



CITY OF BLACK DIAMOND  
PLANNING COMMISSION AGENDA  
October 12, 2021

**THIS IS OFFERED AS A ZOOM MEETING ONLY.  
CALL IN AND JOINING INFORMATION FOLLOWS:**

**Zoom link to join meeting:**

<https://zoom.us/j/4254157187?pwd=RE9OV0VoU1RFc3psSHdjem9mMk9hdz09>

*(Note: You do not need a web cam to join the meeting, but you will need audio to hear the proceedings.)*

Meeting ID: 425 415 7187

Password: PC

**Telephone dial in options:**

+1 253 215 8782 US (Tacoma)

+1 206 337 9723 US (Seattle)

Meeting ID: 425 415 7187

Password: 941820 (phone in only)

**6:00 P.M. - CALL TO ORDER, FLAG SALUTE, AND ROLL CALL**

**APPROVAL OF MINUTES:**

- 1) Regular Planning Commission Meeting on Sept. 7, 2021
- 2) Special Planning Commission Meeting on Sept. 21, 2021

**PUBLIC COMMENTS:** Persons wishing to address the Planning Commission regarding items of new business are encouraged to do so at this time. Please use the "raise your hand" feature and once recognized by the Chair, you may unmute and state your name and city for the record. Please limit your comments to 3 minutes. For those dialing in, please press \*9 to raise your hand and \*6 to unmute yourself.

**PUBLIC HEARING:** If you wish to speak during the Public Hearing, you must provide your name and email address to the Deputy City Clerk at [ethornquist@blackdiamondwa.gov](mailto:ethornquist@blackdiamondwa.gov) by **12 p.m. on Tuesday, October 12, 2021** so that the remote legislative hearing protocols can be emailed to you prior to the start of the meeting. Alternatively, written comments on this topic can be submitted to [mdavis@blackdiamondwa.gov](mailto:mdavis@blackdiamondwa.gov) by **2:00 p.m. on October 12, 2021**.

- 3) Amendments to Comprehensive Plan Appendix 7 (Transportation) to Reflect an Alternative SE Loop Connector Route.

**STUDY/WORK SESSION:** None

**UNFINISHED BUSINESS:** None

**NEW BUSINESS:** None

**COMMUNITY DEVELOPMENT DEPARTMENT REPORT:**

**PUBLIC COMMENTS:** Persons wishing to address the Planning Commission regarding items of new business are encouraged to do so at this time. Please use the "raise your hand" feature and once recognized by the Chair, you may unmute and state your name and city for the record. Please limit your comments to 3 minutes. For those dialing in, please press \*9 to raise your hand and \*6 to unmute yourself.

**ADJOURN:**

This site is barrier free. People needing special assistance or accommodations should contact the Community Development Department 72 hours in advance of the meeting at (360) 851-4447



CITY OF BLACK DIAMOND  
PLANNING COMMISSION MEETING MINUTES  
September 7, 2021, 6:00 PM  
Zoom Virtual Meeting

**1) FLAG SALUTE, CALL TO ORDER, and ROLL CALL:**

Chair Olson called the meeting to order at 6:00 p.m.

**Present:** Chair/Commissioner John Olson  
Commissioner Steve Jensen  
Commissioner Knut Syversen  
Commissioner Pam McCain  
Commissioner Felicia Wheatfall  
Commissioner Dave Ambur

**Unexcused:** Commissioner Richard La Conte

**Staff:** Community Development Director, Mona Davis  
Deputy City Clerk, Carina Thornquist  
Sr. Planner, Joey Portmann  
Consultant, Emily Adams

Chair Olson went over what to expect at the meeting tonight and what a Public Hearing looks like if there is anyone new listening.

**2) APPROVAL OF MINUTES**

*Regular Meeting of June 8, 2021, Regular Meeting of August 10, 2021, Special Meeting of August 24, 2021*

- ❖ The Regular Meeting Minutes of June 8, 2021 were adopted under unanimous consent.
- ❖ The Regular Meeting Minutes of August 10, 2021 were adopted under unanimous consent.
- ❖ The Special Meeting Minutes of August 24, 2021 were adopted under unanimous consent.

**3) PUBLIC COMMENTS -**

- ❖ Kristen Bryant from Bellevue
- ❖ Kelley Sauskojus from Black Diamond
- ❖ Henry Knies from Black Diamond
- ❖ Cynthia Essick from Black Diamond

- ❖ William Bryant from Black Diamond
- ❖ Phillip Acosta from Black Diamond
- ❖ Michelle Young from Black Diamond
- ❖ Bill Bryant from Black Diamond

#### 4) **PUBLIC HEARINGS** –

##### ***a) Delete policy ED-4.5 from the Economic Development Chapter or move it to the Transportation Chapter.***

Chair Olson opened the Public Hearing 4a at 6:24 p.m. regarding the topic “Delete policy ED-4.5 from the Economic Development Chapter or move it to the Transportation Chapter.” He then turned the floor over to Director Davis who introduced the City’s contractor, Emily Adams, who gave a brief staff report and presentation while sharing her screen.

Staff’s recommendation: Move policy ED-4.5 to the Transportation Chapter because it makes the most sense.

Chair Olson opened the Public Comments portion of the Public Hearing at 6:27 p.m. and asked if there was anyone who wanted to speak. Those were as follows:

- ❖ Henry Kneis from Black Diamond – Mr. Kneis asked what the purpose is of the movement.

After asking three times if there were any additional speakers and hearing/seeing no one, Chair Olson closed the Public Hearing 4a at 6:29 p.m. Chair Olson turned it over to Director Davis to respond to the question. Director Davis clarified that this item was initiated by a private citizen request.

##### ***b) Conduct a feasibility study, including costs and scope of operations, on conducting an ecological inventory.***

Chair Olson opened the Public Hearing 4b “Conduct a feasibility study, including costs and scope of operations, on conducting an ecological inventory.” at 6:31 p.m. He turned the floor over to Ms. Adams who gave the brief presentation while sharing her screen. She noted that this docket item was amended from the original request of doing an ecological inventory, to conducting a feasibility study of what it would take to conduct an ecological inventory.

Staff’s recommendation: Add a policy to Chapter 4 of the Comprehensive Plan which is the Natural Environment section 4.3, Policy any-6 conduct an ecological inventory of the city to aid and identify in protecting sensitive areas.

Chair Olson opened the Public Comments portion of the Public Hearing and asked if there was anyone who wanted to speak. Those were as follows:

- ❖ Henry Kneis from Black Diamond – Mr. Kneis can't understand how the staff could consider any changes to be made to the Comprehensive Plan without this inventory being done.
- ❖ Kelly Sauskojus from Black Diamond - Ms. Sauskojus feels that environmental protection needs to be at the top of any considerations for changes being made to the Comprehensive Plan. All of the natural areas within the city limits needs to be protected from the negative impacts before they plan developments. All of the natural areas contribute to the quality of life in Black Diamond and need to be considered before any more development or upzoning. Lake Sawyer, Jones Lake and Lake 12, and Rock Creek are very sensitive areas and need stronger protection so the entire town can enjoy. She shared the negative effects that have contributed to Lake Sawyer's issues. Furthermore, she recommends that any developer who is requesting an upzoning would need to prove that their development wouldn't have any negative impacts to the sensitive areas adjoining their development. In closing, she feels that developer requesting an upzoning would have to prove that their development doesn't have any negative impacts on any sensitive areas and which sensitive areas border their project. Furthermore, the SEPA reviews proving that this process has been done *prior* to any upzoning takes place.
- ❖ Kristen Bryant from Bellevue – Ms. Bryant stated that there is conflicting information about the protection of the environment. She states there are developer interests that state the code is fully protective and the studies will be done. She agreed that the studies will be done, but not until someone applies for a permit, or if they are required to apply for a site specific rezone, they would need to submit those to our code. The code is state law minimum so she would hope an ecological inventory would help to provide areas where the city would like to seek funding for open space, impact fees to protect it and do more to improve the code. She's opposed to using such an inventory in a way that could be contrary to what the original requestors goals were, such as waiving reports for developers in the future because the city feels it's been done in the past so it's ok. Ms. Bryant concluded by saying that there needs to be an assurance that it's being done in the correct way or it would be a poor use of public funds.

After asking three times if there were any additional speakers and hearing/seeing no one, Chair Olson closed the Public Hearing 4b (Conduct a feasibility study, including costs and scope of operations, on conducting an ecological inventory) at 6:40 p.m.



Chair Olson realized that after Public Hearing 4a, he forgot to ask the Commissioners if they had any questions or statements. So he asked the Commissioners if they had any questions, clarifications or comments for either 4a (Delete policy ED-4.5 from the Economic Development Chapter or move it to the Transportation Chapter), or 4b (Conduct a feasibility study, including costs and scope of operations, on conducting an ecological inventory).

Commissioners had questions regarding both 4a and 4b, so Chair Olson turned it over to Director Davis, along with Ms. Adams, to answer those questions.

Director Davis reported that it was brought to City Council and was approved to purchase a new ESRI system to update our GIS mapping. Ms. Davis gave a brief overview of the systems capabilities (i.e. showing wetlands, critical areas, sensitive areas, etc.) stating that it will allow the staff to access more accurate information with ease.

It was opened up to the Commissioners once again for any questions clarifications or comments which Director Davis answered. Chair Olson asked if there were any further questions and seeing/hearing none, he closed this portion of the Public Hearing.

***c) Repeal city prohibitions on marijuana businesses and update land use chapter as needed to facilitate appropriate siting.***

Chair Olson opened the Public Hearing 4c at 6:56 p.m. and then turned it over to Director Davis and Ms. Adams to give a brief overview of repealing city prohibitions on marijuana businesses, as well as updating the land use chapter as needed to facilitate appropriate siting. Ms. Adams who gave the brief presentation while sharing her screen.

**Staff's recommendation:** Staff recommends adding a policy to Chapter 5 Land Use, Section 5.13 Commercial Goals and Policies that states: "Policy LU-50: Analyze the siting of marijuana retail businesses to ensure they are permitted in the appropriate zoning district and to limit impacts on the surrounding community."

Chair Olson opened the Public Comments portion of the Public Hearing and asked if there was anyone who wanted to speak. Those were as follows:

- ❖ Henry Knies from Black Diamond – Mr. Knies wanted to know why is the Planning Commission putting the cart before the horse? Black Diamond City Council hasn't even decided that businesses like this should be permitted within their jurisdiction. Mr. Knies believes it's irrational for the Planning Commission to consider changing the Comprehensive Plan before the City Council has made any decisions.

After asking three times if there were any additional speakers and hearing/seeing no one, Chair Olson closed the Public Hearing 4c (Repeal city prohibitions on marijuana businesses and update land use chapter as needed to facilitate appropriate siting) at 7:03 p.m.

Chair Olson asked the Commissioners if they had any questions, clarifications or comments for 4c (Repeal city prohibitions on marijuana businesses and update land use chapter as needed to facilitate appropriate siting). Chair Olson turned it over to Director Davis and Ms. Adams who gave explanation to the questions asked.

***d) Reconsideration of the 2019 FLUM including possible reversion to the 2009 FLUM, and corresponding updates to the zoning code for consistency with the Comprehensive Plan and the FLUM, and to begin narrowing discrepancies with the PRSC's VISION 2040 and 2050 (as applicable) and Regional Growth Strategy.***

Chair Olson reported that there was mis-information on a website which is not the City of Black Diamonds, but a private party/group. There were about 6 parcels that were incorrect on the website so he advised everyone to read the Packet Material that is on the city's website.

Chair Olson opened the Public Hearing regarding the topic "Reconsideration of the 2019 FLUM including possible reversion to the 2009 FLUM, and corresponding updates to the zoning code for consistency with the Comprehensive Plan and the FLUM, and to begin narrowing discrepancies with the PRSC's VISION 2040 and 2050 (as applicable) and Regional Growth Strategy" at 7:11 p.m. He then turned it over to Director Davis and Mr. Portmann who is the Sr. Planner for the City. Mr. Portmann gave an extensive presentation while sharing his screen. He expressed the importance of correcting any/all errors and to have all their maps and documentation accurate. He gave an overview of the topics that will be presented for discussion. Discussion points were: Inconsistencies, Consolidations, Scrivener's Errors, Undesignated Parcels, Zoning Map Scrivener's Errors and Split Zoning.

There were two (2) issues with incorrect information on the staff report only, which Ms. Adams gave clarification. The correct information listed below:

1. Inconsistency #4 – It states 1<sup>st</sup> and nothing listed a. but the 2<sup>nd</sup> parcel # was accidentally left off.  
Correction: 2<sup>nd</sup> Parcel # 1021069105.
2. Consolidation #4 – Looking at the Info Section in the Table and regarding #3. All parcels are surrounding Lake 12 and the largest parcel number

is #0721079008 which is just for identification purposes if someone is looking on maps and can't find it. And the existing uses are Single Family Home and Vacant Parcels.

Chair Olson asked Director Davis to give some clarification of both maps so citizens have a better understanding of what the differences are. Director Davis turned it over to Mr. Portmann who gave a brief explanation; the FLUM Map acts as Policy and the Zoning Map acts as Regulation.

Chair Olson opened the Public Comments portion of the Public Hearing and asked if there was anyone who wanted to speak. Those were as follows:

- ❖ Kristen Bryant from Bellevue – Ms. Bryant stated that she sent some comments earlier and hopes the Commissioners had time to review them. She is unhappy that the staff report only came out a week ago on 9/1 coming into a holiday weekend. She feels that it doesn't give the public very much time to review it and prepare, especially with having these very important issues that are being decided on. She stated that the staff report shows reduced density but there is still approximately 100-120 acres of dense acreage for development which is zoned medium density. This means it can go up to 12 units per acre of medium density residential or commercial. Friends of Black Diamond sent in a traffic report that they had done because of WSDOT's and PSRC's information that there is no plan or money to widen Highway 169. So the Comprehensive Plan's Traffic Appendix cannot assume that. The traffic model from Friends of Black Diamond versus the city's traffic model, does assume that all projects for intersection improvement are completed. There is a ripple effects that goes into the FLUM Map which will affect the city's traffic for decades. The city's traffic model doesn't even include the FLUM map, but it does include Ten Trails and the projects proposed, and it's difficult to see where the additional development can possibly be accommodated by the roads in 15 years. If you apply for a permit and you don't have the zoning, you're not going to get it. But the City's Municipal Code Chapter 16.10 explains that an owner can apply for a zoning change to be consistent with the FLUM. And if they follow that process and submit all the required documents, it goes through the quasi-judicial zoning process and it's very difficult to not give the zoning to a land owner if their FLUM designation is commercial or higher density.
- ❖ Angela Fettig from Black Diamond – Ms. Fettig believes the FLUM should be reverted back to the 2009 version, then developers must analyze the impacts if they want a Comprehensive Plan FLUM change. She stated that there needs to be an in-depth analysis on how it will affect all types of housing needs, what impact it will have on schools, emergency services,

loss of light industrial revenue, parks, wildlife, neighboring cities, roads and traffic. She feels it's irresponsible to bring in more traffic and residents when our police department can't keep up due to the growth. Ms. Fettig states the growth is too much too fast, and the city has far more growth already planned and approved than the regional share of King County's Growth Target and Growth Management Acts. It ruins the small town feel and just encourages long distance commuting. Ms. Fettig concluded by referring to Chair Olson's earlier comments regarding the website with inaccurate parcel information. She stated that they are accurate parcel numbers which were put out by the city in 2019.

- ❖ Bill Kombol from Black Diamond – Mr. Kombol began by saying the 78 page staff report is very nuanced and comprehensive in how it addresses the different challenges the city faces with inconsistencies, split zoning, etc. He feels those who feel it would be best to revert back to the 2009 plan is misguided. Returning back to some of that zoning would produce as much intense development as they fear. He concluded by stating he felt the city staff got most of it right in balancing where the city needs to move to, and provided comments where he felt the information was inaccurate.
- ❖ Henry Kneis from Black Diamond – Mr. Kneis had questions about the legitimacy of tonight's meeting with 78 pages being available to the public on 9/1, followed by a 3-day holiday weekend, and then ask for public comment on 9/7. There are 4 categories of changes and 25 parcels that are affected. He said there is no way that a member of the general public could read such a document and absorb the material, not to mention prepare to make meaningful comments at a public hearing a week later. If the city believes that this satisfactorily meets the public comment requirements, he feels it's inadequate and illegal.
- ❖ Kelley Sauskojus from Black Diamond – Ms. Sauskojus agrees with the commenter before her that it's not reasonable for the city to think that the public could read through 78 pages and comprehend what it all means. In addition to bring meaningful comments less than a week later to the Public Hearing. She further went on to say that the decisions that we make today are going to affect the city for years to come. Traffic and pedestrian safety is already out of control.
- ❖ Gary Davis from Black Diamond – Mr. Davis said he expressed the same sentiments as Mr. Kneis and Ms. Sauskojus just did. They stated everything that Mr. Davis was wanting to say.
- ❖ Cynthia Essick from Black Diamond – Ms. Essick stated that she has lived at the south end of Lake Sawyer since 1968. When they wanted to build a house on their 1 acre of land, they had to go around to neighbors and get signatures. Now there are 12 homes being built on an acre just so someone can make money. Ms. Essick expressed her issues regarding traffic from large developments, speeding traffic, kids safety and home to

the wildlife being destroyed. She concluded by saying she totally agrees with the previous speakers.

- ❖ Bill Bryant from Black Diamond – Mr. Bryant stated that the parcels of Palmer Coking Coal (PCC) are zoned High Density and these parcels were formerly a coalmine and gravel pit. He stated that the owner has had violations from the Department of Ecology (DOE) and before changing the zoning, it needs to be checked with the DOE and should be either Mineral or Light Industrial, not Residential or Commercial. Mr. Bryant concluded by saying the FLUM changes are totally optional. The city can make land use zoning equal to current use which are: Mineral, Forestry, Light Industrial and Low Density. These allow tax revenues without burdening roads or schools. A rezone must show that it's in the public interest.

After asking three times if there were any additional speakers and hearing/seeing no one, Chair Olson closed the Public Hearing 4d (Reconsideration of the 2019 FLUM including possible reversion to the 2009 FLUM, and corresponding updates to the zoning code for consistency with the Comprehensive Plan and the FLUM, and to begin narrowing discrepancies with the PRSC's VISION 2040 and 2050 (as applicable) and Regional Growth) at 8:01 p.m.

Extensive back and forth discussion took place between the Commissioners and Director Davis.

**5) STUDY/WORK SESSION - September 21, 2021 Discussion and Diliberation about Public Hearings**

Director Davis advised that the items discussed tonight, and the public comments received, are to be thought over and researched if they needed to, and then additional discussion can occur at the Special Meeting on September 21<sup>st</sup>.

**6) UNFINISHED BUSINESS - None**

**7) PUBLIC COMMENTS -**

- ❖ Henry Kneis from Black Diamond
- ❖ Gary Davis from Black Diamond
- ❖ Bill Bryant from Black Diamond
- ❖ Renee Mix from Black Diamond
- ❖ Kristen Bryant from Bellevue

With no other persons requesting to speak, Chair Olson closed the Public Comments at 8:46 p.m.

**8) COMMUNITY DEVELOPMENT DEPARTMENT REPORT -**

Director Davis advised that three (3) Commissioner's terms expire on December 31, 2021. She would like for Chair Olson, Commissioner Ambur and Commissioner McCain to think it over if they would like to continue on with another term. The deadline to inform her with their decision is September 17, 2021 if they will continue on with the Planning Commission as the soliciting process to seek applicants for the Planning Commission would begin now. Two (2) of the Commissioners voiced their decision; Chair Olson and Commissioner Ambur would like to continue.

**9) ADJOURNMENT -**

Commissioner Jensen **Motioned** to adjourn the meeting. **Second** Commissioner McCain. **Vote**, Motion **passed 6-0**.

**The meeting ended at 8:51 p.m.**

These minutes were respectively recorded by Carina A. Thornquist, Deputy City Clerk

ATTEST:

\_\_\_\_\_  
John Olson, Chairperson

\_\_\_\_\_  
Planning Commission Secretary



CITY OF BLACK DIAMOND  
PLANNING COMMISSION  
SPECIAL MEETING MINUTES  
September 21, 2021, 6:00 PM  
Zoom Virtual Meeting

**FLAG SALUTE, CALL TO ORDER, and ROLL CALL:**

Chair Olson called the meeting to order at 6:00 p.m.

**Present:** Chair/Commissioner John Olson  
Commissioner Richard La Conte (arrived late at 6:30 p.m.)  
Commissioner Knut Syversen  
Commissioner Pam McCain  
Commissioner Felicia Wheatfall  
Commissioner Dave Ambur  
**Excused:** Commissioner Steve Jensen  
**Staff:** Community Development Director, Mona Davis  
Sr. Planner, Joey Portmann  
Contractor, Emily Adams  
Deputy City Clerk, Carina Thornquist

**APPROVAL OF MINUTES** - None

**PUBLIC COMMENTS** –

❖ Kristen Bryant from Bellevue

**PUBLIC HEARINGS** - None

**STUDY/WORK SESSION** -

Chair Olson turned the work session over to Director Davis who gave an overview of what will be discussed. She also reported that there was more information that has been obtained which is a traffic review for FLUM and Zoning inconsistencies. She explained that Ms. Adams would go through each one individually and give a brief overview, followed by discussion amongst Commissioners and any questions they may have for staff members, and followed by a consensus of the Commissioners of what they would like to bring to the October meeting.

**1) *Deliberation on deleting policy ED 4.5 from the Economic Development chapter or move it to the Transportation Chapter.***

Ms. Adams gave a brief overview of the topic above. Discussion between Commissioners and staff took place as well as any questions the Commissioners had.

**Staff Recommendation:** Moving it to the Coordination and Consistencies policy section of the Transportation Chapter (Policy T-26).

***Possible Consensus: Approved***

**2) *Deliberation on the preparation of a feasibility study, including costs and scope of operations, on conducting an Ecological Inventory.***

Ms. Adams gave a brief overview of the topic above. Original request was amended as stated above. Discussion between Commissioners and Staff took place as well as any questions the Commissioners may have had.

**Staff Recommendation:** adding a policy to Chapter 4 Natural Environment, section 4.3 that states: "Policy NE-6: Conduct an ecological inventory of the natural areas within the city to aid in identifying and protecting all sensitive areas."

***Possible Consensus: Approval with revisions to wording***

*(Commissioner LaConte joined in the meeting at approximately 6:30 p.m.)*

**3) *Deliberation on repealing city prohibitions on marijuana businesses and update land use chapter as needed to facilitate appropriate siting.***

Ms. Adams gave a brief overview of the topic above. Discussion between Commissioners and Staff took place as well as any questions the Commissioners had.

**Staff Recommendation:** adding a policy to Chapter 5 Land Use, Section 5.13 Commercial Goals and Policies that states: "Policy LU-50: Analyze the siting of marijuana retail businesses to ensure they are permitted in the appropriate zoning district and to limit impacts on the surrounding community."

***Possible Consensus: Approval***



**4) FLUM & Zoning Maps – “Reconsideration of the 2019 FLUM including possible reversion to the 2009 FLUM, and corresponding updates to the zoning code for consistency with the Comprehensive Plan and the FLUM, and to begin narrowing discrepancies with the PSRC’s VISION 2040 and 2050 (as applicable) and Regional Growth Strategies.”**

Ms. Adams gave a brief overview of the topic above. Discussion between Commissioners and Staff took place as well as any questions the Commissioners had.

- ❖ **Inconsistency #1:** Support staff recommendation, revert to 2009 FLUM and keep zoning
- ❖ **Inconsistency #2:** Support staff recommendation of no changes
- ❖ **Inconsistency #3:** Split on changing to MDR/MDR8 or remaining LDR/R4
- ❖ **Inconsistency #4:** Support staff recommendation to revert to 2009 FLUM and keep zoning
- ❖ **Inconsistency #5:** Support staff recommendation to revert to 2009 FLUM and keep zoning
- ❖ **Inconsistency #6:** Support staff recommendation to revert to 2009 FLUM and change zoning to R4
- ❖ **Inconsistency #7:** Support staff recommendation to revert to 2009 FLUM and keep zoning
- ❖ **Consolidations #1 – 4:** Support staff recommendations of no changes
- ❖ **Scriveners Error #1:** Support staff recommendation of no changes
- ❖ **Scriveners Error #2a:** Support staff recommendation to change FLUM designation to Public
- ❖ **Scriveners Error #2b:** Support staff recommendation to change FLUM designation to LDR
- ❖ **Scriveners Error #3:** Support staff recommendation to remove MPD overlay
- ❖ **Undesignated #1:** Support staff recommendation to zone B/IP and designate BP/LI
- ❖ **Undesignated #2:** Support staff recommendation to zone and designate CC
- ❖ **Undesignated #3:** Support staff recommendation to zone and designate Industrial (I)
- ❖ **Undesignated #4:** Support staff recommendation to zone R4 and designate LDR
- ❖ **Zoning Map Scriveners Error:** Support staff recommendation to zone R4
- ❖ **Split Zoned Parcels #1-3:** Support staff recommendations of no changes
- ❖ **TDR Layer:** Support staff recommendation to remove layer from FLUM map and create separate map

Director Davis and Ms. Adams concluded the workshop by reviewing the remaining timelines for the docket items. Director Davis asked the Commissioners if they needed to hold an additional Public Hearing at the October 12<sup>th</sup> meeting on the SE Loop Connector since we would have new information in the way of traffic analysis to review. She added that a decision would need to be made tonight as Carina needs to have the required amount of time to submit the Legal Notice to the newspaper. The consensus was to hold another public hearing at the October 12<sup>th</sup> meeting.

**UNFINISHED BUSINESS** - None

**NEW BUSINESS** - None

**COMMUNITY DEVELOPMENT DEPARTMENT REPORT –**

Director Davis briefly went over the timeline that Emily presented.

**PUBLIC COMMENTS** – None

**ADJOURNMENT –**

Commissioner Ambur **Motioned** to adjourn the meeting. **Second** Commissioner McCain. **Vote, Motion passed 6-0.**

**The meeting ended at 8:18 p.m.**

These minutes were respectively recorded by Carina A. Thornquist, Deputy City Clerk

ATTEST:

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John Olson, Chairperson

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Planning Commission Secretary



# CITY OF BLACK DIAMOND

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**Meeting Date:** October 12, 2021  
**Staff Report Date:** October 5, 2021  
**To:** Planning Commissioners  
**From:** Mona Davis, Community Development Director  
**Subject:** Comprehensive Plan Amendments – SE Loop Connector Alternative

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The purpose of this staff report is to go over final docket item #2021-02: “Amendments to comprehensive plan Appendix 7 (Transportation) to reflect an alternative SE loop connector route.”

A hearing was held on this docket item on August 10, 2021. Following public comments and the hearing, staff requested further information from the applicant including additional data and analysis on the proposed route that examines feasibility on all proposals and itemizes the issues and impacts for each route.

The following information comes from the August 10 staff report and has been revised based on the new information. Revisions to the staff report are underlined, so new information is clearly identifiable.

## Proposal

This was a private request by Black Diamond Partners LLC, aka Oakpointe, to amend the text and map in the transportation appendix to include an alternative Southeast Loop Connector. The request for the alternative is an addition to the list of future road projects in Appendix 7 and none would be deleted.

The Comprehensive Plan currently identifies the SE Loop Connector as a connection between the Lawson Connector and State Route (SR) 169. In addition to the Lawson Street and the Lawson Connector, the SE Loop Connector was proposed to provide additional connectivity between the Lawson Hills MPD and SR 169. The SE Loop Connector Alternative, proposed to be incorporated into the Comprehensive Plan, would connect the Lawson Hills MPD to Lawson Street, which then connects to SR 169. The Lawson Connector would remain.

Language would be added to include the Southeast Loop Connector Alternative on the list that provides the planned classifications by roadway as follows (in red):

## Collectors

- Annexation Road\*
- Southeast Loop Connector\*
- **Southeast Loop Connector Alternative\***
- Morgan Street



- Baker Street (west of SR 169)
- South Connector\*
- Railroad Avenue (Jones Lake Road)
- Lake Sawyer Extension\*

Language would also be added to Table 0-9 which lists the Transportation Capacity Adding Projects for 2022-2035 (page 25 of the transportation appendix). See attachments for details. Further, language would be added as follows:

#### *Arterial and Collector Roadway Improvements*

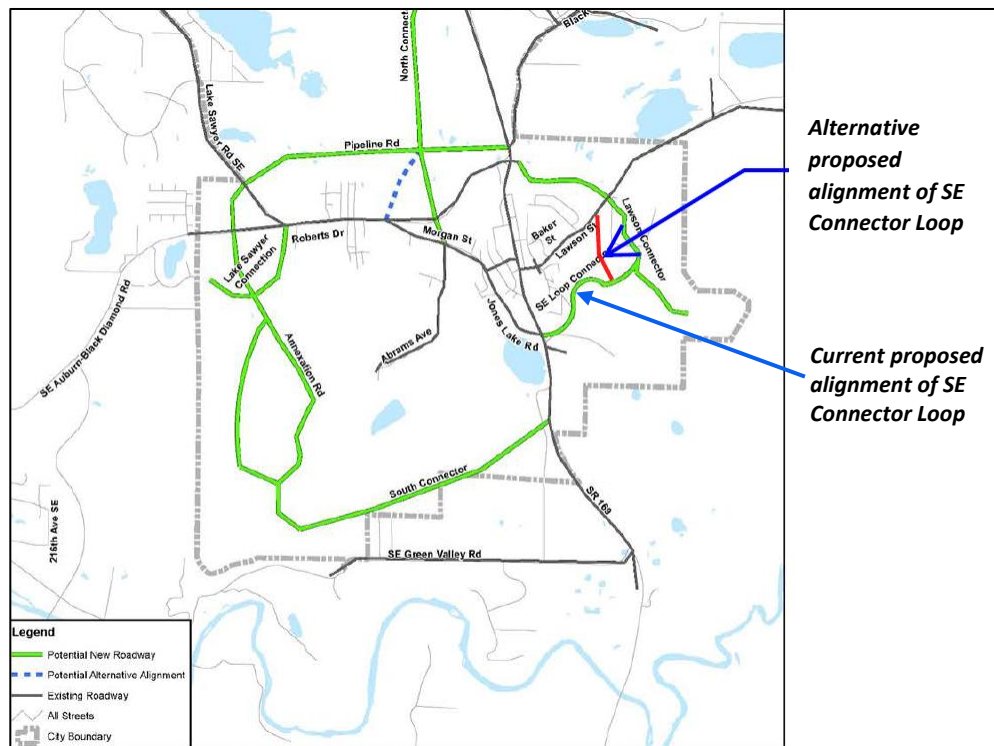
A conceptual configuration for the future roadway system in 2035 is shown in Figure 7-4. New arterial and collector roads include: Pipeline Road, Annexation Road, Lake Sawyer Extension, Lawson Connector, South Connector, Southeast Loop Connector **or Southeast Loop Connector Alternative**, and North Connector.

...

The Pipeline Road will provide an east / west alternative to Roberts Drive and will enhance the circulation and access for industrial development. The North Connector will provide a north / south alternative to SR 169 in the middle of the City. The Annexation Road would provide north-south and east-west circulation through the southwestern portion of the City's Expansion Area. Other new facilities are proposed to improve general circulation **such as the Southeast Loop Connector. The Southeast Loop Connector Alternative is a functionally equivalent roadway alternative to the Southeast Loop Connector, both of which provide secondary access to the Lawson Hills MPD and improve general circulation through the City.**



The alternative would be added to the maps in the following location:



#### Evaluation Criteria (BDMC 16.10.220)

A. All Amendments. All of the comprehensive plan amendments shall be reviewed under the following criteria:

1. Whether the proposed amendment(s) conform to the Growth Management Act (Chapter 36.70A RCW);

**The proposal amendment is for an infrastructure improvement that supports development within the urban area of the City of Black Diamond. The GMA encourages development in urban areas where adequate public facilities exist to serve the development. The SE Loop Connector Alternative would meet the goal of providing adequate infrastructure facilities for urban growth.**

2. Whether the proposed amendment(s) are consistent with and implement the city's comprehensive plan, including the goals, policies and implementation strategies of the various elements of the plan;

**The current Comprehensive Plan identifies the SE Loop Connector as a future transportation improvement. This road is depicted as extending from the Lawson Hills MPD to SR-169. The language in Appendix 7 makes it clear that the routing depicted therein is not settled and that "alternative road alignments may be considered." The intent behind including a preliminary alignment concept in Appendix 7 was "to show a basic route," while expressly mentioning that "exact locations will be determined after engineering and environmental review."**



The proposed amendment is consistent with the following comprehensive plan goals and policies:

- **Policy NE-17:** Minimize areas of vegetation loss and grading disturbance to protect water quality and prevent erosion, when developing on moderate and highly erodible soils.
- **Policy NE-35:** Preserve existing natural trees and vegetation on steep hillsides, along stream banks and other habitat areas, and where visual buffers between uses or activities are desirable.
- **Policy T-10 Pedestrians, Bicycles, and Transit Policy:** Black Diamond recognizes the primacy of pedestrians and other non-motorized modes of mobility. The City shall lessen dependence upon and the influence of the automobile by encouraging complete streets and multi-modal travel for all users including pedestrians, bicyclists, and transit passengers of all ages and abilities. City actions will:
  - Require new roadways to incorporate pedestrian, bicycle and transit facilities including appropriately spaced crosswalks on arterials and collectors.
- **Policy T-12 Transportation Health and Safety Policy:** The City of Black Diamond will provide a transportation system that enhances the health and safety of residents by:
  - Expanding the sidewalk, bike lane, and multi-use path network in the city.
- **Policy T-14 Character of the City Policy:** Enhance the character that the City currently possesses by:
  - Encouraging landscaping, parkway trees, and compatible architecture in the design and construction of roadways, especially SR 169, and other facilities along selected corridors.
- **Policy T-15 Environmental Protection and Conservation Policy:** Design transportation facilities within Black Diamond that minimizes adverse environmental impacts resulting from both their construction and operation. The City will fulfill this need by:
  - Aligning and locating transportation facilities away from environmentally sensitive areas.
  - Mitigating unavoidable environmental impacts.
- **Policy ED-4.1:** Focus investment in infrastructure and services.
- **Policy U-22:** Manage the quality of stormwater runoff to protect public health and safety, surface and groundwater quality, and the natural drainage systems.
- **Policy U-24:** Design stormwater lines or pathways to minimize potential erosion and sedimentation, discourage significant vegetation clearing, and preserve the natural drainage systems such as rivers, streams, lakes, and wetlands.



3. Whether circumstances related to the proposed amendment(s) and/or the area in which it is located have substantially changed since the adoption of the city's comprehensive plan;  
**Since completion of the EIS, preliminary designs of the currently identified SE Loop Connector have identified several challenges associated with the roadway, including but not limited to roadway grade, right of way impacts, and storm drainage. The SE Loop Connector Alternative was explored to help mitigate these challenges while maintaining a supplemental access to the Lawson Hills MPD. The inclusion of an alternative connection to Lawson Hills can ensure when the MPD project moves forward that there are multiple options that can help the City respond to changing circumstances around transportation and allows the City to evaluate and select the option that best fits the City.**
  4. Whether the assumptions upon which the city's comprehensive plan is based are no longer valid, or whether new information is available which was not considered during the adoption process or any annual amendments of the city's comprehensive plan; and **Additional investigation and research have been done on the SE Loop Connector since it was originally included in the Comprehensive Plan, compared to the proposed alternative. The SE Loop Connector has a steeper roadway grade, longer road length, requires more earthwork, includes several retaining walls, has more affected properties, requires a new SR 169 intersection, and is closer to existing homes than the proposed alternative. The SE Loop Connector Alternative provides an alternate approach that could be utilized if included in the comprehensive plan.**
  5. Whether the proposed amendment(s) reflects current, widely held values of the residents of the city.  
**The proposed amendment was added as a docketed item following a public hearing with the Planning Commission and was adopted by City Council as part of the final docket indicating public support for the amendment to be considered. The proposed amendment for an alternative route has fewer environmental impacts, as the route would require less area (number of parcels) of disturbance, reduced topographical impacts to steep slopes (which would result in significantly less cut and fill), and there would be less stormwater facility requirements (i.e., less pollution generating impervious surface).**
- B. Amendments for Site-Specific Proposals. In addition to the above, any proposal for a site-specific development or amendment shall be reviewed under the following criteria:
1. Whether the proposed site-specific amendment(s) meets concurrency requirements for transportation and does not adversely affect adopted level of service standards for other public facilities and services (e.g., police, fire and emergency medical services, parks, fire flow and general governmental services);



The proposal would not cause the level of service on the roadways to fall below the City standards. There would be a need for improvements at two intersections to maintain intersection level of service (see item A4 above).

2. Any proposed site-specific amendment(s) will not result in probable significant adverse impacts to the city's transportation network, capital facilities, utilities, parks and environmental features that cannot be mitigated, and will not place uncompensated burdens upon existing or planned service capabilities;

**The SE Connector Alternative route is through a relatively flat parcel of land that is outside of mapped landslide hazard areas. There are wetlands in the vicinity of the SE Connector Alternative, however no wetland buffers would need to be encroached upon for the SE Connector Alternative. Both the SE Loop Connector and the proposed Alternative will have to cross Lawson Creek using a bridge, passing through the Lawson Creek Buffer. Impacts from the SE Loop Connector Alternative can be fully mitigated, and development of this roadway would be funded by the proponent.**

3. In the case of a site-specific amendment(s) to the comprehensive plan's land use map, that the subject parcels are physically suitable for the requested land use designation and the anticipated land use development, including, but not limited to, the following: (i) access; (ii) provision of utilities; and (iii) compatibility with existing and planned surrounding land uses;

**The proposed alignment will likely only cross one parcel (1321069018) that is not owned by the proponent, which is suitable for development of the road (the road would cross the undeveloped portion of the parcel). The SE Loop Connector Alternative is a significantly shorter road than what is currently proposed and requires substantially less impacts to surrounding properties and will not require an independent off-site stormwater system.**

4. The proposed site-specific amendment(s) will not create pressure to change the land use designation of other properties, unless the change of land use designation for other properties is in the long-term best interests of the city as a whole;

**The proposal would not change the land use designation of other properties.**

5. The proposed site specific amendment(s) does not materially affect the land use and population growth projections that are the bases of the comprehensive plan;  
**The proposal itself does not affect land use or population growth projections, but rather would be developed in support of growth at a time when the population of the Lawson Hills MPD would require additional access.**

6. If within an incorporated urban growth area (UGA), the proposed site-specific amendment(s) does not materially affect the adequacy or availability of urban facilities and services to the immediate area and the overall UGA;





**The proposal would not affect the adequacy of urban facilities or services. Instead, it would provide infrastructure that complements growth in the urban area.**

7. The proposed amendment(s) is consistent with any applicable county-wide policies for the city and any other applicable inter-jurisdictional policies or agreements, and any other local, state or federal laws.

**The proposal would be consistent with federal, state and local laws, regulations and policies. It would be evaluated in compliance with the development agreement and MPD permit conditions of approval.**

### **Traffic Engineer Review**

The transportation memo and documentation provided by the proponent with the application was sent to the City of Black Diamond's third-party, contracted traffic engineer at Parametrix. The materials the applicant submitted were evaluated for accuracy, viability, and to provide a recommendation to the City.

#### First Review

Comments given included confirmation of the trip redistribution in the technical memo, and a desire to see revisions to the traffic memo to identify improvements that would be beyond those, or those not evaluated, in the applicable Environmental Impact Statement. These include the northbound left-turn lane as an additional improvement and the new intersection with Lawson Street forecasted level of service. City staff concurs these revisions need to be included but does not believe these revisions need to occur now, but rather would need to be taken into consideration at the time of the project when the alternatives are evaluated.

After review of the alternative materials, the traffic engineer ultimately concurs with the proposed text and map changes proposed for the comprehensive plan. See attached Technical Review Memo from Alex Atchison, PE with Parametrix dated July 22, 2021.

#### Second Review

Parametrix further reviewed the additional traffic analysis items submitted by the applicant (prepared by Transpo Group dated September 24, 2021), following the first public hearing.

Comments given included confirmation of the revised trip redistribution in the technical memo, and agreement that the Lawson Connector results in a vehicular route that is more convenient than Lawson Street for most vehicles traveling north and west. The analysis shows that any impacts to intersections can be mitigated with additional turn lanes and/or changes in intersection control (e.g., adding a traffic signal). Transpo's analysis is consistent with the 2009 EIS but acknowledges that updates to the MPD analyses and assumptions have occurred – including that the construction of a fourth leg at the SR 169/Roberts Drive intersection has been determined infeasible.

After review of the further materials, it is recommended the interaction of the proposed signal at SR 169/Lawson Connector and the proposed roundabout at SR 169/Roberts Drive be evaluated in future analysis to insure that queuing from the signal doesn't potentially impact the roundabout.



The City concurs that further analysis will be done in the future when the roadway alignment is being selected.

### **Staff recommendation**

After review of the application materials and third-party review notes provided by the City's contract traffic engineers at Parametrix, staff recommends **approval** of these amendments.

### **Attachments**

1. Black Diamond - Proposed Comprehensive Plan Amendment - Review Comments from Alex Atchison, PE with Parametrix dated September 29, 2021
2. Lawson Hills MPD SE Connector Analysis from David Evans and Associates, Inc. dated September 21, 2021
3. Requested Comprehensive Plan Amendment – SE Connector Alternative from TranspoGroup dated September 24, 2021
4. Technical Review Memo from Alex Atchison, PE with Parametrix dated July 22, 2021
5. SE Loop Connector Alternative – Application Materials

## TECHNICAL MEMORANDUM

**DATE:** September 29, 2021  
**TO:** Mona Davis, City of Black Diamond  
**FROM:** Alex Atchison, PE, PTOE  
**SUBJECT:** Black Diamond - Proposed Comprehensive Plan Amendment - Review Comments  
**CC:** Seth Boettcher, City of Black Diamond  
Emily Adams, City of Black Diamond  
**PROJECT NUMBER:** 214-3043-029 Task 37  
**PROJECT NAME:** Black Diamond - Proposed Comprehensive Plan Amendment

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This memorandum provides comments on Oakpointe's proposed amendments to the City of Black Diamond's Comprehensive Plan and supporting traffic analysis, dated September 24, 2021.

**Comment #1:** We generally concur with the revised trip distribution described in Transpo Group's "Requested Comprehensive Plan Amendment – SE Loop Connector Alternative" technical memo (September 24, 2021). The previous analysis assumed worst case impacts assuming all traffic shifts from the SE Connector to Lawson Street. In this memo, traffic is assumed to use both Lawson Street and the Lawson Connector.

Transpo's assumption that majority of traffic previously assigned to the eastbound through movement at SR 169/Jones Lake Road/SE Connector will instead turn left onto the Lawson Connector from southbound SR 169 could be a bit optimistic. However, we do agree that the Lawson Connector results in a vehicular route that is more convenient than Lawson Street for the majority of vehicles traveling north and west. Actual traffic distribution may vary, but as shown in this analysis and previous analysis, any impacts to intersections can be mitigated with additional turn lanes and/or changes in intersection control (e.g., adding a traffic signal).

**Comment #2:** Transpo's updated analysis clearly distinguishes proposed improvements that would be additional to improvements beyond those identified in the EIS. The operational analysis shows the impacts resulting from the removal of the SE Connector Alternative can be mitigated with additional turn lanes and/or change in intersection control (e.g., adding a traffic signal), as mentioned in Comment #1.

The updated analysis does note that as part of the EIS, it was assumed that the Lawson Connector would intersect SR 169 as the fourth (westbound) leg of the SR 169/Roberts Drive intersection. The memo also states that since the EIS was completed the construction of a fourth leg at the SR 169/Roberts Drive intersection has been determined infeasible. As such, the SR 169/Roberts Drive intersection is now proposed as three lane roundabout and the Lawson Connector will intersect with SR 169 approximately 400 feet south of Roberts Drive.

Transpo's analysis assumed the new intersection of SR 169/Lawson Connector would be signal controlled, consistent with the 2009 EIS recommendation of a signal at the intersection of SR 169/Roberts Drive/Lawson Connector. Updates to the MPD analyses and assumptions have occurred since the 2009 EIS. The MPD is now proposing a roundabout at SR 169/Roberts Drive as part of their mitigation. This is consistent with the assumption in the 2019 Comprehensive Plan that assumes a roundabout at the intersection of SR 169/Roberts Drive/Lawson Parkway.

So, while the proposed signal at the new intersection of SR 169/Lawson Connector is shown to meet WSDOT's LOS D standard, we recommend the interaction of the proposed signal at SR 169/Lawson Connector and the proposed roundabout at SR 169/Roberts Drive be evaluated in future analysis to insure that queuing from the signal doesn't potentially impact the roundabout.



DAVID EVANS  
AND ASSOCIATES INC.

MEMORANDUM

**DATE:** September 21, 2021

**TO:** Mona Davis  
Community Development Director  
24301 Roberts Drive  
Black Diamond, WA 98010

**FROM:** Adam Stricker, PE, David Evans and Associates, Inc.  
Beau Willert, PE, David Evans and Associates, Inc.

**SUBJECT:** Lawson Hills MPD SE Connector Analysis

**PROJECT:** Lawson Hills MPD

**CC:** Brian Ross, Oakpointe  
Justin Wortman, Oakpointe  
Tom Matt, PE, David Evans and Associates, Inc.

This memorandum is intended to compare the impacts of constructing secondary access roads for the Lawson MPD. The SE Connector would connect the southeastern portion of the site to SR169 via a new intersection with SR169 at Railroad Ave. An alternative route, called the "SE Connector Alternative" in this memo, has been identified that provides a secondary connection to Lawson Street.

Preliminary design studies of both the SE Connector and SE Connector Alternative have been prepared; copies are attached to this memorandum. Significant right of way, engineering and neighborhood impacts are present in the design. This memorandum compares the two alternatives relative to grading, walls, storm drainage, right of way acquisition and neighborhood impacts.

Alternative Analysis Summary:

| Evaluation Parameter             | SE Connector                    | SE Connector Alternative    |
|----------------------------------|---------------------------------|-----------------------------|
| Max. Roadway Grade (%)           | 12                              | 2                           |
| Road Length                      | 2,600 ft                        | 900 ft                      |
| Earthwork Volume                 | 15,920 CY Cut<br>25,575 CY Fill | 650 CY Cut<br>1,200 CY Fill |
| Max. Wall Height                 | 25'                             | No Walls                    |
| Wall Square Footage              | 24,900                          | No Walls                    |
| Storm Drainage                   | Large vault                     | Utilizes MPD Facilities     |
| Right of Way Acquisition         | 16 Properties                   | 1 Parcel                    |
| Proximity to Existing Homes      | 40 feet                         | 250 feet                    |
| SR 169 Intersection Improvements | New intersection                | No new intersection         |



These categories will be discussed in greater length below, but as can be seen from the brief summary above, the SE Connector Alternative is a significantly shorter road that requires substantially less impacts to surrounding properties, and will not require an independent off-site stormwater system.

A preliminary design of the SE Connector has been prepared by David Evans Associates and is presented in an engineering exhibit set titled “Lawson South Access Conceptual Plans” and has been attached to this memorandum. A preliminary plan and profile of the SE Connector Alternative has also been prepared and is presented in the attached “SE Connector Alternative” exhibits. The same road section was used in both of these design studies. These plans were created using LIDAR contours, parcel boundaries and aerial photography.

### **Existing Conditions and Critical Areas**

The SE Connector is to be constructed over a steeply sloping forested hillside with existing grades in the range of 20% to 40% in some sections. The soils and slopes found on the SE Connector site suggest the presence of landslide hazards and potential erosion hazard areas. These critical areas are found on the Lawson Hills MPD site near the connection point to the SE Connector. Geotechnical analysis would be required to determine if construction on these slopes could be done safely. The lower portions of the SE Connector are within the 225' core buffer and shoreline zone of Jones Lake and cross Lawson Creek and its associated buffer.

The SE Connector Alternative route is through a relatively flat parcel of land that is outside of mapped landslide hazard areas. There are wetlands in the vicinity of the SE Connector Alternative, however no wetland buffers would need to be encroached upon for the SE Connector Alternative. The SE Connector Alternative will have to cross Lawson Creek, passing through the Lawson Creek Buffer.

### **Roadway Grade**

The SE Connector is approximately 2,600 feet in length and accomplishes an elevation change of approximately 220' over its length. The SE Connector will have a maximum road grade of 12% for a distance of approximately 580'.

The SE Connector Alternative requires a shorter length (approximate 900') of road before connecting to other proposed roads internal to the Lawson Hills MPD. The majority of slopes in the SE Connector Alternative are 2% or less. Total elevation change for the SE Connector Alternative is approximately 10'.

### **Earthwork Volumes**

The SE Connector requires 15,920 cubic yards of cut and 25,575 cubic yards of fill resulting in a net of 9,655 cubic yards fill. It is not known if the soils produced from the cut are suitable for use as fill.

The SE Connector Alternative requires a 650 cubic yards of cut and 2,600 cubic yards of fill for the grading of the SE Connector Alternative.

### **Wall Height**

The SE Connector will require approximately ten retaining walls with several of these walls being over 20' tall. Nearly all of these walls are proposed in areas of extreme slopes, which will complicate design and construction. The walls at stations 7+50, 11+00 and 18+00 are within 50' of existing residences and will



require special design consideration to not undermine the adjacent structures.

The SE Connector Alternative would require no retaining walls except for walls related to the crossing of Lawson Creek.

### **Wall Square Footage**

The SE Connector requires a total of 24,900 Square feet of wall face. Additional sections of wall may be required if geotechnical studies show that the areas of proposed cut and fill slopes are not suitable.

The SE Connector alternative would require no walls or rockeries except as needed for crossing of Lawson Creek .

### **Bridge**

The SE Connector will have to cross Lawson Creek using a 120' long bridge. Likely construction types for this bridge could include wide flange deck girder or steel deck girder with an anticipated structure depth in the range of 50". The allowable structure depth of the future bridge may be limited by the low clearance to the high water elevations of Lawson Creek. The bed of Lawson Creek lies about 12' below the bridge deck and the available freeboard to pass high stream flows precludes the use of a culvert and fill style of crossing.

The SE Connector alternative would also require a similar bridge crossing of Lawson Creek.

### **Storm Drainage Vault**

The SE Connector proposes over 2.5 acres of impervious surfaces; approximately 1.8 acres of this will be pollution generating impervious surfaces. The SE Connector will require a stormwater vault and a water quality treatment train to accomplish flow control and water quality treatment minimum requirements. Preliminary sizing of this system shows that a vault with a live storage volume of 60,800 cubic feet and a water quality volume of 30,400 cubic feet will be required. This results in a vault with a minimum footprint of 44' wide by 196' long by 13' deep. The depth and width of this vault footprint was selected to minimize grading back into the hillside to the north of the vault. The north side of Railroad Ave, although in a steep hillside, is the only possible location for the vault as the south side of Railroad Ave is within the Jones Lake buffer and shoreline setback and would involve the placement of fill within this critical area. A 23' max height wall will be required to grade in the vault location. This stormwater facility would only treat stormwater from the SE Connector.

The SE Connector Alternative will require a similar level of flow control and water quality treatment but will be able to utilize stormwater infrastructure built for other phases of the Lawson Hills MPD. The SE Connector Alternative proposes much less impervious surface than the SE Connector.

The SE Connector Alternative's ability to utilize MPD stormwater facilities reduces the City's maintenance burden compared to the SE Connector which would require a standalone stormwater facility. The SE Connector Alternative provides a way to prevent many of the impacts that the SE Connector presents and provides a much more economic and feasible connection.



### **Right of Way Acquisition**

The SE Connector proposes roadway or grading over 16 privately owned parcels. Of these parcels the SE Connector bisects three and completely envelopes one. Rerouting of utility lines may require disturbances to additional properties. Some of these property owners may not be interested in selling property for ROW and grading. If this is the case the city would have to use eminent domain to make the SE Connector feasible. In total there are seven parcels containing residences that would need to be partially or completely acquired for the construction of the SE Connector.

The SE Connector Alternative can be constructed with the acquisition of a single additional parcel (parcel number 1321069018). This parcel was identified in Figure 3-3 of the Lawson Hills MPD as a potential expansion parcel.

### **Proximity to Existing Homes**

The SE Connector passes within 100' of eight existing structures and three existing structures are within 40' of proposed retaining walls. Significant grading revisions are required for the driveways to six residences that are currently accessed from Pacific Street.

Pacific Street in its existing condition is a minimally traveled, gravel paved, dead end road that serves as the access to eight residences. The SE Connector would replace Pacific Street as the access to six of these existing residences and would route a significant volume of traffic through this neighborhood. Pacific Street would need to be terminated to the north of the SE Connector as the SE Connector must be constructed approximately 6' above the existing grade of Pacific Street at that point for slope criteria to be met.

There is one residence currently on the offsite parcel to be acquired for the SE Connector Alternative. This house could potentially remain after construction of the SE Connector Alternative. The nearest offsite house is 250' from the SE Connector Alternative entry at Lawson street. There would be no encroachments on this off site property.

The SE Connector Alternative provides access to Lawson Street, which is currently a well-utilized route to downtown Black Diamond and SR 169. The SE Connector Alternative is much less impactful to existing residences.

### **SR 169 Intersection Improvements**

The intersection of the SE Connector and State Route 169 presents several design challenges including intersection type selection, grading and pedestrian access. Roundabouts are the intersection type preferred by WSDOT, however the centerline slope of SR 169 in the area of the intersection ranges from 6% to 8% based on LIDAR contours. This is above the ideal range of centerline slopes for roundabout intersections (slopes of up to 4% are typical for roundabouts, 2% being ideal) however, WSDOT has designed and requested non-standard roundabouts in this range of existing slopes. Shown on the conceptual plan is a signal-controlled intersection with two travel lanes along the access and two travel lanes and a center turn lane along SR-169 requiring widening of SR169 at this location. Regrading of SR169 to a lower slope through the intersection can be anticipated. If a roundabout is ultimately required at this location additional impacts and ROW acquisition should be anticipated. The addition of an intersection, whether a roundabout or a signal, will tend to decrease the level of service of SR 169.





The SE Connector Alternative will take access off Lawson Street which intersects SR 169 near downtown Black Diamond. Intersection improvements at Lawson Street and SR 169 are already a requirement of the MPD and would provide far less impacts to traffic than an additional intersection on SR 169 as is necessary with the SE Connector. A new intersection at Lawson Street would be required. It is acknowledged that further traffic impact analysis would need to be conducted to fully understand offsite road improvements that the SE Connector Alternative may trigger.

### **Conclusion**

The SE Connector design has a number of design constraints that make it much more impactful than the SE Connector Alternative. The SE Connector proposes to add a major roadway, several large walls and a bridge in the middle of a quiet neighborhood. The SE Connector requires a new intersection on SR169 and a standalone stormwater facility. This infrastructure and the property acquisition, including possible eminent domain, necessary to construct this alternative would have a major impact on the character of the community.

The SE Connector Alternative is able to accomplish a secondary connection with a significantly shorter length of road through fewer critical areas. The reduction in impervious surfaces that the SE Connector Alternative can provide is in keeping with the overall MPD goals of reducing impervious coverage and impacts to critical areas.

### **Attachments/Enclosures:**

- SE Connector Overall Improvement Plan – Aerial
- SE Connector Overall Improvement Plan & Property Owner Impacts
- SE Connector (Lawson South Access) Profiles
- SE Connector Alternative Improvement Plan & Profile





## OVERALL IMPROVEMENT PLAN

# LAWSON SOUTH ACCESS

## CONCEPTUAL PLAN

CITY OF BLACK DIAMOND

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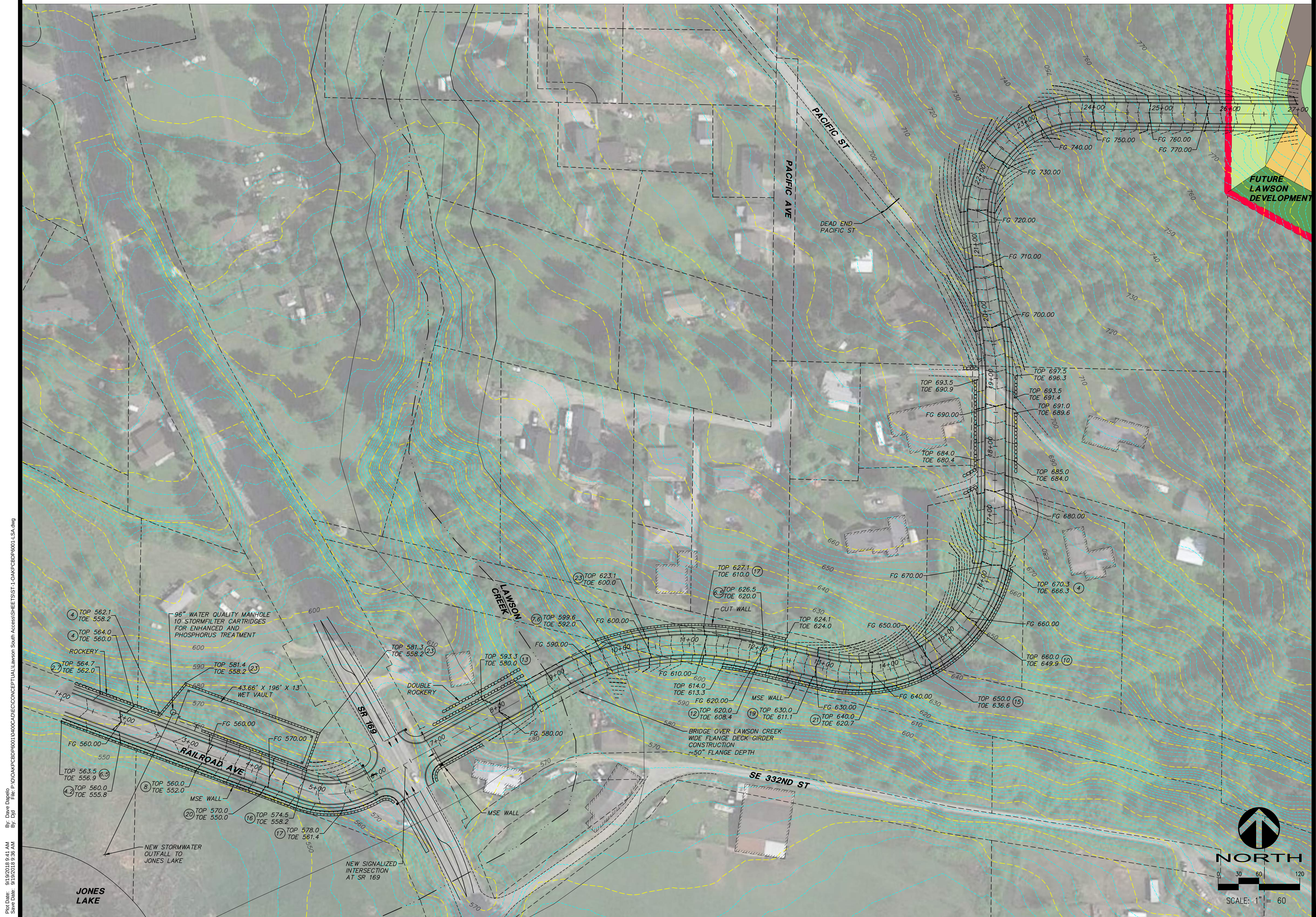
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## OVERALL IMPROVEMENT PLAN

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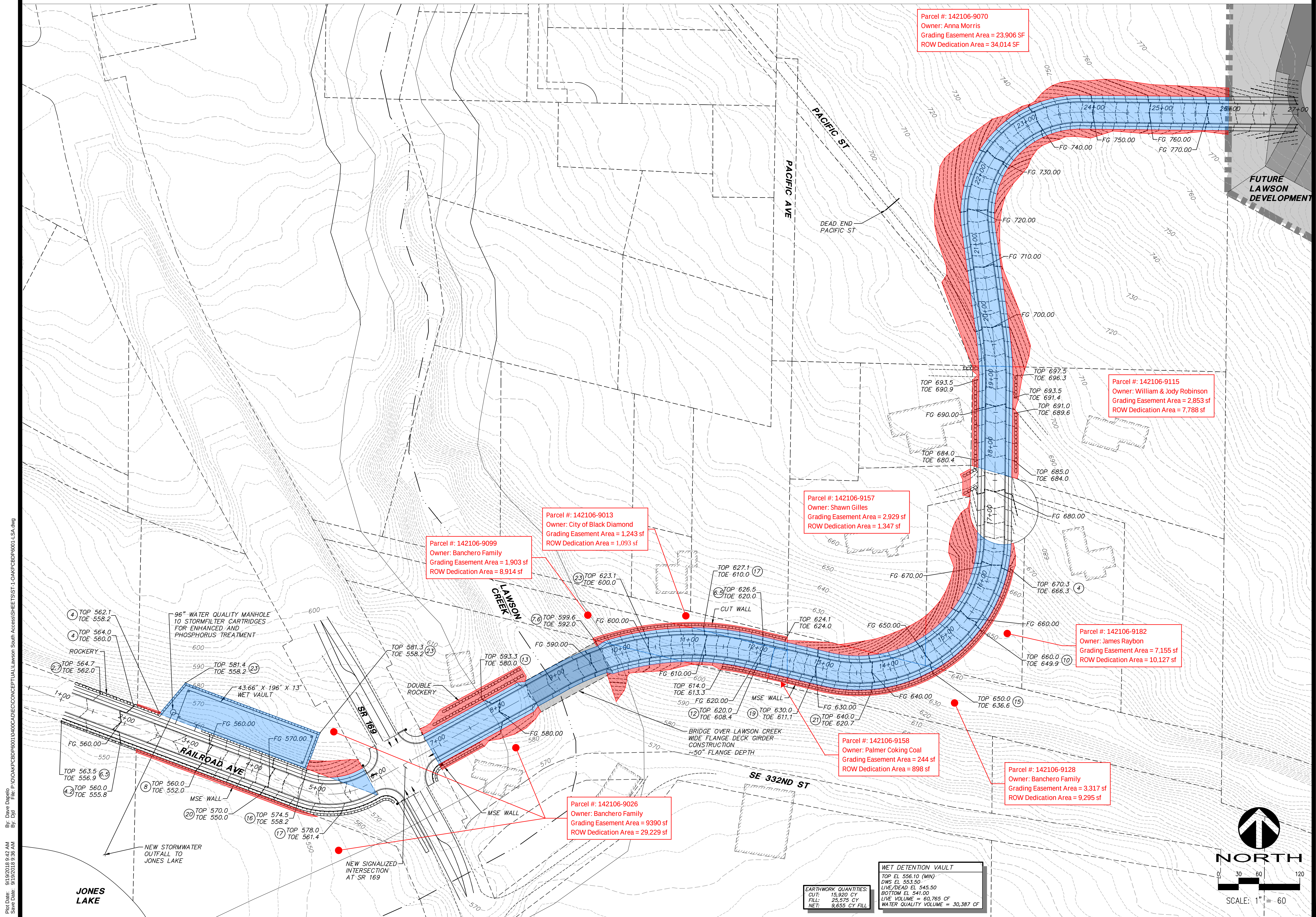
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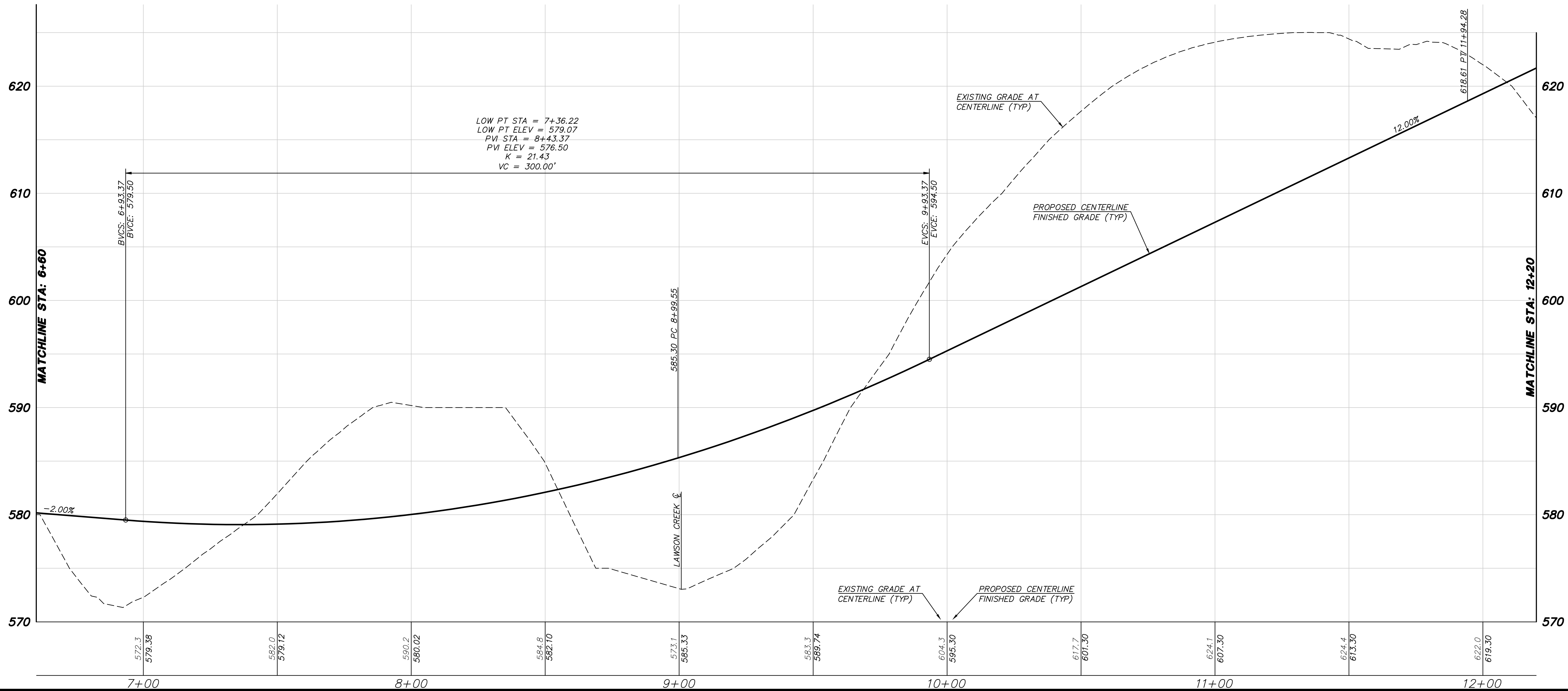
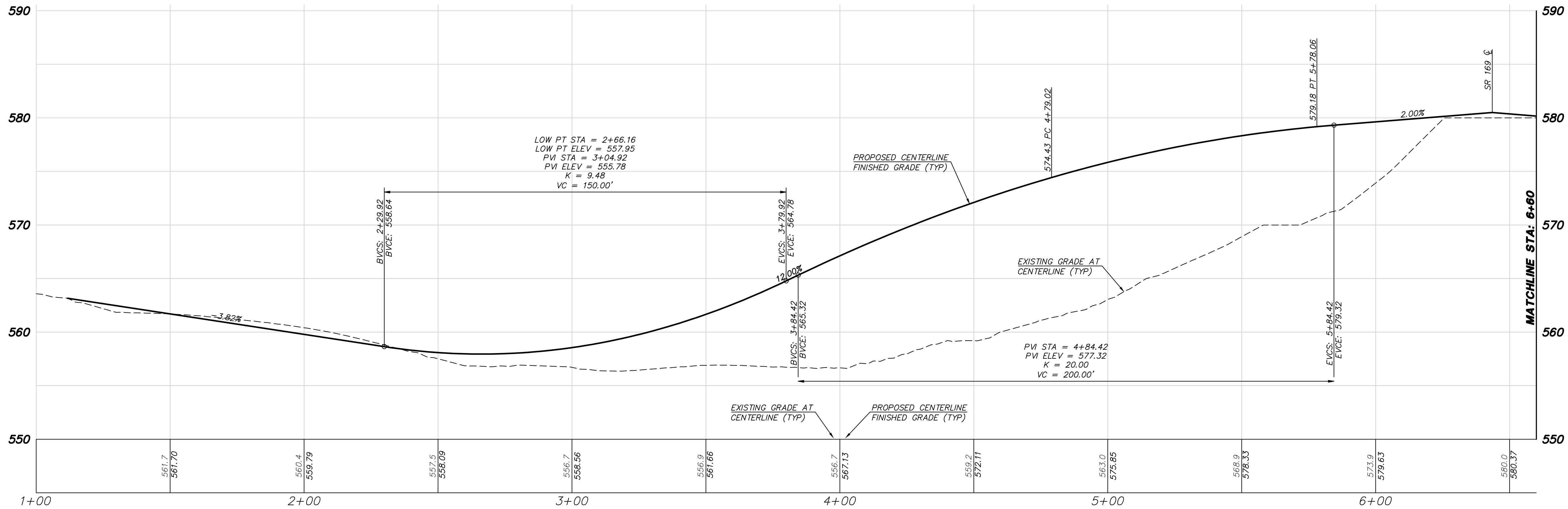
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# LAWSON SOUTH ACCESS

## CONCEPTUAL PLAN

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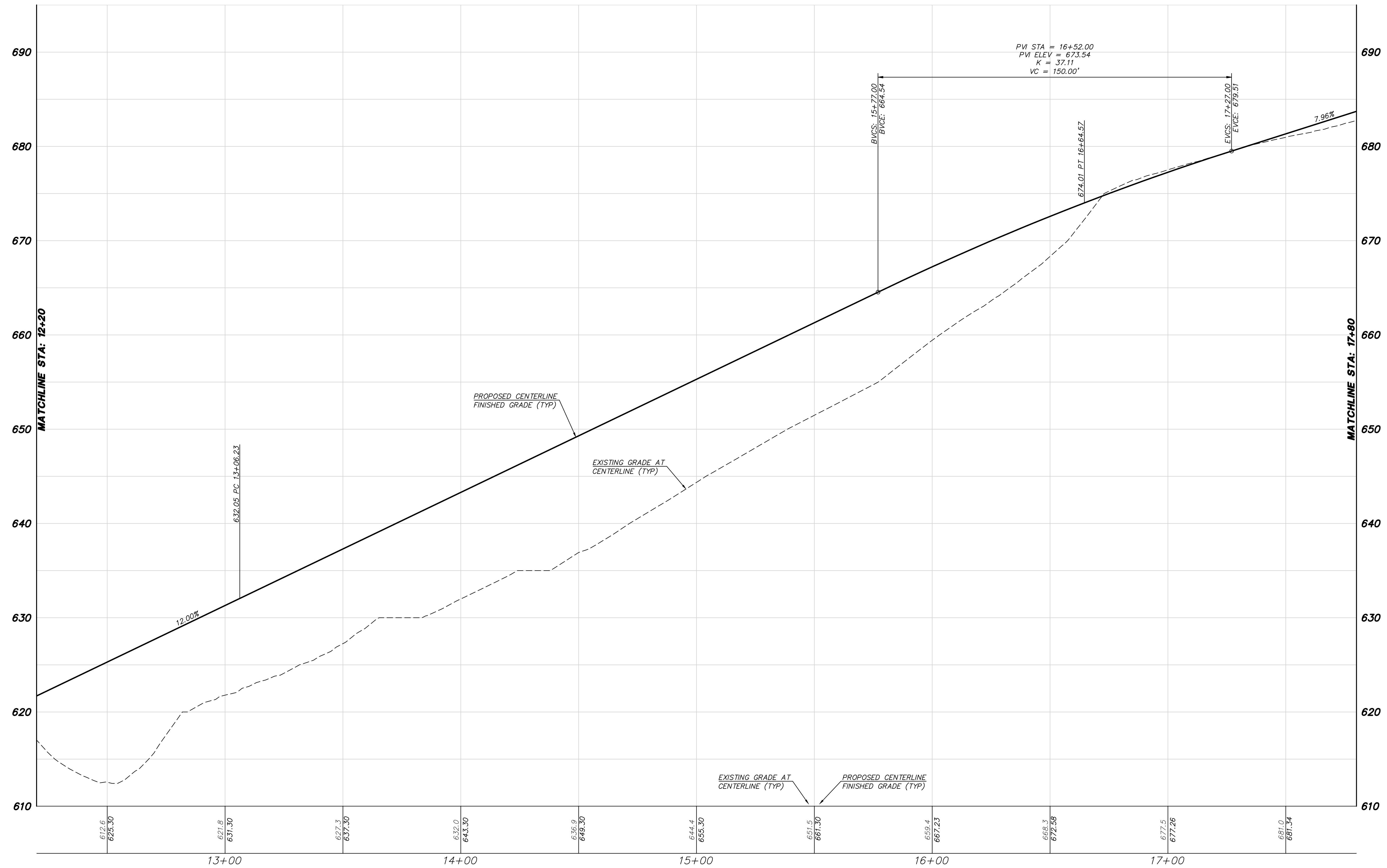
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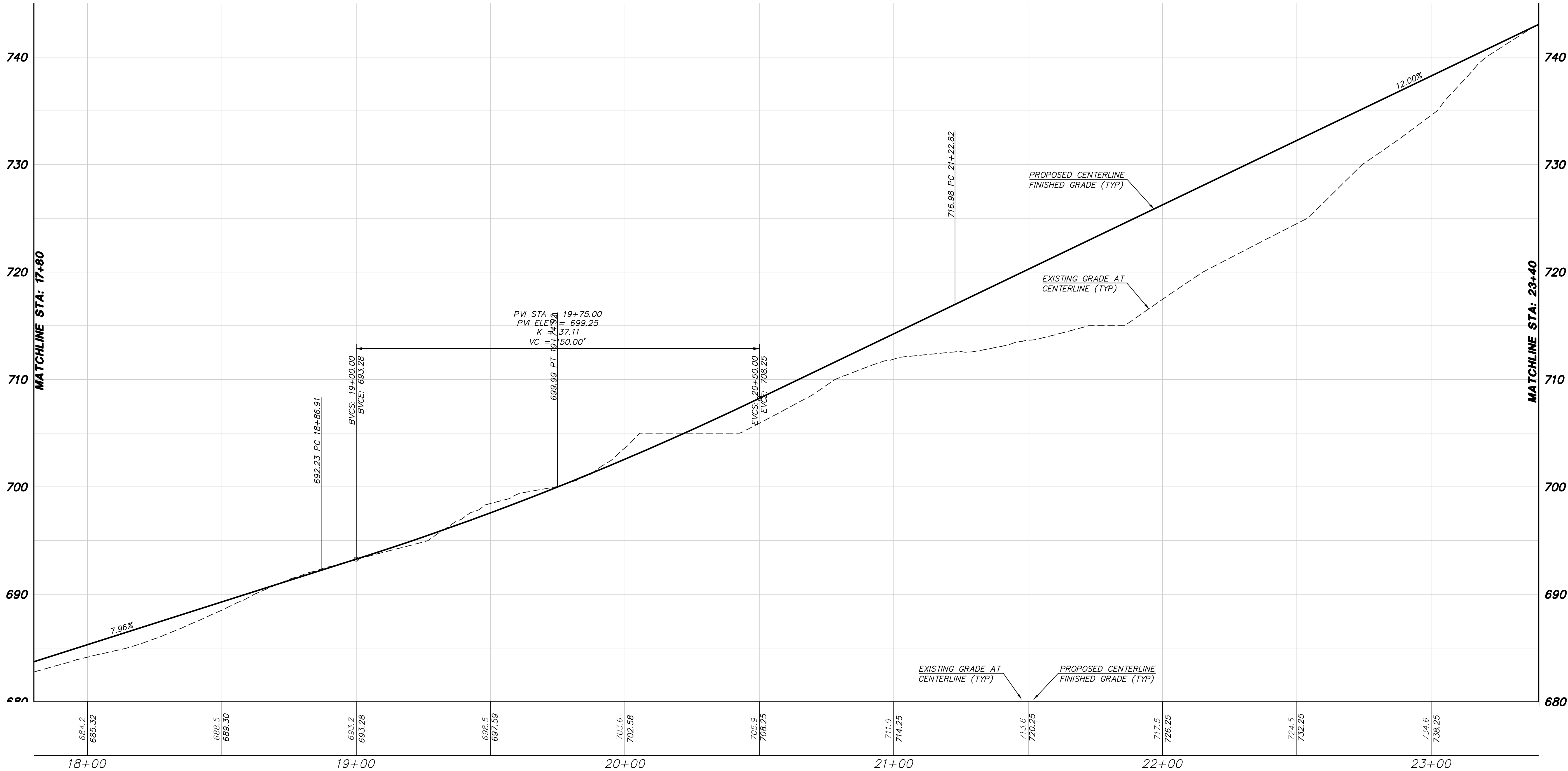
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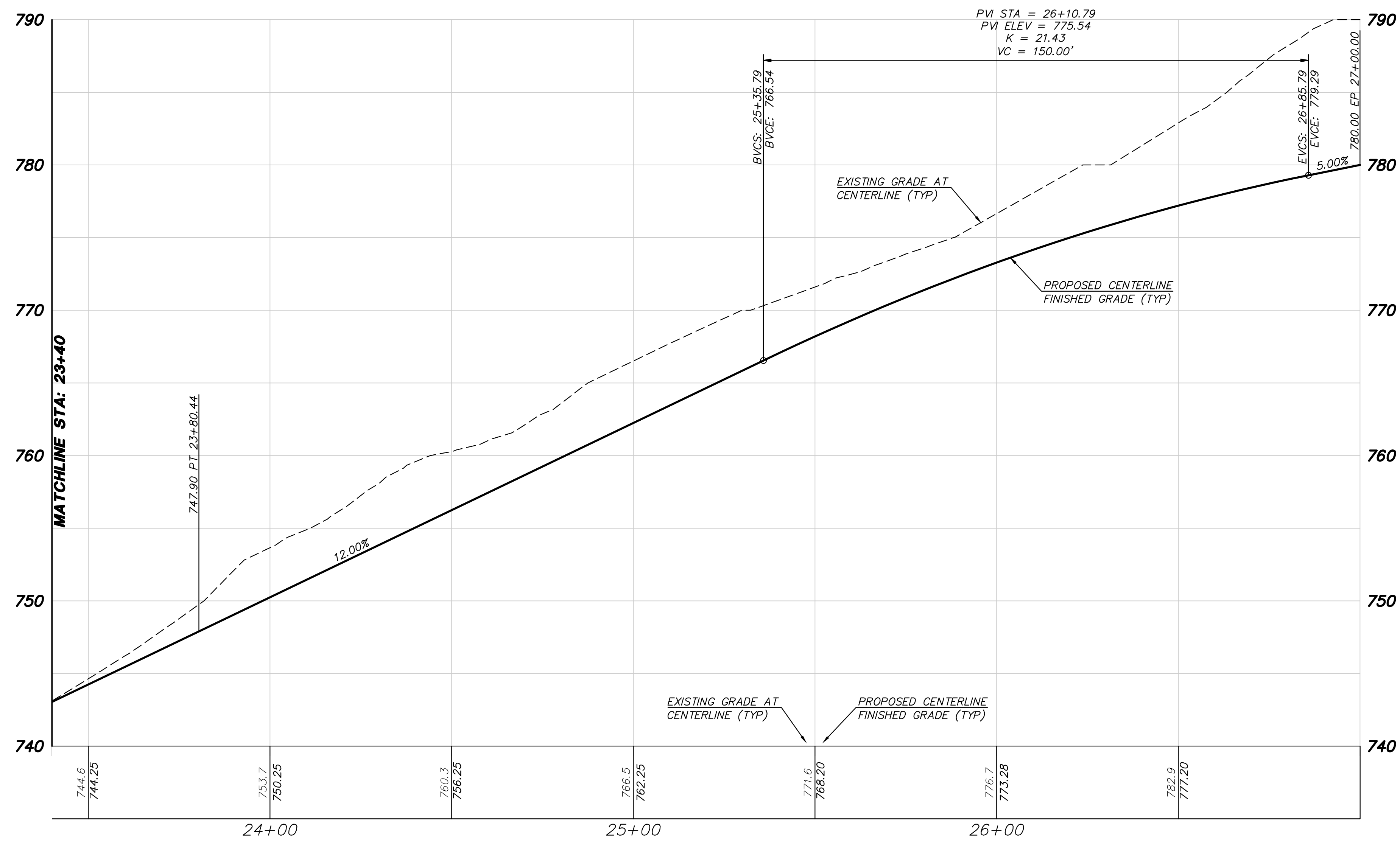
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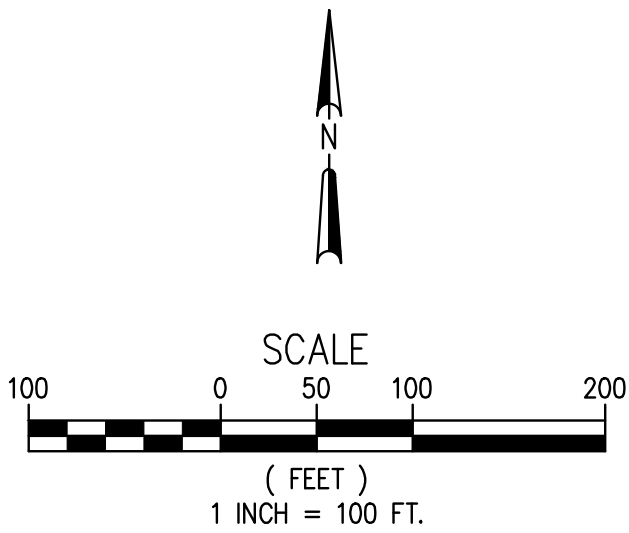
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SE CONNECTOR ALTERNATIVE



SE CONNECTOR ALTERNATIVE

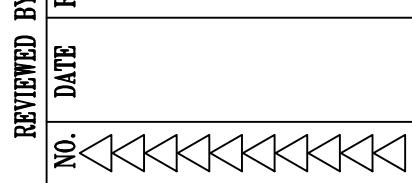
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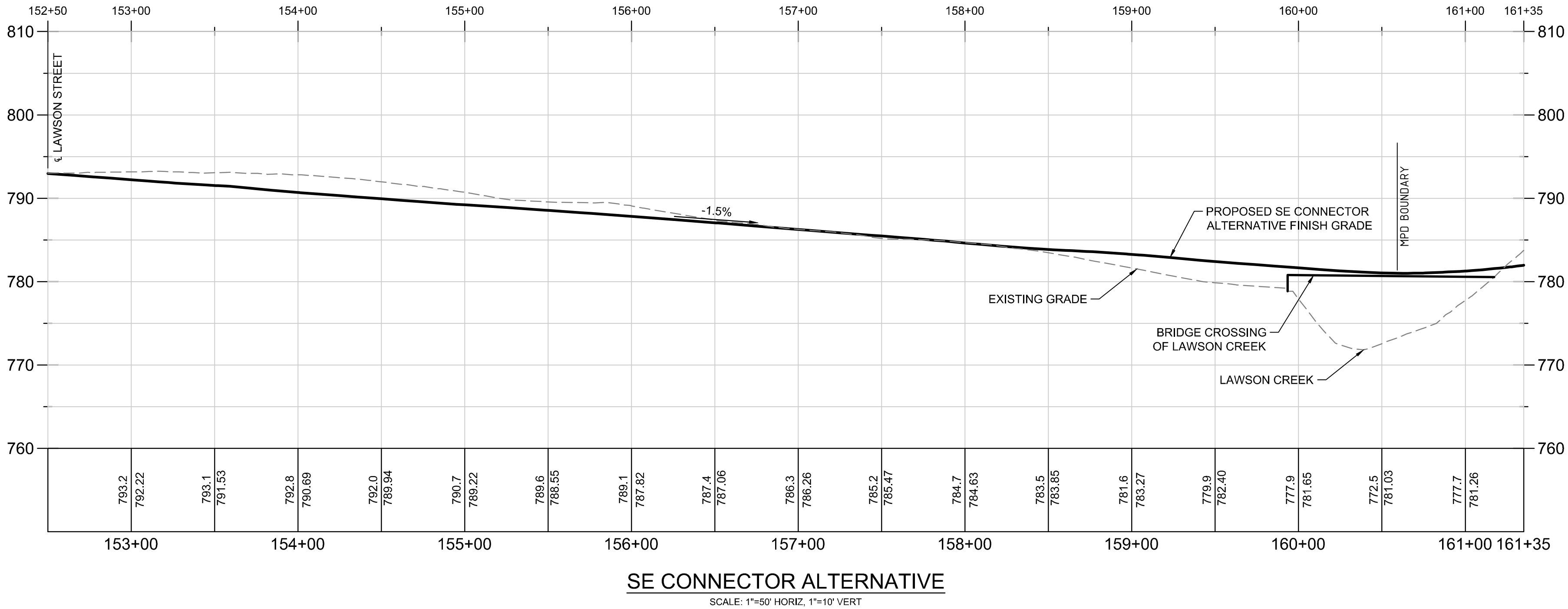
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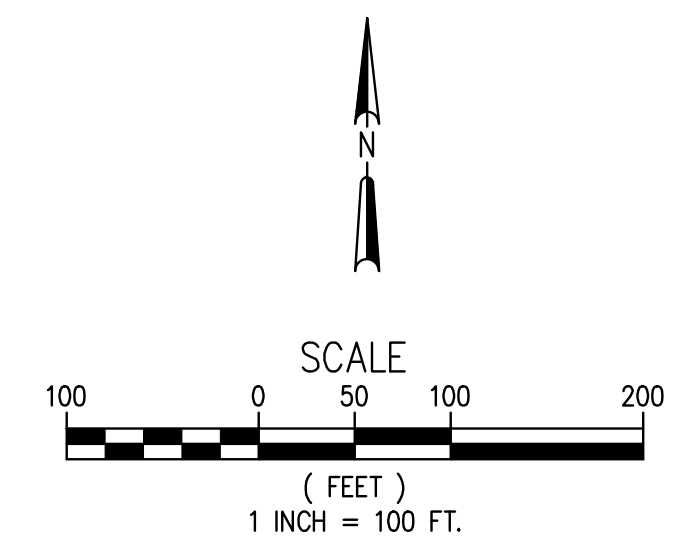
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**DAVID EVANS  
AND ASSOCIATES INC.**

20300 Woodinville Snohomish Rd NE  
Woodinville Washington 98072  
Phone: 425.415.2000



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## MEMORANDUM

|                 |                                                                   |            |          |
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| <b>Date:</b>    | September 24, 2021                                                | <b>TG:</b> | 16450.00 |
| <b>To:</b>      | Andrew Williamson – City of Black Diamond                         |            |          |
| <b>From:</b>    | Mike Swenson, P.E., PTOE and Maris Fry, P.E. – Transpo Group      |            |          |
| <b>cc:</b>      | Brian Ross and Justin Wortman – Oakpointe                         |            |          |
| <b>Subject:</b> | Requested Comprehensive Plan Amendment – SE Connector Alternative |            |          |

This memorandum provides analysis evaluating the proposed inclusion of a route for the SE Connector that differs from the conceptual route depicted in the City of Black Diamond's 2019 Comprehensive Plan. This updated route has been referred to as the SE Connector Alternative. Oakpointe is requesting the SE Connector Alternative be added to the Comprehensive Plan as preliminary engineering studies of the current SE Connector alignment have identified significant challenges. It would be beneficial to include both alignments in the Comprehensive Plan to allow continued refinement of site development and roadway engineering plans. In support of this proposed amendment, this memorandum includes the following information:

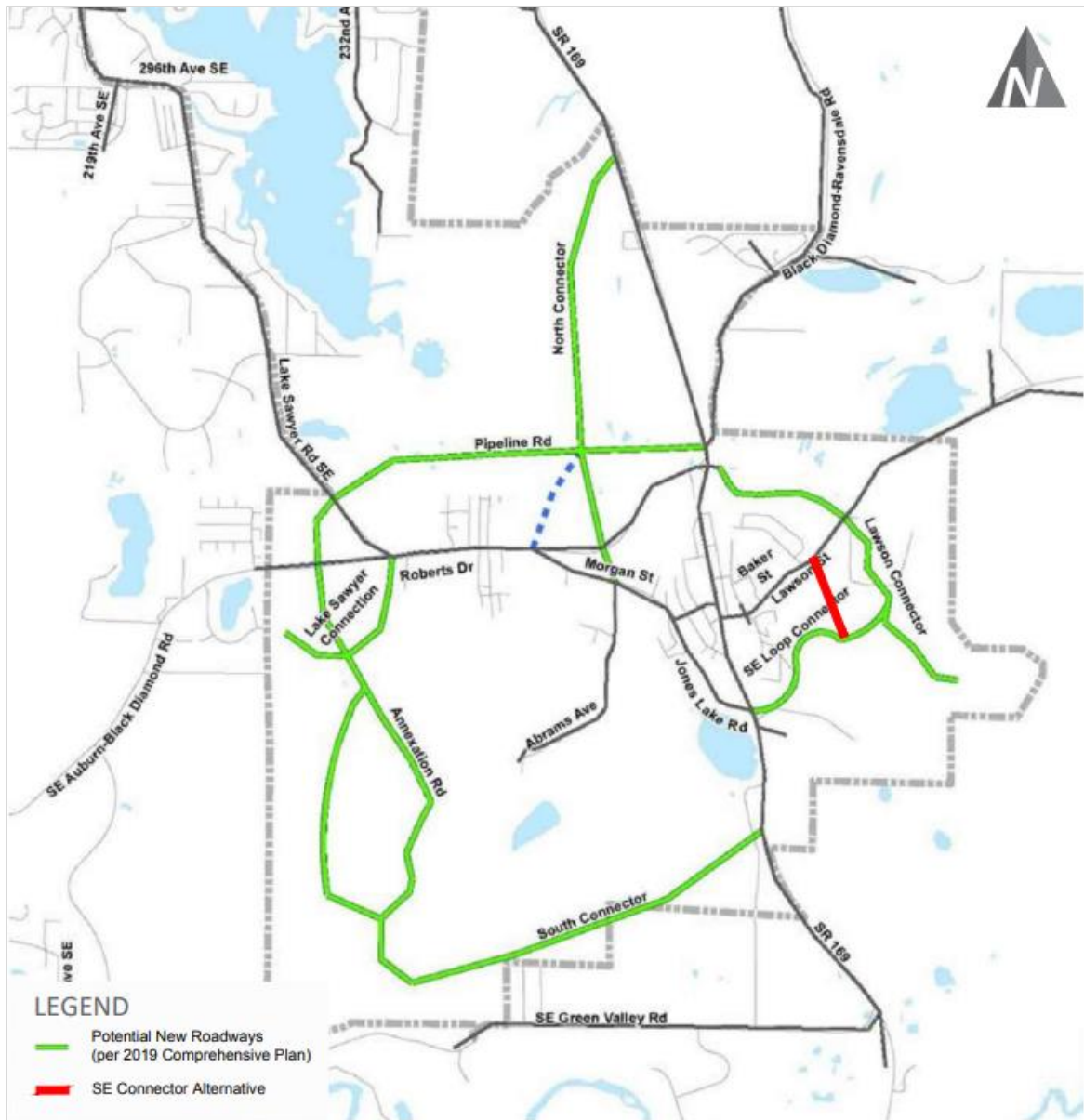
- Overview of the proposed SE Connector Alternative
- SE Connector Challenges and Considerations
- Operational impacts of the SE Connector Alternative
  - Summary of pertinent EIS analyses and findings
  - SE Connector Alternative impacts

As detailed below, this analysis determined that the impacts of the proposed SE Connector Alternative could be sufficiently mitigated through the addition of turn lanes at the intersection of SR 169/Baker Street and installation of a traffic signal at Lawson Street/Lawson Connector. Improvements are still required at the intersection of SR 169/Jones Lake Road, but to a lesser extent than proposed in the EIS. All other mitigation measures outlined in the EIS are sufficient to accommodate shifts in traffic patterns with the proposed SE Connector Alternative.

## SE Connector Alternative Overview

As shown in Figure 1, the Comprehensive Plan currently identifies the SE Connector as a connection between the Lawson Connector and State Route (SR) 169. In addition to the Lawson Street and the Lawson Connector, the SE Connector was proposed to provide additional connectivity between the Lawson Hills MPD and SR 169. The SE Connector Alternative proposed to be incorporated into the Comprehensive Plan has been identified as shown in Figure 1. The SE Connector Alternative would connect the Lawson Hills MPD to Lawson Street, which then connects to SR 169. The Lawson Connector would remain.





**Figure 1: Proposed SE Connector Alternative** (Base Map Source: City of Black Diamond 2019 Comprehensive Plan)

To understand the anticipated impacts of the proposed SE Connector Alternative, the volume projections outlined in the Environmental Impact Study (EIS), which were documented in detail in the *Lawson Hills Transportation Technical Report (TTR)* performed by Parametrix in 2009, were updated assuming traffic shifts from the SE Connector to the Lawson Connector and Lawson Street via the SE Connector Alternative. In contrast, the previously submitted analysis determined the *worst-case impacts* of the proposed SE Connector Alternative assuming that *all traffic* shifts from the SE Connector to Lawson Street.

The routing patterns outlined in the EIS assume most project traffic travels to and from the north and west. Specifically, 60 percent of traffic is projected to travel to and from the north via SR 169 and 25 percent of traffic is projected to travel to and from the west via Roberts Drive or downtown Black Diamond. These assumptions are generally based on the City's and the Puget Sound

Regional Council (PSRC) travel demand model with minor adjustments incorporated based on local knowledge of the regional transportation system.

Based on routing patterns outlined in the EIS, this analysis assumes that approximately 60 percent of traffic previously routed to the SE Connector is routed to the Lawson Connector, and the remaining 40 percent is routed to Lawson Street. This assumes that all traffic traveling to and from the south utilizes Lawson Street only. Traffic traveling to and from the north and west primarily utilizes the Lawson Connector and secondarily utilizes Lawson Street. The proposed alignment of the Lawson Connector results in a vehicular route that is more convenient than Lawson Street for the majority of vehicles traveling north and west, but this analysis assumes that approximately 15 percent of vehicles traveling north and west are rerouted to Lawson Street and the remainder are rerouted to the Lawson Connector. Based on the anticipated trip assignment and re-routing associated with the revised Alternative analysis, volume and operations impacts were evaluated at the following intersections:

1. SR 169/Lawson Connector
2. SR 169/Baker Street
3. SR 169/Lawson Street
4. SR 169/Jones Lake Road
5. Railroad Avenue/Baker Street
6. Lawson Street/SE Connector Alternative
7. Lawson Street/Lawson Connector

## SE Connector Challenges and Considerations

Since completion of the EIS, preliminary designs of the currently identified SE Connector have identified several challenges associated with the roadway, including but not limited to roadway grade, right of way impacts, and storm drainage. The SE Connector Alternative was explored to help mitigate these challenges while maintaining a supplemental access to the Lawson Hills MPD. A summary of the evaluation between the SE Connector and the Alternative is summarized in Table 1. A comprehensive alternatives evaluation is included as Attachment A.

**Table 1. SE Connector Alternative Evaluation**

| Evaluation Parameter             | SE Connector                  | SE Connector Alternative  |
|----------------------------------|-------------------------------|---------------------------|
| Max. Roadway Grade (%)           | 12                            | 2                         |
| Road Length                      | 2,600 ft                      | 900 ft                    |
| Earthwork Volume                 | 15,920 CY Cut; 25,575 CY Fill | 650 CY Cut; 1,200 CY Fill |
| Max. Wall Height                 | 25 ft                         | No walls                  |
| Wall Square Footage              | 24,900                        | No walls                  |
| Storm Drainage                   | Large vault                   | Utilizes MPD facilities   |
| Right of Way Acquisition         | 16 properties                 | 1 parcel                  |
| SR 169 Intersection Improvements | New intersection              | No new intersection       |

Source: Lawson Hills MPD Condition #25 memorandum prepared by David Evans and Associates in August 2020.

Considering the above challenges, it should also be noted that most traffic traveling to and from the Lawson Hills MPD will be oriented to the north and west, rather than the south. While the SE Connector would provide a supplemental access to the Lawson Hills MPD, vehicular traffic is more likely to use the Lawson Connector as an alternative to the SE Connector rather than Lawson Street given the proposed orientation of the Lawson Connector. The following section describes the impacts to the transportation network considering the proposed SE Connector Alternative.



## Traffic Operations Analysis

This section summarizes the findings of the EIS at the study intersections and the impacts of the proposed SE Connector Alternative.

### *Summary of Pertinent EIS Findings*

The analysis contained within the EIS developed traffic volume projections and defined impacts for the Lawson Hills MPD, as well as the collective impacts of the Lawson Hills and Ten Trails MPDs. Based on this analysis, the following mitigations were identified at the above study intersections for full build-out conditions of both MPDs.

- **SR 169/Lawson Connector:** As part of the EIS, it was assumed that the Lawson Connector would intersect with SR 169 as the fourth (westbound) leg of the SR 169/Roberts Drive intersection. The proposed mitigation included second southbound and northbound through lanes and southbound and northbound left turn pockets.  
  
It should be noted that since the EIS was completed, the construction of a fourth leg at SR 169/Roberts Drive has been determined infeasible. As such, the SR 169/Roberts Drive intersection is currently proposed as a three-leg roundabout and the Lawson Connector will intersect with SR 169 approximately 400 feet south of Roberts Drive. While the ultimate traffic control of SR 169/Lawson Connector has not been finalized, it is preliminarily planned as a traffic signal with a single northbound through lane, a single southbound through lane and southbound left-turn lane, and a single westbound lane that would be restricted to right turns only. The analyses contained within this report assume the revised alignment and traffic control.
- **SR 169/Baker Street:** The proposed mitigation measure included implementation of a traffic signal.
- **SR 169/Lawson Street:** The proposed mitigation measure included implementation of a traffic signal and southbound left-turn lane.
- **SR 169/Jones Lake Road:** The proposed mitigation measure included implementation of a traffic signal and northbound, westbound, and southbound left-turn lanes.
- **Railroad Avenue/Baker Street:** No mitigation measures were identified in the EIS.
- **Lawson Street/SE Connector Alternative:** This intersection was not contemplated as part of the EIS.
- **Lawson Street/Lawson Connector:** This intersection was assumed to operate as side-street (Lawson Connector) stop-controlled as part of the EIS.

The mitigated channelization and traffic control as well as the future EIS traffic volumes at each intersection<sup>1</sup> are summarized in Figure 2. Based on a review of the EIS analysis, approximately 776 project trips were routed via the Lawson Connector, 239 project trips were routed via Lawson Street, and 778 project trips were routed via the SE Connector.

### *Operations Analysis*

To understand the anticipated impacts of the proposed SE Connector Alternative, the volume projections outlined in the EIS were updated assuming traffic shifts from the SE Connector to the Alternative and the Lawson Connector. Based on the anticipated orientation of MPD traffic, and as

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<sup>1</sup> The traffic volumes at SR 169/Lawson Connector are based on the future EIS traffic volumes at the intersection of SR 169/Roberts Drive/Lawson Connector with turning volumes adjusted as necessary based on the change in alignment.

outlined previously, this analysis assumes that approximately 60 percent of traffic previously routed to the SE Connector is routed to the Lawson Connector, and the remaining 40 percent is routed to Lawson Street. Figure 2 depicts the re-routed volumes and the adjusted future traffic volumes.

Using these adjusted volumes, intersection level of service (LOS) was evaluated at the study intersections. The channelization and traffic control associated with the EIS-identified mitigations were used as a baseline to determine if additional mitigations would be necessary, with the following exceptions:

- **SR 169/Lawson Connector:** As noted previously, this intersection is preliminarily planned as a traffic signal with a single northbound through lane, a single southbound through lane and southbound left-turn lane, and a single westbound lane that would be restricted to right turns only.
- **Lawson Street/SE Connector Alternative:** This intersection is assumed to operate as side-street (SE Connector Alternative) stop-controlled.

Weekday PM peak hour levels of service and delays were calculated at study intersections based on methodologies contained in the *Highway Capacity Manual, 6th Edition* (Transportation Research Board). As shown in Table 2, the re-routed traffic volumes result in the need for additional improvements beyond those identified in the EIS at two intersections: SR 169/Baker Street and Lawson Street/Lawson Connector. Additionally, mitigations are still required at the intersection of SR 169/Jones Lake Road, but to a lesser extent than proposed in the EIS.

To meet WSDOT's LOS D or better standard at SR 169/Baker Street, a northbound left-turn lane and southbound right-turn lane would be necessary. To meet the City of Black Diamond's LOS C or better standard at Lawson Street/Lawson Connector, the intersection would need to be signalized. Additionally, the traffic signal and northbound left-turn lane would need to remain at the intersection of SR 169/Jones Lake Road. Consistent with the EIS, no mitigations would be necessary at the intersection of Railroad Avenue/Baker Street. The mitigated channelization and traffic control assumptions are summarized in Figure 2. With these additional mitigations in place, the intersections are projected to operate at acceptable level of service, as shown on Table 2.

**Table 2. Traffic Analysis Summary – SE Connector Alternative**

| Intersection                   | LOS Standard | With Mitigated Traffic Control from EIS |                    |                 | With Changes to Proposed Mitigation Measures |       |    |
|--------------------------------|--------------|-----------------------------------------|--------------------|-----------------|----------------------------------------------|-------|----|
|                                |              | LOS <sup>1</sup>                        | Delay <sup>2</sup> | WM <sup>3</sup> | LOS                                          | Delay | WM |
| 1. SR 169/Lawson Connector     | D            | B                                       | 15                 | -               | No Change                                    |       |    |
| 2. SR 169/Baker St             | D            | F                                       | >120               | -               | C                                            | 32    | -  |
| 3. SR 169/Lawson St            | D            | B                                       | 15                 | -               | No Change                                    |       |    |
| 4. SR 169/Jones Lake Rd        | D            | B                                       | 13                 | -               | B                                            | 16    | -  |
| 5. Railroad Ave/Baker St       | C            | B                                       | 14                 | WB              | No Change                                    |       |    |
| 6. Lawson St/SE Connector Alt. | C            | C                                       | 15                 | NB              | No Change                                    |       |    |
| 7. Lawson St/Lawson Connector  | C            | F                                       | >120               | NB              | A                                            | 9     | -  |

Source: HCM 6th Edition and Transpo Group, 2020

1. Level of service (A – F) as defined by the Highway Capacity Manual (HCM) 6th Edition, Transportation Research Board

2. Average delay per vehicle in seconds

3. Worst movement (WM) reported for two-way stop sign traffic control



## Conclusions

- As part of the EIS, it was assumed that vehicles accessing the Lawson Hills MPD would utilize the SE Connector, Lawson Street, and the Lawson Connector. With the proposed comprehensive plan amendment, vehicles previously assumed to utilize the SE Connector would shift to Lawson Street and the Lawson Connector. In line with the anticipated routing patterns, approximately 60 percent of trips are expected to shift to the Lawson Connector, and the remaining 40 percent are expected to shift to Lawson Street.
- The operations analysis determined that the impacts of the SE Connector Alternative can be adequately mitigated assuming the following:
  - Implementation of additional improvements beyond those identified in the EIS at two intersections:
    - **SR 169/Baker Street:** New northbound left-turn lane and southbound right-turn lane
    - **Lawson Street/Lawson Connector:** Traffic signal
  - Implementation of limited improvements (traffic signal) at the intersection of **SR 169/Jones Lake Road**
  - Improvements would remain unnecessary at the intersection of Railroad Avenue/Baker Street.



|                                      |                                    | ① SR 169 Lawson Connector        | ② SR 169 Baker St                      | ③ SR 169 Lawson St                                                       | ④ SR 169 Jones Lake Rd/SE Connector                       | ⑤ Railroad Ave Baker St                    | ⑥ Lawson Street SE Connector Alternative | ⑦ Lawson Street Lawson Connector                   |
|--------------------------------------|------------------------------------|----------------------------------|----------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------|------------------------------------------|----------------------------------------------------|
| Weekday PM Peak Hour Traffic Volumes | EIS Volumes                        | 1,509<br>457<br>305<br>721<br>14 | 1,392<br>104<br>60<br>115<br>64<br>802 | 1,211<br>5<br>286<br>84<br>0<br>42<br>1<br>1<br>1<br>1<br>51<br>773      | 1,191<br>1<br>57<br>111<br>188<br>132<br>38<br>117<br>720 | 305<br>156<br>171<br>13<br>16<br>232       | 253 → ← 83                               | 287<br>12<br>0<br>9<br>60<br>184<br>34<br>0<br>175 |
|                                      | Re-Routed                          | -57<br>196<br>250<br>-100        | -57<br>17<br>19<br>-100                | -57<br>17<br>30<br>19<br>132<br>117<br>-111                              | 132<br>-57<br>-111<br>-188<br>-132<br>117                 | 34<br>38                                   | 38 → ← 45<br>113<br>136                  | 196<br>38<br>45<br>250                             |
|                                      | With SE Loop Connector Alternative | 1,452<br>653<br>555<br>621<br>14 | 1,335<br>104<br>60<br>132<br>83<br>702 | 1,154<br>5<br>303<br>114<br>19<br>174<br>1<br>18<br>1<br>1<br>168<br>662 | 1,323<br>1<br>108<br>38<br>837                            | 305<br>190<br>209<br>13<br>16<br>232       | 291 → ← 128<br>113<br>136                | 483<br>12<br>0<br>9<br>60<br>222<br>79<br>0<br>425 |
|                                      | Channelization and Traffic Control | See Note 1                       |                                        |                                                                          | See Note 2                                                | No change relative to existing conditions. | Does Not Exist As Part of EIS            |                                                    |
|                                      |                                    |                                  |                                        |                                                                          | See Note 3                                                | No change relative to existing conditions. |                                          |                                                    |

- Notes:
- 1) Intersection was analyzed as a four leg intersection as part of the EIS (with Roberts Drive as fourth leg). Channelization adjusted as part of this analysis to be consistent with current feasible mitigation measures.
  - 2) Signal was proposed with new east leg of intersection
  - 3) East leg of intersection no longer proposed and northbound left-turn lane not necessary as a mitigation measure.

# Summary of Traffic Analysis in Support of SE Connector Alternative

Comprehensive Plan Amendment

FIGURE  
2



**Attachment A:**  
Comprehensive Alternatives Evaluation



DAVID EVANS  
AND ASSOCIATES INC.

MEMORANDUM

**DATE:** September 21, 2021

**TO:** Mona Davis  
Community Development Director  
24301 Roberts Drive  
Black Diamond, WA 98010

**FROM:** Adam Stricker, PE, David Evans and Associates, Inc.  
Beau Willert, PE, David Evans and Associates, Inc.

**SUBJECT:** Lawson Hills MPD SE Connector Analysis

**PROJECT:** Lawson Hills MPD

**CC:** Brian Ross, Oakpointe  
Justin Wortman, Oakpointe  
Tom Matt, PE, David Evans and Associates, Inc.

This memorandum is intended to compare the impacts of constructing secondary access roads for the Lawson MPD. The SE Connector would connect the southeastern portion of the site to SR169 via a new intersection with SR169 at Railroad Ave. An alternative route, called the "SE Connector Alternative" in this memo, has been identified that provides a secondary connection to Lawson Street.

Preliminary design studies of both the SE Connector and SE Connector Alternative have been prepared; copies are attached to this memorandum. Significant right of way, engineering and neighborhood impacts are present in the design. This memorandum compares the two alternatives relative to grading, walls, storm drainage, right of way acquisition and neighborhood impacts.

Alternative Analysis Summary:

| Evaluation Parameter             | SE Connector                    | SE Connector Alternative    |
|----------------------------------|---------------------------------|-----------------------------|
| Max. Roadway Grade (%)           | 12                              | 2                           |
| Road Length                      | 2,600 ft                        | 900 ft                      |
| Earthwork Volume                 | 15,920 CY Cut<br>25,575 CY Fill | 650 CY Cut<br>1,200 CY Fill |
| Max. Wall Height                 | 25'                             | No Walls                    |
| Wall Square Footage              | 24,900                          | No Walls                    |
| Storm Drainage                   | Large vault                     | Utilizes MPD Facilities     |
| Right of Way Acquisition         | 16 Properties                   | 1 Parcel                    |
| Proximity to Existing Homes      | 40 feet                         | 250 feet                    |
| SR 169 Intersection Improvements | New intersection                | No new intersection         |





These categories will be discussed in greater length below, but as can be seen from the brief summary above, the SE Connector Alternative is a significantly shorter road that requires substantially less impacts to surrounding properties, and will not require an independent off-site stormwater system.

A preliminary design of the SE Connector has been prepared by David Evans Associates and is presented in an engineering exhibit set titled “Lawson South Access Conceptual Plans” and has been attached to this memorandum. A preliminary plan and profile of the SE Connector Alternative has also been prepared and is presented in the attached “SE Connector Alternative” exhibits. The same road section was used in both of these design studies. These plans were created using LIDAR contours, parcel boundaries and aerial photography.

### **Existing Conditions and Critical Areas**

The SE Connector is to be constructed over a steeply sloping forested hillside with existing grades in the range of 20% to 40% in some sections. The soils and slopes found on the SE Connector site suggest the presence of landslide hazards and potential erosion hazard areas. These critical areas are found on the Lawson Hills MPD site near the connection point to the SE Connector. Geotechnical analysis would be required to determine if construction on these slopes could be done safely. The lower portions of the SE Connector are within the 225' core buffer and shoreline zone of Jones Lake and cross Lawson Creek and its associated buffer.

The SE Connector Alternative route is through a relatively flat parcel of land that is outside of mapped landslide hazard areas. There are wetlands in the vicinity of the SE Connector Alternative, however no wetland buffers would need to be encroached upon for the SE Connector Alternative. The SE Connector Alternative will have to cross Lawson Creek, passing through the Lawson Creek Buffer.

### **Roadway Grade**

The SE Connector is approximately 2,600 feet in length and accomplishes an elevation change of approximately 220' over its length. The SE Connector will have a maximum road grade of 12% for a distance of approximately 580'.

The SE Connector Alternative requires a shorter length (approximate 900') of road before connecting to other proposed roads internal to the Lawson Hills MPD. The majority of slopes in the SE Connector Alternative are 2% or less. Total elevation change for the SE Connector Alternative is approximately 10'.

### **Earthwork Volumes**

The SE Connector requires 15,920 cubic yards of cut and 25,575 cubic yards of fill resulting in a net of 9,655 cubic yards fill. It is not known if the soils produced from the cut are suitable for use as fill.

The SE Connector Alternative requires a 650 cubic yards of cut and 2,600 cubic yards of fill for the grading of the SE Connector Alternative.

### **Wall Height**

The SE Connector will require approximately ten retaining walls with several of these walls being over 20' tall. Nearly all of these walls are proposed in areas of extreme slopes, which will complicate design and construction. The walls at stations 7+50, 11+00 and 18+00 are within 50' of existing residences and will



require special design consideration to not undermine the adjacent structures.

The SE Connector Alternative would require no retaining walls except for walls related to the crossing of Lawson Creek.

### **Wall Square Footage**

The SE Connector requires a total of 24,900 Square feet of wall face. Additional sections of wall may be required if geotechnical studies show that the areas of proposed cut and fill slopes are not suitable.

The SE Connector alternative would require no walls or rockeries except as needed for crossing of Lawson Creek .

### **Bridge**

The SE Connector will have to cross Lawson Creek using a 120' long bridge. Likely construction types for this bridge could include wide flange deck girder or steel deck girder with an anticipated structure depth in the range of 50". The allowable structure depth of the future bridge may be limited by the low clearance to the high water elevations of Lawson Creek. The bed of Lawson Creek lies about 12' below the bridge deck and the available freeboard to pass high stream flows precludes the use of a culvert and fill style of crossing.

The SE Connector alternative would also require a similar bridge crossing of Lawson Creek.

### **Storm Drainage Vault**

The SE Connector proposes over 2.5 acres of impervious surfaces; approximately 1.8 acres of this will be pollution generating impervious surfaces. The SE Connector will require a stormwater vault and a water quality treatment train to accomplish flow control and water quality treatment minimum requirements. Preliminary sizing of this system shows that a vault with a live storage volume of 60,800 cubic feet and a water quality volume of 30,400 cubic feet will be required. This results in a vault with a minimum footprint of 44' wide by 196' long by 13' deep. The depth and width of this vault footprint was selected to minimize grading back into the hillside to the north of the vault. The north side of Railroad Ave, although in a steep hillside, is the only possible location for the vault as the south side of Railroad Ave is within the Jones Lake buffer and shoreline setback and would involve the placement of fill within this critical area. A 23' max height wall will be required to grade in the vault location. This stormwater facility would only treat stormwater from the SE Connector.

The SE Connector Alternative will require a similar level of flow control and water quality treatment but will be able to utilize stormwater infrastructure built for other phases of the Lawson Hills MPD. The SE Connector Alternative proposes much less impervious surface than the SE Connector.

The SE Connector Alternative's ability to utilize MPD stormwater facilities reduces the City's maintenance burden compared to the SE Connector which would require a standalone stormwater facility. The SE Connector Alternative provides a way to prevent many of the impacts that the SE Connector presents and provides a much more economic and feasible connection.





### **Right of Way Acquisition**

The SE Connector proposes roadway or grading over 16 privately owned parcels. Of these parcels the SE Connector bisects three and completely envelopes one. Rerouting of utility lines may require disturbances to additional properties. Some of these property owners may not be interested in selling property for ROW and grading. If this is the case the city would have to use eminent domain to make the SE Connector feasible. In total there are seven parcels containing residences that would need to be partially or completely acquired for the construction of the SE Connector.

The SE Connector Alternative can be constructed with the acquisition of a single additional parcel (parcel number 1321069018). This parcel was identified in Figure 3-3 of the Lawson Hills MPD as a potential expansion parcel.

### **Proximity to Existing Homes**

The SE Connector passes within 100' of eight existing structures and three existing structures are within 40' of proposed retaining walls. Significant grading revisions are required for the driveways to six residences that are currently accessed from Pacific Street.

Pacific Street in its existing condition is a minimally traveled, gravel paved, dead end road that serves as the access to eight residences. The SE Connector would replace Pacific Street as the access to six of these existing residences and would route a significant volume of traffic through this neighborhood. Pacific Street would need to be terminated to the north of the SE Connector as the SE Connector must be constructed approximately 6' above the existing grade of Pacific Street at that point for slope criteria to be met.

There is one residence currently on the offsite parcel to be acquired for the SE Connector Alternative. This house could potentially remain after construction of the SE Connector Alternative. The nearest offsite house is 250' from the SE Connector Alternative entry at Lawson street. There would be no encroachments on this off site property.

The SE Connector Alternative provides access to Lawson Street, which is currently a well-utilized route to downtown Black Diamond and SR 169. The SE Connector Alternative is much less impactful to existing residences.

### **SR 169 Intersection Improvements**

The intersection of the SE Connector and State Route 169 presents several design challenges including intersection type selection, grading and pedestrian access. Roundabouts are the intersection type preferred by WSDOT, however the centerline slope of SR 169 in the area of the intersection ranges from 6% to 8% based on LIDAR contours. This is above the ideal range of centerline slopes for roundabout intersections (slopes of up to 4% are typical for roundabouts, 2% being ideal) however, WSDOT has designed and requested non-standard roundabouts in this range of existing slopes. Shown on the conceptual plan is a signal-controlled intersection with two travel lanes along the access and two travel lanes and a center turn lane along SR-169 requiring widening of SR169 at this location. Regrading of SR169 to a lower slope through the intersection can be anticipated. If a roundabout is ultimately required at this location additional impacts and ROW acquisition should be anticipated. The addition of an intersection, whether a roundabout or a signal, will tend to decrease the level of service of SR 169.



The SE Connector Alternative will take access off Lawson Street which intersects SR 169 near downtown Black Diamond. Intersection improvements at Lawson Street and SR 169 are already a requirement of the MPD and would provide far less impacts to traffic than an additional intersection on SR 169 as is necessary with the SE Connector. A new intersection at Lawson Street would be required. It is acknowledged that further traffic impact analysis would need to be conducted to fully understand offsite road improvements that the SE Connector Alternative may trigger.

### **Conclusion**

The SE Connector design has a number of design constraints that make it much more impactful than the SE Connector Alternative. The SE Connector proposes to add a major roadway, several large walls and a bridge in the middle of a quiet neighborhood. The SE Connector requires a new intersection on SR169 and a standalone stormwater facility. This infrastructure and the property acquisition, including possible eminent domain, necessary to construct this alternative would have a major impact on the character of the community.

The SE Connector Alternative is able to accomplish a secondary connection with a significantly shorter length of road through fewer critical areas. The reduction in impervious surfaces that the SE Connector Alternative can provide is in keeping with the overall MPD goals of reducing impervious coverage and impacts to critical areas.

### **Attachments/Enclosures:**

- SE Connector Overall Improvement Plan – Aerial
- SE Connector Overall Improvement Plan & Property Owner Impacts
- SE Connector (Lawson South Access) Profiles
- SE Connector Alternative Improvement Plan & Profile





## OVERALL IMPROVEMENT PLAN

# LAWSON SOUTH ACCESS

## CONCEPTUAL PLAN

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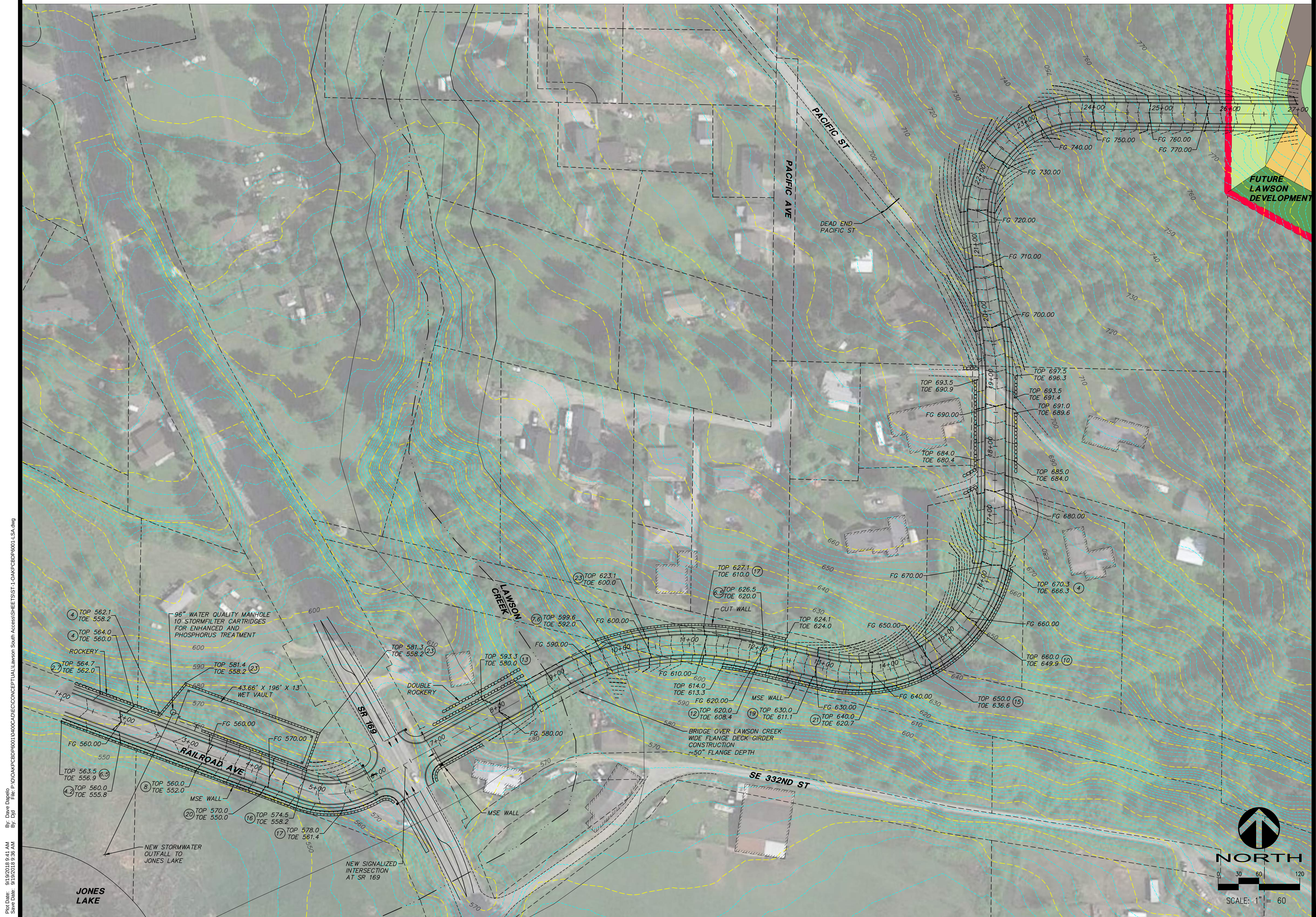
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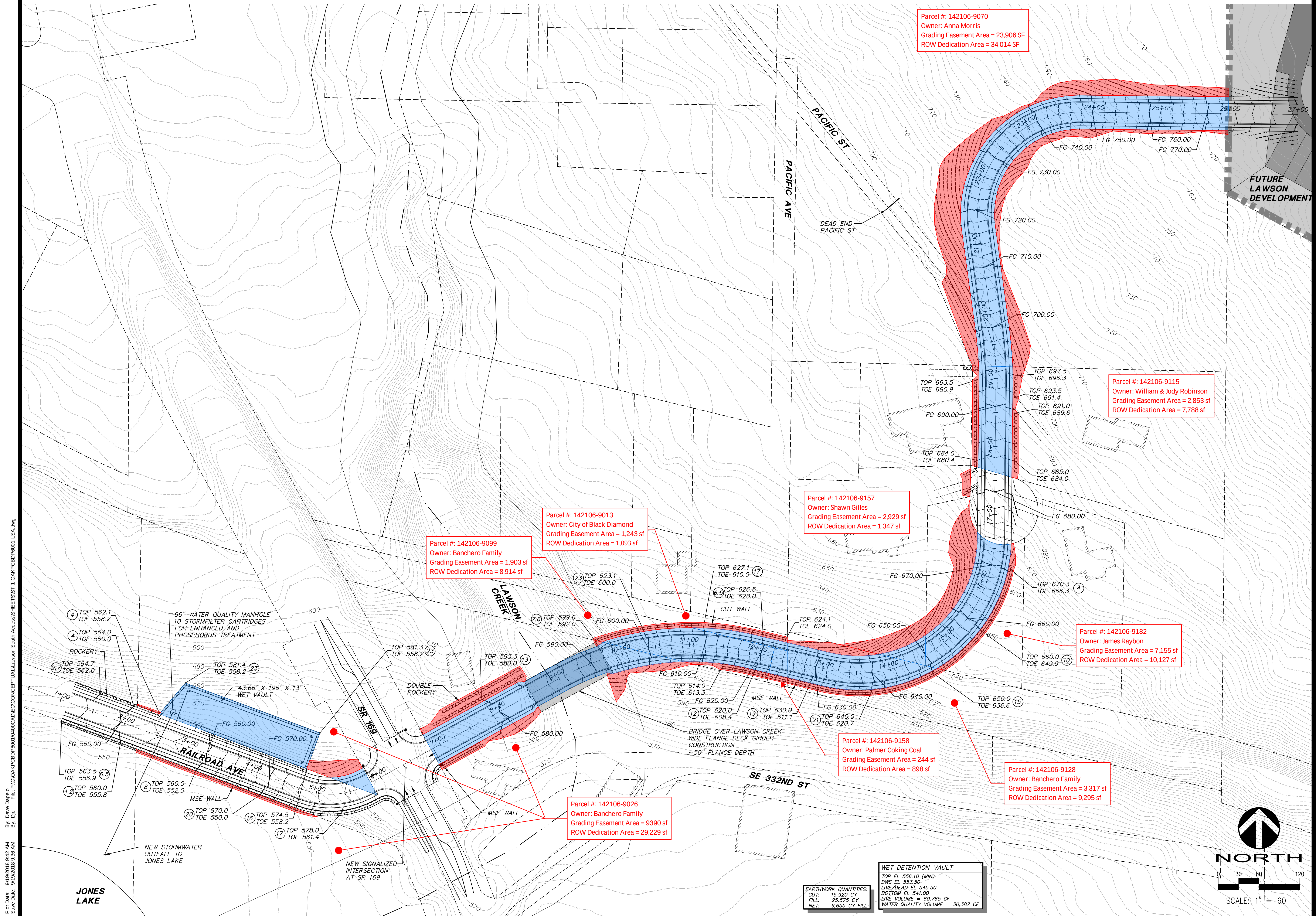
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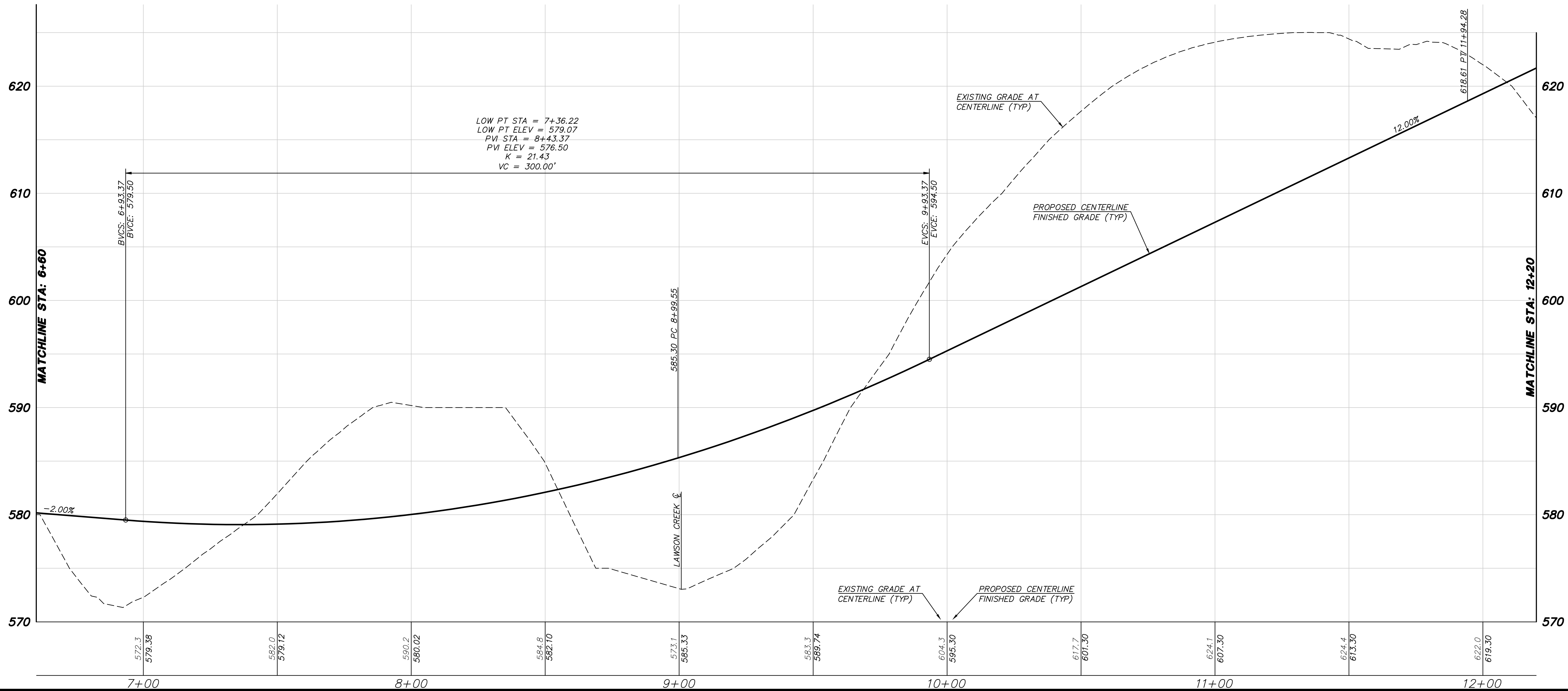
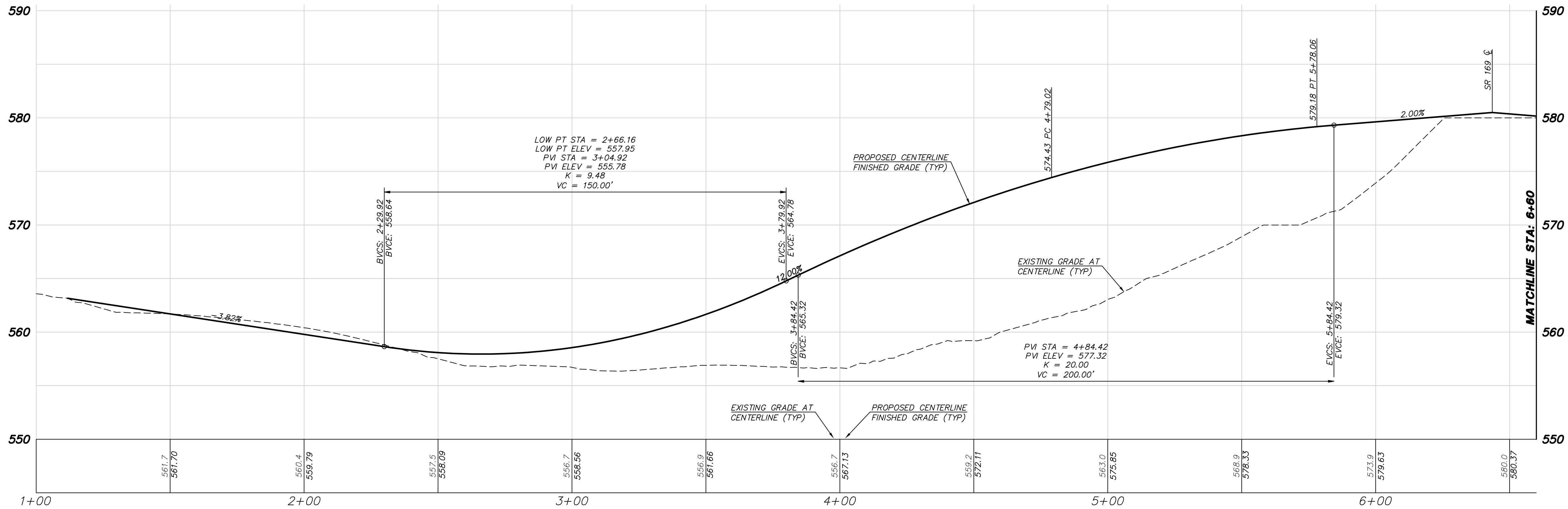
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# LAWSON SOUTH ACCESS

## CONCEPTUAL PLAN

## CONCEPTUAL PLAN

CITY OF BLACK DIAMOND

| REGISTERED BY: |      | DATE     | BY | CK |
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| NO.            | DATE | REVISION |    |    |
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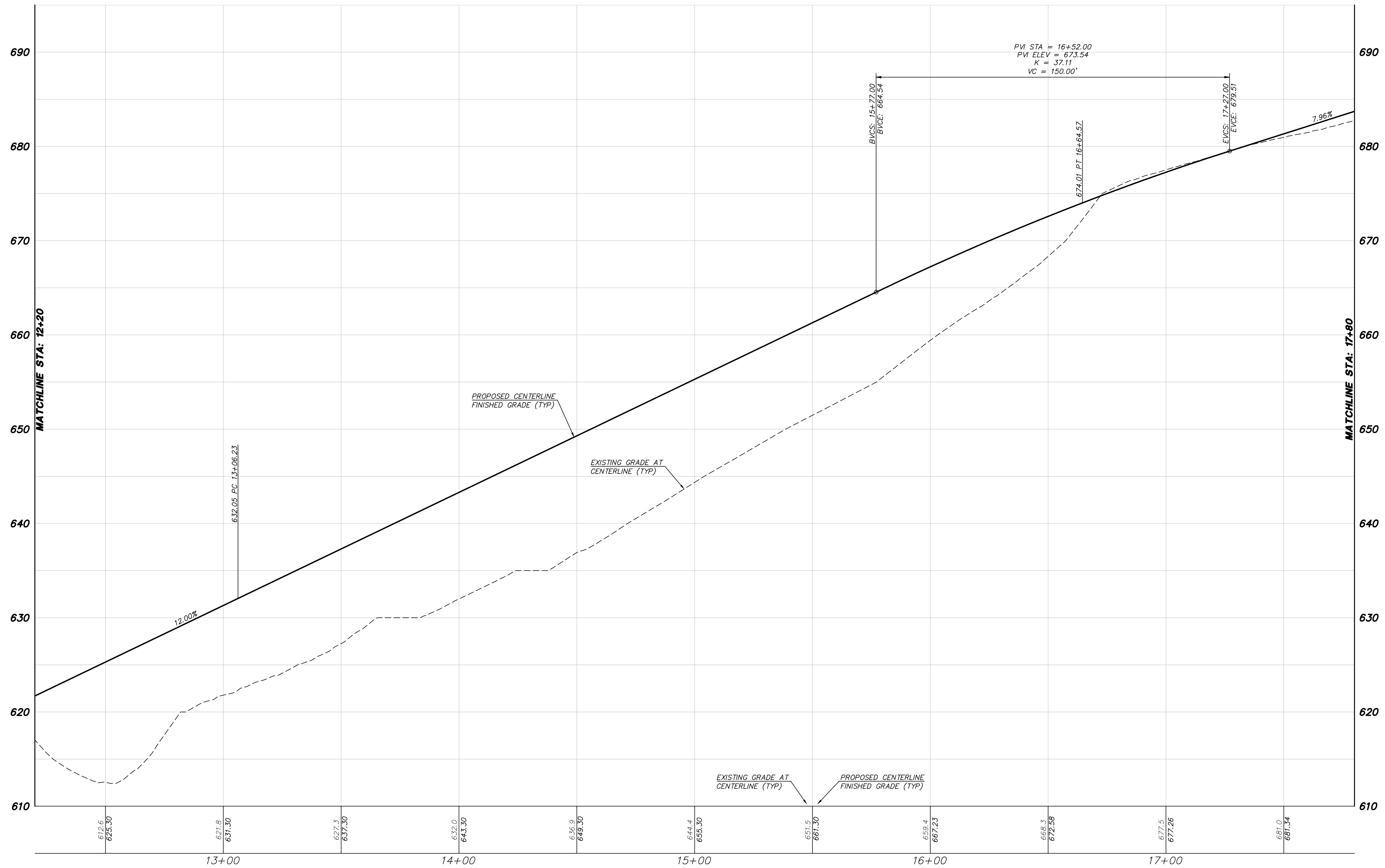
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PROJECT NO.  
**OAKPCBDP6001**

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SHEET NO. **4**

OF **6**



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By: Djd File: P:\OAK\CBDP6001\0400\CAD\EC\CONCEPTUAL\Lawson South Access\SHEETS\PF-1-OAK\CBDP6001-LSA.dwg



**LAWSON SOUTH ACCESS**

## CONCEPTUAL PLAN

CITY OF BLACK DIAMOND

WASHINGTON

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NOT FOR  
CONSTRUCTION**

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UNLESS SIGNED AND DATED

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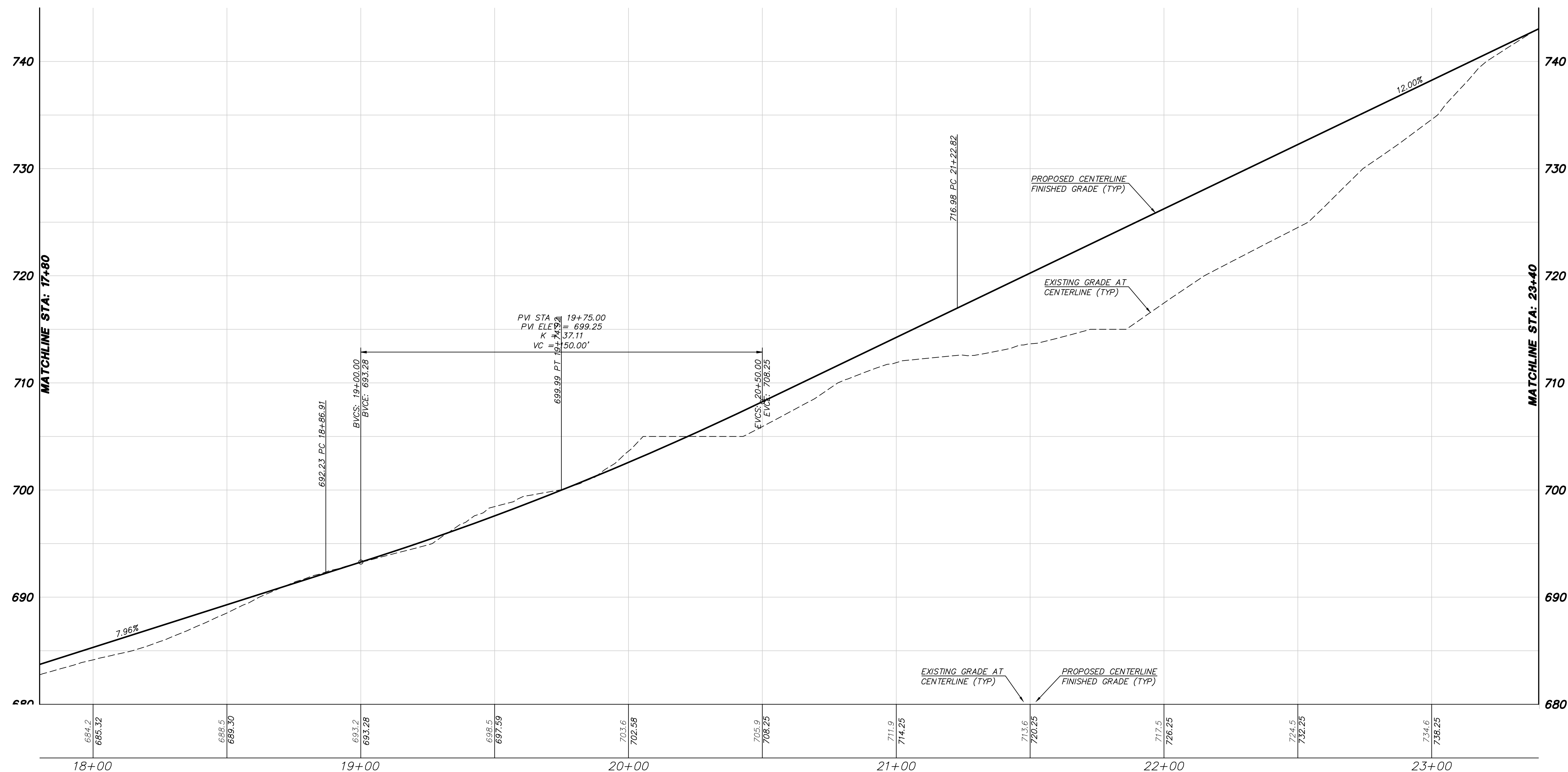
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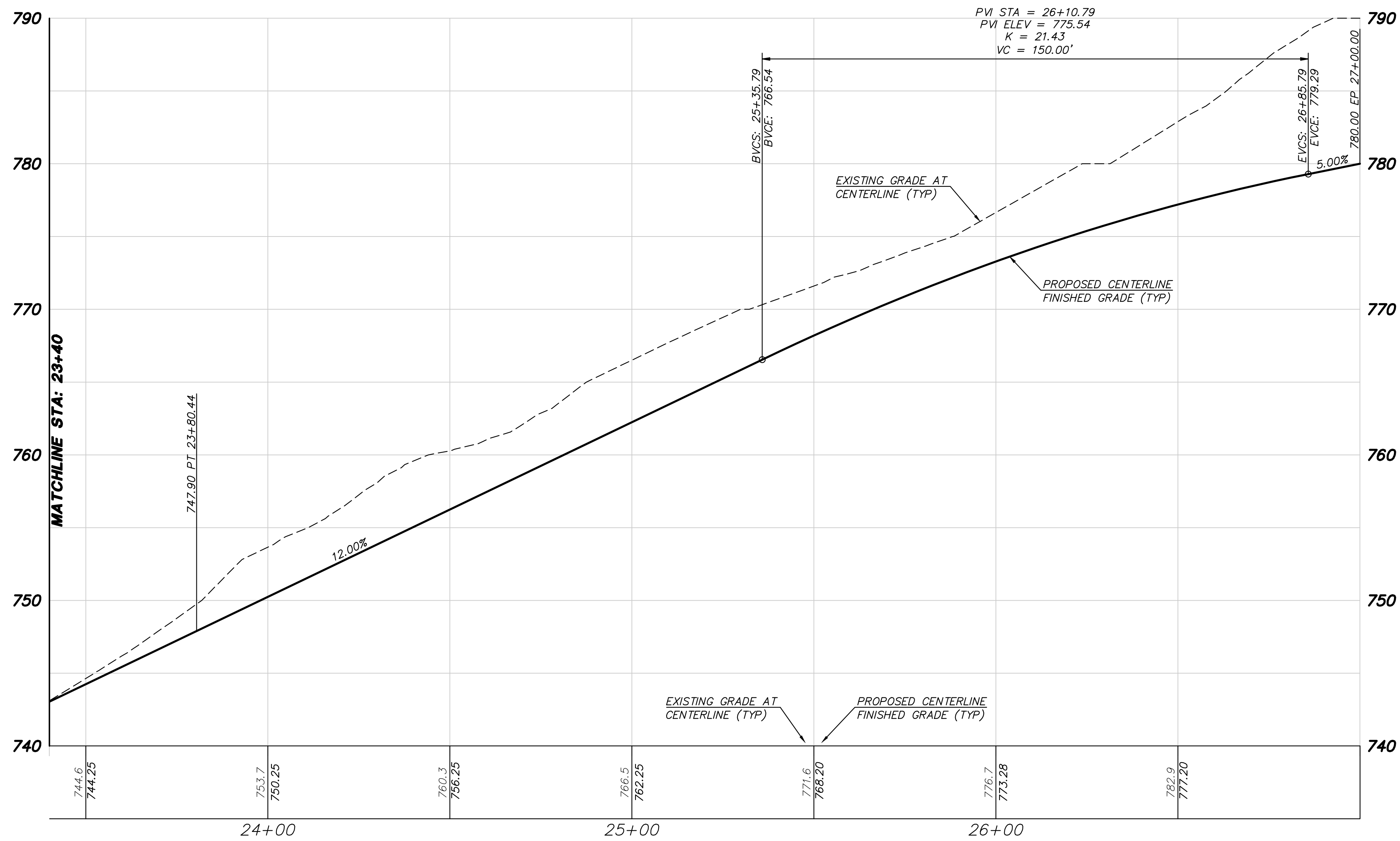
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OF **6**







# LAWSON SOUTH ACCESS

**WASHINGTON**

CITY OF BLACK DIAMOND

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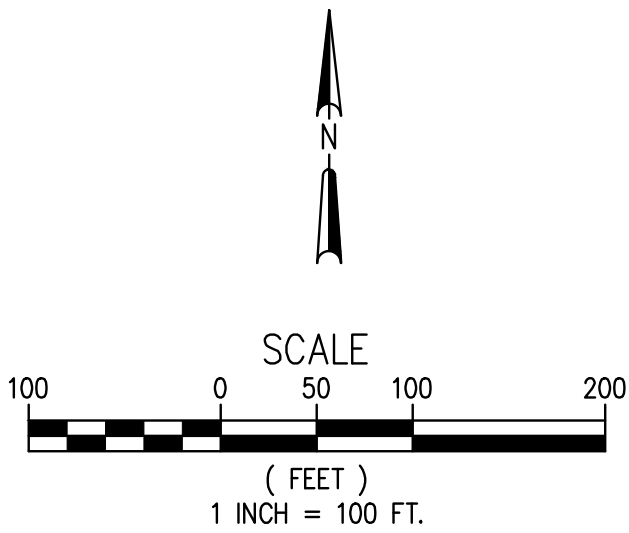
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Save Date: 8/13/2020 8:28 AM By: File P:\OAKPCBDP6007\0400CAD\EXHIBITS\Master Plan\Roadway\SE Connector Alternative Plan.dwg

SE CONNECTOR ALTERNATIVE



SE CONNECTOR ALTERNATIVE

REVIEWED BY: DATE: BY: CK

NO. DATE REVISION

DESIGNED: CADD: WA

EXHIBIT

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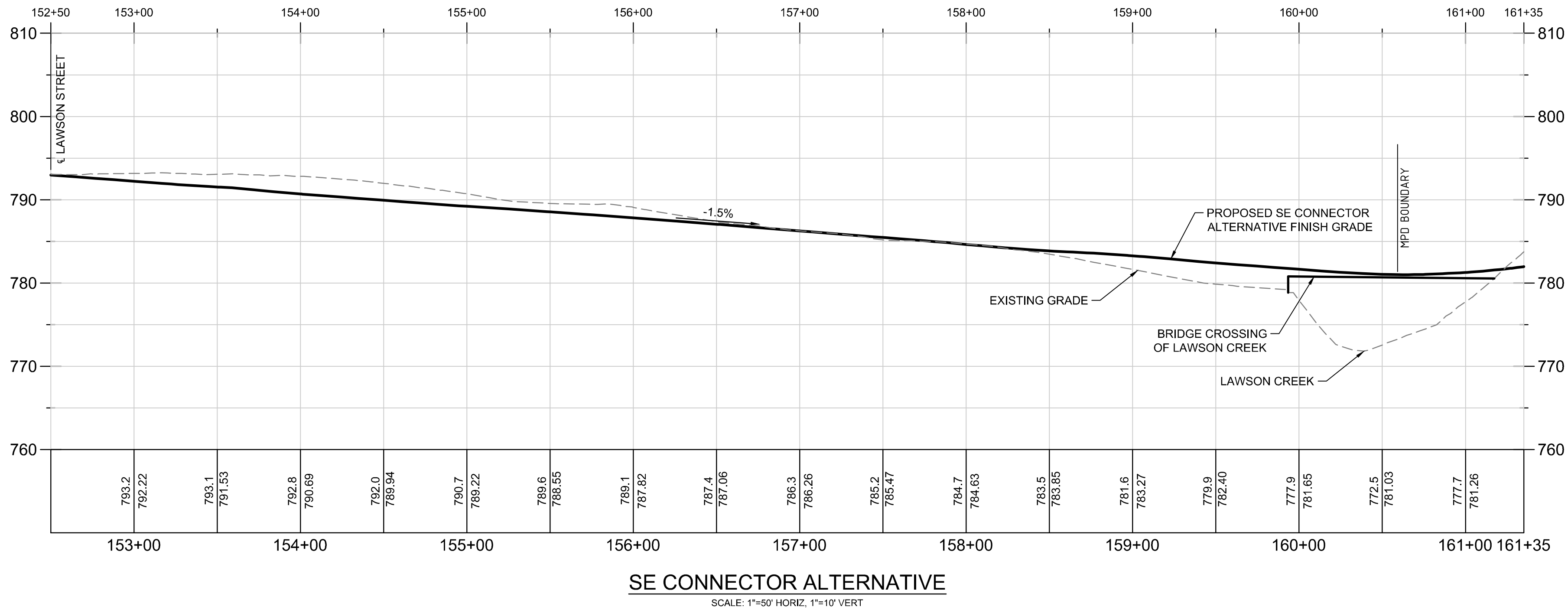
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OAKPOINTE  
LAWSON HILLS  
BLACK DIAMOND

DAVID EVANS  
AND ASSOCIATES INC.  
20300 Woodinville Snohomish Rd NE  
Woodinville Washington 98072  
Phone: 425.415.2000





SE CONNECTOR ALTERNATIVE PROFILE

OAKPOINTE  
**LAWSON HILLS**

WA

BLACK DIAMOND

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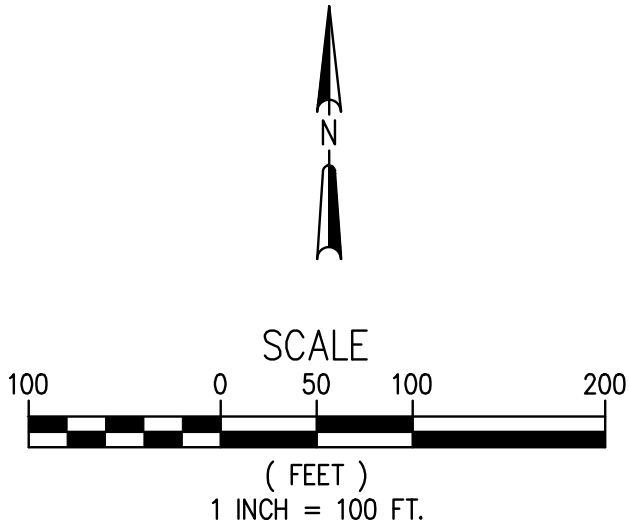
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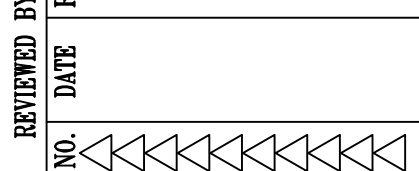
SE CONNECTOR ALTERNATIVE



SE CONNECTOR ALTERNATIVE

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PROJECT NO.  
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SHEET NO.

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OAKPOINTE  
LAWSON HILLS  
BLACK DIAMOND  
W/A

DAVID EVANS  
AND ASSOCIATES INC.  
20300 Woodinville Snohomish Rd NE  
Woodinville Washington 98072  
Phone: 425.415.2000



**Attachment B:**  
LOS Worksheets

# HCM Signalized Intersection Capacity Analysis

## 1: SR 169 & Lawson Pkwy

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - EIS Channelization

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |  |
| Traffic Volume (vph)              | 0                                                                                 | 555                                                                               | 621                                                                               | 14                                                                                | 653                                                                               | 1452                                                                              |
| Future Volume (vph)               | 0                                                                                 | 555                                                                               | 621                                                                               | 14                                                                                | 653                                                                               | 1452                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |
| Frt                               |                                                                                   | 0.86                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              |
| Satd. Flow (prot)                 |                                                                                   | 1611                                                                              | 1857                                                                              |                                                                                   | 1770                                                                              | 1863                                                                              |
| Flt Permitted                     |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.20                                                                              | 1.00                                                                              |
| Satd. Flow (perm)                 |                                                                                   | 1611                                                                              | 1857                                                                              |                                                                                   | 371                                                                               | 1863                                                                              |
| Peak-hour factor, PHF             | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              |
| Adj. Flow (vph)                   | 0                                                                                 | 590                                                                               | 661                                                                               | 15                                                                                | 695                                                                               | 1545                                                                              |
| RTOR Reduction (vph)              | 0                                                                                 | 121                                                                               | 1                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Lane Group Flow (vph)             | 0                                                                                 | 469                                                                               | 675                                                                               | 0                                                                                 | 695                                                                               | 1545                                                                              |
| Turn Type                         |                                                                                   | Over                                                                              | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |
| Protected Phases                  |                                                                                   | 1                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |
| Permitted Phases                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 19.9                                                                              | 30.1                                                                              |                                                                                   | 55.0                                                                              | 60.0                                                                              |
| Effective Green, g (s)            |                                                                                   | 19.9                                                                              | 30.1                                                                              |                                                                                   | 55.0                                                                              | 60.0                                                                              |
| Actuated g/C Ratio                |                                                                                   | 0.33                                                                              | 0.50                                                                              |                                                                                   | 0.92                                                                              | 1.00                                                                              |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |
| Lane Grp Cap (vph)                |                                                                                   | 534                                                                               | 931                                                                               |                                                                                   | 804                                                                               | 1863                                                                              |
| v/s Ratio Prot                    |                                                                                   | 0.29                                                                              | 0.36                                                                              |                                                                                   | 0.29                                                                              | c0.83                                                                             |
| v/s Ratio Perm                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.51                                                                              |                                                                                   |
| v/c Ratio                         |                                                                                   | 0.88                                                                              | 0.72                                                                              |                                                                                   | 0.86                                                                              | 0.83                                                                              |
| Uniform Delay, d1                 |                                                                                   | 18.9                                                                              | 11.7                                                                              |                                                                                   | 11.6                                                                              | 0.0                                                                               |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |
| Incremental Delay, d2             |                                                                                   | 15.1                                                                              | 4.9                                                                               |                                                                                   | 9.6                                                                               | 4.4                                                                               |
| Delay (s)                         |                                                                                   | 34.0                                                                              | 16.6                                                                              |                                                                                   | 21.2                                                                              | 4.4                                                                               |
| Level of Service                  |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   | C                                                                                 | A                                                                                 |
| Approach Delay (s)                | 34.0                                                                              |                                                                                   | 16.6                                                                              |                                                                                   |                                                                                   | 9.6                                                                               |
| Approach LOS                      | C                                                                                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 2000 Control Delay            |                                                                                   | 15.1                                                                              |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   | B                                                                                 |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Actuated Cycle Length (s)         |                                                                                   | 60.0                                                                              |                                                                                   | Sum of lost time (s)                                                              |                                                                                   | 10.0                                                                              |
| Intersection Capacity Utilization |                                                                                   | 80.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | D                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |



## HCM 6th Signalized Intersection Summary

### 2: SR 169 & Baker St

## SE Connector Alternative Analysis

### Future (2025) PM Peak Hour - EIS Channelization

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)       | 60                                                                                | 132                                                                               | 83                                                                                | 702                                                                               | 1335                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 132                                                                               | 83                                                                                | 702                                                                               | 1335                                                                              | 104                                                                               |
| Initial Q (Qb), veh          | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Ped-Bike Adj(A_pbT)          | 1.00                                                                              | 0.99                                                                              | 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       | 1900                                                                              | 1900                                                                              | 1856                                                                              | 1856                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 65                                                                                | 142                                                                               | 89                                                                                | 755                                                                               | 1435                                                                              | 112                                                                               |
| Peak Hour Factor             | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 3                                                                                 | 3                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 76                                                                                | 167                                                                               | 50                                                                                | 314                                                                               | 1245                                                                              | 97                                                                                |
| Arrive On Green              | 0.15                                                                              | 0.15                                                                              | 1.00                                                                              | 1.00                                                                              | 0.73                                                                              | 0.73                                                                              |
| Sat Flow, veh/h              | 518                                                                               | 1131                                                                              | 0                                                                                 | 432                                                                               | 1712                                                                              | 134                                                                               |
| Grp Volume(v), veh/h         | 208                                                                               | 0                                                                                 | 844                                                                               | 0                                                                                 | 0                                                                                 | 1547                                                                              |
| Grp Sat Flow(s),veh/h/ln     | 1657                                                                              | 0                                                                                 | 432                                                                               | 0                                                                                 | 0                                                                                 | 1846                                                                              |
| Q Serve(g_s), s              | 9.8                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 58.2                                                                              |
| Cycle Q Clear(g_c), s        | 9.8                                                                               | 0.0                                                                               | 58.2                                                                              | 0.0                                                                               | 0.0                                                                               | 58.2                                                                              |
| Prop In Lane                 | 0.31                                                                              | 0.68                                                                              | 0.11                                                                              |                                                                                   |                                                                                   | 0.07                                                                              |
| Lane Grp Cap(c), veh/h       | 245                                                                               | 0                                                                                 | 364                                                                               | 0                                                                                 | 0                                                                                 | 1343                                                                              |
| V/C Ratio(X)                 | 0.85                                                                              | 0.00                                                                              | 2.32                                                                              | 0.00                                                                              | 0.00                                                                              | 1.15                                                                              |
| Avail Cap(c_a), veh/h        | 269                                                                               | 0                                                                                 | 364                                                                               | 0                                                                                 | 0                                                                                 | 1343                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 2.00                                                                              | 2.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.45                                                                              | 0.00                                                                              | 0.00                                                                              | 0.45                                                                              |
| Uniform Delay (d), s/veh     | 33.2                                                                              | 0.0                                                                               | 35.2                                                                              | 0.0                                                                               | 0.0                                                                               | 10.9                                                                              |
| Incr Delay (d2), s/veh       | 20.6                                                                              | 0.0                                                                               | 598.4                                                                             | 0.0                                                                               | 0.0                                                                               | 72.8                                                                              |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 5.3                                                                               | 0.0                                                                               | 65.6                                                                              | 0.0                                                                               | 0.0                                                                               | 44.0                                                                              |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 53.8                                                                              | 0.0                                                                               | 633.5                                                                             | 0.0                                                                               | 0.0                                                                               | 83.7                                                                              |
| LnGrp LOS                    | D                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 | F                                                                                 |
| Approach Vol, veh/h          | 208                                                                               |                                                                                   |                                                                                   | 844                                                                               | 1547                                                                              |                                                                                   |
| Approach Delay, s/veh        | 53.8                                                                              |                                                                                   |                                                                                   | 633.5                                                                             | 83.7                                                                              |                                                                                   |
| Approach LOS                 | D                                                                                 |                                                                                   |                                                                                   | F                                                                                 | F                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                   |
| Phs Duration (G+Y+Rc), s     | 63.2                                                                              |                                                                                   | 16.8                                                                              |                                                                                   | 63.2                                                                              |                                                                                   |
| Change Period (Y+Rc), s      | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   |
| Max Green Setting (Gmax), s  | 57.0                                                                              |                                                                                   | 13.0                                                                              |                                                                                   | 57.0                                                                              |                                                                                   |
| Max Q Clear Time (g_c+l1), s | 60.2                                                                              |                                                                                   | 11.8                                                                              |                                                                                   | 60.2                                                                              |                                                                                   |
| Green Ext Time (p_c), s      | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 259.9                                                                             |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |

# HCM 6th Signalized Intersection Summary

## 3: SR 169 & Lawson Rd

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - EIS Channelization

|                              |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations          |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |  |  |                                                                                     |
| Traffic Volume (veh/h)       | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                   | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| Future Volume (veh/h)        | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                   | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| 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                                                                              | 0.99                                                                              |                                                                                   | 0.99                                                                              | 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       | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1856                                                                                | 1856                                                                                | 1856                                                                                | 1870                                                                                | 1870                                                                                | 1870                                                                                |
| Adj Flow Rate, veh/h         | 1                                                                                 | 19                                                                                | 1                                                                                 | 185                                                                               | 20                                                                                | 121                                                                               | 1                                                                                   | 704                                                                                 | 179                                                                                 | 322                                                                                 | 1228                                                                                | 5                                                                                   |
| Peak Hour Factor             | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 3                                                                                   | 3                                                                                   | 3                                                                                   | 2                                                                                   | 2                                                                                   | 2                                                                                   |
| Cap, veh/h                   | 51                                                                                | 356                                                                               | 18                                                                                | 242                                                                               | 19                                                                                | 112                                                                               | 45                                                                                  | 962                                                                                 | 244                                                                                 | 399                                                                                 | 1256                                                                                | 5                                                                                   |
| Arrive On Green              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.68                                                                                | 0.68                                                                                | 0.68                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                |
| Sat Flow, veh/h              | 18                                                                                | 1778                                                                              | 90                                                                                | 856                                                                               | 93                                                                                | 560                                                                               | 0                                                                                   | 1426                                                                                | 362                                                                                 | 629                                                                                 | 1861                                                                                | 8                                                                                   |
| Grp Volume(v), veh/h         | 21                                                                                | 0                                                                                 | 0                                                                                 | 326                                                                               | 0                                                                                 | 0                                                                                 | 884                                                                                 | 0                                                                                   | 0                                                                                   | 322                                                                                 | 0                                                                                   | 1233                                                                                |
| Grp Sat Flow(s),veh/h/ln     | 1886                                                                              | 0                                                                                 | 0                                                                                 | 1509                                                                              | 0                                                                                 | 0                                                                                 | 1788                                                                                | 0                                                                                   | 0                                                                                   | 629                                                                                 | 0                                                                                   | 1869                                                                                |
| Q Serve(g_s), s              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 15.3                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 28.6                                                                                | 0.0                                                                                 | 44.0                                                                                |
| Cycle Q Clear(g_c), s        | 0.7                                                                               | 0.0                                                                               | 0.0                                                                               | 16.0                                                                              | 0.0                                                                               | 0.0                                                                               | 25.4                                                                                | 0.0                                                                                 | 0.0                                                                                 | 54.0                                                                                | 0.0                                                                                 | 44.0                                                                                |
| Prop In Lane                 | 0.05                                                                              |                                                                                   | 0.05                                                                              | 0.57                                                                              |                                                                                   | 0.37                                                                              | 0.00                                                                                |                                                                                     | 0.20                                                                                | 1.00                                                                                |                                                                                     | 0.00                                                                                |
| Lane Grp Cap(c), veh/h       | 424                                                                               | 0                                                                                 | 0                                                                                 | 372                                                                               | 0                                                                                 | 0                                                                                 | 1252                                                                                | 0                                                                                   | 0                                                                                   | 399                                                                                 | 0                                                                                   | 1262                                                                                |
| V/C Ratio(X)                 | 0.05                                                                              | 0.00                                                                              | 0.00                                                                              | 0.88                                                                              | 0.00                                                                              | 0.00                                                                              | 0.71                                                                                | 0.00                                                                                | 0.00                                                                                | 0.81                                                                                | 0.00                                                                                | 0.98                                                                                |
| Avail Cap(c_a), veh/h        | 424                                                                               | 0                                                                                 | 0                                                                                 | 372                                                                               | 0                                                                                 | 0                                                                                 | 1252                                                                                | 0                                                                                   | 0                                                                                   | 399                                                                                 | 0                                                                                   | 1262                                                                                |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.33                                                                                | 1.33                                                                                | 1.33                                                                                |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.00                                                                              | 1.00                                                                              | 0.00                                                                              | 0.00                                                                              | 0.80                                                                                | 0.00                                                                                | 0.00                                                                                | 0.09                                                                                | 0.00                                                                                | 0.09                                                                                |
| Uniform Delay (d), s/veh     | 25.9                                                                              | 0.0                                                                               | 0.0                                                                               | 32.5                                                                              | 0.0                                                                               | 0.0                                                                               | 8.4                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 10.3                                                                                | 0.0                                                                                 | 3.6                                                                                 |
| Incr Delay (d2), s/veh       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 20.2                                                                              | 0.0                                                                               | 0.0                                                                               | 2.7                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 1.7                                                                                 | 0.0                                                                                 | 4.0                                                                                 |
| 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     | 0.3                                                                               | 0.0                                                                               | 0.0                                                                               | 8.4                                                                               | 0.0                                                                               | 0.0                                                                               | 8.9                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 4.4                                                                                 | 0.0                                                                                 | 3.6                                                                                 |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LnGrp Delay(d),s/veh         | 25.9                                                                              | 0.0                                                                               | 0.0                                                                               | 52.7                                                                              | 0.0                                                                               | 0.0                                                                               | 11.1                                                                                | 0.0                                                                                 | 0.0                                                                                 | 11.9                                                                                | 0.0                                                                                 | 7.6                                                                                 |
| LnGrp LOS                    | C                                                                                 | A                                                                                 | A                                                                                 | D                                                                                 | A                                                                                 | A                                                                                 | B                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   |
| Approach Vol, veh/h          |                                                                                   | 21                                                                                |                                                                                   |                                                                                   | 326                                                                               |                                                                                   |                                                                                     | 884                                                                                 |                                                                                     |                                                                                     | 1555                                                                                |                                                                                     |
| Approach Delay, s/veh        |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 52.7                                                                              |                                                                                   |                                                                                     | 11.1                                                                                |                                                                                     |                                                                                     | 8.5                                                                                 |                                                                                     |
| Approach LOS                 |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Timer - Assigned Phs         |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Phs Duration (G+Y+Rc), s     |                                                                                   | 59.0                                                                              |                                                                                   | 21.0                                                                              |                                                                                   | 59.0                                                                              |                                                                                     | 21.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Change Period (Y+Rc), s      |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Green Setting (Gmax), s  |                                                                                   | 54.0                                                                              |                                                                                   | 16.0                                                                              |                                                                                   | 54.0                                                                              |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Q Clear Time (g_c+I1), s |                                                                                   | 27.4                                                                              |                                                                                   | 2.7                                                                               |                                                                                   | 56.0                                                                              |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Green Ext Time (p_c), s      |                                                                                   | 5.4                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   |                                                                                   | 14.6                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th LOS                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM 6th Signalized Intersection Summary 4: SR 169 & Jones Lake Rd

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - EIS Channelization

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |  |  |  |                                                                                   |
| Traffic Volume (veh/h)       | 1                                                                                 | 108                                                                               | 38                                                                                | 837                                                                               | 1323                                                                              | 1                                                                                 |
| Future Volume (veh/h)        | 1                                                                                 | 108                                                                               | 38                                                                                | 837                                                                               | 1323                                                                              | 1                                                                                 |
| 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       | 1900                                                                              | 1900                                                                              | 1870                                                                              | 1870                                                                              | 1856                                                                              | 1856                                                                              |
| Adj Flow Rate, veh/h         | 1                                                                                 | 116                                                                               | 41                                                                                | 900                                                                               | 1423                                                                              | 1                                                                                 |
| Peak Hour Factor             | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 2                                                                                 | 2                                                                                 | 3                                                                                 | 3                                                                                 |
| Cap, veh/h                   | 1                                                                                 | 117                                                                               | 186                                                                               | 1547                                                                              | 1534                                                                              | 1                                                                                 |
| Arrive On Green              | 0.07                                                                              | 0.07                                                                              | 0.83                                                                              | 0.83                                                                              | 0.83                                                                              | 0.83                                                                              |
| Sat Flow, veh/h              | 14                                                                                | 1586                                                                              | 376                                                                               | 1870                                                                              | 1854                                                                              | 1                                                                                 |
| Grp Volume(v), veh/h         | 118                                                                               | 0                                                                                 | 41                                                                                | 900                                                                               | 0                                                                                 | 1424                                                                              |
| Grp Sat Flow(s),veh/h/ln     | 1614                                                                              | 0                                                                                 | 376                                                                               | 1870                                                                              | 0                                                                                 | 1855                                                                              |
| Q Serve(g_s), s              | 5.9                                                                               | 0.0                                                                               | 7.4                                                                               | 13.0                                                                              | 0.0                                                                               | 46.2                                                                              |
| Cycle Q Clear(g_c), s        | 5.9                                                                               | 0.0                                                                               | 53.6                                                                              | 13.0                                                                              | 0.0                                                                               | 46.2                                                                              |
| Prop In Lane                 | 0.01                                                                              | 0.98                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.00                                                                              |
| Lane Grp Cap(c), veh/h       | 119                                                                               | 0                                                                                 | 186                                                                               | 1547                                                                              | 0                                                                                 | 1535                                                                              |
| V/C Ratio(X)                 | 0.99                                                                              | 0.00                                                                              | 0.22                                                                              | 0.58                                                                              | 0.00                                                                              | 0.93                                                                              |
| Avail Cap(c_a), veh/h        | 119                                                                               | 0                                                                                 | 367                                                                               | 2447                                                                              | 0                                                                                 | 2427                                                                              |
| HCM Platoon Ratio            | 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                                                                              |
| Uniform Delay (d), s/veh     | 37.5                                                                              | 0.0                                                                               | 25.1                                                                              | 2.3                                                                               | 0.0                                                                               | 5.2                                                                               |
| Incr Delay (d2), s/veh       | 78.3                                                                              | 0.0                                                                               | 0.6                                                                               | 0.3                                                                               | 0.0                                                                               | 4.6                                                                               |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 4.9                                                                               | 0.0                                                                               | 0.7                                                                               | 2.2                                                                               | 0.0                                                                               | 9.5                                                                               |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 115.7                                                                             | 0.0                                                                               | 25.7                                                                              | 2.7                                                                               | 0.0                                                                               | 9.8                                                                               |
| LnGrp LOS                    | F                                                                                 | A                                                                                 | C                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |
| Approach Vol, veh/h          | 118                                                                               |                                                                                   |                                                                                   | 941                                                                               | 1424                                                                              |                                                                                   |
| Approach Delay, s/veh        | 115.7                                                                             |                                                                                   |                                                                                   | 3.7                                                                               | 9.8                                                                               |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | A                                                                                 | A                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                   |
| Phs Duration (G+Y+Rc), s     | 71.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   | 71.0                                                                              |                                                                                   |
| Change Period (Y+Rc), s      | 4.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Max Green Setting (Gmax), s  | 106.0                                                                             |                                                                                   | 6.0                                                                               |                                                                                   | 106.0                                                                             |                                                                                   |
| Max Q Clear Time (g_c+l1), s | 55.6                                                                              |                                                                                   | 7.9                                                                               |                                                                                   | 48.2                                                                              |                                                                                   |
| Green Ext Time (p_c), s      | 6.9                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 18.8                                                                              |                                                                                   |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |

HCM 6th TWSC  
5: Baker St & Railroad Ave

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - EIS Channelization

| Intersection             |                                                                                   |        |                                                                                   |        |       |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|--------|-------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 4.8                                                                               |        |                                                                                   |        |       |                                                                                   |
| Movement                 | WBL                                                                               | WBR    | NBT                                                                               | NBR    | SBL   | SBT                                                                               |
| Lane Configurations      |  |        |  |        |       |  |
| Traffic Vol, veh/h       | 13                                                                                | 209    | 232                                                                               | 16     | 190   | 305                                                                               |
| Future Vol, veh/h        | 13                                                                                | 209    | 232                                                                               | 16     | 190   | 305                                                                               |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0                                                                                 | 0      | 0     | 0                                                                                 |
| Sign Control             | Stop                                                                              | Stop   | Free                                                                              | Free   | Free  | Free                                                                              |
| RT Channelized           | -                                                                                 | None   | -                                                                                 | None   | -     | None                                                                              |
| Storage Length           | 0                                                                                 | -      | -                                                                                 | -      | -     | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -      | 0                                                                                 | -      | -     | 0                                                                                 |
| Grade, %                 | 0                                                                                 | -      | 0                                                                                 | -      | -     | 0                                                                                 |
| Peak Hour Factor         | 89                                                                                | 89     | 89                                                                                | 89     | 89    | 89                                                                                |
| Heavy Vehicles, %        | 2                                                                                 | 2      | 2                                                                                 | 2      | 2     | 2                                                                                 |
| Mvmt Flow                | 15                                                                                | 235    | 261                                                                               | 18     | 213   | 343                                                                               |
|                          |                                                                                   |        |                                                                                   |        |       |                                                                                   |
| Major/Minor              | Minor1                                                                            | Major1 |                                                                                   | Major2 |       |                                                                                   |
| Conflicting Flow All     | 1039                                                                              | 270    | 0                                                                                 | 0      | 279   | 0                                                                                 |
| Stage 1                  | 270                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 769                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Critical Hdwy            | 6.42                                                                              | 6.22   | -                                                                                 | -      | 4.12  | -                                                                                 |
| Critical Hdwy Stg 1      | 5.42                                                                              | -      | -                                                                                 | -      | -     | -                                                                                 |
| Critical Hdwy Stg 2      | 5.42                                                                              | -      | -                                                                                 | -      | -     | -                                                                                 |
| Follow-up Hdwy           | 3.518                                                                             | 3.318  | -                                                                                 | -      | 2.218 | -                                                                                 |
| Pot Cap-1 Maneuver       | 255                                                                               | 769    | -                                                                                 | -      | 1284  | -                                                                                 |
| Stage 1                  | 775                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 457                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Platoon blocked, %       |                                                                                   |        | -                                                                                 | -      |       | -                                                                                 |
| Mov Cap-1 Maneuver       | 203                                                                               | 769    | -                                                                                 | -      | 1284  | -                                                                                 |
| Mov Cap-2 Maneuver       | 203                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Stage 1                  | 775                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 363                                                                               | -      | -                                                                                 | -      | -     | -                                                                                 |
|                          |                                                                                   |        |                                                                                   |        |       |                                                                                   |
|                          |                                                                                   |        |                                                                                   |        |       |                                                                                   |
| Approach                 | WB                                                                                | NB     |                                                                                   | SB     |       |                                                                                   |
| HCM Control Delay, s     | 13.7                                                                              | 0      |                                                                                   | 3.2    |       |                                                                                   |
| HCM LOS                  | B                                                                                 |        |                                                                                   |        |       |                                                                                   |
|                          |                                                                                   |        |                                                                                   |        |       |                                                                                   |
| Minor Lane/Major Mvmt    |                                                                                   | NBT    | NBRWBLn1                                                                          | SBL    | SBT   |                                                                                   |
| Capacity (veh/h)         |                                                                                   | -      | -                                                                                 | 661    | 1284  | -                                                                                 |
| HCM Lane V/C Ratio       |                                                                                   | -      | -                                                                                 | 0.377  | 0.166 | -                                                                                 |
| HCM Control Delay (s)    |                                                                                   | -      | -                                                                                 | 13.7   | 8.4   | 0                                                                                 |
| HCM Lane LOS             |                                                                                   | -      | -                                                                                 | B      | A     | A                                                                                 |
| HCM 95th %tile Q(veh)    |                                                                                   | -      | -                                                                                 | 1.8    | 0.6   | -                                                                                 |



HCM 6th TWSC  
6: SE Connector Alternative & Lawson Rd

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - EIS Channelization

| Intersection             |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|--------------------------|-----------------------------------------------------------------------------------|--------|--------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|
| Int Delay, s/veh         | 3.1                                                                               |        |        |                                                                                   |                                                                                   |       |
| Movement                 | EBT                                                                               | EBR    | WBL    | WBT                                                                               | NBL                                                                               | NBR   |
| Lane Configurations      |  |        |        |  |  |       |
| Traffic Vol, veh/h       | 291                                                                               | 113    | 0      | 128                                                                               | 136                                                                               | 0     |
| Future Vol, veh/h        | 291                                                                               | 113    | 0      | 128                                                                               | 136                                                                               | 0     |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0      | 0                                                                                 | 0                                                                                 | 0     |
| Sign Control             | Free                                                                              | Free   | Free   | Free                                                                              | Stop                                                                              | Stop  |
| RT Channelized           | -                                                                                 | None   | -      | None                                                                              | -                                                                                 | None  |
| Storage Length           | -                                                                                 | -      | -      | -                                                                                 | 0                                                                                 | -     |
| Veh in Median Storage, # | 0                                                                                 | -      | -      | 0                                                                                 | 0                                                                                 | -     |
| Grade, %                 | 0                                                                                 | -      | -      | 0                                                                                 | 0                                                                                 | -     |
| Peak Hour Factor         | 89                                                                                | 89     | 89     | 89                                                                                | 89                                                                                | 89    |
| Heavy Vehicles, %        | 2                                                                                 | 2      | 2      | 2                                                                                 | 2                                                                                 | 2     |
| Mvmt Flow                | 327                                                                               | 127    | 0      | 144                                                                               | 153                                                                               | 0     |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Major/Minor              | Major1                                                                            | Major2 | Minor1 |                                                                                   |                                                                                   |       |
| Conflicting Flow All     | 0                                                                                 | 0      | 454    | 0                                                                                 | 535                                                                               | 391   |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 391                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 144                                                                               | -     |
| Critical Hdwy            | -                                                                                 | -      | 4.12   | -                                                                                 | 6.42                                                                              | 6.22  |
| Critical Hdwy Stg 1      | -                                                                                 | -      | -      | -                                                                                 | 5.42                                                                              | -     |
| Critical Hdwy Stg 2      | -                                                                                 | -      | -      | -                                                                                 | 5.42                                                                              | -     |
| Follow-up Hdwy           | -                                                                                 | -      | 2.218  | -                                                                                 | 3.518                                                                             | 3.318 |
| Pot Cap-1 Maneuver       | -                                                                                 | -      | 1107   | -                                                                                 | 506                                                                               | 658   |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 683                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 883                                                                               | -     |
| Platoon blocked, %       | -                                                                                 | -      |        | -                                                                                 |                                                                                   |       |
| Mov Cap-1 Maneuver       | -                                                                                 | -      | 1107   | -                                                                                 | 506                                                                               | 658   |
| Mov Cap-2 Maneuver       | -                                                                                 | -      | -      | -                                                                                 | 506                                                                               | -     |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 683                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 883                                                                               | -     |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Approach                 | EB                                                                                | WB     |        | NB                                                                                |                                                                                   |       |
| HCM Control Delay, s     | 0                                                                                 | 0      |        | 15.2                                                                              |                                                                                   |       |
| HCM LOS                  | C                                                                                 |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Minor Lane/Major Mvmt    | NBLn1                                                                             | EBT    | EBR    | WBL                                                                               | WBT                                                                               |       |
| Capacity (veh/h)         | 506                                                                               | -      | -      | 1107                                                                              | -                                                                                 |       |
| HCM Lane V/C Ratio       | 0.302                                                                             | -      | -      | -                                                                                 | -                                                                                 |       |
| HCM Control Delay (s)    | 15.2                                                                              | -      | -      | 0                                                                                 | -                                                                                 |       |
| HCM Lane LOS             | C                                                                                 | -      | -      | A                                                                                 | -                                                                                 |       |
| HCM 95th %tile Q(veh)    | 1.3                                                                               | -      | -      | 0                                                                                 | -                                                                                 |       |

HCM 6th TWSC  
7: Lawson Pkwy & Lawson Rd

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - EIS Channelization

| Intersection             |        |       |      |        |      |      |        |       |       |        |       |       |
|--------------------------|--------|-------|------|--------|------|------|--------|-------|-------|--------|-------|-------|
| Int Delay, s/veh         | 98.6   |       |      |        |      |      |        |       |       |        |       |       |
| Movement                 | EBL    | EBT   | EBR  | WBL    | WBT  | WBR  | NBL    | NBT   | NBR   | SBL    | SBT   | SBR   |
| Lane Configurations      |        | ↕     |      |        | ↕    |      |        | ↕     |       |        | ↕     |       |
| Traffic Vol, veh/h       | 9      | 60    | 209  | 0      | 37   | 0    | 63     | 414   | 0     | 0      | 465   | 12    |
| Future Vol, veh/h        | 9      | 60    | 209  | 0      | 37   | 0    | 63     | 414   | 0     | 0      | 465   | 12    |
| Conflicting Peds, #/hr   | 0      | 0     | 0    | 0      | 0    | 0    | 0      | 0     | 0     | 0      | 0     | 0     |
| Sign Control             | Free   | Free  | Free | Free   | Free | Free | Stop   | Stop  | Stop  | Stop   | Stop  | Stop  |
| RT Channelized           | -      | -     | None | -      | -    | None | -      | -     | None  | -      | -     | None  |
| Storage Length           | -      | -     | -    | -      | -    | -    | -      | -     | -     | -      | -     | -     |
| Veh in Median Storage, # | -      | 0     | -    | -      | 0    | -    | -      | 0     | -     | -      | 0     | -     |
| Grade, %                 | -      | 0     | -    | -      | 0    | -    | -      | 0     | -     | -      | 0     | -     |
| Peak Hour Factor         | 91     | 91    | 91   | 91     | 91   | 91   | 91     | 91    | 91    | 91     | 91    | 91    |
| Heavy Vehicles, %        | 2      | 2     | 2    | 2      | 2    | 2    | 2      | 2     | 2     | 2      | 2     | 2     |
| Mvmt Flow                | 10     | 66    | 230  | 0      | 41   | 0    | 69     | 455   | 0     | 0      | 511   | 13    |
|                          |        |       |      |        |      |      |        |       |       |        |       |       |
| Major/Minor              | Major1 |       |      | Major2 |      |      | Minor1 |       |       | Minor2 |       |       |
| Conflicting Flow All     | 41     | 0     | 0    | 296    | 0    | 0    | 504    | 242   | 181   | 470    | 357   | 41    |
| Stage 1                  | -      | -     | -    | -      | -    | -    | 201    | 201   | -     | 41     | 41    | -     |
| Stage 2                  | -      | -     | -    | -      | -    | -    | 303    | 41    | -     | 429    | 316   | -     |
| Critical Hdwy            | 4.12   | -     | -    | 4.12   | -    | -    | 7.12   | 6.52  | 6.22  | 7.12   | 6.52  | 6.22  |
| Critical Hdwy Stg 1      | -      | -     | -    | -      | -    | -    | 6.12   | 5.52  | -     | 6.12   | 5.52  | -     |
| Critical Hdwy Stg 2      | -      | -     | -    | -      | -    | -    | 6.12   | 5.52  | -     | 6.12   | 5.52  | -     |
| Follow-up Hdwy           | 2.218  | -     | -    | 2.218  | -    | -    | 3.518  | 4.018 | 3.318 | 3.518  | 4.018 | 3.318 |
| Pot Cap-1 Maneuver       | 1568   | -     | -    | 1265   | -    | -    | 478    | 660   | 862   | 504    | 569   | 1030  |
| Stage 1                  | -      | -     | -    | -      | -    | -    | 801    | 735   | -     | 974    | 861   | -     |
| Stage 2                  | -      | -     | -    | -      | -    | -    | 706    | 861   | -     | 604    | 655   | -     |
| Platoon blocked, %       |        | -     | -    |        | -    | -    |        |       |       |        |       |       |
| Mov Cap-1 Maneuver       | 1568   | -     | -    | 1265   | -    | -    | 101    | 655   | 862   | 219    | 564   | 1030  |
| Mov Cap-2 Maneuver       | -      | -     | -    | -      | -    | -    | 101    | 655   | -     | 219    | 564   | -     |
| Stage 1                  | -      | -     | -    | -      | -    | -    | 795    | 729   | -     | 966    | 861   | -     |
| Stage 2                  | -      | -     | -    | -      | -    | -    | 283    | 861   | -     | 225    | 650   | -     |
|                          |        |       |      |        |      |      |        |       |       |        |       |       |
|                          |        |       |      |        |      |      |        |       |       |        |       |       |
| Approach                 | EB     |       |      | WB     |      |      | NB     |       |       | SB     |       |       |
| HCM Control Delay, s     | 0.2    |       |      | 0      |      |      | 214.6  |       |       | 47.5   |       |       |
| HCM LOS                  |        |       |      |        |      |      | F      |       |       | E      |       |       |
|                          |        |       |      |        |      |      |        |       |       |        |       |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBL   | EBT  | EBR    | WBL  | WBT  | WBR    | SBLn1 |       |        |       |       |
| Capacity (veh/h)         | 380    | 1568  | -    | -      | 1265 | -    | -      | 570   |       |        |       |       |
| HCM Lane V/C Ratio       | 1.379  | 0.006 | -    | -      | -    | -    | -      | 0.92  |       |        |       |       |
| HCM Control Delay (s)    | 214.6  | 7.3   | 0    | -      | 0    | -    | -      | 47.5  |       |        |       |       |
| HCM Lane LOS             | F      | A     | A    | -      | A    | -    | -      | E     |       |        |       |       |
| HCM 95th %tile Q(veh)    | 25.7   | 0     | -    | -      | 0    | -    | -      | 11.4  |       |        |       |       |



# HCM Signalized Intersection Capacity Analysis

## 1: SR 169 & Lawson Pkwy

# SE Connector Alternative Analysis

Future (2025) PM Peak Hour - Mitigation Channelization

| Movement                          | WBL  | WBR   | NBT  | NBR                       | SBL   | SBT   |
|-----------------------------------|------|-------|------|---------------------------|-------|-------|
| Lane Configurations               |      | ↰     | ↰    |                           | ↰     | ↰     |
| Traffic Volume (vph)              | 0    | 555   | 621  | 14                        | 653   | 1452  |
| Future Volume (vph)               | 0    | 555   | 621  | 14                        | 653   | 1452  |
| Ideal Flow (vphpl)                | 1900 | 1900  | 1900 | 1900                      | 1900  | 1900  |
| Total Lost time (s)               |      | 5.0   | 5.0  |                           | 5.0   | 5.0   |
| Lane Util. Factor                 |      | 1.00  | 1.00 |                           | 1.00  | 1.00  |
| Frt                               |      | 0.86  | 1.00 |                           | 1.00  | 1.00  |
| Flt Protected                     |      | 1.00  | 1.00 |                           | 0.95  | 1.00  |
| Satd. Flow (prot)                 |      | 1611  | 1857 |                           | 1770  | 1863  |
| Flt Permitted                     |      | 1.00  | 1.00 |                           | 0.20  | 1.00  |
| Satd. Flow (perm)                 |      | 1611  | 1857 |                           | 371   | 1863  |
| Peak-hour factor, PHF             | 0.94 | 0.94  | 0.94 | 0.94                      | 0.94  | 0.94  |
| Adj. Flow (vph)                   | 0    | 590   | 661  | 15                        | 695   | 1545  |
| RTOR Reduction (vph)              | 0    | 121   | 1    | 0                         | 0     | 0     |
| Lane Group Flow (vph)             | 0    | 469   | 675  | 0                         | 695   | 1545  |
| Turn Type                         |      | Over  | NA   |                           | pm+pt | NA    |
| Protected Phases                  |      | 1     | 2    |                           | 1     | 6     |
| Permitted Phases                  |      |       |      |                           | 6     |       |
| Actuated Green, G (s)             |      | 19.9  | 30.1 |                           | 55.0  | 60.0  |
| Effective Green, g (s)            |      | 19.9  | 30.1 |                           | 55.0  | 60.0  |
| Actuated g/C Ratio                |      | 0.33  | 0.50 |                           | 0.92  | 1.00  |
| Clearance Time (s)                |      | 5.0   | 5.0  |                           | 5.0   | 5.0   |
| Vehicle Extension (s)             |      | 3.0   | 3.0  |                           | 3.0   | 3.0   |
| Lane Grp Cap (vph)                |      | 534   | 931  |                           | 804   | 1863  |
| v/s Ratio Prot                    |      | 0.29  | 0.36 |                           | 0.29  | c0.83 |
| v/s Ratio Perm                    |      |       |      |                           | 0.51  |       |
| v/c Ratio                         |      | 0.88  | 0.72 |                           | 0.86  | 0.83  |
| Uniform Delay, d1                 |      | 18.9  | 11.7 |                           | 11.6  | 0.0   |
| Progression Factor                |      | 1.00  | 1.00 |                           | 1.00  | 1.00  |
| Incremental Delay, d2             |      | 15.1  | 4.9  |                           | 9.6   | 4.4   |
| Delay (s)                         |      | 34.0  | 16.6 |                           | 21.2  | 4.4   |
| Level of Service                  |      | C     | B    |                           | C     | A     |
| Approach Delay (s)                | 34.0 |       | 16.6 |                           |       | 9.6   |
| Approach LOS                      | C    |       | B    |                           |       | A     |
| <b>Intersection Summary</b>       |      |       |      |                           |       |       |
| HCM 2000 Control Delay            |      | 15.1  |      | HCM 2000 Level of Service |       | B     |
| HCM 2000 Volume to Capacity ratio |      | 1.00  |      |                           |       |       |
| Actuated Cycle Length (s)         |      | 60.0  |      | Sum of lost time (s)      |       | 10.0  |
| Intersection Capacity Utilization |      | 80.6% |      | ICU Level of Service      |       | D     |
| Analysis Period (min)             |      | 15    |      |                           |       |       |
| c Critical Lane Group             |      |       |      |                           |       |       |

# HCM Signalized Intersection Capacity Analysis

## 2: SR 169 & Baker St

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - Mitigation Channelization



| Movement                          | EBL   | EBR  | NBL   | NBT  | SBT                       | SBR  |
|-----------------------------------|-------|------|-------|------|---------------------------|------|
| Lane Configurations               |       |      |       |      |                           |      |
| Traffic Volume (vph)              | 60    | 132  | 83    | 702  | 1335                      | 104  |
| Future Volume (vph)               | 60    | 132  | 83    | 702  | 1335                      | 104  |
| Ideal Flow (vphpl)                | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900 |
| Total Lost time (s)               | 5.0   |      | 5.0   | 5.0  | 5.0                       | 5.0  |
| Lane Util. Factor                 | 1.00  |      | 1.00  | 1.00 | 1.00                      | 1.00 |
| Frpb, ped/bikes                   | 1.00  |      | 1.00  | 1.00 | 1.00                      | 0.97 |
| Flpb, ped/bikes                   | 1.00  |      | 1.00  | 1.00 | 1.00                      | 1.00 |
| Frt                               | 0.91  |      | 1.00  | 1.00 | 1.00                      | 0.85 |
| Flt Protected                     | 0.98  |      | 0.95  | 1.00 | 1.00                      | 1.00 |
| Satd. Flow (prot)                 | 1697  |      | 1752  | 1845 | 1863                      | 1540 |
| Flt Permitted                     | 0.98  |      | 0.07  | 1.00 | 1.00                      | 1.00 |
| Satd. Flow (perm)                 | 1697  |      | 124   | 1845 | 1863                      | 1540 |
| Peak-hour factor, PHF             | 0.93  | 0.93 | 0.93  | 0.93 | 0.93                      | 0.93 |
| Adj. Flow (vph)                   | 65    | 142  | 89    | 755  | 1435                      | 112  |
| RTOR Reduction (vph)              | 64    | 0    | 0     | 0    | 0                         | 22   |
| Lane Group Flow (vph)             | 143   | 0    | 89    | 755  | 1435                      | 90   |
| Confl. Peds. (#/hr)               | 3     |      |       |      |                           | 3    |
| Heavy Vehicles (%)                | 0%    | 0%   | 3%    | 3%   | 2%                        | 2%   |
| Turn Type                         | Prot  |      | Perm  | NA   | NA                        | Perm |
| Protected Phases                  | 4     |      |       | 2    | 6                         |      |
| Permitted Phases                  |       |      | 2     |      |                           | 6    |
| Actuated Green, G (s)             | 10.6  |      | 59.4  | 59.4 | 59.4                      | 59.4 |
| Effective Green, g (s)            | 10.6  |      | 59.4  | 59.4 | 59.4                      | 59.4 |
| Actuated g/C Ratio                | 0.13  |      | 0.74  | 0.74 | 0.74                      | 0.74 |
| Clearance Time (s)                | 5.0   |      | 5.0   | 5.0  | 5.0                       | 5.0  |
| Vehicle Extension (s)             | 3.0   |      | 3.0   | 3.0  | 3.0                       | 3.0  |
| Lane Grp Cap (vph)                | 224   |      | 92    | 1369 | 1383                      | 1143 |
| v/s Ratio Prot                    | c0.08 |      |       | 0.41 | c0.77                     |      |
| v/s Ratio Perm                    |       |      | 0.72  |      |                           | 0.06 |
| v/c Ratio                         | 0.64  |      | 0.97  | 0.55 | 1.04                      | 0.08 |
| Uniform Delay, d1                 | 32.9  |      | 9.4   | 4.5  | 10.3                      | 2.8  |
| Progression Factor                | 1.00  |      | 0.60  | 0.75 | 1.00                      | 1.00 |
| Incremental Delay, d2             | 5.8   |      | 59.2  | 0.8  | 34.5                      | 0.1  |
| Delay (s)                         | 38.7  |      | 64.8  | 4.2  | 44.8                      | 3.0  |
| Level of Service                  | D     |      | E     | A    | D                         | A    |
| Approach Delay (s)                | 38.7  |      |       | 10.6 | 41.8                      |      |
| Approach LOS                      | D     |      |       | B    | D                         |      |
| <b>Intersection Summary</b>       |       |      |       |      |                           |      |
| HCM 2000 Control Delay            |       |      | 31.4  |      | HCM 2000 Level of Service | C    |
| HCM 2000 Volume to Capacity ratio |       |      | 0.98  |      |                           |      |
| Actuated Cycle Length (s)         |       |      | 80.0  |      | Sum of lost time (s)      | 10.0 |
| Intersection Capacity Utilization |       |      | 90.0% |      | ICU Level of Service      | E    |
| Analysis Period (min)             |       |      | 15    |      |                           |      |
| c Critical Lane Group             |       |      |       |      |                           |      |



# HCM 6th Signalized Intersection Summary 2: SR 169 & Baker St

## SE Connector Alternative Analysis Future (2025) PM Peak Hour - Mitigation Channelization

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |  |  |  |  |
| Traffic Volume (veh/h)       | 60                                                                                | 132                                                                               | 83                                                                                | 702                                                                               | 1335                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 132                                                                               | 83                                                                                | 702                                                                               | 1335                                                                              | 104                                                                               |
| Initial Q (Qb), veh          | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Ped-Bike Adj(A_pbT)          | 1.00                                                                              | 0.99                                                                              | 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       | 1900                                                                              | 1900                                                                              | 1856                                                                              | 1856                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 65                                                                                | 142                                                                               | 89                                                                                | 755                                                                               | 1435                                                                              | 112                                                                               |
| Peak Hour Factor             | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 3                                                                                 | 3                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 76                                                                                | 167                                                                               | 90                                                                                | 1350                                                                              | 1360                                                                              | 1150                                                                              |
| Arrive On Green              | 0.15                                                                              | 0.15                                                                              | 1.00                                                                              | 1.00                                                                              | 0.73                                                                              | 0.73                                                                              |
| Sat Flow, veh/h              | 518                                                                               | 1131                                                                              | 332                                                                               | 1856                                                                              | 1870                                                                              | 1582                                                                              |
| Grp Volume(v), veh/h         | 208                                                                               | 0                                                                                 | 89                                                                                | 755                                                                               | 1435                                                                              | 112                                                                               |
| Grp Sat Flow(s),veh/h/ln     | 1657                                                                              | 0                                                                                 | 332                                                                               | 1856                                                                              | 1870                                                                              | 1582                                                                              |
| Q Serve(g_s), s              | 9.8                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 58.2                                                                              | 1.7                                                                               |
| Cycle Q Clear(g_c), s        | 9.8                                                                               | 0.0                                                                               | 58.2                                                                              | 0.0                                                                               | 58.2                                                                              | 1.7                                                                               |
| Prop In Lane                 | 0.31                                                                              | 0.68                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Lane Grp Cap(c), veh/h       | 245                                                                               | 0                                                                                 | 90                                                                                | 1350                                                                              | 1360                                                                              | 1150                                                                              |
| V/C Ratio(X)                 | 0.85                                                                              | 0.00                                                                              | 0.99                                                                              | 0.56                                                                              | 1.05                                                                              | 0.10                                                                              |
| Avail Cap(c_a), veh/h        | 269                                                                               | 0                                                                                 | 90                                                                                | 1350                                                                              | 1360                                                                              | 1150                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 2.00                                                                              | 2.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.45                                                                              | 0.45                                                                              | 0.45                                                                              | 0.45                                                                              |
| Uniform Delay (d), s/veh     | 33.2                                                                              | 0.0                                                                               | 29.1                                                                              | 0.0                                                                               | 10.9                                                                              | 3.2                                                                               |
| Incr Delay (d2), s/veh       | 20.6                                                                              | 0.0                                                                               | 60.8                                                                              | 0.8                                                                               | 33.2                                                                              | 0.1                                                                               |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 5.3                                                                               | 0.0                                                                               | 3.2                                                                               | 0.3                                                                               | 29.6                                                                              | 0.4                                                                               |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 53.8                                                                              | 0.0                                                                               | 89.9                                                                              | 0.8                                                                               | 44.1                                                                              | 3.3                                                                               |
| LnGrp LOS                    | D                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 |
| Approach Vol, veh/h          | 208                                                                               |                                                                                   |                                                                                   | 844                                                                               | 1547                                                                              |                                                                                   |
| Approach Delay, s/veh        | 53.8                                                                              |                                                                                   |                                                                                   | 10.2                                                                              | 41.2                                                                              |                                                                                   |
| Approach LOS                 | D                                                                                 |                                                                                   |                                                                                   | B                                                                                 | D                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                   |
| Phs Duration (G+Y+Rc), s     | 63.2                                                                              |                                                                                   | 16.8                                                                              |                                                                                   | 63.2                                                                              |                                                                                   |
| Change Period (Y+Rc), s      | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   |
| Max Green Setting (Gmax), s  | 57.0                                                                              |                                                                                   | 13.0                                                                              |                                                                                   | 57.0                                                                              |                                                                                   |
| Max Q Clear Time (g_c+I1), s | 60.2                                                                              |                                                                                   | 11.8                                                                              |                                                                                   | 60.2                                                                              |                                                                                   |
| Green Ext Time (p_c), s      | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 32.1                                                                              |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |

# HCM Signalized Intersection Capacity Analysis

## 3: SR 169 & Lawson Rd

# SE Connector Alternative Analysis

Future (2025) PM Peak Hour - Mitigation Channelization

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |  |  |                                                                                     |
| Traffic Volume (vph)              | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                  | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| Future Volume (vph)               | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                  | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frpb, ped/bikes                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Flpb, ped/bikes                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.95                                                                              |                                                                                   |                                                                                    | 0.97                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1880                                                                              |                                                                                   |                                                                                   | 1717                                                                              |                                                                                   |                                                                                    | 1782                                                                                |                                                                                     | 1765                                                                                | 1861                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |                                                                                    | 0.88                                                                                |                                                                                     | 0.31                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1864                                                                              |                                                                                   |                                                                                   | 1435                                                                              |                                                                                   |                                                                                    | 1564                                                                                |                                                                                     | 583                                                                                 | 1861                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                               | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Adj. Flow (vph)                   | 1                                                                                 | 19                                                                                | 1                                                                                 | 185                                                                               | 20                                                                                | 121                                                                               | 1                                                                                  | 704                                                                                 | 179                                                                                 | 322                                                                                 | 1228                                                                                | 5                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                  | 11                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 300                                                                               | 0                                                                                 | 0                                                                                  | 873                                                                                 | 0                                                                                   | 322                                                                                 | 1233                                                                                | 0                                                                                   |
| Confl. Peds. (#/hr)               | 3                                                                                 |                                                                                   | 3                                                                                 | 5                                                                                 |                                                                                   | 5                                                                                 | 3                                                                                  |                                                                                     | 5                                                                                   | 5                                                                                   |                                                                                     | 3                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 3%                                                                                 | 3%                                                                                  | 3%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                    | 54.0                                                                                |                                                                                     | 54.0                                                                                | 54.0                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                    | 54.0                                                                                |                                                                                     | 54.0                                                                                | 54.0                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                    | 0.68                                                                                |                                                                                     | 0.68                                                                                | 0.68                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 372                                                                               |                                                                                   |                                                                                   | 287                                                                               |                                                                                   |                                                                                    | 1055                                                                                |                                                                                     | 393                                                                                 | 1256                                                                                |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.66                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.01                                                                              |                                                                                   |                                                                                   | c0.21                                                                             |                                                                                   |                                                                                    | 0.56                                                                                |                                                                                     | 0.55                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.05                                                                              |                                                                                   |                                                                                   | 1.04                                                                              |                                                                                   |                                                                                    | 0.83                                                                                |                                                                                     | 0.82                                                                                | 0.98                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 32.0                                                                              |                                                                                   |                                                                                    | 9.6                                                                                 |                                                                                     | 9.5                                                                                 | 12.5                                                                                |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     | 0.36                                                                                | 0.41                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   | 65.0                                                                              |                                                                                   |                                                                                    | 7.5                                                                                 |                                                                                     | 4.4                                                                                 | 8.5                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 97.0                                                                              |                                                                                   |                                                                                    | 17.0                                                                                |                                                                                     | 7.8                                                                                 | 13.7                                                                                |                                                                                     |
| Level of Service                  |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     | A                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 97.0                                                                              |                                                                                   |                                                                                    | 17.0                                                                                |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   | 23.9                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   | 80.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   | 143.2%                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM 6th Signalized Intersection Summary

## 3: SR 169 & Lawson Rd

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - Mitigation Channelization

|                              |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations          |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |  |  |                                                                                     |
| Traffic Volume (veh/h)       | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                   | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| Future Volume (veh/h)        | 1                                                                                 | 18                                                                                | 1                                                                                 | 174                                                                               | 19                                                                                | 114                                                                               | 1                                                                                   | 662                                                                                 | 168                                                                                 | 303                                                                                 | 1154                                                                                | 5                                                                                   |
| 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                                                                              | 0.99                                                                              |                                                                                   | 0.99                                                                              | 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       | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1856                                                                                | 1856                                                                                | 1856                                                                                | 1870                                                                                | 1870                                                                                | 1870                                                                                |
| Adj Flow Rate, veh/h         | 1                                                                                 | 19                                                                                | 1                                                                                 | 185                                                                               | 20                                                                                | 121                                                                               | 1                                                                                   | 704                                                                                 | 179                                                                                 | 322                                                                                 | 1228                                                                                | 5                                                                                   |
| Peak Hour Factor             | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 3                                                                                   | 3                                                                                   | 3                                                                                   | 2                                                                                   | 2                                                                                   | 2                                                                                   |
| Cap, veh/h                   | 51                                                                                | 356                                                                               | 18                                                                                | 242                                                                               | 19                                                                                | 112                                                                               | 45                                                                                  | 962                                                                                 | 244                                                                                 | 399                                                                                 | 1256                                                                                | 5                                                                                   |
| Arrive On Green              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.20                                                                              | 0.68                                                                                | 0.68                                                                                | 0.68                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                |
| Sat Flow, veh/h              | 18                                                                                | 1778                                                                              | 90                                                                                | 856                                                                               | 93                                                                                | 560                                                                               | 0                                                                                   | 1426                                                                                | 362                                                                                 | 629                                                                                 | 1861                                                                                | 8                                                                                   |
| Grp Volume(v), veh/h         | 21                                                                                | 0                                                                                 | 0                                                                                 | 326                                                                               | 0                                                                                 | 0                                                                                 | 884                                                                                 | 0                                                                                   | 0                                                                                   | 322                                                                                 | 0                                                                                   | 1233                                                                                |
| Grp Sat Flow(s),veh/h/ln     | 1886                                                                              | 0                                                                                 | 0                                                                                 | 1509                                                                              | 0                                                                                 | 0                                                                                 | 1788                                                                                | 0                                                                                   | 0                                                                                   | 629                                                                                 | 0                                                                                   | 1869                                                                                |
| Q Serve(g_s), s              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 15.3                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 28.6                                                                                | 0.0                                                                                 | 44.0                                                                                |
| Cycle Q Clear(g_c), s        | 0.7                                                                               | 0.0                                                                               | 0.0                                                                               | 16.0                                                                              | 0.0                                                                               | 0.0                                                                               | 25.4                                                                                | 0.0                                                                                 | 0.0                                                                                 | 54.0                                                                                | 0.0                                                                                 | 44.0                                                                                |
| Prop In Lane                 | 0.05                                                                              |                                                                                   | 0.05                                                                              | 0.57                                                                              |                                                                                   | 0.37                                                                              | 0.00                                                                                |                                                                                     | 0.20                                                                                | 1.00                                                                                |                                                                                     | 0.00                                                                                |
| Lane Grp Cap(c), veh/h       | 424                                                                               | 0                                                                                 | 0                                                                                 | 372                                                                               | 0                                                                                 | 0                                                                                 | 1252                                                                                | 0                                                                                   | 0                                                                                   | 399                                                                                 | 0                                                                                   | 1262                                                                                |
| V/C Ratio(X)                 | 0.05                                                                              | 0.00                                                                              | 0.00                                                                              | 0.88                                                                              | 0.00                                                                              | 0.00                                                                              | 0.71                                                                                | 0.00                                                                                | 0.00                                                                                | 0.81                                                                                | 0.00                                                                                | 0.98                                                                                |
| Avail Cap(c_a), veh/h        | 424                                                                               | 0                                                                                 | 0                                                                                 | 372                                                                               | 0                                                                                 | 0                                                                                 | 1252                                                                                | 0                                                                                   | 0                                                                                   | 399                                                                                 | 0                                                                                   | 1262                                                                                |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.33                                                                                | 1.33                                                                                | 1.33                                                                                |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.00                                                                              | 1.00                                                                              | 0.00                                                                              | 0.00                                                                              | 0.47                                                                                | 0.00                                                                                | 0.00                                                                                | 0.09                                                                                | 0.00                                                                                | 0.09                                                                                |
| Uniform Delay (d), s/veh     | 25.9                                                                              | 0.0                                                                               | 0.0                                                                               | 32.5                                                                              | 0.0                                                                               | 0.0                                                                               | 8.4                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 10.3                                                                                | 0.0                                                                                 | 3.6                                                                                 |
| Incr Delay (d2), s/veh       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 20.2                                                                              | 0.0                                                                               | 0.0                                                                               | 1.6                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 1.7                                                                                 | 0.0                                                                                 | 4.0                                                                                 |
| 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     | 0.3                                                                               | 0.0                                                                               | 0.0                                                                               | 8.4                                                                               | 0.0                                                                               | 0.0                                                                               | 8.5                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 4.4                                                                                 | 0.0                                                                                 | 3.6                                                                                 |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LnGrp Delay(d),s/veh         | 25.9                                                                              | 0.0                                                                               | 0.0                                                                               | 52.7                                                                              | 0.0                                                                               | 0.0                                                                               | 10.0                                                                                | 0.0                                                                                 | 0.0                                                                                 | 11.9                                                                                | 0.0                                                                                 | 7.6                                                                                 |
| LnGrp LOS                    | C                                                                                 | A                                                                                 | A                                                                                 | D                                                                                 | A                                                                                 | A                                                                                 | A                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   |
| Approach Vol, veh/h          |                                                                                   | 21                                                                                |                                                                                   |                                                                                   | 326                                                                               |                                                                                   |                                                                                     | 884                                                                                 |                                                                                     |                                                                                     | 1555                                                                                |                                                                                     |
| Approach Delay, s/veh        |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 52.7                                                                              |                                                                                   |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     | 8.5                                                                                 |                                                                                     |
| Approach LOS                 |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Timer - Assigned Phs         |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Phs Duration (G+Y+Rc), s     |                                                                                   | 59.0                                                                              |                                                                                   | 21.0                                                                              |                                                                                   | 59.0                                                                              |                                                                                     | 21.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Change Period (Y+Rc), s      |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Green Setting (Gmax), s  |                                                                                   | 54.0                                                                              |                                                                                   | 16.0                                                                              |                                                                                   | 54.0                                                                              |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Q Clear Time (g_c+I1), s |                                                                                   | 27.4                                                                              |                                                                                   | 2.7                                                                               |                                                                                   | 56.0                                                                              |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Green Ext Time (p_c), s      |                                                                                   | 5.4                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   |                                                                                   | 14.2                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th LOS                  |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Signalized Intersection Capacity Analysis

## 4: SR 169 & Jones Lake Rd

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - Mitigation Channelization

| Movement                          | EBL   | EBR  | NBL   | NBT  | SBT                       | SBR  |
|-----------------------------------|-------|------|-------|------|---------------------------|------|
| Lane Configurations               | WT    |      |       | WT   | WT                        |      |
| Traffic Volume (vph)              | 1     | 108  | 38    | 837  | 1323                      | 1    |
| Future Volume (vph)               | 1     | 108  | 38    | 837  | 1323                      | 1    |
| Ideal Flow (vphpl)                | 1900  | 1900 | 1900  | 1900 | 1900                      | 1900 |
| Total Lost time (s)               | 4.0   |      |       | 4.0  | 4.0                       |      |
| Lane Util. Factor                 | 1.00  |      |       | 1.00 | 1.00                      |      |
| Frt                               | 0.87  |      |       | 1.00 | 1.00                      |      |
| Flt Protected                     | 1.00  |      |       | 1.00 | 1.00                      |      |
| Satd. Flow (prot)                 | 1645  |      |       | 1859 | 1844                      |      |
| Flt Permitted                     | 1.00  |      |       | 0.70 | 1.00                      |      |
| Satd. Flow (perm)                 | 1645  |      |       | 1296 | 1844                      |      |
| Peak-hour factor, PHF             | 0.93  | 0.93 | 0.93  | 0.93 | 0.93                      | 0.93 |
| Adj. Flow (vph)                   | 1     | 116  | 41    | 900  | 1423                      | 1    |
| RTOR Reduction (vph)              | 109   | 0    | 0     | 0    | 0                         | 0    |
| Lane Group Flow (vph)             | 8     | 0    | 0     | 941  | 1424                      | 0    |
| Heavy Vehicles (%)                | 0%    | 0%   | 2%    | 2%   | 3%                        | 3%   |
| Turn Type                         | Prot  |      | Perm  | NA   | NA                        |      |
| Protected Phases                  | 4     |      |       | 2    | 6                         |      |
| Permitted Phases                  |       |      | 2     |      |                           |      |
| Actuated Green, G (s)             | 5.9   |      |       | 82.6 | 82.6                      |      |
| Effective Green, g (s)            | 5.9   |      |       | 82.6 | 82.6                      |      |
| Actuated g/C Ratio                | 0.06  |      |       | 0.86 | 0.86                      |      |
| Clearance Time (s)                | 4.0   |      |       | 4.0  | 4.0                       |      |
| Vehicle Extension (s)             | 3.0   |      |       | 3.0  | 3.0                       |      |
| Lane Grp Cap (vph)                | 100   |      |       | 1109 | 1578                      |      |
| v/s Ratio Prot                    | c0.00 |      |       |      | c0.77                     |      |
| v/s Ratio Perm                    |       |      |       | 0.73 |                           |      |
| v/c Ratio                         | 0.08  |      |       | 0.85 | 0.90                      |      |
| Uniform Delay, d1                 | 42.7  |      |       | 3.7  | 4.4                       |      |
| Progression Factor                | 1.00  |      |       | 1.00 | 1.00                      |      |
| Incremental Delay, d2             | 0.3   |      |       | 6.2  | 7.6                       |      |
| Delay (s)                         | 43.1  |      |       | 9.9  | 12.0                      |      |
| Level of Service                  | D     |      |       | A    | B                         |      |
| Approach Delay (s)                | 43.1  |      |       | 9.9  | 12.0                      |      |
| Approach LOS                      | D     |      |       | A    | B                         |      |
| <b>Intersection Summary</b>       |       |      |       |      |                           |      |
| HCM 2000 Control Delay            |       |      | 12.6  |      | HCM 2000 Level of Service | B    |
| HCM 2000 Volume to Capacity ratio |       |      | 0.85  |      |                           |      |
| Actuated Cycle Length (s)         |       |      | 96.5  |      | Sum of lost time (s)      | 8.0  |
| Intersection Capacity Utilization |       |      | 88.3% |      | ICU Level of Service      | E    |
| Analysis Period (min)             |       |      | 15    |      |                           |      |
| c Critical Lane Group             |       |      |       |      |                           |      |



# HCM 6th Signalized Intersection Summary 4: SR 169 & Jones Lake Rd

## SE Connector Alternative Analysis Future (2025) PM Peak Hour - Mitigation Channelization

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |                                                                                   |  |  |                                                                                   |
| Traffic Volume (veh/h)       | 1                                                                                 | 108                                                                               | 38                                                                                | 837                                                                               | 1323                                                                              | 1                                                                                 |
| Future Volume (veh/h)        | 1                                                                                 | 108                                                                               | 38                                                                                | 837                                                                               | 1323                                                                              | 1                                                                                 |
| 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       | 1900                                                                              | 1900                                                                              | 1870                                                                              | 1870                                                                              | 1856                                                                              | 1856                                                                              |
| Adj Flow Rate, veh/h         | 1                                                                                 | 116                                                                               | 41                                                                                | 900                                                                               | 1423                                                                              | 1                                                                                 |
| Peak Hour Factor             | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 2                                                                                 | 2                                                                                 | 3                                                                                 | 3                                                                                 |
| Cap, veh/h                   | 1                                                                                 | 103                                                                               | 65                                                                                | 1145                                                                              | 1573                                                                              | 1                                                                                 |
| Arrive On Green              | 0.06                                                                              | 0.06                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              |
| Sat Flow, veh/h              | 14                                                                                | 1586                                                                              | 29                                                                                | 1349                                                                              | 1854                                                                              | 1                                                                                 |
| Grp Volume(v), veh/h         | 118                                                                               | 0                                                                                 | 941                                                                               | 0                                                                                 | 0                                                                                 | 1424                                                                              |
| Grp Sat Flow(s),veh/h/ln     | 1614                                                                              | 0                                                                                 | 1378                                                                              | 0                                                                                 | 0                                                                                 | 1855                                                                              |
| Q Serve(g_s), s              | 6.0                                                                               | 0.0                                                                               | 22.9                                                                              | 0.0                                                                               | 0.0                                                                               | 46.2                                                                              |
| Cycle Q Clear(g_c), s        | 6.0                                                                               | 0.0                                                                               | 69.0                                                                              | 0.0                                                                               | 0.0                                                                               | 46.2                                                                              |
| Prop In Lane                 | 0.01                                                                              | 0.98                                                                              | 0.04                                                                              |                                                                                   |                                                                                   | 0.00                                                                              |
| Lane Grp Cap(c), veh/h       | 105                                                                               | 0                                                                                 | 1209                                                                              | 0                                                                                 | 0                                                                                 | 1574                                                                              |
| V/C Ratio(X)                 | 1.13                                                                              | 0.00                                                                              | 0.78                                                                              | 0.00                                                                              | 0.00                                                                              | 0.90                                                                              |
| Avail Cap(c_a), veh/h        | 105                                                                               | 0                                                                                 | 1687                                                                              | 0                                                                                 | 0                                                                                 | 2130                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 1.00                                                                              | 0.00                                                                              | 0.00                                                                              | 1.00                                                                              |
| Uniform Delay (d), s/veh     | 43.2                                                                              | 0.0                                                                               | 5.5                                                                               | 0.0                                                                               | 0.0                                                                               | 4.6                                                                               |
| Incr Delay (d2), s/veh       | 125.6                                                                             | 0.0                                                                               | 1.6                                                                               | 0.0                                                                               | 0.0                                                                               | 4.7                                                                               |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 6.0                                                                               | 0.0                                                                               | 4.5                                                                               | 0.0                                                                               | 0.0                                                                               | 9.5                                                                               |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 168.7                                                                             | 0.0                                                                               | 7.0                                                                               | 0.0                                                                               | 0.0                                                                               | 9.3                                                                               |
| LnGrp LOS                    | F                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 |
| Approach Vol, veh/h          | 118                                                                               |                                                                                   |                                                                                   | 941                                                                               | 1424                                                                              |                                                                                   |
| Approach Delay, s/veh        | 168.7                                                                             |                                                                                   |                                                                                   | 7.0                                                                               | 9.3                                                                               |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | A                                                                                 | A                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                   |
| Phs Duration (G+Y+Rc), s     | 82.2                                                                              |                                                                                   | 10.0                                                                              |                                                                                   | 82.2                                                                              |                                                                                   |
| Change Period (Y+Rc), s      | 4.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Max Green Setting (Gmax), s  | 106.0                                                                             |                                                                                   | 6.0                                                                               |                                                                                   | 106.0                                                                             |                                                                                   |
| Max Q Clear Time (g_c+I1), s | 71.0                                                                              |                                                                                   | 8.0                                                                               |                                                                                   | 48.2                                                                              |                                                                                   |
| Green Ext Time (p_c), s      | 7.2                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 18.8                                                                              |                                                                                   |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |

HCM 6th TWSC  
5: Baker St & Railroad Ave

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - Mitigation Channelization

| Intersection             |                                                                                   |          |                                                                                   |        |       |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------|--------|-------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 4.8                                                                               |          |                                                                                   |        |       |                                                                                   |
| Movement                 | WBL                                                                               | WBR      | NBT                                                                               | NBR    | SBL   | SBT                                                                               |
| Lane Configurations      |  |          |  |        |       |  |
| Traffic Vol, veh/h       | 13                                                                                | 209      | 232                                                                               | 16     | 190   | 305                                                                               |
| Future Vol, veh/h        | 13                                                                                | 209      | 232                                                                               | 16     | 190   | 305                                                                               |
| Conflicting Peds, #/hr   | 0                                                                                 | 0        | 0                                                                                 | 0      | 0     | 0                                                                                 |
| Sign Control             | Stop                                                                              | Stop     | Free                                                                              | Free   | Free  | Free                                                                              |
| RT Channelized           | -                                                                                 | None     | -                                                                                 | None   | -     | None                                                                              |
| Storage Length           | 0                                                                                 | -        | -                                                                                 | -      | -     | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -        | 0                                                                                 | -      | -     | 0                                                                                 |
| Grade, %                 | 0                                                                                 | -        | 0                                                                                 | -      | -     | 0                                                                                 |
| Peak Hour Factor         | 89                                                                                | 89       | 89                                                                                | 89     | 89    | 89                                                                                |
| Heavy Vehicles, %        | 2                                                                                 | 2        | 2                                                                                 | 2      | 2     | 2                                                                                 |
| Mvmt Flow                | 15                                                                                | 235      | 261                                                                               | 18     | 213   | 343                                                                               |
|                          |                                                                                   |          |                                                                                   |        |       |                                                                                   |
| Major/Minor              | Minor1                                                                            | Major1   |                                                                                   | Major2 |       |                                                                                   |
| Conflicting Flow All     | 1039                                                                              | 270      | 0                                                                                 | 0      | 279   | 0                                                                                 |
| Stage 1                  | 270                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 769                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Critical Hdwy            | 6.42                                                                              | 6.22     | -                                                                                 | -      | 4.12  | -                                                                                 |
| Critical Hdwy Stg 1      | 5.42                                                                              | -        | -                                                                                 | -      | -     | -                                                                                 |
| Critical Hdwy Stg 2      | 5.42                                                                              | -        | -                                                                                 | -      | -     | -                                                                                 |
| Follow-up Hdwy           | 3.518                                                                             | 3.318    | -                                                                                 | -      | 2.218 | -                                                                                 |
| Pot Cap-1 Maneuver       | 255                                                                               | 769      | -                                                                                 | -      | 1284  | -                                                                                 |
| Stage 1                  | 775                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 457                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Platoon blocked, %       |                                                                                   |          | -                                                                                 | -      |       | -                                                                                 |
| Mov Cap-1 Maneuver       | 203                                                                               | 769      | -                                                                                 | -      | 1284  | -                                                                                 |
| Mov Cap-2 Maneuver       | 203                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Stage 1                  | 775                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
| Stage 2                  | 363                                                                               | -        | -                                                                                 | -      | -     | -                                                                                 |
|                          |                                                                                   |          |                                                                                   |        |       |                                                                                   |
|                          |                                                                                   |          |                                                                                   |        |       |                                                                                   |
| Approach                 | WB                                                                                | NB       |                                                                                   | SB     |       |                                                                                   |
| HCM Control Delay, s     | 13.7                                                                              | 0        |                                                                                   | 3.2    |       |                                                                                   |
| HCM LOS                  | B                                                                                 |          |                                                                                   |        |       |                                                                                   |
|                          |                                                                                   |          |                                                                                   |        |       |                                                                                   |
| Minor Lane/Major Mvmt    | NBT                                                                               | NBRWBLn1 | SBL                                                                               | SBT    |       |                                                                                   |
| Capacity (veh/h)         | -                                                                                 | -        | 661                                                                               | 1284   | -     |                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                 | -        | 0.377                                                                             | 0.166  | -     |                                                                                   |
| HCM Control Delay (s)    | -                                                                                 | -        | 13.7                                                                              | 8.4    | 0     |                                                                                   |
| HCM Lane LOS             | -                                                                                 | -        | B                                                                                 | A      | A     |                                                                                   |
| HCM 95th %tile Q(veh)    | -                                                                                 | -        | 1.8                                                                               | 0.6    | -     |                                                                                   |



HCM 6th TWSC  
6: SE Connector Alternative & Lawson Rd

SE Connector Alternative Analysis  
Future (2025) PM Peak Hour - Mitigation Channelization

| Intersection             |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|--------------------------|-----------------------------------------------------------------------------------|--------|--------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|
| Int Delay, s/veh         | 3.1                                                                               |        |        |                                                                                   |                                                                                   |       |
| Movement                 | EBT                                                                               | EBR    | WBL    | WBT                                                                               | NBL                                                                               | NBR   |
| Lane Configurations      |  |        |        |  |  |       |
| Traffic Vol, veh/h       | 291                                                                               | 113    | 0      | 128                                                                               | 136                                                                               | 0     |
| Future Vol, veh/h        | 291                                                                               | 113    | 0      | 128                                                                               | 136                                                                               | 0     |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0      | 0                                                                                 | 0                                                                                 | 0     |
| Sign Control             | Free                                                                              | Free   | Free   | Free                                                                              | Stop                                                                              | Stop  |
| RT Channelized           | -                                                                                 | None   | -      | None                                                                              | -                                                                                 | None  |
| Storage Length           | -                                                                                 | -      | -      | -                                                                                 | 0                                                                                 | -     |
| Veh in Median Storage, # | 0                                                                                 | -      | -      | 0                                                                                 | 0                                                                                 | -     |
| Grade, %                 | 0                                                                                 | -      | -      | 0                                                                                 | 0                                                                                 | -     |
| Peak Hour Factor         | 89                                                                                | 89     | 89     | 89                                                                                | 89                                                                                | 89    |
| Heavy Vehicles, %        | 2                                                                                 | 2      | 2      | 2                                                                                 | 2                                                                                 | 2     |
| Mvmt Flow                | 327                                                                               | 127    | 0      | 144                                                                               | 153                                                                               | 0     |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Major/Minor              | Major1                                                                            | Major2 | Minor1 |                                                                                   |                                                                                   |       |
| Conflicting Flow All     | 0                                                                                 | 0      | 454    | 0                                                                                 | 535                                                                               | 391   |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 391                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 144                                                                               | -     |
| Critical Hdwy            | -                                                                                 | -      | 4.12   | -                                                                                 | 6.42                                                                              | 6.22  |
| Critical Hdwy Stg 1      | -                                                                                 | -      | -      | -                                                                                 | 5.42                                                                              | -     |
| Critical Hdwy Stg 2      | -                                                                                 | -      | -      | -                                                                                 | 5.42                                                                              | -     |
| Follow-up Hdwy           | -                                                                                 | -      | 2.218  | -                                                                                 | 3.518                                                                             | 3.318 |
| Pot Cap-1 Maneuver       | -                                                                                 | -      | 1107   | -                                                                                 | 506                                                                               | 658   |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 683                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 883                                                                               | -     |
| Platoon blocked, %       | -                                                                                 | -      |        | -                                                                                 |                                                                                   |       |
| Mov Cap-1 Maneuver       | -                                                                                 | -      | 1107   | -                                                                                 | 506                                                                               | 658   |
| Mov Cap-2 Maneuver       | -                                                                                 | -      | -      | -                                                                                 | 506                                                                               | -     |
| Stage 1                  | -                                                                                 | -      | -      | -                                                                                 | 683                                                                               | -     |
| Stage 2                  | -                                                                                 | -      | -      | -                                                                                 | 883                                                                               | -     |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Approach                 | EB                                                                                | WB     |        | NB                                                                                |                                                                                   |       |
| HCM Control Delay, s     | 0                                                                                 | 0      |        | 15.2                                                                              |                                                                                   |       |
| HCM LOS                  | C                                                                                 |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
|                          |                                                                                   |        |        |                                                                                   |                                                                                   |       |
| Minor Lane/Major Mvmt    | NBLn1                                                                             | EBT    | EBR    | WBL                                                                               | WBT                                                                               |       |
| Capacity (veh/h)         | 506                                                                               | -      | -      | 1107                                                                              | -                                                                                 |       |
| HCM Lane V/C Ratio       | 0.302                                                                             | -      | -      | -                                                                                 | -                                                                                 |       |
| HCM Control Delay (s)    | 15.2                                                                              | -      | -      | 0                                                                                 | -                                                                                 |       |
| HCM Lane LOS             | C                                                                                 | -      | -      | A                                                                                 | -                                                                                 |       |
| HCM 95th %tile Q(veh)    | 1.3                                                                               | -      | -      | 0                                                                                 | -                                                                                 |       |

# HCM Signalized Intersection Capacity Analysis

## 7: Lawson Pkwy & Lawson Rd

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - Mitigation Channelization

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 9                                                                                 | 60                                                                                | 209                                                                               | 0                                                                                 | 37                                                                                | 0                                                                                 | 79                                                                                 | 425                                                                                 | 0                                                                                   | 0                                                                                   | 483                                                                                 | 12                                                                                  |
| Future Volume (vph)               | 9                                                                                 | 60                                                                                | 209                                                                               | 0                                                                                 | 37                                                                                | 0                                                                                 | 79                                                                                 | 425                                                                                 | 0                                                                                   | 0                                                                                   | 483                                                                                 | 12                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Frt                               |                                                                                   | 0.90                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 |                                                                                   | 1671                                                                              |                                                                                   |                                                                                   | 1863                                                                              |                                                                                   |                                                                                    | 1848                                                                                |                                                                                     |                                                                                     | 1857                                                                                |                                                                                     |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 0.85                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 |                                                                                   | 1655                                                                              |                                                                                   |                                                                                   | 1863                                                                              |                                                                                   |                                                                                    | 1591                                                                                |                                                                                     |                                                                                     | 1857                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                               | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                |
| Adj. Flow (vph)                   | 10                                                                                | 66                                                                                | 230                                                                               | 0                                                                                 | 41                                                                                | 0                                                                                 | 87                                                                                 | 467                                                                                 | 0                                                                                   | 0                                                                                   | 531                                                                                 | 13                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 180                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 1                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 126                                                                               | 0                                                                                 | 0                                                                                 | 41                                                                                | 0                                                                                 | 0                                                                                  | 554                                                                                 | 0                                                                                   | 0                                                                                   | 543                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                 | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     |                                                                                     | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                    | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                  |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 8.5                                                                               |                                                                                   |                                                                                   | 8.5                                                                               |                                                                                   |                                                                                    | 20.3                                                                                |                                                                                     |                                                                                     | 20.3                                                                                |                                                                                     |
| Effective Green, g (s)            |                                                                                   | 8.5                                                                               |                                                                                   |                                                                                   | 8.5                                                                               |                                                                                   |                                                                                    | 20.3                                                                                |                                                                                     |                                                                                     | 20.3                                                                                |                                                                                     |
| Actuated g/C Ratio                |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                    | 0.52                                                                                |                                                                                     |                                                                                     | 0.52                                                                                |                                                                                     |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                |                                                                                   | 362                                                                               |                                                                                   |                                                                                   | 408                                                                               |                                                                                   |                                                                                    | 832                                                                                 |                                                                                     |                                                                                     | 971                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 0.29                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | c0.08                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | c0.35                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         |                                                                                   | 0.35                                                                              |                                                                                   |                                                                                   | 0.10                                                                              |                                                                                   |                                                                                    | 0.67                                                                                |                                                                                     |                                                                                     | 0.56                                                                                |                                                                                     |
| Uniform Delay, d1                 |                                                                                   | 12.8                                                                              |                                                                                   |                                                                                   | 12.1                                                                              |                                                                                   |                                                                                    | 6.8                                                                                 |                                                                                     |                                                                                     | 6.2                                                                                 |                                                                                     |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             |                                                                                   | 0.6                                                                               |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                    | 2.0                                                                                 |                                                                                     |                                                                                     | 0.7                                                                                 |                                                                                     |
| Delay (s)                         |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                    | 8.8                                                                                 |                                                                                     |                                                                                     | 6.9                                                                                 |                                                                                     |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                   | 12.2                                                                              |                                                                                   |                                                                                    | 8.8                                                                                 |                                                                                     |                                                                                     | 6.9                                                                                 |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 9.2                                                                               |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.57                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 38.8                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 88.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM 6th Signalized Intersection Summary

## 7: Lawson Pkwy & Lawson Rd

# SE Connector Alternative Analysis

## Future (2025) PM Peak Hour - Mitigation Channelization

|                              |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations          |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)       | 9                                                                                 | 60                                                                                | 209                                                                               | 0                                                                                 | 37                                                                                | 0                                                                                 | 79                                                                                 | 425                                                                                 | 0                                                                                   | 0                                                                                   | 483                                                                                 | 12                                                                                  |
| Future Volume (veh/h)        | 9                                                                                 | 60                                                                                | 209                                                                               | 0                                                                                 | 37                                                                                | 0                                                                                 | 79                                                                                 | 425                                                                                 | 0                                                                                   | 0                                                                                   | 483                                                                                 | 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                                                                               |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |
| Parking Bus, Adj             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Work Zone On Approach        |                                                                                   | No                                                                                |                                                                                   |                                                                                   | No                                                                                |                                                                                   |                                                                                    | No                                                                                  |                                                                                     |                                                                                     | No                                                                                  |                                                                                     |
| Adj Sat Flow, veh/h/ln       | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                               | 1870                                                                                | 1870                                                                                | 1870                                                                                | 1870                                                                                | 1870                                                                                |
| Adj Flow Rate, veh/h         | 10                                                                                | 66                                                                                | 230                                                                               | 0                                                                                 | 41                                                                                | 0                                                                                 | 87                                                                                 | 467                                                                                 | 0                                                                                   | 0                                                                                   | 531                                                                                 | 13                                                                                  |
| Peak Hour Factor             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                               | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                |
| Percent Heavy Veh, %         | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                  | 2                                                                                   | 2                                                                                   | 2                                                                                   | 2                                                                                   | 2                                                                                   |
| Cap, veh/h                   | 107                                                                               | 96                                                                                | 308                                                                               | 0                                                                                 | 467                                                                               | 0                                                                                 | 179                                                                                | 645                                                                                 | 0                                                                                   | 0                                                                                   | 865                                                                                 | 21                                                                                  |
| Arrive On Green              | 0.25                                                                              | 0.25                                                                              | 0.25                                                                              | 0.00                                                                              | 0.25                                                                              | 0.00                                                                              | 0.48                                                                               | 0.48                                                                                | 0.00                                                                                | 0.00                                                                                | 0.48                                                                                | 0.48                                                                                |
| Sat Flow, veh/h              | 22                                                                                | 386                                                                               | 1233                                                                              | 0                                                                                 | 1870                                                                              | 0                                                                                 | 135                                                                                | 1356                                                                                | 0                                                                                   | 0                                                                                   | 1818                                                                                | 45                                                                                  |
| Grp Volume(v), veh/h         | 306                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 | 41                                                                                | 0                                                                                 | 554                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 544                                                                                 |
| Grp Sat Flow(s),veh/h/ln     | 1640                                                                              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1870                                                                              | 0                                                                                 | 1492                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 1862                                                                                |
| Q Serve(g_s), s              | 0.8                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.6                                                                               | 0.0                                                                               | 3.9                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 7.9                                                                                 |
| Cycle Q Clear(g_c), s        | 6.2                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.6                                                                               | 0.0                                                                               | 11.8                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 7.9                                                                                 |
| Prop In Lane                 | 0.03                                                                              |                                                                                   | 0.75                                                                              | 0.00                                                                              |                                                                                   | 0.00                                                                              | 0.16                                                                               |                                                                                     | 0.00                                                                                | 0.00                                                                                |                                                                                     | 0.02                                                                                |
| Lane Grp Cap(c), veh/h       | 512                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 | 467                                                                               | 0                                                                                 | 824                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 886                                                                                 |
| V/C Ratio(X)                 | 0.60                                                                              | 0.00                                                                              | 0.00                                                                              | 0.00                                                                              | 0.09                                                                              | 0.00                                                                              | 0.67                                                                               | 0.00                                                                                | 0.00                                                                                | 0.00                                                                                | 0.00                                                                                | 0.61                                                                                |
| Avail Cap(c_a), veh/h        | 821                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 | 821                                                                               | 0                                                                                 | 1330                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 1482                                                                                |
| 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                                                                              | 0.00                                                                              | 1.00                                                                              | 0.00                                                                              | 1.00                                                                               | 0.00                                                                                | 0.00                                                                                | 0.00                                                                                | 0.00                                                                                | 1.00                                                                                |
| Uniform Delay (d), s/veh     | 12.6                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 10.5                                                                              | 0.0                                                                               | 7.7                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 7.1                                                                                 |
| Incr Delay (d2), s/veh       | 1.1                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.1                                                                               | 0.0                                                                               | 1.0                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 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     | 1.9                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.2                                                                               | 0.0                                                                               | 2.1                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 2.0                                                                                 |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LnGrp Delay(d),s/veh         | 13.7                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 10.6                                                                              | 0.0                                                                               | 8.7                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 7.8                                                                                 |
| LnGrp LOS                    | B                                                                                 | A                                                                                 | A                                                                                 | A                                                                                 | B                                                                                 | A                                                                                 | A                                                                                  | A                                                                                   | A                                                                                   | A                                                                                   | A                                                                                   | A                                                                                   |
| Approach Vol, veh/h          |                                                                                   | 306                                                                               |                                                                                   |                                                                                   | 41                                                                                |                                                                                   |                                                                                    | 554                                                                                 |                                                                                     |                                                                                     | 544                                                                                 |                                                                                     |
| Approach Delay, s/veh        |                                                                                   | 13.7                                                                              |                                                                                   |                                                                                   | 10.6                                                                              |                                                                                   |                                                                                    | 8.7                                                                                 |                                                                                     |                                                                                     | 7.8                                                                                 |                                                                                     |
| Approach LOS                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Timer - Assigned Phs         |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 6                                                                                 |                                                                                    | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Phs Duration (G+Y+Rc), s     |                                                                                   | 22.3                                                                              |                                                                                   | 14.1                                                                              |                                                                                   | 22.3                                                                              |                                                                                    | 14.1                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Change Period (Y+Rc), s      |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                   | 5.0                                                                               |                                                                                    | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Green Setting (Gmax), s  |                                                                                   | 29.0                                                                              |                                                                                   | 16.0                                                                              |                                                                                   | 29.0                                                                              |                                                                                    | 16.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Q Clear Time (g_c+I1), s |                                                                                   | 13.8                                                                              |                                                                                   | 8.2                                                                               |                                                                                   | 9.9                                                                               |                                                                                    | 2.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Green Ext Time (p_c), s      |                                                                                   | 3.5                                                                               |                                                                                   | 1.1                                                                               |                                                                                   | 3.5                                                                               |                                                                                    | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   |                                                                                   | 9.4                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 6th LOS                  |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## TECHNICAL MEMORANDUM

**DATE:** July 22, 2021  
**TO:** Mona Davis, City of Black Diamond  
**FROM:** Alex Atchison, PE, PTOE  
**SUBJECT:** Black Diamond - Proposed Comprehensive Plan Amendment - Review Comments  
**CC:** Seth Boettcher, City of Black Diamond  
Emily Adams, City of Black Diamond  
**PROJECT NUMBER:** 214-3043-029 Task 37  
**PROJECT NAME:** Black Diamond - Proposed Comprehensive Plan Amendment

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This memorandum provides comments on Oakpointe's proposed amendments to the City of Black Diamond's Comprehensive Plan and supporting traffic analysis, dated March 1, 2021.

**Comment #1:** We concur with the trip redistribution described in Transpo Group's "Comprehensive Plan Amendment – SE Loop Connector Alternative" technical memo (March 1, 2021) to reflect the proposed SE Loop Connector Alternative.

**Comment #2:** The transportation analysis notes that a traffic signal and a northbound left-turn lane were identified in the *Lawson Hills Technical Transportation Report (TTR)*, (Parametrix, 2009) as mitigation for impacts to the intersection of SR 169/Baker Street. Table 19 in the Lawson Hill TTR identifies only a signal as mitigation at the intersection of SR 169/Baker Street. In Table 17 of the *Ten Trails and Lawson Hills Master Planned Development Phase 1B Traffic Monitoring Report*, prepared by Transpo Group in September 2020, additional improvements at SR 169/Baker Street are identified, including an eastbound left-turn refuge lane and a northbound left-turn lane.

However, as the traffic memo refers specifically to "pertinent EIS findings," if a northbound left-turn lane is needed to mitigate impacts at SR 169/Baker Street under the proposed SE Loop Connector Alternative this would be an additional improvement beyond those identified in the EIS. We recommend the traffic memo be updated to reflect the northbound left-turn lane as an additional improvement.

**Comment #3:** The SE Loop Connector Alternative will create a new intersection with Lawson Street that was not evaluated as part of the EIS. We recommend the traffic memo be updated to show the forecasted level of service operations at this new intersection.

**Comment #4:** We concur with the proposed text and map changes proposed for the comprehensive plan.



## David Linehan

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**From:** Justin Wortman <jwortman@oakpointe.com>  
**Sent:** Monday, March 1, 2021 3:25 PM  
**To:** Mona Davis  
**Subject:** Black Diamond Comprehensive Plan Amendment -- Items for Docket  
**Attachments:** BD Comprehensive Plan Amendment - SEPA Checklist.pdf; Comp Plan Amendment - SE Loop Connector Alternative.pdf; Master Permit Application\_signed.pdf; Sensitive Area ID Form\_signed.pdf; Comprehensive Plan Submittal.pdf

Mona,

Please find attached an application proposing an amendment for the docket for the Black Diamond Comprehensive Plan.

If you have any questions or need any additional information, please don't hesitate to ask.

Thanks,  
Justin



**Justin Wortman**  
Senior Project Manager



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March 1, 2021

Mona Davis  
Community Development Director  
City of Black Diamond  
Community Development Department  
24301 Roberts Drive  
P.O. Box 599  
Black Diamond, WA 98010

**RE: City of Black Diamond Comprehensive Plan Amendment – Items for Docket**

Pursuant to Black Diamond Municipal Code 16.10.220, CCD Black Diamond Partners LLC ("Oakpointe" or "Master Developer") respectively suggests text and map amendments to the City of Black Diamond Comprehensive Plan to include an alternative Southeast Loop Connector. The rationale for this request is to include a Southeast Loop Connector alternative in order to provide optionality given potential environmental impacts, topography and extensive third-party parcel acquisition associated with the existing Southeast Loop Connector.

Attached to this letter is Oakpointe's submittal to meet the City's requirements for a comprehensive plan text and map amendment. It includes a project narrative, the purpose of the amendments, consistency with the comprehensive plan goals and policies, and consistency with the evaluation criteria for amendments. It also includes suggested text changes (in "bill" format) for three pages of the comprehensive plan, as well as one map change. A SEPA non-project action checklist is attached as well.

I appreciate your consideration of our suggested changes to the Black Diamond Comprehensive Plan.

Sincerely,

Brian Ross  
CEO Oakpointe





## PROJECT NARRATIVE

The proposal is a Comprehensive Plan amendment that would allow an alternative route alignment to the SE Loop Connector and is identified as a future transportation improvement in the 2019 adopted Comprehensive Plan. As an alternative to the SE Loop Connector extending from the Lawson Hills MPD to SR 169, the SE Loop Connector Alternative would route the access road from the MPD to Lawson Street (see proposed map change). This request is an addition to the list of future road projects in Appendix 7, Table 0-9 (nothing is being deleted).

One parcel would be affected by this proposal: King County Parcel Number 1321069018. The address is 32317 Botts Drive. The owner is Palmer Coking Coal Co. LLP (contact information: P.O. Box 10, Black Diamond, Washington 98010). The parcel is 689,990 square feet in size. The existing land use zone is R4 - no concurrent zoning change is being requested. The legal description is:

PARCEL 4 CITY OF BLACK DIAMOND LOT LINE ADJUSTMENT NO PLN 19-0028  
RECORDING NO 20190619900008 (BEING A PORTION OF NW QTR STR 13-21-06 AND NE QTR STR 14-21-06).

The proposal is for text and map amendments. The suggested changes to the Comprehensive Plan are in Appendix 7 (Transportation Appendix) for the plan sections titled Functional Classification System located on page A7-10; Transportation Improvement Recommendations on page 19 (*should be A7-19*); and Table 0-9 on page 25 (*should be A7-25*). A map amendment is suggested for Figure 7-4 on page 47 (*should be A7-47*). Attached are the relevant Comprehensive Plan text sections and figure with the suggested additions in “bill” format. Similarly, the suggested map change is shown in red.

## PURPOSE OF THE AMENDMENT

The amendment is proposed because the alternative alignment likely involves fewer impacts, less cost, and reduced right-of-way acquisition requirements. It does not preclude development of the existing SE Loop Connector, but provides two options for a secondary access route to the Lawson Hills MPD. As stated in the Transportation Appendix on page A7-19 of the Transportation (emphasis added):

*“The proposed roadways are to show the general route and connections of future roadways and are not specific to design level locations. **Alternative roads and alignments may be considered.** The intent is to show a basic route, connections and concept and the exact locations will be determined after engineering and environmental review. These new roads will distribute future traffic growth throughout the City that would otherwise have been concentrated on the few existing major arterials.”*

This proposal presents an alternative road alignment to be considered that will further the objective stated above. Some preliminary environmental and engineering work has been completed for this alternative, but in the future (when the road is needed) a decision can be made on the which option to construct.

## **CONSISTENCY WITH THE COMPREHENSIVE PLAN**

### **Comprehensive Plan Goals and Policies**

**Natural Environment Policy 17: Minimize areas of vegetation loss and grading disturbance to protect water quality and prevent erosion, when developing on moderate and highly erodible soils.**

The SE Loop Connector Alternative would cross a relatively flat area and the alignment is not mapped as a landslide or erosion hazard area. Construction Best Management Practices to avoid or minimize erosion would be employed as part of the Temporary Erosion and Sediment Control Plan. This alternative results in minimal vegetation loss and grading (refer to the SEPA checklist).

**Natural Environment Policy 35: Preserve existing natural trees and vegetation on steep hillsides, along stream banks and other habitat areas, and where visual buffers between uses or activities are desirable.**

The SE Loop Connector Alternative avoids crossing steep hillsides thereby helping to preserve existing natural trees and vegetation on steep slopes.

**Transportation Policy T-10 Pedestrians, Bicycles, and Transit Policy: Black Diamond recognizes the primacy of pedestrians and other non-motorized modes of mobility. The City shall lessen dependence upon and the influence of the automobile by encouraging complete streets and multi-modal travel for all users including pedestrians, bicyclists, and transit passengers of all ages and abilities. City actions will:**

- **Require new roadways to incorporate pedestrian, bicycle and transit facilities including appropriately spaced crosswalks on arterials and collectors.**

The SE Loop Connector Alternative would incorporate pedestrian and bicycle facilities into the road design.

**Transportation Policy T-12 Transportation Health and Safety Policy: The City of Black Diamond will provide a transportation system that enhances the health and safety of residents by:**

- **Expanding the sidewalk, bike lane, and multi-use path network in the city.**

The SE Loop Connector Alternative would expand the sidewalk and bike lane network in the City.

**Transportation Policy T-14 Character of the City Policy: Enhance the character that the City currently possesses by:**

- **Encouraging landscaping, parkway trees, and compatible architecture in the design and construction of roadways, especially SR 169, and other facilities along selected corridors.**

The SE Loop Connector Alternative would incorporate landscaping into the design of the roadway.



**Transportation Policy T-15 Environmental Protection and Conservation Policy: Design transportation facilities within Black Diamond that minimizes adverse environmental impacts resulting from both their construction and operation. The City will fulfill this need by:**

- **Aligning and locating transportation facilities away from environmentally sensitive areas**

The SE Loop Connector Alternative would locate the right-of-way away from wetlands and steep slopes. The SE Loop Connector Alternative would cross Lawson Creek but would provide an opportunity for the elimination of the existing culvert under Botts Drive. This would be part of future studies concerning the implementation of the alternative.

- **Mitigating unavoidable environmental impacts**

Under the SE Loop Connector Alternative there would be few environmental impacts due to the routing of the alignment. However, this alternative would cross Lawson Creek. A bridge crossing is proposed so that stream flow and fish passage are not impeded. Other mitigation as necessary would be incorporated into the design for any impacts that may occur in consultation with the City. This may include the elimination of the Botts Drive crossing of Lawson Creek and the removal of the existing culvert.

**Economic Development Policy ED-4.1: Focus investment in infrastructure and services**

**Stormwater Policy U-22: Manage the quality of stormwater runoff to protect public health and safety, surface and groundwater quality, and the natural drainage systems.**

The SE Loop Connector Alternative would provide stormwater runoff flow control and water quality treatment prior to discharge of runoff.

**Stormwater Policy U-24: Design stormwater lines or pathways to minimize potential erosion and sedimentation, discourage significant vegetation clearing, and preserve the natural drainage systems such as rivers, streams, lakes, and wetlands.**

The SE Loop Connector Alternative would provide stormwater flow control and water quality treatment. Outfall of treated stormwater runoff would be discharged to existing drainage systems in a manner consistent with the Department of Ecology's Stormwater Manual for Western Washington.

### **EVALUATION CRITERIA FOR PROPOSED AMENDMENTS (BDMC Chapter 16.10.220)**

**BDMC 16.10.220.A. All Amendments. All of the comprehensive plan amendments shall be reviewed under the following criteria:**

- 1. Whether the proposed amendment(s) conform to the Growth Management Act (Chapter 36.70A RCW).**

The proposal amendment is for an infrastructure improvement that supports development within the urban area of the City of Black Diamond. The GMA encourages development in urban areas where adequate public facilities exist to serve the development. The SE Loop

Connector Alternative would meet the goal of providing adequate infrastructure facilities for urban growth.

**2. Whether the proposed amendment(s) are consistent with and implement the city's comprehensive plan, including the goals, policies, and implementation strategies of the various elements of the plan.**

Consistency with the City's Comprehensive Plan is described above.

**3. Whether circumstances related to the proposed amendment(s) and/or the area in which it is located have substantially changed since the adoption of the city's comprehensive plan.**

**4. Whether the assumptions upon which the city's comprehensive plan is based are no longer valid, or whether new information is available which was not considered during the adoption process or any annual amendments of the city's comprehensive plan.**

Significant additional investigation and research has been done on the SE Loop Connector since it was originally included in the Comprehensive Plan. Given the considerable additional impacts and hurdles that have been discovered through this research, it became apparent that developing an alternative was a practical approach. The SE Loop Connector Alternative provides a more practical approach.

**5. Whether the proposed amendment(s) reflects current, widely held values of the residents of the city.**

The proposed amendment would likely be accepted by residents as a better alternative to the SE Loop Connector currently in the Comprehensive Plan. This would be due to fewer environmental impacts:

- The route does not bring traffic through an existing quiet neighborhood.
- Route does not cross as steep of slopes and significantly less cut and fill
- Less area of disturbance
- Does not require large retaining walls
- Acquisition of one parcel instead of 16 parcels
- Reduction in stormwater facility requirements (i.e., less pollution generating impervious surface)

**B. Amendments for Site-Specific Proposals. In addition to the above, any proposal for a site-specific development or amendment shall be reviewed under the following criteria:**

**1. Whether the proposed site-specific amendment(s) meets concurrency requirements for transportation and does not adversely affect adopted level of service standards for other public facilities and services (e.g., police, fire and emergency medical services, parks, fire flow and general governmental services).**

The proposal would not cause the level of service on the roadways to fall below the City standards. There would be a need for improvements at two intersections to maintain intersection level of service (see item A4 above).

**2. Any proposed site-specific amendment(s) will not result in probable significant adverse impacts to the city's transportation network, capital facilities, utilities, parks and**



**environmental features that cannot be mitigated, and will not place uncompensated burdens upon existing or planned service capabilities.**

Impacts from the SE Loop Connector Alternative can be fully mitigated, and development of this roadway would be funded by the proponent.

**3. In the case of a site-specific amendment(s) to the comprehensive plan's land use map, that the subject parcels are physically suitable for the requested land use designation and the anticipated land use development, including, but not limited to, the following: (i) access; (ii) provision of utilities; and (iii) compatibility with existing and planned surrounding land uses.**

The alignment would cross one parcel, which is suitable for development of the road (the road would cross the undeveloped portion of the parcel).

**4. The proposed site-specific amendment(s) will not create pressure to change the land use designation of other properties, unless the change of land use designation for other properties is in the long-term best interests of the city as a whole.**

The proposal would not change the land use designation of other properties.

**5. The proposed site specific amendment(s) does not materially affect the land use and population growth projections that are the bases of the comprehensive plan.**

The proposal itself does not affect land use or population growth but rather would be developed in support of growth at a time when the population of the Lawson Hills MPD would require additional access.

**6. If within an incorporated urban growth area (UGA), the proposed site-specific amendment(s) does not materially affect the adequacy or availability of urban facilities and services to the immediate area and the overall UGA.**

The proposal would not affect the adequacy of urban facilities or services. Instead, it would provide infrastructure that complements growth in the urban area.

**7. The proposed amendment(s) is consistent with any applicable county-wide policies for the city and any other applicable inter-jurisdictional policies or agreements, and any other local, state or federal laws.**

The proposal would be consistent with federal, state and local laws, regulations and policies. It would occur in compliance with a development agreement and MPD permit conditions of approval.

## **Suggested Comprehensive Plan Changes**



## Functional Classification System

Roadway classifications define the character of service that a street is intended to provide. The City has classified its roadway system and adopted roadway design standards based on the roadway's functional and physical characteristics. The functional classification system is a hierarchical system providing for the gradation of traffic flow from an access function to a movement function. The functional classification system for the City is described in **Table 0-4** and the accompanying roadway design standards are summarized in **Table 0-5**.

The following list provides the planned classifications by roadway.

### Principal Arterials

- SR 169

### Minor Arterials

- SE 288th Street
- Roberts Drive
- North Connector\*
- North-South Connector\*/Abrams Road
- Black Diamond-Ravensdale Road
- Lake Sawyer Road
- Pipeline Road\*
- Lawson Connector\*

### Collectors

- Annexation Road\*
- Southeast Loop Connector\*
- [Southeast Loop Connector Alternative\\*](#)
- Morgan Street
- Baker Street (west of SR 169)
- South Connector\*
- Railroad Avenue (Jones Lake Road)
- Lake Sawyer Extension\* a

### Local Access

All remaining roadways within the city are shown on Figure 7-1 and Table 0-4. These tables serve as only a general guide for the different classifications and the City's Road Design Standards should be reference for further clarification.

The short-term forecast coincides with the City's TIP and represents current growth trends and expected short term development within the city. Future levels and timing of land development were based on conversations with City staff, local landowners, and development firms. Changes to development patterns and priorities may vary the need for and the completion order of the transportation improvements. The long-term traffic forecast represents the future growth in housing, employment and background traffic that will produce the expected 2035 traffic projections. The City's Development Agreement with the Master Planned Development (MPD) Developer requires updates at the beginning and middles of the three phases of development so as to program the timing of transportation capacity adding projects to come online as needed.

## Transportation Improvement Recommendations

This section of the transportation plan establishes intersection and roadway improvement programs for the periods 2015 to 2021 and 2022 to 2035.

### Arterial and Collector Roadway Improvements

A conceptual configuration for the future roadway system in 2035 is shown in Figure 7-4. New arterial and collector roads include: Pipeline Road, Annexation Road, Lake Sawyer Extension, Lawson Connector, South Connector, Southeast Loop Connector or Southeast Loop Connector Alternative, and North Connector.

The proposed roadways are to show the general route and connections of future roadways and are not specific to design level locations. Alternative roads and alignments may be considered. The intent is to show a basic route, connections and concept and the exact locations will be determined after engineering and environmental review. These new roads will distribute future traffic growth throughout the City that would otherwise have been concentrated on the few existing major arterials.

The Pipeline Road will provide an east / west alternative to Roberts Drive and will enhance the circulation and access for industrial development. The North Connector will provide a north / south alternative to SR 169 in the middle of the City. The Annexation Road would provide north-south and east-west circulation through the southwestern portion of the City's Expansion Area. Other new facilities are proposed to improve general circulation such as the Southeast Loop Connector. The Southeast Loop Connector Alternative is a functionally equivalent roadway alternative to the Southeast Loop Connector, both of which provide secondary access to the Lawson Hills MPD and improve general circulation through the City.

### Agency Coordination

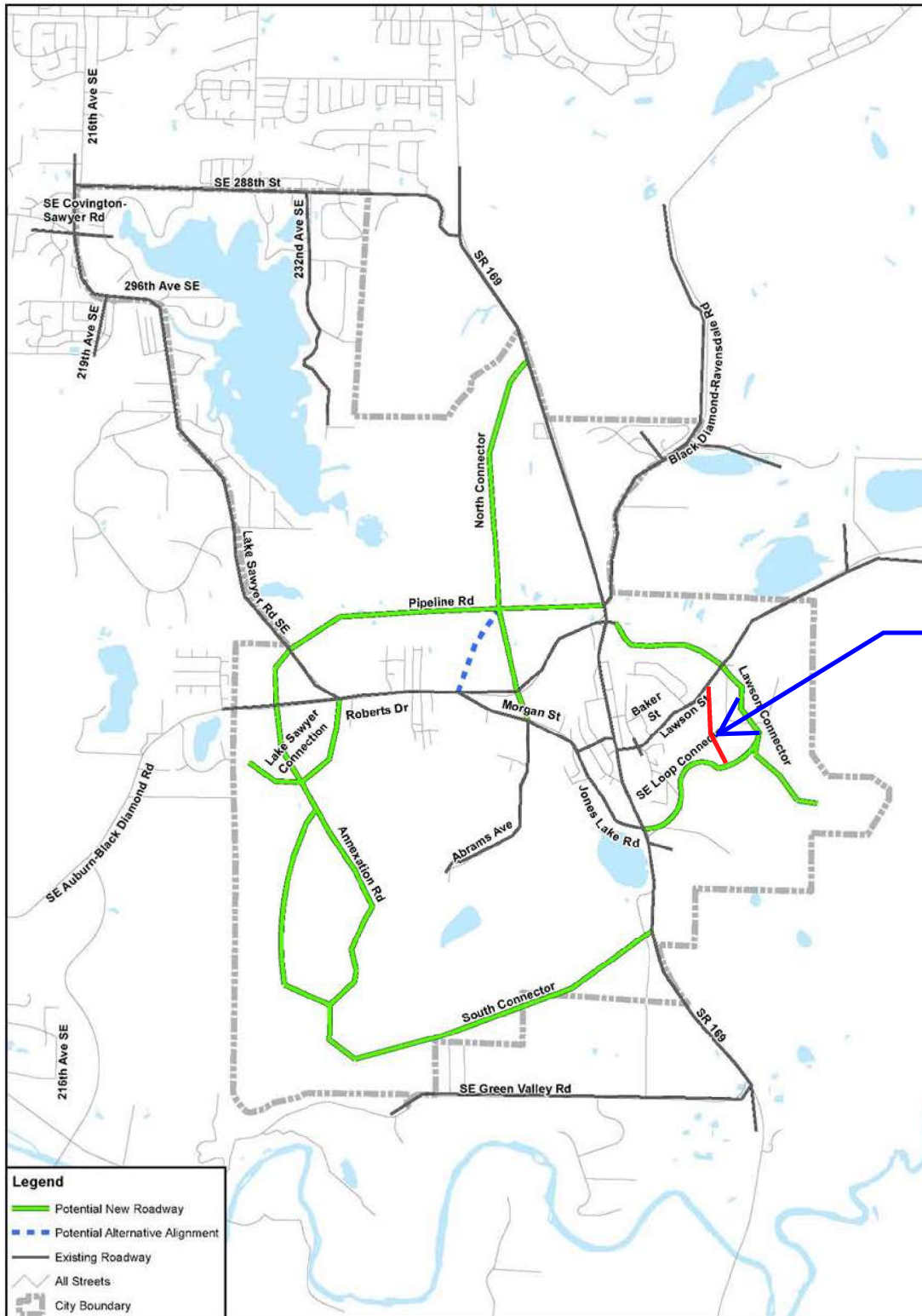
Improvements on SR 169 will require coordination with WSDOT. The City has adopted a Gateway Overlay District from the North City boundary to Roberts Drive regulating how development will occur along the roadway including separated meandering sidewalks within the front setbacks of the properties. The Comprehensive Plan should include a vision for SR 169 through the city. The City could use the vision to begin discussions with WSDOT to coordinate the future design of the road. Then as development occurs along the highway, improvements (such as lanes, sidewalks, bike lanes, median planting, turn pockets, driveways, and signals) could be implemented consistent with the overall design. The City will continue to participate in the implementation of or future updates to the SR 169 Route Development Plan (WSDOT, 2007) and as well as any other regional transportation planning efforts.



## CITY OF BLACK DIAMOND COMPREHENSIVE PLAN

May 2, 2019

|                                                        |                                                                           |                                                                                                        |                             |                             |
|--------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|
| A8, South Connector                                    | South Connector                                                           | A new east west collector in south Black Diamond connecting SR 169 to southwest Black Diamond          | Within 7 to 20 years        | \$7,560,000 with City       |
| A9, SE Loop connector                                  | SE Loop Connector                                                         | Construct a new collector street from Lawson Hills MPD to SR 169 for a second connection               | Within 7 to 20 years        | \$7,125,000 with City       |
| <u>SE Loop Connector Alternative</u>                   | <u>SE Loop Connector Alternative</u>                                      | <u>Construct a new collector street from Lawson Hills MPD to Lawson Street for a second connection</u> | <u>Within 7 to 20 years</u> | <u>Future grant funding</u> |
| Widen SR 169 From Roberts Drive to north City limits   |                                                                           | Widen SR 169 to 4 lanes from Roberts Drive to north City limits.                                       | Within 7 to 20 years        | Future grant funding        |
| SR 169 / RR Ave / SE Loop Connector                    | SR 169 / Jones Lake Road / SE Loop Connector                              | Signal or roundabout                                                                                   | Within 7 to 20 years        | \$630,000 City and          |
| <u>Lawson Street/SE Loop Connector Alternative</u>     | <u>Lawson Street/SE Loop Connector Alternative</u>                        | <u>Lawson Street &amp; SE Loop Connector Alternative Intersection</u>                                  | <u>Within 7 to 20 years</u> | <u>Future grant funding</u> |
| SE 288 <sup>th</sup> Street & 232 <sup>nd</sup> Ave SE |                                                                           | Channelization improvements                                                                            | Within 7 to 20 years        | Future grant funding        |
| SR 169 / South Connector                               |                                                                           | Roundabout                                                                                             | Within 7 to 20 years        | \$630,000 City and          |
| North Connector & Pipeline Road                        |                                                                           | Roundabout                                                                                             | Within 7 to 20 years        | Future with City            |
| North Connector & Roberts Drive                        |                                                                           | Roundabout or maybe a signal                                                                           | Within 7 to 20 years        | Future with City            |
| SR 169 / Baker Street & SR 169/ Lawson Street          | Intersection improvements for Lawson Street and Baker Street with SR 169. | One roundabout or two signals. Right of Way needed.                                                    | Within 7 to 20 years        | \$1,260,000                 |
| SE Auburn Black Diamond Road / Morgan Street           | Roberts Drive & Morgan Street Intersection                                | Roundabout or maybe a Signal                                                                           | Within 7 to 20 years        |                             |
| SE 288 <sup>th</sup> Street & 232 <sup>nd</sup> Ave SE |                                                                           | Channelization Improvements.                                                                           | Within 7 to 20 years        | \$630,000                   |
| North Connector & Pipeline Road                        |                                                                           | Roundabout                                                                                             | Within 7 to 20 years        |                             |



**ALTERNATIVE**



## **Additional Reference Material**

## MEMORANDUM

|                 |                                                              |            |          |
|-----------------|--------------------------------------------------------------|------------|----------|
| <b>Date:</b>    | March 1, 2021                                                | <b>TG:</b> | 16450.00 |
| <b>To:</b>      | Andrew Williamson – City of Black Diamond                    |            |          |
| <b>From:</b>    | Mike Swenson, P.E., PTOE and Maris Fry, P.E. – Transpo Group |            |          |
| <b>cc:</b>      | Brian Ross and Justin Wortman – Oakpointe                    |            |          |
| <b>Subject:</b> | Comprehensive Plan Amendment – SE Loop Connector Alternative |            |          |

This memorandum provides analysis evaluating the proposed inclusion of the SE Loop Connector Alternative in the City of Black Diamond's 2019 Comprehensive Plan. This memorandum includes the following information:

- Overview of the proposed Alternative
- Summary of pertinent EIS findings
- Operational impacts of the SE Loop Connector Alternative

As detailed below, this analysis determined that the worst-case impacts of the proposed SE Loop Connector Alternative could be sufficiently mitigated through the addition of turn lanes at the intersections of SR 169/Baker Street and SR 169/Lawson Street.

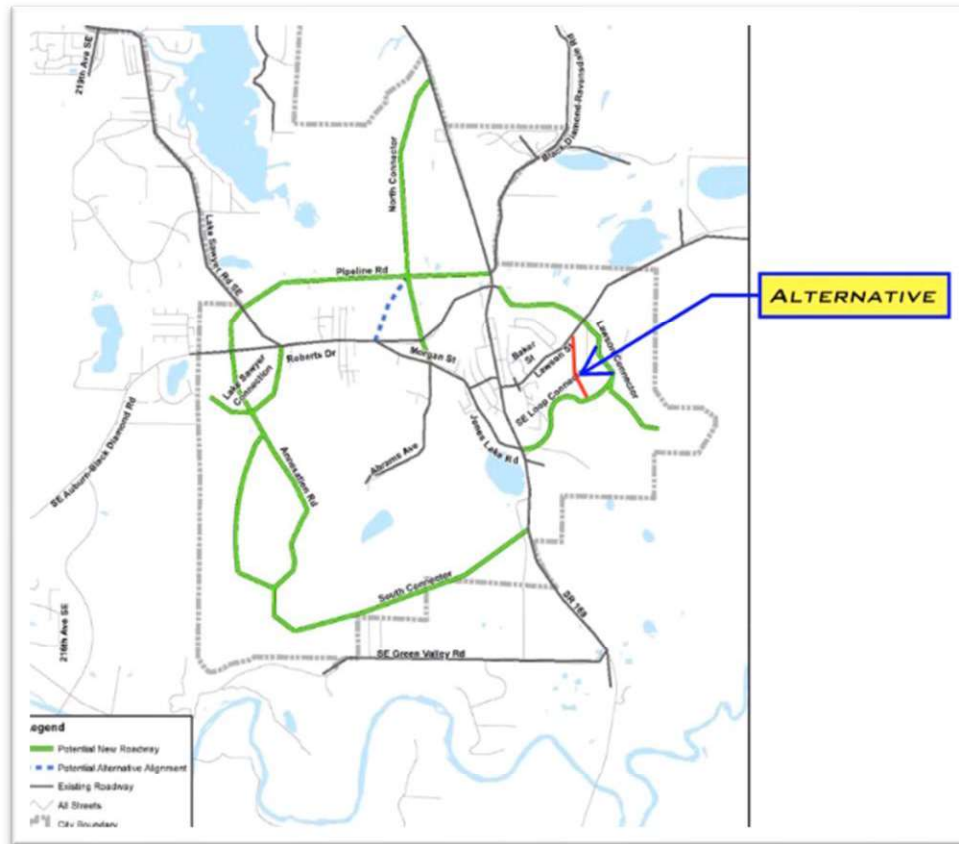
### Alternative Overview

As shown in Figure 1, the Comprehensive Plan currently identifies the SE Loop Connector as a connection between the Lawson Connector and SR 169. The identified SE Loop Connector Alternative is shown in Figure 1.

The SE Loop Connector was analyzed in the *Lawson Hills Technical Transportation Report (TTR)*, performed by Parametrix in 2009, which was used as the basis for the transportation-related EIS findings for the Lawson Hills MPD. To understand the worst-case impacts of the proposed SE Loop Connector Alternative, the volume projections outlined in the Lawson Hills TTR were updated assuming all traffic shifts from the SE Loop Connector to the Alternative. Based on the anticipated trip assignment and re-routing associated with the Alternative, volume and operations impacts were limited to the following intersections:

1. SR 169/Baker Street
2. SR 169/Lawson Street
3. SR 169/Jones Lake Road
4. Railroad Avenue/Baker Street





## Summary of Pertinent EIS Findings

The analysis contained within the Lawson Hills TTR developed traffic volume projections and defined impacts for the Lawson Hills MPD, as well as the collective impacts of the Lawson Hills and Ten Trails MPDs. Based on this analysis, the following mitigations were identified at the above study intersections for full build-out conditions of both MPDs. The channelization and traffic control for the intersections are also summarized in Figure 1.

- **SR 169/Baker Street:** Traffic signal and northbound left-turn lane
- **SR 169/Lawson Street:** Traffic signal and southbound left-turn lane
- **SR 169/Jones Lake Road:** Traffic signal and northbound, westbound, and southbound left-turn lanes
- **Railroad Avenue/Baker Street:** No mitigations necessary

## Traffic Operations Analysis

To determine the worst-case impacts of the SE Loop Connector Alternative, traffic volume projections from the Lawson Hills TTR were revised to account for re-routed traffic. This analysis conservatively assumed that all traffic routed through the SE Loop Connector in the EIS is re-routed to Lawson Street. Figure 1 depicts the re-routed volumes and the adjusted full-build traffic volumes.

Using these adjusted volumes, intersection level of service (LOS) was evaluated at the study intersections. The channelization and traffic control associated with the EIS-identified mitigations were used as a baseline in order to determine if additional mitigations would be necessary. For the intersection of SR 169/Jones Lake Road, channelization and traffic control consistent with existing conditions was assumed to determine if introduction of the SE Loop Connector Alternative would result in mitigations no longer being necessary.

Weekday PM peak hour levels of service and delays were calculated at study intersections based on existing peak hour factors (PHFs) and methodologies contained in the *Highway Capacity Manual, 6th Edition* (Transportation Research Board). As shown in Table 1, the re-routed traffic volumes result in the need for additional improvements beyond those identified in the EIS at two intersections: SR 169/Baker Street and SR 169/Lawson Street. Additionally, mitigations are still required at the intersection of SR 169/Jones Lake Road.

In order to meet WSDOT's LOS D or better standard, additional southbound and eastbound right-turn lanes would be needed at SR 169/Baker Street and an additional westbound right-turn lane would be needed at SR 169/Lawson Street. Additionally, the traffic signal and northbound left-turn lane would need to remain at the intersection of SR 169/Jones Lake Road. Consistent with the EIS, no mitigations would be necessary at the intersection of Railroad Avenue/Baker Street. The mitigated channelization and traffic control assumptions are summarized in Figure 1. With these additional mitigations in place, the intersections are projected to operate at LOS D or better, as shown on Table 1.

**Table 1. Traffic Analysis Summary – Removal of SE Loop Connector**

| Intersection                    | LOS Standard | Mitigated Traffic Control (EIS) |                    |                 | Mitigated Traffic Control (Removal of SE Loop Connector) |       |    |
|---------------------------------|--------------|---------------------------------|--------------------|-----------------|----------------------------------------------------------|-------|----|
|                                 |              | LOS <sup>1</sup>                | Delay <sup>2</sup> | WM <sup>3</sup> | LOS                                                      | Delay | WM |
| 1. SR 169/Baker Street          | D            | F                               | 129                | -               | D                                                        | 53    | -  |
| 2. SR 169/Lawson Street         | D            | F                               | 170                | -               | D                                                        | 48    | -  |
| 3. SR 169/Jones Lake Road       | D            | F                               | 53                 | EB              | A                                                        | 4     | -  |
| 4. Railroad Avenue/Baker Street | C            | B                               | 12                 | WB              | No Change                                                |       |    |

Source: HCM 6th Edition and Transpo Group, 2020

1. Level of service (A – F) as defined by the Highway Capacity Manual (HCM) 6th Edition, Transportation Research Board

2. Average delay per vehicle in seconds

3. Worst movement (WM) reported for two-way stop sign traffic control

## Conclusions

This analysis determined that the worst-case impacts of the SE Loop Connector Alternative can be adequately mitigated assuming the following:

- Implementation of additional improvements beyond those identified in the EIS at two intersections:
  - **SR 169/Baker Street:** New southbound and eastbound right-turn lanes
  - **SR 169/Lawson Street:** New westbound right-turn lane
- Implementation of limited improvements (construction of a traffic signal and northbound left-turn lane) at the intersection of **SR 169/Jones Lake Road**

Additionally, improvements would remain unnecessary at the intersection of Railroad Avenue/Baker Street.





|                          | Weekday PM Peak Hour Traffic Volumes |                                    | Change                                  |
|--------------------------|--------------------------------------|------------------------------------|-----------------------------------------|
|                          | Re-Routed                            | With SE Loop Connector Alternative |                                         |
| 1 SR 169/ Baker St       |                                      |                                    |                                         |
| 2 SR 169/ Lawson St      |                                      |                                    |                                         |
| 3 SR 169/ Jones Lake Rd  |                                      |                                    | <br>Signal was proposed at intersection |
| 4 Railroad Ave/ Baker St |                                      |                                    | No change relative to existing          |

# Traffic Analysis in Support of SE Loop Connector Alternative

Comprehensive Plan Amendment

**Attachment A:**  
LOS Worksheets

## HCM 6th Signalized Intersection Summary

## 1: SR-169 &amp; Baker St

02/26/2021

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |  |  |  |                                                                                   |
| Traffic Volume (veh/h)       | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| 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       | 1900                                                                              | 1900                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Peak Hour Factor             | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 38                                                                                | 182                                                                               | 218                                                                               | 1502                                                                              | 1166                                                                              | 87                                                                                |
| Arrive On Green              | 0.14                                                                              | 0.14                                                                              | 0.19                                                                              | 1.00                                                                              | 0.68                                                                              | 0.68                                                                              |
| Sat Flow, veh/h              | 270                                                                               | 1291                                                                              | 1781                                                                              | 1870                                                                              | 1719                                                                              | 128                                                                               |
| Grp Volume(v), veh/h         | 360                                                                               | 0                                                                                 | 260                                                                               | 827                                                                               | 0                                                                                 | 1542                                                                              |
| Grp Sat Flow(s),veh/h/ln     | 1565                                                                              | 0                                                                                 | 1781                                                                              | 1870                                                                              | 0                                                                                 | 1847                                                                              |
| Q Serve(g_s), s              | 22.5                                                                              | 0.0                                                                               | 15.5                                                                              | 0.0                                                                               | 0.0                                                                               | 108.5                                                                             |
| Cycle Q Clear(g_c), s        | 22.5                                                                              | 0.0                                                                               | 15.5                                                                              | 0.0                                                                               | 0.0                                                                               | 108.5                                                                             |
| Prop In Lane                 | 0.17                                                                              | 0.82                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.07                                                                              |
| Lane Grp Cap(c), veh/h       | 220                                                                               | 0                                                                                 | 218                                                                               | 1502                                                                              | 0                                                                                 | 1253                                                                              |
| V/C Ratio(X)                 | 1.64                                                                              | 0.00                                                                              | 1.20                                                                              | 0.55                                                                              | 0.00                                                                              | 1.23                                                                              |
| Avail Cap(c_a), veh/h        | 220                                                                               | 0                                                                                 | 218                                                                               | 1502                                                                              | 0                                                                                 | 1253                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 2.00                                                                              | 2.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.13                                                                              | 0.13                                                                              | 0.00                                                                              | 1.00                                                                              |
| Uniform Delay (d), s/veh     | 68.8                                                                              | 0.0                                                                               | 55.9                                                                              | 0.0                                                                               | 0.0                                                                               | 25.8                                                                              |
| Incr Delay (d2), s/veh       | 305.7                                                                             | 0.0                                                                               | 93.9                                                                              | 0.2                                                                               | 0.0                                                                               | 111.1                                                                             |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 27.7                                                                              | 0.0                                                                               | 13.3                                                                              | 0.1                                                                               | 0.0                                                                               | 83.1                                                                              |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 374.5                                                                             | 0.0                                                                               | 149.8                                                                             | 0.2                                                                               | 0.0                                                                               | 136.8                                                                             |
| LnGrp LOS                    | F                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 | F                                                                                 |
| Approach Vol, veh/h          | 360                                                                               |                                                                                   |                                                                                   | 1087                                                                              | 1542                                                                              |                                                                                   |
| Approach Delay, s/veh        | 374.5                                                                             |                                                                                   |                                                                                   | 36.0                                                                              | 136.8                                                                             |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 | F                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 5                                                                                 | 6                                                                                 |
| Phs Duration (G+Y+Rc), s     | 133.0                                                                             |                                                                                   | 27.0                                                                              |                                                                                   | 20.0                                                                              | 113.0                                                                             |
| Change Period (Y+Rc), s      | 4.5                                                                               |                                                                                   | 4.5                                                                               |                                                                                   | 4.5                                                                               | 4.5                                                                               |
| Max Green Setting (Gmax), s  | 128.5                                                                             |                                                                                   | 22.5                                                                              |                                                                                   | 15.5                                                                              | 108.5                                                                             |
| Max Q Clear Time (g_c+I1), s | 2.0                                                                               |                                                                                   | 24.5                                                                              |                                                                                   | 17.5                                                                              | 110.5                                                                             |
| Green Ext Time (p_c), s      | 8.1                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 128.8                                                                             |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |



## HCM 6th Signalized Intersection Summary

## 2: SSR-169/SR-169 &amp; Lawson St

02/26/2021



| Movement                     | EBL  | EBT  | EBR  | WBL   | WBT   | WBR   | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|------------------------------|------|------|------|-------|-------|-------|------|------|------|------|------|------|
| Lane Configurations          |      | ↕    |      |       | ↕     |       |      | ↕    |      | ↗    | ↘    |      |
| Traffic Volume (veh/h)       | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 5    |
| Future Volume (veh/h)        | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 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 |      | 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       | 1900 | 1900 | 1900 | 1900  | 1900  | 1900  | 1811 | 1811 | 1811 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h         | 1    | 1    | 1    | 179   | 0     | 395   | 1    | 682  | 173  | 532  | 1190 | 5    |
| Peak Hour Factor             | 0.97 | 0.97 | 0.97 | 0.97  | 0.97  | 0.97  | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %         | 0    | 0    | 0    | 0     | 0     | 0     | 6    | 6    | 6    | 2    | 2    | 2    |
| Cap, veh/h                   | 71   | 70   | 56   | 90    | 0     | 132   | 23   | 698  | 177  | 518  | 1526 | 6    |
| Arrive On Green              | 0.12 | 0.12 | 0.12 | 0.12  | 0.00  | 0.12  | 0.50 | 0.50 | 0.50 | 0.58 | 1.00 | 1.00 |
| Sat Flow, veh/h              | 332  | 569  | 450  | 485   | 0     | 1071  | 0    | 1393 | 353  | 1781 | 1861 | 8    |
| Grp Volume(v), veh/h         | 3    | 0    | 0    | 574   | 0     | 0     | 856  | 0    | 0    | 532  | 0    | 1195 |
| Grp Sat Flow(s), veh/h/ln    | 1351 | 0    | 0    | 1556  | 0     | 0     | 1747 | 0    | 0    | 1781 | 0    | 1869 |
| Q Serve(g_s), s              | 0.0  | 0.0  | 0.0  | 19.6  | 0.0   | 0.0   | 7.6  | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s        | 0.2  | 0.0  | 0.0  | 19.8  | 0.0   | 0.0   | 76.7 | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Prop In Lane                 | 0.33 |      | 0.33 | 0.31  |       | 0.69  | 0.00 |      | 0.20 | 1.00 |      | 0.00 |
| Lane Grp Cap(c), veh/h       | 197  | 0    | 0    | 222   | 0     | 0     | 898  | 0    | 0    | 518  | 0    | 1533 |
| V/C Ratio(X)                 | 0.02 | 0.00 | 0.00 | 2.59  | 0.00  | 0.00  | 0.95 | 0.00 | 0.00 | 1.03 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h        | 197  | 0    | 0    | 222   | 0     | 0     | 898  | 0    | 0    | 518  | 0    | 1533 |
| HCM Platoon Ratio            | 1.00 | 1.00 | 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 | 0.00 | 1.00  | 0.00  | 0.00  | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.09 |
| Uniform Delay (d), s/veh     | 61.5 | 0.0  | 0.0  | 71.4  | 0.0   | 0.0   | 39.0 | 0.0  | 0.0  | 33.5 | 0.0  | 0.0  |
| Incr Delay (d2), s/veh       | 0.0  | 0.0  | 0.0  | 726.3 | 0.0   | 0.0   | 20.6 | 0.0  | 0.0  | 19.8 | 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  | 0.0  | 0.0  | 54.0  | 0.0   | 0.0   | 37.5 | 0.0  | 0.0  | 18.7 | 0.0  | 0.2  |
| Unsig. Movement Delay, s/veh |      |      |      |       |       |       |      |      |      |      |      |      |
| LnGrp Delay(d),s/veh         | 61.6 | 0.0  | 0.0  | 797.7 | 0.0   | 0.0   | 59.6 | 0.0  | 0.0  | 53.3 | 0.0  | 0.4  |
| LnGrp LOS                    | E    | A    | A    | F     | A     | A     | E    | A    | A    | F    | A    | A    |
| Approach Vol, veh/h          |      | 3    |      |       | 574   |       |      | 856  |      |      | 1727 |      |
| Approach Delay, s/veh        |      | 61.6 |      |       | 797.7 |       |      | 59.6 |      |      | 16.7 |      |
| Approach LOS                 |      | E    |      |       | F     |       |      | E    |      |      | B    |      |
| Timer - Assigned Phs         | 1    | 2    |      | 4     |       | 6     |      | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s     | 51.0 | 84.7 |      | 24.3  |       | 135.7 |      | 24.3 |      |      |      |      |
| Change Period (Y+Rc), s      | 4.5  | 4.5  |      | 4.5   |       | 4.5   |      | 4.5  |      |      |      |      |
| Max Green Setting (Gmax), s  | 46.5 | 80.2 |      | 19.8  |       | 131.2 |      | 19.8 |      |      |      |      |
| Max Q Clear Time (g_c+H), s  | 10.5 | 78.7 |      | 2.2   |       | 2.0   |      | 21.8 |      |      |      |      |
| Green Ext Time (p_c), s      | 0.0  | 0.9  |      | 0.0   |       | 19.7  |      | 0.0  |      |      |      |      |
| <b>Intersection Summary</b>  |      |      |      |       |       |       |      |      |      |      |      |      |
| HCM 6th Ctrl Delay           |      |      |      | 170.2 |       |       |      |      |      |      |      |      |
| HCM 6th LOS                  |      |      |      | F     |       |       |      |      |      |      |      |      |

# HCM 6th TWSC

## 3: SR-169 & Railroad Ave

02/26/2021

| Intersection             |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|--------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 2.7                                                                               |        |       |                                                                                   |                                                                                   |      |
| Movement                 | EBL                                                                               | EBR    | NBL   | NBT                                                                               | SBT                                                                               | SBR  |
| Lane Configurations      |  |        |       |  |  |      |
| Traffic Vol, veh/h       | 0                                                                                 | 108    | 38    | 837                                                                               | 1323                                                                              | 1    |
| Future Vol, veh/h        | 0                                                                                 | 108    | 38    | 837                                                                               | 1323                                                                              | 1    |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0     | 0                                                                                 | 0                                                                                 | 0    |
| Sign Control             | Stop                                                                              | Stop   | Free  | Free                                                                              | Free                                                                              | Free |
| RT Channelized           | -                                                                                 | Stop   | -     | None                                                                              | -                                                                                 | None |
| Storage Length           | 0                                                                                 | -      | -     | -                                                                                 | -                                                                                 | -    |
| Veh in Median Storage, # | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Grade, %                 | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Peak Hour Factor         | 97                                                                                | 97     | 97    | 97                                                                                | 97                                                                                | 97   |
| Heavy Vehicles, %        | 2                                                                                 | 2      | 2     | 2                                                                                 | 2                                                                                 | 2    |
| Mvmt Flow                | 0                                                                                 | 111    | 39    | 863                                                                               | 1364                                                                              | 1    |
| Major/Minor              | Minor2                                                                            | Major1 |       | Major2                                                                            |                                                                                   |      |
| Conflicting Flow All     | 2306                                                                              | 1365   | 1365  | 0                                                                                 | -                                                                                 | 0    |
| Stage 1                  | 1365                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 941                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy            | 6.42                                                                              | 6.22   | 4.12  | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 1      | 5.42                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 2      | 5.42                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Follow-up Hdwy           | 3.518                                                                             | 3.318  | 2.218 | -                                                                                 | -                                                                                 | -    |
| Pot Cap-1 Maneuver       | 42                                                                                | 180    | 503   | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 237                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 380                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Platoon blocked, %       |                                                                                   |        |       | -                                                                                 | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 36                                                                                | 180    | 503   | -                                                                                 | -                                                                                 | -    |
| Mov Cap-2 Maneuver       | 36                                                                                | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 202                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 380                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Approach                 | EB                                                                                | NB     |       | SB                                                                                |                                                                                   |      |
| HCM Control Delay, s     | 52.9                                                                              | 0.6    |       | 0                                                                                 |                                                                                   |      |
| HCM LOS                  | F                                                                                 |        |       |                                                                                   |                                                                                   |      |
| Minor Lane/Major Mvmt    | NBL                                                                               | NBT    | EBLn1 | SBT                                                                               | SBR                                                                               |      |
| Capacity (veh/h)         | 503                                                                               | -      | 180   | -                                                                                 | -                                                                                 |      |
| HCM Lane V/C Ratio       | 0.078                                                                             | -      | 0.619 | -                                                                                 | -                                                                                 |      |
| HCM Control Delay (s)    | 12.8                                                                              | 0      | 52.9  | -                                                                                 | -                                                                                 |      |
| HCM Lane LOS             | B                                                                                 | A      | F     | -                                                                                 | -                                                                                 |      |
| HCM 95th %tile Q(veh)    | 0.3                                                                               | -      | 3.5   | -                                                                                 | -                                                                                 |      |

## HCM 6th TWSC

## 4: Railroad Ave/Morgan St &amp; Baker St

02/26/2021

| Intersection             |                                                                                   |          |                                                                                   |      |       |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 7.9                                                                               |          |                                                                                   |      |       |                                                                                   |
| Movement                 | WBL                                                                               | WBR      | NBT                                                                               | NBR  | SBL   | SBT                                                                               |
| Lane Configurations      |  |          |  |      |       |  |
| Traffic Vol, veh/h       | 13                                                                                | 359      | 44                                                                                | 16   | 329   | 132                                                                               |
| Future Vol, veh/h        | 13                                                                                | 359      | 44                                                                                | 16   | 329   | 132                                                                               |
| Conflicting Peds, #/hr   | 0                                                                                 | 0        | 0                                                                                 | 0    | 0     | 0                                                                                 |
| Sign Control             | Stop                                                                              | Stop     | Free                                                                              | Free | Free  | Free                                                                              |
| RT Channelized           | -                                                                                 | None     | -                                                                                 | None | -     | None                                                                              |
| Storage Length           | 0                                                                                 | -        | -                                                                                 | -    | -     | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -        | 0                                                                                 | -    | -     | 0                                                                                 |
| Grade, %                 | 0                                                                                 | -        | 0                                                                                 | -    | -     | 0                                                                                 |
| Peak Hour Factor         | 97                                                                                | 97       | 97                                                                                | 97   | 97    | 97                                                                                |
| Heavy Vehicles, %        | 2                                                                                 | 2        | 2                                                                                 | 2    | 2     | 2                                                                                 |
| Mvmt Flow                | 13                                                                                | 370      | 45                                                                                | 16   | 339   | 136                                                                               |
| Major/Minor              | Minor1                                                                            | Major1   | Major2                                                                            |      |       |                                                                                   |
| Conflicting Flow All     | 867                                                                               | 53       | 0                                                                                 | 0    | 61    | 0                                                                                 |
| Stage 1                  | 53                                                                                | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 814                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Critical Hdwy            | 6.42                                                                              | 6.22     | -                                                                                 | -    | 4.12  | -                                                                                 |
| Critical Hdwy Stg 1      | 5.42                                                                              | -        | -                                                                                 | -    | -     | -                                                                                 |
| Critical Hdwy Stg 2      | 5.42                                                                              | -        | -                                                                                 | -    | -     | -                                                                                 |
| Follow-up Hdwy           | 3.518                                                                             | 3.318    | -                                                                                 | -    | 2.218 | -                                                                                 |
| Pot Cap-1 Maneuver       | 323                                                                               | 1014     | -                                                                                 | -    | 1542  | -                                                                                 |
| Stage 1                  | 970                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 436                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Platoon blocked, %       |                                                                                   |          | -                                                                                 | -    |       | -                                                                                 |
| Mov Cap-1 Maneuver       | 246                                                                               | 1014     | -                                                                                 | -    | 1542  | -                                                                                 |
| Mov Cap-2 Maneuver       | 246                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 1                  | 970                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 332                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Approach                 | WB                                                                                | NB       |                                                                                   | SB   |       |                                                                                   |
| HCM Control Delay, s     | 11.8                                                                              | 0        |                                                                                   | 5.7  |       |                                                                                   |
| HCM LOS                  | B                                                                                 |          |                                                                                   |      |       |                                                                                   |
| Minor Lane/Major Mvmt    | NBT                                                                               | NBRWBLn1 | SBL                                                                               | SBT  |       |                                                                                   |
| Capacity (veh/h)         | -                                                                                 | -        | 914                                                                               | 1542 | -     |                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                 | -        | 0.42                                                                              | 0.22 | -     |                                                                                   |
| HCM Control Delay (s)    | -                                                                                 | -        | 11.8                                                                              | 8    | 0     |                                                                                   |
| HCM Lane LOS             | -                                                                                 | -        | B                                                                                 | A    | A     |                                                                                   |
| HCM 95th %tile Q(veh)    | -                                                                                 | -        | 2.1                                                                               | 0.8  | -     |                                                                                   |



## HCM 6th Signalized Intersection Summary

## 1: SR-169 &amp; Baker St

02/26/2021

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| 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       | 1811                                                                              | 1811                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Peak Hour Factor             | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              |
| Percent Heavy Veh, %         | 6                                                                                 | 6                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 102                                                                               | 321                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| Arrive On Green              | 0.06                                                                              | 0.06                                                                              | 0.20                                                                              | 1.00                                                                              | 0.71                                                                              | 0.71                                                                              |
| Sat Flow, veh/h              | 1725                                                                              | 1535                                                                              | 1781                                                                              | 1870                                                                              | 1870                                                                              | 1585                                                                              |
| Grp Volume(v), veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Grp Sat Flow(s),veh/h/ln     | 1725                                                                              | 1535                                                                              | 1781                                                                              | 1870                                                                              | 1870                                                                              | 1585                                                                              |
| Q Serve(g_s), s              | 5.6                                                                               | 6.3                                                                               | 18.2                                                                              | 0.0                                                                               | 113.0                                                                             | 3.4                                                                               |
| Cycle Q Clear(g_c), s        | 5.6                                                                               | 6.3                                                                               | 18.2                                                                              | 0.0                                                                               | 113.0                                                                             | 3.4                                                                               |
| Prop In Lane                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Lane Grp Cap(c), veh/h       | 102                                                                               | 321                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| V/C Ratio(X)                 | 0.61                                                                              | 0.92                                                                              | 0.83                                                                              | 0.50                                                                              | 1.09                                                                              | 0.10                                                                              |
| Avail Cap(c_a), veh/h        | 194                                                                               | 403                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 1.33                                                                              | 1.33                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 1.00                                                                              | 0.46                                                                              | 0.46                                                                              | 1.00                                                                              | 1.00                                                                              |
| Uniform Delay (d), s/veh     | 73.5                                                                              | 62.0                                                                              | 60.1                                                                              | 0.0                                                                               | 23.5                                                                              | 7.4                                                                               |
| Incr Delay (d2), s/veh       | 5.7                                                                               | 23.7                                                                              | 8.6                                                                               | 0.5                                                                               | 51.7                                                                              | 0.2                                                                               |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 2.7                                                                               | 17.5                                                                              | 10.5                                                                              | 0.2                                                                               | 64.7                                                                              | 1.2                                                                               |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 79.2                                                                              | 85.7                                                                              | 68.7                                                                              | 0.5                                                                               | 75.2                                                                              | 7.6                                                                               |
| LnGrp LOS                    | E                                                                                 | F                                                                                 | E                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 |
| Approach Vol, veh/h          | 359                                                                               |                                                                                   |                                                                                   | 1087                                                                              | 1542                                                                              |                                                                                   |
| Approach Delay, s/veh        | 84.6                                                                              |                                                                                   |                                                                                   | 16.8                                                                              | 70.5                                                                              |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 | E                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 5                                                                                 | 6                                                                                 |
| Phs Duration (G+Y+Rc), s     | 146.2                                                                             |                                                                                   | 13.8                                                                              |                                                                                   | 28.7                                                                              | 117.5                                                                             |
| Change Period (Y+Rc), s      | 4.5                                                                               |                                                                                   | 4.5                                                                               |                                                                                   | 4.5                                                                               | 4.5                                                                               |
| Max Green Setting (Gmax), s  | 133.0                                                                             |                                                                                   | 18.0                                                                              |                                                                                   | 15.5                                                                              | 113.0                                                                             |
| Max Q Clear Time (g_c+I1), s | 2.0                                                                               |                                                                                   | 8.3                                                                               |                                                                                   | 20.2                                                                              | 115.0                                                                             |
| Green Ext Time (p_c), s      | 8.1                                                                               |                                                                                   | 0.9                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 52.7                                                                              |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                   |                                                                                   |

## HCM 6th Signalized Intersection Summary

## 2: SSR-169/SR-169 &amp; Lawson St

02/26/2021



| Movement                      | EBL  | EBT  | EBR  | WBL   | WBT   | WBR   | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-------------------------------|------|------|------|-------|-------|-------|------|------|------|------|------|------|
| Lane Configurations           |      | ↔    |      |       | ↔     | ↔     |      | ↔    |      | ↔    | ↔    |      |
| Traffic Volume (veh/h)        | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 5    |
| Future Volume (veh/h)         | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 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 |      | 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        | 1900 | 1900 | 1900 | 1900  | 1900  | 1900  | 1811 | 1811 | 1811 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h          | 1    | 1    | 1    | 179   | 0     | 395   | 1    | 682  | 173  | 532  | 1190 | 5    |
| Peak Hour Factor              | 0.97 | 0.97 | 0.97 | 0.97  | 0.97  | 0.97  | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %          | 0    | 0    | 0    | 0     | 0     | 0     | 6    | 6    | 6    | 2    | 2    | 2    |
| Cap, veh/h                    | 30   | 29   | 15   | 133   | 0     | 667   | 23   | 698  | 177  | 518  | 1526 | 6    |
| Arrive On Green               | 0.12 | 0.12 | 0.12 | 0.12  | 0.00  | 0.12  | 0.50 | 0.50 | 0.50 | 0.39 | 1.00 | 1.00 |
| Sat Flow, veh/h               | 0    | 237  | 119  | 710   | 0     | 1610  | 0    | 1393 | 353  | 1781 | 1861 | 8    |
| Grp Volume(v), veh/h          | 3    | 0    | 0    | 179   | 0     | 395   | 856  | 0    | 0    | 532  | 0    | 1195 |
| Grp Sat Flow(s), veh/h/ln     | 356  | 0    | 0    | 710   | 0     | 1610  | 1747 | 0    | 0    | 1781 | 0    | 1869 |
| Q Serve(g_s), s               | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 19.8  | 7.6  | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s         | 19.8 | 0.0  | 0.0  | 19.8  | 0.0   | 19.8  | 76.7 | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Prop In Lane                  | 0.33 |      | 0.33 | 1.00  |       | 1.00  | 0.00 |      | 0.20 | 1.00 |      | 0.00 |
| Lane Grp Cap(c), veh/h        | 74   | 0    | 0    | 133   | 0     | 667   | 898  | 0    | 0    | 518  | 0    | 1533 |
| V/C Ratio(X)                  | 0.04 | 0.00 | 0.00 | 1.35  | 0.00  | 0.59  | 0.95 | 0.00 | 0.00 | 1.03 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h         | 74   | 0    | 0    | 133   | 0     | 667   | 898  | 0    | 0    | 518  | 0    | 1533 |
| HCM Platoon Ratio             | 1.00 | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 | 1.00 | 1.33 | 1.33 | 1.33 |
| Upstream Filter(I)            | 1.00 | 0.00 | 0.00 | 1.00  | 0.00  | 1.00  | 1.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.12 |
| Uniform Delay (d), s/veh      | 62.3 | 0.0  | 0.0  | 73.5  | 0.0   | 36.4  | 39.0 | 0.0  | 0.0  | 49.1 | 0.0  | 0.0  |
| Incr Delay (d2), s/veh        | 0.2  | 0.0  | 0.0  | 198.0 | 0.0   | 1.4   | 20.6 | 0.0  | 0.0  | 21.4 | 0.0  | 0.5  |
| 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      | 0.1  | 0.0  | 0.0  | 12.8  | 0.0   | 12.4  | 37.5 | 0.0  | 0.0  | 22.8 | 0.0  | 0.2  |
| Unsig. Movement Delay, s/veh  |      |      |      |       |       |       |      |      |      |      |      |      |
| LnGrp Delay(d),s/veh          | 62.5 | 0.0  | 0.0  | 271.4 | 0.0   | 37.8  | 59.6 | 0.0  | 0.0  | 70.5 | 0.0  | 0.5  |
| LnGrp LOS                     | E    | A    | A    | F     | A     | D     | E    | A    | A    | F    | A    | A    |
| Approach Vol, veh/h           |      | 3    |      |       | 574   |       |      | 856  |      |      | 1727 |      |
| Approach Delay, s/veh         |      | 62.5 |      |       | 110.6 |       |      | 59.6 |      |      | 22.1 |      |
| Approach LOS                  |      | E    |      |       | F     |       |      | E    |      |      | C    |      |
| Timer - Assigned Phs          | 1    | 2    |      | 4     |       | 6     |      | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s      | 51.0 | 84.7 |      | 24.3  |       | 135.7 |      | 24.3 |      |      |      |      |
| Change Period (Y+Rc), s       | 4.5  | 4.5  |      | 4.5   |       | 4.5   |      | 4.5  |      |      |      |      |
| Max Green Setting (Gmax), s   | 46.5 | 80.2 |      | 19.8  |       | 131.2 |      | 19.8 |      |      |      |      |
| Max Q Clear Time (g_c+1.0), s | 46.5 | 78.7 |      | 21.8  |       | 2.0   |      | 21.8 |      |      |      |      |
| Green Ext Time (p_c), s       | 0.0  | 0.9  |      | 0.0   |       | 19.7  |      | 0.0  |      |      |      |      |
| <b>Intersection Summary</b>   |      |      |      |       |       |       |      |      |      |      |      |      |
| HCM 6th Ctrl Delay            |      |      |      | 48.4  |       |       |      |      |      |      |      |      |
| HCM 6th LOS                   |      |      |      | D     |       |       |      |      |      |      |      |      |

## HCM 6th Signalized Intersection Summary

## 3: SR-169 &amp; Railroad Ave

02/26/2021



| Movement                     | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
|------------------------------|------|------|------|------|------|------|
| Lane Configurations          |      |      |      |      |      |      |
| Traffic Volume (veh/h)       | 1    | 108  | 38   | 837  | 1323 | 1    |
| Future Volume (veh/h)        | 1    | 108  | 38   | 837  | 1323 | 1    |
| 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       | 1900 | 1900 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h         | 1    | 0    | 39   | 863  | 1364 | 1    |
| Peak Hour Factor             | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %         | 0    | 0    | 2    | 2    | 2    | 2    |
| Cap, veh/h                   | 2    |      | 334  | 1697 | 1696 | 1    |
| Arrive On Green              | 0.00 | 0.00 | 0.91 | 0.91 | 0.91 | 0.91 |
| Sat Flow, veh/h              | 912  | 0    | 398  | 1870 | 1869 | 1    |
| Grp Volume(v), veh/h         | 2    | 0    | 39   | 863  | 0    | 1365 |
| Grp Sat Flow(s), veh/h/ln    | 1825 | 0    | 398  | 1870 | 0    | 1870 |
| Q Serve(g_s), s              | 0.1  | 0.0  | 3.7  | 7.9  | 0.0  | 25.1 |
| Cycle Q Clear(g_c), s        | 0.1  | 0.0  | 28.8 | 7.9  | 0.0  | 25.1 |
| Prop In Lane                 | 0.50 | 0.00 | 1.00 |      |      | 0.00 |
| Lane Grp Cap(c), veh/h       | 5    |      | 334  | 1697 | 0    | 1697 |
| V/C Ratio(X)                 | 0.41 |      | 0.12 | 0.51 | 0.00 | 0.80 |
| Avail Cap(c_a), veh/h        | 328  |      | 334  | 1697 | 0    | 1697 |
| HCM Platoon Ratio            | 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 |
| Uniform Delay (d), s/veh     | 49.8 | 0.0  | 6.5  | 0.8  | 0.0  | 1.6  |
| Incr Delay (d2), s/veh       | 45.9 | 0.0  | 0.7  | 1.1  | 0.0  | 4.2  |
| Initial Q Delay(d3), s/veh   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln    | 0.1  | 0.0  | 0.4  | 0.5  | 0.0  | 2.0  |
| Unsig. Movement Delay, s/veh |      |      |      |      |      |      |
| LnGrp Delay(d), s/veh        | 95.7 | 0.0  | 7.2  | 1.9  | 0.0  | 5.8  |
| LnGrp LOS                    | F    |      | A    | A    | A    | A    |
| Approach Vol, veh/h          | 2    | A    |      | 902  | 1365 |      |
| Approach Delay, s/veh        | 95.7 |      |      | 2.1  | 5.8  |      |
| Approach LOS                 | F    |      |      | A    | A    |      |
| Timer - Assigned Phs         | 2    |      |      | 4    |      | 6    |
| Phs Duration (G+Y+Rc), s     | 95.2 |      |      | 4.8  |      | 95.2 |
| Change Period (Y+Rc), s      | 4.5  |      |      | 4.5  |      | 4.5  |
| Max Green Setting (Gmax), s  | 73.0 |      |      | 18.0 |      | 73.0 |
| Max Q Clear Time (g_c+I1), s | 30.8 |      |      | 2.1  |      | 27.1 |
| Green Ext Time (p_c), s      | 9.4  |      |      | 0.0  |      | 23.7 |

## Intersection Summary

|                    |     |
|--------------------|-----|
| HCM 6th Ctrl Delay | 4.4 |
| HCM 6th LOS        | A   |

## Notes

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





**CITY OF BLACK DIAMOND**  
**PLANNING DIVISION**  
**MASTER APPLICATION**

EXHIBIT B

OFFICE USE ONLY

|           |  |
|-----------|--|
| FILE #    |  |
| APPL TYPE |  |
| FEE PAID  |  |

24301 Roberts Dr, PO Box 599 Black Diamond, WA 98010  
Phone: (360)886-2560, Fax: (360)886-2592

|                                                                                                                  |                                            |                                                |                                             |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------|---------------------------------------------|
| <b>NAME OF PROJECT/DEVELOPMENT:</b><br>Southeast Loop Connector Alternative Comprehensive Plan Amendment         |                                            |                                                |                                             |
| <b>ADDRESS/LOCATION OF PROPERTY:</b><br>Parcel No. 1321069018 (See attached plan set for additional information) |                                            |                                                |                                             |
| <b>OWNER NAME</b>                                                                                                |                                            | <b>ADDRESS</b>                                 |                                             |
| CCD Black Diamond Partners LLC                                                                                   |                                            | 3025 112th Ave NE Suite 100 Bellevue, WA 98004 |                                             |
| <b>EMAIL</b>                                                                                                     | <b>PHONE</b>                               | <b>FAX</b>                                     |                                             |
| jwortman@oakpointe.com                                                                                           | (425) 898-2100                             | (425) 898-2139                                 |                                             |
| <b>APPLICANT NAME</b>                                                                                            |                                            | <b>ADDRESS</b>                                 |                                             |
| CCD Black Diamond Partners LLC                                                                                   |                                            | 3025 112th Ave NE Suite 100 Bellevue, WA 98004 |                                             |
| <b>EMAIL</b>                                                                                                     | <b>PHONE</b>                               | <b>FAX</b>                                     |                                             |
| jwortman@oakpointe.com                                                                                           | (425) 898-2100                             | (425) 898-2139                                 |                                             |
| <b>CONTACT NAME</b>                                                                                              |                                            | <b>ADDRESS</b>                                 |                                             |
| Justin Wortman                                                                                                   |                                            | 3025 112th Ave NE Suite 100 Bellevue, WA 98004 |                                             |
| <b>EMAIL</b>                                                                                                     | <b>PHONE</b>                               | <b>FAX</b>                                     |                                             |
| jwortman@oakpointe.com                                                                                           | (425) 898-2100                             | (425) 898-2139                                 |                                             |
| <b>BRIEF DESCRIPTION OF PROJECT:</b>                                                                             |                                            |                                                |                                             |
| Comprehensive Plan Amendment and Rezone                                                                          |                                            |                                                |                                             |
| <b>PARCEL #:</b><br>132106-9018; See attached legal description                                                  | <i>*Legal Description must be attached</i> | <b>1/4 SEC:</b> NE                             | <b>SEC:</b> 13                              |
|                                                                                                                  |                                            | <b>TWN:</b> 21                                 | <b>RANGE:</b> 06                            |
| <b>SIZE (ACRES/SQ FT):</b> 48,600 sq ft                                                                          |                                            | <b>ZONING:</b> MPD                             | <b>COMP PLAN DESIGNATION:</b> MPD Overlay + |

EXISTING LAND USE: Vacant MPD

ADJACENT LAND USE: NORTH: SFR SOUTH: Vacant MPD/SFR  
EAST: Vacant MPD/SFR WEST: Vacant MPD

DOES THE SITE CONTAIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS? CHECK ALL THAT APPLY:

FLOOD HAZARD AREA ☐ LANDSLIDE HAZARD AREA ☐ SEISMIC HAZARD AREA ☐  
COAL MINE HAZARD AREA ☐ STEEP SLOPE HAZARD ☐ WETLANDS ☒ STREAMS ☐

I certify under penalty of perjury, under the laws of the State of Washington, that the foregoing and attached exhibits are true and correct. I further certify that I am the owner of the property described above or authorized to act on behalf of the above interested parties.

**OWNER**

|            |              |
|------------|--------------|
| PRINT NAME | See Attached |
| SIGNATURE  |              |

**APPLICANT/AGENT**

|            |              |
|------------|--------------|
| PRINT NAME | See Attached |
| SIGNATURE  |              |

**CHANGES TO APPROVED APPLICATIONS WILL CONSTITUTE A NEW APPLICATION AND WILL BE SUBJECT TO FULL APPLICATION FEES.**

**SOUTHEAST LOOP CONNECTOR ALTERNATIVE COMPREHENSIVE PLAN AMENDMENT  
COMPREHENSIVE PLAN AMENDMENT AND REZONE  
LEGAL DESCRIPTION**

PARCEL 4 CITY OF BLACK DIAMOND LOT LINE ADJUSTMENT NO PLN 19-0028  
RECORDING NO 20190619900008 (BEING A PORTION OF NW QTR STR 13-21-06 AND  
NE QTR STR 14-21-06).

**CITY OF BLACK DIAMOND  
COMPREHENSIVE PLAN AMENDMENT AND REZONE  
SIGNATURE PAGE**

Owner:

CCD Black Diamond Partners LLC, a Delaware limited liability company

By: Oakpointe LLC, its Manager

By:   
Brian Ross, Manager  
Date: 3/2/2021

Applicant:

CCD Black Diamond Partners LLC, a Delaware limited liability company

By: Oakpointe LLC, its Manager

By:   
Brian Ross, Manager  
Date: 3/1/2021



Purpose of Checklist: The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help the City of Black Diamond identify impacts from a proposal (and to reduce or avoid impacts from the proposal, if it can be done), and to help the City decide whether an EIS is required.

**A. BACKGROUND**

**1. Name of proposed project, if applicable:**

Comprehensive Plan Amendment Request – Southeast Loop Connector Alternative

**2. Name of proponent:**

CCD Black Diamond Partners LLC

**3. Address and phone number of proponent and contact person:**

Proponent:  
CCD Black Diamond Partners LLC.

Contact:  
Justin Wortman  
CCD Black Diamond Partners LLC.  
3025 112<sup>th</sup> Ave NE, Suite 100  
Bellevue, WA 98004  
(425) 898-2100

**4. Date checklist prepared:**

February 26, 2021

**5. Agency requesting checklist:**

City of Black Diamond

**6. Proposed timing or schedule (including phasing, if applicable):**

This proposal is for the 2021 Comprehensive Plan Amendment

**7. Do you have any plans for future additions, expansions, or further activity related to or connected with this proposal? If yes, please explain.**

If the Southeast Loop Connector Alternative is ultimately included in the Black Diamond Comprehensive Plan, the alternative may in the future, subject to permitting requirements, be used as a secondary access to the Lawson Hills Master Planned Development (MPD).

**8. Environmental information that has been prepared, or will be prepared, directly related to this proposal.**

- Comprehensive Plan Amendment – SE Loop Connector Alternative Traffic Analysis, dated 3/1/21, by Transpo Group.

**9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by this proposal.**

Currently, there are no other applications pending for approval related to this proposal.

**10. List any governmental approvals or permits that will be needed for your proposal, if known.**

This amendment proposal will need to be approved by the City.

**11. Description of the proposal including the proposed uses and the size of the project and site.**

The proposal is for a Black Diamond Comprehensive Plan (Comp Plan) amendment that would include in the Comp Plan an alternative to the SE Loop Connector identified in the adopted Comprehensive Plan. The SE Loop Connector Alternative is located between the future MPD road and Lawson Street (see attached Comp Plan Map Change). Therefore, text amendments are proposed to the Comprehensive Plan's Transportation Appendix for the plan sections titled Functional Classification System located on page A7-10; the Transportation Improvement Recommendations on page 19; and Table 0-9 on page 25. A map amendment is proposed for Figure 7-4 on page 47. **(Note: This is an addition to the future road projects list and does not preclude the implementation of the SE Loop Connector.)**

See attached documents for proposed text and map changes (in strikeout and highlight):

- Functional Classification System - Comp Plan Text Change 1
- Transportation Improvement Recommendations - Comp Plan Text Change 2
- Table 0.9 - Comp Plan Text Change 3
- Figure 7-4 - Comp Plan Map Change 1.

**12. Location of the proposal. Provide a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if available.**

The SE Loop Connector Alternative would be located in Township 21N, Range 6E, Section 13 (See attached Figure 7-4).

**B. ENVIRONMENTAL ELEMENTS**

**1. Earth**

- a. General description of the site (circle one)** flat and rolling, hilly, steep slopes, mountainous.

The land that the road segment would traverse is fairly flat.

- b. What is the steepest slope on the site (approximate percent slope)?**

The steepest slope is approximately 6 percent.

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.**

Based on the USDA Natural Resource Conservation Service Soil Survey, the soil type is Beausite gravelly sandy loam. Since the site is located within an urban growth area it is not considered prime farmland.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

There are no surface indications or history of unstable soils in the vicinity.

- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.**

Grading would occur to construct the road, install temporary construction erosion controls, and permanent stormwater runoff facilities. The approximate cut and fill amounts for the road alternative itself are 650 cubic yards of cut and 2,600 cubic yards of fill.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

Limited erosion could occur as a result of the initial construction on-site; however, temporary erosion and sedimentation control (TESC) measures would be utilized during the construction phase to minimize potential erosion impacts (see 1h below). Temporary erosion and sedimentation control plans must be submitted to and approved by the City of Black Diamond prior to any clearing or grading activity.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?**

Approximately 21,600 square feet of impervious road surface would be created.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:**

The site would be stabilized consistent with an approved temporary erosion and sedimentation control (TESC) plan in compliance with the then-applicable DOE Stormwater Management Manual for Western Washington as amended in 2014 and City of Black Diamond requirements (BDMC 15.28). Temporary erosion and sedimentation control plans must be submitted to and approved by the City of Black Diamond prior to any clearing or grading activity. Construction stormwater would be managed per the TESC Plan and Stormwater Pollution Prevention Plan (SWPPP) prior to being discharged.

The TESC would include the use of best management practices (BMPs), which could include all or a combination of the following:

1. Construction activity should be scheduled or phased as much as possible to avoid earthwork activity during the wet season.
2. The winter performance of a site is dependent on a well-conceived plan for control of site erosion and stormwater runoff. The site plan should include ground-cover measures and staging areas. The contractor should be prepared to implement and maintain the required measures to reduce the amount of exposed ground.
3. Temporary erosion and sedimentation control (TESC) elements and perimeter flow control should be established prior to the start of grading.
4. During the wetter months of the year, or when significant storm events are predicted during the summer months, the work area should be stabilized so that if showers occur, it can receive the rainfall without excessive erosion or sediment transport. The required measures for an area to be "buttoned-up" would depend on the time of year and the duration that the area would be left unworked. During the winter months, areas that are to be left unworked for more than 2 days should be mulched or covered with plastic. During the summer months, stabilization would usually consist of seal-rolling the subgrade. Such measures would aid in the contractor's ability to get back into a work area after a storm event. The stabilization process also includes establishing temporary stormwater conveyance channels through work areas to route runoff to the approved treatment/discharge facilities.



5. All disturbed areas should be revegetated as soon as possible. If it is outside of the growing season, the disturbed areas should be covered with mulch. Straw mulch provides a cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

6. Surface runoff and discharge should be controlled during and following development. Uncontrolled discharge may promote erosion and sediment transport.

7. Soils that are to be reused around the site should be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering stockpiles with plastic sheeting, or the use of silt fences around pile perimeters.

In addition to the approved TESC plan, the contractor would be monitored by the Washington State Department of Ecology under the National Pollutant Discharge Elimination System Permit (NPDES) General Stormwater Construction Permit. As part of the NPDES permit requirements, the contractor is required to keep a copy of the SWPPP on-site for reference. The SWPPP includes objectives to implement BMPs to minimize erosion and silt and sediment impacts from rainfall runoff during construction and to identify, reduce, eliminate, or prevent the pollution of stormwater, prevent violations of surface water quality, ground water quality, or sediment management standards, and prevent adverse water quality impacts during construction by controlling peak rates and volumes of stormwater runoff at the permittee's outfall and discharge locations. In addition, the contractor would provide a certified erosion control supervisor to be on site whenever earthwork or other activity that might result in turbid runoff is being performed.

## 2. Air

- a. **What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.**

During project construction, heavy equipment operation and vehicles would generate exhaust emissions. Additionally, dust particulates generated primarily by construction equipment and construction activities would be produced during the construction phase of this project. During paving operations odors from asphalt would be detectable to some people near the project site. There would be long-term emissions from vehicles using the completed alternative route.

- b. **Are there any off-site sources of emissions or odors that may affect your proposal? If so, generally describe.**

There are no known off-site sources of emissions or odors that would affect the road alternative.

- c. **Proposed measures to reduce or control emissions or other impacts to air, if any:**

To minimize the potential adverse impacts from emissions resulting from construction activities, Best Management Practices (BMPs) would be implemented to ensure that minimal amounts of dust and exhaust fumes leave the preliminary plat site. BMP measures may include street cleaning/sweeping, wheel washing, and watering of the site as necessary to help control dust and other particulates; and minimizing vehicle and equipment idling to reduce exhaust emissions at the site.

## 3. Water

- a. **Surface:**

- 1) **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

Lawson Creek is located on the road alignment and the SE Loop Connector Alternative would cross the creek. No work would occur in the water. The alignment would pass one Category IV wetland and may slightly encroach on the wetland buffer.

- 2) **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

Work would occur within 200 feet of Lawson Creek. However, no work would take place in the water as the SE Loop Connector Alternative would cross Lawson Creek via a bridge.

- 3) **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

No fill or dredge material would be placed in or removed from surface water or wetlands.

- 4) **Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities, if known.**

The road alternative would not require any surface water withdrawals or diversions.

- 5) **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. If so, note location on the site plan.**

The proposal would cross the 100-year floodplain. FEMA lists the area around Lawson Creek as an area of minimal flood hazard (Zone X).

- 6) **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No waste materials would be discharged to surface waters.

**b. Ground:**

- 1) **Will groundwater be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.**

No ground water would be withdrawn. Some stormwater would infiltrate into the ground and the remainder would be sent to a stormwater system.

- 2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals ..; agricultural; etc.) Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

No waste materials would be discharged into the ground.

**c. Water Run-off (including stormwater):**

- 1) **Describe the source of run-off (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

Rainfall is the only source of runoff. Stormwater would be collected in roadside catch basins and directed into the stormwater control system that would be constructed as part of the Lawson Hills Master Planned Development. Some stormwater (not captured by the catch basins) would run off the road surface and infiltrate into the ground.

- 2) **Could waste materials enter ground or surface waters? If so, generally describe.**

Construction activities such as fueling, and equipment operation and maintenance can create the potential for spills or minor leaks of fuel, oil, hydraulic fluid or other material into the soil that could make their way into the groundwater. There would be potential for waste materials from the completed road surface to enter groundwater via stormwater runoff.

- d. **Proposed measures to reduce or control surface, ground, and run-off water impacts, if any:**

A temporary erosion and control plan (TESC) and surface water pollution prevention plan (SWPPP) would be prepared for approval by the City of Black Diamond and Washington Department of Ecology (under the NPDES General Construction Stormwater permit) and implemented during construction. These plans contain BMPs for controlling surface and groundwater impacts during construction. See Section 1h above for more detail on the mitigation measures.

#### 4. Plants

- a. **Check or circle types of vegetation found on the site:**

☒ **Deciduous trees:** Alder, maple, aspen, other bitter cherry, cascara  
☒ **Evergreen trees:** Fir, cedar, pine, other hemlock  
☒ **Shrubs**  
☒ **Grass**  
☒ **Pasture**  
☐ **Crop or grain**  
☐ **Wet Soil Plants:** Cattail, buttercup, bulrush, skunk cabbage, other  
☐ **Water Plants:** Water Lily, eelgrass, milfoil, other  
☐ **Other types of vegetation**

- b. **What kind and amount of vegetation will be removed or altered?**

Only the areas within the clearing limits would have vegetation removed. Areas outside of the clearing limits would retain existing vegetation. Evergreen and deciduous trees and shrubs would be removed.

- c. **List threatened or endangered species known to be on or near the site.**

There are no known threatened or endangered plant species on or near the site.

- d. **Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:**

The clearing limits would be delineated (using continuous flagging and orange barrier fencing) prior to clearing and grading to minimize vegetation removal.

#### 5. Animals



- a. Check or circle any birds and animals which have been observed on or near the site, or are known to be on or near the site:

  X   Birds: hawk, heron, eagle, songbirds, other:  
  X   Mammals: deer, bear, elk, beaver, other:  
  X   Fish: bass, salmon, trout, herring, shellfish,  
      Other:

- b. List any threatened or endangered species known to be on or near the site.

According the U.S. Fish and Wildlife's Information for Planning and Consultation (IPaC) database (accessed online) there are no critical habitats at this location and no known threatened, endangered, or priority species known to be on the site.

- c. Is the site part of a migration route? If so, explain.

The project site lies within the migratory bird Pacific Flyway; however, the site is not known to contain critical habitat for migratory birds.

- d. Proposed measures to preserve or enhance wildlife, if any:

No measures are proposed.

## 6. Energy and Natural Resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Energy in the form of diesel, gasoline and possibly electricity would be used during construction. Electricity would be used for lighting the roadway.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The project will not affect the potential use of solar energy by adjacent properties.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Limiting idling construction equipment would reduce the amount of fuel used during construction.

## 7. Environmental Health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill or hazardous waste, that could occur as a result of this proposal? If so, describe.

Construction equipment and activities such as fueling, and equipment operation (leaky equipment) and maintenance (leaky storage containers) can create the potential for spills or minor leaks of fuel, oil, hydraulic fluid or other material that could potentially pose a threat to environmental health. Project related construction activities and material handling/storage would meet all current local, county, state and federal regulations. The completed road would not result in any environmental health hazards.

- 1) Describe special emergency services that might be required.

No special emergency services would be needed.

**2) Proposed measures to reduce or control environmental health hazards, if any:**

State regulations regarding safety and the handling of hazardous materials would be enforced during the construction process. Equipment refueling areas would be located in areas where a spill could be quickly contained, and where the risk of the hazardous material entering ground water is minimized.

In order to reduce the risk of environmental health hazards during construction, the selected contractor would submit a Spill Prevention Control and Countermeasures Plan (SPCCP) with future permits. The SPCCP would include the handling of petroleum products and an emergency response procedure for any soil contaminated by a spill. The plan should include the use of fueling pads or berms located in areas where a spill could be quickly contained and where the risk of hazardous materials entering surface water is minimized, procedures to follow in case of spills, a maintenance plan to minimize leaky equipment, specify a staging area for vehicle maintenance, solid waste handling and disposal Best Management Practices (BMPs), and BMPs for any chemicals to be used or stored onsite during construction. State regulations regarding safety and the handling of hazardous materials will be followed during the construction process.

**b. Noise**

**1) What types of noise exist in the area, which may affect your project (for example: traffic, equipment operation, other)?**

There is no noise source that would affect the road project.

**2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.**

Construction equipment and activities would create impact and prolonged duration noise during the construction period, which would vary in intensity depending on the equipment in use and type of activity. Construction activities on the site would temporarily increase the peak on-site noise levels. Once completed, there would be noise produced by vehicles on the road.

**3) Proposed measures to reduce or control noise impacts, if any:**

Construction activity would be limited to hours and days as specified by the Lawson Hills MPD Development Agreement dated December 12, 2011.

**8. Land and Shoreline Use**

**a. What is the current use of the site and adjacent properties?**

The site is currently pastureland with one residence. Surrounding property is mostly residential or vacant, wooded property.

**b. Has the site been used for agriculture? If so, describe.**

Fields located on the site have recently been plowed.

**c. Describe any structures on the site.**

There is one residence on the property; however, the road alignment would not impact the house.

**d. Will any structures be demolished? If so, what?**

No structures would be demolished.

**e. What is the current zoning classification of the site?**

The current zoning is R-4 and MPD.

**f. What is the current comprehensive plan designation of the site?**

The comprehensive plan designation for the site is Low Density Residential and Master Planned Development. The current transportation improvement plan attached to the Comprehensive Plan identifies the SE Loop Connector.

**g. If applicable, what is the current shoreline master program designation of the site?**

There is no shoreline designation on the site.

**h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.**

There is a Category IV wetland on the site and Lawson Creek, both are environmentally sensitive areas.

**i. Approximately how many people would reside or work in the completed project?**

Not applicable.

**j. Approximately how many people would the completed project displace?**

Not applicable.

**k. Proposed measures to avoid or reduce displacement impacts, if any:**

Not applicable.

**l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:**

The proposal will be reviewed for compatibility with the Comprehensive Plan by the Community Development Department as part of the amendment process.

**9. Housing**

**a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.**

Not applicable.

**b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**

Not applicable.

**c. Proposed measures to reduce or control housing impacts, if any:**



Not applicable.

## 10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

Lighting would be provided along the roadway and would be approximately 20 feet in height.

- b. What views in the immediate vicinity would be altered or obstructed?**

No views would be obstructed. There would be a slight alteration in views of the site due to the road surface.

- c. Proposed measures to reduce or control aesthetic impacts, if any:**

No measures are proposed.

## 11. Light and Glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?**

Night lighting would be installed along the road for safety.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?**

There would be no light or glare that would be a safety hazard or interfere with views.

- c. What existing off-site sources of light or glare may affect your proposal?**

There are no off-site sources of light or glare that would affect the proposal.

- d. Proposed measures to reduce or control light and glare impacts, if any:**

No measures are proposed.

## 12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity?**

There are several community parks in the vicinity of this site, including the Eagle Creek Community Park, Lake Sawyer Regional Park (undeveloped) and Ginder Creek Park (undeveloped). There are also a number of lakes in the general area including Lake Sawyer, Horseshoe Lake, Keevie Lake and Oak Lake that provide water-based recreational opportunities.

- b. Would the proposed project displace any existing recreational uses? If so, describe.**

No existing authorized recreational uses would be displaced.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**

The road alternative would provide sidewalks for pedestrian and bicycle recreation. Sidewalks would be ADA compliant with curb ramps.

### 13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.**

There are no significant historic or cultural resources on the site.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.**

There are no known landmarks or evidence of historic, archaeological, scientific or cultural importance known to be on or next to the project site.

- c. Proposed measures to reduce or control impacts, if any:**

The project would comply with all applicable local, state and federal laws.

### 14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.**

The SE Loop Connector Alternative would connect to Lawson Street and a not-yet-built portion of road.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

The site is not currently served by public transit. The nearest Metro Transit Route is 143/907 that runs on SR 169 and stops at the intersection with Baker Street.

- c. How many parking spaces would the completed project have? How many would the project eliminate?**

No parking spaces would be added or eliminated.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).**

The project would not require new roads but would require a new intersection at Lawson Street.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

The project would not occur in the immediate vicinity of water, rail or air transportation

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**

Unknown at this time.

- g. Proposed measures to reduce or control transportation impacts, if any:**

During construction, workers and trucks with materials will travel to and from the site and could be timed to avoid peak traffic hours. For example, workers can arrive early in the morning before the AM peak hour and if possible, material trips can be scheduled to occur during off-peak hours. Flaggers, signage and barriers would be used to help general traffic avoid the construction zone. The contractor would be required to prepare and implement a traffic control plan during construction.

## 15. Public Services

- a. **Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.**

During construction, there could be a slight increase in the potential demand for emergency medical services due to the operation of heavy construction equipment. The completed project would not result in an increase in the demand for public services.

- b. **Proposed measures to reduce or control direct impacts on public services, if any.**

No measures are proposed.

## 16. Utilities

- a. **Indicate utilities currently available at the site:**

Electricity is available at the site.

- b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

Electricity would be used for lighting on the finished project.

## C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: \_\_\_\_\_

Name of signee: Justin Wortman

Position and Agency/Organization: Senior Project Manager, CCD Black Diamond Partners, LLC.

Date Submitted: February 26, 2021



## A. Supplemental Sheet for Nonproject Actions

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

### 1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Construction of the proposal would cause temporary increases in diesel exhaust emissions from construction equipment and gasoline exhaust emissions from construction workers travelling to and from the site. During dry weather, construction earthwork may also result in dust generation. There would also be a temporary increase in construction noise. However, the construction period would be relatively short as compared to the SE Loop Connector, which would reduce the duration of construction-related impacts.

The proposal operation would result in stormwater runoff from the increase in impervious road surface, emissions to air from vehicle exhaust, and increased noise from vehicles moving on the road. There would be no release of toxic or hazardous substances.

### Proposed measures to avoid or reduce such increases are:

The site will be stabilized consistent with an approved temporary erosion and sedimentation control (TESC) plan in compliance with the then-applicable DOE Stormwater Management Manual for Western Washington as amended in 2014 and City of Black Diamond requirements (BDMC 15.28). Temporary erosion and sedimentation control plans must be submitted to and approved by the City of Black Diamond prior to any clearing or grading activity. Construction stormwater will be managed per the TESC Plan and Stormwater Pollution Prevention Plan (SWPPP) prior to being discharged.

The TESC will include the use of best management practices (BMPs), which could include all or a combination of the following:

1. Construction activity should be scheduled or phased as much as possible to avoid earthwork activity during the wet season.
2. The winter performance of a site is dependent on a well-conceived plan for control of site erosion and stormwater runoff. The site plan should include ground-cover measures and staging areas. The contractor should be prepared to implement and maintain the required measures to reduce the amount of exposed ground.
3. Temporary erosion and sedimentation control (TESC) elements and perimeter flow control should be established prior to the start of grading.

4. During the wetter months of the year, or when significant storm events are predicted during the summer months, the work area should be stabilized so that if showers occur, it can receive the rainfall without excessive erosion or sediment transport. The required measures for an area to be “buttoned-up” will depend on the time of year and the duration that the area will be left unworked. During the winter months, areas that are to be left unworked for more than 2 days should be mulched or covered with plastic. During the summer months, stabilization will usually consist of seal-rolling the subgrade. Such measures will aid in the contractor’s ability to get back into a work area after a storm event. The stabilization process also includes establishing temporary stormwater conveyance channels through work areas to route runoff to the approved treatment/discharge facilities.

5. All disturbed areas should be revegetated as soon as possible. If it is outside of the growing season, the disturbed areas should be covered with mulch. Straw mulch provides a cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

6. Surface runoff and discharge should be controlled during and following development. Uncontrolled discharge may promote erosion and sediment transport.

7. Soils that are to be reused around the site should be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering stockpiles with plastic sheeting, or the use of silt fences around pile perimeters.

In addition to the approved TESC plan, the contractor will be monitored by the Washington State Department of Ecology under the National Pollutant Discharge Elimination System Permit (NPDES) General Stormwater Construction Permit. As part of the NPDES permit requirements, the contractor is required to keep a copy of the SWPPP on-site for reference. The SWPPP includes objectives to implement BMPs to minimize erosion and silt and sediment impacts from rainfall runoff during construction and to identify, reduce, eliminate, or prevent the pollution of stormwater, prevent violations of surface water quality, ground water quality, or sediment management standards, and prevent adverse water quality impacts during construction by controlling peak rates and volumes of stormwater runoff at the permittee’s outfall and discharge locations. In addition, the contractor will provide a certified erosion control supervisor to be on site whenever earthwork or other activity that might result in turbid runoff is being performed.

To minimize the potential adverse impacts from emissions resulting from construction activities, Best Management Practices (BMPs) will be implemented to ensure that minimal amounts of dust and exhaust fumes leave the site. BMP measures may include the following: street cleaning/sweeping; wheel washing; installing stabilized rock construction entrances; watering of the site as necessary to help control dust and other particulates; covering trucks beds carrying soil material; and minimizing vehicle and equipment idling to reduce exhaust emissions at the site.

## **2. How would the proposal be likely to affect plants, animals, fish, or marine life?**

The proposal would have no effect on fish or marine life (stormwater would be treated prior to discharge). Only one parcel would be affected by the proposal and the route would not impact any wetlands or sensitive wildlife habitat on that property.

**Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

Stormwater would be treated prior to discharge into surface waters.

**3. How would the proposal be likely to deplete energy or natural resources?**

The proposal would use energy in the form of diesel, gasoline and possibly electricity during construction. Natural resources such as petroleum, aggregates (e.g., rock, sand, gravel), cement, and various metals (e.g., steel rebar) would be used in constructing the road and road elements (e.g., guard railings, light posts, walls, etc.).

**Proposed measures to protect or conserve energy and natural resources are:**

No measures are proposed.

**4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**

There are no environmentally sensitive areas along the proposal right-of-way except for Lawson Creek. The proposal alignment would cross the creek (similar to the SE Loop Connector).

**Proposed measures to protect such resources or to avoid or reduce impacts are:**

A bridge would be constructed to span across the creek with bridge supports that are located outside the ordinary high water mark. In this way, creek flow and fish passage would not be impeded.

**5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

The proposal would not impact shoreline uses.

**Proposed measures to avoid or reduce shoreline and land use impacts are:**

No measures are proposed.

**6. How would the proposal be likely to increase demands on transportation or public services and utilities?**

The proposal would not increase the demand for transportation or public services. There would be a slight increase in demand for electricity to operate lighting along the roadway for safety.

**Proposed measures to reduce or respond to such demand(s) are:**

The project itself would serve the demand for transportation circulation and access.



**7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

The proposal would not conflict with any local, state, or federal laws for protection of the environment.



## CITY OF BLACK DIAMOND SENSITIVE AREA IDENTIFICATION FORM

This form identifies potential sensitive areas located on the subject property. This is a supplemental form to the sensitive area applications. Further study and or identification of sensitive areas may be required. Please complete the following information to the best of your ability.

|                                                                                                                                                                                                                                                                                                                                                                                                  |  |                                                           |                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------|-----------------------|
| <b>Applicant:</b> CCD Black Diamond Partners LLC                                                                                                                                                                                                                                                                                                                                                 |  | <b>Permit #:</b>                                          |                       |
| <b>Parcel#:</b> See attached legal                                                                                                                                                                                                                                                                                                                                                               |  | <b>Site Address:</b> Southeast Loop Connector Alternative |                       |
| <b>Sensitive Areas Identified:</b><br><input type="checkbox"/> Geologic Hazard Area <input type="checkbox"/> Erosion Hazard Area <input checked="" type="checkbox"/> Wetlands<br><input type="checkbox"/> Flood Zone <input type="checkbox"/> Aquifer Recharge <input type="checkbox"/> Stream Corridor<br><input type="checkbox"/> To my knowledge there are no sensitive areas on my property. |  |                                                           |                       |
| <b>Comments:</b><br>Comprehensive Plan Amendment                                                                                                                                                                                                                                                                                                                                                 |  |                                                           |                       |
| <b>Signature:</b> See Attached                                                                                                                                                                                                                                                                                                                                                                   |  |                                                           | <b>Date:</b> 3/1/2021 |

~For Official Use Only~

|                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reports Completed or Required:</b><br><input type="checkbox"/> Sensitive Area Report <input type="checkbox"/> Wetland Delineation Report <input type="checkbox"/> Geotechnical Report                                  |
| <b>Inspection Results:</b><br><input type="checkbox"/> No Sensitive Areas Present <input type="checkbox"/> Sensitive Areas Present, but No Impact<br><input type="checkbox"/> Sensitive Areas may be affected by proposal |
| <b>Summary of Findings:</b><br><hr/> <hr/> <hr/> <hr/>                                                                                                                                                                    |

|                                                                                                          |              |
|----------------------------------------------------------------------------------------------------------|--------------|
| <b>Signature:</b><br><hr style="border: none; border-top: 1px solid black;"/> Natural Resources Director | <b>Date:</b> |
|----------------------------------------------------------------------------------------------------------|--------------|

**SOUTHEAST LOOP CONNECTOR ALTERNATIVE COMPREHENSIVE PLAN AMENDMENT  
COMPREHENSIVE PLAN AMENDMENT AND REZONE  
LEGAL DESCRIPTION**

PARCEL 4 CITY OF BLACK DIAMOND LOT LINE ADJUSTMENT NO PLN 19-0028  
RECORDING NO 20190619900008 (BEING A PORTION OF NW QTR STR 13-21-06 AND  
NE QTR STR 14-21-06).



**SOUTHEAST LOOP CONNECTOR ALTERNATIVE COMPREHENSIVE PLAN AMENDMENT  
COMPREHENSIVE PLAN AMENDMENT AND REZONE  
SENSITIVE AREA IDENTIFICATION FORM  
SIGNATURE PAGE**

Applicant:

CCD Black Diamond Partners LLC, a Delaware limited liability company

By: Oakpointe LLC, its Manager

By: 

Brian Ross, Manager

Date: 3/1/2021

## MEMORANDUM

|                 |                                                              |            |          |
|-----------------|--------------------------------------------------------------|------------|----------|
| <b>Date:</b>    | March 1, 2021                                                | <b>TG:</b> | 16450.00 |
| <b>To:</b>      | Andrew Williamson – City of Black Diamond                    |            |          |
| <b>From:</b>    | Mike Swenson, P.E., PTOE and Maris Fry, P.E. – Transpo Group |            |          |
| <b>cc:</b>      | Brian Ross and Justin Wortman – Oakpointe                    |            |          |
| <b>Subject:</b> | Comprehensive Plan Amendment – SE Loop Connector Alternative |            |          |

This memorandum provides analysis evaluating the proposed inclusion of the SE Loop Connector Alternative in the City of Black Diamond's 2019 Comprehensive Plan. This memorandum includes the following information:

- Overview of the proposed Alternative
- Summary of pertinent EIS findings
- Operational impacts of the SE Loop Connector Alternative

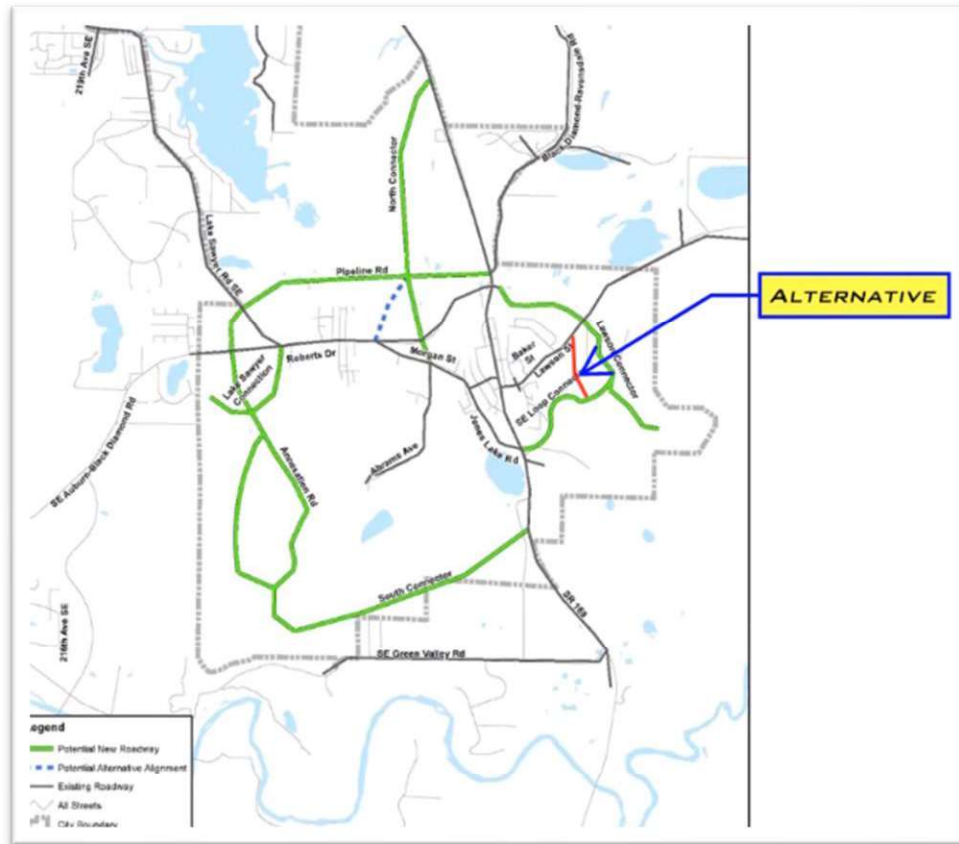
As detailed below, this analysis determined that the worst-case impacts of the proposed SE Loop Connector Alternative could be sufficiently mitigated through the addition of turn lanes at the intersections of SR 169/Baker Street and SR 169/Lawson Street.

### Alternative Overview

As shown in Figure 1, the Comprehensive Plan currently identifies the SE Loop Connector as a connection between the Lawson Connector and SR 169. The identified SE Loop Connector Alternative is shown in Figure 1.

The SE Loop Connector was analyzed in the *Lawson Hills Technical Transportation Report* (TTR), performed by Parametrix in 2009, which was used as the basis for the transportation-related EIS findings for the Lawson Hills MPD. To understand the worst-case impacts of the proposed SE Loop Connector Alternative, the volume projections outlined in the Lawson Hills TTR were updated assuming all traffic shifts from the SE Loop Connector to the Alternative. Based on the anticipated trip assignment and re-routing associated with the Alternative, volume and operations impacts were limited to the following intersections:

1. SR 169/Baker Street
2. SR 169/Lawson Street
3. SR 169/Jones Lake Road
4. Railroad Avenue/Baker Street



## Summary of Pertinent EIS Findings

The analysis contained within the Lawson Hills TTR developed traffic volume projections and defined impacts for the Lawson Hills MPD, as well as the collective impacts of the Lawson Hills and Ten Trails MPDs. Based on this analysis, the following mitigations were identified at the above study intersections for full build-out conditions of both MPDs. The channelization and traffic control for the intersections are also summarized in Figure 1.

- **SR 169/Baker Street:** Traffic signal and northbound left-turn lane
- **SR 169/Lawson Street:** Traffic signal and southbound left-turn lane
- **SR 169/Jones Lake Road:** Traffic signal and northbound, westbound, and southbound left-turn lanes
- **Railroad Avenue/Baker Street:** No mitigations necessary

## Traffic Operations Analysis

To determine the worst-case impacts of the SE Loop Connector Alternative, traffic volume projections from the Lawson Hills TTR were revised to account for re-routed traffic. This analysis conservatively assumed that all traffic routed through the SE Loop Connector in the EIS is re-routed to Lawson Street. Figure 1 depicts the re-routed volumes and the adjusted full-build traffic volumes.



Using these adjusted volumes, intersection level of service (LOS) was evaluated at the study intersections. The channelization and traffic control associated with the EIS-identified mitigations were used as a baseline in order to determine if additional mitigations would be necessary. For the intersection of SR 169/Jones Lake Road, channelization and traffic control consistent with existing conditions was assumed to determine if introduction of the SE Loop Connector Alternative would result in mitigations no longer being necessary.

Weekday PM peak hour levels of service and delays were calculated at study intersections based on existing peak hour factors (PHFs) and methodologies contained in the *Highway Capacity Manual, 6th Edition* (Transportation Research Board). As shown in Table 1, the re-routed traffic volumes result in the need for additional improvements beyond those identified in the EIS at two intersections: SR 169/Baker Street and SR 169/Lawson Street. Additionally, mitigations are still required at the intersection of SR 169/Jones Lake Road.

In order to meet WSDOT's LOS D or better standard, additional southbound and eastbound right-turn lanes would be needed at SR 169/Baker Street and an additional westbound right-turn lane would be needed at SR 169/Lawson Street. Additionally, the traffic signal and northbound left-turn lane would need to remain at the intersection of SR 169/Jones Lake Road. Consistent with the EIS, no mitigations would be necessary at the intersection of Railroad Avenue/Baker Street. The mitigated channelization and traffic control assumptions are summarized in Figure 1. With these additional mitigations in place, the intersections are projected to operate at LOS D or better, as shown on Table 1.

**Table 1. Traffic Analysis Summary – Removal of SE Loop Connector**

| Intersection                    | LOS Standard | Mitigated Traffic Control (EIS) |                    |                 | Mitigated Traffic Control (Removal of SE Loop Connector) |       |    |
|---------------------------------|--------------|---------------------------------|--------------------|-----------------|----------------------------------------------------------|-------|----|
|                                 |              | LOS <sup>1</sup>                | Delay <sup>2</sup> | WM <sup>3</sup> | LOS                                                      | Delay | WM |
| 1. SR 169/Baker Street          | D            | F                               | 129                | -               | D                                                        | 53    | -  |
| 2. SR 169/Lawson Street         | D            | F                               | 170                | -               | D                                                        | 48    | -  |
| 3. SR 169/Jones Lake Road       | D            | F                               | 53                 | EB              | A                                                        | 4     | -  |
| 4. Railroad Avenue/Baker Street | C            | B                               | 12                 | WB              | No Change                                                |       |    |

Source: HCM 6th Edition and Transpo Group, 2020

1. Level of service (A – F) as defined by the Highway Capacity Manual (HCM) 6th Edition, Transportation Research Board

2. Average delay per vehicle in seconds

3. Worst movement (WM) reported for two-way stop sign traffic control

## Conclusions

This analysis determined that the worst-case impacts of the SE Loop Connector Alternative can be adequately mitigated assuming the following:

- Implementation of additional improvements beyond those identified in the EIS at two intersections:
  - **SR 169/Baker Street:** New southbound and eastbound right-turn lanes
  - **SR 169/Lawson Street:** New westbound right-turn lane
- Implementation of limited improvements (construction of a traffic signal and northbound left-turn lane) at the intersection of **SR 169/Jones Lake Road**

Additionally, improvements would remain unnecessary at the intersection of Railroad Avenue/Baker Street.



|                          | Weekday PM Peak Hour Traffic Volumes |                                    | Change                                  |
|--------------------------|--------------------------------------|------------------------------------|-----------------------------------------|
|                          | Re-Routed                            | With SE Loop Connector Alternative |                                         |
| 1 SR 169/ Baker St       |                                      |                                    |                                         |
| 2 SR 169/ Lawson St      |                                      |                                    |                                         |
| 3 SR 169/ Jones Lake Rd  |                                      |                                    | <br>Signal was proposed at intersection |
| 4 Railroad Ave/ Baker St |                                      |                                    | No change relative to existing          |

# Traffic Analysis in Support of SE Loop Connector Alternative

Comprehensive Plan Amendment

**Attachment A:**  
LOS Worksheets



## HCM 6th Signalized Intersection Summary

## 1: SR-169 &amp; Baker St

02/26/2021

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |                                                                                   |  |  |  |                                                                                   |
| Traffic Volume (veh/h)       | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| 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       | 1900                                                                              | 1900                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Peak Hour Factor             | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              |
| Percent Heavy Veh, %         | 0                                                                                 | 0                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 38                                                                                | 182                                                                               | 218                                                                               | 1502                                                                              | 1166                                                                              | 87                                                                                |
| Arrive On Green              | 0.14                                                                              | 0.14                                                                              | 0.19                                                                              | 1.00                                                                              | 0.68                                                                              | 0.68                                                                              |
| Sat Flow, veh/h              | 270                                                                               | 1291                                                                              | 1781                                                                              | 1870                                                                              | 1719                                                                              | 128                                                                               |
| Grp Volume(v), veh/h         | 360                                                                               | 0                                                                                 | 260                                                                               | 827                                                                               | 0                                                                                 | 1542                                                                              |
| Grp Sat Flow(s),veh/h/ln     | 1565                                                                              | 0                                                                                 | 1781                                                                              | 1870                                                                              | 0                                                                                 | 1847                                                                              |
| Q Serve(g_s), s              | 22.5                                                                              | 0.0                                                                               | 15.5                                                                              | 0.0                                                                               | 0.0                                                                               | 108.5                                                                             |
| Cycle Q Clear(g_c), s        | 22.5                                                                              | 0.0                                                                               | 15.5                                                                              | 0.0                                                                               | 0.0                                                                               | 108.5                                                                             |
| Prop In Lane                 | 0.17                                                                              | 0.82                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 0.07                                                                              |
| Lane Grp Cap(c), veh/h       | 220                                                                               | 0                                                                                 | 218                                                                               | 1502                                                                              | 0                                                                                 | 1253                                                                              |
| V/C Ratio(X)                 | 1.64                                                                              | 0.00                                                                              | 1.20                                                                              | 0.55                                                                              | 0.00                                                                              | 1.23                                                                              |
| Avail Cap(c_a), veh/h        | 220                                                                               | 0                                                                                 | 218                                                                               | 1502                                                                              | 0                                                                                 | 1253                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 2.00                                                                              | 2.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 0.00                                                                              | 0.13                                                                              | 0.13                                                                              | 0.00                                                                              | 1.00                                                                              |
| Uniform Delay (d), s/veh     | 68.8                                                                              | 0.0                                                                               | 55.9                                                                              | 0.0                                                                               | 0.0                                                                               | 25.8                                                                              |
| Incr Delay (d2), s/veh       | 305.7                                                                             | 0.0                                                                               | 93.9                                                                              | 0.2                                                                               | 0.0                                                                               | 111.1                                                                             |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 27.7                                                                              | 0.0                                                                               | 13.3                                                                              | 0.1                                                                               | 0.0                                                                               | 83.1                                                                              |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 374.5                                                                             | 0.0                                                                               | 149.8                                                                             | 0.2                                                                               | 0.0                                                                               | 136.8                                                                             |
| LnGrp LOS                    | F                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 | F                                                                                 |
| Approach Vol, veh/h          | 360                                                                               |                                                                                   |                                                                                   | 1087                                                                              | 1542                                                                              |                                                                                   |
| Approach Delay, s/veh        | 374.5                                                                             |                                                                                   |                                                                                   | 36.0                                                                              | 136.8                                                                             |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 | F                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   | 4                                                                                 |                                                                                   | 5                                                                                 | 6                                                                                 |
| Phs Duration (G+Y+Rc), s     | 133.0                                                                             |                                                                                   | 27.0                                                                              |                                                                                   | 20.0                                                                              | 113.0                                                                             |
| Change Period (Y+Rc), s      | 4.5                                                                               |                                                                                   | 4.5                                                                               |                                                                                   | 4.5                                                                               | 4.5                                                                               |
| Max Green Setting (Gmax), s  | 128.5                                                                             |                                                                                   | 22.5                                                                              |                                                                                   | 15.5                                                                              | 108.5                                                                             |
| Max Q Clear Time (g_c+I1), s | 2.0                                                                               |                                                                                   | 24.5                                                                              |                                                                                   | 17.5                                                                              | 110.5                                                                             |
| Green Ext Time (p_c), s      | 8.1                                                                               |                                                                                   | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 128.8                                                                             |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |

## HCM 6th Signalized Intersection Summary

## 2: SSR-169/SR-169 &amp; Lawson St

02/26/2021



| Movement                     | EBL  | EBT  | EBR  | WBL   | WBT   | WBR   | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|------------------------------|------|------|------|-------|-------|-------|------|------|------|------|------|------|
| Lane Configurations          |      | ↕    |      |       | ↕     |       |      | ↕    |      | ↗    | ↘    |      |
| Traffic Volume (veh/h)       | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 5    |
| Future Volume (veh/h)        | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 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 |      | 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       | 1900 | 1900 | 1900 | 1900  | 1900  | 1900  | 1811 | 1811 | 1811 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h         | 1    | 1    | 1    | 179   | 0     | 395   | 1    | 682  | 173  | 532  | 1190 | 5    |
| Peak Hour Factor             | 0.97 | 0.97 | 0.97 | 0.97  | 0.97  | 0.97  | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %         | 0    | 0    | 0    | 0     | 0     | 0     | 6    | 6    | 6    | 2    | 2    | 2    |
| Cap, veh/h                   | 71   | 70   | 56   | 90    | 0     | 132   | 23   | 698  | 177  | 518  | 1526 | 6    |
| Arrive On Green              | 0.12 | 0.12 | 0.12 | 0.12  | 0.00  | 0.12  | 0.50 | 0.50 | 0.50 | 0.58 | 1.00 | 1.00 |
| Sat Flow, veh/h              | 332  | 569  | 450  | 485   | 0     | 1071  | 0    | 1393 | 353  | 1781 | 1861 | 8    |
| Grp Volume(v), veh/h         | 3    | 0    | 0    | 574   | 0     | 0     | 856  | 0    | 0    | 532  | 0    | 1195 |
| Grp Sat Flow(s), veh/h/ln    | 1351 | 0    | 0    | 1556  | 0     | 0     | 1747 | 0    | 0    | 1781 | 0    | 1869 |
| Q Serve(g_s), s              | 0.0  | 0.0  | 0.0  | 19.6  | 0.0   | 0.0   | 7.6  | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s        | 0.2  | 0.0  | 0.0  | 19.8  | 0.0   | 0.0   | 76.7 | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Prop In Lane                 | 0.33 |      | 0.33 | 0.31  |       | 0.69  | 0.00 |      | 0.20 | 1.00 |      | 0.00 |
| Lane Grp Cap(c), veh/h       | 197  | 0    | 0    | 222   | 0     | 0     | 898  | 0    | 0    | 518  | 0    | 1533 |
| V/C Ratio(X)                 | 0.02 | 0.00 | 0.00 | 2.59  | 0.00  | 0.00  | 0.95 | 0.00 | 0.00 | 1.03 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h        | 197  | 0    | 0    | 222   | 0     | 0     | 898  | 0    | 0    | 518  | 0    | 1533 |
| HCM Platoon Ratio            | 1.00 | 1.00 | 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 | 0.00 | 1.00  | 0.00  | 0.00  | 1.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.09 |
| Uniform Delay (d), s/veh     | 61.5 | 0.0  | 0.0  | 71.4  | 0.0   | 0.0   | 39.0 | 0.0  | 0.0  | 33.5 | 0.0  | 0.0  |
| Incr Delay (d2), s/veh       | 0.0  | 0.0  | 0.0  | 726.3 | 0.0   | 0.0   | 20.6 | 0.0  | 0.0  | 19.8 | 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  | 0.0  | 0.0  | 54.0  | 0.0   | 0.0   | 37.5 | 0.0  | 0.0  | 18.7 | 0.0  | 0.2  |
| Unsig. Movement Delay, s/veh |      |      |      |       |       |       |      |      |      |      |      |      |
| LnGrp Delay(d), s/veh        | 61.6 | 0.0  | 0.0  | 797.7 | 0.0   | 0.0   | 59.6 | 0.0  | 0.0  | 53.3 | 0.0  | 0.4  |
| LnGrp LOS                    | E    | A    | A    | F     | A     | A     | E    | A    | A    | F    | A    | A    |
| Approach Vol, veh/h          |      | 3    |      |       | 574   |       |      | 856  |      |      | 1727 |      |
| Approach Delay, s/veh        |      | 61.6 |      |       | 797.7 |       |      | 59.6 |      |      | 16.7 |      |
| Approach LOS                 |      | E    |      |       | F     |       |      | E    |      |      | B    |      |
| Timer - Assigned Phs         | 1    | 2    |      | 4     |       | 6     |      | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s     | 51.0 | 84.7 |      | 24.3  |       | 135.7 |      | 24.3 |      |      |      |      |
| Change Period (Y+Rc), s      | 4.5  | 4.5  |      | 4.5   |       | 4.5   |      | 4.5  |      |      |      |      |
| Max Green Setting (Gmax), s  | 46.5 | 80.2 |      | 19.8  |       | 131.2 |      | 19.8 |      |      |      |      |
| Max Q Clear Time (g_c+H), s  | 19.5 | 78.7 |      | 2.2   |       | 2.0   |      | 21.8 |      |      |      |      |
| Green Ext Time (p_c), s      | 0.0  | 0.9  |      | 0.0   |       | 19.7  |      | 0.0  |      |      |      |      |
| <b>Intersection Summary</b>  |      |      |      |       |       |       |      |      |      |      |      |      |
| HCM 6th Ctrl Delay           |      |      |      | 170.2 |       |       |      |      |      |      |      |      |
| HCM 6th LOS                  |      |      |      | F     |       |       |      |      |      |      |      |      |

# HCM 6th TWSC

## 3: SR-169 & Railroad Ave

02/26/2021

| Intersection             |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|--------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 2.7                                                                               |        |       |                                                                                   |                                                                                   |      |
| Movement                 | EBL                                                                               | EBR    | NBL   | NBT                                                                               | SBT                                                                               | SBR  |
| Lane Configurations      |  |        |       |  |  |      |
| Traffic Vol, veh/h       | 0                                                                                 | 108    | 38    | 837                                                                               | 1323                                                                              | 1    |
| Future Vol, veh/h        | 0                                                                                 | 108    | 38    | 837                                                                               | 1323                                                                              | 1    |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0     | 0                                                                                 | 0                                                                                 | 0    |
| Sign Control             | Stop                                                                              | Stop   | Free  | Free                                                                              | Free                                                                              | Free |
| RT Channelized           | -                                                                                 | Stop   | -     | None                                                                              | -                                                                                 | None |
| Storage Length           | 0                                                                                 | -      | -     | -                                                                                 | -                                                                                 | -    |
| Veh in Median Storage, # | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Grade, %                 | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Peak Hour Factor         | 97                                                                                | 97     | 97    | 97                                                                                | 97                                                                                | 97   |
| Heavy Vehicles, %        | 2                                                                                 | 2      | 2     | 2                                                                                 | 2                                                                                 | 2    |
| Mvmt Flow                | 0                                                                                 | 111    | 39    | 863                                                                               | 1364                                                                              | 1    |
| Major/Minor              | Minor2                                                                            | Major1 |       | Major2                                                                            |                                                                                   |      |
| Conflicting Flow All     | 2306                                                                              | 1365   | 1365  | 0                                                                                 | -                                                                                 | 0    |
| Stage 1                  | 1365                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 941                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy            | 6.42                                                                              | 6.22   | 4.12  | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 1      | 5.42                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 2      | 5.42                                                                              | -      | -     | -                                                                                 | -                                                                                 | -    |
| Follow-up Hdwy           | 3.518                                                                             | 3.318  | 2.218 | -                                                                                 | -                                                                                 | -    |
| Pot Cap-1 Maneuver       | 42                                                                                | 180    | 503   | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 237                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 380                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Platoon blocked, %       |                                                                                   |        |       | -                                                                                 | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 36                                                                                | 180    | 503   | -                                                                                 | -                                                                                 | -    |
| Mov Cap-2 Maneuver       | 36                                                                                | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 202                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 380                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Approach                 | EB                                                                                | NB     |       | SB                                                                                |                                                                                   |      |
| HCM Control Delay, s     | 52.9                                                                              | 0.6    |       | 0                                                                                 |                                                                                   |      |
| HCM LOS                  | F                                                                                 |        |       |                                                                                   |                                                                                   |      |
| Minor Lane/Major Mvmt    | NBL                                                                               | NBT    | EBLn1 | SBT                                                                               | SBR                                                                               |      |
| Capacity (veh/h)         | 503                                                                               | -      | 180   | -                                                                                 | -                                                                                 |      |
| HCM Lane V/C Ratio       | 0.078                                                                             | -      | 0.619 | -                                                                                 | -                                                                                 |      |
| HCM Control Delay (s)    | 12.8                                                                              | 0      | 52.9  | -                                                                                 | -                                                                                 |      |
| HCM Lane LOS             | B                                                                                 | A      | F     | -                                                                                 | -                                                                                 |      |
| HCM 95th %tile Q(veh)    | 0.3                                                                               | -      | 3.5   | -                                                                                 | -                                                                                 |      |



## HCM 6th TWSC

## 4: Railroad Ave/Morgan St &amp; Baker St

02/26/2021

| Intersection             |                                                                                   |          |                                                                                   |      |       |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 7.9                                                                               |          |                                                                                   |      |       |                                                                                   |
| Movement                 | WBL                                                                               | WBR      | NBT                                                                               | NBR  | SBL   | SBT                                                                               |
| Lane Configurations      |  |          |  |      |       |  |
| Traffic Vol, veh/h       | 13                                                                                | 359      | 44                                                                                | 16   | 329   | 132                                                                               |
| Future Vol, veh/h        | 13                                                                                | 359      | 44                                                                                | 16   | 329   | 132                                                                               |
| Conflicting Peds, #/hr   | 0                                                                                 | 0        | 0                                                                                 | 0    | 0     | 0                                                                                 |
| Sign Control             | Stop                                                                              | Stop     | Free                                                                              | Free | Free  | Free                                                                              |
| RT Channelized           | -                                                                                 | None     | -                                                                                 | None | -     | None                                                                              |
| Storage Length           | 0                                                                                 | -        | -                                                                                 | -    | -     | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -        | 0                                                                                 | -    | -     | 0                                                                                 |
| Grade, %                 | 0                                                                                 | -        | 0                                                                                 | -    | -     | 0                                                                                 |
| Peak Hour Factor         | 97                                                                                | 97       | 97                                                                                | 97   | 97    | 97                                                                                |
| Heavy Vehicles, %        | 2                                                                                 | 2        | 2                                                                                 | 2    | 2     | 2                                                                                 |
| Mvmt Flow                | 13                                                                                | 370      | 45                                                                                | 16   | 339   | 136                                                                               |
| Major/Minor              | Minor1                                                                            | Major1   | Major2                                                                            |      |       |                                                                                   |
| Conflicting Flow All     | 867                                                                               | 53       | 0                                                                                 | 0    | 61    | 0                                                                                 |
| Stage 1                  | 53                                                                                | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 814                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Critical Hdwy            | 6.42                                                                              | 6.22     | -                                                                                 | -    | 4.12  | -                                                                                 |
| Critical Hdwy Stg 1      | 5.42                                                                              | -        | -                                                                                 | -    | -     | -                                                                                 |
| Critical Hdwy Stg 2      | 5.42                                                                              | -        | -                                                                                 | -    | -     | -                                                                                 |
| Follow-up Hdwy           | 3.518                                                                             | 3.318    | -                                                                                 | -    | 2.218 | -                                                                                 |
| Pot Cap-1 Maneuver       | 323                                                                               | 1014     | -                                                                                 | -    | 1542  | -                                                                                 |
| Stage 1                  | 970                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 436                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Platoon blocked, %       |                                                                                   |          | -                                                                                 | -    |       | -                                                                                 |
| Mov Cap-1 Maneuver       | 246                                                                               | 1014     | -                                                                                 | -    | 1542  | -                                                                                 |
| Mov Cap-2 Maneuver       | 246                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 1                  | 970                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Stage 2                  | 332                                                                               | -        | -                                                                                 | -    | -     | -                                                                                 |
| Approach                 | WB                                                                                | NB       | SB                                                                                |      |       |                                                                                   |
| HCM Control Delay, s     | 11.8                                                                              | 0        | 5.7                                                                               |      |       |                                                                                   |
| HCM LOS                  | B                                                                                 |          |                                                                                   |      |       |                                                                                   |
| Minor Lane/Major Mvmt    | NBT                                                                               | NBRWBLn1 | SBL                                                                               | SBT  |       |                                                                                   |
| Capacity (veh/h)         | -                                                                                 | -        | 914                                                                               | 1542 | -     |                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                 | -        | 0.42                                                                              | 0.22 | -     |                                                                                   |
| HCM Control Delay (s)    | -                                                                                 | -        | 11.8                                                                              | 8    | 0     |                                                                                   |
| HCM Lane LOS             | -                                                                                 | -        | B                                                                                 | A    | A     |                                                                                   |
| HCM 95th %tile Q(veh)    | -                                                                                 | -        | 2.1                                                                               | 0.8  | -     |                                                                                   |

## HCM 6th Signalized Intersection Summary

## 1: SR-169 &amp; Baker St

02/26/2021

|                              |  |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations          |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| Future Volume (veh/h)        | 60                                                                                | 288                                                                               | 252                                                                               | 802                                                                               | 1392                                                                              | 104                                                                               |
| 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       | 1811                                                                              | 1811                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              | 1870                                                                              |
| Adj Flow Rate, veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Peak Hour Factor             | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              | 0.97                                                                              |
| Percent Heavy Veh, %         | 6                                                                                 | 6                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 |
| Cap, veh/h                   | 102                                                                               | 321                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| Arrive On Green              | 0.06                                                                              | 0.06                                                                              | 0.20                                                                              | 1.00                                                                              | 0.71                                                                              | 0.71                                                                              |
| Sat Flow, veh/h              | 1725                                                                              | 1535                                                                              | 1781                                                                              | 1870                                                                              | 1870                                                                              | 1585                                                                              |
| Grp Volume(v), veh/h         | 62                                                                                | 297                                                                               | 260                                                                               | 827                                                                               | 1435                                                                              | 107                                                                               |
| Grp Sat Flow(s),veh/h/ln     | 1725                                                                              | 1535                                                                              | 1781                                                                              | 1870                                                                              | 1870                                                                              | 1585                                                                              |
| Q Serve(g_s), s              | 5.6                                                                               | 6.3                                                                               | 18.2                                                                              | 0.0                                                                               | 113.0                                                                             | 3.4                                                                               |
| Cycle Q Clear(g_c), s        | 5.6                                                                               | 6.3                                                                               | 18.2                                                                              | 0.0                                                                               | 113.0                                                                             | 3.4                                                                               |
| Prop In Lane                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              |
| Lane Grp Cap(c), veh/h       | 102                                                                               | 321                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| V/C Ratio(X)                 | 0.61                                                                              | 0.92                                                                              | 0.83                                                                              | 0.50                                                                              | 1.09                                                                              | 0.10                                                                              |
| Avail Cap(c_a), veh/h        | 194                                                                               | 403                                                                               | 313                                                                               | 1655                                                                              | 1321                                                                              | 1119                                                                              |
| HCM Platoon Ratio            | 1.00                                                                              | 1.00                                                                              | 1.33                                                                              | 1.33                                                                              | 1.00                                                                              | 1.00                                                                              |
| Upstream Filter(I)           | 1.00                                                                              | 1.00                                                                              | 0.46                                                                              | 0.46                                                                              | 1.00                                                                              | 1.00                                                                              |
| Uniform Delay (d), s/veh     | 73.5                                                                              | 62.0                                                                              | 60.1                                                                              | 0.0                                                                               | 23.5                                                                              | 7.4                                                                               |
| Incr Delay (d2), s/veh       | 5.7                                                                               | 23.7                                                                              | 8.6                                                                               | 0.5                                                                               | 51.7                                                                              | 0.2                                                                               |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |
| %ile BackOfQ(50%),veh/ln     | 2.7                                                                               | 17.5                                                                              | 10.5                                                                              | 0.2                                                                               | 64.7                                                                              | 1.2                                                                               |
| Unsig. Movement Delay, s/veh |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LnGrp Delay(d),s/veh         | 79.2                                                                              | 85.7                                                                              | 68.7                                                                              | 0.5                                                                               | 75.2                                                                              | 7.6                                                                               |
| LnGrp LOS                    | E                                                                                 | F                                                                                 | E                                                                                 | A                                                                                 | F                                                                                 | A                                                                                 |
| Approach Vol, veh/h          | 359                                                                               |                                                                                   |                                                                                   | 1087                                                                              | 1542                                                                              |                                                                                   |
| Approach Delay, s/veh        | 84.6                                                                              |                                                                                   |                                                                                   | 16.8                                                                              | 70.5                                                                              |                                                                                   |
| Approach LOS                 | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 | E                                                                                 |                                                                                   |
| Timer - Assigned Phs         | 2                                                                                 |                                                                                   |                                                                                   | 4                                                                                 | 5                                                                                 | 6                                                                                 |
| Phs Duration (G+Y+Rc), s     | 146.2                                                                             |                                                                                   |                                                                                   | 13.8                                                                              | 28.7                                                                              | 117.5                                                                             |
| Change Period (Y+Rc), s      | 4.5                                                                               |                                                                                   |                                                                                   | 4.5                                                                               | 4.5                                                                               | 4.5                                                                               |
| Max Green Setting (Gmax), s  | 133.0                                                                             |                                                                                   |                                                                                   | 18.0                                                                              | 15.5                                                                              | 113.0                                                                             |
| Max Q Clear Time (g_c+I1), s | 2.0                                                                               |                                                                                   |                                                                                   | 8.3                                                                               | 20.2                                                                              | 115.0                                                                             |
| Green Ext Time (p_c), s      | 8.1                                                                               |                                                                                   |                                                                                   | 0.9                                                                               | 0.0                                                                               | 0.0                                                                               |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th Ctrl Delay           |                                                                                   |                                                                                   | 52.7                                                                              |                                                                                   |                                                                                   |                                                                                   |
| HCM 6th LOS                  |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                   |                                                                                   |

## HCM 6th Signalized Intersection Summary

## 2: SSR-169/SR-169 &amp; Lawson St

02/26/2021



| Movement                     | EBL  | EBT  | EBR  | WBL   | WBT   | WBR   | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|------------------------------|------|------|------|-------|-------|-------|------|------|------|------|------|------|
| Lane Configurations          |      | ↔    |      |       | ↔     | ↔     |      | ↔    |      | ↔    | ↔    |      |
| Traffic Volume (veh/h)       | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 5    |
| Future Volume (veh/h)        | 1    | 1    | 1    | 174   | 0     | 383   | 1    | 662  | 168  | 516  | 1154 | 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 |      | 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       | 1900 | 1900 | 1900 | 1900  | 1900  | 1900  | 1811 | 1811 | 1811 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h         | 1    | 1    | 1    | 179   | 0     | 395   | 1    | 682  | 173  | 532  | 1190 | 5    |
| Peak Hour Factor             | 0.97 | 0.97 | 0.97 | 0.97  | 0.97  | 0.97  | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %         | 0    | 0    | 0    | 0     | 0     | 0     | 6    | 6    | 6    | 2    | 2    | 2    |
| Cap, veh/h                   | 30   | 29   | 15   | 133   | 0     | 667   | 23   | 698  | 177  | 518  | 1526 | 6    |
| Arrive On Green              | 0.12 | 0.12 | 0.12 | 0.12  | 0.00  | 0.12  | 0.50 | 0.50 | 0.50 | 0.39 | 1.00 | 1.00 |
| Sat Flow, veh/h              | 0    | 237  | 119  | 710   | 0     | 1610  | 0    | 1393 | 353  | 1781 | 1861 | 8    |
| Grp Volume(v), veh/h         | 3    | 0    | 0    | 179   | 0     | 395   | 856  | 0    | 0    | 532  | 0    | 1195 |
| Grp Sat Flow(s), veh/h/ln    | 356  | 0    | 0    | 710   | 0     | 1610  | 1747 | 0    | 0    | 1781 | 0    | 1869 |
| Q Serve(g_s), s              | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 19.8  | 7.6  | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Cycle Q Clear(g_c), s        | 19.8 | 0.0  | 0.0  | 19.8  | 0.0   | 19.8  | 76.7 | 0.0  | 0.0  | 46.5 | 0.0  | 0.0  |
| Prop In Lane                 | 0.33 |      | 0.33 | 1.00  |       | 1.00  | 0.00 |      | 0.20 | 1.00 |      | 0.00 |
| Lane Grp Cap(c), veh/h       | 74   | 0    | 0    | 133   | 0     | 667   | 898  | 0    | 0    | 518  | 0    | 1533 |
| V/C Ratio(X)                 | 0.04 | 0.00 | 0.00 | 1.35  | 0.00  | 0.59  | 0.95 | 0.00 | 0.00 | 1.03 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h        | 74   | 0    | 0    | 133   | 0     | 667   | 898  | 0    | 0    | 518  | 0    | 1533 |
| HCM Platoon Ratio            | 1.00 | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 | 1.00 | 1.33 | 1.33 | 1.33 |
| Upstream Filter(I)           | 1.00 | 0.00 | 0.00 | 1.00  | 0.00  | 1.00  | 1.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.12 |
| Uniform Delay (d), s/veh     | 62.3 | 0.0  | 0.0  | 73.5  | 0.0   | 36.4  | 39.0 | 0.0  | 0.0  | 49.1 | 0.0  | 0.0  |
| Incr Delay (d2), s/veh       | 0.2  | 0.0  | 0.0  | 198.0 | 0.0   | 1.4   | 20.6 | 0.0  | 0.0  | 21.4 | 0.0  | 0.5  |
| 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     | 0.1  | 0.0  | 0.0  | 12.8  | 0.0   | 12.4  | 37.5 | 0.0  | 0.0  | 22.8 | 0.0  | 0.2  |
| Unsig. Movement Delay, s/veh |      |      |      |       |       |       |      |      |      |      |      |      |
| LnGrp Delay(d),s/veh         | 62.5 | 0.0  | 0.0  | 271.4 | 0.0   | 37.8  | 59.6 | 0.0  | 0.0  | 70.5 | 0.0  | 0.5  |
| LnGrp LOS                    | E    | A    | A    | F     | A     | D     | E    | A    | A    | F    | A    | A    |
| Approach Vol, veh/h          |      | 3    |      |       | 574   |       |      | 856  |      |      | 1727 |      |
| Approach Delay, s/veh        |      | 62.5 |      |       | 110.6 |       |      | 59.6 |      |      | 22.1 |      |
| Approach LOS                 |      | E    |      |       | F     |       |      | E    |      |      | C    |      |
| Timer - Assigned Phs         | 1    | 2    |      | 4     |       | 6     |      | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s     | 51.0 | 84.7 |      | 24.3  |       | 135.7 |      | 24.3 |      |      |      |      |
| Change Period (Y+Rc), s      | 4.5  | 4.5  |      | 4.5   |       | 4.5   |      | 4.5  |      |      |      |      |
| Max Green Setting (Gmax), s  | 46.5 | 80.2 |      | 19.8  |       | 131.2 |      | 19.8 |      |      |      |      |
| Max Q Clear Time (g_c+H), s  | 19.8 | 78.7 |      | 21.8  |       | 2.0   |      | 21.8 |      |      |      |      |
| Green Ext Time (p_c), s      | 0.0  | 0.9  |      | 0.0   |       | 19.7  |      | 0.0  |      |      |      |      |
| <b>Intersection Summary</b>  |      |      |      |       |       |       |      |      |      |      |      |      |
| HCM 6th Ctrl Delay           |      |      |      | 48.4  |       |       |      |      |      |      |      |      |
| HCM 6th LOS                  |      |      |      | D     |       |       |      |      |      |      |      |      |



## HCM 6th Signalized Intersection Summary

## 3: SR-169 &amp; Railroad Ave

02/26/2021



| Movement                     | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
|------------------------------|------|------|------|------|------|------|
| Lane Configurations          |      |      |      |      |      |      |
| Traffic Volume (veh/h)       | 1    | 108  | 38   | 837  | 1323 | 1    |
| Future Volume (veh/h)        | 1    | 108  | 38   | 837  | 1323 | 1    |
| 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       | 1900 | 1900 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h         | 1    | 0    | 39   | 863  | 1364 | 1    |
| Peak Hour Factor             | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %         | 0    | 0    | 2    | 2    | 2    | 2    |
| Cap, veh/h                   | 2    |      | 334  | 1697 | 1696 | 1    |
| Arrive On Green              | 0.00 | 0.00 | 0.91 | 0.91 | 0.91 | 0.91 |
| Sat Flow, veh/h              | 912  | 0    | 398  | 1870 | 1869 | 1    |
| Grp Volume(v), veh/h         | 2    | 0    | 39   | 863  | 0    | 1365 |
| Grp Sat Flow(s), veh/h/ln    | 1825 | 0    | 398  | 1870 | 0    | 1870 |
| Q Serve(g_s), s              | 0.1  | 0.0  | 3.7  | 7.9  | 0.0  | 25.1 |
| Cycle Q Clear(g_c), s        | 0.1  | 0.0  | 28.8 | 7.9  | 0.0  | 25.1 |
| Prop In Lane                 | 0.50 | 0.00 | 1.00 |      |      | 0.00 |
| Lane Grp Cap(c), veh/h       | 5    |      | 334  | 1697 | 0    | 1697 |
| V/C Ratio(X)                 | 0.41 |      | 0.12 | 0.51 | 0.00 | 0.80 |
| Avail Cap(c_a), veh/h        | 328  |      | 334  | 1697 | 0    | 1697 |
| HCM Platoon Ratio            | 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 |
| Uniform Delay (d), s/veh     | 49.8 | 0.0  | 6.5  | 0.8  | 0.0  | 1.6  |
| Incr Delay (d2), s/veh       | 45.9 | 0.0  | 0.7  | 1.1  | 0.0  | 4.2  |
| Initial Q Delay(d3), s/veh   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln    | 0.1  | 0.0  | 0.4  | 0.5  | 0.0  | 2.0  |
| Unsig. Movement Delay, s/veh |      |      |      |      |      |      |
| LnGrp Delay(d), s/veh        | 95.7 | 0.0  | 7.2  | 1.9  | 0.0  | 5.8  |
| LnGrp LOS                    | F    |      | A    | A    | A    | A    |
| Approach Vol, veh/h          | 2    | A    |      | 902  | 1365 |      |
| Approach Delay, s/veh        | 95.7 |      |      | 2.1  | 5.8  |      |
| Approach LOS                 | F    |      |      | A    | A    |      |
| Timer - Assigned Phs         | 2    |      |      | 4    |      | 6    |
| Phs Duration (G+Y+Rc), s     | 95.2 |      |      | 4.8  |      | 95.2 |
| Change Period (Y+Rc), s      | 4.5  |      |      | 4.5  |      | 4.5  |
| Max Green Setting (Gmax), s  | 73.0 |      |      | 18.0 |      | 73.0 |
| Max Q Clear Time (g_c+I1), s | 30.8 |      |      | 2.1  |      | 27.1 |
| Green Ext Time (p_c), s      | 9.4  |      |      | 0.0  |      | 23.7 |

## Intersection Summary

HCM 6th Ctrl Delay 4.4

HCM 6th LOS A

## Notes

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