222nd St SE, and 223rd St SE.

   O-3. Add buffered bike lanes to 23rd Dr SE, 224th St SE, and 20th Ave SE south of 222nd St SE as marked on Figure 2.

   O-4. Add buffered bike lanes to 26th/29th Ave SE between 220th St SE and 228th St SE.

   O-5. Add uphill climbing lanes to the east side of 26th Pl SE, 30th Dr SE, and 223rd St SE between 30th Dr SE and 29th Dr SE as marked on Figure 2. Further improvements may be pursued per the Street Design *Section F* and *Section G*.

   O-6. Work with WSDOT to improve the pedestrian/bike experience on 228th St SE under I-405 (e.g., bollards protecting bike lanes and/or path added behind columns).

4. **Require with redevelopment.** Through street frontage improvement standards, require the following projects:

   R-1. Require a cycle track and sidewalks on the west side of 17th Ave SE with redevelopment (through frontage improvement standards).

   R-2. Require redevelopment (through frontage improvement standards) on 220th St SE to accommodate a shared use path on the north side and wide sidewalk on the south side (see Map 17).

5. Complete other Canyon Park Pedestrian/Bicycle Plan (Map 14) projects as opportunities arise and prioritize as possible in citywide transportation planning.

6. As through-block connections are developed (see *Through-block Connections* in *Urban Design & Community Livability*), pursue opportunities to extend them through parcels not yet redeveloping to reduce piece-meal segments and achieve formal connections sooner.

Through-block Connections

Large blocks, dead-end streets, and geographical barriers limit mobility by all modes through the subarea except along the principal streets through the park. These limitations negatively impact business and neighborhood vitality by reducing the diversity of paths between destinations. A network of through-block connections will shorten travel distances, create a more dynamic, complex, and resilient urban environment, and will improve circulation options for businesses. See the *Through-block Connections* Policies and Actions in the *Urban Design & Community Livability* element.

Transit

Recent Swift Green Line improvements and planned Sound Transit I-405 BRT investments will significantly improve the speed and reliability of transit-based commutes to and from the area in the coming years. This will help to mitigate traffic congestion, reduce greenhouse gas emissions, and improve the efficiency of public infrastructure.

Two BRT projects have the potential to make transit an important mode in what has traditionally been an automobile-oriented area:

- Community Transit's Swift Green Line service between Canyon Park Park-and-Ride and Everett, which began in 2019 and may extend to downtown Bothell in a future phase.
- Sound Transit's Stride I-405 BRT line will connect the Park-and-Ride to Lynnwood, Bellevue, and the I-405 corridor to the south. Stride is projected to begin service in 2024.

To maximize the value of regional investments in BRT, and other transportation improvements, the following policies should be pursued.

Transit Priority

Key to increasing the effectiveness and desirability of transit is providing a fast alternative to driving. By prioritizing transit, buses will be able to move more quickly through congested areas.

The subarea planning process explored the feasibility and benefits of alternative BRT options, including:

1. **Business Access and Transit (BAT) lanes** in Bothell-Everett Highway's outside lanes.
   a. An early proposal to widen Bothell-Everett Highway to 9 lanes to accommodate new BAT lanes without impacting existing general purpose lanes was infeasible due to property, ecological, and City financial impacts.
   b. An option to convert the outside general purpose lanes to BAT lanes, combined with a planned project to complete the 7-lane configuration of Bothell-Everett Highway north of I-405, was feasible and favorable for its great travel time savings for transit, but negatively impacted general purpose travel times. Transit signal priority (TSP) was also considered to improve bus speed and reliability.

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2. **Reversible bus-only center lane.** This option puts transit in the center lane, and the direction changes with the peak traffic direction. This is operationally challenging, more expensive than traditional BAT lanes, and complex for riders.
3. **Parallel BRT route** east of Bothell-Everett Highway. This option was relatively feasible, especially combined with the 20th Ave St extension project under consideration in this plan, could serve the business center with better "door-to-door" service, and had mild travel time savings for transit. However, though Community Transit supports this route for local service, iit does not meet their standards for BRT corridors.

Actions

1. Complete the planned addition of one lane to Bothell-Everett Highway (SR 527) to achieve three through-lanes in each direction (Project C-4 on Map 16) and, if determined feasible, provide transit signal priority (TSP) for the Swift Green Line and other local routes.

2. Coordinate with Community Transit, WSDOT, and Snohomish County to understand feasibility for BAT lanes and transit signal priority (TSP) on Bothell-Everett Highway through Bothell and Snohomish County. When these agencies are ready to implement Business Access and Transit (BAT) lanes regionally, convert the outside general purpose lanes to BAT lanes.

3. Coordinate with Community Transit to understand opportunities and needs for local transit to use a parallel route east of Bothell-Everett Highway. Include bus needs (i.e., do not preclude transit) in roadway and intersection design when extending 20th Ave SE to Maltby Rd (SR 524).

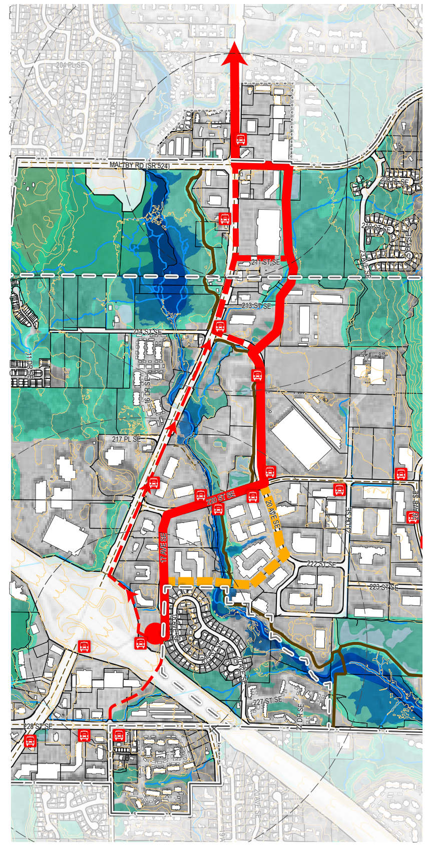

Figure 47. Alternate transit route

Most Applicable Policies

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips to and from the subarea and within the subarea.

Park-and-rides

Land use and transit patterns in suburban areas like Canyon Park often make it challenging for nearby residents to easily access transit stops by means other than driving. Park-and-rides expand transit access by allowing people to drive and park near high-quality transit service. However, the existing Canyon Park Park-and-Ride, a surface lot with 309 spaces, is typically filled to 99% of its capacity on an average weekday. A new structured park-and-ride south of I-405 would prevent unnecessary trips into the business center for transit riders coming from south of Canyon Park, increase access to transit, and support a lively neighborhood close to transit if designed well. More intense development over the existing lot would also increase access to transit and improve the pedestrian/bike connection from the future I-405 BRT station and 17th Ave SE.

Actions

1. Work with WSDOT and Community Transit to pursue a public-private redevelopment of the existing Canyon Park park-and-ride that preserves (and potentially expands) existing parking spaces. See design recommendations in *Park-and-ride Redevelopment and Design* on page 70.
2. Facilitate public-private partnerships (Sound Transit, Community Transit, WSDOT, and private developer) to explore the creation of a new park-and-ride on the south side of I-405 near the freeway transit station. See design recommendations in *Park-and-ride Redevelopment and Design* on page 70.

Most Applicable Policies

TH-10 Expand access to park-and-rides in Canyon Park to ease the transition from suburban, auto-oriented travel to other modes.

TH-11 Encourage catalyst redevelopment projects that support transit ridership.

Vehicular Travel

The majority of daily travel through the subarea takes place in private SOVs. This travel mode provides flexibility for people to reach destinations in the order and time they need and reflects the lack of reliable transit options historically available. However, when a large proportion of SOV trips occur in the same direction at the same time, roads and highways become congested and travel speeds decrease substantially. Vehicular travel will continue to be an important feature of Canyon Park mobility in the future. Nevertheless, strategies to preserve solo driving's flexibility and ease of movement should be balanced with the per-person space efficiencies, infrastructure costs, public health, and greenhouse-gas (GHG) emissions benefits of other travel modes. Reducing the growth of traffic congestion ensures private vehicle travel remains a viable option for those who need it and allows freight, transit, and emergency vehicles to operate efficiently.

Transportation Demand Management/ Commute Trip Reduction

The primary source of traffic congestion in the subarea is morning and evening commute trips. Because so many trips occur in SOV motor vehicles over a short period of time, road capacity is overwhelmed. For most commuters, mode choices are made based on the convenience, cost, availability, and travel time of different options. Programs that provide benefits to commuters who travel via transit, walking, biking, or carpooling, or encourage staggered work shifts, can help shift commuters away from single-occupancy vehicle commutes and reduce congestion.

Transportation demand management programs are an effective approach for reducing SOV commutes. These programs set goals and develop voluntary programs with employers, encouraging employees to use transit or active transportation (walking, biking, etc.), telecommuting, carpooling, or commuting at off-peak hours. Typical programs include compensating employees who don't drive based on the typical cost to the employer of providing free parking.

Actions

1. Work with employers, Community Transit, and other regional transportation organizations to develop and implement transportation demand management/commute trip reduction programs, including transit pass subsidies, staggered shifts and telecommuting options, paid parking, reduced parking, and improved "last mile" options.
2. Facilitate partnerships and advocate for flexible travel options within the subarea, especially "last mile" trips between Canyon Park park-and-ride and major employers, like on-demand bicycle or e-scooter

Most Applicable Policies

TH-5 Work with the private sector and agency partners to reduce commuters' dependency on single occupancy vehicles (e.g., through a transportation demand management (TDM) or commute trip reduction (CTR) program).

TH-6 Encourage options for fast, easy "last-mile" trips between transit stops and job sites/ residences.

TH-7 Encourage shared parking solutions between businesses.

rentals (i.e., bike share), a circulator shuttle, app-based ride-hailing service, or other options.

3. Facilitate conversations amongst businesses and authorize a shared parking program to allow parking lot owners to share or rent out any excess parking stalls.
4. Require bicycle, e-bike, scooter, and/or other micromobility device parking with development and public gathering space.

Proposed Vehicular Projects

The vehicular circulation system has choke points that limit capacity. The *Imagine Bothell*... 2015 Comprehensive Plan proposed projects to improve vehicular circulation in Canyon Park as Bothell and surrounding areas grow in population. This plan recommends additional projects to mitigate increased vehicular trips caused by the increased growth proposed in this plan. These projects were selected because they increase capacity and/or connectivity of the street network without impractical ramifications to City funds, ecological functions, and private property. Wetlands and streams, steep slopes, and neighborhood considerations also constrain system improvements.

Note that this plan presents the 214th St SE extension (project #X) between 11th Dr SE and 9th Ave SE as the preferred option. If this is deemed infeasible or undesirable, Bothell will need to update its LOS policy or identify other mitigation measures to meet current LOS standards.

Most Applicable Policies

TH-8 Strategically expand road/intersection capacity to improve traffic flows within the subarea. Minimize business, resident, and ecological impacts to the maximum extent feasible.

TH-9 Improve street network connectivity by extending select Canyon Park streets to relieve congestion on Bothell-Everett Highway and at choke points. Minimize business, resident, and ecological impacts to the maximum extent feasible.

Actions

Implement the following projects, which include projects already planned through the Comprehensive Plan and this Subarea Plan's new recommendations (see Map 16 for project locations):

1. **Comprehensive Plan Projects.** Complete the projects planned through the *Imagine Bothell*...Comprehensive Plan identified in Map 16:

   C-1. 9th Ave SE multimodal improvements. Widen 9th Ave SE from 228th St SE to SR 524 to upgrade the street to a Collector Arterial standard (3-lanes) with improved pedestrian/bike facilities and improvements to the 228th St SE and SR 524 intersections. At 9th Ave SE and SR 524 add a second northbound left turn lane.

   C-2. SR 527 near SR 524. Add a third northbound through lane to SR 527 from 211th St SE to north of SR 524 (Maltby Rd) and add a southbound left turn lane from SR 527 to SR 524.

   C-3. SR 527/214th St SE intersection. Re-channelize the westbound through/left lane to a through/right lane.

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C-4. SR 527 seven-lane cross section. Add a third southbound lane to SR 527 between SR 524 (Maltby Rd) and 220th St SE. Make associated intersection improvements.

C-5. SR 527/220th St SE intersection. As part of project C-6, work with WSDOT to construct the planned improvements at the 220th St SE and Bothell-Everett Highway intersection.

C-6. WSDOT I-405 direct access ETL ramps. Work with WSDOT to complete the proposed express toll lane (ETL) direct access ramps at 17th Ave SE and I-405, street improvements to 17th Ave SE, and intersection improvements at 17th Ave SE and 220th St SE.

C-7. WSDOT I-405 widening and SR 527 interchange. Support WSDOT in widening I-405 and adding a second Express Toll lane from SR 522 to I-5 in Lynnwood and making improvements to the SR 527/I-405 interchange ramps.

C-8. 228th St SE/Fitzgerald Rd intersection. Add an eastbound right turn pocket.

C-9. 228th St SE/29th Dr SE intersection. Add a westbound right turn pocket.

C-10. 228th St SE/31st Ave SE. Add a westbound dedicated right turn lane on 228th St SE where it meets 31st Ave SE.

C-11. Fitzgerald Rd (240th St SE to 228th St SE) widening. Widen Fitzgerald Road and add curb, gutter, and sidewalks from 240th St SE to 228th St SE.

2. **Mitigation projects related to concurrency corridors.** Complete the vehicular mitigation projects identified on Map 16:

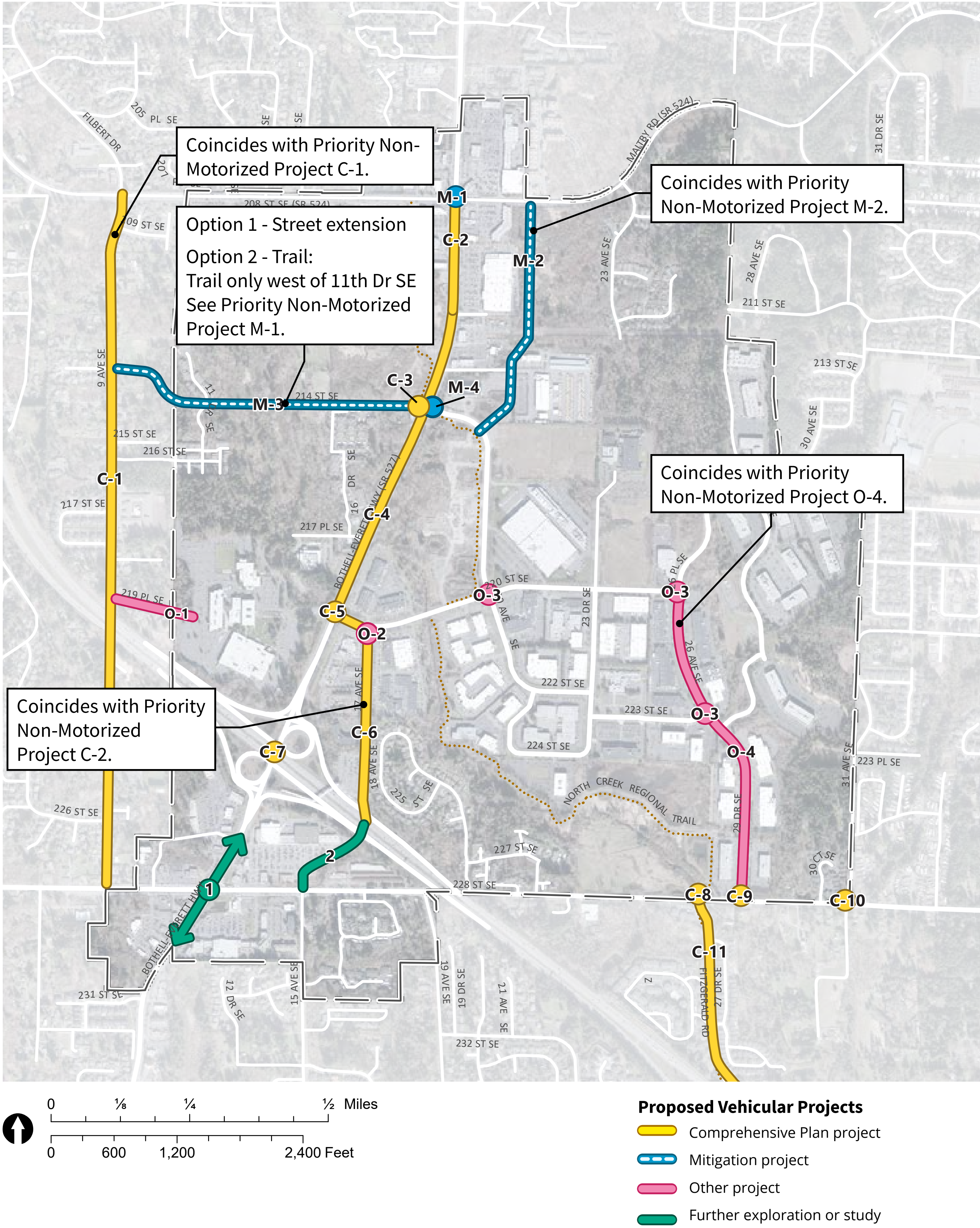
M-1. SR 524 (Maltby Rd)/SR 527 intersection. Modify the intersection to include two westbound left turn lanes and two westbound through lanes.

M-2. 20th Ave SE extension. Extend 20th Ave SE north to Maltby Road and install a signal at the 20th Ave SE/214th St SE intersection. Consider transit signal priority (TSP) capability.

M-3. 214th St SE extension. Extend 214th St SE west to 9th Ave SE, including a traffic signal at 9th Ave SE and pedestrian/bicycle facilities (preferred option). Alternatively, extend a trail only westward from 11th Dr SE to 9th Ave SE.

M-4. 214th St SE/SR 527 intersection. Add a westbound right turn lane and dual westbound left turn lane.

Map 16. Proposed vehicular projects



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3. **Other projects.** Complete or allow the other vehicular projects identified on Map 16:
   - **O-1. 219th Pl SE extension.** Allow private property owners to improve 219th Pl SE and open access to the properties northwest of the I-405/527 interchange.
   - **O-2. 17th Ave SE/220th St SE intersection.** Add westbound dual left-turn lanes and a new southbound receiving lane on 17th Ave SE.
   - **O-3. Internal streets monitoring.** Monitor traffic conditions and install new traffic control such as signal or roundabout for three intersections in the CPBC if warranted. Also, monitor if increased capacity is needed on 220th St SE east of 20th Ave SE.
   - **O-4. 26th/29th Ave SE rechannelization.** Rechannelize road to three lanes when constructing bicycle facility (see non-motorized project O-4 on page 107).

Exploration or Study

1. **SR 527 corridor study.** See "SR 527 Corridor Study" below.
2. **WSDOT 17th Ave SE extension south of I-405.** Work with WSDOT to pursue and expedite the plan for ETL and bus access on the south side of I-405.

SR 527 Corridor Study

SR 527 is a heavily used and complicated corridor. As a transit corridor serving multiple jurisdictions, it would benefit from further study to solidify a regional vision for its function, performance, design, and adjacent land uses. Partners should include Snohomish County, WSDOT, Community Transit, and Sound Transit.

As part of this study, the 228th St SE/Bothell-Everrett Highway (SR 527) intersection is of particular interest. Intersection modifications at 228th St SE and Bothell-Everett Highway (SR 527) could potentially improve traffic flows. A future study is needed to consider, among other options, a “displaced left turn” concept. The study will be used to better understand benefits of potential designs and associated impacts to adjacent properties and pedestrian/bicycle facilities.

Action

1. With regional partners including Snohomish County, WSDOT, Community Transit, and Sound Transit, pursue an SR 527 corridor study to explore transit optimization, alternative intersection designs, and other issues.
2. Study a displaced left turn lane intersection concept for the 228th St SE/Bothell-Everett Highway (SR 527) intersection.

Most Applicable Policies

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

TH-6 Encourage options for fast, easy “last-mile” trips between transit stops and job sites/ residences.

TH-8 Strategically expand road/intersection capacity to improve traffic flows within the subarea. Minimize business, resident, and ecological impacts to the maximum extent feasible.

ED-5 Retain existing businesses in Canyon Park even as development occurs (i.e., prevent displacement).

North Creek Crossing in Business Center

This plan recommends implementing an east-west neighborhood center street with redevelopment through the (approximately) 22140 17th Ave SE and 22042 20th Ave SE blocks aligned with the existing bridge (see *Concept* and *Urban Design & Community Livability*). At a minimum, this future connection would provide a pedestrian and bicycle path to link transit riders and businesses further east and accommodate emergency vehicles and deliveries on either side of North Creek.

To support future transit, Bothell might also consider a vehicular crossing over North Creek at or near the existing bridge in the Canyon Park Business Center. Accommodating transit and even general purpose traffic could better distribute trips, especially relieving congestion at the 17th Ave SE/220th St SE intersection, and make transit more reliable. Thus, any design of this street and adjacent public gathering space should not preclude transit.

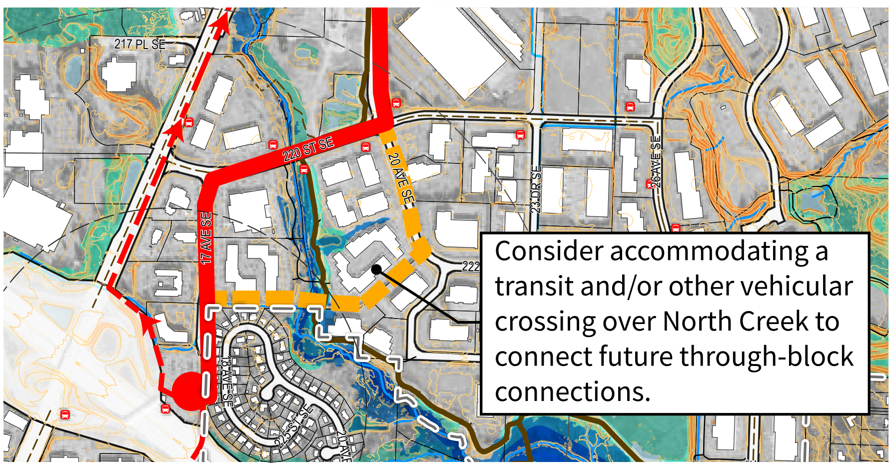

Figure 48. Potential transit and/or general purpose route connecting 17th Ave SE to 20th Ave SE

Actions

1. Study the feasibility of a long-term auto/bus route and bridge connecting 17th Ave SE and 20th Ave SE aligned near the existing North Creek Bridge (see Figure 48).
2. If redevelopment occurs prior to the study identified above require that the redevelopment does not preclude automobile and bus travel on the future east-west neighborhood center street. This

Most Applicable Policies

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

TH-9 Improve street network connectivity by extending select Canyon Park streets to relieve congestion on Bothell-Everett Highway and at choke points. Minimize business, resident, and ecological impacts to the maximum extent feasible.

TH-9 Improve street network connectivity by extending select Canyon Park streets to relieve congestion on Bothell-Everett Highway and at choke points. Minimize business, resident, and ecological impacts to the maximum extent feasible.

recommendation applies to the street segments west and east of North Creek.

3. If including a transit route with redevelopment, require that the route locate in a manner that accommodates development on the north and south sides of the neighborhood center street. In other words, do not add a bus route that would occupy developable area without adding a "there" to this neighborhood center. In two cases, a route on the south edges of these properties would be acceptable:
    a. If it is an interim step with a plan for a permanent neighborhood center street as part of a future development.
    b. If the neighborhood south of this property redevelops with more intense uses and orients toward the new street.

Emergency Services

Emergency Services must often seek alternative routes during emergency calls and periods of heavy congestion. To ensure that emergency vehicles can use alternative routes, any street extension must accommodate emergency service vehicles, even when such access is only through private property. Likewise, any future through-block connections must provide for emergency vehicle service.

Actions

1. Design new street extensions to accommodate Emergency Service vehicles.
2. In design standards for *Through-block Connections*,include a provision to accommodate Emergency Service vehicles either directly on the street or at an agreed-upon distance.
3. Require that street extensions must be open for emergency services access.

Most Applicable Policy

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

Curb Space and Parking

As Canyon Park redevelops with increased height and density, demand will increase for curb space by all modes of travel—walking, biking, transit, freight, and private vehicles. In addition, transportation network companies (e.g., Uber, Lyft) and micromobility travel is increasing for shorter distance trips and require curb space. Policies to manage curb space usage can provide clear direction on where different demands can be met and help avoid conflicts between modes, such as double parking, which can impede transit, bike, and vehicle flow.

Development regulations can require a certain amount of space to be given to parking needs. However, in already developed areas or where parking needs must be met in the right-of-way, guidance is helpful for balancing competing needs. Some policies to consider for managing curb space include the following:

- Provide designated curb space for short-term passenger loading including transportation network companies, and freight goods and service deliveries that limit conflict between modes including transit operations. This could include moving freight loading zones around the block from a major transit route.
- Consider implementation of flex zones that allow for multiple shared uses throughout the day to more efficiently use the curb space, such as combined commercial and passenger loading zones.
- Establish off-hour delivery windows for freight to minimize truck trips occurring during peak congestion hours.
- Implement parking time limits or other mechanism to deter unecessary parking.
- Charge for parking when vehicle occupancy is lower than target occupancy.
- As popularity of micromobility such as scooter share and bike share increases, identify safe designated parking areas so as to not impede people walking and biking.

Actions

1. Monitor parking and curb space needs, and as needed, study and implement curb space policies.
2. Require adequate micromobility parking in new developments through development regulations.

Most Applicable Policies

ED-8 Functionally support businesses with continued emergency, delivery, and other access.

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-3 Improve quality, connectivity, and access to safe routes for people walking, biking, and rolling throughout the subarea.

TH-5 Work with the private sector and agency partners to reduce commuters' dependency on single occupancy vehicles (e.g., through a transportation demand management (TDM) or commute trip reduction (CTR) program).

TH-6 Encourage options for fast, easy "last-mile" trips between transit stops and job sites/ residences.

TH-7 Encourage shared parking solutions between businesses.

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Other Streets Design

The designs of Bothell-Everett Highway (SR 527), 20th Ave SE extension to Maltby Rd (SR 524), 214th St SE extension to 9th Ave SE, 219th Pl SE, and 9th Ave SE are discussed in the *Proposed Vehicular Projects* section. In addition, this Subarea Plan explored a vision for streets internal to the Canyon Park Business Center with business representatives and nearby residents. The overarching themes included:

- Keep the existing tree-lined streets; their character attracts businesses to Canyon Park.
- Add bicycle and pedestrian paths throughout (on existing streets and by forging new connections) to facilitate a shift away from car travel and be a recreational amenity for employees.
- Better connect the upper and lower business center areas across the steep topography, especially for people bicycling.
- Address stormwater flooding issues.

The following map and subsequent street cross-sections present a vision for this area's existing streets. Most include simple paint on the street to formalize bicycle routes. A few missing sidewalks and crosswalks are noted on the map and should be completed with redevelopment. The suburban nature of these streets with wide landscaped easements makes them suitable for enhanced green stormwater infrastructure where feasible. Unless otherwise noted as a "high priority project," projects are to be implemented with redevelopment.

Actions

1. Implement the **high priority projects** indicated on Figures X-X.
2. Implement other curb-to-curb improvements as feasible.
3. Apply development design standards to back-of-curb improvements.

Most Applicable Policies

MN-7 Improve access to and crossings of North Creek to make it a unifying element of Canyon Park.

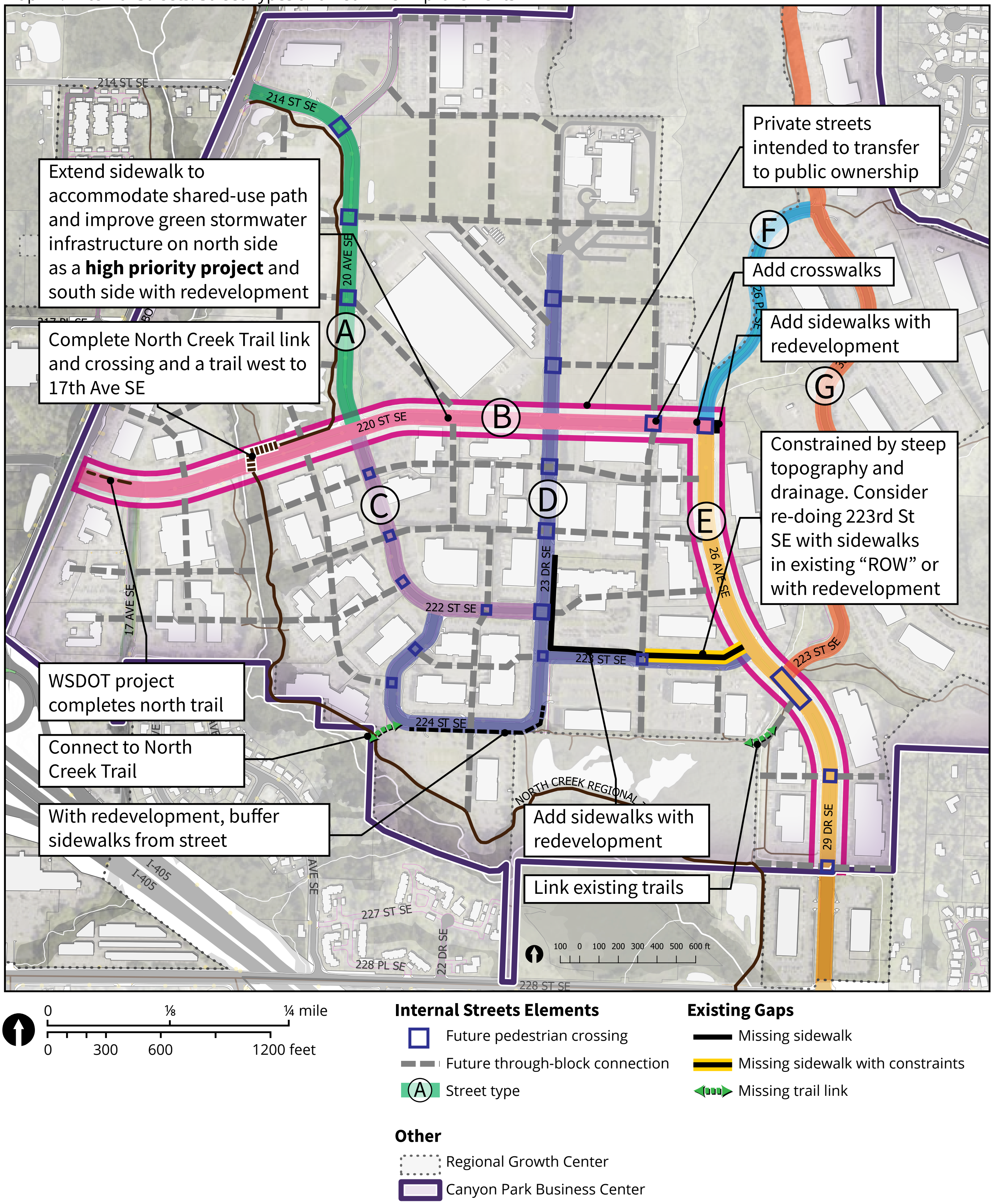
MN-14 Encourage pedestrian, bicycle, para-transit, and micromobility (e.g., scooters, electric assist bikes, shared bikes, electric skateboards) connections between residences, businesses, commercial services, and amenities to create a more cohesive community.

TH-1 Improve multimodal infrastructure and circulation to make transit and non-car modes attractive options.

TH-2 Improve quality, reliability, and access to transit for employees and residents for trips within, to, and from the subarea.

TH-6 Encourage options for fast, easy "last-mile" trips between transit stops and job sites/ residences.

Map 17. Internal Streets: Street Types and Ped/Bike Improvements



Section A

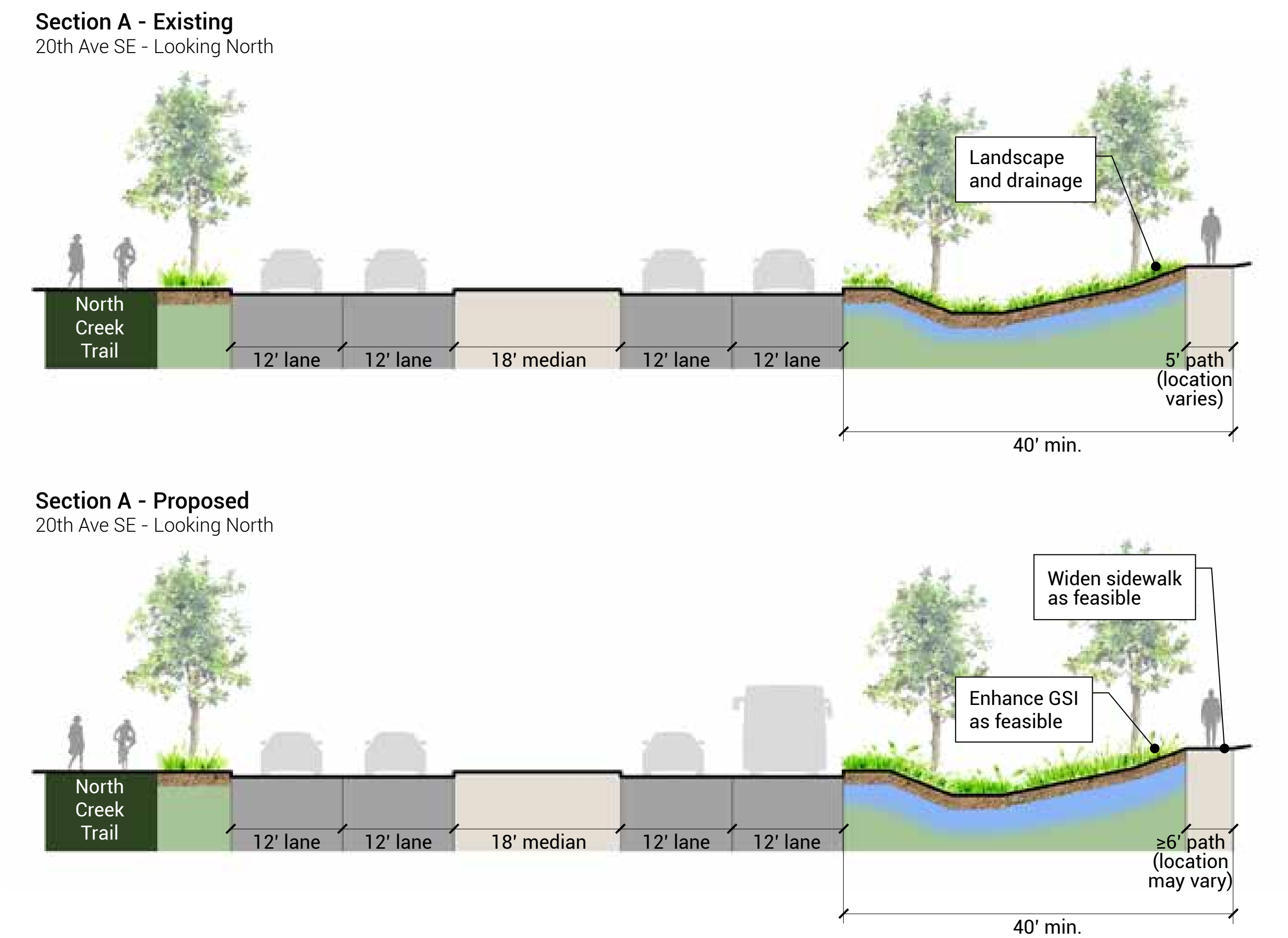


Figure 49. Street Section A

Section B

Note, installing a shared use path on the north side of 220th St SE is a **high priority**

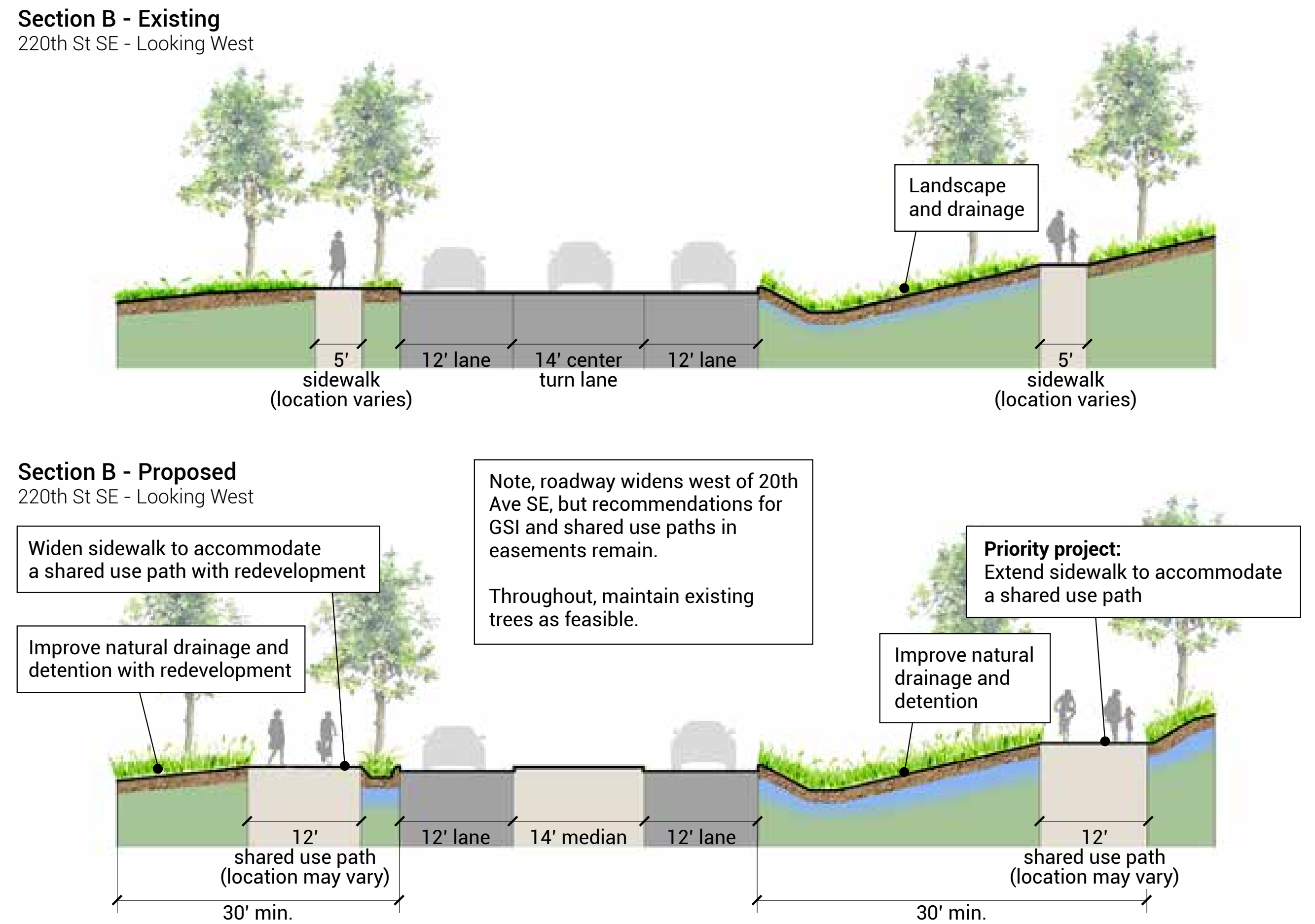


Figure 50. Street Section B

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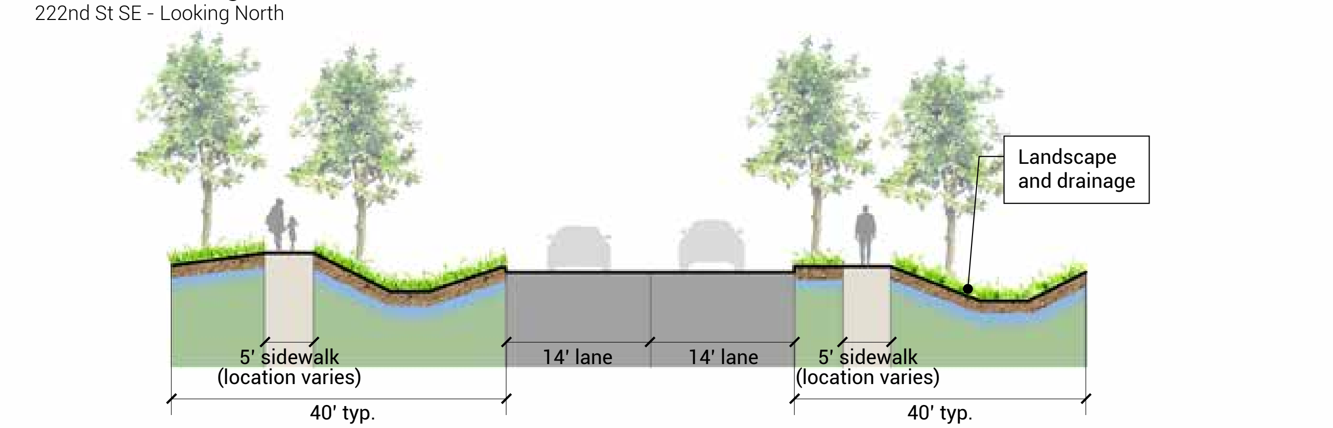
Section C

Section C - Existing
222nd St SE - Looking North



Section C - Proposed
222nd St SE - Looking North

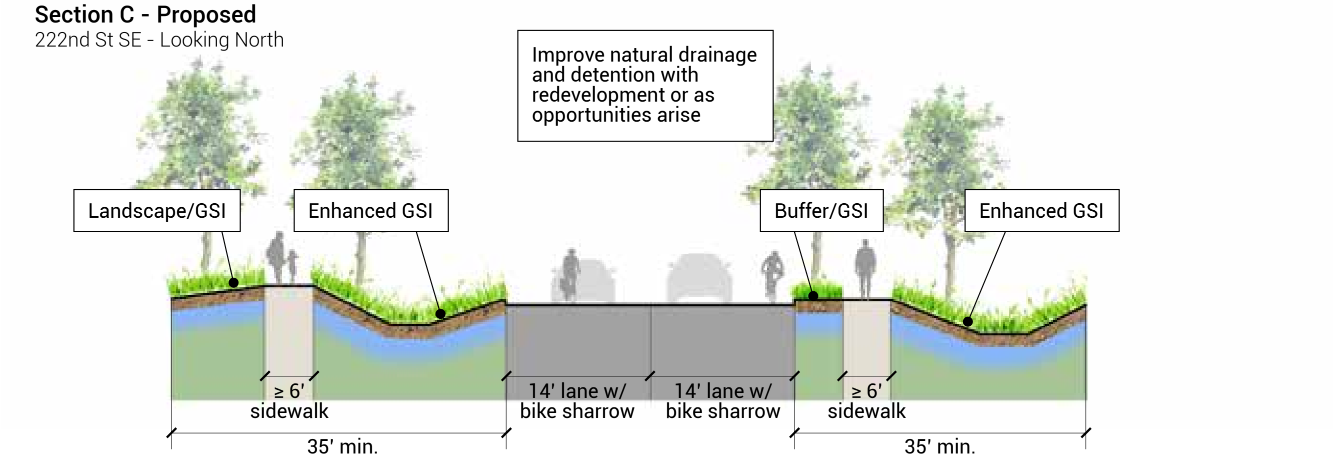


Figure 51. Street Section C

Section D

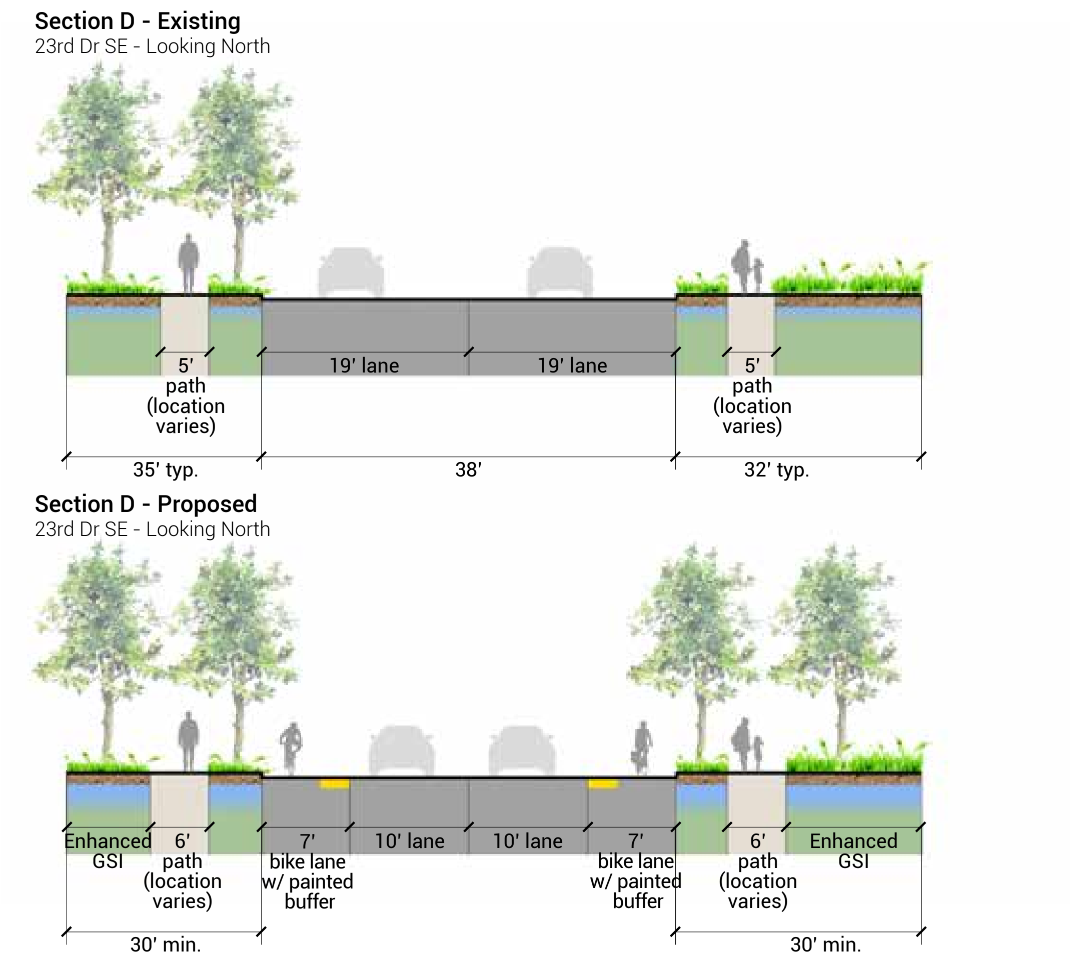


Figure 52. Street Section D

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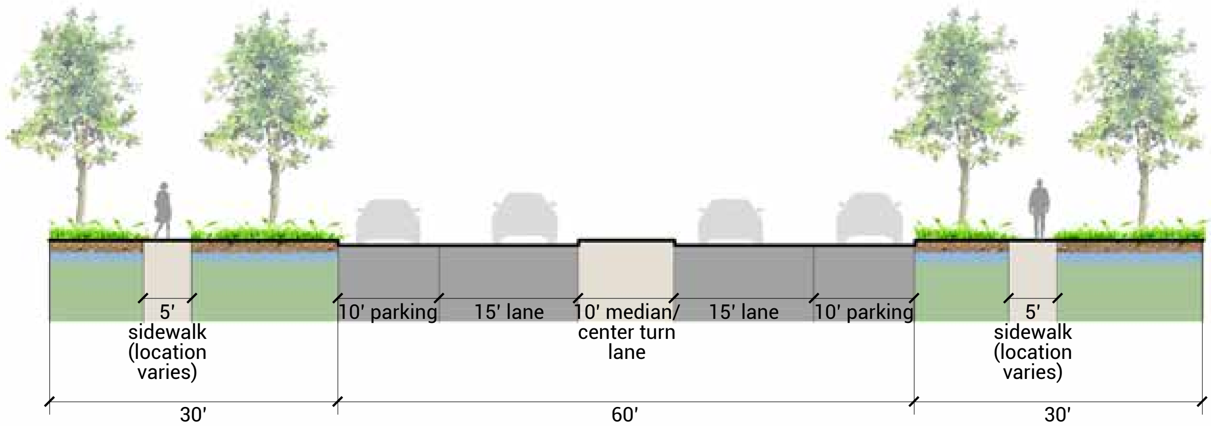
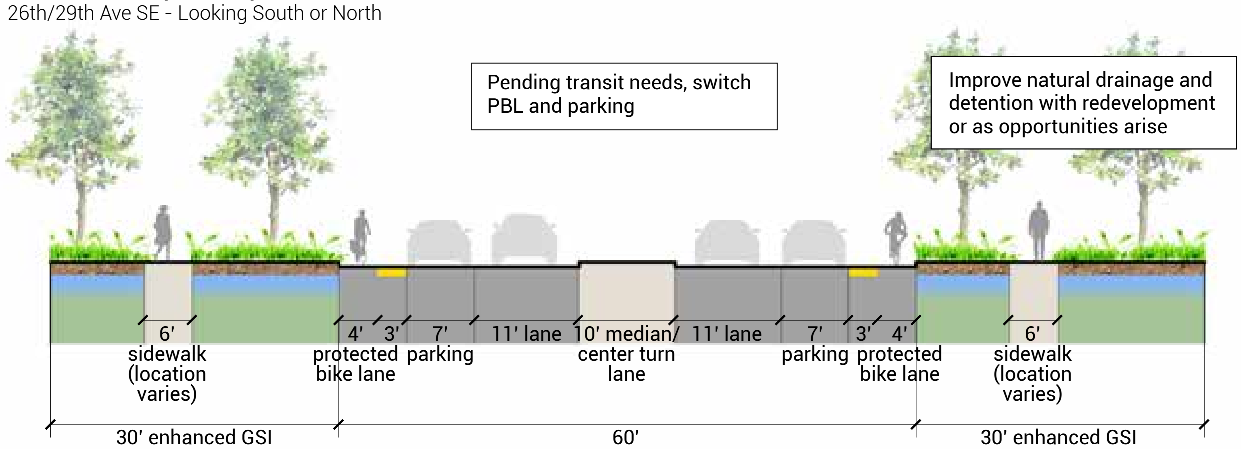
Section E

Note, installing bicycle facilities on 26th/29th Ave SE is a **high priority project**. When reducing existing 5-lane sections to 3 lanes, accommodate right turn lanes at intersections.

Section E - Existing
26th/29th Ave SE - Looking South or North



Section E - Proposed Option 1
26th/29th Ave SE - Looking South or North



Section E - Proposed Option 2
26th/29th Ave SE - Looking South or North

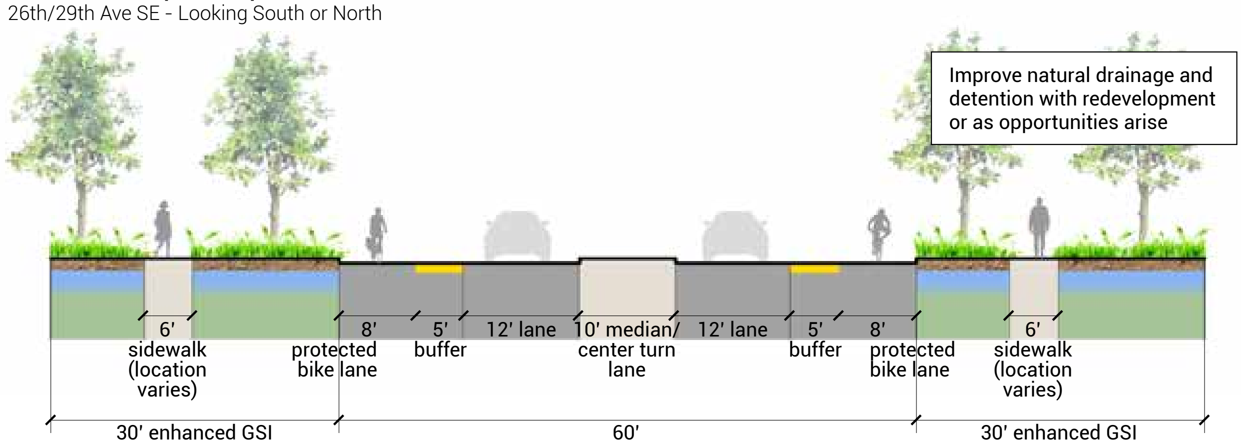


Figure 53. Street Section E

Section F

Note, adding the uphill climbing bike lane is a **high priority**.

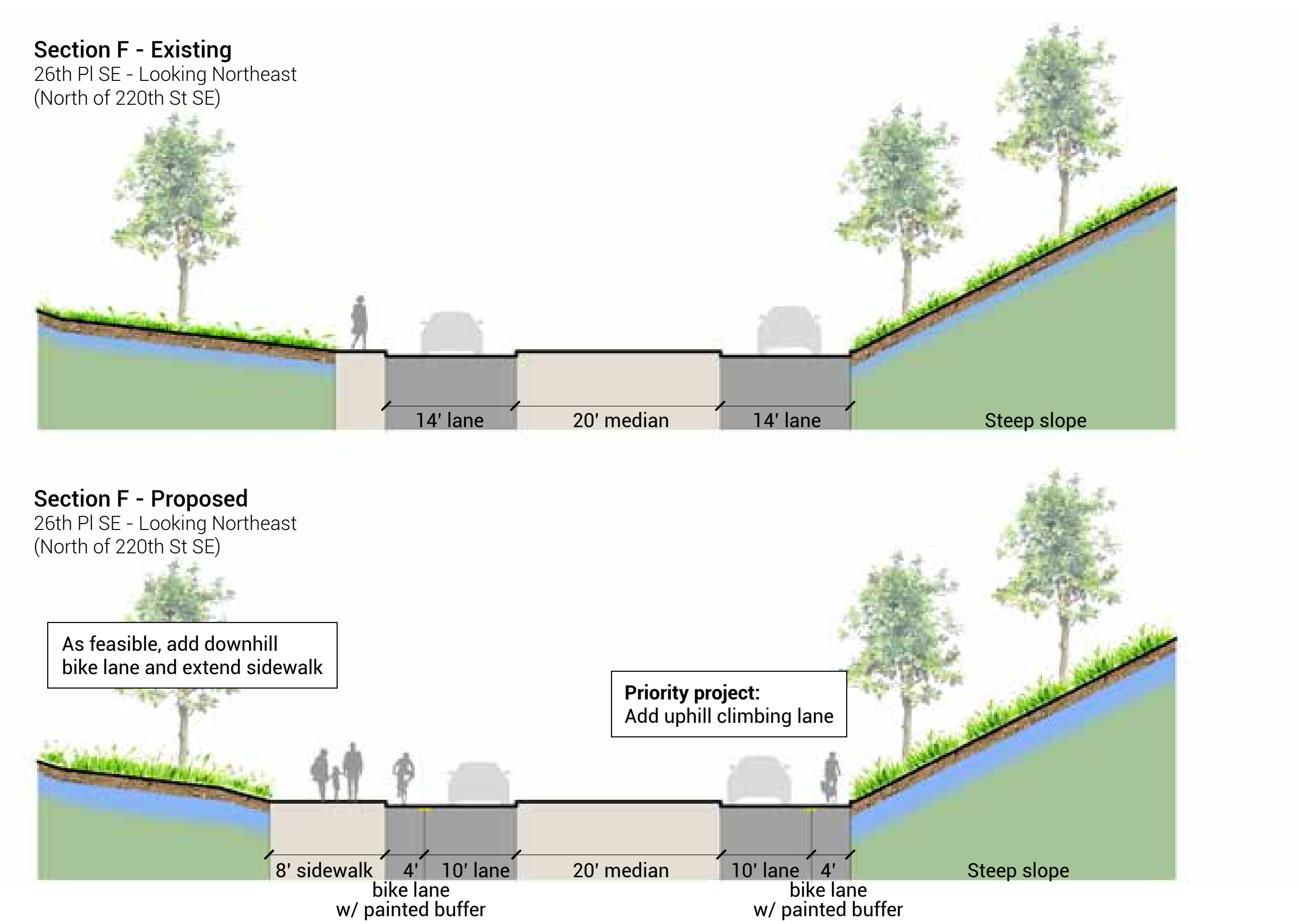


Figure 54. Street Section F

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Section G

Note, adding the uphill climbing bike lane is a **high priority**.

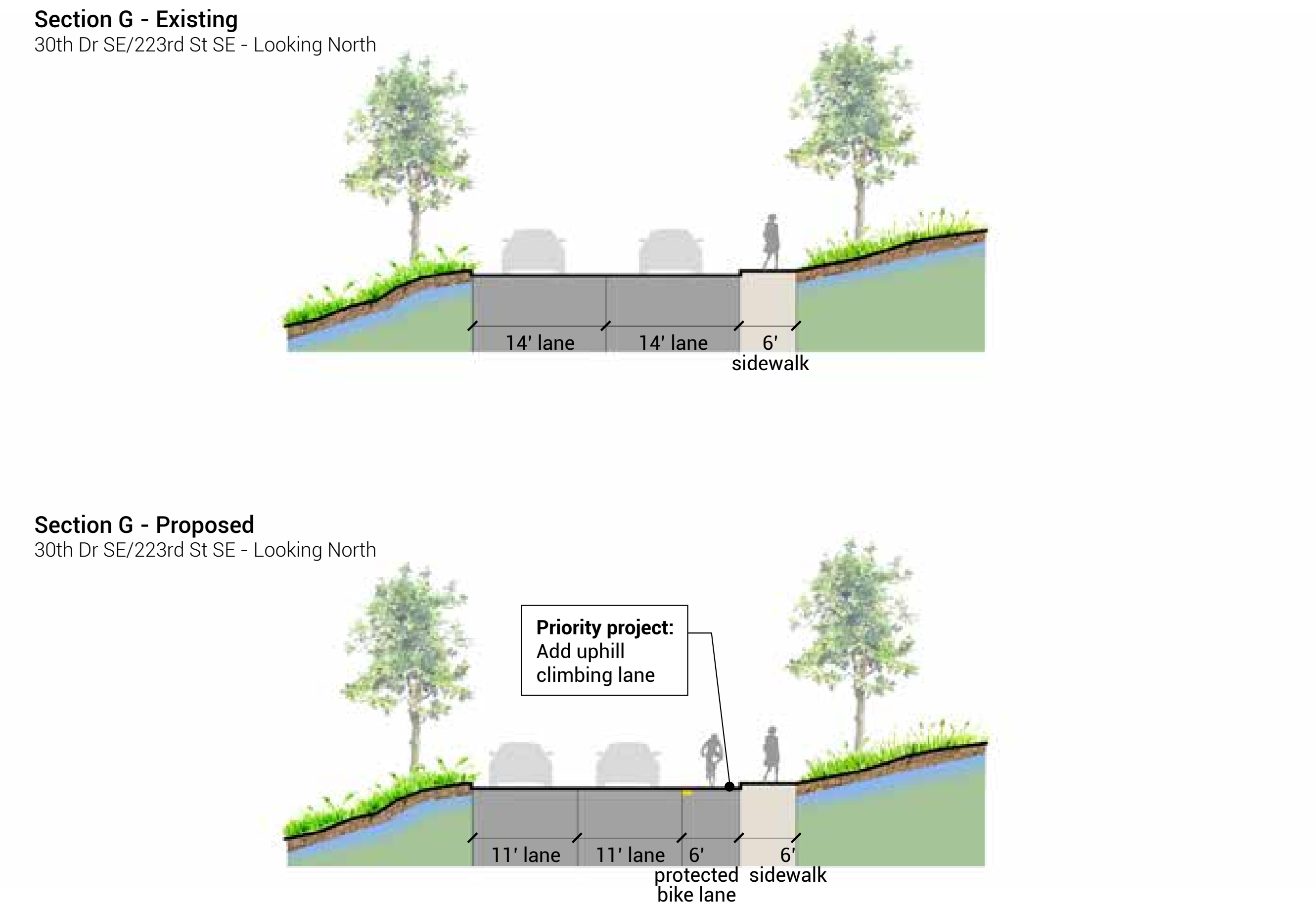


Figure 55. Street Section G

Project Phasing

Street Extensions and 9th Ave SE Safety Improvements

214th St SE extension. One of the potential transportation mitigation strategies would be to extend 214th St SE from the BEH to 9th Ave SE as a means of distributing traffic throughout the system. This link could add approximately 1,000 PM peak hour vehicle trips to 9th Ave SE. However, 9th Ave SE lacks many safety features such as sidewalks, protected bike lanes and a center turn lane or pockets and is not ready to accommodate these increased traffic levels particularly because of the presence of Crystal Creek Elementary School.

219th Pl SE extension. Another potential transportation mitigation strategy would be to extend 219th Pl SE from the parking lot located west of the Philips building to 9th Ave SE. However, because this connection would serve a limited area and is projected to generate no more than 150 PM peak hour trips, 219th Pl SE may be extended to 9th Ave SE without the need to construct safety improvements on 9th Ave SE or 219th St SE.

Most Applicable Policy

MN-15 Phase projects for least negative impacts and greatest benefits to residents, businesses, and ecological systems.

Action

Install 9th Ave SE safety improvements such as sidewalks, protected bike lanes, center turn lanes or pockets and a traffic signal at the new 214th St SE/9th Ave SE intersection prior to connecting 214th St SE to 9th Ave SE (vehicular projects 5 and 9 and high priority non-motorized project 2.1).

LOS Policy

The *Imagine Bothell...* Comprehensive Plan adopted a "concurrency corridor" LOS standard for traffic operations. The LOS standard is based on the average delay vehicles experience at identified intersections along concurrency corridors during the peak hour (typically 5-6pm). Three concurrency corridors have been identified within the Canyon Park Study area:

- Maltby Road/SR 524
- SR 527
- 228th Street SW/SE

The adopted average corridor delay for these corridors is LOS E. While a specific intersection along these corridors may operate with a longer delay, the goal of this standard is to evaluate the average delay drivers experience along the entire arterial corridor.

As stated in the Transportation Approach, Bothell may have to consider updating its LOS policy if 214th St SE is not extended to 9th Ave SE and/or if Bothell-Everett Highway general purpose lanes convert to BAT lanes (in the long term and pending regional support). These changes combined with the expected growth (by the year 2044) would likely extend SOV delays on Bothell-Everett Highway past Bothell's currently accepted LOS. Under adopted concurrency regulations, when a corridor exceeds an LOS of "E" the City cannot issue permits for new projects.

Accordingly, the City may be faced with having to accept an LOS that exceeds E for the Bothell-Everett Highway between 228th St SE and SR 524 (Maltby Road). Options include:

- Except the intersections on Bothell-Everett Highway between 228th St SE and Maltby road (SR-524) from the City's corridor concurrency calculation, **or**
- Revise the standard to increase the allowable delay. The City would accept a maximum LOS of "F" with a delay up to, for example, 120 seconds for the portion of the Bothell-Everett Highway between 228th St SE and Maltby Road (SR 524).

Note that an LOS policy based on person, rather than vehicle, delay is another long term option. This type of measure would better recognize the multimodal goals for Canyon Park. However, at this time, the number of people using transit and non-motorized options does not outweigh the number of general purpose drivers. In the long term as transit service increases, Bothell could consider a per-person-based standard. The Highway Capacity Manual outlines a methodology, which would recognize the contributions of transit priority infrastructure in reducing overall delay (https://americawalks.org/analyze-person-delay-instead-of-vehicle-delay/). See additional options in ***Appendix X: Memorandum: Canyon Park Subarea Plan - Transportation Level of Service (LOS) Considerations.***

Action

Monitor conditions and revisit LOS policy when necessary.

Most Applicable Policy

TH-12 If needed, consider updating Bothell's LOS policy to recognize "ultimate capacity" of Canyon Park corridors and better support transit and other travel modes.

Attachment 2

Addendum to Draft Environmental Impact Statement

City of Bothell™

Addendum

Document Addended: December 2019 Canyon Park Subarea Plan and Planned Action Draft Environmental Impact Statement | Addendum Issued: July 9, 2020

Prepared by: BERK Consulting, Inc., Fehr & Peers, and MAKERS

Introduction

This Addendum serves as an environmental document providing additional information and analysis regarding the December 2019 Canyon Park Subarea Plan and Planned Action Draft Environmental Impact Statement (Draft EIS). The Addendum does not substantially change the analysis of significant impacts and alternatives in the existing environmental document. It provides an overview of a Preferred Alternative in the range of the Draft EIS Alternatives. In response to requests, it includes information about land capacity methods, and it provides some transportation evaluation of private streets and an AM peak hour, both subjects that are not part of the City's adopted levels of service or Draft EIS thresholds of significance; however, the information can assist the subarea planning process, development of alternative levels of service policies, and general transportation circulation and operations in the study area consistent with the City's municipal code and design standards and specifications approach to inadequate road conditions. As well, an analysis of transit options is provided in response to Draft EIS mitigation measures addressing transit and to address overall congestion on the City's corridors subject to the corridor LOS.

Alternatives Considered

DRAFT EIS ALTERNATIVES AND PREFERRED ALTERNATIVE

The EIS considers a range of alternatives that illustrate how to implement the community's vision for an economic and multi-faceted center that respects the natural environment and provides multiple modes of travel. The Draft EIS alternatives and topics were developed based on a review of scoping comments and prior engagement results. The Preferred Alternative considers Draft EIS comments and public engagement results, and consideration of the vision and conditions and trends by the Planning Commission. The Draft EIS alternatives – No Action, Business Plus, Live/Work, and Live/Work Mitigated, are shared below along with the Preferred Alternative that will be evaluated further in the Final EIS pending Summer 2020. The Preferred Alternative is characterized in this Addendum since some of the transportation evaluation addresses it. The Preferred Alternative will be more fully addressed in the Final EIS with the range of environmental topics in the Draft EIS.

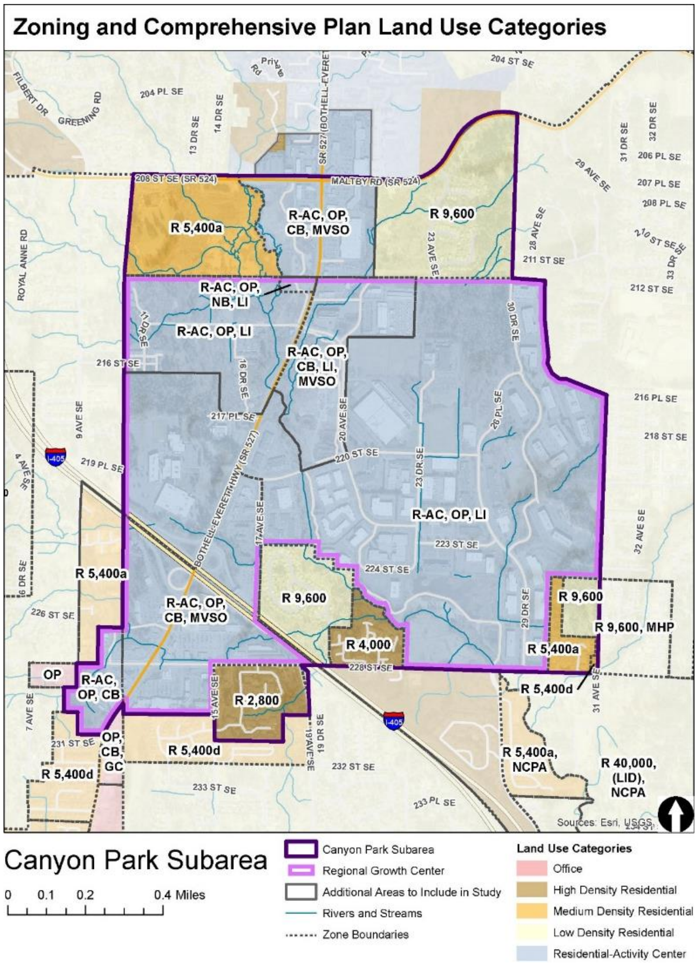
- No Action, a SEPA Required Alternative, assumes growth according to current trends. Between 2012 and 2018 the area appears to have added about 4,400 jobs, largely in existing buildings, and has generally achieved the 2035 job target. Residential permit applications and interest increased as well. Under current City Plans and development regulations, there is capacity to add another 4,500 residents and about 4,800 jobs in new structures by 2035. This alternative retains current Future Land Use designations and zoning, which allow a mix of employment and residential uses through most of the study area. Current RGC boundaries are 733 acres and include areas of wetlands. The updated subarea plan, proposed revisions to the RGC boundary, incentives and regulations, investments in amenities and infrastructure, and planned action would not be adopted.

- The Business Plus Alternative would add about the same number of residents as the No Action Alternative (4,500) and a much higher number of jobs (17,350) by 2043/44. This alternative focuses most future growth in employment but allows select areas of mixed-use at shopping areas in Thrasher's Corner and to the southwest of I-405. Development evaluated includes revisions to (1) height allowances for mixed-use development, (2) minimum densities for residential uses, (3) minimum intensities for employment uses, and (4) parking standards for businesses and housing uses; added investments in transit, roads, bicycle pedestrian facilities, and trail connections; and transitions to newer stormwater standards. The RGC boundary would be revised to 613 acres to meet Puget Sound Regional Council Criteria. Amendments integrating the Subarea Plan would be made to the City's Imagine Bothell… Comprehensive Plan, development regulations, and capital plans.
- The Live/Work Alternative anticipates the greatest residential population capacity at nearly 7,200 and a substantial addition of jobs at nearly 15,300 by 2043/44. This alternative offers the most locations where mixed-use residential and retail or residential and office could be located. Revisions to development standards for both businesses and housing uses, and added investments in both infrastructure and amenities, are similar to the Business Plus Alternative. Revisions to the RGC boundary would be the same as the Business Plus Alternative. Amendments integrating the Subarea Plan would be made to the City's Imagine Bothell… Comprehensive Plan, development regulations, and capital plans.
- "Mitigated" Live/Work Alternative: To explore additional mitigation of impacts, a "Mitigated" Live/Work Alternative has been developed with a smaller RGC boundary of 565 acres, and 25% lower growth. It also includes greater transportation demand management measures, greater infrastructure investments, and level of service (LOS) policy options. It reduces impacts and is in the range of the Business Plus and Live/Work alternatives.
- The Preferred "Middle Ground" Alternative combines elements of the Draft EIS Alternatives. It is similar to the Mitigated Live/Work with a smaller RGC boundary, and a land use pattern that allows for targeted mixed uses at existing shopping centers and along the Bothell-Everett Highway. Some blocks emphasize office uses near I-405 and closer to the business park, similar to the Business Plus Alternative. Areas outside the RGC would retain their No Action zoning. Similar to the Mitigated Live-Work Alternative the Preferred "Middle Ground" Alternative includes greater transportation demand management measures, greater infrastructure investments, and level of service (LOS) policy options. It has a larger share of residential growth similar to the Live/Work Alternative and job growth similar to the Mitigated Live/Work Alternative. There is a near 1:1 jobs/housing balance under the Preferred Alternative that reduces trips compared to the other action alternatives.

LAND USE PATTERN

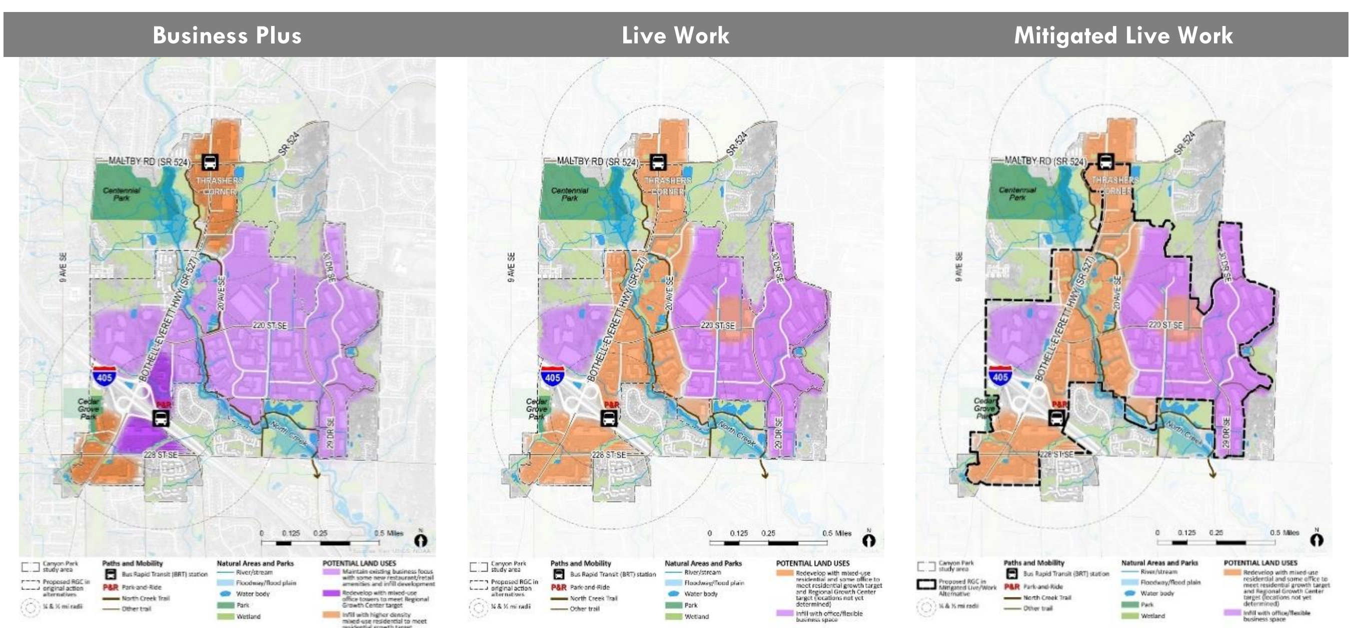
The **No Action Alternative** would retain current Future Land Use designations and zoning. Current zoning allows a mix of employment and residential uses through most of the study area, as shown in Figure 1. Action alternatives illustrated in Figure 2 and identify different areas of mixed use and business focused areas. The **Preferred Alternative** land use pattern blends the proposals of the Business Plus Alternative and Live/Work & Mitigated Live/Work Alternatives as illustrated on Figure 3.

Figure 1. Current Comprehensive Plan and Zoning Map



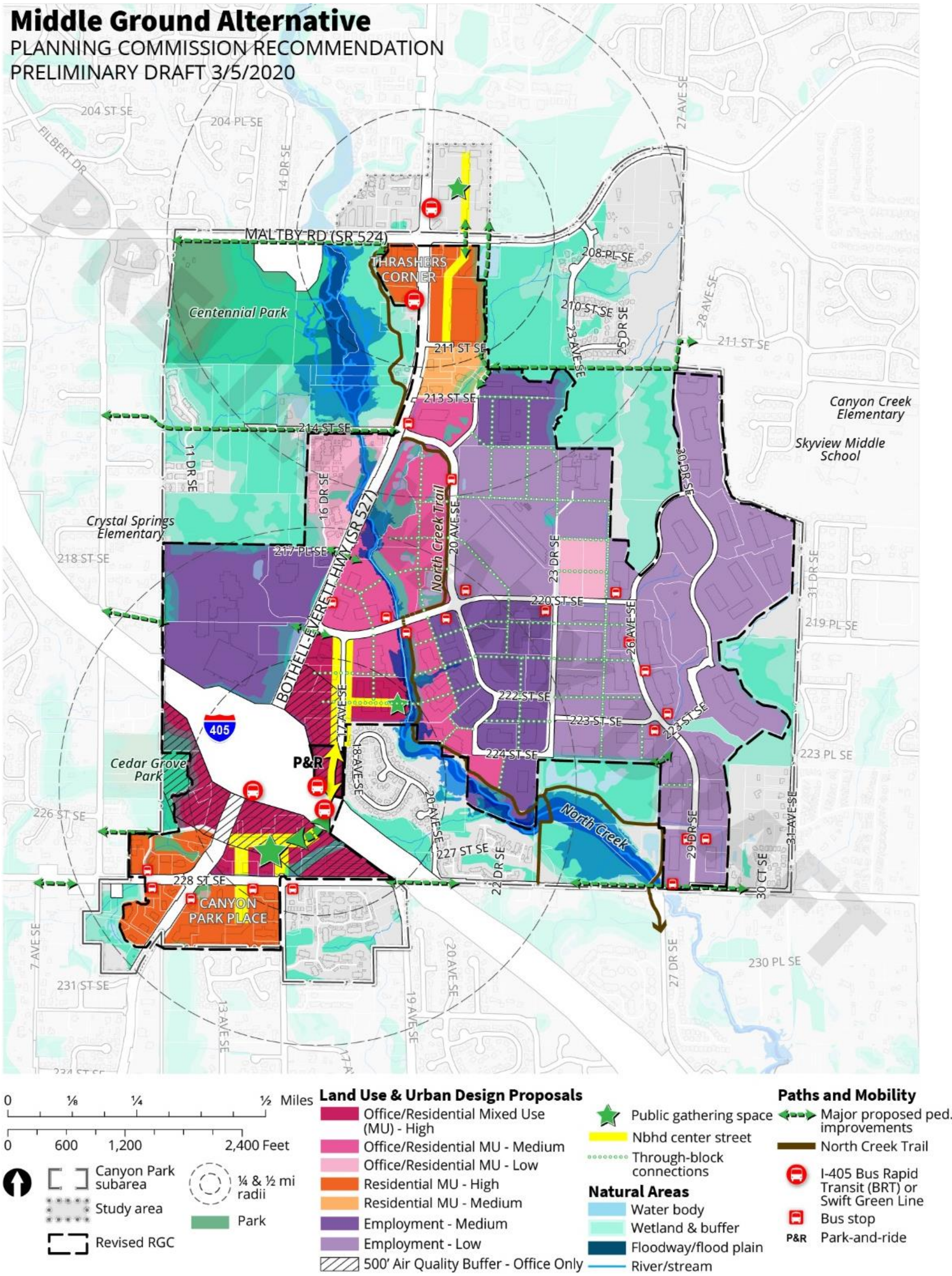
Source: City of Bothell, 2019; BERK 2019.

Figure 2. Draft EIS Alternatives – Business Plus and Live/Work and Mitigated Live/Work



Source; MAKERS, 2019.

Figure 3. Preferred "Middle Ground" Alternative – Draft

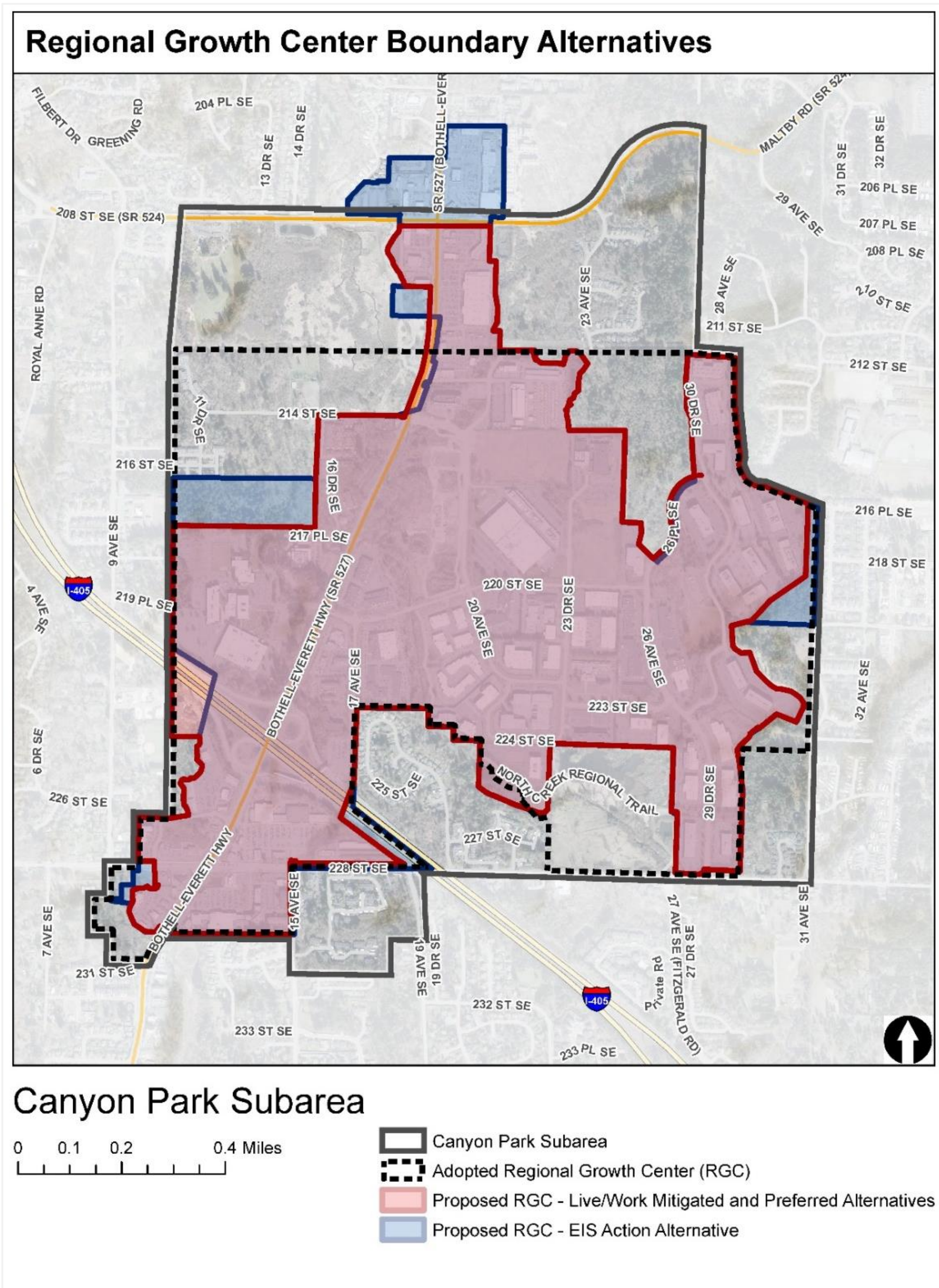


Source; MAKERS, 2020.

REGIONAL GROWTH CENTER BOUNDARIES

The Preferred Alternative addresses the smallest RGC boundary studied similar to the Mitigated Live/Work Alternative at 565 Acres and less than the Business Plus or Live/Work Alternatives at 613 acres or the No Action Alternative at 733 acres. See Figure 4.

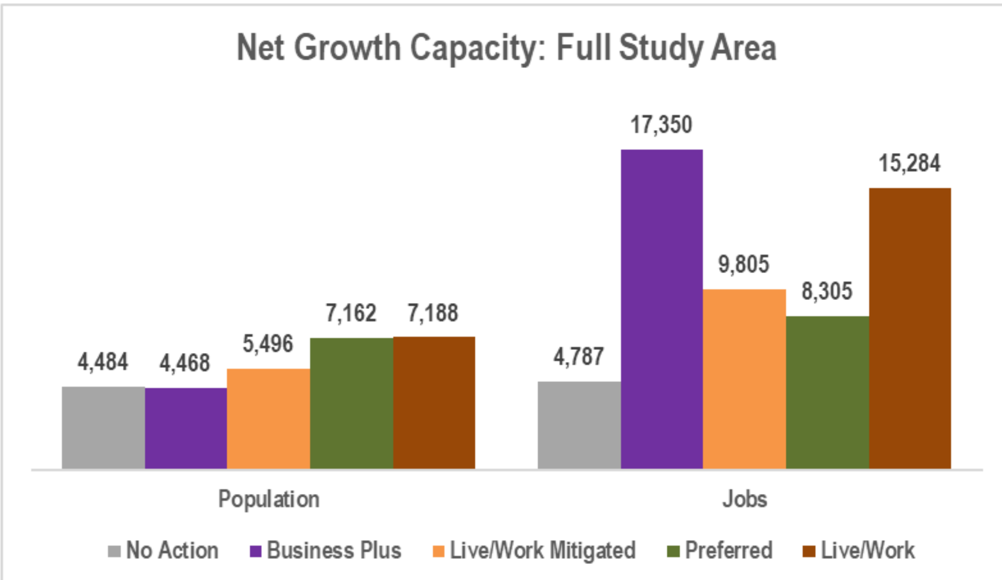
Figure 4. Comparison of RGC Boundary Alternatives



Source: City of Bothell, 2019; BERK, 2019.

Similar to other studied alternatives, the Preferred Alternative would reinforce the Canyon Park Study Area as an employment center with diverse housing choices. While the Business Plus alternative focuses to the greatest degree on employment land uses, the other Action Alternatives focus on both housing and employment land uses particularly the Live/Work Alternative followed by the Preferred Alternative. All Action Alternatives increase employment opportunities as well, with the greatest under the Business Plus Alternative and followed by the Live/Work Alternative. The Preferred Alternative provides jobs at a level similar to but a little less than the Mitigated Live/Work Alternative. There is a greater balance of expected population and jobs similar to but greater than the No Action Alternative. See Figure 5.

Figure 5. Net Growth—All Alternatives



Source: BERK, 2019.

Environmental Information

LAND USE CAPACITY

Since the December 2019 Draft Environmental Impact Statement (Draft EIS) buildable lands mapping and analysis has been updated and the method is addressed in Attachment A. The analysis addresses parcels evaluated in 2015 as redevelopable by 2035 in the County and City analysis of the 2015 *Imagine…Bothell* Comprehensive Plan Update that zoned more land for mixed uses. The analysis also updates 2012/2015 analysis with more recent Assessor data. It also corrects the location of partially-used properties compared to the Draft EIS that due to a formula error had not included total square feet for properties with multiple buildings.

Based on current zoning and the updated buildable lands analysis, the No Action Alternative could accommodate about 4,484-4,847 residents in the full study area and about 4,787-4,804 jobs including the full study area. The higher range results are the updated capacity estimates addressed in Attachment A, and the lower range estimates were included in the December 2019 Draft EIS. As a slightly lower bookend the December 2019 Draft EIS results are continued the in the SEPA process, but the updated capacity results are presented for comparison.

A comparison of capacity results for all alternatives is presented below in Table 1. The Business Plus Alternative has a similar capacity for about 4,000 residents and a much higher number of jobs at 17,350 compared to the No Action Alternative. The Live/Work Alternative would have a greater residential population of nearly 7,200 and high job count at nearly 15,300. To explore additional mitigation of impacts, a "Mitigated" Live/Work Alternative was been developed with lower growth as described above. The Preferred Alternative has a capacity for housing similar to Live/Work and a job capacity similar to but lower than the Mitigated Live/Work Alternative. Under all alternatives, nearly all the growth would be in the RGC, as shown in Table 1.

Table 1. Housing, Population, and Jobs—Net Growth

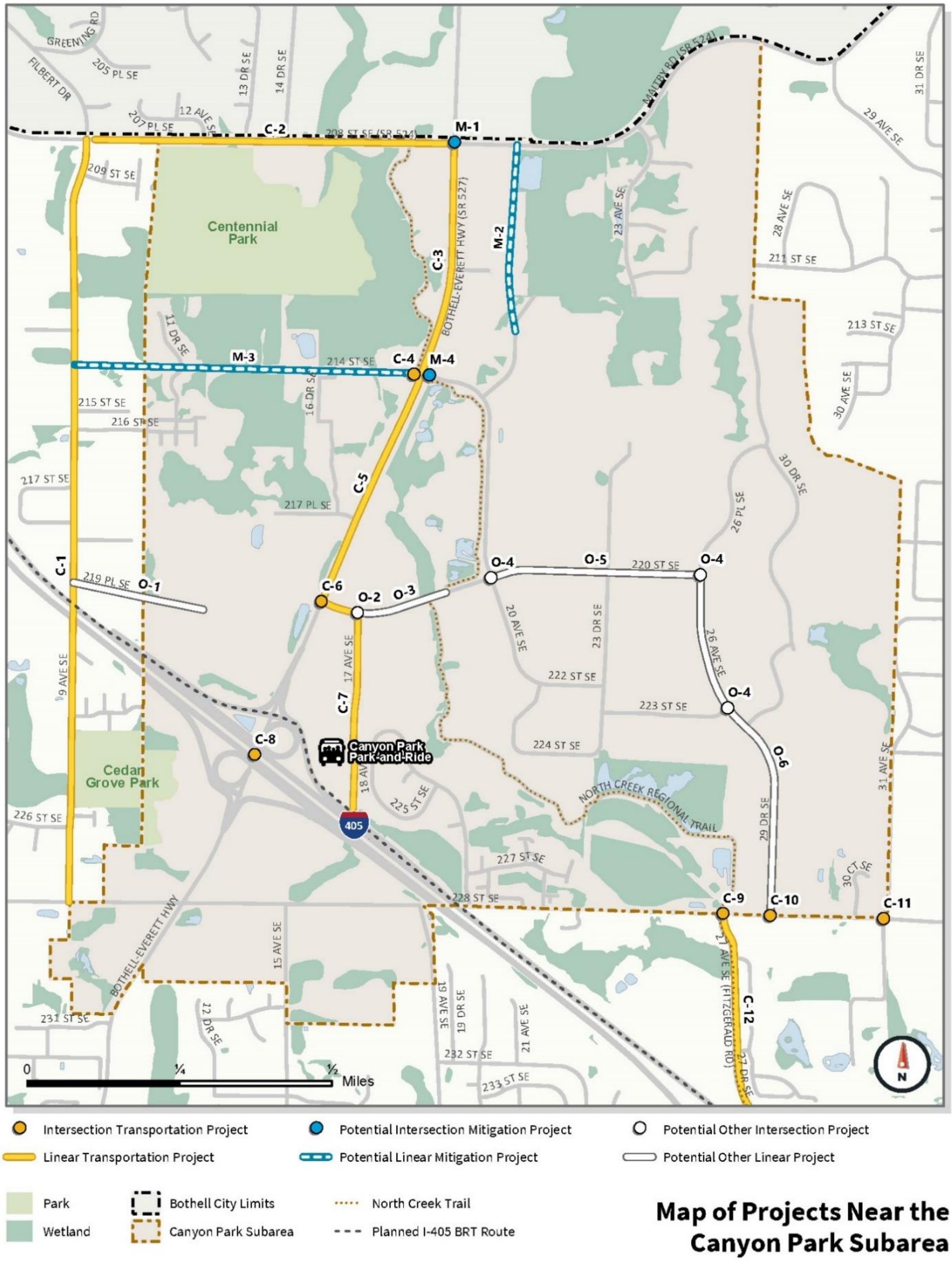
	REGIONAL GROWTH CENTER (RGC)*				FULL STUDY AREA			
Alternative	**Dwelling Capacity**	**Population Capacity**	**Job Capacity**	**Total Activity Units**	**Dwelling Capacity**	**Population Capacity**	**Job Capacity**	**Total Activity Units**
No Action EIS Assumption**	1,856	3,712	4,530	8,242	2,242	4,484	4,787	9,271
No Action: Capacity Amended**	2,029	3,713	4,430	8,143	2,654	4,847	4,804	9,651
Mitigated Live/Work	2,816	4,225	9,458	13,683	3,614	5,496	9,805	15,302
Preferred	4,075	6,142	7,598	13,740	4,687	7,162	8,305	15,467
Business Plus	2,687	4,012	17,209	21,221	2,915	4,468	17,350	21,818
Live/Work	4,498	6,732	15,143	21,875	4,726	7,188	15,284	22,472

*Note: *See Figure 4 and associated text. No Action Alternative RGC boundaries equal 733 acres. The Business Plus and Live/Work Alternatives have a RGC boundary encompassing 613 acres. The proposed boundary in the Mitigated Live/Work Alternative encompasses 565 acres.*
*** Updated capacity assumptions are shown for comparison. As a slightly lower bookend for the overall study area, the No Action EIS assumptions are continued in the SEPA process.*
Source: MAKERS, 2020; BERK, 2020.

TRANSPORTATION

Additional transportation analysis was completed to respond to comments and questions for the Preferred Alternative, which would generate the lowest new PM peak hour trips compared to other Action Alternatives in the draft EIS. The Preferred Alternative was evaluated with and without the 214th Street extension. In addition, limited AM analysis and private streets analysis address public comments and an exploration of inadequate road conditions but are not related to the City's adopted corridor LOS. Transit is reviewed to meet some of the mitigation goals expressed in Draft EIS and to better understand its effect on the City's adopted corridor LOS standard. The list of transportation mitigation projects assumed in the analysis is shown in Figure 6, and are similar to the mitigation proposed for the Mitigated Live/Work Alternative.

Figure 6. Preferred Alternative Network Map



Source: Fehr & Peers, 2020.

Figure 6 Key

No.	Project	Description
	Comprehensive Plan or WSDOT Projects	
C-1	9th Ave SE Widening: 228th St SE to SR 524	Upgrade road to a Collector road standard (3-lanes) with improved pedestrian/bike facilities. At 9th Ave SE and SR 524 add a second northbound left turn lane.
C-2	North Creek Trail – Section 4	Complete the missing link along SR 524 between current trail and Filbert Rd.
C-3	SR 527 (211th St SE to north of SR 524)	Add a third northbound through lane. Add a southbound left turn lane at SR 524 (2 left). Also known as SR 527/SR524 Intersection Improvements.
C-4	214th St SE & SR 527	Re-channelize the westbound through/left lane to a through/right lane. Replaced by project #M-4.
C-5	SR 527: Add a southbound lane between SR 524 and 220th St SE	Add a third southbound lane, and associated intersection revisions.
C-6	220th St SE and SR 527 Intersection	WSDOT planned intersection improvements as part of project #C-7 including a northbound right turn lane, dual southbound left turn lane, and additional westbound right turn lane.
C-7	WSDOT I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project	Add one ETL in each direction of I-405 between south of SR 522 and SR 527, as well as build direct access ramps at SR 522 and near SR 527 at 17th Avenue SE. Includes improvements to 17th Ave SE including a cycle track on the east side of 17th Ave, and at 220th St SE / 17th Ave SE and 220th St SE / SR-527 intersections. Funded.
C-8	WSDOT I-405, SR 527 to I-5 Express Toll Lane Project	Add one ETL in each direction of I-405 between SR 527 and I-5. Currently unfunded.
C-9	228th St SE & Fitzgerald Rd intersection	Adds eastbound right turn pocket.
C-10	228th St SE & 29th Dr SE intersection	Adds westbound right turn pocket.
C-11	228th St SE / 31st Ave SE Intersection	Add a westbound dedicated right turn lane.
C-12	Fitzgerald Rd: 240th St SE to 228th St SE	Widen road and add curb, gutter, and sidewalks.
	Mitigation Projects	
M-1	SR 527 & SR 524 Intersection	Modify the SR 524 (Maltby Rd) and SR 527 intersection to include two westbound left turn lanes and two westbound through lanes.
M-2	20th Ave SE Extension	Extend 20th Ave SE to SR 524 including a new traffic signal at SR 524.
M-3	214th St SE Roadway Extension	Extend 214th St SE west to 9th Avenue SE, including a traffic signal at 9th Ave SE and pedestrian/bicycle facilities.

No.	Project	Description
M-4	214th St SE & SR 527	Add channelized westbound right turn lane and dual westbound left turn lane. Replaces project #C-4.
	Other Operational Improvement Projects	
O-1	219th Place Extension	Allow private property owners to improve 219th Pl SE to 9th Avenue SE and open access to the properties northwest of the I-405/527 interchange.
O-2	17th Ave SE/220th St SE Intersection	Monitor traffic conditions at the 17th Ave SE/220th St SE intersection. Evaluate traffic signal timing/signal coordination changes as business park redevelops. Consider intersection improvements such as add westbound dual left-turn lanes and a new southbound receiving lane on 17th Ave SE if needed as redevelopment occurs.
O-3	North Creek Trail - 220th St SE	Complete missing North Creek Trail connection on north side of 220th Street.
O-4	Internal Street Intersection Improvements	Monitor traffic conditions and install new traffic control such as signal or roundabout for three intersections in the CPBC if warranted. Also monitor if increased capacity is needed on 220th St SE east of 20th Ave SE.
O-5	220th St SE Shared-use Path	Construct shared-use path on north side of 220th Street SE between the North Creek Trail and 26th Ave SE
O-6	26th Ave/29th Drive SE Bicycle Facility	Re-channelize road to 3-lanes and construct an on-street bike facility on 26th Ave/29th Drive between 228th Street SE and 220th Street SE.

Future Exploration or Study

1. Work with WSDOT to pursue and expedite the plan for ETL and bus access on the south side of I-405.
2. At Bothell Everett Highway and 228th St SE study the feasibility of a "displaced left turn lane" intersection concept.

PM Peak Hour Trips

The City's LOS is based on PM peak hour traffic operations along corridors. The Draft EIS also reviewed growth at three main entrances to the subarea and business park. The Preferred Alternative results in less PM peak hour trips than any of the Action Alternatives including the Mitigated Live/Work Alternative at the primary entrances to the subarea and business park. Generally, Preferred Alternative results would result in lower congestion along the corridors compared to the other action alternatives related to the City's PM peak hour standard. See Table 2.

Table 2. Estimated New PM Peak Hour Trips (In/Out/Total)— Alternatives by 2043/44

Area	No Action	FEIS Preferred Alternative	Mitigated Live/Work	Business Plus	Live/Work
1. Canyon Park Main Area	980 / 1,630 / 2,600	1,360 /2,120 /3,480	1,670 / 3,120 / 4,790	1,490 / 4,300 / 5,790	2,800 / 4,860 / 7,660

Area	No Action	FEIS Preferred Alternative	Mitigated Live/Work	Business Plus	Live/Work
2. South of I-405/SR 527 Interchange	560 / 620 / 1,180	630 /680 /1,310	560 / 580 / 1,140	1,030 / 1,200 / 2,230	1,080 / 1,130 / 2,210
3. Thrasher's Corner/North of SR 524	90 / 80 / 170	120 /100 /220	330 / 280 / 610	560 / 480 / 1,040	560 / 480 / 1,040
Total	**1,630 / 2,330 / 3,960**	**2,110 /2,900 /5,010**	**2,560 / 3,970 / 6,530**	**3,080 / 5,980 / 9,060**	**4,430 / 6,470 / 10,900**

- New PM Peak Hour Vehicle Trip Generation (MXD+ Tool).
- Assumes a 14% reduction in Vehicle Trips with TDM Strategies.

Source: Fehr & Peers, 2020.

214th Street Extension

The roadway extension was proposed to provide a more connected arterial street network within the subarea. 9th Avenue SE is a collector arterial and the City's Comprehensive Plan includes a project to upgrade the corridor to a 3-lane collector road with sidewalks and bike lanes. The new 214th Street connection would distribute peak hour traffic and enable 9th Avenue SE to serve as a north-south alternative route to the very congested SR 527 corridor for some travelers. It should be noted that most vehicles using this new connection would not be destined for I 405, as that would require significant out of direction travel, as opposed to staying on SR 527. Vehicles are more likely to be traveling west on 228th Street SE or SR 524. The Preferred Alternative was evaluated with and without the 214th Street extension between SR 527 and 9th Avenue SE during the PM period. The 2043 PM peak hour corridor LOS results are shown below in Table 3.

Table 3. 2043 PM Concurrency Corridor LOS Results for the Preferred Alternative

Corridor	With 214th Street Extension	Without 214th Street Extension
SR 524	E (63)	E (76)
SR 527	E (71)	**F (89)**
228th St SE/SW	E (62)	E (68)

Fehr & Peers, 2020. Both scenarios assumed the new 20th Avenue SE/SR 524 intersection is added to the SR 524 concurrency corridor. The 219th Place connection between Philips parking lot and 9th Avenue SE was also assumed, but the 228th Street widening was not included. No BAT lanes were assumed on SR 527.

Under the Preferred Alternative, the SR 524 and SR 527 concurrency corridors would meet the LOS E standard with the 214th Street SE extension. Several individual intersections, however, are expected to operate at LOS F on the SR 527 corridor: 220th Street SE, I-405 northbound ramp, and 228th Street SE intersections. The Preferred Alternative corridor delays are within the range of findings in the DEIS as the corridor delays are lower than the No Action Alternative (where SR 524 and SR 527 corridors operate at LOS F) as it includes transportation mitigation projects, and lower than the Mitigated Live/Work Alternative as the proposed new PM peak hour trips is about 1,500 fewer trips compared to the Mitigated Live/Work Alternative.

The 214th Street Extension would increase 9th Avenue SE vehicle traffic by up to 400 vehicles during the PM peak hour on either end of 9th Avenue SE for a total of 800 more peak hour trips. There is increased traffic expected at the 9th Avenue SE/SR 524 and 9th Avenue SE/228th Street SE intersections, and delays are expected to increase for the 228th Street SE corridor, however the corridor would still meet the LOS E standard. The 214th Street extension would also provide designated non-motorized facilities to serve alternative transportation modes to and from the subarea, reduce congestion, and improve level of service.

AM Evaluation

The AM peak hour analysis is not required under the City's LOS standard as the highest traffic volumes are during the PM peak hour as evaluated in the Draft EIS. The additional limited AM peak period analysis was completed for the Preferred Alternative at nine selected intersections including the Canyon Park main entrances along SR 527, the I-405 ramp intersections, and on 9th Avenue SE. These locations were evaluated in response to comments received from WSDOT, the Canyon Park Business Owners Association, and community members who wanted to know more about the effects of Canyon Park Subarea growth and of a potential 214th Street Extension between SR 527 and 9th Avenue SE. The AM analysis also helps inform how the PM mitigation projects identified in the Draft EIS may perform during the AM peak hour with different traffic patterns.

All studied locations, including the three main business park entrances (220th Street SE/SR 527, 214th Street SE/ SR 527 and 228th Street SE/29th Drive SE), are expected to operate at LOS E or better with the exception of SR 527/SR 524 and SR 527/228th Street SE intersections. The AM analysis of the Preferred Alternative does not fundamentally change the Draft EIS conclusions as both locations were also expected to operate at LOS F conditions under the PM peak hour for the No Action Alternative and the Mitigated Live/Work Alternative. Evaluating these two locations during the AM period could be considered as part of future development operational requirements to identify if traffic improvements are needed at these locations.

In addition, the AM analysis was evaluated for both with and without the 214th Street extension. With the 214th Street extension traffic volumes are expected to increase along 9th Avenue SE, however the intersection operations at both the 9th Avenue SE/SR 524 and 9th Avenue SE/228th Street SE intersections would operate at LOS E. The I-405 ramp intersections are also expected to operate at LOS E or better during AM conditions. The I-405 northbound ramp is expected to operate at LOS F, as shown for the Mitigated Live/Work Alternative in the Draft EIS.

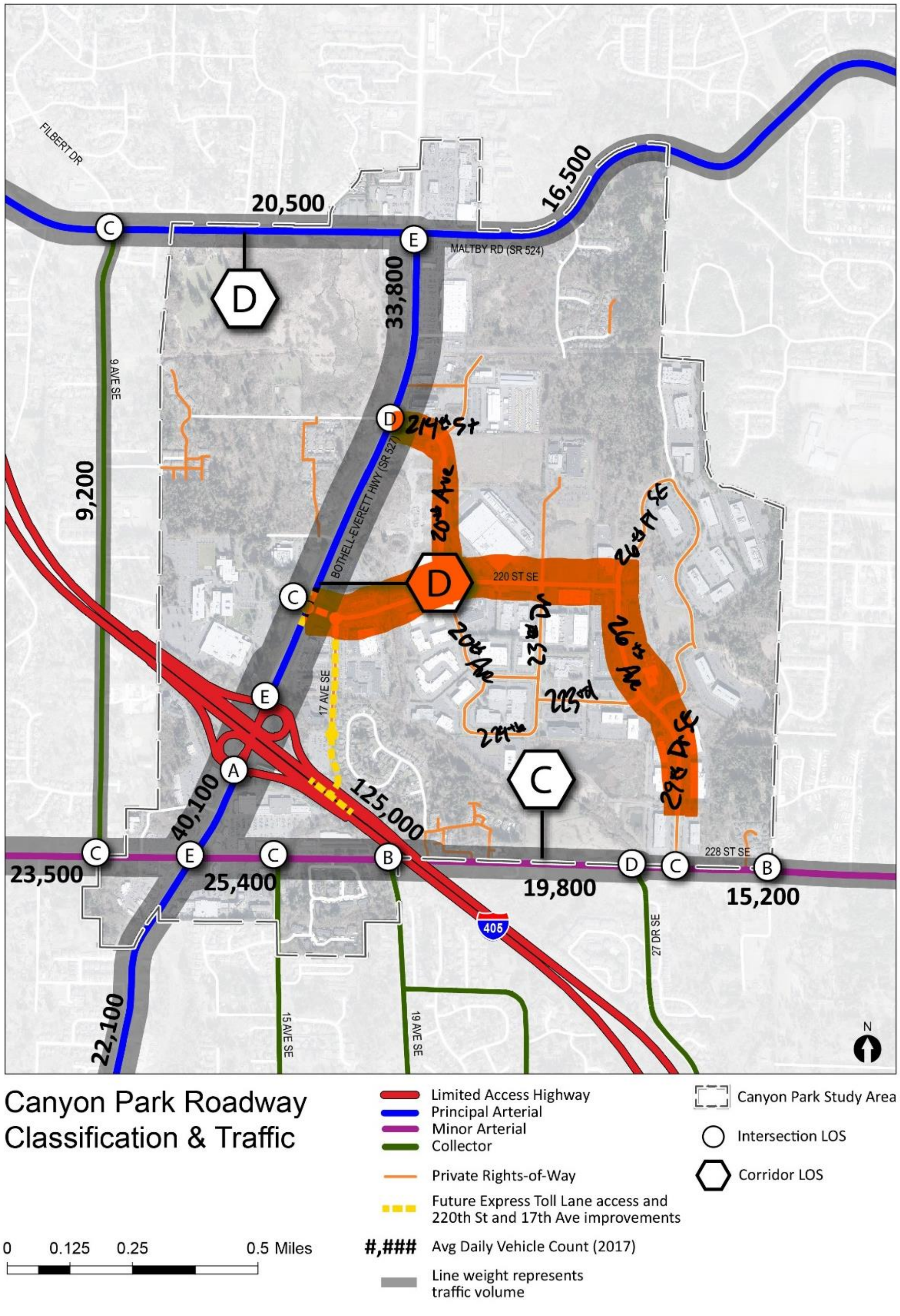
See Attachment C for additional information on the AM traffic analysis.

Private Streets Evaluation

Because business park trips largely funnel through the three main access points to the corridors under study, it was anticipated that the private street evaluation at the time of the Preferred Alternative development may show that conversion to public streets better distributes trips along a more complete network and connected network; if so, the overall traffic congestion results are likely to be similar to or slightly better than the range of results in the Draft EIS. The Preferred Alternative is expected to generate the fewest new PM peak hour trips of all Action Alternatives and results are in the range of the Draft EIS; see Table 2.

The Draft EIS noted that the City's LOS standards are corridor based and address the PM Peak hour. The Draft EIS assumes with Action Alternatives that selected private streets would become public streets in the future following improvement to public standards. A letter of intent is under discussion between the City and the Canyon Park Business Owner Association. These streets are identified on Figure 7. When public, the streets would not be part of the City's corridor LOS standards as that is applied to higher functional class corridors. However, the City has committed to evaluate the private streets at the time of the Preferred Alternative. When the streets become public, the City could track operation and safety conditions such as through its municipal code and design standards and specifications approach to inadequate road conditions.

Figure 7. Potential Future Public Streets Map



Source: Makers 2020.

Private Street Capacity and Traffic Control

The main spine road includes the east-west 220th Street SE, the north-south 26th Avenue SE/29th Drive SE, and 214th Street SE/20th Avenue SE between Sr 527 and 220th Street SE. The new PM peak hour traffic volumes generated under the Preferred Alternative were roughly assigned onto the internal street network to estimate vehicle-to-capacity (v/c) ratios along the internal streets, as well as to identify if potential intersection control changes would be needed at full build-out. The actual assignment of new PM peak hour trips is somewhat speculative as development and driveway access may change in the future, however the approximate peak hour trips on each roadway segment was used to estimate the v/c ratio on each roadway segment. A v/c ratio over 1.0 indicates that vehicle demand is higher than roadway capacity and congestion would occur. The forecasted link volumes are likely conservatively high as vehicles trips are assigned to the main access driveways, while in reality there are smaller parking lot driveways and access points along 220th Street SE and 26th Avenue SE/29th Drive SE that may decrease vehicle demand at the internal four intersections studied:

1. 20th Avenue SE/220th Street SE
2. 23rd Avenue SE/220th Street SE
3. 26th Avenue SE/220th Street SE
4. 223rd Street SE/26th Avenue SE/29th Drive SE

To accommodate the Preferred Alternative growth, the 220th Street SE road should be 4-5 lanes. Traffic monitoring should be completed as the business park redevelops to identify if an added lane on 220th Street SE is needed east of 20th Avenue SE, where it is currently 3 lanes. The 26th Avenue SE/29th Drive SE would be near capacity under the current cross-section. A road diet to a 3-lane road to provide in-street bike facilities would increase the v/c ratio over 1.0. Vehicle trips however are likely to distribute to other local streets such as 223rd Street SE/23rd Avenue SE to avoid 26th Avenue SE during peak period congestion if possible.

Intersection Control

Within the private street network, an intersection traffic control change such as a traffic signal or roundabout would likely be needed at three intersections: 20th Avenue SE/220th Street SE, 26th Avenue SE/220th Street SE, and 223rd Street SE/29th Drive SE under the Preferred Alternative. Periodic traffic monitoring and a traffic engineering study would be needed to identify if and when an intersection control change is warranted at these locations. The draft WSDOT study, which assumed land use growth similar to the No Action Alternative, also expected a potential need for intersection control changes as the 20th Avenue SE, 23rd Avenue SE, and 26th Avenue SE intersections on 220th Street SE were expected to operate at LOS F in the future during one or both peak periods under current stop control configuration.

The 17th Avenue SE/220th Street SE intersection was also evaluated in the separate WSDOT I-405 Direct Access Ramp study and expected this intersection to operate at LOS C for both AM and PM peak hours. Under the Preferred Alternative, the lowest growth of all the Action Alternatives, this intersection is expected to operate at LOS F during both peak periods. This is a combination of the higher land use growth overall in the Preferred Alternative as well as the higher land use growth located closer to the Canyon Park park-and-ride (accessible from 17th Avenue SE only) compared to the No Action land use assumptions.

Potential improvements to address future inadequate road conditions could include traffic signal timing improvements such as increasing cycle lengths for both time periods. For the AM peak hour, the intersection could operate better with dual westbound left turn lanes and a new southbound receiving lane on 17th Avenue SE, however widening the intersection would result in a more uncomfortable pedestrian environment as crossing distances increase.

Periodic traffic monitoring at 17th Avenue SE/220th Street SE intersection should be conducted as the business park changes and develops to identify if and when operational improvements such as signal timing/signal coordination with the adjacent SR 527/220th Street SE intersection (expected to operate at LOS F under the No Action and the Preferred Alternative) or other intersection improvements such as widening are needed to improve traffic operations. If an intersection widening/traffic operations improvement project is pursued as the business park redevelops, the City could apply its code and design manual requirements to address inadequate road conditions. See BMC 17.04.010 C and D and Bothell Design and Construction Standards, 2020 Update.

See Attachment C for additional information on the private streets traffic analysis.

Transit Facility Concepts

The SR 527 corridor peak hour congestion is expected to worsen in the future and there is a desire to improve transit access to and from the subarea. The Draft EIS identified some potential mitigation measures involving transit, as well as person-based service standards. In addition, a subarea visioning goal is for Canyon Park to be a regional transportation hub with its existing park-and-ride and bus rapid transit (BRT) service (existing *Swift* Green Line and planned Sound Transit I-405 BRT). Three potential transit facility concepts were explored at a high level for the subarea in Attachment D and summarized below:

- **Center Reversible Transit Only Lane** - the SR 527 corridor would be widened to construct a center transit only lane that would operate southbound in the AM peak period and northbound in the PM peak period to provide improved transit speed and reliability in the main commute direction. This concept is to limit widening of SR 527 corridor. Non-peak direction transit trips would travel with general-purpose traffic.
- **Outside Business Access Transit lanes** - convert the outside general-purpose lane to a BAT lane. This results in two general purpose lanes and a BAT lane in each direction. This would be a trade-off between decreasing general purpose capacity for increased transit speed and reliability to serve the subarea.
- **Internal Subarea Parallel Transit Corridor** - This concept would route transit off congested SR 527 to an internal transit corridor within the subarea. The route would be from the park-and-ride to 17th Avenue SE, 220th Street SE, and 20th Avenue SE along the new street extension to SR 524. A new signal at 2214th Street SE and 20th Avenue SE would assist transit access turning left from the 20th Avenue extension.

Each option was evaluated at a high level in terms of implementation needs, operations, and comparison of potential transit travel time. The internal parallel transit corridor has promise for local Community Transit routes with similar or slightly faster travel times than using SR 527 and could better serve people in the business park, however the *Swift* Green Line design principles is to operate on arterials. The Center Reversible Transit Only lane requires transit stops in the median so likely only the *Swift* Green Line would use it to limit widening for local stops on the corridor, however the dedicated transit facility would improve transit travel times.

In the long term, and pending support and a coordinated effort among regional partners—Community Transit, WSDOT, Snohomish County, City of Mill Creek, and City of Everett—is for Business Access and Transit (BAT) lanes through Bothell and Snohomish County by converting the outside general purpose lanes. Bothell strongly supports this long-term goal to best leverage the regional investment in a robust, functioning, and comprehensive transit system. It is noted that with the reduced vehicle capacity on SR 527 with the BAT lanes, the corridor would not meet its LOS E corridor standard. The SR 527 corridor can only meet its LOS E standard with the 214th Street extension and without outside BAT lanes converted from general purpose lanes. A policy change would be needed to either accept higher levels of corridor delay or exempt some intersections from the corridor. This would prioritize transit speed, reliability, and transit usage in the subarea over trying to "build your way out of congestion".

Attachment A: Land Capacity Updates

The 2015 analysis conducted by Snohomish County in consultation with the City was reported in the Comprehensive Plan and the Draft EIS in Tables 18 and 19.

At the time of the Draft EIS the tabular data from the County and City effort was available along with 2012 spatial data about land status (e.g. vacant, partially developed, etc.) was available. Snohomish County was provided a copy of the Draft EIS and made no comments.

Additional City and County coordination occurred following the Draft EIS Comment Period and the 2015 spatial data was provided by the County. In association with the 2015 Comprehensive Plan Update, it showed the County and City considered more lands for redevelopment by the year 2035 considering then new planning and zoning allowing for greater areas of mixed uses even if not qualifying as redevelopable or partially developed under the standard formulas in the 2012 report.

Considering the 2012 Buildable Lands Report assumptions informed by permit trends, pipeline projects, and other relevant considerations, the resulting land capacity is presented as a range. Compared to the Draft EIS results, the amended results are a little higher in capacity in the full study area but within 10% results. In the RGC, the capacity results are similar in both the Draft EIS and Amended results. The No Action Alternative assumptions in the Draft EIS are retained as a lower bookend comparison to the Action Alternatives for a conservative comparison.

Corrected information in the Draft EIS is noted in track changes below. The more detailed land capacity method is provided in Appendix B.

Buildable Land Capacity

Under the State of Washington Growth Management Act, each County and City is required to provide sufficient land capacity for added population to meet growth targets assigned by counties in consultation with cities. Many counties, including Snohomish and King Counties, also assign housing and employment targets.

The City of Bothell found that its 2014 Comprehensive Plan did not provide enough population capacity. In 2015, Bothell added opportunities for mixed-use development in the Canyon Park study area. The capacity for jobs and housing was increased by amending the zoning of portions of the study area to include the Residential-Activity Center designation, as shown in Table 18 and Table 19.

Table 18. Current Bothell Comprehensive Plan Population Capacity

County (portion)	2014 OFM[1] Pop. Est.	2035 Pop. Target (net)	Current (2014) plus target population	Pop. Capacity (2014 Pop. + Pop. capacity)	Pop. Capacity Surplus (+) or Deficit (-)	Canyon Park: *Additional population capacity*
King	24,610	6,495	31,105	35,263	+4,158	
Snohomish	17,020	6,940	23,960	20,406	-3,544	4,498
Total	**41,630**	**13,435**	**55,065**	**55,669**	**See note**	

[1] Washington State Office of Financial Management

Note: A total population capacity is not given for both combined counties, since surplus in one county cannot be used to offset a deficit in another county. All numbers in the above table are stated in terms of population (persons).

Source: City of Bothell, 2015.

Table 19. Current Bothell Comprehensive Plan Employment Capacity

County (portion)	Employment Target (2035) (additional jobs)	2035 Employment Capacity (surplus jobs [+] or deficit [-])	Canyon Park: Additional employment capacity	Expanded Red Barn Village
King	3,097	6,344 (+3,247)		
Snohomish	4,960	5,500 (+540)	753	807
Total	**8,057**	**11,844**	**753**	**807**

Note: Current employment figures are not shown due to the constantly changing nature of employment numbers.

Source: City of Bothell, 2015.

Most of the study area is fully or partially developed. A small amount of the study area is in active permit review, or in the "pipeline", and some lands are redevelopable or vacant. About one third of land in the study area is mapped as critical area and protected from alteration, as shown in Table 20.

Table 20. Canyon Park Property Buildable Land Status, Updated 2020

Property Status	Acres	Critical Area Acres
Developed/Constant	460.9 ~~472.5~~	213.4 ~~245.3~~
Partially-Used[1]	201.5 ~~352.4~~	42.4 ~~48.4~~
Pipeline[2]	43.1 ~~30.7~~	3.1 ~~3.1~~
Redevelopable[3]	195.9 ~~33.4~~	11.8 ~~2.7~~
Vacant	55.6 ~~45.8~~	30.9 ~~2.4~~
Total[4]	**957.0 ~~934.8~~**	**301.6 ~~302.0~~**

[1]Partially-Used: For commercial, industrial, and mixed-use zones, the floor area ratio is usually less than 25% and the building improvement to land value ratio is greater than 100%.

[2]Pipeline: Properties in permit review.

[3]Redevelopable: For multifamily, commercial, industrial, or mixed-use zoned or designated land, existing buildings valued at less than 100% of the land value are usually considered potentially redevelopable.
[4]Total acres are net parcel acres excluding public rights of way. With rights of way total acres are 1,037.
Source: Snohomish County Tomorrow, 2012; Snohomish County PDS 2015; Snohomish County Assessor, 2018; BERK, 2019 and 2020.

The *2012 Buildable Lands Report for Snohomish County* calculated capacity in the Canyon Park Study Area based on Vacant and Redevelopable Land. Redevelopable land includes parcels where the improvement value is less than 100% of the land value. As described above, the City added capacity for mixed-use development on Redevelopable land in its 2015 Comprehensive Plan.

Reviewing 2012 and 2015 County and City results ~~and maps available at the time, it appears that Partially Developed Land was not identified in the 2012 Buildable Lands Report and not in the City's capacity analysis of its 2015 R-AC additions in the Canyon Park area~~areas updated with more recent Assessor data, the resulting buildable land is shown in Figure 36. The 2012 Buildable Lands Report defines Partially Developed land as developed to 25% of allowed building space even if building value exceeds more than 100% of the land value.

Figure 37 and Table 21 shows updated population and employment capacity conditions based on updated Snohomish County data (excluding critical areas and applying similar market availability factors as the 2012 report), and adding parcels the City and County evaluated in 2015 and addressing property information as of 2020. The resulting population capacity is similar to the City's results in 2015 (4,498 in Comprehensive Plan is similar to results in Table 21, less than 10% different) and the employment results are greater currently than studied in 2012 or 2015. Adjusting some of the assumptions about the share of property that could be used for residential and commercial in mixed-use formats could alter the results (e.g., greater population, less employment).

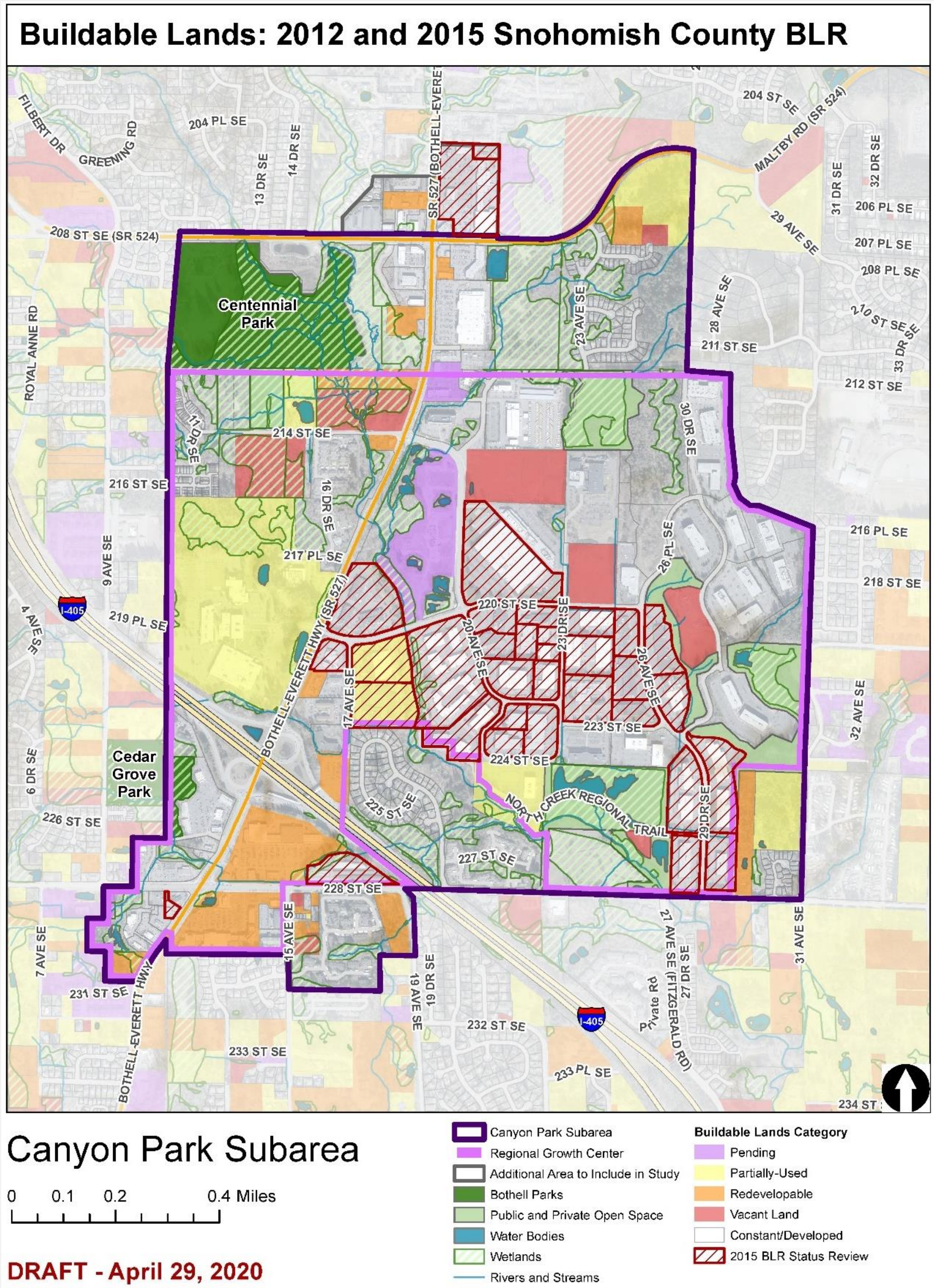
Table 21. Current Canyon Park Capacity Review

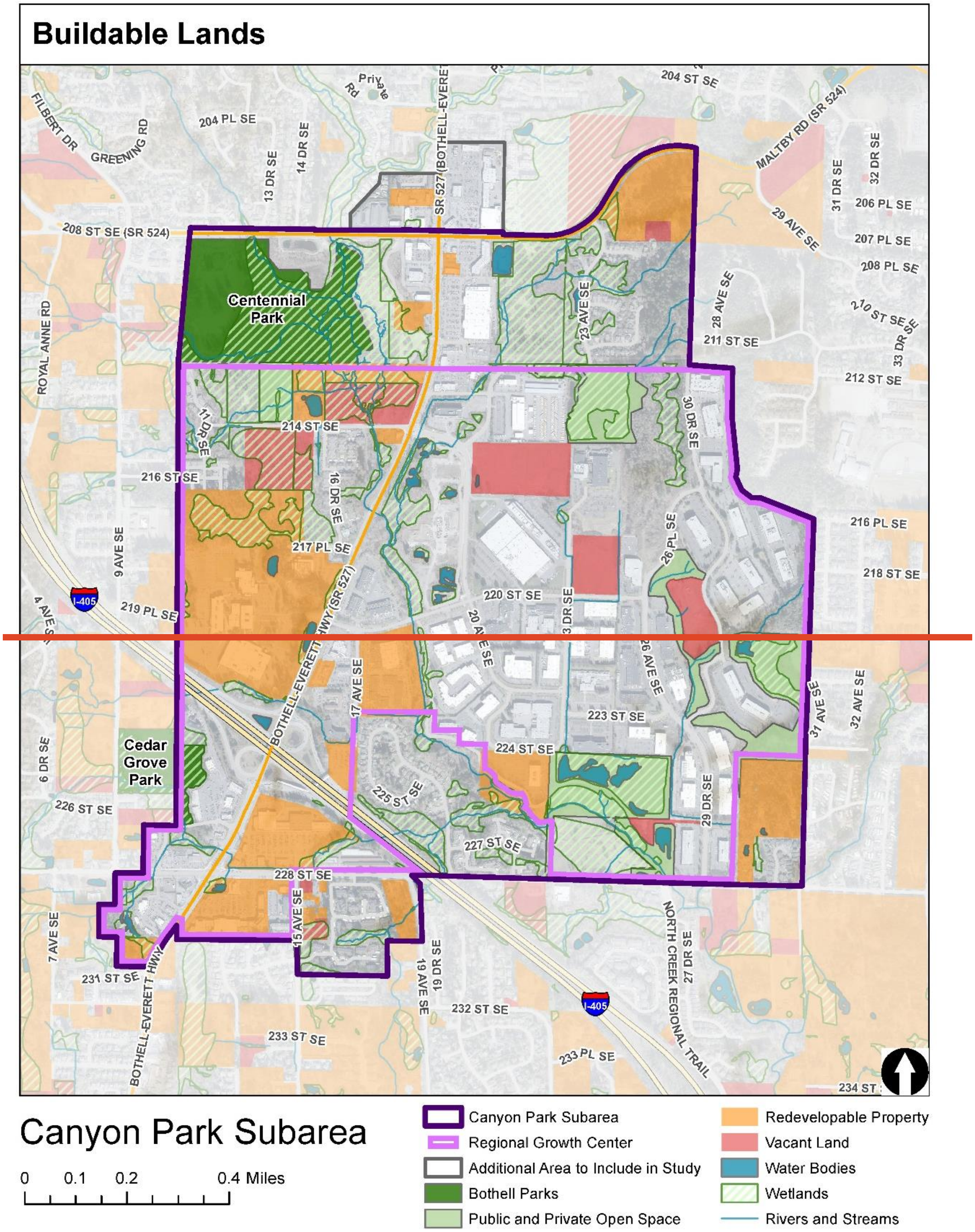
	Population Capacity		Employment Capacity	
	Full Study Area	RGC	Full Study Area	RGC
Redevelopable Land	1,856 ~~282~~	1,447 ~~124~~	2,306 ~~456~~	2,281 ~~401~~
Partially Developed Land	924~~2,192~~	344~~1,640~~	2,161~~3,877~~	1,881~~3,681~~
Pipeline Development	1,687~~1,836~~	1,687~~1,836~~	- ~~0~~	- ~~0~~
Vacant	380 ~~174~~	235 ~~108~~	337 ~~454~~	268 ~~405~~
Total	**4,847~~4,484~~**	**3,713 ~~3,708~~***	**4,804~~4,787~~**	**4,430 ~~4,487~~***

*Notes: *Reflects the adopted RGC boundary. ~~When the capacity estimates were applied to more refined blocks and transportation analysis zones the estimates rounded and were around 1% higher: 3,712 population (+4) and 4,530 (+43) but when considering the full study area, the numbers added to similar amounts.~~ This table reflects an updated and corrected land capacity analysis. The amount studied in the EIS is less than 10% different than these amounts and is a slightly lower bookend.*

Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; BERK, 2019.

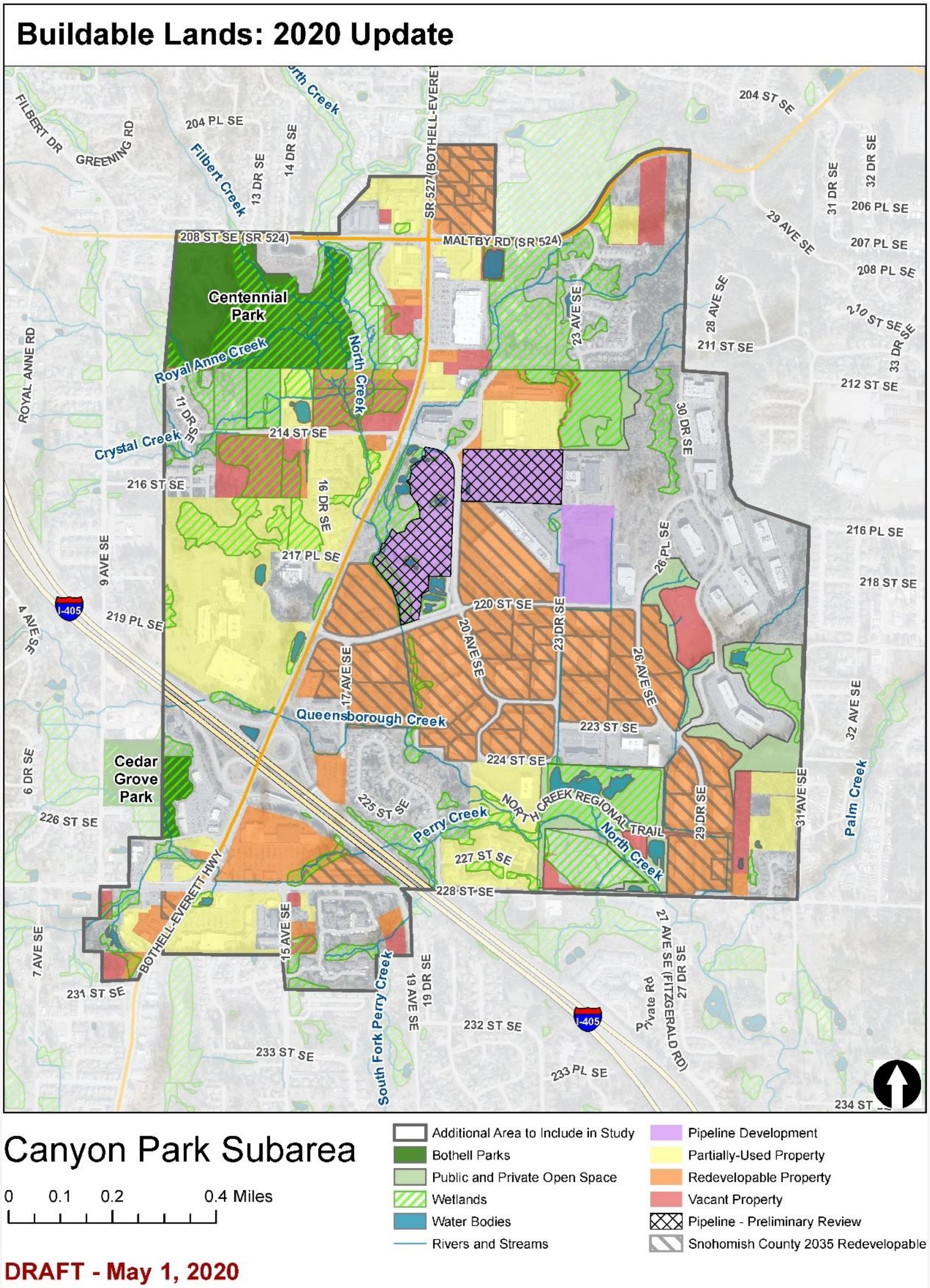
Figure 36. Canyon Park Buildable Lands, 2012 and 2015

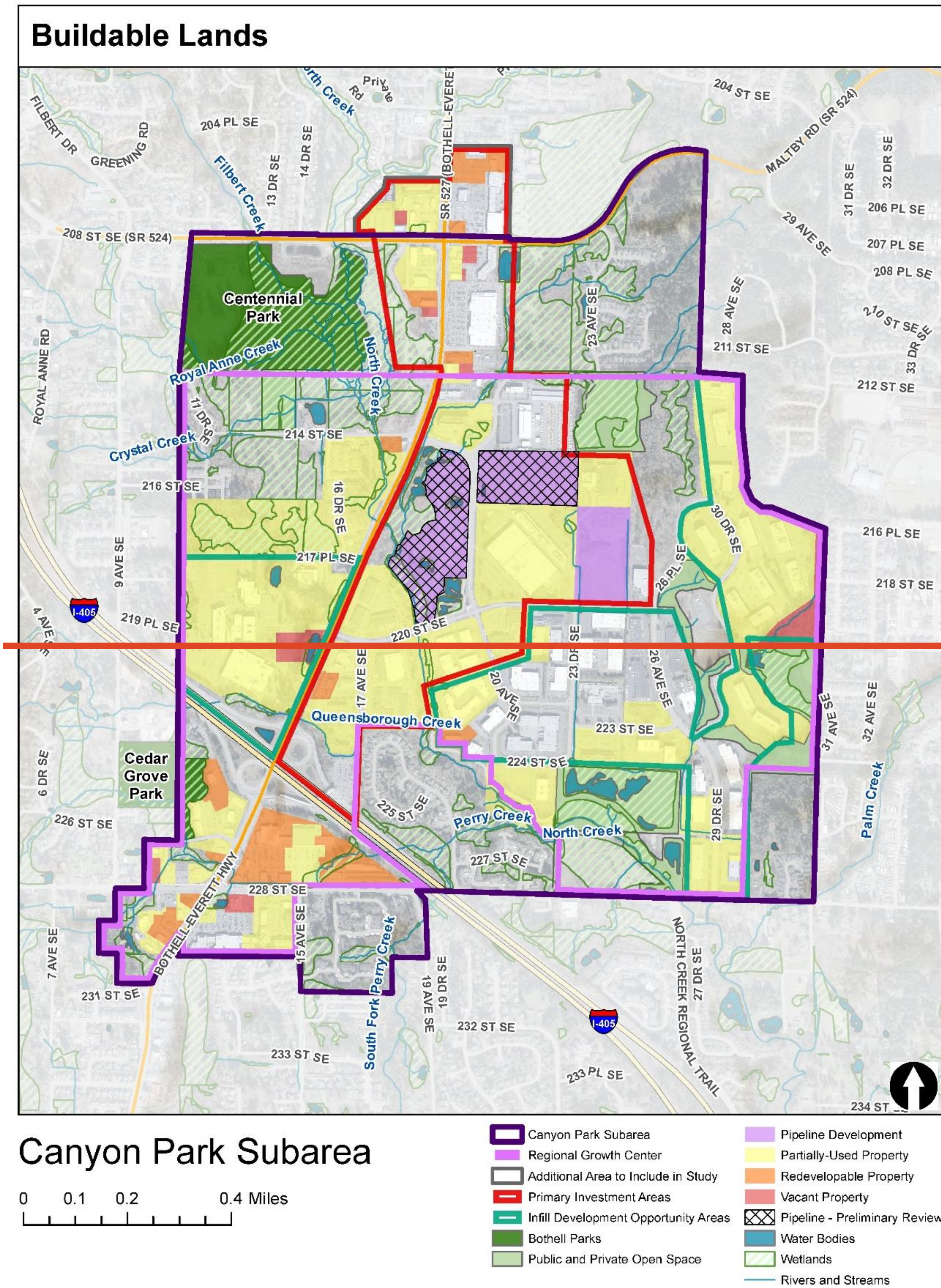




Source: Snohomish County Tomorrow, 2012; BERK, 2019.

Figure 37. Canyon Park Buildable Lands, ~~2018~~2020





Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; BERK, ~~2019~~2020.

Adding buildable land capacity to the Comprehensive Plan reported capacity, the maximum activity units per net acre by 2035 is projected to be about 31 in the present RGC boundaries.

Table 22. Activity Units, Current and 2035 Projected Current Comprehensive Plan

Activity Units	Regional Growth Center (RGC) Current	Regional Growth Center (RGC) 2035	Full Study Area Current	Full Study Area 2035
Population[1]	1,773	5,486~~5~~[4]	3,079	7,~~563~~926
Employment[2]	10,833	15,2~~3~~63[4]	11,767	16,~~554~~571
Gross Acres	733	733	1,037	1,037
Activity Units per Gross Acre	**17.2**	**28.3~~4~~**	**14.3**	**23.6~~3~~**
Net Acres[3]	673	673	935	935
Activity Units per Net Acre	**18.7**	**30.8~~31.0~~**	**15.9**	**~~25.8~~26.2**

Notes/Sources:

[1]ESRI Business Analyst – 2018 population, accessed 2019.

[2]PSRC, 2017.

[3]Excludes non-parcel areas but retains private roads.

[4]~~The estimates of units for the current RGC reflect the 1% higher estimates that occurred when disaggregating capacity results across blocks and analysis zones.~~ See notes associated with Table 21.

Attachment B: Buildable Lands Methods

Bothell Canyon Park Subarea Plan Update and Planned Action

Land Capacity and Growth Assumptions Description

Background

The purpose of this document is to provide additional detail regarding assumptions and methods for the No Action and Action Alternative land use assumptions.

Under the State of Washington Growth Management Act, each County and City is required to provide sufficient land capacity for added population to meet growth targets assigned by counties in consultation with cities. Many counties, including Snohomish and King Counties, also assign housing and employment targets.

The City of Bothell found that its 2014 Comprehensive Plan did not provide enough population capacity. In 2015, Bothell added opportunities for mixed-use development in the Canyon Park study area. The capacity for jobs and housing was increased by amending the zoning of portions of the study area to include the Residential-Activity Center designation.

Pages 3-34 to 3-39 of the Draft EIS describe the City's 2015 Comprehensive Plan capacity results and updated capacity results prepared for the Bothell Canyon Park Subarea Plan and Planned Action Draft EIS in December 2019, particularly the No Action Alternative. Additional information is included in the Socioeconomics section of the Draft EIS (e.g. Tables 33 and 34).

The Action Alternatives considered land capacity results (e.g. partially used and redevelopable sites), but the results for those scenarios additionally consider Community Scoping Meeting Input including economic and urban design information (e.g. typologies) as described in Draft EIS Appendix A.

Results are intended to support the City in its efforts to meet Puget Sound Regional Council's Center's criteria for Regional Growth Centers and are expressed in the form of activity units – combined population and jobs). See more description in Section 3.2 of the Draft EIS, Land Use Patterns and Policies.

It should be noted that the focus of this document is on the current 2012 Buildable Lands Report methods as it relates to the current Comprehensive Plan/No Action Alternative. The County and cities are currently preparing an update to the Buildable Lands Report that is still in progress at the time of this writing. It should also be noted that the City will determine appropriate assumptions in the framework of the methodology update as part of its Comprehensive Plan Update due in 2024, and consider citywide results.

Land Capacity Approach

SNOHOMISH COUNTY 2012 BUILDABLE LANDS REPORT

In 2012, Snohomish County in consultation with cities produced a Buildable Lands Report. It was meant to support Comprehensive Plan Updates due by 2015. In summary, the steps include:

- Step 1: Buildable Lands Inventory (What land in the UGAs could be developed?)
- Step 2: Development History – Residential, Commercial and Industrial (What density actually happens in each zone?)
- Step 3: Capacity Calculations -- Assignment of Future Development Densities to the Buildable Lands Inventory (What is the land capacity as of 2011?)
- Step 4: Reductions for Uncertainty (How much of the land capacity is likely to be available for development by 2025?)
- Steps 5 & 6: UGA Growth Target/Capacity Comparisons (What are the growth targets, and is there enough land capacity?)

The report is available at the Snohomish County website: https://snohomishcountywa.gov/1352/Buildable-Lands

The steps as applied to the No Action Alternative, representing the current Comprehensive Plan, are described below.

NO ACTION ALTERNATIVE

Step 1: Land Suitable for Development

Vacant, Redevelopable, and Partially-Used Land

BERK Consulting, Inc. obtained the buildable lands spatial layers from 2012, 2015, and updated parcel data from the Snohomish County Assessor. The revised analysis was conducted from January to May 2019, and corrected in February 2020. The effective base year is 2018.

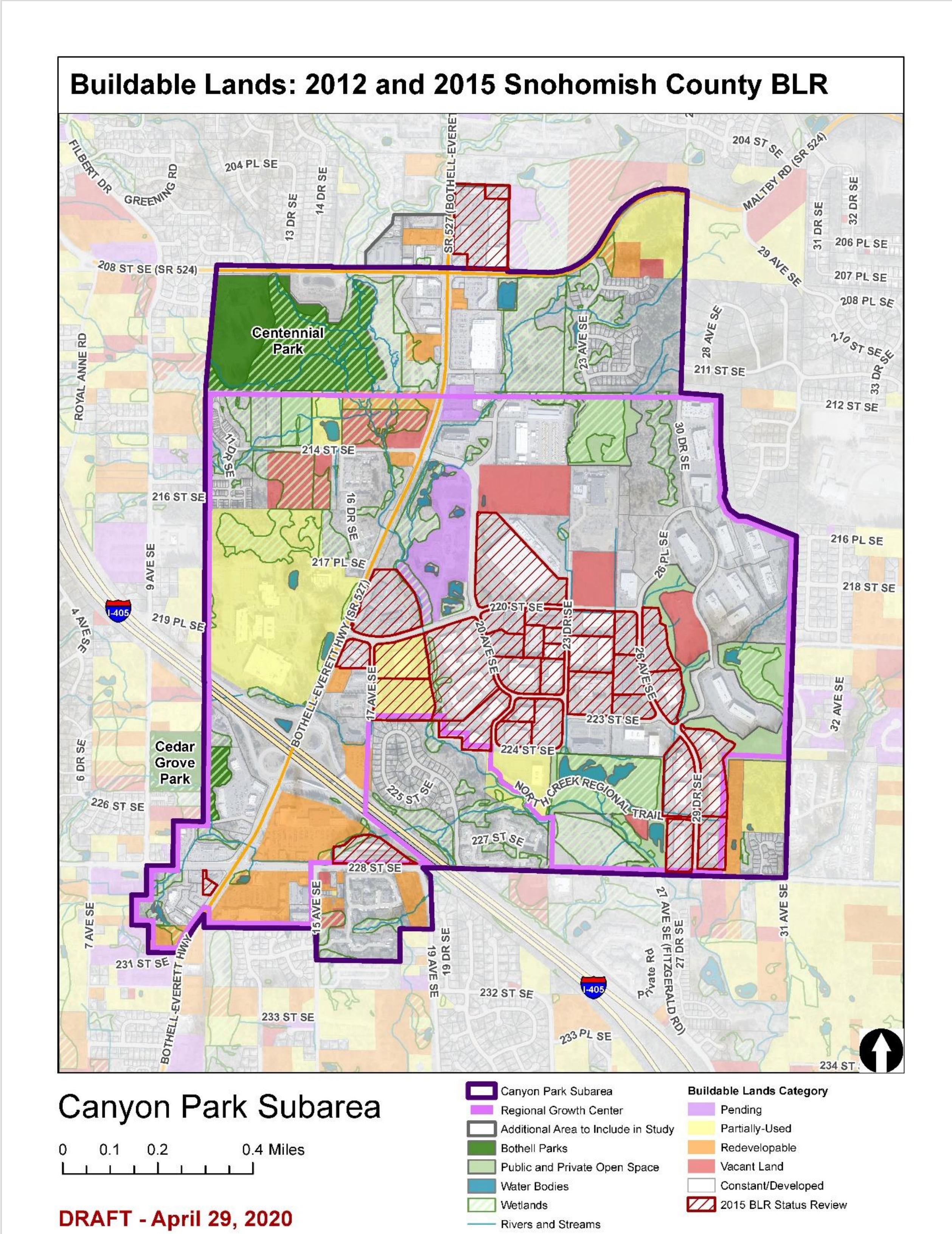
Land was identified as one of the following:

- Vacant: Generally those where the Assessor's building improvement value is less than $2,000.
- Redevelopable: For multi-family, commercial, industrial, or mixed-use zoned or designated land, existing buildings valued at less than 100% of the land value were considered potentially redevelopable.
- Partially Used: For commercial, industrial, and mixed-use zones, land developed to 25% of allowed building space even if building value exceeds more than 100% of the land value were considered partially-used.

Figure 1 has been corrected since the December 2019 Draft Environmental Impact Statement (Draft EIS) to distinguish redevleopable and partially-used properties rather than lumping them as redevelopable, and to show then pending development. In addition, Figure 1 shows parcels evaluated in 2015 as redevelopable by 2035 in the County and City analysis of the 2015 *Imagine…Bothell* Comprehensive Plan Update that zoned more land for mixed uses. Figure 2 updates the 2012/2015 analysis with more recent Assessor data. It also corrects the location of partially-used properties compared to the Draft EIS that due to a formula error had not included total square feet for properties with multiple buildings.

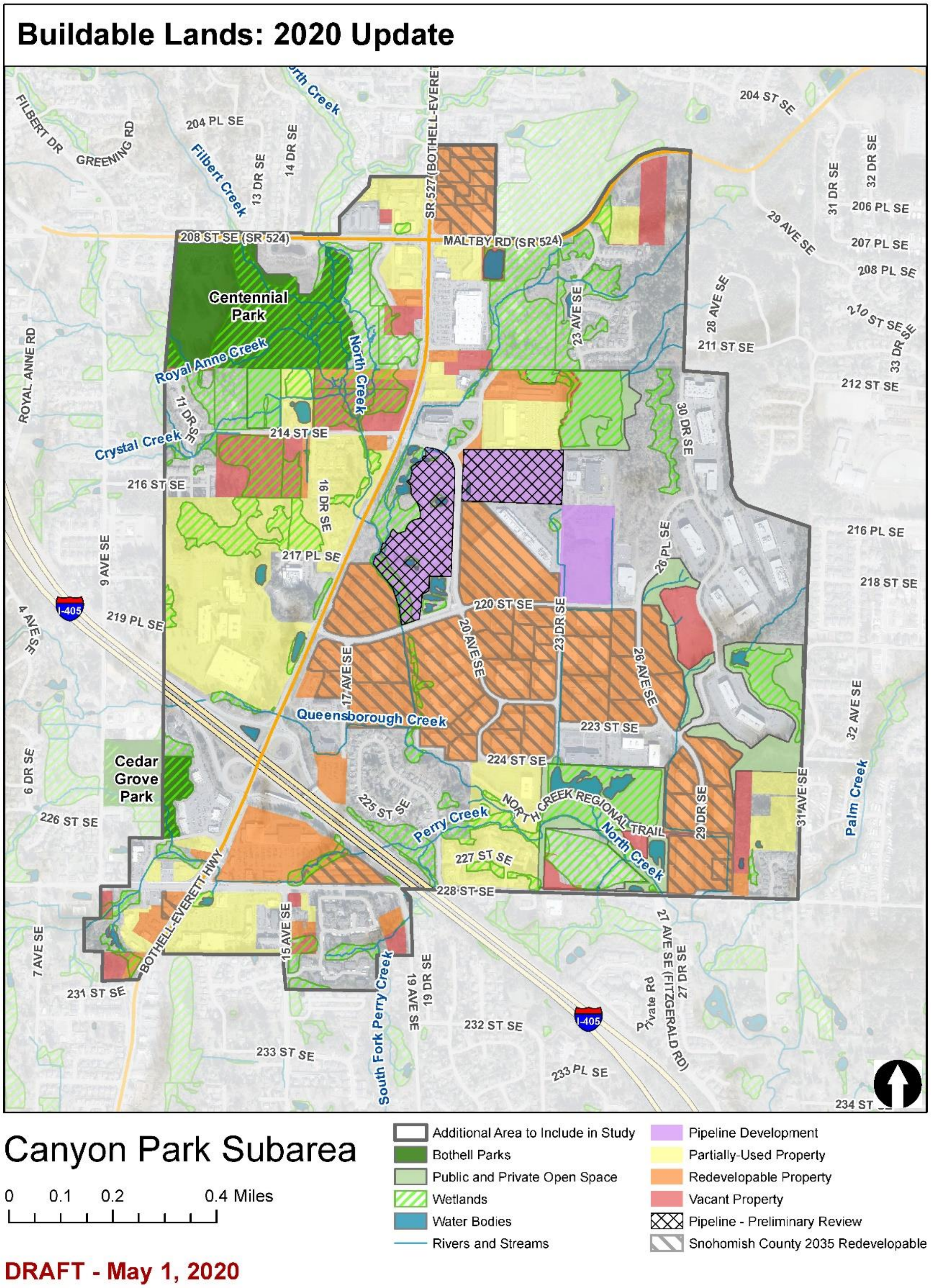
In both the 2012 Buildable Lands Report results and the more recent analysis for the Canyon Park Subarea Plan Update there is minimal vacant land in this urban area. In 2012, the results did not include much partially used land and more redevelopable land. By 2020, with more current land and improvement value information, a little more land is seen as partially used. In addition, more land is considered redevelopable by 2035. See Figure 1 compared to Figure 2.

Figure 1. Canyon Park Buildable Lands, 2012 and 2015



Source: Snohomish County Tomorrow, 2012; Snohomish County 2015; BERK, 2020.

Figure 2. Canyon Park Buildable Lands2020



Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; Snohomish County PDS 2015; BERK, 2020.

Critical Areas Deductions

Critical areas include lands important to protect for their functions and values such as wetlands, streams, and aquifers, or lands important to protect for public health and safety such as geologic hazards and floodplains. After the vacant, partially developed, and redevelopable land is summed, critical areas are deducted from the buildable land. Total acres and critical areas acres by buildable land status are reported in Table 1.

Table 1. Canyon Park Property Buildable Land Status, Updated 2020, Full Study Area

Property Status	Gross Acres	Net Acres	Critical Area Acres
Developed/Constant	460.9	247.5	213.4
Partially-Used[1]	201.5	159.1	42.4
Pipeline[2]	43.1	40.0	3.1
Redevelopable[3]	195.9	184.1	11.8
Vacant	55.6	24.8	30.9
Total[4]	**957.0**	**655.4**	**301.6**

[1]Partially-Used: For commercial, industrial, and mixed-use zones, the floor area ratio is usually less than 25% and the building improvement to land value ratio is greater than 100%.
[2]Pipeline: Properties in permit review.
[3]Redevelopable: For multifamily, commercial, industrial, or mixed-use zoned or designated land, existing buildings valued at less than 100% of the land value are usually considered potentially redevelopable. Also includes lands the County and City considered 2035 Redevelopable in the 2015 *Imagine…Bothell* Comprehensive Plan Update.
[4]Total acres are net parcel acres excluding public rights of way. With rights of way total acres are 1,037.
Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; Snohomish County PDS 2015; BERK, 2020.

Economic Units

Similar to the 2012 Buildable Lands Report, parcels were reviewed for common ownership where zoning was consistent across parcels, and considered as single economic units.

Pending Development

In addition to vacant, redevelopable, and partially used land, the Buildable Land method considers pending development including approved but not yet built projects. Pending developments can be considered in place of the standard capacity methods since they may be representative of market conditions and densities/intensities.

For the Bothell Canyon Park Subarea Plan Update purposes, the following pending developments were considered in Table 2.

Table 2. Pipeline Development Considered in No Action Land Capacity Results

Name	Status	Units
Canyon Park Apartments	Preliminary Review	561
Canyon Park Tract 24 Townhomes	Preliminary Review	239
Tract 18-19 Townhomes	Approved	118

Source: City of Bothell; BERK, 2019.

A fall 2019 pre-application addressing the Juno site also provided information about how additional employment space could be accommodated on a partially developed site.

One other proposal in preliminary review is not included regarding the Sound Transit maintenance facility. At this time, insufficient information about the Sound Transit maintenance facility proposal is available for the City to evaluate what impacts the facility may have on the vision for the subarea as well as the potential compatibility of the action alternatives in relation to the potential facility. The Sound Transit Bus Base qualifies as an essential public facility that must be evaluated by an independent Hearing Examiner who must approve a conditional use permit for the facility. Essential Public Facilities have additional approval criteria within Bothell Municipal Code Section 12.06.080(B)(2).

Step 2 and Step 3: Trends and Densities

Residential and Employment Densities

The 2012 Buildable Lands Report identifies assumed densities for each residential and mixed use zone and employees per acre for mixed use, commercial, and industrial zones considering development history between 1995 to 2010. The 2012 analysis classified most of the properties in the study area as primarily commercial or residential, with relatively few mixed use sites. More sites were considered mixed use in the 2015 analysis given zoning changes at that time, and assumed densities were increased considering how properties may develop as mixed use by 2035.

Table 3. Residential and Employment Density Assumptions (Per Acre)

Zoning	Res. Density*	Emp. Density
PCB	9.85	37.01
R 2,800	14.39	
R 4,000	19.02	
R 5,400a	5.98	
R 5,400d	5.27	
R 9,600	3.35	
R-AC, OP, CB	9.85-30	28.51-30
R-AC, OP, CB, LI, MVSO	9.85-30	30-54.66
R-AC, OP, CB, MVSO	9.85-30	30-66.25
R-AC, OP, LI	9.85-30	30-54.66
UC	45	27

Note: *For the 2015 *Imagine…Bothell* Comprehensive Plan Update capacity estimates, the County and City considered 30 dwelling units per acre and 30 employees per acre on sites allowed mixed uses. These alternative densities were applied to 100% of sites considered redevelopable by 2035.
Source: Snohomish County, 2012

These density assumptions are applied to the net buildable acres consistent with their zoning.

The 2012 results considered parcel-specific zoned densities based on predominant use of commercial or residential uses or in some cases mixed uses; in 2015 added redevelopable sites were assumed to have 30 jobs per acre and 30 residential units per acre on 100% of the same site. For mixed use zones, the buildable lands analysis for the Canyon Park Subarea Plan Update in 2020 assumes a 50/50 split on net developable acres, and half are applied the residential densities and half the employment rates. This is similar to mixed use zone approaches by other cities such as Lynnwood and Everett in the 2012 Buildable Lands Report.

The analysis assumes that future development on partially-used properties would be an expansion of their existing use, not a replacement similar to the 2012 Buildable Lands Report assumption that partially-used sites have room for additional development without demolition. The analysis for the Canyon Park Subarea Plan Update in 2020 also considers recent permit activity in the last five years. Business park area sites that were recently the subject of high-value permits (over $300,000 to multiple millions) were considered to develop all as employment rather than mixed use.

Deducting Existing Dwellings and Jobs on Partially-Used and Redevelopable Sites

Existing jobs are deducted from partially used and redevelopable sites by removing existing jobs as estimated in the 2012 Buildable Lands Report. The results removed about 2,400 jobs from Partially-Used sites and about 4,700 jobs from redevelopable sites.

Existing dwelling units are removed from the analysis similar to the above approach with jobs; there were about 78 existing dwelling units subtracted from the residential capacity.

Step 4: Reductions for Uncertainties

Miscellaneous Public/Institutional Use Reduction

Per the 2012 Buildable Lands Report methodology, a 5% reduction factor was used to account for the uncertainty of land availability for infrastructure and public needs:

> *A 5% reduction factor was used to account for the uncertainty of land availability for development due to: new stormwater regulations requiring larger detention ponds (especially in the unincorporated UGAs), potential need for regional or local stormwater facilities, potential need for transmission line, utility, or road or rail rights-of-way, potential need of land for public or institutional uses like police/fire stations, churches, water supply storage facilities, wastewater treatment and pump stations, landfills and transfer stations, cemeteries, libraries, daycares, small parks or open space, municipal offices, and other uses…*

It should be noted that a site purchased for the Northshore School District as a special high school to provide curriculum and training for students who may be a talent pipeline for businesses in the Canyon Park Subarea was identified as a partially used site with a potential to add employment whether for educational or other purposes.

Market Factor

A market factor is applied to capacity results to recognize not all landowners would be ready to develop or redevelop their property in a planning period. The Buildable Lands Report in 2012 applies a 15% deduction for vacant land and 30% for partially-used and redevelopable land.

In the No Action land capacity analysis, a 30% deduction was used on vacant, partially-used, and redevelopable land for residential purposes. For jobs, no market factor was assumed. This is because the City's assumptions for job growth in the study area between 2012 and 2035 have already been met, largely by jobs reoccupying existing buildings. There is still capacity to build new buildings in the study area.

Land Capacity Results

The Draft EIS included a sum of land capacity as listed in Table 4, assuming a market factor on residential and excluding it from employment.

Table 4. Draft EIS Results with Market Factor Assumptions

No Action Capacity in Study Area	Res. Units	Population	Total Emp.
With BLR Market Factor 30%	2,242	4,484	3,351
With no Market Factor	N/A	N/A	4,787

Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; BERK, 2019.

The overall results incorporated into the Draft EIS for the full study area and Regional Growth Center sub-set are shown in Table 13.

Table 5. Draft EIS December 2019 Canyon Park Capacity Review

	Population Capacity		Employment Capacity	
	Full Study Area	RGC	Full Study Area	RGC
Redevelopable Land	282	124	456	401
Partially Developed Land	2,192	1,640	3,877	3,681
Pipeline Development	1,836	1,836	0	0
Vacant	174	108	454	405
Total	**4,484**	**3,708***	**4,787**	**4,487***

Notes: *Reflects the adopted RGC boundary. When the capacity estimates were applied to more refined blocks and transportation analysis zones the estimates rounded and were around 1% higher: 3,712 population (+4) and 4,530 (+43) jobs but when considering the full study area, the numbers added to similar amounts.
Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; BERK, 2019.

Correcting the classification of partially-developed and redevelopable properties per the 2015 County and City evaluation for the *Imagine Bothell*…Comprehensive Plan Update, and applying assumptions as detailed above, revised results are similar in total for the Canyon Park Subarea Plan Update.

Table 6. Canyon Park Subarea and Canyon Park Vision Study Area north of Maltby Road: Net Capacity

	Population Capacity		Employment Capacity [1]	
	Full Study Area	RGC	Full Study Area	RGC
Redevelopable Land	1,856	1,447	2,306	2,281
Partially Developed Land	924	344	2,161	1,881
Pipeline Development	1,687	1,687	-	-
Vacant	380	235	337	268
Total [2]	**4,847**	**3,713**	**4,804**	**4,430**

[1] Job capacity without the market factor.
[2] If assuming properties with investment in recent permits over $300,000 stay employment oriented, as well as CPBOA properties which are limited by CC&Rs from residential at this time, the resulting job capacity for the study area equals 4,804.

If only business-park area properties with investment in recent permits over $300,000 stay employment oriented, and otherwise mixed use is assumed similar to the County and City evaluation for the 2015 *Imagine…Bothell* Comprehensive Plan Update, the resulting job capacity would slightly decrease to 4,373, and the population capacity would increase to 5,097.

Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; Snohomish County PDS 2015; BERK, 2020.

Traffic Model and Growth Trends/Market Forces

For the period 2012-2035, the Transportation evaluation for the Comprehensive Plan tested about 4,000 jobs and 3,000 dwellings (equivalent to roughly 5,300 people based on the model's 2.4 persons per household assumption that is greater than the 2 persons per household assumption in the 2012 Buildable Lands Report) within transportation analysis zones that encompass the study area and lands beyond. The transportation analysis zones extend outside the study area, but most jobs and most residential growth should be within the study area.

By updating the base year to 2018 using information from the PSRC LUV model covering the City's transportation analysis zones, results show the City has achieved the jobs planned for 2035 as of 2018 in the study area, but there is more growth anticipated for households.

To test the likelihood of additional employment growth in the 2018-2035 timeframe the transportation analysis (and the rest of the EIS) assumed growth similar to the No Action Capacity results developed earlier in 2019 per Table 8 below in Step 5: Net Capacity section.

Table 7. Comprehensive Plan Traffic Model Assumptions – Canyon Park Vicinity

Period	Res. Units	Population	Total Emp.
2012-2035 Growth	2,684	6,442	4,110
2018-2035 Growth	2,129	5,110	(256)

Source: City of Bothell 2015; Fehr & Peers, PSRC, BERK, 2019.

Step 5: Net Capacity

Following the above Steps, the updated 2020 population capacity range for the full study area is similar/slightly lower than the County's/City's results in 2015; the 2020 employment results are greater than results in 2015. Adjusting some of the assumptions about the share of property that could be used for residential and commercial in mixed-use formats could alter the results (e.g., greater population, less employment).

Table 8. Canyon Park Subarea and Canyon Park Vision Study Area north of Maltby Road: Net Capacity

Scenario	Population	Housing Units	Jobs
2012 Capacity	225	106	3,120
2015 Capacity [1]	5,272	3,003	3,965
Draft EIS Studied	4,484	2,242	4,787 [2]
Updated 2020 LCA [1]	4,847 - 5,097	2,654 - 2,790	4,373 - 4,804 [2,3]

[1] Updates capacity of the current 2015 updated Bothell Comprehensive Plan (No Action Alternative). Includes area north of Maltby Road as well as city limits. The Comprehensive Plan page LU-11 reports 4,498 for area in city limits.

[2] Job capacity without the market factor.
[3] High range of employment assumes properties with investment in recent permits over $300,000 stay employment oriented, as well as CPBOA properties which are limited by CC&Rs from residential at this time. Low range employment assumes that business-park area properties with investment in recent permits over $300,000 stay employment oriented; otherwise mixed use as evaluated by the County and City in the 2015 *Imagine…Bothell* Comprehensive Plan Update.
Source: Snohomish County Tomorrow, 2012; Snohomish County Assessor, 2018; Snohomish County PDS 2015; BERK, 2020.

The December 2019 Draft EIS assumptions tested growth similar in employment and slightly lower in population compared to 2020 results. No Action Alternative growth assumptions still remains lower than all other studied alternatives and continues as a lower bookend as described further below.

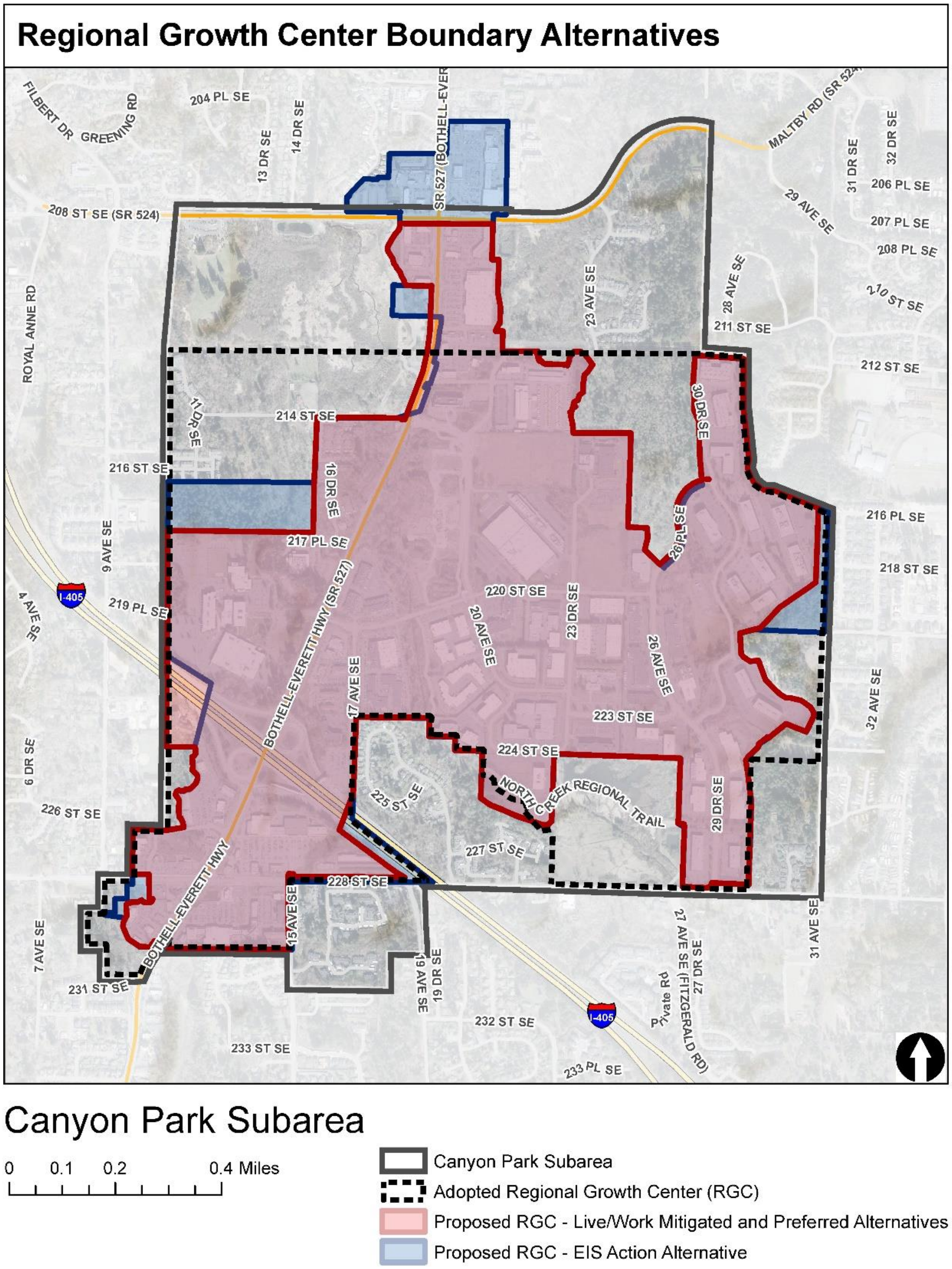
ACTION ALTERNATIVES

Regional Growth Center Boundaries

Growth estimates for Action Alternatives are based on a target of 45 activity units – population and jobs – per gross acre of Regional Growth Center area Outside of the Regional Growth Center boundary results of the No Action capacity are applied.

Current RGC boundaries are 733 acres and include areas of wetlands. The new PSRC guidance promotes more compact RGC boundaries of up to 640 acres or a square mile. The Business Plus and Live/Work Alternatives would add the Thrasher's Corner intersection and abutting properties to RGC boundaries and reduce the boundaries elsewhere, particularly excluding wetland areas that are not allowed to develop. The result is an RGC boundary of about 613 acres. The proposed boundary in the Mitigated Live/Work Alternative and Preferred Alternative is similar to those of other Action Alternatives, but refines areas further near wetlands and roads, producing a boundary of 565 acres. See Figure 3 to compare RGC boundary alternatives.

Figure 3. Comparison of RGC Boundary Alternatives



Source: City of Bothell, 2019; BERK 2019.

Typologies

Draft EIS Alternatives

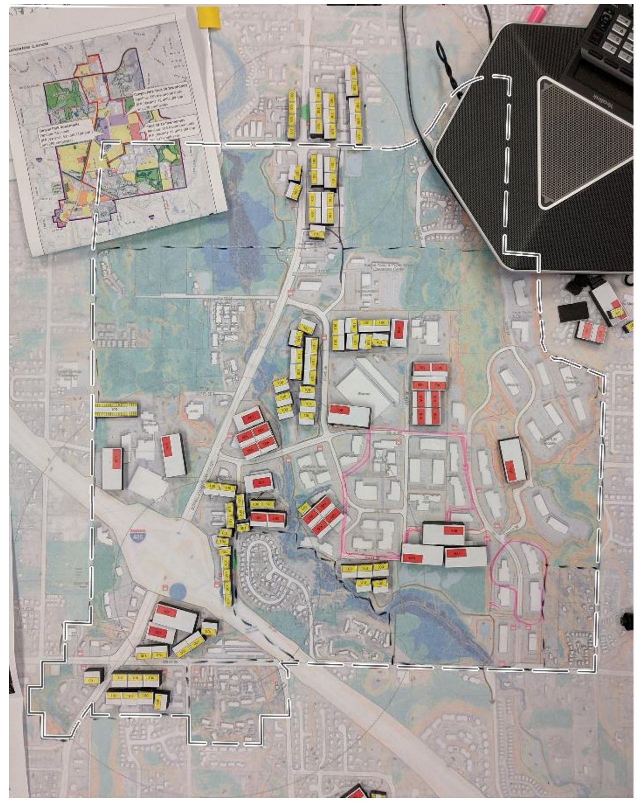
Within the study area, growth estimates are based on typologies that represent different building types and parking areas that fit the zoning standards and concepts for added jobs and housing in the study area. The typologies were created considering economic and urban design conditions in the study area. For example, the added development is largely located on sites at the shopping centers and along the Bothell-Everett Highway and near the I-405 Park and Ride, and these sites have some potential for redevelopment or infill, with employment and residential or mixed uses. Also, the areas in the central or eastern business park, there was less added development to consider retaining the business-related uses in these areas.

Typologies were provided for public exercises at a Community Scoping Meeting in spring 2019. See Attachment A. Community input at the scoping meeting informed the City and Consultant team (collectively the project team). See Draft EIS Appendix A.

The typologies were translated into employment and residents/dwellings per acre, similar to the buildable lands methodology, except that densities are planned rather than based on achieved in prior years. The typologies represent building types found in the region and suited to the study area.

Following the scoping meeting, the project team developed distinct alternatives and applied typologies to base maps. Results were summed by block and transportation analysis zone. See net results by Transportation Analysis Zone (TAZ) below.

Figure 4. Alternative Development Spring 2019

Business Plus Alternative Development	Live/Work Alternative Development
	

Source: Makers, 2019.

Market Factor

Because the growth estimates using typologies exceeded the Regional Growth Center activity-unit-based targets, a market factor of 15% was applied to growth number results for the Business Plus and Live/Work Alternatives. The resulting Activity Units per acre are still above 45 activity units per acre for a conservative analysis (activity units: Business Plus 54.0, Live/Work 55.1).

The "Mitigated Live/Work" Alternative has the same pattern as the primary Live/Work Alternative, but reduces the Regional Growth Center boundaries and the corresponding growth by about 25% to reduce mitigation requirements while still meeting the Regional Growth Center criteria of 45 activity units per acre.

Preferred Alternative

For the Preferred Alternative, the Planning Commission considered Draft EIS Alternatives and comments. Based on this, a conceptual Preferred Alternative that blended features of each alternative has been developed. The areas within the RGC were applied new zones. Areas outside the RGC were retained with No Action zones.

Table 9. Urban Design Parameters by Land Use Designation

● Required ◒ Encouraged ○ Allowed ⊗ Not allowed

Zone	Residential	Retail	Minimum Density	Parking Minimum	Public/Private Common Usable O.S.[1]	Private O.S.[2]	Examples
Residential MU – High Encourages a high intensity (6+ stories, typically apartments/condos), holistic residential neighborhood to meet residential growth targets and make use of transit, focused public investment, and nearby job investment, and nearby job opportunities.	●	● Along main streets & special corners	**Minimum:** 90 du/acre **Target:** 133 du/acre	1 stall per 450 SF retail + .75 stalls per bedroom, but no more than 2.2 stalls/unit[3] *Approx. average 1.25 stalls per unit*	●	◒	
Residential MU – Medium Encourages a medium intensity (4-6 stories), holistic residential neighborhood to meet residential growth targets and transition between the high-intensity TOD and nearby job opportunities.	●	● Along main streets & special corners	**Minimum:** 45 du/acre **Target:** 57 du/acre	1.1 stall per bedroom, but no more than 2.2 stalls per unit *Approx. average 1.5 stalls per unit*	●	◒	

[1] Encourage consolidation of open space as central gathering places in neighborhood centers (i.e., Thrasher's Corner, Canyon Park Place, and Canyon Park Business Center).
[2] To be explored further when drafting regulations.
[3] Note, some developments within a ¼ mile of frequent transit may be eligible for a parking minimum exception per HB 1923, modified by HB 2343, allowing a minimum of .75 stalls per unit.

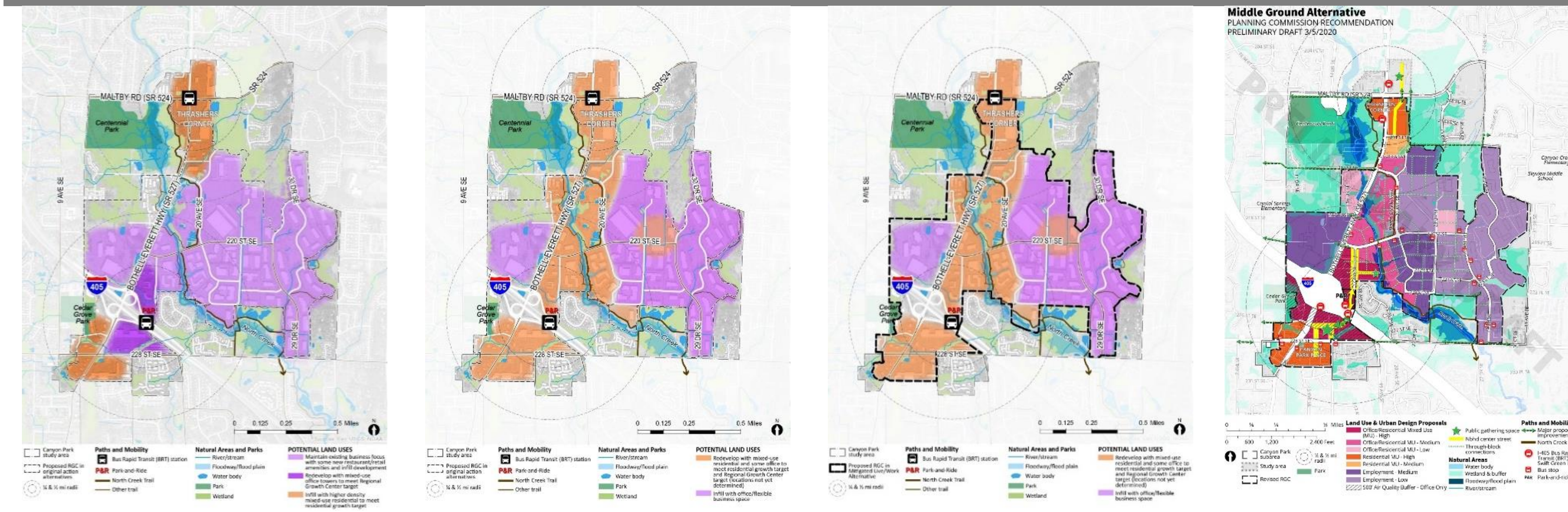
Zone	Residential	Retail	Minimum Density	Parking Minimum	Public/Private Common Usable O.S.[1]	Private O.S.[2]	Examples
Office/Residential – High Encourages high-intensity office mixed-use development (6+ stories) near transit and areas impacted by highway air quality and noise—while allowing residential—to make use of focused public investment and further develop a transit-oriented job center and holistic neighborhood.		Along main streets & special corners	**Minimum:** 0.60 FAR or 90 du/acre **Target:** 3.00 FAR or 133 du/acre	1 stall / 500 SF office/retail *Average 1.25 per dwelling unit*		Office Res	 
Office/Residential – Medium Encourages medium-intensity office mixed-use development (3-6 stories) near areas impacted by highway air quality and noise—while allowing residential—to meet growth targets, create a holistic neighborhood, and transition between the high-intensity TOD and nearby job opportunities.		At special corners	**Minimum:** 0.50 FAR or 45 du/acre **Target:** 1.50 FAR or 57 du/acre	1 stall / 500 SF office/retail + 0.9 spaces / 1,000 SF light industrial *Average 1.5 per dwelling unit*		Office Res	 

Zone	Residential	Retail	Minimum Density	Parking Minimum	Public/Private Common Usable O.S.[1]	Private O.S.[2]	Examples
Office/Residential – Low Encourages lower intensity development (1-3 stories) further from transit and focused public investments. "Missing middle" housing makes use of North Creek and connects residential areas. Commercial makes use of highway visibility and existing business park.	○	◓ At special corners	**Minimum:** 0.35 FAR 25-35 du/acre **Target:** 0.50 FAR 25-35 du/acre	1.5 stalls per bedroom, but no more than 2.2 stalls per unit	●	○ Office ◓ Res	 
Employment – Medium Encourages medium intensity (3-6 story) office / flex / manufacturing to continue business park viability and make use of proximate transit and nearby holistic neighborhood. Residential not allowed to protect light industrial and incubator spaces in business park from displacement.	⊗	◓ At special corners	**Minimum:** 0.50 FAR **Target:** 1.50 FAR	1 stall / 500 SF office/retail + 0.9 spaces / 1,000 SF light industrial	● (minimal)	○	
Employment – Low Allows low intensity (1-2 story) office / flex / manufacturing to continue business park viability and make use of proximate transit and nearby holistic neighborhood. Residential not allowed to protect light industrial and incubator spaces in business park from displacement.	⊗	○	**Minimum:** 0.35 FAR **Target:** 0.50 FAR	1 stall / 400 SF office + .9 spaces / 1,000 SF light industrial	● (minimal)	○	

Source: Makers, 2020.

Figure 5. Draft EIS Alternatives – Business Plus and Live/Work and Mitigated Live/Work

Business Plus	Live Work	Mitigated Live Work	Preferred



Source; MAKERS, 2019 and 2020.

Preferred Alternative zones were applied to parcels. Preferred alternative zone standard were informed by typologies similar to Draft EIS Alternatives. Target densities and floor area ratios per Table 9 were assumed to determine capacity for population and jobs. The densities are at the target level rather than maximum or minimum. The densities were applied to net acres excluding critical areas. Additionally, household sizes of 1.5 for high and medium zones and 2.0 for low zones were applied to net housing units.

Table 10. Typologies and Densities

		Jobs per acre	Du per acre	HH size	Residents per acre	AU per acre
1	TOD Office	367				367
2	Eastgate Office	116				116
3	Low Office/flex	40				40
4	TOD 5 over 2	12	118	1.5	177	189
5	Surface parking 5 over 2		91	1.5	136.5	136.5
6	Three story walkup		22	1.5	33	33
7	Apartment Townhouse mix		57	2	114	114
8	Townhouse		17	2	34	34

Source: Makers 2020.

Table 11. Preferred Alternative Density Assumptions

Future Land Use	Target DU/ac	Household Size	Target FAR	Target AU/Ac	Res Split	Jobs Split	Res AU	Jobs AU
Residential MU – High	133	1.5	-	200	90%	10%	179.6	20.0
Residential MU – Medium	57	1.5	-	86	90%	10%	77.0	8.6
Employment – Medium			1.50	100	0%	100%	0.0	100.0
Employment – Low			0.50	50	0%	100%	0.0	50.0
Office/Residential – High	133	1.5	3.00	200	60%	40%	119.7	79.8
Office/Residential – Medium	57	1.5	1.50	86	60%	40%	51.3	34.2
Office/Residential – Low	35	2.0	0.50	70	90%	10%	63.0	7.0

Source: Makers 2020.

Jobs were distributed based on shares reflecting the intent of the zone or State Employment Security Department data. See Table 12.

Table 12. Job Sector Shares by Zone

PAFLU	Retail Pct	Office Pct	Manu Pct
Residential MU – High	0.75	0.25	0
Residential MU – Medium	0.75	0.25	0
Employment – Medium	0	0.6	0.4
Employment – Low	0	0.6	0.4
Office/Residential – High	0.25	0.5	0.25
Office/Residential – Medium	0.25	0.5	0.25
Office/Residential – Low	0.25	0.5	0.25

Source: Makers 2020.

Net Capacity

A comparison of capacity results for all alternatives is presented below in Table 13. The Business Plus Alternative has a similar capacity for about 4,000 residents and a much higher number of jobs at 17,350 compared to the No Action Alternative. The Live/Work Alternative would have a greater residential population of nearly 7,200 and high job count at nearly 15,300. To explore additional mitigation of impacts, a "Mitigated" Live/Work Alternative has been developed with lower growth as described above. The Preferred Alternative has a capacity for housing similar to Live/Work and a job capacity similar to but lower than the Mitigated Live/Work Alternative. Under all alternatives, nearly all the growth would be in the RGC, as shown in Table 13.

Table 13. Housing, Population, and Jobs—Net Growth

	Regional Growth Center (RGC)*				Full Study Area			
Alternative	Dwelling Capacity	Population Capacity	Job Capacity	Total Activity Units	Dwelling Capacity	Population Capacity	Job Capacity	Total Activity Units
No Action EIS Assumption**	1,856	3,712	4,530	8,242	2,242	4,484	4,787	9,271
No Action: Capacity Amended**	2,029	3,713	4,430	8,143	2,654	4,847	4,804	9,651
Mitigated Live/Work	2,816	4,225	9,458	13,683	3,614	5,496	9,805	15,302
Preferred	4,075	6,142	7,598	13,740	4,687	7,162	8,305	15,467
Business Plus	2,687	4,012	17,209	21,221	2,915	4,468	17,350	21,818
Live/Work	4,498	6,732	15,143	21,875	4,726	7,188	15,284	22,472

Note: *See Figure 3 and associated text. No Action Alternative RGC boundaries equal 733 acres. The Business Plus and Live/Work Alternatives have a RGC boundary encompassing 613 acres. The proposed boundary in the Mitigated Live/Work Alternative encompasses 565 acres.
** Updated capacity assumptions are shown for comparison. As a slightly lower bookend for the overall study area, the No Action EIS assumptions are continued in the SEPA process.
Source: MAKERS, 2020; BERK, 2020.

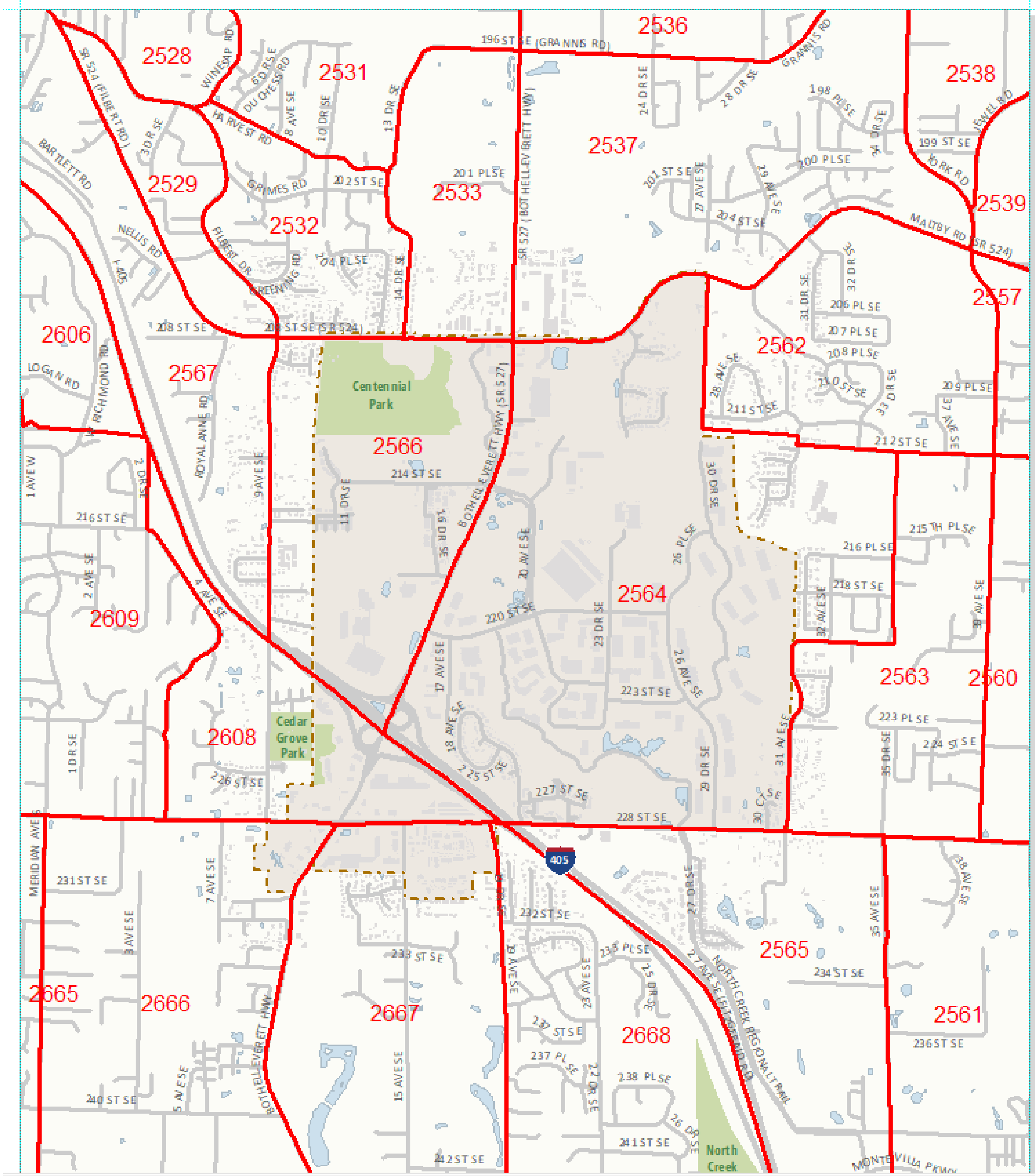
Net capacity results by TAZ for the Full Study Area are presented below. A TAZ map follows. The Preferred Alternative distributes housing similar to other Draft EIS Alternatives with more focus of housing in the southwest and less in the north. Under the Preferred Alternative, the combination of housing and jobs results in the lowest trips studied with Action Alternatives.

Table 14. Capacity by Transportation Analysis Zones (TAZs) – Full Study Area

	No Action		Mitigated Live/Work		Business Plus		Live/Work		Preferred	
TAZ	HH	Jobs	HH	Jobs	HH	Jobs	HH	Jobs	HH	Jobs
2564	1,757	2,939	2,271	8,029	704	13,454	2,970	12,292	2,707	6,232
2566	201	914	86	641	170	970	113	970	31	605
2608	86	630	216	742	454	2,235	283	1,332	681	1,260
2666	12	26	44	41	170	81	57	81	468	38
2667	28	162	346	102	567	201	453	201	470	9
2533	91	95	174	178	-	292	227	292	137	155
2537	67	21	476	72	850	117	623	117	193	5
Total	**2,242**	**4,787**	**3,614**	**9,805**	**2,915**	**17,350**	**4,726**	**15,284**	**4,687**	**8,305**

HH=households
Source: MAKERS, 2019; BERK, 2019 and 2020.

Figure 6. Transportation Analysis Zones (TAZs) in Canyon Park Subarea Vicinity



Source: Fehr & Peers, 2019.

Attachment A: Typologies

Residential

1. **TOD Mixed-Use Residential/Commercial**

101 Kirkland Ave, Kirkland - 101 Apartments

10410 NE 2nd St, Bellevue - Avalon Meydenbauer

- Structure/underground parking
- Higher relaxation of required parking units due to transit
- 5+1 stories, residential with ground-floor retail/office
- 1.1 parking space / unit + 1 space / 450 sf (relaxed parking requirements from transit)
- 150 dwelling units + 15,000 sf retail/office per acre

2. **Residential, higher density multifamily**

18420 102nd Ave NE, Bothell - Edition Apartments

15631 Ash Way, Lynnwood - Tivalli Apartments

- 5–6 stories, residential
- Structure/underground parking
- 1.25 spaces per unit (Low to moderate relaxation of required parking units due to transit)
- 160 dwelling units per acre

Commercial

3. **TOD Mixed Use Commercial**

1416 NW Ballard Way, Seattle - Ballard Blocks 2

15631 Ash Way, Lynnwood - Tivalli Apartments

- Structure/underground parking
- 6 stories, office with ground-floor retail
- 1 space / 500 sf office / retail (relaxed parking requirements from transit)
- 75,000 sf office + 15,000 sf retail per acre

4. **Commercial - Office/Light Industrial, higher density**

15809 Bear Creek Pky NE, Redmond - The Offices at Riverpark

1120 112th Ave NE, Bellevue - One Twelfth @ Twelfth - East Building

- Structure/surface parking
- 6 stories, office/light industrial uses with accessory retail/restaurant (cafe)
- 1 space / 600 sf (moderate relaxation of required parking units due to transit – also depends on mix between office and light industrial)
- 75,000 sf office / light industrial + 500 sf retail per acre

5. Mixed-Use Office/Retail, medium density

15224 Main St, Mill Creek - Park Place Center

2034 NW 56th St, Seattle - Greenfire Campus (Commercial)

- Structure/surface parking
- 4 stories, office with ground-floor retail
- 1 space / 300 sf (low relaxation of required parking units due to transit)
- 30,000 sf office + 10,000 sf retail per acre

6. Commercial - Office/Light Industrial, medium density

21540 30th Dr SE, Bothell - Canyon Park Heights Office Center

32001 32nd Ave S, Federal Way - East Campus Corporate Park I

- Structure/surface parking
- 4 stories, office/light industrial uses
- 1 space / 500 sf (low relaxation of required parking units due to transit)
- 25,000 sf office per acre

7. Commercial - Office/Flex, lower density

22102 17th Ave SE, Bothell - Building II

22722 29th Dr SE, Bothell - Canyon Park 228 - West Bldg

- Surface parking only
- 2 stories, office/flex/light industrial uses
- Infill/default development
- 1 space / 500 sf (depends on mix between office and light industrial – assumes more flex/industrial space)
- 12,000 sf office/flex per acre

Holistic Neighborhood Building Typology

Game pieces represent a range of plausible development types to help visualize what fits in the area.
They are not intended to represent every possible type.

Office – High Density

Description:
High density offices support a large number of workers on a relatively small site, relying on transit and underground parking to reduce surface parking needs. Due to the high cost of structured parking construction, these buildings are most suitable for areas with high land values and/or that are close to high capacity transit.

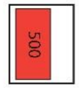
Height: 65 ft

Parking: 250 stalls
- 1 stall per 2 workers
- mostly structured

Activity Units per acre: 550

Activity Units per game piece: 500

Game Piece:



Office – Medium Density

Description:
These office buildings can support a large number of workers at a medium cost of construction. They require a large land area to accomodate surface parking.

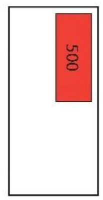
Height: 65 ft

Parking: 500 stalls
- 1 stall per worker
- mostly surface

Activity Units per acre: 174

Activity Units per game piece: 500

Game Piece:



Flex Space/Light Industrial – Low Density

Description:
Low density flexible buildings are used for many types of employment including offices, manufacturing, warehousing and transportation, research and development, and other uses requiring large, open spaces. Construction costs are low, but buildings and paved areas require a large amount of land.

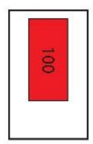
Height: 25 ft

Parking: 100 stalls
- 1 stall per worker
- mostly surface
- paved areas for truck loading included

Activity Units per acre: 56

Activity Units per game piece: 100

Game Piece:



Residential – High Density

Description:
High density residential buildings are typically apartments or condos. This type relies on transit use and structured parking to nearly eliminate surface parking. Due to the cost of structured parking, these buildings are most suitable for areas with high land values and/or that are close to high capacity transit.

Height: 65 ft

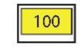
Parking: 50 stalls
- 0.75 stalls per dwelling unit
- mostly structured

Assumed household size:
1.5 people

Activity Units per acre: 260

Activity Units per game piece:
100

Game Piece:



Residential – Medium Density

Description:
This is a medium density building type with apartments or condos. Surface parking lowers the cost of construction but requires more land. More parking is provided per dwelling unit than the high-density type.

Height: 65 ft

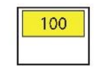
Parking: 100 stalls
- 1.5 stalls per dwelling unit
- half surface, half structure

Assumed household size:
1.5 people

Activity Units per acre: 137

Activity Units per game piece:
100

Game Piece:



Residential – Townhouses

Description:
Townhouses are attached single-family homes, offering a moderate density while providing more private space than a multifamily building. These buildings are relatively inexpensive to build and are more affordable than detached single-family homes.

Height: 35 ft

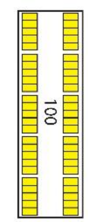
Parking: 100 stalls
- 2 stalls per dwelling unit

Assumed household size:
2 people

Activity Units per acre: 42

Activity Units per game piece:
100

Game Piece:



Attachment C: AM and Internal Street Transportation Analysis

FEHR PEERS

MEMORANDUM

Date: July 8, 2020

To: Bruce Blackburn, Steve Morikawa, and Sherman Goong, City of Bothell

From: Carmen Kwan and Kendra Breiland, Fehr & Peers

Subject: Canyon Park Subarea Plan – AM and Internal Street Transportation Analysis

SE18-0650

The Canyon Park Subarea Plan EIS is evaluating the potential impacts of additional growth to meet PSRC regional growth center criteria. The transportation chapter is focusing on potential impacts to auto/freight, transit, and people walking and biking. Potential mitigation strategies are also explored to support the proposed land use increase for the Preferred Alternative, which is expected to generate lower new PM peak hour trips (+5,000) compared to the Mitigated Live/Work Alternative (+6,500), but higher trips compared to the No Action Alternative (+4,000). This document summarizes additional transportation analysis for the Preferred Alternative to support the subarea plan and includes the following:

- Transportation mitigation test with and without the proposed 214th Street Extension between SR 527 and 9th Avenue SE.
- AM peak hour intersection operation analysis at select intersections in the subarea.
- Internal street analysis for the Canyon Park business center including peak hour vehicle-to-capacity ratios of the main spine road and potential need for intersection control changes.
- More detailed review of the AM and PM peak hour traffic operations at the 17th Avenue SE/220th Street SE intersection.

Transportation Mitigation Test – 214th Street Extension

In the Draft Environment Impact Statement (Draft EIS), a 214th Street Extension between SR 527 and 9th Avenue SE was proposed to provide a more connected arterial street network within the subarea. 9th Avenue SE is a collector arterial and the City's Comprehensive Plan includes a project to upgrade the corridor to a 3-lane collector road with sidewalks and bike lanes. The new 214th

Street connection would distribute peak hour traffic and enable 9th Avenue SE to serve as a north-south alternative route to the very congested SR 527 corridor for some travelers. The 214th Street SE extension is expected to carry approximately 800 trips in the PM peak hour. This street extension would result in increased vehicle traffic along 9th Avenue SE compared to without the extension as roughly half the vehicles would route north to SR 524 and half would route south to 228th Street SE. Two-way peak hour traffic volumes on 9th Avenue SE would increase from 1,400 – 1,700 under the Preferred Alternative without the street extension to 1,800 – 2,100 vehicles with the connection. The 2043 PM peak hour corridor LOS results are shown below in **Table 1**.

Table 1. 2043 PM Concurrency Corridor LOS Results for the Preferred Alternative

Corridor	With 214th Street Extension	Without 214th Street Extension
SR 524	E (63)	E (76)
SR 527	E (71)	**F (89)**
228th St SE/SW	E (62)	E (68)

Fehr & Peers, 2020. Both scenarios assumed the new 20th Avenue SE/SR 524 intersection is added to the SR 524 concurrency corridor. The 219th Place connection between Philips parking lot and 9th Avenue SE was also assumed, but the 228th Street widening was not included. No BAT lanes were assumed on SR 527.

- Under the Preferred Alternative, the SR 524 and SR 527 concurrency corridors would meet the LOS E standard with the 214th Street SE extension. Several individual intersections however are expected to operate at LOS F on the SR 527 corridor: 220th Street SE, I-405 northbound ramp, and 228th Street SE intersections.
- There is increased traffic expected at the 9th Avenue SE/SR 524 and 9th Avenue SE/228th Street SE intersections, and delays are expected to increase for the 228th Street SE corridor, however the corridor would still meet the LOS E standard.
- The 214th Street extension would increase 9th Avenue SE vehicle traffic by up to 400 vehicles during the PM peak hour on either end of 9th Avenue SE.
- It should be noted that most vehicles using this new connection would not be destined for I-405, as that would require significant out of direction travel, as opposed to staying on SR 527. Vehicles are more likely to be traveling west on 228th Street SE or SR 524.
- The 214th Street extension would also provide designated non-motorized facilities to serve alternative transportation modes to and from the subarea, reduce congestion, and improve level of service.
- The Preferred Alternative corridor delays are within the range of findings in the Draft EIS as the corridor delays are lower than the No Action Alternative (where SR 524 and SR 527

corridors operate at LOS F) as it includes transportation mitigation projects, and lower than the Mitigated Live/Work Alternative as the proposed new PM peak hour trips is about 1,500 fewer trips compared to the Mitigated Live/Work Alternative.

-

AM Peak Hour Analysis

The AM peak hour intersection analysis is not required under the City's LOS standard as the highest traffic volumes are during the PM peak hour as evaluated in the Draft EIS. The limited AM peak period analysis was completed for the Preferred Alternative at nine selected intersections including the Canyon Park main entrances along SR 527, the I-405 ramp intersections, and on 9th Avenue SE. These locations were evaluated in response to comments received from WSDOT, the Canyon Park Business Owners Association, and community members who wanted to know more about the effects of a potential 214th Street Extension between SR 527 and 9th Avenue SE. The traffic forecasts at the following intersections were developed by increasing the total inbound and outbound peak hour trips in the travel demand model to match the trip generation estimated from the proposed land use growth and running a new traffic assignment. The increase in traffic volumes at intersections were added onto the existing AM peak hour counts collected from WSDOT in 2018. Since traffic counts were not available at 9th Avenue SE/SR 524 and 9th Avenue/228th SE Street SE, the existing PM counts were reversed to represent the AM commute. For simplicity, the AM traffic forecasts also assumed the approximate same number of vehicles using the I-405 direct access ramps at 17th Avenue SE as the WSDOT I-405 analysis. Signal timing cycle lengths, splits, and offsets were optimized for the analysis similar to the PM peak hour in the Draft EIS.

Intersection operation results are shown in **Table 3,** and study intersections are mapped in **Figure 1**. All intersections are expected to operate at LOS E or better except for SR 527/SR 524 intersection (93 seconds of average delay) and SR 527/228th Street SE (120 -140 seconds of average delay). These two locations currently operate with high delays during peak hours and are expected to be more congested in the future with the proposed increase in land use.

- The AM analysis is not required to be evaluated for the City's LOS standard. A smaller set of locations were evaluated to test proposed mitigation projects identified as solutions for the PM Peak Hour results, to review operations during the AM period and to respond to community comments.
- The 214th Street extension would increase vehicle trips on 9th Avenue SE, and the intersection operations at SR 524/9th Avenue SE and 228th Street SE/9th Avenue SE are

similar compared to without the street connection, however the intersections are expected to operate at LOS E or better.

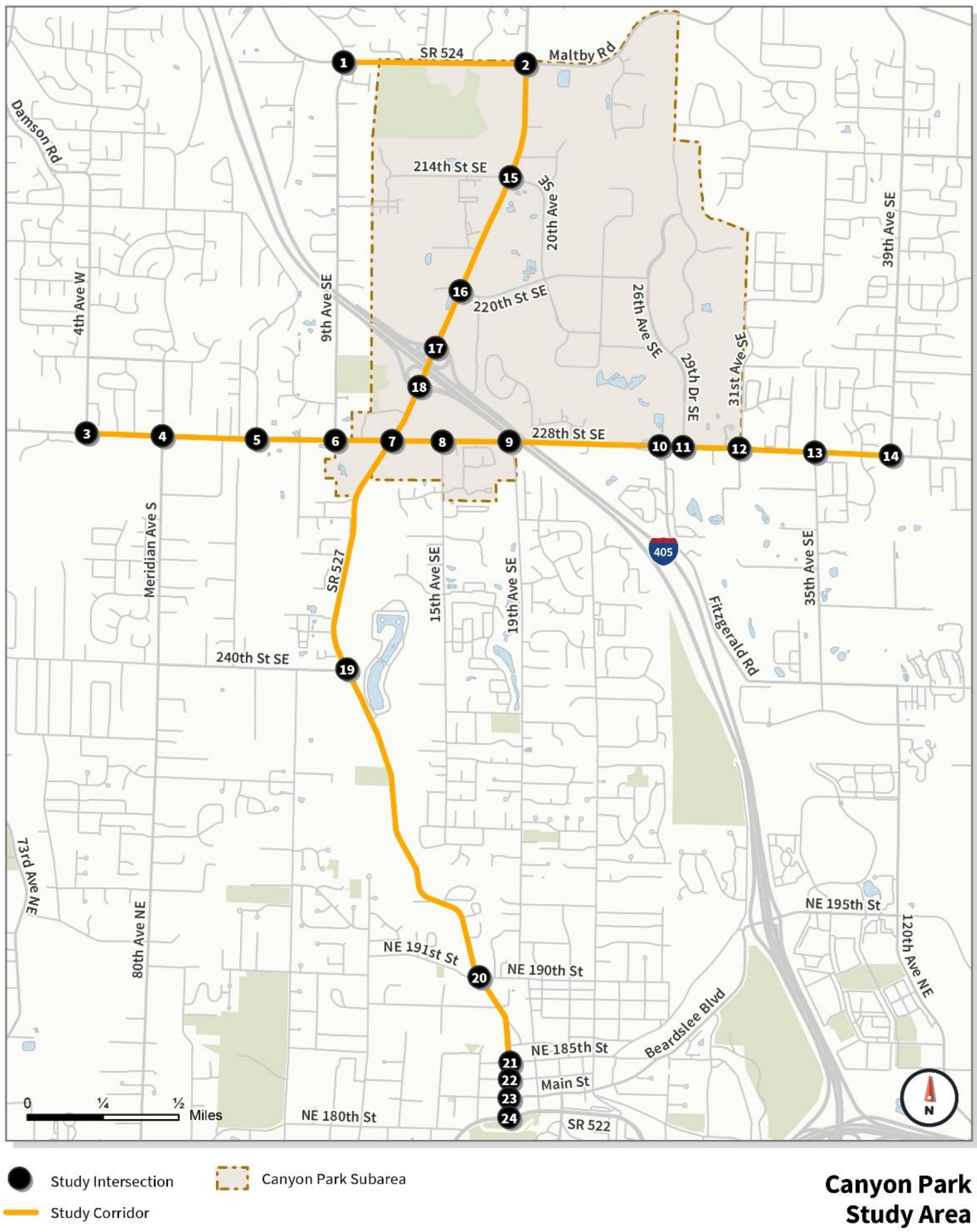
- The I-405 ramp intersections are expected to operate at LOS E or better during the AM conditions.
- The three main business park entrances (220th Street SE/SR 527, 214th Street SE/ SR 527 and 228th Street SE/29th Drive SE are expected to operate at LOS E or better.

Table 3. 2043 AM Peak Hour LOS Analysis

Map ID	Intersection	With 214th Street Connection		Without 214th Street Connection	
		Delay (sec)	LOS	Delay (sec)	LOS
1	*SR 524/9th Ave SE*	63	E	74	E
2	*SR 527/SR 524*	92	**F**	93	**F**
15	*SR 527/214th St SE*	70	E	36	D
16	*SR 527/220th St SE*	38	D	64	E
17	*SR 527/ I-405 Northbound Ramps*	5	A	5	A
18	*SR 527/ I-405 Southbound Ramps*	31	C	23	C
6	*228th St SE/9th Ave SE*	58	E	62	E
7	*SR 527/228th St SE*	120	**F**	138	**F**
11	*228th St SE/29th Dr SE*	60	E	60	E

Fehr & Peers, 2020.

Figure 1. Canyon Park Draft EIS Study Intersections



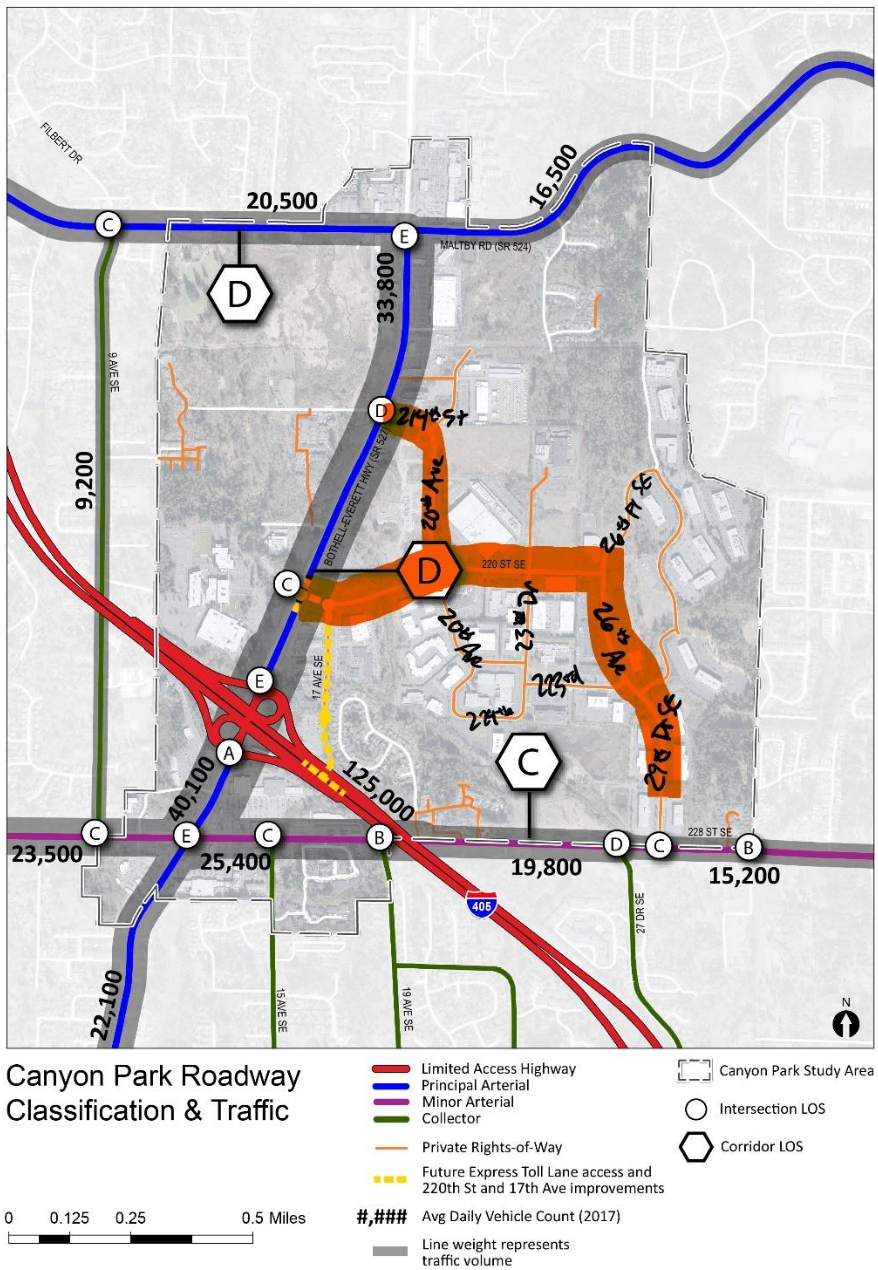
Internal Canyon Park Street Analysis

Background

Because business park trips largely funnel through the three main access points to the corridors under study, it was anticipated that the private street evaluation at the time of the Preferred Alternative development may show that conversion to public streets better distributes trips along a more complete network and connected network; if so, the overall traffic congestion results are likely to be similar to or slightly better than the range of results in the Draft EIS. The Preferred Alternative is expected to generate the fewest new PM peak hour trips of all Action Alternatives and results are in the range of the Draft EIS as noted on page 1 of this memo.

The Draft EIS noted that the City's LOS standards are corridor based and address the PM Peak hour. The Draft EIS assumes with Action Alternatives that selected private streets would become public streets in the future following improvement to public standards. A letter of intent is under discussion between the City and the Canyon Park Business Owner Association. These streets are identified on Figure 1. When public, the streets would not be part of the City's corridor LOS standards as that is applied to higher functional class corridors. However, the City has committed to evaluate the private streets at the time of the Preferred Alternative. When the streets become public, the City could track operation and safety conditions such as through its municipal code and design standards and specifications approach to inadequate road conditions.

Figure 1. Potential Future Public Streets Map



Summary of Results

Within the private street network, an intersection traffic control change such as a traffic signal or roundabout would likely be needed at three intersections: 20th Avenue SE/220th Street SE, 26th

Avenue SE/220th Street SE, and 223rd Street SE/29th Drive SE under the Preferred Alternative. Periodic traffic monitoring and a traffic engineering study would be needed to identify if and when an intersection control change is warranted at these locations. The draft WSDOT study, which assumed land use growth similar to the No Action Alternative, also expected a potential need for intersection control changes as the 20th Avenue SE, 23rd Avenue SE, and 26th Avenue SE intersections on 220th Street SE were expected to operate at LOS F in the future during one or both peak periods under current stop control configuration.

The 17th Avenue SE/220th Street SE intersection was also evaluated in the separate WSDOT I-405 Direct Access Ramp study and expected this intersection to operate at LOS C for both AM and PM peak hours. Under the Preferred Alternative, the lowest growth of all the Action Alternatives, this intersection is expected to operate at LOS F during both peak periods. This is a combination of the higher land use growth overall in the Preferred Alternative as well as the higher land use growth located closer to the Canyon Park park-and-ride (accessible from 17th Avenue SE only) compared to the No Action land use assumptions.

Potential improvements to address future inadequate road conditions could include traffic signal timing improvements such as increasing cycle lengths for both time periods. For the AM peak hour, the intersection could operate better with dual westbound left turn lanes and a new southbound receiving lane on 17th Avenue SE, however widening the intersection would result in a more uncomfortable pedestrian environment as crossing distances increase.

Periodic traffic monitoring at 17th Avenue SE/220th Street SE intersection should be conducted as the business park changes and develops to identify if and when operational improvements such as signal timing/signal coordination with the adjacent SR 527/220th Street SE intersection (expected to operate at LOS F under the No Action and the Preferred Alternative) or other intersection improvements such as widening are needed to improve traffic operations. If an intersection widening/traffic operations improvement project is pursued, this project could be constructed through frontage improvements as the business park redevelops.

Detailed results are presented below.

Vehicle-to-Capacity Ratio

The main spine road of the internal Canyon Park street system in the future is anticipated to be converted to a public street and was evaluated at a high level for the growth proposed under the

Preferred Alternative.[1] Specifically the PM peak hour vehicle-to-capacity (v/c) ratio was estimated for the main spine road (the east-west 220th Street SE, the north-south 26th Avenue SE/29th Drive SE, and 214th Street SE between SR 527 and 220th Street SE) to identify the number of travel lanes needed and the potential need for intersection control changes was estimated at four intersections below. Locations are also mapped in **Figure 2**.

1. 20th Avenue SE/220th Street SE
2. 23rd Avenue SE/220th Street SE
3. 26th Avenue SE/220th Street SE
4. 223rd Street SE/26th Avenue SE/29th Drive SE

The Preferred Alternative assumes an increase of 3,500 new PM peak hour trips for the main business park area compared to existing conditions. Land use growth by new households and new jobs was aggregated to super block areas numbered 1 through 16 (see **Figure 3**). The increase in vehicle trips was proportionately distributed to each super block based on the proposed land use growth in that block. For example, super block 7 contains 10 percent of all household and total job growth in the business park, therefore 10 percent of the new inbound and outbound trips generated are assigned to it. Actual trips generated by area will depend on the type of land use mix added, however this method provides an idea of how development could occur.

The trips were assigned onto the internal street network based on the most likely used driveway and proximity to closes business park entrance. The new trips were then added onto the existing AM and PM turning movement counts from WSDOT's Draft I-405 Express Toll Lane Analysis (received 12-6-2019) to develop the future year internal street forecasts. The actual assignment of new PM peak hour trips is somewhat speculative as development and driveway access may change in the future, however the approximate peak hour trips on each roadway segment was used to roughly estimate the v/c ratio on each link. A v/c ratio over 1.0 indicates that vehicle demand is higher than roadway capacity and congestion would occur. The forecast link volumes are likely conservatively high as vehicles trips are assigned to the main access driveways, while in reality there are smaller parking lot driveways/access points along 220th Street SE and 26th Avenue SE/29th Drive SE that may decrease vehicle demand at the internal four intersections studied.

[1] The Draft EIS assumes with Action Alternatives that selected private streets would become public streets in the future following improvement to public standards. A letter of intent is under discussion between the City and the Canyon Park Business Owner Association.

Figure 2. Internal Street and Intersection Analysis

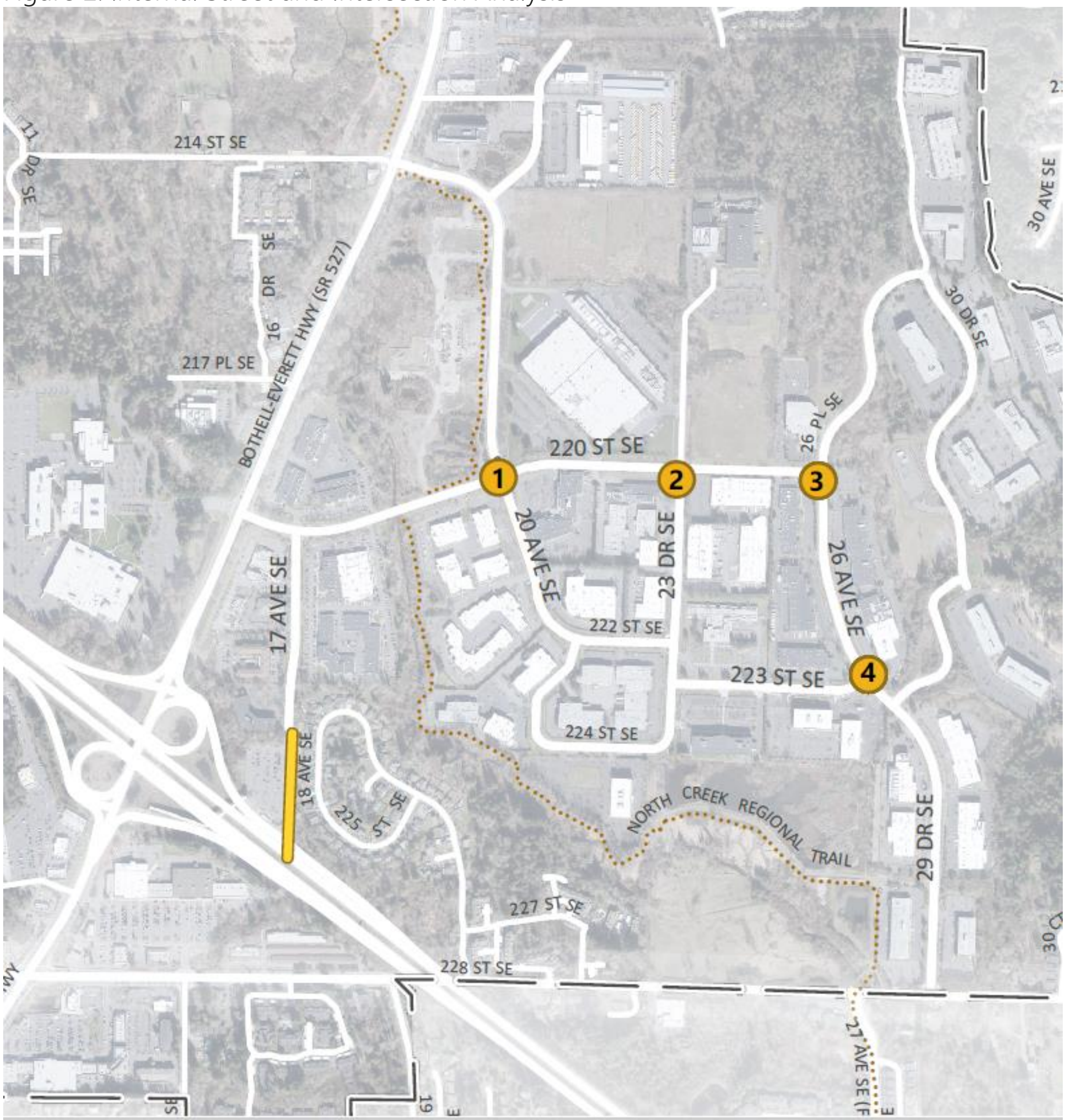
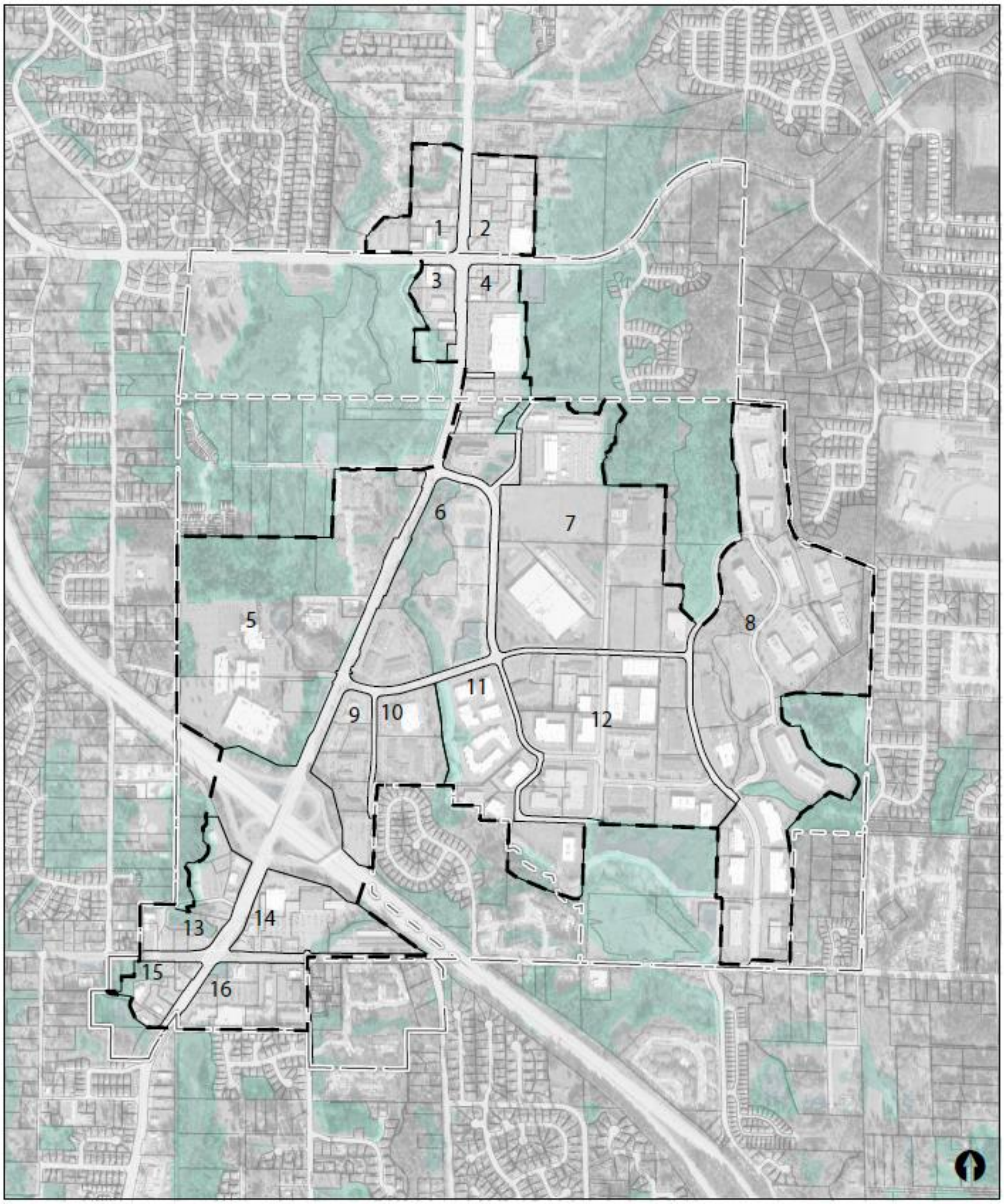


Figure 3. Canyon Park Subarea Plan – Superblock Map



The one-direction roadway approach capacity was estimated using the Quality/Level of Service Handbook, Table 7- Peak Hour Directional Volumes for Urbanized Areas (Florida Department of Transportation, 2013). This handbook and methodology is used nationwide and is appropriate for generalized planning and provides a quick review of capacity or LOS for future long-range estimates. This document summarizes generalized roadway capacities based on environment (urban or rural), and roadway characteristics: number of travel lanes, presence of left/right-turn pockets, speed limit, and presence of a median. The one-way approach capacity was estimated for each internal intersections studied.

Table 4. 2043 PM Peak Hour Volume-to-Capacity Analysis

Intersection Approach (One Way)	Preferred Alternative Link Volume	One-way Approach Capacity	Vehicle-to-Capacity Ratio	Comments
17th Ave/220th St Northbound	1800	1450	1.24	High percentage of proposed land use south of 220th St and west of 17th Ave can only be accessed via 17th Ave.
Southbound	360	600	0.63	
Eastbound	1280	1550	0.82	
Westbound	1460	1450	1.00	Just over threshold.
20th Ave/220th St Northbound	600	600	1.04	Just over threshold. Added NB left turn pocket at intersection (currently shared L/T/R) would decrease v/c ratio to less than 1.0
Southbound	540	1450	0.37	
Eastbound	1240	1550	0.81	
Westbound	1560	1150	1.36	Added WB right turn pocket at intersection (currently shared L/T, T/R), would decrease v/c ratio to 1.02
23rd Ave/220th St Northbound	80	600	0.14	
Southbound	160	600	0.28	
Eastbound	660	600	1.15	Eastbound demand could be lower if drivers use some of the smaller parking lot driveways along 220th St.
Westbound	1480	1150	1.29	Westbound demand could be lower if drivers prefer to use 23rd Ave/223rd St (parallel north-south road to the west) to access 220th Street instead of 26th Ave. New turn pockets may be needed for northbound 23rd Ave at 220th Street.

Intersection Approach (One Way)	Preferred Alternative Link Volume	One-way Approach Capacity	Vehicle-to-Capacity Ratio	Comments
26th Ave/220th St Northbound	900	750	1.19	Potentially lower vehicle demand if 223rd St/23rd Ave (parallel north-south road to the west) is used to access 220th St SE instead of 26th Ave. New turn pockets may be needed for northbound 23rd Ave at 220th Street then.
Southbound	680	750	0.90	
Eastbound	640	750	0.85	Minor approach assumed as EB approach (lowest volume intersection approach)
29th Ave/223rd St Northbound	740	750	0.98	
Southbound	620	1200	0.51	
Eastbound	520	600	0.90	
Westbound	40	600	0.07	

Fehr & Peers, 2020. Note that peak hour link volumes are a high-level estimate used mostly to determine capacity needs of the internal street system. Actual redevelopment and potential internal driveway accesses could change the results shown.

- 17th Avenue SE northbound approach is expected to have a v/c ratio over 1.0. This is mostly because of the proportion of increased land use south of 220th Street and west of 17th Avenue SE (super block 9), which can only be accessed by this road. Increasing the intersection size could lead to a more unfriendly pedestrian environment.
- The v/c ratios are over 1.0 on 220th Street SE at 20th Avenue SE and 23rd Avenue SE. A 4-5-lane cross-section on 220th Street SE should be maintained. Traffic monitoring should be conducted along 220th Street SE east of 20th Avenue SE to see if an additional travel lane is needed.
- The v/c ratios for 29th Drive is just under 1.0 for the existing street system. If a road diet is implemented for a 3-lane cross-section to accommodate bicycle facilities and to improve access using other modes, the v/c ratio may exceed 1.0. If a road diet is implemented, it is likely vehicles would shift to 23rd Avenue SE if possible to avoid peak hour congestion on 29th Drive/26th Avenue SE.
- To provide alternative, low-speed capacity to public streets within the business park, consider adopting a policy to connect surface parking lots and adjacent parcels wherever possible.

Internal Intersection Control Change

The estimated internal street volumes were also used to evaluate if a potential change in intersection control (such as a traffic signal) would be necessary. This was based on the MUTCD Peak Hour traffic signal warrant, which considers the sum of the vehicles on the higher minor approach compared to the sum of the volumes in both direction of the major street. This is to see if there are enough gaps on the major street to allow for vehicles on the minor approach to travel through the intersection. Note that this analysis is based on future year traffic forecasts at full build out. Traffic counts would need to be collected over time as Canyon Park redevelops and a traffic engineering study would be needed to identify when a traffic signal at an intersection is warranted. Other intersection traffic control such as a roundabout could also be considered.

Table 5. 2043 PM Peak Hour Internal Intersection Control Analysis

Intersection	VPH on Major Street (both)	VPH On Minor Street (Highest of two)	Minor Street Greater than 150?	Signal Warrant Met?	Comments
20th Ave/220th St	2790	600	Yes	Yes	
23rd Ave /220th St	2140	170	Yes	Maybe	Minor approach volumes just over threshold, and there are other smaller driveways between 20th Ave and 23rd Ave vehicles could use that could decrease minor approach vehicle demand.
26th Ave /220th St	1580	630	Yes	Yes	
29th Dr/223rd St	1360	530	Yes	Yes	

Fehr & Peers, 2020. Note this is a rough approximation for the full build-out conditions. Traffic monitoring would need to be conducted over time to identify when/if a traffic signal is warranted as the business park redevelops.

- An intersection control change such as a traffic signal would likely be needed at three intersections: 20th Avenue SE/220th Street SE, 26th Avenue SE/220th Street SE, and 29th Drive SE/223rd Street SE.
- The peak hour signal warrant might be met at 23rd Avenue SE/220th Street SE, however there are smaller local driveways along 220th Street SE that may reduce the demand on 23rd Avenue SE.
- Intersection control change could include traffic signal or roundabout. Traffic monitoring and traffic engineering study would be needed to identify when/if an intersection control change is warranted.

17th Avenue/220th Street Intersection Analysis

The 17th Avenue/220th Street intersection is closely spaced to the main business park entrance at 220th Street SE/SR 527, and all vehicles entering and exiting the I-405 Direct Access Ramps would travel through it. The draft WSDOT I-405 Direct Access Ramp study evaluated the traffic operations at this location under future conditions which generally equates to the Canyon Park No Action Alternative, This location was further evaluated in this memo with the higher land use growth assumed in the Canyon Park Subarea Preferred Alternative. Note that this Preferred Alternative has the lowest vehicle trip generation of all Action Alternatives evaluated in the Canyon Park Subarea Draft EIS.

Traffic volumes in the Synchro network provided by WSDOT was updated with the expected growth in trips for the Preferred Alternative, and intersection LOS and queue results were extracted. It was noted that the traffic signal timing for some phases were shorter than the time needed to accommodate a pedestrian crossing. This is coded when few pedestrian crossings are expected during the analysis hour, and when the crossing distance is long with relatively low vehicle approach volumes. When a pedestrian crossing is activated, the phase would be extended to accommodate the pedestrian crossing, and the traffic signal will go out of sync with the closely spaced coordinated SR 527/220th Street SE intersection (200 feet to the west). It may take a few cycles for the signal to go back into sync.

Future year traffic forecasts summed the existing peak hour counts, new vehicle trips from the Preferred Alternative land use growth, and the WSDOT I-405 Direct Access ramp volume forecasts. The intersection is expected to carry 4,900 PM peak hour trips, 1,600 more than the WSDOT future year forecast of 3,300 peak hour trips. The increase in vehicle demand under the Preferred Alternative results in the higher vehicle delay at the analysis intersection. The increase in demand is a result of the overall higher land use growth in the Preferred Alternative, and in particular the higher land use growth in the area south of 220th Street SE and west of 17th Avenue SE compared to the WSDOT analysis. Approximately a quarter of the new growth within the business park is located on this super block 9 area (see **Figure 3**). About 10 percent of land use growth is in super block 10 which is also only accessible by 17th Avenue SE.

Potential strategies to reduce delay at this intersection could be to increase the cycle length from 70 to 140 seconds for an improved LOS F. Widening the intersection for two westbound left-turn lanes and two 17th Avenue SE southbound through lanes south of 220th Street SE, instead of the one southbound through lane would result in LOS E operations in the AM period. Increasing the intersection size may be undesirable however as it creates a less friendly pedestrian environment. During the PM peak hour, increasing the cycle length from 75 seconds to 150 seconds may improve operations to LOS E.

Table 6. 17th Avenue SE/220th Street SE Intersection LOS Analysis

	PM LOS	PM Delay	AM LOS	AM Delay
WSDOT I-405 ETL Study	C	22	C	21
Canyon Park- Preferred Alternative	**F**	88	**F**	104

Fehr & Peers, 2020.

The average and 95th percentile queues were extracted from the Synchro model for both the Canyon Park Preferred Alternative (**Table 7**), where values in parenthesis show the increase compared to draft WSDOT I-405 Direct Access Ramp analysis shown in draft(**Table 8**). Queues that exceed the roadway link are shown bolded in red text.

Table 7. 17th Avenue SE/220th Street SE Intersection Queue Analysis – Canyon Park

	EBL	EBT	EBR	WBL	WBT	NBL	NBT/R	SBT
Storage	50	350	350	200	655	500	575	350
PM Average Queue	75 (+25)	175 (+50)	250 (+50)	175 (+100)	225 (+100)	400 (+175)	50 (+50)	225 (+175)
PM 95th Percentile Queue	100 (+50)	200 (+75)	300 (+50)	**350** (+200)	325 (+175)	**525** (+250)	125 (+75)	**375** (+225)
AM Average Queue	25	**450** (+250)	**775** (+50)	**350** (+300)	50 (+25)	150 (+175)	25 (+25)	125 (+100)
AM 95th Percentile Queue	50 (+25)	**475** (+275)	**850** (+600)	**525** (+375)	75 (+25)	250 (+125)	100 (+50)	250 (+200)

Fehr & Peers, 2020. Queues are rounded to the nearest 25 feet. Values in parentheses are queue increase compared to draft WSDOT I-405 Express Toll Lane Analysis.

Table 8. 17th Avenue SE/220th Street SE Intersection Queue Analysis – draft WSDOT Analysis

	EBL	EBT	EBR	WBL	WBT	NBL	NBT/R	SBT
Link Distance	50	350	350	200	655	500	575	350
PM Average Queue	50	125	200	75	125	225	0	50
PM 95th Percentile Queue	50	125	250	150	150	275	50	150
AM Average Queue	25	200	300	50	25	75	0	25
AM 95th Percentile Queue	25	200	250	150	50	125	50	50

Fehr & Peers, 2020. Queues are reported from the draft WSDOT Synchro network received 12/2019. Queues are rounded to the nearest 25 feet.

- The 17th Avenue SE/220th Street intersection peak hour intersection operations are expected to operate at LOS F. The intersection is expected to carry an additional 1,600 PM peak hour trips compared to the WSDOT I-405 Express Toll Lane analysis. The adjacent SR 527/220th Street SE intersection is also expected to operate at LOS F under No Action and the Preferred Alternative.
- The 95th percentile queue lengths may exceed storage in the westbound left, northbound left, and southbound through movements during the PM peak hour. Synchro also reported that queues could be longer since vehicle demand is so high.
- During the AM peak hour, the eastbound left, eastbound right, and westbound left queues may exceed storage during the AM peak hour, which may affect operations at upstream intersections such as at SR 527.
- Strategies to address inadequate road conditions could include traffic signal timing improvements such as increased cycle length to 150 seconds for the PM peak hour. During the AM period the cycle length could increase to 140 seconds, however the intersection may still operate at LOS F. Intersection improvements could be dual westbound left turn lanes and an extra southbound through lane on 17th Avenue SE, however increasing the size of the intersection would make a more unfriendly pedestrian environment by increasing crossing distances.
- Traffic monitoring at 17th Ave/220th Street intersection location should be conducted periodically as the business park develops to identify if and when operational improvements such as signal timing/signal coordination with SR 527/220th Street intersection or other intersection improvements such as widening are needed to improve traffic operations.

Vistro File: \...\CanyonPark Network Changes_0501_With_214.vistro

Report File: C:\...\PA_Vistro_v2.pdf

Scenario 3 Preferred Alterantive (w 214th)

6/29/2020

Trip Generation summary

Added Trips

Zone ID: Name	Land Use variables	Code	Ind. Var.	Rate	Quantity	% In	% Out	Trips In	Trips Out	Total Trips	% of Total Trips
1: Zone				1.000	0.000	50.00	50.00	1360	2120	3480	69.46
2: Zone				1.000	0.000	50.00	50.00	630	680	1310	26.15
3: Zone				1.000	0.000	50.00	50.00	120	100	220	4.39
					Added Trips Total			**2110**	**2900**	**5010**	**100.00**

Vistro File: \...\CanyonPark Network Changes_0501_With_214.vistro

Report File: C:\...\PA_Vistro_v2.pdf

Scenario 3 Preferred Alterantive (w 214th)

6/29/2020

Trip Distribution summary

	Zone 1: Zone			
	To Zone:		From Zone:	
Zone / Gate	**Share %**	**Trips**	**Share %**	**Trips**
2: Zone	0.00	0	0.00	0
3: Zone	0.00	0	0.00	0
4: Gate	8.00	109	11.00	233
5: Gate	12.00	163	11.00	233
6: Gate	7.00	95	6.00	127
7: Gate	23.00	313	24.00	510
8: Gate	8.00	109	7.00	148
9: Gate	11.00	150	16.00	339
10: Gate	16.00	218	13.00	276
11: Gate	15.00	204	12.00	254
Total	**100.00**	**1361**	**100.00**	**2120**

	Zone 2: Zone			
	To Zone:		From Zone:	
Zone / Gate	**Share %**	**Trips**	**Share %**	**Trips**
1: Zone	0.00	0	0.00	0
3: Zone	0.00	0	0.00	0
4: Gate	8.00	50	11.00	75
5: Gate	12.00	76	11.00	75
6: Gate	7.00	44	6.00	41
7: Gate	23.00	145	24.00	162
8: Gate	8.00	50	7.00	48
9: Gate	11.00	69	16.00	109
10: Gate	16.00	101	13.00	88
11: Gate	15.00	95	12.00	82
Total	**100.00**	**630**	**100.00**	**680**

	Zone 3: Zone			
	To Zone:		From Zone:	
Zone / Gate	**Share %**	**Trips**	**Share %**	**Trips**
1: Zone	0.00	0	0.00	0
2: Zone	0.00	0	0.00	0
4: Gate	8.00	10	11.00	11
5: Gate	12.00	14	11.00	11
6: Gate	7.00	8	6.00	6
7: Gate	23.00	28	24.00	24
8: Gate	8.00	10	7.00	7
9: Gate	11.00	13	16.00	16
10: Gate	16.00	19	13.00	13
11: Gate	15.00	18	12.00	12
Total	**100.00**	**120**	**100.00**	**100**

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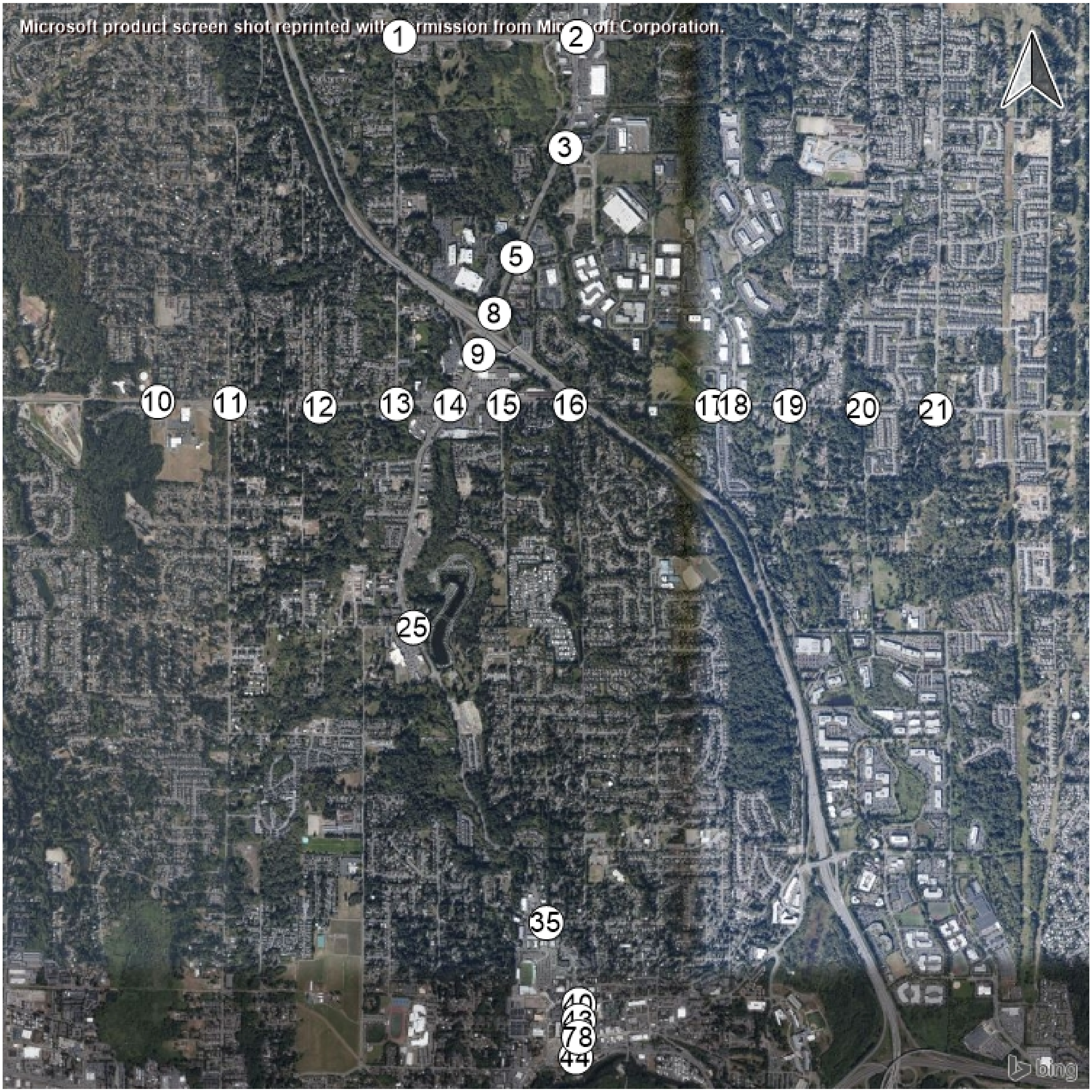
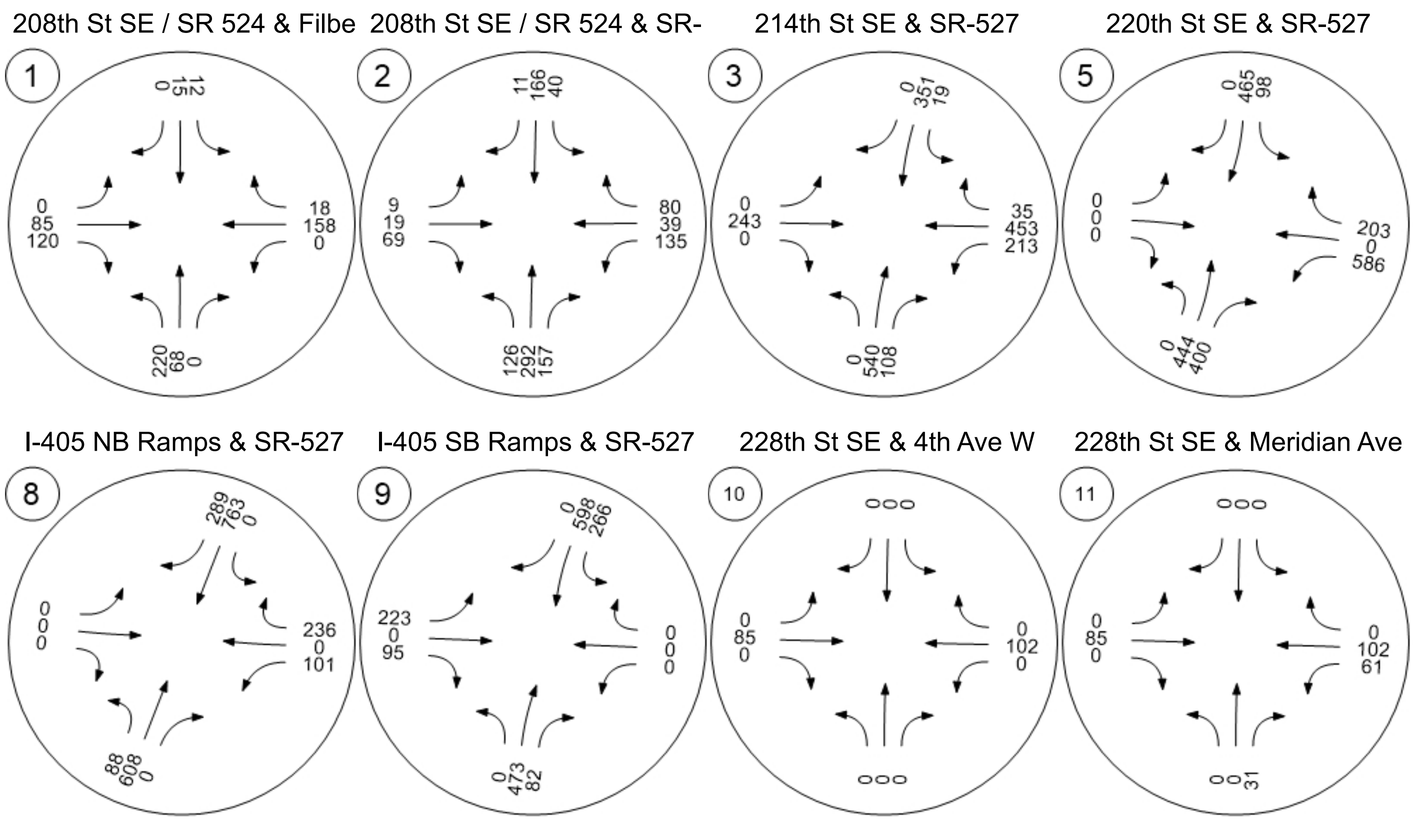
Version 7.00-06

Study Intersections

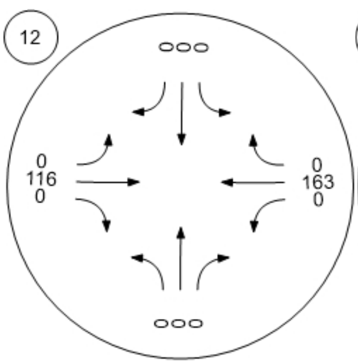


Traffic Volume - Net New Site Trips

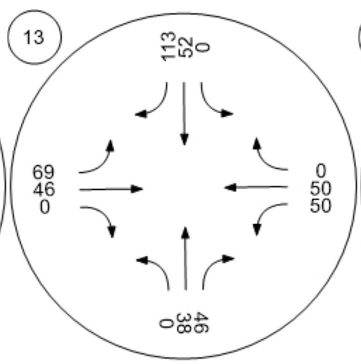


Traffic Volume - Net New Site Trips

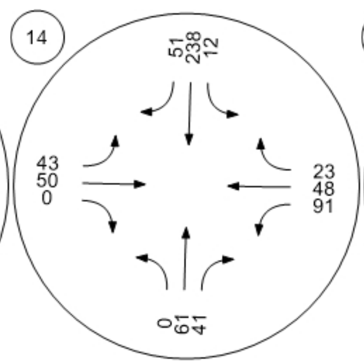
228th St SE & 4th Ave SE



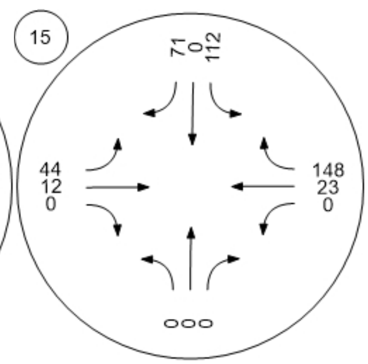
228th St SE & 9th Ave SE



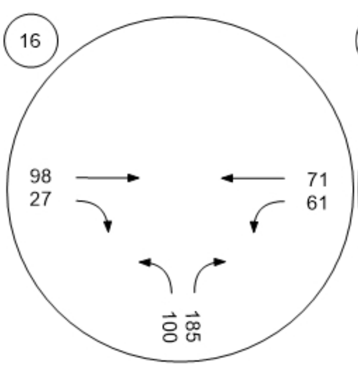
228th St SE & SR-527



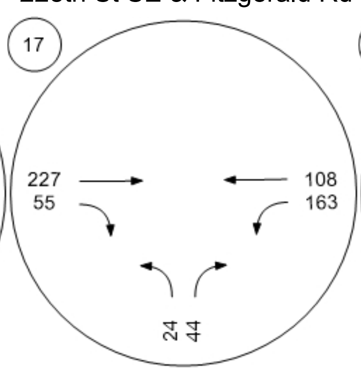
228th St SE & 15th Ave SE



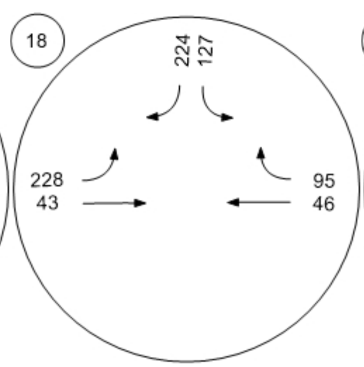
228th St SE & 19th Ave SE



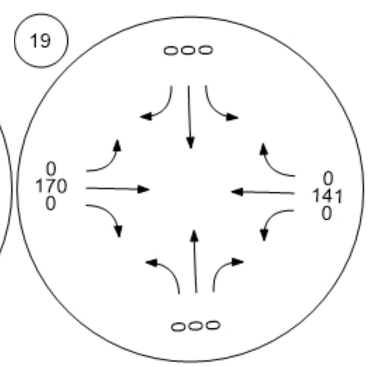
228th St SE & Fitzgerald Rd



228th St SE & 29th Dr SE



228th St SE & 31st Ave SE



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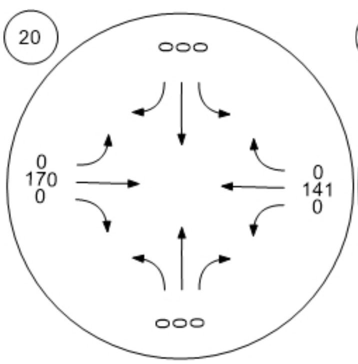
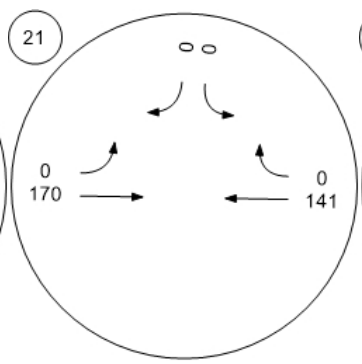
Traffic Volume - Net New Site Trips

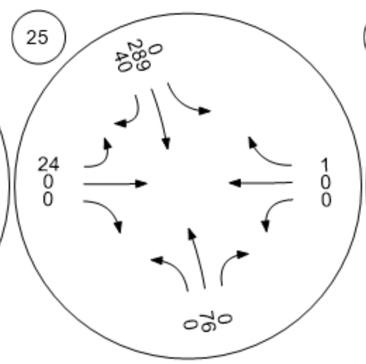
228th St SE & 35th Ave SE



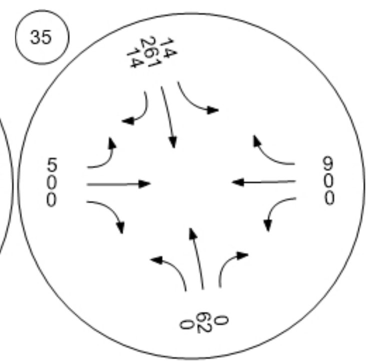
228th St SE & 39th Ave SE



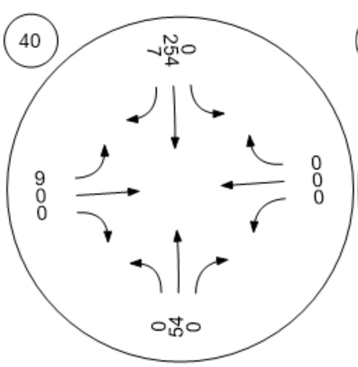
240th St SE & SR-527



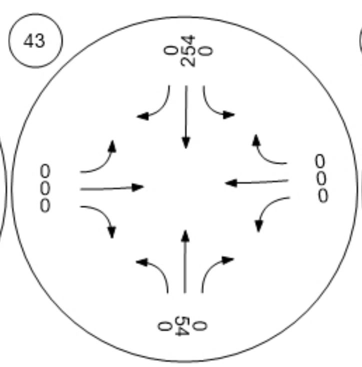
NE 191st St & SR-527



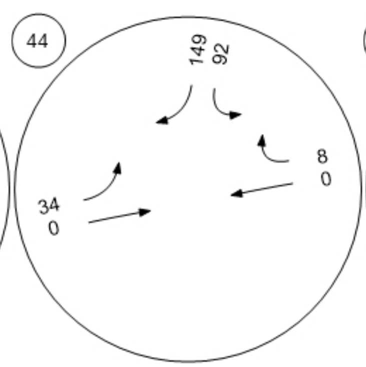
NE 185th St & SR-527



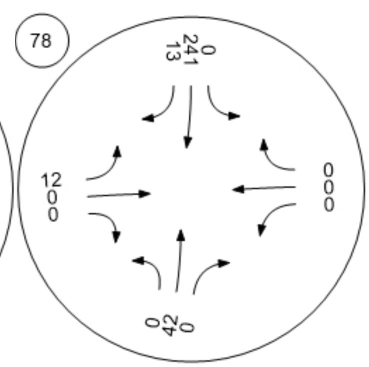
NE 183rd St & SR-527



SR-522 & SR-527



Main St & SR-527



Preferred Alternative 2043 PM Analysis

1 SR-524 Corridor

Intersection	Preferred Alternative with 214th Street: Delay (sec)	Preferred Alternative with 214th Street: LOS	Preferred Alternative without 214th Street: Delay (sec)	Preferred Alternative without 214th Street: LOS
208th St SE / SR 524 & Filbert Dr	62	E	70	E
208th St SE / SR 524 & SR-527	70	E	113	F
SR 524 / 20th Ave SE (new)	50	D	52	D
WEIGHTED AVERAGE (2 original intersections)	*66*	*E*	*96*	*F*
WEIGHTED AVERAGE (3 intersections)	*63*	*E*	*76*	*E*

2 228th Street SW/SE Corridor

Intersection	Preferred Alternative with 214th Street: Delay (sec)	Preferred Alternative with 214th Street: LOS	Preferred Alternative without 214th Street: Delay (sec)	Preferred Alternative without 214th Street: LOS
228th St SE & 4th Ave W	22	C	30	C
228th St SE & Meridian Ave	37	D	45	D
228th St SE & 4th Ave SE	18	B	29	C
228th St SE & 9th Ave SE	76	E	66	E
228th St SE & SR-527	130	F	161	F
228th St SE & 15th Ave SE	17	B	16	B
228th St SE & 19th Ave SE	58	E	58	E
228th St SE & Fitzgerald Rd	63	E	63	E
228th St SE & 29th Dr SE	46	D	46	D
228th St SE & 31st Ave SE	76	E	76	E
228th St SE & 35th Ave SE	40	D	40	D
228th St SE & 39th Ave SE	53	D	53	D
WEIGHTED AVERAGE	*62*	*E*	*68*	*E*

5 SR-527 Corridor

Intersection	Preferred Alternative with 214th Street: Delay (sec)	Preferred Alternative with 214th Street: LOS	Preferred Alternative without 214th Street: Delay (sec)	Preferred Alternative without 214th Street: LOS
208th St SE / SR 524 & SR-527	70	E	113	F
214th St SE & SR-527	53	D	70	E
220th St SE & SR-527	123	F	145	F
I-405 NB Ramps & SR-527	109	F	152	F
I-405 SB Ramps & SR-527	8	A	13	B
228th St SE & SR-527	130	F	161	F
240th St SE & SR-527	47	D	47	D
NE 191st St & SR-527	57	E	57	E
NE 185th St & SR-527	55	E	55	E
NE 183rd St & SR-527	16	B	16	B
Main St & SR-527	29	C	29	C
SR-522 & SR-527	61	E	61	E
WEIGHTED AVERAGE	*71*	*E*	*89*	*F*

HCM 6th Signalized Intersection Summary
1: 9th Ave SE/Filbert Dr & 208th St SE / SR 524

06/26/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1385	270	141	1428	103	945	288	314	102	65	4
Future Volume (veh/h)	7	1385	270	141	1428	103	945	288	314	102	65	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	7	1458	209	153	1552	107	1027	313	274	112	71	3
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	1	1	1	2	2	2
Cap, veh/h	79	1504	671	146	1543	106	1156	333	291	142	145	6
Arrive On Green	0.02	0.42	0.42	0.05	0.46	0.45	0.33	0.36	0.36	0.05	0.08	0.08
Sat Flow, veh/h	1781	3554	1585	1781	3374	231	3483	919	805	1781	1780	75
Grp Volume(v), veh/h	7	1458	209	153	813	846	1027	0	587	112	0	74
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1829	1742	0	1724	1781	0	1855
Q Serve(g_s), s	0.3	56.4	3.7	7.0	64.3	64.3	39.3	0.0	46.3	7.2	0.0	5.4
Cycle Q Clear(g_c), s	0.3	56.4	3.7	7.0	64.3	64.3	39.3	0.0	46.3	7.2	0.0	5.4
Prop In Lane	1.00		1.00	1.00		0.13	1.00		0.47	1.00		0.04
Lane Grp Cap(c), veh/h	79	1504	671	146	812	836	1156	0	624	142	0	151
V/C Ratio(X)	0.09	0.97	0.31	1.05	1.00	1.01	0.89	0.00	0.94	0.79	0.00	0.49
Avail Cap(c_a), veh/h	127	1504	671	146	812	836	1156	0	678	142	0	350
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.8	39.7	2.4	36.9	38.2	38.2	44.5	0.0	43.5	65.5	0.0	61.8
Incr Delay (d2), s/veh	0.2	16.6	0.3	86.9	31.7	34.1	8.4	0.0	20.8	22.8	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	27.5	4.3	6.5	34.3	35.8	18.3	0.0	23.2	5.0	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	56.2	2.8	123.9	69.9	72.3	52.9	0.0	64.3	88.4	0.0	65.1
LnGrp LOS	C	E	A	F	F	F	D	A	E	F	A	E
Approach Vol, veh/h		1674			1812			1614			186	
Approach Delay, s/veh		49.5			75.6			57.0			79.1	
Approach LOS		D			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	63.5	50.7	15.4	6.2	68.3	11.2	54.9
Change Period (Y+Rc), s	5.0	5.0	4.5	4.5	5.0	5.0	4.5	4.5
Max Green Setting (Gmax), s	6.0	58.5	35.5	26.0	5.0	59.5	6.7	54.8
Max Q Clear Time (g_c+I1), s	9.0	58.4	41.3	7.4	2.3	66.3	9.2	48.3
Green Ext Time (p_c), s	0.0	0.1	0.0	0.3	0.0	0.0	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	61.8
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
2: SR-527 & 208th St SE / SR 524 06/26/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	709	594	329	405	609	365	566	1882	687	182	886	311
Future Volume (veh/h)	709	594	329	405	609	365	566	1882	687	182	886	311
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1687	1687	1885	1870	1870	1870
Adj Flow Rate, veh/h	746	625	0	440	662	0	596	1981	0	196	953	0
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	2	2	2
Cap, veh/h	673	844		501	666		644	2163		183	1121	
Arrive On Green	0.19	0.24	0.00	0.24	0.31	0.00	0.21	0.47	0.00	0.05	0.32	0.00
Sat Flow, veh/h	3483	3582	1598	3456	3554	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	746	625	0	440	662	0	596	1981	0	196	953	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1728	1777	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	29.0	24.2	0.0	18.4	27.9	0.0	28.1	60.1	0.0	8.0	37.6	0.0
Cycle Q Clear(g_c), s	29.0	24.2	0.0	18.4	27.9	0.0	28.1	60.1	0.0	8.0	37.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	673	844		501	666		644	2163		183	1121	
V/C Ratio(X)	1.11	0.74		0.88	0.99		0.93	0.92		1.07	0.85	
Avail Cap(c_a), veh/h	673	844		647	666		690	2177		183	1121	
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.76	0.76	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.5	53.1	0.0	55.6	51.5	0.0	58.4	37.0	0.0	71.0	48.0	0.0
Incr Delay (d2), s/veh	68.1	3.5	0.0	8.5	29.0	0.0	17.8	7.6	0.0	86.1	8.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.1	11.3	0.0	8.0	13.9	0.0	12.5	23.0	0.0	5.7	17.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	128.6	56.6	0.0	64.1	80.4	0.0	76.1	44.6	0.0	157.1	56.2	0.0
LnGrp LOS	F	E		E	F		E	D		F	E	
Approach Vol, veh/h		1371	A		1102	A		2577	A		1149	A
Approach Delay, s/veh		95.8			73.9			51.9			73.4	
Approach LOS		F			E			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.2	74.5	25.7	39.4	35.3	51.3	33.0	32.1
Change Period (Y+Rc), s	4.5	* 4.5	* 4.1	* 4.1	* 4.3	4.5	* 4.1	* 4.1
Max Green Setting (Gmax), s	6.0	* 70	* 28	* 29	* 33	42.9	* 29	* 28
Max Q Clear Time (g_c+I1), s	10.0	62.1	20.4	26.2	30.1	39.6	31.0	29.9
Green Ext Time (p_c), s	0.0	7.9	1.3	0.8	0.9	2.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	245	2	369	459	393	2	2710	168	83	1381	5
Future Volume (veh/h)	25	245	2	369	459	393	2	2710	168	83	1381	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	30	292	0	473	588	0	2	2853	0	91	1518	5
Peak Hour Factor	0.84	0.84	0.84	0.78	0.78	0.78	0.95	0.95	0.95	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	1	1	1	1	1	1	3	3	3
Cap, veh/h	50	326	0	341	465		4	2941		82	3211	11
Arrive On Green	0.03	0.18	0.00	0.10	0.25	0.00	0.00	1.00	0.00	0.05	0.62	0.61
Sat Flow, veh/h	1753	1841	0	3483	1885	1598	1795	5316	0	1767	5212	17
Grp Volume(v), veh/h	30	292	0	473	588	0	2	2853	0	91	984	539
Grp Sat Flow(s),veh/h/ln	1753	1841	0	1742	1885	1598	1795	1716	0	1767	1689	1852
Q Serve(g_s), s	2.5	23.3	0.0	14.7	37.0	0.0	0.2	0.0	0.0	7.0	23.7	23.7
Cycle Q Clear(g_c), s	2.5	23.3	0.0	14.7	37.0	0.0	0.2	0.0	0.0	7.0	23.7	23.7
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	50	326	0	341	465		4	2941		82	2080	1141
V/C Ratio(X)	0.60	0.89	0.00	1.39	1.26		0.52	0.97		1.10	0.47	0.47
Avail Cap(c_a), veh/h	70	454	0	341	465		48	2941		82	2080	1141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.09	0.09	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	72.0	60.3	0.0	67.7	56.5	0.0	74.6	0.0	0.0	71.5	15.6	15.6
Incr Delay (d2), s/veh	11.0	15.5	0.0	191.5	135.3	0.0	9.6	1.6	0.0	130.0	0.8	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	12.3	0.0	15.6	35.1	0.0	0.1	0.4	0.0	6.1	8.9	9.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.0	75.9	0.0	259.1	191.8	0.0	84.2	1.6	0.0	201.5	16.4	17.0
LnGrp LOS	F	E	A	F	F		F	A		F	B	B
Approach Vol, veh/h		322			1061	A		2855	A		1614	
Approach Delay, s/veh		76.5			221.8			1.7			27.0	
Approach LOS		E			F			A			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	89.7	18.7	30.6	4.3	96.4	8.3	41.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	7.0	83.0	6.0	37.0	4.0	86.0	6.0	37.0
Max Q Clear Time (g_c+I1), s	9.0	2.0	16.7	25.3	2.2	25.7	4.5	39.0
Green Ext Time (p_c), s	0.0	77.5	0.0	0.9	0.0	33.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	52.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	80	346	1330	15	860	51	1794	785	558	1620	10
Future Volume (veh/h)	28	80	346	1330	15	860	51	1794	785	558	1620	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1786	1786	1786	1744	1744	1744	1744	1744	1744
Adj Flow Rate, veh/h	32	221	178	1430	0	785	54	1909	0	641	1862	11
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	1	1	1	4	4	4	4	4	4
Cap, veh/h	46	191	153	1032	0	1607	74	1555		516	2160	13
Arrive On Green	0.03	0.11	0.11	0.30	0.00	0.38	0.01	0.11	0.00	0.32	0.88	0.88
Sat Flow, veh/h	1701	1786	1437	3402	0	2984	1661	4761	1478	3222	4883	29
Grp Volume(v), veh/h	32	221	178	1430	0	785	54	1909	0	641	1210	663
Grp Sat Flow(s),veh/h/ln	1701	1786	1437	1701	0	1492	1661	1587	1478	1611	1587	1738
Q Serve(g_s), s	2.8	16.0	16.0	45.5	0.0	2.7	4.9	49.0	0.0	24.0	27.7	27.8
Cycle Q Clear(g_c), s	2.8	16.0	16.0	45.5	0.0	2.7	4.9	49.0	0.0	24.0	27.7	27.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	46	191	153	1032	0	1607	74	1555		516	1404	769
V/C Ratio(X)	0.70	1.16	1.16	1.39	0.00	0.49	0.73	1.23		1.24	0.86	0.86
Avail Cap(c_a), veh/h	96	191	153	1032	0	1607	100	1555		516	1404	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.39	0.39	0.00	0.41	0.41	0.41
Uniform Delay (d), s/veh	72.4	67.0	67.0	52.3	0.0	12.9	73.0	66.9	0.0	51.0	6.4	6.4
Incr Delay (d2), s/veh	17.4	115.0	122.6	179.7	0.0	0.1	4.0	104.8	0.0	116.4	3.1	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	13.4	11.1	45.3	0.0	6.4	2.2	36.0	0.0	16.4	3.3	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.8	182.0	189.6	231.9	0.0	13.0	77.0	171.7	0.0	167.4	9.5	11.9
LnGrp LOS	F	F	F	F	A	B	E	F		F	A	B
Approach Vol, veh/h		431			2215			1963	A		2514	
Approach Delay, s/veh		178.3			154.3			169.1			50.4	
Approach LOS		F			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.0	53.0	49.0	20.0	10.6	70.4	7.5	61.5
Change Period (Y+Rc), s	4.5	4.5	4.0	4.5	4.5	4.5	4.0	4.5
Max Green Setting (Gmax), s	23.5	48.5	45.0	15.5	8.5	63.5	8.0	52.5
Max Q Clear Time (g_c+I1), s	26.0	51.0	47.5	18.0	6.9	29.8	4.8	4.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	17.9	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	123.2
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	521	9	941	0	1650	530	0	2408	830
Future Volume (veh/h)	0	0	0	521	9	941	0	1650	530	0	2408	830
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1772	1772	1772	0	1786	1786	0	1786	1786
Adj Flow Rate, veh/h				635	11	0	0	1897	0	0	2768	0
Peak Hour Factor				0.82	0.82	0.82	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %				2	2	2	0	1	1	0	1	1
Cap, veh/h				525	9		0	2061		0	2061	
Arrive On Green				0.32	0.32	0.00	0.00	1.00	0.00	0.00	0.81	0.00
Sat Flow, veh/h				1660	29	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				646	0	0	0	1897	0	0	2768	0
Grp Sat Flow(s),veh/h/ln				1689	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				47.4	0.0	0.0	0.0	0.0	0.0	0.0	91.1	0.0
Cycle Q Clear(g_c), s				47.4	0.0	0.0	0.0	0.0	0.0	0.0	91.1	0.0
Prop In Lane				0.98		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				534	0		0	2061		0	2061	
V/C Ratio(X)				1.21	0.00		0.00	0.92		0.00	1.34	
Avail Cap(c_a), veh/h				534	0		0	2061		0	2061	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.33	1.33
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.38	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh				51.3	0.0	0.0	0.0	0.0	0.0	0.0	14.4	0.0
Incr Delay (d2), s/veh				111.2	0.0	0.0	0.0	3.5	0.0	0.0	154.7	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				36.5	0.0	0.0	0.0	1.0	0.0	0.0	61.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				162.5	0.0	0.0	0.0	3.5	0.0	0.0	169.1	0.0
LnGrp LOS				F	A		A	A		A	F	
Approach Vol, veh/h					646	A		1897	A		2768	A
Approach Delay, s/veh					162.5			3.5			169.1	
Approach LOS					F			A			F	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	97.0	53.0	97.0
Change Period (Y+Rc), s	5.9	5.6	5.9
Max Green Setting (Gmax), s	91.1	47.4	91.1
Max Q Clear Time (g_c+I1), s	93.1	49.4	2.0
Green Ext Time (p_c), s	0.0	0.0	40.2

Intersection Summary	
HCM 6th Ctrl Delay	109.2
HCM 6th LOS	F

Notes

Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	497	0	760	0	0	0	0	1650	632	0	2058	820
Future Volume (veh/h)	497	0	760	0	0	0	0	1650	632	0	2058	820
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1772	0	1772				0	1786	1786	0	1772	1772
Adj Flow Rate, veh/h	512	0	0				0	1774	0	0	2189	0
Peak Hour Factor	0.97	0.97	0.97				0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	2				0	1	1	0	2	2
Cap, veh/h	624	0					0	2487		0	2467	
Arrive On Green	0.19	0.00	0.00				0.00	0.97	0.00	0.00	1.00	0.00
Sat Flow, veh/h	3274	0	1502				0	3483	1514	0	3455	1502
Grp Volume(v), veh/h	512	0	0				0	1774	0	0	2189	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	22.5	0.0	0.0				0.0	6.5	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	22.5	0.0	0.0				0.0	6.5	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	624	0					0	2487		0	2467	
V/C Ratio(X)	0.82	0.00					0.00	0.71		0.00	0.89	
Avail Cap(c_a), veh/h	1318	0					0	2487		0	2467	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.33	1.33	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.09	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh	58.3	0.0	0.0				0.0	0.6	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.0	0.0				0.0	0.2	0.0	0.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	0.0	0.0				0.0	0.7	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.2	0.0	0.0				0.0	0.8	0.0	0.0	0.5	0.0
LnGrp LOS	E	A					A	A		A	A	
Approach Vol, veh/h		512	A					1774	A		2189	A
Approach Delay, s/veh		62.2						0.8			0.5	
Approach LOS		E						A			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		115.8				115.8		34.2				
Change Period (Y+Rc), s		5.9				5.9		5.6				
Max Green Setting (Gmax), s		78.1				78.1		60.4				
Max Q Clear Time (g_c+I1), s		2.0				8.5		24.5				
Green Ext Time (p_c), s		49.2				31.9		4.1				
Intersection Summary												
HCM 6th Ctrl Delay			7.7									
HCM 6th LOS			A									

Notes

Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	608	0	0	912	183	0	0	0	190	0	25
Future Volume (veh/h)	73	608	0	0	912	183	0	0	0	190	0	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1856
Adj Flow Rate, veh/h	78	654	0	0	991	199	0	0	0	213	0	28
Peak Hour Factor	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.92	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	3
Cap, veh/h	245	2897	0	646	1158	233	0	1	0	240	0	211
Arrive On Green	0.03	0.82	0.00	0.00	0.77	0.77	0.00	0.00	0.00	0.13	0.00	0.13
Sat Flow, veh/h	1781	3647	0	1781	1512	304	0	1870	0	1781	0	1567
Grp Volume(v), veh/h	78	654	0	0	0	1190	0	0	0	213	0	28
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1781	0	1815	0	1870	0	1781	0	1567
Q Serve(g_s), s	1.3	6.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0	17.6	0.0	2.4
Cycle Q Clear(g_c), s	1.3	6.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0	17.6	0.0	2.4
Prop In Lane	1.00		0.00	1.00		0.17	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	245	2897	0	646	0	1391	0	1	0	240	0	211
V/C Ratio(X)	0.32	0.23	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.89	0.00	0.13
Avail Cap(c_a), veh/h	276	2897	0	698	0	1391	0	206	0	291	0	256
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.9	3.1	0.0	0.0	0.0	11.9	0.0	0.0	0.0	63.8	0.0	57.1
Incr Delay (d2), s/veh	0.7	0.2	0.0	0.0	0.0	6.9	0.0	0.0	0.0	23.3	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	2.0	0.0	0.0	0.0	26.3	0.0	0.0	0.0	9.6	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.6	3.3	0.0	0.0	0.0	18.8	0.0	0.0	0.0	87.0	0.0	57.4
LnGrp LOS	C	A	A	A	A	B	A	A	A	F	A	E
Approach Vol, veh/h		732			1190			0			241	
Approach Delay, s/veh		5.4			18.8			0.0			83.6	
Approach LOS		A			B						F	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	0.0	126.3		23.7	7.3	118.9		0.0
Change Period (Y+Rc), s	3.5	4.0		3.5	3.5	4.0		3.5
Max Green Setting (Gmax), s	4.5	90.0		24.5	6.5	88.0		16.5
Max Q Clear Time (g_c+I1), s	0.0	8.3		19.6	3.3	68.7		0.0
Green Ext Time (p_c), s	0.0	5.5		0.5	0.1	11.2		0.0

Intersection Summary	
HCM 6th Ctrl Delay	21.5
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	603	147	189	852	252	237	177	214	125	63	12
Future Volume (veh/h)	9	603	147	189	852	252	237	177	214	125	63	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	10	648	138	203	916	248	252	188	228	147	74	14
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.94	0.94	0.94	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	452	798	170	650	1023	276	373	262	220	287	201	38
Arrive On Green	0.20	0.27	0.27	0.29	0.37	0.37	0.09	0.14	0.14	0.08	0.13	0.14
Sat Flow, veh/h	1795	2938	625	1795	2786	753	1795	1885	1587	1795	1539	291
Grp Volume(v), veh/h	10	395	391	203	588	576	252	188	228	147	0	88
Grp Sat Flow(s),veh/h/ln	1795	1791	1771	1795	1791	1748	1795	1885	1587	1795	0	1830
Q Serve(g_s), s	0.0	15.4	15.5	1.0	23.2	23.3	6.8	7.2	5.7	5.3	0.0	3.3
Cycle Q Clear(g_c), s	0.0	15.4	15.5	1.0	23.2	23.3	6.8	7.2	5.7	5.3	0.0	3.3
Prop In Lane	1.00		0.35	1.00		0.43	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	452	486	481	650	657	642	373	262	220	287	0	239
V/C Ratio(X)	0.02	0.81	0.81	0.31	0.89	0.90	0.68	0.72	1.03	0.51	0.00	0.37
Avail Cap(c_a), veh/h	452	547	541	650	673	657	373	530	447	287	0	500
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.1	25.5	25.5	18.6	22.4	22.4	27.6	30.9	9.8	25.6	0.0	29.7
Incr Delay (d2), s/veh	0.0	13.7	14.0	0.3	17.1	17.7	4.8	3.7	38.6	1.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	8.1	8.0	2.5	12.1	12.0	1.3	3.4	5.9	2.3	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.1	39.2	39.5	18.8	39.4	40.1	32.4	34.6	48.4	27.2	0.0	30.7
LnGrp LOS	C	D	D	B	D	D	C	C	F	C	A	C
Approach Vol, veh/h		796			1367			668			235	
Approach Delay, s/veh		39.2			36.7			38.5			28.5	
Approach LOS		D			D			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.0	24.4	10.8	13.8	18.9	31.5	10.2	14.4				
Change Period (Y+Rc), s	3.5	4.0	3.5	3.5	3.5	4.0	3.5	3.5				
Max Green Setting (Gmax), s	9.3	22.9	7.3	21.0	4.0	28.2	6.7	21.6				
Max Q Clear Time (g_c+I1), s	3.0	17.5	8.8	5.3	2.0	25.3	7.3	9.2				
Green Ext Time (p_c), s	0.4	2.9	0.0	0.2	0.0	2.2	0.0	1.4				
Intersection Summary												
HCM 6th Ctrl Delay			37.1									
HCM 6th LOS			D									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1056	3	3	1252	240	1	0	1	51	0	8
Future Volume (veh/h)	20	1056	3	3	1252	240	1	0	1	51	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1900	1900	1900	1870	1870	1870
Adj Flow Rate, veh/h	24	1257	4	3	1346	252	1	0	0	62	0	0
Peak Hour Factor	0.84	0.84	0.84	0.93	0.93	0.93	0.88	0.88	0.88	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	2	2	2
Cap, veh/h	247	1331	4	360	2557	472	145	0	0	128	0	0
Arrive On Green	0.01	0.71	0.72	0.15	0.85	0.85	0.06	0.00	0.00	0.06	0.00	0.00
Sat Flow, veh/h	1781	1863	6	1795	3007	555	1722	0	0	1421	0	0
Grp Volume(v), veh/h	24	0	1261	3	793	805	1	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1869	1795	1791	1771	1723	0	0	1421	0	0
Q Serve(g_s), s	0.6	0.0	88.9	0.0	17.9	18.6	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear(g_c), s	0.6	0.0	88.9	0.0	17.9	18.6	0.1	0.0	0.0	6.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.31	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	247	0	1335	360	1523	1506	145	0	0	128	0	0
V/C Ratio(X)	0.10	0.00	0.94	0.01	0.52	0.53	0.01	0.00	0.00	0.48	0.00	0.00
Avail Cap(c_a), veh/h	282	0	1408	360	1523	1506	270	0	0	251	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.3	0.0	18.8	41.6	3.0	3.1	66.8	0.0	0.0	69.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	14.5	0.0	1.3	1.4	0.0	0.0	0.0	2.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	40.4	0.1	5.3	5.5	0.0	0.0	0.0	2.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	0.0	33.4	41.6	4.3	4.4	66.9	0.0	0.0	72.7	0.0	0.0
LnGrp LOS	A	A	C	D	A	A	E	A	A	E	A	A
Approach Vol, veh/h		1285			1601			1			62	
Approach Delay, s/veh		32.9			4.4			66.9			72.7	
Approach LOS		C			A			E			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.0	111.6		11.4	6.0	132.5		11.4
Change Period (Y+Rc), s	4.5	* 4		3.5	3.5	4.5		3.5
Max Green Setting (Gmax), s	4.5	* 1.1E2		21.0	5.5	112.0		21.0
Max Q Clear Time (g_c+I1), s	2.0	90.9		8.5	2.6	20.6		2.1
Green Ext Time (p_c), s	0.0	16.7		0.1	0.0	22.3		0.0

Intersection Summary			
HCM 6th Ctrl Delay			18.3
HCM 6th LOS			B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	379	821	2	110	1038	660	17	66	72	285	64	283
Future Volume (vph)	379	821	2	110	1038	660	17	66	72	285	64	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.2		4.5	4.2		4.5	4.5		4.8	4.5	4.8
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.94		1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	1787	3573		1770	3356		1770	1702		1698	1723	1576
Flt Permitted	0.07	1.00		0.15	1.00		0.95	1.00		0.95	0.47	1.00
Satd. Flow (perm)	134	3573		287	3356		1770	1702		1698	834	1576
Peak-hour factor, PHF	0.85	0.85	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.88	0.92	0.88
Adj. Flow (vph)	446	966	2	120	1104	702	18	72	78	324	70	322
RTOR Reduction (vph)	0	0	0	0	66	0	0	27	0	0	0	193
Lane Group Flow (vph)	446	968	0	120	1740	0	18	123	0	194	200	129
Confl. Peds. (#/hr)	4		3	3		4	1		3	3		1
Confl. Bikes (#/hr)						1						1
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%	2%	2%	2%	1%	2%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6								8
Actuated Green, G (s)	82.5	82.5		67.2	67.2		3.4	17.4		20.9	42.8	34.9
Effective Green, g (s)	82.5	82.8		67.2	67.5		3.4	17.4		20.6	42.8	34.6
Actuated g/C Ratio	0.55	0.55		0.45	0.45		0.02	0.12		0.14	0.29	0.23
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
Lane Grp Cap (vph)	365	1972		239	1510		40	197		233	361	363
v/s Ratio Prot	c0.22	0.27		0.04	c0.52		0.01	c0.07		c0.11	0.08	
v/s Ratio Perm	c0.45			0.19							0.08	0.08
v/c Ratio	1.22	0.49		0.50	1.15		0.45	0.62		0.83	0.55	0.36
Uniform Delay, d1	58.2	20.6		27.6	41.2		72.4	63.2		63.0	45.5	48.4
Progression Factor	0.93	0.80		0.78	0.64		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	116.2	0.6		0.2	69.3		7.9	6.8		21.7	2.3	0.8
Delay (s)	170.2	17.1		21.6	95.8		80.2	69.9		84.7	47.8	49.2
Level of Service	F	B		C	F		F	E		F	D	D
Approach Delay (s)		65.4			91.2			71.0			58.4	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	76.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	105.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	513	380	220	302	653	523	500	981	170	552	992	821
Future Volume (veh/h)	513	380	220	302	653	523	500	981	170	552	992	821
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1230	1870	1870	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	523	388	224	321	695	430	515	1011	150	657	1181	0
Peak Hour Factor	0.98	0.98	0.98	0.94	0.94	0.94	0.97	0.97	0.97	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	1	1	1	2	2	2	1	1	1
Cap, veh/h	660	709	403	358	847	566	346	1092	162	429	955	
Arrive On Green	0.10	0.11	0.11	0.13	0.16	0.16	0.10	0.24	0.24	0.16	0.35	0.00
Sat Flow, veh/h	2273	2166	1232	1795	3582	1562	3456	4485	664	3483	3582	1598
Grp Volume(v), veh/h	523	317	295	321	695	430	515	767	394	657	1181	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1621	1795	1791	1562	1728	1702	1745	1742	1791	1598
Q Serve(g_s), s	33.8	25.4	25.9	26.4	28.2	19.4	15.0	33.0	33.1	18.5	40.0	0.0
Cycle Q Clear(g_c), s	33.8	25.4	25.9	26.4	28.2	19.4	15.0	33.0	33.1	18.5	40.0	0.0
Prop In Lane	1.00		0.76	1.00		1.00	1.00		0.38	1.00		1.00
Lane Grp Cap(c), veh/h	660	582	531	358	847	566	346	829	425	429	955	
V/C Ratio(X)	0.79	0.55	0.56	0.90	0.82	0.76	1.49	0.93	0.93	1.53	1.24	
Avail Cap(c_a), veh/h	660	582	531	473	979	624	346	840	430	429	955	
HCM Platoon Ratio	0.33	0.33	0.33	0.67	0.67	0.67	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	0.81	0.81	0.81	0.72	0.72	0.72	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	63.4	56.3	56.6	63.5	60.0	47.7	67.5	55.4	55.6	62.7	48.4	0.0
Incr Delay (d2), s/veh	5.6	3.0	3.4	12.5	6.5	6.8	235.5	16.0	26.4	239.7	107.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	12.7	11.9	13.7	14.0	8.5	17.8	15.7	17.4	22.0	30.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.0	59.3	60.0	75.9	66.5	54.5	303.0	71.4	82.0	302.4	155.7	0.0
LnGrp LOS	E	E	E	E	E	D	F	E	F	F	F	
Approach Vol, veh/h		1135			1446			1676			1838	A
Approach Delay, s/veh		63.9			65.0			145.0			208.1	
Approach LOS		E			E			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.5	40.5	33.9	53.1	19.0	44.0	47.5	39.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	17.5	36.5	39.0	39.0	14.5	39.5	37.5	40.5				
Max Q Clear Time (g_c+I1), s	20.5	35.1	28.4	27.9	17.0	42.0	35.8	30.2				
Green Ext Time (p_c), s	0.0	0.9	1.0	2.1	0.0	0.0	0.6	4.2				
Intersection Summary												
HCM 6th Ctrl Delay			130.0									
HCM 6th LOS			F									

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	852	99	101	1103	190	100	24	41	209	60	183
Future Volume (veh/h)	95	852	99	101	1103	190	100	24	41	209	60	183
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	0.97		0.96	0.97		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	100	897	96	106	1161	176	111	27	4	225	65	73
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	308	2194	235	473	2108	318	234	129	19	347	108	121
Arrive On Green	0.05	0.90	0.90	0.03	0.68	0.68	0.06	0.08	0.08	0.12	0.13	0.13
Sat Flow, veh/h	1781	3235	346	1795	3106	469	1810	1608	238	1810	806	906
Grp Volume(v), veh/h	100	493	500	106	667	670	111	0	31	225	0	138
Grp Sat Flow(s),veh/h/ln	1781	1777	1804	1795	1791	1784	1810	0	1846	1810	0	1712
Q Serve(g_s), s	2.6	6.5	6.5	2.7	28.6	29.0	8.4	0.0	2.4	16.8	0.0	11.4
Cycle Q Clear(g_c), s	2.6	6.5	6.5	2.7	28.6	29.0	8.4	0.0	2.4	16.8	0.0	11.4
Prop In Lane	1.00		0.19	1.00		0.26	1.00		0.13	1.00		0.53
Lane Grp Cap(c), veh/h	308	1205	1224	473	1216	1211	234	0	148	347	0	229
V/C Ratio(X)	0.33	0.41	0.41	0.22	0.55	0.55	0.47	0.00	0.21	0.65	0.00	0.60
Avail Cap(c_a), veh/h	383	1205	1224	512	1216	1211	234	0	345	347	0	411
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.24	0.24	0.24	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.1	2.7	2.7	6.7	12.3	12.4	58.6	0.0	64.6	53.5	0.0	61.4
Incr Delay (d2), s/veh	0.1	0.1	0.1	0.1	0.4	0.4	1.5	0.0	0.7	4.2	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.8	1.8	1.0	11.3	11.4	4.0	0.0	1.1	8.1	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.2	2.8	2.8	6.8	12.8	12.9	60.1	0.0	65.2	57.7	0.0	63.9
LnGrp LOS	B	A	A	A	B	B	E	A	E	E	A	E
Approach Vol, veh/h		1093			1443			142			363	
Approach Delay, s/veh		3.5			12.4			61.2			60.0	
Approach LOS		A			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	105.2	13.0	23.0	8.6	105.3	21.0	15.0
Change Period (Y+Rc), s	4.0	4.0	4.0	3.5	4.0	4.0	4.0	3.5
Max Green Setting (Gmax), s	8.0	82.0	9.0	35.5	11.0	79.0	17.0	27.5
Max Q Clear Time (g_c+I1), s	4.7	8.5	10.4	13.4	4.6	31.0	18.8	4.4
Green Ext Time (p_c), s	0.1	8.6	0.0	0.5	0.1	13.8	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	838	277	421	1111	356	475
Future Volume (veh/h)	838	277	421	1111	356	475
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	901	298	439	1157	440	586
Peak Hour Factor	0.93	0.93	0.96	0.96	0.81	0.81
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	1083	357	480	1204	509	453
Arrive On Green	0.41	0.41	0.20	0.64	0.28	0.28
Sat Flow, veh/h	2738	872	1795	1885	1795	1598
Grp Volume(v), veh/h	609	590	439	1157	440	586
Grp Sat Flow(s),veh/h/ln	1791	1724	1795	1885	1795	1598
Q Serve(g_s), s	27.4	27.6	14.9	51.6	20.9	25.5
Cycle Q Clear(g_c), s	27.4	27.6	14.9	51.6	20.9	25.5
Prop In Lane		0.51	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	734	707	480	1204	509	453
V/C Ratio(X)	0.83	0.83	0.91	0.96	0.86	1.29
Avail Cap(c_a), veh/h	734	707	508	1204	509	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.8	23.8	22.6	15.2	30.6	32.3
Incr Delay (d2), s/veh	9.2	9.8	19.9	18.1	15.4	148.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.8	12.6	11.6	24.4	10.9	28.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.0	33.6	42.5	33.2	46.1	180.4
LnGrp LOS	C	C	D	C	D	F
Approach Vol, veh/h	1199			1596	1026	
Approach Delay, s/veh	33.3			35.8	122.8	
Approach LOS	C			D	F	

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	20.6	40.9	61.5	28.5
Change Period (Y+Rc), s	3.5	4.5	4.5	3.5
Max Green Setting (Gmax), s	18.5	35.0	57.0	25.0
Max Q Clear Time (g_c+I1), s	16.9	29.6	53.6	27.5
Green Ext Time (p_c), s	0.2	3.5	2.5	0.0

Intersection Summary	
HCM 6th Ctrl Delay	58.4
HCM 6th LOS	E

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	977	235	218	1218	313	79
Future Volume (vph)	977	235	218	1218	313	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	3.0	4.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1881	1561	1770	1863	1805	1572
Flt Permitted	1.00	1.00	0.04	1.00	0.95	1.00
Satd. Flow (perm)	1881	1561	80	1863	1805	1572
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.85	0.85
Adj. Flow (vph)	1051	253	240	1338	368	93
RTOR Reduction (vph)	0	34	0	0	0	67
Lane Group Flow (vph)	1051	219	240	1338	368	26
Confl. Peds. (#/hr)		1	1		23	
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	90.0	90.0	105.5	104.5	25.5	25.5
Effective Green, g (s)	90.5	90.0	106.0	105.0	26.0	26.0
Actuated g/C Ratio	0.60	0.60	0.71	0.70	0.17	0.17
Clearance Time (s)	4.0	4.0	3.5	4.5	3.5	3.5
Vehicle Extension (s)	4.0	4.0	3.0	4.0	3.0	3.0
Lane Grp Cap (vph)	1134	936	191	1304	312	272
v/s Ratio Prot	0.56		c0.10	0.72	c0.20	
v/s Ratio Perm		0.14	c0.79			0.02
v/c Ratio	0.93	0.23	1.26	1.03	1.18	0.10
Uniform Delay, d1	26.8	14.0	61.0	22.5	62.0	52.1
Progression Factor	1.00	1.00	1.02	1.07	1.00	1.00
Incremental Delay, d2	14.1	0.6	119.5	15.4	108.9	0.2
Delay (s)	40.9	14.6	181.4	39.4	170.9	52.3
Level of Service	D	B	F	D	F	D
Approach Delay (s)	35.7			61.0	147.0	
Approach LOS	D			E	F	

Intersection Summary			
HCM 2000 Control Delay	63.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	303	778	786	202	422	735
Future Volume (veh/h)	303	778	786	202	422	735
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1885	1885	1870	1870
Adj Flow Rate, veh/h	322	828	819	151	469	498
Peak Hour Factor	0.94	0.94	0.96	0.96	0.90	0.90
Percent Heavy Veh, %	2	2	1	1	2	2
Cap, veh/h	261	1147	779	660	499	676
Arrive On Green	0.15	0.61	0.41	0.41	0.28	0.28
Sat Flow, veh/h	1781	1870	1885	1596	1781	1585
Grp Volume(v), veh/h	322	828	819	151	469	498
Grp Sat Flow(s),veh/h/ln	1781	1870	1885	1596	1781	1585
Q Serve(g_s), s	11.0	23.0	31.0	4.6	19.3	19.7
Cycle Q Clear(g_c), s	11.0	23.0	31.0	4.6	19.3	19.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	261	1147	779	660	499	676
V/C Ratio(X)	1.23	0.72	1.05	0.23	0.94	0.74
Avail Cap(c_a), veh/h	261	1160	779	660	499	676
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.41	0.41	0.32	0.32	1.00	1.00
Uniform Delay (d), s/veh	32.0	10.1	22.0	14.3	26.4	18.0
Incr Delay (d2), s/veh	117.9	1.6	33.4	0.3	26.1	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	8.2	19.6	1.6	11.3	17.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	149.9	11.7	55.4	14.5	52.5	22.2
LnGrp LOS	F	B	F	B	D	C
Approach Vol, veh/h		1150	970		967	
Approach Delay, s/veh		50.4	49.1		36.9	
Approach LOS		D	D		D	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		50.5		24.5	15.0	35.5
Change Period (Y+Rc), s		* 4.5		3.5	4.0	4.5
Max Green Setting (Gmax), s		* 47		21.0	11.0	31.0
Max Q Clear Time (g_c+I1), s		25.0		21.7	13.0	33.0
Green Ext Time (p_c), s		4.3		0.0	0.0	0.0
Intersection Summary						
HCM 6th Ctrl Delay			45.8			
HCM 6th LOS			D			
Notes						

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	960	1	1	851	200	1	0	1	260	0	230
Future Volume (veh/h)	275	960	1	1	851	200	1	0	1	260	0	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1826	1826	1826	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	316	1103	1	1	935	185	2	0	0	292	0	258
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.50	0.50	0.50	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	5	5	5	0	0	0	0	0	0
Cap, veh/h	345	902	1	341	889	752	147	0	0	440	0	320
Arrive On Green	0.09	0.33	0.33	0.14	0.49	0.49	0.20	0.00	0.00	0.20	0.00	0.20
Sat Flow, veh/h	1767	1854	2	1739	1826	1546	256	0	0	1730	0	1610
Grp Volume(v), veh/h	316	0	1104	1	935	185	2	0	0	292	0	258
Grp Sat Flow(s),veh/h/ln	1767	0	1855	1739	1826	1546	256	0	0	1730	0	1610
Q Serve(g_s), s	9.2	0.0	36.5	0.0	36.5	5.2	0.1	0.0	0.0	0.0	0.0	11.5
Cycle Q Clear(g_c), s	9.2	0.0	36.5	0.0	36.5	5.2	11.7	0.0	0.0	11.6	0.0	11.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	345	0	903	341	889	752	147	0	0	440	0	320
V/C Ratio(X)	0.91	0.00	1.22	0.00	1.05	0.25	0.01	0.00	0.00	0.66	0.00	0.81
Avail Cap(c_a), veh/h	345	0	903	341	889	752	224	0	0	538	0	429
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.50	0.00	0.50	0.67	0.67	0.67	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	25.3	27.7	19.2	11.2	34.3	0.0	0.0	28.7	0.0	28.7
Incr Delay (d2), s/veh	16.8	0.0	105.4	0.0	39.7	0.4	0.0	0.0	0.0	2.3	0.0	8.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	0.0	42.6	0.0	23.3	1.7	0.0	0.0	0.0	5.1	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.8	0.0	130.7	27.7	58.9	11.6	34.3	0.0	0.0	31.0	0.0	36.7
LnGrp LOS	D	A	F	C	F	B	C	A	A	C	A	D
Approach Vol, veh/h		1420			1121			2			550	
Approach Delay, s/veh		112.5			51.1			34.3			33.6	
Approach LOS		F			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.1	41.0		18.9	15.1	41.0		18.9				
Change Period (Y+Rc), s	4.5	4.5		4.0	4.5	4.5		4.0				
Max Green Setting (Gmax), s	5.5	36.5		20.0	5.5	36.5		20.0				
Max Q Clear Time (g_c+I1), s	2.0	38.5		13.6	11.2	38.5		13.7				
Green Ext Time (p_c), s	0.0	0.0		1.4	0.0	0.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			76.2									
HCM 6th LOS			E									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	870	360	220	761	0	280	1	420	0	2	1
Future Volume (veh/h)	1	870	360	220	761	0	280	1	420	0	2	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	418	418	418
Adj Flow Rate, veh/h	1	1024	369	253	875	0	311	1	195	0	8	4
Peak Hour Factor	0.85	0.85	0.85	0.87	0.87	0.87	0.90	0.90	0.90	0.25	0.25	0.25
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	100	100	100
Cap, veh/h	338	897	764	414	1292	0	338	1	302	0	6	4
Arrive On Green	0.00	0.97	0.97	0.41	1.00	0.00	0.19	0.19	0.19	0.00	0.01	0.01
Sat Flow, veh/h	1767	1856	1571	1767	1856	0	1762	6	1572	0	418	354
Grp Volume(v), veh/h	1	1024	369	253	875	0	312	0	195	0	8	4
Grp Sat Flow(s),veh/h/ln	1767	1856	1571	1767	1856	0	1767	0	1572	0	418	354
Q Serve(g_s), s	0.0	72.5	1.8	11.9	0.0	0.0	26.0	0.0	17.2	0.0	2.1	1.6
Cycle Q Clear(g_c), s	0.0	72.5	1.8	11.9	0.0	0.0	26.0	0.0	17.2	0.0	2.1	1.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	338	897	764	414	1292	0	339	0	302	0	6	4
V/C Ratio(X)	0.00	1.14	0.48	0.61	0.68	0.00	0.92	0.00	0.65	0.00	1.35	1.04
Avail Cap(c_a), veh/h	378	897	764	414	1292	0	353	0	314	0	57	47
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.16	0.16	0.16	0.20	0.20	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	2.5	1.1	37.2	0.0	0.0	59.5	0.0	55.9	0.0	73.9	74.2
Incr Delay (d2), s/veh	0.0	66.3	0.4	0.4	0.3	0.0	27.6	0.0	3.8	0.0	223.7	142.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	17.6	0.4	6.1	0.1	0.0	14.3	0.0	7.2	0.0	0.6	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.9	68.8	1.4	37.6	0.3	0.0	87.0	0.0	59.7	0.0	297.6	216.6
LnGrp LOS	C	F	A	D	A	A	F	A	E	A	F	F
Approach Vol, veh/h		1394			1128			507			12	
Approach Delay, s/veh		50.9			8.7			76.5			270.6	
Approach LOS		D			A			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	35.6	77.5		5.1	3.7	109.4		31.8				
Change Period (Y+Rc), s	4.5	* 4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	12.5	* 73		20.0	4.0	81.5		29.5				
Max Q Clear Time (g_c+I1), s	13.9	74.5		4.1	2.0	2.0		28.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	5.2		0.3				

Intersection Summary	
HCM 6th Ctrl Delay	40.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	615	670	691	133	88	340
Future Volume (veh/h)	615	670	691	133	88	340
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1885	1885	1856	1856	1826	1826
Adj Flow Rate, veh/h	668	728	813	151	107	0
Peak Hour Factor	0.92	0.92	0.85	0.85	0.82	0.82
Percent Heavy Veh, %	1	1	3	3	5	5
Cap, veh/h	703	1643	728	135	130	116
Arrive On Green	0.73	1.00	0.48	0.48	0.07	0.00
Sat Flow, veh/h	1795	1885	1516	282	1739	1547
Grp Volume(v), veh/h	668	728	0	964	107	0
Grp Sat Flow(s),veh/h/ln	1795	1885	0	1798	1739	1547
Q Serve(g_s), s	43.2	0.0	0.0	72.0	9.1	0.0
Cycle Q Clear(g_c), s	43.2	0.0	0.0	72.0	9.1	0.0
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	703	1643	0	863	130	116
V/C Ratio(X)	0.95	0.44	0.00	1.12	0.82	0.00
Avail Cap(c_a), veh/h	703	1643	0	863	255	227
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.31	0.31	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.1	0.0	0.0	39.0	68.4	0.0
Incr Delay (d2), s/veh	9.7	0.3	0.0	68.1	14.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	0.1	0.0	47.5	4.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.8	0.3	0.0	107.1	82.5	0.0
LnGrp LOS	C	A	A	F	F	A
Approach Vol, veh/h		1396	964		107	
Approach Delay, s/veh		13.0	107.1		82.5	
Approach LOS		B	F		F	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	134.8	15.2	58.8	76.0
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	119.5	22.0	43.5	71.5
Max Q Clear Time (g_c+I1), s	2.0	11.1	45.2	74.0
Green Ext Time (p_c), s	0.7	0.3	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	52.8
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	474	2	160	2	2	6	260	1626	2	5	1089	459
Future Volume (veh/h)	474	2	160	2	2	6	260	1626	2	5	1089	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1885	1870	1870	1870	1885	1885	1885	1870	1885	1885
Adj Flow Rate, veh/h	593	0	0	2	2	-2	271	1694	2	5	1224	516
Peak Hour Factor	0.80	0.92	0.80	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.89	0.89
Percent Heavy Veh, %	1	2	1	2	2	2	1	1	1	2	1	1
Cap, veh/h	651	0	290	3	3	208	292	1997	2	270	1352	542
Arrive On Green	0.18	0.00	0.00	0.00	0.00	0.00	0.16	0.54	0.54	0.15	0.55	0.55
Sat Flow, veh/h	3591	0	1598	1781	1870	0	1795	3671	4	1781	2478	994
Grp Volume(v), veh/h	593	0	0	2	0	0	271	826	870	5	867	873
Grp Sat Flow(s),veh/h/ln	1795	0	1598	1781	1870	0	1795	1791	1884	1781	1791	1680
Q Serve(g_s), s	23.4	0.0	0.0	0.2	0.0	0.0	21.5	56.5	56.5	0.3	61.7	71.0
Cycle Q Clear(g_c), s	23.4	0.0	0.0	0.2	0.0	0.0	21.5	56.5	56.5	0.3	61.7	71.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.59
Lane Grp Cap(c), veh/h	651	0	290	3	3	0	292	974	1025	270	977	917
V/C Ratio(X)	0.91	0.00	0.00	0.70	0.00	0.00	0.93	0.85	0.85	0.02	0.89	0.95
Avail Cap(c_a), veh/h	683	0	304	37	39	0	292	1234	1299	270	993	932
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.1	0.0	0.0	72.2	0.0	0.0	59.8	27.9	27.9	52.2	29.0	31.1
Incr Delay (d2), s/veh	15.5	0.0	0.0	75.7	0.0	0.0	34.0	5.3	5.1	0.0	10.0	18.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	0.0	0.0	0.1	0.0	0.0	12.4	24.1	25.3	0.2	27.4	31.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.6	0.0	0.0	147.9	0.0	0.0	93.8	33.2	33.0	52.2	39.0	50.0
LnGrp LOS	E	A	A	F	A	A	F	C	C	D	D	D
Approach Vol, veh/h		593			2			1967			1745	
Approach Delay, s/veh		73.6			147.9			41.5			44.6	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.2	83.5		29.7	27.0	83.7		4.2
Change Period (Y+Rc), s	5.3	* 5.3		4.0	4.0	5.3		4.0
Max Green Setting (Gmax), s	3.0	* 99		27.0	23.0	79.7		3.0
Max Q Clear Time (g_c+I1), s	2.3	58.5		25.4	23.5	73.0		2.2
Green Ext Time (p_c), s	0.0	19.7		0.3	0.0	5.4		0.0

Intersection Summary			
HCM 6th Ctrl Delay			47.2
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	230	130	160	310	209	130	1712	150	134	1081	134
Future Volume (veh/h)	105	230	130	160	310	209	130	1712	150	134	1081	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	114	250	24	178	344	209	137	1802	96	138	1114	138
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	3	3	3
Cap, veh/h	126	489	404	367	330	201	219	1789	793	148	1580	195
Arrive On Green	0.04	0.26	0.26	0.09	0.30	0.30	0.06	0.50	0.50	0.06	0.50	0.50
Sat Flow, veh/h	1795	1885	1559	1795	1088	661	1781	3554	1576	1767	3155	390
Grp Volume(v), veh/h	114	250	24	178	0	553	137	1802	96	138	621	631
Grp Sat Flow(s),veh/h/ln	1795	1885	1559	1795	0	1750	1781	1777	1576	1767	1763	1783
Q Serve(g_s), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	7.6	40.8	41.0
Cycle Q Clear(g_c), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	7.6	40.8	41.0
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	126	489	404	367	0	531	219	1789	793	148	883	893
V/C Ratio(X)	0.91	0.51	0.06	0.49	0.00	1.04	0.63	1.01	0.12	0.93	0.70	0.71
Avail Cap(c_a), veh/h	126	489	404	384	0	531	262	1789	793	148	883	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.2	47.4	41.8	35.5	0.0	52.3	29.8	37.3	10.1	69.0	28.9	29.0
Incr Delay (d2), s/veh	51.5	0.4	0.0	0.4	0.0	50.4	1.7	23.1	0.3	53.1	4.7	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	8.1	0.7	4.7	0.0	27.3	2.8	37.4	1.9	7.4	18.1	18.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.8	47.8	41.8	35.9	0.0	102.7	31.5	60.3	10.4	122.1	33.6	33.7
LnGrp LOS	F	D	D	D	A	F	C	F	B	F	C	C
Approach Vol, veh/h		388			731			2035			1390	
Approach Delay, s/veh		62.1			86.4			56.0			42.4	
Approach LOS		E			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	79.0	16.6	42.4	12.4	78.6	10.0	49.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	8.0	75.0	14.0	37.0	12.0	71.0	6.0	45.0
Max Q Clear Time (g_c+I1), s	9.6	77.5	12.6	19.0	8.3	43.0	8.5	47.5
Green Ext Time (p_c), s	0.0	0.0	0.1	0.5	0.1	6.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	57.3
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	150	10	95	260	240	13	1264	60	230	964	127
Future Volume (veh/h)	124	150	10	95	260	240	13	1264	60	230	964	127
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1870	1870	1870	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	135	163	9	112	283	247	14	1420	64	237	994	130
Peak Hour Factor	0.92	0.92	0.92	0.85	0.92	0.85	0.92	0.89	0.89	0.97	0.97	0.92
Percent Heavy Veh, %	2	2	2	1	2	2	2	1	1	0	0	0
Cap, veh/h	137	562	31	420	280	244	230	1476	66	247	1611	211
Arrive On Green	0.05	0.32	0.32	0.04	0.31	0.31	0.03	0.56	0.56	0.10	0.50	0.50
Sat Flow, veh/h	1781	1756	97	1795	912	796	1781	3487	157	1810	3201	418
Grp Volume(v), veh/h	135	0	172	112	0	530	14	728	756	237	560	564
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1795	0	1708	1781	1791	1852	1810	1805	1815
Q Serve(g_s), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	57.9	58.6	14.6	33.5	33.6
Cycle Q Clear(g_c), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	57.9	58.6	14.6	33.5	33.6
Prop In Lane	1.00		0.05	1.00		0.47	1.00		0.08	1.00		0.23
Lane Grp Cap(c), veh/h	137	0	593	420	0	524	230	758	784	247	908	913
V/C Ratio(X)	0.98	0.00	0.29	0.27	0.00	1.01	0.06	0.96	0.96	0.96	0.62	0.62
Avail Cap(c_a), veh/h	137	0	593	420	0	524	289	758	784	247	908	913
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	0.0	38.2	35.8	0.0	52.0	24.5	31.6	31.7	47.4	26.9	26.9
Incr Delay (d2), s/veh	72.1	0.0	0.1	0.3	0.0	42.3	0.1	21.3	21.7	46.1	3.1	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.0	4.8	0.5	0.0	25.8	0.3	26.7	28.0	12.1	15.1	15.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.9	0.0	38.3	36.1	0.0	94.3	24.6	52.9	53.4	93.5	30.0	30.0
LnGrp LOS	F	A	D	D	A	F	C	D	D	F	C	C
Approach Vol, veh/h		307			642			1498			1361	
Approach Delay, s/veh		71.6			84.1			52.9			41.0	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	68.0	9.0	54.0	7.0	80.0	11.0	52.0
Change Period (Y+Rc), s	3.5	4.5	3.5	6.0	3.5	4.5	3.5	6.0
Max Green Setting (Gmax), s	15.5	63.5	5.5	48.0	8.5	70.5	7.5	46.0
Max Q Clear Time (g_c+I1), s	16.6	60.6	7.5	12.4	2.7	35.6	9.5	48.0
Green Ext Time (p_c), s	0.0	1.4	0.0	0.6	0.0	2.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	55.4
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	100	5	130	45	200	0	1044	220	0	1004	25
Future Volume (veh/h)	75	100	5	130	45	200	0	1044	220	0	1004	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.92	0.96		0.94	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	0	1885	1885	0	1885	1885
Adj Flow Rate, veh/h	91	122	2	149	52	143	0	1111	217	0	1167	28
Peak Hour Factor	0.82	0.82	0.82	0.87	0.87	0.87	0.94	0.94	0.94	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	2	2	2	0	1	1	0	1	1
Cap, veh/h	170	214	4	258	60	166	0	2099	408	0	2512	60
Arrive On Green	0.05	0.11	0.12	0.08	0.14	0.15	0.00	1.00	1.00	0.00	0.70	0.70
Sat Flow, veh/h	1810	1861	31	1781	419	1152	0	3081	581	0	3668	86
Grp Volume(v), veh/h	91	0	124	149	0	195	0	664	664	0	585	610
Grp Sat Flow(s),veh/h/ln	1810	0	1891	1781	0	1571	0	1791	1776	0	1791	1869
Q Serve(g_s), s	6.6	0.0	9.3	10.8	0.0	18.2	0.0	0.0	0.0	0.0	21.6	21.6
Cycle Q Clear(g_c), s	6.6	0.0	9.3	10.8	0.0	18.2	0.0	0.0	0.0	0.0	21.6	21.6
Prop In Lane	1.00		0.02	1.00		0.73	0.00		0.33	0.00		0.05
Lane Grp Cap(c), veh/h	170	0	217	258	0	227	0	1259	1249	0	1259	1314
V/C Ratio(X)	0.53	0.00	0.57	0.58	0.00	0.86	0.00	0.53	0.53	0.00	0.46	0.46
Avail Cap(c_a), veh/h	195	0	435	278	0	403	0	1259	1249	0	1259	1314
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.79	0.79
Uniform Delay (d), s/veh	55.4	0.0	62.9	51.5	0.0	62.5	0.0	0.0	0.0	0.0	9.8	9.8
Incr Delay (d2), s/veh	1.0	0.0	0.9	1.4	0.0	3.7	0.0	1.4	1.4	0.0	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	4.6	5.0	0.0	7.5	0.0	0.5	0.5	0.0	8.4	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	0.0	63.8	52.9	0.0	66.3	0.0	1.4	1.4	0.0	10.8	10.8
LnGrp LOS	E	A	E	D	A	E	A	A	A	A	B	B
Approach Vol, veh/h		215			344			1328			1195	
Approach Delay, s/veh		60.6			60.5			1.4			10.8	
Approach LOS		E			E			A			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		109.9	16.3	23.7		109.9	11.9	28.1				
Change Period (Y+Rc), s		4.5	3.5	6.0		4.5	3.5	6.0				
Max Green Setting (Gmax), s		86.5	14.5	35.0		86.5	10.5	39.0				
Max Q Clear Time (g_c+I1), s		2.0	12.8	11.3		23.6	8.6	20.2				
Green Ext Time (p_c), s		3.6	0.0	0.2		3.0	0.0	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			15.8									
HCM 6th LOS			B									

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	674	1310	1580	398	612	469
Future Volume (vph)	674	1310	1580	398	612	469
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.0	5.0	5.5	3.5
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3400	3505	3438	1503	3502	1581
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3400	3505	3438	1503	3502	1581
Peak-hour factor, PHF	0.94	0.94	0.95	0.95	0.87	0.87
Adj. Flow (vph)	717	1394	1663	419	703	539
RTOR Reduction (vph)	0	0	0	6	0	4
Lane Group Flow (vph)	717	1394	1663	413	703	535
Confl. Peds. (#/hr)	15			15	11	22
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	Prot	NA	NA	pm+ov	Prot	pt+ov
Protected Phases	3 5	2	6	7	7	3 5
Permitted Phases				6		4
Actuated Green, G (s)	34.0	79.0	69.0	98.0	29.0	63.0
Effective Green, g (s)	33.0	78.5	69.0	98.0	28.5	61.5
Actuated g/C Ratio	0.22	0.52	0.46	0.65	0.19	0.41
Clearance Time (s)		5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	0.4	4.0	4.0	
Lane Grp Cap (vph)	748	1834	1581	981	665	648
v/s Ratio Prot	c0.21	c0.40	c0.48	0.08	c0.20	0.18
v/s Ratio Perm				0.19		0.16
v/c Ratio	0.96	0.76	1.05	0.42	1.06	0.83
Uniform Delay, d1	57.8	28.3	40.5	12.4	60.8	39.5
Progression Factor	1.00	1.00	1.00	1.00	1.01	0.58
Incremental Delay, d2	22.8	3.0	37.7	0.4	49.5	7.4
Delay (s)	80.6	31.3	78.2	12.8	110.6	30.3
Level of Service	F	C	E	B	F	C
Approach Delay (s)		48.1	65.0		75.8	
Approach LOS		D	E		E	

Intersection Summary			
HCM 2000 Control Delay	60.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	6	15	30	0	220	0	1022	52	24	1041	13
Future Volume (veh/h)	12	6	15	30	0	220	0	1022	52	24	1041	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	7	2	33	0	28	0	1111	54	28	1197	15
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	0	2	0	2	2	2	2	2
Cap, veh/h	225	67	19	83	0	0	0	1234	60	866	3008	38
Arrive On Green	0.11	0.05	0.05	0.02	0.00	0.00	0.00	0.36	0.36	0.90	1.00	1.00
Sat Flow, veh/h	1781	1352	386	1781	33		0	3538	167	1781	3593	45
Grp Volume(v), veh/h	13	0	9	33	75.1		0	573	592	28	592	620
Grp Sat Flow(s),veh/h/ln	1781	0	1738	1781	E		0	1777	1835	1781	1777	1862
Q Serve(g_s), s	0.0	0.0	0.7	0.0			0.0	45.8	45.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.7	0.0			0.0	45.8	45.9	0.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00			0.00		0.09	1.00		0.02
Lane Grp Cap(c), veh/h	225	0	86	83			0	637	657	866	1487	1558
V/C Ratio(X)	0.06	0.00	0.10	0.40			0.00	0.90	0.90	0.03	0.40	0.40
Avail Cap(c_a), veh/h	225	0	406	125			0	1001	1033	866	1487	1558
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00			0.00	0.61	0.61	0.87	0.87	0.87
Uniform Delay (d), s/veh	61.3	0.0	68.1	72.0			0.0	45.6	45.6	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.5	3.0			0.0	12.2	12.0	0.0	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.3	1.3			0.0	22.2	22.8	0.1	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.4	0.0	68.6	75.1			0.0	57.8	57.6	3.7	0.7	0.7
LnGrp LOS	E	A	E	E			A	E	E	A	A	A
Approach Vol, veh/h		22						1165			1240	
Approach Delay, s/veh		64.3						57.7			0.7	
Approach LOS		E						E			A	
Timer - Assigned Phs	1	2	3	4		6	7					
Phs Duration (G+Y+Rc), s	71.8	58.2	6.5	13.5		130.1	19.9					
Change Period (Y+Rc), s	4.5	* 4.5	3.5	6.0		4.5	3.5					
Max Green Setting (Gmax), s	6.5	* 85	6.5	35.0		94.5	4.5					
Max Q Clear Time (g_c+I1), s	2.0	47.9	2.0	2.7		2.0	2.0					
Green Ext Time (p_c), s	0.0	5.9	0.0	0.0		6.3	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			29.3									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	1316	66	165	1031	28	295	0	300	20	0	60
Future Volume (veh/h)	76	1316	66	165	1031	28	295	0	300	20	0	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	83	1430	72	179	1121	30	321	0	326	22	0	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	331	2456	123	297	2522	67	184	0	370	42	16	85
Arrive On Green	1.00	1.00	1.00	0.71	0.71	0.71	0.23	0.00	0.23	0.23	0.00	0.23
Sat Flow, veh/h	488	3443	173	349	3536	95	1337	0	1585	53	70	363
Grp Volume(v), veh/h	83	736	766	179	563	588	321	0	326	87	0	0
Grp Sat Flow(s),veh/h/ln	488	1777	1839	349	1777	1853	1337	0	1585	486	0	0
Q Serve(g_s), s	6.2	0.0	0.0	45.2	20.0	20.0	3.0	0.0	29.8	2.2	0.0	0.0
Cycle Q Clear(g_c), s	26.2	0.0	0.0	45.2	20.0	20.0	35.0	0.0	29.8	32.0	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.05	1.00		1.00	0.25		0.75
Lane Grp Cap(c), veh/h	331	1267	1312	297	1267	1322	184	0	370	144	0	0
V/C Ratio(X)	0.25	0.58	0.58	0.60	0.44	0.44	1.75	0.00	0.88	0.61	0.00	0.00
Avail Cap(c_a), veh/h	331	1267	1312	297	1267	1322	184	0	370	144	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.42	0.42	0.42	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.4	0.0	0.0	12.6	9.0	9.0	63.5	0.0	55.5	50.2	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.8	0.8	8.8	1.1	1.1	357.0	0.0	24.7	17.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.3	0.3	4.0	7.7	8.0	25.4	0.0	14.5	3.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.2	0.8	0.8	21.4	10.2	10.1	420.5	0.0	80.2	67.7	0.0	0.0
LnGrp LOS	A	A	A	C	B	B	F	A	F	E	A	A
Approach Vol, veh/h		1585			1330			647			87	
Approach Delay, s/veh		0.9			11.6			249.1			67.7	
Approach LOS		A			B			F			E	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		111.0		39.0		111.0				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		35.0		107.0		35.0		107.0				
Max Q Clear Time (g_c+I1), s		37.0		28.2		34.0		47.2				
Green Ext Time (p_c), s		0.0		19.7		0.0		17.2				
Intersection Summary												
HCM 6th Ctrl Delay			50.4									
HCM 6th LOS			D									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1444	211	141	1723	103	650	288	314	102	65	4
Future Volume (veh/h)	7	1444	211	141	1723	103	650	288	314	102	65	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	7	1520	147	153	1873	107	707	313	274	112	71	3
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	1	1	1	2	2	2
Cap, veh/h	78	1674	747	161	1726	98	994	301	264	120	145	6
Arrive On Green	0.02	0.47	0.47	0.05	0.50	0.50	0.29	0.33	0.32	0.04	0.08	0.08
Sat Flow, veh/h	1781	3554	1585	1781	3419	193	3483	919	804	1781	1780	75
Grp Volume(v), veh/h	7	1520	147	153	965	1015	707	0	587	112	0	74
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1836	1742	0	1723	1781	0	1855
Q Serve(g_s), s	0.3	56.1	2.5	6.3	71.6	71.6	25.8	0.0	46.5	5.5	0.0	5.4
Cycle Q Clear(g_c), s	0.3	56.1	2.5	6.3	71.6	71.6	25.8	0.0	46.5	5.5	0.0	5.4
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.47	1.00		0.04
Lane Grp Cap(c), veh/h	78	1674	747	161	897	927	994	0	565	120	0	151
V/C Ratio(X)	0.09	0.91	0.20	0.95	1.08	1.10	0.71	0.00	1.04	0.93	0.00	0.49
Avail Cap(c_a), veh/h	126	1754	782	161	897	927	994	0	565	120	0	406
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.5	34.7	2.3	33.1	35.1	35.2	45.4	0.0	47.8	66.7	0.0	62.3
Incr Delay (d2), s/veh	0.2	7.3	0.2	55.1	52.4	59.2	2.1	0.0	48.3	61.2	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	25.2	2.7	5.1	42.8	46.0	11.5	0.0	27.5	6.1	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.7	42.0	2.5	88.3	87.5	94.4	47.5	0.0	96.1	127.9	0.0	65.6
LnGrp LOS	C	D	A	F	F	F	D	A	F	F	A	E
Approach Vol, veh/h		1674			2133			1294			186	
Approach Delay, s/veh		38.5			90.8			69.5			103.1	
Approach LOS		D			F			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	70.8	44.5	15.5	6.2	75.6	9.5	50.5
Change Period (Y+Rc), s	5.0	5.0	4.5	4.5	5.0	5.0	4.5	4.5
Max Green Setting (Gmax), s	6.0	69.0	20.5	30.5	5.0	70.0	5.0	46.0
Max Q Clear Time (g_c+I1), s	8.3	58.1	27.8	7.4	2.3	73.6	7.5	48.5
Green Ext Time (p_c), s	0.0	7.7	0.0	0.3	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	709	594	388	405	609	365	861	1882	687	182	886	311
Future Volume (veh/h)	709	594	388	405	609	365	861	1882	687	182	886	311
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1687	1687	1885	1870	1870	1870
Adj Flow Rate, veh/h	746	625	0	440	662	0	906	1981	0	196	953	0
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	2	2	2
Cap, veh/h	673	914		501	734		596	2086		145	1077	
Arrive On Green	0.19	0.26	0.00	0.24	0.35	0.00	0.06	0.15	0.00	0.04	0.30	0.00
Sat Flow, veh/h	3483	3582	1598	3456	3554	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	746	625	0	440	662	0	906	1981	0	196	953	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1728	1777	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	29.0	23.6	0.0	18.4	26.6	0.0	28.7	64.0	0.0	6.3	38.3	0.0
Cycle Q Clear(g_c), s	29.0	23.6	0.0	18.4	26.6	0.0	28.7	64.0	0.0	6.3	38.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	673	914		501	734		596	2086		145	1077	
V/C Ratio(X)	1.11	0.68		0.88	0.90		1.52	0.95		1.35	0.88	
Avail Cap(c_a), veh/h	673	914		647	734		596	2088		145	1077	
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.90	0.90	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.5	50.4	0.0	55.6	47.7	0.0	70.3	62.1	0.0	71.8	49.8	0.0
Incr Delay (d2), s/veh	68.1	2.1	0.0	9.9	15.1	0.0	242.3	10.8	0.0	196.1	10.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.1	10.8	0.0	8.1	12.1	0.0	32.1	28.5	0.0	6.7	18.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	128.6	52.5	0.0	65.4	62.7	0.0	312.5	72.9	0.0	268.0	60.0	0.0
LnGrp LOS	F	D		E	E		F	E		F	E	
Approach Vol, veh/h		1371	A		1102	A		2887	A		1149	A
Approach Delay, s/veh		93.9			63.8			148.1			95.5	
Approach LOS		F			E			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.5	72.0	25.7	42.3	33.0	49.5	33.0	35.0
Change Period (Y+Rc), s	4.5	* 4.5	* 4.1	* 4.1	* 4.3	4.5	* 4.1	* 4.1
Max Green Setting (Gmax), s	6.0	* 68	* 28	* 32	* 29	44.5	* 29	* 31
Max Q Clear Time (g_c+I1), s	8.3	66.0	20.4	25.6	30.7	40.3	31.0	28.6
Green Ext Time (p_c), s	0.0	1.5	1.3	1.6	0.0	3.1	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	113.1
HCM 6th LOS	F

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	10	2	527	10	688	2	2710	352	142	1381	5
Future Volume (veh/h)	25	10	2	527	10	688	2	2710	352	142	1381	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	30	12	0	676	13	0	2	2853	0	156	1518	5
Peak Hour Factor	0.84	0.84	0.84	0.78	0.78	0.78	0.95	0.95	0.95	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	1	1	1	1	1	1	3	3	3
Cap, veh/h	166	78	0	348	90		4	3345		178	3902	13
Arrive On Green	0.09	0.04	0.00	0.10	0.05	0.00	0.00	1.00	0.00	0.10	0.75	0.74
Sat Flow, veh/h	1753	1841	0	3483	1885	1598	1795	5316	0	1767	5212	17
Grp Volume(v), veh/h	30	12	0	676	13	0	2	2853	0	156	984	539
Grp Sat Flow(s),veh/h/ln	1753	1841	0	1742	1885	1598	1795	1716	0	1767	1689	1852
Q Serve(g_s), s	2.4	0.9	0.0	15.0	1.0	0.0	0.2	0.0	0.0	13.1	15.5	15.5
Cycle Q Clear(g_c), s	2.4	0.9	0.0	15.0	1.0	0.0	0.2	0.0	0.0	13.1	15.5	15.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	166	78	0	348	90		4	3345		178	2528	1387
V/C Ratio(X)	0.18	0.15	0.00	1.94	0.14		0.52	0.85		0.88	0.39	0.39
Avail Cap(c_a), veh/h	166	196	0	348	314		48	3345		200	2528	1387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.09	0.09	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.6	69.2	0.0	67.5	68.4	0.0	74.6	0.0	0.0	66.5	6.7	6.7
Incr Delay (d2), s/veh	0.5	0.9	0.0	433.8	0.3	0.0	9.6	0.3	0.0	30.2	0.5	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.5	0.0	27.7	0.5	0.0	0.1	0.1	0.0	7.3	5.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.1	70.1	0.0	501.3	68.7	0.0	84.2	0.3	0.0	96.7	7.1	7.5
LnGrp LOS	E	E	A	F	E		F	A		F	A	A
Approach Vol, veh/h		42			689	A		2855	A		1679	
Approach Delay, s/veh		65.1			493.1			0.3			15.6	
Approach LOS		E			F			A			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.1	101.5	19.0	10.4	4.3	116.3	18.2	11.2
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	17.0	85.0	15.0	16.0	4.0	98.0	6.0	25.0
Max Q Clear Time (g_c+I1), s	15.1	2.0	17.0	2.9	2.2	17.5	4.4	3.0
Green Ext Time (p_c), s	0.1	79.3	0.0	0.0	0.0	37.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	70.2
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	80	346	1330	15	860	51	1978	785	558	1778	10
Future Volume (veh/h)	28	80	346	1330	15	860	51	1978	785	558	1778	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1786	1786	1786	1744	1744	1744	1744	1744	1744
Adj Flow Rate, veh/h	32	221	178	1430	0	785	54	2104	0	641	2044	11
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	1	1	1	4	4	4	4	4	4
Cap, veh/h	46	191	153	987	0	1547	73	1650		494	2227	12
Arrive On Green	0.03	0.11	0.11	0.29	0.00	0.37	0.01	0.11	0.00	0.15	0.46	0.45
Sat Flow, veh/h	1701	1786	1437	3402	0	2982	1661	4761	1478	3222	4886	26
Grp Volume(v), veh/h	32	221	178	1430	0	785	54	2104	0	641	1327	728
Grp Sat Flow(s),veh/h/ln	1701	1786	1437	1701	0	1491	1661	1587	1478	1611	1587	1739
Q Serve(g_s), s	2.8	16.0	16.0	43.5	0.0	2.7	4.9	52.0	0.0	23.0	58.7	58.7
Cycle Q Clear(g_c), s	2.8	16.0	16.0	43.5	0.0	2.7	4.9	52.0	0.0	23.0	58.7	58.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	46	191	153	987	0	1547	73	1650		494	1446	793
V/C Ratio(X)	0.70	1.16	1.16	1.45	0.00	0.51	0.73	1.27		1.30	0.92	0.92
Avail Cap(c_a), veh/h	85	191	153	987	0	1547	89	1650		494	1446	793
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.26	0.26	0.00	0.41	0.41	0.41
Uniform Delay (d), s/veh	72.4	67.0	67.0	53.3	0.0	14.4	73.0	66.4	0.0	63.5	38.2	38.2
Incr Delay (d2), s/veh	17.4	115.0	122.6	208.0	0.0	0.1	4.8	125.0	0.0	140.1	5.0	8.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	13.4	11.1	47.2	0.0	6.8	2.2	41.3	0.0	18.9	22.8	25.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.8	182.0	189.6	261.3	0.0	14.5	77.8	191.4	0.0	203.6	43.2	46.7
LnGrp LOS	F	F	F	F	A	B	E	F		F	D	D
Approach Vol, veh/h		431			2215			2158	A		2696	
Approach Delay, s/veh		178.3			173.8			188.6			82.3	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.0	56.0	47.0	20.0	10.6	72.4	7.5	59.5
Change Period (Y+Rc), s	4.5	4.5	4.0	4.5	4.5	4.5	4.0	4.5
Max Green Setting (Gmax), s	22.5	51.5	43.0	15.5	7.5	66.5	7.0	51.5
Max Q Clear Time (g_c+I1), s	25.0	54.0	45.5	18.0	6.9	60.7	4.8	4.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	4.9	0.0	2.3

Intersection Summary	
HCM 6th Ctrl Delay	145.4
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	521	9	941	0	1834	530	0	2566	830
Future Volume (veh/h)	0	0	0	521	9	941	0	1834	530	0	2566	830
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1772	1772	1772	0	1786	1786	0	1786	1786
Adj Flow Rate, veh/h				635	11	0	0	2108	0	0	2949	0
Peak Hour Factor				0.82	0.82	0.82	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %				2	2	2	0	1	1	0	1	1
Cap, veh/h				514	9		0	2084		0	2084	
Arrive On Green				0.31	0.31	0.00	0.00	1.00	0.00	0.00	0.20	0.00
Sat Flow, veh/h				1660	29	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				646	0	0	0	2108	0	0	2949	0
Grp Sat Flow(s),veh/h/ln				1689	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				46.4	0.0	0.0	0.0	0.0	0.0	0.0	92.1	0.0
Cycle Q Clear(g_c), s				46.4	0.0	0.0	0.0	0.0	0.0	0.0	92.1	0.0
Prop In Lane				0.98		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				522	0		0	2084		0	2084	
V/C Ratio(X)				1.24	0.00		0.00	1.01		0.00	1.42	
Avail Cap(c_a), veh/h				522	0		0	2084		0	2084	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.21	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh				51.8	0.0	0.0	0.0	0.0	0.0	0.0	59.8	0.0
Incr Delay (d2), s/veh				122.1	0.0	0.0	0.0	12.1	0.0	0.0	187.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				37.3	0.0	0.0	0.0	3.5	0.0	0.0	96.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				173.9	0.0	0.0	0.0	12.1	0.0	0.0	247.0	0.0
LnGrp LOS				F	A		A	F		A	F	
Approach Vol, veh/h					646	A		2108	A		2949	A
Approach Delay, s/veh					173.9			12.1			247.0	
Approach LOS					F			B			F	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		98.0		52.0		98.0
Change Period (Y+Rc), s		5.9		5.6		5.9
Max Green Setting (Gmax), s		92.1		46.4		92.1
Max Q Clear Time (g_c+I1), s		94.1		48.4		2.0
Green Ext Time (p_c), s		0.0		0.0		50.5

Intersection Summary	
HCM 6th Ctrl Delay	151.9
HCM 6th LOS	F

Notes

Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	497	0	760	0	0	0	0	1834	632	0	2216	840
Future Volume (veh/h)	497	0	760	0	0	0	0	1834	632	0	2216	840
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1772	0	1772				0	1786	1786	0	1772	1772
Adj Flow Rate, veh/h	512	0	0				0	1972	0	0	2357	0
Peak Hour Factor	0.97	0.97	0.97				0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	2				0	1	1	0	2	2
Cap, veh/h	623	0					0	2488		0	2468	
Arrive On Green	0.19	0.00	0.00				0.00	0.73	0.00	0.00	1.00	0.00
Sat Flow, veh/h	3274	0	1502				0	3483	1514	0	3455	1502
Grp Volume(v), veh/h	512	0	0				0	1972	0	0	2357	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	22.5	0.0	0.0				0.0	55.6	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	22.5	0.0	0.0				0.0	55.6	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	623	0					0	2488		0	2468	
V/C Ratio(X)	0.82	0.00					0.00	0.79		0.00	0.96	
Avail Cap(c_a), veh/h	1275	0					0	2488		0	2468	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.09	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh	58.3	0.0	0.0				0.0	12.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.0	0.0				0.0	0.2	0.0	0.0	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	0.0	0.0				0.0	17.9	0.0	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.2	0.0	0.0				0.0	13.0	0.0	0.0	1.3	0.0
LnGrp LOS	E	A					A	B		A	A	
Approach Vol, veh/h		512	A					1972	A		2357	A
Approach Delay, s/veh		62.2						13.0			1.3	
Approach LOS		E						B			A	

Timer - Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		115.9				115.9		34.1
Change Period (Y+Rc), s		5.9				5.9		5.6
Max Green Setting (Gmax), s		80.1				80.1		58.4
Max Q Clear Time (g_c+I1), s		2.0				57.6		24.5
Green Ext Time (p_c), s		56.3				17.9		4.0

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
10: 228th St SE & 4th Ave W 06/26/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	792	0	0	1070	183	0	0	0	190	0	25
Future Volume (veh/h)	73	792	0	0	1070	183	0	0	0	190	0	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1856
Adj Flow Rate, veh/h	78	852	0	0	1163	199	0	0	0	213	0	28
Peak Hour Factor	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.92	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	3
Cap, veh/h	123	2897	0	539	1192	204	0	1	0	240	0	211
Arrive On Green	0.03	0.82	0.00	0.00	0.77	0.77	0.00	0.00	0.00	0.13	0.00	0.13
Sat Flow, veh/h	1781	3647	0	1781	1556	266	0	1870	0	1781	0	1567
Grp Volume(v), veh/h	78	852	0	0	0	1362	0	0	0	213	0	28
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1781	0	1822	0	1870	0	1781	0	1567
Q Serve(g_s), s	1.3	8.7	0.0	0.0	0.0	103.8	0.0	0.0	0.0	17.6	0.0	2.4
Cycle Q Clear(g_c), s	1.3	8.7	0.0	0.0	0.0	103.8	0.0	0.0	0.0	17.6	0.0	2.4
Prop In Lane	1.00		0.00	1.00		0.15	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	2897	0	539	0	1396	0	1	0	240	0	211
V/C Ratio(X)	0.63	0.29	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.89	0.00	0.13
Avail Cap(c_a), veh/h	155	2897	0	591	0	1396	0	206	0	291	0	256
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	46.4	3.4	0.0	0.0	0.0	16.2	0.0	0.0	0.0	63.8	0.0	57.1
Incr Delay (d2), s/veh	5.4	0.3	0.0	0.0	0.0	18.9	0.0	0.0	0.0	23.3	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	2.8	0.0	0.0	0.0	44.3	0.0	0.0	0.0	9.6	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.9	3.6	0.0	0.0	0.0	35.2	0.0	0.0	0.0	87.0	0.0	57.4
LnGrp LOS	D	A	A	A	A	D	A	A	A	F	A	E
Approach Vol, veh/h		930			1362			0			241	
Approach Delay, s/veh		7.7			35.2			0.0			83.6	
Approach LOS		A			D						F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	126.3		23.7	7.3	118.9		0.0				
Change Period (Y+Rc), s	3.5	4.0		3.5	3.5	4.0		3.5				
Max Green Setting (Gmax), s	4.5	90.0		24.5	6.5	88.0		16.5				
Max Q Clear Time (g_c+I1), s	0.0	10.7		19.6	3.3	105.8		0.0				
Green Ext Time (p_c), s	0.0	7.8		0.5	0.1	0.0		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	29.7
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	787	147	189	1010	252	237	177	214	125	63	12
Future Volume (veh/h)	9	787	147	189	1010	252	237	177	214	125	63	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	10	846	138	203	1086	248	252	188	228	147	74	14
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.94	0.94	0.94	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	432	983	160	554	1090	248	376	261	220	291	205	39
Arrive On Green	0.19	0.32	0.32	0.24	0.38	0.38	0.09	0.14	0.14	0.09	0.13	0.14
Sat Flow, veh/h	1795	3082	503	1795	2898	658	1795	1885	1587	1795	1539	291
Grp Volume(v), veh/h	10	492	492	203	669	665	252	188	228	147	0	88
Grp Sat Flow(s),veh/h/ln	1795	1791	1794	1795	1791	1766	1795	1885	1587	1795	0	1831
Q Serve(g_s), s	0.0	19.3	19.3	1.8	27.9	28.2	6.8	7.2	6.3	5.2	0.0	3.3
Cycle Q Clear(g_c), s	0.0	19.3	19.3	1.8	27.9	28.2	6.8	7.2	6.3	5.2	0.0	3.3
Prop In Lane	1.00		0.28	1.00		0.37	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	432	571	572	554	673	664	376	261	220	291	0	244
V/C Ratio(X)	0.02	0.86	0.86	0.37	0.99	1.00	0.67	0.72	1.04	0.51	0.00	0.36
Avail Cap(c_a), veh/h	432	602	603	554	673	664	376	520	438	296	0	500
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.8	24.0	24.0	21.5	23.3	23.4	27.4	30.9	12.0	25.3	0.0	29.6
Incr Delay (d2), s/veh	0.0	15.6	15.6	0.4	33.1	35.4	4.6	3.7	40.2	1.4	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	10.1	10.1	2.7	17.0	17.3	1.3	3.4	6.0	2.2	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.8	39.6	39.6	21.9	56.4	58.8	32.0	34.6	52.1	26.7	0.0	30.5
LnGrp LOS	C	D	D	C	E	F	C	C	F	C	A	C
Approach Vol, veh/h		994			1537			668			235	
Approach Delay, s/veh		39.4			52.9			39.6			28.1	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.3	27.9	10.8	14.0	18.0	32.2	10.4	14.4
Change Period (Y+Rc), s	3.5	4.0	3.5	3.5	3.5	4.0	3.5	3.5
Max Green Setting (Gmax), s	7.0	25.2	7.3	21.0	4.0	28.2	7.1	21.2
Max Q Clear Time (g_c+I1), s	3.8	21.3	8.8	5.3	2.0	30.2	7.2	9.2
Green Ext Time (p_c), s	0.2	2.6	0.0	0.2	0.0	0.0	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1240	3	3	1410	240	1	0	1	51	0	8
Future Volume (veh/h)	20	1240	3	3	1410	240	1	0	1	51	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1900	1900	1900	1870	1870	1870
Adj Flow Rate, veh/h	24	1476	4	3	1516	252	1	0	0	62	0	0
Peak Hour Factor	0.84	0.84	0.84	0.93	0.93	0.93	0.88	0.88	0.88	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	2	2	2
Cap, veh/h	224	1405	4	240	2613	425	145	0	0	128	0	0
Arrive On Green	0.01	0.75	0.76	0.11	0.85	0.85	0.06	0.00	0.00	0.06	0.00	0.00
Sat Flow, veh/h	1781	1864	5	1795	3073	500	1722	0	0	1421	0	0
Grp Volume(v), veh/h	24	0	1480	3	870	898	1	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1869	1795	1791	1782	1723	0	0	1421	0	0
Q Serve(g_s), s	0.5	0.0	113.0	0.0	21.2	22.7	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.0	113.0	0.0	21.2	22.7	0.1	0.0	0.0	6.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.28	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	224	0	1408	240	1523	1515	145	0	0	128	0	0
V/C Ratio(X)	0.11	0.00	1.05	0.01	0.57	0.59	0.01	0.00	0.00	0.48	0.00	0.00
Avail Cap(c_a), veh/h	259	0	1408	240	1523	1515	270	0	0	251	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.4	0.0	18.5	59.8	3.3	3.4	66.8	0.0	0.0	69.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	38.6	0.0	1.6	1.7	0.0	0.0	0.0	2.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	57.3	0.1	6.3	6.7	0.0	0.0	0.0	2.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.6	0.0	57.1	59.8	4.8	5.1	66.9	0.0	0.0	72.7	0.0	0.0
LnGrp LOS	A	A	F	E	A	A	E	A	A	E	A	A
Approach Vol, veh/h		1504			1771			1			62	
Approach Delay, s/veh		56.3			5.1			66.9			72.7	
Approach LOS		E			A			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.1	117.5		11.4	6.0	132.5		11.4				
Change Period (Y+Rc), s	4.5	* 4		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	4.5	* 1.1E2		21.0	5.5	112.0		21.0				
Max Q Clear Time (g_c+I1), s	2.0	115.0		8.5	2.5	24.7		2.1				
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	28.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			29.4
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	1005	2	110	1196	660	17	66	72	285	64	125
Future Volume (veh/h)	195	1005	2	110	1196	660	17	66	72	285	64	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1900	1900	1870	1870	1870	1885	1870	1885
Adj Flow Rate, veh/h	229	1182	2	120	1272	653	18	72	49	374	0	45
Peak Hour Factor	0.85	0.85	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.88	0.92	0.88
Percent Heavy Veh, %	1	1	1	2	0	0	2	2	2	1	2	1
Cap, veh/h	358	2340	4	261	1220	570	260	94	64	364	0	71
Arrive On Green	0.17	0.64	0.64	0.03	0.35	0.34	0.15	0.09	0.09	0.10	0.00	0.05
Sat Flow, veh/h	1795	3669	6	1781	2366	1107	1781	1033	703	3591	0	1541
Grp Volume(v), veh/h	229	577	607	120	941	984	18	0	121	374	0	45
Grp Sat Flow(s),veh/h/ln	1795	1791	1884	1781	1805	1668	1781	0	1736	1795	0	1541
Q Serve(g_s), s	13.5	25.8	25.8	5.4	77.3	77.3	1.3	0.0	10.2	15.2	0.0	3.8
Cycle Q Clear(g_c), s	13.5	25.8	25.8	5.4	77.3	77.3	1.3	0.0	10.2	15.2	0.0	3.8
Prop In Lane	1.00		0.00	1.00		0.66	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	358	1142	1202	261	930	860	260	0	157	364	0	71
V/C Ratio(X)	0.64	0.51	0.51	0.46	1.01	1.15	0.07	0.00	0.77	1.03	0.00	0.64
Avail Cap(c_a), veh/h	358	1142	1202	347	930	860	260	0	301	364	0	365
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	55.5	14.5	14.5	24.3	49.1	49.2	55.2	0.0	66.7	67.4	0.0	55.3
Incr Delay (d2), s/veh	3.8	1.6	1.5	0.1	11.8	66.8	0.1	0.0	10.6	54.5	0.0	12.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	10.9	11.5	2.4	39.1	49.2	0.6	0.0	5.0	9.7	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.3	16.1	16.0	24.4	60.9	115.9	55.3	0.0	77.3	121.9	0.0	68.1
LnGrp LOS	E	B	B	C	F	F	E	A	E	F	A	E
Approach Vol, veh/h		1413			2045			139			419	
Approach Delay, s/veh		23.1			85.3			74.5			116.1	
Approach LOS		C			F			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	99.9	20.0	18.1	30.4	81.5	26.4	11.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.8	75.7	15.5	26.0	13.5	77.0	5.7	35.8
Max Q Clear Time (g_c+I1), s	7.4	27.8	17.2	12.2	15.5	79.3	3.3	5.8
Green Ext Time (p_c), s	0.2	10.9	0.0	0.6	0.0	0.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	66.2
HCM 6th LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	697	380	220	302	653	523	500	981	170	552	992	979
Future Volume (veh/h)	697	380	220	302	653	523	500	981	170	552	992	979
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1230	1870	1870	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	711	388	224	321	695	430	515	1011	150	657	1181	0
Peak Hour Factor	0.98	0.98	0.98	0.94	0.94	0.94	0.97	0.97	0.97	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	1	1	1	2	2	2	1	1	1
Cap, veh/h	725	770	438	355	839	526	299	1074	159	350	907	
Arrive On Green	0.11	0.12	0.12	0.20	0.23	0.23	0.09	0.24	0.24	0.13	0.34	0.00
Sat Flow, veh/h	2273	2166	1232	1795	3582	1561	3456	4485	664	3483	3582	1598
Grp Volume(v), veh/h	711	317	295	321	695	430	515	767	394	657	1181	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1621	1795	1791	1561	1728	1702	1745	1742	1791	1598
Q Serve(g_s), s	46.8	25.1	25.6	26.2	27.7	22.4	13.0	33.2	33.3	15.1	38.0	0.0
Cycle Q Clear(g_c), s	46.8	25.1	25.6	26.2	27.7	22.4	13.0	33.2	33.3	15.1	38.0	0.0
Prop In Lane	1.00		0.76	1.00		1.00	1.00		0.38	1.00		1.00
Lane Grp Cap(c), veh/h	725	632	576	355	839	526	299	815	418	350	907	
V/C Ratio(X)	0.98	0.50	0.51	0.90	0.83	0.82	1.72	0.94	0.94	1.88	1.30	
Avail Cap(c_a), veh/h	725	632	576	473	979	587	299	817	419	350	907	
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	0.74	0.74	0.74	0.72	0.72	0.72	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	66.6	53.7	54.0	58.8	54.6	45.6	68.5	56.0	56.1	65.0	49.7	0.0
Incr Delay (d2), s/veh	23.9	2.1	2.4	13.1	6.8	9.8	337.6	18.7	30.0	396.0	136.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.8	12.4	11.6	13.2	13.3	9.4	19.7	16.0	17.8	25.6	32.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	90.5	55.9	56.4	71.8	61.4	55.4	406.1	74.7	86.1	461.0	186.2	0.0
LnGrp LOS	F	E	E	E	E	E	F	E	F	F	F	
Approach Vol, veh/h		1323			1446			1676			1838	A
Approach Delay, s/veh		74.6			61.9			179.2			284.4	
Approach LOS		E			E			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.1	39.9	33.7	57.3	17.0	42.0	51.9	39.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.5	35.5	39.0	43.0	12.5	37.5	41.5	40.5
Max Q Clear Time (g_c+I1), s	17.1	35.3	28.2	27.6	15.0	40.0	48.8	29.7
Green Ext Time (p_c), s	0.0	0.1	1.0	2.4	0.0	0.0	0.0	4.3

Intersection Summary	
HCM 6th Ctrl Delay	161.0
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	852	99	101	1103	190	100	24	41	209	60	183
Future Volume (veh/h)	95	852	99	101	1103	190	100	24	41	209	60	183
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	0.97		0.96	0.97		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	100	897	96	106	1161	176	111	27	4	225	65	73
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	308	2194	235	497	2107	318	234	129	19	347	108	121
Arrive On Green	0.07	1.00	1.00	0.03	0.68	0.68	0.06	0.08	0.08	0.12	0.13	0.13
Sat Flow, veh/h	1781	3235	346	1795	3106	469	1810	1608	238	1810	806	906
Grp Volume(v), veh/h	100	493	500	106	667	670	111	0	31	225	0	138
Grp Sat Flow(s),veh/h/ln	1781	1777	1804	1795	1791	1784	1810	0	1846	1810	0	1712
Q Serve(g_s), s	2.6	0.0	0.0	2.7	28.6	29.1	8.4	0.0	2.4	16.8	0.0	11.4
Cycle Q Clear(g_c), s	2.6	0.0	0.0	2.7	28.6	29.1	8.4	0.0	2.4	16.8	0.0	11.4
Prop In Lane	1.00		0.19	1.00		0.26	1.00		0.13	1.00		0.53
Lane Grp Cap(c), veh/h	308	1205	1224	497	1215	1210	234	0	148	347	0	229
V/C Ratio(X)	0.32	0.41	0.41	0.21	0.55	0.55	0.47	0.00	0.21	0.65	0.00	0.60
Avail Cap(c_a), veh/h	383	1205	1224	536	1215	1210	234	0	345	347	0	411
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.24	0.24	0.24	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.9	0.0	0.0	6.6	12.4	12.5	58.6	0.0	64.6	53.5	0.0	61.4
Incr Delay (d2), s/veh	0.1	0.1	0.1	0.1	0.4	0.4	1.5	0.0	0.7	4.2	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.0	11.3	11.5	4.0	0.0	1.1	8.1	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	0.1	0.1	6.6	12.8	12.9	60.1	0.0	65.2	57.7	0.0	63.9
LnGrp LOS	A	A	A	A	B	B	E	A	E	E	A	E
Approach Vol, veh/h		1093			1443			142			363	
Approach Delay, s/veh		1.0			12.4			61.2			60.0	
Approach LOS		A			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	105.2	13.0	23.0	8.7	105.3	21.0	15.0
Change Period (Y+Rc), s	4.0	4.0	4.0	3.5	4.0	4.0	4.0	3.5
Max Green Setting (Gmax), s	8.0	82.0	9.0	35.5	11.0	79.0	17.0	27.5
Max Q Clear Time (g_c+I1), s	4.7	2.0	10.4	13.4	4.6	31.1	18.8	4.4
Green Ext Time (p_c), s	0.1	8.6	0.0	0.5	0.1	13.8	0.0	0.1

Intersection Summary			
HCM 6th Ctrl Delay			16.3
HCM 6th LOS			B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	838	277	421	1111	356	475
Future Volume (veh/h)	838	277	421	1111	356	475
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	901	298	439	1157	440	586
Peak Hour Factor	0.93	0.93	0.96	0.96	0.81	0.81
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	1083	357	480	1204	509	453
Arrive On Green	0.41	0.41	0.20	0.64	0.28	0.28
Sat Flow, veh/h	2738	872	1795	1885	1795	1598
Grp Volume(v), veh/h	609	590	439	1157	440	586
Grp Sat Flow(s),veh/h/ln	1791	1724	1795	1885	1795	1598
Q Serve(g_s), s	27.4	27.6	14.9	51.6	20.9	25.5
Cycle Q Clear(g_c), s	27.4	27.6	14.9	51.6	20.9	25.5
Prop In Lane		0.51	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	734	707	480	1204	509	453
V/C Ratio(X)	0.83	0.83	0.91	0.96	0.86	1.29
Avail Cap(c_a), veh/h	734	707	508	1204	509	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.8	23.8	22.6	15.2	30.6	32.3
Incr Delay (d2), s/veh	9.2	9.8	19.9	18.1	15.4	148.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.8	12.6	11.6	24.4	10.9	28.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.0	33.6	42.5	33.2	46.1	180.4
LnGrp LOS	C	C	D	C	D	F
Approach Vol, veh/h	1199			1596	1026	
Approach Delay, s/veh	33.3			35.8	122.8	
Approach LOS	C			D	F	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	20.6	40.9				61.5		28.5
Change Period (Y+Rc), s	3.5	4.5				4.5		3.5
Max Green Setting (Gmax), s	18.5	35.0				57.0		25.0
Max Q Clear Time (g_c+I1), s	16.9	29.6				53.6		27.5
Green Ext Time (p_c), s	0.2	3.5				2.5		0.0

Intersection Summary			
HCM 6th Ctrl Delay			58.4
HCM 6th LOS			E

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	977	235	218	1218	313	79
Future Volume (vph)	977	235	218	1218	313	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	3.0	4.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1881	1561	1770	1863	1805	1572
Flt Permitted	1.00	1.00	0.04	1.00	0.95	1.00
Satd. Flow (perm)	1881	1561	80	1863	1805	1572
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.85	0.85
Adj. Flow (vph)	1051	253	240	1338	368	93
RTOR Reduction (vph)	0	34	0	0	0	67
Lane Group Flow (vph)	1051	219	240	1338	368	26
Confl. Peds. (#/hr)		1	1		23	
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	90.0	90.0	105.5	104.5	25.5	25.5
Effective Green, g (s)	90.5	90.0	106.0	105.0	26.0	26.0
Actuated g/C Ratio	0.60	0.60	0.71	0.70	0.17	0.17
Clearance Time (s)	4.0	4.0	3.5	4.5	3.5	3.5
Vehicle Extension (s)	4.0	4.0	3.0	4.0	3.0	3.0
Lane Grp Cap (vph)	1134	936	191	1304	312	272
v/s Ratio Prot	0.56		c0.10	0.72	c0.20	
v/s Ratio Perm		0.14	c0.79			0.02
v/c Ratio	0.93	0.23	1.26	1.03	1.18	0.10
Uniform Delay, d1	26.8	14.0	61.0	22.5	62.0	52.1
Progression Factor	1.00	1.00	1.01	1.06	1.00	1.00
Incremental Delay, d2	14.1	0.6	119.5	15.4	108.9	0.2
Delay (s)	40.9	14.6	181.2	39.2	170.9	52.3
Level of Service	D	B	F	D	F	D
Approach Delay (s)	35.7			60.8	147.0	
Approach LOS	D			E	F	

Intersection Summary			
HCM 2000 Control Delay	62.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	303	778	786	202	422	735
Future Volume (veh/h)	303	778	786	202	422	735
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1885	1885	1870	1870
Adj Flow Rate, veh/h	322	828	819	151	469	498
Peak Hour Factor	0.94	0.94	0.96	0.96	0.90	0.90
Percent Heavy Veh, %	2	2	1	1	2	2
Cap, veh/h	261	1147	779	660	499	676
Arrive On Green	0.15	0.61	0.41	0.41	0.28	0.28
Sat Flow, veh/h	1781	1870	1885	1596	1781	1585
Grp Volume(v), veh/h	322	828	819	151	469	498
Grp Sat Flow(s),veh/h/ln	1781	1870	1885	1596	1781	1585
Q Serve(g_s), s	11.0	23.0	31.0	4.6	19.3	19.7
Cycle Q Clear(g_c), s	11.0	23.0	31.0	4.6	19.3	19.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	261	1147	779	660	499	676
V/C Ratio(X)	1.23	0.72	1.05	0.23	0.94	0.74
Avail Cap(c_a), veh/h	261	1160	779	660	499	676
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.41	0.41	0.32	0.32	1.00	1.00
Uniform Delay (d), s/veh	32.0	10.1	22.0	14.3	26.4	18.0
Incr Delay (d2), s/veh	117.9	1.6	33.4	0.3	26.1	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	8.2	19.6	1.6	11.3	17.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	149.9	11.7	55.4	14.5	52.5	22.2
LnGrp LOS	F	B	F	B	D	C
Approach Vol, veh/h		1150	970		967	
Approach Delay, s/veh		50.4	49.1		36.9	
Approach LOS		D	D		D	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		50.5		24.5	15.0	35.5
Change Period (Y+Rc), s		* 4.5		3.5	4.0	4.5
Max Green Setting (Gmax), s		* 47		21.0	11.0	31.0
Max Q Clear Time (g_c+I1), s		25.0		21.7	13.0	33.0
Green Ext Time (p_c), s		4.3		0.0	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		45.8
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	960	1	1	851	200	1	0	1	260	0	230
Future Volume (veh/h)	275	960	1	1	851	200	1	0	1	260	0	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1826	1826	1826	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	316	1103	1	1	935	185	2	0	0	292	0	258
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.50	0.50	0.50	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	5	5	5	0	0	0	0	0	0
Cap, veh/h	345	902	1	341	889	752	147	0	0	440	0	320
Arrive On Green	0.09	0.33	0.33	0.14	0.49	0.49	0.20	0.00	0.00	0.20	0.00	0.20
Sat Flow, veh/h	1767	1854	2	1739	1826	1546	256	0	0	1730	0	1610
Grp Volume(v), veh/h	316	0	1104	1	935	185	2	0	0	292	0	258
Grp Sat Flow(s),veh/h/ln	1767	0	1855	1739	1826	1546	256	0	0	1730	0	1610
Q Serve(g_s), s	9.2	0.0	36.5	0.0	36.5	5.2	0.1	0.0	0.0	0.0	0.0	11.5
Cycle Q Clear(g_c), s	9.2	0.0	36.5	0.0	36.5	5.2	11.7	0.0	0.0	11.6	0.0	11.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	345	0	903	341	889	752	147	0	0	440	0	320
V/C Ratio(X)	0.91	0.00	1.22	0.00	1.05	0.25	0.01	0.00	0.00	0.66	0.00	0.81
Avail Cap(c_a), veh/h	345	0	903	341	889	752	224	0	0	538	0	429
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.50	0.00	0.50	0.67	0.67	0.67	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	25.3	27.7	19.2	11.2	34.3	0.0	0.0	28.7	0.0	28.7
Incr Delay (d2), s/veh	16.8	0.0	105.4	0.0	39.7	0.4	0.0	0.0	0.0	2.3	0.0	8.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	0.0	42.6	0.0	23.3	1.7	0.0	0.0	0.0	5.1	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.8	0.0	130.7	27.7	58.9	11.6	34.3	0.0	0.0	31.0	0.0	36.7
LnGrp LOS	D	A	F	C	F	B	C	A	A	C	A	D
Approach Vol, veh/h		1420			1121			2			550	
Approach Delay, s/veh		112.5			51.1			34.3			33.6	
Approach LOS		F			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.1	41.0		18.9	15.1	41.0		18.9
Change Period (Y+Rc), s	4.5	4.5		4.0	4.5	4.5		4.0
Max Green Setting (Gmax), s	5.5	36.5		20.0	5.5	36.5		20.0
Max Q Clear Time (g_c+I1), s	2.0	38.5		13.6	11.2	38.5		13.7
Green Ext Time (p_c), s	0.0	0.0		1.4	0.0	0.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	76.2
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	870	360	220	761	0	280	1	420	0	2	1
Future Volume (veh/h)	1	870	360	220	761	0	280	1	420	0	2	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	418	418	418
Adj Flow Rate, veh/h	1	1024	369	253	875	0	311	1	195	0	8	4
Peak Hour Factor	0.85	0.85	0.85	0.87	0.87	0.87	0.90	0.90	0.90	0.25	0.25	0.25
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	100	100	100
Cap, veh/h	338	897	764	414	1292	0	338	1	302	0	6	4
Arrive On Green	0.00	0.97	0.97	0.41	1.00	0.00	0.19	0.19	0.19	0.00	0.01	0.01
Sat Flow, veh/h	1767	1856	1571	1767	1856	0	1762	6	1572	0	418	354
Grp Volume(v), veh/h	1	1024	369	253	875	0	312	0	195	0	8	4
Grp Sat Flow(s),veh/h/ln	1767	1856	1571	1767	1856	0	1767	0	1572	0	418	354
Q Serve(g_s), s	0.0	72.5	1.8	11.9	0.0	0.0	26.0	0.0	17.2	0.0	2.1	1.6
Cycle Q Clear(g_c), s	0.0	72.5	1.8	11.9	0.0	0.0	26.0	0.0	17.2	0.0	2.1	1.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	338	897	764	414	1292	0	339	0	302	0	6	4
V/C Ratio(X)	0.00	1.14	0.48	0.61	0.68	0.00	0.92	0.00	0.65	0.00	1.35	1.04
Avail Cap(c_a), veh/h	378	897	764	414	1292	0	353	0	314	0	57	47
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.16	0.16	0.16	0.20	0.20	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	2.5	1.1	37.2	0.0	0.0	59.5	0.0	55.9	0.0	73.9	74.2
Incr Delay (d2), s/veh	0.0	66.3	0.4	0.4	0.3	0.0	27.6	0.0	3.8	0.0	223.7	142.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	17.6	0.4	6.1	0.1	0.0	14.3	0.0	7.2	0.0	0.6	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.9	68.8	1.4	37.6	0.3	0.0	87.0	0.0	59.7	0.0	297.6	216.6
LnGrp LOS	C	F	A	D	A	A	F	A	E	A	F	F
Approach Vol, veh/h		1394			1128			507			12	
Approach Delay, s/veh		50.9			8.7			76.5			270.6	
Approach LOS		D			A			E			F	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	35.6	77.5		5.1	3.7	109.4		31.8
Change Period (Y+Rc), s	4.5	* 4.5		3.5	3.5	4.5		3.5
Max Green Setting (Gmax), s	12.5	* 73		20.0	4.0	81.5		29.5
Max Q Clear Time (g_c+I1), s	13.9	74.5		4.1	2.0	2.0		28.0
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	5.2		0.3

Intersection Summary			
HCM 6th Ctrl Delay			40.4
HCM 6th LOS			D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	615	670	691	133	88	340
Future Volume (veh/h)	615	670	691	133	88	340
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			0.98	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1885	1885	1856	1856	1826	1826
Adj Flow Rate, veh/h	668	728	813	151	107	0
Peak Hour Factor	0.92	0.92	0.85	0.85	0.82	0.82
Percent Heavy Veh, %	1	1	3	3	5	5
Cap, veh/h	703	1643	728	135	130	116
Arrive On Green	0.73	1.00	0.48	0.48	0.07	0.00
Sat Flow, veh/h	1795	1885	1516	282	1739	1547
Grp Volume(v), veh/h	668	728	0	964	107	0
Grp Sat Flow(s),veh/h/ln	1795	1885	0	1798	1739	1547
Q Serve(g_s), s	43.2	0.0	0.0	72.0	9.1	0.0
Cycle Q Clear(g_c), s	43.2	0.0	0.0	72.0	9.1	0.0
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	703	1643	0	863	130	116
V/C Ratio(X)	0.95	0.44	0.00	1.12	0.82	0.00
Avail Cap(c_a), veh/h	703	1643	0	863	255	227
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.31	0.31	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.1	0.0	0.0	39.0	68.4	0.0
Incr Delay (d2), s/veh	9.7	0.3	0.0	68.1	14.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	0.1	0.0	47.5	4.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.8	0.3	0.0	107.1	82.5	0.0
LnGrp LOS	C	A	A	F	F	A
Approach Vol, veh/h		1396	964		107	
Approach Delay, s/veh		13.0	107.1		82.5	
Approach LOS		B	F		F	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		134.8		15.2	58.8	76.0
Change Period (Y+Rc), s		4.5		4.0	4.5	4.5
Max Green Setting (Gmax), s		119.5		22.0	43.5	71.5
Max Q Clear Time (g_c+I1), s		2.0		11.1	45.2	74.0
Green Ext Time (p_c), s		0.7		0.3	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		52.8
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	474	2	160	2	2	6	260	1626	2	5	1089	459
Future Volume (veh/h)	474	2	160	2	2	6	260	1626	2	5	1089	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1885	1870	1870	1870	1885	1885	1885	1870	1885	1885
Adj Flow Rate, veh/h	593	0	0	2	2	-2	271	1694	2	5	1224	516
Peak Hour Factor	0.80	0.92	0.80	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.89	0.89
Percent Heavy Veh, %	1	2	1	2	2	2	1	1	1	2	1	1
Cap, veh/h	651	0	290	3	3	208	292	1997	2	270	1352	542
Arrive On Green	0.18	0.00	0.00	0.00	0.00	0.00	0.16	0.54	0.54	0.15	0.55	0.55
Sat Flow, veh/h	3591	0	1598	1781	1870	0	1795	3671	4	1781	2478	994
Grp Volume(v), veh/h	593	0	0	2	0	0	271	826	870	5	867	873
Grp Sat Flow(s),veh/h/ln	1795	0	1598	1781	1870	0	1795	1791	1884	1781	1791	1680
Q Serve(g_s), s	23.4	0.0	0.0	0.2	0.0	0.0	21.5	56.5	56.5	0.3	61.7	71.0
Cycle Q Clear(g_c), s	23.4	0.0	0.0	0.2	0.0	0.0	21.5	56.5	56.5	0.3	61.7	71.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.59
Lane Grp Cap(c), veh/h	651	0	290	3	3	0	292	974	1025	270	977	917
V/C Ratio(X)	0.91	0.00	0.00	0.70	0.00	0.00	0.93	0.85	0.85	0.02	0.89	0.95
Avail Cap(c_a), veh/h	683	0	304	37	39	0	292	1234	1299	270	993	932
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.1	0.0	0.0	72.2	0.0	0.0	59.8	27.9	27.9	52.2	29.0	31.1
Incr Delay (d2), s/veh	15.5	0.0	0.0	75.7	0.0	0.0	34.0	5.3	5.1	0.0	10.0	18.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	0.0	0.0	0.1	0.0	0.0	12.4	24.1	25.3	0.2	27.4	31.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.6	0.0	0.0	147.9	0.0	0.0	93.8	33.2	33.0	52.2	39.0	50.0
LnGrp LOS	E	A	A	F	A	A	F	C	C	D	D	D
Approach Vol, veh/h		593			2			1967			1745	
Approach Delay, s/veh		73.6			147.9			41.5			44.6	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.2	83.5		29.7	27.0	83.7		4.2				
Change Period (Y+Rc), s	5.3	* 5.3		4.0	4.0	5.3		4.0				
Max Green Setting (Gmax), s	3.0	* 99		27.0	23.0	79.7		3.0				
Max Q Clear Time (g_c+I1), s	2.3	58.5		25.4	23.5	73.0		2.2				
Green Ext Time (p_c), s	0.0	19.7		0.3	0.0	5.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			47.2
HCM 6th LOS			D

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	300	0	0	0	0	0
Future Volume (veh/h)	300	0	0	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	326	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	355	316	4807	0	0	3815
Arrive On Green	0.20	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1585	6958	0	0	5443
Grp Volume(v), veh/h	326	0	0	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	1585	1609	0	0	1702
Q Serve(g_s), s	26.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	26.9	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00		0.00	0.00	
Lane Grp Cap(c), veh/h	355	316	4807	0	0	3815
V/C Ratio(X)	0.92	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1496	1331	4807	0	0	3815
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	58.8	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	9.6	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	68.5	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	E	A	A	A	A	A
Approach Vol, veh/h	326		0			0
Approach Delay, s/veh	68.5		0.0			0.0
Approach LOS	E					

Timer - Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		116.1				116.1		33.9
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		16.0				16.0		126.0
Max Q Clear Time (g_c+I1), s		0.0				0.0		28.9
Green Ext Time (p_c), s		0.0				0.0		1.0

Intersection Summary	
HCM 6th Ctrl Delay	68.5
HCM 6th LOS	E

HCM 6th Signalized Intersection Summary
35: SR-527 & NE 191st St/NE 190th St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	230	130	160	310	209	130	1712	150	134	1081	134
Future Volume (veh/h)	105	230	130	160	310	209	130	1712	150	134	1081	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	114	250	24	178	344	209	137	1802	96	138	1114	138
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.95	0.95	0.95	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	3	3	3
Cap, veh/h	126	489	404	367	330	201	219	1789	793	148	1580	195
Arrive On Green	0.04	0.26	0.26	0.09	0.30	0.30	0.06	0.50	0.50	0.06	0.50	0.50
Sat Flow, veh/h	1795	1885	1559	1795	1088	661	1781	3554	1576	1767	3155	390
Grp Volume(v), veh/h	114	250	24	178	0	553	137	1802	96	138	621	631
Grp Sat Flow(s),veh/h/ln	1795	1885	1559	1795	0	1750	1781	1777	1576	1767	1763	1783
Q Serve(g_s), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	7.6	40.8	41.0
Cycle Q Clear(g_c), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	7.6	40.8	41.0
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	126	489	404	367	0	531	219	1789	793	148	883	893
V/C Ratio(X)	0.91	0.51	0.06	0.49	0.00	1.04	0.63	1.01	0.12	0.93	0.70	0.71
Avail Cap(c_a), veh/h	126	489	404	384	0	531	262	1789	793	148	883	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.2	47.4	41.8	35.5	0.0	52.3	29.8	37.3	10.1	69.0	28.9	29.0
Incr Delay (d2), s/veh	51.5	0.4	0.0	0.4	0.0	50.4	1.7	23.1	0.3	53.1	4.7	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	8.1	0.7	4.7	0.0	27.3	2.8	37.4	1.9	7.4	18.1	18.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.8	47.8	41.8	35.9	0.0	102.7	31.5	60.3	10.4	122.1	33.6	33.7
LnGrp LOS	F	D	D	D	A	F	C	F	B	F	C	C
Approach Vol, veh/h		388			731			2035			1390	
Approach Delay, s/veh		62.1			86.4			56.0			42.4	
Approach LOS		E			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	79.0	16.6	42.4	12.4	78.6	10.0	49.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	8.0	75.0	14.0	37.0	12.0	71.0	6.0	45.0
Max Q Clear Time (g_c+I1), s	9.6	77.5	12.6	19.0	8.3	43.0	8.5	47.5
Green Ext Time (p_c), s	0.0	0.0	0.1	0.5	0.1	6.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	57.3
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	150	10	95	260	240	13	1264	60	230	964	127
Future Volume (veh/h)	124	150	10	95	260	240	13	1264	60	230	964	127
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1870	1870	1870	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	135	163	9	112	283	247	14	1420	64	237	994	130
Peak Hour Factor	0.92	0.92	0.92	0.85	0.92	0.85	0.92	0.89	0.89	0.97	0.97	0.92
Percent Heavy Veh, %	2	2	2	1	2	2	2	1	1	0	0	0
Cap, veh/h	137	562	31	420	280	244	230	1476	66	247	1611	211
Arrive On Green	0.05	0.32	0.32	0.04	0.31	0.31	0.03	0.56	0.56	0.10	0.50	0.50
Sat Flow, veh/h	1781	1756	97	1795	912	796	1781	3487	157	1810	3201	418
Grp Volume(v), veh/h	135	0	172	112	0	530	14	728	756	237	560	564
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1795	0	1708	1781	1791	1852	1810	1805	1815
Q Serve(g_s), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	57.9	58.6	14.6	33.5	33.6
Cycle Q Clear(g_c), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	57.9	58.6	14.6	33.5	33.6
Prop In Lane	1.00		0.05	1.00		0.47	1.00		0.08	1.00		0.23
Lane Grp Cap(c), veh/h	137	0	593	420	0	524	230	758	784	247	908	913
V/C Ratio(X)	0.98	0.00	0.29	0.27	0.00	1.01	0.06	0.96	0.96	0.96	0.62	0.62
Avail Cap(c_a), veh/h	137	0	593	420	0	524	289	758	784	247	908	913
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	0.0	38.2	35.8	0.0	52.0	24.5	31.6	31.7	47.4	26.9	26.9
Incr Delay (d2), s/veh	72.1	0.0	0.1	0.3	0.0	42.3	0.1	21.3	21.7	46.1	3.1	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.0	4.8	0.5	0.0	25.8	0.3	26.7	28.0	12.1	15.1	15.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.9	0.0	38.3	36.1	0.0	94.3	24.6	52.9	53.4	93.5	30.0	30.0
LnGrp LOS	F	A	D	D	A	F	C	D	D	F	C	C
Approach Vol, veh/h		307			642			1498			1361	
Approach Delay, s/veh		71.6			84.1			52.9			41.0	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	68.0	9.0	54.0	7.0	80.0	11.0	52.0
Change Period (Y+Rc), s	3.5	4.5	3.5	6.0	3.5	4.5	3.5	6.0
Max Green Setting (Gmax), s	15.5	63.5	5.5	48.0	8.5	70.5	7.5	46.0
Max Q Clear Time (g_c+I1), s	16.6	60.6	7.5	12.4	2.7	35.6	9.5	48.0
Green Ext Time (p_c), s	0.0	1.4	0.0	0.6	0.0	2.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	55.4
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	100	5	130	45	200	0	1044	220	0	1004	25
Future Volume (veh/h)	75	100	5	130	45	200	0	1044	220	0	1004	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.92	0.96		0.94	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	0	1885	1885	0	1885	1885
Adj Flow Rate, veh/h	91	122	2	149	52	143	0	1111	217	0	1167	28
Peak Hour Factor	0.82	0.82	0.82	0.87	0.87	0.87	0.94	0.94	0.94	0.86	0.86	0.86
Percent Heavy Veh, %	0	0	0	2	2	2	0	1	1	0	1	1
Cap, veh/h	170	214	4	258	60	166	0	2099	408	0	2512	60
Arrive On Green	0.05	0.11	0.12	0.08	0.14	0.15	0.00	1.00	1.00	0.00	0.70	0.70
Sat Flow, veh/h	1810	1861	31	1781	419	1152	0	3081	581	0	3668	86
Grp Volume(v), veh/h	91	0	124	149	0	195	0	664	664	0	585	610
Grp Sat Flow(s),veh/h/ln	1810	0	1891	1781	0	1571	0	1791	1776	0	1791	1869
Q Serve(g_s), s	6.6	0.0	9.3	10.8	0.0	18.2	0.0	0.0	0.0	0.0	21.6	21.6
Cycle Q Clear(g_c), s	6.6	0.0	9.3	10.8	0.0	18.2	0.0	0.0	0.0	0.0	21.6	21.6
Prop In Lane	1.00		0.02	1.00		0.73	0.00		0.33	0.00		0.05
Lane Grp Cap(c), veh/h	170	0	217	258	0	227	0	1259	1249	0	1259	1314
V/C Ratio(X)	0.53	0.00	0.57	0.58	0.00	0.86	0.00	0.53	0.53	0.00	0.46	0.46
Avail Cap(c_a), veh/h	195	0	435	278	0	403	0	1259	1249	0	1259	1314
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.79	0.79
Uniform Delay (d), s/veh	55.4	0.0	62.9	51.5	0.0	62.5	0.0	0.0	0.0	0.0	9.8	9.8
Incr Delay (d2), s/veh	1.0	0.0	0.9	1.4	0.0	3.7	0.0	1.4	1.4	0.0	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	4.6	5.0	0.0	7.5	0.0	0.5	0.5	0.0	8.4	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	0.0	63.8	52.9	0.0	66.3	0.0	1.4	1.4	0.0	10.8	10.8
LnGrp LOS	E	A	E	D	A	E	A	A	A	A	B	B
Approach Vol, veh/h		215			344			1328			1195	
Approach Delay, s/veh		60.6			60.5			1.4			10.8	
Approach LOS		E			E			A			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		109.9	16.3	23.7		109.9	11.9	28.1				
Change Period (Y+Rc), s		4.5	3.5	6.0		4.5	3.5	6.0				
Max Green Setting (Gmax), s		86.5	14.5	35.0		86.5	10.5	39.0				
Max Q Clear Time (g_c+I1), s		2.0	12.8	11.3		23.6	8.6	20.2				
Green Ext Time (p_c), s		3.6	0.0	0.2		3.0	0.0	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			15.8									
HCM 6th LOS			B									

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	674	1310	1580	398	612	469
Future Volume (vph)	674	1310	1580	398	612	469
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.0	5.0	5.5	3.5
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3400	3505	3438	1503	3502	1581
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3400	3505	3438	1503	3502	1581
Peak-hour factor, PHF	0.94	0.94	0.95	0.95	0.87	0.87
Adj. Flow (vph)	717	1394	1663	419	703	539
RTOR Reduction (vph)	0	0	0	6	0	4
Lane Group Flow (vph)	717	1394	1663	413	703	535
Confl. Peds. (#/hr)	15			15	11	22
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	Prot	NA	NA	pm+ov	Prot	pt+ov
Protected Phases	3 5	2	6	7	7	3 5
Permitted Phases				6		4
Actuated Green, G (s)	34.0	79.0	69.0	98.0	29.0	63.0
Effective Green, g (s)	33.0	78.5	69.0	98.0	28.5	61.5
Actuated g/C Ratio	0.22	0.52	0.46	0.65	0.19	0.41
Clearance Time (s)		5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	0.4	4.0	4.0	
Lane Grp Cap (vph)	748	1834	1581	981	665	648
v/s Ratio Prot	c0.21	c0.40	c0.48	0.08	c0.20	0.18
v/s Ratio Perm				0.19		0.16
v/c Ratio	0.96	0.76	1.05	0.42	1.06	0.83
Uniform Delay, d1	57.8	28.3	40.5	12.4	60.8	39.5
Progression Factor	1.00	1.00	1.00	1.00	1.03	0.59
Incremental Delay, d2	22.8	3.0	37.7	0.4	49.5	7.4
Delay (s)	80.6	31.3	78.2	12.8	112.0	30.6
Level of Service	F	C	E	B	F	C
Approach Delay (s)		48.1	65.0		76.7	
Approach LOS		D	E		E	

Intersection Summary			
HCM 2000 Control Delay	61.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	6	15	30	0	220	0	1022	52	24	1041	13
Future Volume (veh/h)	12	6	15	30	0	220	0	1022	52	24	1041	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	7	2	33	0	28	0	1111	54	28	1197	15
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	0	2	0	2	2	2	2	2
Cap, veh/h	225	67	19	83	0	0	0	1234	60	866	3008	38
Arrive On Green	0.11	0.05	0.05	0.02	0.00	0.00	0.00	0.36	0.36	0.90	1.00	1.00
Sat Flow, veh/h	1781	1352	386	1781	33		0	3538	167	1781	3593	45
Grp Volume(v), veh/h	13	0	9	33	75.1		0	573	592	28	592	620
Grp Sat Flow(s),veh/h/ln	1781	0	1738	1781	E		0	1777	1835	1781	1777	1862
Q Serve(g_s), s	0.0	0.0	0.7	0.0			0.0	45.8	45.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.7	0.0			0.0	45.8	45.9	0.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00			0.00		0.09	1.00		0.02
Lane Grp Cap(c), veh/h	225	0	86	83			0	637	657	866	1487	1558
V/C Ratio(X)	0.06	0.00	0.10	0.40			0.00	0.90	0.90	0.03	0.40	0.40
Avail Cap(c_a), veh/h	225	0	406	125			0	1001	1033	866	1487	1558
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00			0.00	0.61	0.61	0.87	0.87	0.87
Uniform Delay (d), s/veh	61.3	0.0	68.1	72.0			0.0	45.6	45.6	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.5	3.0			0.0	12.2	12.0	0.0	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.3	1.3			0.0	22.2	22.8	0.1	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.4	0.0	68.6	75.1			0.0	57.8	57.6	3.7	0.7	0.7
LnGrp LOS	E	A	E	E			A	E	E	A	A	A
Approach Vol, veh/h		22						1165			1240	
Approach Delay, s/veh		64.3						57.7			0.7	
Approach LOS		E						E			A	
Timer - Assigned Phs	1	2	3	4		6	7					
Phs Duration (G+Y+Rc), s	71.8	58.2	6.5	13.5		130.1	19.9					
Change Period (Y+Rc), s	4.5	* 4.5	3.5	6.0		4.5	3.5					
Max Green Setting (Gmax), s	6.5	* 85	6.5	35.0		94.5	4.5					
Max Q Clear Time (g_c+I1), s	2.0	47.9	2.0	2.7		2.0	2.0					
Green Ext Time (p_c), s	0.0	5.9	0.0	0.0		6.3	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			29.3									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	1316	66	165	1031	28	295	0	300	20	0	60
Future Volume (veh/h)	76	1316	66	165	1031	28	295	0	300	20	0	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	83	1430	72	179	1121	30	321	0	266	22	0	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	393	2755	138	278	2828	76	0	274	232	0	0	232
Arrive On Green	0.80	0.80	0.80	0.80	0.80	0.80	0.00	0.00	0.15	0.00	0.00	0.15
Sat Flow, veh/h	488	3443	173	349	3536	95	0	1870	1585	0	0	1585
Grp Volume(v), veh/h	83	736	766	179	563	588	0	0	266	0	0	12
Grp Sat Flow(s),veh/h/ln	488	1777	1839	349	1777	1853	0	1870	1585	0	0	1585
Q Serve(g_s), s	9.0	21.2	21.4	54.0	13.9	13.9	0.0	0.0	22.0	0.0	0.0	1.0
Cycle Q Clear(g_c), s	22.9	21.2	21.4	75.4	13.9	13.9	0.0	0.0	22.0	0.0	0.0	1.0
Prop In Lane	1.00		0.09	1.00		0.05	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	393	1421	1471	278	1421	1483	0	274	232	0	0	232
V/C Ratio(X)	0.21	0.52	0.52	0.64	0.40	0.40	0.00	0.00	1.14	0.00	0.00	0.05
Avail Cap(c_a), veh/h	393	1421	1471	278	1421	1483	0	274	232	0	0	232
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.45	0.45	0.45	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	7.8	5.1	5.1	18.1	4.4	4.4	0.0	0.0	64.0	0.0	0.0	55.0
Incr Delay (d2), s/veh	0.5	0.6	0.6	11.0	0.8	0.8	0.0	0.0	103.4	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	6.8	7.1	5.0	4.6	4.8	0.0	0.0	15.6	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.3	5.7	5.7	29.1	5.2	5.2	0.0	0.0	167.4	0.0	0.0	55.1
LnGrp LOS	A	A	A	C	A	A	A	A	F	A	A	E
Approach Vol, veh/h		1585			1330			266			12	
Approach Delay, s/veh		5.9			8.4			167.4			55.1	
Approach LOS		A			A			F			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	0.0	26.0		124.0	0.0	26.0		124.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	22.0		112.0	4.0	22.0		112.0
Max Q Clear Time (g_c+I1), s	0.0	24.0		24.9	0.0	3.0		77.4
Green Ext Time (p_c), s	0.0	0.0		19.9	0.0	0.0		14.6

Intersection Summary			
HCM 6th Ctrl Delay			20.6
HCM 6th LOS			C

2043 AM Preferred Alternative

		Without 214		With 214	
Map ID	Intersection	Delay	V2 LOS	Delay	LOS
1	208th/9th	73.9	E	63.2	E
2	SR 527/208th	92.9	F	92.3	F
15	SR 527/214th	35.4	D	69.6	E
16	SR 527/220th	63.5	E	22.8	C
17	SR 527/ I-405 NB Ramps	5	A	5	A
18	SR 527/ I-405 SB Ramps	22.9	C	30.6	C
6	228th/9th	61.7	E	57.5	E
7	SR 527/228th	138.3	F	119.8	F
11	228th/29th (not widened)	60.1	E	60.2	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1428	945	314	1385	102	270	65	141	103	288	7
Future Volume (veh/h)	4	1428	945	314	1385	102	270	65	141	103	288	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	4	1503	920	341	1505	106	293	71	86	113	316	7
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	1	1	1	2	2	2
Cap, veh/h	161	1703	759	312	2043	143	296	156	189	179	337	7
Arrive On Green	0.01	0.48	0.48	0.14	0.61	0.60	0.09	0.20	0.20	0.07	0.18	0.18
Sat Flow, veh/h	1781	3554	1585	1781	3369	236	3483	766	928	1781	1822	40
Grp Volume(v), veh/h	4	1503	920	341	790	821	293	0	157	113	0	323
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1828	1742	0	1694	1781	0	1863
Q Serve(g_s), s	0.2	54.7	48.3	20.0	45.2	46.1	12.1	0.0	11.7	8.1	0.0	24.5
Cycle Q Clear(g_c), s	0.2	54.7	48.3	20.0	45.2	46.1	12.1	0.0	11.7	8.1	0.0	24.5
Prop In Lane	1.00		1.00	1.00		0.13	1.00		0.55	1.00		0.02
Lane Grp Cap(c), veh/h	161	1703	759	312	1078	1109	296	0	345	179	0	344
V/C Ratio(X)	0.02	0.88	1.21	1.09	0.73	0.74	0.99	0.00	0.46	0.63	0.00	0.94
Avail Cap(c_a), veh/h	214	1742	777	312	1078	1109	296	0	345	179	0	344
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	33.7	18.4	48.6	20.0	20.2	65.5	0.0	50.3	53.4	0.0	57.7
Incr Delay (d2), s/veh	0.0	5.8	107.2	77.6	2.8	2.9	49.0	0.0	1.2	5.3	0.0	33.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	24.3	39.7	18.0	18.7	19.7	7.4	0.0	5.1	3.9	0.0	14.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.4	39.5	125.6	126.2	22.8	23.1	114.6	0.0	51.5	58.6	0.0	90.8
LnGrp LOS	C	D	F	F	C	C	F	A	D	E	A	F
Approach Vol, veh/h		2427			1952			450			436	
Approach Delay, s/veh		72.1			41.0			92.6			82.5	
Approach LOS		E			D			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	72.7	16.2	30.5	5.7	91.0	13.5	33.2
Change Period (Y+Rc), s	5.0	5.0	4.5	4.5	5.0	5.0	4.5	4.5
Max Green Setting (Gmax), s	19.0	69.3	11.7	26.0	5.0	83.3	9.0	28.7
Max Q Clear Time (g_c+I1), s	22.0	56.7	14.1	26.5	2.2	48.1	10.1	13.7
Green Ext Time (p_c), s	0.0	11.0	0.0	0.0	0.0	15.2	0.0	0.7

Intersection Summary			
HCM 6th Ctrl Delay			63.2
HCM 6th LOS			E

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	322	616	731	456	420	95	153	440	120	155	1847	303
Future Volume (veh/h)	322	616	731	456	420	95	153	440	120	155	1847	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1687	1687	1885	1870	1870	1870
Adj Flow Rate, veh/h	339	648	0	496	457	0	161	463	0	167	1986	0
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	2	2	2
Cap, veh/h	741	762		548	564		139	2192		214	1741	
Arrive On Green	0.21	0.21	0.00	0.16	0.16	0.00	0.04	0.48	0.00	0.06	0.49	0.00
Sat Flow, veh/h	3483	3582	1598	3456	3554	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	339	648	0	496	457	0	161	463	0	167	1986	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1728	1777	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	14.7	30.1	0.0	24.4	21.5	0.0	7.7	10.1	0.0	8.2	84.8	0.0
Cycle Q Clear(g_c), s	14.7	30.1	0.0	24.4	21.5	0.0	7.7	10.1	0.0	8.2	84.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	741	762		548	564		139	2192		214	1741	
V/C Ratio(X)	0.46	0.85		0.90	0.81		1.16	0.21		0.78	1.14	
Avail Cap(c_a), veh/h	1047	1077		561	577		139	2192		266	1741	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	59.4	65.5	0.0	71.5	70.3	0.0	82.7	26.4	0.0	80.0	44.1	0.0
Incr Delay (d2), s/veh	0.4	4.7	0.0	17.9	8.4	0.0	126.1	0.2	0.0	11.3	70.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	14.2	0.0	12.2	10.4	0.0	5.5	3.8	0.0	4.0	52.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.8	70.2	0.0	89.4	78.6	0.0	208.7	26.6	0.0	91.3	114.9	0.0
LnGrp LOS	E	E		F	E		F	C		F	F	
Approach Vol, veh/h		987	A		953	A		624	A		2153	A
Approach Delay, s/veh		66.6			84.3			73.6			113.1	
Approach LOS		E			F			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.4	86.4		40.8	12.0	88.8		31.5				
Change Period (Y+Rc), s	4.0	4.5		* 4.1	* 4.3	4.5		4.1				
Max Green Setting (Gmax), s	13.0	63.2		* 52	* 7.7	68.2		28.0				
Max Q Clear Time (g_c+I1), s	10.2	12.1		32.1	9.7	86.8		26.4				
Green Ext Time (p_c), s	0.2	6.7		4.6	0.0	0.0		0.8				
Intersection Summary												
HCM 6th Ctrl Delay			92.3									
HCM 6th LOS			F									

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	457	35	15	253	116	10	630	323	362	2567	160
Future Volume (veh/h)	35	457	35	15	253	116	10	630	323	362	2567	160
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	42	544	40	19	324	0	11	663	0	398	2821	176
Peak Hour Factor	0.84	0.84	0.84	0.78	0.78	0.78	0.95	0.95	0.95	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	1	1	1	1	1	1	3	3	3
Cap, veh/h	231	474	35	139	355		18	1750		412	2749	168
Arrive On Green	0.13	0.28	0.28	0.04	0.19	0.00	0.02	0.68	0.00	0.23	0.56	0.56
Sat Flow, veh/h	1753	1693	124	3483	1885	1598	1795	5316	0	1767	4878	298
Grp Volume(v), veh/h	42	0	584	19	324	0	11	663	0	398	1934	1063
Grp Sat Flow(s),veh/h/ln	1753	0	1817	1742	1885	1598	1795	1716	0	1767	1689	1799
Q Serve(g_s), s	3.2	0.0	42.0	0.8	25.3	0.0	0.9	8.3	0.0	33.4	84.5	84.5
Cycle Q Clear(g_c), s	3.2	0.0	42.0	0.8	25.3	0.0	0.9	8.3	0.0	33.4	84.5	84.5
Prop In Lane	1.00		0.07	1.00		1.00	1.00		0.00	1.00		0.17
Lane Grp Cap(c), veh/h	231	0	509	139	355		18	1750		412	1903	1014
V/C Ratio(X)	0.18	0.00	1.15	0.14	0.91		0.62	0.38		0.97	1.02	1.05
Avail Cap(c_a), veh/h	231	0	509	139	490		48	1750		412	1903	1014
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	0.93	0.93	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.9	0.0	54.0	69.5	59.7	0.0	73.3	17.2	0.0	56.9	32.7	32.8
Incr Delay (d2), s/veh	0.4	0.0	87.4	0.2	14.7	0.0	29.2	0.6	0.0	35.2	24.8	41.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	31.5	0.4	13.6	0.0	0.6	2.8	0.0	18.6	38.5	45.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.3	0.0	141.4	69.7	74.4	0.0	102.4	17.8	0.0	92.1	57.5	74.6
LnGrp LOS	E	A	F	E	E		F	B		F	F	F
Approach Vol, veh/h		626			343	A		674	A		3395	
Approach Delay, s/veh		135.8			74.1			19.1			66.9	
Approach LOS		F			E			B			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.0	55.0	10.0	46.0	5.5	88.5	23.8	32.2
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	35.0	50.0	6.0	42.0	4.0	81.0	9.0	39.0
Max Q Clear Time (g_c+I1), s	35.4	10.3	2.8	44.0	2.9	86.5	5.2	27.3
Green Ext Time (p_c), s	0.0	9.7	0.0	0.0	0.0	0.0	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	69.6
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	20	497	20	70	220	953	1412	707	1756	30
Future Volume (veh/h)	5	5	20	497	20	70	220	953	1412	707	1756	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1786	1786	1786	1744	1744	1744	1744	1744	1744
Adj Flow Rate, veh/h	6	6	-105	534	22	-76	234	1014	0	813	2018	34
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	1	1	1	4	4	4	4	4	4
Cap, veh/h	16	1	1	597	250	938	256	1244		1567	2862	48
Arrive On Green	0.01	0.00	0.00	0.18	0.14	0.00	0.26	0.44	0.00	0.97	1.00	1.00
Sat Flow, veh/h	1701	1786	1514	3402	1786	1514	1661	4761	1478	3222	4821	81
Grp Volume(v), veh/h	6	6	-105	534	22	-76	234	1014	0	813	1328	724
Grp Sat Flow(s),veh/h/ln	1701	1786	1514	1701	1786	1514	1661	1587	1478	1611	1587	1729
Q Serve(g_s), s	0.5	0.1	0.0	23.0	1.6	0.0	20.5	27.9	0.0	2.1	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.1	0.0	23.0	1.6	0.0	20.5	27.9	0.0	2.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	16	1	1	597	250	938	256	1244		1567	1884	1026
V/C Ratio(X)	0.38	5.04	-104.05	0.89	0.09	-0.08	0.91	0.82		0.52	0.70	0.71
Avail Cap(c_a), veh/h	51	42	35	646	327	1004	288	2491		1567	1884	1026
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.53	0.53	0.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	73.9	75.0	0.0	60.5	56.2	0.0	54.7	39.1	0.0	1.1	0.0	0.0
Incr Delay (d2), s/veh	14.6	1957.6	0.0	14.2	0.1	0.0	17.8	3.3	0.0	0.0	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	11.2	0.7	0.0	8.9	9.6	0.0	0.4	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	88.4	2032.6	0.0	74.7	56.3	0.0	72.5	42.3	0.0	1.1	0.2	0.4
LnGrp LOS	F	F	A	E	E	A	E	D		A	A	A
Approach Vol, veh/h		-93			480			1248	A		2865	
Approach Delay, s/veh		0.0			85.7			48.0			0.5	
Approach LOS		A			F			D			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	77.0	43.2	29.8	0.0	27.1	93.0	4.9	25.0
Change Period (Y+Rc), s	4.5	4.5	4.0	4.5	4.5	4.5	4.0	4.5
Max Green Setting (Gmax), s	23.5	78.0	28.0	3.0	25.5	76.0	4.0	27.0
Max Q Clear Time (g_c+I1), s	4.1	29.9	25.0	2.1	22.5	2.0	2.5	3.6
Green Ext Time (p_c), s	1.5	8.8	0.8	0.0	0.1	29.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	22.8
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	195	5	1027	0	1612	613	0	1576	529
Future Volume (veh/h)	0	0	0	195	5	1027	0	1612	613	0	1576	529
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1772	1772	1772	0	1786	1786	0	1786	1786
Adj Flow Rate, veh/h				238	6	0	0	1853	0	0	1811	0
Peak Hour Factor				0.82	0.82	0.82	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %				2	2	2	0	1	1	0	1	1
Cap, veh/h				267	7		0	2583		0	2583	
Arrive On Green				0.16	0.16	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Sat Flow, veh/h				1648	42	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				244	0	0	0	1853	0	0	1811	0
Grp Sat Flow(s),veh/h/ln				1690	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				21.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s				21.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane				0.98		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				274	0		0	2583		0	2583	
V/C Ratio(X)				0.89	0.00		0.00	0.72		0.00	0.70	
Avail Cap(c_a), veh/h				399	0		0	2583		0	2583	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00	2.00
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.22	0.00	0.00	0.49	0.00
Uniform Delay (d), s/veh				61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh				18.2	0.0	0.0	0.0	0.4	0.0	0.0	0.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				10.5	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				79.8	0.0	0.0	0.0	0.4	0.0	0.0	0.8	0.0
LnGrp LOS				E	A		A	A		A	A	
Approach Vol, veh/h					244	A		1853	A		1811	A
Approach Delay, s/veh					79.8			0.4			0.8	
Approach LOS					E			A			A	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	120.1	29.9	120.1
Change Period (Y+Rc), s	5.9	5.6	5.9
Max Green Setting (Gmax), s	103.1	35.4	103.1
Max Q Clear Time (g_c+I1), s	2.0	23.2	2.0
Green Ext Time (p_c), s	37.7	1.1	39.8

Intersection Summary	
HCM 6th Ctrl Delay	5.5
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	519	0	757	0	0	0	0	1706	531	0	1307	687
Future Volume (veh/h)	519	0	757	0	0	0	0	1706	531	0	1307	687
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1772	0	1772				0	1786	1786	0	1772	1772
Adj Flow Rate, veh/h	535	0	0				0	1834	0	0	1390	0
Peak Hour Factor	0.97	0.97	0.97				0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	2				0	1	1	0	2	2
Cap, veh/h	650	0					0	2459		0	2440	
Arrive On Green	0.20	0.00	0.00				0.00	0.24	0.00	0.00	1.00	0.00
Sat Flow, veh/h	3274	0	1502				0	3483	1514	0	3455	1502
Grp Volume(v), veh/h	535	0	0				0	1834	0	0	1390	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	23.5	0.0	0.0				0.0	75.1	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	23.5	0.0	0.0				0.0	75.1	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	650	0					0	2459		0	2440	
V/C Ratio(X)	0.82	0.00					0.00	0.75		0.00	0.57	
Avail Cap(c_a), veh/h	1427	0					0	2459		0	2440	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.33	0.33	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.09	0.00	0.00	0.62	0.00
Uniform Delay (d), s/veh	57.6	0.0	0.0				0.0	44.3	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.0	0.0				0.0	0.2	0.0	0.0	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	0.0	0.0				0.0	34.2	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.3	0.0	0.0				0.0	44.5	0.0	0.0	0.6	0.0
LnGrp LOS	E	A					A	D		A	A	
Approach Vol, veh/h		535	A					1834	A		1390	A
Approach Delay, s/veh		61.3						44.5			0.6	
Approach LOS		E						D			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		114.6				114.6		35.4				
Change Period (Y+Rc), s		5.9				5.9		5.6				
Max Green Setting (Gmax), s		73.1				73.1		65.4				
Max Q Clear Time (g_c+I1), s		2.0				77.1		25.5				
Green Ext Time (p_c), s		19.9				0.0		4.3				
Intersection Summary												
HCM 6th Ctrl Delay			30.6									
HCM 6th LOS			C									

Notes

Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	1039	17	72	821	285	2	64	110	660	66	379
Future Volume (veh/h)	282	1039	17	72	821	285	2	64	110	660	66	379
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1900	1900	1870	1870	1870	1885	1870	1885
Adj Flow Rate, veh/h	332	1222	18	78	873	66	2	70	87	801	0	186
Peak Hour Factor	0.85	0.85	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.88	0.92	0.88
Percent Heavy Veh, %	1	1	1	2	0	0	2	2	2	1	2	1
Cap, veh/h	504	1767	26	128	983	74	390	85	106	837	0	199
Arrive On Green	0.24	0.49	0.49	0.04	0.29	0.29	0.22	0.11	0.11	0.23	0.00	0.13
Sat Flow, veh/h	1795	3613	53	1781	3394	257	1781	755	938	3591	0	1565
Grp Volume(v), veh/h	332	606	634	78	464	475	2	0	157	801	0	186
Grp Sat Flow(s),veh/h/ln	1795	1791	1875	1781	1805	1845	1781	0	1693	1795	0	1565
Q Serve(g_s), s	19.0	39.2	39.2	5.0	36.9	36.9	0.1	0.0	13.6	33.0	0.0	15.6
Cycle Q Clear(g_c), s	19.0	39.2	39.2	5.0	36.9	36.9	0.1	0.0	13.6	33.0	0.0	15.6
Prop In Lane	1.00		0.03	1.00		0.14	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	504	876	917	128	523	534	390	0	191	837	0	199
V/C Ratio(X)	0.66	0.69	0.69	0.61	0.89	0.89	0.01	0.00	0.82	0.96	0.00	0.94
Avail Cap(c_a), veh/h	504	876	917	130	588	601	390	0	293	843	0	597
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.80	0.80	0.80	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	48.0	29.6	29.6	45.5	50.9	51.0	45.8	0.0	65.0	56.8	0.0	50.5
Incr Delay (d2), s/veh	3.2	4.5	4.3	6.3	16.5	16.2	0.0	0.0	13.2	21.2	0.0	22.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	17.9	18.7	2.5	19.1	19.5	0.1	0.0	6.6	17.4	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.2	34.0	33.9	51.8	67.4	67.1	45.8	0.0	78.3	78.0	0.0	73.2
LnGrp LOS	D	C	C	D	E	E	D	A	E	E	A	E
Approach Vol, veh/h		1572			1017			159			987	
Approach Delay, s/veh		37.6			66.1			77.9			77.1	
Approach LOS		D			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	77.6	39.8	21.4	41.2	47.7	37.3	23.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.9	63.6	35.5	26.0	21.9	48.6	4.0	57.5
Max Q Clear Time (g_c+I1), s	7.0	41.2	35.0	15.6	21.0	38.9	2.1	17.6
Green Ext Time (p_c), s	0.0	9.3	0.2	0.8	0.1	4.2	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	57.5
HCM 6th LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	975	879	276	135	351	517	158	597	161	566	1048	271
Future Volume (veh/h)	975	879	276	135	351	517	158	597	161	566	1048	271
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1230	1870	1870	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	995	897	282	144	373	424	163	615	141	674	1248	0
Peak Hour Factor	0.98	0.98	0.98	0.94	0.94	0.94	0.97	0.97	0.97	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	1	1	1	2	2	2	1	1	1
Cap, veh/h	936	1310	411	172	639	471	115	757	170	423	967	
Arrive On Green	0.69	0.83	0.82	0.16	0.30	0.30	0.03	0.18	0.18	0.04	0.09	0.00
Sat Flow, veh/h	2273	2650	831	1795	3582	1556	3456	4159	936	3483	3582	1598
Grp Volume(v), veh/h	995	601	578	144	373	424	163	501	255	674	1248	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1704	1795	1791	1556	1728	1702	1691	1742	1791	1598
Q Serve(g_s), s	61.8	20.3	20.8	11.7	13.3	18.4	5.0	21.2	21.8	18.2	40.5	0.0
Cycle Q Clear(g_c), s	61.8	20.3	20.8	11.7	13.3	18.4	5.0	21.2	21.8	18.2	40.5	0.0
Prop In Lane	1.00		0.49	1.00		1.00	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	936	878	842	172	639	471	115	619	308	423	967	
V/C Ratio(X)	1.06	0.68	0.69	0.84	0.58	0.90	1.42	0.81	0.83	1.59	1.29	
Avail Cap(c_a), veh/h	936	878	842	249	967	614	115	715	355	423	967	
HCM Platoon Ratio	1.67	1.67	1.67	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	0.48	0.48	0.48	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.00
Uniform Delay (d), s/veh	23.4	8.4	8.6	61.9	47.9	41.4	72.5	58.9	59.2	72.0	68.3	0.0
Incr Delay (d2), s/veh	39.5	2.1	2.2	15.1	3.9	22.8	230.0	6.5	14.0	269.3	132.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	4.8	4.7	5.7	5.9	7.3	5.9	9.5	10.4	24.4	37.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.9	10.5	10.8	77.0	51.8	64.1	302.5	65.3	73.2	341.3	200.4	0.0
LnGrp LOS	F	B	B	E	D	E	F	E	E	F	F	
Approach Vol, veh/h		2174			941			919			1922	A
Approach Delay, s/veh		34.6			61.2			109.6			249.8	
Approach LOS		C			E			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.2	31.3	18.4	78.1	9.0	44.5	65.8	30.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	31.0	20.3	67.2	4.5	40.0	47.5	40.0
Max Q Clear Time (g_c+I1), s	20.2	23.8	13.7	22.8	7.0	42.5	63.8	20.4
Green Ext Time (p_c), s	0.0	2.4	0.2	6.6	0.0	0.0	0.0	3.8

Intersection Summary	
HCM 6th Ctrl Delay	119.8
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	699	450	700	662	131	226
Future Volume (veh/h)	699	450	700	662	131	226
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1885	1885	1870	1870
Adj Flow Rate, veh/h	744	479	729	631	146	-68
Peak Hour Factor	0.94	0.94	0.96	0.96	0.90	0.90
Percent Heavy Veh, %	2	2	1	1	2	2
Cap, veh/h	558	1501	1035	877	162	461
Arrive On Green	0.33	1.00	0.55	0.55	0.09	0.00
Sat Flow, veh/h	1781	1870	1885	1596	1781	1585
Grp Volume(v), veh/h	744	479	729	631	146	-68
Grp Sat Flow(s),veh/h/ln	1781	1870	1885	1596	1781	1585
Q Serve(g_s), s	15.0	0.0	21.3	22.1	6.1	0.0
Cycle Q Clear(g_c), s	15.0	0.0	21.3	22.1	6.1	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	558	1501	1035	877	162	461
V/C Ratio(X)	1.33	0.32	0.70	0.72	0.90	-0.15
Avail Cap(c_a), veh/h	558	1501	1035	877	499	761
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.84	0.84	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.3	0.0	12.4	12.6	33.8	0.0
Incr Delay (d2), s/veh	159.8	0.5	4.0	5.1	16.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	32.0	0.2	8.9	8.0	3.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	174.1	0.5	16.4	17.7	50.1	0.0
LnGrp LOS	F	A	B	B	D	A
Approach Vol, veh/h		1223	1360		78	
Approach Delay, s/veh		106.1	17.0		93.8	
Approach LOS		F	B		F	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		64.7		10.3	19.0	45.7
Change Period (Y+Rc), s		* 4.5		3.5	4.0	4.5
Max Green Setting (Gmax), s		* 47		21.0	15.0	27.0
Max Q Clear Time (g_c+I1), s		2.0		8.1	17.0	24.1
Green Ext Time (p_c), s		2.2		0.4	0.0	1.9

Intersection Summary		
HCM 6th Ctrl Delay		60.2
HCM 6th LOS		E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: 9th Ave SE/Filbert Dr & 208th St SE / SR 524

06/29/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1723	945	314	1444	102	270	65	141	103	288	7
Future Volume (veh/h)	4	1723	945	314	1444	102	270	65	141	103	288	7
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	4	1814	920	341	1570	106	293	71	86	113	316	7
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	1	1	1	2	2	2
Cap, veh/h	151	1725	770	295	2066	139	291	154	186	176	333	7
Arrive On Green	0.01	0.49	0.49	0.14	0.61	0.60	0.08	0.20	0.20	0.07	0.18	0.18
Sat Flow, veh/h	1781	3554	1585	1781	3380	227	3483	766	928	1781	1822	40
Grp Volume(v), veh/h	4	1814	920	341	821	855	293	0	157	113	0	323
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1830	1742	0	1694	1781	0	1863
Q Serve(g_s), s	0.2	70.4	49.5	20.0	48.4	49.5	12.1	0.0	11.9	8.2	0.0	24.9
Cycle Q Clear(g_c), s	0.2	70.4	49.5	20.0	48.4	49.5	12.1	0.0	11.9	8.2	0.0	24.9
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.55	1.00		0.02
Lane Grp Cap(c), veh/h	151	1725	770	295	1086	1119	291	0	340	176	0	340
V/C Ratio(X)	0.03	1.05	1.20	1.15	0.76	0.76	1.01	0.00	0.46	0.64	0.00	0.95
Avail Cap(c_a), veh/h	203	1725	770	295	1086	1119	291	0	340	176	0	340
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.8	37.3	18.5	52.0	20.3	20.6	66.4	0.0	51.2	54.2	0.0	58.6
Incr Delay (d2), s/veh	0.0	36.6	100.5	100.9	3.2	3.4	54.8	0.0	1.3	6.0	0.0	35.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	38.3	39.0	18.7	20.1	21.2	7.6	0.0	5.2	4.0	0.0	15.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	73.9	119.0	152.9	23.6	24.0	121.3	0.0	52.5	60.2	0.0	94.2
LnGrp LOS	C	F	F	F	C	C	F	A	D	E	A	F
Approach Vol, veh/h		2738			2017			450			436	
Approach Delay, s/veh		89.0			45.6			97.3			85.4	
Approach LOS		F			D			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.0	74.4	16.1	30.5	5.7	92.7	13.5	33.1				
Change Period (Y+Rc), s	5.0	5.0	4.5	4.5	5.0	5.0	4.5	4.5				
Max Green Setting (Gmax), s	19.0	69.4	11.6	26.0	5.0	83.4	9.0	28.6				
Max Q Clear Time (g_c+I1), s	22.0	72.4	14.1	26.9	2.2	51.5	10.2	13.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	15.6	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay			73.9									
HCM 6th LOS			E									

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	322	616	1026	456	420	95	153	440	120	155	1847	303
Future Volume (veh/h)	322	616	1026	456	420	95	153	440	120	155	1847	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1687	1687	1885	1870	1870	1870
Adj Flow Rate, veh/h	339	648	0	496	457	0	161	463	0	167	1986	0
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	2	2	2
Cap, veh/h	748	769		548	564		139	2183		214	1734	
Arrive On Green	0.21	0.21	0.00	0.16	0.16	0.00	0.04	0.47	0.00	0.06	0.49	0.00
Sat Flow, veh/h	3483	3582	1598	3456	3554	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	339	648	0	496	457	0	161	463	0	167	1986	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1728	1777	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	14.6	30.0	0.0	24.4	21.5	0.0	7.7	10.2	0.0	8.2	84.4	0.0
Cycle Q Clear(g_c), s	14.6	30.0	0.0	24.4	21.5	0.0	7.7	10.2	0.0	8.2	84.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	748	769		548	564		139	2183		214	1734	
V/C Ratio(X)	0.45	0.84		0.90	0.81		1.16	0.21		0.78	1.15	
Avail Cap(c_a), veh/h	1248	1284		561	577		139	2183		266	1734	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	59.1	65.1	0.0	71.5	70.3	0.0	82.7	26.6	0.0	80.0	44.3	0.0
Incr Delay (d2), s/veh	0.4	2.7	0.0	17.9	8.4	0.0	126.1	0.2	0.0	11.3	72.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	14.0	0.0	12.2	10.4	0.0	5.5	3.8	0.0	4.0	53.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.5	67.8	0.0	89.4	78.6	0.0	208.7	26.8	0.0	91.3	117.1	0.0
LnGrp LOS	E	E		F	E		F	C		F	F	
Approach Vol, veh/h		987	A		953	A		624	A		2153	A
Approach Delay, s/veh		65.0			84.3			73.8			115.1	
Approach LOS		E			F			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.4	86.0		41.1	12.0	88.4		31.5				
Change Period (Y+Rc), s	4.0	4.5		* 4.1	* 4.3	4.5		4.1				
Max Green Setting (Gmax), s	13.0	53.2		* 62	* 7.7	58.2		28.0				
Max Q Clear Time (g_c+I1), s	10.2	12.2		32.0	9.7	86.4		26.4				
Green Ext Time (p_c), s	0.2	6.5		5.0	0.0	0.0		0.8				

Intersection Summary		
HCM 6th Ctrl Delay		92.9
HCM 6th LOS		F

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	5	35	15	10	175	10	630	480	657	2567	360
Future Volume (veh/h)	35	5	35	15	10	175	10	630	480	657	2567	360
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	42	6	40	19	13	-82	11	663	0	722	2821	396
Peak Hour Factor	0.84	0.84	0.84	0.78	0.78	0.78	0.95	0.95	0.95	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	1	1	1	1	1	1	3	3	3
Cap, veh/h	64	11	76	139	113	639	18	2352		601	3554	476
Arrive On Green	0.04	0.06	0.06	0.04	0.06	0.00	0.02	0.91	0.00	0.34	0.79	0.78
Sat Flow, veh/h	1753	202	1345	3483	1885	1598	1795	5316	0	1767	4515	605
Grp Volume(v), veh/h	42	0	46	19	13	-82	11	663	0	722	2076	1141
Grp Sat Flow(s),veh/h/ln	1753	0	1546	1742	1885	1598	1795	1716	0	1767	1689	1743
Q Serve(g_s), s	3.5	0.0	4.3	0.8	1.0	0.0	0.9	2.2	0.0	51.0	50.9	60.8
Cycle Q Clear(g_c), s	3.5	0.0	4.3	0.8	1.0	0.0	0.9	2.2	0.0	51.0	50.9	60.8
Prop In Lane	1.00		0.87	1.00		1.00	1.00		0.00	1.00		0.35
Lane Grp Cap(c), veh/h	64	0	87	139	113	639	18	2352		601	2658	1372
V/C Ratio(X)	0.66	0.00	0.53	0.14	0.12	-0.13	0.62	0.28		1.20	0.78	0.83
Avail Cap(c_a), veh/h	70	0	320	139	390	873	48	2352		601	2658	1372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	0.91	0.91	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.4	0.0	68.8	69.5	66.7	0.0	73.3	3.6	0.0	49.5	8.8	10.0
Incr Delay (d2), s/veh	18.1	0.0	4.9	0.2	0.2	0.0	28.6	0.3	0.0	106.0	2.4	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.8	0.4	0.5	0.0	0.6	0.7	0.0	39.5	15.2	20.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.4	0.0	73.7	69.7	66.9	0.0	101.9	3.9	0.0	155.5	11.2	16.0
LnGrp LOS	F	A	E	E	E	A	F	A		F	B	B
Approach Vol, veh/h		88			-50			674	A		3939	
Approach Delay, s/veh		81.2			0.0			5.5			39.0	
Approach LOS		F			A			A			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	55.0	72.6	10.0	12.4	5.5	122.1	9.5	13.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	51.0	45.0	6.0	31.0	4.0	92.0	6.0	31.0
Max Q Clear Time (g_c+I1), s	53.0	4.2	2.8	6.3	2.9	62.8	5.5	3.0
Green Ext Time (p_c), s	0.0	9.8	0.0	0.1	0.0	29.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	35.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	20	681	20	70	220	1110	1412	707	1756	30
Future Volume (veh/h)	5	5	20	681	20	70	220	1110	1412	707	1756	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1786	1786	1786	1744	1744	1744	1744	1744	1744
Adj Flow Rate, veh/h	6	6	-105	732	22	-76	234	1181	0	813	2018	34
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	1	1	1	4	4	4	4	4	4
Cap, veh/h	16	1	1	465	180	879	256	1427		1569	3050	51
Arrive On Green	0.01	0.00	0.00	0.14	0.10	0.00	0.26	0.50	0.00	0.97	1.00	1.00
Sat Flow, veh/h	1701	1786	1514	3402	1786	1514	1661	4761	1478	3222	4821	81
Grp Volume(v), veh/h	6	6	-105	732	22	-76	234	1181	0	813	1328	724
Grp Sat Flow(s),veh/h/ln	1701	1786	1514	1701	1786	1514	1661	1587	1478	1611	1587	1729
Q Serve(g_s), s	0.5	0.1	0.0	20.5	1.7	0.0	20.5	31.7	0.0	2.0	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.1	0.0	20.5	1.7	0.0	20.5	31.7	0.0	2.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	16	1	1	465	180	879	256	1427		1569	2008	1094
V/C Ratio(X)	0.38	5.04	-104.05	1.57	0.12	-0.09	0.91	0.83		0.52	0.66	0.66
Avail Cap(c_a), veh/h	51	137	116	465	327	1004	288	2491		1569	2008	1094
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.47	0.47	0.00	0.47	0.47	0.47
Uniform Delay (d), s/veh	73.9	75.0	0.0	64.8	61.4	0.0	54.7	34.1	0.0	1.0	0.0	0.0
Incr Delay (d2), s/veh	14.6	1957.6	0.0	268.7	0.1	0.0	16.2	2.7	0.0	0.1	0.8	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	26.3	0.8	0.0	8.8	10.3	0.0	0.4	0.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	88.4	2032.6	0.0	333.5	61.5	0.0	71.0	36.9	0.0	1.1	0.8	1.5
LnGrp LOS	F	F	A	F	E	A	E	D		A	A	A
Approach Vol, veh/h		-93			678			1415	A		2865	
Approach Delay, s/veh		0.0			362.0			42.5			1.1	
Approach LOS		A			F			D			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	77.0	49.0	24.0	0.0	27.1	98.9	4.9	19.1
Change Period (Y+Rc), s	4.5	4.5	4.0	4.5	4.5	4.5	4.0	4.5
Max Green Setting (Gmax), s	23.5	78.0	20.0	11.0	25.5	76.0	4.0	27.0
Max Q Clear Time (g_c+I1), s	4.0	33.7	22.5	2.1	22.5	2.0	2.5	3.7
Green Ext Time (p_c), s	1.5	10.7	0.0	0.0	0.1	29.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	63.5
HCM 6th LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	195	5	1027	0	1769	613	0	1760	529
Future Volume (veh/h)	0	0	0	195	5	1027	0	1769	613	0	1760	529
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1772	1772	1772	0	1786	1786	0	1786	1786
Adj Flow Rate, veh/h				238	6	0	0	2033	0	0	2023	0
Peak Hour Factor				0.82	0.82	0.82	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %				2	2	2	0	1	1	0	1	1
Cap, veh/h				265	7		0	2587		0	2587	
Arrive On Green				0.16	0.16	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Sat Flow, veh/h				1648	42	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				244	0	0	0	2033	0	0	2023	0
Grp Sat Flow(s),veh/h/ln				1690	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				21.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s				21.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane				0.98		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				272	0		0	2587		0	2587	
V/C Ratio(X)				0.90	0.00		0.00	0.79		0.00	0.78	
Avail Cap(c_a), veh/h				365	0		0	2587		0	2587	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00	2.00
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.15	0.00
Uniform Delay (d), s/veh				61.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh				21.3	0.0	0.0	0.0	0.2	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				10.8	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				83.0	0.0	0.0	0.0	0.2	0.0	0.0	0.4	0.0
LnGrp LOS				F	A		A	A		A	A	
Approach Vol, veh/h					244	A		2033	A		2023	A
Approach Delay, s/veh					83.0			0.2			0.4	
Approach LOS					F			A			A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		120.2		29.8		120.2
Change Period (Y+Rc), s		5.9		5.6		5.9
Max Green Setting (Gmax), s		106.1		32.4		106.1
Max Q Clear Time (g_c+I1), s		2.0		23.2		2.0
Green Ext Time (p_c), s		49.3		0.9		49.9

Intersection Summary	
HCM 6th Ctrl Delay	5.0
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	519	0	757	0	0	0	0	1863	531	0	1491	687
Future Volume (veh/h)	519	0	757	0	0	0	0	1863	531	0	1491	687
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1772	0	1772				0	1786	1786	0	1772	1772
Adj Flow Rate, veh/h	535	0	0				0	2003	0	0	1586	0
Peak Hour Factor	0.97	0.97	0.97				0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	0	2				0	1	1	0	2	2
Cap, veh/h	650	0					0	2460		0	2440	
Arrive On Green	0.20	0.00	0.00				0.00	0.49	0.00	0.00	1.00	0.00
Sat Flow, veh/h	3274	0	1502				0	3483	1514	0	3455	1502
Grp Volume(v), veh/h	535	0	0				0	2003	0	0	1586	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	23.5	0.0	0.0				0.0	75.3	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	23.5	0.0	0.0				0.0	75.3	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	650	0					0	2460		0	2440	
V/C Ratio(X)	0.82	0.00					0.00	0.81		0.00	0.65	
Avail Cap(c_a), veh/h	1362	0					0	2460		0	2440	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.67	0.67	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.09	0.00	0.00	0.49	0.00
Uniform Delay (d), s/veh	57.6	0.0	0.0				0.0	30.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.0	0.0				0.0	0.3	0.0	0.0	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	0.0	0.0				0.0	31.7	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.4	0.0	0.0				0.0	30.3	0.0	0.0	0.7	0.0
LnGrp LOS	E	A					A	C		A	A	
Approach Vol, veh/h		535	A					2003	A		1586	A
Approach Delay, s/veh		61.4						30.3			0.7	
Approach LOS		E						C			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		114.6				114.6		35.4				
Change Period (Y+Rc), s		5.9				5.9		5.6				
Max Green Setting (Gmax), s		76.1				76.1		62.4				
Max Q Clear Time (g_c+I1), s		2.0				77.3		25.5				
Green Ext Time (p_c), s		26.1				0.0		4.3				

Intersection Summary			
HCM 6th Ctrl Delay			22.9
HCM 6th LOS			C

Notes
Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	283	1196	17	72	1005	285	2	64	110	660	66	379
Future Volume (veh/h)	283	1196	17	72	1005	285	2	64	110	660	66	379
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1900	1900	1870	1870	1870	1885	1870	1885
Adj Flow Rate, veh/h	333	1407	18	78	1069	66	2	70	87	801	0	186
Peak Hour Factor	0.85	0.85	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.88	0.92	0.88
Percent Heavy Veh, %	1	1	1	2	0	0	2	2	2	1	2	1
Cap, veh/h	445	1858	24	118	1165	72	356	85	106	771	0	200
Arrive On Green	0.21	0.51	0.51	0.04	0.34	0.34	0.20	0.11	0.11	0.21	0.00	0.13
Sat Flow, veh/h	1795	3621	46	1781	3447	213	1781	755	938	3591	0	1565
Grp Volume(v), veh/h	333	696	729	78	560	575	2	0	157	801	0	186
Grp Sat Flow(s),veh/h/ln	1795	1791	1877	1781	1805	1855	1781	0	1693	1795	0	1565
Q Serve(g_s), s	20.6	46.4	46.5	4.7	44.6	44.7	0.1	0.0	13.6	32.2	0.0	15.7
Cycle Q Clear(g_c), s	20.6	46.4	46.5	4.7	44.6	44.7	0.1	0.0	13.6	32.2	0.0	15.7
Prop In Lane	1.00		0.02	1.00		0.11	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	445	919	963	118	610	627	356	0	191	771	0	200
V/C Ratio(X)	0.75	0.76	0.76	0.66	0.92	0.92	0.01	0.00	0.82	1.04	0.00	0.93
Avail Cap(c_a), veh/h	445	919	963	118	641	659	356	0	293	771	0	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.74	0.74	0.74	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.4	29.1	29.1	42.2	47.6	47.7	48.0	0.0	65.0	58.9	0.0	51.1
Incr Delay (d2), s/veh	6.8	5.8	5.6	9.7	16.7	16.4	0.0	0.0	13.2	43.0	0.0	22.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.5	21.3	22.3	2.4	22.9	23.5	0.1	0.0	6.6	19.2	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.3	34.9	34.7	51.9	64.4	64.1	48.1	0.0	78.3	101.9	0.0	73.2
LnGrp LOS	E	C	C	D	E	E	D	A	E	F	A	E
Approach Vol, veh/h		1758			1213			159			987	
Approach Delay, s/veh		39.4			63.4			77.9			96.5	
Approach LOS		D			E			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	81.2	37.0	21.4	36.7	54.9	34.5	23.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.9	67.6	32.5	26.0	20.5	53.0	4.0	54.5
Max Q Clear Time (g_c+I1), s	6.7	48.5	34.2	15.6	22.6	46.7	2.1	17.7
Green Ext Time (p_c), s	0.0	10.2	0.0	0.8	0.0	3.7	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	61.7
HCM 6th LOS	E

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
14: SR-527 & 228th St SE

06/29/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1132	879	276	135	351	517	158	597	161	566	1048	455
Future Volume (veh/h)	1132	879	276	135	351	517	158	597	161	566	1048	455
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1230	1870	1870	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	1155	897	282	144	373	424	163	615	141	674	1248	0
Peak Hour Factor	0.98	0.98	0.98	0.94	0.94	0.94	0.97	0.97	0.97	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	1	1	1	2	2	2	1	1	1
Cap, veh/h	938	1327	416	172	660	470	115	757	170	400	943	
Arrive On Green	0.69	0.84	0.83	0.16	0.31	0.31	0.03	0.18	0.18	0.04	0.09	0.00
Sat Flow, veh/h	2273	2650	831	1795	3582	1557	3456	4159	936	3483	3582	1598
Grp Volume(v), veh/h	1155	601	578	144	373	424	163	501	255	674	1248	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1704	1795	1791	1557	1728	1702	1691	1742	1791	1598
Q Serve(g_s), s	61.9	19.0	19.5	11.7	13.1	19.5	5.0	21.2	21.8	17.2	39.5	0.0
Cycle Q Clear(g_c), s	61.9	19.0	19.5	11.7	13.1	19.5	5.0	21.2	21.8	17.2	39.5	0.0
Prop In Lane	1.00		0.49	1.00		1.00	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	938	890	854	172	660	470	115	619	308	400	943	
V/C Ratio(X)	1.23	0.67	0.68	0.84	0.57	0.90	1.42	0.81	0.83	1.69	1.32	
Avail Cap(c_a), veh/h	938	890	854	249	967	604	115	715	355	400	943	
HCM Platoon Ratio	1.67	1.67	1.67	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	0.36	0.36	0.36	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	23.3	7.7	7.8	61.9	46.9	41.2	72.5	58.9	59.2	72.2	68.5	0.0
Incr Delay (d2), s/veh	107.9	1.5	1.6	15.1	3.5	23.1	230.0	6.5	14.0	310.1	146.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	26.3	4.3	4.3	5.7	5.7	7.7	5.9	9.5	10.4	25.3	38.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	131.3	9.2	9.4	77.0	50.4	64.3	302.5	65.3	73.2	382.2	214.6	0.0
LnGrp LOS	F	A	A	E	D	E	F	E	E	F	F	
Approach Vol, veh/h		2334			941			919			1922	A
Approach Delay, s/veh		69.7			60.7			109.6			273.4	
Approach LOS		E			E			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.2	31.3	18.4	79.1	9.0	43.5	65.9	31.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.5	31.0	20.3	68.2	4.5	39.0	48.5	40.0
Max Q Clear Time (g_c+I1), s	19.2	23.8	13.7	21.5	7.0	41.5	63.9	21.5
Green Ext Time (p_c), s	0.0	2.4	0.2	6.6	0.0	0.0	0.0	3.8

Intersection Summary	
HCM 6th Ctrl Delay	138.3
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	699	450	700	662	131	226
Future Volume (veh/h)	699	450	700	662	131	226
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1885	1885	1870	1870
Adj Flow Rate, veh/h	744	479	729	631	146	-68
Peak Hour Factor	0.94	0.94	0.96	0.96	0.90	0.90
Percent Heavy Veh, %	2	2	1	1	2	2
Cap, veh/h	558	1501	1035	877	162	461
Arrive On Green	0.33	1.00	0.55	0.55	0.09	0.00
Sat Flow, veh/h	1781	1870	1885	1596	1781	1585
Grp Volume(v), veh/h	744	479	729	631	146	-68
Grp Sat Flow(s),veh/h/ln	1781	1870	1885	1596	1781	1585
Q Serve(g_s), s	15.0	0.0	21.3	22.1	6.1	0.0
Cycle Q Clear(g_c), s	15.0	0.0	21.3	22.1	6.1	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	558	1501	1035	877	162	461
V/C Ratio(X)	1.33	0.32	0.70	0.72	0.90	-0.15
Avail Cap(c_a), veh/h	558	1501	1035	877	499	761
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.81	0.81	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.3	0.0	12.4	12.6	33.8	0.0
Incr Delay (d2), s/veh	159.4	0.5	4.0	5.1	16.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	31.9	0.2	8.9	8.0	3.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	173.7	0.5	16.4	17.7	50.1	0.0
LnGrp LOS	F	A	B	B	D	A
Approach Vol, veh/h		1223	1360		78	
Approach Delay, s/veh		105.9	17.0		93.8	
Approach LOS		F	B		F	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		64.7		10.3	19.0	45.7
Change Period (Y+Rc), s		* 4.5		3.5	4.0	4.5
Max Green Setting (Gmax), s		* 47		21.0	15.0	27.0
Max Q Clear Time (g_c+I1), s		2.0		8.1	17.0	24.1
Green Ext Time (p_c), s		2.2		0.4	0.0	1.9

Intersection Summary			
HCM 6th Ctrl Delay			60.1
HCM 6th LOS			E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	977	968	619	186	171	521	20	414	113	5	105
Future Volume (veh/h)	170	977	968	619	186	171	521	20	414	113	5	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.99	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1633	1633	1633	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	179	1028	921	652	196	173	548	21	281	119	5	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	18	18	18	2	2	2	0	0	0
Cap, veh/h	538	914	688	458	1151	534	617	38	509	150	3	53
Arrive On Green	0.03	0.08	0.08	0.23	0.39	0.39	0.18	0.34	0.34	0.10	0.10	0.10
Sat Flow, veh/h	1781	3554	1576	1555	2972	1379	3456	111	1483	702	29	531
Grp Volume(v), veh/h	179	1028	921	652	196	173	548	0	302	214	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1576	1555	1486	1379	1728	0	1594	1262	0	0
Q Serve(g_s), s	5.0	18.0	18.0	16.0	3.0	6.2	10.8	0.0	10.8	7.0	0.0	0.0
Cycle Q Clear(g_c), s	5.0	18.0	18.0	16.0	3.0	6.2	10.8	0.0	10.8	7.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.93	0.56		0.42
Lane Grp Cap(c), veh/h	538	914	688	458	1151	534	617	0	547	206	0	0
V/C Ratio(X)	0.33	1.12	1.34	1.42	0.17	0.32	0.89	0.00	0.55	1.04	0.00	0.00
Avail Cap(c_a), veh/h	591	914	688	458	1151	534	617	0	547	206	0	0
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.3	32.0	22.9	17.6	14.1	15.0	28.1	0.0	18.6	32.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	57.8	153.1	202.5	0.3	1.6	14.8	0.0	1.2	72.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	15.8	39.4	30.9	1.0	2.1	5.5	0.0	3.9	7.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.4	89.8	176.0	220.1	14.4	16.6	42.8	0.0	19.9	105.8	0.0	0.0
LnGrp LOS	B	F	F	F	B	B	D	A	B	F	A	A
Approach Vol, veh/h		2128			1021			850			214	
Approach Delay, s/veh		121.0			146.1			34.7			105.8	
Approach LOS		F			F			C			F	

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	17.0	11.0	10.9	31.1		28.0	20.0	22.0
Change Period (Y+Rc), s	4.5	4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s	12.5	7.0	9.0	25.0		24.0	16.0	18.0
Max Q Clear Time (g_c+I1), s	12.8	9.0	7.0	8.2		12.8	18.0	20.0
Green Ext Time (p_c), s	0.0	0.0	0.1	2.3		1.4	0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			108.9
HCM 6th LOS			F

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	386	786	364	977	113	1243	5	559	171	10	170
Future Volume (veh/h)	105	386	786	364	977	113	1243	5	559	171	10	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1870	1870	1870	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	111	406	688	383	1028	115	1308	5	507	180	11	101
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	2	2	2	0	0	0	0	0	0
Cap, veh/h	212	509	687	326	930	104	1053	9	908	217	12	80
Arrive On Green	0.02	0.05	0.05	0.12	0.20	0.20	0.30	0.57	0.57	0.21	0.21	0.21
Sat Flow, veh/h	1739	3469	1516	1781	4652	519	3510	16	1584	654	56	375
Grp Volume(v), veh/h	111	406	688	383	752	391	1308	0	512	292	0	0
Grp Sat Flow(s),veh/h/ln	1739	1735	1516	1781	1702	1768	1755	0	1600	1085	0	0
Q Serve(g_s), s	4.0	8.7	11.0	9.0	15.0	15.0	22.5	0.0	15.1	15.8	0.0	0.0
Cycle Q Clear(g_c), s	4.0	8.7	11.0	9.0	15.0	15.0	22.5	0.0	15.1	16.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.29	1.00		0.99	0.62		0.35
Lane Grp Cap(c), veh/h	212	509	687	326	681	354	1053	0	917	309	0	0
V/C Ratio(X)	0.52	0.80	1.00	1.18	1.10	1.11	1.24	0.00	0.56	0.94	0.00	0.00
Avail Cap(c_a), veh/h	212	509	687	326	681	354	1053	0	917	309	0	0
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.36	0.36	0.36	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	26.8	34.6	21.9	26.0	30.0	30.0	26.3	0.0	10.0	31.1	0.0	0.0
Incr Delay (d2), s/veh	0.8	4.8	21.1	106.7	66.6	79.9	117.1	0.0	0.8	36.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	4.3	14.3	11.1	12.3	14.0	25.9	0.0	4.7	8.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.7	39.4	43.0	132.6	96.6	109.9	143.3	0.0	10.8	67.8	0.0	0.0
LnGrp LOS	C	D	F	F	F	F	F	A	B	E	A	A
Approach Vol, veh/h		1205			1526			1820			292	
Approach Delay, s/veh		40.4			109.0			106.0			67.8	
Approach LOS		D			F			F			E	

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	27.0	20.0	9.0	19.0		47.0	13.0	15.0
Change Period (Y+Rc), s	4.5	4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s	22.5	16.0	5.0	15.0		43.0	9.0	11.0
Max Q Clear Time (g_c+I1), s	24.5	18.0	6.0	17.0		17.1	11.0	13.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		4.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	88.3
HCM 6th LOS	F

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	111	406	827	383	1147	1308	593	370
v/c Ratio	0.53	0.81	0.79	1.23	1.01	1.25	0.56	1.43
Control Delay	37.3	57.8	18.2	154.0	61.3	145.2	5.9	238.2
Queue Delay	0.0	0.0	1.1	0.0	33.7	0.8	0.0	2.1
Total Delay	37.3	57.8	19.4	154.0	95.0	146.0	5.9	240.3
Queue Length 50th (ft)	73	161	244	~173	~228	~397	50	~217
Queue Length 95th (ft)	m92	m191	m293	#339	#315	#520	123	#379
Internal Link Dist (ft)		272			574		493	270
Turn Bay Length (ft)	50			200		500		
Base Capacity (vph)	210	504	1042	311	1135	1050	1065	259
Starvation Cap Reductn	0	0	72	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	252	157	0	37
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.81	0.85	1.23	1.30	1.46	0.56	1.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	179	1028	1019	652	376	548	457	235
v/c Ratio	0.39	1.13	1.17	1.48	0.24	0.89	0.55	1.52
Control Delay	9.3	91.5	99.6	248.0	8.4	48.0	5.2	286.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	91.5	99.6	248.0	8.4	48.0	5.2	286.0
Queue Length 50th (ft)	31	~324	~463	~357	20	120	6	~124
Queue Length 95th (ft)	m34	m#327	m#467	#551	39	#205	64	#256
Internal Link Dist (ft)		272			574		493	270
Turn Bay Length (ft)	50			200		500		
Base Capacity (vph)	475	910	873	441	1592	613	833	155
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	1.13	1.17	1.48	0.24	0.89	0.55	1.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Internal Street Analysis
New trips are assigned to super block based on proposed new household and jobs within each area.

PM Canyon Park Business Center - MXD 1	
In	1360
Out	2120

Superblock Number	HH	Emp	Total	Percent	Trips In	Trips Out	Notes
5	0	468	468	6%	76	119	Trips use 220th Street
6	515	515	1030	12%	168	261	Trips use 17th Ave SE
7	59	781	840	10%	137	213	Trips use 23rd Ave SE/driveway
8	0	449	449	5%	73	114	Trips use 26th Place
9	358	1787	2145	26%	349	544	Trips use 17th Ave
10	525	372	897	11%	146	228	Trips use 17th Ave
11	380	611	992	12%	161	252	Trips use 20th Ave SE
12	0	1537	1537	18%	250	390	Trips use 223rd St
Total	1838	6520	8358	100%	1360	2120	

Note, dots do not represent anything anymore. Used to represent old Business+ growth.

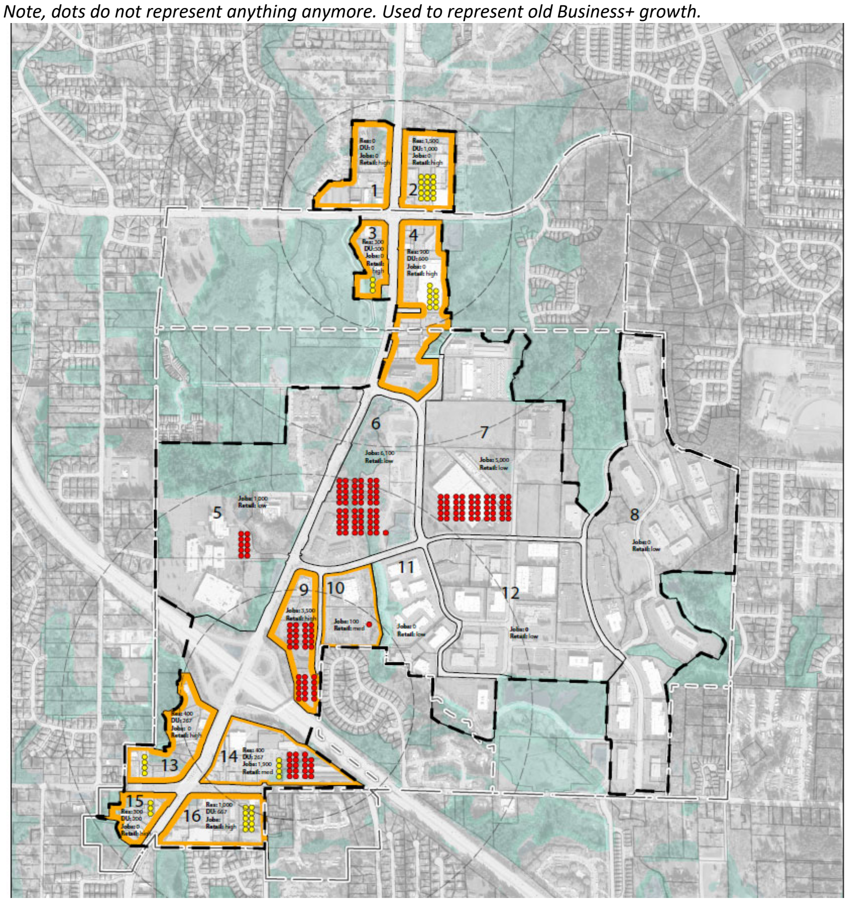


TABLE 7

Generalized **Peak Hour Directional** Volumes for Florida's **Urbanized Areas**[1]

12/18/12

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
1	Undivided	*	830	880	**
2	Divided	*	1,910	2,000	**
3	Divided	*	2,940	3,020	**
4	Divided	*	3,970	4,040	**

Class II (35 mph or slower posted speed limit)

Lanes	Median	B	C	D	E
1	Undivided	*	370	750	800
2	Divided	*	730	1,630	1,700
3	Divided	*	1,170	2,520	2,560
4	Divided	*	1,610	3,390	3,420

Non-State Signalized Roadway Adjustments

(Alter corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways - 10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
1	Divided	Yes	No	+5%
1	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	-25%
–	–	–	Yes	+ 5%

One-Way Facility Adjustment

Multiply the corresponding directional volumes in this table by 1.2

BICYCLE MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/Bicycle Lane Coverage	B	C	D	E
0-49%	*	150	390	1,000
50-84%	110	340	1,000	>1,000
85-100%	470	1,000	>1,000	**

PEDESTRIAN MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	B	C	D	E
0-49%	*	*	140	480
50-84%	*	80	440	800
85-100%	200	540	880	>1,000

BUS MODE (Scheduled Fixed Route)[3]

(Buses in peak hour in peak direction)

Sidewalk Coverage	B	C	D	E
0-84%	> 5	≥ 4	≥ 3	≥ 2
85-100%	> 4	≥ 3	≥ 2	≥ 1

UNINTERRUPTED FLOW FACILITIES

FREEWAYS

Lanes	B	C	D	E
2	2,260	3,020	3,660	3,940
3	3,360	4,580	5,500	6,080
4	4,500	6,080	7,320	8,220
5	5,660	7,680	9,220	10,360
6	7,900	10,320	12,060	12,500

Freeway Adjustments

Auxiliary Lane	Ramp Metering
+ 1,000	+ 5%

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
1	Undivided	420	840	1,190	1,640
2	Divided	1,810	2,560	3,240	3,590
3	Divided	2,720	3,840	4,860	5,380

Uninterrupted Flow Highway Adjustments

Lanes	Median	Exclusive left lanes	Adjustment factors
1	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

[1] Values shown are presented as peak hour directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual and the Transit Capacity and Quality of Service Manual.

[2] Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility.

[3] Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.

* Cannot be achieved using table input value defaults.

** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

Source:
Florida Department of Transportation
Systems Planning Office
www.dot.state.fl.us/planning/systems/sm/los/default.shtm

TABLE 7
(continued)

Generalized **Peak Hour Directional** Volumes for Florida's **Urbanized Areas**

12/18/12

INPUT VALUE ASSUMPTIONS	Uninterrupted Flow Facilities			Interrupted Flow Facilities					
				State Arterials				Class I	
	Freeways	Highways		Class I		Class II		Bicycle	Pedestrian
ROADWAY CHARACTERISTICS									
Area type (lu, u)	lu	u	u	u	u	u	u	u	u
Number of through lanes (both dir.)	4-12	2	4-6	2	4-8	2	4-8	4	4
Posted speed (mph)	70	50	50	45	50	30	30	45	45
Free flow speed (mph)	75	55	55	50	55	35	35	50	50
Auxiliary lanes (n,y)	n								
Median (n, nr, r)		n	r	n	r	n	r	r	r
Terrain (l,r)	l	l	l	l	l	l	l	l	l
% no passing zone		80							
Exclusive left turn lane impact (n, y)		[n]	y	y	y	y	y	y	y
Exclusive right turn lanes (n, y)				n	n	n	n	n	n
Facility length (mi)	4	5	5	2	2	1.9	1.8	2	2
Number of basic segments	4								
TRAFFIC CHARACTERISTICS									
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.547	0.550	0.550	0.550	0.560	0.565	0.560	0.565	0.565
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,950	1,950	1,950	1,950	1,950
Heavy vehicle percent	4.0	2.0	2.0	1.0	1.0	1.0	1.0	2.5	2.0
Local adjustment factor	0.91	0.97	0.98						
% left turns				12	12	12	12	12	12
% right turns				12	12	12	12	12	12
CONTROL CHARACTERISTICS									
Number of signals				4	4	10	10	4	6
Arrival type (1-6)				3	3	4	4	4	4
Signal type (a, c, p)				c	c	c	c	c	c
Cycle length (C)				120	150	120	120	120	120
Effective green ratio (g/C)				0.44	0.45	0.44	0.44	0.44	0.44
MULTIMODAL CHARACTERISTICS									
Paved shoulder/bicycle lane (n, y)								n, 50%, y	n
Outside lane width (n, t, w)								t	t
Pavement condition (d, t, w)								t	
On-street parking (n, y)								n	n
Sidewalk (n, y)									n, 50%, y
Sidewalk/roadway separation (a, t, w)									t
Sidewalk protective barrier (n, y)									n

LEVEL OF SERVICE THRESHOLDS

Level of Service	Freeways	Highways		Arterials		Bicycle	Ped	Bus
	Density	Two-Lane	Multilane	Class I	Class II	Score	Score	Buses/hr.
		%ffs	Density	ats	ats			
B	≤ 17	> 83.3	≤ 17	> 31 mph	> 22 mph	≤ 2.75	≤ 2.75	≤ 6
C	≤ 24	> 75.0	≤ 24	> 23 mph	> 17 mph	≤ 3.50	≤ 3.50	≤ 4
D	≤ 31	> 66.7	≤ 31	> 18 mph	> 13 mph	≤ 4.25	≤ 4.25	< 3
E	≤ 39	> 58.3	≤ 35	> 15 mph	> 10 mph	≤ 5.00	≤ 5.00	< 2

% ffs = Percent free flow speed   ats = Average travel speed

Internal Street Capacity Estimate

	17th/220th	Assumptions
NB	1454	Two lanes divided, non-state rt adjustment, shared RT
SB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
EB	1530	Two lanes divided, non-state rt adjustment, exclusive LT and RT
WB	1454	Two lanes divided, non-state rt adjustment, shared RT
	20th/220th	
NB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
SB	1454	Two lanes divided, non-state rt adjustment, minus 5% because RT is major approach so not necessarily 'exclusive' RT
EB	1530	Two lane divided, non-state rt adjustment, no turn lane adjustment
WB	1148	Two lanes undivided, non-state rt adjustment, no turn lane adjustment
	23rd/220th	
NB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
SB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
EB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
WB	1148	Two lanes undivided, non-state rt adjustmnt, no turn lane adjustment
	26th/220th	
NB	756	One lane undivided, non-state rt adjustment, left turn lane adjustment
SB	756	One lane undivided, non-state rt adjustment, left turn lane adjustment
EB	756	One lane undivided, non-state rt adjustment, left turn lane adjustment
WB		
	223rd/29th	
NB	756	One lane undivided, non-state rt adjustment, right turn lane adjustment
SB	1224	Two lanes divided, non-state rt adjustmnt, no turn lane adjustment
EB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment
WB	576	One lane undivided, non-state rt adjustment, no turn lane adjustment

Attachment D: Transit Analysis

MEMORANDUM

Date: June 23, 2020

To: Bruce Blackburn, Steve Morikawa, and Sherman Goong, City of Bothell

From: Carmen Kwan and Kendra Breiland, Fehr & Peers

Subject: Canyon Park Subarea Plan – Transit Facility Concepts

SE18-0650

The Canyon Park Subarea Plan EIS is evaluating the potential impacts of additional growth to meet PSRC regional growth center criteria. The transportation chapter is focusing on potential impacts to auto/freight, transit, and people walking and biking. Potential mitigation strategies are also explored to support the increase in vehicle traffic with land use growth. Since the SR 527 corridor peak hour congestion is expected to worsen in the future, there is a desire to improve transit access to and from the subarea. In addition, a subarea visioning goal is for Canyon Park to be a regional transportation hub with its existing park-and-ride and bus rapid transit (BRT) service (existing *Swift* Green Line and planned Sound Transit I-405 BRT). This document summarizes a high-level review of potential transit travel time and operating conditions for three potential transit facility concepts.

Transit Facility Concepts

Within the subarea, local Community Transit (CT) and *Swift* Green Line provide transit service along SR 527 and 228th Street SE. To access the existing park-and-ride and serve the business park, transit routes complete a loop within Canyon Park. Local routes enter the business park at the 228th St SE and 29th Ave SE intersection, and the SR 527 and 214th Street intersection, while the *Swift* Green Line enters at the SR 527 and 220th Street intersection (see **Figure 1**).

Under the future No Build Alternative, the City's Comprehensive Plan assumes an additional third northbound through lane constructed from north of 211th Street to north of SR 524 intersection. In the southbound direction, a third southbound through lane would be constructed from SR 524 to 217th Street which would connect to an existing right turn lane to the I-405 northbound on/off-ramps. The SR 527 corridor is therefore generally three general purpose lanes each direction with dual left turns at major signalized intersections, and an additional northbound channelized right-turn lane only lane approach SR 524 intersection.

Figure 1. Existing Transit Facilities.

For the Canyon Park Subarea Plan, three transit facility options are considered:

Center Reversible Transit Only Lane – the SR 527 corridor would be widened to construct a center transit only lane. SR 527 would have two southbound through lanes, dual left turn lanes approaching intersections, the center transit only lane, and three northbound through lanes. This is a capacity reduction of one general purpose lane in the southbound direction compared to the No Build Alternative. The transit only lane would operate southbound in the AM peak period and northbound in the PM peak period to provide improved transit speed and reliability in the main commute direction. During these time periods, transit in the non-peak direction would travel mixed with general-purpose traffic.

Outside Business Access Transit (BAT) Lanes – convert the outside general-purpose lane to a BAT lane. This results in two general purpose lanes and a BAT lane in each direction, and reduced vehicle capacity for general purpose traffic compared to the No Build Alternative.

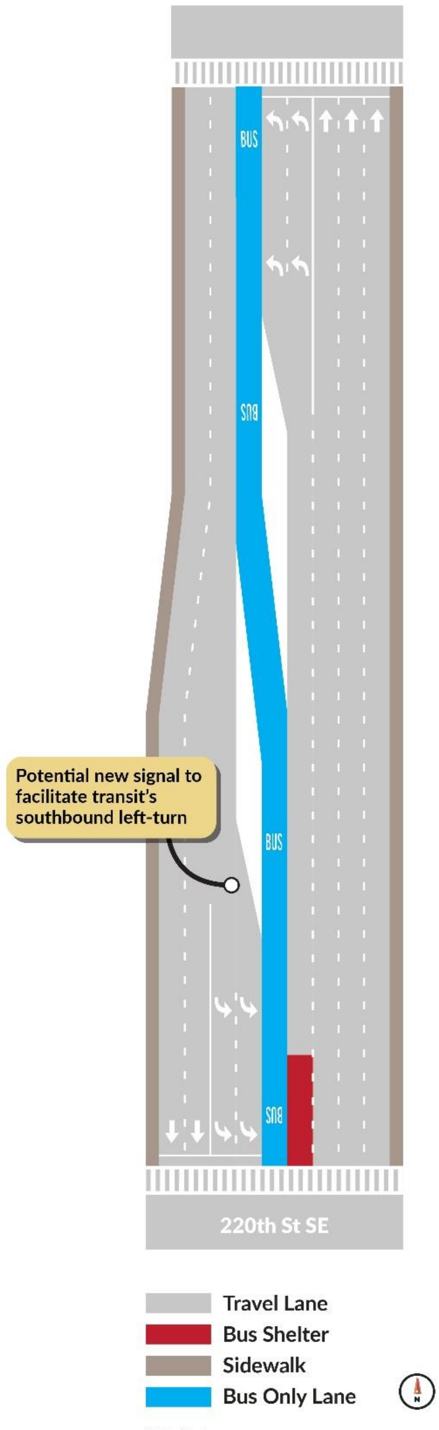
Internal Subarea Parallel Transit Corridor – The SR 527 corridor is congested during current peak periods. As the increased land use would result in additional vehicle traffic and increased congestion, this concept would route transit off SR 527 to an internal transit corridor within the subarea. The route would be from the park-and-ride at the south end to 17th Avenue SE, 220th Street SE, and 20th Avenue SE along the new street extension to SR 524. A new signal at 214th Street SE and 20th Avenue SE would assist transit access turning left from the 20th Avenue extension.

Transit Operations

Center Reversible Transit Only Lane

A conceptual plan view of this concept is shown in **Figure 2**.

Figure 2. Conceptual Drawing of Center Reversible Transit Only Lane



Note: Figure is conceptual only and not to scale.

Implementation of this transit concept would require:

- Corridor re-channelization.
- More transit operation complexity with lane shifts to the center of the roadway to access the transit only lane.
- Major intersection traffic signal revision with bus only signal/bus only phase.
- ITS overhead signs (LED changeable sign such as a red 'X'/'do not enter' and 'Bus Only') to notify buses when to use it.
- Transit stops are required in the median for peak direction traffic, which requires additional widening. This will also require a two-stage pedestrian crossing to reach the roadside. Therefore, this transit facility is likely only for SWIFT Green Line and not local routes to limit widening and constructing new stops.
- If more transit stops are included, generally buses with passenger loading on both sides of the bus would be needed
- Design would need to consider length of left-turn storage approaching intersections so queues do not back into through lanes.
- Potentially a new half traffic signal needed upstream of SR 527/220th Street SE so that SWIFT can transition from the center Transit Only lane to the southbound left-turn lane into Canyon Park.
- Southbound SWIFT stop south of SR 524 would need to be moved north of SR 524 so the Swift can serve it before entering the center Transit Only lane south of SR 524.
- Potentially need both the northbound SWIFT stop in the median (peak direction trip) and existing roadside stop (for non-peak direction trips).
- General purpose traffic would be more delayed compared to without a transit facility on SR 527 with the loss of a southbound general purpose lane and by the extra Bus Only phases needed at 220th Street and SR 524 intersections. Bus Only phases could be about 5-10 seconds at each intersection. General purpose traffic delay would be less than compared to the Outside BAT Lanes scenario.

Outside Business Access Transit (BAT) Lanes

Convert one of three general purpose lanes for a BAT lane in each direction.

- Corridor signing and striping.
- Potential traffic signal revisions (would have been needed if City constructed the Comprehensive Plan's additional SB through lane),or add transit signal priority such as at southbound 214th Street intersection so buses can merge into the southbound left-turn lane at 220h Street intersection..
- General purpose traffic experiences increased delay with the reduced capacity of SR 527 (three general purpose lanes to two general purpose lanes). Longer queues along the SR 527 is also expected. Additional traffic simulation would be needed to determine effects on SR 527 operations if this concept is chosen, and would likely be conducted when coordinated effort among regional partners are in place for Business Access and Transit (BAT) lanes through Bothell and Snohomish County. Regional partners include Community Transit, WSDOT, Snohomish County, City of Mill Creek, and City of Everett.

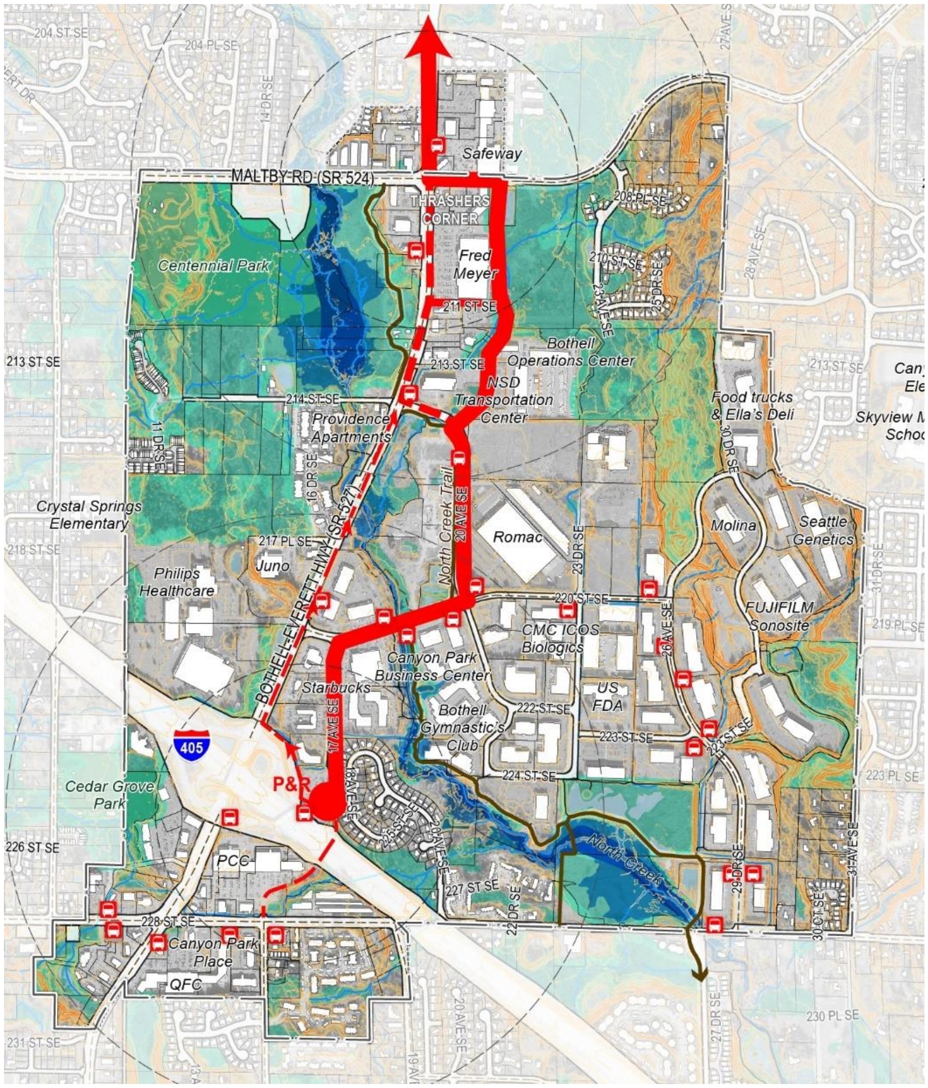
- Can be used by both local and SWIFT transit operations. Transit able to use existing roadside stops.
- Fewer lane changes for transit operators along corridor.
- SR 527/220th intersection delay increases which would affect operations at the I-405 Direct Access Ramp project. Delay increases 109 seconds to 184 seconds (both LOS F) at 220th St intersection, and from 53 seconds (LOS D) to 146 seconds (LOS F) at 214th Street intersection.
- This concept could be utilized by both local and *Swift* Green Line in both directions all hours of the day. The outside BAT lanes would also allow use by right-turning vehicles to access business driveways, which may slow down bus operations. Transit will still be able to bypass peak hour queues along the SR 527 corridor.
- Traffic simulation such as Vissim or SimTraffic is outside the scope of this subarea plan, but should be considered when regional partners are ready to coordinate on a regional transit plan for BAT lanes in the future. This is to better understand potential general purpose queueing.

Internal Parallel Transit Route

Use the internal street network from the park-and-ride, 17th Avenue SE, 220th Street SE, 20th Avenue SE, and the new 20th Avenue SE extension to SR 524. The potential route is shown in red in **Figure 3.** This concept would need to consider:

- Transit would share internal business park streets with general purpose traffic. Thus, transit accommodating infrastructure like transit signal priority and transit queue jump lanes may need to be considered.
- Slightly longer travel route compared to SR 527 corridor (1.5 miles compared to 1.2 miles).
- Better serves internal Canyon Park Business area as transit riders may not need to walk to SR 527.
- Potentially more reliable travel conditions on the internal road compared to SR 527 which is influenced by regional trips.
- New traffic signal needed at 20th Avenue SE/SR 524 with transit signal priority to facilitate bus turn onto and off of SR 524. Signal would be constructed as part of the roadway extension.
- New traffic signal potentially needed at 214th Street SE/20th Avenue SE to facilitate southbound left-turns for transit.
- General purpose traffic on the SR 527 corridor would not be affected as transit is on a new route.

Figure 3. Internal Parallel Transit Route



Transit Travel Time

The northbound PM peak hour transit travel time was estimated from the Canyon Park park-and-ride to north of SR 524 for each scenario. Travel time estimates are a combination of assumed travel speeds between intersections and Synchro intersection delay to travel through the intersection.

No Transit Facility – The No Transit Facility transit travel time assumes transit travels at the same speed as general purpose traffic. Travel time is estimated by the approach delay at each signalized intersection, and an assumed 10 mph travel speed between intersections. This was estimated as the segment speed for an LOS E corridor which operates at 50 percent of a typical 20 mph urban street facility.

SR 527 Reversible Transit Only Lane – Assumes travel speeds of 25 mph between intersections. Intersection delay is added assuming a bus misses the through phase at each major signalized intersection. Travel times could be shorter with transit signal priority to extend the green time when a bus approaches the intersection.

Outside BAT Lanes - The outside BAT lane travel time range is shown as a range where the lower travel time assumes no intersection delay along the corridor. The higher range assumes the bus misses the northbound through phase at every signalized intersection. Transit travel times could be shorter with transit signal priority installed at intersections along the corridor.

Internal Parallel Transit Route – The internal transit route assumed an average transit travel speed of 15 mph, with intersection delay estimated from Synchro.

Table 1. Estimated 2043 PM Northbound Transit Travel Time

Scenario	Travel Time (min)
No Transit Facility	10.5 min
SR 527 Reversible Transit Only Lane	7.3 min
Outside BAT Lanes	5.5 – 9.5 min
Internal Parallel Transit Route	9.1 min

Fehr & Peers, 2020.

- The No Transit Facility travel time on SR 527 could be reduced with transit signal priority at signalized intersections along the corridor.
- The Reversible Transit Only Lane would allow for more consistent travel speeds between signalized intersections and allow transit to bypass general purpose traffic. Transit travel speeds could improve by up to three minutes compared to without a transit facility.
- The Outside BAT lanes could allow for faster transit travel times depending on the level of transit signal priority, however it may still experience some delay traveling with right-turning vehicles.

- The internal parallel transit route may have a similar or slightly better transit travel time compared to traveling on SR 527 corridor, but carries the advantage of having stops closer to destinations within the business park from the transit rider perspective.

Corridor LOS Analysis

The City's concurrency corridor LOS analysis was completed for the PM peak hour for the Preferred Alternative with and without the BAT lane, and with and without the 214th Street Extension. The proposed new 20th Avenue SE/SR 524 intersection was included with the SR 524 corridor analysis. The results for the 'No BAT Lanes' scenario represents the corridor results for the Internal Parallel Transit Route, and generally represents the Reversible Center Transit Only Lane (though intersection delays may be slightly higher to accommodate bus only phases as needed). Corridors not meeting the LOS E standard are shown bolded in red text.

Table 2. PM Corridor LOS Results

Corridor	With 214th Extension		Without 214th Extension	
	No BAT Lanes	BAT Lanes	No BAT Lanes	BAT Lanes
SR 524	E (57)	**F (82)**	E (77)	**F (92)**
SR 527	E (74)	**F (97)**	**F (86)**	**F (112)**
228th St SE/SW	E (56)	E (56)	E (63)	E (63)

Fehr & Peers, 2020. BAT lanes assumed a SR 527 cross-section of a southbound BAT, 2 southbound lanes, 2 northbound lanes, and a northbound BAT lane. All scenarios assumed the 20th Ave Extension, the 219th Place connection, and the 228th Street SE widening project.

The City's corridor concurrency LOS E standard could be met with the 214th Street SE extension between SR 527 and 9th Avenue SE. Adding BAT lanes would require changing the LOS standard, such as to accept higher levels of delay (LOS F) on the SR 527 and SR 524 corridors. The LOS Standard could change from LOS E currently to LOS F (up to 120 seconds). The City of Tukwila has adopted a similar policy for specific corridors in its Urban Center. Or the City could exempt specific intersections (such as the 220th Street SE, 214th Street SE, and SR 524 intersections) from the SR 527 corridor.

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Canyon Park PM Transit Travel Time (No Transit Facility)
assume travel time is Northbound outbound

	From	To	Length (ft)	Speed (mph)	travel time (min)	Intersection Turn Delay (Synchro)	Movement	Total Travel Time (min)	Notes
Segment 1	P&R	I-405 NB Ramp	1000	30	0.38		WBR	0.38	
Segment 2	I-405 NB Ramp	SR 527/220th St	900	10	1.02	103.6	NBT	2.75	
Segment 3	SR 527/220th St	SR 527/214th St	2100	10	2.39	62	NBT	3.42	
Segment 4	SR 527/214th St	SR 527/211st St	920	10	1.05	10.7	NBT	1.22	
Segment 5	SR 527/211st St	SR 527/SR 524	1400	10	1.59	69.4	NBT	2.75	
Total			**6320 feet, (1.2 mi)**					**10.5**	

Assumptions:
Urban travel speeds is 20 mph.
LOS E corridor is traveling at 50% of urban speed.
Assume 10 mph travel between signals.
Add intersection delay

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Canyon Park PM Transit Travel Time (SR 527 Transit Only)
assume travel time is Northbound outbound

	From	To	Length (ft)	Speed (mph)	travel time (min)	Intersection Turn Delay (Synchro)	Movement	Total Travel Time (min)	Notes
Segment 1	P&R	I-405 NB Ramp	1000	30	0.38		WBR	0.38	No WBR delay at I-405 channelized right turn.
Segment 2	I-405 NB Ramp	SR 527/220th St	900	30	0.34	103.6	NBT	2.07	Lane change to inside GP NBT lane before 220th (challenging two-lane change), then continues into transit only north of intersection, where bus goes with NBT phase. Bus stops at median station north of 220th St.
Segment 3	SR 527/220th St	SR 527/214th St	2100	30	0.80	62	NBT	1.83	Stop at SR527/220th and assume miss the through phase. NBT green phase is 88 seconds. Max waiting time is 62 seconds.
Segment 4	SR 527/214th St	SR 527/211st St	920	30	0.35	62	NBT	1.38	Assume bus just missed through phase
Segment 5	SR 527/211st St	SR 527/SR 524	1400	30	0.53	69.4	NBT	1.69	Bus Only phase allows bus to transition from Transit Only lane to outside NBT lane to serve existing bus stop. -or- Potential new traffic signal to stop all NB vehicles to allow the bus to cross over to right-most NBT lane, for the stop at Maltby Rd. Assume bus will still experience NBT intersection delay
Total			**6320 feet, (1.2 mi)**					**7.3**	

Assumptions:
Corridor speed limit is 45 mph, but assume bus will travel at average 30 mph to speed to account for dwell/aceleration/deceleration.

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Outside BAT Lane Concept

	From	To	Length (ft)	Speed (mph)	travel time (min)	Intersection Turn Delay (Synchro)	Movement	Total Travel Time (n	Notes
Segment 1	P&R	I-405 NB Ramp	1000	30	0.38		WBR	0.38	
Segment 2	I-405 NB Ramp	SR 527/220th St	900	12	0.85	88	NBT	2.32	Assume still experience 220th NBT delay. Assume just missed NBT phase
Segment 3	SR 527/220th St	SR 527/214th St	2100	12	1.99	60	NBT	2.99	Assume still experience 214th NBT delay. Assume just missed NBT phase
Segment 4	SR 527/214th St	SR 527/211st St	920	12	0.87	30	NBT	1.37	Assume still experience 214th NBT delay. Assume just missed NBT phase
Segment 5	SR 527/211st St	SR 527/SR 524	1400	12	1.33	75	NBT	2.58	Assume just missed NBT phase and will have to wait for next cycle to start. TSP for bus to travel NBT would decrease intersection delay
Total			**6320 feet, (1.2 mi)**		**5.4**			**9.6**	

Assumptions:
Urban travel speeds is 20 mph.
LOS E corridor is traveling at 50% of urban speed.
Assuming Bus is in an outside BAT lane (converted from GP lane), it can travel at slightly faster speeds, though will still need to share with right-turning vehicles.
Assume 12 mph travel between signals.
Add intersection delay

Travel Time
9.6 min if it missed the northbound through phase at every traffic signal
5.4 minutes if bus does not wait at any traffic signal

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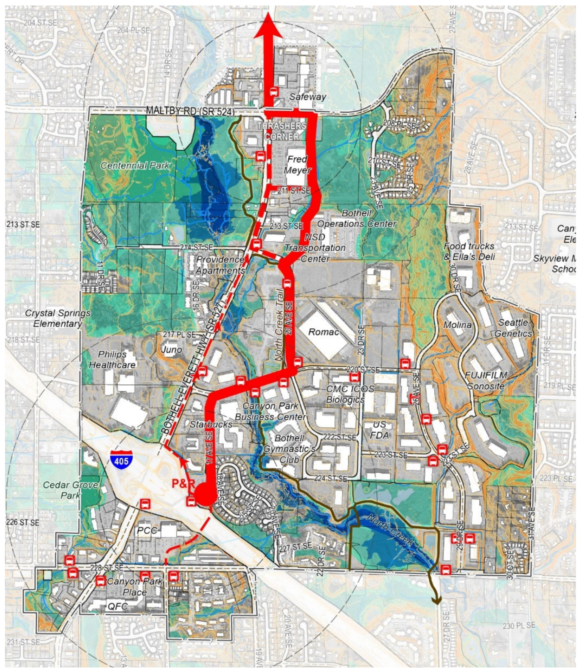
Canyon Park PM Transit Travel Time (Internal Parallel Transit Corridor)
assume travel time is Northbound outbound

	From	To	Length (ft)	Speed (mph)	travel time (min)	Intersection Turn Delay (Synchro)	Movement	Total Travel Ti	Notes
Segment 1	P&R	17th Ave/220th St	1620	15	1.23	10.7	NBR	1.41	NB Approach delay is 24 seconds, largest delay is NBL
Segment 2	17th Ave/220th St	20th Ave/220th St	1110	15	0.84	44.4	EBL	1.58	EB Approach delay is 32.7 seconds, largest delay is EBL
Segment 3	20th Ave/220th St	20th Ave/214th St	1600	15	1.21	0	NBR	1.21	
Segment 4	20th Ave/214th St	New Access 20th Ave/SR524	2500	15	1.89	145	NBL	4.31	Assume TSP could potentially decrease delay.
Segment 5	New Access 20th Ave/SR524	SR524/SR527	750	15	0.57	0	WBR	0.57	WB Approach delay is 103.7 seconds, largest delay is WBT, which may slow buses down.
Total			**7580 feet, (1.5 mi)**					**9.1**	

Sensitivity Test

20 mph	7.6 min
18 mph	8.1 min
15 mph	9.1 min



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5/18/2020 (Revised with SR 524/20th Ave Intersection)

Full Corridor Analysis

with 214th Extension — without 214th Extension

1 SR 524 Corridor

Intersection	Delay (sec) with 214th Extension	LOS with 214th Extension	Delay (sec) without 214th Extension	LOS without 214th Extension
208th St SE / SR 524 & Filbert Dr	62	E	83	F
208th St SE / SR 524 & SR-527	70	E	73	E
208th St SE / 20th Ave (new)	21	C	21	C
WEIGHTED AVERAGE	*57*	*E*	*77*	*E*

2 228th Street SW/SE Corridor

Intersection	Delay (sec) with 214th Extension	LOS with 214th Extension	Delay (sec) without 214th Extension	LOS without 214th Extension
228th St SE & 4th Ave W	65	E	98	F
228th St SE & Meridian Ave	37	D	45	D
228th St SE & 4th Ave SE	18	B	29	C
228th St SE & 9th Ave SE	105	F	66	E
228th St SE & SR-527	131	F	163	F
228th St SE & 15th Ave SE	18	B	18	B
228th St SE & 19th Ave SE	50	D	50	D
228th St SE & Fitzgerald Rd	32	C	32	C
228th St SE & 29th Dr SE	23	C	23	C
228th St SE & 31st Ave SE	21	C	30	C
228th St SE & 35th Ave SE	34	C	34	C
228th St SE & 39th Ave SE	31	C	31	C
WEIGHTED AVERAGE	*56*	*E*	*63*	*E*

5 SR-527 Corridor

Intersection	Delay (sec) with 214th Extension	LOS with 214th Extension	Delay (sec) without 214th Extension	LOS without 214th Extension
208th St SE / SR 524 & SR-527	82	F	113	F
214th St SE & SR-527	53	D	72	E
220th St SE & SR-527	109	F	119	F
I-405 NB Ramps & SR-527	125	F	136	F
I-405 SB Ramps & SR-527	24	C	26	C
228th St SE & SR-527	131	F	163	F
240th St SE & SR-527	47	D	47	D
NE 191st St & SR-527	65	E	57	E
NE 185th St & SR-527	60	E	55	E
NE 183rd St & SR-527	16	B	16	B
Main St & SR-527	4	A	29	C
SR-522 & SR-527	63	E	61	E
WEIGHTED AVERAGE	*74*	*E*	*86*	*F*

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5/20/2020 (Revised with SR 524/20th Ave Intersection)

Outside BAT lane converted from GP lane **Full Corridor Analysis**

with 214th Extension without 214th Extension

1 SR 524 Corridor

Intersection	with 214th Extension Delay (sec)	with 214th Extension LOS	without 214th Extension Delay (sec)	without 214th Extension LOS
208th St SE / SR 524 & Filbert Dr	62	E	83	F
208th St SE / SR 524 & SR-527	124	F	129	F
208th St SE / 20th Ave (new)	21	C	21	C
WEIGHTED AVERAGE	*82*	*F*	*92*	*F*

2 228th Street SW/SE Corridor

Intersection	with 214th Extension Delay (sec)	with 214th Extension LOS	without 214th Extension Delay (sec)	without 214th Extension LOS
228th St SE & 4th Ave W	65	E	98	F
228th St SE & Meridian Ave	37	D	45	D
228th St SE & 4th Ave SE	18	B	29	C
228th St SE & 9th Ave SE	105	F	66	E
228th St SE & SR-527	131	F	163	F
228th St SE & 15th Ave SE	18	B	18	B
228th St SE & 19th Ave SE	50	D	50	D
228th St SE & Fitzgerald Rd	32	C	32	C
228th St SE & 29th Dr SE	23	C	23	C
228th St SE & 31st Ave SE	21	C	30	C
228th St SE & 35th Ave SE	34	C	34	C
228th St SE & 39th Ave SE	31	C	31	C
WEIGHTED AVERAGE	*56*	*E*	*63*	*E*

5 SR-527 Corridor

Intersection	with 214th Extension Delay (sec)	with 214th Extension LOS	without 214th Extension Delay (sec)	without 214th Extension LOS
208th St SE / SR 524 & SR-527	124	F	129	F
214th St SE & SR-527	146	F	166	F
220th St SE & SR-527	184	F	236	F
I-405 NB Ramps & SR-527	125	F	144	F
I-405 SB Ramps & SR-527	24	C	26	C
228th St SE & SR-527	131	F	163	F
240th St SE & SR-527	47	D	47	D
NE 191st St & SR-527	65	E	57	E
NE 185th St & SR-527	60	E	55	E
NE 183rd St & SR-527	16	B	16	B
Main St & SR-527	4	A	29	C
SR-522 & SR-527	63	E	61	E
WEIGHTED AVERAGE	*97*	*F*	*112*	*F*