



City of Bothell™

CANYON PARK SUBAREA Planned Action Draft EIS

Volume 2 | Appendices | December 2019



Prepared by:

BERK
Fehr & Peers
MAKERS
Pertee
The Watershed Company

Volume 2 | Appendices

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A Scoping and Engagement



City of Bothell

Canyon Park Subarea Planned Action Determination of Significance

City of Bothell™ and Request for Comments on Scope of EIS

Description of proposal

The City of Bothell is proposing to update its subarea plan for the Canyon Park neighborhood including its Regional Growth Center to comply with the new Puget Sound Regional Council (PSRC) Centers framework criteria. The Canyon Park subarea plan is an element of the City's *Imagine Bothell... Comprehensive Plan*.

Through this process the City of Bothell would identify amendments to applicable goals, policies, land use designations, zoning districts, development regulations, and capital plans including transportation, parks, and other infrastructure investments. These amendments to plans and regulations would be designed to create opportunities for employment, residential, and mixed-use development that meet a draft Canyon Park Vision developed in 2018 through stakeholder outreach:

- **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 is 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 coming from throughout the region.
- **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.
- **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.

In addition to adopting a subarea plan and associated development regulations, the City of Bothell intends to designate a Planned Action consistent with RCW 43.21C.440 to facilitate future growth consistent with the subarea plan. The City also intends to establish recovery of expenses towards the preparation of an environmental impact statement per RCW 43.21C.428.

Proponent

City of Bothell

Location of proposal

The Canyon Park Subarea is located in Snohomish County and within Bothell city limits and urban growth area. The area is encompassed by SR 524 and Thrashers Corner to the north including shopping areas to the north and south at SR 527; the general alignment of 31st Avenue SE to the east; 228th Street SE to the south including commercial areas on both sides; and the general alignment of 8th Avenue SE on the west. It is traversed by SR 527 and by North Creek. It contains the 300-acre Canyon Park Business

Center and several large light manufacturing businesses as well as commercial and residential areas. In total, the study area equals nearly 1,040 acres.

Lead agency

City of Bothell

EIS Required. The lead agency has determined this proposal is likely to have a significant adverse impact on the environment. An environmental impact statement (EIS) is required under RCW 43.21C.030 (2)(c) and will be prepared. A scoping document indicating likely environmental impacts can be reviewed at our offices.

The lead agency has identified the following areas for discussion in the EIS: natural environment, land use, aesthetics, socioeconomics, transportation & greenhouse gas emissions, public services, utilities, and stormwater.

The City will evaluate a No Action Alternative addressing the current plans and zoning for the area. Two other alternatives would be addressed that vary growth levels, land use patterns, and investments in amenities and infrastructure designed to achieve PSRC Centers criteria and the Subarea Plan draft Vision.

Scoping. Agencies, affected tribes, and members of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. The method and deadline for providing comments is:

Scoping Comment period:	April 8, 2019 to 4:00 p.m., April 29, 2019
<hr/>	
Scoping Comment meeting:	4:00 to 6:30 PM Thursday, April 25, 2019
	Canyon Hills Community Church
	22027 17 th Avenue SE
	Bothell, WA 98021
<hr/>	
Send written comments to:	Bruce Blackburn, Senior Planner
	City of Bothell, Community Development Department
	18415 101st Avenue NE
	Bothell, WA 98011
	Bruce.Blackburn@bothellwa.gov , 425-806-6405

Responsible official

Jeffrey N. Smith, Development Services Manager
City of Bothell, Community Development Department
18415 101st Avenue NE
Bothell, WA 98011
jeff.smith@bothellwa.gov, 425-806-6407

Date: April 8, 2019

Signature: Signature on File

You may appeal this determination of significance to by 4:00 pm April 22, 2019. With respect to any appeal, you should be prepared to make specific, factual objections. SEPA appeals must be submitted precisely as outlined and detailed in BMC Title 14.02 and BMC Title 11 including payment of the applicable appeal fee. Contact Bruce Blackburn, Senior Planner, Bruce.Blackburn@bothellwa.gov, to read or ask about the procedures for SEPA appeals.

Canyon Park Subarea Plan Planned Action Environmental Impact Statement Scoping Document and Fact Sheet



City of Bothell™

April 2019 | City of Bothell

Introduction

The City of Bothell is proposing to update its subarea plan for the Canyon Park neighborhood including its Regional Growth Center to comply with the new Puget Sound Regional Council (PSRC) Centers framework criteria <https://www.psrc.org/centers>. The Canyon Park subarea plan is a portion of the City's *Imagine Bothell... Comprehensive Plan* <http://www.bothellwa.gov/300/Community-Development>.

Through this process the City of Bothell would identify amendments to applicable goals, policies, land use designations, zoning districts, development regulations, and capital plans including transportation, parks, and other infrastructure investments. These amendments to plans and regulations would be designed to create opportunities for employment, residential, and mixed-use development that meet a draft Canyon Park Vision developed in 2018 through stakeholder outreach available through this link <http://www.bothellwa.gov/1176/Canyon-Park-Visioning>. In general terms the Vision Report identifies Canyon Park should be:

- **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 is 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 coming from throughout the region.
- **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.
- **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.

In addition to adopting a subarea plan and associated development regulations, the City of Bothell intends to prepare an Environmental Impact Statement (EIS) and designate a Planned Action consistent with RCW 43.21C.440 to facilitate future growth consistent with the subarea plan. The City also intends to establish recovery of expenses towards the preparation of an environmental impact statement per RCW 43.21C.428.

What is a Planned Action?

The City is proposing that the Canyon Park area be designated as a Planned Action, pursuant to the State Environmental Policy Act (“SEPA”; see RCW 43.21c.440 and WAC 197-11-164 to 172). A planned action provides more detailed environmental analysis during an areawide planning stage rather than at the project permit review stage. Designating a planned action streamlines environmental review for development proposals. Planned actions would be allowed if they meet or exceed proposed land use and environmental performance standards in the planned action ordinance. The City also intends to establish recovery of expenses towards the preparation of an environmental impact statement per RCW 43.21C.428. A diagram of the Planned Action process is included below.

Planned Action Process



What topics would the EIS Cover?

Bothell has identified the following areas for discussion in the EIS: natural environment, land use, aesthetics, socioeconomics, transportation & greenhouse gas emissions, public services, utilities, and stormwater. Existing conditions, potential impacts of each alternative, and mitigation measures would be identified for each topic.

What Alternatives could be studied?

To address the regional growth strategy of creating thriving and livable centers, and to help meet Bothell’s assigned growth targets, over 20,000 employees and residents could be added to the Canyon Park subarea. This would be in addition to the current levels of nearly 15,000 employees and residents. Allowing compact development helps protect environmental resources, and focuses limited financial resources in infrastructure, transit, and amenities to locations where employment and population can most benefit from these investments.

To identify the implications of added jobs and residents, and to ensure environmental impacts are mitigated, the City will evaluate alternatives in the EIS. These include a No Action Alternative which will address the impacts associated with the current Canyon Park Subarea Plan and zoning regulations; this no-action alternative is required under SEPA rules.

Two other alternatives would also be addressed that would evaluate varying levels of growth, land use mixes and patterns, and public and private investments in amenities and infrastructure which would achieve PSRC Centers activity criteria and the Canyon Park draft Vision Report.

The table below compares potential features of the alternatives. Through the scoping process the alternatives would be refined for study.

Potential Alternative Features

Features	Current Canyon Park Subarea Plan (No Action)	Alternative Proposal – Employment Focus	Alternative Proposal – Mixed Use Focus
Potential Changes to Land Use	Per current Comprehensive Plan and Zoning	Allow a range of employment and residential uses with more employment accommodated in the central subarea and mixed use in shopping centers.	Allow a range of employment and residential uses with more mixed-use nodes in north, central, and south near transit facilities. Employment is focused in west, central, and east.
Potential Changes to Development Standards	Current plan and code, no changes proposed.	Consider changes to height, floor area ratios, density, parking rates, and other standards to increase opportunities for job and housing investments.	
Potential investments in transportation, parks, and stormwater	Implement current capital plans.	Consider added investments in transit, roads, and bicycle and pedestrian facilities. Evaluate long-term status of private roads and public road connections. Complete trail connections. Consider need and potential for parks. Address transition to newer stormwater standards and ability to improve water quality. Consider ecological enhancements along North Creek and other wetlands areas.	
Potential Growth above current approximate 15,000 employees and residents in full study area*	Over 9,000 combined jobs and population added per current plans	To be determined. To meet PSRC Centers criteria, 20,000+ employees and residents could be added.	
Regional Growth Center	Keep current subarea plan. Retain current boundaries of about 733 acres.	Prepare a new subarea plan. Consider modifying the size and shape of center based on PSRC criteria. Typically, 640 acres is a maximum size with flexibility on sizing if transit is within center.	

Note: Development capacity is subject to refinements and correction.

How can I participate in the subarea plan? Where can I find more information?

You can find information about the Canyon Park Subarea planning process at the project website: <http://www.bothellwa.gov/1176/Canyon-Park-Visioning>.

Contact Person:

Bruce Blackburn, Senior Planner
City of Bothell, Community Development Department
18415 101st Avenue NE
Bothell, WA 98011
Bruce.Blackburn@bothellwa.gov, 425-806-6405

The City invites your participation. You can:

- Visit the project website (see link above) to learn about the study area and planning process,
- Ask to be added to the email contact list (send your request to Bruce Blackburn above),
- Attend workshops, meetings, and hearings hosted by the City's Planning Commission or City Council,
- Respond to surveys, and
- Provide written comments.

Early comment opportunities include a 21-day scoping period in April 2019.

In summer 2019, the City expects to issue a Draft Planned Action EIS with a 30-day comment period.

Information about events and comment opportunities will be posted at the project website identified above.

Scoping Comments and Summary Responses

November 2019

The City of Bothell issued a Determination of Significance and Scoping Notice on April 8, 2019 and provided a scoping comment period for 21 days until April 29, 2019. The City received the following written comments:

Utility Agencies

- Alderwood Water and Wastewater District, April 26, 2019
- King County Department of Natural Resources and Parks Wastewater Treatment Division, April 25, 2019

Transportation Agencies

- Washington State Department of Transportation, April 29, 2019, email
- Washington State Department of Transportation, April 29, 2019, letter
- Sound Transit, April 29, 2019

Education Agencies

- Brent Planning Solutions on behalf of the Northshore School District, April 23, 2019

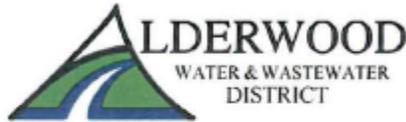
Property and Business Owners

- Mike Mabrito, Sr. Dir. Facilities, Seattle Genetics, Inc.
- Van Ness Feldman, April 29, 2019

Responses to scoping comments are not required under SEPA. The City considered the comments in the development of the EIS alternatives and analysis. As a courtesy the City has provided summary responses to comments in this document in the order listed above.

Other scoping activities included an open house, with results summarized under separate cover.

Canyon Park EIS Scoping Comments – City Responses



3626 - 156th Street SW • Lynnwood, WA 98087-5021 • 425-743-4605 • 425-742-4562 Fax • www.awwd.com

April 26, 2019

Bruce Blackburn, Senior Planner

City of Bothell Community Development Department 18415 101 Avenue NE

Bothell, WA 98011 Bruce.Blackburn@bothellwa.gov

RE: Canyon Park Subarea Planned Action Determination of Significance and Request for Comments on Scope of Environmental Impact Statement

Mr. Blackburn:

Thank you for the opportunity to comment on the scope of City of Bothell's Environmental Impact Statement (EIS) for the Canyon Park Subarea Plan Update. The proposed scope of the EIS appears to cover a broad range of potential areas of concern. The Alderwood Water & Wastewater District (AWWD) provides both water and sewer service within the study area and offers the following comments:

Water

AWWD has a number of projects within the Canyon Park Subarea that will increase capacity and modify water pressure. These system improvements are ongoing and have been identified as necessary to serve the growth and development anticipated under current regulations. The Alternative Proposals in the Canyon Park Subarea Plan Update may significantly change the character of future development, including building heights and densities. These changes may drastically affect the water demands necessary to accommodate that type of development. The EIS should take a careful look at the availability of water in the Canyon Park Subarea.

City Response:

Comment noted. The EIS process will identify the status of the AWWD plans, planned water facilities, water pressure needs, and the process to identify improvements to accommodate the action alternatives.

Sewer

The Canyon Park Subarea covers five sewer sub-basins and AWWD has identified several sewer capacity improvements that are necessary to accommodate the growth and development anticipated under the existing (No Action) Alternative. The Alternative Proposals in the Canyon Park Subarea Plan Update may significantly change the capacity required to serve the area. The EIS should carefully consider the sewer capacity available in the area as well as identifying the capacity needs of the Alternative Proposals.

City Response:

Comment noted. The EIS process will describe the regional and local sewer facilities and plans and the process to identify improvements accommodate the action alternatives.

King County's North Creek Interceptor also runs through the Canyon Park Subarea. Although the County recently did a major project to increase Interceptor capacity, significant new development could use up that capacity faster than expected. The EIS should look at the impacts of all alternatives on this Interceptor as well as King County's future plans for this regional sewer trunk line. It should also be noted that major upgrades to sewer facilities can take extended periods of time to plan, design and construct.

City Response:

Comment noted. The EIS will address the Interceptor and regional sewer treatment capacity in relation to the alternatives.

Respectfully,

Jenifer Galatas

Utility Program Manager
Engineering & Development Dept.
JGalatas@awwd.com
425-743-4605 x7979



King County

Department of Natural Resources and Parks
Wastewater Treatment Division
King Street Center, KSC-
NR-0505 201 South
Jackson Street
Seattle, WA 98104-3855

April 25, 2019

sent via email:

Bruce.Blackburn@bothellwa.gov

Bruce Blackburn
City of Bothell, Community Development Department 18415 101st Avenue NE
Bothell, WA 98011 Dear Bruce Blackburn:

OAP Ref No.1778

The King County Wastewater Treatment Division (WTD) has received the Canyon Park Subarea Planned Action Determination of Significance and Request for Comments on Scope of EIS.

King County WTD facilities, including branches of the North Creek Interceptor, lie within the Canyon Park Neighborhood Sub area plan. We have enclosed a map showing the general locations of the various branches of the North Creek Interceptor in the plan area.

City Response:
Thank you.

WTD requests that City of Bothell complete the following actions:

In order to protect this wastewater facility, WTD requests that the City of Bothell note specific actions to accommodate and protect the King County WTD facilities in the Draft Environmental Impact Statement for the Canyon Park Subarea. If you require additional specific information, including location and size of the WTD facilities, please contact:

Mark Lampard
Local Public Agency Coordinator
King County WTD, Engineering and Technical Resources 201 South
Jackson Street, KSC-NR-0503
Seattle, WA 98104-3855
(206) 477-5414 / mark.lampard@kingcounty.gov

City Response:

Thank you for providing Mr. Lampard's contact information. The City and its consultants are aware of the King County WTD facility and its location. The EIS identifies County WTD facilities.

King County has permanent easements for sewer lines in the Canyon Park Neighborhood Subarea, and must be assured the right to maintain and repair these sewer lines. In the event that a line must be relocated, a new permanent easement must be provided. Please contact King County regarding these easements at:

Bill Wilbert, Supervisor
Permitting Compliance and Property Acquisit
King County Wastewater Treatment Division
201 South Jackson Street, KSC-NR-0512
Seattle, WA 98104-3855
(206) 477-5523 / bill.wilbert@kingcounty.gov

City Response:

Comment noted. Thank you for providing Mr. Wilbert's contact information.

Thank you for the opportunity to review and comment on this proposal.

Sincerely,

Grace Smith
Water Quality Planner

cc: Mark Lampard Local Public Agency Coordinator
Bill Wilbert, Supervisor, Permitting Compliance and Property Acquisition

From: Alm, Peter <AlmP@wsdot.wa.gov>
Sent: Monday, April 29, 2019 11:30 AM
To: Bruce Blackburn <Bruce.Blackburn@bothellwa.gov>
Subject: [EXTERNAL] Canyon Park Environmental Scoping Notice

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

"

Hello Bruce,

Below are WSDOT's comments regarding the Canyon Park Environmental Scoping Notice.

Canyon Park was designated a Regional Growth Center in 1995, prior to the development of requirements for RGC designation. The requirements for Urban Growth Centers are well laid out now, and I have a hard time seeing how this small area with multiple constraints is going to do that, or even meet their growth targets. Here are some of the concerns I have regarding the city's desire to remain a designated RGC and items/questions I would like to see addressed in the PA-EIS.

Thank you for integrating these concerns into your comment letter.

City Response: Thank you for providing additional comments on subject areas beyond state transportation functions.

- **Transportation**

- The majority of study area internal roads are privately-owned ROW. Lack of standards on private internal road networks was also a major Stakeholder concern. How will the city address this?
- 42% of public comments were transportation-related: heavy commuting congestion, ped/bike infrastructure, traffic on 228th St SE, more P&Rs and transit service, difficult left-turns, need more stop lights. "Recruiting new employees to Canyon Park is challenging because of traffic, and the commute is impacting quality of life for existing employees." 228th is highlighted for one of the main mixed-use development areas. Does the city have the ROW and the funding to address existing community traffic concerns, and how will it meet the future traffic demand?
- Next largest concern (17% of public comments) was declining quality of life, especially freeway noise, and the desire to preserve Bothell's small town character, nature, PROS, and its "country village" feel.
- The majority of people accessing the Canyon Park Business Park are funneled to only three main access points that are reached via congested corridors. "During

- a site visit, long queues were observed on NB SR 527 as early as 3 pm.” (consultant, Existing Conditions Report)
- Bothell has adopted LOS E for allowable average corridor delay, meaning that the City evaluates traffic congestion at the corridor level. While the corridors are expected to meet the LOS E standard in 2035, the following individual intersections near the subarea are expected to operate at LOS F:
 - 228th Street SE/9th Avenue SE (planned transportation improvements include unfunded improvements and widening on 228th (EC report)
 - 228th Street SE/SR 527
 - SR 527/220th Street SE
- Note that the adopted LOS standard for intersections on SRs 527 and 524 is LOS E-Mitigated and explain how this standard will be met.
- SR 527 has un-buffered bicycle lanes. Signalized crosswalks are available to access the business park at 220th and 214th Streets which is approximately 0.4 mi apart. The discomfort of biking on a major arterial and the lack of options for crossing may be inhibiting the city’s desire to support ped/bike modes. “During a site visit, few people were observed walking or biking on the street.” (EC report) How will this be addressed?

City Response: The EIS addresses the effect of alternatives on multiple modes addressing the City’s levels of service. The potential for improvements to motorized and non-motorized facilities is addressed.

The growth associated with the alternatives including the business park is reviewed for effects on the public road system and levels of service, and the major business park access points from the public road system are evaluated. The City will be evaluating the potential for the conversion of private streets to public streets and a refined access and circulation analysis associated with a preferred alternative as part of a draft subarea plan that can be folded into the Final Environmental Impact Statement to be issued in the spring of 2020. This refined analysis of access is anticipated to fit within the overall evaluation of transportation levels of service in the Draft EIS.

- **Environmental constraints.** Meeting the growth targets is going to stress the following resources:
 - The study area contains all five regulated critical areas: wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas. It additionally contains beautiful natural areas, salmonid-bearing streams, floodways and floodplain. It is particularly rife with wetlands and steep slopes.
 - The subarea is located within the Lake Washington/Cedar/Sammamish Watershed, Watershed Resource Inventory Area (WRIA) 8. WRIA 8 is considered to be the most densely populated, developed and degraded watershed within the Puget Sound Basin. The entire Canyon Park Subarea is also located within the North Creek drainage basin.
 - North Creek supports runs of six federally-listed threatened fish species.
 - North Creek has been placed on Washington State’s 303d list for fecal coliform, pH, temperature, dissolved oxygen and bio-assessment. How does this balance

out with the desire to make North Creek more accessible for recreation? And with thousands of new residents?

- The stakeholder/community Visioning done last year showed a clear desire to protect and maintain the natural environment and to preserve and enhance natural amenities, open space and greenery. How does increasing the residential and employment population by 233% dovetail with that?
- The existing subarea plan contains “implementation of the North Creek Watershed Management Plan” – how will that be integrated?

City Response: Comment noted. The EIS addresses the Natural Environment and potential for adverse and beneficial effects of the alternatives.

- **Stormwater Management**

- The present 2-year flood discharge exceeds the historical 100-year discharge, and 100-year flows have increased by 50 percent.
- The current stormwater management system consists of both public and privately-owned flow control and water quality facilities. Both controlled and uncontrolled runoff within the subarea is conveyed to various wetlands and creeks and eventually discharge into North Creek. The consultant for the Existing Conditions report found that “the City has a significant amount of storm drain pipe, culverts, catch basins, detention facilities and water quality treatment facilities to maintain and insure functionality. ... it may be necessary to review the planned improvements and determine if any major sewer capital improvements projects will need to be done in the short-term to support growth within the Canyon Park Sub-Area.”
- Is this something the City is prepared to address? Will utilize impact fees for development and re-development be utilized?

City Response: Comment noted. The EIS addresses Stormwater Management and other infrastructure in the Utilities section of the EIS. The City manages stormwater through its stormwater utility and application of its stormwater manual. The effect of planned transportation improvements on critical areas and habitat is addressed in the EIS.

- **Equity**

- From the maps presented in the background materials, it appears that mixed use and MFR uses exist and are planned adjacent to I-405 and SR 527. How will these areas be protected from noise and poor air quality?
- Please include a discussion of university housing in the subarea.
- An evolution towards higher quality office space in the Business Park could potentially displace existing businesses, many of which rely on the lower leasing costs of flex space in the Business Park. The conversion of flex space and increases in rents could result in the loss of affordable space for tenants, including startups and small businesses, and increase turnover in the area. Long-term mixed use development will likely require redevelopment of existing flex and office space in the Business Park. (EC Report) Accommodating the growth of existing and new businesses and continuing to meet the needs of both small and large businesses was another Stakeholder priority. How to avoid or mitigate displacement/gentrification?

City Response: The EIS addresses the potential for business displacement in the Socioeconomics section.

At a programmatic level the Action Alternatives consider mixed uses in retail areas, similar to allowances found today in the No Action Alternative. The proximity of residential uses to air and noise sources is addressed in terms of Land Use compatibility in the EIS.

Additionally, EIS addresses GHG/Air Quality. Allowing for mixed uses and non-motorized transportation improvements can reduce per capita greenhouse gases and reduce air emissions over other forms of development and transportation investments.

Thank you,

Peter Alm

WSDOT – NW Region Development Services

206-440-4711

PO Box 330310 MS 240

15700 Dayton Avenue North

Seattle, WA 98133-9710



1 405 Program Office
600-108th Avenue NE Ste. 405
Bellevue, WA 98004
425-456-8582
TIY: 1-800-833-6388
www.wsdot.wa.gov

April 29, 2019

Bruce Blackburn, Senior Planner
City of Bothell, Community Development
Department 18415 101 Avenue NE
Bothell, WA 98011

RE: City of Bothell, Canyon Park Subarea Plan EIS Scoping Comments

Dear Mr. Blackburn,

This letter represents the Washington State Department of Transportation's (WSDOT) comments on the City of Bothell Canyon Park Subarea Planned Action.

We have been working with the City on the I-405, SR 522 to SR 527 Capacity Improvements Project over the past year. This project will provide a new express toll lane (ETL) direct access at 17th Avenue SE, into the Canyon Park area. The planned action will change the land use and transportation dynamics of the Canyon Park area.

WSDOT has the following comments:

1. Overall future transportation improvements assumed in the EIS will need to support the proposed land use assumptions, including density, population, employment and types of use.

City Response:

Comment noted. An understanding of transportation impacts upon the public transportation system is an integral part of the evaluation of all alternatives for the DEIS.

2. Traffic analyses should consider the I-405, SR 522 to SR 527 Capacity Improvements Project as a baseline condition.

City Response:

Comment noted. All alternatives, including the No Action alternative, will assume the Express Toll Lane (ETL) expansion from SR522 to SR527 and the ETL on and off ramp to the WSDOT Park and Ride facility on 17th Ave SE as a baseline condition.

WSDOT is in the best position to evaluate the direct impacts of the improvements associated with the WSDOT project.

3. The planned action would likely increase traffic volume and congestion in the area. Analysis of the level of service, queueing and multimodal operation impacts along with proposed mitigation should be captured. The traffic analysis should address east-west trips into and out of the study area, including 228th Street SE and SR 524 between 9th Avenue SE and 39th Avenue SE. The analysis should also include the following locations:
- SR 527/Eastbound 1-405 Ramp Terminal
City Response:
This intersection will be analyzed
 - SR 527/Westbound 1-405 Ramp Terminal
City Response:
This intersection will be analyzed
 - SR 527/220th Street SE
City Response:
This intersection will be analyzed
 - SR 527/214th Street SE
City Response:
This intersection will be analyzed
 - SR 527/SR 524 (Maltby Road)
City Response:
This intersection will be analyzed
 - 17th Avenue SE/220th Street SE
City Response:
This intersection will be analyzed
 - 17th Avenue SE/Canyon Park Park and Ride access
City Response:
This intersection is best analyzed by WSDOT as part of WSDOT's environmental analysis of the ETL expansion project because WSDOT will have more complete information of the planned improvements and transportation impacts and specifics of existing traffic using this intersection.
 - 1-405 Direct Access Ramp at 17th Ave SE
City Response:
See response above.

4. The Canyon Park Vision's stated plan for substantial growth will increase demand for parking and pick-up/drop-off trips at the Canyon Park Park and Ride. While improvements to walkable infrastructure, ridesharing service, and local public and private transit services may help offset some of the increased demand, the analysis should evaluate how the Canyon Park Park and Ride will be impacted, and if additional parking and/or transit-oriented development opportunities will be included as part of the proposed subarea plan.

City Response:
Comment noted.

5. The Canyon Park area is defined as a transportation hub in the Existing Conditions document. The EIS should provide information about what is assumed for the existing and proposed transportation network for each mode—general traffic, HOV/ETL users, transit, truck traffic, bicycles, and pedestrians. Infrastructure enhancement for these modes should be included as part of the evaluation.

City Response:
Comment noted. An understanding of these mode traffic impacts is part of the City's environmental review.

WSDOT appreciates the opportunity to provide these scoping comments. If you have any questions, please do not hesitate to contact me at henryk@wsdot.wa.gov.

Sincerely,

Kim Henry, PE

I-405/SR 167 Program Administrator



Bruce Blackburn, Senior Planner
City of Bothell Community Development
Department 18415 101 Avenue NE
Bothell, WA 98011

RE: Scoping Comments for Canyon Park Subarea Plan Environmental Impact Statement (EIS)

Dear Mr. Blackburn

Thank you for the opportunity to provide scoping comments on the above- referenced EIS. Sound Transit is engaged in productive work with the City of Bothell to implement the new bus rapid transit service (BRT) in the region via the newly named Stride BRT service. Stride will serve Bothell via both I-405 and SR 522/NE 145th corridors.

Stride investments will connect Bothell residents and businesses to local and express transit service, and will support the type of mixed use and higher density development that the City envisions for the Regional Growth Center (RGC) in Canyon Park. Sound Transit supports the City's goals for the designated regional growth center and we hope to continue working with city staff to evaluate the potential for transit-oriented development in the BRT station area.

City Response:

Comment noted. Thank you.

We appreciate Bothell's recognition that certain facilities and infrastructure are integral to operating transit service. The Stride bus operations and maintenance facility is part of the voter-approved ST3 package of high capacity transit improvements. The representative site is within the Canyon Park area. The currently-vacant site is located just south of Bothell's Public Works Operations Center shared with the Northshore School District bus maintenance facility, also in the RGC.

This representative site was identified because it meets site size and accessibility needs and is proximate to the crossing point of the Stride lines. Sound Transit plans to design and operate the maintenance facility so as to be an asset to the community and a good neighbor to surrounding land uses.

Sound Transit requests that the EIS consider the both I-405 and SR 522 BRT service and the bus operations and maintenance facility as existing conditions in each of the alternatives analyzed. We also request that the City consider and identify any negative impacts that could occur to operations of that facility and to BRT service associated with the alternatives analyzed.

City Response:

The I-405 and SR-522 BRT routes and the Bus Maintenance Operations Facility do not currently exist and an evaluation of these routes and facilities as an 'existing condition' is

problematic. The alternatives provide a vision and overall land use pattern for employment and residential growth to support ongoing PSRC designation of this area as an employment center. Planned transportation investments such as the BRT lines are addressed in the EIS in the context of the City's multimodal level of service analysis.

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).

Also, the City is considering a Planned Action for the subarea and there are limitations on covering essential public facilities that are not accessory to or part of a residential, office, school, commercial, recreational, service, or industrial development that is designated a planned action. (RCW 43.21c.440 (1)(f))

Sound Transit is providing for multi-use facilities that meet Bellevue's Spring District vision, and the City looks forward to similar discussions with Sound Transit in the Canyon Park Regional Growth Center.

Sound Transit looks forward to continuing to partner with the City of Bothell in the implementation of BRT service, stations, parking facilities and supporting infrastructure. Please contact Bernard van de Kamp, East Corridor Development Director, at 206-903-7413 or in email at Bernard.vandekamp@soundtransit.org, if you have any questions.

City Response:

Comment: Thank you for providing Mr. VandeKamp's contact information.

Karen Kitsis
Deputy Executive Director
Office of Capital Project Development
cc: Paul Comish, Project Director, HCT Development
Kamuron Gurol, HCT North Corridor Development Director
Bernard van de Kamp, HCT East Corridor Development
Director
Luke Lamon, GCR East Corridor Manager



April 23, 2019

Bruce Blackburn, Senior Planner
City of Bothell, Community Development
Department 18415 101st Avenue NE
Bothell, WA 98021

Re: City of Bothell - Canyon Park Subarea Planned Action Northshore School District Request for Comments on Scope of EIS

Dear Mr. Blackburn,

The Northshore School District No. 417 (District) thanks the city and planning staff for including the District in the Canyon Park Subarea Planned Action Determination of Significance and Request for Comments on Scope of EIS. It is our understanding that the city will be adopting a subarea plan and associated development regulations as a result of the EIS process. Scoped items for consideration need to address potential impacts to the District from the alternatives to be included in the EIS.

City Response:

Comment noted. The DEIS will include an analysis of school impacts resulting from the action alternatives.

Residential densities directly generate impacts to the District facilities as well as to the existing infrastructure. Student generation from any increased residential density must be considered and evaluated on how they impact the existing and planned school facilities within and adjacent to the subarea. In addition, walking conditions to school facilities must be identified for their adequacy and, if lacking, mitigation measures must be provided. The District has worked well with the city on issues of Safe Walk considerations with proposed development; however, these efforts have fallen short. It is common for developers to claim that the requirement of providing Safe Walk routes exceeds the actual impact from the proposed development. This can leave the District in a situation where bussing may be needed within their Safe Walk distance. In these situations, the cost for the added bus trips may not be compensated by state funding.

City Response:

Comment noted. The DEIS includes an analysis of the City's non-motorized levels of service, the status of sidewalk and pedestrian facilities, and identify potential mitigating measures.

The District looks forward to reviewing the EIS and how these issues will be addressed as the city moves forward with the subarea adoption. If I can provide any additional information on the EIS and scoping, please don't hesitate to contact me directly at either 425.971.6409 or via email at lbrent@brentplanningsolutions.com.

Sincerely,

BRENT PLANNING SOLUTIONS, LLC

Laura S. Brent, AICP cc: Traci Rogstad, Northshore School District No. 417

Reply Reply All Forward



Fri 4/26/2019 4:41 PM

Karen Walter <KWalter@muckleshoot.nsn.us>

[EXTERNAL] RE: Canyon Park Environmental Scoping Notice

To Bruce Blackburn|

Retention Policy Never Delete (Never)

Expires Never

You forwarded this message on 4/29/2019 8:40 AM.

Bruce,

Thank you for sending us this Scoping Notice for the City of Bothell's Canyon Park Subarea Plan and forthcoming DEIS. The areas identified to be considered in the DEIS are rather broad as one would expect for a scoping notice. However, the EIS needs to look carefully at a couple of issues that keep coming up on various individual projects that should be addressed programmatically:

1. Stream typing for streams in the project area that flow into North Creek. Over the years, we have seen several streams incorrectly classified as non fishbearing due to artificial barriers which can and should be replaced. If any project area streams meet the physical criteria from WAC 222-16-031 for presumed fish use, then these streams should be considered potential fish bearing, unless there is a documented natural barrier downstream.

City Response:

Comment noted. The correct identification of fish-bearing streams is an important environmental consideration. The EIS maps streams and identifies critical areas regulations.

The stream information should be used when considering road improvements that involve stream crossings and potential barrier culverts need to be determined. A culvert inventory and plan for replacing identified fish passage barriers should be part of this plan.

City Response:

Comment noted. WDFW Washington State Fish Passage Mapping (<https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html>) and associated ratings for stream crossings within the planning area have been reviewed as part of the EIS process. Full or partial barrier culverts within the planning area are not prevalent, and none occur along the major stream, North Creek. However, where the plan includes transportation projects associated with existing full or partial fish passage barriers, such barriers and the amount and importance of habitat that

would be made available by their correction will be taken into consideration when determining the order and scheduling of such improvements.

Riparian buffers is another important consideration as the permanent loss of existing trees or the opportunity to replace trees where there is only grass or shrubs is an important feature for fish habitat and water quality.

Finally, fish-bearing waters is an important consideration for stormwater discharges from both quantity and quality perspectives. Stormwater retrofit needs should be avoided with more careful and conservative planning of stormwater inputs into existing or potential fish bearing streams.

City Response:

Comment noted. The EIS addresses stormwater management in a Utilities section, as well as the Natural Environment section. Much of the area was developed in the 1980s and 1990s. Modern surface water regulations are substantially improved over those in effect at that time.

2. Potential flood control issues on North Creek

Portions of North Creek are flowing through the planning area. Previous facilities to manage North Creek floodwaters are antiquated and new approaches are needed that do not result in permanent dredging to maintain flood conveyance to protect existing and new infrastructure and buildings as dredging will continue to degrade fish habitat and affect fish production. With a subarea plan, other alternatives need to be considered including modifying existing berms/ levees to provide improved conveyance and opportunities to restore fish habitat functions and conditions. There may also be a need to modify existing properties/infrastructure in the planning area to address the larger flood control and fish habitat issues. Part of this review and analysis should include updated flood mapping. We have found several jurisdictions using 10-15 year old flood maps that are clearly outdated and still used for project level permitting.

City Response:

Comment noted. Using the most recent adopted flood plain information is an important element of understanding impacts associated with development of Canyon Park. The City is not aware of any ongoing or planned dredging in the study area.

We appreciate the opportunity to review this proposal and look forward to see a robust EIS that addresses these issues particularly if there will be no future project level environmental review done for individual projects.

Best regards,

Karen Walter
Watersheds and Land Use Team Leader

*Muckleshoot Indian Tribe Fisheries Division
Habitat Program
39015-A 172nd Ave SE
Auburn, WA 98092*

 Reply  Reply All  Forward

 **Mike Mabrito** <MMabrito@seagen.com>
RE: [EXTERNAL] Upcoming Canyon Park Activities

Mon 4/22/2019 8:07 AM

To Bruce Blackburn
Cc Monique Greer

Retention Policy Never Delete (Never) Expires Never

 You replied to this message on 4/22/2019 8:16 AM.

Action Items

Bruce,

Thank you for all of the information to date on the Canyon Park project. It is exciting and I hope to make the open house on Thursday. Prior to this, I wanted to share with you some of Seattle Genetics' concerns about the proposal.

Residential and some commercial development in the areas indicated will be a very exciting evolution for the area. The proposal does create some concerns for us as the largest employer in the park (and in Bothell) so we would hope that efforts going forward will adequately address these concerns so as to continue to make the park a welcoming place for Seattle Genetics.

1. Vehicular segregation of business traffic from residential traffic. If 220th or 29th become major feeders into the residential developments, this could further aggravate prime time backups and delays despite the fact that you would assume the residential traffic would be 'reverse commuting.'

City Response:

Transportation impacts is indeed an important element of this effort and will be an important focus of this environmental analysis. 220th ST SE and 29th /Ave SE are currently privately owned by the Canyon Park Business Center Owner's Association. The City's evaluation focuses on the City's corridor and intersection levels of service on public roads. The major access points to the business park are addressed to evaluate City levels of service on public roads. The potential transportation improvements and benefits or impacts are also addressed.

2. If the City takes over the streets in the park, we would hope that there would be some thought and investment put forth on creating a better flow of traffic on the main park arterials during prime time traffic peaks.

Additional traffic congestion on major arterials around the park could result from the number of residential units being planned. Again, we would hope that there would be some thought and investment put forth to mitigate this.

City Response:

Discussions between the City and the Owner's Association regarding the transfer of the private streets to the City of Bothell are on-going. The growth associated with the alternatives including the business park is reviewed for effects on the public road system and levels of service, and the major business park access points from the public road system are evaluated. Currently, private roads are not subject to City public street standards, and instead meet business park standards. The City will be evaluating the potential for the conversion of private streets to public streets and a refined access and circulation analysis associated with a preferred alternative as part of a draft subarea plan that can be folded into the Final Environmental Impact Statement to be issued in the spring of 2020. This refined analysis of access is anticipated to fit within the overall evaluation of transportation levels of service in the Draft EIS.

3. With major tracts of land that were slated for business use now being used for residential development, the expansion opportunities for a growing company are now much more limited. Would there be any consideration around limiting, by strengthening/changing current zoning, the amount of land that could be converted to residential or non-business use?

City Response:

Both action alternatives being evaluated contemplate significant areas (64% to 80% of net growth) being devoted to 'business' uses such as offices, light manufacturing and other commercial uses.

Please feel free to contact me anytime to discuss if you would like. Otherwise, hope to see you on Thursday.

Kind regards,

Mike Mabrito
Sr. Dir. Facilities
Seattle Genetics, Inc.



719 Second Avenue, Suite 1150
Seattle, WA 98104-1728
206-623-9372
vnf.com

April 29, 2019

Bruce Blackburn
Senior Planner
City of Bothell
Community Development Department
18415 101st Avenue NE
Bothell, WA 98011

Sent by email: Bruce.Blackburn@bothellwa.gov

RE: Scoping Comments, Canyon Park Subarea Plan Planned Action Environmental Impact Statement

Bruce:

As you know, our firm represents the Canyon Park Business Center Owners Association (“CPBCOA”). The CPBCOA appreciates the opportunity to provide scoping comments to the City of Bothell (“the City”) for the Environmental Impact Statement (“EIS”) of the proposed Canyon Park Subarea Plan Planned Action (“the Planned Action”).

CPBCOA is comprised of over 30 property owners. There are over 100 businesses within the Canyon Park Business Center (“CPBC”), many of which are within the biomedical and life sciences manufacturing and research and development industries.

CPBC is located within the City of Bothell’s Canyon Park Regional Growth Center (“RGC”). The RGC is a major employment center within the City and the region, with over 10,000 jobs.

The Planned Action will have significant impacts on the CPBC. These impacts will affect businesses, employees, residents and property owners within the Park. We submit the following scoping comments to the City and request that these impacts be fully identified, analyzed and mitigated through the EIS process.

1. Transportation Impacts

The CPBCOA anticipates that the Planned Action will have adverse transportation impacts on the CPBC and within the RGC. There is currently significant vehicular congestion and intersection delays that within the CPBC and in the surrounding area of the RGC.

The impacts of the planned WSDOT I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project are unknown at this time. In our meetings with WSDOT staff and

consultants, WSDOT responded to concerns about these impacts by stating that these that the WSDOT project will simply shift traffic patterns around the 405/527 interchange without creating additional impacts. WSDOT staff minimized the potential impacts to the CPBC road system on the grounds that the use of the express access lanes will be limited due to the cost of the tolls. To date, WSDOT has not conducted a traffic analysis and nor provided any data to support these responses.

City Response:

WSDOT has identified it will have its complete assessment of transportation impacts in the spring of 2020.

In addition, the CPBCOA was recently contacted by Sound Transit regarding its plans to develop a bus maintenance facility in CPBC to support its Bus Rapid Transit Program. To date we have received no information regarding the potential transportation and other impacts from this proposal, but we anticipate those effects will be significant both for CPBC and for the surrounding area

City Response:

Sound Transit has not submitted definitive information describing the scope of the Bus Maintenance Facility. The impacts of that facility will indeed be important to understand and evaluate once fully known.

The Planned Action EIS must account for the changes in traffic patterns and transportation modes that will result from the WSDOT project and Sound Transit projects, in addition to analyzing the traffic impacts from the additional development that will result from the Planned Action.

City Response:

Timing is a critical component in this process because several pieces of information are needed to fully understand the impacts of all of these actions. WSDOT is conducting its own environmental review of the ETL project and Sound Transit will be required to conduct its own environmental analysis of the bus base facility. Certainly, the City must also fully evaluate the impacts of its actions regarding the Subarea Plan Update.

A. We request that the EIS provide a complete evaluation of impacts to traffic volumes and intersection operations within the CPBC and the RGC based upon the build out of the WSDOT project, the Sound Transit project and the Planned Action. These intersections include the following:

- 17th Ave SE/220th St SE
- 220th St SE/SR527
- 20th Ave SE/220th St SE
- 214th St SE/SR527
- 23rd Ave SE/220th St SE
- 26th Ave SE/220th St SE
- 26th Ave SE/233rd St SE
- 26th Ave SE/228th St SE

City Response:

The City recognizes the importance of the above identified intersections to the area's transportation system particularly the intersections where the public and private street systems connect.

- B. We request that the EIS evaluate a full range of mitigation options for transportation impacts, including, but not limited to, additional north-south connections within the RGC to alleviate congestion on SR527.

City Response:

Comment noted. The City will conduct transportation modeling in both the DEIS and FEIS.

- C. We request that the EIS evaluate the average and peak in-bound and out-bound delay for CPBC employees and visitors both with and without the Planned Action.

City Response:

Comment noted.

- D. Many employees in CPBC use public transit. We request that the EIS evaluate impacts to transit service both with and without the Planned Action.

City Response:

Comment noted. Transit service is an important component of the overall transportation system. This includes Sound Transit's planned I405 and SR522 and Community Transit's SR527 Bus Rapid Transit (BRT) services. One of the purposes of the WSDOT project is to facilitate BRT services to the Canyon Park area.

- E. We request that the EIS include an analysis of the projected increase in transit ridership and use of the park and ride lot within CPBC. The increased use of the park and ride lot must be mitigated in order to avoid spillover parking impacts on properties within CPBC, which would adversely affect existing businesses and property owners.

City Response:

Comment noted.

- F. We request that the EIS include an analysis of the projected increase in transit ridership and the resulting increase in demand for "last mile" transportation within the CPBC and RGC.

City Response:

Comment noted. 'First and last mile' considerations are an important consideration within the Canyon Park RGC.

2. CPBC Roads

The roads within CPBC are privately owned and maintained by the CPBCOA. We are unaware of any existing easement or other right that would authorize vehicles that are not bound for a business or residence within the CPBC to travel through the CPBC.

City Response:

Comment noted.

- A. We request that the EIS evaluate the impacts of existing cut through traffic on CPBC roads and analyze the projected growth of cut through traffic with and without the Planned Action. Additional road connections from the CPBC to SR524 should be considered for potential mitigation for these impacts.

City Response:

Comment noted. The growth associated with the alternatives including the business park is reviewed for effects on the public road system and levels of service, and the major business park access points from the public road system are evaluated. Currently, private roads are not subject to City public street standards, and instead meet business park standards. The City will be evaluating the potential for the conversion of private streets to public streets and a refined access and circulation analysis associated with a preferred alternative as part of a draft subarea plan that can be folded into the Final Environmental Impact Statement to be issued in 2020. This refined analysis of access is anticipated to fit within the overall evaluation of transportation levels of service in the Draft EIS.

- B. Over the past year, the CPBCOA has conducted significant analysis to determine the required improvements to the CPBC roads to allow for dedication and acceptance by the City of Bothell. We request that the EIS evaluate the effects on Planned Action if the CPBC roads remain private or are dedicated to the City.

City Response:

Comment noted. See above. The potential of the private streets being converted to public streets is an on-going conversation that should be understood as the City identifies a preferred alternative.

3. Land Use

The CPBC is currently developed with a combination of commercial and industrial businesses. Since the designation of CPBC as a RGC, however, the City of Bothell has established a broader mixed use vision for the CPBC going forward, including residential and service businesses. In recognition of that vision, the CPBCOA recently decided to permit a limited amount of residential development in the CPBC by approving the Third Amendment to the Amended and Restated Declaration of Covenants, Conditions and Restrictions for the Canyon Park Business Center - Snohomish County Recording No. 201807050389 ("CC&Rs).

City Response:

Comment noted.

- A. The Canyon Park Vision proposes significantly more residential development in the Park than is currently permitted by the CC&Rs. We request that the EIS evaluate the potential

effects of the Planned Action on current and future land uses within the CPBC, including specifically potential erosion of existing and future commercial and industrial uses.

City Response:

Comment noted. Both action alternatives within the DEIS propose substantial portions (64% to 80% of net growth) of the RGC to remain as 'business' oriented development. Retention of the employment potential of Canyon Park was a key objective of the vision work done in 2018 and was reiterated in follow-up public engagement in 2019.

- B. Recent proposals for residential development in the CPBC have consisted of townhomes. We request that the EIS evaluate whether this form of residential development in the RGC provides sufficient levels of density to meet residential growth targets and to achieve the goals of the Comprehensive Plan for the RGC. Additionally, we request that the EIS evaluate whether this form of residential development is appropriate from an urban form and design perspective, given the scale of existing and future buildings in the RGC.

City Response:

Comment noted. An evaluation of the correct type and scale of development will be considered in both the EIS process and as part of the Subarea Plan Update.

- C. Commercial service uses are currently concentrated along the SR527 corridor, which is not a pedestrian oriented area. We request that the EIS evaluate how commercial service and office uses can be integrated throughout the RGC in mixed use structures to create a more pedestrian oriented environment, increase the property tax base, and provide additional amenities and services to support residential, commercial and industrial uses.

City Response:

Comment noted.

- D. As noted above, Sound Transit has recently proposed to locate a bus maintenance facility within the CPBC. The CC&Rs currently prohibit this use, but it is permitted under the City's zoning regulations. These types of industrial and institutional uses are not compatible with the mixed use vision of the RGC that is described in the Canyon Park Vision. We request that the EIS evaluate restricting these types of uses and other similar heavy industrial uses to mitigate impacts on existing and future uses proposed by the Planned Action.

City Response:

Comment noted. 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).

4. Public Amenities/Open Space

Because of the limited amount of residential development within the CPBC and RGC, there are limited public amenities and open space. Our evaluation of recent proposals for residential development in the CPBC indicates that current City development standards do not require significant amenity or recreational open space for new developments. If the new

development is located in an existing residential area with adequate levels of service for parks, open space and other recreational amenities, it is not imperative for individual developments to provide these features. In an area that is being planned to accommodate significant new residential development where it has historically not existed, the new residential uses must be supported with these features.

- A. There have historically been very low levels of City capital investment in parks, open space and other amenity features within the RGC. As a result, the RGC lacks a defining urban design feature or focal point, and the levels of service are lower than in other areas of the City. We request that the EIS evaluate the existing parks/open space level of service within the RGC and compare it to other neighborhoods/centers within the City. If the level of service is lower in the RGC, sufficient City capital investment is required as mitigation to support future growth.

City Response:

Comment noted. Parks level of service and implications of the alternatives, as well as parks investments associated with alternatives and effects on urban design, are addressed in the EIS.

- B. Depending on the timing and scale of the City's capital investment in public amenities and parks/open space, individual development projects should be required to mitigate the increased demand on existing features in the RGC. We request that the EIS evaluate the increased demand for public amenities and recreational space based on the projected population and employment growth proposed by the Planned Action. Based on this increased demand, mitigation should consist of amendments to the Zoning Code to require that individual developments provide amenities and recreational space for new residents of the RGC.

City Response:

Comment noted.

5. Planned Action Process

While we are supportive of the City using the optional Planned Action process for the Subarea Plan, we urge caution to ensure that this does not have unintended consequences on future processes for public notification and environmental review. It is imperative that public notices of application for future projects clearly identify whether the project will utilize a Planned Action Determination in lieu of the standard SEPA Determination process. If the potential impacts of a future project action were not analyzed and mitigated through the Planned Action process, the public should have the opportunity to comment and request supplemental environmental review of those impacts.

City Response:

Comment noted. A development proposal which is not compliant with the stipulations of the Planned Action EIS and associated Planned Action ordinance must conduct additional environmental review. Such an action would involve public notice.

Thank you in advance for considering these scoping comments. We look forward to continued participation in the EIS process.

Sincerely,

Tim McHarg, AICP
Senior Land Use Planner

Community Scoping Meeting Results

The Community Scoping Meeting took place on April 25, 2019 at the Canyon Hills Community Church in the study area. The event included a presentation (shown twice to accommodate participants' different drop-in schedules), interactive exercises asking participants about land use and transportation options for the area, and a check-in on the Phase 1 Vision Plan's vision and objectives. The following summarizes the major themes heard and the activities' results.



Major Themes

- The study area lacks complete, safe, and comfortable pedestrian connections.
- Transit doesn't work for local travel.
- Encourage new housing in existing retail clusters.



Land Use Activity Results

Place-Specific Ideas

Group 1

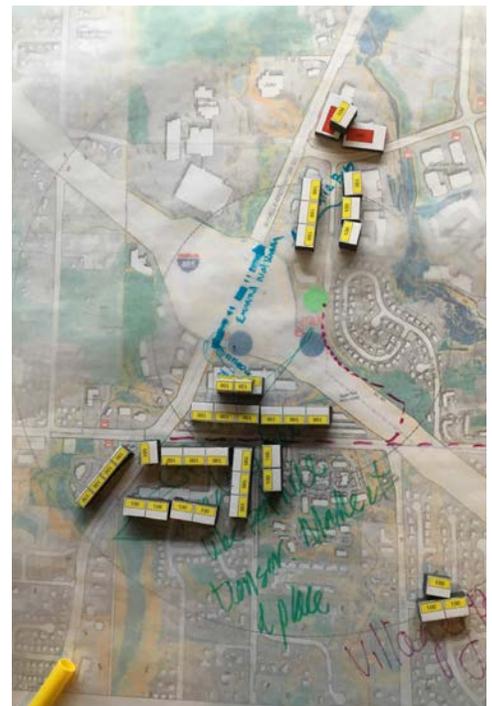
- Lack of grocery stores within the business park

Group 2

- Opportunity for mixed use at Canyon Park Place (PCC, etc.) and Thrasher's Corner
- "Village Pockets" spread in neighborhoods outside of study area
- Walking route along 228th
- Residential and mixed use on 17th Ave SE and intersection with 220th St SE

Group 3

- Build grid of internal connections in central business park.
- Add pockets of high-intensity mixed use spread throughout business park on grid.
- Mixed use, high density node at Thrashers Corner, spilling into business park along 20th Ave.





- Gradual density “step up” along Maltby Road west of SR 527.
- “Gentle Density” with small lot, ADUs, duplex, triplex etc. west of study area on 9th Ave.
- Add Community Gardens west of study area to the north and south.

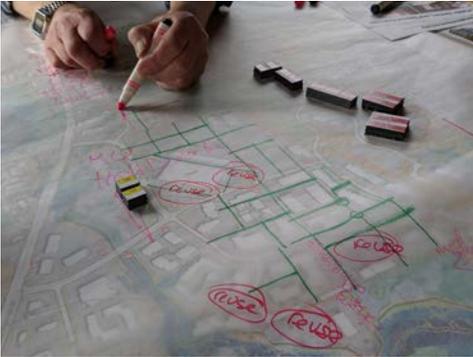
Group 5

- Propose major increase in residences at Canyon Park Place – add around 2,700 new residents in existing retail/surface lot areas.

General Ideas

Group 1

- High density, walkable, pedestrian prioritization
- Create a connected grid of streets.
- Congestion can be a good thing when it shows you people love a place.
- Remove parking minimums, provide for shared parking.
- Create protected bikeways throughout.
- Need covered outdoor spaces, play areas, water features, near multifamily areas to provide useable open space.
- Important school issues to consider:
 - Existing school capacity is stretched
 - Access to schools is difficult in areas not served by buses, where walking is not an easy option
 - School related traffic
- Transportation investments should be concurrent with growth.
- Try a one-way grid based on commute direction.
- Try bus lanes like on 3rd Ave in Seattle.



Group 2

- Reduce car dependency.
- More infill, mixed use building so people can live near places to shop and restaurants.
- Transit oriented development
- Add accessory dwelling units (ADUs) in lower density areas.
- Prefers mixed use alternative to business hub; recreate what works downtown.
- The area needs focal points.
- Provide incentives for mixed use and alternative modes.



Group 4

- Parking – provide enough for mixed use and guest visitors.

Transportation Table

- More daycare services are needed.



Suggested Pedestrian Improvements

- Need walkable routes between residences south of the study area and transit stops and trails. (People are driving and parking in the business park to use the trail system.)
- 228th St SE needs continuous sidewalks. (Multiple comments about this.) Missing links include:
 - Under I-405
 - Between 7th Ave SE and 9th Ave SE. In the meantime, a crosswalk is needed at 7th Ave SE to reach the sidewalk side.
 - Between 29th Dr SE and 31st Ave SE
- Improve the safety and comfort of the pedestrian connection across the I-405 southbound on-ramp to the BRT station (near PCC).
- Add crosswalks on Maltby Rd.
- SR 527 should be improved for walking between the study area and downtown Bothell (since bus headways are long).
- Improve/maintain North Creek Trail (e.g., raised roots).



Suggested Transit Improvements

- Increase park-and-ride capacity. All Bothell and Kenmore park-and-rides are full by 7am. (Multiple comments about this.)
- Provide service to the east.
- Increase frequency of 120 service.
- Shuttle suggestions:
 - Circulator between residences, park-and-ride, and business park
 - Canyon Park to downtown Bothell

Suggested Bike Improvements

- Improve bike crossing on 228th St SE for trailhead east of 22nd Dr SE.
- Provide a bike facility to QFC.
- Add bike parking in shopping centers.

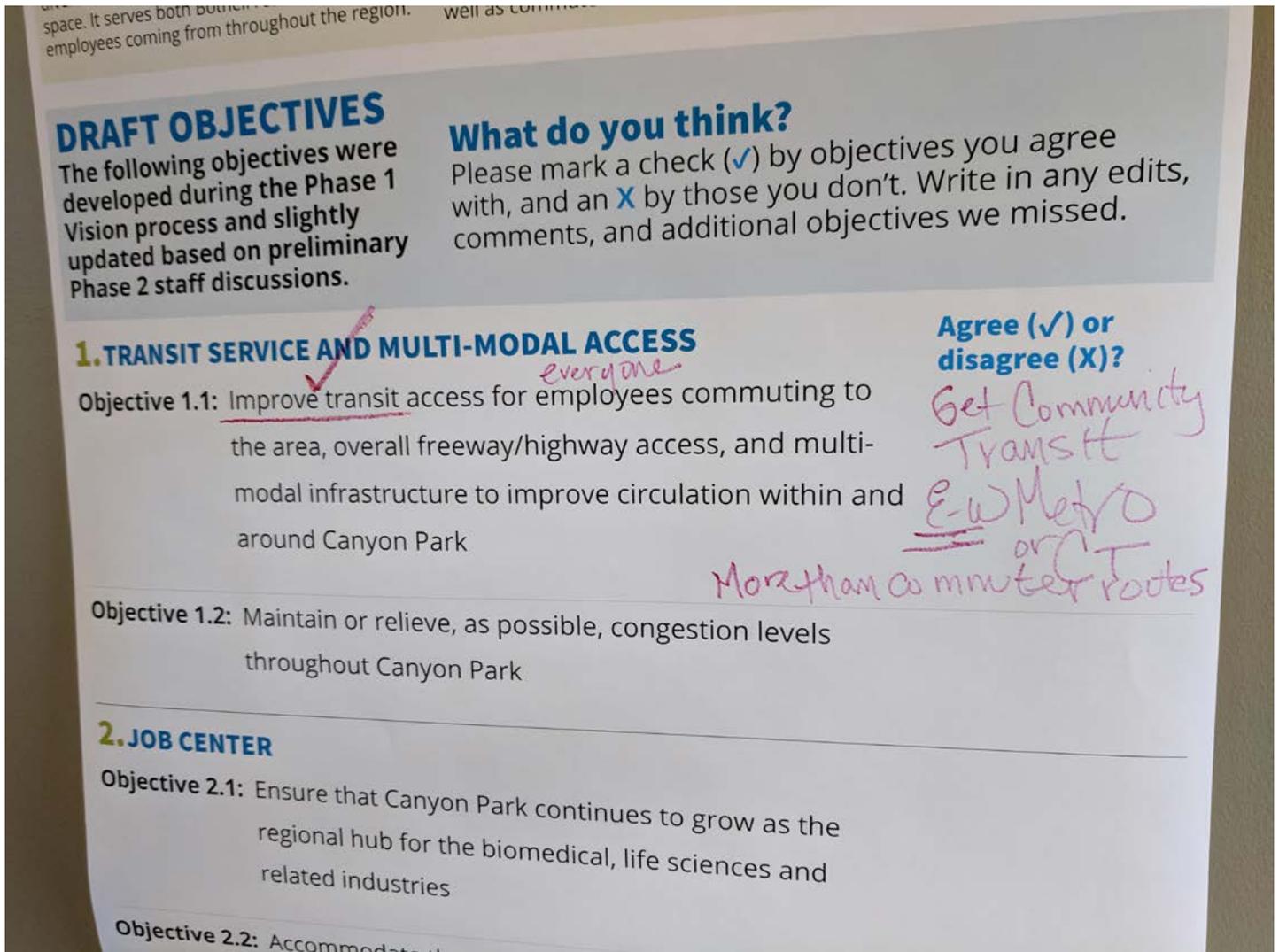


Suggested Vehicular Improvements

- The circuitous route to the park-and-ride causes additional congestion.
- Fix problematic queuing at 228th St SE and 31st Ave SE (driving in center turn lane and eastbound lane at 31st).
- Coordinate signals on 228th to relieve congestion.
- Improve approach signal at 19th Ave SE/228th St SE.
- People use 19th Ave SE to avoid SR 527 traffic.
- People use 15th Ave SE to avoid the 19th Ave SE/228th St SE signal.
- Change operation control at the 220th St SE and 20th Ave SE intersection.
- Residents are parking in the Thrasher's Corner vicinity (not enough parking at multifamily buildings?).

Objectives Activity Results

Participants generally agreed with the draft objectives, mostly developed during the Phase 1 Vision Plan process. One suggested edit is noted in the photo below.



Community-wide Survey Results

The Canyon Park Visioning Follow-up Survey was open April 7-29, 2019 and received 333 responses.

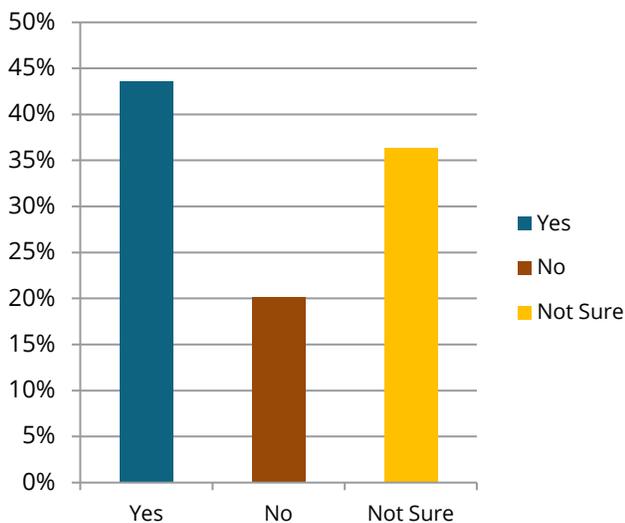
Canyon Park Vision

Survey respondents are generally supportive of the adopted Canyon Park Vision, though many are uncertain.

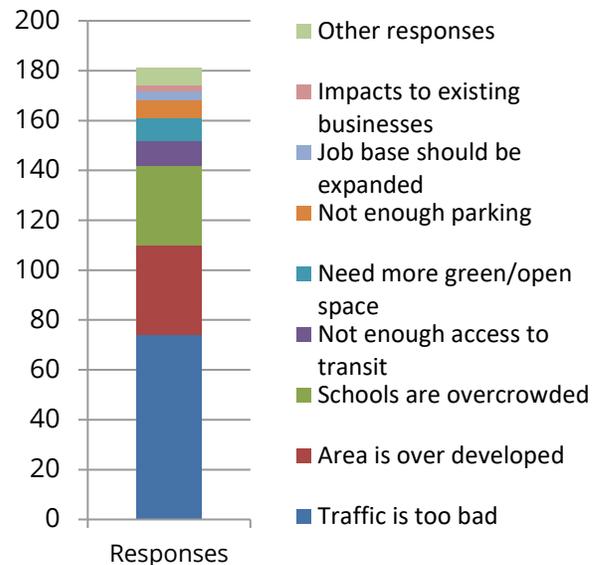
- 44% say it's still viable
- 20% say it's not
- 36% aren't sure

Many respondents expressed concern that the vision doesn't adequately address existing or future traffic congestion. Other respondents were concerned that the vision would exacerbate the fast pace of residential development, school overcrowding, the loss of green space, and poor access to transit including the lack of capacity at the I-405 park-and-ride.

Is this still a viable vision for Canyon Park?



If not, why not responses

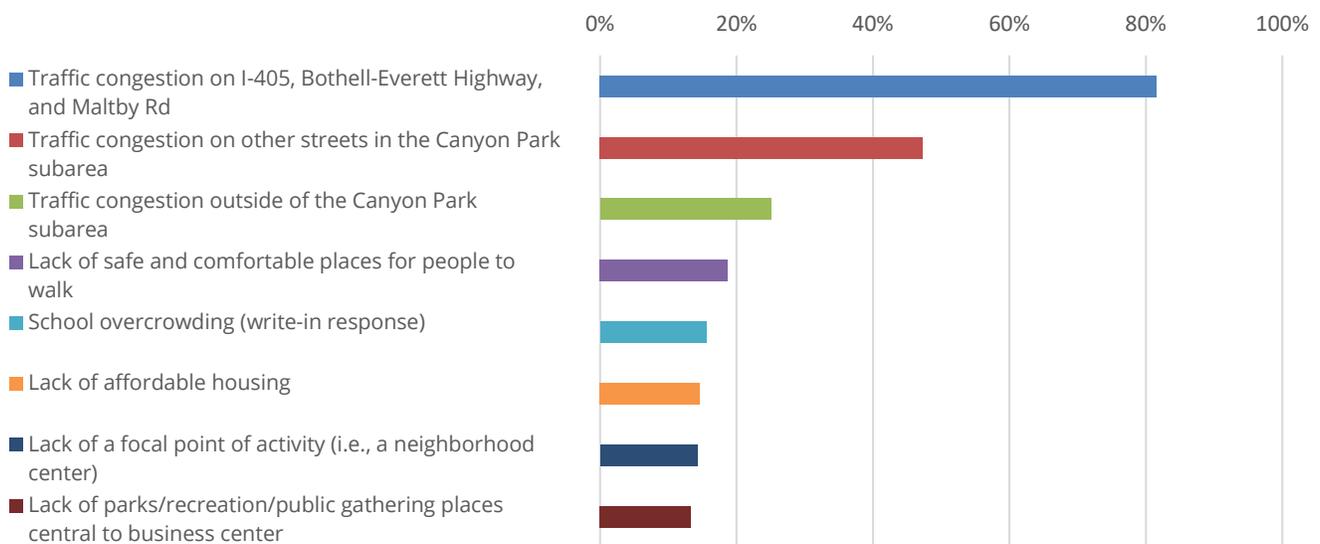


Concerns about the Future of Canyon Park

Vehicular traffic congestion is by far the top concern. More than 80% of survey respondents were concerned about traffic congestion on Canyon Park’s main arterials: I-405, SR 527, and SR 524. Nearly half also indicated concern about other roads in the study area, and a quarter were concerned about traffic outside the study area.

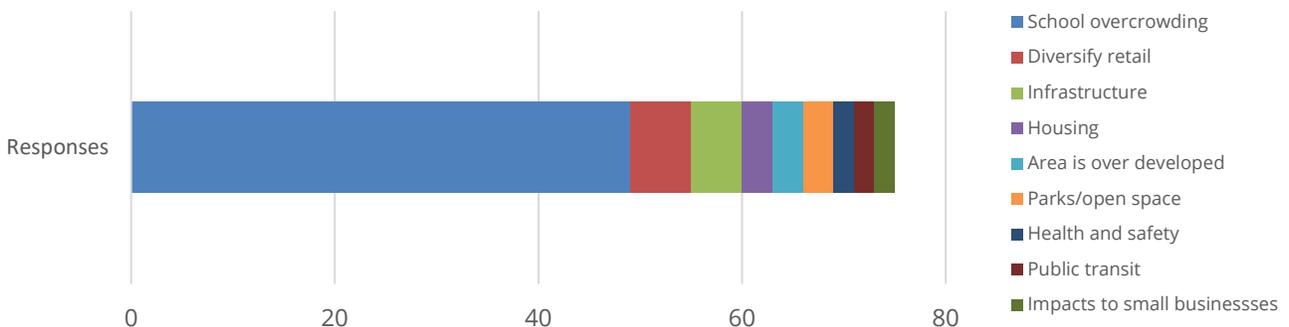
Respondents want a robust neighborhood. Apart from traffic, many respondents were concerned with the lack of neighborhood-making amenities in the area, including the lack of safe places to walk (19%), the lack of a neighborhood focal point (14%), and the lack of parks and recreational gathering places near the business center (13%). The lack of affordable housing (16%) was also cited as concerns by many respondents. 22% of respondents chose to write in a response in addition to the choices provided. Of these, three quarters entered a response related to school overcrowding, for a total of 15% of all responses.

What concerns you most about the future of Canyon Park? (select up to 3)



(Top 8 of 17 options shown.)

"Other" Write-in Responses



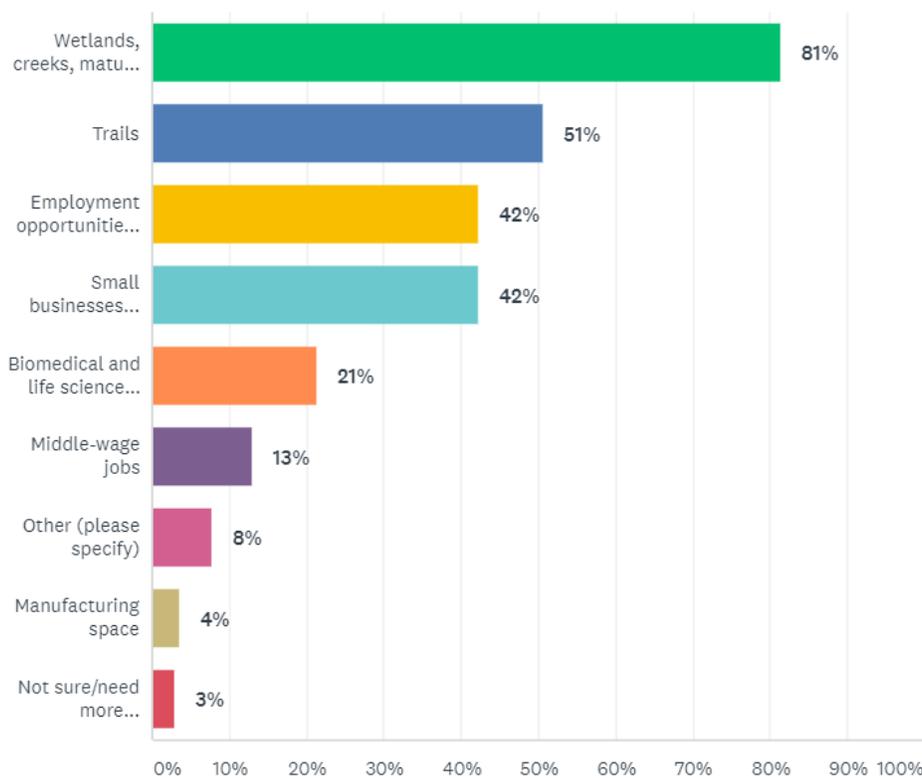
Existing Assets

Natural areas are cherished. When asked about existing Canyon Park assets that were most important to preserve, a majority of respondents indicated that wetlands, creeks, and natural areas should be preserved (81%) along with the trails that allow people to access them (51%).

Employment opportunities and small businesses are important. Many also indicated that employment opportunities (42%) and small businesses in retail nodes (42%) should be preserved. Surprisingly, preserving the biomedical/life sciences industry cluster was a top priority for only 21%.

What Canyon Park assets do you most want to preserve? (Select up to 3.)

Answered: 310 Skipped: 23



"Other" Write-in Responses

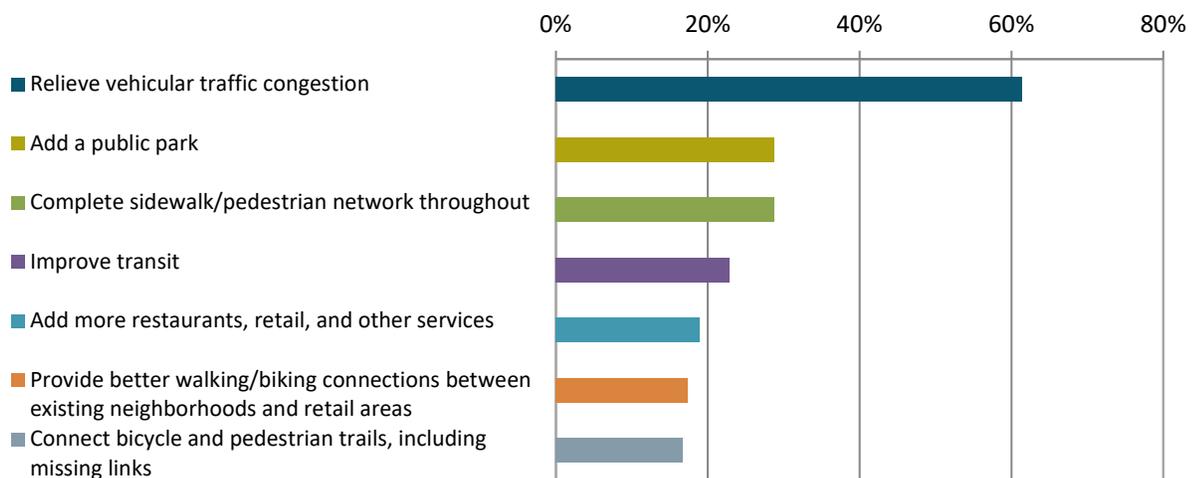


Public Investments

When asked about the most important public investments for the future of Canyon Park, the following rose to the top:

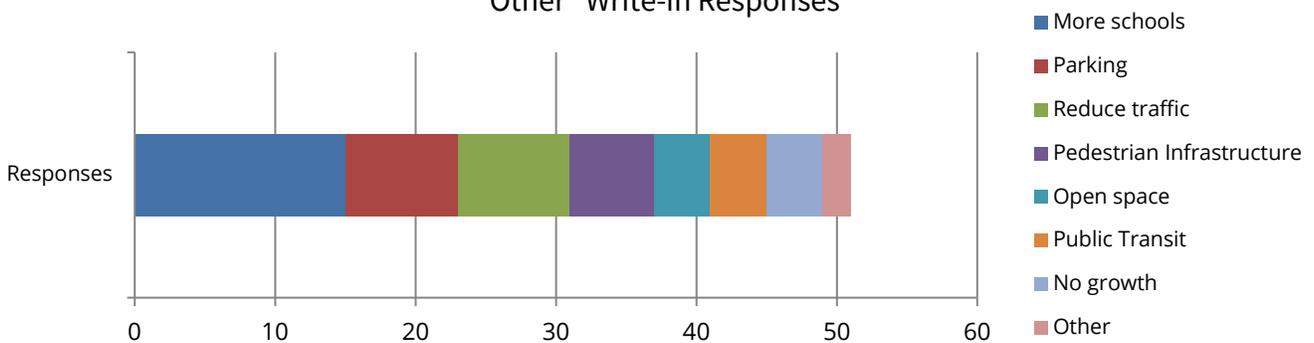
1. **Vehicular congestion relief.** 61% of respondents called for unspecified investments to relieve vehicular congestion.
2. **Walking and biking network.** Many respondents also called for better places to walk (29%) and bike (17%), as well as better walking and biking connections to existing retail from nearby neighborhoods (17%).
3. **Neighborhood amenities.** Large minorities called for public amenities like a park (29%) and restaurants and retail (19%).
4. **Transit service.** About 23% of respondents called for better transit service.

What could be the most effective public investments in Canyon Park?



(Top 7 of 17 options shown.)

"Other" Write-in Responses



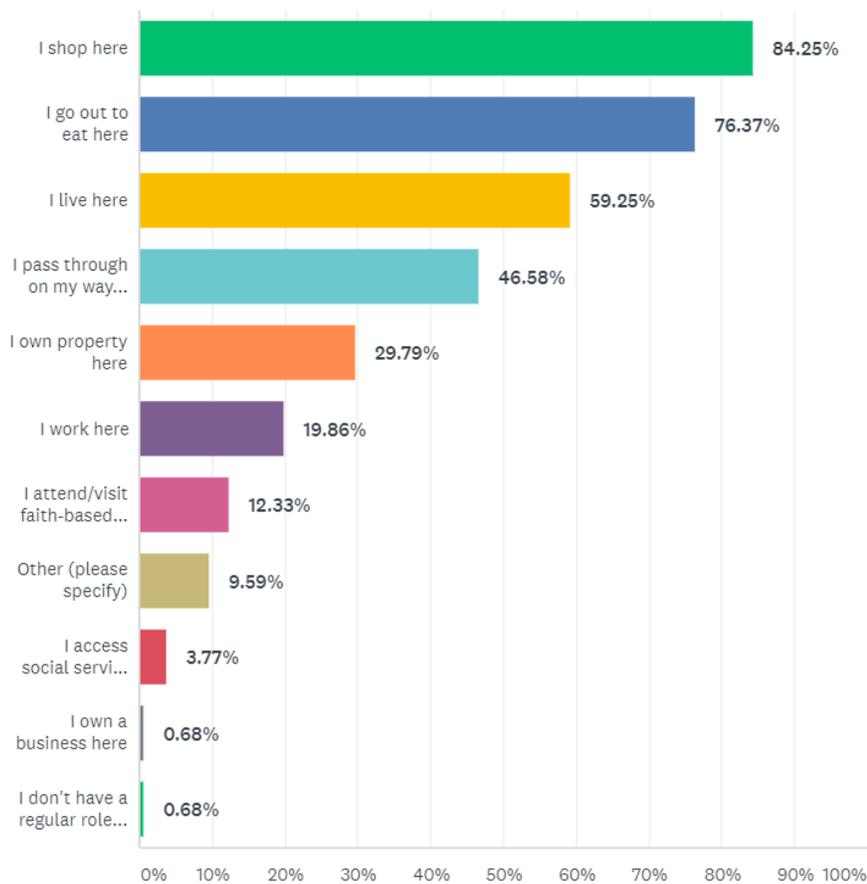
Participation

The scoping survey was promoted at City Council and Planning Commission meetings, on the City website and Facebook page, in direct emails to area businesses, and at several public events. Social media was the most effective route to the survey, with 85% of respondents getting to the survey through those means.

292 respondents shared their roles in Canyon Park. Of these, more than three quarters shop and/or go out to eat in the study area, 59% live there, and about half pass through on their regular commute. Despite the study area hosting three times as many workers as residents, the survey had relatively low participation among workers, with only 20% saying they work in Canyon Park. Among those who said they live in the study area, about half own property, which is lower than the 67% homeownership rate for Bothell as a whole.

What is your role in Canyon Park? (Select all that apply.)

Answered: 292 Skipped: 41



About 85% of respondents described their race as white/Caucasian and 8% of respondents described themselves as Asian (including South Asian and East Asian). Almost three quarters identify as female, about one quarter male, and about 5% as non-binary or preferred not to answer. The vast majority are over 35 years old, with 59% between 36 and 50 years old and 22% over the age of 50.

Canyon Park Business Center Owners Association Meeting Results

The project team held a workshop with the Canyon Park Business Center Owners Association on July 10, 2019 to explore alternatives for analysis under the DEIS. The team presented the Regional Growth Center purpose and criteria, Bothell growth targets and trends, existing transportation conditions, Phase 1 Vision recap, recent community engagement summary, and potential ideas for consideration. The approximately 20 participants broke into four small groups to brainstorm solutions to the complex land use and transportation challenges.

Major themes

Transportation

- Improve SR 527 traffic conditions for cars and buses. See map photos on following pages for specific ideas, e.g., street extensions.
- Encourage a park-and-ride south of I-405, transit-oriented development, and express toll lane (ETL) access from both sides of I-405.
- Consider the effects of ETL access on internal streets.
- City needs to carefully consider how to accommodate growth in traffic from new employees and residents.

Land Use and Other

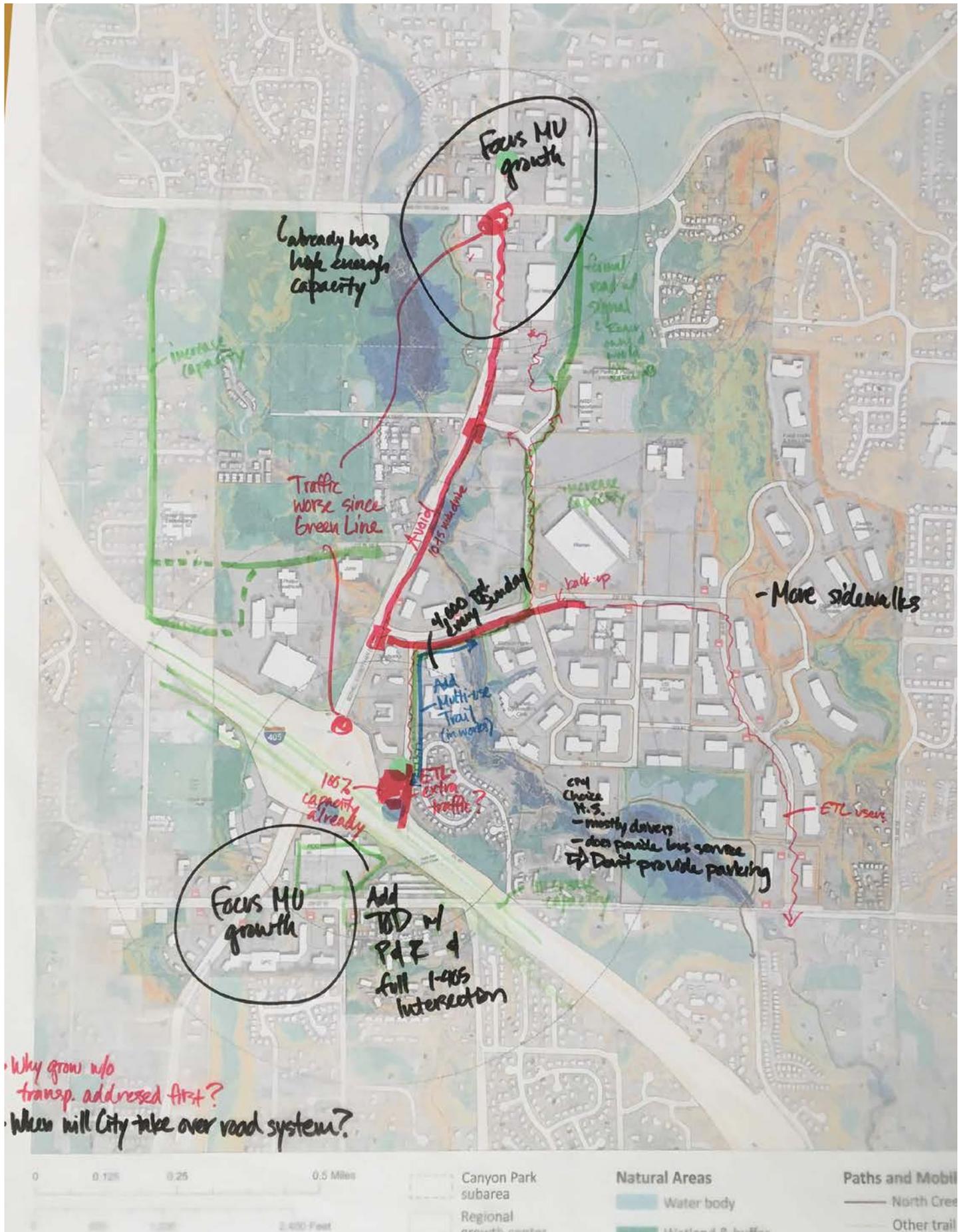
- Limit the potential for residential development in the business center to reduce displacement pressure on existing and future businesses.
- Encourage amenities/destinations (e.g., lunch restaurants, exercise) and an environment for walking to attract employees.
- Leave business park relatively alone, except for some retail/amenities.
- Focus mixed-use development in existing retail areas (i.e., Thrasher's Corner and Canyon Park Place areas).
- Plan the 17th Ave area with transit-oriented development and expanded park-and-ride.
- Improve parks with entertainment/gathering options.
- Where considering housing, match to employee demographics. This likely means families.



Table 1



Table 4



Why grow w/o transp. addressed first?
When will City take over road system?

Interagency Transportation Advisory Committee Meeting Summary

The project team held a workshop on August 8, 2019 with an Interagency Transportation Advisory Committee—comprised of WSDOT, Sound Transit (ST), Community Transit, Snohomish County, Northshore School District, and Bothell Public Works representatives—to explore transportation options for analysis. The team presented the Regional Growth Center purpose and criteria, Bothell growth targets and trends, existing transportation conditions, Phase 1 Vision recap, recent community engagement summary, and potential ideas for consideration. The approximately 20 participants broke into four small groups to brainstorm solutions to the complex land use and transportation challenges. Major themes are summarized below and the following maps illustrate participants' specific ideas.

Top Priorities

- Internal circulator shuttle/van
- Transit priority - BAT lanes, etc
- Pedestrian and bicycle infrastructure and considerations for first/last mile
- Intercept people outside of the area who are using Swift and ST I-405 bus rapid transit (BRT), e.g., with park-and-rides south of I-405 and north of Maltby Rd/SR 524
- Consider roundabouts
- Advocate for express toll lane (ETL) access on the south side and possibly for a nonmotorized and transit to have a through route
- Consider regional solutions, like a new I-405 interchange to relieve pressure on Canyon Park. (Note that this is not in the I-405 Master Plan. Special use or direct access may be possible.)
- Supporting a Regional Growth Center here generally makes sense given the transit investment and regional transportation options

Next Steps

- What is needed to affect ridership of an internal circulator?
- Consider Swift travel speed and reliability on SR 527
- Trail enhancements for bike
- New road connections – what is possible? Eastward is most needed.
- Continue including Thrasher's Corner in the analysis as the County already allows dense mixed used development there

Table 3



B Vision Plan



CITY OF BOTHELL **CANYON PARK VISION**

Summer 2018

ACKNOWLEDGMENTS

City of Bothell

Bruce Blackburn, Senior Planner
David Boyd, Senior Planner
Eddie Low, Deputy Public Works Director
Jennifer Phillips, City Manager
Tom Burdett, AICP
Michael Kattermann, AICP

Stakeholder Working Group

Bothell Chamber of Commerce
Snohomish County Economic Alliance
Business Property Development
CBRE
Fuji Film Sonosite
Hinds - Bock
Juno Therapeutics
Main Street properties
Philips
ROIC
Seattle Genetics
SteelWave
Woodbridge Northwest
Chestnut Highlands HOA
Canyon Park Business Park Owners Association

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INTRODUCTION



INTRODUCTION

BACKGROUND AND PURPOSE

In February 2016, the Bothell City Council committed to a major update of the City's Canyon Park Regional Center Subarea Plan. The update is planned to be carried out in several phases and this report represents the initial phase of that effort. The first phase entails establishment of a vision for the designated Canyon Park Regional Growth Center (RGC) and Subarea. Visioning is the City's initial step in developing a more complete plan for the RGC and Subarea and providing guidance and goals for future planning efforts in the area.

The objectives the Visioning Phase of the effort are as follows:

- Enhance business expansion and job growth opportunities
- Understand how the Plan Update will accommodate the City's growth targets through mixed use residential and retail development
- Ensure that any strategies designed for the Canyon Park RGC complement rather than compete with the City's downtown

METHODOLOGY AND APPROACH

The approach to developing an initial vision for Canyon Park is rooted in several major tasks: engagement with key stakeholders, determining the baseline economic market and infrastructure conditions, assessing the center's development potential and outlining high-level visions and plans for the area. The visioning process is reliant on the establishment of objectives that capture the role of the center within the city, the county, and

the region. The approach leveraged the expertise of economic development specialists, urban designers and transportation experts to inform a comprehensive vision for Canyon Park.

The work carried out in the Visioning Phase will provide a strong foundation detailing plans that will take place in Phase 2. The vision will also detail Subarea plan and strategies that will be designed in the next phase of the process.

VISIONING PHASE KEY TASKS

- Stakeholder and Public Engagement
- Economic and Market Analysis
- Infrastructure and Urban Design Framework Review
- Vision framework and strategy

NEXT PHASE - SUBAREA PLAN DEVELOPMENT

- Leverage vision work to develop a new Subarea plan for the area
- Update regulations, growth targets and capacity analysis
- Conduct necessary infrastructure, transportation and environmental review

ORGANIZATION OF THE REPORT

The report is organized as follows:

- **Industries and Employment.** A profile of businesses and employment in Canyon Park.
- **Real Estate and Growth.** A review of real estate market conditions as well as historical and projected growth.
- **Infrastructure and Planning Framework.** A review of the physical and regulatory environment.
- **Stakeholder Engagement.** Highlights and findings from stakeholder engagement efforts.
- **Vision and Strategy.** The vision, objectives and strategies proposed for Canyon Park.

HOW TO USE THIS DOCUMENT

The vision report is meant to serve as a tool and guiding document for future planning efforts in Canyon Park. The analysis, vision and framework laid forth in the report establish a common understanding of the important role that Canyon Park plays in the local economy and need for Canyon Park to continue to serve as a regional economic hub supporting bio-technology and bio-medical device companies. The Vision Report is the first phase of a multiphase approach and can be leveraged as a guiding document for future planning efforts.

STUDY LIMITATIONS

The analysis is not an appraised valuation. Community Attributes is not a licensed appraiser and this analysis is not intended to be used for the valuation of property in the City of Bothell or otherwise for any investment purposes.

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INDUSTRIES AND EMPLOYMENT



INDUSTRIES AND EMPLOYMENT

REGIONAL GROWTH CENTERS

Regional growth centers (RGC) are designated by the Puget Sound Regional Council (PSRC) and are characterized by compact, pedestrian-oriented development with a mix of residences, jobs, retail, services, and entertainment. These centers are intended to provide proximity to services, shopping, recreation, and jobs, as well as housing. Centers are to be focal points for new growth and are identified to receive a significant portion of the region's population and employment growth. Regional growth centers are expected to achieve densities sufficient to support high-capacity transit through long-term growth and development over the

20-year comprehensive planning period and beyond. The PSRC is currently in the process of updating the regional centers framework, including updates to designation criteria and requirements.



EXHIBIT 1. REGIONAL GROWTH CENTERS, PUGET SOUND REGION

Source: Puget Sound Regional Council, 2017

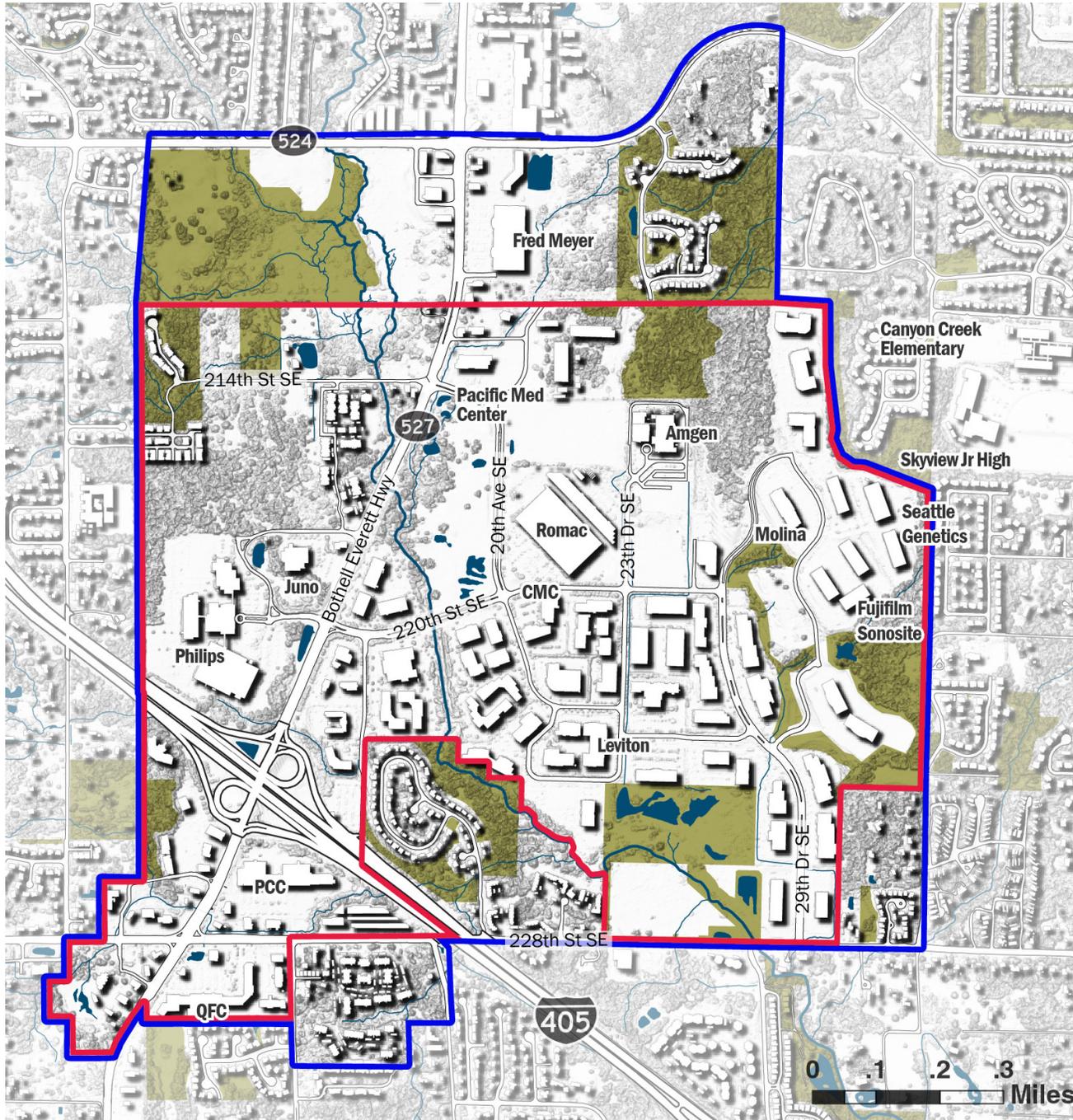
ABOUT THE CANYON PARK REGIONAL GROWTH CENTER

The Canyon Park RGC is a neighborhood in the Snohomish County portion of Bothell that serves as a major employment and commercial hub for the City of Bothell and the surrounding region. Regional growth centers (RGC) are envisioned as major focal points of higher density population and employment, served with efficient multi-modal transportation infrastructure and services. Bothell Canyon Park was designated as an RGC through the adoption of the 1995 update of VISION 2020 (updated later to VISION 2040). It is a medium-sized regional growth center in terms of total gross acreage (735 acres) and is comprised of a diverse mix of office, light industrial, R&D, retail and other commercial/residential uses. The current planning area boundaries for the neighborhood and project are shown on the following page (see **Exhibit 2**).

Development within the area largely occurred in the 1980s and early 1990s. Developed with over 500 acres of business and industrial parks, 50 acres of retail and service uses, and approximately 500 residential housing units in outlying areas of the subarea.

The boundaries of the Canyon Park regional growth center generally coincide with those of the Canyon Park/Thrasher's Corner Subarea. In addition to office, commercial and residential development, the center contains significant steep slopes, natural areas, wetlands, and wildlife habitat.

EXHIBIT 2. CANYON PARK DESIGNATED BOUNDARIES



The boundaries of the Canyon Park Regional Growth Center encompass land on both the north and south sides of Interstate 405 and the east and west sides of Highway 527. The Center is roughly bounded by Highway 524 on the north and 228th Street SE on the south, while the boundary does not consistently follow roadways on the east and west. North Creek generally bisects the Center on a north-south axis.

CANYON PARK AT A GLANCE

- 735 acres
- 6% of population in Bothell (2010)
- 6% of housing in Bothell (2010)
- 33% of employment (2010)

Canyon Park RGC & Subarea Study Area

-  Canyon Park Regional Growth Center
-  Canyon Park Subarea Boundary
-  Parks & Opens Space
-  Lakes, Streams & Water Features
-  Buildings

Source: Community Attributes Inc., City of Bothell

BUSINESS IN CANYON PARK

The Canyon Park RGC plays an important role in the Puget Sound regional economy. The growth of the University of Washington Bothell campus and transformation of Downtown Bothell have made Canyon Park even more desirable for businesses. Together, Downtown, UW, and Canyon Park put Bothell on the map as an important business center in the 21st century.

Philips, Seattle Genetics, AGC Biologics, Juno Therapeutics and others contribute to a strong history of biomedical company clustering in the zone. Boeing has a presence in Canyon Park, along with other aerospace related companies. Canyon Park is unique among business parks in the region. Roughly equidistant to Everett/Lynnwood, Downtown Seattle, and the Eastside King County centers of Bellevue and Redmond, Canyon Park is well-positioned to capitalize on rapid growth in King and Snohomish County.

Bothell Canyon Park is a major employment center, with biomedical, high technology, and other national and international firms located within the Park. The area also contains numerous service businesses, restaurants, and retailers. The area's retail is generally clustered on the west side of I-405, with a secondary concentration on the north end of the area approaching Thrasher's Corner. As previously noted, Canyon Park's industrial and office space developed most intensively in the late 1980s to early 2000s. Additional details on real estate indicators and growth can be found later in the report.

Exhibit 3 illustrates the amount of employment by industry within the Canyon Park RGC while **Exhibit 4** illustrates the geographic distribution of companies within the RGC.

INDUSTRY ATTRIBUTES

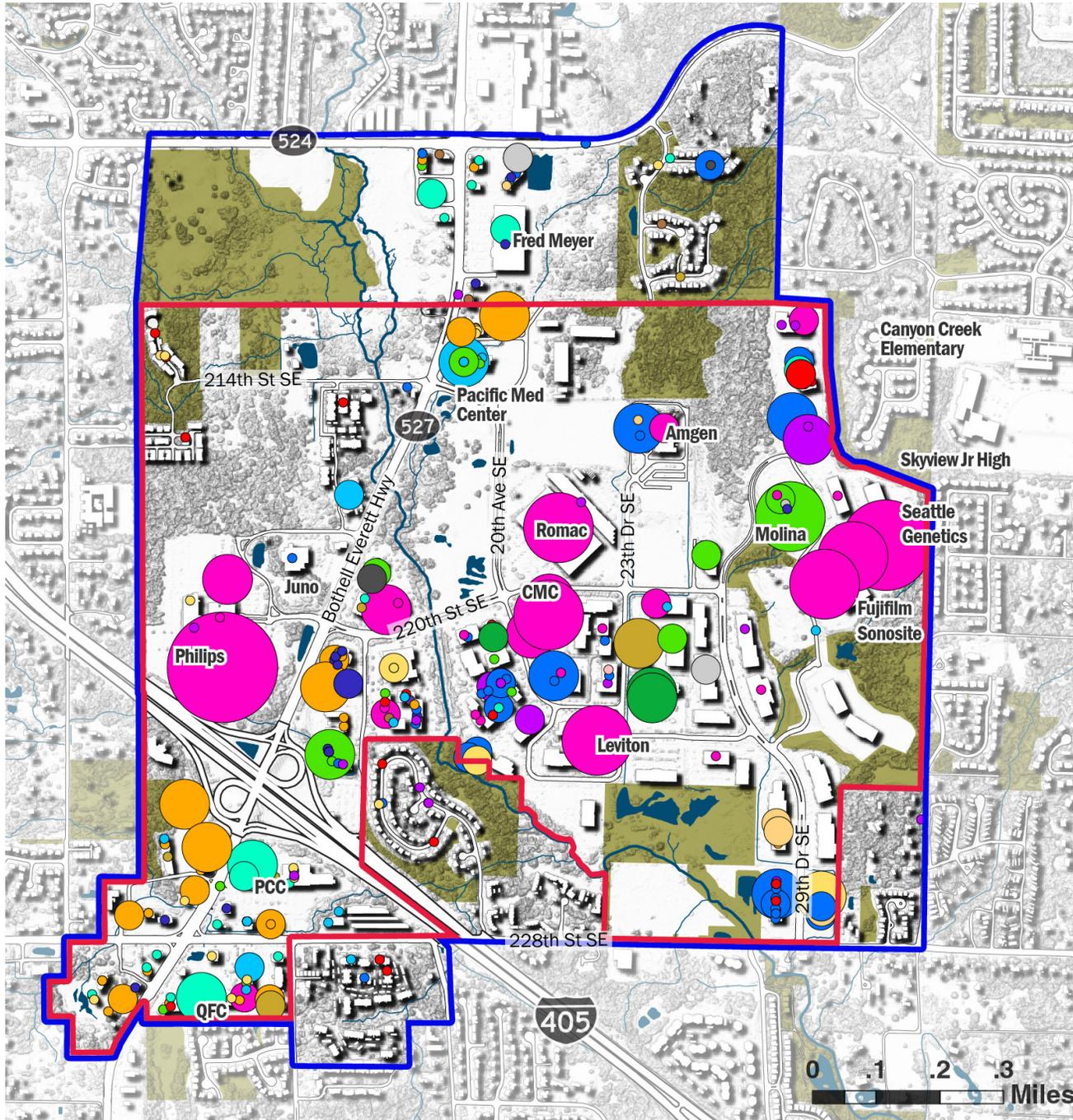
- Canyon Park is a major employment center in the region
- Serves as a predominant cluster for biomedical and life sciences manufacturing and Research & Development (R&D)
- There are approximately 10,000 jobs in the Canyon Park RGC representing 30% of the City's employment
- Almost half of the jobs in the RGC fall under the umbrella of manufacturing, representing one of the region's most important advanced manufacturing industry clusters

EXHIBIT 3. LOCAL INDUSTRIES SUMMARY, CANYON PARK, 2017

NAICS Sector	NAICS Sector Title	Number of Establishments	Total Employment at Location	Average Facility Size
31-33	Manufacturing	40	4,714	37,548
72	Accommodation and Food Services	56	891	4,733
54	Professional, Scientific, and Technical Services	68	797	4,449
62	Health Care and Social Assistance	39	726	6,763
44-45	Retail Trade	32	505	11,113
42	Wholesale Trade	23	277	7,234
53	Real Estate and Rental and Leasing	25	241	5,404
81	Other Services (except Public Administration)	40	214	3,075
52	Finance and Insurance	27	173	3,755
23	Construction	18	166	3,742
92	Public Administration	3	144	15,284
61	Educational Services	9	139	8,797
56	Admin/Support and Waste/Remediation Serv.	25	121	2,681
51	Information	9	67	3,560
48-49	Transportation & Warehousing	4	62	10,723
71	Arts, Entertainment, and Recreation	4	51	8,576
21	Mining, Quarrying, and Oil and Gas Extraction	1	5	2,500
11	Agriculture, Forestry, Fishing and Hunting	2	4	2,306
<i>Total</i>		425	9,297	NA

Source: CAI, 2017; City of Bothell, 2017; Hoovers, 2017.

EXHIBIT 4. LOCAL INDUSTRIES, CANYON PARK, 2017



Canyon Park RGC & Subarea Industries by 2 Digit NAICS



Source: Community Attributes Inc., Hoover's, 2017

EMPLOYEE COMMUTING

As a major employment center, Canyon Park attracts a workforce from throughout the region. Access to and from the area, much like other employment centers in the region, is a critical factor for companies based there.

Exhibits 5 -7 illustrate the commuting patterns of employees in Canyon Park. A majority of employees commute from less than 10 miles away while almost a third commute between 10 and 24 miles. Their places of residence are generally concentrated throughout north King County and southern Snohomish County, indicating a desire to live in a location with reasonable access to Canyon Park. Most notably, less than approximately 6% of Canyon Park employees live in Bothell illustrating the sheer volume of people commuting to Canyon Park every day. By providing additional housing in the RGC, it will be possible for more employees to live close to work. This could have a positive effect on traffic and demand for local retail, restaurants and services.

EXHIBIT 5. EMPLOYEE DISTANCE COMMUTED, CANYON PARK, 2015

Distance	% of Employees in Canyon Park
Less than 10 miles	54.40%
10 to 24 miles	29.40%
25 to 50 miles	9.50%
Greater than 50 miles	6.80%

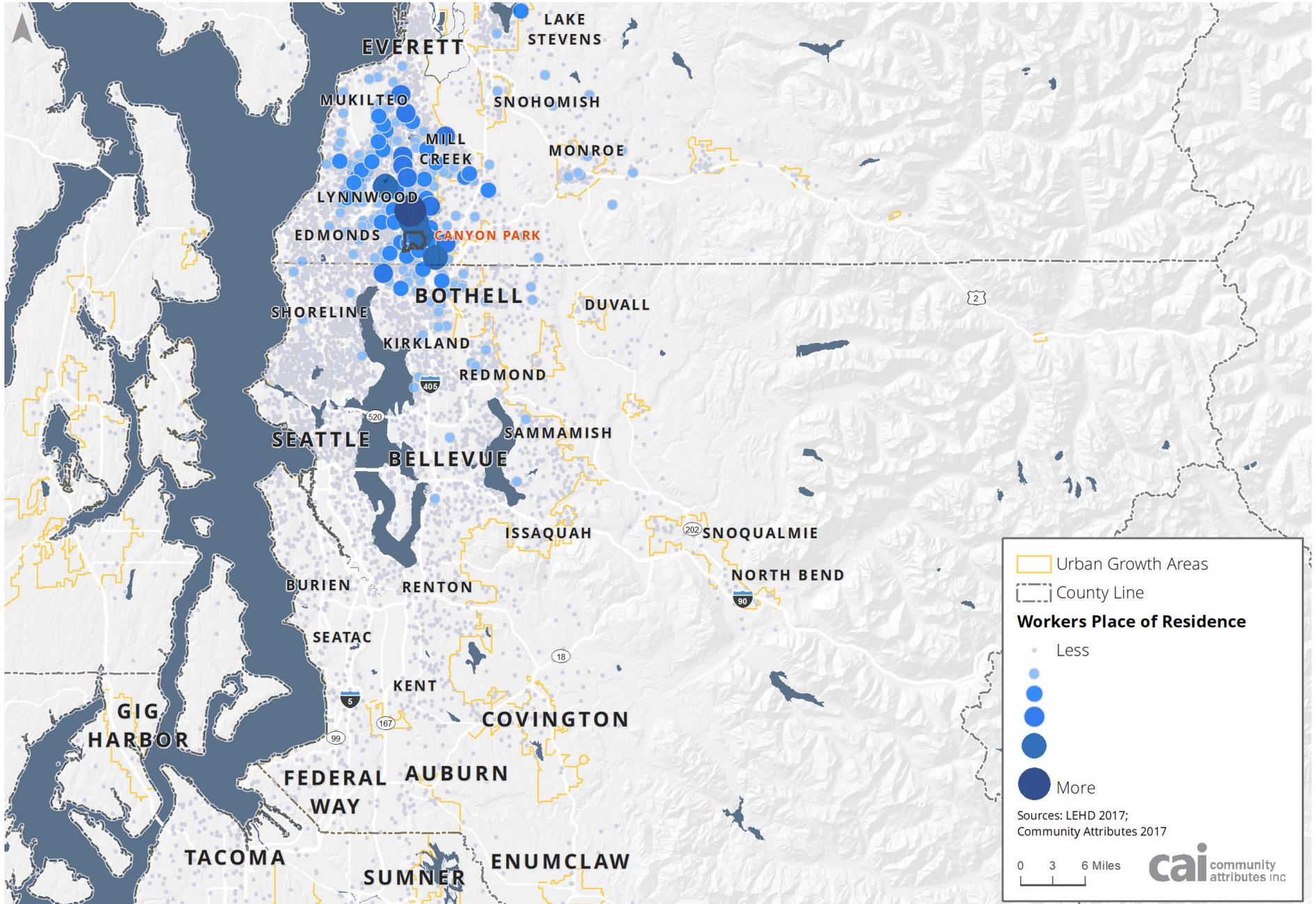
Source: US Census Longitudinal Employer-Household Dynamics (LEHD), 2017.

EXHIBIT 6. EMPLOYEE PLACE OF RESIDENCE, CANYON PARK, 2015

Place of Residence	% of Employees in Canyon Park
Seattle	11.6%
Everett	5.8%
Bothell	5.6%
Kirkland	4.1%
Bothell West CDP (unincorporated)	2.7%
Marysville	2.5%
Lynnwood	2.4%
Mill Creek East CDP (unincorporated)	2.4%
Silver Firs (unincorporated)	2.3%
Mill Creek	2.3%
Other Locations	56.4%

Source: US Census Longitudinal Employer-Household Dynamics (LEHD), 2017.

EXHIBIT 7. EMPLOYEE PLACE OF RESIDENCE MAP, CANYON PARK, 2015



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REAL ESTATE AND GROWTH



REAL ESTATE AND GROWTH

The following analysis provides a review of key indicators that illustrate recent and projected growth in the RGC as well as current and historical market conditions. The analysis provides perspectives on how the RGC might participate in future regional growth.

REAL ESTATE INDICATORS

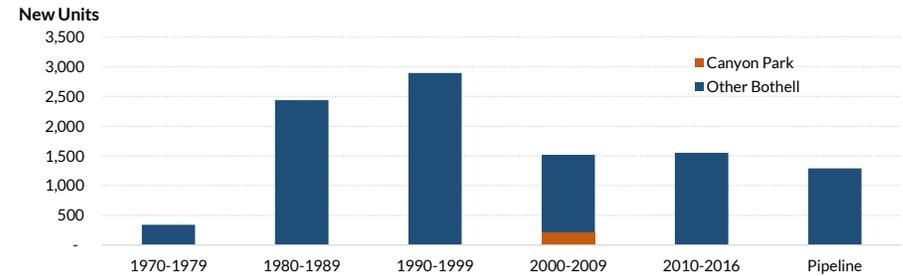
Exhibits 8-10 illustrate the current inventory of commercial space within Canyon Park as well as historical development patterns in the City of Bothell. Significant investment in multifamily development has been made in recent years, but most of that investment is outside of the Canyon Park RGC. Commercial development in Canyon Park has been limited since 2009, with the majority of development occurring in the 1980s and 1990s. This decline from previous decades corresponds to the Great Recession in 2008 and its after-effects on the commercial and industrial real estate markets.

EXHIBIT 8. COMMERCIAL INVENTORY SQUARE FOOTAGE, CANYON PARK, 2018

Type	Square Footage	%
Flex	2,327,400	46%
Office	1,625,100	32%
Retail	391,800	8%
Industrial	421,600	8%
Other	296,300	6%
Total	5,062,200	100%

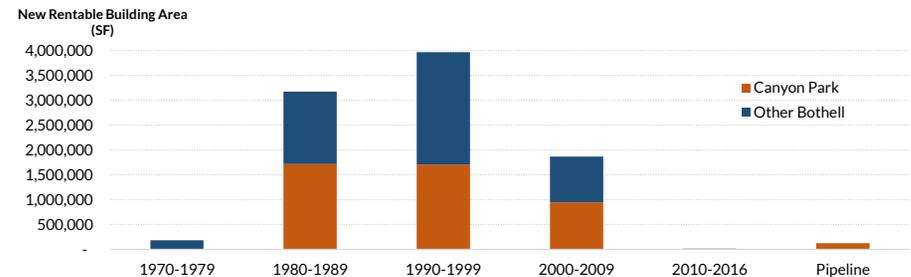
Source: CoStar, 2017

EXHIBIT 9. MULTIFAMILY DEVELOPMENT HISTORY AND PIPELINE, BOTHELL



Source: CoStar, 2017

EXHIBIT 10. OFFICE/IND/FLEX DEVELOPMENT HISTORY AND PIPELINE, BOTHELL

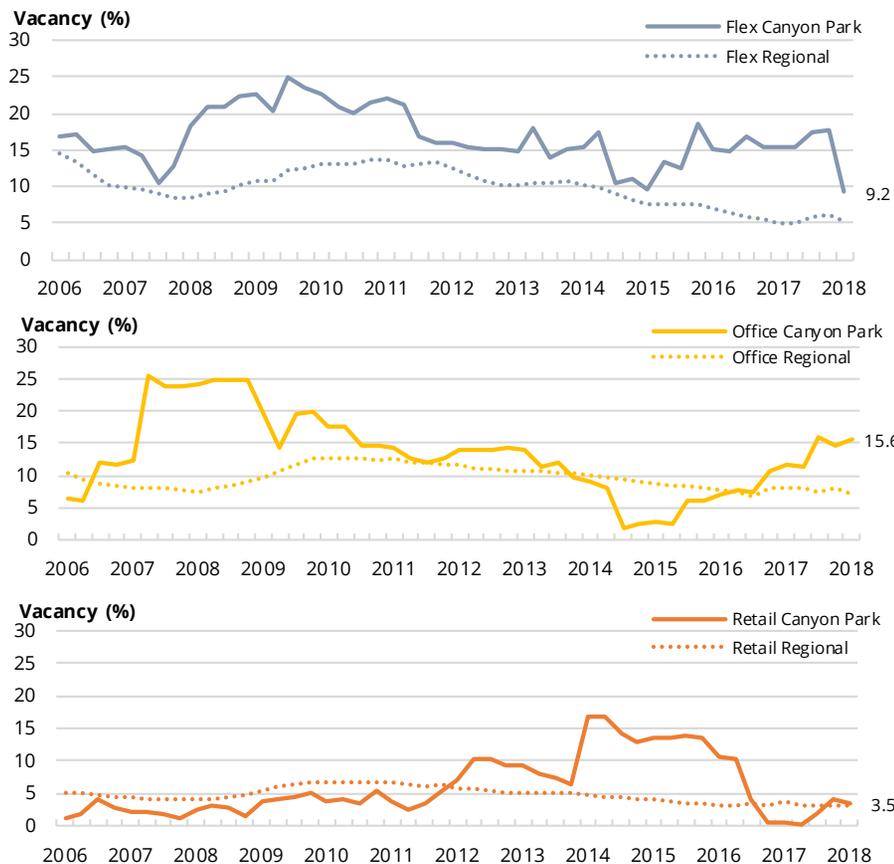


Source: CoStar, 2017

Exhibits 11 and 12 illustrate overall real estate conditions in Canyon Park compared to the region. They include data on selected commercial building typologies including retail, office and flex space (defined as versatile space used for a combination of office, R&D and industrial uses). They serve as a barometer of relative demand for commercial space in Canyon Park.

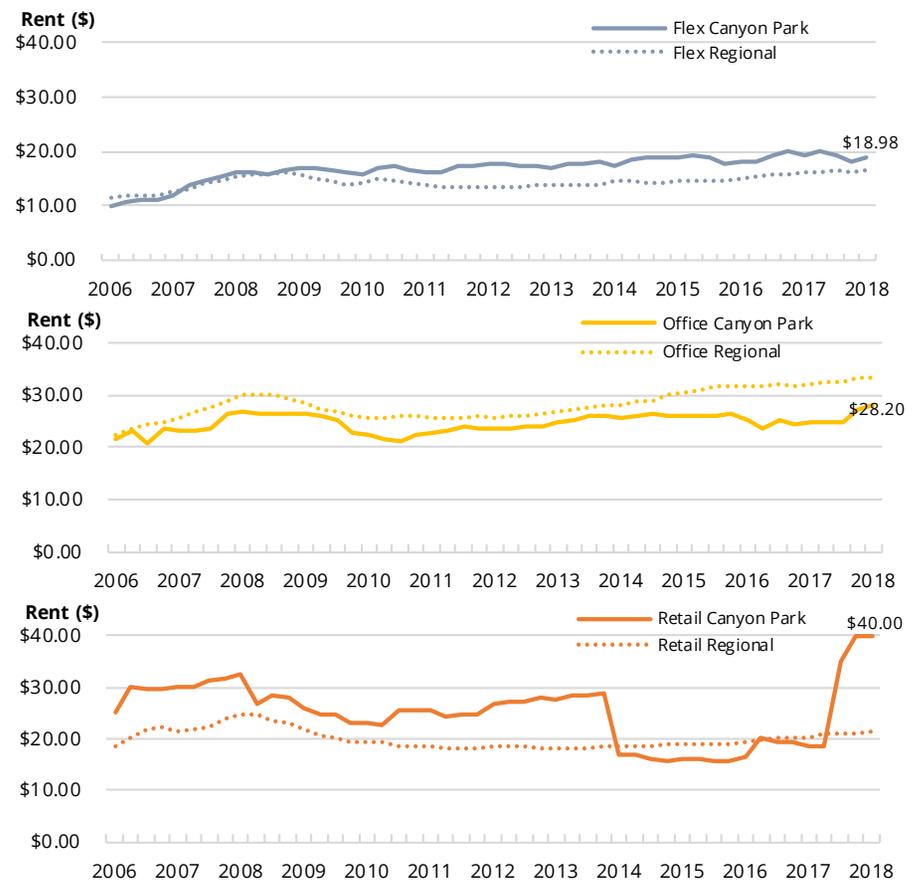
Analysis: Flex and retail space within Canyon Park are performing relatively well, indicating strong demand. Flex vacancy rates have decreased, matching regional levels. Retail vacancy rates are low, similar to what's found regionally, while rents have climbed substantially, likely related to major new leases in 2017. Office vacancy rates have increased locally while decreasing regionally. Given negative absorption in recent years and few large deliveries of new office product, Canyon Park may not compete effectively in the regional office market. Potential reasons could be physical factors, location, rents, or amenities, and could be explored in future study.

EXHIBIT 11. VACANCY RATES, CANYON PARK AND REGION, 2006-2018



Source: CoStar, 2018; Community Attributes, Inc. 2018

EXHIBIT 12. LEASE RATES, CANYON PARK AND REGION, 2006-2018

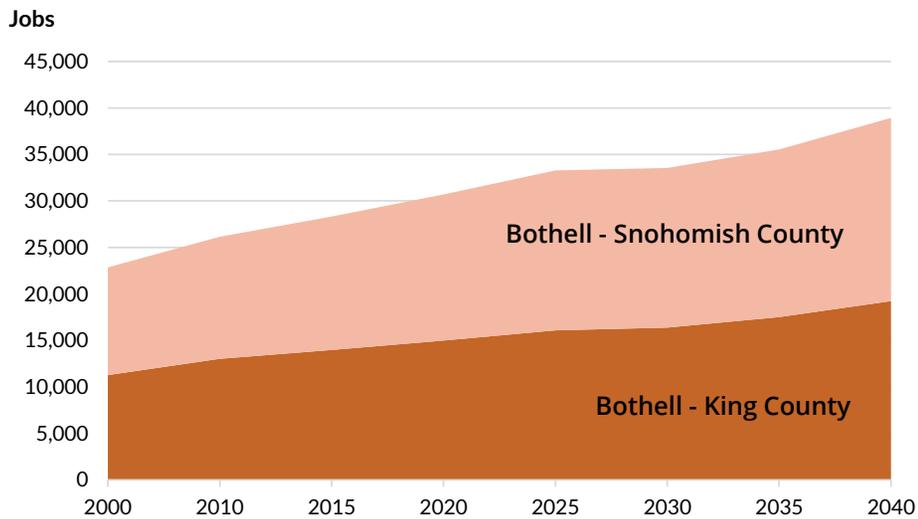


Source: CoStar, 2018; Community Attributes, Inc. 2018

POPULATION GROWTH

Bothell is expected to grow by about 24,400 residents between 2010 and 2040, according to PSRC forecasts. The Snohomish County portion of Bothell is expected to capture about 9,000 of these residents. This growth would represent a compound annual growth rate (CAGR) of 1.5% for the Snohomish County portion of Bothell and 2.2% for the King County portion. If these forecasts hold, the Snohomish County portion of Bothell will capture 37% of Bothell’s total population growth. Forecasts call for an additional 4,000 housing units in the Snohomish County portion of Bothell to accommodate this growth. This has major implications for the Canyon Park RGC and its role in accommodating housing.

EXHIBIT 13. FORECASTED POPULATION GROWTH FOR BOTHELL (KING AND SNOHOMISH), 2010 - 2040

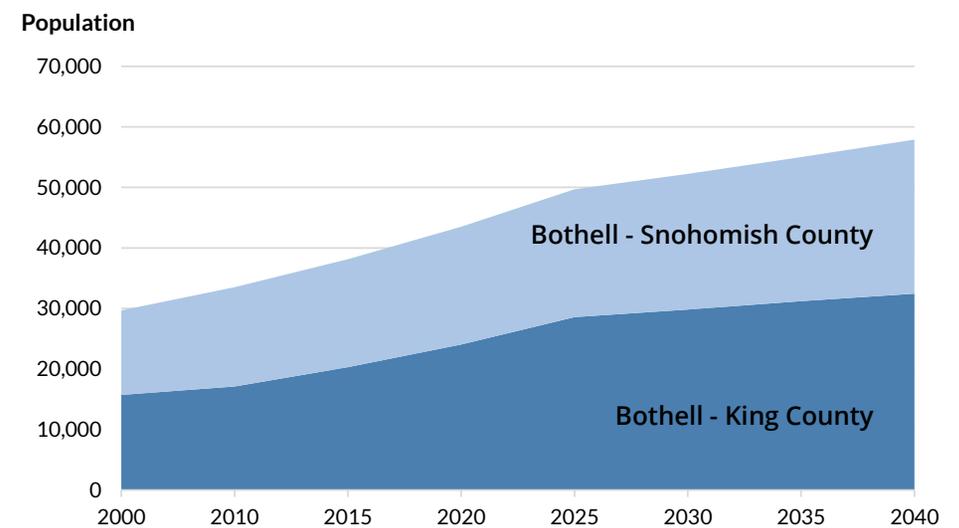


Source: PSRC Land Use Vision, 2015

EMPLOYMENT GROWTH

Bothell employment is expected to grow by about 12,800 between 2010 and 2040, according to PSRC forecasts. The Snohomish County portion of Bothell is expected to capture about 51.5% (6,600) of these employees; this growth would represent a compound annual growth rate (CAGR) of 1.4% for the Snohomish County portion of Bothell. The King County portion of Bothell would encompass the remaining 6,200 employees - 48.5% of forecasted growth.

EXHIBIT 14. FORECASTED EMPLOYMENT GROWTH FOR BOTHELL (KING AND SNOHOMISH), 2010 - 2040



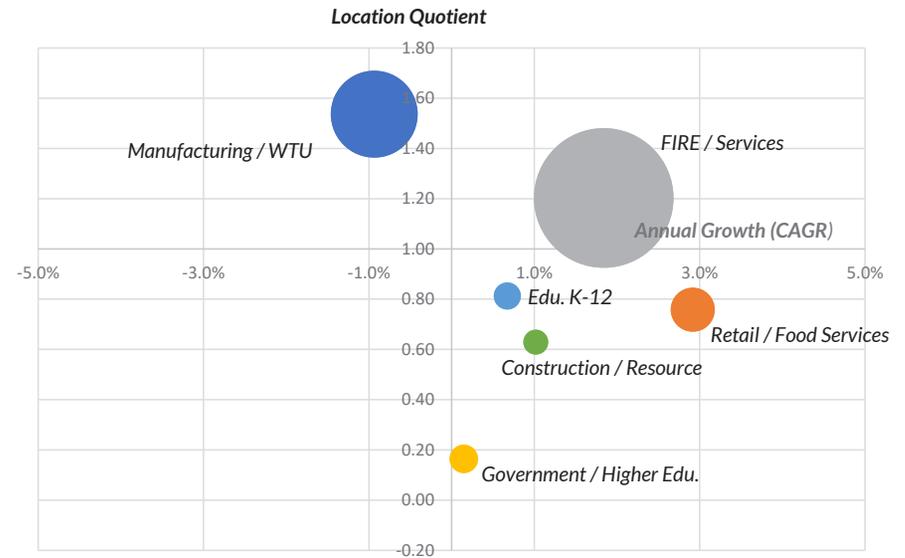
Source: PSRC Land Use Vision, 2015

INDUSTRY CLUSTERS

Exhibit 15 combines several metrics to illustrate the relative concentrations and projected growth in Bothell by industry. Location quotients (Y, or vertical, axis) measure the relative concentration of jobs in a given area. Annual growth is given on the X axis, based on Puget Sound Regional Council (PSRC) forecasts. Colored bubbles represent different industry sectors, and the bubbles are scaled according to total employment. Within Bothell's Snohomish County portion, the largest sector is FIRE/ Services (Finance, Insurance and Real Estate); the sector with the highest location quotient (greatest concentration) relative to the Central Puget Sound region (King, Kitsap, Pierce and Snohomish Counties) is Manufacturing / WTU (Warehousing Transportation and Utilities). Retail/Food Services, Construction/Resource and FIRE/Services are expected to grow significantly between 2010 and 2040. Despite its high local concentration, Manufacturing/ WTU employment is expected to contract between 2010 and 2040.

The exhibit illustrates the relative importance of Canyon Park and Bothell as a regional hub for high tech manufacturing and professional services. The data also give some insight into likely employment by industry trajectories in the coming years. For instance, despite the projected negative growth rate in Manufacturing / WTU, Bothell's outsized footprint in these industries relative to the rest of the region will likely result in strong continued employment in these industries - especially those for which Bothell continues to accumulate or reinforce innovation-driven competitive advantage - such as in the biomedical and life science sectors. And, with the strong growth rates, a large jobs presence, and strong location quotients in the FIRE and Services industries, significant upward employment growth may be expected in these sectors.

EXHIBIT 15. LOCATION QUOTIENTS AND FORECAST GROWTH BY INDUSTRY SECTOR, BOTHELL (SNOHOMISH), 2010 - 2040



Source: Community Attributes, Inc.; PSRC, 2017.

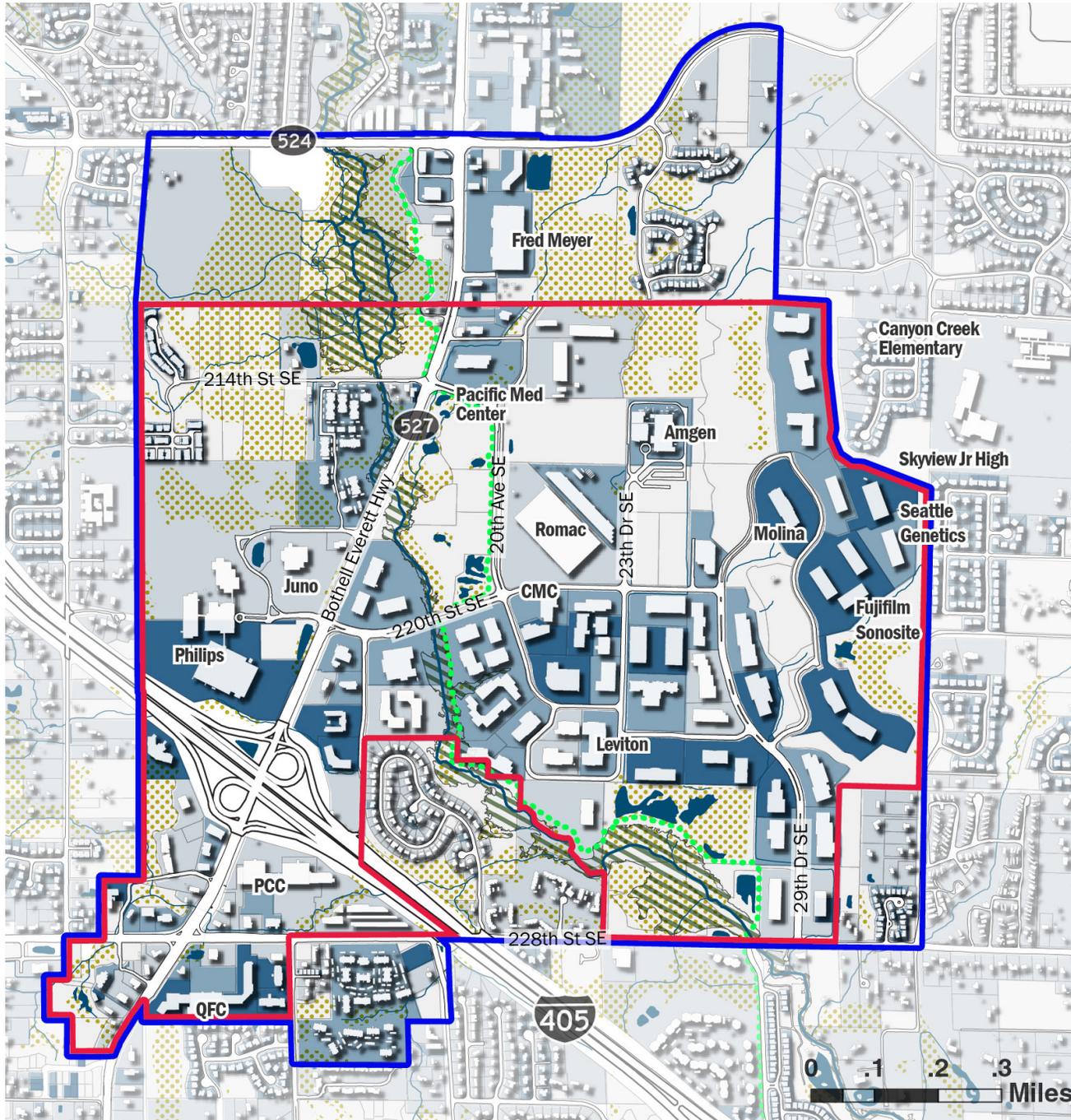
Note: FIRE represents Finance, Insurance and Real Estate; WTU represents Warehousing, Transportation and Utilities

DEVELOPABLE AREAS

Exhibit 16 leverages parcel data and assessed improvement values to illustrate the relative build-out of Canyon Park. The analysis illustrates where potential opportunities for future development may be located, including several vacant properties as well as those that have relatively low value improvements. The exhibit also illustrates the relative constraints posed by critical areas, which are discussed in more detail later in this report. Several undeveloped parcels within the Canyon Park RGC represent significant opportunities for expansion of commercial / industrial development.

The City of Bothell has estimated the overall capacity of population and employment for the Canyon Park RGC. The area's developable capacity is impacted by existing development and the amount of critical areas present (wetlands, floodplain, steep slopes) as shown in **Exhibit 16**. The City added a significant amount of residential capacity in the RGC through the implementation of the R-AC designation across most areas in Canyon Park. The designation allows for development of high density multifamily housing and is responsible for the estimated total population capacity of 4,400 people (see Infrastructure and Planning Framework section for more details) and increases employment capacity by approximately 750.

EXHIBIT 16. IMPROVEMENT VALUES, CANYON PARK, 2017



This map provides an overview of the relative value of improvements on different properties in Canyon Park. This is one indicator of redevelopment potential.

Canyon Park RGC & Subarea Improvement Values

- Canyon Park Regional Growth Center
 - Canyon Park Subarea Boundary
 - Buildings
 - Lakes, Streams & Water Features
 - Floodplain
 - Wetlands
- Improvement \$ / Land Sq. Ft.
- \$0
 - \$0 - \$25
 - \$25 - \$50
 - \$50 or more

Source: Community Attributes Inc., City of Bothell

Source: CoStart, 2018; Community Attributes, Inc. 2018.

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INFRASTRUCTURE & PLANNING FRAMEWORK



INFRASTRUCTURE AND PLANNING FRAMEWORK

PLANNED CAPACITY AND LAND USE

Both VISION 2040 and Transportation 2040, the central Puget Sound region’s transportation plan, call for focusing growth management and transportation strategies on regionally-designated centers. Planning for each regional growth center is primarily the responsibility of local government: cities and, in several cases, counties. Bothell includes the Canyon Park Subarea Plan as an element in its Imagine Bothell Comprehensive Plan. The subarea described in the plan is slightly larger than the designated RGC boundary including more residential areas to the south and east of the center.

The City of Bothell has assigned mixed-use development zoning to the Canyon Park RGC. The RGC includes: OP or Office Professional zoning which permits office uses; LI or Light Industrial which permits manufacturing, warehousing, research and development uses; and in 2015 the City added the R-AC or Residential Activity Center zoning classification which permits attached residential uses and does not prescribe a specific residential density limit. This has created the need for more planning to ensure that the population growth is accommodated in a way that makes efficient use of land, maximizes allowable densities where possible and contributes to a quality built environment.

EXHIBIT 17. PLANNED CAPACITY, CANYON PARK

Estimated Population Capacity through R-AC Zoning	4,498
Additional Employment Capacity through R-AC Zoning	753
Total Estimated Employment Capacity in Snohomish County Portion of Bothell	5,500

Source: City of Bothell, 2017.

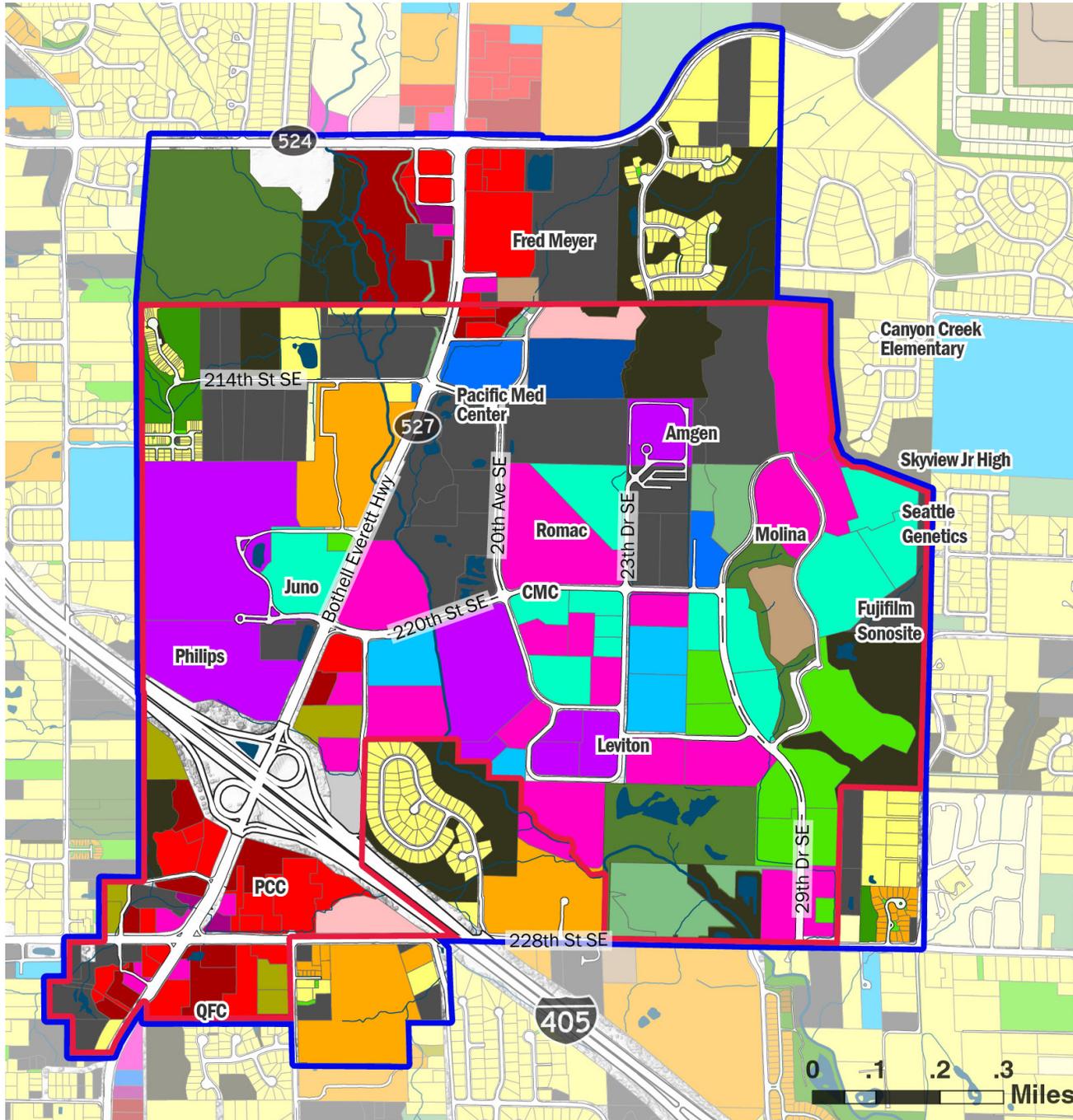
Exhibit 17 shows the estimated capacity of land in the Canyon Park RGC as well as the Snohomish County portion of Bothell. Estimates are based on the amount of vacant and redevelopable land as well as density of development permitted by zoning. Canyon Park is a critical component of the City’s overall capacity for growth in Snohomish County, representing a large majority of overall capacity in the area.

Exhibit 18 illustrates the existing mix of land uses in Canyon Park within both the RGC and subarea boundaries. Prevalent industry uses include manufacturing and lab research uses. In addition, vacant properties are shown in gray and represent a significant amount of land within the RGC.

LAND USE ATTRIBUTES

- Predominant land uses are R&D, manufacturing and office uses
- Concentrations of retail existing at the north and south end of the study area
- Some multifamily and single family uses on fringes of planning boundaries

EXHIBIT 18. LAND USE, CANYON PARK, 2017

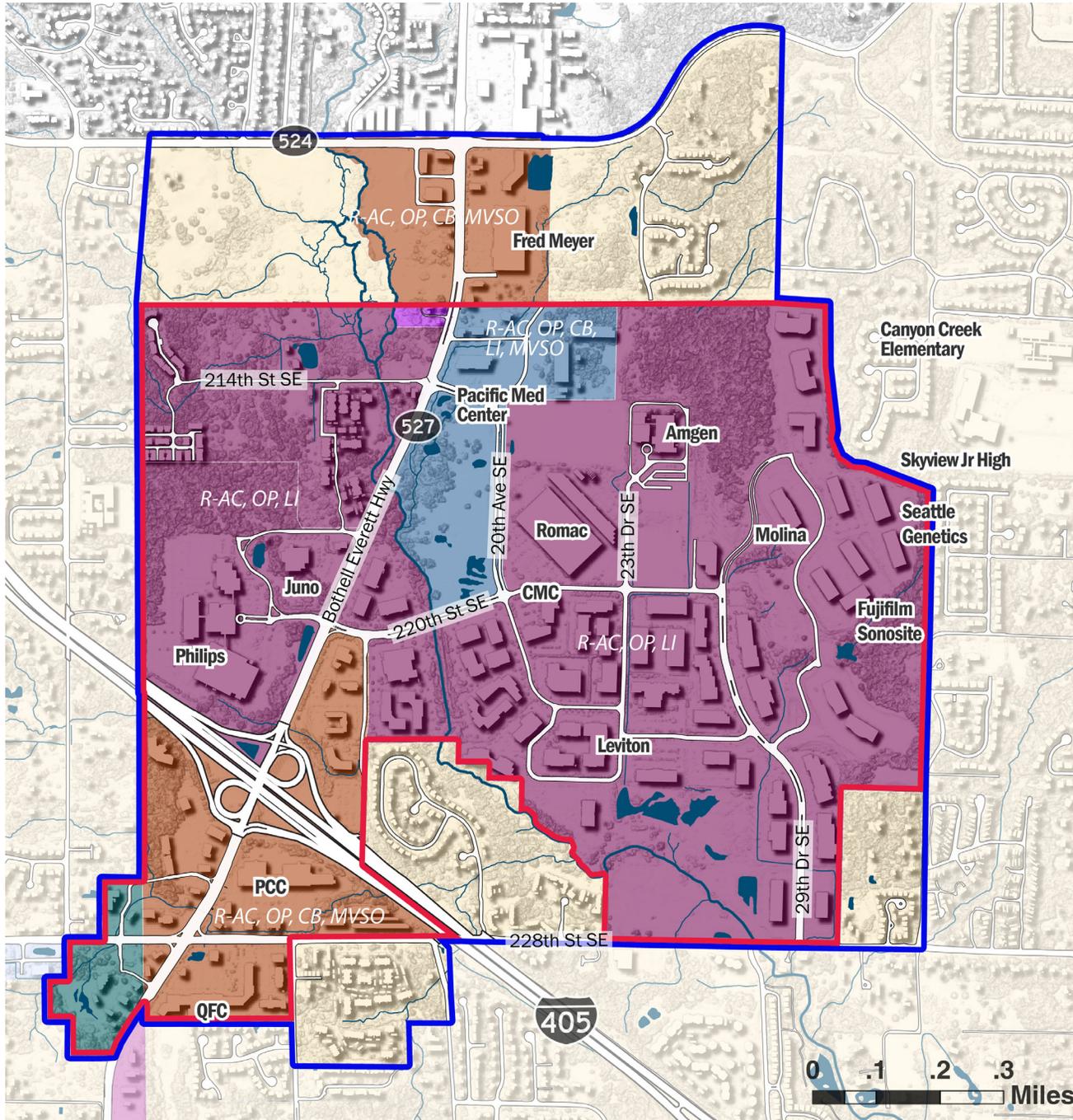


Canyon Park RGC & Subarea Land Use

- Canyon Park Regional Growth Center
- Canyon Park Subarea Boundary
- Single Family Residential
- Manufactured Homes
- Multifamily Residential
- Mobile Home Park
- Hotel / Motel
- Utilities
- Other Services
- Retail
- Eating Places & Food Service
- Business & Professional Services
- Engineering, Lab, Research
- Manufacturing & Warehouse
- Construction
- Auto-Related
- Medical & Other Health Services
- Churches & Schools
- Parks & Open Space
- Transportation
- Parking
- Vacant Area
- Other

Source: Community Attributes Inc., City of Bothell, 2017

EXHIBIT 19. ZONING, CANYON PARK AREA, 2017



Canyon Park RGC and Subarea

Area Zoning

- OP
- OP, CB, GC
- OP, GC
- R-AC, OP, CB
- R-AC, OP, CB, LI, MVSO
- R-AC, OP, CB, MVSO
- R-AC, OP, LI
- R-AC, OP, NB, LI
- Residential Zoning

See page 22 for brief descriptions of these zoning classifications.

Existing zoning in Canyon Park (see **Exhibit 19**) largely consists of a mix of office park, light industrial and commercial oriented regulations and uses. In addition, much of the area within the Canyon Park RGC also allows for high density housing in the form of the aforementioned R-AC designation. **Exhibit 20** provides a synopsis of the various combinations of zoning designations present within the Canyon Park RGC.

EXHIBIT 20. ZONING SUMMARY, CANYON PARK AREA, 2017

Attributes	R-AC, OP, CB, MVSO	R (9,600, 4,000, 5,400a)	R-AC, OP, LI	R-AC, OP, CB,LI, MVSO
Location	SW Corner of Subarea	Pockets along edges of subarea	West side, SE Corner, east side	Central, along highway
Major Uses	Office, restaurants (including drive through), retail, multifamily & single family residential, car sales	Single family residential, Multifamily residential, ADU	Multifamily & single family residential, light industrial, offices, restaurants, transit stations	Office, restaurants (including drive through), retail, multifamily & single family residential, light industrial, Colleges, medical offices
Conditional Uses	Colleges, medical offices, transit stations	Mobile home parks; police & fire stations; schools; transit stations	Colleges, hospitals	Colleges, medical offices
Height Limit	35 feet, or up to 65 feet if meeting at-grade commercial or parking requirements	30-35 ft	65 ft (R-AC), 100 ft (other uses)	65 ft (R-AC), 100 ft (other uses)
Density	Driven by building envelope and lot coverage requirements	4.5-11 SF homes/acre	Driven by building envelope and lot coverage requirements	Driven by building envelope and lot coverage requirements

CRITICAL AREAS AND NATURAL ENVIRONMENT

One of the most predominant and important features of Canyon Park is its abundance of open space and critical areas. **Exhibit 21** illustrates this abundance and diversity. Not only is the area defined by wetlands and creeks, it also features a natural divide in topography along its eastern border. The environmental features of Canyon Park represent both opportunity in the form of public open space and constraints in terms of limiting the amount of developable land for future growth.

WETLANDS

Wetlands are a predominant feature of the Canyon Park RGC and are preserved throughout the area in protective tracts or are owned by the City of Bothell. Future planning efforts should not only work to enhance this unique feature but also provide limited passive or visual access to them. Recognition of the ecological, recreational and scenic value of the wetlands was identified as an important physical feature by Stakeholders participating in the vision phase.

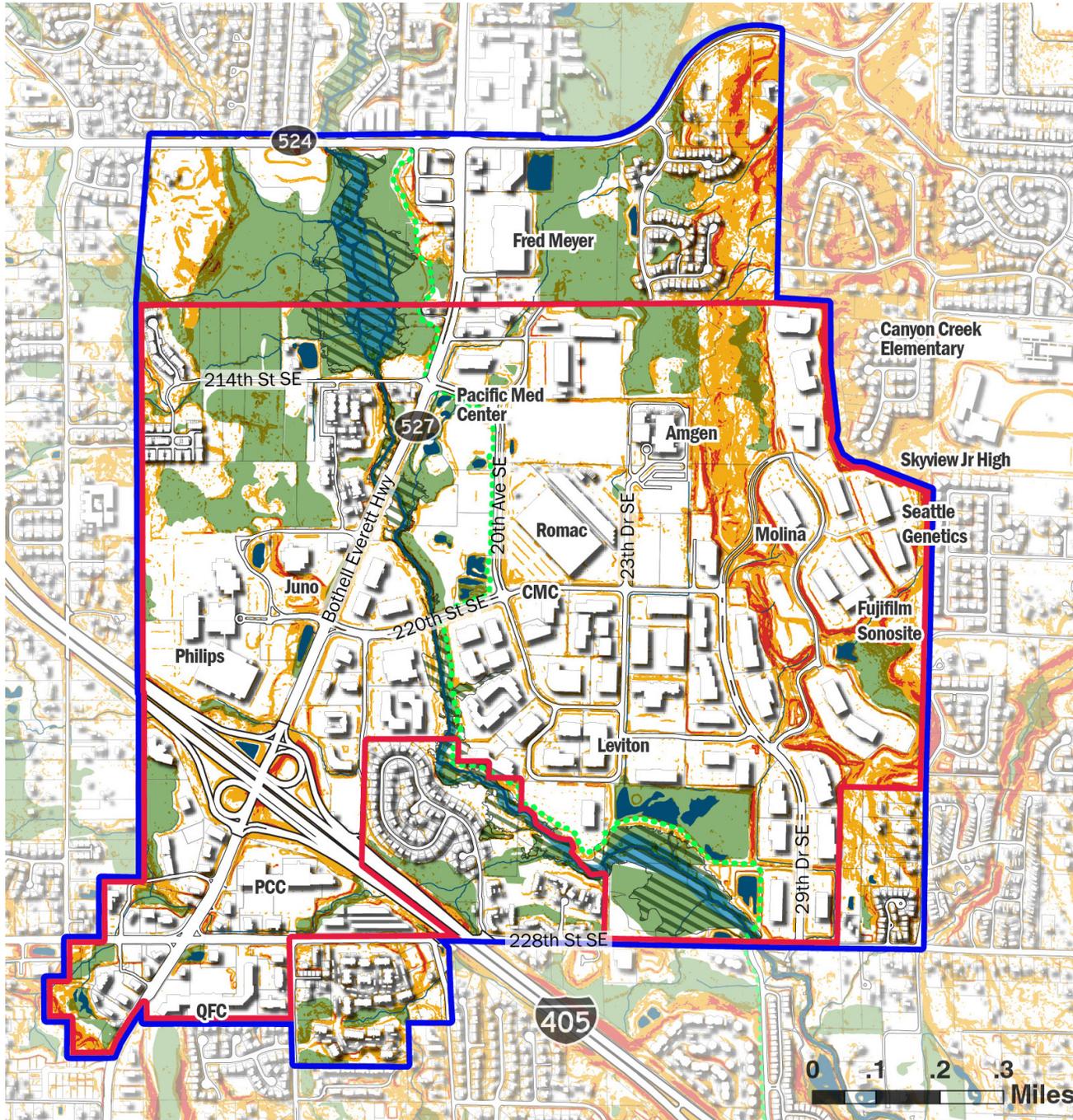
NORTH CREEK

North Creek not only serves as an important component of the regional watershed, it also provides natural corridors within Canyon Park and other areas outside of the RGC. Furthermore, the adjacent North Creek Trail can serve as a signature feature that showcases the natural beauty of Canyon Park and provides an opportunity for non-motorized connections within and outside the area.

STEEP SLOPES/BENCH

Steep slopes separate the eastern most portion of the RGC. The top shelf is developed with office/business park uses. The steeply sloped areas that remain undeveloped provide a natural transition between areas of the RGC.

EXHIBIT 21. CRITICAL AREAS, CANYON PARK



Canyon Park RGC & Subarea Environmental Features

- Canyon Park Regional Growth Center
- Canyon Park Subarea Boundary
- Lakes, Streams & Water Features
- Buildings
- Wetlands
- Floodway
- Floodplain
- Moderately High Slope Area 15-40%
- High Slope Area 40%+
- North Creek Trail

Source: Community Attributes Inc., City of Bothell

TRANSPORTATION

The Canyon Park RGC is served by several primary arterials that connect the area to Mill Creek, Everett and I-5 to the north and Kirkland, Redmond and Bellevue to the south. SR-527 serves as the main north-south oriented roadway through the area while SR-524 is a major east-west connecting route. Transit service within Canyon Park is provided by Sound Transit and Community Transit, which both operate bus service along I-405 and within the area.

In addition to the major highway and arterial connections to the Canyon Park RGC there exists a network of smaller locally serving roads. A unique attribute of the area is that many of the roads within the RGC are privately owned and maintained. **Exhibit 22** illustrates the location of these roads within the RGC. Almost all of the privately owned roads are associated with the original Canyon Park business park.

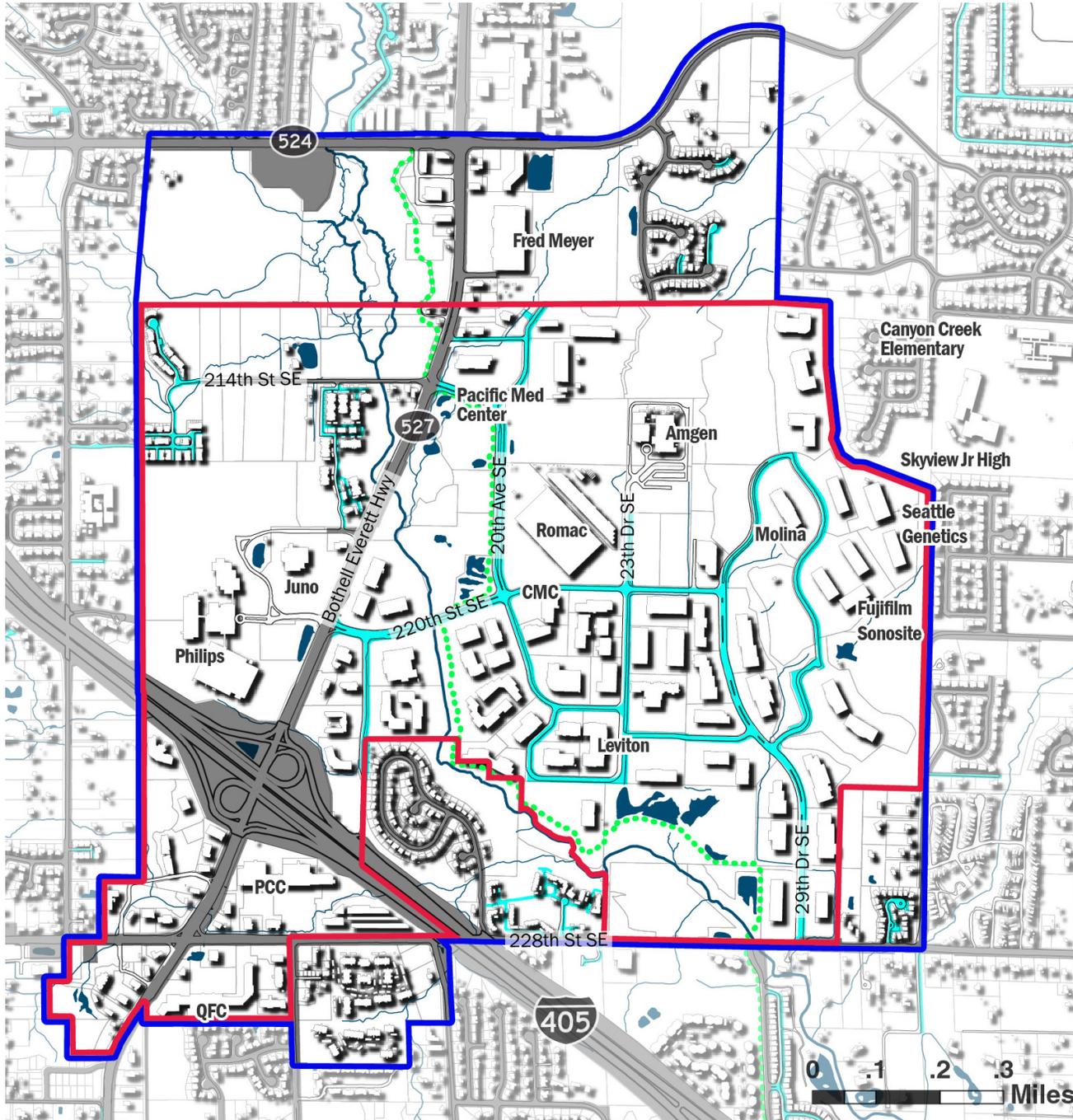
TRANSPORTATION CHARACTERISTICS

- Two major transportation corridors bisect the area (I-405 and SR-527)
- The majority of internal roads within the area are privately owned rights-of-way
- The area is primarily accessed by auto and bus service though there are quality bicycle and pedestrian options available
- Congestion on roads accessing the RGC is prevalent
- The lack of congestion within Canyon Park provides for a more appealing driving/walking experience but is also a potential symptom of limited connectivity
- The interior of the business park campus has good pedestrian/bike facilities and low traffic roads, with a few exceptions

PLANNED TRANSPORTATION IMPROVEMENTS

Planned transportation improvement projects in the area (funded and unfunded) are summarized in **Exhibit 22** on the following pages. Sources referenced included the City of Bothell 2018-2023 Transportation Improvement Plan, Bothell Public Works Needs List, Draft Regional Transportation 2040 Plan, Snohomish County Transportation Improvements, Sound Transit 3 Plan, and Community Transit Long Range Plan. Comments are provided in **Exhibit 22** about how these projects could help improve mobility in the Canyon Park area.

EXHIBIT 22. RIGHTS-OF-WAY, CANYON PARK, 2017



Canyon Park RGC & Subarea

Rights-of-Way by Ownership

- Canyon Park Regional Growth Center
- Canyon Park Subarea Boundary
- Lakes, Streams & Water Features
- Buildings
- Private Rights-of-Way
- Public Rights-of-Way
- North Creek Trail

Source: Community Attributes Inc., City of Bothell

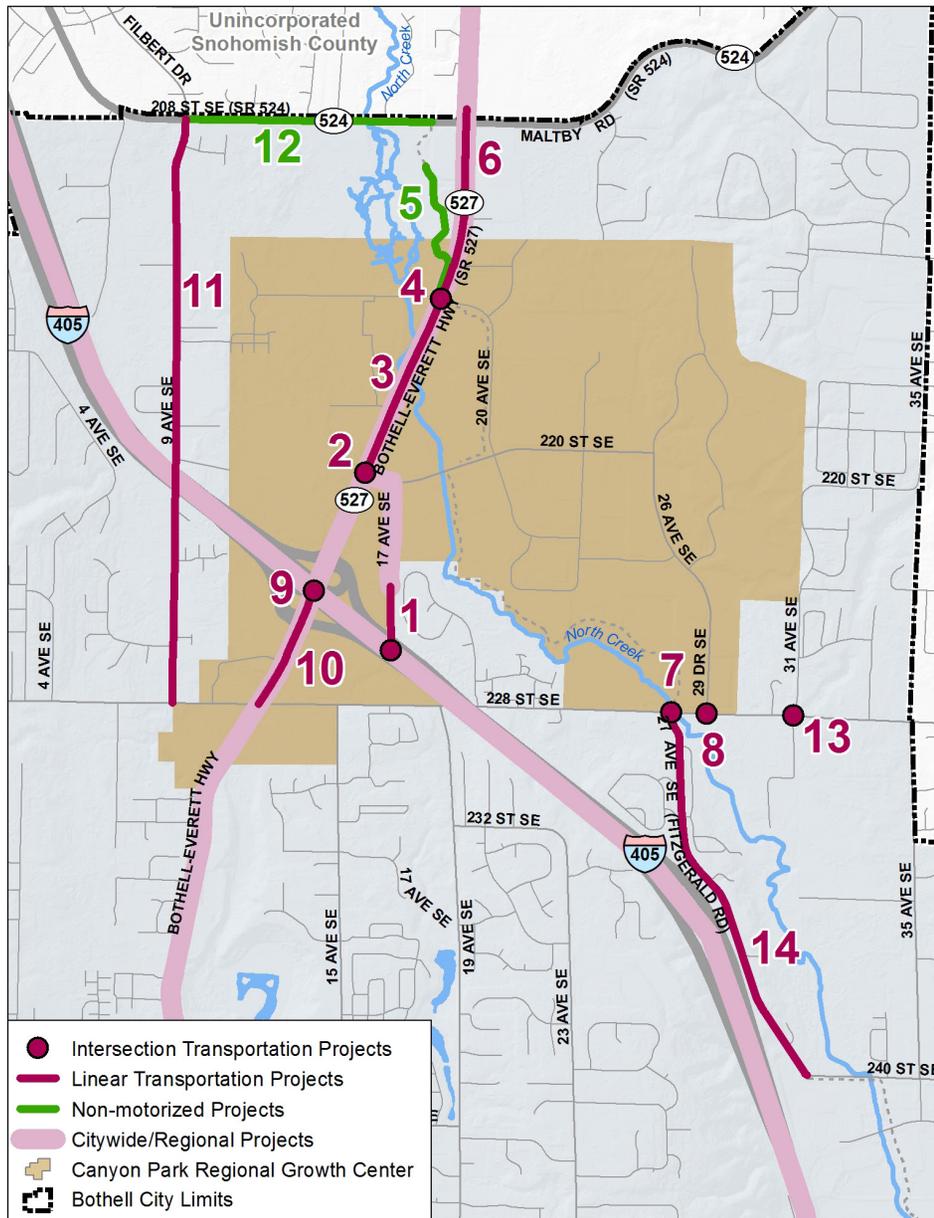
EXHIBIT 23. CANYON PARK AREA – PLANNED TRANSPORTATION IMPROVEMENTS

MAP NO.	PROJECT	DESCRIPTION	COMPLETION DATE/SOURCE	COMMENTS
1	I-405 Direct Access Ramps	Add direct Express Toll Lane access ramps to 17th Ave SE to the Park and Ride in the business park. Part of the I-405 Master Plan Project.	2024. This project is directly connected to the ST3 I-405 and SR 522 BRT improvements	WSDOT received funding to complete (100%) design work and begin right-of-way analysis.
2	220th Street SE and SR 527	Adds eastbound left turn lane (2 left).	TBD. Bothell Public Works Needs List	Unfunded. Improves traffic operations at 220th St SE intersection.
3	SR 527 Add Southbound Lane from SR 524 to 220th Street SE	Prepare plans, specifications, and estimates to add third southbound lane, as well as associated intersection revisions adjacent to the project corridor.	2025 PSRC Transportation 2040 Plan.	Financially Constrained. \$14.1 M Increases capacity to help traffic flow through the corridor.
4	214th Street SE and SR 527 Intersection	Re-channelizes westbound through/left lane to through/right.	TBD. Bothell Public Works Needs List	Unfunded. Improves traffic operations at 214th St SE intersection.
5	North Creek Trail – Section 3	Regional trail extension paralleling SR 527 from 214th St SE to just south of SR 524	By 2023 / Bothell 2018 – 2023 TIP	Completes non-motorized access to business park.
6	SR 527 (211th Street SE to north of SR 524)	Adds third northbound through lane. Add southbound left turn lane at SR 524 (2 left). Also known as SR 527/SR 524 Intersection Improvements	TBD. Bothell Public Works Needs List	Unfunded. Provides more through capacity on SR 527.

MAP NO.	PROJECT	DESCRIPTION	COMPLETION DATE/SOURCE	COMMENTS
7	228th Street SE and Fitzgerald Road	Adds eastbound right turn pocket	TBD. Bothell Public Works Needs List	Unfunded. Improves traffic flow along 228th St SE.
8	228th Street SE and 29th Drive SE	Adds westbound right turn pocket.	TBD. Bothell Public Works Needs List	Unfunded. Improves traffic operations/flow along 228th St SE.
9	I-405 Widening and SR 527 Interchange Improvements	Widening I-405 to add a second Express Toll lane from SR 522 to I 5 in Lynnwood. Improve SR 527 and I-405 Interchange	2030 PSRC Transportation 2040 Plan.	Financially Constrained. \$399.4 M Dual toll lanes can help with traffic flow along I-405. Interchange improvements could improve the walking environment across I-405 to the project area.
10	SR 527/228th Street to I-405 Improvements	Intersection improvements to be coordinated with I-405/ SR 527 Interchange improvement project described above.	2030 PSRC Transportation 2040 Plan.	Financially Constrained. \$20.6 M Could identify how to make the congested intersection operate more efficiently near the project area.
11	9th Avenue SE Widening: 228th St SE to SR 524	Upgrade road to Collector road standards, including improvements at the 228th and SR 524 intersections	TBD. Bothell Public Works Needs List	Unfunded. Improves another north-south road in the area, which may help relieve
12	North Creek Trail – Section 4	Complete missing link along SR 524 from Section 3 to the west.	By 2023 / Bothell 2018 – 2023 TIP	Completes non-motorized access to business park.
13	228th Street SE and 31st Avenue SE	Adds westbound right turn pocket.	TBD. Bothell Public Works Needs List	Unfunded. Improves traffic operations/flow along 228th St SE.

MAP NO.	PROJECT	DESCRIPTION	COMPLETION DATE/SOURCE	COMMENTS
14	Fitzgerald Road Improvements: 240th Street SE to 228th Street SE	Widen road to add curb/gutter and sidewalks	TBD. Bothell Public Works Needs List	Unfunded. Improves non-motorized access to business park from the south.
15	SWIFT Green Line	Frequent transit connections between Canyon Park P&R to Boeing. Would intersect with existing Swift 'Blue' line on Highway 99	2019 / Community Transit	Improved transit to/from the project area. Employers can market transit amenities to employees. Unfunded future SWIFT extension is planned south on SR 527 to Downtown Bothell. Other unfunded new SWIFT lines would operate throughout the county including one along SR 524.
16	SR 527 Corridor Study (SR 524 to SR 522)	Corridor study to develop a long-range plan to address capacity and congestion.	By 2023 / Bothell 2018 – 2023 TIP	SR 527 is a main access road to the study area. Business park should participate in the study to help identify improved access solutions for all modes at the 214th and 220th intersections.
17	ST3 I-405 BRT Project	Enhanced service connection between Lynnwood TC, Bothell/ Canyon Park P&R, Bellevue, Renton, and Burien.	2024 / ST 3 Project Map	Provides enhanced regional transit access to the Canyon Park area. Employers can market transit amenities to employees. Note that riders would still need to travel from the P&R to the office buildings.
18	Adaptive Signal Control Phase I along SR 527	Improve traffic signal control to be more responsive to vehicle demand through the corridor.	TBD. Snohomish County Transportation Improvements.	Will improve traffic flow on SR 527, one of
19	ST 3 – New SR-522 Bus Rapid Transit (BRT) route	BRT service for Woodinville, Downtown Bothell, Kenmore, Lake Forest Park, Seattle, and Shoreline.	2024.	Provides enhanced regional transit access from Downtown Bothell to the Link light rail station at Shoreline South/NE 145 th and BRT on I-405

EXHIBIT 24. MAP OF PROJECTS NEAR THE RGC

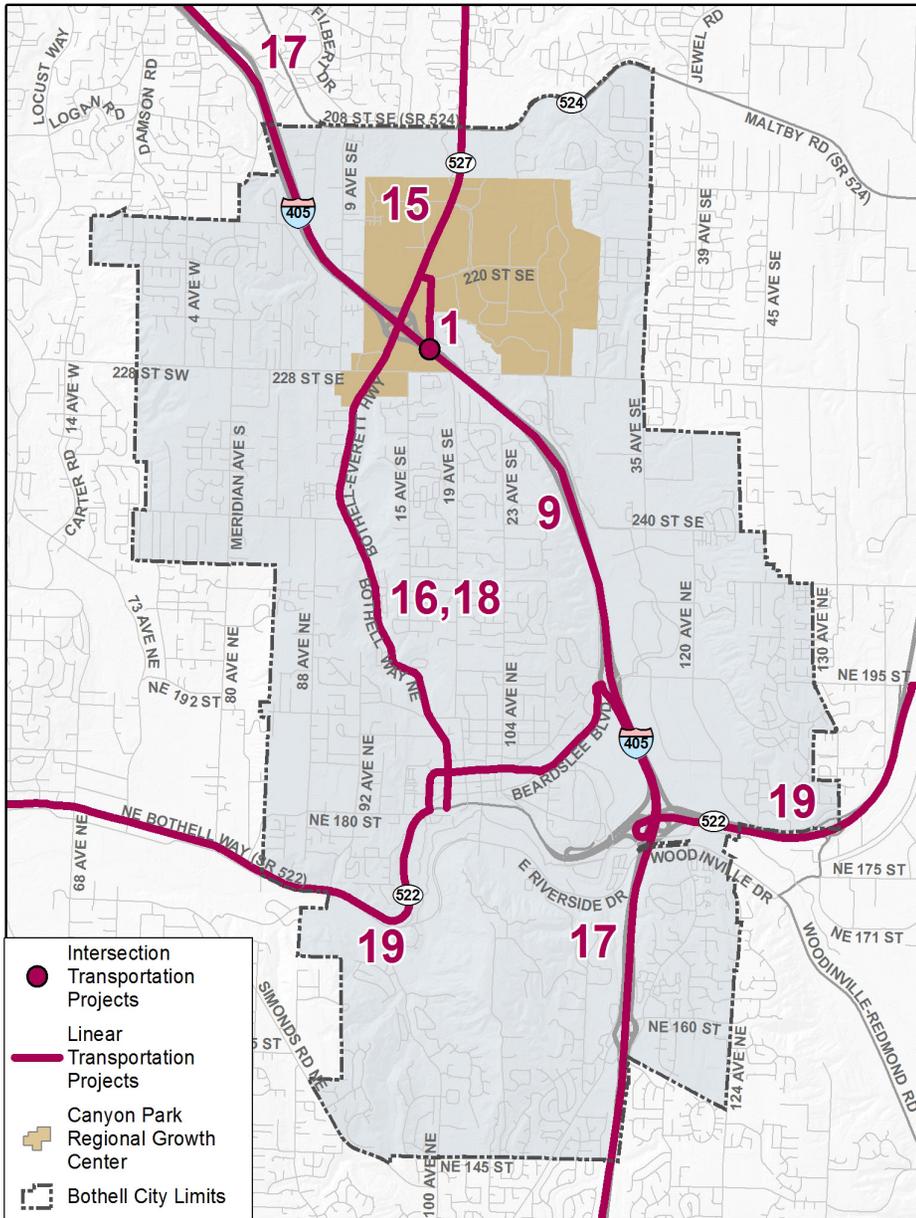


Source: City of Bothell, 2018

EXHIBIT 25. DESCRIPTION OF PLANNED PROJECTS NEAR OR WITHIN THE RGC

NO.	PROJECT	DESCRIPTION
1	WSDOT I-405 Direct Express Toll Lane Access Ramps	Direct access ramps from ETL to Canyon Park at 17 Ave SE and Transit connections. Includes improvements to 17 Ave SE and intersections at 220 St SE / 17 Ave SE and 220 St SE / SR-527.
2	220 St SE and SR 527 Intersection	Add another eastbound left turn lane (2 total left turn lanes).
3	SR 527 Add a southbound lane between SR 524 and 220 St SE	Prepare plans, specifications, and estimates to add a third southbound lane, and associated intersection revisions.
4	214 St SE and SR 527	Re-channelize the westbound through/left lane to a through/right lane.
5	North Creek Trail - Section 3	Extension of the regional trail paralleling SR 527 from 214 St SE to SR 524.
6	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.
7	228 St SE and Fitzgerald Road intersection	Adds eastbound right turn pocket.
8	228 St SE and 29th DR SE intersection	Adds westbound right turn pocket.
9	I-405 Widening and SR 527 Interchange Improvements	Widening I-405 to add a second Express Toll lane from SR 522 to I-5 in Lynnwood. Improvements to the SR 527 and I-405 Interchange/ramps.
10	SR 527 / 228 St to I-405 Intersection/interchange	Intersection improvements to coordinate with the I-405/ SR 527 interchange improvement project (9) described above.
11	9 Ave SE Widening: 228th St SE to SR 524	Upgrade road to a Collector road standard (3-lanes) with improved pedestrian/bike facilities and improvements to the 228 and SR 524 intersections.
12	North Creek Trail - Section 4	Complete the missing link along SR 524 between current trail and Filbert Road.
13	229 St SE / 31st Ave SE Intersection	Add a westbound dedicated right turn lane.
14	Fitzgerald Road: 240 St SE to 228 St SE	Widen road and add curb, gutter and sidewalks.

EXHIBIT 26. MAP OF REGIONAL CONNECTION PROJECTS



Source: City of Bothell, 2018

EXHIBIT 27. DESCRIPTION OF REGIONAL CONNECTION PROJECTS

NO.	PROJECT	DESCRIPTION
1	WSDOT I-405 Direct Express Toll Lane Access Ramps	Direct access ramps from ETL to Canyon Park at 17 Ave SE and Transit connections. Includes improvements to 17 Ave SE and intersections at 220 ST SE / 17 Ave SE and 220 ST SE / SR-527.
15	SWIFT 'Green' Line - Community Transit	Bus Rapid Transit service along SR-527 between Canyon Park and Boeing (Everett). Would intersect with existing Swift 'Blue' line on Highway 99 and eventually the Lynnwood light rail station
16	SR 527 Corridor Study (SR 524 to SR 522)	Corridor study to develop a long-range plan to address needed capacity and reduce congestion
17	ST3 - New I-405 Bus Rapid Transit (BRT) route	BRT service from Lynnwood through Canyon Park, Kirkland, Bellevue, Renton, and Burien
18	Adaptive signal synchronization along SR 527	Improve traffic signal controls along SR-527 to be more responsive to vehicle demand
19	ST 3 - New SR-522 Bus Rapid Transit (BRT) route	BRT service for Woodinville, Downtown Bothell, Kenmore, Lake Forest Park, Seattle, and Shoreline

Exhibits 26 and 27 identify transportation improvements in Exhibit 23 that will offer Canyon Park commuters regional connections. Of particular importance are Bus Rapid Transit (BRT) enhancements to I-405, SR-527, and SR-522; a second Express Toll Lane (ETL) along I-405; and a new ETL exit/access ramp to Canyon Park.

TRANSPORTATION OPPORTUNITIES

In reviewing the transportation conditions of Canyon Park the project transportation consultant, Fehr & Peers, developed the following assessment of transportation observations and opportunities (Exhibit 24).

EXHIBIT 28. CANYON PARK AREA OBSERVATIONS AND OPPORTUNITIES

OBSERVATIONS	OPPORTUNITIES
Congestion on adjacent access roads	Explore new road connections to reduce demand on SR 527 corridors. Potential road extensions could be to connect west to 9th Ave SE or northeast to SR 524. However, these areas may be constrained by wetlands.
Congestion on I-405	Coordinate with WSDOT to explore opportunities to ease I-405 congestion, such as adding a second toll lane on I-405
Leverage Planned Transit Improvements	SWIFT Green line (2019) and I-405 BRT system (2024) will provide enhanced non-SOV access to the business park. These transit improvements can be marketed to help attract companies/employees.
First / Last Mile access from Park-and-Ride	Free bike share program (Spin, Limebike, etc.) Free subarea shuttle circulator (Microsoft Connect, Seattle Genetics)
Leverage/Embrace North Creek Trail	Define a bicycle route - "Canyon Park Loop" Add improved wayfinding signage to destinations/trail crossings
Improve pedestrian/bicycle access to subarea	Create a 'Gateway' entrance at 220th or 214th Street. Create a new Street Design Standard for the segment to improve bicycle and pedestrian access. Formalize pedestrian goat path trails on the east side to provide better connections to the neighborhoods to the east.

Source: Fehr & Peers, 2017

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An aerial photograph of a university campus, showing various buildings, roads, and green spaces. The image is overlaid with a semi-transparent blue filter. The text 'STAKEHOLDER ENGAGEMENT' is prominently displayed in the upper left quadrant in a bold, white, sans-serif font.

STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT

STAKEHOLDER WORKING GROUP

The future growth of the Canyon Park area is critical to both the City of Bothell and the businesses and residents that call it home. As such, the City formed a stakeholder working group to help develop a new vision for the area. The stakeholder working group served as a critical component of the visioning process.

GROUP PURPOSE & FORMATION

The group was formed to provide the following:

- To serve as a sounding board and voice for the local businesses and residents
- Help establish vision priorities and objectives
- Identify challenges and opportunities in the area

The group included representatives from:

- Local government
- Real estate
- Neighbors/local community
- Regional and local economic development
- Local industry/businesses
- Property owners

STAKEHOLDER WORKING GROUP DISCUSSION

The following represents a summary of the themes and priorities discussed by the stakeholder working group. Stakeholder input was instrumental in development of the proposed vision and objectives contained later in the report. The input gathered is organized by common topic areas.

Canyon Park Strengths

- Open space and greenery
- Natural amenities that have been preserved
- The existing trail network
- The existing biomedical and life sciences industry cluster
- The relative strength of the regional economy and growth in Bothell

Transportation and Access

- Traffic congestion to and within the park is a major concern (I-405 and state highways)
- There is a lack of reliable transit options
- Growth is and will continue to impact travel times for employees
- Need to improve traffic flow north and south on SR 527
- Staging of flexible shifts/operations is practiced by several companies to avoid impacts of peak time traffic
- Internal roads are a challenge but are not the primary transportation issue
- Much of the internal road network is privately owned and not up to the standards of the City

Amenities and Services

- There is a noticeable lack of amenities (restaurants, eateries, coffee shops, recreation) within the park
- Need/desire for more restaurant options
- Area is lacking 'urban lifestyle' amenities attractive to employees

Employees

- Attracting talent is a challenge for local industries
- Recruiting new employees to Canyon Park is challenging because of traffic
- The commute is impacting quality of life for existing employees
- Need/desire to substantially improve transit services and for companies to promote transit ridership

Industry Growth and Development

- The area should remain an important manufacturing location
- Consider the long-term goals of the companies currently in the park
- Millennials are influencing how companies can grow
- Current building stock doesn't match the needs of growth businesses in terms of size and building type
- Building and facility/redevelopment where can this happen?

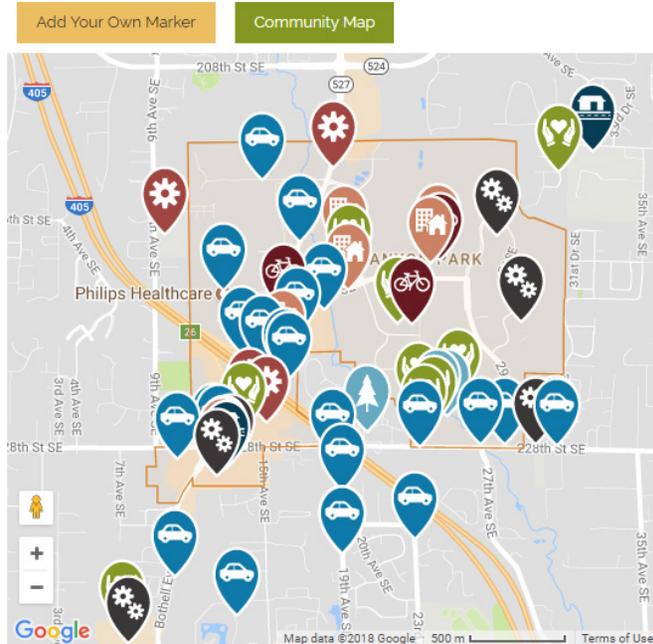
Housing Development

- Housing supply and affordability is a challenge for local employees
- The City should explore the Seattle Multi-family residential tax exemption to encourage affordable/workforce housing
- How will new residential impact traffic congestion?
- Current CC&R's in the business park prohibit the development of housing – this is a major challenge.

PUBLIC ENGAGEMENT

Two avenues for public comment were implemented for the project. In addition to a public open house meeting hosted by the City of Bothell, an on-line project portal on the City’s web page provided an opportunity for area residents and employees to offer their thoughts on vision priorities, area challenges and specific opportunities. **Exhibits 29 and 30** illustrate the geographic concentration of comments and the types of comments received. Transportation was the most common topic mentioned. A large majority of commenters considered themselves Canyon Park residents or employees.

EXHIBIT 29. MAP OF PUBLIC COMMENTS, BOTHELL CANYON PARK VISIONING



Source: Community Attributes Inc., 2017.

EXHIBIT 30. PUBLIC COMMENT TOOL SUMMARY, BOTHELL CANYON PARK VISIONING

Category	Count	Percent	Canyon Park Resident	Canyon Park Employee	Neither
Transportation	28	44%	18	6	6
Quality of Life	10	16%	7	1	2
Housing	8	13%	8	0	0
General	6	9%	3	1	2
Services	4	6%	4	1	0
Open Space	3	5%	3	0	0
Recreation	3	5%	2	0	1
Regulations Land	2	3%	2	0	0
Industry and Employment	0	0%	0	0	0
Total	59	100%	44	9	9

Source: Community Attributes Inc., 2017.

Exhibit 31 on the following page provides a more detailed summary of public comments organized by major theme.

EXHIBIT 31. PUBLIC COMMENT THEMES

CATEGORY	COMMON THEMES
General	Preserve Country Village, small town character Planning for schools (2)
Housing	Need higher density housing, more public transportation Good area for housing (2) Housing traffic Too much housing
Open Space	Preserve natural amenities/open space (3) Dog Parks
Quality of Life	Remove shooting range Community recreation center (2) Dog park (2) Preserve natural amenities/open space Preserve Country Village Movie theatre Cultural center Declining quality of life, Freeway noise
Recreation	Neighborhood restaurant/beer garden Community recreation center (2)

CATEGORY	COMMON THEMES
Regulations Land Use	Preservation of trees and greenery Lack of infrastructure
Services	Planning for schools Impact on emergency healthcare services Need for more retail/shopping (2)
Transportation	Traffic congestion (8) Pedestrian infrastructure (6) 228th St SE traffic (5) Need more park and ride lots/parking (3) Transit service lacking/need more public transit (2) Difficult left turn movements (2) East west traffic flow Chick-Fil-A traffic (2) Local Commute Traffic light synchronization More stop lights Impact of office growth North Creek Trail Missing link

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The background of the image is a semi-transparent blue aerial photograph of a residential neighborhood. The houses and streets are visible in a lighter shade of blue. Overlaid on this is the text 'VISION & STRATEGY' in a large, bold, white, sans-serif font, centered horizontally and positioned in the upper third of the image.

VISION & STRATEGY

VISION AND STRATEGY

WHAT DEFINES CANYON PARK?

Canyon Park is an established and successful business park and employment hub for the region and City of Bothell. It is defined by the businesses that call it home and the people that commute to work there every day. The most critical strengths recognized during the visioning process included:

- Home to internationally recognized businesses and research facilities
- Abundance of ecologically significant natural amenities
- Location within a growing and desirable area for housing and retail
- Significant tracts of vacant and undeveloped land

Although the area has many strengths, challenges exist. Through the visioning process several common themes arose that define the need for a new vision for the area.

- Canyon Park is a critical component of the City's capacity for growth in employment and housing
- Transportation infrastructure is not keeping up with demand and the commute to and from the area is difficult and getting worse
- People commuting to Canyon Park are not well served by transit or multi-modal infrastructure
- The area lacks amenities and services for employees and residents
- The area is an important urban center and lacks a cohesive vision and plan

CENTRAL LOCATION

The area adjacent to the intersection of 220th Ave SE and Highway 527 currently serves as the primary gateway and is where the hub of retail activity now occurs for the business park (**Exhibit 32**) north of I-405. With its central location, relatively underdeveloped parcels, adjacency to the North Creek trail and transit facilities, this location has great potential to serve as a mixed-use node for the area.

EXHIBIT 32. 220TH AVE AND HIGHWAY 527 ALONG NORTH CREEK



GATEWAYS INTO THE AREA

The commercial node at 527 and 228th SE currently serves as the retail and services hub for Canyon Park and the surrounding Neighborhood (Exhibit 33). It is defined by auto oriented retail and is separated from the Canyon Park Business Park by I-405.

EXHIBIT 33. SOUTH OF I-405 COMMERCIAL CENTER



EXHIBIT 34. SOUTHERN BOUNDARY OF THE SUBAREA ALONG 228TH ST SE AND 29TH DRIVE SE



The southeast corner of the subarea comprises a key exit/entrance to the business park and includes a major open space/ecological area owned by the City of Bothell (see Exhibit 34).

Exhibit 35 illustrates the northern boundary of the area, which currently lies outside of the Regional Growth Center Boundary.

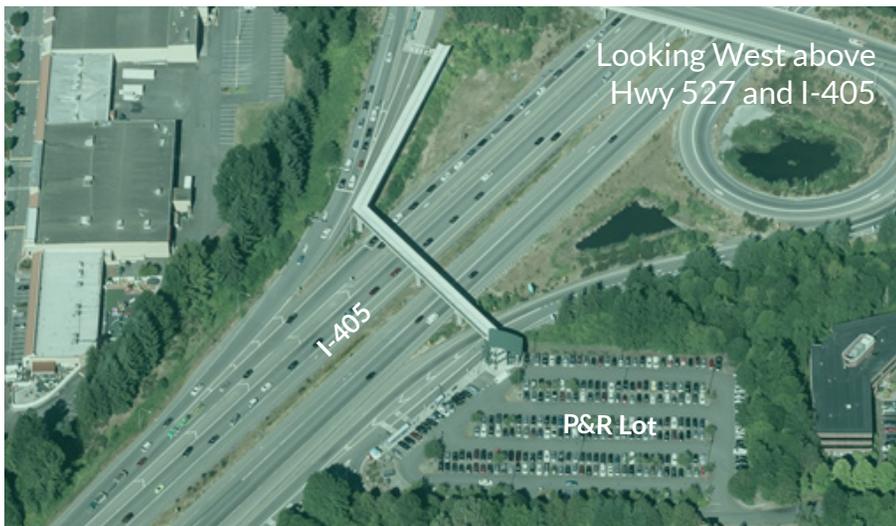
EXHIBIT 35. NORTHERN GATEWAY AT HIGHWAY 527 AND MALTBY ROAD



TRANSIT HUB AND MULTI-MODAL ACCESS

The park-and-ride facility and transit lines serving it are a key asset to build upon. Planned transit expansions to the area will increase its importance as a transit hub serving the RGC and surrounding areas (Exhibit 36).

EXHIBIT 36. PARK-AND-RIDE FACILITY WITH I-405 PEDESTRIAN OVERPASS



GROWTH OPPORTUNITIES

The Canyon Park Subarea includes major swaths of undeveloped land. Much of the undeveloped land is centrally located and adjacent to existing business park uses (Exhibit 37).

EXHIBIT 37. CENTRALLY LOCATED UNDEVELOPED PARCELS



A VISION FOR CANYON PARK

The following represents a potential vision for Canyon Park. The Vision serves a broad set of values identified for the area and reflects both the technical analysis conducted for the project as well as the input and values of the public and stakeholders that were engaged throughout.

CANYON PARK VISION

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 is 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 coming from throughout the region.

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.

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.

VISION FOCUS AREAS AND OBJECTIVES

The Canyon Park area that includes both the PSRC-designated Regional Growth Center (RGC) as well as the City's Canyon Park Subarea Boundary serves as a local commercial hub and regional employment destination. Future planning efforts should align with the values and opportunities identified for the area as described in the aforementioned vision statements. The following Focus Areas are based on the analysis of existing conditions, market analysis, stakeholder engagement and the broader public input conducted over the course of this effort.

FOCUS AREA I. TRANSIT SERVICE AND MULTI-MODAL ACCESS

Objective: Improve transit access for employees commuting to the area, overall freeway/highway upgrades and invest in multi-modal infrastructure to improve circulation within and around Canyon Park

FOCUS AREA II. BIOMEDICAL/LIFE SCIENCES CENTER

Objective: Ensure that the Canyon Park Area continues to grow as the regional hub for the biomedical, life sciences and related industries

FOCUS AREA III. HOUSING FOR THE WORKFORCE

Objective: Promote development of a diverse range of market rate and affordable housing in Canyon Park and ensure that it meets the needs of the local workforce

FOCUS AREA IV. INDUSTRY GROWTH

Objective: Accommodate the growth of existing and new businesses in Canyon Park and continue to meet the needs of both small and large businesses

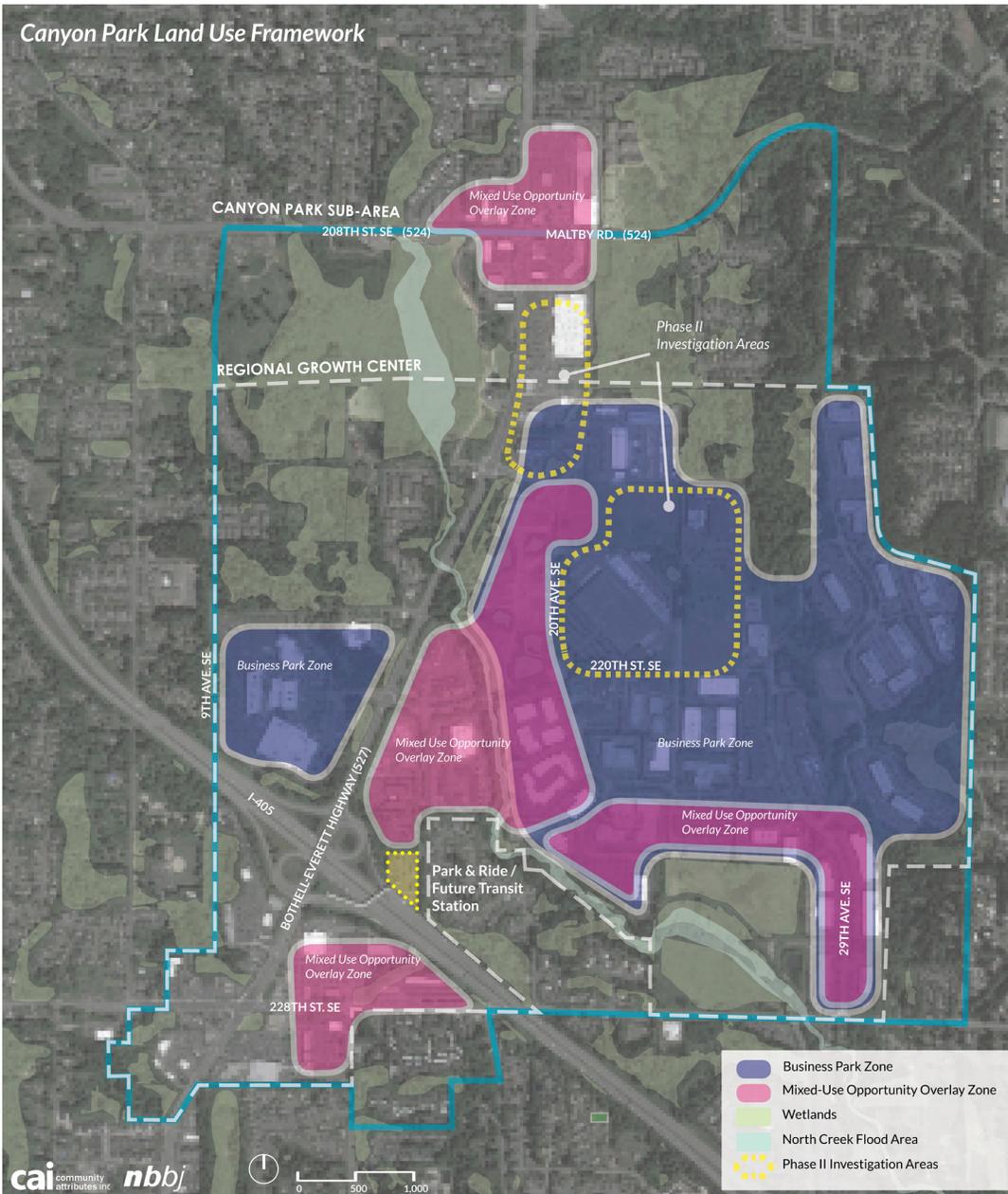
FOCUS AREA V. PARKS AND PUBLIC SPACE

Objective: Implement new public park space with recreational uses and with investments in signature public spaces

FOCUS AREA VI. AMENITIES AND SERVICES

Objective: Increase the number of retail and service amenities that serve Canyon Park and the surrounding area

EXHIBIT 38. CANYON PARK VISION, FUTURE LAND USE FRAMEWORK



Source: NBBJ, 2018; Community Attributes, Inc., 2018

VISION FRAMEWORK: FUTURE LAND USE

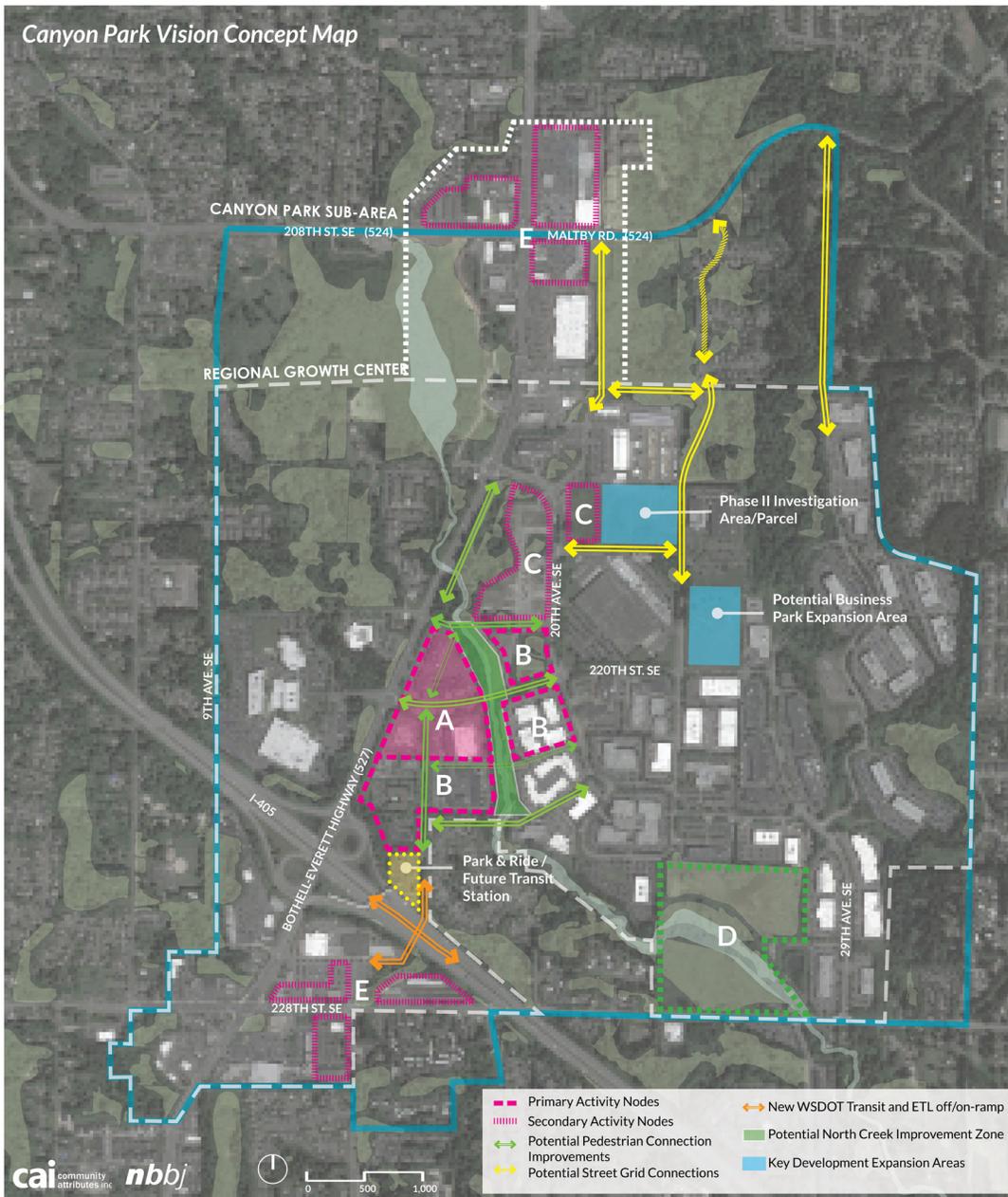
An important component of establishing a vision for the Canyon Park Area is identification of future land use designations. **Exhibit 38** illustrates the general land use pattern envisioned for the area. The Land Use Framework Map calls for two general land use zones. Uses envisioned in the zones are described in more detail in the Vision Concept Map and subsequent conceptual illustrations.

Mixed Use Opportunity Zones: Areas identified for a mix of office, retail and high-density housing development. The areas were selected based on their proximity to transit access, adjacency to existing amenities and mix of existing uses and services. Such areas would be open to more transformative development types with higher densities and more urban building forms. In addition, infrastructure and amenities would follow suit with a focus on connections to existing and new transit facilities.

Business Park Zones: Areas where the core land use and capacity is dedicated to current and potential expanded business park uses. The area could accommodate more urbanized office developments in the future and ensure that the area continues to serve as a life sciences center for the region.

Next Phase Investigation Areas: Areas identified for further study during the next phase of the City's planning efforts for Canyon Park (Subarea planning process). Analysis should focus on the mix of uses appropriate for these areas and their overall impact on population and employment capacity.

EXHIBIT 39. CANYON PARK VISION, CONCEPT MAP



VISION FRAMEWORK: ACTIVITY NODES

The concept map and activity nodes framework provide a strategy for implementing the vision (**Exhibit 39**). The approach is rooted in establishing a primary activity node within the subarea (A). Other areas serve as extensions of this primary node and use it as the commercial, service and amenity rich focal point currently lacking in Canyon Park.

A. PRIMARY ACTIVITY NODE:

Mixed-use development opportunity in close proximity to BRT and ST Express Stop / Park-and-Ride as well as a new signature public space along North Creek. *Envisioned Uses: Office/Retail or Residential/Retail with Structured Parking*

B. ACTIVITY NODE EXTENSION:

Sites with mixed-use development potential which can naturally extend south to the park-and-ride and east to the business park. *Envisioned Uses: Office/Retail or Residential/Retail with Structured Parking*

C. MIXED-USE RESIDENTIAL:

Opportunity sites for primarily residential uses with ground floor retail and structured parking to connect with retail properties to the north.

D. PASSIVE RECREATION OPPORTUNITY:

Existing wetland areas to be improved for passive recreation opportunities. Introduction of medium density residential at perimeter properties would reinforce as neighborhood amenity.

E. SECONDARY NODE OPPORTUNITIES:

Sites/areas with mixed-use redevelopment opportunity. Areas where RGC boundary adjustments may be appropriate.

Source; NBBJ, 2017.

VISION CONCEPT – URBAN DESIGN ELEMENTS

The following conceptual drawings depict the proposed vision for Canyon Park. The images and concepts presented herein illustrate the key urban design elements that should be considered in future planning efforts. The drawings and urban design elements depicted illustrate the types of activities, public infrastructure and building types envisioned for in the proposed Primary Activity Node (See area 'A' in **Exhibit 39**).

PUBLIC SPACE AND NATURAL AMENITIES

- Wide sidewalks / public plazas
- Bike lanes / street parking / multi-modal streets
- Natural areas as pedestrian amenity
- North Creek featured as a showcase natural amenity
- New park and signature public spaces that include areas for active recreation

TRANSPORTATION

- New connections to the North Creek Trail and enhancement of existing trail infrastructure
- Improved access and connection to the park-and-ride facility and transit services
- Focus on improved transit services and non-motorized infrastructure for Canyon Park employees
- Design of updated street cross sections to balance needs of trucks, commuters and residents
- Explore public-private partnerships to fund improvements to private roads and to facilitate transfer to public ownership and maintenance

BUILDING USES AND ORIENTATION

- Buildings that engage the street and sidewalk
- First floor retail
- Sidewalk cafes
- Large floor-plate for research and tech office

VISION CONCEPT – EXAMPLES

The following represent examples of development types that typify the density, quality and mix of uses envisioned for Canyon Park.



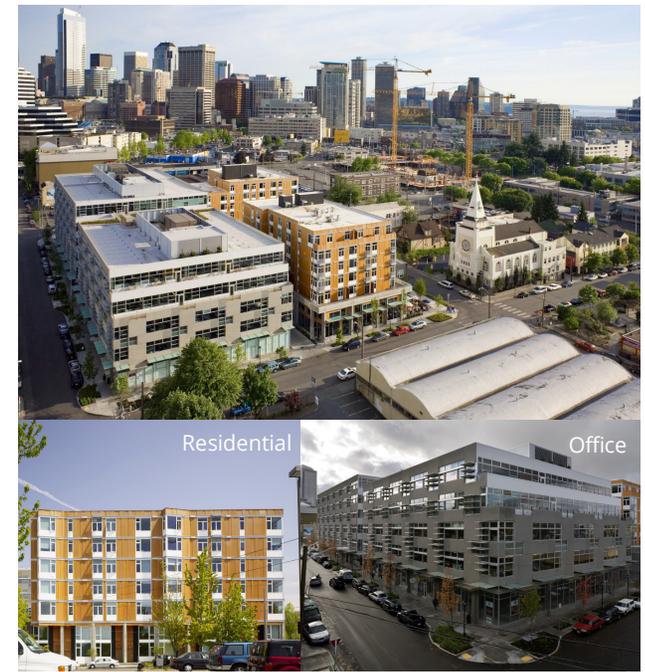
**Beardslee Crossing Mixed Use Development
Bothell, WA**

- Combination housing and retail
- 6 Stories
- Located near University of Washington Bothell and I-405
- 450 apartments
- 52,000 sf of retail/commercial



**Vue Research Center
South Lake Union, Seattle, WA**

- Completed in 2016
- 7 floors of leasable space
- Comprised of a new 122,000 square foot building adjoined to the existing 101,000 square feet
- Includes laboratory and office space
- Amenities: fitness center, retail space on the first floor with an on-site cafe, a 100-person conference center



**Alley 24 Mixed Use Development
South Lake Union, Seattle, WA**

- Half Block office - 5 Stories, up to 38,000 SF floorplates.
- Tenants: Wunderman, NBBJ, Skanska, Cole + Weber, etc.
- Half block residential - 7 Stories. Retail shared parking between office/residential

EXHIBIT 40. CANYON PARK: NORTH CREEK CONCEPT SKETCH - 220TH STREET SE LOOKING WEST



This view of 220th St. SE (looking west) illustrates the potential development intensity and appropriate building typologies for the parts of Canyon Park that are envisioned as a mixed-use center. As a hub for retail, office, and potentially residential uses, public space and multi-modal transportation are important in these areas, and are represented by the bike lanes, small public plazas, wider sidewalks and other amenities. Buildings front directly on the sidewalk to provide visual interest, and street trees add aesthetic quality while buffering pedestrians from traffic. On-street

parking in strategic locations serves local retailers while acting as a passive traffic calming device.



EXHIBIT 41. CANYON PARK: EXISTING NORTH CREEK CROSSING - 220TH STREET SE LOOKING EAST



This view of 220th St. SE (looking west) illustrates the potential development intensity and appropriate building typologies for the parts of Canyon Park that are envisioned as a mixed-use center. As a hub for retail, office, and potentially residential uses, public space and multi-modal transportation are important in these areas, and are represented by the bike lanes, small public plazas, wider sidewalks and other amenities. Buildings front directly on the

sidewalk to provide visual interest, and street trees add aesthetic quality while buffering pedestrians from traffic. On-street parking in strategic locations serves local retailers while acting as a passive traffic calming device.



EXHIBIT 42. ILLUSTRATIONS OF URBAN DESIGN CONCEPTS



Used with the permission - Roger Belanich

Wide sidewalks enhance pedestrian and public spaces and connect the buildings with the street

EXHIBIT 42. ILLUSTRATIONS OF URBAN DESIGN CONCEPTS



Used with permission - Marc Boettcher / Main Street Properties
The engagement of the building with the street and sidewalk is an important element

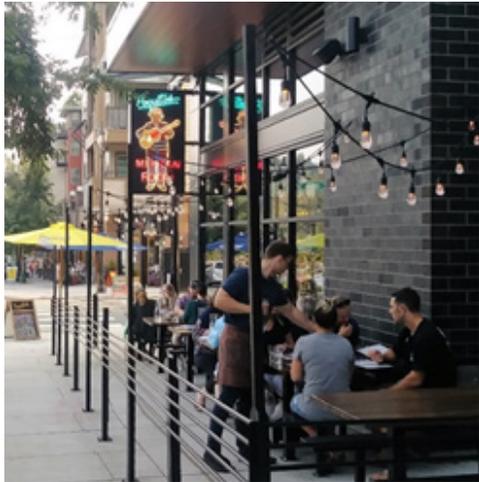


Photo Credit: Danielle Olson



Photo Credit: Danielle Olson

Retail spaces can expand onto adjacent sidewalks providing additional amenities

EXHIBIT 42. ILLUSTRATIONS OF URBAN DESIGN CONCEPTS



Photo Credit: Danielle Olson

Streams and other natural features can offer natural amenities further enhancing walkways, and public spaces

EXHIBIT 42. ILLUSTRATIONS OF URBAN DESIGN CONCEPTS



Photo Credit: Danielle Olson

Green spaces can be provided within even highly urbanized areas. Stakeholders participating in the Canyon Park Vision effort identified that natural features are an important visual amenity of the Canyon Park area.

EXHIBIT 42. ILLUSTRATIONS OF URBAN DESIGN CONCEPTS



Used with permission

Buildings can offer a mix of uses such as retail, office, even research and technology uses on the lower levels with residential dwellings on the upper levels.

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CITY OF BOTHELL
CANYON PARK VISION

Summer 2018

C Transportation Synchro LOS Reports

2043 No Action

HCM Signalized Intersection Capacity Analysis

1: 9th Ave SE/Filbert Dr & 208th St SE / SR 524

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	7	1389	150	131	1545	153	675	210	324	111	60	4
Future Volume (vph)	7	1389	150	131	1545	153	675	210	324	111	60	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.91		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3385	1441	1770	3491		1787	1688		1769	1847	
Flt Permitted	0.06	1.00	1.00	0.06	1.00		0.56	1.00		0.20	1.00	
Satd. Flow (perm)	112	3385	1441	105	3491		1055	1688		371	1847	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	7	1462	158	142	1679	166	734	228	352	122	66	4
RTOR Reduction (vph)	0	1	64	0	5	0	0	40	0	0	2	0
Lane Group Flow (vph)	7	1477	78	142	1840	0	734	540	0	122	68	0
Confl. Peds. (#/hr)									5	5		
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	66.7	65.7	65.7	77.7	71.7		59.2	48.8		25.5	19.6	
Effective Green, g (s)	68.7	66.7	66.7	78.7	72.7		59.7	49.3		26.5	20.1	
Actuated g/C Ratio	0.47	0.46	0.46	0.54	0.50		0.41	0.34		0.18	0.14	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	3.8	3.8	2.0	3.8		2.0	3.8		2.0	3.8	
Lane Grp Cap (vph)	75	1542	656	147	1733		608	568		128	253	
v/s Ratio Prot	0.00	0.44		c0.05	c0.53		c0.29	0.32		0.04	0.04	
v/s Ratio Perm	0.04		0.05	0.46			c0.20			0.13		
v/c Ratio	0.09	0.96	0.12	0.97	1.06		1.21	0.95		0.95	0.27	
Uniform Delay, d1	34.2	38.5	22.9	42.4	36.9		40.5	47.4		57.0	56.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	14.2	0.1	63.0	40.2		108.1	26.2		64.3	0.7	
Delay (s)	34.4	52.7	23.0	105.5	77.1		148.7	73.5		121.3	57.3	
Level of Service	C	D	C	F	E		F	E		F	E	
Approach Delay (s)		50.0			79.1			115.5			97.9	
Approach LOS		D			E			F			F	

Intersection Summary

HCM 2000 Control Delay	79.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	146.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary

2: SR-527 & 208th St SE / SR 524

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑	↖	↖	↖↗	↖	↖↗	↑↑↑	↖	↖↗	↑↑	↖
Traffic Volume (veh/h)	707	638	350	469	564	273	830	2137	865	148	974	309
Future Volume (veh/h)	707	638	350	469	564	273	830	2137	865	148	974	309
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	744	672	0	374	803	0	874	2249	0	159	1047	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	692		380	798		492	2088		122	1161	
Arrive On Green	0.19	0.19	0.00	0.21	0.21	0.00	0.16	0.45	0.00	0.04	0.33	0.00
Sat Flow, veh/h	3483	3582	1598	1781	3741	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	744	672	0	374	803	0	874	2249	0	159	1047	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1781	1870	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	29.0	27.9	0.0	31.4	32.0	0.0	23.7	68.0	0.0	5.3	42.2	0.0
Cycle Q Clear(g_c), s	29.0	27.9	0.0	31.4	32.0	0.0	23.7	68.0	0.0	5.3	42.2	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	692		380	798		492	2088		122	1161	
V/C Ratio(X)	1.10	0.97		0.98	1.01		1.77	1.08		1.30	0.90	
Avail Cap(c_a), veh/h	673	692		380	798		492	2088		122	1161	
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	60.5	60.1	0.0	58.7	59.0	0.0	63.2	41.0	0.0	72.3	48.2	0.0
Incr Delay (d2), s/veh	67.0	26.9	0.0	41.8	33.4	0.0	356.9	44.3	0.0	183.2	10.9	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	19.0	15.2	0.0	18.4	18.7	0.0	33.6	33.0	0.0	5.4	19.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	127.5	87.0	0.0	100.6	92.4	0.0	420.1	85.3	0.0	255.5	59.2	0.0
LnGrp LOS	F	F		F	F		F	F		F	E	
Approach Vol, veh/h		1416	A		1177	A		3123	A		1206	A
Approach Delay, s/veh		108.3			95.0			179.0			85.0	
Approach LOS		F			F			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	72.0		33.0	28.0	53.0		36.0				
Change Period (Y+Rc), s	4.0	4.5		* 4.1	* 4.3	4.5		4.1				
Max Green Setting (Gmax), s	5.0	67.5		* 29	* 24	48.5		31.9				
Max Q Clear Time (g_c+I1), s	7.3	70.0		31.0	25.7	44.2		34.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	3.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay	133.9
HCM 6th LOS	F

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- * HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: SR-527 & 214th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↖	↗	↖	↕↕↕		↖	↕↕↕	
Traffic Volume (veh/h)	25	2	2	350	6	756	2	3274	152	125	1493	5
Future Volume (veh/h)	25	2	2	350	6	756	2	3274	152	125	1493	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		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	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	30	2	0	449	0	560	2	3446	0	137	1641	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	330	22	312	395	0	697	4	2196		82	2457	7
Arrive On Green	0.20	0.20	0.00	0.22	0.00	0.22	0.00	0.57	0.00	0.05	0.47	0.46
Sat Flow, veh/h	1648	110	1560	1795	0	3169	1795	5316	0	1767	5214	16
Grp Volume(v), veh/h	32	0	0	449	0	560	2	3446	0	137	1063	583
Grp Sat Flow(s),veh/h/ln	1758	0	1560	1795	0	1585	1795	1716	0	1767	1689	1852
Q Serve(g_s), s	2.2	0.0	0.0	33.0	0.0	25.1	0.2	64.0	0.0	7.0	36.4	36.4
Cycle Q Clear(g_c), s	2.2	0.0	0.0	33.0	0.0	25.1	0.2	64.0	0.0	7.0	36.4	36.4
Prop In Lane	0.94		1.00	1.00		1.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	352	0	312	395	0	697	4	2196		82	1591	873
V/C Ratio(X)	0.09	0.00	0.00	1.14	0.00	0.80	0.52	1.57		1.66	0.67	0.67
Avail Cap(c_a), veh/h	352	0	312	395	0	697	48	2196		82	1591	873
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	0.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.9	0.0	0.0	58.5	0.0	55.4	74.7	32.4	0.0	71.5	30.6	30.6
Incr Delay (d2), s/veh	0.1	0.0	0.0	88.0	0.0	9.5	9.6	256.4	0.0	344.9	1.9	3.5
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	0.0	0.0	24.6	0.0	11.0	0.1	74.6	0.0	11.0	14.8	16.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.0	0.0	0.0	146.5	0.0	64.9	84.3	288.8	0.0	416.4	32.5	34.1
LnGrp LOS	D	A	A	F	A	E	F	F		F	C	C
Approach Vol, veh/h		32			1009			3448	A		1783	
Approach Delay, s/veh		49.0			101.2			288.7			62.5	
Approach LOS		D			F			F			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	68.0		34.0	4.3	74.7		37.0				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	7.0	63.0		30.0	4.0	66.0		33.0				
Max Q Clear Time (g_c+I1), s	9.0	66.0		4.2	2.2	38.4		35.0				
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	21.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay	193.0
HCM 6th LOS	F

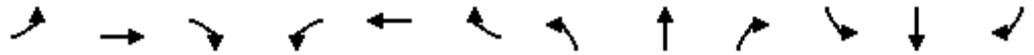
Notes

- User approved pedestrian interval to be less than phase max green.
- 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.

HCM Signalized Intersection Capacity Analysis

5: SR-527 & 220th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	80	737	326	15	760	134	2005	654	571	1619	93
Future Volume (vph)	236	80	737	326	15	760	134	2005	654	571	1619	93
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5	4.0	4.0	4.5	4.0	4.0	
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.96	0.95	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85	1.00	0.86	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1693	1488	1439	3285	1384	1371	1644	4725	1440	3190	4686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1693	1488	1439	3285	1384	1371	1644	4725	1440	3190	4686	
Peak-hour factor, PHF	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	268	91	838	351	16	817	143	2133	696	656	1861	107
RTOR Reduction (vph)	0	99	151	0	217	218	0	0	235	0	4	0
Lane Group Flow (vph)	268	369	310	351	199	199	143	2133	461	656	1964	0
Confl. Peds. (#/hr)	18					18			6	6		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	4%	4%	4%	4%	4%	4%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8			4			2			
Actuated Green, G (s)	21.5	30.5	30.5	13.5	22.5	22.5	15.0	61.5	61.5	26.5	73.0	
Effective Green, g (s)	22.0	31.0	31.0	14.0	23.0	22.5	15.5	62.0	61.5	27.0	73.5	
Actuated g/C Ratio	0.15	0.21	0.21	0.09	0.15	0.15	0.10	0.41	0.41	0.18	0.49	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.0	4.0	1.5	4.0	
Lane Grp Cap (vph)	248	307	297	306	212	205	169	1953	590	574	2296	
v/s Ratio Prot	c0.16	c0.25		0.11	0.14		0.09	c0.45		c0.21	0.42	
v/s Ratio Perm			0.22			0.15			0.32			
v/c Ratio	1.08	1.20	1.04	1.15	0.94	0.97	0.85	1.09	0.78	1.14	0.86	
Uniform Delay, d1	64.0	59.5	59.5	68.0	62.8	63.4	66.1	44.0	38.4	61.5	33.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.11	0.78	0.76	1.12	0.72	
Incremental Delay, d2	80.3	117.6	64.4	97.4	44.1	54.5	12.9	45.1	3.8	81.3	3.7	
Delay (s)	144.3	177.1	123.9	165.4	106.9	117.9	86.3	79.3	33.1	150.3	27.9	
Level of Service	F	F	F	F	F	F	F	E	C	F	C	
Approach Delay (s)		149.2			128.1			68.8			58.5	
Approach LOS		F			F			E			E	

Intersection Summary

HCM 2000 Control Delay	86.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary
 8: SR-527 & I-405 NB Ramps

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	530	9	996	0	1765	618	0	2338	588
Future Volume (veh/h)	0	0	0	530	9	996	0	1765	618	0	2338	588
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				646	11	0	0	2029	0	0	2687	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				536	9		0	2038		0	2038	
Arrive On Green				0.32	0.32	0.00	0.00	1.00	0.00	0.00	0.40	0.00
Sat Flow, veh/h				1661	28	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				657	0	0	0	2029	0	0	2687	0
Grp Sat Flow(s),veh/h/ln				1689	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				48.4	0.0	0.0	0.0	0.0	0.0	0.0	90.1	0.0
Cycle Q Clear(g_c), s				48.4	0.0	0.0	0.0	0.0	0.0	0.0	90.1	0.0
Prop In Lane				0.98		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				545	0		0	2038		0	2038	
V/C Ratio(X)				1.21	0.00		0.00	1.00		0.00	1.32	
Avail Cap(c_a), veh/h				545	0		0	2038		0	2038	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	0.67	0.67
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.27	0.00
Uniform Delay (d), s/veh				50.8	0.0	0.0	0.0	0.0	0.0	0.0	44.8	0.0
Incr Delay (d2), s/veh				109.0	0.0	0.0	0.0	5.0	0.0	0.0	144.2	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				36.9	0.0	0.0	0.0	1.4	0.0	0.0	79.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				159.8	0.0	0.0	0.0	5.0	0.0	0.0	189.0	0.0
LnGrp LOS				F	A		A	A		A	F	
Approach Vol, veh/h					657	A		2029	A		2687	A
Approach Delay, s/veh					159.8			5.0			189.0	
Approach LOS					F			A			F	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		96.0		54.0		96.0						
Change Period (Y+Rc), s		5.9		5.6		5.9						
Max Green Setting (Gmax), s		90.1		48.4		90.1						
Max Q Clear Time (g_c+I1), s		92.1		50.4		2.0						
Green Ext Time (p_c), s		0.0		0.0		46.2						
Intersection Summary												
HCM 6th Ctrl Delay				116.0								
HCM 6th LOS				F								
Notes												
Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th Signalized Intersection Summary
 9: SR-527 & I-405 SB Ramps

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗		↖					↖↗	↖		↖↗	↖
Traffic Volume (veh/h)	445	0	849	0	0	0	0	1915	614	0	2102	530
Future Volume (veh/h)	445	0	849	0	0	0	0	1915	614	0	2102	530
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	459	0	0				0	2059	0	0	2236	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	565	0					0	2548		0	2528	
Arrive On Green	0.17	0.00	0.00				0.00	1.00	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	459	0	0				0	2059	0	0	2236	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	20.2	0.0	0.0				0.0	0.0	0.0	0.0	1.2	0.0
Cycle Q Clear(g_c), s	20.2	0.0	0.0				0.0	0.0	0.0	0.0	1.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	565	0					0	2548		0	2528	
V/C Ratio(X)	0.81	0.00					0.00	0.81		0.00	0.88	
Avail Cap(c_a), veh/h	1384	0					0	2548		0	2528	
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	0.09	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh	59.7	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	4.1	0.0	0.0				0.0	0.3	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	8.8	0.0	0.0				0.0	0.1	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.8	0.0	0.0				0.0	0.3	0.0	0.0	0.5	0.0
LnGrp LOS	E	A					A	A		A	A	
Approach Vol, veh/h		459	A					2059	A		2236	A
Approach Delay, s/veh		63.8						0.3			0.5	
Approach LOS		E						A			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		118.5				118.5		31.5				
Change Period (Y+Rc), s		5.9				5.9		5.6				
Max Green Setting (Gmax), s		75.1				75.1		63.4				
Max Q Clear Time (g_c+I1), s		3.2				2.0		22.2				
Green Ext Time (p_c), s		49.1				43.2		3.6				

Intersection Summary

HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

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

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	608	0	0	922	190	0	0	0	200	0	27
Future Volume (veh/h)	73	608	0	0	922	190	0	0	0	200	0	27
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	1002	207	0	0	0	225	0	30
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	223	2875	0	641	1143	236	0	1	0	251	0	221
Arrive On Green	0.03	0.81	0.00	0.00	0.76	0.76	0.00	0.00	0.00	0.14	0.00	0.14
Sat Flow, veh/h	1781	3647	0	1781	1504	311	0	1870	0	1781	0	1567
Grp Volume(v), veh/h	78	654	0	0	0	1209	0	0	0	225	0	30
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1781	0	1814	0	1870	0	1781	0	1567
Q Serve(g_s), s	1.4	6.5	0.0	0.0	0.0	71.9	0.0	0.0	0.0	18.6	0.0	2.5
Cycle Q Clear(g_c), s	1.4	6.5	0.0	0.0	0.0	71.9	0.0	0.0	0.0	18.6	0.0	2.5
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	223	2875	0	641	0	1379	0	1	0	251	0	221
V/C Ratio(X)	0.35	0.23	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.90	0.00	0.14
Avail Cap(c_a), veh/h	255	2875	0	693	0	1379	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	25.1	3.4	0.0	0.0	0.0	13.0	0.0	0.0	0.0	63.3	0.0	56.4
Incr Delay (d2), s/veh	0.9	0.2	0.0	0.0	0.0	8.1	0.0	0.0	0.0	25.6	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	1.7	2.1	0.0	0.0	0.0	29.0	0.0	0.0	0.0	10.3	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.0	3.5	0.0	0.0	0.0	21.1	0.0	0.0	0.0	88.9	0.0	56.7
LnGrp LOS	C	A	A	A	A	C	A	A	A	F	A	E
Approach Vol, veh/h		732			1209			0				255
Approach Delay, s/veh		5.9			21.1			0.0				85.1
Approach LOS		A			C							F
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	125.3		24.7	7.3	118.0		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	8.5		20.6	3.4	73.9		0.0				
Green Ext Time (p_c), s	0.0	5.5		0.5	0.0	9.2		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				23.5								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary

11: Meridian Ave & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	603	153	128	812	252	237	177	183	125	63	12
Future Volume (veh/h)	9	603	153	128	812	252	237	177	183	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	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	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	10	648	165	138	873	271	252	188	195	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	250	1332	339	410	1409	437	415	303	255	322	227	43
Arrive On Green	0.00	0.47	0.47	0.06	0.52	0.52	0.10	0.16	0.16	0.08	0.15	0.15
Sat Flow, veh/h	1795	2827	719	1795	2691	834	1795	1885	1589	1795	1539	291
Grp Volume(v), veh/h	10	410	403	138	581	563	252	188	195	147	0	88
Grp Sat Flow(s),veh/h/ln	1795	1791	1755	1795	1791	1734	1795	1885	1589	1795	0	1831
Q Serve(g_s), s	0.2	11.0	11.0	2.6	16.0	16.1	6.8	6.5	8.2	4.8	0.0	3.0
Cycle Q Clear(g_c), s	0.2	11.0	11.0	2.6	16.0	16.1	6.8	6.5	8.2	4.8	0.0	3.0
Prop In Lane	1.00		0.41	1.00		0.48	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	250	844	827	410	938	908	415	303	255	322	0	270
V/C Ratio(X)	0.04	0.49	0.49	0.34	0.62	0.62	0.61	0.62	0.76	0.46	0.00	0.33
Avail Cap(c_a), veh/h	335	844	827	462	938	908	415	571	481	327	0	536
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	11.2	12.7	12.7	9.3	11.8	11.8	24.0	27.4	28.1	22.7	0.0	26.7
Incr Delay (d2), s/veh	0.1	2.0	2.0	0.5	3.1	3.2	2.5	2.1	4.7	1.0	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	4.4	4.3	0.9	6.3	6.1	4.0	3.0	3.3	2.0	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.3	14.7	14.8	9.7	14.8	14.9	26.5	29.5	32.9	23.8	0.0	27.4
LnGrp LOS	B	B	B	A	B	B	C	C	C	C	A	C
Approach Vol, veh/h		823			1282			635				235
Approach Delay, s/veh		14.7			14.3			29.3				25.1
Approach LOS		B			B			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	37.0	10.8	14.3	4.2	40.7	9.9	15.2				
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	6.4	20.8	7.3	21.0	4.0	23.2	6.6	21.7				
Max Q Clear Time (g_c+I1), s	4.6	13.0	8.8	5.0	2.2	18.1	6.8	10.2				
Green Ext Time (p_c), s	0.1	4.0	0.0	0.2	0.0	3.7	0.0	1.2				
Intersection Summary												
HCM 6th Ctrl Delay			18.5									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary
 12: 4th Ct SE/4th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	975	3	3	1121	240	1	0	1	41	0	28
Future Volume (veh/h)	20	975	3	3	1121	240	1	0	1	41	0	28
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	1161	4	3	1205	258	1	0	1	50	0	34
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	331	1503	5	311	2315	491	103	16	65	120	4	45
Arrive On Green	0.01	0.81	0.81	0.00	0.79	0.80	0.07	0.00	0.07	0.07	0.00	0.07
Sat Flow, veh/h	1781	1863	6	1795	2928	620	650	216	866	831	59	605
Grp Volume(v), veh/h	24	0	1165	3	732	731	2	0	0	84	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1869	1795	1791	1757	1731	0	0	1495	0	0
Q Serve(g_s), s	0.3	0.0	31.9	0.0	14.5	14.8	0.0	0.0	0.0	5.1	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	31.9	0.0	14.5	14.8	0.1	0.0	0.0	5.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.35	0.50		0.50	0.60		0.40
Lane Grp Cap(c), veh/h	331	0	1509	311	1416	1390	183	0	0	169	0	0
V/C Ratio(X)	0.07	0.00	0.77	0.01	0.52	0.53	0.01	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	394	0	1509	381	1416	1390	393	0	0	377	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	3.1	0.0	4.9	6.8	3.7	3.7	43.0	0.0	0.0	45.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	3.9	0.0	1.4	1.4	0.0	0.0	0.0	2.2	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	0.1	0.0	9.3	0.0	4.2	4.2	0.0	0.0	0.0	2.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.2	0.0	8.8	6.8	5.1	5.1	43.0	0.0	0.0	47.7	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	A	D	A	A
Approach Vol, veh/h		1189			1466			2				84
Approach Delay, s/veh		8.7			5.1			43.0				47.7
Approach LOS		A			A			D				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	3.8	85.7		10.5	5.4	84.1		10.5				
Change Period (Y+Rc), s	3.5	* 4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	4.5	* 64		21.0	5.5	62.0		21.0				
Max Q Clear Time (g_c+I1), s	2.0	33.9		7.5	2.3	16.8		2.1				
Green Ext Time (p_c), s	0.0	18.1		0.2	0.0	16.1		0.0				

Intersection Summary

HCM 6th Ctrl Delay	8.0
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

13: 228th St SE & 9th Ave SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑		↖	↑↑		↖	↑		↗↘	↑	
Traffic Volume (veh/h)	320	880	2	142	1302	650	17	28	91	275	2	140
Future Volume (veh/h)	320	880	2	142	1302	650	17	28	91	275	2	140
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	1885	1885	1885	1870	1900	1900	1870	1870	1870	1885	1870	1870
Adj Flow Rate, veh/h	376	1035	2	154	1385	654	18	30	4	312	2	6
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	2
Cap, veh/h	399	2624	5	457	1558	673	25	71	9	260	43	129
Arrive On Green	0.12	0.72	0.71	0.09	1.00	1.00	0.01	0.04	0.04	0.07	0.11	0.10
Sat Flow, veh/h	1795	3668	7	1781	2435	1051	1781	1612	215	3483	405	1214
Grp Volume(v), veh/h	376	505	532	154	993	1046	18	0	34	312	0	8
Grp Sat Flow(s),veh/h/ln	1795	1791	1884	1781	1805	1681	1781	0	1827	1742	0	1619
Q Serve(g_s), s	15.8	16.8	16.8	4.7	0.0	0.0	1.5	0.0	2.7	11.2	0.0	0.7
Cycle Q Clear(g_c), s	15.8	16.8	16.8	4.7	0.0	0.0	1.5	0.0	2.7	11.2	0.0	0.7
Prop In Lane	1.00		0.00	1.00		0.63	1.00		0.12	1.00		0.75
Lane Grp Cap(c), veh/h	399	1281	1348	457	1155	1076	25	0	80	260	0	172
V/C Ratio(X)	0.94	0.39	0.39	0.34	0.86	0.97	0.72	0.00	0.42	1.20	0.00	0.05
Avail Cap(c_a), veh/h	427	1281	1348	524	1155	1076	68	0	317	260	0	343
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	27.6	8.5	8.5	8.0	0.0	0.0	73.6	0.0	69.9	69.4	0.0	60.3
Incr Delay (d2), s/veh	28.5	0.9	0.9	0.0	0.8	4.0	31.6	0.0	5.0	120.8	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	6.6	7.0	1.6	0.3	1.2	0.9	0.0	1.4	9.4	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.1	9.4	9.3	8.0	0.8	4.0	105.3	0.0	74.9	190.2	0.0	60.4
LnGrp LOS	E	A	A	A	A	A	F	A	E	F	A	E
Approach Vol, veh/h		1413			2193			52				320
Approach Delay, s/veh		21.8			2.8			85.4				186.9
Approach LOS		C			A			F				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.4	111.5	16.0	11.1	22.7	100.2	6.6	20.5				
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	12.5	82.0	11.5	26.0	20.5	74.0	5.7	31.8				
Max Q Clear Time (g_c+I1), s	6.7	18.8	13.2	4.7	17.8	2.0	3.5	2.7				
Green Ext Time (p_c), s	0.2	9.0	0.0	0.1	0.4	39.1	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				25.5								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary

14: SR-527 & 228th St SE

11/26/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	645	375	220	295	748	537	490	1017	205	609	943	970
Future Volume (veh/h)	645	375	220	295	748	537	490	1017	205	609	943	970
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	658	383	224	314	796	382	505	1048	211	725	1123	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	561	718	413	348	1003	438	276	1107	223	372	1027	
Arrive On Green	0.41	0.56	0.55	0.19	0.28	0.28	0.08	0.26	0.26	0.07	0.19	0.00
Sat Flow, veh/h	2273	2155	1241	1795	3582	1564	3456	4257	856	3483	3582	1598
Grp Volume(v), veh/h	658	315	292	314	796	382	505	838	421	725	1123	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1619	1795	1791	1564	1728	1702	1709	1742	1791	1598
Q Serve(g_s), s	37.0	16.7	17.3	25.6	30.9	34.9	12.0	36.2	36.3	16.0	43.0	0.0
Cycle Q Clear(g_c), s	37.0	16.7	17.3	25.6	30.9	34.9	12.0	36.2	36.3	16.0	43.0	0.0
Prop In Lane	1.00		0.77	1.00		1.00	1.00		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	561	592	539	348	1003	438	276	885	444	372	1027	
V/C Ratio(X)	1.17	0.53	0.54	0.90	0.79	0.87	1.83	0.95	0.95	1.95	1.09	
Avail Cap(c_a), veh/h	561	592	539	455	1003	438	276	885	444	372	1027	
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	0.75	0.75	0.75	0.58	0.58	0.58	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	44.1	25.9	26.3	59.1	50.0	51.4	69.0	54.5	54.6	69.6	60.6	0.0
Incr Delay (d2), s/veh	91.8	2.6	2.9	11.4	3.8	13.2	385.9	18.7	29.9	429.0	43.9	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	16.5	6.5	6.2	12.8	14.4	15.3	20.0	17.4	19.0	29.4	26.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	135.9	28.5	29.2	70.5	53.8	64.7	454.9	73.2	84.6	498.7	104.5	0.0
LnGrp LOS	F	C	C	E	D	E	F	E	F	F	F	
Approach Vol, veh/h		1265			1492			1764			1848	A
Approach Delay, s/veh		84.5			60.1			185.2			259.1	
Approach LOS		F			E			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	43.0	33.0	54.0	16.0	47.0	41.0	46.0				
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	15.5	38.5	37.5	40.5	11.5	42.5	36.5	41.5				
Max Q Clear Time (g_c+I1), s	18.0	38.3	27.6	19.3	14.0	45.0	39.0	36.9				
Green Ext Time (p_c), s	0.0	0.1	0.9	2.6	0.0	0.0	0.0	2.4				

Intersection Summary

HCM 6th Ctrl Delay	157.4
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

15: 15th Ave SE & 228th St SE

11/26/2019



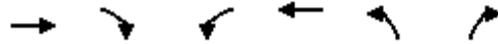
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	879	110	106	1157	194	140	24	41	220	60	191
Future Volume (veh/h)	100	879	110	106	1157	194	140	24	41	220	60	191
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	0.99		0.99	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	1885	1885	1885	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	105	925	116	112	1218	204	156	27	46	237	65	205
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	251	1595	200	353	1544	257	262	135	230	432	86	271
Arrive On Green	0.05	0.50	0.50	0.06	0.51	0.50	0.06	0.22	0.21	0.06	0.22	0.21
Sat Flow, veh/h	1781	3172	398	1795	3056	508	1810	625	1065	1810	398	1255
Grp Volume(v), veh/h	105	518	523	112	710	712	156	0	73	237	0	270
Grp Sat Flow(s),veh/h/ln	1781	1777	1793	1795	1791	1773	1810	0	1690	1810	0	1653
Q Serve(g_s), s	2.2	16.4	16.4	2.3	26.0	26.6	4.5	0.0	2.8	4.5	0.0	12.3
Cycle Q Clear(g_c), s	2.2	16.4	16.4	2.3	26.0	26.6	4.5	0.0	2.8	4.5	0.0	12.3
Prop In Lane	1.00		0.22	1.00		0.29	1.00		0.63	1.00		0.76
Lane Grp Cap(c), veh/h	251	894	902	353	905	896	262	0	365	432	0	357
V/C Ratio(X)	0.42	0.58	0.58	0.32	0.78	0.79	0.60	0.00	0.20	0.55	0.00	0.76
Avail Cap(c_a), veh/h	255	894	902	354	905	896	262	0	581	432	0	568
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)	0.09	0.09	0.09	0.20	0.20	0.20	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.4	13.9	14.0	10.4	16.2	16.4	26.2	0.0	25.8	26.0	0.0	29.6
Incr Delay (d2), s/veh	0.1	0.2	0.2	0.1	1.4	1.5	3.6	0.0	0.3	1.5	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	0.8	6.0	6.1	0.8	9.9	10.1	0.9	0.0	1.1	1.8	0.0	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.5	14.2	14.2	10.5	17.7	18.0	29.8	0.0	26.1	27.5	0.0	32.9
LnGrp LOS	B	B	B	B	B	B	C	A	C	C	A	C
Approach Vol, veh/h		1146			1534			229				507
Approach Delay, s/veh		14.2			17.3			28.6				30.3
Approach LOS		B			B			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.0	43.7	8.0	20.3	7.8	43.9	8.0	20.3				
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	4.0	29.5	4.0	27.0	4.0	29.5	4.0	27.0				
Max Q Clear Time (g_c+I1), s	4.3	18.4	6.5	14.3	4.2	28.6	6.5	4.8				
Green Ext Time (p_c), s	0.0	5.2	0.0	0.9	0.0	0.7	0.0	0.2				

Intersection Summary

HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

HCM Signalized Intersection Capacity Analysis
 16: 19th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	862	270	407	1182	343	423
Future Volume (vph)	862	270	407	1182	343	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	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	0.97	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1881	1558	1787	1881	1787	1599
Flt Permitted	1.00	1.00	0.07	1.00	0.95	1.00
Satd. Flow (perm)	1881	1558	133	1881	1787	1599
Peak-hour factor, PHF	0.93	0.93	0.96	0.96	0.81	0.81
Adj. Flow (vph)	927	290	424	1231	423	522
RTOR Reduction (vph)	0	113	0	0	0	279
Lane Group Flow (vph)	927	177	424	1231	423	243
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	52.9	52.9	76.7	76.7	25.3	25.3
Effective Green, g (s)	53.4	53.4	77.2	77.2	25.8	25.8
Actuated g/C Ratio	0.49	0.49	0.70	0.70	0.23	0.23
Clearance Time (s)	4.5	4.5	3.5	4.5	3.5	3.5
Vehicle Extension (s)	4.0	4.0	2.0	4.0	5.0	5.0
Lane Grp Cap (vph)	913	756	406	1320	419	375
v/s Ratio Prot	0.49		c0.20	0.65	c0.24	
v/s Ratio Perm		0.11	c0.53			0.15
v/c Ratio	1.02	0.23	1.04	0.93	1.01	0.65
Uniform Delay, d1	28.3	16.4	37.0	14.2	42.1	38.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	33.7	0.2	56.7	12.1	46.4	5.2
Delay (s)	62.0	16.7	93.7	26.3	88.5	43.2
Level of Service	E	B	F	C	F	D
Approach Delay (s)	51.2			43.6	63.5	
Approach LOS	D			D	E	

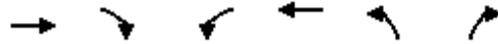
Intersection Summary

HCM 2000 Control Delay	50.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 17: Fitzgerald Rd/27th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	911	294	180	1258	360	47
Future Volume (vph)	911	294	180	1258	360	47
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	1573
Flt Permitted	1.00	1.00	0.07	1.00	0.95	1.00
Satd. Flow (perm)	1881	1561	138	1863	1805	1573
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.85	0.85
Adj. Flow (vph)	980	316	198	1382	424	55
RTOR Reduction (vph)	0	45	0	0	0	34
Lane Group Flow (vph)	980	271	198	1382	424	21
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	102.5	102.5	27.5	27.5
Effective Green, g (s)	90.5	90.0	103.0	103.0	28.0	28.0
Actuated g/C Ratio	0.60	0.60	0.69	0.69	0.19	0.19
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	203	1279	336	293
v/s Ratio Prot	0.52		0.06	c0.74	c0.23	
v/s Ratio Perm		0.17	0.60			0.01
v/c Ratio	0.86	0.29	0.98	1.08	1.26	0.07
Uniform Delay, d1	24.7	14.5	42.6	23.5	61.0	50.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.8	0.8	55.6	49.9	139.6	0.1
Delay (s)	33.5	15.3	98.2	73.4	200.6	50.4
Level of Service	C	B	F	E	F	D
Approach Delay (s)	29.1			76.5	183.4	
Approach LOS	C			E	F	

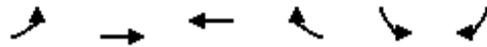
Intersection Summary

HCM 2000 Control Delay	73.5	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)	13.5
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: 228th St SE & 29th Ave SE

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	239	754	811	176	393	683
Future Volume (vph)	239	754	811	176	393	683
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.5	4.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
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)	1770	1863	1881	1563	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1881	1563	1770	1583
Peak-hour factor, PHF	0.94	0.94	0.96	0.96	0.90	0.90
Adj. Flow (vph)	254	802	845	183	437	759
RTOR Reduction (vph)	0	0	0	50	0	235
Lane Group Flow (vph)	254	802	845	134	437	524
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	16.0	70.0	49.5	49.5	32.5	32.5
Effective Green, g (s)	16.0	70.0	49.5	49.5	32.5	32.5
Actuated g/C Ratio	0.15	0.64	0.45	0.45	0.30	0.30
Clearance Time (s)	4.0	4.0	4.5	4.5	3.5	3.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	257	1185	846	703	522	467
v/s Ratio Prot	c0.14	0.43	c0.45		0.25	
v/s Ratio Perm				0.09		c0.33
v/c Ratio	0.99	0.68	1.00	0.19	0.84	1.12
Uniform Delay, d1	46.9	12.8	30.2	18.2	36.3	38.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	52.3	3.1	30.7	0.6	11.2	79.2
Delay (s)	99.3	15.9	60.9	18.8	47.5	117.9
Level of Service	F	B	E	B	D	F
Approach Delay (s)		35.9	53.4		92.2	
Approach LOS		D	D		F	

Intersection Summary

HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary

19: 31st Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	907	1	1	810	200	1	0	1	260	0	230
Future Volume (veh/h)	275	907	1	1	810	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	1043	1	1	890	149	2	0	2	292	0	48
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	324	1170	1	165	921	780	60	19	19	296	0	359
Arrive On Green	0.13	0.63	0.63	0.00	0.50	0.50	0.22	0.00	0.22	0.22	0.00	0.22
Sat Flow, veh/h	1767	1853	2	1739	1826	1546	0	87	87	971	0	1610
Grp Volume(v), veh/h	316	0	1044	1	890	149	4	0	0	292	0	48
Grp Sat Flow(s),veh/h/ln	1767	0	1855	1739	1826	1546	174	0	0	971	0	1610
Q Serve(g_s), s	11.0	0.0	42.6	0.0	42.3	4.7	0.0	0.0	0.0	0.0	0.0	2.1
Cycle Q Clear(g_c), s	11.0	0.0	42.6	0.0	42.3	4.7	20.0	0.0	0.0	20.0	0.0	2.1
Prop In Lane	1.00		0.00	1.00		1.00	0.50		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	324	0	1171	165	921	780	99	0	0	296	0	359
V/C Ratio(X)	0.97	0.00	0.89	0.01	0.97	0.19	0.04	0.00	0.00	0.99	0.00	0.13
Avail Cap(c_a), veh/h	324	0	1171	269	925	783	99	0	0	296	0	359
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	1.00
Uniform Delay (d), s/veh	27.5	0.0	14.0	16.4	21.5	12.2	29.0	0.0	0.0	37.5	0.0	28.0
Incr Delay (d2), s/veh	42.8	0.0	10.0	0.0	22.3	0.4	0.2	0.0	0.0	48.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.6	0.0	18.4	0.0	22.1	1.7	0.1	0.0	0.0	10.4	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.3	0.0	24.0	16.4	43.8	12.6	29.2	0.0	0.0	85.7	0.0	28.1
LnGrp LOS	E	A	C	B	D	B	C	A	A	F	A	C
Approach Vol, veh/h		1360			1040			4				340
Approach Delay, s/veh		34.7			39.3			29.2				77.5
Approach LOS		C			D			C				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	61.2		24.0	16.0	49.8		24.0				
Change Period (Y+Rc), s	4.5	4.5		4.0	4.5	4.5		4.0				
Max Green Setting (Gmax), s	5.5	51.5		20.0	11.5	45.5		20.0				
Max Q Clear Time (g_c+I1), s	2.0	44.6		22.0	13.0	44.3		22.0				
Green Ext Time (p_c), s	0.0	5.6		0.0	0.0	1.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	41.8
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary
 20: 35th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗		↖	↗
Traffic Volume (veh/h)	1	787	360	220	740	0	280	1	420	0	2	1
Future Volume (veh/h)	1	787	360	220	740	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	926	342	253	851	0	311	1	198	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	283	997	852	284	1184	0	364	1	325	0	7	4
Arrive On Green	0.00	0.54	0.54	0.10	0.64	0.00	0.21	0.21	0.21	0.00	0.02	0.01
Sat Flow, veh/h	1767	1856	1571	1767	1856	0	1762	6	1572	0	418	354
Grp Volume(v), veh/h	1	926	342	253	851	0	312	0	198	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	48.2	13.3	8.5	32.1	0.0	17.8	0.0	12.0	0.0	1.7	1.2
Cycle Q Clear(g_c), s	0.0	48.2	13.3	8.5	32.1	0.0	17.8	0.0	12.0	0.0	1.7	1.2
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	283	997	852	284	1184	0	365	0	325	0	7	4
V/C Ratio(X)	0.00	0.93	0.40	0.89	0.72	0.00	0.86	0.00	0.61	0.00	1.19	1.00
Avail Cap(c_a), veh/h	341	1196	1020	315	1347	0	507	0	451	0	82	68
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	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	13.4	22.4	14.0	29.2	12.7	0.0	40.0	0.0	37.7	0.0	51.5	51.8
Incr Delay (d2), s/veh	0.0	11.2	0.3	22.7	1.6	0.0	9.1	0.0	1.4	0.0	159.6	128.5
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	0.0	22.7	4.6	8.1	12.5	0.0	8.6	0.0	4.7	0.0	0.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	33.6	14.3	52.0	14.3	0.0	49.1	0.0	39.1	0.0	211.1	180.3
LnGrp LOS	B	C	B	D	B	A	D	A	D	A	F	F
Approach Vol, veh/h		1269			1104			510				12
Approach Delay, s/veh		28.4			22.9			45.2				200.8
Approach LOS		C			C			D				F
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.1	61.3		4.7	3.6	71.8		24.6				
Change Period (Y+Rc), s	3.5	4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	12.5	68.0		20.0	4.0	76.5		29.5				
Max Q Clear Time (g_c+I1), s	10.5	50.2		3.7	2.0	34.1		19.8				
Green Ext Time (p_c), s	0.1	6.5		0.0	0.0	4.9		1.3				

Intersection Summary

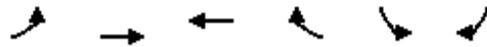
HCM 6th Ctrl Delay	30.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 21: 228th St SE & 39th Ave SE

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↙	↘
Traffic Volume (veh/h)	615	587	670	133	88	340
Future Volume (veh/h)	615	587	670	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	638	788	150	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	635	1633	774	147	132	117
Arrive On Green	0.32	0.87	0.51	0.51	0.08	0.00
Sat Flow, veh/h	1795	1885	1509	287	1739	1547
Grp Volume(v), veh/h	668	638	0	938	107	0
Grp Sat Flow(s),veh/h/ln	1795	1885	0	1797	1739	1547
Q Serve(g_s), s	45.0	9.5	0.0	71.0	8.4	0.0
Cycle Q Clear(g_c), s	45.0	9.5	0.0	71.0	8.4	0.0
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	635	1633	0	921	132	117
V/C Ratio(X)	1.05	0.39	0.00	1.02	0.81	0.00
Avail Cap(c_a), veh/h	635	1633	0	921	276	246
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	43.2	1.9	0.0	33.8	63.0	0.0
Incr Delay (d2), s/veh	50.0	0.1	0.0	34.4	13.3	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	29.3	2.2	0.0	38.8	4.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	93.2	1.9	0.0	68.2	76.3	0.0
LnGrp LOS	F	A	A	F	E	A
Approach Vol, veh/h		1306	938		107	
Approach Delay, s/veh		48.6	68.2		76.3	
Approach LOS		D	E		E	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		124.0		14.5	49.0	75.0
Change Period (Y+Rc), s		4.5		4.0	4.5	4.5
Max Green Setting (Gmax), s		119.5		22.0	44.5	70.5
Max Q Clear Time (g_c+I1), s		11.5		10.4	47.0	73.0
Green Ext Time (p_c), s		0.6		0.3	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	57.7
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 25: SR-527 & 240th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	488	2	160	2	2	6	260	1613	2	5	1048	484
Future Volume (veh/h)	488	2	160	2	2	6	260	1613	2	5	1048	484
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		0.98
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	611	0	200	2	2	7	271	1680	2	5	1178	544
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	689	0	304	14	3	10	269	1982	2	196	1239	543
Arrive On Green	0.19	0.00	0.19	0.01	0.01	0.01	0.15	0.54	0.54	0.11	0.52	0.52
Sat Flow, veh/h	3591	0	1583	1781	365	1276	1795	3671	4	1781	2405	1054
Grp Volume(v), veh/h	611	0	200	2	0	9	271	820	862	5	861	861
Grp Sat Flow(s),veh/h/ln	1795	0	1583	1781	0	1641	1795	1791	1884	1781	1791	1668
Q Serve(g_s), s	19.4	0.0	13.7	0.1	0.0	0.6	17.5	45.3	45.4	0.3	52.4	60.2
Cycle Q Clear(g_c), s	19.4	0.0	13.7	0.1	0.0	0.6	17.5	45.3	45.4	0.3	52.4	60.2
Prop In Lane	1.00		1.00	1.00		0.78	1.00		0.00	1.00		0.63
Lane Grp Cap(c), veh/h	689	0	304	14	0	13	269	967	1017	196	923	860
V/C Ratio(X)	0.89	0.00	0.66	0.15	0.00	0.71	1.01	0.85	0.85	0.03	0.93	1.00
Avail Cap(c_a), veh/h	722	0	318	46	0	42	269	1130	1189	196	923	860
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	0.0	43.7	57.6	0.0	57.8	49.7	22.8	22.8	46.4	26.4	28.3
Incr Delay (d2), s/veh	11.9	0.0	3.5	1.8	0.0	23.7	56.8	6.0	5.7	0.0	16.1	31.0
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	9.7	0.0	5.6	0.1	0.0	0.3	11.8	18.8	19.7	0.1	24.3	29.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	0.0	47.2	59.3	0.0	81.6	106.4	28.8	28.5	46.4	42.5	59.3
LnGrp LOS	E	A	D	E	A	F	F	C	C	D	D	F
Approach Vol, veh/h		811			11			1953			1727	
Approach Delay, s/veh		55.3			77.5			39.5			50.9	
Approach LOS		E			E			D			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	18.1	67.9		25.9	21.0	65.0		4.9				
Change Period (Y+Rc), s	5.3	* 5.3		4.0	4.0	5.3		4.0				
Max Green Setting (Gmax), s	3.0	* 73		23.0	17.0	59.7		3.0				
Max Q Clear Time (g_c+I1), s	2.3	47.4		21.4	19.5	62.2		2.6				
Green Ext Time (p_c), s	0.0	15.2		0.4	0.0	0.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	46.8
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.

HCM 6th Signalized Intersection Summary
 35: SR-527 & NE 191st St/NE 190th St

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	106	230	130	160	310	206	130	1701	150	131	1033	143
Future Volume (veh/h)	106	230	130	160	310	206	130	1701	150	131	1033	143
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	0.99		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	115	250	102	178	344	176	137	1791	96	135	1065	147
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	139	458	378	364	344	176	238	1761	781	138	1465	202
Arrive On Green	0.04	0.24	0.24	0.09	0.30	0.30	0.07	0.50	0.50	0.04	0.47	0.47
Sat Flow, veh/h	1795	1885	1556	1795	1166	597	1781	3554	1575	1767	3109	429
Grp Volume(v), veh/h	115	250	102	178	0	520	137	1791	96	135	603	609
Grp Sat Flow(s),veh/h/ln	1795	1885	1556	1795	0	1762	1781	1777	1575	1767	1763	1775
Q Serve(g_s), s	4.5	12.7	5.8	7.8	0.0	32.4	4.7	54.5	2.4	4.3	30.3	30.4
Cycle Q Clear(g_c), s	4.5	12.7	5.8	7.8	0.0	32.4	4.7	54.5	2.4	4.3	30.3	30.4
Prop In Lane	1.00		1.00	1.00		0.34	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	139	458	378	364	0	521	238	1761	781	138	830	836
V/C Ratio(X)	0.82	0.55	0.27	0.49	0.00	1.00	0.58	1.02	0.12	0.98	0.73	0.73
Avail Cap(c_a), veh/h	139	458	378	368	0	521	259	1761	781	138	830	836
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	36.5	36.3	33.7	26.6	0.0	38.7	22.8	27.8	6.7	51.6	23.4	23.5
Incr Delay (d2), s/veh	29.9	0.8	0.1	0.4	0.0	39.0	1.3	25.9	0.1	70.2	3.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	5.9	2.2	3.4	0.0	19.4	2.0	27.8	1.3	6.2	12.7	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.4	37.1	33.9	27.0	0.0	77.8	24.1	53.6	6.8	121.8	26.6	26.7
LnGrp LOS	E	D	C	C	A	E	C	F	A	F	C	C
Approach Vol, veh/h		467			698			2024			1347	
Approach Delay, s/veh		43.6			64.8			49.4			36.2	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.0	58.0	13.8	30.2	10.7	55.3	8.0	36.0				
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	4.0	54.0	10.0	26.0	8.0	50.0	4.0	32.0				
Max Q Clear Time (g_c+I1), s	6.3	56.5	9.8	14.7	6.7	32.4	6.5	34.4				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6	0.0	5.4	0.0	0.0				

Intersection Summary

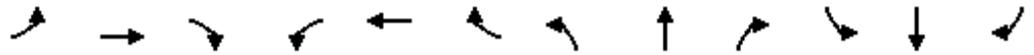
HCM 6th Ctrl Delay	47.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 40: SR-527 & NE 185th St

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	150	10	95	260	240	13	1254	60	230	917	126
Future Volume (veh/h)	121	150	10	95	260	240	13	1254	60	230	917	126
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		0.98	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	132	163	9	112	283	247	14	1409	64	237	945	129
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	177	416	23	355	207	181	286	1746	79	269	1772	242
Arrive On Green	0.07	0.24	0.24	0.06	0.23	0.23	0.03	0.67	0.67	0.08	0.56	0.56
Sat Flow, veh/h	1781	1756	97	1795	909	793	1781	3486	158	1810	3183	434
Grp Volume(v), veh/h	132	0	172	112	0	530	14	722	751	237	536	538
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1795	0	1702	1781	1791	1853	1810	1805	1812
Q Serve(g_s), s	8.1	0.0	11.3	6.9	0.0	33.0	0.5	42.1	42.5	8.9	27.1	27.2
Cycle Q Clear(g_c), s	8.1	0.0	11.3	6.9	0.0	33.0	0.5	42.1	42.5	8.9	27.1	27.2
Prop In Lane	1.00		0.05	1.00		0.47	1.00		0.09	1.00		0.24
Lane Grp Cap(c), veh/h	177	0	439	355	0	387	286	897	928	269	1005	1009
V/C Ratio(X)	0.75	0.00	0.39	0.32	0.00	1.37	0.05	0.81	0.81	0.88	0.53	0.53
Avail Cap(c_a), veh/h	326	0	439	510	0	387	520	897	928	406	1005	1009
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	42.3	0.0	46.6	39.4	0.0	56.0	17.6	19.1	19.2	28.1	20.3	20.3
Incr Delay (d2), s/veh	6.2	0.0	0.2	0.5	0.0	181.4	0.1	6.3	6.3	13.6	2.0	2.0
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	3.9	0.0	5.3	3.1	0.0	33.7	0.2	16.1	16.8	5.2	11.8	11.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.4	0.0	46.8	39.9	0.0	237.4	17.7	25.4	25.4	41.7	22.3	22.3
LnGrp LOS	D	A	D	D	A	F	B	C	C	D	C	C
Approach Vol, veh/h		304			642			1487			1311	
Approach Delay, s/veh		47.5			203.0			25.4			25.8	
Approach LOS		D			F			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	77.1	12.5	40.3	6.9	85.2	13.8	39.0				
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	22.5	49.5	21.5	34.0	22.5	49.5	22.5	33.0				
Max Q Clear Time (g_c+I1), s	10.9	44.5	8.9	13.3	2.5	29.2	10.1	35.0				
Green Ext Time (p_c), s	0.7	2.1	0.3	0.6	0.0	2.5	0.2	0.0				

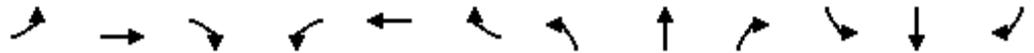
Intersection Summary

HCM 6th Ctrl Delay	57.8
HCM 6th LOS	E

HCM 6th Signalized Intersection Summary

43: SR-527 & NE 183rd St

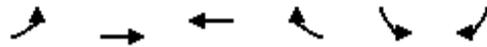
11/26/2019



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	1034	220	0	957	25
Future Volume (veh/h)	75	100	5	130	45	200	0	1034	220	0	957	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	136	0	1100	214	0	1113	27
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	182	219	4	263	64	167	0	2083	403	0	2490	60
Arrive On Green	0.05	0.12	0.12	0.08	0.15	0.15	0.00	1.00	1.00	0.00	1.00	1.00
Sat Flow, veh/h	1810	1861	31	1781	436	1140	0	3083	579	0	3667	87
Grp Volume(v), veh/h	91	0	124	149	0	188	0	657	657	0	558	582
Grp Sat Flow(s),veh/h/ln	1810	0	1892	1781	0	1576	0	1791	1777	0	1791	1869
Q Serve(g_s), s	6.4	0.0	9.0	10.4	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.4	0.0	9.0	10.4	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.72	0.00		0.33	0.00		0.05
Lane Grp Cap(c), veh/h	182	0	222	263	0	231	0	1248	1238	0	1248	1302
V/C Ratio(X)	0.50	0.00	0.56	0.57	0.00	0.81	0.00	0.53	0.53	0.00	0.45	0.45
Avail Cap(c_a), veh/h	211	0	450	277	0	408	0	1248	1238	0	1248	1302
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.81	0.81
Uniform Delay (d), s/veh	53.1	0.0	60.4	49.4	0.0	59.8	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.8	1.3	0.0	2.6	0.0	1.4	1.4	0.0	0.9	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	3.0	0.0	4.4	4.8	0.0	6.9	0.0	0.5	0.5	0.0	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	0.0	61.2	50.8	0.0	62.4	0.0	1.4	1.4	0.0	0.9	0.9
LnGrp LOS	D	A	E	D	A	E	A	A	A	A	A	A
Approach Vol, veh/h		215			337			1314				1140
Approach Delay, s/veh		58.1			57.2			1.4				0.9
Approach LOS		E			E			A				A
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		105.6	15.9	23.5		105.6	11.7	27.8				
Change Period (Y+Rc), s		4.5	3.5	6.0		4.5	3.5	6.0				
Max Green Setting (Gmax), s		82.5	13.5	35.0		82.5	10.5	38.0				
Max Q Clear Time (g_c+I1), s		2.0	12.4	11.0		2.0	8.4	18.7				
Green Ext Time (p_c), s		3.5	0.0	0.2		2.8	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay				11.5								
HCM 6th LOS				B								

HCM Signalized Intersection Capacity Analysis
 44: SR-522 Realignment/SR-522 & SR-527

11/26/2019



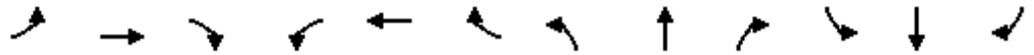
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	670	1310	1580	396	592	445
Future Volume (vph)	670	1310	1580	396	592	445
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.0	5.0	5.5	3.5
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	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	1504	3502	1585
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3400	3505	3438	1504	3502	1585
Peak-hour factor, PHF	0.94	0.94	0.95	0.95	0.87	0.87
Adj. Flow (vph)	713	1394	1663	417	680	511
RTOR Reduction (vph)	0	0	0	10	0	3
Lane Group Flow (vph)	713	1394	1663	407	680	508
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)	37.0	76.0	66.0	93.0	27.0	64.0
Effective Green, g (s)	36.5	75.5	66.0	93.0	26.5	63.0
Actuated g/C Ratio	0.25	0.52	0.46	0.64	0.18	0.43
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)	855	1825	1564	1016	640	688
v/s Ratio Prot	c0.21	0.40	c0.48	0.07	c0.19	0.19
v/s Ratio Perm				0.20		0.13
v/c Ratio	0.83	0.76	1.06	0.40	1.06	0.74
Uniform Delay, d1	51.4	27.7	39.5	12.5	59.2	34.1
Progression Factor	1.00	1.00	1.00	1.00	0.74	1.01
Incremental Delay, d2	6.7	3.1	41.7	0.4	52.0	3.3
Delay (s)	58.1	30.8	81.2	12.9	96.0	37.7
Level of Service	E	C	F	B	F	D
Approach Delay (s)		40.0	67.5		70.9	
Approach LOS		D	E		E	

Intersection Summary			
HCM 2000 Control Delay	57.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary
78: SR-527 & W Main/Main

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	6	15	30	0	220	0	1016	52	24	998	10
Future Volume (veh/h)	9	6	15	30	0	220	0	1016	52	24	998	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.89	1.00		1.00	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	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	10	7	16	33	0	244	0	1104	57	28	1147	11
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	239	25	57	86	0	0	0	2703	140	415	2992	29
Arrive On Green	0.12	0.05	0.05	0.02	0.00	0.00	0.00	0.79	0.79	0.04	1.00	1.00
Sat Flow, veh/h	1781	463	1059	1781	33		0	3529	177	1781	3606	35
Grp Volume(v), veh/h	10	0	23	33	72.4		0	571	590	28	565	593
Grp Sat Flow(s),veh/h/ln	1781	0	1522	1781	E		0	1777	1836	1781	1777	1864
Q Serve(g_s), s	0.0	0.0	2.1	0.0			0.0	14.6	14.6	0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	2.1	0.0			0.0	14.6	14.6	0.4	0.0	0.0
Prop In Lane	1.00		0.70	1.00			0.00		0.10	1.00		0.02
Lane Grp Cap(c), veh/h	239	0	81	86			0	1398	1445	415	1474	1546
V/C Ratio(X)	0.04	0.00	0.28	0.38			0.00	0.41	0.41	0.07	0.38	0.38
Avail Cap(c_a), veh/h	239	0	346	142			0	1398	1445	461	1474	1546
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	0.71	0.71	0.88	0.88	0.88
Uniform Delay (d), s/veh	58.5	0.0	65.9	69.6			0.0	4.9	4.9	3.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	1.9	2.8			0.0	0.6	0.6	0.1	0.7	0.6
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	0.3	0.0	0.9	1.3			0.0	4.9	5.0	0.1	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.6	0.0	67.8	72.4			0.0	5.5	5.5	3.4	0.7	0.6
LnGrp LOS	E	A	E	E			A	A	A	A	A	A
Approach Vol, veh/h		33						1161			1186	
Approach Delay, s/veh		65.0						5.5			0.7	
Approach LOS		E						A			A	
Timer - Assigned Phs	1	2	3	4		6	7					
Phs Duration (G+Y+Rc), s	6.2	118.6	6.4	13.8		124.8	20.2					
Change Period (Y+Rc), s	3.5	4.5	3.5	6.0		4.5	3.5					
Max Green Setting (Gmax), s	6.5	80.5	7.5	33.0		90.5	4.5					
Max Q Clear Time (g_c+I1), s	2.4	16.6	2.0	4.1		2.0	2.0					
Green Ext Time (p_c), s	0.0	6.0	0.0	0.1		5.9	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			4.9									
HCM 6th LOS			A									

2043 Live/Work

HCM 6th Signalized Intersection Summary
 1: 9th Ave SE/Filbert Dr & 208th St SE / SR 524

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1570	150	246	2048	277	675	200	372	147	60	4
Future Volume (veh/h)	7	1570	150	246	2048	277	675	200	372	147	60	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	0.99		0.98	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	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	7	1653	98	267	2226	294	734	217	359	162	66	2
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	77	1690	716	239	1708	221	525	180	299	136	330	10
Arrive On Green	0.02	0.45	0.45	0.10	0.54	0.53	0.15	0.29	0.28	0.05	0.18	0.18
Sat Flow, veh/h	1781	3741	1585	1781	3165	409	1795	631	1043	1781	1805	55
Grp Volume(v), veh/h	7	1653	98	267	1228	1292	734	0	576	162	0	68
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1777	1797	1795	0	1674	1781	0	1860
Q Serve(g_s), s	0.3	62.9	5.2	15.0	78.3	78.3	22.0	0.0	41.5	7.0	0.0	4.5
Cycle Q Clear(g_c), s	0.3	62.9	5.2	15.0	78.3	78.3	22.0	0.0	41.5	7.0	0.0	4.5
Prop In Lane	1.00		1.00	1.00		0.23	1.00		0.62	1.00		0.03
Lane Grp Cap(c), veh/h	77	1690	716	239	959	970	525	0	479	136	0	340
V/C Ratio(X)	0.09	0.98	0.14	1.12	1.28	1.33	1.40	0.00	1.20	1.19	0.00	0.20
Avail Cap(c_a), veh/h	123	1690	716	239	959	970	525	0	479	136	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	35.5	39.0	23.2	49.0	33.4	33.5	47.7	0.0	51.9	53.5	0.0	50.3
Incr Delay (d2), s/veh	0.2	17.0	0.1	93.7	134.1	156.7	190.8	0.0	109.6	138.8	0.0	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	0.1	32.1	2.0	10.5	67.9	74.8	36.5	0.0	32.0	6.8	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.7	56.0	23.3	142.7	167.4	190.2	238.5	0.0	161.5	192.3	0.0	50.6
LnGrp LOS	D	E	C	F	F	F	F	A	F	F	A	D
Approach Vol, veh/h		1758			2787			1310				230
Approach Delay, s/veh		54.1			175.6			204.7				150.4
Approach LOS		D			F			F				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	69.5	26.0	30.5	6.2	82.3	11.0	45.5				
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	14.0	64.5	21.5	26.0	5.0	73.5	6.5	41.0				
Max Q Clear Time (g_c+I1), s	17.0	64.9	24.0	6.5	2.3	80.3	9.0	43.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	145.8
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary

2: SR-527 & 208th St SE / SR 524

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗↘	↑↑	↗	↘	↗↘	↗	↗↘	↑↑↑	↗	↗↘	↑↑	↗
Traffic Volume (veh/h)	743	594	621	838	685	312	1354	2168	1157	179	1028	354
Future Volume (veh/h)	743	594	621	838	685	312	1354	2168	1157	179	1028	354
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	782	625	0	921	732	0	1425	2282	0	192	1105	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	692		903	474		665	1873		138	829	
Arrive On Green	0.19	0.19	0.00	0.25	0.25	0.00	0.21	0.41	0.00	0.04	0.23	0.00
Sat Flow, veh/h	3483	3582	1598	3563	1870	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	782	625	0	921	732	0	1425	2282	0	192	1105	0
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1781	1870	1585	1558	1535	1598	1728	1777	1585
Q Serve(g_s), s	29.0	25.6	0.0	38.0	38.0	0.0	32.0	61.0	0.0	6.0	35.0	0.0
Cycle Q Clear(g_c), s	29.0	25.6	0.0	38.0	38.0	0.0	32.0	61.0	0.0	6.0	35.0	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	692		903	474		665	1873		138	829	
V/C Ratio(X)	1.16	0.90		1.02	1.54		2.14	1.22		1.39	1.33	
Avail Cap(c_a), veh/h	673	692		903	474		665	1873		138	829	
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	60.5	59.1	0.0	56.0	56.0	0.0	59.0	44.5	0.0	72.0	57.5	0.0
Incr Delay (d2), s/veh	88.4	15.2	0.0	35.2	255.5	0.0	519.5	103.5	0.0	213.2	157.9	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	21.0	13.0	0.0	21.3	51.4	0.0	60.3	40.2	0.0	6.7	33.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	148.9	74.3	0.0	91.2	311.5	0.0	578.5	148.0	0.0	285.2	215.4	0.0
LnGrp LOS	F	E		F	F		F	F		F	F	
Approach Vol, veh/h		1407	A		1653	A		3707	A		1297	A
Approach Delay, s/veh		115.7			188.8			313.5			225.8	
Approach LOS		F			F			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.0	65.0		33.0	36.0	39.0		42.0				
Change Period (Y+Rc), s	4.0	4.5		* 4.1	* 4.3	4.5		4.1				
Max Green Setting (Gmax), s	6.0	60.5		* 29	* 32	34.5		37.9				
Max Q Clear Time (g_c+I1), s	8.0	63.0		31.0	34.0	37.0		40.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	239.3
HCM 6th LOS	F

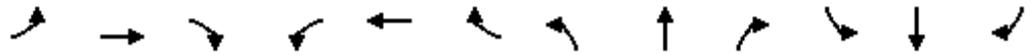
Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- * HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: SR-527 & 214th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗	↖	↖	↑↑↑		↖	↑↑↑	
Traffic Volume (veh/h)	25	2	2	735	6	650	2	3931	323	238	2076	5
Future Volume (veh/h)	25	2	2	735	6	650	2	3931	323	238	2076	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		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	1841	1841	1841	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	30	2	0	942	0	569	2	4138	0	262	2281	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	330	22	312	503	0	889	4	1818		106	2146	5
Arrive On Green	0.20	0.20	0.00	0.28	0.00	0.28	0.00	0.24	0.00	0.06	0.41	0.40
Sat Flow, veh/h	1648	110	1560	1795	0	3175	1795	5316	0	1767	5219	11
Grp Volume(v), veh/h	32	0	0	942	0	569	2	4138	0	262	1476	810
Grp Sat Flow(s),veh/h/ln	1758	0	1560	1795	0	1587	1795	1716	0	1767	1689	1853
Q Serve(g_s), s	2.2	0.0	0.0	42.0	0.0	23.6	0.2	53.0	0.0	9.0	61.7	61.7
Cycle Q Clear(g_c), s	2.2	0.0	0.0	42.0	0.0	23.6	0.2	53.0	0.0	9.0	61.7	61.7
Prop In Lane	0.94		1.00	1.00		1.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	352	0	312	503	0	889	4	1818		106	1389	762
V/C Ratio(X)	0.09	0.00	0.00	1.87	0.00	0.64	0.52	2.28		2.47	1.06	1.06
Avail Cap(c_a), veh/h	352	0	312	503	0	889	48	1818		106	1389	762
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.09	0.09	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.9	0.0	0.0	54.0	0.0	47.4	74.8	57.2	0.0	70.5	44.2	44.2
Incr Delay (d2), s/veh	0.1	0.0	0.0	400.8	0.0	3.5	9.6	574.2	0.0	689.3	42.7	50.7
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	1.0	0.0	0.0	74.9	0.0	9.8	0.1	120.0	0.0	24.3	33.0	37.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.0	0.0	0.0	454.8	0.0	50.9	84.4	631.4	0.0	759.8	86.9	94.9
LnGrp LOS	D	A	A	F	A	D	F	F		F	F	F
Approach Vol, veh/h		32			1511			4140	A		2548	
Approach Delay, s/veh		49.0			302.7			631.1			158.6	
Approach LOS		D			F			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.0	57.0		34.0	4.3	65.7		46.0				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	9.0	52.0		30.0	4.0	57.0		42.0				
Max Q Clear Time (g_c+I1), s	11.0	55.0		4.2	2.2	63.7		44.0				
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	0.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	422.3
HCM 6th LOS	F

Notes

- User approved pedestrian interval to be less than phase max green.
- 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.

HCM Signalized Intersection Capacity Analysis

5: SR-527 & 220th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖↗	↖	↗	↖	↑↑↑	↗	↖↗	↑↑↑	↘
Traffic Volume (vph)	145	80	455	1076	15	894	51	1887	1387	1154	2086	10
Future Volume (vph)	145	80	455	1076	15	894	51	1887	1387	1154	2086	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00	0.97	0.95	0.95	1.00	0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.97	0.97	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.85	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1608	1668	1515	3285	1404	1395	1644	4725	1440	3190	4722	
Flt Permitted	0.95	0.36	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1608	601	1515	3285	1404	1395	1644	4725	1440	3190	4722	
Peak-hour factor, PHF	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	165	91	517	1157	16	961	54	2007	1476	1326	2398	11
RTOR Reduction (vph)	0	0	114	0	207	207	0	0	396	0	1	0
Lane Group Flow (vph)	125	131	403	1157	280	283	54	2007	1080	1326	2409	0
Confl. Peds. (#/hr)	18					18			6	6		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	4%	4%	4%	4%	4%	4%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8			4			2			
Actuated Green, G (s)	11.5	41.0	29.5	23.5	41.5	41.5	4.5	52.5	52.5	26.5	74.5	
Effective Green, g (s)	12.0	42.0	30.0	24.0	42.0	42.0	5.0	53.0	53.0	27.0	75.0	
Actuated g/C Ratio	0.08	0.28	0.20	0.16	0.28	0.28	0.03	0.35	0.35	0.18	0.50	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.0	4.0	1.5	4.0	
Lane Grp Cap (vph)	128	253	303	525	393	390	54	1669	508	574	2361	
v/s Ratio Prot	0.08	0.04		c0.35	0.20		0.03	0.42		c0.42	0.51	
v/s Ratio Perm		0.10	c0.27			0.20			c0.75			
v/c Ratio	0.98	0.52	1.33	2.20	0.71	0.72	1.00	1.20	2.13	2.31	1.02	
Uniform Delay, d1	68.9	45.5	60.0	63.0	48.6	48.8	72.5	48.5	48.5	61.5	37.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.21	0.78	0.64	1.22	0.50	
Incremental Delay, d2	71.4	0.7	170.0	547.9	5.0	5.6	36.7	91.7	506.9	591.3	15.9	
Delay (s)	140.2	46.2	230.0	610.9	53.6	54.4	124.6	129.7	538.1	666.0	34.5	
Level of Service	F	D	F	F	D	D	F	F	F	F	C	
Approach Delay (s)		184.4			355.9			300.1			258.7	
Approach LOS		F			F			F			F	

Intersection Summary

HCM 2000 Control Delay	287.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.00		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	142.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary
 8: SR-527 & I-405 NB Ramps

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	634	9	958	0	2336	566	0	3408	1050
Future Volume (veh/h)	0	0	0	634	9	958	0	2336	566	0	3408	1050
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				773	11	0	0	2685	0	0	3917	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				555	8		0	2081		0	2081	
Arrive On Green				0.33	0.33	0.00	0.00	1.00	0.00	0.00	0.61	0.00
Sat Flow, veh/h				1665	24	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				784	0	0	0	2685	0	0	3917	0
Grp Sat Flow(s),veh/h/ln				1689	0	1502	0	1697	1514	0	1697	1514
Q Serve(g_s), s				50.0	0.0	0.0	0.0	92.0	0.0	0.0	92.0	0.0
Cycle Q Clear(g_c), s				50.0	0.0	0.0	0.0	92.0	0.0	0.0	92.0	0.0
Prop In Lane				0.99		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				563	0		0	2081		0	2081	
V/C Ratio(X)				1.39	0.00		0.00	1.29		0.00	1.88	
Avail Cap(c_a), veh/h				563	0		0	2081		0	2081	
HCM Platoon Ratio				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	0.00	0.00	0.09	0.00	0.00	0.09	0.00
Uniform Delay (d), s/veh				50.0	0.0	0.0	0.0	0.0	0.0	0.0	29.0	0.0
Incr Delay (d2), s/veh				187.5	0.0	0.0	0.0	130.9	0.0	0.0	397.1	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
%ile BackOfQ(50%),veh/ln				50.3	0.0	0.0	0.0	37.8	0.0	0.0	148.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				237.5	0.0	0.0	0.0	130.9	0.0	0.0	426.1	0.0
LnGrp LOS				F	A		A	F		A	F	
Approach Vol, veh/h				784		A		2685		A	3917	A
Approach Delay, s/veh				237.5				130.9			426.1	
Approach LOS				F				F			F	
Timer - Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		96.0		54.0		96.0						
Change Period (Y+Rc), s		5.9		5.6		5.9						
Max Green Setting (Gmax), s		90.1		48.4		90.1						
Max Q Clear Time (g_c+I1), s		94.0		52.0		94.0						
Green Ext Time (p_c), s		0.0		0.0		0.0						
Intersection Summary												
HCM 6th Ctrl Delay				298.8								
HCM 6th LOS				F								
Notes												
Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th Signalized Intersection Summary
 9: SR-527 & I-405 SB Ramps

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (veh/h)	794	0	759	0	0	0	0	2085	710	0	3096	710
Future Volume (veh/h)	794	0	759	0	0	0	0	2085	710	0	3096	710
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	819	0	0				0	2242	0	0	3294	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	958	0					0	2220		0	2202	
Arrive On Green	0.29	0.00	0.00				0.00	0.65	0.00	0.00	0.87	0.00
Sat Flow, veh/h	3274	0	1502				0	3483	1514	0	3455	1502
Grp Volume(v), veh/h	819	0	0				0	2242	0	0	3294	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	35.4	0.0	0.0				0.0	98.1	0.0	0.0	98.1	0.0
Cycle Q Clear(g_c), s	35.4	0.0	0.0				0.0	98.1	0.0	0.0	98.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	958	0					0	2220		0	2202	
V/C Ratio(X)	0.86	0.00					0.00	1.01		0.00	1.50	
Avail Cap(c_a), veh/h	1135	0					0	2220		0	2202	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.33	1.33
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	50.1	0.0	0.0				0.0	25.9	0.0	0.0	9.8	0.0
Incr Delay (d2), s/veh	6.2	0.0	0.0				0.0	8.5	0.0	0.0	223.3	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	15.4	0.0	0.0				0.0	37.4	0.0	0.0	74.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	0.0	0.0				0.0	34.4	0.0	0.0	233.1	0.0
LnGrp LOS	E	A					A	F		A	F	
Approach Vol, veh/h		819	A					2242	A		3294	A
Approach Delay, s/veh		56.3						34.4			233.1	
Approach LOS		E						C			F	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		102.1				102.1		47.9				
Change Period (Y+Rc), s		5.9				5.9		5.6				
Max Green Setting (Gmax), s		88.1				88.1		50.4				
Max Q Clear Time (g_c+I1), s		100.1				100.1		37.4				
Green Ext Time (p_c), s		0.0				0.0		4.9				

Intersection Summary

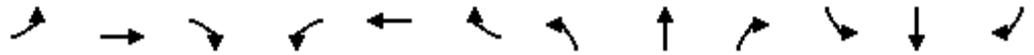
HCM 6th Ctrl Delay	140.2
HCM 6th LOS	F

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

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	↖
Traffic Volume (veh/h)	73	515	0	0	884	190	0	0	0	200	0	27
Future Volume (veh/h)	73	515	0	0	884	190	0	0	0	200	0	27
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	554	0	0	961	204	0	0	0	225	0	2
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	238	2855	0	691	1123	238	0	1	0	248	0	218
Arrive On Green	0.02	0.80	0.00	0.00	0.75	0.75	0.00	0.00	0.00	0.14	0.00	0.14
Sat Flow, veh/h	1781	3647	0	1781	1496	317	0	1870	0	1781	0	1567
Grp Volume(v), veh/h	78	554	0	0	0	1165	0	0	0	225	0	2
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1781	0	1813	0	1870	0	1781	0	1567
Q Serve(g_s), s	1.4	5.1	0.0	0.0	0.0	62.6	0.0	0.0	0.0	17.4	0.0	0.2
Cycle Q Clear(g_c), s	1.4	5.1	0.0	0.0	0.0	62.6	0.0	0.0	0.0	17.4	0.0	0.2
Prop In Lane	1.00		0.00	1.00		0.18	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	2855	0	691	0	1362	0	1	0	248	0	218
V/C Ratio(X)	0.33	0.19	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.91	0.00	0.01
Avail Cap(c_a), veh/h	273	2855	0	741	0	1362	0	214	0	305	0	269
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	21.2	3.2	0.0	0.0	0.0	12.1	0.0	0.0	0.0	59.3	0.0	51.9
Incr Delay (d2), s/veh	0.8	0.2	0.0	0.0	0.0	7.1	0.0	0.0	0.0	25.5	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	1.5	1.6	0.0	0.0	0.0	24.8	0.0	0.0	0.0	9.6	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.0	3.4	0.0	0.0	0.0	19.2	0.0	0.0	0.0	84.9	0.0	51.9
LnGrp LOS	C	A	A	A	A	B	A	A	A	F	A	D
Approach Vol, veh/h		632			1165			0				227
Approach Delay, s/veh		5.7			19.2			0.0				84.6
Approach LOS		A			B							F
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	116.5		23.5	7.3	109.2		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	80.0		24.5	6.5	78.0		16.5				
Max Q Clear Time (g_c+I1), s	0.0	7.1		19.4	3.4	64.6		0.0				
Green Ext Time (p_c), s	0.0	4.5		0.5	0.0	8.4		0.0				

Intersection Summary

HCM 6th Ctrl Delay	22.3
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

11: Meridian Ave & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	9	510	153	128	774	252	237	177	183	125	63	12
Future Volume (veh/h)	9	510	153	128	774	252	237	177	183	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	548	145	138	832	247	252	188	26	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	292	1407	371	481	1504	446	375	244	205	297	183	35
Arrive On Green	0.00	0.50	0.50	0.05	0.55	0.55	0.10	0.13	0.13	0.09	0.12	0.13
Sat Flow, veh/h	1795	2803	739	1795	2722	808	1795	1885	1587	1795	1539	291
Grp Volume(v), veh/h	10	349	344	138	547	532	252	188	26	147	0	88
Grp Sat Flow(s),veh/h/ln	1795	1791	1751	1795	1791	1739	1795	1885	1587	1795	0	1830
Q Serve(g_s), s	0.2	8.4	8.5	2.5	13.8	13.8	6.8	6.8	1.0	5.0	0.0	3.1
Cycle Q Clear(g_c), s	0.2	8.4	8.5	2.5	13.8	13.8	6.8	6.8	1.0	5.0	0.0	3.1
Prop In Lane	1.00		0.42	1.00		0.46	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	292	899	879	481	989	961	375	244	205	297	0	218
V/C Ratio(X)	0.03	0.39	0.39	0.29	0.55	0.55	0.67	0.77	0.13	0.49	0.00	0.40
Avail Cap(c_a), veh/h	376	899	879	537	989	961	375	571	480	298	0	536
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	9.6	10.8	10.8	7.8	10.1	10.1	25.9	29.5	27.0	24.4	0.0	28.5
Incr Delay (d2), s/veh	0.0	1.3	1.3	0.3	2.2	2.3	4.6	5.1	0.3	1.3	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	3.3	3.2	0.8	5.2	5.1	4.4	3.3	0.4	2.1	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	12.0	12.1	8.1	12.3	12.4	30.6	34.6	27.2	25.6	0.0	29.7
LnGrp LOS	A	B	B	A	B	B	C	C	C	C	A	C
Approach Vol, veh/h		703			1217			466				235
Approach Delay, s/veh		12.0			11.9			32.0				27.2
Approach LOS		B			B			C				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.7	39.1	10.8	12.3	4.2	42.7	10.1	13.1				
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	6.4	20.8	7.3	21.0	4.0	23.2	6.6	21.7				
Max Q Clear Time (g_c+I1), s	4.5	10.5	8.8	5.1	2.2	15.8	7.0	8.8				
Green Ext Time (p_c), s	0.1	4.2	0.0	0.2	0.0	4.9	0.0	0.6				
Intersection Summary												
HCM 6th Ctrl Delay											16.9	
HCM 6th LOS											B	

HCM 6th Signalized Intersection Summary

12: 4th Ct SE/4th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	882	3	3	1083	240	1	0	1	51	0	8
Future Volume (veh/h)	20	882	3	3	1083	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	1050	4	3	1165	250	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	358	1604	6	419	2489	530	139	0	0	122	0	0
Arrive On Green	0.01	0.86	0.86	0.00	0.85	0.85	0.05	0.00	0.00	0.05	0.00	0.00
Sat Flow, veh/h	1781	1862	7	1795	2926	622	1761	0	0	1421	0	0
Grp Volume(v), veh/h	24	0	1054	3	709	706	1	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1869	1795	1791	1757	1762	0	0	1421	0	0
Q Serve(g_s), s	0.3	0.0	25.1	0.0	13.7	14.1	0.0	0.0	0.0	6.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	25.1	0.0	13.7	14.1	0.1	0.0	0.0	6.1	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.35	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	358	0	1610	419	1524	1495	139	0	0	122	0	0
V/C Ratio(X)	0.07	0.00	0.65	0.01	0.47	0.47	0.01	0.00	0.00	0.51	0.00	0.00
Avail Cap(c_a), veh/h	397	0	1610	469	1524	1495	278	0	0	259	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	2.2	0.0	3.1	3.6	2.6	2.6	63.2	0.0	0.0	66.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	2.1	0.0	1.0	1.1	0.0	0.0	0.0	3.2	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	0.1	0.0	7.0	0.0	3.8	3.9	0.0	0.0	0.0	2.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.3	0.0	5.2	3.6	3.6	3.7	63.3	0.0	0.0	69.3	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	E	A	A	E	A	A
Approach Vol, veh/h		1078			1418			1				62
Approach Delay, s/veh		5.1			3.7			63.3				69.3
Approach LOS		A			A			E				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	3.9	125.1		11.0	5.9	123.1		11.0				
Change Period (Y+Rc), s	3.5	* 4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	4.5	* 1E2		21.0	5.5	102.0		21.0				
Max Q Clear Time (g_c+I1), s	2.0	27.1		8.1	2.3	16.1		2.1				
Green Ext Time (p_c), s	0.0	22.2		0.1	0.0	16.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay	5.9
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

13: 228th St SE & 9th Ave SE

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 					 		
Traffic Volume (veh/h)	310	797	2	289	1196	698	17	28	209	275	2	130
Future Volume (veh/h)	310	797	2	289	1196	698	17	28	209	275	2	130
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	1885	1885	1885	1870	1900	1900	1870	1870	1870	1885	1870	1870
Adj Flow Rate, veh/h	365	938	2	314	1272	713	18	30	12	312	2	5
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	2
Cap, veh/h	313	2483	5	539	1419	716	31	63	25	279	53	131
Arrive On Green	0.15	0.68	0.67	0.09	0.62	0.61	0.02	0.05	0.05	0.08	0.11	0.11
Sat Flow, veh/h	1795	3667	8	1781	2302	1161	1781	1263	505	3483	466	1164
Grp Volume(v), veh/h	365	458	482	314	967	1018	18	0	42	312	0	7
Grp Sat Flow(s),veh/h/ln	1795	1791	1884	1781	1805	1658	1781	0	1768	1742	0	1630
Q Serve(g_s), s	22.0	16.7	16.7	9.5	66.4	91.6	1.5	0.0	3.5	12.0	0.0	0.6
Cycle Q Clear(g_c), s	22.0	16.7	16.7	9.5	66.4	91.6	1.5	0.0	3.5	12.0	0.0	0.6
Prop In Lane	1.00		0.00	1.00		0.70	1.00		0.29	1.00		0.71
Lane Grp Cap(c), veh/h	313	1213	1275	539	1113	1022	31	0	89	279	0	184
V/C Ratio(X)	1.17	0.38	0.38	0.58	0.87	1.00	0.58	0.00	0.47	1.12	0.00	0.04
Avail Cap(c_a), veh/h	313	1213	1275	734	1113	1022	74	0	312	279	0	351
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	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	57.0	10.5	10.5	8.5	23.8	28.8	73.2	0.0	69.4	69.0	0.0	59.4
Incr Delay (d2), s/veh	104.3	0.9	0.9	0.1	1.0	7.6	16.0	0.0	5.5	90.0	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	21.0	6.8	7.1	3.6	27.6	36.8	0.8	0.0	1.7	8.8	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	161.3	11.4	11.4	8.6	24.7	36.4	89.2	0.0	74.9	159.0	0.0	59.6
LnGrp LOS	F	B	B	A	C	D	F	A	E	F	A	E
Approach Vol, veh/h		1305			2299			60				319
Approach Delay, s/veh		53.3			27.7			79.1				156.8
Approach LOS		D			C			E				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.9	105.6	16.0	11.5	26.0	96.5	6.6	20.9				
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	28.9	65.6	11.5	26.0	21.5	73.0	5.7	31.8				
Max Q Clear Time (g_c+I1), s	11.5	18.7	14.0	5.5	24.0	93.6	3.5	2.6				
Green Ext Time (p_c), s	0.9	7.6	0.0	0.2	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				47.2								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary

14: SR-527 & 228th St SE

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	627	417	220	371	657	483	500	1018	247	575	1381	1092
Future Volume (veh/h)	627	417	220	371	657	483	500	1018	247	575	1381	1092
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	640	426	224	395	699	386	515	1049	230	685	1644	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	455	636	331	389	1075	470	247	1256	275	299	1126	
Arrive On Green	0.20	0.28	0.28	0.07	0.10	0.10	0.07	0.30	0.30	0.09	0.31	0.00
Sat Flow, veh/h	2273	2243	1166	1795	3582	1565	3456	4186	917	3483	3582	1598
Grp Volume(v), veh/h	640	336	314	395	699	386	515	853	426	685	1644	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1632	1795	1791	1565	1728	1702	1699	1742	1791	1598
Q Serve(g_s), s	28.0	23.4	23.9	30.3	26.3	33.9	10.0	32.8	32.8	12.0	44.0	0.0
Cycle Q Clear(g_c), s	28.0	23.4	23.9	30.3	26.3	33.9	10.0	32.8	32.8	12.0	44.0	0.0
Prop In Lane	1.00		0.71	1.00		1.00	1.00		0.54	1.00		1.00
Lane Grp Cap(c), veh/h	455	504	463	389	1075	470	247	1021	510	299	1126	
V/C Ratio(X)	1.41	0.67	0.68	1.02	0.65	0.82	2.09	0.84	0.84	2.29	1.46	
Avail Cap(c_a), veh/h	455	504	463	389	1075	470	247	1021	510	299	1126	
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.75	0.75	0.75	0.59	0.59	0.59	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	56.0	44.3	44.6	65.0	56.0	59.4	65.0	45.8	45.9	64.0	48.0	0.0
Incr Delay (d2), s/veh	193.1	5.2	5.9	39.3	1.8	9.4	502.5	6.2	11.8	583.4	207.6	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.2	11.1	10.5	19.0	13.0	15.5	21.6	14.3	15.2	29.4	51.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	249.1	49.5	50.5	104.3	57.8	68.8	567.5	52.0	57.7	647.4	255.6	0.0
LnGrp LOS	F	D	D	F	E	E	F	D	E	F	F	
Approach Vol, veh/h		1290			1480			1794			2329	A
Approach Delay, s/veh		148.8			73.1			201.4			370.9	
Approach LOS		F			E			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	46.0	34.3	43.7	14.0	48.0	32.0	46.0				
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	11.5	41.5	29.8	39.2	9.5	43.5	27.5	41.5				
Max Q Clear Time (g_c+I1), s	14.0	34.8	32.3	25.9	12.0	46.0	30.0	35.9				
Green Ext Time (p_c), s	0.0	3.8	0.0	2.4	0.0	0.0	0.0	2.7				

Intersection Summary

HCM 6th Ctrl Delay	221.3
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

15: 15th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	146	907	53	106	1005	347	108	24	41	314	60	250
Future Volume (veh/h)	146	907	53	106	1005	347	108	24	41	314	60	250
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	0.98		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	154	955	51	112	1058	348	120	27	3	338	65	146
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	281	2215	118	345	1678	545	182	125	14	371	79	177
Arrive On Green	0.01	0.21	0.21	0.04	0.64	0.64	0.05	0.07	0.08	0.13	0.15	0.16
Sat Flow, veh/h	1781	3429	183	1795	2635	855	1810	1672	186	1810	513	1153
Grp Volume(v), veh/h	154	495	511	112	715	691	120	0	30	338	0	211
Grp Sat Flow(s),veh/h/ln	1781	1777	1835	1795	1791	1699	1810	0	1858	1810	0	1666
Q Serve(g_s), s	4.1	33.8	33.8	3.0	33.7	34.9	7.0	0.0	2.1	18.0	0.0	17.2
Cycle Q Clear(g_c), s	4.1	33.8	33.8	3.0	33.7	34.9	7.0	0.0	2.1	18.0	0.0	17.2
Prop In Lane	1.00		0.10	1.00		0.50	1.00		0.10	1.00		0.69
Lane Grp Cap(c), veh/h	281	1148	1186	345	1141	1082	182	0	139	371	0	256
V/C Ratio(X)	0.55	0.43	0.43	0.32	0.63	0.64	0.66	0.00	0.22	0.91	0.00	0.82
Avail Cap(c_a), veh/h	365	1148	1186	382	1141	1082	182	0	353	371	0	447
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	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.6	32.8	32.8	12.7	15.4	15.6	58.3	0.0	60.9	53.7	0.0	57.3
Incr Delay (d2), s/veh	0.2	0.1	0.1	0.0	0.2	0.3	8.4	0.0	0.8	26.1	0.0	6.6
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	16.2	16.7	1.2	13.4	13.2	1.1	0.0	1.0	5.7	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	32.9	32.9	12.7	15.6	15.8	66.8	0.0	61.6	79.9	0.0	63.9
LnGrp LOS	B	C	C	B	B	B	E	A	E	E	A	E
Approach Vol, veh/h		1160			1518			150				549
Approach Delay, s/veh		30.6			15.5			65.7				73.7
Approach LOS		C			B			E				E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	94.4	11.0	25.5	10.3	93.2	22.0	14.5				
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	71.4	7.0	38.1	13.0	66.4	18.0	27.1				
Max Q Clear Time (g_c+I1), s	5.0	35.8	9.0	19.2	6.1	36.9	20.0	4.1				
Green Ext Time (p_c), s	0.1	8.2	0.0	0.8	0.3	13.1	0.0	0.1				
Intersection Summary												
HCM 6th Ctrl Delay				32.4								
HCM 6th LOS				C								

HCM Signalized Intersection Capacity Analysis
 16: 19th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (vph)	949	298	522	988	522	670
Future Volume (vph)	949	298	522	988	522	670
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1881	1557	1787	1881	1787	1599
Flt Permitted	1.00	1.00	0.07	1.00	0.95	1.00
Satd. Flow (perm)	1881	1557	132	1881	1787	1599
Peak-hour factor, PHF	0.93	0.93	0.96	0.96	0.81	0.81
Adj. Flow (vph)	1020	320	544	1029	644	827
RTOR Reduction (vph)	0	103	0	0	0	263
Lane Group Flow (vph)	1020	217	544	1029	644	564
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	53.5	53.5	79.5	79.5	32.5	32.5
Effective Green, g (s)	54.0	54.0	79.0	80.0	32.0	32.0
Actuated g/C Ratio	0.45	0.45	0.66	0.67	0.27	0.27
Clearance Time (s)	4.5	4.5	3.5	4.5	3.5	3.5
Vehicle Extension (s)	4.0	4.0	2.0	4.0	5.0	5.0
Lane Grp Cap (vph)	846	700	390	1254	476	426
v/s Ratio Prot	0.54		c0.26	0.55	c0.36	
v/s Ratio Perm		0.14	c0.66			0.35
v/c Ratio	1.21	0.31	1.39	0.82	1.35	1.32
Uniform Delay, d1	33.0	21.1	40.3	14.7	44.0	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	103.7	0.3	192.7	4.6	172.2	161.1
Delay (s)	136.7	21.4	233.0	19.4	216.2	205.1
Level of Service	F	C	F	B	F	F
Approach Delay (s)	109.2			93.3	210.0	
Approach LOS	F			F	F	

Intersection Summary

HCM 2000 Control Delay	137.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 17: Fitzgerald Rd/27th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (vph)	1147	318	428	1120	257	125
Future Volume (vph)	1147	318	428	1120	257	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	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	1568
Flt Permitted	1.00	1.00	0.05	1.00	0.95	1.00
Satd. Flow (perm)	1881	1561	85	1863	1805	1568
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.85	0.85
Adj. Flow (vph)	1233	342	470	1231	302	147
RTOR Reduction (vph)	0	39	0	0	0	128
Lane Group Flow (vph)	1233	303	470	1231	302	19
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)	85.0	85.0	111.5	111.5	18.5	18.5
Effective Green, g (s)	85.0	85.0	111.0	112.0	18.0	18.0
Actuated g/C Ratio	0.57	0.57	0.74	0.75	0.12	0.12
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)	1065	884	321	1391	216	188
v/s Ratio Prot	0.66		c0.22	0.66	c0.17	
v/s Ratio Perm		0.19	c0.86			0.01
v/c Ratio	1.16	0.34	1.46	0.88	1.40	0.10
Uniform Delay, d1	32.5	17.5	55.4	14.2	66.0	58.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	81.8	1.1	225.3	8.5	204.8	0.2
Delay (s)	114.3	18.5	280.7	22.7	270.8	59.0
Level of Service	F	B	F	C	F	E
Approach Delay (s)	93.5			94.0	201.4	
Approach LOS	F			F	F	

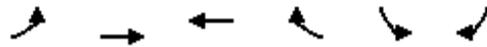
Intersection Summary

HCM 2000 Control Delay	106.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Signalized Intersection Summary

18: 228th St SE & 29th Ave SE

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↕	↗	↖	↗	↘	↘
Traffic Volume (veh/h)	545	792	720	303	587	1024
Future Volume (veh/h)	545	792	720	303	587	1024
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	580	843	750	252	652	812
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	420	1116	633	536	611	543
Arrive On Green	0.24	0.60	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1870	1885	1595	1781	1585
Grp Volume(v), veh/h	580	843	750	252	652	812
Grp Sat Flow(s),veh/h/ln	1781	1870	1885	1595	1781	1585
Q Serve(g_s), s	33.0	46.4	47.0	17.4	48.0	48.0
Cycle Q Clear(g_c), s	33.0	46.4	47.0	17.4	48.0	48.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	420	1116	633	536	611	543
V/C Ratio(X)	1.38	0.76	1.19	0.47	1.07	1.49
Avail Cap(c_a), veh/h	420	1122	633	536	611	543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.49	0.49	1.00	1.00
Uniform Delay (d), s/veh	53.5	20.8	46.5	36.7	46.0	46.0
Incr Delay (d2), s/veh	173.0	0.4	91.4	1.5	55.8	232.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	34.9	19.8	37.9	7.1	30.5	70.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	226.5	21.2	137.9	38.1	101.8	278.0
LnGrp LOS	F	C	F	D	F	F
Approach Vol, veh/h		1423	1002		1464	
Approach Delay, s/veh		104.9	112.8		199.5	
Approach LOS		F	F		F	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		88.0		52.0	37.0	51.0
Change Period (Y+Rc), s		* 4.5		3.5	4.0	4.5
Max Green Setting (Gmax), s		* 84		48.5	33.0	46.5
Max Q Clear Time (g_c+I1), s		48.4		50.0	35.0	49.0
Green Ext Time (p_c), s		4.8		0.0	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	142.5
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

19: 31st Ave SE & 228th St SE

11/26/2019



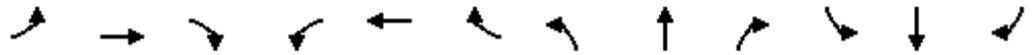
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	1139	1	1	846	200	1	0	1	260	0	230
Future Volume (veh/h)	275	1139	1	1	846	200	1	0	1	260	0	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	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	1309	1	1	930	185	2	0	0	292	0	91
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	351	1356	1	96	1180	999	77	0	0	366	0	286
Arrive On Green	0.09	0.73	0.73	0.00	0.65	0.65	0.18	0.00	0.00	0.18	0.00	0.18
Sat Flow, veh/h	1767	1854	1	1739	1826	1546	145	0	0	1772	0	1610
Grp Volume(v), veh/h	316	0	1310	1	930	185	2	0	0	292	0	91
Grp Sat Flow(s),veh/h/ln	1767	0	1855	1739	1826	1546	145	0	0	1772	0	1610
Q Serve(g_s), s	9.2	0.0	90.1	0.0	51.3	6.7	0.2	0.0	0.0	0.0	0.0	6.9
Cycle Q Clear(g_c), s	9.2	0.0	90.1	0.0	51.3	6.7	22.3	0.0	0.0	22.1	0.0	6.9
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	351	0	1357	96	1180	999	77	0	0	366	0	286
V/C Ratio(X)	0.90	0.00	0.97	0.01	0.79	0.19	0.03	0.00	0.00	0.80	0.00	0.32
Avail Cap(c_a), veh/h	445	0	1369	162	1180	999	117	0	0	410	0	334
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	1.00
Uniform Delay (d), s/veh	29.5	0.0	17.1	30.4	17.8	9.9	67.2	0.0	0.0	56.3	0.0	50.0
Incr Delay (d2), s/veh	18.2	0.0	17.2	0.0	4.9	0.3	0.1	0.0	0.0	9.6	0.0	0.6
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	9.0	0.0	40.0	0.0	22.1	2.4	0.1	0.0	0.0	11.1	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.7	0.0	34.3	30.5	22.7	10.2	67.4	0.0	0.0	65.9	0.0	50.7
LnGrp LOS	D	A	C	C	C	B	E	A	A	E	A	D
Approach Vol, veh/h		1626			1116			2				383
Approach Delay, s/veh		36.9			20.6			67.4				62.3
Approach LOS		D			C			E				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	106.1		28.8	16.6	94.3		28.8				
Change Period (Y+Rc), s	4.5	4.5		4.0	4.5	4.5		4.0				
Max Green Setting (Gmax), s	5.5	102.5		29.0	19.5	88.5		29.0				
Max Q Clear Time (g_c+I1), s	2.0	92.1		24.1	11.2	53.3		24.3				
Green Ext Time (p_c), s	0.0	9.6		0.7	0.8	20.6		0.0				

Intersection Summary

HCM 6th Ctrl Delay	34.2
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary
 20: 35th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗		↖	↗
Traffic Volume (veh/h)	1	1019	360	135	691	0	280	1	361	0	2	1
Future Volume (veh/h)	1	1019	360	135	691	0	280	1	361	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	1199	369	155	794	0	311	1	129	0	8	0
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	351	1176	996	131	1257	0	336	1	300	0	2	1
Arrive On Green	0.00	0.63	0.63	0.04	0.68	0.00	0.19	0.19	0.19	0.00	0.00	0.00
Sat Flow, veh/h	1767	1856	1571	1767	1856	0	1762	6	1572	0	418	354
Grp Volume(v), veh/h	1	1199	369	155	794	0	312	0	129	0	8	0
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	77.5	13.8	5.0	29.5	0.0	21.2	0.0	8.8	0.0	0.5	0.0
Cycle Q Clear(g_c), s	0.0	77.5	13.8	5.0	29.5	0.0	21.2	0.0	8.8	0.0	0.5	0.0
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	351	1176	996	131	1257	0	337	0	300	0	2	1
V/C Ratio(X)	0.00	1.02	0.37	1.18	0.63	0.00	0.92	0.00	0.43	0.00	5.18	0.00
Avail Cap(c_a), veh/h	400	1176	996	131	1257	0	390	0	347	0	67	56
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	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	10.9	22.4	10.7	40.1	11.1	0.0	48.6	0.0	43.6	0.0	60.9	0.0
Incr Delay (d2), s/veh	0.0	31.3	0.2	135.8	1.0	0.0	25.0	0.0	0.7	0.0	1990.0	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	0.0	41.0	4.7	7.4	11.6	0.0	11.7	0.0	3.5	0.0	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.9	53.7	11.0	175.9	12.1	0.0	73.6	0.0	44.3	0.0	2051.0	0.0
LnGrp LOS	B	F	B	F	B	A	E	A	D	A	F	A
Approach Vol, veh/h		1569			949			441			8	
Approach Delay, s/veh		43.6			38.9			65.0			2051.0	
Approach LOS		D			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	81.5		4.5	3.6	86.9		27.4				
Change Period (Y+Rc), s	3.5	4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	5.5	77.0		20.0	4.0	78.5		27.5				
Max Q Clear Time (g_c+I1), s	7.0	79.5		2.5	2.0	31.5		23.2				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	4.4		0.6				

Intersection Summary

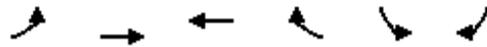
HCM 6th Ctrl Delay	50.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 21: 228th St SE & 39th Ave SE

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↕	↑	↕		↕	↕
Traffic Volume (veh/h)	573	760	706	133	88	255
Future Volume (veh/h)	573	760	706	133	88	255
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	623	826	831	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	596	1633	813	148	132	117
Arrive On Green	0.30	0.87	0.53	0.53	0.08	0.00
Sat Flow, veh/h	1795	1885	1522	277	1739	1547
Grp Volume(v), veh/h	623	826	0	982	107	0
Grp Sat Flow(s),veh/h/ln	1795	1885	0	1799	1739	1547
Q Serve(g_s), s	42.0	14.4	0.0	74.0	8.4	0.0
Cycle Q Clear(g_c), s	42.0	14.4	0.0	74.0	8.4	0.0
Prop In Lane	1.00			0.15	1.00	1.00
Lane Grp Cap(c), veh/h	596	1633	0	961	132	117
V/C Ratio(X)	1.04	0.51	0.00	1.02	0.81	0.00
Avail Cap(c_a), veh/h	596	1633	0	961	276	246
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	44.6	2.2	0.0	32.3	63.0	0.0
Incr Delay (d2), s/veh	49.0	0.1	0.0	34.6	13.3	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	27.5	3.4	0.0	40.3	4.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	93.6	2.3	0.0	66.9	76.3	0.0
LnGrp LOS	F	A	A	F	E	A
Approach Vol, veh/h		1449	982		107	
Approach Delay, s/veh		41.6	66.9		76.3	
Approach LOS		D	E		E	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		124.0		14.5	46.0	78.0
Change Period (Y+Rc), s		4.5		4.0	4.5	4.5
Max Green Setting (Gmax), s		119.5		22.0	41.5	73.5
Max Q Clear Time (g_c+I1), s		16.4		10.4	44.0	76.0
Green Ext Time (p_c), s		0.8		0.3	0.0	0.0

Intersection Summary

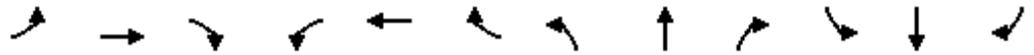
HCM 6th Ctrl Delay	52.8
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 25: SR-527 & 240th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖		↖	↖		↖	↖	
Traffic Volume (veh/h)	567	2	160	2	2	8	260	1576	2	5	1472	624
Future Volume (veh/h)	567	2	160	2	2	8	260	1576	2	5	1472	624
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		0.98
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	710	0	15	2	2	0	271	1642	2	5	1654	701
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	658	0	290	5	6	0	207	1945	2	303	1474	577
Arrive On Green	0.18	0.00	0.18	0.00	0.00	0.00	0.12	0.53	0.52	0.17	0.59	0.58
Sat Flow, veh/h	3591	0	1582	1781	1870	0	1795	3671	4	1781	2497	977
Grp Volume(v), veh/h	710	0	15	2	2	0	271	801	843	5	1147	1208
Grp Sat Flow(s),veh/h/ln	1795	0	1582	1781	1870	0	1795	1791	1884	1781	1791	1684
Q Serve(g_s), s	27.0	0.0	1.2	0.2	0.2	0.0	17.0	56.1	56.1	0.3	87.0	87.0
Cycle Q Clear(g_c), s	27.0	0.0	1.2	0.2	0.2	0.0	17.0	56.1	56.1	0.3	87.0	87.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.58
Lane Grp Cap(c), veh/h	658	0	290	5	6	0	207	949	998	303	1057	994
V/C Ratio(X)	1.08	0.00	0.05	0.37	0.35	0.00	1.31	0.84	0.84	0.02	1.09	1.22
Avail Cap(c_a), veh/h	658	0	290	36	38	0	207	1221	1284	303	1057	994
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.2	0.0	49.7	73.4	73.4	0.0	65.2	29.5	29.5	50.9	30.2	30.6
Incr Delay (d2), s/veh	58.6	0.0	0.0	14.4	12.8	0.0	169.4	5.2	4.9	0.0	54.0	106.3
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	17.7	0.0	0.5	0.1	0.1	0.0	17.4	24.1	25.3	0.2	50.0	61.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	118.8	0.0	49.7	87.8	86.1	0.0	234.6	34.6	34.4	50.9	84.2	136.9
LnGrp LOS	F	A	D	F	F	A	F	C	C	D	F	F
Approach Vol, veh/h		725			4			1915			2360	
Approach Delay, s/veh		117.4			87.0			62.8			111.1	
Approach LOS		F			F			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	29.9	82.1		31.0	21.0	91.0		4.5				
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	17.0	85.7		3.0				
Max Q Clear Time (g_c+I1), s	2.3	58.1		29.0	19.0	89.0		2.2				
Green Ext Time (p_c), s	0.0	18.7		0.0	0.0	0.0		0.0				

Intersection Summary

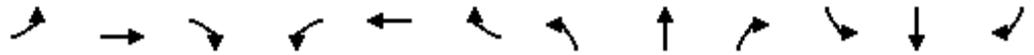
HCM 6th Ctrl Delay	93.5
HCM 6th LOS	F

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.

HCM 6th Signalized Intersection Summary
 35: SR-527 & NE 191st St/NE 190th St

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	230	130	160	310	220	130	1780	150	152	1393	186
Future Volume (veh/h)	118	230	130	160	310	220	130	1780	150	152	1393	186
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	0.99		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	128	250	24	178	344	217	137	1874	90	157	1436	192
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	131	428	353	349	302	190	146	1745	773	146	1535	203
Arrive On Green	0.04	0.23	0.23	0.09	0.28	0.28	0.05	0.49	0.49	0.05	0.49	0.49
Sat Flow, veh/h	1795	1885	1553	1795	1070	675	1781	3554	1575	1767	3127	414
Grp Volume(v), veh/h	128	250	24	178	0	561	137	1874	90	157	803	825
Grp Sat Flow(s),veh/h/ln	1795	1885	1553	1795	0	1745	1781	1777	1575	1767	1763	1778
Q Serve(g_s), s	4.0	13.0	1.3	8.0	0.0	31.0	4.8	54.0	2.3	5.0	46.8	48.5
Cycle Q Clear(g_c), s	4.0	13.0	1.3	8.0	0.0	31.0	4.8	54.0	2.3	5.0	46.8	48.5
Prop In Lane	1.00		1.00	1.00		0.39	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	131	428	353	349	0	492	146	1745	773	146	865	873
V/C Ratio(X)	0.98	0.58	0.07	0.51	0.00	1.14	0.94	1.07	0.12	1.08	0.93	0.95
Avail Cap(c_a), veh/h	131	428	353	365	0	492	146	1745	773	146	865	873
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	41.2	37.9	33.4	28.1	0.0	39.5	26.6	28.0	7.0	51.4	26.2	26.6
Incr Delay (d2), s/veh	71.8	1.4	0.0	0.4	0.0	85.2	54.6	44.6	0.1	96.6	15.9	18.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	6.1	0.5	3.5	0.0	24.7	4.1	32.1	1.2	7.7	22.1	23.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.0	39.3	33.4	28.5	0.0	124.7	81.2	72.6	7.0	148.0	42.1	45.2
LnGrp LOS	F	D	C	C	A	F	F	F	A	F	D	D
Approach Vol, veh/h		402			739			2101			1785	
Approach Delay, s/veh		62.4			101.6			70.3			52.8	
Approach LOS		E			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	58.0	14.0	29.0	9.0	58.0	8.0	35.0				
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	5.0	54.0	11.0	24.0	5.0	54.0	4.0	31.0				
Max Q Clear Time (g_c+I1), s	7.0	56.0	10.0	15.0	6.8	50.5	6.0	33.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	2.5	0.0	0.0				

Intersection Summary

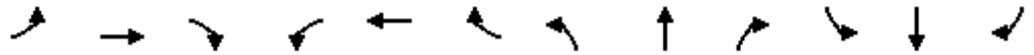
HCM 6th Ctrl Delay	68.1
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 40: SR-527 & NE 185th St

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (veh/h)	135	150	10	95	260	240	13	1320	60	230	1265	138
Future Volume (veh/h)	135	150	10	95	260	240	13	1320	60	230	1265	138
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	147	163	9	112	283	247	14	1483	64	237	1304	142
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	171	558	31	429	277	241	143	1448	62	237	1630	177
Arrive On Green	0.07	0.32	0.30	0.05	0.30	0.29	0.03	0.55	0.55	0.10	0.50	0.49
Sat Flow, veh/h	1781	1756	97	1795	912	796	1781	3494	150	1810	3277	355
Grp Volume(v), veh/h	147	0	172	112	0	530	14	758	789	237	715	731
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1795	0	1707	1781	1791	1854	1810	1805	1827
Q Serve(g_s), s	8.4	0.0	10.1	6.4	0.0	44.0	0.7	60.1	60.1	15.0	47.8	48.6
Cycle Q Clear(g_c), s	8.4	0.0	10.1	6.4	0.0	44.0	0.7	60.1	60.1	15.0	47.8	48.6
Prop In Lane	1.00		0.05	1.00		0.47	1.00		0.08	1.00		0.19
Lane Grp Cap(c), veh/h	171	0	589	429	0	518	143	742	768	237	898	909
V/C Ratio(X)	0.86	0.00	0.29	0.26	0.00	1.02	0.10	1.02	1.03	1.00	0.80	0.80
Avail Cap(c_a), veh/h	185	0	589	443	0	518	205	742	768	237	898	909
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	0.79	0.79	0.79	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.8	0.0	37.2	33.9	0.0	51.0	28.5	32.5	32.6	49.0	30.3	30.6
Incr Delay (d2), s/veh	29.4	0.0	0.1	0.3	0.0	45.5	0.2	34.9	36.0	58.6	7.3	7.5
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	5.1	0.0	4.7	2.9	0.0	25.3	0.3	30.2	31.6	12.5	22.1	22.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	0.0	37.3	34.2	0.0	96.5	28.7	67.4	68.6	107.6	37.6	38.0
LnGrp LOS	E	A	D	C	A	F	C	F	F	F	D	D
Approach Vol, veh/h		319			642			1561			1683	
Approach Delay, s/veh		51.5			85.6			67.7			47.6	
Approach LOS		D			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	64.1	11.8	50.1	6.9	76.1	13.9	48.0				
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	58.5	9.5	44.0	8.5	65.5	11.5	42.0				
Max Q Clear Time (g_c+I1), s	17.0	62.1	8.4	12.1	2.7	50.6	10.4	46.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6	0.0	3.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				61.2								
HCM 6th LOS				E								

HCM 6th Signalized Intersection Summary

43: SR-527 & NE 183rd St

11/26/2019



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	1100	220	0	1305	25
Future Volume (veh/h)	75	100	5	130	45	200	0	1100	220	0	1305	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.95		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	4	149	52	105	0	1170	224	0	1517	29
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	211	246	8	263	87	175	0	2100	400	0	2517	48
Arrive On Green	0.05	0.13	0.12	0.08	0.16	0.15	0.00	1.00	1.00	0.00	1.00	1.00
Sat Flow, veh/h	1810	1824	60	1781	528	1067	0	3093	570	0	3689	69
Grp Volume(v), veh/h	91	0	126	149	0	157	0	696	698	0	755	791
Grp Sat Flow(s),veh/h/ln	1810	0	1883	1781	0	1595	0	1791	1778	0	1791	1872
Q Serve(g_s), s	6.4	0.0	9.0	10.4	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.4	0.0	9.0	10.4	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.67	0.00		0.32	0.00		0.04
Lane Grp Cap(c), veh/h	211	0	254	263	0	262	0	1254	1245	0	1254	1311
V/C Ratio(X)	0.43	0.00	0.50	0.57	0.00	0.60	0.00	0.55	0.56	0.00	0.60	0.60
Avail Cap(c_a), veh/h	240	0	429	277	0	396	0	1254	1245	0	1254	1311
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	1.00	0.00	1.00	0.00	0.86	0.86	0.00	0.59	0.59
Uniform Delay (d), s/veh	52.8	0.0	58.2	49.4	0.0	56.9	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.6	1.3	0.0	0.8	0.0	1.5	1.6	0.0	1.3	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	4.4	4.8	0.0	5.5	0.0	0.5	0.5	0.0	0.4	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	0.0	58.8	50.8	0.0	57.7	0.0	1.5	1.6	0.0	1.3	1.2
LnGrp LOS	D	A	E	D	A	E	A	A	A	A	A	A
Approach Vol, veh/h		217			306			1394			1546	
Approach Delay, s/veh		56.5			54.3			1.6			1.2	
Approach LOS		E			D			A			A	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		105.5	15.9	23.5		105.5	11.7	27.8				
Change Period (Y+Rc), s		4.5	3.5	6.0		4.5	3.5	6.0				
Max Green Setting (Gmax), s		86.5	13.5	31.0		86.5	10.5	34.0				
Max Q Clear Time (g_c+I1), s		2.0	12.4	11.0		2.0	8.4	15.3				
Green Ext Time (p_c), s		3.9	0.0	0.2		4.4	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			9.5									
HCM 6th LOS			A									

HCM Signalized Intersection Capacity Analysis

44: SR-522 Realignment/SR-522 & SR-527

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	707	1310	1580	407	732	633
Future Volume (vph)	707	1310	1580	407	732	633
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	5.0	5.0
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	1506	3502	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3400	3505	3438	1506	3502	1583
Peak-hour factor, PHF	0.94	0.94	0.95	0.95	0.87	0.87
Adj. Flow (vph)	752	1394	1663	428	841	728
RTOR Reduction (vph)	0	0	0	7	0	3
Lane Group Flow (vph)	752	1394	1663	421	841	725
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)	37.0	73.0	63.0	93.0	30.0	67.0
Effective Green, g (s)	35.0	73.0	64.0	95.0	30.0	63.0
Actuated g/C Ratio	0.24	0.50	0.44	0.66	0.21	0.43
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)	820	1764	1517	1028	724	687
v/s Ratio Prot	0.22	c0.40	c0.48	0.09	c0.24	c0.25
v/s Ratio Perm				0.19		0.20
v/c Ratio	0.92	0.79	1.10	0.41	1.16	1.06
Uniform Delay, d1	53.6	29.7	40.5	11.8	57.5	41.0
Progression Factor	1.00	1.00	1.00	1.00	0.77	0.92
Incremental Delay, d2	14.6	3.7	54.1	0.4	85.3	47.0
Delay (s)	68.2	33.4	94.6	12.1	129.6	84.5
Level of Service	E	C	F	B	F	F
Approach Delay (s)		45.6	77.7		108.7	
Approach LOS		D	E		F	
Intersection Summary						
HCM 2000 Control Delay			74.2		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.15			
Actuated Cycle Length (s)			145.0		Sum of lost time (s)	21.0
Intersection Capacity Utilization			96.4%		ICU Level of Service	F
Analysis Period (min)			15			

c Critical Lane Group

HCM 6th Signalized Intersection Summary

78: SR-527 & W Main/Main

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	6	15	30	0	220	0	1064	52	24	1326	30
Future Volume (veh/h)	26	6	15	30	0	220	0	1064	52	24	1326	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.89	1.00		1.00	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	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	7	16	33	0	235	0	1157	57	28	1524	31
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	237	32	74	75	0	0	0	2714	134	387	2958	60
Arrive On Green	0.11	0.07	0.06	0.02	0.00	0.01	0.00	0.79	0.78	0.03	1.00	1.00
Sat Flow, veh/h	1781	465	1063	1781	33		0	3538	170	1781	3561	72
Grp Volume(v), veh/h	28	0	23	33	74.6		0	597	617	28	759	796
Grp Sat Flow(s),veh/h/ln	1781	0	1528	1781	E		0	1777	1837	1781	1777	1856
Q Serve(g_s), s	0.0	0.0	2.1	0.0			0.0	15.5	15.6	0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	2.1	0.0			0.0	15.5	15.6	0.4	0.0	0.0
Prop In Lane	1.00		0.70	1.00			0.00		0.09	1.00		0.04
Lane Grp Cap(c), veh/h	237	0	107	75			0	1400	1448	387	1476	1542
V/C Ratio(X)	0.12	0.00	0.22	0.44			0.00	0.43	0.43	0.07	0.51	0.52
Avail Cap(c_a), veh/h	237	0	337	143			0	1400	1448	445	1476	1542
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	0.64	0.64	0.75	0.75	0.75
Uniform Delay (d), s/veh	58.7	0.0	64.4	70.6			0.0	4.9	4.9	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	1.0	4.0			0.0	0.6	0.6	0.1	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
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.8	1.3			0.0	5.1	5.3	0.1	0.4	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.9	0.0	65.4	74.6			0.0	5.5	5.5	3.8	1.0	0.9
LnGrp LOS	E	A	E	E			A	A	A	A	A	A
Approach Vol, veh/h		51						1214			1583	
Approach Delay, s/veh		61.8						5.5			1.0	
Approach LOS		E						A			A	
Timer - Assigned Phs	1	2	3	4		6	7					
Phs Duration (G+Y+Rc), s	6.2	118.2	6.4	14.1		124.4	20.6					
Change Period (Y+Rc), s	3.5	4.5	3.5	6.0		4.5	3.5					
Max Green Setting (Gmax), s	7.5	81.5	8.5	30.0		92.5	6.5					
Max Q Clear Time (g_c+I1), s	2.4	17.6	2.0	4.1		2.0	2.0					
Green Ext Time (p_c), s	0.0	6.4	0.0	0.0		10.0	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			4.8									
HCM 6th LOS			A									

2043 Live/Work Mitigated

HCM 6th Signalized Intersection Summary
 1: 9th Ave SE/Filbert Dr & 208th St SE / SR 524

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	7	1404	297	141	1448	103	999	300	324	103	69	4
Future Volume (veh/h)	7	1404	297	141	1448	103	999	300	324	103	69	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	1478	238	153	1574	107	1086	326	285	113	76	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	1492	665	128	1509	102	1190	344	301	141	149	6
Arrive On Green	0.02	0.42	0.42	0.04	0.45	0.44	0.34	0.37	0.37	0.05	0.08	0.08
Sat Flow, veh/h	1781	3554	1585	1781	3378	228	3483	920	804	1781	1786	70
Grp Volume(v), veh/h	7	1478	238	153	823	858	1086	0	611	113	0	79
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1829	1742	0	1724	1781	0	1856
Q Serve(g_s), s	0.3	58.6	4.2	6.0	63.3	63.3	42.3	0.0	48.7	7.2	0.0	5.8
Cycle Q Clear(g_c), s	0.3	58.6	4.2	6.0	63.3	63.3	42.3	0.0	48.7	7.2	0.0	5.8
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.47	1.00		0.04
Lane Grp Cap(c), veh/h	79	1492	665	128	794	817	1190	0	645	141	0	155
V/C Ratio(X)	0.09	0.99	0.36	1.19	1.04	1.05	0.91	0.00	0.95	0.80	0.00	0.51
Avail Cap(c_a), veh/h	126	1492	665	128	794	817	1190	0	685	141	0	347
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	35.2	40.8	2.4	36.0	39.2	39.3	44.6	0.0	43.1	65.9	0.0	62.2
Incr Delay (d2), s/veh	0.2	21.0	0.4	141.0	42.1	45.4	10.5	0.0	22.0	25.1	0.0	3.4
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	0.1	29.3	5.0	7.6	36.1	37.9	19.9	0.0	24.5	5.1	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	61.9	2.8	177.0	81.3	84.6	55.1	0.0	65.1	91.0	0.0	65.6
LnGrp LOS	D	E	A	F	F	F	E	A	E	F	A	E
Approach Vol, veh/h		1723			1834			1697				192
Approach Delay, s/veh		53.6			90.8			58.7				80.6
Approach LOS		D			F			E				F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	63.5	52.4	15.8	6.2	67.3	11.2	57.0				
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	5.0	58.5	36.5	26.0	5.0	58.5	6.7	55.8				
Max Q Clear Time (g_c+I1), s	8.0	60.6	44.3	7.8	2.3	65.3	9.2	50.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.8				

Intersection Summary

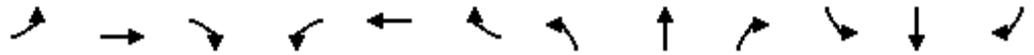
HCM 6th Ctrl Delay	68.7
HCM 6th LOS	E

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

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↕	↗	↖↗	↕	↗	↖↗	↕	↗	↖↗	↕	↗
Traffic Volume (veh/h)	725	604	334	438	625	424	572	1979	698	204	928	332
Future Volume (veh/h)	725	604	334	438	625	424	572	1979	698	204	928	332
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	763	636	0	476	679	0	602	2083	0	219	998	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	927		534	782		600	1995		168	1026	
Arrive On Green	0.19	0.26	0.00	0.26	0.37	0.00	0.06	0.14	0.00	0.05	0.29	0.00
Sat Flow, veh/h	3483	3582	1598	3456	3554	1585	3116	4605	1598	3456	3554	1585
Grp Volume(v), veh/h	763	636	0	476	679	0	602	2083	0	219	998	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	24.0	0.0	19.9	26.6	0.0	28.9	65.0	0.0	7.3	41.7	0.0
Cycle Q Clear(g_c), s	29.0	24.0	0.0	19.9	26.6	0.0	28.9	65.0	0.0	7.3	41.7	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	927		534	782		600	1995		168	1026	
V/C Ratio(X)	1.13	0.69		0.89	0.87		1.00	1.04		1.30	0.97	
Avail Cap(c_a), veh/h	673	927		647	782		600	1995		168	1026	
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	0.65	0.65	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.5	50.1	0.0	54.4	45.4	0.0	70.2	64.3	0.0	71.4	52.8	0.0
Incr Delay (d2), s/veh	77.5	2.1	0.0	8.9	8.6	0.0	37.4	32.7	0.0	172.4	22.1	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	20.0	11.0	0.0	8.6	11.5	0.0	15.2	32.8	0.0	7.2	21.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	138.0	52.2	0.0	63.3	54.1	0.0	107.6	97.0	0.0	243.7	74.9	0.0
LnGrp LOS	F	D		E	D		F	F		F	E	
Approach Vol, veh/h		1399	A		1155	A		2685	A		1217	A
Approach Delay, s/veh		99.0			57.9			99.4			105.3	
Approach LOS		F			E			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.5	69.0	27.2	42.8	33.2	47.3	33.0	37.0				
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	7.0	* 65	* 28	* 34	* 29	42.3	* 29	* 33				
Max Q Clear Time (g_c+I1), s	9.3	67.0	21.9	26.0	30.9	43.7	31.0	28.6				
Green Ext Time (p_c), s	0.0	0.0	1.2	1.9	0.0	0.0	0.0	1.3				

Intersection Summary

HCM 6th Ctrl Delay	93.0
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.

HCM 6th Signalized Intersection Summary

3: SR-527 & 214th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖↗	↑	↖	↖	↑↑↑		↖	↑↑↑	
Traffic Volume (veh/h)	25	300	2	469	673	409	2	2737	192	87	1424	5
Future Volume (veh/h)	25	300	2	469	673	409	2	2737	192	87	1424	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	357	0	601	863	0	2	2881	0	96	1565	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	385	0	415	566		4	2701		71	2933	9
Arrive On Green	0.03	0.21	0.00	0.12	0.30	0.00	0.00	1.00	0.00	0.04	0.56	0.56
Sat Flow, veh/h	1753	1841	0	3483	1885	1598	1795	5316	0	1767	5213	17
Grp Volume(v), veh/h	30	357	0	601	863	0	2	2881	0	96	1014	556
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	28.5	0.0	17.9	45.0	0.0	0.2	78.7	0.0	6.0	28.1	28.1
Cycle Q Clear(g_c), s	2.5	28.5	0.0	17.9	45.0	0.0	0.2	78.7	0.0	6.0	28.1	28.1
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	385	0	415	566		4	2701		71	1900	1042
V/C Ratio(X)	0.60	0.93	0.00	1.45	1.53		0.52	1.07		1.36	0.53	0.53
Avail Cap(c_a), veh/h	70	466	0	415	566		48	2701		71	1900	1042
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	58.2	0.0	66.1	52.5	0.0	74.6	0.0	0.0	72.0	20.5	20.5
Incr Delay (d2), s/veh	11.0	22.2	0.0	214.7	245.6	0.0	9.6	30.9	0.0	229.1	1.1	2.0
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	1.3	15.7	0.0	20.3	59.8	0.0	0.1	7.7	0.0	7.2	10.9	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.0	80.4	0.0	280.8	298.1	0.0	84.2	30.9	0.0	301.1	21.6	22.5
LnGrp LOS	F	F	A	F	F		F	F		F	C	C
Approach Vol, veh/h		387			1464	A		2883	A		1666	
Approach Delay, s/veh		80.6			291.0			31.0			38.0	
Approach LOS		F			F			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	82.7	21.9	35.4	4.3	88.4	8.3	49.0				
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	6.0	76.0	13.0	38.0	4.0	78.0	6.0	45.0				
Max Q Clear Time (g_c+I1), s	8.0	80.7	19.9	30.5	2.2	30.1	4.5	47.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9	0.0	30.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	95.3
HCM 6th LOS	F

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.

HCM 6th Signalized Intersection Summary

5: SR-527 & 220th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	80	399	982	15	865	51	1812	876	580	1741	10
Future Volume (veh/h)	127	80	399	982	15	865	51	1812	876	580	1741	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		0.98	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	144	266	208	1056	0	790	54	1928	0	667	2001	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	171	214	173	873	0	1325	73	1650		558	2324	13
Arrive On Green	0.10	0.12	0.12	0.26	0.00	0.27	0.01	0.11	0.00	0.35	0.95	0.94
Sat Flow, veh/h	1701	1786	1445	3402	0	2967	1661	4761	1478	3222	4886	27
Grp Volume(v), veh/h	144	266	208	1056	0	790	54	1928	0	667	1300	712
Grp Sat Flow(s),veh/h/ln	1701	1786	1445	1701	0	1484	1661	1587	1478	1611	1587	1739
Q Serve(g_s), s	12.5	18.0	18.0	38.5	0.0	6.7	4.9	52.0	0.0	26.0	16.5	16.5
Cycle Q Clear(g_c), s	12.5	18.0	18.0	38.5	0.0	6.7	4.9	52.0	0.0	26.0	16.5	16.5
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	171	214	173	873	0	1325	73	1650		558	1510	827
V/C Ratio(X)	0.84	1.24	1.20	1.21	0.00	0.60	0.73	1.17		1.19	0.86	0.86
Avail Cap(c_a), veh/h	198	214	173	873	0	1325	89	1650		558	1510	827
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	0.31	0.31	0.00	0.33	0.33	0.33
Uniform Delay (d), s/veh	66.3	66.0	66.0	55.8	0.0	15.7	73.0	66.4	0.0	49.0	2.3	2.3
Incr Delay (d2), s/veh	24.1	141.6	132.0	104.9	0.0	0.5	5.7	78.0	0.0	93.6	2.3	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	16.7	13.1	29.3	0.0	7.0	2.2	34.1	0.0	15.9	1.6	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	90.4	207.6	198.0	160.7	0.0	16.2	78.7	144.4	0.0	142.6	4.6	6.5
LnGrp LOS	F	F	F	F	A	B	E	F		F	A	A
Approach Vol, veh/h		618			1846			1982	A		2679	
Approach Delay, s/veh		177.1			98.9			142.6			39.5	
Approach LOS		F			F			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	56.0	42.0	22.0	10.6	75.4	18.6	45.4				
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	25.5	51.5	38.0	17.5	7.5	69.5	17.0	38.5				
Max Q Clear Time (g_c+I1), s	28.0	54.0	40.5	20.0	6.9	18.5	14.5	8.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	24.4	0.1	2.3				

Intersection Summary

HCM 6th Ctrl Delay	95.5
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.

HCM 6th Signalized Intersection Summary
 8: SR-527 & I-405 NB Ramps

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	530	9	998	0	1714	546	0	2565	802
Future Volume (veh/h)	0	0	0	530	9	998	0	1714	546	0	2565	802
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				646	11	0	0	1970	0	0	2948	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	0.41	0.00
Sat Flow, veh/h				1661	28	1502	0	3483	1514	0	3483	1514
Grp Volume(v), veh/h				657	0	0	0	1970	0	0	2948	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)				1.23	0.00		0.00	0.96		0.00	1.43	
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	0.67	0.67
Upstream Filter(I)				1.00	0.00	0.00	0.00	0.40	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	44.5	0.0
Incr Delay (d2), s/veh				119.6	0.0	0.0	0.0	5.8	0.0	0.0	194.0	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
%ile BackOfQ(50%),veh/ln				37.7	0.0	0.0	0.0	1.7	0.0	0.0	94.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				170.9	0.0	0.0	0.0	5.8	0.0	0.0	238.4	0.0
LnGrp LOS				F	A		A	A		A	F	
Approach Vol, veh/h					657	A		1970	A		2948	A
Approach Delay, s/veh					170.9			5.8			238.4	
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		43.6						
Intersection Summary												
HCM 6th Ctrl Delay				148.3								
HCM 6th LOS				F								
Notes												
Unsignalized Delay for [NBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th Signalized Intersection Summary
 9: SR-527 & I-405 SB Ramps

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (veh/h)	570	0	765	0	0	0	0	1662	681	0	2199	665
Future Volume (veh/h)	570	0	765	0	0	0	0	1662	681	0	2199	665
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	588	0	0				0	1787	0	0	2339	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	707	0					0	2400		0	2381	
Arrive On Green	0.22	0.00	0.00				0.00	0.47	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	588	0	0				0	1787	0	0	2339	0
Grp Sat Flow(s),veh/h/ln	1637	0	1502				0	1697	1514	0	1683	1502
Q Serve(g_s), s	25.7	0.0	0.0				0.0	64.2	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	25.7	0.0	0.0				0.0	64.2	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	707	0					0	2400		0	2381	
V/C Ratio(X)	0.83	0.00					0.00	0.74		0.00	0.98	
Avail Cap(c_a), veh/h	1275	0					0	2400		0	2381	
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	0.09	0.00
Uniform Delay (d), s/veh	56.2	0.0	0.0				0.0	28.4	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.7	0.0	0.0				0.0	0.2	0.0	0.0	2.8	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	11.0	0.0	0.0				0.0	27.0	0.0	0.0	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.9	0.0	0.0				0.0	28.6	0.0	0.0	2.8	0.0
LnGrp LOS	E	A					A	C		A	A	
Approach Vol, veh/h		588	A					1787	A		2339	A
Approach Delay, s/veh		59.9						28.6			2.8	
Approach LOS		E						C			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		112.0				112.0		38.0				
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				66.2		27.7				
Green Ext Time (p_c), s		55.7				11.1		4.7				

Intersection Summary

HCM 6th Ctrl Delay	19.7
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

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕		↖	↖			↕			↕	↗
Traffic Volume (veh/h)	73	626	0	0	991	190	0	0	0	200	0	27
Future Volume (veh/h)	73	626	0	0	991	190	0	0	0	200	0	27
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	673	0	0	1077	207	0	0	0	225	0	30
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	172	2875	0	631	1158	223	0	1	0	251	0	221
Arrive On Green	0.03	0.81	0.00	0.00	0.76	0.76	0.00	0.00	0.00	0.14	0.00	0.14
Sat Flow, veh/h	1781	3647	0	1781	1524	293	0	1870	0	1781	0	1567
Grp Volume(v), veh/h	78	673	0	0	0	1284	0	0	0	225	0	30
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1781	0	1817	0	1870	0	1781	0	1567
Q Serve(g_s), s	1.4	6.7	0.0	0.0	0.0	86.7	0.0	0.0	0.0	18.6	0.0	2.5
Cycle Q Clear(g_c), s	1.4	6.7	0.0	0.0	0.0	86.7	0.0	0.0	0.0	18.6	0.0	2.5
Prop In Lane	1.00		0.00	1.00		0.16	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	2875	0	631	0	1381	0	1	0	251	0	221
V/C Ratio(X)	0.45	0.23	0.00	0.00	0.00	0.93	0.00	0.00	0.00	0.90	0.00	0.14
Avail Cap(c_a), veh/h	204	2875	0	683	0	1381	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	35.2	3.4	0.0	0.0	0.0	14.7	0.0	0.0	0.0	63.3	0.0	56.4
Incr Delay (d2), s/veh	1.9	0.2	0.0	0.0	0.0	12.4	0.0	0.0	0.0	25.6	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	2.2	2.2	0.0	0.0	0.0	36.0	0.0	0.0	0.0	10.3	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	3.6	0.0	0.0	0.0	27.1	0.0	0.0	0.0	88.9	0.0	56.7
LnGrp LOS	D	A	A	A	A	C	A	A	A	F	A	E
Approach Vol, veh/h		751			1284			0				255
Approach Delay, s/veh		7.0			27.1			0.0				85.1
Approach LOS		A			C							F
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	125.3		24.7	7.3	118.0		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	8.7		20.6	3.4	88.7		0.0				
Green Ext Time (p_c), s	0.0	5.7		0.5	0.0	0.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay												27.0
HCM 6th LOS												C

HCM 6th Signalized Intersection Summary

11: Meridian Ave & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↗	↗	↗	↘	↘
Traffic Volume (veh/h)	9	621	153	218	881	252	237	177	221	125	63	12
Future Volume (veh/h)	9	621	153	218	881	252	237	177	221	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	668	145	234	947	248	252	188	235	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	459	790	171	657	1040	272	363	263	221	273	190	36
Arrive On Green	0.20	0.27	0.27	0.30	0.37	0.37	0.09	0.14	0.14	0.07	0.12	0.13
Sat Flow, veh/h	1795	2926	634	1795	2809	734	1795	1885	1587	1795	1539	291
Grp Volume(v), veh/h	10	409	404	234	603	592	252	188	235	147	0	88
Grp Sat Flow(s),veh/h/ln	1795	1791	1770	1795	1791	1752	1795	1885	1587	1795	0	1830
Q Serve(g_s), s	0.0	16.2	16.2	2.4	24.0	24.1	6.8	7.1	5.6	5.4	0.0	3.3
Cycle Q Clear(g_c), s	0.0	16.2	16.2	2.4	24.0	24.1	6.8	7.1	5.6	5.4	0.0	3.3
Prop In Lane	1.00		0.36	1.00		0.42	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	459	483	478	657	663	649	363	263	221	273	0	226
V/C Ratio(X)	0.02	0.85	0.85	0.36	0.91	0.91	0.69	0.71	1.06	0.54	0.00	0.39
Avail Cap(c_a), veh/h	459	518	512	657	673	659	363	545	459	273	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	23.9	25.9	25.9	18.4	22.4	22.5	28.1	30.8	9.4	26.5	0.0	30.2
Incr Delay (d2), s/veh	0.0	16.4	16.7	0.3	18.7	19.4	5.6	3.6	46.9	2.1	0.0	1.1
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	8.7	8.7	2.8	12.8	12.7	1.5	3.4	6.5	2.4	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.9	42.3	42.7	18.7	41.1	41.9	33.8	34.4	56.3	28.6	0.0	31.3
LnGrp LOS	C	D	D	B	D	D	C	C	F	C	A	C
Approach Vol, veh/h		823			1429			675				235
Approach Delay, s/veh		42.3			37.8			41.8				29.6
Approach LOS		D			D			D				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.7	24.2	10.8	13.3	19.2	31.8	9.6	14.5				
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	10.5	21.7	7.3	21.0	4.0	28.2	6.1	22.2				
Max Q Clear Time (g_c+I1), s	4.4	18.2	8.8	5.3	2.0	26.1	7.4	9.1				
Green Ext Time (p_c), s	0.4	2.0	0.0	0.2	0.0	1.7	0.0	1.5				
Intersection Summary												
HCM 6th Ctrl Delay												39.2
HCM 6th LOS												D

HCM 6th Signalized Intersection Summary

12: 4th Ct SE/4th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1092	3	3	1280	179	1	0	1	51	0	8
Future Volume (veh/h)	20	1092	3	3	1280	179	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	1300	4	3	1376	186	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	261	1360	4	324	2691	360	145	0	0	128	0	0
Arrive On Green	0.01	0.73	0.73	0.13	0.85	0.85	0.06	0.00	0.00	0.06	0.00	0.00
Sat Flow, veh/h	1781	1864	6	1795	3165	424	1722	0	0	1421	0	0
Grp Volume(v), veh/h	24	0	1304	3	773	789	1	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1869	1795	1791	1798	1723	0	0	1421	0	0
Q Serve(g_s), s	0.6	0.0	93.6	0.0	17.1	17.5	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear(g_c), s	0.6	0.0	93.6	0.0	17.1	17.5	0.1	0.0	0.0	6.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.24	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	261	0	1364	324	1523	1529	145	0	0	128	0	0
V/C Ratio(X)	0.09	0.00	0.96	0.01	0.51	0.52	0.01	0.00	0.00	0.48	0.00	0.00
Avail Cap(c_a), veh/h	296	0	1408	324	1523	1529	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	7.5	0.0	18.1	45.2	3.0	3.0	66.8	0.0	0.0	69.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	15.9	0.0	1.2	1.2	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	42.2	0.1	5.1	5.2	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	34.1	45.2	4.2	4.2	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		1328			1565			1			62	
Approach Delay, s/veh		33.6			4.3			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	24.6	113.9		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	95.6		8.5	2.6	19.5		2.1				
Green Ext Time (p_c), s	0.0	14.3		0.1	0.0	20.9		0.0				

Intersection Summary

HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

13: 228th St SE & 9th Ave SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑		↖	↑↑		↖	↑		↗	↑	↗
Traffic Volume (veh/h)	395	805	2	123	1055	719	17	75	82	293	78	350
Future Volume (veh/h)	395	805	2	123	1055	719	17	75	82	293	78	350
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		0.98
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	465	947	2	134	1122	681	18	82	56	209	259	153
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	353	2334	5	435	1139	636	56	103	71	170	310	256
Arrive On Green	0.17	0.64	0.63	0.02	0.17	0.17	0.03	0.10	0.10	0.09	0.17	0.16
Sat Flow, veh/h	1795	3667	8	1781	2212	1234	1781	1032	704	1795	1870	1568
Grp Volume(v), veh/h	465	463	486	134	897	906	18	0	138	209	259	153
Grp Sat Flow(s),veh/h/ln	1795	1791	1884	1781	1805	1641	1781	0	1736	1795	1870	1568
Q Serve(g_s), s	25.5	19.0	19.0	5.2	74.0	77.3	1.5	0.0	11.7	14.2	20.1	11.8
Cycle Q Clear(g_c), s	25.5	19.0	19.0	5.2	74.0	77.3	1.5	0.0	11.7	14.2	20.1	11.8
Prop In Lane	1.00		0.00	1.00		0.75	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	353	1140	1199	435	930	845	56	0	174	170	310	256
V/C Ratio(X)	1.32	0.41	0.41	0.31	0.97	1.07	0.32	0.00	0.79	1.23	0.84	0.60
Avail Cap(c_a), veh/h	353	1140	1199	469	930	845	56	0	301	170	454	377
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	13.4	13.4	16.1	60.9	62.3	71.1	0.0	66.0	67.9	60.6	44.3
Incr Delay (d2), s/veh	161.1	1.1	1.0	0.0	3.9	34.8	3.3	0.0	10.9	144.0	10.6	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	29.3	8.0	8.4	2.3	37.1	42.4	0.7	0.0	5.7	13.3	10.5	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	215.5	14.4	14.4	16.1	64.8	97.1	74.3	0.0	76.9	211.9	71.2	47.4
LnGrp LOS	F	B	B	B	E	F	E	A	E	F	E	D
Approach Vol, veh/h		1414			1937			156			621	
Approach Delay, s/veh		80.5			76.5			76.6			112.7	
Approach LOS		F			E			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	99.7	19.0	19.5	30.0	81.5	9.2	29.3				
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	10.2	81.3	14.5	26.0	25.5	66.0	4.1	36.4				
Max Q Clear Time (g_c+I1), s	7.2	21.0	16.2	13.7	27.5	79.3	3.5	22.1				
Green Ext Time (p_c), s	0.1	7.8	0.0	0.7	0.0	0.0	0.0	2.6				

Intersection Summary

HCM 6th Ctrl Delay	83.3
HCM 6th LOS	F

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary

14: SR-527 & 228th St SE

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			 		 	  		 	 	
Traffic Volume (veh/h)	517	391	225	288	672	533	500	988	177	559	1125	864
Future Volume (veh/h)	517	391	225	288	672	533	500	988	177	559	1125	864
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	528	399	230	306	715	441	515	1019	157	665	1339	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	636	707	402	335	837	565	323	1136	175	437	1027	
Arrive On Green	0.09	0.11	0.11	0.31	0.39	0.39	0.09	0.25	0.25	0.08	0.19	0.00
Sat Flow, veh/h	2273	2166	1231	1795	3582	1561	3456	4459	686	3483	3582	1598
Grp Volume(v), veh/h	528	326	303	306	715	441	515	777	399	665	1339	0
Grp Sat Flow(s),veh/h/ln	1137	1777	1620	1795	1791	1561	1728	1702	1741	1742	1791	1598
Q Serve(g_s), s	34.2	26.2	26.7	24.6	27.4	12.5	14.0	33.1	33.2	18.8	43.0	0.0
Cycle Q Clear(g_c), s	34.2	26.2	26.7	24.6	27.4	12.5	14.0	33.1	33.2	18.8	43.0	0.0
Prop In Lane	1.00		0.76	1.00		1.00	1.00		0.39	1.00		1.00
Lane Grp Cap(c), veh/h	636	580	529	335	837	565	323	867	443	437	1027	
V/C Ratio(X)	0.83	0.56	0.57	0.91	0.85	0.78	1.60	0.90	0.90	1.52	1.30	
Avail Cap(c_a), veh/h	636	580	529	458	979	627	323	908	464	437	1027	
HCM Platoon Ratio	0.33	0.33	0.33	1.67	1.67	1.67	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	0.81	0.81	0.81	0.70	0.70	0.70	1.00	1.00	1.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	64.6	56.7	57.0	50.4	43.4	31.7	68.0	54.0	54.1	68.7	60.6	0.0
Incr Delay (d2), s/veh	7.7	3.2	3.6	13.8	7.9	7.4	282.7	11.4	19.9	236.6	137.5	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	11.2	13.1	12.2	11.5	11.9	3.5	18.7	15.2	16.7	22.9	39.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.3	59.9	60.6	64.3	51.2	39.1	350.7	65.4	74.1	305.3	198.1	0.0
LnGrp LOS	E	E	E	E	D	D	F	E	E	F	F	
Approach Vol, veh/h		1157			1462			1691			2004	A
Approach Delay, s/veh		65.7			50.3			154.4			233.7	
Approach LOS		E			D			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	42.2	32.0	53.0	18.0	47.0	45.9	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	16.5	39.5	37.8	38.2	13.5	42.5	35.5	40.5				
Max Q Clear Time (g_c+I1), s	20.8	35.2	26.6	28.7	16.0	45.0	36.2	29.4				
Green Ext Time (p_c), s	0.0	2.5	0.9	2.0	0.0	0.0	0.0	4.5				

Intersection Summary

HCM 6th Ctrl Delay	139.2
HCM 6th LOS	F

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

15: 15th Ave SE & 228th St SE

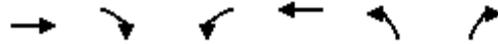
11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	100	861	101	106	1131	194	104	24	41	213	60	187
Future Volume (veh/h)	100	861	101	106	1131	194	104	24	41	213	60	187
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	105	906	98	112	1191	180	116	27	4	229	65	77
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	300	2187	237	495	2105	316	230	129	19	347	104	124
Arrive On Green	0.07	1.00	1.00	0.04	0.68	0.67	0.06	0.08	0.08	0.12	0.13	0.13
Sat Flow, veh/h	1781	3231	349	1795	3108	467	1810	1608	238	1810	782	926
Grp Volume(v), veh/h	105	498	506	112	684	687	116	0	31	229	0	142
Grp Sat Flow(s),veh/h/ln	1781	1777	1803	1795	1791	1784	1810	0	1846	1810	0	1708
Q Serve(g_s), s	2.8	0.0	0.0	2.9	29.9	30.4	8.8	0.0	2.4	17.2	0.0	11.8
Cycle Q Clear(g_c), s	2.8	0.0	0.0	2.9	29.9	30.4	8.8	0.0	2.4	17.2	0.0	11.8
Prop In Lane	1.00		0.19	1.00		0.26	1.00		0.13	1.00		0.54
Lane Grp Cap(c), veh/h	300	1203	1221	495	1213	1208	230	0	148	347	0	228
V/C Ratio(X)	0.35	0.41	0.41	0.23	0.56	0.57	0.50	0.00	0.21	0.66	0.00	0.62
Avail Cap(c_a), veh/h	384	1203	1221	544	1213	1208	230	0	345	347	0	410
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	0.74	0.74	0.74	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.3	0.0	0.0	6.6	12.6	12.8	58.8	0.0	64.6	53.6	0.0	61.5
Incr Delay (d2), s/veh	0.1	0.1	0.1	0.2	1.4	1.4	1.7	0.0	0.7	4.5	0.0	2.8
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	1.0	0.0	0.0	1.1	12.2	12.3	4.2	0.0	1.1	8.3	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.4	0.1	0.1	6.8	14.0	14.2	60.6	0.0	65.2	58.2	0.0	64.3
LnGrp LOS	B	A	A	A	B	B	E	A	E	E	A	E
Approach Vol, veh/h		1109			1483			147				371
Approach Delay, s/veh		1.1			13.6			61.6				60.5
Approach LOS		A			B			E				E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	105.0	13.0	23.0	8.9	105.1	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	9.0	81.0	9.0	35.5	12.0	78.0	17.0	27.5				
Max Q Clear Time (g_c+I1), s	4.9	2.0	10.8	13.8	4.8	32.4	19.2	4.4				
Green Ext Time (p_c), s	0.1	8.8	0.0	0.5	0.2	14.3	0.0	0.1				
Intersection Summary												
HCM 6th Ctrl Delay				17.0								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
 16: 19th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (veh/h)	842	281	450	1124	375	517
Future Volume (veh/h)	842	281	450	1124	375	517
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	905	302	469	1171	463	638
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	989	329	506	2268	519	462
Arrive On Green	0.37	0.37	0.23	0.63	0.29	0.29
Sat Flow, veh/h	2731	877	1795	3676	1795	1598
Grp Volume(v), veh/h	614	593	469	1171	463	638
Grp Sat Flow(s),veh/h/ln	1791	1723	1795	1791	1795	1598
Q Serve(g_s), s	29.3	29.5	17.8	16.0	22.2	26.0
Cycle Q Clear(g_c), s	29.3	29.5	17.8	16.0	22.2	26.0
Prop In Lane		0.51	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	671	646	506	2269	519	462
V/C Ratio(X)	0.91	0.92	0.93	0.52	0.89	1.38
Avail Cap(c_a), veh/h	671	646	507	2269	519	462
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.8	26.8	24.5	9.0	30.7	32.0
Incr Delay (d2), s/veh	16.9	17.9	23.0	0.8	18.5	185.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	14.8	12.8	5.7	11.9	33.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	43.6	44.8	47.5	9.8	49.1	217.2
LnGrp LOS	D	D	D	A	D	F
Approach Vol, veh/h	1207			1640	1101	
Approach Delay, s/veh	44.2			20.6	146.5	
Approach LOS	D			C	F	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	23.3	37.7			61.0	29.0
Change Period (Y+Rc), s	3.5	4.5			4.5	3.5
Max Green Setting (Gmax), s	19.8	33.2			56.5	25.5
Max Q Clear Time (g_c+I1), s	19.8	31.5			18.0	28.0
Green Ext Time (p_c), s	0.0	1.2			11.5	0.0
Intersection Summary						
HCM 6th Ctrl Delay			62.9			
HCM 6th LOS			E			

HCM Signalized Intersection Capacity Analysis
 17: Fitzgerald Rd/27th Ave SE & 228th St SE

11/26/2019



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	1069	241	295	1229	317	89
Future Volume (vph)	1069	241	295	1229	317	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		3.0	4.0	3.0	3.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3460		1770	3539	1805	1591
Flt Permitted	1.00		0.07	1.00	0.95	1.00
Satd. Flow (perm)	3460		123	3539	1805	1591
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.85	0.85
Adj. Flow (vph)	1149	259	324	1351	373	105
RTOR Reduction (vph)	11	0	0	0	0	74
Lane Group Flow (vph)	1397	0	324	1351	373	31
Confl. Peds. (#/hr)		1	1		23	
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Actuated Green, G (s)	72.8		99.5	98.5	31.5	31.5
Effective Green, g (s)	73.3		100.0	99.0	32.0	32.0
Actuated g/C Ratio	0.49		0.67	0.66	0.21	0.21
Clearance Time (s)	4.0		3.5	4.5	3.5	3.5
Vehicle Extension (s)	4.0		3.0	4.0	3.0	3.0
Lane Grp Cap (vph)	1690		336	2335	385	339
v/s Ratio Prot	0.40		c0.15	0.38	c0.21	
v/s Ratio Perm			c0.49			0.02
v/c Ratio	0.83		0.96	0.58	0.97	0.09
Uniform Delay, d1	32.9		49.6	14.0	58.5	47.3
Progression Factor	1.00		0.91	0.76	1.00	1.00
Incremental Delay, d2	4.8		28.2	0.6	37.2	0.1
Delay (s)	37.7		73.2	11.3	95.7	47.5
Level of Service	D		E	B	F	D
Approach Delay (s)	37.7			23.2	85.1	
Approach LOS	D			C	F	

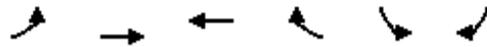
Intersection Summary

HCM 2000 Control Delay	37.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: 228th St SE & 29th Ave SE

11/26/2019



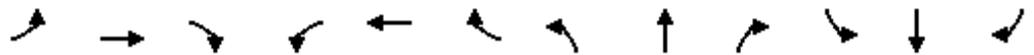
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	355	817	790	224	482	841
Future Volume (vph)	355	817	790	224	482	841
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.5		3.5	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		0.93	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	3439		3274	1441
Flt Permitted	0.95	1.00	1.00		0.97	1.00
Satd. Flow (perm)	1770	3539	3439		3274	1441
Peak-hour factor, PHF	0.94	0.94	0.96	0.96	0.90	0.90
Adj. Flow (vph)	378	869	823	233	536	934
RTOR Reduction (vph)	0	0	34	0	213	20
Lane Group Flow (vph)	378	869	1022	0	790	447
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Turn Type	Prot	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases						4
Actuated Green, G (s)	17.1	47.3	25.7		20.2	37.3
Effective Green, g (s)	17.1	47.3	25.7		20.2	37.3
Actuated g/C Ratio	0.23	0.63	0.34		0.27	0.50
Clearance Time (s)	4.0	4.0	4.5		3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	403	2231	1178		881	716
v/s Ratio Prot	c0.21	0.25	c0.30		c0.24	0.14
v/s Ratio Perm						0.17
v/c Ratio	0.94	0.39	0.87		0.90	0.62
Uniform Delay, d1	28.4	6.8	23.1		26.4	13.7
Progression Factor	1.36	1.36	0.31		1.00	1.00
Incremental Delay, d2	21.5	0.3	5.9		11.7	1.7
Delay (s)	60.1	9.5	13.0		38.1	15.5
Level of Service	E	A	B		D	B
Approach Delay (s)		24.9	13.0		30.9	
Approach LOS		C	B		C	
Intersection Summary						
HCM 2000 Control Delay			23.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			75.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			81.7%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

HCM 6th Signalized Intersection Summary

19: 31st Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗		↘	↗			↕			↗	↘
Traffic Volume (veh/h)	307	1027	1	1	837	200	1	0	1	260	0	230
Future Volume (veh/h)	307	1027	1	1	837	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	353	1180	1	1	920	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	586	1600	1	448	1035	208	147	0	0	440	0	320
Arrive On Green	0.18	0.30	0.30	0.19	0.36	0.36	0.20	0.00	0.00	0.20	0.00	0.20
Sat Flow, veh/h	1767	3615	3	1739	2877	578	256	0	0	1730	0	1610
Grp Volume(v), veh/h	353	575	606	1	554	551	2	0	0	292	0	258
Grp Sat Flow(s),veh/h/ln	1767	1763	1855	1739	1735	1721	256	0	0	1730	0	1610
Q Serve(g_s), s	8.7	22.0	22.0	0.0	22.6	22.6	0.1	0.0	0.0	0.0	0.0	11.5
Cycle Q Clear(g_c), s	8.7	22.0	22.0	0.0	22.6	22.6	11.7	0.0	0.0	11.6	0.0	11.5
Prop In Lane	1.00		0.00	1.00		0.34	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	586	780	821	448	624	619	147	0	0	440	0	320
V/C Ratio(X)	0.60	0.74	0.74	0.00	0.89	0.89	0.01	0.00	0.00	0.66	0.00	0.81
Avail Cap(c_a), veh/h	586	858	903	448	636	631	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)	0.69	0.69	0.69	0.93	0.93	0.93	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.6	22.5	22.5	21.1	22.6	22.6	34.3	0.0	0.0	28.7	0.0	28.7
Incr Delay (d2), s/veh	1.2	4.3	4.1	0.0	15.5	15.7	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	5.8	10.3	10.8	0.0	11.2	11.2	0.0	0.0	0.0	5.1	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.8	26.8	26.6	21.1	38.1	38.3	34.3	0.0	0.0	31.0	0.0	36.7
LnGrp LOS	C	C	C	C	D	D	C	A	A	C	A	D
Approach Vol, veh/h		1534			1106			2				550
Approach Delay, s/veh		26.5			38.2			34.3				33.6
Approach LOS		C			D			C				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	18.4	37.7		18.9	24.6	31.5		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	14.5	27.5		20.0				
Max Q Clear Time (g_c+I1), s	2.0	24.0		13.6	10.7	24.6		13.7				
Green Ext Time (p_c), s	0.0	9.2		1.4	0.5	2.4		0.0				

Intersection Summary

HCM 6th Ctrl Delay	31.8
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

20: 35th Ave SE & 228th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↖	↗		↖	↗
Traffic Volume (veh/h)	1	909	360	220	767	0	280	1	420	0	2	1
Future Volume (veh/h)	1	909	360	220	767	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	1069	369	253	882	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	295	1080	368	522	2441	0	345	1	308	0	6	4
Arrive On Green	0.00	0.84	0.84	0.54	1.00	0.00	0.20	0.20	0.20	0.00	0.01	0.01
Sat Flow, veh/h	1767	2580	879	1767	3618	0	1762	6	1572	0	418	354
Grp Volume(v), veh/h	1	726	712	253	882	0	312	0	195	0	8	4
Grp Sat Flow(s),veh/h/ln	1767	1763	1696	1767	1763	0	1767	0	1572	0	418	354
Q Serve(g_s), s	0.1	56.9	62.8	8.3	0.0	0.0	25.9	0.0	17.1	0.0	2.1	1.6
Cycle Q Clear(g_c), s	0.1	56.9	62.8	8.3	0.0	0.0	25.9	0.0	17.1	0.0	2.1	1.6
Prop In Lane	1.00		0.52	1.00		0.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	295	738	710	522	2441	0	346	0	308	0	6	4
V/C Ratio(X)	0.00	0.98	1.00	0.48	0.36	0.00	0.90	0.00	0.63	0.00	1.35	1.04
Avail Cap(c_a), veh/h	337	738	710	522	2441	0	409	0	364	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)	0.82	0.82	0.82	0.40	0.40	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	26.3	11.7	11.9	26.6	0.0	0.0	58.9	0.0	55.4	0.0	73.9	74.2
Incr Delay (d2), s/veh	0.0	26.2	31.3	0.1	0.0	0.0	19.8	0.0	2.2	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	10.3	10.9	4.7	0.0	0.0	13.5	0.0	7.0	0.0	0.6	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.3	38.0	43.3	26.7	0.0	0.0	78.7	0.0	57.6	0.0	297.6	216.6
LnGrp LOS	C	D	F	C	A	A	E	A	E	A	F	F
Approach Vol, veh/h		1439			1135			507			12	
Approach Delay, s/veh		40.6			6.0			70.6			270.6	
Approach LOS		D			A			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	44.7	67.8		5.1	3.7	108.8		32.4				
Change Period (Y+Rc), s	4.5	* 4.5		3.5	3.5	4.5		3.5				
Max Green Setting (Gmax), s	17.5	* 63		20.0	4.1	76.7		34.2				
Max Q Clear Time (g_c+I1), s	10.3	64.8		4.1	2.1	2.0		27.9				
Green Ext Time (p_c), s	0.3	0.0		0.0	0.0	5.0		1.0				

Intersection Summary

HCM 6th Ctrl Delay	33.7
HCM 6th LOS	C

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.

HCM 6th Signalized Intersection Summary
 21: 228th St SE & 39th Ave SE

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖ ↗	↑	↔		↖	↗
Traffic Volume (veh/h)	615	709	697	133	88	340
Future Volume (veh/h)	615	709	697	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	771	820	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	1117	1643	854	157	130	116
Arrive On Green	0.57	1.00	0.56	0.56	0.08	0.00
Sat Flow, veh/h	3483	1885	1519	280	1739	1547
Grp Volume(v), veh/h	668	771	0	971	107	0
Grp Sat Flow(s),veh/h/ln	1742	1885	0	1798	1739	1547
Q Serve(g_s), s	11.1	0.0	0.0	77.1	9.1	0.0
Cycle Q Clear(g_c), s	11.1	0.0	0.0	77.1	9.1	0.0
Prop In Lane	1.00			0.16	1.00	1.00
Lane Grp Cap(c), veh/h	1117	1643	0	1011	130	116
V/C Ratio(X)	0.60	0.47	0.00	0.96	0.82	0.00
Avail Cap(c_a), veh/h	1117	1643	0	1055	267	237
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.5	0.0	0.0	31.3	68.4	0.0
Incr Delay (d2), s/veh	0.4	0.5	0.0	20.3	14.0	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	5.9	0.2	0.0	38.1	4.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	25.0	0.5	0.0	51.6	82.4	0.0
LnGrp LOS	C	A	A	D	F	A
Approach Vol, veh/h		1439	971		107	
Approach Delay, s/veh		11.8	51.6		82.4	
Approach LOS		B	D		F	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		134.7		15.3	46.4	88.3
Change Period (Y+Rc), s		4.5		4.0	4.5	4.5
Max Green Setting (Gmax), s		118.5		23.0	26.5	87.5
Max Q Clear Time (g_c+I1), s		2.0		11.1	13.1	79.1
Green Ext Time (p_c), s		0.7		0.3	2.8	4.7

Intersection Summary

HCM 6th Ctrl Delay	30.2
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 25: SR-527 & 240th St SE

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖		↖	↖↗		↖	↖↗	
Traffic Volume (veh/h)	485	2	160	2	2	6	260	1636	2	5	1181	482
Future Volume (veh/h)	485	2	160	2	2	6	260	1636	2	5	1181	482
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	607	0	0	2	2	-2	271	1704	2	5	1327	542
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	481	0	214	3	3	208	290	2019	2	344	1494	572
Arrive On Green	0.13	0.00	0.00	0.00	0.00	0.00	0.16	0.55	0.55	0.19	0.59	0.59
Sat Flow, veh/h	3591	0	1598	1781	1870	0	1795	3671	4	1781	2516	962
Grp Volume(v), veh/h	607	0	0	2	0	0	271	831	875	5	919	950
Grp Sat Flow(s),veh/h/ln	1795	0	1598	1781	1870	0	1795	1791	1884	1781	1791	1687
Q Serve(g_s), s	19.5	0.0	0.0	0.2	0.0	0.0	21.7	56.7	56.7	0.3	62.2	76.1
Cycle Q Clear(g_c), s	19.5	0.0	0.0	0.2	0.0	0.0	21.7	56.7	56.7	0.3	62.2	76.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.57
Lane Grp Cap(c), veh/h	481	0	214	3	3	0	290	985	1037	344	1064	1002
V/C Ratio(X)	1.26	0.00	0.00	0.70	0.00	0.00	0.93	0.84	0.84	0.01	0.86	0.95
Avail Cap(c_a), veh/h	481	0	214	37	39	0	290	1283	1350	344	1086	1023
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	63.0	0.0	0.0	72.6	0.0	0.0	60.2	27.5	27.5	47.5	24.6	27.4
Incr Delay (d2), s/veh	133.2	0.0	0.0	75.8	0.0	0.0	35.3	4.9	4.7	0.0	7.5	17.1
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	17.8	0.0	0.0	0.1	0.0	0.0	12.5	24.0	25.2	0.1	26.4	32.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	196.2	0.0	0.0	148.3	0.0	0.0	95.5	32.3	32.1	47.5	32.1	44.5
LnGrp LOS	F	A	A	F	A	A	F	C	C	D	C	D
Approach Vol, veh/h		607			2			1977				1874
Approach Delay, s/veh		196.2			148.3			40.9				38.4
Approach LOS		F			F			D				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	33.4	84.8		23.0	27.0	91.2		4.2				
Change Period (Y+Rc), s	5.3	* 5.3		4.0	4.0	5.3		4.0				
Max Green Setting (Gmax), s	6.5	* 1E2		19.0	23.0	87.7		3.0				
Max Q Clear Time (g_c+I1), s	2.3	58.7		21.5	23.7	78.1		2.2				
Green Ext Time (p_c), s	0.0	20.8		0.0	0.0	7.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay	61.0
HCM 6th LOS	E

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- * HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

34: SR-527 & 211th St

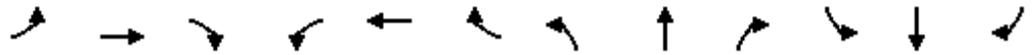
11/26/2019



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+11), 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

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	230	130	160	310	211	130	1719	150	140	1162	139
Future Volume (veh/h)	107	230	130	160	310	211	130	1719	150	140	1162	139
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	116	250	24	178	344	211	137	1809	96	144	1198	143
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	329	202	200	1789	793	148	1589	189
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	1084	665	1781	3554	1576	1767	3170	377
Grp Volume(v), veh/h	116	250	24	178	0	555	137	1809	96	144	664	677
Grp Sat Flow(s),veh/h/ln	1795	1885	1559	1795	0	1749	1781	1777	1576	1767	1763	1785
Q Serve(g_s), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	8.1	45.3	45.7
Cycle Q Clear(g_c), s	6.5	17.0	1.7	10.6	0.0	45.5	6.3	75.5	3.5	8.1	45.3	45.7
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	126	489	404	367	0	530	200	1789	793	148	883	894
V/C Ratio(X)	0.92	0.51	0.06	0.49	0.00	1.05	0.68	1.01	0.12	0.97	0.75	0.76
Avail Cap(c_a), veh/h	126	489	404	384	0	530	220	1789	793	148	883	894
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	46.7	47.4	41.8	35.5	0.0	52.3	32.0	37.3	10.1	69.2	30.0	30.1
Incr Delay (d2), s/veh	55.9	0.4	0.0	0.4	0.0	51.7	5.7	24.1	0.3	65.0	5.9	5.9
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	5.2	8.1	0.7	4.7	0.0	27.5	3.0	37.6	1.9	8.2	20.3	20.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	102.6	47.8	41.8	35.9	0.0	103.9	37.7	61.4	10.4	134.2	35.8	36.0
LnGrp LOS	F	D	D	D	A	F	D	F	B	F	D	D
Approach Vol, veh/h		390			733			2042			1485	
Approach Delay, s/veh		63.8			87.4			57.4			45.5	
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	12.3	78.7	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	10.0	73.0	6.0	45.0				
Max Q Clear Time (g_c+I1), s	10.1	77.5	12.6	19.0	8.3	47.7	8.5	47.5				
Green Ext Time (p_c), s	0.0	0.0	0.1	0.5	0.0	6.9	0.0	0.0				

Intersection Summary

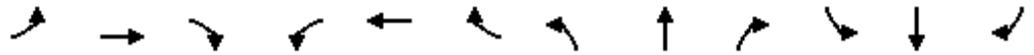
HCM 6th Ctrl Delay	58.8
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
 40: SR-527 & NE 185th St

11/26/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (veh/h)	126	150	10	95	260	240	13	1267	60	230	1042	131
Future Volume (veh/h)	126	150	10	95	260	240	13	1267	60	230	1042	131
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	137	163	9	112	283	247	14	1424	64	237	1074	134
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	208	1476	66	243	1621	202
Arrive On Green	0.05	0.32	0.32	0.04	0.31	0.31	0.02	0.42	0.42	0.10	0.50	0.50
Sat Flow, veh/h	1781	1756	97	1795	912	796	1781	3487	156	1810	3222	401
Grp Volume(v), veh/h	137	0	172	112	0	530	14	730	758	237	601	607
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1795	0	1708	1781	1791	1853	1810	1805	1818
Q Serve(g_s), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	59.5	60.0	14.9	37.2	37.4
Cycle Q Clear(g_c), s	7.5	0.0	10.4	5.5	0.0	46.0	0.7	59.5	60.0	14.9	37.2	37.4
Prop In Lane	1.00		0.05	1.00		0.47	1.00		0.08	1.00		0.22
Lane Grp Cap(c), veh/h	137	0	593	420	0	524	208	758	784	243	908	915
V/C Ratio(X)	1.00	0.00	0.29	0.27	0.00	1.01	0.07	0.96	0.97	0.97	0.66	0.66
Avail Cap(c_a), veh/h	137	0	593	420	0	524	266	758	784	243	908	915
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	0.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.3	0.0	38.2	35.8	0.0	52.0	25.3	42.1	42.2	48.7	27.8	27.8
Incr Delay (d2), s/veh	76.7	0.0	0.1	0.3	0.0	42.3	0.1	21.8	22.1	50.0	3.8	3.8
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	6.4	0.0	4.8	0.5	0.0	25.8	0.3	30.3	31.7	12.4	16.8	17.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	119.1	0.0	38.3	36.1	0.0	94.3	25.5	63.9	64.4	98.7	31.5	31.6
LnGrp LOS	F	A	D	D	A	F	C	E	E	F	C	C
Approach Vol, veh/h		309			642			1502			1445	
Approach Delay, s/veh		74.1			84.1			63.8			42.6	
Approach LOS		E			F			E			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	16.9	62.0	7.5	12.4	2.7	39.4	9.5	48.0				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.6	0.0	3.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	60.1
HCM 6th LOS	E

HCM 6th Signalized Intersection Summary

43: SR-527 & NE 183rd St

11/26/2019



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	1047	220	0	1082	25
Future Volume (veh/h)	75	100	5	130	45	200	0	1047	220	0	1082	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	1114	217	0	1258	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	2100	407	0	2517	56
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	3082	579	0	3676	80
Grp Volume(v), veh/h	91	0	124	149	0	195	0	666	665	0	629	657
Grp Sat Flow(s),veh/h/ln	1810	0	1891	1781	0	1571	0	1791	1776	0	1791	1870
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	24.1	24.1
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	24.1	24.1
Prop In Lane	1.00		0.02	1.00		0.73	0.00		0.33	0.00		0.04
Lane Grp Cap(c), veh/h	170	0	217	258	0	227	0	1259	1249	0	1259	1315
V/C Ratio(X)	0.53	0.00	0.57	0.58	0.00	0.86	0.00	0.53	0.53	0.00	0.50	0.50
Avail Cap(c_a), veh/h	195	0	435	278	0	403	0	1259	1249	0	1259	1315
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	0.74	0.74
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	10.2	10.2
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	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	4.6	5.0	0.0	7.5	0.0	0.5	0.5	0.0	9.3	9.8
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	11.3	11.2
LnGrp LOS	E	A	E	D	A	E	A	A	A	A	B	B
Approach Vol, veh/h		215			344			1331			1286	
Approach Delay, s/veh		60.6			60.5			1.4			11.2	
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		26.1	8.6	20.2				
Green Ext Time (p_c), s		3.6	0.0	0.2		3.3	0.0	0.5				
Intersection Summary												
HCM 6th Ctrl Delay				15.8								
HCM 6th LOS				B								

HCM Signalized Intersection Capacity Analysis

44: SR-522 Realignment/SR-522 & SR-527

11/26/2019



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↗	↑↑	↖↗	↗	↖↗	↗
Traffic Volume (vph)	672	1310	1580	400	652	501
Future Volume (vph)	672	1310	1580	400	652	501
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	1504	3502	1580
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3400	3505	3438	1504	3502	1580
Peak-hour factor, PHF	0.94	0.94	0.95	0.95	0.87	0.87
Adj. Flow (vph)	715	1394	1663	421	749	576
RTOR Reduction (vph)	0	0	0	6	0	4
Lane Group Flow (vph)	715	1394	1663	415	749	573
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	78.0	68.0	98.0	30.0	64.0
Effective Green, g (s)	33.0	77.5	68.0	98.0	29.5	62.5
Actuated g/C Ratio	0.22	0.52	0.45	0.65	0.20	0.42
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	1810	1558	982	688	658
v/s Ratio Prot	c0.21	c0.40	c0.48	0.08	c0.21	0.19
v/s Ratio Perm				0.19		0.17
v/c Ratio	0.96	0.77	1.07	0.42	1.09	0.87
Uniform Delay, d1	57.8	29.1	41.0	12.5	60.2	40.0
Progression Factor	1.00	1.00	1.00	1.00	1.35	0.80
Incremental Delay, d2	22.3	3.2	43.2	0.4	59.3	10.6
Delay (s)	80.1	32.3	84.2	12.9	140.5	42.6
Level of Service	F	C	F	B	F	D
Approach Delay (s)		48.5	69.8		97.9	
Approach LOS		D	E		F	
Intersection Summary						
HCM 2000 Control Delay			68.4		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.05			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			93.5%		ICU Level of Service	F
Analysis Period (min)			15			

c Critical Lane Group

HCM 6th Signalized Intersection Summary
78: SR-527 & W Main/Main

11/26/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	6	15	30	0	220	0	1022	52	24	1113	18
Future Volume (veh/h)	15	6	15	30	0	220	0	1022	52	24	1113	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	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	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	7	2	33	0	28	0	1111	54	28	1279	21
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	245	68	20	83	0	0	0	2739	133	416	2991	49
Arrive On Green	0.11	0.05	0.05	0.02	0.00	0.00	0.00	0.79	0.79	0.04	1.00	1.00
Sat Flow, veh/h	1781	1353	387	1781	33		0	3541	167	1781	3577	59
Grp Volume(v), veh/h	16	0	9	33	75.1		0	572	593	28	635	665
Grp Sat Flow(s),veh/h/ln	1781	0	1739	1781	E		0	1777	1838	1781	1777	1859
Q Serve(g_s), s	1.2	0.0	0.7	0.0			0.0	14.7	14.7	0.4	0.0	0.0
Cycle Q Clear(g_c), s	1.2	0.0	0.7	0.0			0.0	14.7	14.7	0.4	0.0	0.0
Prop In Lane	1.00		0.22	1.00			0.00		0.09	1.00		0.03
Lane Grp Cap(c), veh/h	245	0	88	83			0	1412	1460	416	1486	1554
V/C Ratio(X)	0.07	0.00	0.10	0.40			0.00	0.41	0.41	0.07	0.43	0.43
Avail Cap(c_a), veh/h	245	0	406	137			0	1412	1460	473	1486	1554
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	0.62	0.62	0.84	0.84	0.84
Uniform Delay (d), s/veh	59.8	0.0	68.0	72.0			0.0	4.7	4.7	3.2	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.5	3.0			0.0	0.5	0.5	0.1	0.8	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	0.6	0.0	0.3	1.3			0.0	4.8	5.0	0.1	0.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.9	0.0	68.5	75.1			0.0	5.2	5.2	3.3	0.8	0.7
LnGrp LOS	E	A	E	E			A	A	A	A	A	A
Approach Vol, veh/h		25						1165			1328	
Approach Delay, s/veh		63.0						5.2			0.8	
Approach LOS		E						A			A	
Timer - Assigned Phs	1	2	3	4		6	7					
Phs Duration (G+Y+Rc), s	6.3	123.7	6.5	13.6		129.9	20.1					
Change Period (Y+Rc), s	3.5	4.5	3.5	6.0		4.5	3.5					
Max Green Setting (Gmax), s	7.5	82.5	7.5	35.0		93.5	5.5					
Max Q Clear Time (g_c+I1), s	2.4	16.7	2.0	2.7		2.0	3.2					
Green Ext Time (p_c), s	0.0	6.0	0.0	0.0		7.1	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			4.4									
HCM 6th LOS			A									

D WSDOT I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project Briefing

I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

Canyon Park Business Park Briefing

November 13, 2019

Agenda

1. Introductions

2. Traffic analysis

- Traffic counts
- Sound Transit bus base
- Draft operations
- Discussion

3. Questions

4. Next steps

Currently identified improvements

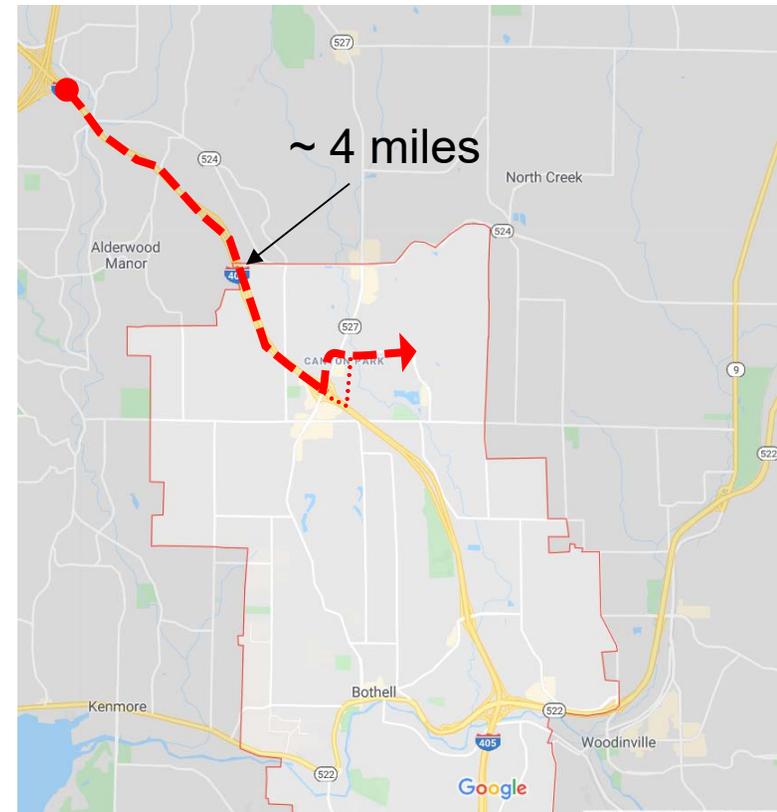
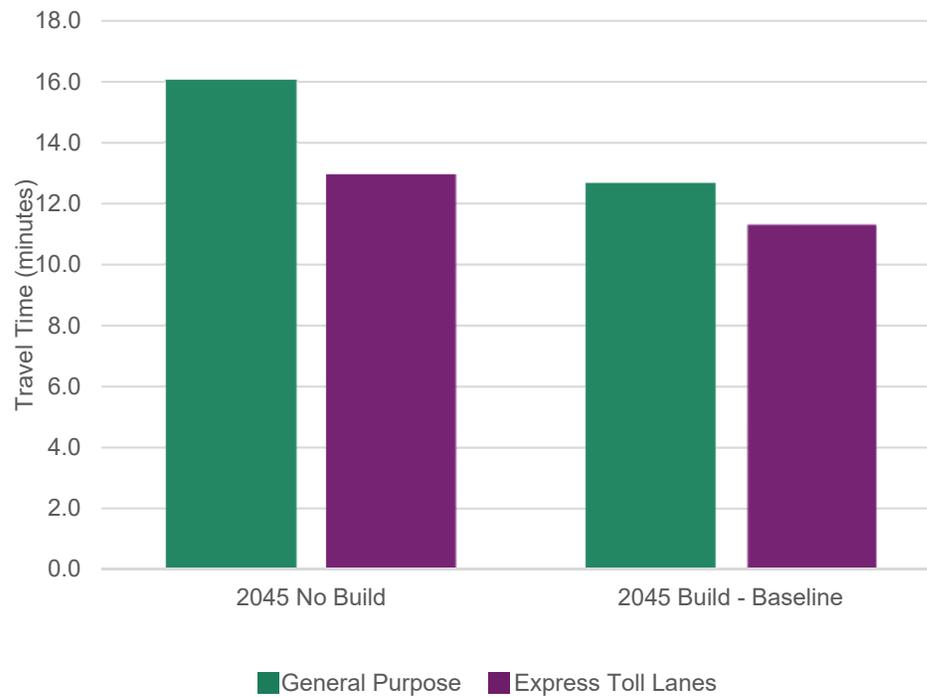


Assumptions

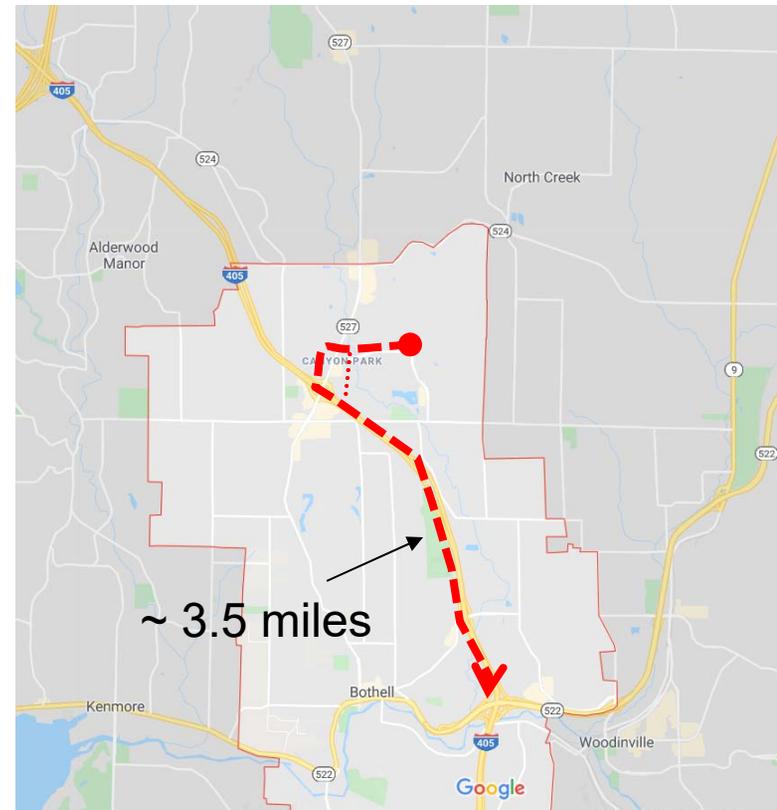
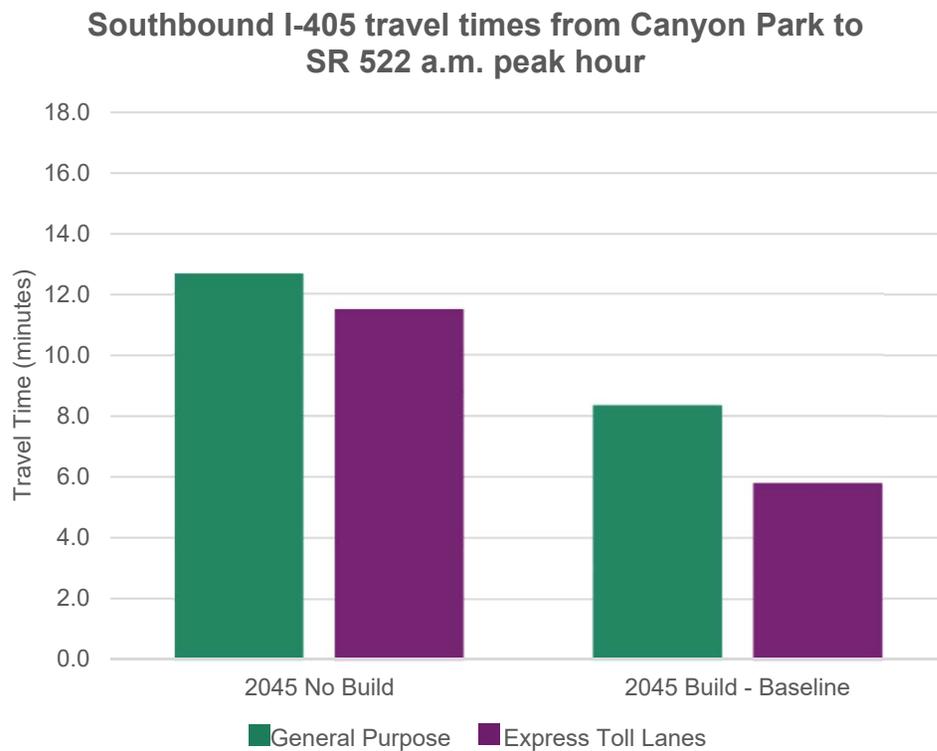
- 1. Traffic counts**
 - **September 2019**
- 2. Forecasts**
 - **2025 and 2045 future years**
- 3. Land use assumptions**
 - **City of Bothell approved Comprehensive Plan**
 - **PSRC**
- 4. Assumed projects**
 - **Funded projects including ST bus base**
- 5. Project signing**
 - **Wayfinding signs**

2045 a.m. peak-hour southbound I-405 travel times (inbound)

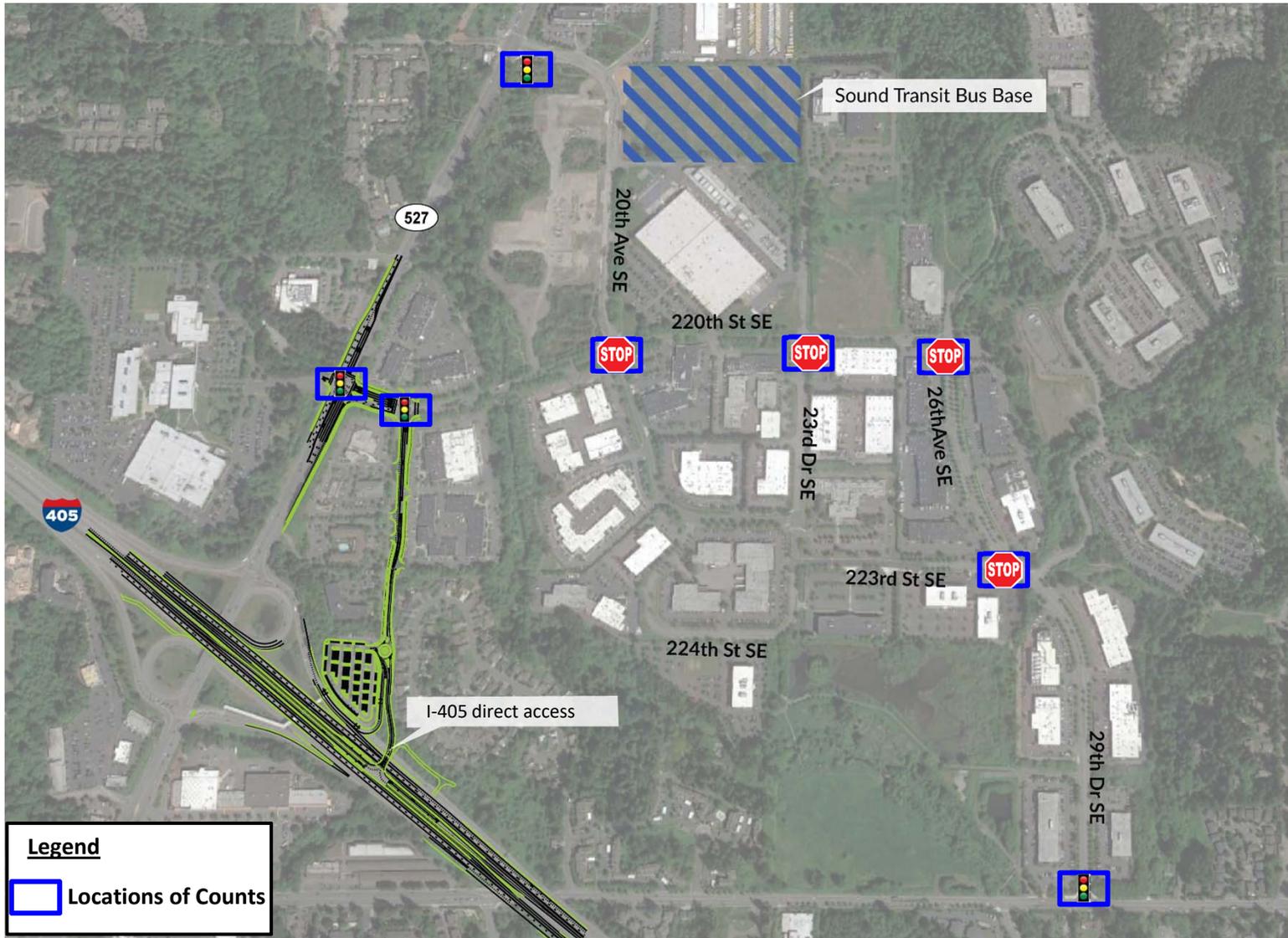
Southbound I-405 travel times from I-5 to Canyon Park a.m. peak hour



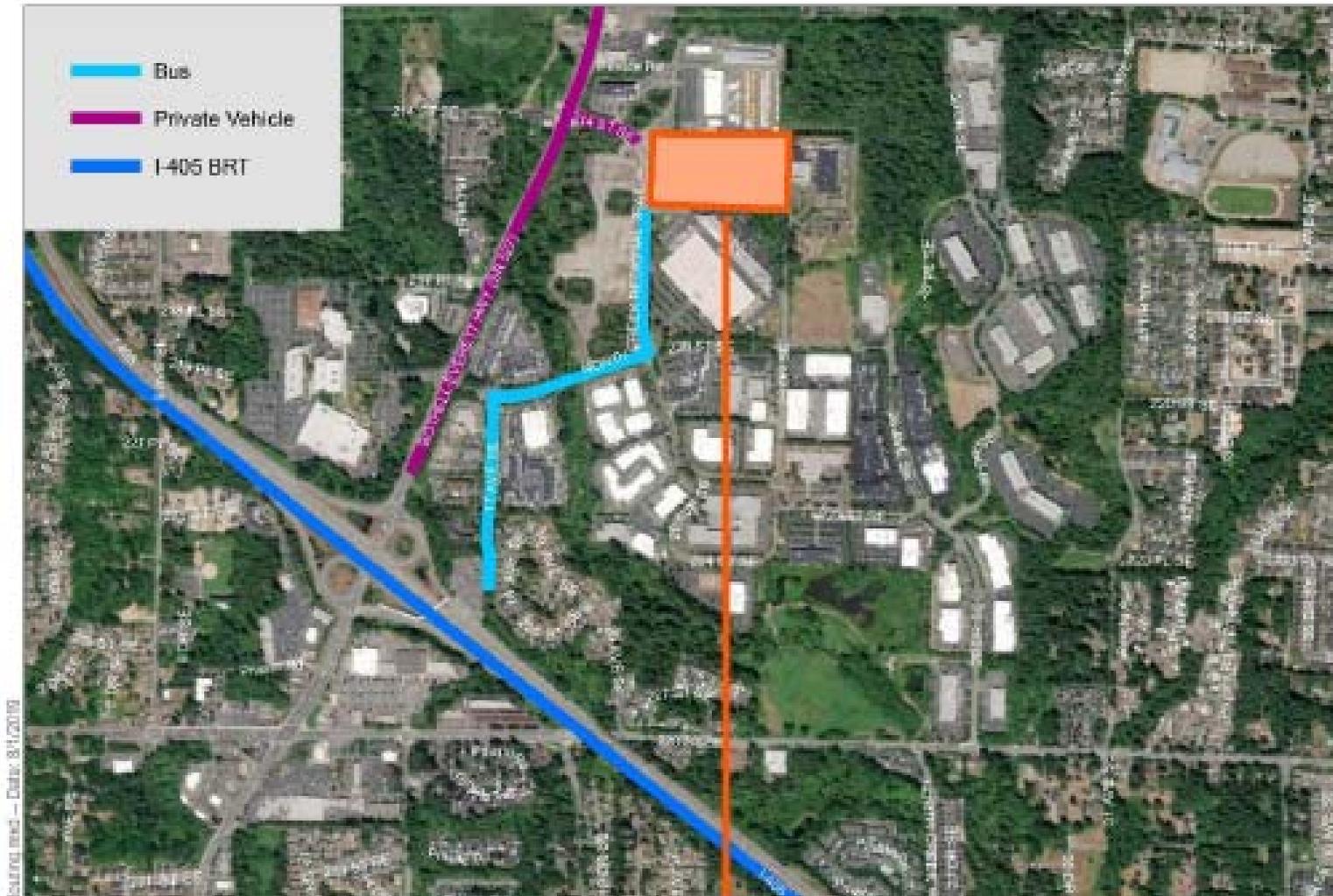
2045 a.m. peak-hour southbound I-405 travel times (outbound)



Traffic counts

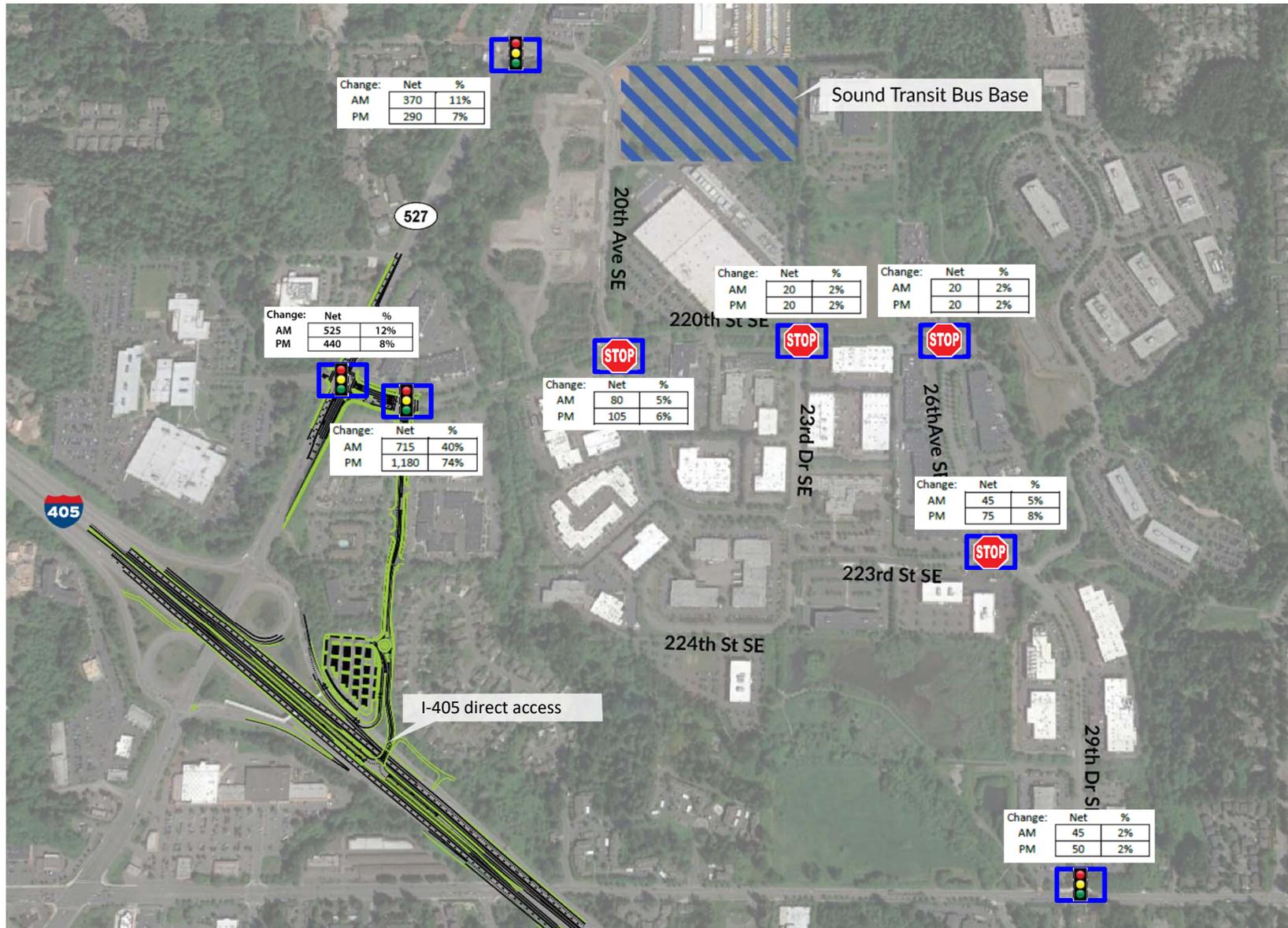


Sound Transit bus base

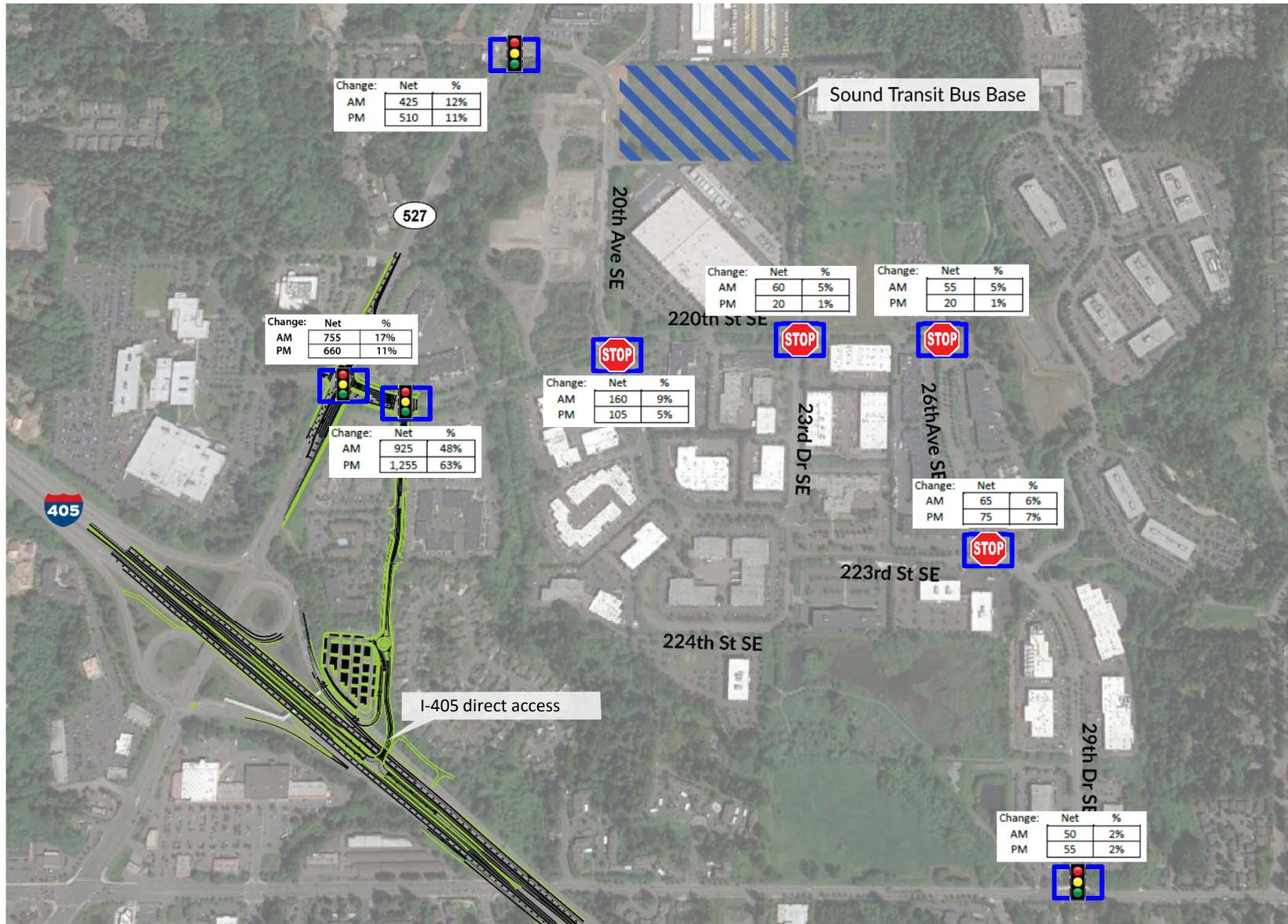


Graphic from Sound Transit pre-application packet

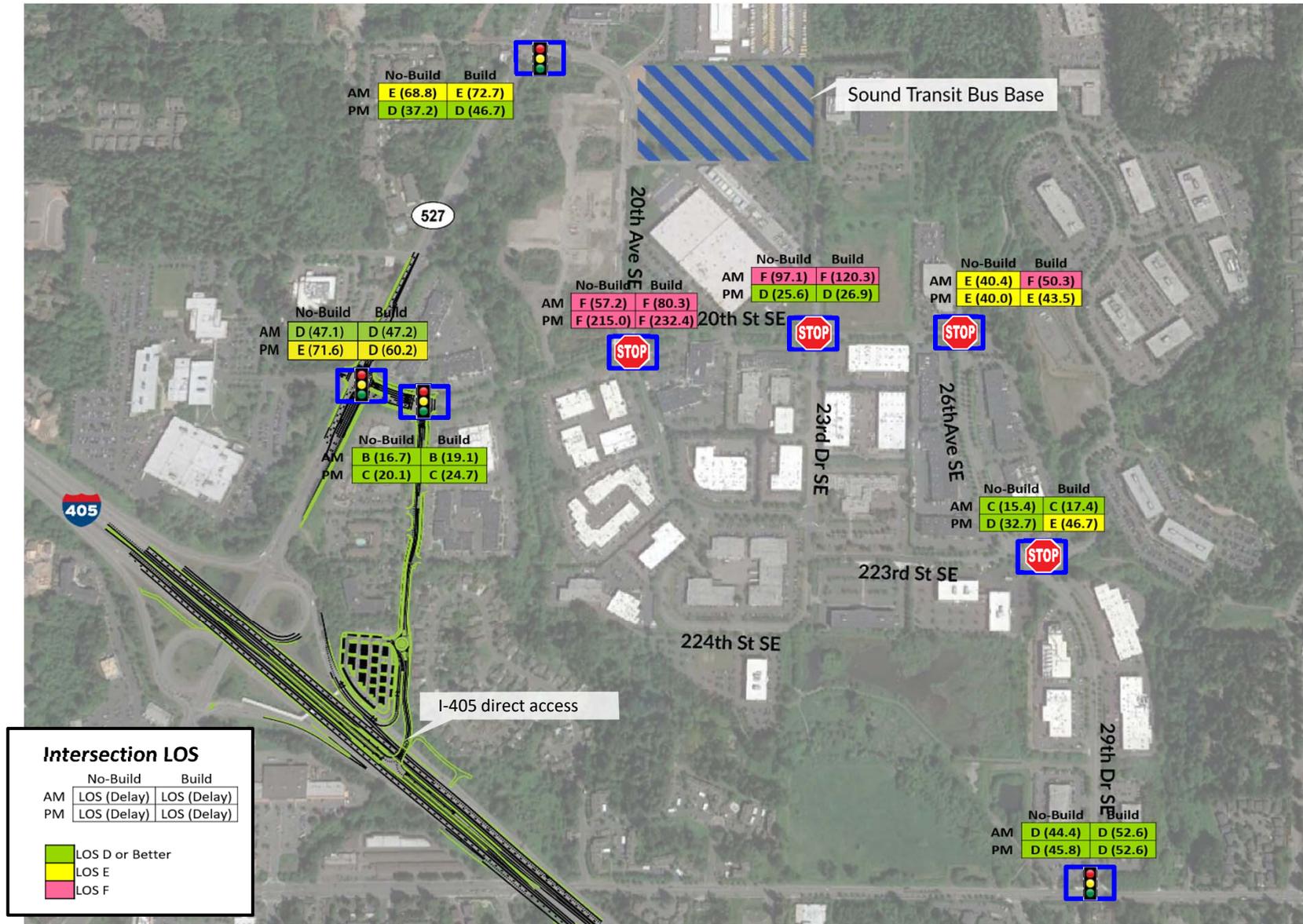
Draft 2025 total intersection volume change



Draft 2045 total intersection volume change



Draft 2045 traffic operations



Operations discussion

Questions?