

MEMORANDUM

DATE: October 31, 2016

TO: Jerry Martens, Project Manager
Martens Enterprises LLC

FROM: Michael Read, PE, Principal, TENW

SUBJECT: Marian Meadows – EIS Consistency of Traffic Impacts
TENW Project No. 3475 – **DRAFT FOR ONLY**

This memorandum summarizes the results of a focused traffic impact analysis of the proposed *Marian Meadows*, a residential subdivision and recreational project in unincorporated Kittitas County near Easton, WA. This analysis documents and review the relative traffic impacts originally evaluated and disclosed within the *Marian Meadows Planned Unit Development, Traffic Impact Study*, December 2006 (226 single family homes) and subsequent *Marian Meadows Planned Unit Development Traffic Impact Study Addendum*, May 2007 (443 single family homes) as part of an extensive EIS process. As the date of these studies are approaching 10 years old and given the substantial changes proposed in reduced buildout of the overall Marian Meadows project, this consistency analysis addresses:

- Review available City/County/WSDOT documents, analysis, and plans, including obtaining other traffic studies prepared in the Easton vicinity and other relevant traffic work.
- Perform p.m. peak hour turning movement counts at the Interchange of Lake Easton Road and I-90 to verify no significant change in existing local freeway access utilization has taken place since original EIS analyses in 2006/07.
- Update project trip generation analysis for the now proposed 113-unit buildout, considering various mixes of residential unit types that may be applicable. This analysis also includes the proposed “for-sale” RV storage units with combined ownership camping facility. Study of up to 100 individual RV storage units is included. An additional RV sales/service facility for both residents/owners within the project also identifies trip generation of potential “external” retail sales.
- Prepare revised traffic forecasts and compare to previous traffic studies for confirmation of the consistency analysis of traffic impacts.
- Document existing and proposed nonmotorized facilities and review nonmotorized impacts and safety.
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- Document continued surface mining operations and truck route conflicts (if any).
- Update transportation mitigation measures to eliminate or reduce potential impacts.

The above scope was review and approved by Kittitas County staff in July 2016.

A site vicinity map is provided in **Figure 1**.



	<p>Figure 1 Project Vicinity</p>	<p>Marian Meadows Easton, Washington</p>
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Project Description

The proposed Marian Meadows includes up to 113 residential units, of which 81 would be single-family homes and 32 apartment units. The approximately 560 acre site is located on the north side of Sparks Road and east of Country Drive in Easton, WA (see **Figure 1**). This analysis also includes up to 100 “for-sale” RV storage units with combined ownership camping facility. Vehicular access to the site is proposed onto Sparks Road via a new on-site private roadway built to public standards. Project buildout is anticipated by year 2030. Secondary fire/emergency vehicle access is proposed onto Country Road, but this would be gated and locked for emergency use only. A preliminary site plan for the development of the initial plat is shown in **Figure 2**.

Project Trip Generation Analysis

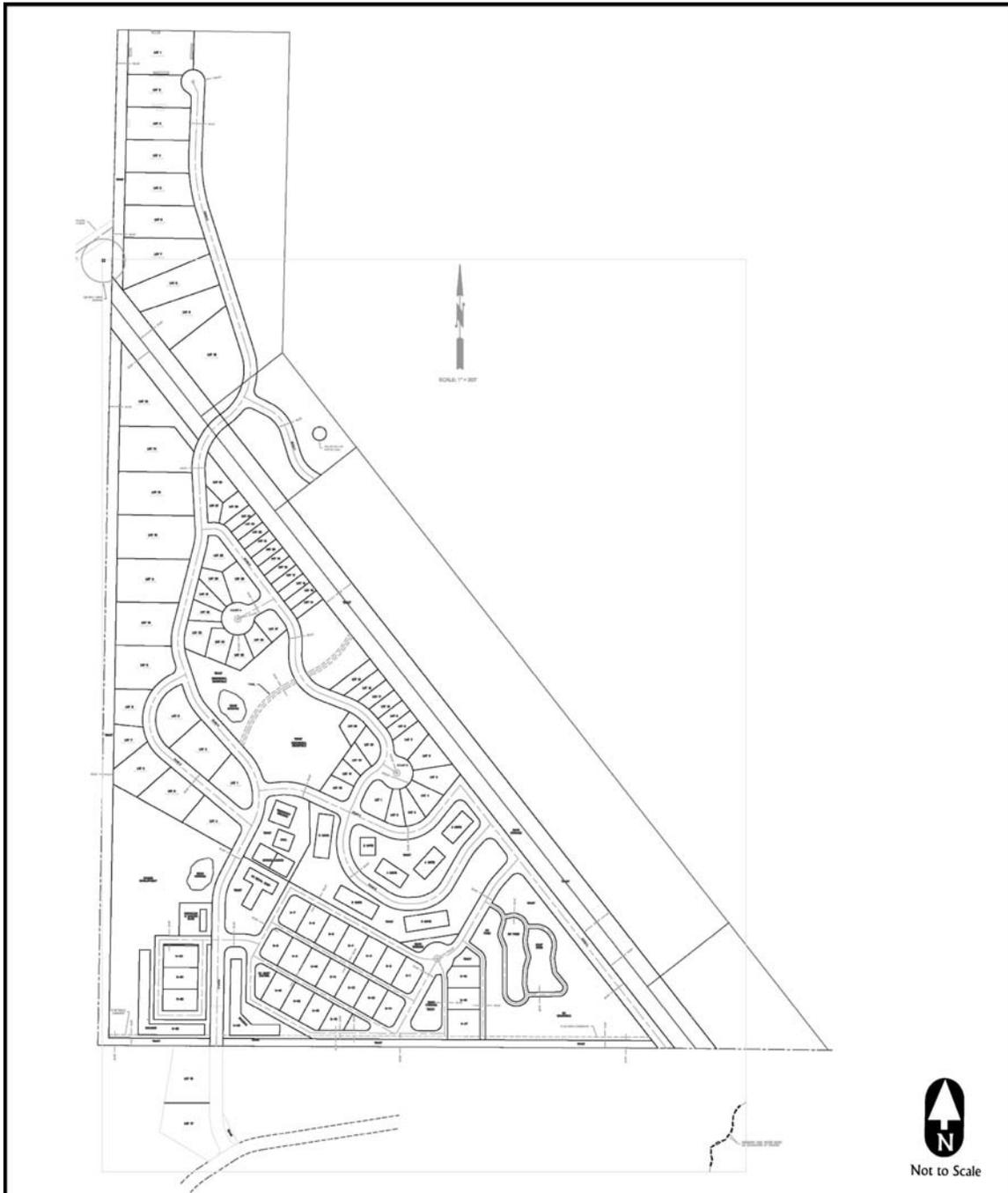
Published trip rate equations compiled by the Institute of Transportation Engineers (ITE) *Trip Generation, 9th Edition, 2012*, were used to estimate daily, a.m. and p.m. peak hour traffic that would be generated by the proposed completion of Marian Meadows using Single-Family Homes (ITE Land Use Code 210) and Apartments (ITE Land Use Code 220). As a conservative approach, the proposed on-site recreational RV units were assumed as Seasonal/Recreational Homes (ITE Land Use Code 260) rather than as RV campground slots given the higher trip generation rates. As provided in **Attachment A**, average and fitted curve equations were applied based upon the latest edition of the *Trip Generation Manual* and compared against the original project trip generation figures from the Marian Meadows EIS. In addition to these known elements, within the context of the RV condominium area a space has been identified for a 15,000 square-foot vehicle shop/part sales to support the RV community and other on-site residents. If open to the public, up to an additional 15 peak hour trips and 150 daily trips could be generated by this potential use. A separate detailed trip generation summary of this use is also included in **Attachment A**.

As shown in **Table 1**, the proposed buildout would generate approximately 1,294 daily, 98 a.m. peak hour (30 entering and 68 exiting), and 133 p.m. peak hour vehicular trips (79 entering and 54 exiting) with buildout of 113 residential housing units and 100 “for-sale” RV storage units. This however, represents a net decrease of approximately 2,695 fewer daily, 304 fewer a.m. peak hour, and 276 fewer p.m. peak hour vehicular than those trip generation levels evaluated in the Marian Meadows EIS (2006/07).

Table 1
Marian Meadows –Trip Generation Summary

Time Period	In	Out	Total
<i>Marian Meadows Using Standard ITE Rates for 2016 Proposal</i>			
Weekday AM Peak Hour	30	68	98
Weekday PM Peak Hour	79	54	133
Weekday Daily	647	647	1,294
<i>Net Change from Marian Meadows EIS (2006/07)</i>			
Weekday AM Peak Hour	-69	-235	-304
Weekday PM Peak Hour	-179	-97	-276
Weekday Daily	-1,348	-1,347	-2,695

Source: Trip Generation Manual, 9th Edition, ITE, 2012.



	<p>Figure 2 Preliminary Site Plan</p>	<p>Marian Meadows Easton, Washington</p>
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Intersection Levels of Service

Level of service (LOS) refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes LOS. At signalized intersections, LOS A represents free-flow conditions-motorists experience little or no delays, and LOS F represents forced-flow conditions-motorists experience an average delay in excess of 80 seconds per vehicle. The LOS reported for signalized intersections represents the average control delay for all vehicles entering the intersection. The LOS reported at stop-controlled intersections is also based on the average control delay (sec/veh), but is reported for stop controlled and yield movements only. **Table 2** outlines the LOS criteria for signalized and unsignalized intersections based on these methodologies.

Table 2
Level of Service Criteria for Intersections

Level of Service	Signalized Intersection Average Delay Range (sec)	Unsignalized Intersection Delay Range (sec)
A	≤ 10	≤ 10
B	> 10 to ≤ 20	> 10 to ≤ 15
C	> 20 to ≤ 35	> 15 to ≤ 25
D	> 35 to ≤ 55	> 25 to ≤ 35
E	> 55 to ≤ 80	> 35 to ≤ 50
F	> 80	> 50

Source: "Highway Capacity Manual", Special Report 209, Transportation Research Board, 2010.

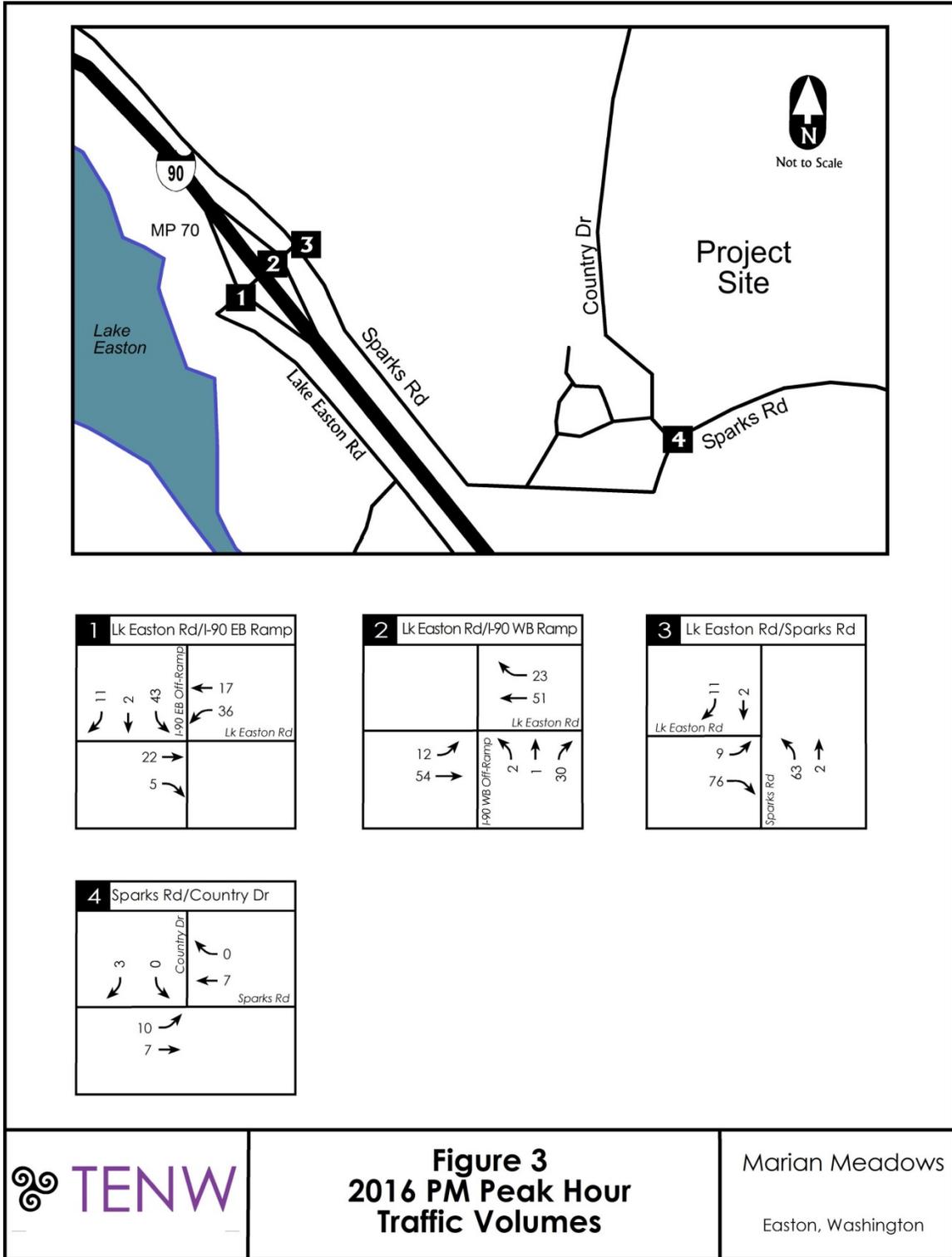
A summary of existing (2016) intersection levels of service are provided at all study intersections in **Table 3**. As shown, all existing study intersections currently operate at LOS A.

Table 3
2016 Intersection Levels of Service

Study Intersection	PM Peak Hour		
	LOS	Delay (sec)	V/C Ratio
<i>Stop Controlled Intersections</i>			
#1 I-90 EB Ramps / Lake Easton Road (SB)	A	9.5	0.07
#2 I-90 WB Ramps / Lake Easton Road (NB)	A	8.8	0.04
#3 Sparks Road / Lake Easton Road (NB)	A	9.3	0.08
#4 Sparks Road / Country Road (SB)	A	8.4	0.00

Source: TENW using Synchro 6.0. Worst movement or approach group reported only for stop controlled intersections.

Attachment B contains traffic counts collected during the p.m. peak hour at relevant study intersections in July 2016.



Non-Project Forecasts

Prior to beginning the analysis of traffic impacts associated with a reduced site plan for the proposed Marian Meadows project, TENW obtained new traffic count information within the study area to determine any changes that have occurred since the original EIS analysis. Based upon the observed historical growth in the immediate study area, a background growth rate of 2 percent per year was applied to 2016 traffic volumes documented as part of this traffic analysis. As the expected completion date will take a number of years to be built and occupied, a 2030 horizon year was assumed. Traffic volume forecasts for 2030 and historical counts are provided in **Attachment C**.

Project Trip Distribution

The distribution of the project trips was based on previous approved trip distribution assumptions from the Marian Meadows EIS, available access routes to/from the project site to regional freeway systems and directness or ease of circulation, and the overall distribution of local shopping/commercial areas and employment centers in the vicinity of the site. The resulting trip distribution of p.m. peak hour project trips is illustrated in **Figure 4**. **Figure 5** overviews 2030 traffic volume forecasts with and without the proposed Marian Meadows project.

Traffic Operational Impacts

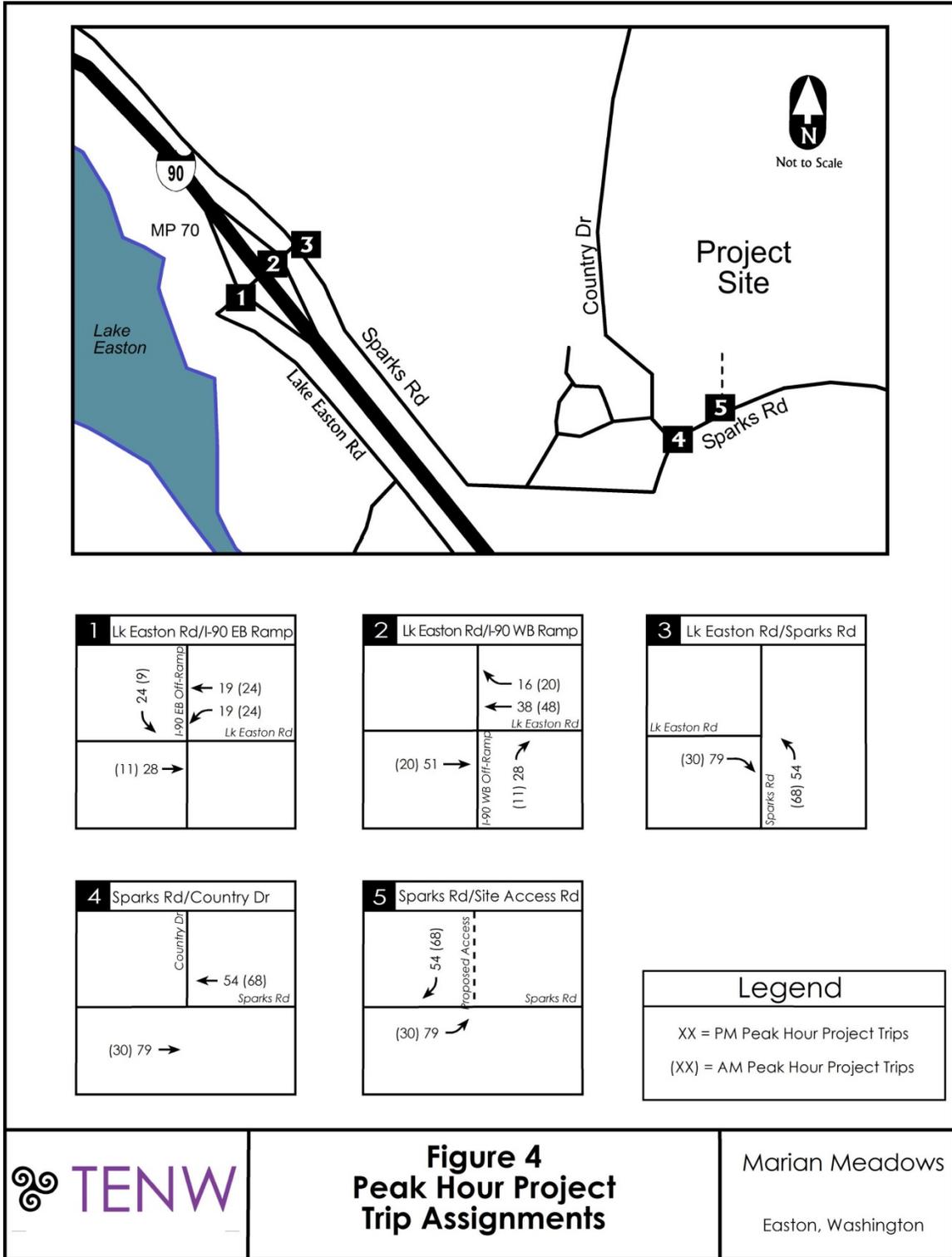
Estimated project intersection LOS impacts during the p.m. peak hour in 2030 are summarized in **Table 4**. As shown, all signalized and unsignalized study intersections are estimated to operate at LOS B or better with or without the project in 2030, with no resultant significant adverse traffic operational impacts expected to occur as a result of the project. All study intersections would meet adopted LOS standards for Kittitas County.

Detailed LOS summary worksheets and queuing estimates at the signalized study intersections are included in **Attachment D**.

Table 4
2030 PM Peak Hour Intersection Level of Service Impacts

Study Intersection	PM Peak Hour Without Project			PM Peak Hour With Project		
	LOS	Delay (sec)	V/C Ratio	LOS	Delay (sec)	V/C Ratio
<i>Stop Controlled Intersections</i>						
#1 I-90 EB Ramps / Lake Easton Road (SB)	A	9.9	0.10	B	11.0	0.15
#2 I-90 WB Ramps / Lake Easton Road (NB)	A	9.0	0.05	A	9.4	0.09
#3 Sparks Road / Lake Easton Road (NB)	A	9.7	0.11	B	10.1	0.18
#4 Sparks Road / Country Road (SB)	A	8.4	0.01	A	8.6	0.01
#5 Sparks Road / Project Site Access Road (SB)	--	--	--	A	8.5	0.05

Source: TENW using Synchro 6.0. Worst movement or approach group reported only for stop controlled intersections.



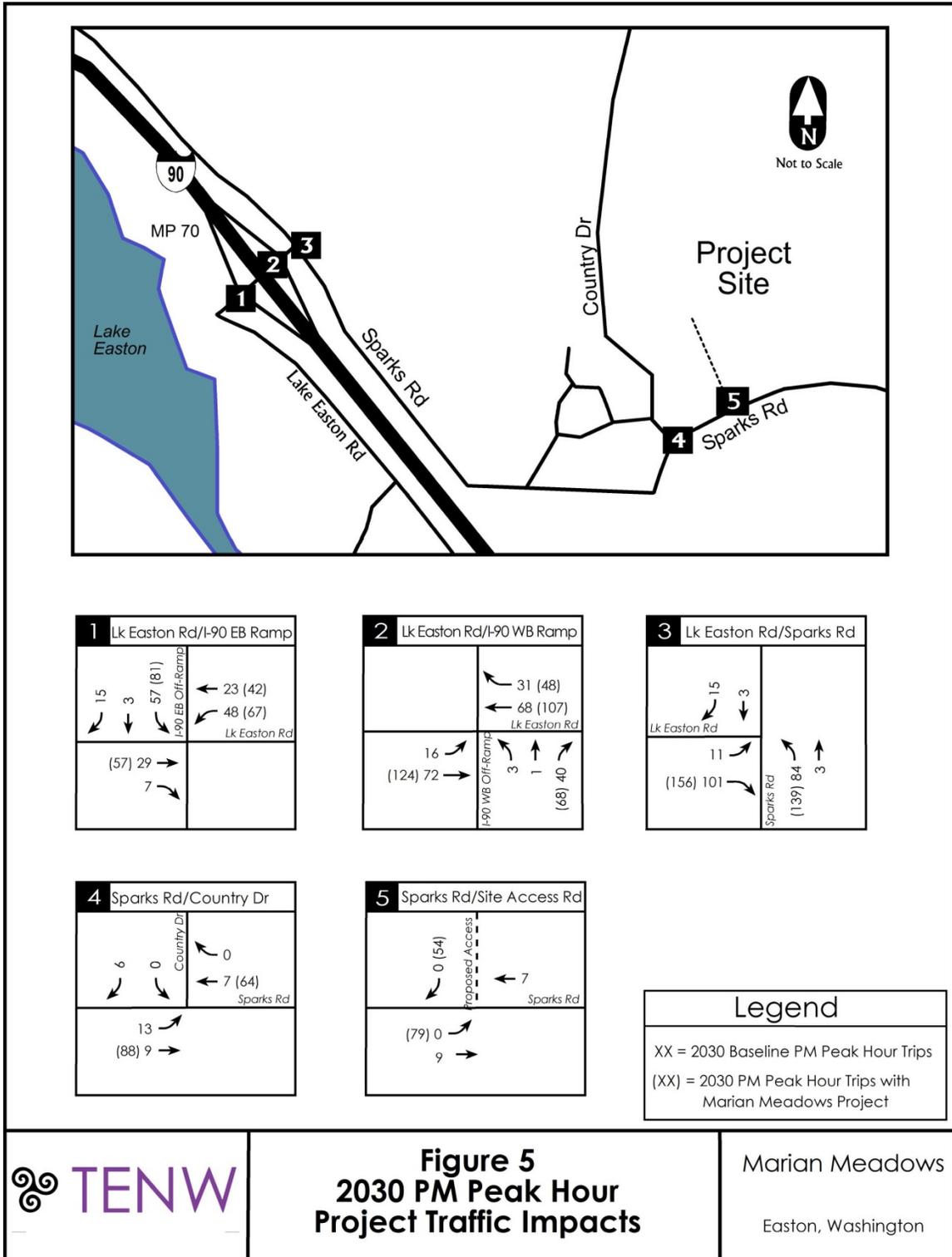


Figure 5
2030 PM Peak Hour
Project Traffic Impacts

Marian Meadows
 Easton, Washington

Site Access and Circulation

The primary access roadway is proposed onto Sparks Road at an existing driveway connection approximately 750 feet east of Country Drive. Secondary fire/emergency vehicle access would be provided via a gated emergency vehicle connection off of Country Road to meet International Fire Code and Kittitas County development standards. Given the limited number of existing trips on Sparks Road, no significant congestion or delay is forecast at the proposed access roadway and no turn lanes are warranted. As part of design review, a detailed engineering exercise of turning radius and fire/emergency vehicle maneuvering analysis of the proposed internal roadway system would be required to ensure fire and emergency vehicle circulation to all portions of the development are provided.

The overall project site is served by a single access route consisting of Sparks Road, which as a potential blockage point at the Silver Creek Bridge. This existing bridge has a substandard width to current Kittitas County standards and traverses just west of Hawthorne Lane approximately ½-mile west of the proposed site access roadway. The proposed alternative site access for fire/emergency vehicles via Country Road could accommodate blockages between Country Road and the site, however any blockages of the site due to an unlikely failure or blockage at the Silver Creek Bridge is not formally available. Potential alternatives include vehicle access via Easton State Airport during summer months (which has a roadway system that comprises an additional bridge over Siler Creek) or a resource road system to the east of the site through a surface mining operation which connects to Tree Farm Road at the next I-90 interchange east.

Nonmotorized Plan/Trails

As part of the overall site development, the applicant proposes to construct an on-site trail system for residents, tenants, and guests of the residential and RV condominium units. This would provide for nonmotorized circulation on-site between major development zones, and connect to adjacent informal trails and national forest properties north and east of the site for general recreational opportunities. Depending upon the proposed on-site roadway system designations (public versus private), the County has the authority to require additional pedestrian facilities under KCC 12.01.170.

Vicinity Truck Mining Operations

An existing surface mining operation currently is generating employee and resource haul trips using large trucks on a site southeast of the proposed Marian Meadows project. However, all truck haul trips and a majority of other employee/business trips associated with this operation utilize a gravel resource road that enters/exits the property via Tree Farm Road and associated I-90 interchange west of the primary route that would be utilized by the proposed Marian Meadows trips. While this site and associated mining operations can also be access via the end of Sparks Road, only occasional and limited trips are generated onto Sparks Road itself. As such, no impacts or conflicts with large trucks associated with the existing surface mining operations are expected.

Conclusions

The County's currently adopted LOS standard is LOS C. By 2030 with or without the proposed Marian Meadows development, all study intersections are expected to operate at LOS B or better during the weekday a.m. and p.m. peak hours which is better than the County's LOS standard. Therefore, no mitigation is required at the study intersections or site access roadway onto Sparks Road.

To mitigate for the unlikely potential of blockage of Sparks Road west of Country Road, the applicant should develop and submit a alternative site access plan of one or more options for County review that could be utilized by residents in the event of blockage of the primary site access road (namely Sparks Road).

If you have any questions regarding the information presented in this memo, please call me at (206) 361-7333 x 101 or mikeread@tenw.com.

Attachment A
Trip Generation Analysis

Marian Meadows PUD (443 Lots to 113 Residential Units & Recreational Uses)
 Trip Generation
 TENW Project No. 3475

Table 1
Comparative Trip Generation Estimate of Reduced Residential Units

	Lots	Units ¹	ITE LUC ²	Directional Distribution		ITE Trip Rate ³	Trips Generated		
				In	Out		In	Out	Total
<u>Daily</u>									
Marian Meadows 2016 (SF Residential Units)	81	DU	210	50%	50%	Based on Equation	432	433	865
Marian Meadows 2016 (MF Residential Units)	32	DU	220	50%	50%	Average Rate	106	107	213
Marian Meadows 2016 (Recreational Units)	100	DU	260	50%	50%	Average Rate	158	158	316
<i>Full Buildout (2007)</i>	<i>443</i>	<i>DU</i>	<i>210</i>	<i>50%</i>	<i>50%</i>	<i>Based on Equation</i>	<i>-2,044</i>	<i>-2,045</i>	<i>-4,089</i>
Net =	-362	DU					-1,348	-1,347	-2,695
<u>AM Peak Hour</u>									
Marian Meadows 2016 (SF Residential Units)	81	DU	210	25%	75%	Based on Equation	16	50	66
Marian Meadows 2016 (MF Residential Units)	32	DU	220	20%	80%	Average Rate	3	13	16
Marian Meadows 2016 (Recreational Units)	100	DU	260	67%	33%	Average Rate	11	5	16
<i>Full Buildout (2007)</i>	<i>443</i>	<i>DU</i>	<i>210</i>	<i>25%</i>	<i>75%</i>	<i>Based on Equation</i>	<i>-80</i>	<i>-240</i>	<i>-320</i>
Net =	-343	DU					-69	-235	-304
<u>PM Peak Hour</u>									
Marian Meadows 2016 (SF Residential Units)	81	DU	210	63%	37%	Based on Equation	55	32	87
Marian Meadows 2016 (MF Residential Units)	32	DU	220	65%	35%	Average Rate	13	7	20
Marian Meadows 2016 (Recreational Units)	100	DU	260	41%	59%	Average Rate	11	15	26
<i>Full Buildout (2007)</i>	<i>443</i>	<i>DU</i>	<i>210</i>	<i>63%</i>	<i>37%</i>	<i>Based on Equation</i>	<i>-258</i>	<i>-151</i>	<i>-409</i>
Net =	-362	DU					-179	-97	-276

Notes:

¹ DU is Dwelling Units.

² Institute of Transportation Engineers (ITE), Land Use Code (LUC) 210 Single-Family Detached Housing.

Potential On-Site 15,000 SF Automobile Care Center
Marian Meadows Consistency Analysis

AM Peak Hour

Land Use		AM Peak Rate	Unit		% Entering	% Exiting	Entering	Exiting	Total Trips	
Automobile Care Center	942	2.25	15,000	square feet	66%	34%	22	11	34	
							Subtotal	23	11	34
							Total	9	5	14
							with Internalization (60%)			

PM Peak Hour

Land Use		PM Peak Rate	Unit		% Entering	% Exiting	Entering	Exiting	Total Trips	
Automobile Care Center	942	3.11	15,000	square feet	48%	52%	22	24	47	
							Subtotal	22	24	47
							Total	9	10	19
							with Internalization (60%)			

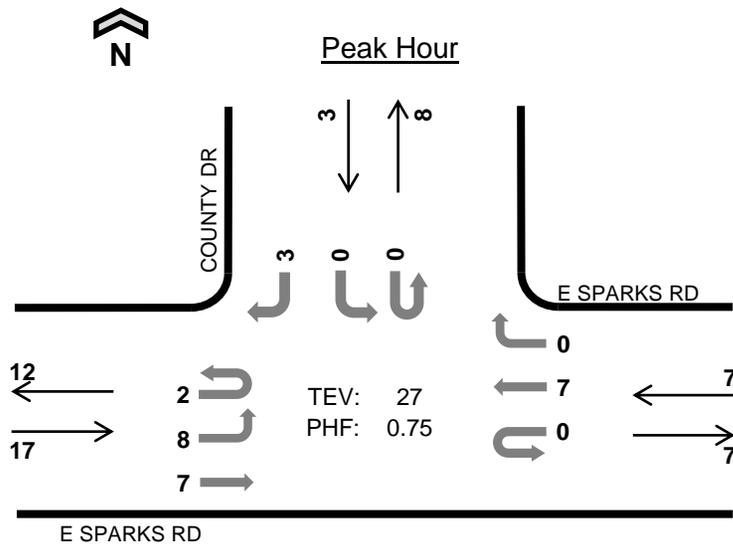
Daily

Land Use		Daily Rate	Unit		% Entering	% Exiting	Entering	Exiting	Total Trips	
Automobile Care Center	942	31.10	15,000	square feet	50%	50%	233	233	467	
							Subtotal	233	233	467
							Total	70	70	140
							with Internalization (60%)			

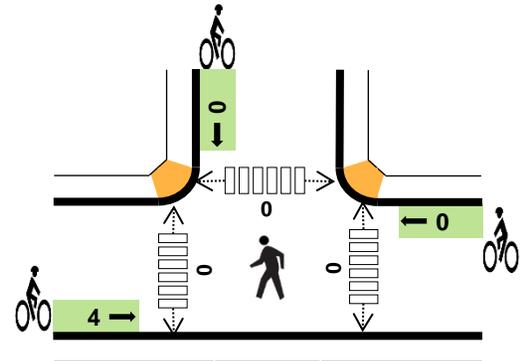
Source: ITE Trip Generation Manual, 9th Edition.

Attachment B
2016 Traffic Counts

COUNTY DR E SPARKS RD



Date: Wed, Jul 13, 2016
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



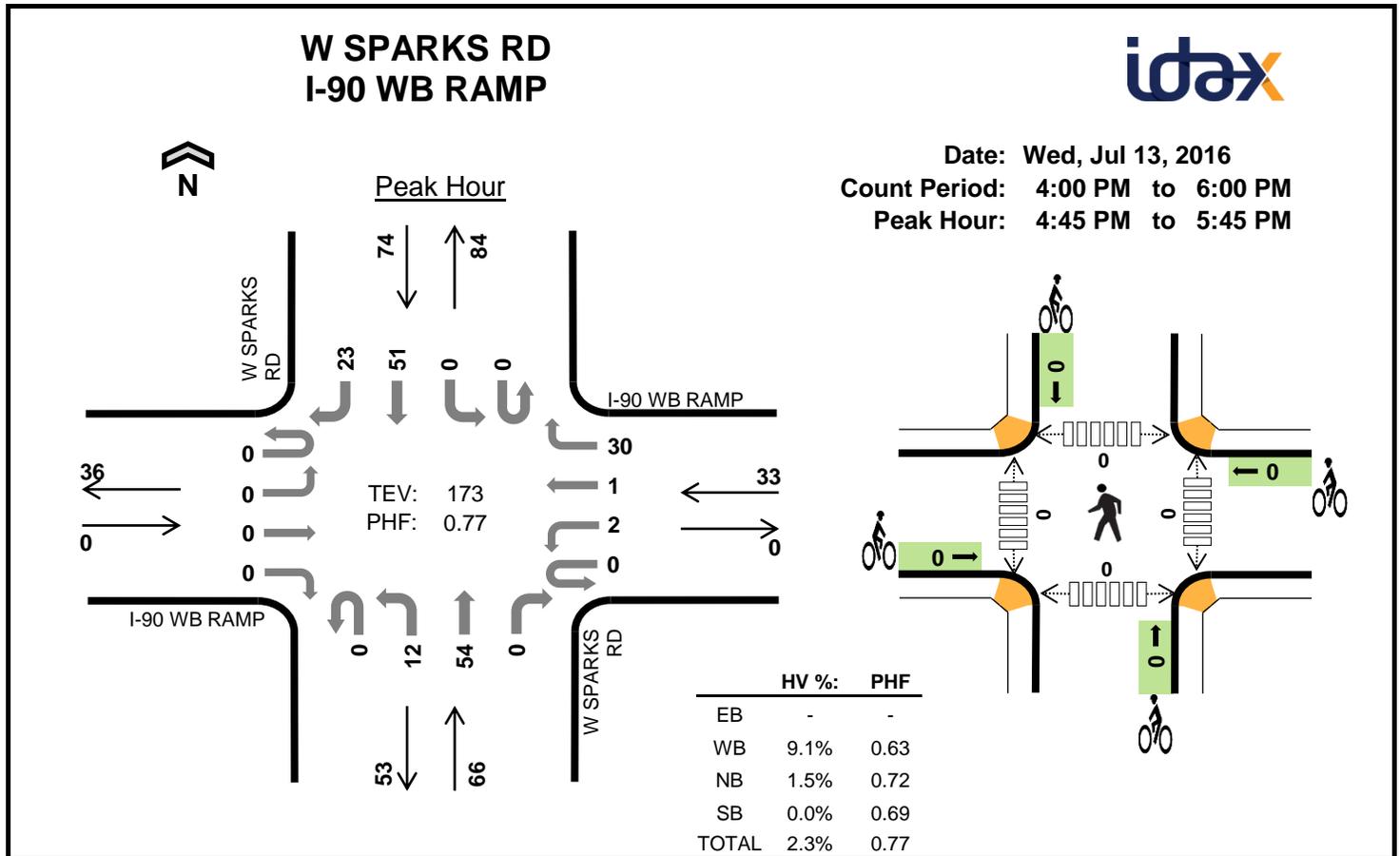
	HV %:	PHF
EB	0.0%	0.61
WB	0.0%	0.58
NB	-	-
SB	33.3%	0.38
TOTAL	3.7%	0.75

Two-Hour Count Summaries

Interval Start	E SPARKS RD				E SPARKS RD				0				COUNTY DR				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		
4:00 PM	1	3	1	0	0	0	1	0	0	0	0	0	0	0	0	1	7	0
4:15 PM	0	2	2	0	0	0	3	0	0	0	0	0	0	0	0	2	9	0
4:30 PM	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0
4:45 PM	0	3	4	0	0	0	1	0	0	0	0	0	0	0	0	0	8	27
5:00 PM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	1	5	25
5:15 PM	0	3	1	0	0	0	1	0	0	0	0	0	0	1	0	1	7	23
5:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	23
5:45 PM	0	1	3	0	0	0	3	0	0	0	0	0	0	0	0	1	8	23
Count Total	2	14	14	0	0	0	12	0	0	0	0	0	0	1	0	7	50	0
Peak Hour	2	8	7	0	0	0	7	0	0	0	0	0	0	0	0	3	27	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	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0
4:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
5:30 PM	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	1	1	6	0	0	1	7	0	0	0	0	0
Peak Hr	0	0	0	1	1	4	0	0	0	4	0	0	0	0	0

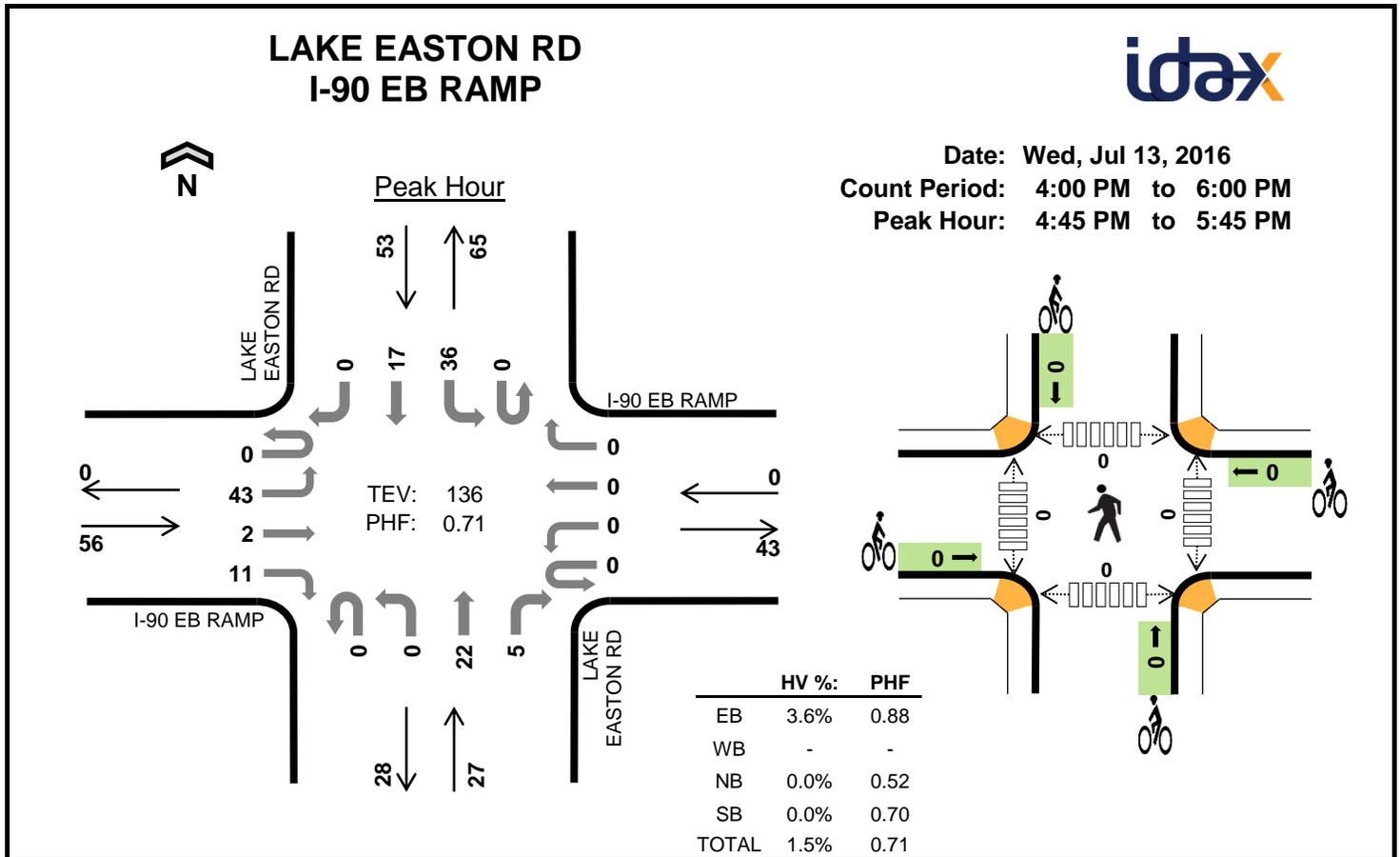


Two-Hour Count Summaries

Interval Start	I-90 WB RAMP				I-90 WB RAMP				W SPARKS RD				W SPARKS RD				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		
4:00 PM	0	0	0	0	0	1	0	11	0	1	13	0	0	0	8	4	38	0
4:15 PM	0	0	0	0	0	2	0	4	0	1	14	0	0	0	7	9	37	0
4:30 PM	0	0	0	0	0	1	0	5	0	0	9	0	0	0	15	6	36	0
4:45 PM	0	0	0	0	0	0	0	8	0	6	17	0	0	0	18	7	56	167
5:00 PM	0	0	0	0	0	1	1	5	0	1	13	0	0	0	8	1	30	159
5:15 PM	0	0	0	0	0	1	0	12	0	2	13	0	0	0	9	4	41	163
5:30 PM	0	0	0	0	0	0	0	5	0	3	11	0	0	0	16	11	46	173
5:45 PM	0	0	0	0	0	2	0	9	0	3	9	0	0	0	20	2	45	162
Count Total	0	0	0	0	0	8	1	59	0	17	99	0	0	0	101	44	329	0
Peak Hour	0	0	0	0	0	2	1	30	0	12	54	0	0	0	51	23	173	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0
Count Total	0	3	2	1	6	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0



Two-Hour Count Summaries

Interval Start	I-90 EB RAMP				I-90 EB RAMP				LAKE EASTON RD				LAKE EASTON RD				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		
4:00 PM	0	8	1	4	0	0	0	0	0	0	4	2	0	3	7	0	29	0
4:15 PM	0	11	0	4	0	0	0	0	0	0	6	3	0	5	5	0	34	0
4:30 PM	0	5	0	2	0	0	0	0	0	0	2	0	0	7	3	0	19	0
4:45 PM	0	12	1	3	0	0	0	0	0	0	11	2	0	15	4	0	48	130
5:00 PM	0	9	1	2	0	0	0	0	0	0	6	2	0	5	4	0	29	130
5:15 PM	0	12	0	3	0	0	0	0	0	0	2	0	0	5	5	0	27	123
5:30 PM	0	10	0	3	0	0	0	0	0	0	3	1	0	11	4	0	32	136
5:45 PM	0	6	0	2	0	0	0	0	0	0	7	0	0	10	12	0	37	125
Count Total	0	73	3	23	0	0	0	0	0	0	41	10	0	61	44	0	255	0
Peak Hour	0	43	2	11	0	0	0	0	0	0	22	5	0	36	17	0	136	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	2	0	0	1	3	0	0	0	0	0	0	0	0	0	0
Count Total	5	0	0	1	6	0	0	0	0	0	0	0	0	0	0
Peak Hour	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0

Attachment C
2030 Forecasts and Historical Counts

Turning Movement Volumes - PM Peak Hour
 Project Name: Marian Meadows EIS Consistency Analysis
 Project #: 3475
 Peak Hour: PM Peak

	Existing	Baseline
Growth Rate =	2.0%	2.0%
Existing Year =	2016	
Future Year =	2030	

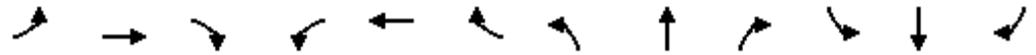
PM Enter 79
 PM Exit 54

TM INFO	TM Count - Peak Hour	2016 Existing	2030 Baseline	Trip Distribution	Project Trips	2030 With Project
Count Date: 10/26/06 Count Source: ATD Count Peak Hour: 5:00-6:00 PM	1 2006 Railroad St/90 EB Ramps	1 2016 Railroad St/90 EB Ramps	1 2030 Baseline Railroad St/90 EB Ramps	1 Railroad St/90 EB Ramps	1 Railroad St/90 EB Ramps	1 Railroad St/90 EB Ramps
%HV PHF EB 7.5 0.71 WB - - NB 3.1 0.57 SB 6.4 0.73 Total 5.9 0.78	↑ N 0 47 51 0 23 23 24 0 0 5 119 0 0 12 0 0 0 28 4 35 32	0 53 65 0 43 17 36 0 0 2 136 0 0 11 0 0 0 22 5 28 27	0 71 86 0 57 23 48 0 0 3 182 0 0 15 0 0 0 29 7 38 36 % Increase = 33.9%	30% 35% 35% 135% 35%	0 38 51 0 24 19 19 0 0 89 0 0 28 28 19 28	0 110 138 0 81 42 67 0 0 3 273 0 0 15 0 0 0 57 7 57 64 Project Share = 33.2%
Count Date: 10/26/06 Count Source: ATD Count Peak Hour: 4:45-5:45 PM	2 2006 Railroad St/90 WB Ramps	2 2016 Railroad St/90 WB Ramps	2 2030 Baseline Railroad St/90 WB Ramps	2 Railroad St/90 WB Ramps	2 Railroad St/90 WB Ramps	2 Railroad St/90 WB Ramps
%HV PHF EB 7.5 0.71 WB 6.9 0.91 NB 13.2 0.95 SB 7.4 0.71 Total 9.6 0.87	↑ N 19 0 54 0 15 39 25 29 0 136 0 4 0 4 49 0 43 53	0 74 84 0 23 51 30 33 0 173 1 1 0 12 54 0 2 0 53 66	0 99 112 0 31 68 40 44 0 231 1 3 0 16 72 0 0 71 88 % Increase = 33.5%	30% 70% 35% 200% 65%	0 54 79 0 16 38 28 28 133 0 0 51 51 38 51	0 154 192 0 48 107 68 72 0 366 1 3 0 16 124 0 0 110 140 Project Share = 36.9%
Count Date: 10/26/06 Count Source: ATD Count Peak Hour: 4:45-5:45 PM	3 2006 Railroad St/Sparks Road	3 2016 Railroad St/Sparks Road	3 2030 Baseline Railroad St/Sparks Road	3 Railroad St/Sparks Road	3 Railroad St/Sparks Road	3 Railroad St/Sparks Road
%HV PHF EB 0.0 0.56 WB 8.0 0.83 NB 9.5 0.93 SB - - Total 8.3 0.90	↑ N 9 0 0 50 0 2 133 2 48 69 7 0 67 55 74	0 65 0 0 0 2 63 78 11 163 2 2 9 0 76 74 85	0 87 104 0 0 0 3 84 0 217 0 0 15 101 84 99 112 % Increase = 32.7%	200% 100%	0 54 79 0 0 133 54 79 54 79	0 142 184 0 0 0 3 139 0 352 0 0 15 181 154 192 Project Share = 38.4%
Count Date: 10/26/06 Count Source: ATD Count Peak Hour: 5:00-6:00 PM	4 2006 County Drive/Sparks Road	4 2016 County Drive/Sparks Road	4 2030 Baseline County Drive/Sparks Road	4 County Drive/Sparks Road	4 County Drive/Sparks Road	4 County Drive/Sparks Road
%HV PHF EB 0.0 0.63 WB 0.0 0.63 NB - - SB 0.0 0.75 Total 0.0 0.75	↑ N 10 6 6 5 5 21 4 5 5 0 0 0 0	0 10 7 3 0 0 0 7 7 27 7 7 0 0 0 0 7 0 0 0 0 0	0 13 9 4 0 0 13 9 9 35 9 9 0 0 0 0 9 0 0 0 0 0 % Increase = 29.6%	100% 200% 100%	54 79 133 54 79 79 79	0 64 89 4 0 0 13 64 13 170 64 89 89 0 0 0 0 0 0 0 0 0 Project Share = 79.4%

Attachment D
Intersection LOS Summary Sheets

HCM Unsignalized Intersection Capacity Analysis
 1: Lake Easton Rd & I-90 EB Ramps

9/19/2016



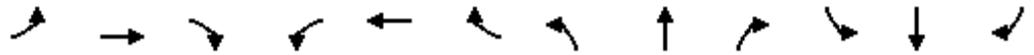
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶			↷						↷	↶
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	22	5	36	17	0	0	0	0	43	2	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	24	5	39	18	0	0	0	0	47	2	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)					1282							
pX, platoon unblocked												
vC, conflicting volume	18			29			136	123	27	123	126	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18			29			136	123	27	123	126	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	94	100	99
cM capacity (veh/h)	1598			1584			808	748	1049	835	746	1060

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	29	58	61
Volume Left	0	39	47
Volume Right	5	0	12
cSH	1700	1584	867
Volume to Capacity	0.02	0.02	0.07
Queue Length 95th (ft)	0	2	6
Control Delay (s)	0.0	5.0	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	5.0	9.5
Approach LOS			A

Intersection Summary		
Average Delay		5.9
Intersection Capacity Utilization	19.6%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis
 2: Lake Easton Rd & I-90 WB Ramps

9/19/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	54	0	0	51	23	2	1	30	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	59	0	0	55	25	2	1	33	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)					1143							
pX, platoon unblocked												
vC, conflicting volume	80			59			153	165	59	186	153	68
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80			59			153	165	59	186	153	68
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	97	100	100	100
cM capacity (veh/h)	1517			1545			809	721	1007	744	733	995

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	72	80	36
Volume Left	13	0	2
Volume Right	0	25	33
cSH	1517	1700	981
Volume to Capacity	0.01	0.05	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	1.4	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	1.4	0.0	8.8
Approach LOS			A

Intersection Summary		
Average Delay		2.2
Intersection Capacity Utilization	20.2%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis

3: Lake Easton Rd & Sparks Rd

9/19/2016



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙			↑	↑	
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	9	73	63	2	2	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	79	68	2	2	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		72	59	99	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		72	59	99	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	99		92	100	100	99
cM capacity (veh/h)	1623		902	827	786	1085

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	89	71	14
Volume Left	10	68	0
Volume Right	79	0	12
cSH	1623	900	1025
Volume to Capacity	0.01	0.08	0.01
Queue Length 95th (ft)	0	6	1
Control Delay (s)	0.8	9.3	8.6
Lane LOS	A	A	A
Approach Delay (s)	0.8	9.3	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay		4.9	
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

4: Sparks Rd & Country Dr

9/19/2016



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	10	7	7	0	0	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	8	8	0	0	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	8				37	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8				37	8
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1613				969	1075
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	18	8	3			
Volume Left	11	0	0			
Volume Right	0	0	3			
cSH	1613	1700	1075			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (ft)	1	0	0			
Control Delay (s)	4.3	0.0	8.4			
Lane LOS	A		A			
Approach Delay (s)	4.3	0.0	8.4			
Approach LOS			A			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization		17.6%		ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Lake Easton Rd & I-90 EB Ramps

9/19/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶			↷						↶	↷
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	29	7	48	23	0	0	0	0	57	3	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	8	52	25	0	0	0	0	62	3	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage veh												
Upstream signal (ft)					1282							
pX, platoon unblocked												
vC, conflicting volume	25			39			183	165	35	165	168	25
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			39			183	165	35	165	168	25
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	92	100	98
cM capacity (veh/h)	1589			1571			744	704	1037	780	700	1051

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	39	77	82
Volume Left	0	52	62
Volume Right	8	0	16
cSH	1700	1571	818
Volume to Capacity	0.02	0.03	0.10
Queue Length 95th (ft)	0	3	8
Control Delay (s)	0.0	5.1	9.9
Lane LOS		A	A
Approach Delay (s)	0.0	5.1	9.9
Approach LOS			A

Intersection Summary		
Average Delay		6.0
Intersection Capacity Utilization	21.4%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis
 2: Lake Easton Rd & I-90 WB Ramps

9/19/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	16	72	0	0	68	31	3	1	40	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	78	0	0	74	34	3	1	43	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)					1143							
pX, platoon unblocked												
vC, conflicting volume	108			78			204	221	78	248	204	91
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	108			78			204	221	78	248	204	91
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	96	100	100	100
cM capacity (veh/h)	1483			1520			747	670	982	668	684	967

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	96	108	48
Volume Left	17	0	3
Volume Right	0	34	43
cSH	1483	1700	952
Volume to Capacity	0.01	0.06	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	1.4	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	1.4	0.0	9.0
Approach LOS			A

Intersection Summary		
Average Delay		2.3
Intersection Capacity Utilization	21.3%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis

3: Lake Easton Rd & Sparks Rd

9/19/2016



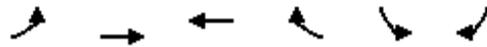
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙			↑	↓	↘
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	11	101	84	3	3	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	110	91	3	3	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		97	79	134	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		97	79	134	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	99		89	100	100	98
cM capacity (veh/h)	1623		865	805	751	1085

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	122	95	20
Volume Left	12	91	0
Volume Right	110	0	16
cSH	1623	862	1010
Volume to Capacity	0.01	0.11	0.02
Queue Length 95th (ft)	1	9	1
Control Delay (s)	0.8	9.7	8.6
Lane LOS	A	A	A
Approach Delay (s)	0.8	9.7	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay		5.0	
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 4: Sparks Rd & Country Dr

9/19/2016



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↔		↙	↘
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	13	9	7	0	0	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	10	8	0	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	8				46	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8				46	8
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1613				956	1075

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	24	8	7
Volume Left	14	0	0
Volume Right	0	0	7
cSH	1613	1700	1075
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (ft)	1	0	0
Control Delay (s)	4.3	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	4.3	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay		4.1	
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Lake Easton Rd & I-90 EB Ramps

9/19/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻			↻						↻	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	57	7	67	42	0	0	0	0	81	3	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	62	8	73	46	0	0	0	0	88	3	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)					1282							
pX, platoon unblocked												
vC, conflicting volume	46			70			275	257	66	257	261	46
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	46			70			275	257	66	257	261	46
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			100	100	100	87	99	98
cM capacity (veh/h)	1562			1531			640	616	998	671	613	1024

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	118	108
Volume Left	0	73	88
Volume Right	8	0	16
cSH	1700	1531	706
Volume to Capacity	0.04	0.05	0.15
Queue Length 95th (ft)	0	4	13
Control Delay (s)	0.0	4.7	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	4.7	11.0
Approach LOS			B

Intersection Summary		
Average Delay		5.9
Intersection Capacity Utilization	24.8%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis

2: Lake Easton Rd & I-90 WB Ramps

9/19/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	16	124	0	0	107	48	3	1	68	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	135	0	0	116	52	3	1	74	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)					1143							
pX, platoon unblocked												
vC, conflicting volume	168			135			312	338	135	386	312	142
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			135			312	338	135	386	312	142
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	92	100	100	100
cM capacity (veh/h)	1409			1450			635	576	914	520	596	905

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	152	168	78
Volume Left	17	0	3
Volume Right	0	52	74
cSH	1409	1700	890
Volume to Capacity	0.01	0.10	0.09
Queue Length 95th (ft)	1	0	7
Control Delay (s)	1.0	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	1.0	0.0	9.4
Approach LOS			A

Intersection Summary		
Average Delay		2.2
Intersection Capacity Utilization	30.4%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis
 3: Lake Easton Rd & Sparks Rd

9/19/2016



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			T	T	
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1	156	139	3	3	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	170	151	3	3	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		105	87	172	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		105	87	172	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	100		82	100	100	98
cM capacity (veh/h)	1623		858	803	721	1085

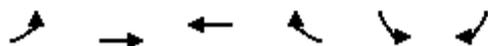
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	171	154	20
Volume Left	1	151	0
Volume Right	170	0	16
cSH	1623	857	1001
Volume to Capacity	0.00	0.18	0.02
Queue Length 95th (ft)	0	16	1
Control Delay (s)	0.1	10.1	8.7
Lane LOS	A	B	A
Approach Delay (s)	0.1	10.1	8.7
Approach LOS		B	A

Intersection Summary			
Average Delay		5.1	
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

4: Sparks Rd & Country Dr

9/19/2016



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	13	88	64	0	0	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	96	70	0	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	70				193	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70				193	70
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1531				788	993
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	110	70	7			
Volume Left	14	0	0			
Volume Right	0	0	7			
cSH	1531	1700	993			
Volume to Capacity	0.01	0.04	0.01			
Queue Length 95th (ft)	1	0	0			
Control Delay (s)	1.0	0.0	8.6			
Lane LOS	A		A			
Approach Delay (s)	1.0	0.0	8.6			
Approach LOS			A			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		22.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 6: Sparks Rd & Site Access Road

9/19/2016



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	79	9	7	0	0	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	10	8	0	0	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	8				189	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8				189	8
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	95
cM capacity (veh/h)	1613				757	1075
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	96	8	59			
Volume Left	86	0	0			
Volume Right	0	0	59			
cSH	1613	1700	1075			
Volume to Capacity	0.05	0.00	0.05			
Queue Length 95th (ft)	4	0	4			
Control Delay (s)	6.6	0.0	8.5			
Lane LOS	A		A			
Approach Delay (s)	6.6	0.0	8.5			
Approach LOS			A			
Intersection Summary						
Average Delay			7.0			
Intersection Capacity Utilization		21.5%		ICU Level of Service		A
Analysis Period (min)			15			