

Traffic Impact Analysis

WILDLIFE MEADOW GLAMPING & RV PARK

Prepared for:

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April 2022

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Introduction

The purpose of this traffic impact analysis (TIA) is to identify potential transportation-related impacts associated with the proposed Wildlife Meadow Glamping & RV Park development in unincorporated King County. As required by King County Road Services, the analysis provides a description of the project and study area, an evaluation of future conditions at the site access point, and identified potential impacts and mitigation measures, as necessary.

Project Description

The project site is currently undeveloped and located along SE Kent Kangley Rd between SE Ravensdale Way and 292nd Avenue SE. The site vicinity is shown on Figure 1. The project would include the development of up to 45 tent, glamping, and RV sites. One vehicular access point is proposed along the southern frontage of the project, accessed via SE Kent Kangley Rd. A preliminary site plan for the development is shown on Figure 2. The proposed project is anticipated to be constructed and operational by 2025.

Study Scope

The scope of this analysis is based on discussions with King County staff and the County's Level 1 TIA guidelines. As specified in these guidelines, only intersections that would be impacted by 30 or more peak hour trips and at least 20 percent of total peak hour project traffic must be studied. Given the low peak hour trip generation of this project (detailed in a later section of this report), no off-site intersections were identified for evaluation. For the purposes of this study, only the site access along SE Kent Kangley Road was evaluated. This study focuses on the weekday AM and PM peak hours for the future with-project conditions. Additionally, this analysis includes a review of existing roadway conditions near the project site and a sight distance evaluation for the proposed site access.



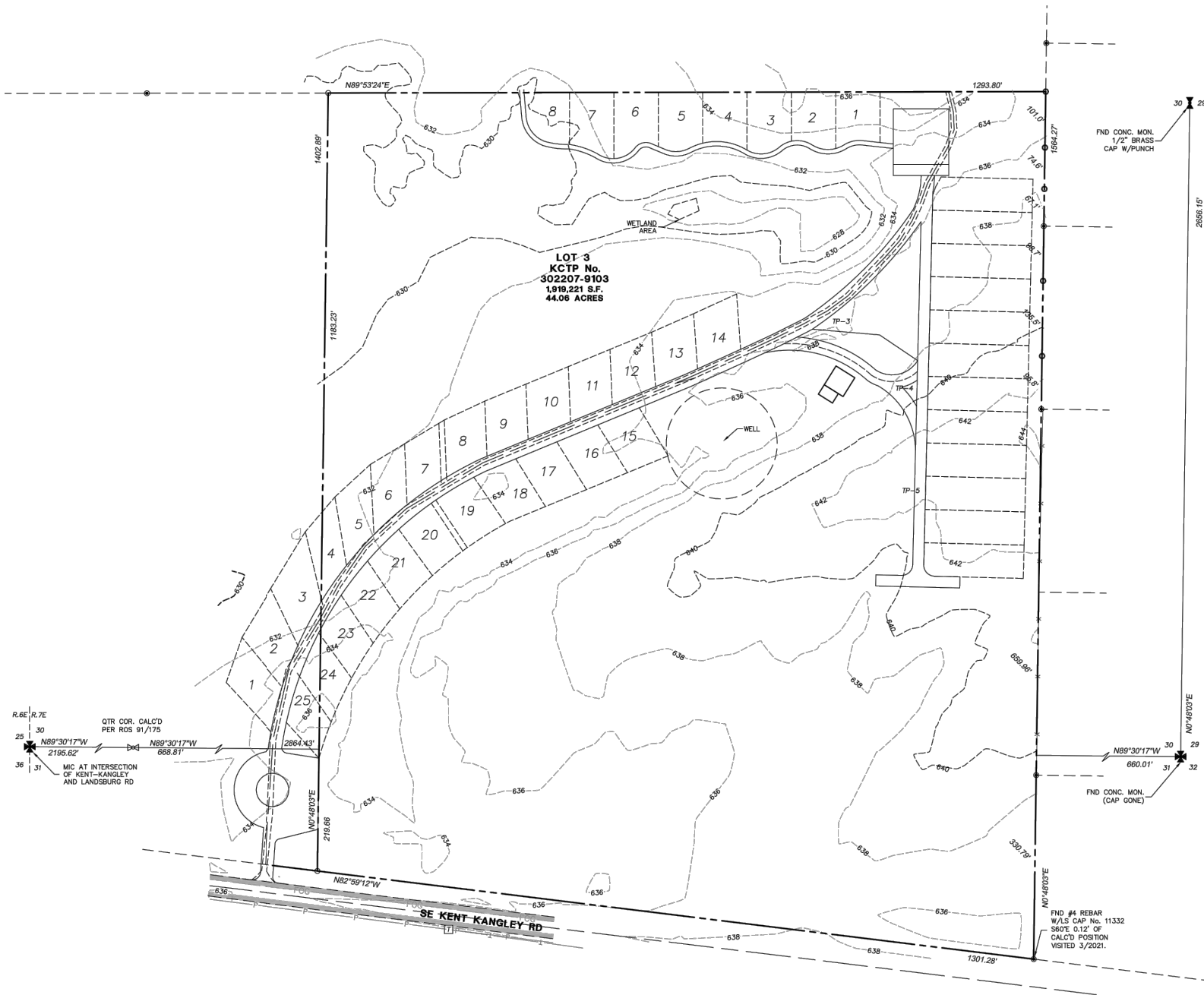
Site Vicinity & Site Access

Wildlife Meadow Glamping & RV Park

FIGURE

1





Preliminary Site Plan

Wildlife Meadow Glamping & RV Park

FIGURE

2



Existing Conditions

This section describes the existing conditions within the identified study area. Study area characteristics are provided for the roadway network, non-motorized facilities, transit, and existing traffic volumes.

Roadway Network

The following sections describe the existing street network within the vicinity of the proposed project and any anticipated changes resulting from planned improvements.

Existing Inventory

SE Kent Kangley Road is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 45 miles per hour (mph) and there is no parking, sidewalks, or bicycle facilities along the roadway. Access to the site would be provided via SE Kent Kangley Road.

Landsburg Road SE is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 40 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

SE Ravensdale Way is a two-lane roadway classified as a minor arterial per the King County Arterial Functional Classification Map (2019). In the vicinity of the project, the posted speed limit is 35 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

292nd Avenue SE is a two-lane local road. In the vicinity of the project, the posted speed limit is 45 mph and there is no parking, sidewalks or bike facilities provided along the roadway.

Planned Improvements

Based on a review of the *King County Transportation Needs Report (TNR, 2020)*, one planned improvement was identified in the vicinity of the project.

SE Kent-Kangley Intersection Improvement: This intersection was recently converted from a side-street stop-controlled intersection to an all-way stop-controlled intersection. The impacts of this treatment will be monitored to determine if installing a permanent traffic calming safety improvement such as a roundabout or signal may be necessary. The potential changes to this intersection are not anticipated to impact the operations at the project's site access.

Non-Motorized Facilities

There are limited pedestrian and bicycle facilities within the vicinity of the project, although the shoulders along SE Kent Kangley Road are approximately 10 feet wide and may accommodate pedestrian and bicycle traffic. Additionally, nearby walking trails provide an alternative to walking along SE Kent Kangley Road.

Transit

There is currently no transit service within the vicinity of the project site.

Vehicle Traffic Volumes

Existing weekday peak period traffic volumes were collected at SE Kent Kangley Road/Landsburg Road SE as a basis for determining traffic volumes along SE Kent Kangley Road at the location of the proposed site driveway. Weekday PM peak hour (4-6 p.m.) traffic volumes were collected in November 2019 and weekday AM peak period (7-9 a.m.) traffic volumes were collected in March 2022. To account for the impacts of COVID-19 on the weekday AM peak hour traffic volumes, historic 2019 and March 2022 counts at the SE Kent Kangley Road/Landsburg Road SE intersection were compared. Based on this comparison, the March 2022 counts were increased by 4 percent to represent typical non-pandemic conditions. Since the weekday PM peak period traffic volumes were collected before the COVID-19 pandemic, no adjustment was made to these volumes aside from the application of a 1.5 percent annual growth rate from 2019 to 2022.

The estimated existing (2022) weekday AM and PM peak hour traffic volumes along SE Kent Kangley Road in the vicinity of the project are shown on Figure 3. The traffic volumes were rounded to the nearest five vehicles to account for daily fluctuations. The detailed weekday peak period traffic counts are included in Appendix A.



Existing Peak Hour Traffic Volumes

Wildlife Meadow Glamping & RV Park

FIGURE

3

Project Impacts

This section of the analysis documents the potential impacts of the proposed project. First, estimated traffic volumes generated by the proposed project are distributed and assigned to the site driveway. Next, these project trips and inherent traffic growth are added to existing traffic volumes to develop the future (2025) with-project traffic volumes at the site driveway. Finally, the proposed site access point is evaluated to determine consistency with King County sight distance standards.

Vehicle Trip Generation

Trip generation estimates for this project are based on average trip rates summarized in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition (2021). The trip rates for the proposed project were based on ITE's Campground/Recreational Vehicle Park (LU #416) land use. The trip generation for the proposed development is shown in Table 1.

Table 1. Estimated Weekday Vehicle Trip Generation

Land Use	Size	Daily Trips ¹	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Campground/Recreational Vehicle Park (LU #416)	45 ou	120 ²	4	6	10	8	4	12

Notes: ou = Occupied Units

1. Trip generation based on ITE *Trip Generation Manual* (11th Edition, 2021).

2. No ITE daily rate for this land use. Daily trips projected as ten times the PM peak hour trips.

As shown in Table 1, the proposed project is anticipated to generate approximately 120 daily trips with 10 occurring during the AM peak hour, and 12 occurring during the PM peak hour.

Vehicle Trip Distribution & Assignment

Trip distribution patterns to and from the project site were based on existing vehicle travel patterns and evaluating the likely origins/destinations of travelers. The project trip distribution and assignment for vehicle trips is shown in Figure 4.

Site Access Evaluation

The project will be accessible from a single side-street stop-controlled driveway located along the southern frontage of the site on SE Kent Kangley Road. The following section summarizes the operational and sight distance analysis completed for the proposed site access intersection.

Future (2025) With-Project Traffic Volumes

The future (2025) with-project traffic volumes at the site access were forecasted by: (1) applying an annual growth rate of 1.5 percent to existing traffic volumes along SE Kent Kangley Road to estimate background traffic growth, and (2) adding project-generated traffic as shown on Figure 4. The resulting future (2025) with-project traffic volumes are shown on Figure 5.

Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At unsignalized side-street, stop-controlled intersections, LOS is measured by the average delay on the critical-movement of the intersection. Traffic operations and average vehicle delay can be described qualitatively with a range of levels of service (LOS A through

LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions.

The future (2025) with-project traffic operations at the site driveway were evaluated based on the above methodology. A single-lane approach was assumed along the driveway. The resulting vehicular operations are shown in Table 3. Detailed LOS worksheets are provided in Appendix C.

Table 2. Future (2025) With-Project Peak Hour LOS Summary

Intersection	Traffic Control	AM Peak Hour			PM Peak Hour		
		LOS ¹	Delay ²	WM ³	LOS	Delay	WM
SE Kent Kangley Rd/Site Driveway	Stop-Controlled	B	10.3	SB	A	9.5	SB

Note: SB = southbound approach

1. Level of Service (A – F) as defined by the 2016 *Highway Capacity Manual* (HCM)
2. Average delay per vehicle in seconds
3. Worst movement reported for unsignalized intersections. SB = southbound, NB = northbound.

As shown in Table 3, the site driveway is forecast to operate at LOS B and LOS A in the AM and PM peak hours, respectively, and would meet King County level of service standards.

The 95th percentile queues were also reviewed for the site access and are shown to be minimal (less than one vehicle in the AM and PM peak hours). Detailed queuing information is provided Appendix C.

Sight Distance

Stopping and entering sight distance were evaluated at the proposed site driveway. Stopping sight distance is the distance necessary to enable a motorist to stop before reaching a stationary object in its path. In contrast, entering sight distance is the distance necessary for a motorist to enter the traffic stream without causing traffic on the major street to reduce its travel speed. The methods and standards used to measure the available sight distance are defined in the *King County Road Design and Construction Standards (2016)*. With an estimated 55 mph design speed along SE Kent Kangley Road (equal to 10 mph above the posted speed limit as defined on page 1-13 of these *Standards*), the recommended minimum stopping sight distance is 495 feet and the recommended minimum entering sight distance is 610 feet and 530 feet for the left- and right- turning vehicles, respectively.

The sight distance triangles for the driveway were evaluated by in-field measurements and are shown in Appendix D. As shown in the appendix, sight distance at the site driveway in the east and west directions are anticipated to meet the recommended entering and stopping sight distances.



Project Trip Distribution & Assignment

Wildlife Meadow Glamping & RV Park

FIGURE

4



Future (2025) With-Project Peak Hour Traffic Volumes

FIGURE

Wildlife Meadow Glamping & RV Park



5

Findings and Conclusions

This analysis summarizes the potential traffic impacts of the proposed Wildlife Meadow Glamping & RV Park development in the City of Ravensdale. General findings and recommendations include:

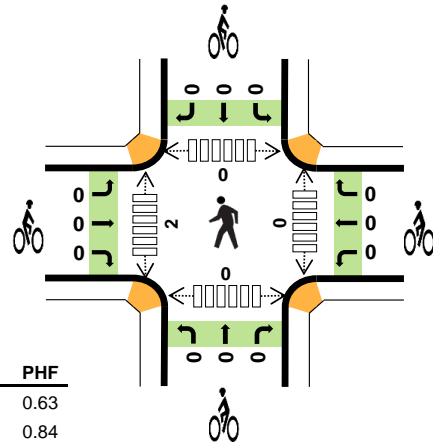
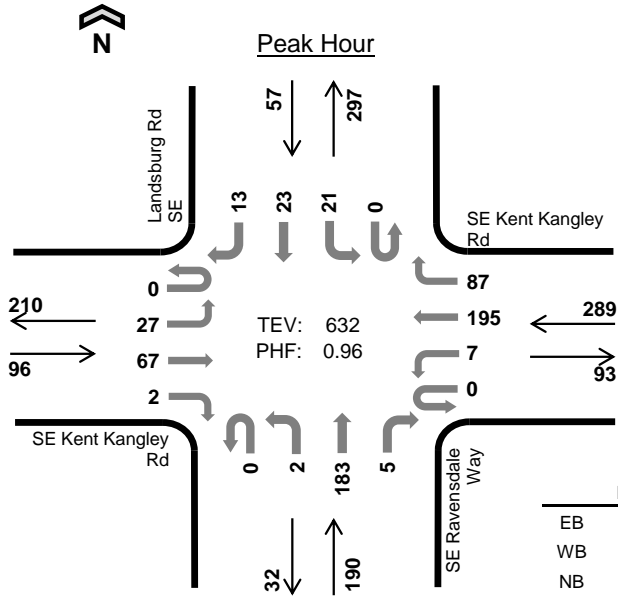
- The proposed project would develop up to 45 tent, glamping, and RV sites. The project site is currently undeveloped.
- The development is estimated to generate approximately 10 new trips during the weekday AM peak hour, and 12 new trips during the weekday PM peak hour.
- One side-street stop-controlled site driveway is proposed along SE Kent Kangley Road. The site access is forecast to operate at LOS B or better during the weekday AM and PM peak hours meeting King County LOS standards.
- Sight distance requirements at the site driveway are satisfied in both directions.

Appendix A: Traffic Counts

SE Ravensdale Way SE Kent Kangley Rd



Date: 03/02/2022
 Count Period: 7:00 AM to 9:00 AM
 Peak Hour: 7:00 AM to 8:00 AM



	HV %:	PHF
EB	13.5%	0.63
WB	5.2%	0.84
NB	5.8%	0.86
SB	8.8%	0.46
TOTAL	7.0%	0.96

Two-Hour Count Summaries

Interval Start	SE Kent Kangley Rd Eastbound				SE Kent Kangley Rd Westbound				SE Ravensdale Way Northbound				Landsburg Rd SE Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	3	10	0	0	1	66	19	0	1	52	1	0	4	5	3	165	0	
7:15 AM	0	4	15	1	0	0	55	20	0	1	54	0	0	0	2	4	156	0	
7:30 AM	0	8	16	1	0	5	41	23	0	0	45	2	0	3	4	1	149	0	
7:45 AM	0	12	26	0	0	1	33	25	0	0	32	2	0	14	12	5	162	632	
8:00 AM	0	6	16	0	0	2	44	7	0	1	36	2	0	8	8	9	139	606	
8:15 AM	0	9	22	0	0	4	40	13	0	2	28	5	0	13	13	5	154	604	
8:30 AM	1	6	17	0	0	14	41	18	0	1	28	0	0	7	16	2	151	606	
8:45 AM	0	5	18	0	0	8	36	20	0	0	28	2	0	11	8	7	143	587	
Count Total	1	53	140	2	0	35	356	145	0	6	303	14	0	60	68	36	1,219	0	
Peak Hour	All	0	27	67	2	0	7	195	87	0	2	183	5	0	21	23	13	632	0
	HV	0	2	10	1	0	1	9	5	0	0	11	0	0	2	2	1	44	0
	HV%	-	7%	15%	50%	-	14%	5%	6%	-	0%	6%	0%	-	10%	9%	8%	7%	0

Note: Two-hour count summary include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	3	7	4	2	16	0	0	0	0	0	0	0	0	0	0
7:15 AM	6	2	1	0	9	0	0	0	0	0	0	0	0	0	0
7:30 AM	2	6	4	0	12	0	0	0	0	0	0	0	0	0	0
7:45 AM	2	0	2	3	7	0	0	0	0	0	0	2	0	0	2
8:00 AM	1	3	4	2	10	0	0	0	0	0	0	0	0	0	0
8:15 AM	6	4	4	2	16	0	0	0	0	0	0	0	0	0	0
8:30 AM	2	7	2	1	12	0	0	0	0	0	0	2	0	0	2
8:45 AM	2	7	1	4	14	0	0	0	0	0	0	2	0	0	2
Count Total	24	36	22	14	96	0	0	0	0	0	0	6	0	0	6
Peak Hour	13	15	11	5	44	0	0	0	0	0	0	2	0	0	2

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	SE Kent Kangley Rd				SE Kent Kangley Rd				SE Ravensdale Way				Landsburg Rd SE				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	1	2	0	0	0	5	2	0	0	4	0	0	2	0	0	16	0
7:15 AM	0	1	5	0	0	0	2	0	0	0	1	0	0	0	0	0	9	0
7:30 AM	0	0	1	1	0	1	2	3	0	0	4	0	0	0	0	0	12	0
7:45 AM	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	1	7	44
8:00 AM	0	0	1	0	0	0	3	0	0	1	2	1	0	1	0	1	10	38
8:15 AM	0	2	4	0	0	1	1	2	0	1	1	2	0	1	1	0	16	45
8:30 AM	0	1	1	0	0	3	3	1	0	0	2	0	0	0	1	0	12	45
8:45 AM	0	0	2	0	0	0	3	4	0	0	1	0	0	2	1	1	14	52
Count Total	0	5	18	1	0	5	19	12	0	2	17	3	0	6	5	3	96	0
Peak Hour	0	2	10	1	0	1	9	5	0	0	11	0	0	2	2	1	44	0

Two-Hour Count Summaries - Bikes														
Interval Start	SE Kent Kangley Rd			SE Kent Kangley Rd			SE Ravensdale Way			Landsburg Rd SE			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



Prepared for: **Transpo Group**
Traffic Count Consultants, Inc.

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WBE/DBE

Intersection: Landsburg Rd SE/SE Ravensdale Rd & SE Kent-Kangley Rd/SE 272nd St
Location: Black Diamond, Washington

Date of Count: Wed 11/20/2019
Checked By: Jess

Time Interval	From North on (SB) Landsburg Rd SE				From South on (NB) SE Ravensdale Rd				From East on (WB) SE Kent-Kangley Rd				From West on (EB) SE 272nd St				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	23	45	13	1	2	11	4	0	2	36	6	3	4	65	0	211
4:30 P	3	22	48	11	1	0	20	4	3	1	41	11	2	7	57	0	222
4:45 P	2	25	56	6	0	0	10	6	1	2	40	11	0	6	68	0	230
5:00 P	3	29	54	9	0	1	11	4	1	3	36	6	0	4	51	1	209
5:15 P	2	30	50	12	0	0	8	7	0	5	43	7	0	10	60	3	235
5:30 P	1	24	49	6	0	0	10	5	1	4	33	3	1	7	61	3	205
5:45 P	2	23	47	4	0	0	9	0	2	4	39	6	0	5	55	0	192
6:00 P	0	13	43	6	1	0	8	0	0	2	21	6	1	10	61	0	170
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Survey	15	189	392	67	3	3	87	30	8	23	289	56	7	53	478	7	1674
Peak Hour: 4:15 PM to 5:15 PM																	
Total	10	106	208	38	1	1	49	21	5	11	160	35	2	27	236	4	896
Approach	352				71				206				267				896
%HV	2.8%				1.4%				2.4%				0.7%				2.0%
PHF	0.96				0.74				0.94				0.90				0.95

Landsburg Rd SE
 463 (Total)
 352 (SB), 111 (NB)
 38 (Ped), 208 (Bike), 106 (Total)

SE 272nd St
 199 (SB), 267 (NB), 27 (Ped), 236 (Bike), 4 (Total)

SE Kent-Kangley Rd
 35 (SB), 160 (NB), 11 (Ped), 206 (Bike), 569 (Total)

SE Ravensdale Rd
 223 (SB), 71 (NB), 294 (Total)

4:15 PM to 5:15 PM

PHF %HV

EB	0.90	0.7%	
WB	0.94	2.4%	
In: 896	NB	0.74	1.4%
Out: 896	SB	0.96	2.8%
T Int.	0.95	2.0%	

Conditions:

Bicycles From:

	N	S	E	W
INT 01				
INT 02				
INT 03				
INT 04				
INT 05				
INT 06	NO BIKES			
INT 07				
INT 08				
INT 09				
INT 10				
INT 11				
INT 12				
Total	0	0	0	0

PEDs Across:

	N	S	E	W
INT 01				
INT 02				
INT 03				
INT 04				
INT 05				
INT 06				
INT 07				
INT 08				1
INT 09				
INT 10				
INT 11				
INT 12				
Total	0	0	0	1

Special Notes:



Prepared for: **The Transpo Group**
Traffic Count Consultants, Inc.

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WBE/DBE

Intersection: Landsburg Rd SE/SE Ravensdale Way & SE Kent-Kangley Rd/SE 272nd St

Date of Count: Tue 11/16/2021

Location: Black Diamond, Washington

Checked By: Jen

Time Interval	From North on (SB) Landsburg Rd SE				From South on (NB) SE Ravensdale Way				From East on (WB) SE Kent-Kangley Rd				From West on (EB) SE 272nd St				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	6	53	2	1	1	42	8	3	33	43	11	1	4	15	7	225
4:30 P	0	9	53	0	2	6	38	7	2	30	46	14	0	1	8	3	215
4:45 P	0	6	74	3	1	1	35	5	1	24	52	13	0	0	7	5	225
5:00 P	0	4	59	8	1	1	31	9	0	38	54	7	0	2	9	0	222
5:15 P	0	5	53	4	0	3	37	11	1	20	48	9	0	2	2	5	199
5:30 P	0	4	71	0	0	4	38	7	1	24	51	8	1	2	12	8	229
5:45 P	0	5	52	2	0	5	34	4	0	15	52	6	0	2	11	6	194
6:00 P	0	4	39	1	0	2	26	11	1	26	49	11	0	3	12	2	186
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Survey	0	43	454	20	5	23	281	62	9	210	395	79	2	16	76	36	1695
--------------	---	----	-----	----	---	----	-----	----	---	-----	-----	----	---	----	----	----	------

Peak Hour: 4:00 PM to 5:00 PM

Total	0	25	239	13	5	9	146	29	6	125	195	45	1	7	39	15	887
Approach	277				184				365				61				887
%HV	n/a				2.7%				1.6%				1.6%				1.4%
PHF	0.83				0.90				0.92				0.59				0.99

Landsburg Rd SE

475

277 198

SE 272nd St 13 239 25

0 Bike
0 Ped

SE Kent-Kangley Rd

45 365

195 458

125

0 Bike
0 Ped 93

4:00 PM to 5:00 PM

9 146 29

0 Ped
0 Bike

379 184

SE Ravensdale Way

563

Bicycles From: N S E W

INT 01				0
INT 02				0
INT 03				0
INT 04				0
INT 05				0
INT 06				0
INT 07				0
INT 08				0
INT 09				0
INT 10				0
INT 11				0
INT 12				0
	0	0	0	0

916 1.0 PHF Peak Hour Volume

		PHF %HV	
Check	EB	0.59	1.6%
	WB	0.92	1.6%
In: 887	NB	0.90	2.7%
Out: 887	SB	0.83	n/a
	T Int.	0.99	1.4%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Appendix B: LOS Definitions

Highway Capacity Manual 2010/6th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* and 6th Edition (Transportation Research Board, 2010 and 2016, respectively).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F ¹	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F ¹	>50

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix C: LOS Worksheets

HCM 6th TWSC
 1: SE Kent Kangley Rd & Site Access

Ravensdale RV Park & Campground
 Future (2025) With-Project AM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	4	100	315	0	1	5
Future Vol, veh/h	4	100	315	0	1	5
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	96	96	96	96	96	96
Heavy Vehicles, %	13	13	5	5	2	2
Mvmt Flow	4	104	328	0	1	5

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	328	0	-	0	440 328
Stage 1	-	-	-	-	328 -
Stage 2	-	-	-	-	112 -
Critical Hdwy	4.23	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.317	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1172	-	-	-	574 713
Stage 1	-	-	-	-	730 -
Stage 2	-	-	-	-	913 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1172	-	-	-	572 713
Mov Cap-2 Maneuver	-	-	-	-	572 -
Stage 1	-	-	-	-	727 -
Stage 2	-	-	-	-	913 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1172	-	-	-	685
HCM Lane V/C Ratio	0.004	-	-	-	0.009
HCM Control Delay (s)	8.1	0	-	-	10.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 6th TWSC
 1: SE Kent Kangley Rd & Site Access

Ravensdale RV Park & Campground
 Future (2025) With-Project PM Peak Hour

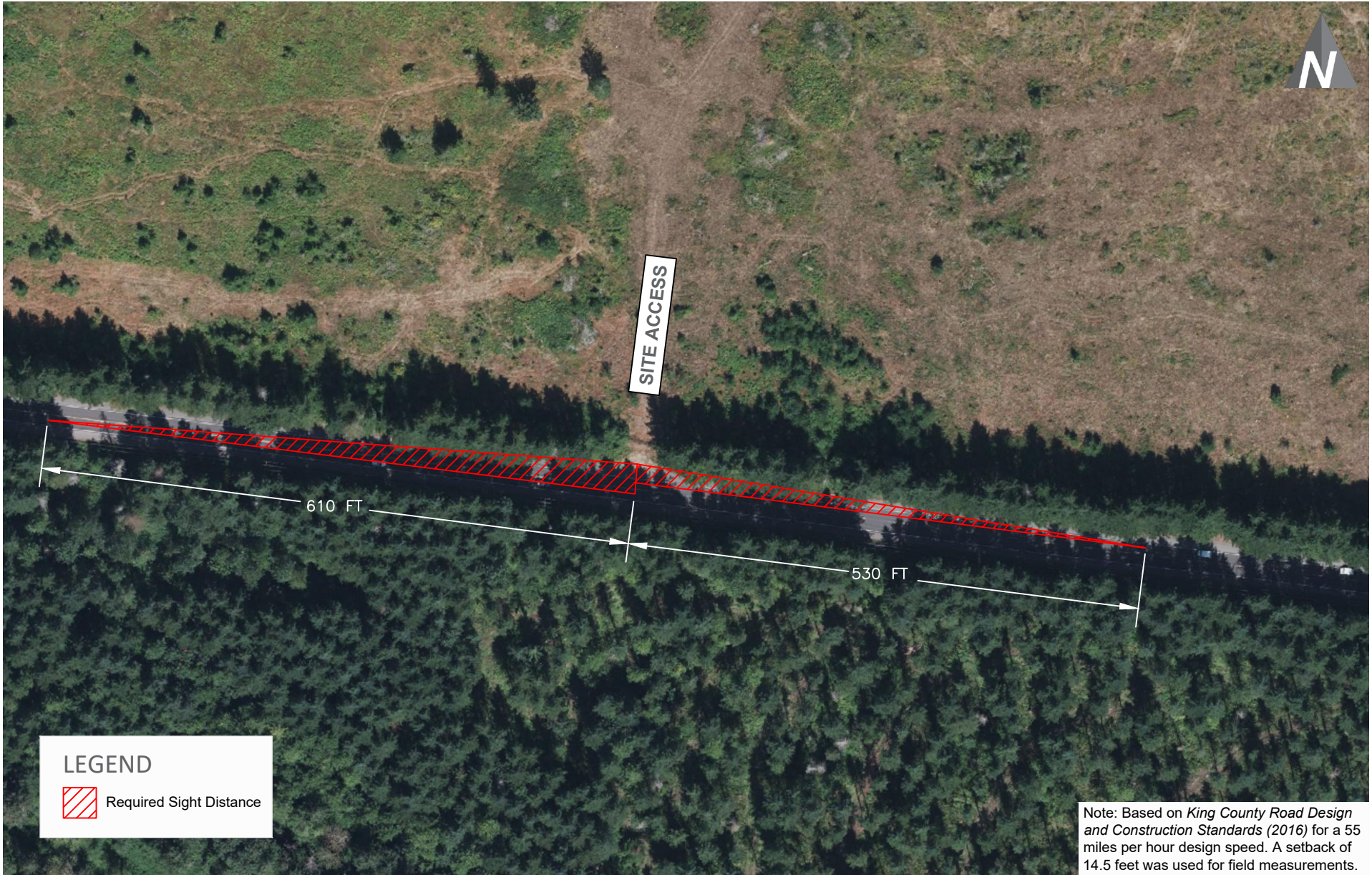
Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	7	395	225	1	0	4
Future Vol, veh/h	7	395	225	1	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	7	416	237	1	0	4

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	238	0	0	668	238
Stage 1	-	-	-	238	-
Stage 2	-	-	-	430	-
Critical Hdwy	4.11	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.209	-	-	3.518	3.318
Pot Cap-1 Maneuver	1335	-	-	423	801
Stage 1	-	-	-	802	-
Stage 2	-	-	-	656	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	1335	-	-	420	801
Mov Cap-2 Maneuver	-	-	-	420	-
Stage 1	-	-	-	796	-
Stage 2	-	-	-	656	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.5
HCM LOS			A

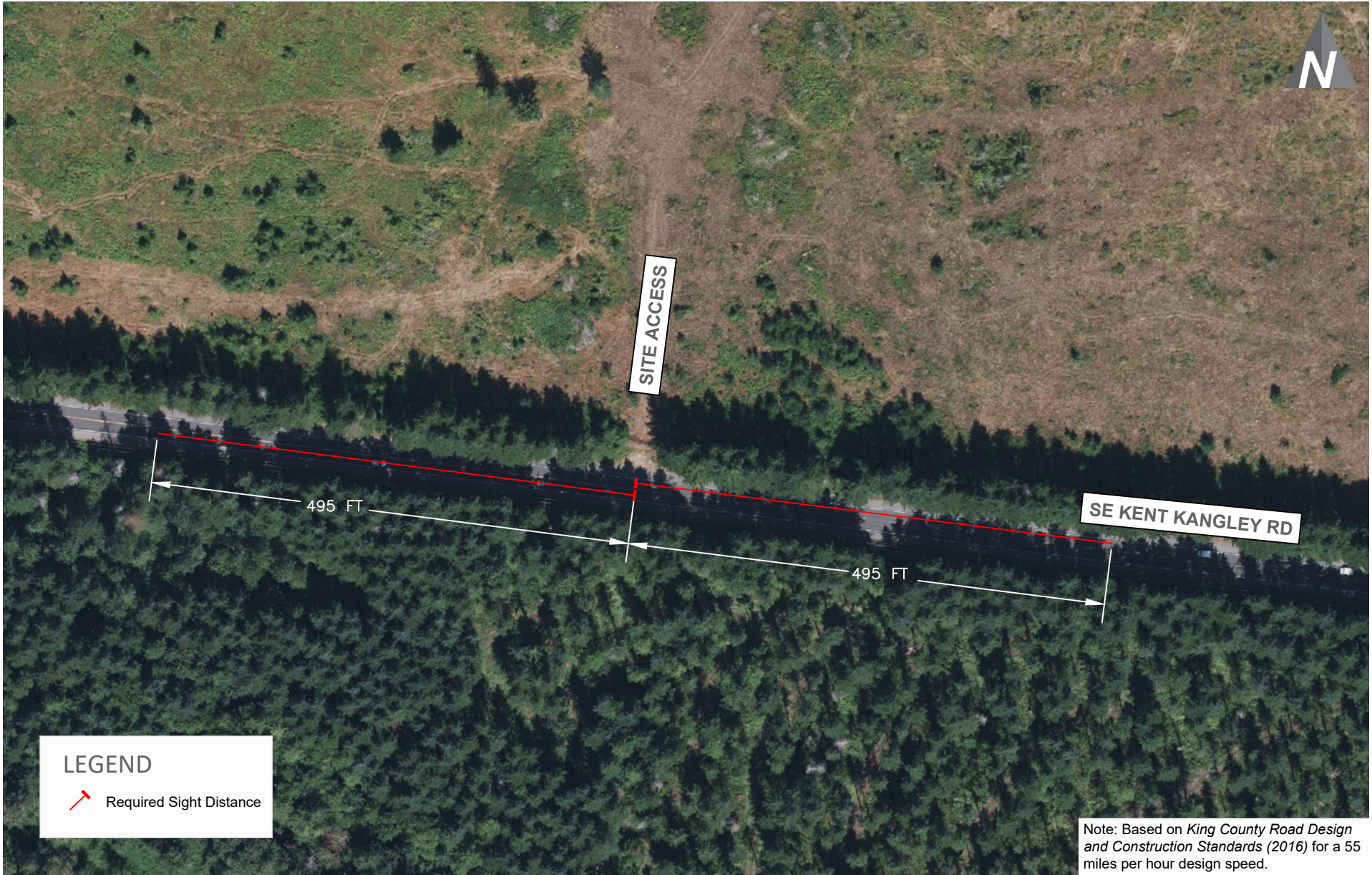
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1335	-	-	-	801
HCM Lane V/C Ratio	0.006	-	-	-	0.005
HCM Control Delay (s)	7.7	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Appendix D: Sight Distance Triangles



Entering Sight Distance

Wildlife Meadow Glamping & RV Park



Stopping Sight Distance

Wildlife Meadow Glamping & RV Park