

TRANSPORTATION IMPACT ANALYSIS
**BIG BUCK RIDGE
CLUSTER PLAT**
RESIDENTIAL PROJECT

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1. INTRODUCTION

This transportation impact analysis was prepared for the Big Buck Ridge Cluster Plat residential project, located in Kittitas County, Washington. This analysis supports the permitting process, including review under the State Environmental Policy Act (SEPA). The transportation subjects addressed in this report include the project's impacts to the roadway system, intersection operations, and traffic safety. The scope and methodology of this analysis was reviewed and confirmed by Kittitas County staff on February 1, 2013.

1.1. Project Description

The proposed project would construct 13 additional single-family residential homes on the proposed plat located on Big Buck Ridge Road, south of Big Trail Road. One home currently exists, so the completed plat would have 14 homes. The site is located north of the City of Cle Elem, and would connect to the City street system via Montgomery Avenue. An alternate route could occur via Columbia Avenue; however, at the recommendation of Kittitas County staff to present a conservative analysis, all traffic from the proposed development was assumed to use Montgomery Avenue. A site vicinity map is shown on Figure 1.

Access to the residential development would be from a new roadway connecting to Big Buck Ridge Road. The new roadway within the site would be constructed to meet Kittitas County private road standards. The proposed site plat map is shown on Figure 2.

1.2. Methodology and Study Area

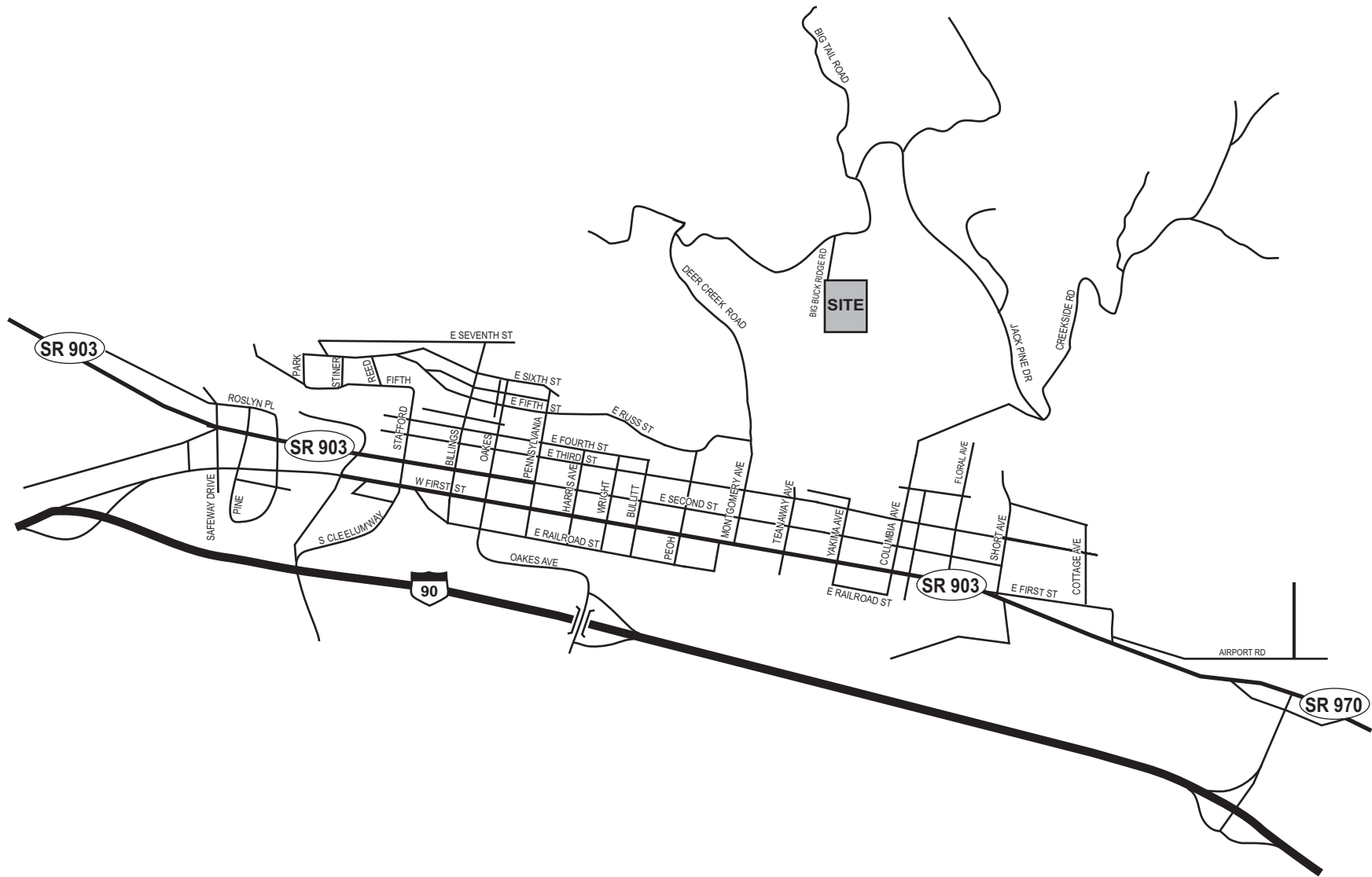
This study was performed in accordance with standard practice for transportation impact analyses, and all analyses were performed under the direction of Marni Heffron, who is a registered Professional Engineer in Washington State. Key assumptions used in the transportation analysis were confirmed with Christina Wollman of the Kittitas County Public Works Department.¹

The proposed City Heights development property is located west of the project site. An Environmental Impact Statement (EIS)² was completed for this development in 2010. The EIS included a Transportation Element that assumed full build out of the City Heights project along with other significant proposed developments in the area, including the Suncadia plat south of the City Heights development. Key roadways and 17 intersections were evaluated in the City Heights analysis for full development, which was assumed for the year 2022. In addition, the proposed Forest Ridge Residential site is located east of the project site. A traffic impact analysis³ was completed for that project with an assumed horizon year of 2022. To be consistent with the analyses for the City Heights and Forest Ridge projects, the new analysis for the Big Buck Ridge Cluster Plat development was also performed for the year 2022. This nine-year horizon is reasonable for development of this small plat. Traffic volumes assumed for the City Heights analysis and the Forest Ridge development were included in the future 2022 forecasts.

¹ Email confirmation from Christina Wollman, Planner II, Floodplain Manager, February 1, 2013.

² City Heights Final EIS, November 10, 2010.

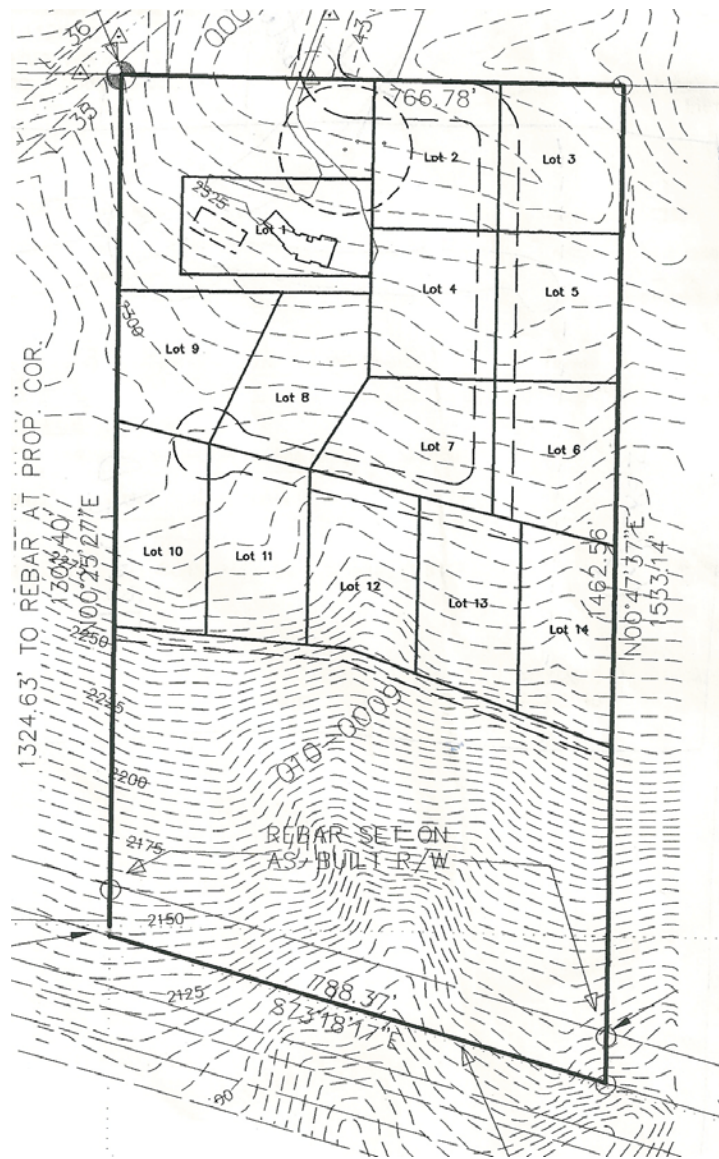
³ Forest Ridge Residential Project – REVISED Transportation Impact Analysis, (Heffron Transportation, Inc., November 19, 2009.



**BIG BUCK RIDGE
CLUSTER PLAT**

Figure 1
VICINITY MAP

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BIG BUCK RIDGE
CLUSTER PLAT

Figure 2
PROPOSED SITE PLAT MAP

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The City Heights Draft EIS forecast future traffic volumes by incorporating traffic associated with all permitted but not yet constructed development projects in the area that could be completed by the year 2022. By the time the Final EIS was issued, the City agreed this level of growth was too aggressive and not likely to occur, and the City recommended applying an annual growth rate of 3% per year for a 14-year growth period (from 2008 to 2022). Four years since those forecasts were prepared, new traffic counts along SR 903 determined that there has been almost no growth during the PM peak hour since 2008. However, to provide a conservative evaluation, traffic volume forecasts from the City Heights FEIS were used to forecast year 2022 traffic volumes for this analysis.

The PM peak hour was evaluated for the Big Buck Ridge Cluster Plat project since past studies have shown that this is the time of day when area traffic volumes are at the highest. The proposed project would also generate the highest number of trips during the PM peak hour.

The study area for this analysis includes the E 1st Street (SR 903)/Montgomery Avenue intersection. This intersection could experience the highest increase in traffic associated with the project since it would serve traffic to and from I-90, both east and west of Cle Elum, and Montgomery Avenue connects directly to Big Buck Ridge Road.

2. BACKGROUND CONDITIONS

This section describes the existing roadway network, traffic volumes, traffic operations at the study intersection, and safety. It also describes how these conditions may change in the future without the proposed project. Future analysis was performed for the year 2022 to be consistent with analysis performed for the City Heights and Forest Ridge developments.

2.1. Roadway Network

The Big Buck Cluster Plat site is located just north of the Cle Elum city limits. Descriptions of the main roadways that would serve this site are below.

State Route 903 (SR 903) (Also E 1st Street) is a state highway, classified as a Rural Collector that connects from the I-90/SR 970/SR 903 interchange to the City of Roslyn, Suncadia Resort, to northwest of the City of Ronald, where it continues as Salmon La Sac Road. SR 903 is a two-lane paved roadway, and has some areas of very wide paved shoulders (up to 16 feet), and some areas with no shoulders. From SR 970 to Montgomery Avenue, the road has wide travel lanes, wide shoulders, on-street parking and only a few block faces with sidewalks, curb or gutter. The posted speed limit in this section is 30 mph.

Montgomery Avenue is local access north-south roadway with one travel lane in each direction. This roadway has wide gravel shoulders and on-street parking. Sidewalks are provided on both sides of the street south of 3rd Street. The speed limit is 25.

Big Buck Ridge Road is an unimproved local access roadway that serves the existing single-family home on the proposed site. This roadway connects to Big Tail Road; a two-lane roadway that provides access to a limited number of residential lots.

The Washington State Department of Transportation (WSDOT) has plans for widening and improving SR 903, as documented in its *Route Development Plan*.⁴ This document presented long range (20-

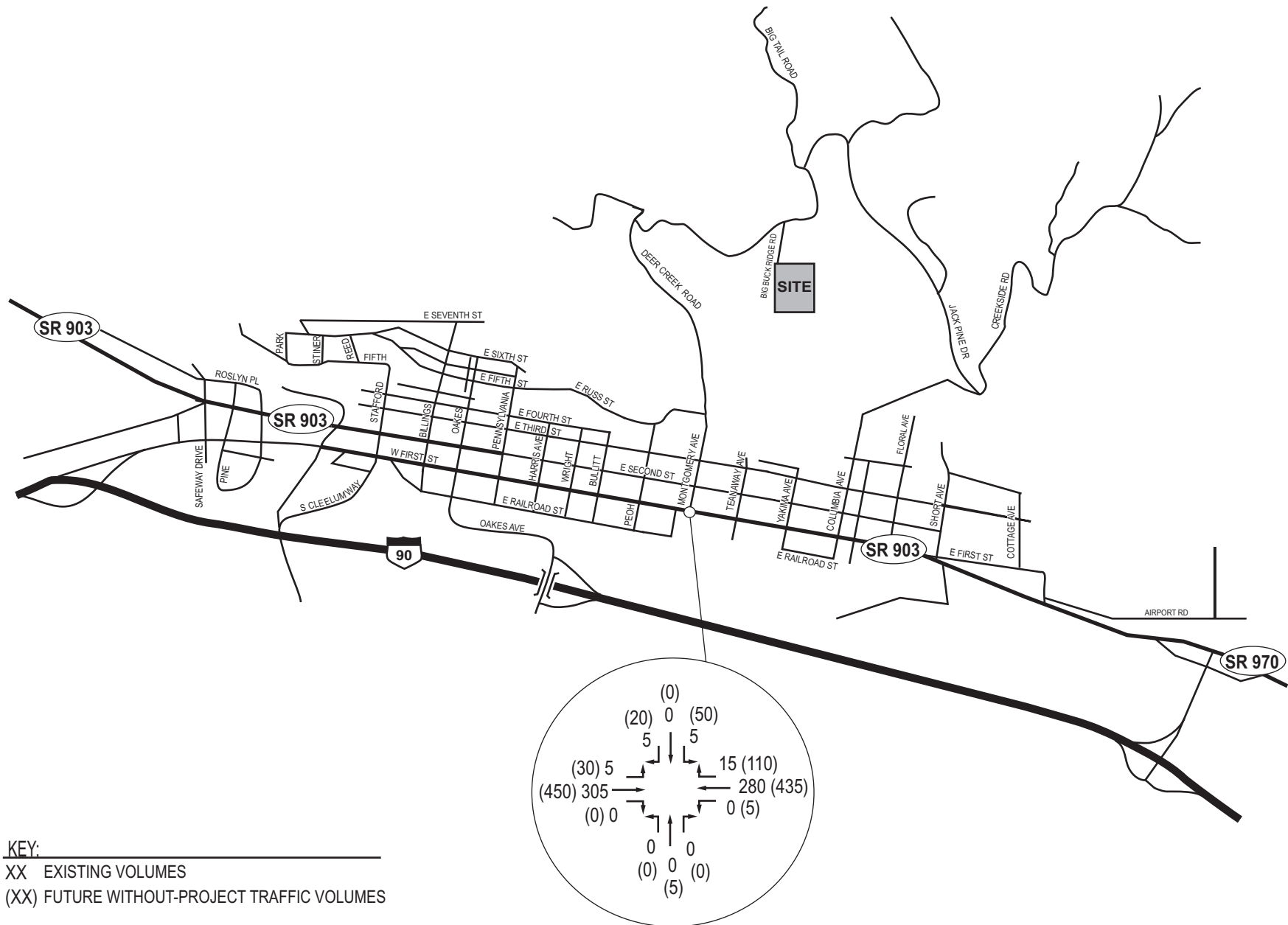
⁴ WSDOT, January 2004.

year) plans out year 2024 to make improvements along this corridor that support congestion relief, economic initiatives, and safety requirements. Some of the recommended improvements have been completed. The improvements identified for the roadway include widening SR 903 from Oakes Avenue to Ranger Station Road (and extending the existing two-way left-turn lane to Floral Avenue), channelizing major intersections from Ranger Station Road to Roslyn, and constructing a two-way left-turn lane from Ranger Station Road to Roslyn). These recommendations include a Modified Design Level with 12-foot minimum lane widths, six-foot minimum paved shoulders in unincorporated areas and the City of Roslyn, and at least eight feet of paved parking, sidewalks, curb, and gutter (assumed for the downtown area) in the City of Cle Elum. However, none of these improvements would change the analysis evaluation between existing and future conditions. Therefore, at the SR 903 (1st Street)/Montgomery Avenue intersection the geometry was assumed to remain the same as existing for the future 2022 conditions.

2.2. Traffic Volumes

The City Heights EIS presented existing traffic volumes for the year 2008. New traffic counts performed in 2012 along SR 903, west of the site determined that no growth has occurred in the SR 903 corridor over the past four years. Therefore traffic volumes from 2008 were used to represent 2013 existing traffic volumes for this study. These are shown on Figure 3.

The proposed Big Buck Cluster Plat is anticipated to be complete sometime in the next decade or so. Therefore, the year 2022 was selected for analysis, which provides for mid-to long-range planning, and is consistent with the future analysis performed for the City Heights EIS and other development projects in the area. Although no growth has occurred in the past four years, the future forecasts developed for the City Heights Final EIS (which included a 3% per year growth rate plus the City Heights traffic) and traffic associated with the nearby Forest Ridge project, was used as the future-without-project condition for this analysis. The 2022 without-project traffic volumes are also shown on Figure 3.



**BIG BUCK RIDGE
CLUSTER PLAT**

**Figure 3
EXISTING (2013) AND FUTURE (2022) WITHOUT PROJECT
PM PEAK TRAFFIC VOLUMES**

2.3. Traffic Operations

Kittitas County staff requested level of service analysis for the SR 903/Montgomery Avenue intersection to determine how the proposed project would affect traffic operations. Levels of service (LOS) analyses for this unsignalized intersection were performed for the PM peak hour traffic volumes. Level of service is a qualitative measure used to characterize traffic operating conditions. Six letter designations, “A” through “F,” are used to define level of service. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. Appendix A presents the level of service criteria for signalized and unsignalized intersections. Level of service for the study area intersection was analyzed using methodologies found in the *Highway Capacity Manual*⁵ and Trafficware’s *Synchro 8.0* analysis software. Results for the unsignalized intersection were reported using the *HCM* module.

Table 1 summarizes level of service estimated for existing and future 2022 without-project conditions. The City of Cle Elum has established LOS D as its standard for intersection operations. Kittitas County has adopted LOS C for rural facilities and LOS D for urban facilities. WSDOT generally prefers LOS C for rural locations and LOS D for urban conditions. The study intersection is located within the City of Cle Elum; therefore, the urban condition of LOS D should apply. All movements at the study intersection are estimated to continue operating above the established LOS standards for all jurisdictions in the future (year 2022) without the proposed project complete.

Table 1. Level of Service – Existing and Future Without-Project PM Peak Hour Conditions

Unsignalized Intersection	Existing (2013)		2022 w/o Project	
	LOS ¹	Delay ²	LOS	Delay
SR 903 / Montgomery Avenue				
Eastbound Approach	A	0.2	A	0.9
Westbound Approach	A	0.0	A	0.1
Southbound Approach	B	12.4	D	29.3
Northbound Approach	A	0.0	C	24.6

Source: Heffron Transportation, Inc., February 2013.

1. Level of service.
2. Average seconds of delay per vehicle.

2.4. Traffic Safety

Collision data were obtained from WSDOT for the SR 903/Montgomery Avenue intersection. Data for the three and one-half year period between January 1, 2009 and July 31, 2012 were collected. During this time, there were zero reported collisions. Therefore, no unusual safety conditions currently exist at this location.

⁵ Transportation Research Board. 2010.

3. PROJECT IMPACTS

This section of the report describes the conditions that would exist with the Big Buck Ridge Cluster Plat, which would construct up to an additional 13 single-family homes to a plat that currently has one occupied single-family home. Although some of these units could be recreational homes, for the purpose of this analysis, all of the homes were evaluated as primary residences that are occupied year round.

3.1. Roadway Network

The proposed project is not proposing to change any of the existing roadways in the area. The internal access road would be built to Kittitas County private road standards.

3.2. Project Trip Generation

Trip generation for the residential project was determined using rates in *Trip Generation*.⁶ Trip generation was determined based on the average rates for Single-Family Residential (Land Use Code 210). The estimated trips associated with the existing single-family home on the site are also included. Table 2 summarizes the proposed project’s total and net vehicle trip generation. As shown, the proposed project is anticipated to generate an additional 120 vehicle trips per day, 10 vehicle trips during the AM peak hour, and 13 vehicle trips during the PM peak hour.

Table 2. Vehicle Trips Generated by the Proposed Project

Single-Family Residential	Dwelling Units	Daily Trips	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Full-Build	14	130	3	8	11	9	5	14
Existing	-1	-10	0	-1	-1	-1	0	-1
Net Increase	13	120	3	7	10	8	5	13

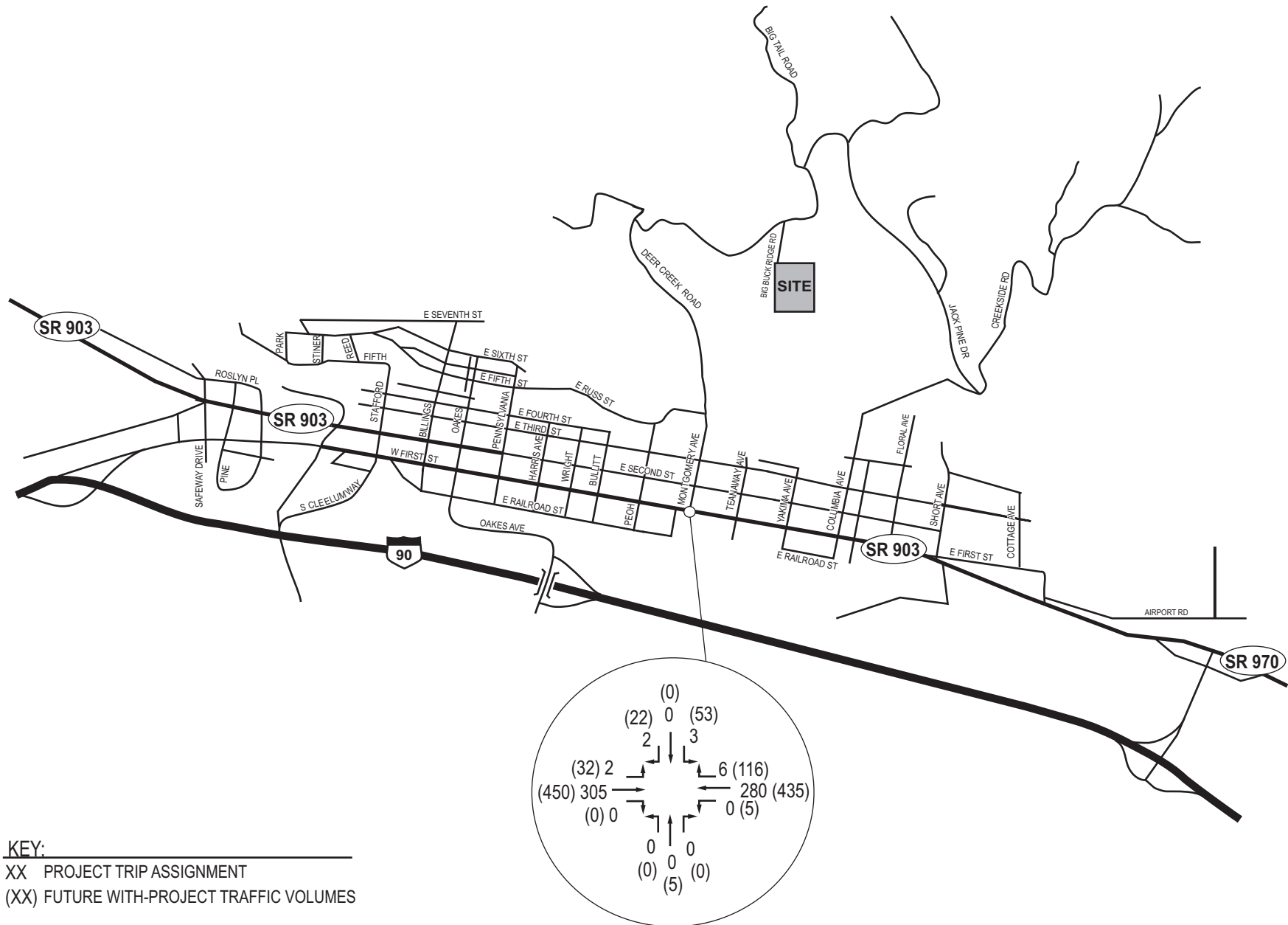
Source: Heffron Transportation, Inc., February 2013.

3.3. Trip Distribution and Assignment

The trip distribution pattern for this project was estimated based on the site’s location relative to the commercial and retail activities in South Cle Elum and Cle Elum; and access to I-90. During the PM peak hour, most residential trips are related to residents returning from work; however, some could also be shopping trips or other non-work activities. To analyze a conservative condition, all proposed project trips were assumed to use the study intersection with a similar travel pattern as the forecast volumes at this location. This included about 30% of the traffic to/from the west and 70% to/from the east, both along SR 903 (E 1st Street). The proposed project trips assignment is shown on Figure 4.

The project traffic was added to the 2022 without-project traffic forecasts described previously. The resulting year 2022 with-Big Buck Cluster Plat traffic volumes are also shown on Figure 4.

⁶ Institute of Transportation Engineers (ITE), 9th Edition, 2012.



**BIG BUCK RIDGE
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Figure 4
PROJECT TRIP ASSIGNMENT AND FUTURE (2022) WITH-PROJECT
PM PEAK HOUR TRAFFIC VOLUMES

3.4. Traffic Operations

A level of service for the study area intersection was calculated using the 2022-with-project traffic volumes and the methodology described earlier in this report. Table 3 shows the results of the analysis; the without-project results are shown for comparison. The traffic volumes associated with the proposed Big Buck Cluster Plat would degrade the level of service for the northbound approach (driveway) of the study intersection. However, the increase in delay on this approach during the PM peak hour is estimated to be less than a half of a second, which would not be a noticeable change. This approach and the other approaches would continue to operate at acceptable levels with the proposed project complete.

Table 3. Level of Service – Future (Year 2022) PM Peak Hour Conditions

Unsignalized Intersection	2022 w/o Project		2022 w/ Project	
	LOS ¹	Delay ²	LOS	Delay
SR 903 / Montgomery Avenue				
Eastbound Approach	A	0.9	A	1.0
Westbound Approach	A	0.1	A	0.1
Southbound Approach	D	29.3	D	30.5
Northbound Approach	C	24.6	D	25.0

Source: Heffron Transportation, Inc., February 2013.

1. Level of service.
2. Average seconds of delay per vehicle.

3.5. Traffic Safety

The project would result in a small increase in vehicular traffic in the study area. The additional vehicular traffic that would be generated by the project is not expected to result in any new adverse impacts to safety conditions in the study area.

3.6. Site Access

The exact location of the proposed site access roadway is not yet known. When it is designed, it will be required to meet Kittitas County requirements, including meeting minimum sight distances where the new roadway intersects either Big Buck Ridge Road or Big Tail Road.

4. SUMMARY

The project would not result in significant adverse impacts to traffic conditions. No transportation mitigation would be required to satisfy the proposed development of the Big Buck Ridge Cluster Plat.

REFERENCES

City Heights Draft EIS, Transportation System, April 2010.

City Heights Final EIS, Chapter 2: Comments and Responses, November 2010.

Email correspondence with Christina Wollman to Michelle Brown, February 1, 2013.

Forest Ridge Residential Project – REVISED Transportation Impact Analysis, (Heffron Transportation, Inc., November 19, 2009).

Institute of Transportation Engineers, *Trip Generation*, 9th Edition, 2012.

Transportation Research Board, *Highway Capacity Manual*, 2010.

Washington State Department of Transportation, Collision Data – Obtained February 2013.

Washington State Department of Transportation, *Route Development Plan*, January 2004.

APPENDIX A

LEVEL OF SERVICE DEFINITIONS

Levels of service (LOS) are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delays. Levels of service for this analysis were developed using procedures presented in the *Highway Capacity Manual* (Transportation Research Board, 2010).

Level of service for signalized intersections is defined in terms of delay. Delay can be a cause of driver discomfort, frustration, inefficient fuel consumption, and lost travel time. Specifically, level of service criteria are stated in terms of the average delay per vehicle in seconds. Delay is a complex measure and is dependent on a number of variables including: the quality of progression, cycle length, green ratio, and a volume-to-capacity ratio for the lane group or approach in question. Table A-1 shows the level of service criteria for signalized intersections from the *Highway Capacity Manual*.

Table A-1. Level of Service Criteria

Level of Service	Average Delay Per Vehicle	General Description
A	Less than 10.0 Seconds	Free flow
B	10.1 to 20.0 seconds	Stable flow (slight delays)
C	20.1 to 35.0 seconds	Stable flow (acceptable delays)
D	35.1 to 55.0 seconds	Approaching unstable flow (tolerable delay—occasionally wait through more than one signal cycle before proceeding).
E	55.1 to 80.0 seconds	Unstable flow (approaching intolerable delay)
F	Greater than 80.0 seconds	Forced flow (jammed)

Source: Transportation Research Board, *Highway Capacity Manual*, 2010.

For unsignalized two-way-stop-controlled, all-way-stop-controlled, and roundabout intersections, level of service is based on the average delay per vehicle. The level of service for a two-way, stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Delay is related to the availability of gaps in the main street's traffic flow, and the ability of a driver to enter or pass through those gaps. The delay at an all-way, stop-sign (AWSC) controlled intersection is based on saturation headways, departure headways, and service times. Delay at roundabouts is based on entry flow rates and flow rate capacity. Table A-2 shows the level of service criteria for unsignalized intersections from the *Highway Capacity Manual*.

Table A-2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay (seconds per vehicle)
A	Less than 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

Source: Transportation Research Board, *Highway Capacity Manual*, 2010.