

July 31, 2007

Ms. Jan Ollivier
Kittitas County Public Works
411 N Ruby St, Suite 1
Ellensburg, WA 98926

RECEIVED

SEP 21 2007

**Kittitas County
CDS**

AUG 03 2007

TG: 07190.00

**SUBJECT: MEADOW SPRINGS, STARLITE HEIGHTS, AND TAMARACK RIDGE—
TRAFFIC IMPACT ANALYSIS**

Dear Jan:

We have prepared a traffic impact analysis (TIA) for the proposed Meadow Springs, Starlite Heights, and Tamarack Ridge residential developments. These three developments are closely related, and were analyzed together in this traffic impact analysis. This analysis evaluates the potential traffic-related impacts associated with the proposed projects.

Project Description

Attachment 1 illustrates the project site and surrounding vicinity. The project site is generally located on the south side of Westside Road, between Summerside Drive and Banti Creek Road within Kittitas County, Washington. The proposed site plans for each project are illustrated in Attachment 2. The Meadow Springs project would include the construction of 62 single-family dwelling units, Starlite Heights 32 dwelling units, and Tamarack Ridge 32 dwelling units. The land is currently undeveloped. Vehicular access for all the developments is proposed at two locations: primary access would be north at Westside Road (west of Banti Creek Road), and a secondary access west at Pasco Road. It is anticipated that the entire project would be completed and generating traffic between 2012 and 2015. For the purposes of this analysis, 2013 was assumed as the horizon year.

Study Scope

The study area includes the Westside Road/Golf Course Road intersection and surrounding roadways. The analysis begins by describing conditions in the vicinity of the project site, including the roadway network, existing and future traffic volumes, traffic operations, traffic safety, non-motorized facilities, and transit service. Future with-project conditions are evaluated by adding site-generated traffic to future without-project volumes.

Existing and 2013 Baseline Conditions

This section describes existing and 2013 baseline conditions within the identified study area, including the roadway network, existing and future traffic volumes, traffic operations, traffic safety, non-motorized facilities, and transit service.

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Roadway Network

The roadway network in the immediate vicinity of the project consists of several roads ranging from local roads to collectors, and whose intersections are all unsignalized. The following roadways were considered for this analysis:

- **Golf Course Road** is a two-lane rural minor collector roadway connecting I-90 to Westside Road. Within the study area the posted speed limit is 35 mph.
- **Westside Road** is a two-lane rural minor collector roadway running from Golf Course Road to the City of South Cle Elum. Within the study area, the posted speed limit is 35 mph.
- **Pasco Road** and **Fowler Creek Road** are unpaved, two-lane local roads providing access to rural areas south of Westside Road.

Other than basic improvements associated with the project sites, no roadway improvements were assumed for 2013 roadway conditions.

Traffic Volumes

Existing daily and PM peak hour traffic volumes were collected for the existing study area intersection to evaluate existing operations and as a basis for forecasting future traffic volumes. Daily counts were obtained from the County along Westside Road and Golf Course Road. A PM peak hour turning movement count at the Westside Road/Golf Course Road intersection was collected in June 2007. Traffic count summary sheets are included as attachments.

To forecast future volumes, linear regression analysis was applied to historical daily traffic volumes and then forecasted forward to year 2013. Historical daily traffic volumes were provided by Kittitas County for the years 2003 to 2007. Five roadway segments in close proximity to the site were included in the growth rate analysis as summarized in Table 1. Using linear regression, an average daily volume growth per year in the form of a single straight line was fitted to the historical data. This straight line was extended to the year 2013 to forecast the anticipated 2013 daily volume. As shown in Table 1, the average annual growth rate from 2007 to 2013 is between 5 and 6 percent. To provide a conservative (higher) estimate of future baseline traffic volumes, a 6 percent annual growth rate was used to forecast future 2013 daily and PM peak hour traffic volumes.

Attachment 3 illustrates existing and future traffic volumes for the roadways and intersections of interest.

Table 1. Growth Rate Assumptions

Roadway Segment ¹	Historical Daily Traffic Volumes					Forecasted	Annual
	2003	2004	2005	2006	2007	Daily Volume ²	Growth Rate ³ (2007 to 2013)
Westside Rd (MP 2.14 to 3.94)	664	715	705	684	885	1,060	3.1%
Westside Rd (MP 3.94 to 4.17)	600	600	600	680	800	1,040	4.5%
Westside Rd (MP 4.17 to 7.29)	512	600	661	675	795	1,160	6.5%
Westside Rd (MP 7.29 to 7.53)	500	500	500	600	600	780	4.5%
Golf Course Rd (MP 0.42 to 0.89)	450	523	582	557	676	945	5.7%
Average							5.3%
Growth Rate Assumed for TIA							6.0%

1. Westside Rd @ Woods and Steele Rd = MP 3.80; Westside Rd @ Golf Course Rd = MP 7.29, Golf Course Rd @ Westside Rd = MP 0.89
2. Forecasted daily volume estimated from linear regression of historical traffic volumes.
3. Annual growth rate based on comparing 2007 and 2013 volumes.

Peak Hour Traffic Operations

Level of service for intersection operations is described alphabetically (A through F). LOS is measured in average control delay per vehicle and is typically reported by approach movement for two-way, stop-controlled intersections.

Existing and future peak hour LOS results were calculated at study intersections based on methodologies contained in the *Highway Capacity Manual* (Transportation Research Board, 2000). *Synchro 6.0* (Build 614) was used for the calculations. The existing study intersection is an unsignalized intersection with a stop sign on the westbound approach (Golf Course Road). It currently operates at LOS A with approximately 9 seconds of average delay per vehicle at the stop-controlled approach. Under 2013 baseline conditions, it is not expected to increase substantially as shown in Table 3. Detailed LOS worksheets for this intersection analysis are included as an attachment.

Traffic Safety

Accident records were reviewed to identify if any traffic patterns indicate traffic safety problems. Based on 2004 to 2006 accident records provided by Kittitas County, only one accident was recorded for the Westside Road/Golf Course Road intersection. Accidents along Westside Road (MP 3.80 to 7.29) had an annual rate of 3 accidents per year. Accidents along Golf Course Road had an annual rate of 1 accident per year. Most of the accidents were single vehicle accidents that are typical for low volume rural corridors. Based on the accident records, current traffic patterns do not indicate traffic safety problems.

Non-Motorized Facilities

Except for the Iron Horse Trail near I-90, formal non-motorized facilities are very limited within the site vicinity. Roadways in the immediate vicinity are without sidewalk and are narrow with limited shoulders. School-aged children in the area are currently bused due to the limited non-motorized facilities and walking distance to the nearest public schools.

Transit Service

Other than school bus service, there is no dedicated transit service within the study area.

Project Impacts

This section of the analysis documents project-generated impacts on the surrounding roadway network and at the intersections of interest. First, peak hour project traffic volumes are estimated, distributed, and assigned to adjacent roadways and intersections within the study area. Next, 2013 with-project peak hour traffic volumes are projected and potential impacts to traffic volumes, traffic operations, and non-motorized facilities are identified.

Trip Generation

Trips generated for each of the proposed residential developments are summarized in Table 2. Estimates of project-generated vehicle trips were calculated using average daily and peak hour trip rates for single-family residential units published in *Trip Generation* (ITE, 7th Edition). This information is based on hundreds of trip generation studies of single-family detached housing developments in the United States and Canada.

Table 2. Trip Generation

Time Period	Rate ¹	Size	Project Trips		
			Total	In	Out
<i>Meadow Springs</i>					
Weekday PM Peak Hour	1.01	62 Dwelling Units	63	40	23
Weekday AM Peak Hour	0.75	62 Dwelling Units	47	12	35
Weekday Daily	9.57	62 Dwelling Units	594	297	297
<i>Starlite Heights</i>					
Weekday PM Peak Hour	1.01	32 Dwelling Units	32	20	12
Weekday AM Peak Hour	0.75	32 Dwelling Units	24	6	18
Weekday Daily	9.57	32 Dwelling Units	306	153	153
<i>Tamarack Ridge</i>					
Weekday PM Peak Hour	1.01	32 Dwelling Units	32	20	12
Weekday AM Peak Hour	0.75	32 Dwelling Units	24	6	18
Weekday Daily	9.57	32 Dwelling Units	306	153	153
<i>TOTAL of All Site Plans</i>					
Weekday PM Peak Hour		126 Dwelling Units	127	80	47
Weekday AM Peak Hour		126 Dwelling Units	95	24	71
Weekday Daily		126 Dwelling Units	1,206	603	603

1. Average trips rates for Single-Family Detached Housing (#210) from ITE Trip Generation Manual, 7th Edition.

As illustrated in Table 2, the total trip generated by all three developments is anticipated to generate 127 PM peak hour trips (80 inbound trips and 47 outbound trips), 95 AM peak hour trips (24 inbound trips and 71 outbound trips) and approximately 1,200 daily trips.

Trip Distribution and Assignment

Trip distribution for this development was based on the existing travel patterns and the general location of the site within the community. As shown in Attachment 1, it is estimated that approximately 80 percent of project traffic would be oriented to/from I-90 to the north and 20 to the east along Westside Road. The corresponding assignment of daily and PM peak hour project traffic volumes are illustrated in Attachment 3.

The distribution patterns shown on Attachment 3 assume that all project traffic would use the new site access via Westside Road east of Summerside Drive. The secondary access to Pasco Road and Fowler Creek Road would be limited to emergency vehicles only, so no general project trips are anticipated along these roads.

Traffic Volume Impact

Project traffic was added to future baseline daily and PM peak hour traffic volumes at the roadways and intersections of interest. The resulting 2013 with-project traffic volumes are illustrated in Attachment 3. While project traffic would add a large percentage of new traffic to the study area, total with-project roadway volumes are still relatively low compared to general rural roadway capacities.

Traffic Operations Impact

As shown in Table 3, traffic operations would not noticeably degrade with the addition of project traffic. Intersection operations with or without project traffic during the 2013 horizon year would be at LOS A. Intersection operations at the new Site Access/Westside Road intersection would be LOS B.

Table 3. Intersection Peak Hour Level of Service – Future Baseline and With Project

Intersection	2007 Existing			2013 Baseline			2013 With Project		
	Mov ¹	LOS ²	Delay ³	Mov	LOS	Delay	Mov	LOS	Delay
<i>PM Peak Hour</i>									
Westside Rd / Golf Course Rd	WB	A	9.0	WB	A	9.2	WB	A	9.9
Westside Rd / Site Driveway							NB	B	10.5

1. Intersection approach movement; WB is westbound, NB is northbound
2. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 2000)
3. Average delay per vehicle in seconds, by approach movement

Non-Motorized Impacts

Except for the Iron Horse Trail near I-90, formal non-motorized facilities are very limited within the site vicinity. It is anticipated that the project impacts to surrounding non-motorized facilities would be insignificant.

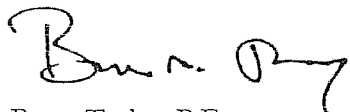
Ms. Jan Ollivier
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Conclusion

The combined residential development of Meadow Springs, Starlite Heights, and Tamarack Ridge would not generate any significant adverse traffic impact to the surrounding roadways system by 2013. As such, no off-site improvements would be necessary.

Please contact us should you have any questions or require additional information.

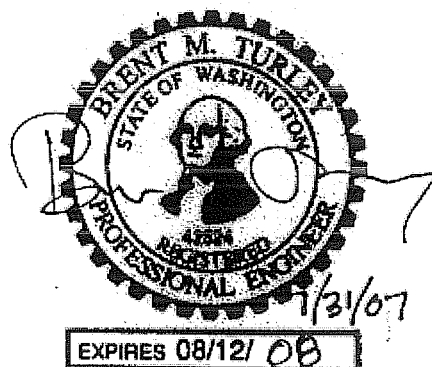
Sincerely,
The Transpo Group, Inc.



Brent Turley, P.E.
Senior Transportation Engineer

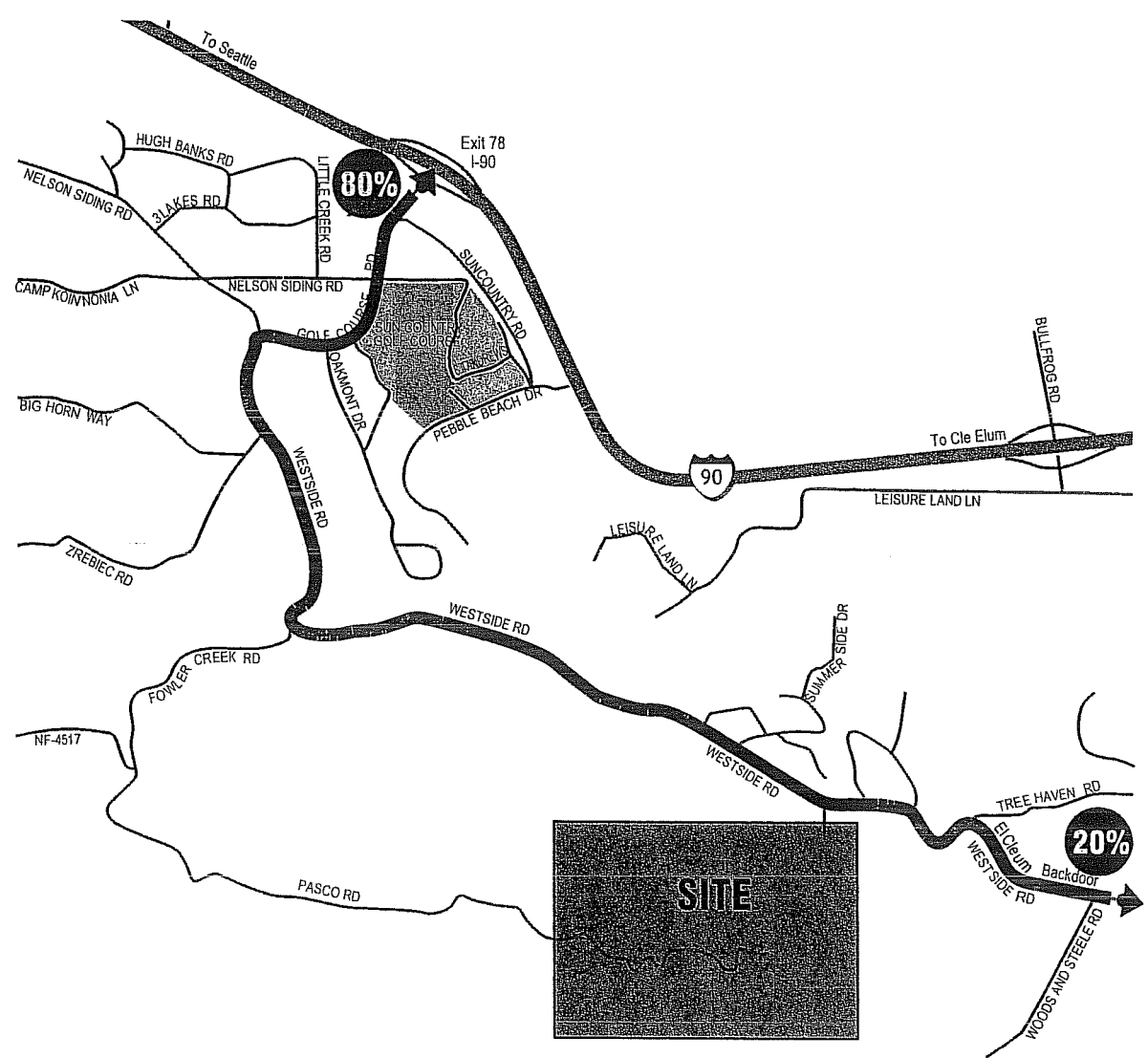
Attachments

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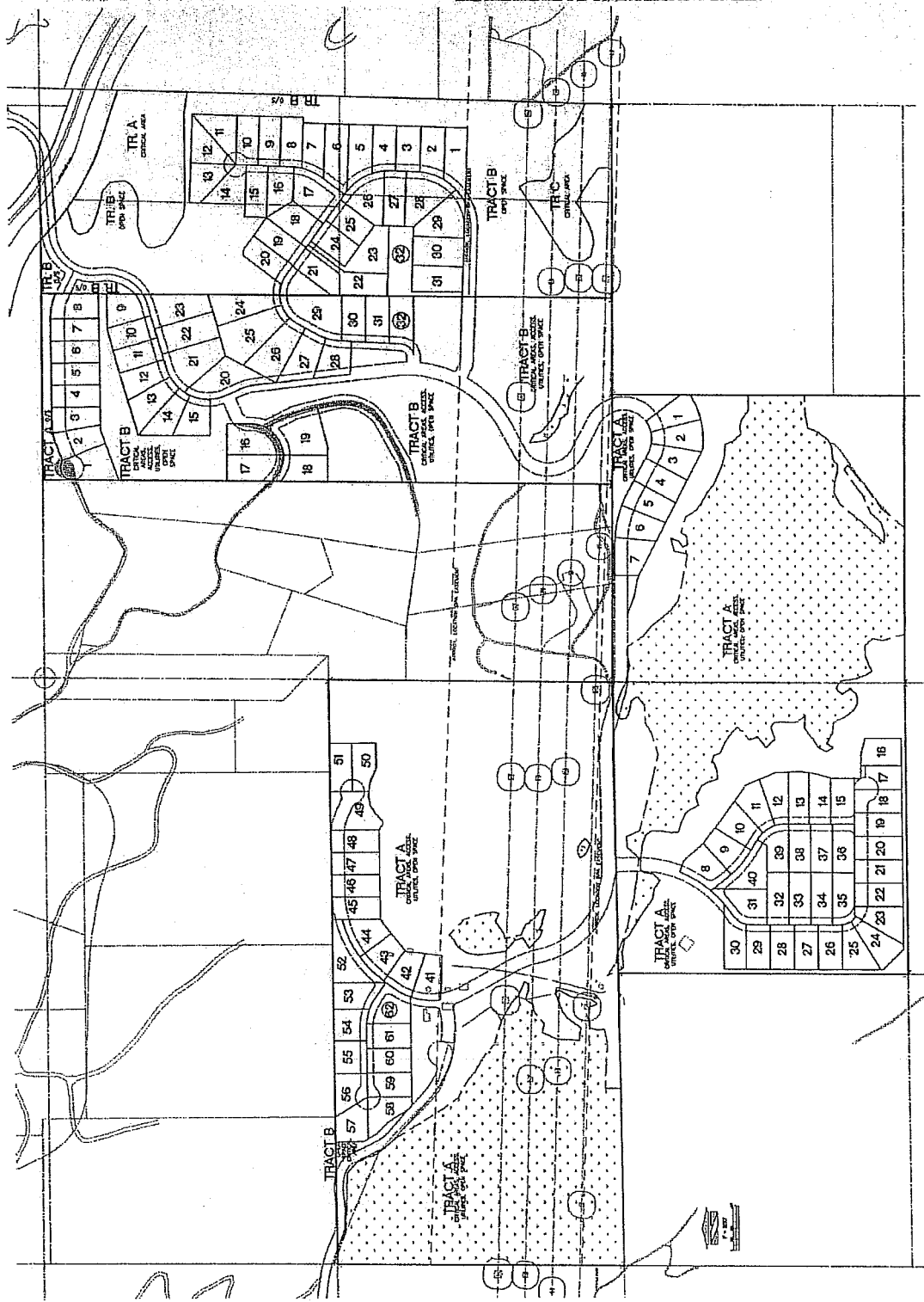
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Attachment 1 Site Vicinity and Project Distribution

Meadow Springs, Starlite Heights, and Tamarack Ridge TIA



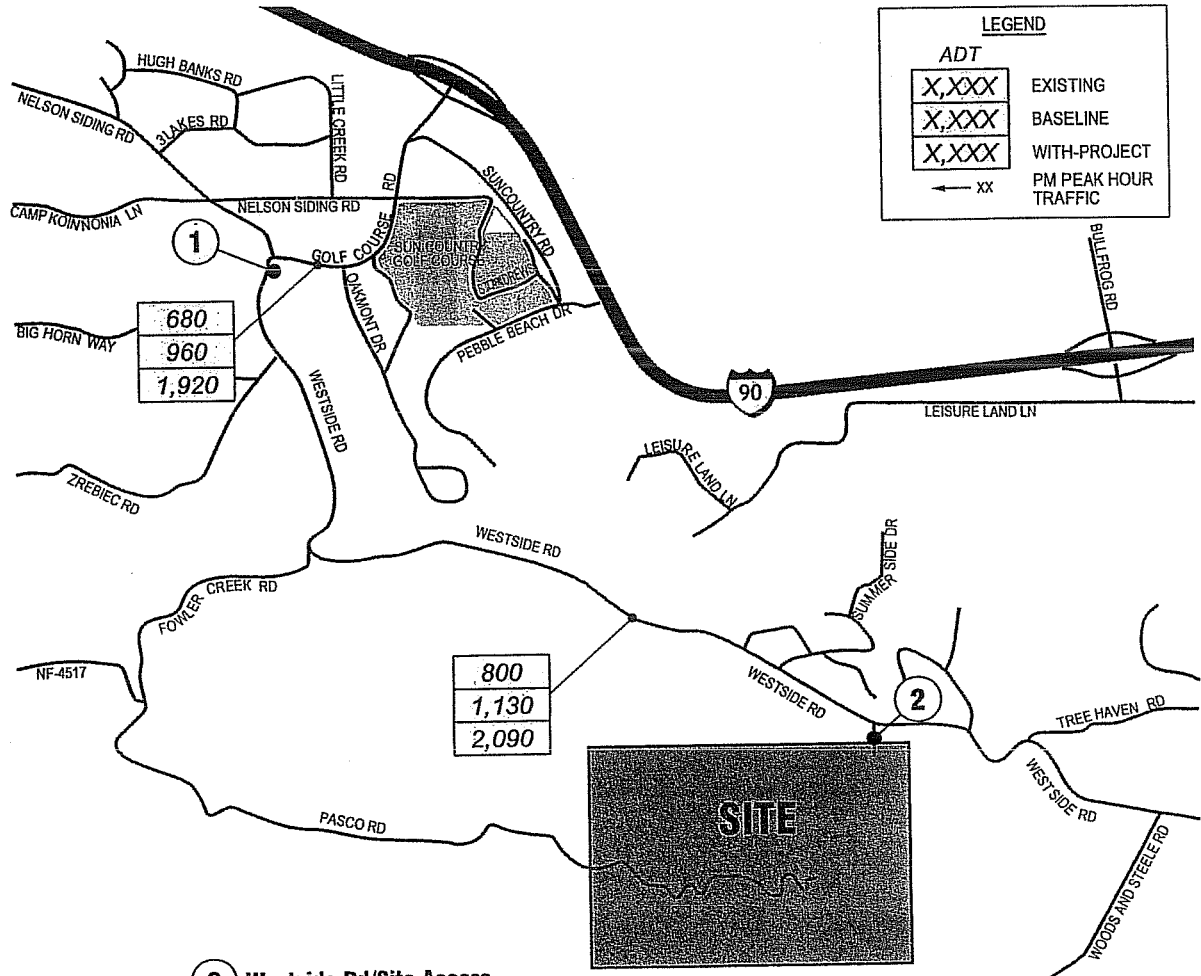


Attachment 2
Preliminary Site Plan

Meadow Springs, Starlite Heights, and Tamarack Ridge TIA

1 Westside Rd/Golf Course Rd

Existing	Baseline	Project Only	With-Project



2 Westside Rd/Site Access

Existing	Baseline	Project Only	With-Project



Attachment 3

Existing (2007) and Future (2013) Traffic Volumes

Meadow Springs, Starlite Heights, and Tamarack Ridge TIA



TRAFFICCOUNT, INC.

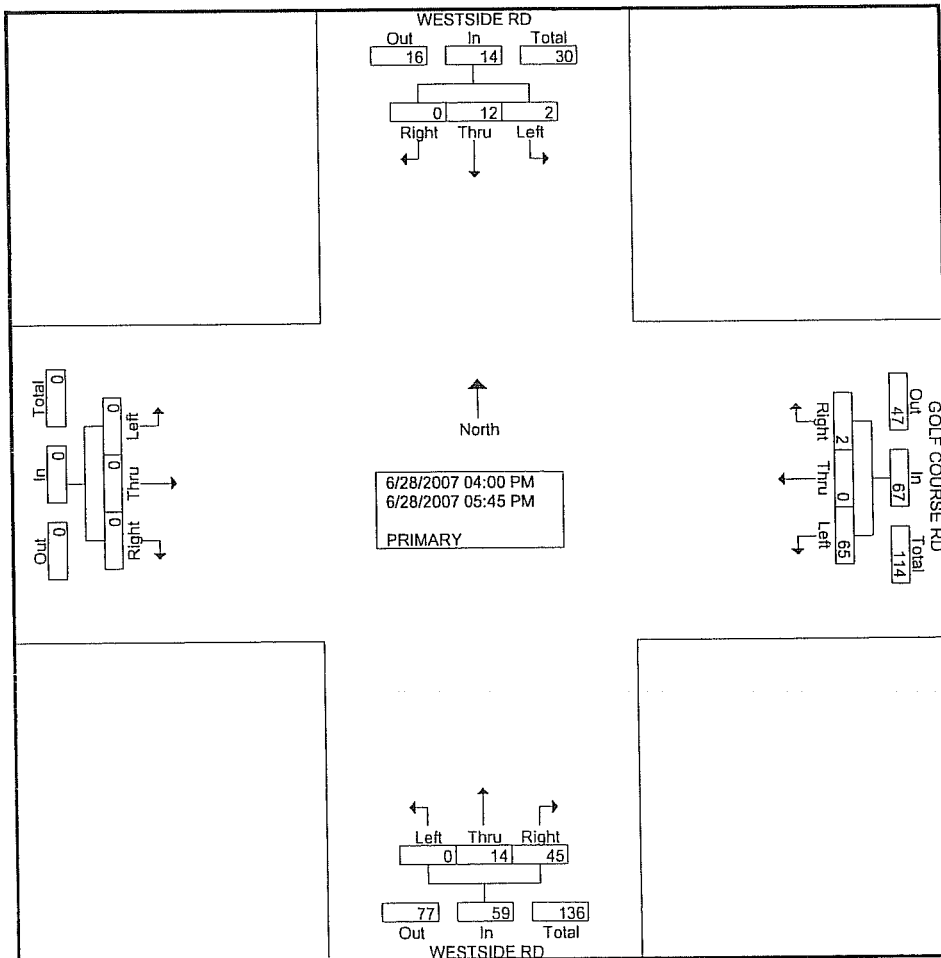
P.O. BOX 2508
 OLYMPIA, WASHINGTON 98507
 (360) 491-8116

CLE ELUM, WASHINGTON
 WESTSIDE RD
 GOLF COURSE RD
 LOC# 01P TPG07177M

File Name : TPG17901P
 Site Code : 00000001
 Start Date : 6/28/2007
 Page No : 1

Groups Printed- PRIMARY

Start Time	WESTSIDE RD From North				GOLF COURSE RD From East				WESTSIDE RD From South				From West				Exclu. Total	Inclu. Total	Int. Total	
	Right	Thru	Left	Truck	Right	Thru	Left	Truck	Right	Thru	Left	Truck	Right	Thru	Left	Truck				
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0			
04:00 PM	0	2	0	0	0	0	10	1	1	0	0	1	0	0	0	0	0	2	13	15
04:15 PM	0	0	0	0	0	0	8	1	4	1	0	0	0	0	0	0	0	1	13	14
04:30 PM	0	3	2	0	2	0	12	0	8	2	0	1	0	0	0	0	0	1	29	30
04:45 PM	0	2	0	0	0	0	6	0	5	2	0	0	0	0	0	0	0	0	15	15
Total	0	7	2	0	2	0	36	2	18	5	0	2	0	0	0	0	0	4	70	74
05:00 PM	0	1	0	0	0	0	6	1	6	5	0	0	0	0	0	0	0	1	18	19
05:15 PM	0	2	0	1	0	0	6	0	7	2	0	0	0	0	0	0	0	1	17	18
05:30 PM	0	1	0	0	0	0	7	0	7	2	0	0	0	0	0	0	0	0	17	17
05:45 PM	0	1	0	0	0	0	10	0	7	0	0	0	0	0	0	0	0	0	18	18
Total	0	5	0	1	0	0	29	1	27	9	0	0	0	0	0	0	0	2	70	72
Grand Total	0	12	2	1	2	0	65	3	45	14	0	2	0	0	0	0	0	6	140	146
Apprch %	0	85.7	14.3		3	0	97		76.3	23.7	0		0	0	0			4.1	95.9	
Total %	0	8.6	1.4		1.4	0	46.4		32.1	10	0		0	0	0					



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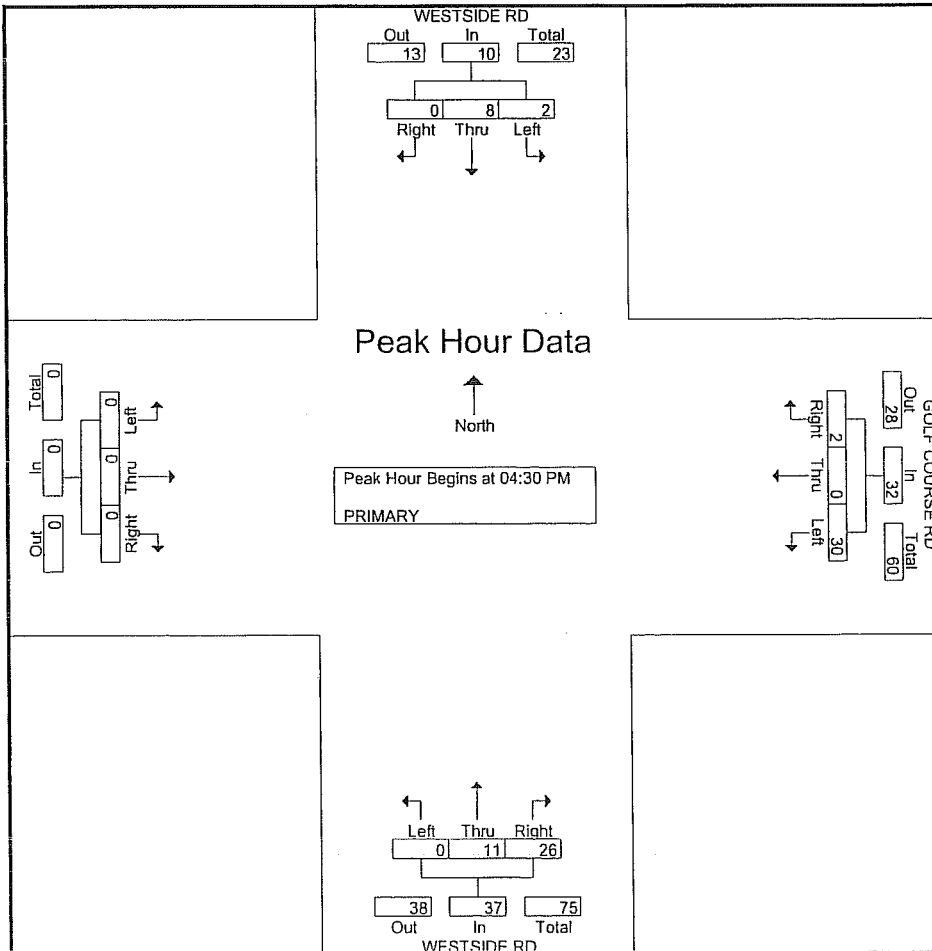
CLE ELUM, WASHINGTON
 WESTSIDE RD
 GOLF COURSE RD
 LOC# 01P TPG07177M

File Name : TPG17901P
 Site Code : 00000001
 Start Date : 6/28/2007
 Page No : 2

Start Time	WESTSIDE RD From North				GOLF COURSE RD From East				WESTSIDE RD From South				From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
04:30 PM	0	3	2	5	2	0	12	14	8	2	0	10	0	0	0	0	29
04:45 PM	0	2	0	2	0	0	6	6	5	2	0	7	0	0	0	0	15
05:00 PM	0	1	0	1	0	0	6	6	6	5	0	11	0	0	0	0	18
05:15 PM	0	2	0	2	0	0	6	6	7	2	0	9	0	0	0	0	17
Total Volume	0	8	2	10	2	0	30	32	26	11	0	37	0	0	0	0	79
% App. Total	0	80	20		6.2	0	93.8		70.3	29.7	0		0	0	0		
PHF	.000	.667	.250	.500	.250	.000	.625	.571	.813	.550	.000	.841	.000	.000	.000	.000	.681

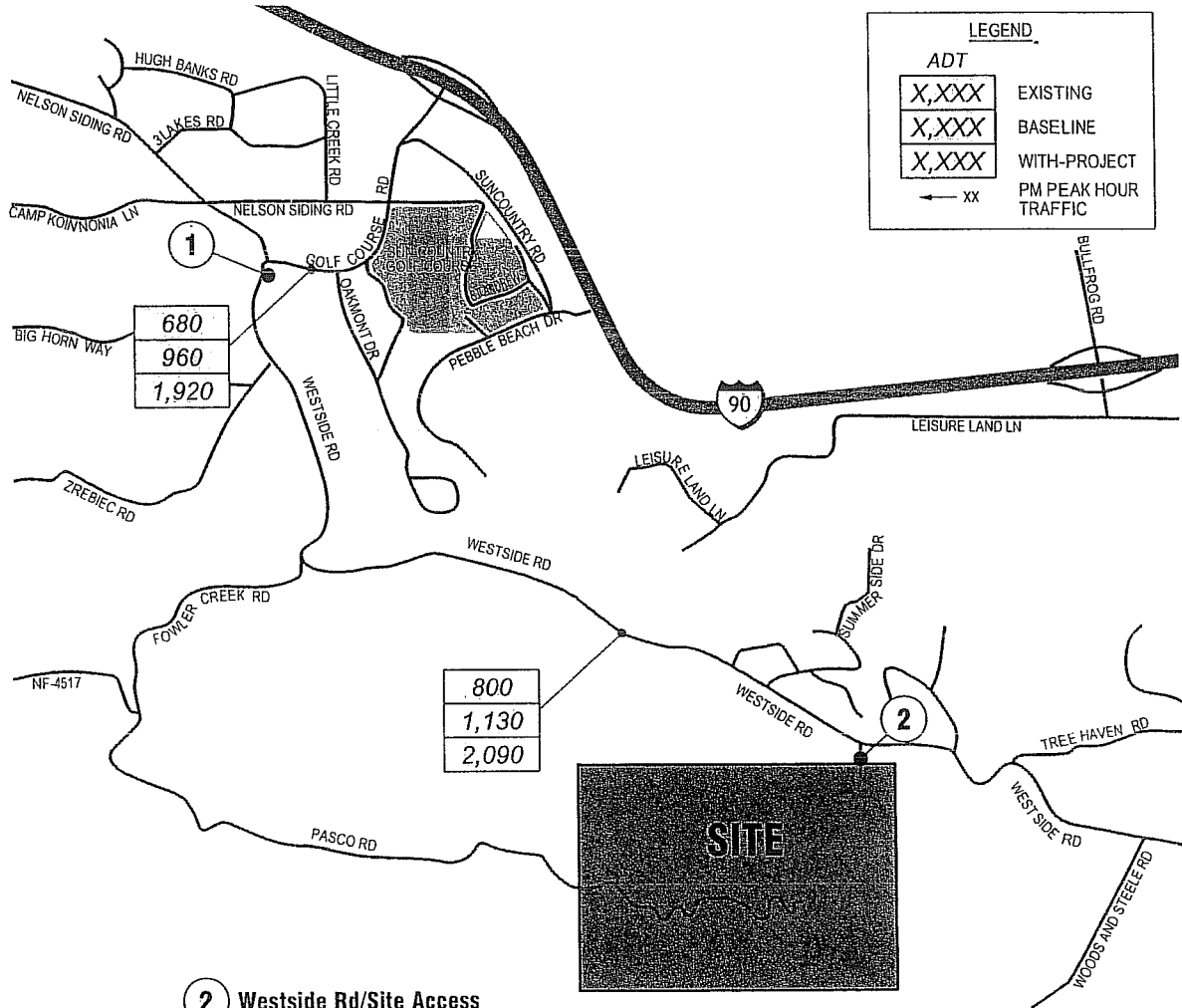
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:30 PM



1 Westside Rd/Golf Course Rd

Existing	Baseline	Project Only	With Project



2 Westside Rd/Site Access

Existing	Baseline	Project Only	With Project



Attachment 3

Existing (2007) and Future (2013) Traffic Volumes

Meadow Springs, Starlite Heights, and Tamarack Ridge TIA



TRAFFICOUNT, INC.

P.O. BOX 2508
OLYMPIA, WASHINGTON 98507
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CLE ELUM, WASHINGTON
WESTSIDE RD
GOLF COURSE RD
LOC# 01P TPG07177M

File Name : TPG17901P
Site Code : 00000001
Start Date : 6/28/2007
Page No : 1

Groups Printed- PRIMARY

Start Time	WESTSIDE RD From North					GOLF COURSE RD From East					WESTSIDE RD From South					From West					Exclu. Total	Inclu. Total	Int. Total
	Right	Thru	Left	Truck	App. Total	Right	Thru	Left	Truck	App. Total	Right	Thru	Left	Truck	App. Total	Right	Thru	Left	Truck	App. Total			
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
04:00 PM	0	2	0	0	2	0	0	10	1	10	1	0	0	1	1	0	0	0	0	0	2	13	15
04:15 PM	0	0	0	0	0	0	0	8	1	8	4	1	0	0	5	0	0	0	0	0	1	13	14
04:30 PM	0	3	2	0	5	2	0	12	0	14	8	2	0	1	10	0	0	0	0	0	1	29	30
04:45 PM	0	2	0	0	2	0	0	6	0	6	5	2	0	0	7	0	0	0	0	0	0	15	15
Total	0	7	2	0	9	2	0	36	2	38	18	5	0	2	23	0	0	0	0	0	4	70	74
05:00 PM	0	1	0	0	1	0	0	6	1	6	6	5	0	0	11	0	0	0	0	0	1	18	19
05:15 PM	0	2	0	1	2	0	0	6	0	6	7	2	0	0	9	0	0	0	0	0	1	17	18
05:30 PM	0	1	0	0	1	0	0	7	0	7	7	2	0	0	9	0	0	0	0	0	0	17	17
05:45 PM	0	1	0	0	1	0	0	10	0	10	7	0	0	0	7	0	0	0	0	0	0	18	18
Total	0	5	0	1	5	0	0	29	1	29	27	9	0	0	36	0	0	0	0	0	2	70	72
Grand Total	0	12	2	1	14	2	0	65	3	67	45	14	0	2	59	0	0	0	0	0	6	140	146
Apprch %	0	85.7	14.3			3	0	97			76.3	23.7	0			0	0	0					
Total %	0	8.6	1.4		10	1.4	0	46.4		47.9	32.1	10	0		42.1	0	0	0		0	4.1	95.9	

Start Time	WESTSIDE RD From North				GOLF COURSE RD From East				WESTSIDE RD From South				From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	3	2	5	2	0	12	14	8	2	0	10	0	0	0	0	29
04:45 PM	0	2	0	2	0	0	6	6	5	2	0	7	0	0	0	0	15
05:00 PM	0	1	0	1	0	0	6	6	6	5	0	11	0	0	0	0	18
05:15 PM	0	2	0	2	0	0	6	6	7	2	0	9	0	0	0	0	17
Total Volume	0	8	2	10	2	0	30	32	26	11	0	37	0	0	0	0	79
% App. Total	0	80	20		6.2	0	93.8		70.3	29.7	0		0	0	0		
PHF	.000	.667	.250	.500	.250	.000	.625	.571	.813	.550	.000	.841	.000	.000	.000	.000	.681

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:30 PM				04:00 PM				04:30 PM				04:00 PM			
+0 mins.	0	3	2	5	0	0	10	10	8	2	0	10	0	0	0	0
+15 mins.	0	2	0	2	0	0	8	8	5	2	0	7	0	0	0	0
+30 mins.	0	1	0	1	2	0	12	14	6	5	0	11	0	0	0	0
+45 mins.	0	2	0	2	0	0	6	6	7	2	0	9	0	0	0	0
Total Volume	0	8	2	10	2	0	36	38	26	11	0	37	0	0	0	0
% App. Total	0	80	20		5.3	0	94.7		70.3	29.7	0		0	0	0	
PHF	.000	.667	.250	.500	.250	.000	.750	.679	.813	.550	.000	.841	.000	.000	.000	.000

3: Existing Golf Course Rd & Westside Rd



Lane Configurations	Y	B	A
Signal Control	0%	0%	0%
Grade	0%	0%	0%
Volume	53	35	54
Peak Hour Factor	0.68	0.68	0.68
Pedestrians			
Walking Speed (ft/s)			
Right turn flare (veh)			
Median storage (veh)			
pX, platoon unblocked			
vC1, stage 1 conf vol	53	35	54
vCu, unblocked vol	95	100	100
IC, 2 stage (s)			
pl queue free %			
Volume Left	44	0	3
Volume Right	953	1700	1519
Volume Left	4	0	0
Queue Length 95th (ft)	A	A	A
Lane LOS	A	A	A
Approach LOS	A	A	A
Average Delay	3.8		
Intersection Capacity Utilization	15		
Analysis Period (min)	15		

7: Baseline Golf Course Rd & Westside Rd



Lane Configurations	Y	B	A
Signal Control	0%	0%	0%
Grade	0%	0%	0%
Volume	76	51	78
Peak Hour Factor	0.68	0.68	0.68
Pedestrians			
Walking Speed (ft/s)			
Right turn flare (veh)			
Median storage (veh)			
pX, platoon unblocked			
vC1, stage 1 conf vol	76	51	78
vCu, unblocked vol	93	100	100
IC, 2 stage (s)			
pl queue free %			
Volume Left	65	0	4
Volume Right	925	1700	1469
Volume Left	6	0	0
Queue Length 95th (ft)	A	A	A
Lane LOS	A	A	A
Approach LOS	A	A	A
Average Delay	3.9		
Intersection Capacity Utilization	15		
Analysis Period (min)	15		



Lane Configurations	T			T		
Sign Control	0%			0%		
Grade	0%			0%		
Volume (veh/h)	0.68	0.68	0.68	0.70	0.70	0.70
Peak Hour Factor	0.68	0.68	0.68	0.70	0.70	0.70
Hourly Volume	0.68	0.68	0.68	0.70	0.70	0.70
Pedestrians						
Walking Speed (ft/s)						
Right turn lane (veh)						
Median storage (veh)						
PX, platoon unblocked						
vC1, stage 1 conf vol	104	79	134	193	147	293
vC2, stage 2 conf vol						
vCu, unblocked vol	82	100	100	98	92	98
IC, 2 stage (s)						
pl queue free %						
Volume Left	157	0	4	0	23	54
Volume Right	889	1700	1420	1700	1363	719
SH						
Queue Length 95th (ft)	17	0	0	0	1	8
Control Delay (s)	A	A	A	A	A	B
Lane LOS	A	A	A	A	A	B
Approach Delay (s)	A	A	A	A	A	B
Approach LOS	A	A	A	A	A	B
Average Delay	5.2			2.3		
Intersection Capacity Utilization	0.22			0.22		
Analysis Period (min)	15			15		



Lane Configurations	T			T		
Sign Control	0%			0%		
Grade	0%			0%		
Volume (veh/h)	0.70	0.70	0.70	0.70	0.70	0.70
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Hourly Volume	0.70	0.70	0.70	0.70	0.70	0.70
Pedestrians						
Walking Speed (ft/s)						
Right turn lane (veh)						
Median storage (veh)						
PX, platoon unblocked						
vC1, stage 1 conf vol	193	147	293	193	147	293
vC2, stage 2 conf vol						
vCu, unblocked vol	98	92	98	98	92	98
IC, 2 stage (s)						
pl queue free %						
Volume Left	0	23	54	0	23	54
Volume Right	1700	1363	719	1700	1363	719
SH						
Queue Length 95th (ft)	0	1	8	0	1	8
Control Delay (s)	A	A	B	A	A	B
Lane LOS	A	A	B	A	A	B
Approach Delay (s)	A	A	B	A	A	B
Approach LOS	A	A	B	A	A	B
Average Delay	2.3			2.3		
Intersection Capacity Utilization	0.22			0.22		
Analysis Period (min)	15			15		