Chapter 3 The Built Environment – Effects on People and Community Resources

What is addressed in this chapter?

This chapter describes the community’s existing built environment and how the alternatives may impact that built environment. This chapter specifically addresses the following elements:

- Land Use
- Transportation
- Noise
- Public Utilities (water supply, wastewater, stormwater)
- Visual
- Historic and Cultural Resources
- Public Services (parks, schools, public safety)
- Fiscal Analysis
Transportation

1 What roadways currently serve the area?

The roadway transportation system is composed of a variety of different roadway types, each with a different intended use and characteristic. For example, some roads have several lanes, relatively high speed limits, longer distances between intersections, and are generally used for long-distance trips.

The different categories of roads, based on their intended uses and characteristics, are called “functional classifications.” The functional classifications in the study area can be generally defined as:

- **Principal Arterials** – Roadways that typically connect two or more communities, primarily serve through traffic, have the highest speed limits, and have limited direct access to abutting properties.

- **Minor Arterials** – Roadways that typically connect areas within a community and slightly favor through traffic, have relatively high speed limits, and have infrequent and controlled access to abutting properties.

- **Collectors** – Roadways that connect residential neighborhoods with other areas within a community, are intended to serve through and cross street traffic equally, have lower speed limits, and prioritize property access over through traffic.

- **Local Access Streets** – Roadways that are within neighborhoods that primarily serve traffic to and from driveways, have the lowest speed limits, and frequent direct access to individual residential or commercial properties.

Where can I find additional technical analysis?
A detailed Transportation Technical Report is available in Appendix B.

What are roadway design standards?
“Design standards” refer to a variety of roadway attributes, such as grades, curves, lane and shoulder widths, and speed limits. These standards are different for different roadway types to ensure the safety of the intended users.
There are two important state routes that serve the City of Black Diamond:

- **SR 169** (also known as Maple Valley Black Diamond Road SE and 3rd Avenue, within City Limits) is an urban principal arterial that serves as a primary north-south route for commuters traveling between Renton, Maple Valley, Covington, Black Diamond, and Enumclaw. The majority of trips along SR 169 are long-distance “regional” trips. The WSDOT classifies SR 169 as a Highway of Statewide Significance.

- **SR 516** (also known as SE Kent Kangley Road) is an urban minor arterial in the study area, though it is outside Black Diamond’s city limits. This important east-west route connects SR 18 and SR 169 and is an important route for the communities of Maple Valley, Covington, Black Diamond, and Ravensdale.

The remaining roadways within the study area consist of minor arterials, collector arterials, and local access streets. These roadway types generally accommodate moderate- to short-distance trips and connect the regional roadways, such as SR 169, to businesses and residences.

2 What is level of service and what are “acceptable” levels of service?

Level of service (LOS) is an estimate of the quality and performance of the transportation system operations. Traffic conditions are assessed with respect to the average intersection delay, which is measured in seconds per vehicle. The letter “A” is used to describe the least amount of congestion and best (quickest) operations and the letter “F” indicates the most congestion and worst (slowest) operations. Exhibit 3-3 provides a description of the amount of delay corresponding to each LOS grade.
The traffic analysis provides us with a good representation of how traffic conditions would be in the future without or with a project. However, the emphasis should be placed on the relative differences between alternatives, rather than focus on any single alternative.

### Exhibit 3-3

**Level of Service Criteria**

<table>
<thead>
<tr>
<th>LOS Rating</th>
<th>Average Delay for Signalized Intersections (seconds/vehicle)</th>
<th>Average Delay for Two-Way Stop Control (TWSC) Intersections (seconds/vehicle)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 – 10</td>
<td>0 – 10</td>
</tr>
<tr>
<td>B</td>
<td>&gt; 10 – 20</td>
<td>&gt; 10 – 15</td>
</tr>
<tr>
<td>C</td>
<td>&gt; 20 – 35</td>
<td>&gt; 15 – 25</td>
</tr>
<tr>
<td>D</td>
<td>&gt; 35 – 55</td>
<td>&gt; 25 – 35</td>
</tr>
<tr>
<td>E</td>
<td>&gt; 55 – 80</td>
<td>&gt; 35 – 50</td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

Source: Highway Capacity Manual 2000, modified from Exhibits 16-2 and 17-2; TWSC: two-way stop control.

¹ LOS ratings for TWSC and three-legged stop-control intersections are based on the worst movement average delay; LOS is not defined for the overall intersection.

Different jurisdictions set different LOS standards for the intersections they are responsible for. Based on the jurisdictions adopted policies, the acceptable LOS standards for intersections in the study area include:

- City of Black Diamond – LOS C (except for SR 169, which is LOS D)
- City of Maple Valley – LOS D
- City of Covington – LOS D
- King County – LOS E
- WSDOT – LOS D

### 3 What is traffic currently like in the study area?

SR 169 is the only regional north-south roadway that connects areas with high levels of employment and services. As a result, a majority of commuters utilize SR 169 during some point of their trip. Peak hour traffic along SR 169 is highly “directional” because there is little employment in the Black Diamond area. During the morning peak hour, approximately 72 percent of travel is northbound, compared to only 30 percent during the evening peak. SR 169 becomes moderately congested, due to the lack of alternative north-south routes and the highly directional distribution of traffic during the peak hours.

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**What does the traffic analysis tell us?**
The traffic analysis provides us with a good representation of how traffic conditions would be in the future without or with a project. However, the emphasis should be placed on the relative differences between alternatives, rather than focus on any single alternative.
SR 516, SE Kent Kangley Road, Roberts Drive, and Lawson Street provide the primary east-west connections to SR 169. Despite having low roadway capacities and being affected by SR 169 operations, the relatively low volumes along these roadways results in low to moderate levels of congestion.

A total of 46 intersections were selected to be studied for this project, covering a large geographic area ranging across Maple Valley, Covington, Black Diamond, and other areas within King County.

During the evening peak hour, three of the study intersections currently operate worse than their LOS standards:

- SE 288th Street/216th Avenue SE – LOS D (LOS C is the City of Black Diamond standard)
- SR 169/Black Diamond Ravensdale Road – LOS F (LOS D is the City of Black Diamond standard along SR 169)
- SR 169/SR 516 – LOS E (LOS D is the City of Maple Valley standard)

The existing evening (PM) peak hour traffic operations are shown in Exhibit 3-4.

4 What future scenarios were analyzed?

A build-out year of 2025 was analyzed as the “future year” condition. The analysis assumes that all roadway improvements as listed in the City’s Transportation Element of the Comprehensive Plan, including new alignments, are constructed. No “interim” year analysis was conducted; therefore all impacts are based upon the assumption that at build out, all planned improvements are in place.

(Note: The land use quantities discussed under different disciplines may have nominal deviations as a result of the timing of when each analysis was completed. However, these small differences would not result in substantial changes that would affect the decision-making process. A sensitivity analysis was completed for Alternative 1 based on the construction of 1,330 single-family residences. The result was a maximum difference in intersection delays of 0.8 seconds/vehicle. The increase in dwelling units did not change any of the LOS grades, recommendations for mitigation, or conclusions.)
Exhibit 3-5
2007 Existing PM Peak Hour Traffic Conditions

The Villages
Lawson Hills
Intersection operates better than LOS standard
Intersection operates at LOS standard
Intersection operates worse than LOS standard
City Boundaries

Exhibits in this EIS are intended to provide a general graphical depiction of built and natural environment conditions and may not be accurate to the parcel level.
5 How would the alternatives impact traffic operations in the future?

All of the alternatives are expected to increase travel delay as a result of increased traffic generated by the proposed land uses. However, the extent of the impacts is directly related to the total number of residential units and office/retail square feet proposed in each alternative. The higher the unit count, the more traffic is generated, and the more potential delay that could occur.

It should not be overlooked that the City’s Transportation Element includes a substantially revised network from today’s existing conditions. Many of the new roadways are developer-driven projects, which would be required as a result of development. No environmental analysis has been conducted on any of the potential new alignments – upon receipt of specific applications for development, the City will need to determine if additional impacts could occur, and what appropriate mitigation may be necessary.

Specific traffic operational analysis was only conducted on Alternatives 1 (No MPD Action) and 2 (MPD Proposal). Alternatives 3 (Mitigated MPD) and 4 (Fiscally Balanced MPD) were not analyzed in detail because they represent scenarios that are less densely developed, with fewer residential units and commercial/office square feet.

At some locations, the increases in delay would result in a level of service that is considered unacceptable. The number of intersections expected to operate below their respective standards in 2025 are:

- Alternative 1 – 10 of 46 would fail.
- Alternative 2 – 12 of 46 would fail.
Alternative 3 has 25 percent less residential units and reduced office and retail square footage. With 28 percent fewer trips on the network, it can be assumed that there would likely be fewer intersections that will degrade below their accepted LOS.

Alternative 4 has roughly the same number of units and office/retail square footage as Alternative 2, and impacts to intersections would generally be comparable.

Although 10 intersections would fail under Alternative 1, only eight of these intersections would need improvements. This is because two intersections (SR 169/Witte Road and SR 169/Wax Road) would continue to operate below their respective LOS standards, but the amount of delay under Alternative 1 would be less than Baseline conditions.

The intersections that are expected to degrade worse than their respective LOS standards are shown on Exhibits 3-5 and 3-6.
Exhibit 3-5
2025 Alternative 1
PM Peak Hour Traffic Conditions

Exhibits in this EIS are intended to provide a general graphical depiction of built and natural environment conditions and may not be accurate to the parcel level.
Exhibit 3-6
2025 Alternative 2
PM Peak Hour Traffic Conditions

Exhibits in this EIS are intended to provide a general graphical depiction of built and natural environment conditions and may not be accurate to the parcel level.
6 What measures could mitigate impacts on future traffic conditions?

The identified intersection mitigation measures are similar amongst all of the alternatives, however, the number of locations and magnitude of improvements is different. Mitigation measures generally consist of channelization improvements, such as left- and right-turn pockets, acceleration lanes, signal phasing and timing, and adding through-lanes.

In all cases, the 2025 planned network is assumed as a condition of the alternatives. Since the planned network includes many new alignments that would be needed as a result of development, Exhibit 3-7 should not be assumed to be a comprehensive list of all transportation mitigation needed to support the alternatives – it only addresses additional mitigation needs, beyond the planned improvements depicted in the City’s Transportation Element.

Exhibit 3-7
Mitigation Measures

<table>
<thead>
<tr>
<th>Study Intersection</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE 288th St/216th Avenue SE</td>
<td>Signalize.</td>
<td>Signalize.</td>
</tr>
<tr>
<td>SR 169/Roberts Drive</td>
<td>Add SBL turn pocket.</td>
<td>Add SBL turn pocket.</td>
</tr>
<tr>
<td>SR 169/SE Black Diamond Ravensdale Road (Pipeline Road)</td>
<td>NA</td>
<td>Add SBL turn pocket.</td>
</tr>
<tr>
<td>SR 169/SE 240th Street</td>
<td>NA</td>
<td>Add third SB lane from Wax Road to Witte Road ending it as a right only lane at Witte Road.</td>
</tr>
<tr>
<td>SR 169/Witte Road</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SR 169/SE Wax Road</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SR 169/SE 231st Street</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SE 272nd Street/160th Avenue SE</td>
<td>Provide a 100-foot refuge on WB approach for SBL turning vehicles.</td>
<td>Add SBR turn pocket. Provide a 100-foot refuge on WB approach for SBL turning vehicles.</td>
</tr>
<tr>
<td>SE Kent Kangley Road/ Landsburg Road SE</td>
<td>Add a SBL turn pocket.</td>
<td>Add a SBL turn pocket.</td>
</tr>
<tr>
<td>SR 169/SE Green Valley Road</td>
<td>Provide a refuge on SB approach for EBL turning vehicles.</td>
<td>Provide a refuge on SB approach for EBL turning vehicles.</td>
</tr>
<tr>
<td>SE Auburn-Black Diamond Road/ SE Green Valley Road</td>
<td>Provide a refuge on EB approach for NBL turning vehicles.</td>
<td>Provide a refuge on EB approach for NBL turning vehicles.</td>
</tr>
<tr>
<td>SR 169/North Connector</td>
<td>Convert to a TWSC with NB and SB free movements. Provide a refuge on SB approach for EBL turning vehicles.</td>
<td>Signalize. Add SBR and NBL turn pockets.</td>
</tr>
</tbody>
</table>
Exhibit 3-7 summarizes the mitigation measures for Alternatives 1 and 2. Although Alternative 3 was not analyzed in detail, it assumes approximately 28 percent less trips than Alternative 2, and would likely require similar mitigation. Alternative 4 was created solely as a fiscally balanced alternative only, and was therefore not analyzed for transportation impacts.

It is important to note that in the case of intersection improvements where control beyond a four-way stop is needed, the City will strongly encourage the consideration of roundabouts. The mitigation table in this chapter does not consider if a roundabout or signal would be the preferred control device at a specific intersection.

However, in cases where the mitigation indicates that a signal be installed, every effort should be made to first determine if a roundabout is appropriate.

7 What transit routes currently serve the area?

Public transit within the study area is provided by King County Metro in the form of bus service. King County Metro provides transit service along the major roads in the study area and connects to several major activity areas, such as Renton, Seattle, Enumclaw, Kent, Timberlane, and Lake Meridian.

Exhibit 3-8 summarizes the existing transit service.

<table>
<thead>
<tr>
<th>Route</th>
<th>Weekday Headway (Min)</th>
<th>Service Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM Peak</td>
<td>Midday</td>
</tr>
<tr>
<td>KC 143</td>
<td>20-30 (northbound only)</td>
<td>No service</td>
</tr>
<tr>
<td>KC 149</td>
<td>20-30 (southbound only)</td>
<td>120</td>
</tr>
<tr>
<td>KC 912</td>
<td>No service</td>
<td>120 (4 trips)</td>
</tr>
<tr>
<td>KC 168</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>KC 159</td>
<td>20-30 (northbound only)</td>
<td>No service</td>
</tr>
</tbody>
</table>

Notes: KC = King County Metro route number
KC Route 168 is the only route in the area that provides weekend service with 60 minute headways throughout the day.
To complement the transit service described in Exhibit 3-8, the following park and ride facilities are provided in the study area:

- **Black Diamond Masonic Lodge** – Served by King County Metro Routes 143, 149, and 912.
- **Cornerstone United Methodist Church** – Served by King County Metro Route 912.
- **Maple Valley Park and Ride** – Served by King County Metro Routes 143 and 149.

8 **How would the alternatives affect future transit service?**

The demand for public transit can be expected to increase as population and congestion increase, and King County Metro may alter their operations to compensate for longer travel times and maintain the same quality of transit service. None of the alternatives are expected to adversely affect transit service or facilities in the study area.

9 **What pedestrian, bicycle, and other off-road facilities are currently available in the area?**

Non-motorized travel, such as walking and biking, are important elements of the transportation system and the provision, extent, and quality of non-motorized facilities affect mode choice.

The SR 169 and SR 516 corridors in the study area generally accommodate non-motorized travel with gravel or paved shoulders. Sidewalks are located along the majority of both corridors on at least one side of the road, except for the area between SR 516 and downtown Black Diamond along SR 169. Striped crosswalks with pedestrian call buttons are located at most of the signalized intersections. There are no formally designated (striped) on-street bicycle lanes within the study area. However, both routes have wide curb lanes or paved shoulders that can serve as informal bicycle routes.

This area has a fairly heavy recreational bicycling use, and Auburn-Black Diamond Road is a favorite route.

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**Off-Road Trails**
For more information regarding off-road trails in Black Diamond, please see the Parks and Recreation section of this document.
10 How would the alternatives affect future pedestrian, bicycle, and other off-road facilities in the area?

The future alternatives would not affect the non-motorized system external to the specific project sites. On site, the master planned alternatives (2, 3, and 4) would all incorporate trails and sidewalks as part of their developments. This is the benefit of building as an MPD, rather than incremental development as described in Alternative 1, which would not necessarily provide for additional non-motorized travel opportunities.