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Memorandum

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Subject	Transportation Analysis Memorandum Revised Draft
Project Name	Kittitas County Transfer Station Relocation Project
Attention	Patti Johnson, Director, Kittitas County Solid Waste Division
From	Christopher Pylant/Jacobs Engineering Group Inc. Sanjeev Tandle/Jacobs Engineering Group Inc.
Date	November 1, 2019

1. Introduction

1.1 Purpose

Jacobs Engineering has prepared a Transportation Analysis to evaluate planned improvements associated with the relocation of the Kittitas County Transfer Station and the Kittitas County Department of Public Works' Maintenance Facility. The purpose of the study is to document existing 2019 traffic conditions and evaluate future 2022 traffic conditions with and without the proposed facility.

1.2 Project Description

Kittitas County Solid Waste Department proposes to relocate the existing Ellensburg Transfer Station located at 1001 Industrial Way, Ellensburg and the existing Lower County Public Works Maintenance Facility located at 505 W 14th Street, Ellensburg, to a parcel along the east side of US 97 just south of Old Highway 10 in the City of Ellensburg. The approximately 50.6-acre site is zoned Light Industrial.

The relocated transfer station would serve both county residents and commercial haulers. The facility will handle solid waste, recyclables, household hazardous waste (also referred to as moderate risk waste - MRW), and yard waste.

The approximate 11.03-acre maintenance facility area will house County road maintenance equipment and personnel. Routine equipment maintenance will be performed at the location. There are future plans for a fueling facility, but there will be no construction of an underground storage tank at this time.

The conceptual design for the entire property includes approximately 23.04 acres of impervious surface, approximately 5,000 linear feet of roadway, approximately 51,000 sq ft of storm water ponds, and 11 stand-alone buildings. The site plan is shown on Figure 1.

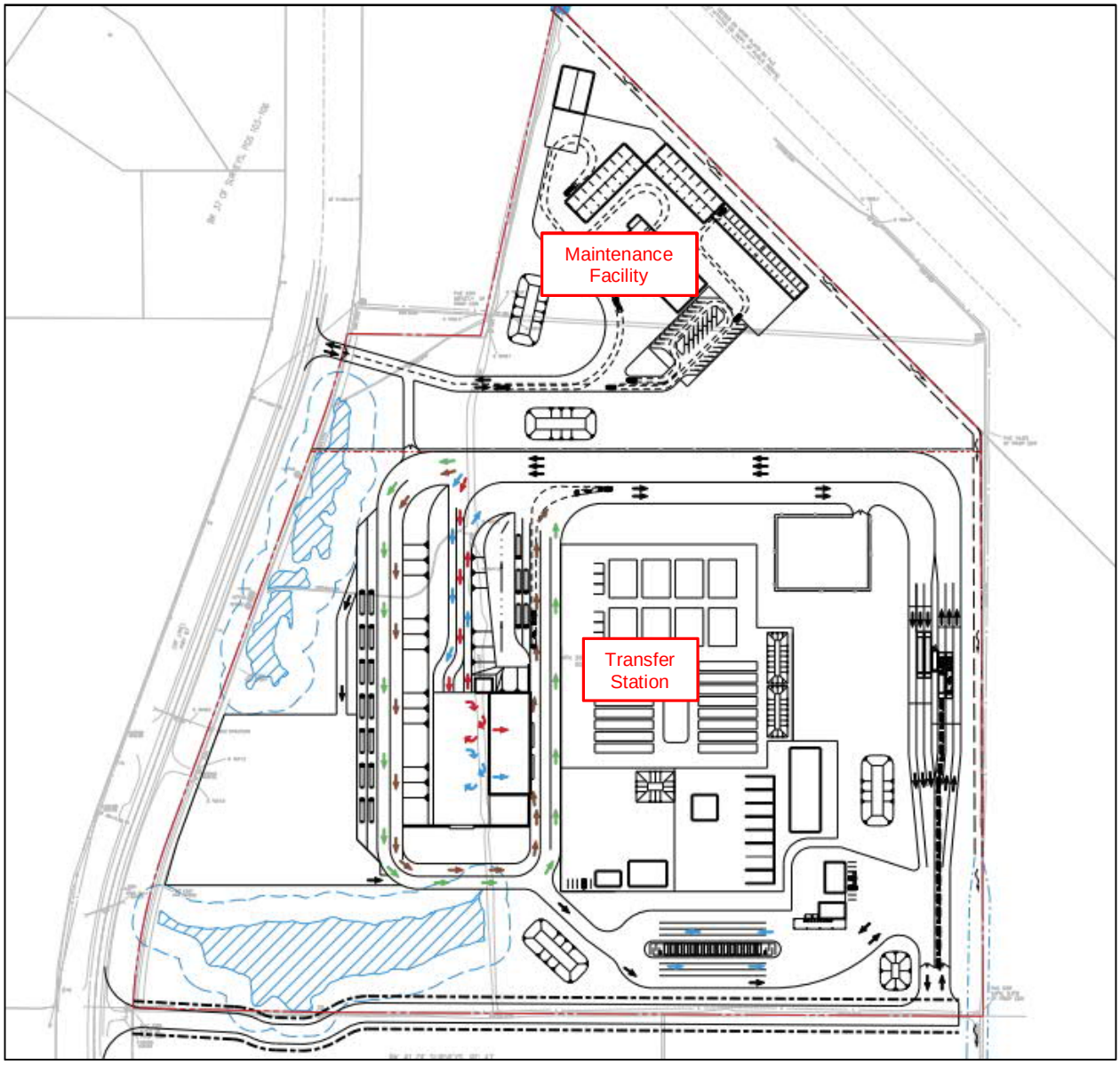


Figure 1. Site Plan

2. Study Area

The study area is comprised of the following intersections:

- US 97 at Project Access
- US 97 at Ellensburg Cement Products (ECP) Driveway/Future Comprehensive Plan Roadway
- US 97/W University Way/N Dolarway Rd
- Reecer Creek Road at W University Way
- N Railroad Avenue at W 5th Avenue

The intersections and study area limits are shown in Figure 2.

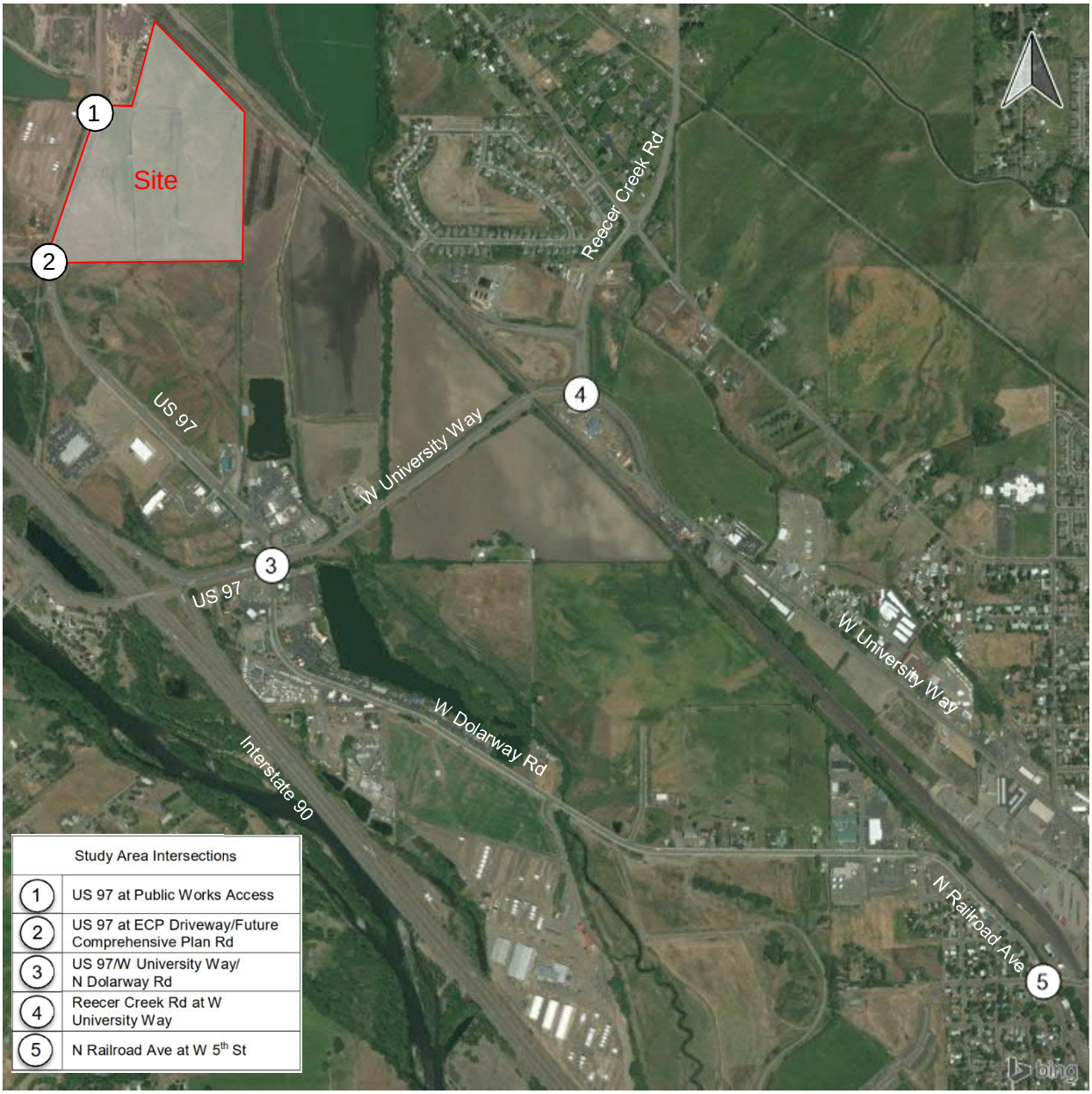


Figure 2. Project Study Area

3. Analysis Methodology

3.1 Traffic Analysis Methods

This study includes intersection analysis of the weekday p.m. peak hours since these hours generally have the highest volumes at the study intersections. The queueing analysis for the transfer station considers the Saturday peak hour, when the highest trip generation is expected to occur at the site. This memorandum documents 2019 existing conditions and 2022 with and without project conditions.

The Synchro software package was used to analyze stop-controlled study intersections. Synchro utilizes the HCM 6th edition analysis method. The Sidra 8 traffic analysis tool was used to analyze the roundabout study intersection.

Traffic volumes were collected at existing study area intersections for existing conditions for 2-hour periods in April and May 2019. Existing heavy vehicle percentages were obtained from the p.m. peak hour counts. These existing heavy vehicle percentages were assumed for the future year analysis.

3.2 Measures of Effectiveness

The Synchro and Sidra models were used to evaluate traffic conditions and the results were quantified using the following measures of effectiveness:

- Level of service (LOS)
- Worst-movement delay (stop-controlled intersections)
- Average delay (roundabout intersection)
- Volume/capacity (V/C) ratio (roundabout intersection)

3.3 Level of Service

LOS is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades A through F with A representing optimum conditions and F representing breakdown or over-capacity flows. The LOS for a Two-Way STOP Control intersection is defined by the worst movement delay. The complete methodology is established in the Highway Capacity Manual (HCM) published by the Transportation Research Board (2010). The LOS for roundabouts is based on the definition of LOS for signalized intersections, per WSDOT policies (2018). Table 1 presents the delay thresholds for each LOS grade at unsignalized and signalized intersections.

LOS calculations were performed for stop-controlled intersections using the Synchro 10 software package in accordance with the HCM methodology. LOS, queue length, and V/C calculations were performed for roundabout intersections using the Sidra 8 software package in accordance with WSDOT policies (2018).

Table 1. Level of Service Definition for Intersections

LOS	Brief Description	Unsignalized Intersections (average delay/vehicle in seconds, worst movement)	Roundabouts(average delay/vehicle in seconds)
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 15	10 to 20
C	Stable conditions with significant affect from other vehicles.	15 to 25	20 to 35
D	High density traffic conditions still with stable flow.	25 to 35	35 to 55
E	At or near capacity flows.	35 to 50	55 to 80
F	Over capacity conditions.	> 50	> 80

Source: Transportation Research Board, 2010

4. Existing 2019 Conditions

4.1 Data Collection

Existing traffic volumes were collected on Wednesday, April 10 and Tuesday, June 4, 2019 at existing study area intersections. The data was collected between 4:00 and 6:00 p.m. as required by the City of Ellensburg. Additionally, a site visit was also conducted during the peak period to observe general travel

patterns and queue lengths at the study intersections. The site visit showed the roundabout at US 97/ N Dolarway Rd/ W University Way operating at free flow conditions. There were queues observed at the southbound left turn lane of the Reecer Creek Road/University Way intersection and the westbound shared through/left turn lane of the N Railroad Avenue/W 5th Avenue intersection.

Though the traffic data was collected for two hours during the p.m. peak period, the actual peak hour within the peak period is the four consecutive 15-minute periods with the highest total volume when all movements are added together. Thus, the evening peak hour at one intersection may be 4:30 p.m. to 5:30 p.m. if those four consecutive 15-minute periods have the highest combined volumes. Existing p.m. peak hour counts, rounded to the nearest five vehicles, are shown in Figure 3 and raw counts are provided in Attachment 1.

At the request of City of Ellensburg staff, traffic volumes for the intersection of N Railroad Avenue/W 5th Avenue were obtained from the City of Ellensburg Comprehensive Plan (2019). A two percent per year growth rate was then applied to these volumes to represent growth from 2015 to 2019.

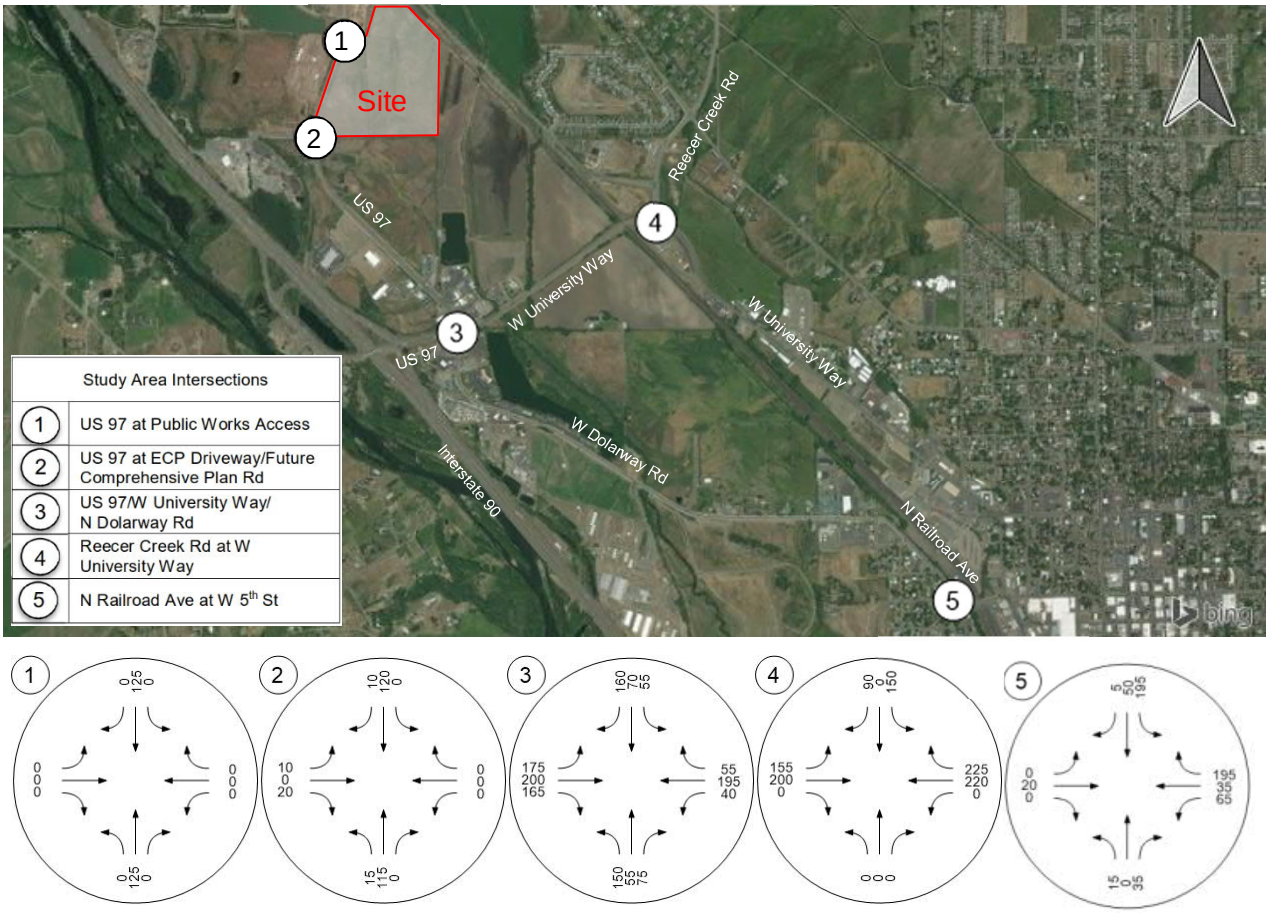


Figure 3. Existing 2019 p.m. Peak Hour Turning Movement Volumes

5. Project Trips

5.1 Trip Generation

5.1.1 Transfer Station

The relocated transfer station would serve both Kittitas County residents and commercial haulers. The facility will handle solid waste, recyclables, household hazardous waste (also referred to as moderate risk waste - MRW), and yard waste.

The trip generation for vehicles accessing the facility was estimated using recent and historical data from the existing Ellensburg Transfer Station. Approximately 808 daily weekday trips are expected to be generated by the proposed facility. Though the facility is planned to be closed daily at 4 p.m., it is estimated that the facility would generate 88 new trips per hour 3-4 p.m (see Table 2). Of these 88 trips, 6 will be truck trips per the *Kittitas County Transfer Station Basis of Design Report*, CH2M, December 2016.

Table 2. Transfer Station Trip Generation

	Weekday p.m. Peak Hour (3-4 p.m.)		
	Inbound	Outbound	Total
Recycling	20	20	40
Scales (MSW, MRW, yard waste)	24	24	48
Transfer Station Total	**44**	**44**	**88**

5.1.2 DPW Maintenance facility

Project trip generation for the maintenance facility was based upon rates obtained from the Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017. The land use of the proposed maintenance facility was assumed to be office for the purposes of calculating trip generation. This is a conservative assumption since office land uses generate more trips per square foot than a maintenance facility with an office component. The number of trips forecast to be generated by the proposed project are determined by multiplying the trip generation rates by the land use quantity. As shown in Table 4, the proposed development is projected to generate approximately 229 daily vehicle trips, 27 of these will occur during the evening peak hour.

Table 3. Public Works Maintenance Facility Trip Generation

	Quantity	Units	Weekday p.m. Peak Hour		
			Inbound	Outbound	Total
Trip Generation Rate	1	TSF	0.18	0.97	1.15
Trips Generated	23.520	TSF	4	23	27

TSF = Thousand Square Feet

5.2 Trip Distribution

Figure 4 shows the project trip distribution patterns. The forecast project trip distributions are based on review of existing traffic volume data, surrounding land uses, and the local and regional roadway facilities in the project vicinity.

Figure 4. Trip Distribution

5.3 Trip Assignment

Based on the identified trip generation and distributions, Figure 5 shows the project-generated weekday trips for the evening peak hour at the study intersections.

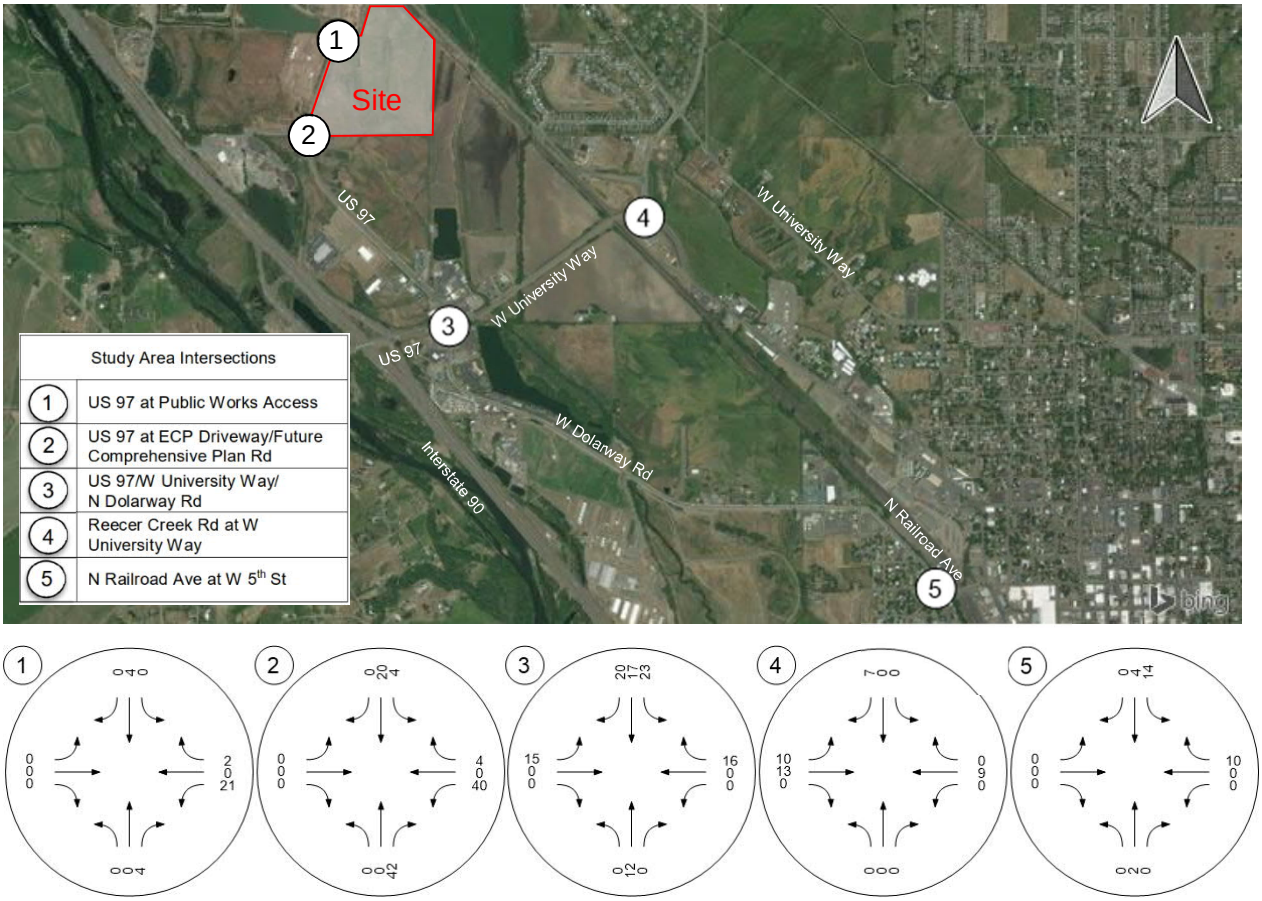


Figure 5. Project p.m. Peak Hour Intersection Turning Movement Volumes

6. 2022 Conditions

6.1 2022 Without Project Traffic Volumes

The 2022 Without Project traffic volumes were developed for this study to provide a baseline for assessing future potential alternatives. City of Ellensburg and Kittitas County staff provided lists of other planned developments in the study area. Trips generated by these projects were added to Year 2022 conditions and are shown in Table 4. To reflect ambient growth in the region and to account for unknown planned developments in the area, 1 percent per year growth rate was also applied to the existing turning movement counts.

The peak hour factors and lane configurations at the study intersections under 2022 conditions were kept the same as existing conditions. The 2022 Without Project p.m. peak hour intersection traffic volumes are shown in Figure 6. No other background improvements were assumed as for 2022 conditions.

Table 4. Other Development Trip Generation

	Weekday p.m. Peak Hour		
	Inbound	Outbound	Total
Loves Tire Center	4	6	10
Pilot Travel Center	23	19	42
Black Horse (Single Family Residential)	232	136	368
Palomino (Single Family Residential)	80	47	127
Total	**339**	**208**	**547**

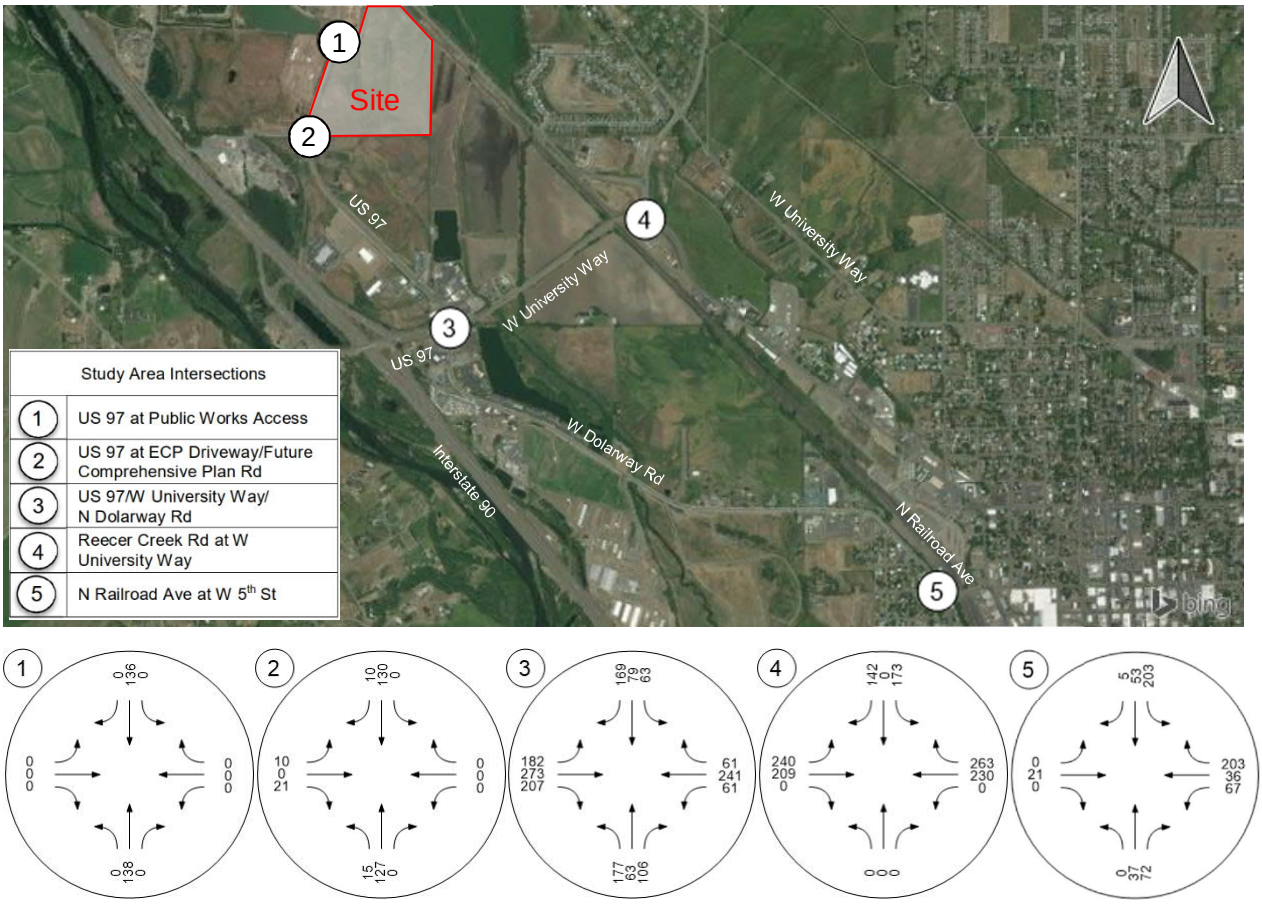
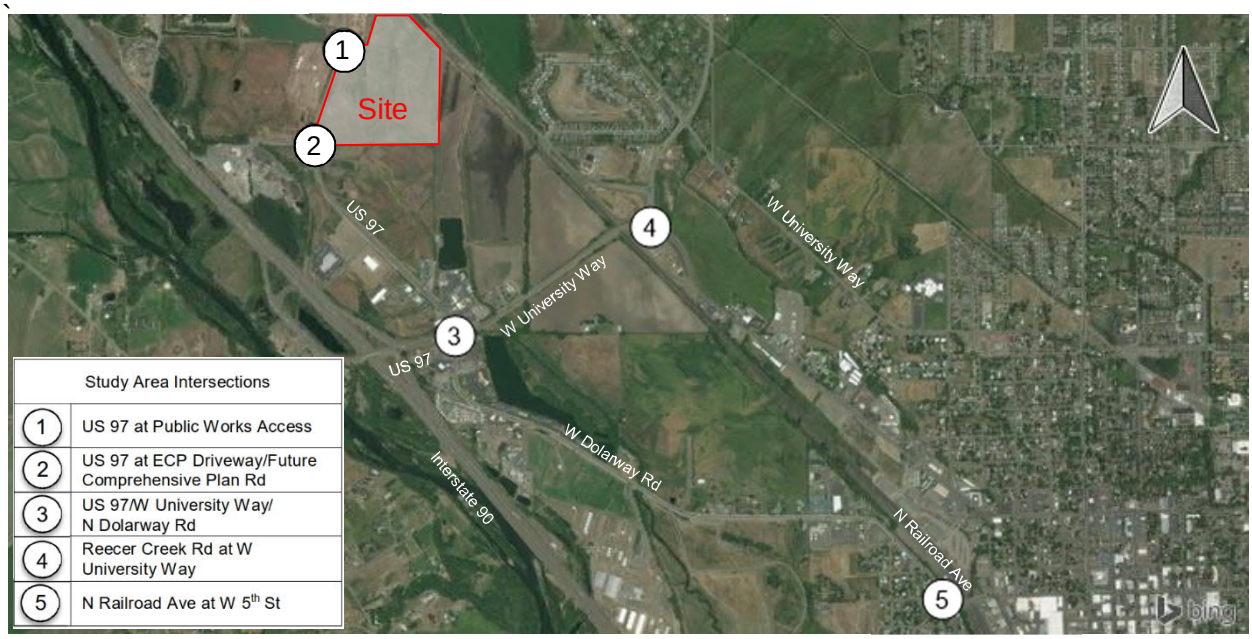


Figure 6. 2022 Without Project p.m. Peak Hour Intersection Turning Movement Volumes

6.2 2022 With Project Traffic Forecasts

For the 2022 With Project scenario, project volumes are added to the 2022 Without Project volumes. The 2022 Without Project p.m. peak hour intersection traffic volumes are shown in Figure 7.



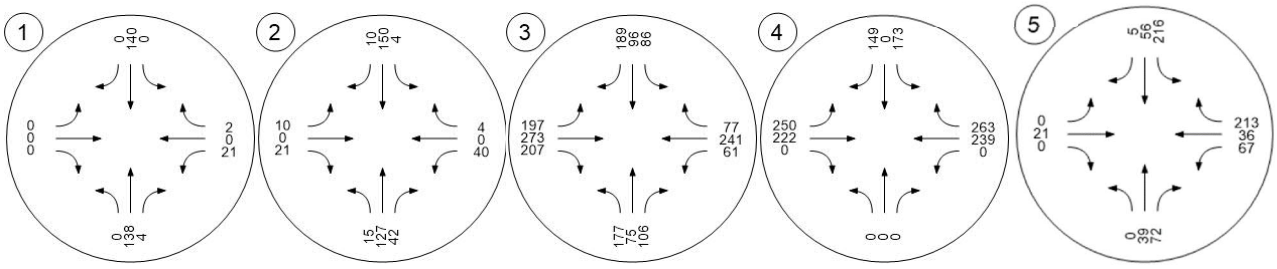


Figure 7. 2022 With Project p.m. Peak Hour Intersection Turning Movement Volumes

7. Traffic Analysis Results

7.1 Level of Service Summary

Table 5 provides LOS and delay information for the p.m. peak hour.

As shown in Table 5, the US 97/ N Dolarway Rd/ W University Way intersection currently operates at LOS A for existing p.m. peak hour conditions and is expected to continue to operate at LOS A in year 2022 conditions with and without the project. The US 97 at ECP Driveway/ Future Comprehensive Plan Road intersection currently operates and is expected to continue operating at LOS B in all future conditions. The intersection of US 97 and the proposed public works access is projected to operate at LOS B. The N Railroad Avenue at W 5th Street intersection currently operates at LOS C and is expected to continue operating at LOS C in all future conditions.

The Reecer Creek Road at W University Way intersection currently operates at LOS E due to the delay at the southbound left turn movement. The LOS is projected to operate at LOS F in year 2022 without and with project conditions.

Table 5. Existing and 2022 p.m. Peak Hour Level of Service and Delay

Int. #	Intersection	Traffic Control	2019 Existing		2022 Without Project		2022 With Project	
			LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
1	US 97 at Public Works Access	One-Way Stop	n/a	n/a	n/a	n/a	B	10.4
2	US 97 at ECP Driveway/Future Comprehensive Plan Rd	One-Way Stop (Existing)/ Two Way Stop	B	10.0	B	10.2	B	12.1
3	US 97/N Dolarway Rd/ W University Way	Roundabout	A	6.9	A	7.4	A	7.7
4	Reecer Creek Rd at W University Way	One-Way Stop	E	38.3	F	148.0	F	180.3
5	N Railroad Ave at W 5th St	Two-Way Stop	C	16.0	C	16.5	C	17.3

The City of Ellensburg 2019-2024 Transportation Improvement Plan includes the installation of signals at both the Reecer Creek Road at W University Way and N Railroad Avenue at W 5th Street intersections. When signalized, both intersections are projected to operate at LOS B or better in year 2022 conditions.

Synchro and Sidra output sheets are provided in Attachment 2.

7.2 Queue Length Summary

p.m. Peak Hours

Table 6 summarizes the 95th percentile queueing for the US 97/ N Dolarway Rd/ W University Way intersection during the p.m. peak hour.

Table 6. Existing and Future p.m. Peak 95th Percentile Queue Comparison (in feet)

Int. #	Int. Name	Control Type	Approach Direction	Lane Group	2019 Existing	2022 Without Project	2022 With Project
2	US 97/ N Dolarway Rd/ W University Way	Roundabout	SB	LT-TH-RT	25	25	50
				RT	0	0	0
			NB	LT-TH-RT	50	75	75
			EB	LT	50	50	50
				TH-RT	75	100	100
			WB	LT-TH-RT	50	50	50
				RT	0	0	0

As shown in Table 6, during the p.m. peak hour all southbound, eastbound, and westbound approaches of the US 97/ N Dolarway Rd/ W University Way intersection do not experience significant queueing with or without the project. The highest queue under is projected to be 100 feet, or approximately 4 vehicles.

7.3 V/C Ratio

Table 7 provides volume to capacity (V/C) ratios for the US 97/ N Dolarway Rd/ W University Way intersection during the p.m. peak hour.

Table 7. Existing and 2022 p.m. Peak Hour V/C Ratios

Int. #	Intersection	Traffic Control	2019 Existing	2022 Without Project	2022 With Project
			V/C	V/C	V/C
2	US 97/N Dolarway Rd/ W University Way	Roundabout	0.37	0.50	0.53

As shown in Table 7, during the p.m. peak hour the US 97/ N Dolarway Rd/ W University Way intersection is projected to have an acceptable V/C ratio under all project scenarios.

8. Site Access Queueing Analysis Results

8.1 Assumptions

The trip generation, time spent at scales, and vehicle classifications were obtained from the Kittitas County Transfer Station Basis of Design Report prepared by CH2M, dated December 2016. Trip distribution was developed by reviewing existing traffic and land use patterns. The study year for this analysis was 2046, which was based on the design life of the proposed facility. Trip generation for 2046 was estimated by applying a 31 percent growth rate (based on State of Washington Office of Financial Management population projections) to peak existing Saturday peak hour trip generation. it should be noted that the analysis was conducted for the transfer station access to the future comprehensive plan roadway. The second ingress lane of this driveway was not included in the queueing analysis as it will mainly be used by empty trucks that will not queue at the weigh station. Table 8 provides the other assumptions made for the queueing analysis.

Table 8. Queueing Analysis Assumptions

Simulation Parameters			
	Analysis period	Saturday, 10:00 a.m. – 11:00 a.m.	
	Simulation runs	10	
Vehicle Input	**Destination**	**Vehicles**	
	weigh station loop	78	
	recycle loop	78	
Weigh Station Transaction Time		**sec**	
		60 - 90	
Vehicle Speed	**Vehicle speed:**	**mph**	
	Future Comprehensive Plan Road	40	
	within Transfer Station area	5 - 10	
	while making right turn	7 - 10	
	while making left turn	10 - 12	
Vehicle Classifications	**Destination**	**Type**	**Percent**
	Weigh station	Commercial Vehicle	8
		Pickup Truck	46
		Pickup Truck w/ Trailer	46
	Recycle loop	Pickup Truck	50
		Pickup Truck w/ Trailer	50

As shown in Table 9, the 95-percentile queue length behind the weigh station is projected to be 140 feet. This is the length that is not expected to be exceeded more than 5% of the time. Vehicles are expected to wait up to 381 seconds to move past the weigh station. Vehicles accessing the recycling will have little to

no delay. Based on the analysis, the 95-percentile queue length at the weigh station is contained within the site and will not result in spillback onto the public right-of-way.

Table 9. Queuing Analysis Results

Location	Measure	Result
At Weigh Station - Inbound	95th Percentile Queue Length	140 ft
From upstream of Transfer Station Entrance to just past Weigh Station	Average Vehicle Delay (including 60+ sec transaction time)	381 sec/veh
From upstream of Transfer Station Entrance to just past entrance to Recycle Loop	Average Vehicle Delay	2 sec/veh

9. Traffic Impact Fees

The City of Ellensburg assesses traffic impact fees based on the number of trips expected to occur during the peak hour. In this case, “Peak hour” is defined as the consecutive 60-minute period during the 4:00 p.m. and 6:00 p.m. peak period during which the highest volume occurs.

Because the proposed transfer station is planned to close at 4:00 p.m., the actual number of trips generated by the project after this time will be minimal. Only two trips associated with transfer station employees will occur after 4:00 p.m.

The base impact fee for developments is $1,817 per p.m. peak hour trip and the City allows for a 50% reduction in fees for industrial zones. Therefore, the calculated traffic impact fee for the transfer station is $1,817 ($1,817/peak hour trip x 2 peak hour trips x 50% = $1,817).

The maintenance facility is projected to generate 27 trips during the PM peak hour. The calculated traffic impact fee for the maintenance facility station is $49,059 ($1,817/peak hour trip x 27 peak hour trips = $49,059).

The total number of trips generated by the development during the PM peak hour is 29 trips. The calculated traffic impact fee for the entire project is $50,876.

10. References

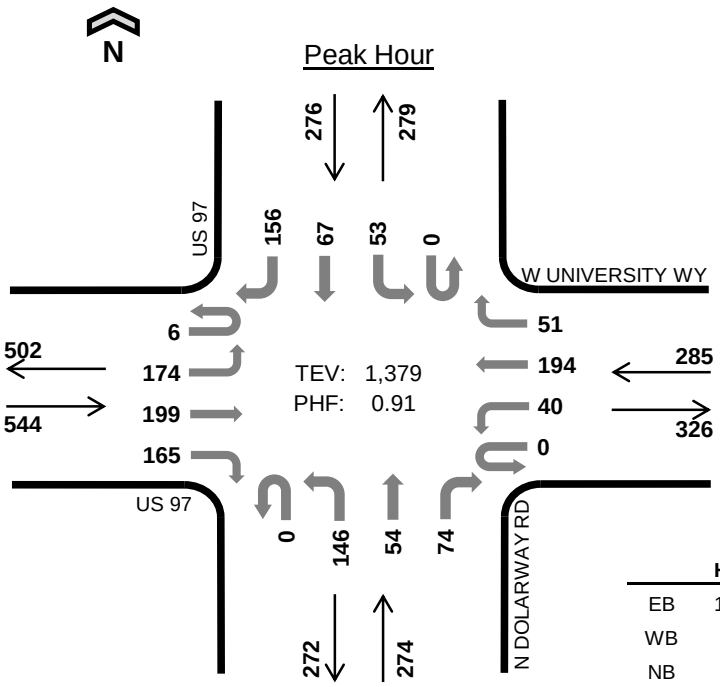
Transportation Research Board. 2010. *Highway Capacity Manual (HCM)*.

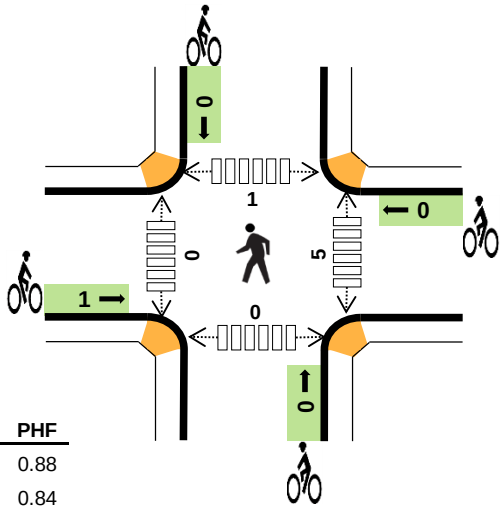
Washington State Department of Transportation. April 2018. *WSDOT Sidra Policy Settings*. Retrieved from http://www.wsdot.wa.gov/NR/rdonlyres/0012E6B9-DC52-4B28-AE9C-5E4EACC98C0B/0/Sidrapolicy.pdf

Attachment 1
Traffic Volumes

W UNIVERSITY WY
US 97

Date: Wed, Apr 10, 2019
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM





	HV %:	PHF
EB	19.7%	0.88
WB	2.8%	0.84
NB	6.9%	0.84
SB	21.4%	0.85
TOTAL	14.0%	0.91

Two-Hour Count Summaries

Interval Start	US 97 Eastbound				W UNIVERSITY WY Westbound				N DOLARWAY RD Northbound				US 97 Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	35	62	43	0	13	44	13	0	37	10	12	0	12	18	34	333	0
4:15 PM	**1**	**52**	**60**	**42**	**0**	**7**	**42**	**8**	**0**	**34**	**15**	**15**	**0**	**8**	**11**	**46**	**341**	0
4:30 PM	**2**	**43**	**46**	**49**	**0**	**12**	**56**	**17**	**0**	**48**	**11**	**23**	**0**	**11**	**19**	**40**	**377**	0
4:45 PM	**3**	**33**	**47**	**35**	**0**	**7**	**41**	**17**	**0**	**23**	**11**	**20**	**0**	**14**	**12**	**34**	**297**	1,348
5:00 PM	**0**	**46**	**46**	**39**	**0**	**14**	**55**	**9**	**0**	**41**	**17**	**16**	**0**	**20**	**25**	**36**	**364**	**1,379**
5:15 PM	0	24	46	29	1	16	61	5	0	35	14	23	0	13	15	35	317	1,355
5:30 PM	0	42	71	35	1	5	43	17	0	35	7	23	0	13	19	25	336	1,314
5:45 PM	0	27	68	31	0	15	40	16	0	28	11	12	0	12	14	40	314	1,331
Count Total	6	302	446	303	2	89	382	102	0	281	96	144	0	103	133	290	2,679	0
Peak Hour	**6**	**174**	**199**	**165**	**0**	**40**	**194**	**51**	**0**	**146**	**54**	**74**	**0**	**53**	**67**	**156**	**1,379**	**0**

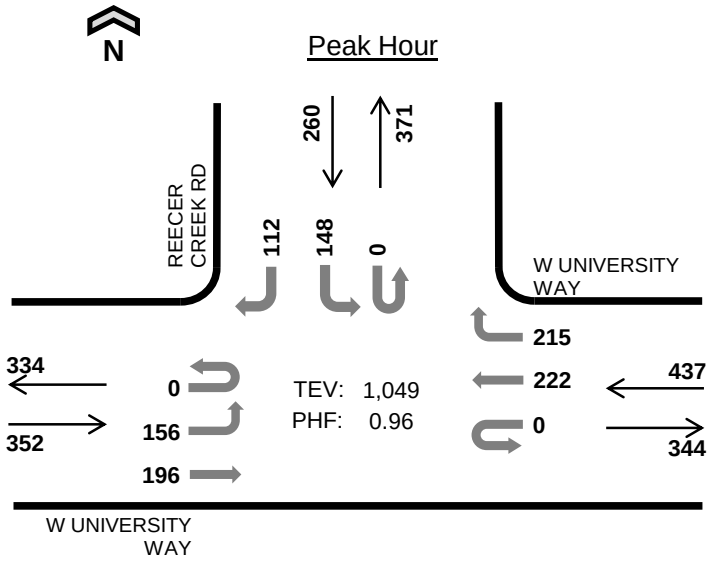
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

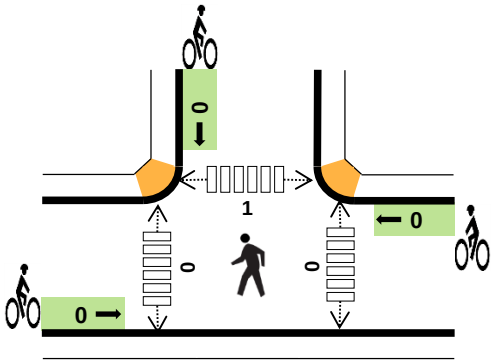
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	29	2	4	7	*42*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	**35**	**2**	**4**	**20**	***61***	**1**	**0**	**0**	**0**	***1***	**2**	**0**	**1**	**0**	*3*
4:30 PM	**20**	**1**	**8**	**8**	***37***	**0**	**0**	**0**	**0**	***0***	**2**	**0**	**0**	**0**	*2*
4:45 PM	**22**	**2**	**3**	**20**	***47***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**30**	**3**	**4**	**11**	***48***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	***1***
5:15 PM	9	2	0	16	*27*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	22	2	3	4	*31*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	16	1	2	15	*34*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	183	15	28	101	*327*	1	0	0	0	*1*	5	0	1	0	*6*
Peak Hour	**107**	**8**	**19**	**59**	***193***	**1**	**0**	**0**	**0**	***1***	**5**	**0**	**1**	**0**	***6***

Mark Skaggs: (425) 250-0777 mark.skaggs@idaxdata.com

REECER CREEK RD
W UNIVERSITY WAY

Date: Tue, Jun 04, 2019
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM





	HV %:	PHF
EB	2.3%	0.87
WB	0.9%	0.90
NB	-	-
SB	3.1%	0.88
TOTAL	1.9%	0.96

Two-Hour Count Summaries

Interval Start	W UNIVERSITY WAY Eastbound				W UNIVERSITY WAY Westbound				0 Northbound				REECER CREEK RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	39	71	0	0	0	48	53	0	0	0	0	0	48	0	26	285	0
4:15 PM	0	30	50	0	0	0	55	55	0	0	0	0	0	45	0	26	261	0
4:30 PM	0	37	46	0	0	0	60	60	0	0	0	0	0	38	0	22	263	0
4:45 PM	0	37	49	0	0	0	44	46	0	0	0	0	0	38	0	18	232	1,041
5:00 PM	**0**	**48**	**53**	**0**	**0**	**0**	**59**	**62**	**0**	**0**	**0**	**0**	**0**	**29**	**0**	**21**	**272**	1,028
5:15 PM	**0**	**40**	**50**	**0**	**0**	**0**	**58**	**55**	**0**	**0**	**0**	**0**	**0**	**39**	**0**	**27**	**269**	1,036
5:30 PM	**0**	**40**	**43**	**0**	**0**	**0**	**54**	**50**	**0**	**0**	**0**	**0**	**0**	**37**	**0**	**33**	**257**	1,030
5:45 PM	**0**	**28**	**50**	**0**	**0**	**0**	**51**	**48**	**0**	**0**	**0**	**0**	**0**	**43**	**0**	**31**	**251**	**1,049**
Count Total	0	299	412	0	0	0	429	429	0	0	0	0	0	317	0	204	2,090	0
Peak Hour	**0**	**156**	**196**	**0**	**0**	**0**	**222**	**215**	**0**	**0**	**0**	**0**	**0**	**148**	**0**	**112**	**1,049**	**0**

Note: Two-hour count summary volumes 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
4:00 PM	7	3	0	7	*17*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	9	7	0	5	*21*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	5	2	0	1	*8*	0	0	0	1	*1*	0	0	0	0	*0*
4:45 PM	4	4	0	0	*8*	0	0	0	0	*0*	0	0	0	0	*0*
5:00 PM	**3**	**3**	**0**	**5**	***11***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**2**	**0**	**0**	**0**	***2***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:30 PM	**0**	**0**	**0**	**2**	***2***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:45 PM	**3**	**1**	**0**	**1**	***5***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	***1***
Count Total	33	20	0	21	*74*	0	0	0	1	*1*	0	0	1	0	*1*
Peak Hr	**8**	**4**	**0**	**8**	***20***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	***1***

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Attachment 2
Synchro and Sidra Output

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	0	20	0	0	0	15	115	0	0	120	10
Future Vol, veh/h	10	0	20	0	0	0	15	115	0	0	120	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	23	23	23	2	2	2	13	13	13	19	19	19
Mvmt Flow	11	0	23	0	0	0	17	131	0	0	136	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	307	307	142	318	312	131	147	0	0	131	0	0
Stage 1	142	142	-	165	165	-	-	-	-	-	-	-
Stage 2	165	165	-	153	147	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.73	6.43	7.12	6.52	6.22	4.23	-	-	4.29	-	-
Critical Hdwy Stg 1	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.707	4.207	3.507	3.518	4.018	3.318	2.317	-	-	2.371	-	-
Pot Cap-1 Maneuver	606	574	853	635	603	919	1370	-	-	1356	-	-
Stage 1	813	741	-	837	762	-	-	-	-	-	-	-
Stage 2	790	724	-	849	775	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	600	567	853	612	595	919	1370	-	-	1356	-	-
Mov Cap-2 Maneuver	600	567	-	612	595	-	-	-	-	-	-	-
Stage 1	802	741	-	826	752	-	-	-	-	-	-	-
Stage 2	780	715	-	826	775	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	0	0.9	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1370	-	-	748	-	1356	-	-
HCM Lane V/C Ratio	0.012	-	-	0.046	-	-	-	-
HCM Control Delay (s)	7.7	0	-	10	0	0	-	-
HCM Lane LOS	A	A	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	155	200	220	225	150	90
Future Vol, veh/h	155	200	220	225	150	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	6	6	3	3	4	4
Mvmt Flow	165	213	234	239	160	96

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	473	0	-	0	897	354
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	543	-
Critical Hdwy	4.16	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.254	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1068	-	-	-	308	685
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	578	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1068	-	-	-	261	685
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	578	-

Approach	EB	WB	SB
HCM Control Delay, s	3.9	0	28.1
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1068	-	-	-	261	685
HCM Lane V/C Ratio	0.154	-	-	-	0.611	0.14
HCM Control Delay (s)	9	-	-	-	38.3	11.1
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0.5	-	-	-	3.7	0.5

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	20	0	65	35	195	0	35	70	195	50	5
Future Vol, veh/h	0	20	0	65	35	195	0	35	70	195	50	5
Conflicting Peds, #/hr	11	0	7	7	0	11	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	55	65	-	-	155	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	3	3	3
Mvmt Flow	0	22	0	72	39	217	0	39	78	217	56	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	710	612	66	591	576	91	62	0	0	119	0	0
Stage 1	493	493	-	80	80	-	-	-	-	-	-	-
Stage 2	217	119	-	511	496	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	351	411	1003	422	431	972	1541	-	-	1463	-	-
Stage 1	562	550	-	934	832	-	-	-	-	-	-	-
Stage 2	790	801	-	549	549	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	219	349	995	352	366	960	1541	-	-	1460	-	-
Mov Cap-2 Maneuver	219	349	-	352	366	-	-	-	-	-	-	-
Stage 1	562	468	-	932	830	-	-	-	-	-	-	-
Stage 2	577	799	-	441	467	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16	13.1	0	6.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1541	-	-	349	357	960	1460	-	-
HCM Lane V/C Ratio	-	-	-	0.064	0.311	0.226	0.148	-	-
HCM Control Delay (s)	0	-	-	16	19.6	9.8	7.9	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1.3	0.9	0.5	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	0	21	0	0	0	15	127	0	0	130	10
Future Vol, veh/h	10	0	21	0	0	0	15	127	0	0	130	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	23	23	23	2	2	2	13	13	13	19	19	19
Mvmt Flow	11	0	24	0	0	0	17	144	0	0	148	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	332	332	154	344	337	144	159	0	0	144	0	0
Stage 1	154	154	-	178	178	-	-	-	-	-	-	-
Stage 2	178	178	-	166	159	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.73	6.43	7.12	6.52	6.22	4.23	-	-	4.29	-	-
Critical Hdwy Stg 1	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.707	4.207	3.507	3.518	4.018	3.318	2.317	-	-	2.371	-	-
Pot Cap-1 Maneuver	583	555	840	610	584	903	1356	-	-	1341	-	-
Stage 1	801	732	-	824	752	-	-	-	-	-	-	-
Stage 2	777	714	-	836	766	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	577	547	840	586	576	903	1356	-	-	1341	-	-
Mov Cap-2 Maneuver	577	547	-	586	576	-	-	-	-	-	-	-
Stage 1	790	732	-	812	741	-	-	-	-	-	-	-
Stage 2	766	704	-	812	766	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	0	0.8	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1356	-	-	732	-	1341	-	-
HCM Lane V/C Ratio	0.013	-	-	0.048	-	-	-	-
HCM Control Delay (s)	7.7	0	-	10.2	0	0	-	-
HCM Lane LOS	A	A	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	-	0	-	-

Intersection	
Int Delay, s/veh	23.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	240	209	230	263	173	142
Future Vol, veh/h	240	209	230	263	173	142
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	6	6	3	3	4	4
Mvmt Flow	255	222	245	280	184	151

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	525	0	-	0	1117	385
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	732	-
Critical Hdwy	4.16	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.254	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1022	-	-	-	227	658
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	472	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1022	-	-	-	~ 170	658
Mov Cap-2 Maneuver	-	-	-	-	~ 170	-
Stage 1	-	-	-	-	512	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	SB
HCM Control Delay, s	5.2	0	86.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1022	-	-	-	170	658
HCM Lane V/C Ratio	0.25	-	-	-	1.083	0.23
HCM Control Delay (s)	9.7	-	-	-	148	12.1
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	1	-	-	-	9.2	0.9

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	21	0	67	36	203	0	37	72	203	53	5
Future Vol, veh/h	0	21	0	67	36	203	0	37	72	203	53	5
Conflicting Peds, #/hr	11	0	7	7	0	11	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	55	65	-	-	155	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	3	3	3
Mvmt Flow	0	23	0	74	40	226	0	41	80	226	59	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	739	637	69	616	600	94	65	0	0	123	0	0
Stage 1	514	514	-	83	83	-	-	-	-	-	-	-
Stage 2	225	123	-	533	517	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	336	398	1000	406	417	968	1537	-	-	1458	-	-
Stage 1	547	539	-	930	830	-	-	-	-	-	-	-
Stage 2	782	798	-	534	537	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	205	336	992	336	352	956	1537	-	-	1455	-	-
Mov Cap-2 Maneuver	205	336	-	336	352	-	-	-	-	-	-	-
Stage 1	547	455	-	928	828	-	-	-	-	-	-	-
Stage 2	563	796	-	424	454	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.5	13.6	0	6.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1537	-	-	336	341	956	1455	-	-
HCM Lane V/C Ratio	-	-	-	0.069	0.336	0.236	0.155	-	-
HCM Control Delay (s)	0	-	-	16.5	20.8	9.9	7.9	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1.4	0.9	0.5	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	2	138	4	0	140
Future Vol, veh/h	21	2	138	4	0	140
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	88	88	88	88	88	88
Heavy Vehicles, %	2	2	13	13	19	19
Mvmt Flow	24	2	157	5	0	159

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	319	160	0	0	162	0
Stage 1	160	-	-	-	-	-
Stage 2	159	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.29	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.371	-
Pot Cap-1 Maneuver	674	885	-	-	1320	-
Stage 1	869	-	-	-	-	-
Stage 2	870	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	674	885	-	-	1320	-
Mov Cap-2 Maneuver	674	-	-	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	870	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	688	1320	-
HCM Lane V/C Ratio	-	-	0.038	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	10	0	21	40	0	4	15	127	42	4	150	10
Future Vol, veh/h	10	0	21	40	0	4	15	127	42	4	150	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	23	23	23	2	2	2	13	13	13	19	19	19
Mvmt Flow	11	0	24	45	0	5	17	144	48	5	170	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	391	412	176	400	393	168	181	0	0	192	0	0
Stage 1	186	186	-	202	202	-	-	-	-	-	-	-
Stage 2	205	226	-	198	191	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.73	6.43	7.12	6.52	6.22	4.23	-	-	4.29	-	-
Critical Hdwy Stg 1	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.33	5.73	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.707	4.207	3.507	3.518	4.018	3.318	2.317	-	-	2.371	-	-
Pot Cap-1 Maneuver	532	499	816	560	543	876	1331	-	-	1286	-	-
Stage 1	769	708	-	800	734	-	-	-	-	-	-	-
Stage 2	751	680	-	804	742	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	522	490	816	536	533	876	1331	-	-	1286	-	-
Mov Cap-2 Maneuver	522	490	-	536	533	-	-	-	-	-	-	-
Stage 1	758	705	-	789	724	-	-	-	-	-	-	-
Stage 2	737	670	-	777	739	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	12.1	0.6	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1331	-	-	691	556	1286	-	-
HCM Lane V/C Ratio	0.013	-	-	0.051	0.09	0.004	-	-
HCM Control Delay (s)	7.7	0	-	10.5	12.1	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-

Intersection	
Int Delay, s/veh	27.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	250	222	239	263	173	149
Future Vol, veh/h	250	222	239	263	173	149
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	6	6	3	3	4	4
Mvmt Flow	266	236	254	280	184	159

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	534	0	-	0	1162	394
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	768	-
Critical Hdwy	4.16	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.254	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1014	-	-	-	214	651
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	454	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1014	-	-	-	~ 158	651
Mov Cap-2 Maneuver	-	-	-	-	~ 158	-
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	454	-

Approach	EB	WB	SB
HCM Control Delay, s	5.2	0	102.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1014	-	-	-	158	651
HCM Lane V/C Ratio	0.262	-	-	-	1.165	0.243
HCM Control Delay (s)	9.8	-	-	-	180.3	12.3
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	1.1	-	-	-	10.1	1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	21	0	67	36	203	0	37	72	203	53	5
Future Vol, veh/h	0	21	0	67	36	203	0	37	72	203	53	5
Conflicting Peds, #/hr	11	0	7	7	0	11	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	55	65	-	-	155	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	3	3	3
Mvmt Flow	0	23	0	74	40	226	0	41	80	226	59	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	739	637	69	616	600	94	65	0	0	123	0	0
Stage 1	514	514	-	83	83	-	-	-	-	-	-	-
Stage 2	225	123	-	533	517	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.218	-	-	2.227	-	-
Pot Cap-1 Maneuver	336	398	1000	406	417	968	1537	-	-	1458	-	-
Stage 1	547	539	-	930	830	-	-	-	-	-	-	-
Stage 2	782	798	-	534	537	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	205	336	992	336	352	956	1537	-	-	1455	-	-
Mov Cap-2 Maneuver	205	336	-	336	352	-	-	-	-	-	-	-
Stage 1	547	455	-	928	828	-	-	-	-	-	-	-
Stage 2	563	796	-	424	454	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.5	13.6	0	6.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1537	-	-	336	341	956	1455	-	-
HCM Lane V/C Ratio	-	-	-	0.069	0.336	0.236	0.155	-	-
HCM Control Delay (s)	0	-	-	16.5	20.8	9.9	7.9	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1.4	0.9	0.5	-	-

MOVEMENT SUMMARY

Site: 1 [E - US 97/N Dolarway Rd/W University Way]

Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: N Dolarway Rd												
3	L2	165	6.9	0.373	10.5	LOS B	1.3	35.5	0.47	0.74	0.48	33.1
8	T1	60	6.9	0.373	5.3	LOS A	1.3	35.5	0.47	0.74	0.48	33.1
18	R2	82	6.9	0.373	5.4	LOS A	1.3	35.5	0.47	0.74	0.48	32.2
Approach		308	6.9	0.373	8.1	LOS A	1.3	35.5	0.47	0.74	0.48	32.9
East: W University Way												
1	L2	44	2.8	0.235	11.7	LOS B	1.3	32.7	0.54	0.61	0.54	35.7
6	T1	214	2.8	0.235	5.8	LOS A	1.3	32.7	0.54	0.61	0.54	35.7
16	R2	60	2.8	0.037	3.7	LOS A	0.0	0.0	0.00	0.46	0.00	36.9
Approach		319	2.8	0.235	6.2	LOS A	1.3	32.7	0.44	0.58	0.44	35.9
North: US 97												
7	L2	60	21.4	0.136	11.4	LOS B	0.6	16.5	0.43	0.62	0.43	34.7
4	T1	77	21.4	0.136	5.5	LOS A	0.6	16.5	0.43	0.62	0.43	35.0
14	R2	176	21.4	0.127	3.9	LOS A	0.0	0.0	0.00	0.45	0.00	36.6
Approach		313	21.4	0.136	5.7	LOS A	0.6	16.5	0.19	0.53	0.19	35.8
West: US 97												
5	L2	192	19.7	0.219	11.0	LOS B	1.0	27.5	0.37	0.68	0.37	33.3
2	T1	220	19.7	0.365	5.5	LOS A	1.9	55.1	0.40	0.54	0.40	35.9
12	R2	181	19.7	0.365	5.6	LOS A	1.9	55.1	0.40	0.54	0.40	34.6
Approach		593	19.7	0.365	7.3	LOS A	1.9	55.1	0.39	0.58	0.39	34.6
All Vehicles		1533	14.0	0.373	6.9	LOS A	1.9	55.1	0.38	0.60	0.38	34.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [OY - US 97/N Dolarway Rd/W University Way]

Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: N Dolarway Rd												
3	L2	195	6.9	0.499	11.7	LOS B	2.3	61.5	0.59	0.84	0.68	32.7
8	T1	69	6.9	0.499	6.5	LOS A	2.3	61.5	0.59	0.84	0.68	32.6
18	R2	116	6.9	0.499	6.7	LOS A	2.3	61.5	0.59	0.84	0.68	31.8
Approach		380	6.9	0.499	9.2	LOS A	2.3	61.5	0.59	0.84	0.68	32.4
East: W University Way												
1	L2	67	2.8	0.315	12.1	LOS B	1.9	48.1	0.61	0.66	0.61	35.3
6	T1	265	2.8	0.315	6.3	LOS A	1.9	48.1	0.61	0.66	0.61	35.4
16	R2	67	2.8	0.041	3.7	LOS A	0.0	0.0	0.00	0.46	0.00	36.9
Approach		399	2.8	0.315	6.8	LOS A	1.9	48.1	0.51	0.63	0.51	35.6
North: US 97												
7	L2	69	21.4	0.167	11.9	LOS B	0.8	22.2	0.51	0.67	0.51	34.4
4	T1	87	21.4	0.167	6.0	LOS A	0.8	22.2	0.51	0.67	0.51	34.8
14	R2	186	21.4	0.135	3.9	LOS A	0.0	0.0	0.00	0.45	0.00	36.6
Approach		342	21.4	0.167	6.0	LOS A	0.8	22.2	0.23	0.55	0.23	35.6
West: US 97												
5	L2	200	19.7	0.254	11.5	LOS B	1.1	32.7	0.43	0.71	0.43	33.2
2	T1	300	19.7	0.496	6.0	LOS A	3.0	87.1	0.51	0.58	0.51	35.6
12	R2	227	19.7	0.496	6.0	LOS A	3.0	87.1	0.51	0.58	0.51	34.3
Approach		727	19.7	0.496	7.5	LOS A	3.0	87.1	0.49	0.62	0.49	34.5
All Vehicles		1848	13.7	0.499	7.4	LOS A	3.0	87.1	0.47	0.65	0.49	34.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [OYP - US 97/N Dolarway Rd/W University Way]

Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: N Dolarway Rd												
3	L2	195	6.9	0.534	12.2	LOS B	2.7	70.2	0.63	0.87	0.75	32.5
8	T1	82	6.9	0.534	7.0	LOS A	2.7	70.2	0.63	0.87	0.75	32.5
18	R2	116	6.9	0.534	7.1	LOS A	2.7	70.2	0.63	0.87	0.75	31.6
Approach		393	6.9	0.534	9.6	LOS A	2.7	70.2	0.63	0.87	0.75	32.2
East: W University Way												
1	L2	67	2.8	0.324	12.3	LOS B	2.0	50.4	0.64	0.68	0.64	35.3
6	T1	265	2.8	0.324	6.5	LOS A	2.0	50.4	0.64	0.68	0.64	35.3
16	R2	85	2.8	0.052	3.7	LOS A	0.0	0.0	0.00	0.46	0.00	36.9
Approach		416	2.8	0.324	6.9	LOS A	2.0	50.4	0.51	0.63	0.51	35.6
North: US 97												
7	L2	95	21.4	0.214	12.0	LOS B	1.0	29.6	0.53	0.68	0.53	34.3
4	T1	105	21.4	0.214	6.1	LOS A	1.0	29.6	0.53	0.68	0.53	34.6
14	R2	208	21.4	0.151	3.9	LOS A	0.0	0.0	0.00	0.45	0.00	36.6
Approach		408	21.4	0.214	6.3	LOS A	1.0	29.6	0.26	0.56	0.26	35.5
West: US 97												
5	L2	216	19.7	0.280	11.9	LOS B	1.3	37.4	0.48	0.74	0.48	33.1
2	T1	300	19.7	0.514	6.3	LOS A	3.2	93.0	0.56	0.62	0.57	35.4
12	R2	227	19.7	0.514	6.4	LOS A	3.2	93.0	0.56	0.62	0.57	34.2
Approach		744	19.7	0.514	8.0	LOS A	3.2	93.0	0.54	0.65	0.54	34.3
All Vehicles		1962	13.9	0.534	7.7	LOS A	3.2	93.0	0.49	0.67	0.52	34.4

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.