Site Access Analysis

LOS and Queuing

Level of service and queue calculations at the site access on Sparks Road were calculated using the methodology and procedures outlined in the 2000 *Highway Capacity Manual*, Special Report 209, Transportation Research Board using the *Highway Capacity Software (HCS 2000)* program. The reported queue lengths are 95th percentile queues, which represent a condition that is exceeded only five percent of the time.

The weekday a.m. and p.m. peak hour traffic volumes at the proposed access on Sparks Road were based on existing counts conducted on Sparks Road in the vicinity of Country Drive. Consistent with the analysis at the study intersections, the future 2011 background traffic volumes at the proposed access were estimated using a 1.43 annual growth rate. The resulting a.m. and p.m. peak hour traffic volumes at the proposed access on Sparks Road are summarized in **Figure 6**.

The weekday a.m. and p.m. peak hour LOS and queue analysis results at the proposed access on Sparks Road are summarized in Table 5.

T Sparks I LOS and Q			y	
		2011 V	Vith Pro	<u>ject</u>
	LOS¹	Delay_	V/C	Queue² Length (ft)
Sparks Road/Project Access				
AM Peak Hour				
Southbound Left-Right (outbound)	Α	8.8	0.11	25
Eastbound Left-through (inbound)	A	7.4	0.06	25
PM Peak Hour				
Southbound Left-Right (outbound)	A	8.6	0.07	25
Eastbound Left-through (inbound)	Α	7.5	0.12	25
The level of service at stop-controlled in Therefore, the reported LOS does not reintersection.	epresent a n	neasure of th	ie overali o	perations of the
Queue lengths are 95 th percentile queue five percent of the time. 25 feet = 1 ve	es, which re chicle	present a co	ndition tha	t is exceeded only

As shown in **Table 5**, all movements entering and exiting the proposed Sparks Road access are expected to operate at LOS A during the weekday a.m. and p.m. peak hours. The 95th percentile queue length experienced at the driveway is estimated to be 25 feet (1 vehicle) for vehicles exiting and entering the site during the weekday a.m. and p.m. peak hours. Detailed LOS and queue summary worksheets for the project driveway are provided in **Appendix B**.

Turn Lane Analysis

As requested by the County, an analysis was conducted to determine whether a left-turn lane on Sparks Road into the development or a right turn acceleration lane from the development onto Sparks Road should be considered. This analysis was based on guidelines included in the WSDOT *Design Manual*, May 2006.

Based on the estimated future traffic volumes at the project driveway during the a.m. and p.m. peak hours with the proposed project, a left-turn lane on Sparks Road is not needed for capacity as shown by figure 910-8a from the *Design Manual* (see analysis in **Appendix C**). Based on discussion included in the *Design Manual* regarding acceleration lanes (speed change lanes), "Justification for a speed change lane depends on many factors such as speed, traffic volumes, capacity, type of highway, the design and frequency of intersections, and accident history. Since the background traffic on Sparks Road is low (less than 10 peak hour trips) a right turn acceleration lane from the development onto Sparks Road would not be recommended.

Mitigation

The County's currently adopted LOS standard is LOS C. In 2011 with or without the proposed 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 proposed at the study intersections.

Appendix A: Level of Service Calculations at Study Intersections

Existing Conditions

Project Description Marian Meadows Development

East/West Street: Railroad Street North/South Street: I-90 Eastbound Ramps
Intersection Orientation: East-West Study Period (hrs): 0.25

Velstole Volumes and	Paulusiusi					
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	Т	R	L	T	R
Volume (veh/h)	0	15	2	19	15	0
Peak-hour factor, PHF	1.00	0.47	0.47	0.50	0.50	1.00
Hourly Flow Rate (veh/h)	0	31	4	38	30	0
Proportion of heavy	•			6		
vehicles, P _{HV}	. 0			0		
Median type			Undi	vided		
IRT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
7111101 001001				·		
Viovement	7	8	9	10	11	12
	7 L		9 R	10 L	Т	R
Vlovement		8	ļ	ļ	T 0	R 4
Volume (veh/h)	L	8 T	R	L	T 0 0.81	R 4 0.81
Movement Volume (veh/h) Peak-hour factor, PHF	L 0	8 T 0	R 0	L 9	T 0	R 4
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h)	L 0 1.00	8 T 0 1.00	R 0 1.00	L 9 0.81 11	T 0 0.81	R 4 0.81 4
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy	L 0 1.00	8 T 0 1.00	R 0 1.00	9 0.81	T 0 0.81	R 4 0.81
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h)	L 0 1.00	8 T 0 1.00	R 0 1.00	L 9 0.81 11	T 0 0.81 0 15	R 4 0.81 4
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy vehicles, P _{HV}	L 0 1.00	8 T 0 1.00 0	R 0 1.00	L 9 0.81 11	T 0 0.81 0 15 0	R 4 0.81 4
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy vehicles, P _{HV} Percent grade (%)	L 0 1.00	8 T 0 1.00 0	R 0 1.00	L 9 0.81 11	T 0 0.81 0 15	R 4 0.81 4 15
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach	L 0 1.00	8 T 0 1.00 0 0	R 0 1.00 0	L 9 0.81 11 15	T 0 0 0.81 0 15 0 N 0	R 4 0.81 4 15
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy vehicles, P _{HV} Percent grade (%) Flared approach Storage	L 0 1.00	8 T 0 1.00 0 0	R 0 1.00 0	L 9 0.81 11	T 0 0.81 0 15 0	R 4 0.81 4 15

Control Delay, Queue L	encilin Level o)f Service						DATE OF THE STATE OF
Approach	EB	WB		Northboun	d	;	Southbound	<u> </u>
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
/olume, v (vph)		38					15	
Capacity, c _m (vph)		1551					850	
//c ratio		0.02					0.02	
Queue length (95%)		0.08					0.05	
Control Delay (s/veh)		7.4					9.3	
OS		Α					A	
Approach delay (s/veh)							9.3	
Approach LOS							Α	

General Information

Analyst TENW
Agency/Co.
Date Performed 11/29/2006
Analysis Time Period AM Peak

Site Information
Railroad St/I-90 WB Ramps
Jurisdiction
Analysis Year 2006 Existing

Project Description Marian Meadows Development

| East/West Street: Railroad Street | North/South Street: I-90 Westbound Ramps

Intersection Orientation: East-West Study Period (hrs): 0.25

Vehicle Vallines site					Westbound	
Major Street		Eastbound			5	6
Movement	1	2	3	4	<u>5</u>	
	<u> </u>	T	R	L		19
Volume (veh/h)	11	15	0	0	39	
Peak-hour factor, PHF	0.57	0.57	1.00	1.00	0.69	0.69
Hourly Flow Rate (veh/h)	1	26	0	0	56	27
Proportion of heavy vehicles, P _{HV}	13			0		
Vledian type			Undi	ivided		
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
Vovement	7	8	9	10	11	12
ľ	L	Т	R	L	T	R
Volume (veh/h)	1	1	18	0	0	0
Peak-hour factor, PHF	0.71	0.71	0.71	1.00	1.00	1.00
THOURING Flow Rate (ven/11)	1	1	25	0	0	0
Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV}	15	15	25 15	0	0	0
Proportion of heavy /ehicles, P _{HV}	<u> </u>			1	0	
Proportion of heavy	<u> </u>	15		1	0 0 N	
Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach	<u> </u>	15		1	0	0
Proportion of heavy rehicles, P _{HV} Percent grade (%)	<u> </u>	15 0 N		1	0 0 N 0	0
Proportion of heavy /ehicles, P _{HV} Percent grade (%) Clared approach Storage	<u> </u>	15 0 N	15 .	1	0 0 N	0

Control Delay, Queue L	engih Level o)f-Service						
Approach	EB	WB		Northbound	tt	S	outhbound	1
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				ļ
/olume, v (vph)	1			27				
Capacity, c _m (vph)	1447			995				
ı/c ratio	0.00			0.03				
Queue length (95%)	0.00			0.08				
Control Delay (s/veh)	7.5			8.7				
.OS	Α			Α				<u></u>
Approach delay (s/veh)				8.7				
Approach LOS				<u> </u>		<u> </u>		

General InformationSite InformationAnalystTENWIntersectionRailroad St/Sparks RdAgency/Co.JurisdictionDate Performed11/29/2006Analysis Year2006 ExistingAnalysis Time PeriodAM Peak Hour

Project Description Marian Meadows Development

East/West Street: Railroad Street | North/South Street: Sparks Road

Intersection Orientation: East-West Study Period (hrs): 0.25

Vehicle Volumes zine		is the second				
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	Т	R	L	Т	R
Volume (veh/h)	, 5	0	28	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate (veh/h)	5	0	28	0	0	0
Proportion of heavy	10			0 .		
vehicles, P _{HV}	10		<u></u>			
Median type			Undi	vided		
RT Channelized?			0			0
Lanes	0.	0	0	0	0	0
Configuration	LTR	LR				
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
Movement	7	8	9	10	11	12
1	L	Т	R	L	T	R
Volume (veh/h)	50	1	0	0	1	8
Peak-hour factor, PHF	0.80	0.80	1.00	1.00	0.45	0.45
Hourly Flow Rate (veh/h)	62	1	0	0	2	17
Proportion of heavy	40	18	0	o	11	11
∕ehicles, P _{HV}	18	10		0		
Percent grade (%)		0			. 0	
clared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	1	0	0	1.	0
Configuration	LT					TR

Control Delay, Queue,	enolin, sevelo	of Service						
Approach	EB	WB		Northbound	d	S	Southboun	<u>d</u>
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
Volume, v (vph)	5		63					19
Capacity, c _m (vph)	1572		914					1030
//c ratio	0.00		0.07					0.02
Queue length (95%)	0.01		0.22					0.06
Control Delay (s/veh)	7.3		9.2					8.6
_OS	Α		Α					A
Approach delay (s/veh)				9.2			8.6	
Approach LOS				А			Α	
								37

ericalistation distribution in the contraction of t General internation Sparks Rd/Country Dr Intersection **TENW** l Analyst Jurisdiction Agency/Co. 2006 Existing Analysis Year 11/29/2006 Date Performed AM Peak Hour Analysis Time Period Marian Meadows Development Project Description Country Drive North/South Street: East/West Street: Sparks Road Study Period (hrs): 0.25 East-West Intersection Orientation:

valing extellines sale	Parelle statistic					
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	1	0	0	8	0
Peak-hour factor, PHF	0.38	0.38	1.00	1.00	0.50	0.50
Hourly Flow Rate (veh/h)	5	2	0	0	16	0
Proportion of heavy	20			o		
vehicles, P _{HV}	33					
Median type			Undi	vided		
IRT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
Vlovement	7	8	9	10	11	12
	L	Т	R	L	Т	R
Volume (veh/h)	0	0	0	0	0	6
Peak-hour factor, PHF	1.00	1.00	1.00	0.75	1.00	0.75
Hourly Flow Rate (veh/h)	0	0	0	0	0	8
Proportion of heavy	0	0	0	17	0	17
/ehicles, P _{HV}		0				
Percent grade (%)		0			0	
-lared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	0	0	0	0	0
Configuration				na variance a variance plane instruction of the state of	LR	

Control Delay, Queue	EB	WB		Northbound	1		Southbound	activate and of
Approach			7	1	9	10	11	12
Movement	1	4	1 /	8	9	10		12
Lane Configuration	LT						LR	
/olume, v (vph)	5						8	
Capacity, c _m (vph)	1421						1021	
r/c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.5						8.6	
.OS	A						A	
Approach delay (s/veh)							8.6	
Approach LOS							Α	

General Information

Analyst
Agency/Co.

Site Information

Intersection

Railroad St/l-90 EB Ramps

Jurisdiction

Date Performed 11/9/2006 Analysis Year 2006 Existing
Analysis Time Period PM Peak Hour

Project Description Marian Meadows Development

East/West Street: Railroad Street North/South Street: I-90 Eastbound Ramps
Intersection Orientation: East-West Study Period (hrs): 0.25

Janish Volumestine	ine mennen	S S S					
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	Т	R	
Volume (veh/h)	0	28	4	24	23	0	
Peak-hour factor, PHF	1.00	0.57	0.57	0.73	0.73	1.00	
Hourly Flow Rate (veh/h)	0	49	.7	32	31	0	
Proportion of heavy	_	,		6			
vehicles, P _{HV}	0			O	-		
Median type		Undivided					
IRT Channelized?			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street		Northbound			Southbound		
Vovement	7	8	9	10	11	12	
	L	T	R	L	Т	R	
Volume (veh/h)	0	0	0	23	5	12	
Peak-hour factor, PHF	1.00	1.00	1.00	0.71	0.71	0.71	
Hourly Flow Rate (veh/h)	0	0	0	32	7	16	
Proportion of heavy				8	8	8	
, ehicles, P _{HV}	0	0	. 0	0		Ů	
Percent grade (%)		0			0		
Flared approach		N			N		
Storage		0			0		
RT Channelized?			0			0	
anes	0	0	0	0	1	0	
Configuration					LTR]	

Control Delay, Queue l	englis Level o	f Service						
Approach	EB	WB		Northboun	d		Southbound	<u>!</u>
ı _ı vlovement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
/olume, v (vph)		32					55	
Capacity, c _m (vph)		1523					850	
//c ratio		0.02					0.06	
Queue length (95%)		0.06					0.21	
Control Delay (s/veh)		7.4					9.5	
OS		Α					Α	
Approach delay (s/veh)							9.5	
Approach LOS							Α	

्रांशां हात्रास्त्रास्त्राह्मात्राह्मात्राह्म enter la terment de la constant Railroad St/I-90 WB Ramps **TENW** Intersection Analyst Jurisdiction Agency/Co. 2006 Existing Analysis Year Date Performed 11/29/2006 PM Peak Analysis Time Period Project Description Marian Meadows Development North/South Street: I-90 Westbound Ramps East/West Street: Railroad Street

Study Period (hrs):

0.25

Vehicle Voluntes and	aringing.					
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
-	L	T	R	L	T	R
Volume (veh/h)	4	49	0	0	39	15
Peak-hour factor, PHF	0.95	0.95	1.00	1.00	0.71	0.71
Hourly Flow Rate (veh/h)	4	51	0	0	54	21
Proportion of heavy	13			О		
vehicles, P _{HV}	13			0		
Median type			Undi	vided		
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
				l 10	11	12
Vovement	7	88	9	10		
Novement	7 L	8 T	R R	L	T	R
	7 L 4				T 0	R 0
Movement Volume (veh/h) Peak-hour factor, PHF	L	T	R	L	T 0 1.00	R 0 1.00
Volume (veh/h)	L 4	T 0	R 25	L 0	T 0	R 0
Volume (veh/h) Peak-hour factor, PHF	L 4 0.91 4	T 0 0.91	R 25 0.91 27	L 0 1.00	T 0 1.00	R 0 1.00
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h)	L 4 0.91	T 0 0.91	R 25 0.91	0 1.00	T 0 1.00	R 0 1.00
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy	L 4 0.91 4	T 0 0.91	R 25 0.91 27	L 0 1.00	T 0 1.00	R 0 1.00
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV}	L 4 0.91 4	T 0 0.91 0	R 25 0.91 27	L 0 1.00	T 0 1.00 0	R 0 1.00
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%)	L 4 0.91 4	T 0 0.91 0 7	R 25 0.91 27	L 0 1.00	T 0 1.00 0 0 0	R 0 1.00
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach	L 4 0.91 4	T 0 0.91 0 7	R 25 0.91 27	L 0 1.00	T 0 0 1.00 0 0 0 N 0 0	R 0 1.00 0
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach Storage	L 4 0.91 4	T 0 0.91 0 7	R 25 0.91 27 7	L 0 1.00	T 0 1.00 0 0 0 N	R 0 1.00 0

Control Delay, Queue'l	entitie Meevelk	of Service						
Approach	EB	WB		Northbound		Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
Volume, v (vph)	4			31				
Capacity, c _m (vph)	1457			982				
ı/c ratio	0.00			0.03				
Queue length (95%)	0.01			0.10				
Control Delay (s/veh)	7.5			8.8				
_OS	Α			Α				<u> </u>
Approach delay (s/veh)				8.8				
Approach LOS	. —			Α				

Intersection Orientation: East-West

General intermentant

TENW

Site information
Intersection

Railroad St/Sparks Rd

Analyst Agency/Co.

Date Performed

Analysis Time Period

11/29/2006 PM Peak Hour Jurisdiction Analysis Year

2006 Existing

Project Description Marian Meadows Development

East/West Street: Railroad Street

North/South Street: Sparks Road

Intersection Orientation: East-West Study Period (hrs): 0.2

Validiewellingerand	rvijisinisi						
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	Т	R	
Volume (veh/h)	7	0	67	0	0	0	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate (veh/h)	7	0	67	0	0	0	
Proportion of heavy	10			О			
vehicles, P _{HV}	10						
Median type				ivided	1 1		
RT Channelized?			0			0	
Lanes	0	0	0	0	0	0	
Configuration	LTR	LR					
Upstream Signal		0			0		
Minor Street		Northbound		Southbound			
Vovement	7	8	9	10	11	12	
1	L	Т	R	L	Т	R	
Volume (veh/h)	48	2	0	0	2	7	
Peak-hour factor, PHF	0.83	0.83	1.00	1.00	0.56	0.56	
Hourly Flow Rate (veh/h)	57	2	0	0	3	12	
Proportion of heavy	8	8	0	0	0	o	
/ehicles, P _{HV}	0						
Percent grade (%)		0			0		
clared approach		N			N		
Storage		0			0		
RT Channelized?			0			0	
anes	0	1	0	0	1	0	
Configuration	LT					TR	

Control Delay, Queue					IN A PER CHARACTER THAT CAN	l	200	ıthbound	
Approach	EB	WB		Northbound			Outribouri		
Movement	1	4	7	8	9	10	11	12	
Lane Configuration	LTR		LT					TR	
/olume, v (vph)	7		59					15	
Capacity, c _m (vph)	1572		908					1020	
//c ratio	0.00		0.06					0.01	
Queue length (95%)	0.01		0.21					0.04	
Control Delay (s/veh)	7.3		9.2					8.6	
.OS	A		Α					<u> </u>	
Approach delay (s/veh)				9.2			8.6		
Approach LOS				Α			A		

GENERALI DE MENERALIST		Sie Memalien	
Analyst	TENW	Intersection	Sparks Rd/Country Dr
Agency/Co.	•	Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2006 Existing
Analysis Time Period	PM Peak Hour		
Project Description Mari	ian Meadows Developmen	t	
East/West Street: Sparks	Road	North/South Street: (Country Drive
Intersection Orientation:		Study Period (hrs): 0	.25

Addiole Voluntes and							
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	Т	R	L	T	R	
Volume (veh/h)	5	5	0	0	4	1	
Peak-hour factor, PHF	0.63	0.63	1.00	1.00	0.63	0.63	
-lourly Flow Rate (veh/h)	7	7	0	0	6	1	
Proportion of heavy vehicles, P _{HV}	. 0			0			
Vledian type		Undivided					
RT Channelized?			0			0	
Lanes	0	1	0	0	1	0	
Configuration	LT					TR	
Jpstream Signal		0			0		
	Northhound						
		Northbound			Southbound		
Minor Street Vovement	7	Northbound 8	9	10	Southbound 11	12	
Minor Street	7 L	,	9 R	10 L		R	
Minor Street Vovement	7 L 0	8	<u> </u>	L 0	11 T 0	R 6	
Minor Street Volume (veh/h)	L	8 T	R	L	11 T	R 6 0.75	
Minor Street Vovement	L 0	8 T 0	R 0	L 0	11 T 0	R 6	
Minor Street Vovement Volume (veh/h) Peak-hour factor, PHF	L 0 1.00	8 T 0 1.00	R 0 1.00	L 0 0.75	11 T 0 1.00	R 6 0.75	
Minor Street volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV}	L 0 1.00	8 T 0 1.00	R 0 1.00	0 0.75 0	11 T 0 1.00	R 6 0.75 8	
Minor Street Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%)	L 0 1.00	8 T 0 1.00 0	R 0 1.00	0 0.75 0	11 T 0 1.00 0	R 6 0.75 8	
Minor Street volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Clared approach	L 0 1.00	8 T 0 1.00 0	R 0 1.00	0 0.75 0	11 T 0 1.00 0	R 6 0.75 8	
Minor Street Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach Storage	L 0 1.00	8 T 0 1.00 0 0	R 0 1.00	0 0.75 0	11 T 0 1.00 0 0	R 6 0.75 8	
Minor Street volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Clared approach	L 0 1.00	8 T 0 1.00 0 0	R 0 1.00 0	0 0.75 0	11 T 0 1.00 0 0	R 6 0.75 8 0	

Control Delay Queue L	ength, Level o	of Service						
Approach	EB	WB		Northboun	d	Southbound		
Novement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR_	
/olume, v (vph)	7						8	
Capacity, c _m (vph)	1627						1083	
√c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.2						8.3	
.OS	Α						Α	<u></u>
Approach delay (s/veh)							8.3	
Approach LOS							Α	

Configuration

2011 Baseline Conditions

General Information
Analyst
Agency/Co.
Date Performed
Analysis Time Period

AM Peak

Site Information
Railroad St/I-90 EB Ramps
Jurisdiction
Analysis Year
2011 Without Project

Project Description Marian Meadows Development

East/West Street: Railroad Street | North/South Street: I-90 Eastbound Ramps

Intersection Orientation: East-West Study Period (hrs): 0.25

Venice Volumes and	Evilleingh.	G TEST SER					
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	T	R	L	ТТ	R	
Volume (veh/h)	0	16	2	20	16	0	
Peak-hour factor, PHF	1.00	0.47	0.47	0.50	0.50	1.00	
Hourly Flow Rate (veh/h)	0	34	4	40	32	0	
Proportion of heavy	0			6			
vehicles, P _{HV}	U			0	-		
Median type		Undivided					
RT Channelized?			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Jpstream Signal		0			0		
Minor Street		Northbound		Southbound			
				40	1 44	4.0	
Movement	7	8	9	10	11	12	
Vovement I	<i>l</i>	8 T	9 R	10 L	Т	R	
Volume (veh/h)	/ L 0			10 L 10		R 4	
	L	Т	R	L 10 0.81	Т	R	
Volume (veh/h)	L 0	T 0	R 0	L 10	T 0	R 4	
Volume (veh/h) Deak-hour factor, PHF	L 0 1.00	T 0 1.00	R 0 1.00	L 10 0.81 12	T 0 0.81 0	R 4 0.81 4	
Volume (veh/h) Peak-hour factor, PHF Indourly Flow Rate (veh/h)	L 0 1.00	T 0 1.00	R 0 1.00	L 10 0.81	T 0 0.81	R 4 0.81 4 15	
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy	L 0 1.00	T 0 1.00	R 0 1.00	L 10 0.81 12	T 0 0.81 0	R 4 0.81 4	
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy hehicles, P _{HV}	L 0 1.00	T 0 1.00 0	R 0 1.00	L 10 0.81 12	T 0 0.81 0	R 4 0.81 4 15	
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy Percent grade (%)	L 0 1.00	T 0 1.00 0 0	R 0 1.00	L 10 0.81 12	T 0 0.81 0 15	R 4 0.81 4 15	
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach	L 0 1.00	T 0 1.00 0 0 N	R 0 1.00	L 10 0.81 12	T 0 0.81 0 15 0	R 4 0.81 4 15	
Volume (veh/h) Peak-hour factor, PHF Hourly Flow Rate (veh/h) Proportion of heavy /ehicles, P _{HV} Percent grade (%) Flared approach Storage	L 0 1.00	T 0 1.00 0 0 N	R 0 1.00 0	L 10 0.81 12	T 0 0.81 0 15 0	R 4 0.81 4 15	

Control Delay, Queue	englin Levelt	of Service						
Approach	EB	WB		Northboun	d	Southbound		
lovement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
/olume, v (vph)		40	:				16	
Capacity, c _m (vph)		1547					838	
/c ratio		0.03					0.02	
Queue length (95%)		0.08					0.06	
Control Delay (s/veh)		7.4					9.4	
.OS		Α					Α	
Approach delay (s/veh)							9.4	
Approach LOS							Α	

	1110 1		
Sederal information		Sile incometica	
Analyst	TENW	Intersection	Railroad St/I-90 WB Ramps
Agency/Co. Date Performed	11/29/2006	Jurisdiction Analysis Year	2011 Without Project
Analysis Time Period	AM Peak		
Project Description Mar	ian Meadows Developme	nt	
East/West Street: Railros	ad Street	North/South Street: 1-	-90 Westbound Ramps
<u>Luca i i con con con con con con con con con con</u>		lov 1 5 2 1 1 1 \ A	0.5

ast/vvest Street. Railfoad Street								
East-West		Study Period	(nrs): <i>0.25</i>					
Evellemen				10/ th d				
					6			
1	2		4		0 R			
L	T		<u>L</u>		20			
1								
0.57					0.69			
11	28	0	0	60	28			
13			o					
	Undivided							
	1		l		0			
	4			1	0			
	7	0	U		TR			
L/				0				
				1				
		1						
7	!	<u> </u>			.l			
L	T	J		<u></u>	R			
1	11				0			
0.71	0.71				1.00			
1	1	26	0	0	0			
15	15	15	0	0	0			
	0			0				
	N			N				
	0			0				
		0			0			
0	1 LTR	0	0	0	0			
	East-West Adjustment 1 L 1 0.57 1 13 0 LT 7 L 1 0.71 1 15	East-West Comparison Compa	East-West Eastbound 1	Study Period (hrs): 0.25 Adjustments Eastbound 1	Study Period (hrs): 0.25 Study Period (hrs):			

Control Delay Queue		1	发展的	Northbound			outhbound	
Approach	EB	WB		Northbourid				
./lovement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
/olume, v (vph)	1			28				
Capacity, c _m (vph)	1441			992				
//c ratio	0.00			0.03				
Queue length (95%)	0.00			0.09				ļ
Control Delay (s/veh)	7.5			8.7				<u> </u>
.OS	Α		·	A				
Approach delay (s/veh)				8.7				
Approach LOS				Α		<u> </u>		

Strainfoldinantare General Information Railroad St/Sparks Rd Intersection **TENW** Analyst Jurisdiction Agency/Co. 2011 Without Project Analysis Year 11/29/2006 Date Performed AM Peak Hour Analysis Time Period Marian Meadows Development Project Description Sparks Road East/West Street: Railroad Street North/South Street: Study Period (hrs): 0.25 East-West Intersection Orientation:

Validates volumes and							
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	Т	R	L L	Т	R	
Volume (veh/h)	5	0	30	0	0	0	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate (veh/h)	5	0	30	0	0	0	
Proportion of heavy vehicles, P _{HV}	10			0			
Median type		Undivided					
RT Channelized?			0			0	
Lanes	0	0	0	0	0	0	
Configuration	LTR	LR					
Upstream Signal		0			0		
Minor Street		Northbound	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Southbound			
Vovement	7	8	9	10	11	12	
	L	Т	R	L	T	R	
Volume (veh/h)	54	1	0	0	1	9	
Peak-hour factor, PHF	0.80	0.80	1.00	1.00	0.45	0.45	
Hourly Flow Rate (veh/h)	67	1	0	0	2	20	
Proportion of heavy /ehicles, P _{HV}	18	18	0	0	11	11	
Percent grade (%)		0			0		
Flared approach		N			N		
Storage		0			0		
RT Channelized?			0			0	
anes	0	1	0	0	1	0	
Configuration	LT					│ <i>TR</i>	

Control Belay, Queue L Approach	EB	l WB	active and the second	Northbound	d	S	outhboun	d	
Movement	1	4	7	8	9	10	11	12	
Lane Configuration	LTR		LT					TR	
/olume, v (vph)	5		68					22	
Capacity, c _m (vph)	1572		909					1033	
/c ratio	0.00		0.07					0.02	
Queue length (95%)	0.01		0.24					0.07	
Control Delay (s/veh)	7.3		9.3					8.6	
.OS	Α		A					A	
Approach delay (s/veh)			9.3		8.6				
Approach LOS				Α			A		

General InformationSite InformationAnalystTENWAgency/Co.IntersectionSparks Rd/Country DrJurisdiction

Date Performed 11/29/2006 Analysis Time Period AM Peak Hour 2011 Without Project

Project Description Marian Meadows Development

East/West Street: Sparks Road North/South Street: Country Drive
Intersection Orientation: East-West Study Period (hrs): 0.25

Ventele Volumes en e	avelusiumi.					
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	Т	R		Т	R
Volume (veh/h)	2	1	0	0	9	0
Peak-hour factor, PHF	0.38	0.38	1.00	1.00	0.50	0.50
Hourly Flow Rate (veh/h)	5	2	0	0	18	0
Proportion of heavy				О		
vehicles, P _{HV}	33			0		
Median type			Undi	vided		
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Jpstream Signal		0			0	
Minor Street		Northbound			Southbound	
Vovement	7	8	9	10	11	12
ľ	L	Т	R	L	Т	R
Volume (veh/h)	0	0	0	0	0	6
Peak-hour factor, PHF	1.00	1.00	1.00	0.75	1.00	0.75
Hourly Flow Rate (veh/h)	0	0	0	0	0	8
Proportion of heavy				17	0	17
/ehicles, P _{HV}	0	0	0	17		
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue L	engih, Leveli	if Service						
Approach	EB	WB		Northboun	d	Southbound		
.vlovement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
/olume, v (vph)	5						8	
Capacity, c _m (vph)	1419						1019	
//c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.5						8.6	
.OS	Α						Α	
Approach delay (s/veh)							8.6	
Approach LOS							Α	

General information Railroad St/I-90 EB Ramps Intersection **TENW** Analyst Jurisdiction Agency/Co. 2011 Without Project Analysis Year 11/9/2006 Date Performed PM Peak Hour Analysis Time Period Marian Meadows Development Project Description North/South Street: I-90 Eastbound Ramps

East/West Street: Railroad Street

Study Period (hrs): 0.25 Intersection Orientation: East-West

Vehicle Volumes and							
		Eastbound			Westbound		
Major Street	1	2	3	4	5	6	
Movement	<u> </u>	 -	R	L	T	R	
Volume (veh/h)	0	30	4	26	25	0	
Peak-hour factor, PHF	1.00	0.57	0.57	0.73	0.73	1.00	
Hourly Flow Rate (veh/h)	0	52	7	35	34	0	
Proportion of heavy vehicles, P _{HV}	0			6			
Median type			Undi	livided			
RT Channelized?			0			0	
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street		Northbound			Southbound		
Vovement	7	8	9	10	11	12	
VIOVEINCIT	L	Т	R	L	T	R	
Volume (veh/h)	0	0	0	25	5	13	
Peak-hour factor, PHF	1.00	1.00	1.00	0.71	0.71	0.71	
Hourly Flow Rate (veh/h)	0	0	0	35	7	18	
Proportion of heavy rehicles, P _{HV}	0	0	0	8	8	8	
Percent grade (%)		0			0		
Flared approach		N			N		
Storage		0			0		
RT Channelized?			0			0	
	0	0	0	0	1	0	
_anes Configuration					LTR		

Jorniguration			Control of the Contro	emerene muse senare		THE RESERVE THE PROPERTY.	新加州尼西部州南部	
Control De aviouere	englineLevelo	ifi Servijee						
Approach	EB	WB Northbound S			Southbound			
Novement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
/olume, v (vph)		35					60	
Capacity, c _m (vph)		1520					840	
//c ratio		0.02					0.07	
Queue length (95%)		0.07					0.23	
Control Delay (s/veh)		7.4					9.6	
OS		A					Α	
Approach delay (s/veh)				t,			9.6	
Approach LOS							Α	
-P-L			ti CEL 11	All Diebte D	d			Version 4

Gineral Internation		selpaniohisie	
Analyst	TENW	Intersection	Railroad St/I-90 WB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 Without Project
Analysis Time Period	PM Peak		

Project Description Marian Meadows Development

East/West Street: Railroad Street North/South Street: I-90 Westbound Ramps

Intersection Orientation: East-West Study Period (hrs): 0.25

yeshiclesy/submescence	TATION TO THE					
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	Ť	R	L	Т	R
Volume (veh/h)	4	53	0	0	42	16
Peak-hour factor, PHF	0.95	0.95	1.00	1.00	0.71	0.71
Hourly Flow Rate (veh/h)	4	55	0	0	59	22
Proportion of heavy	40			О		
vehicles, P _{HV}	13					
Median type			Undi	vided		
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	
Minor Street		Northbound		<u> </u>	Southbound	
Vovement	7	8	9	10	11	12
	L	Т	R	L	T	R
Volume (veh/h)	4	0	27	0	0	0
Peak-hour factor, PHF	0.91	0.91	0.91	1.00	1.00	1.00
Hourly Flow Rate (veh/h)	4	0	29	0	0	0
Proportion of heavy	7	7	7	0	0	0
/ehicles, P _{HV}	/	/				
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	1	0	0	0	0
Configuration		LTR				

Control Delay, Queue L	ength, Level (Othe aread		
Approach	EB	WB Northbound			d		outhbound	
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
√olume, v (vph)	4			33				
Capacity, c _m (vph)	1450			977				
//c ratio	0.00			0.03				
Queue length (95%)	0.01			0.10				<u> </u>
Control Delay (s/veh)	7.5			8.8				
_OS	Α			A]
Approach delay (s/veh)				8.8				
Approach LOS				Α				

General Information

Analyst TENW
Agency/Co.
Date Performed 11/29/2006
Analysis Time Period PM Peak Hour

Site Information
Railroad St/Sparks Rd
Jurisdiction
Analysis Year 2011 Without Project

Project Description Marian Meadows Development

East/West Street: Railroad Street North/South Street: Sparks Road Intersection Orientation: East-West Study Period (hrs): 0.25

Veletale Verlunies ante	and the sure						
Major Street		Eastbound			Westbound		
Movement	1	2	3	4	5	6	
	L	Т	R	L	Т	R	
volume (veh/h)	8	0	72	0	0	0	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly Flow Rate (veh/h)	8	0	72	0	0	00	
Proportion of heavy	10			О			
vehicles, P _{HV}	10			<u> </u>			
Vedian type		Undivided					
RT Channelized?			0			0	
Lanes	0	0	0	0	0	0	
Configuration	LTR	LR					
Upstream Signal		0			0		
Minor Street		Northbound			Southbound		
Vovement	7	8	9	10	11	12	
ľ	L	Т	R	L	Т	R	
Volume (veh/h)	52	2	0	0	2	8	
Peak-hour factor, PHF	0.83	0.83	1.00	1.00	0.56	0.56	
Hourly Flow Rate (veh/h)	62	2	0	0	3	14	
Proportion of heavy		8	0	0	0	О	
rehicles, P _{HV}	8	0					
Percent grade (%)		0			00		
Clared approach		N			N		
Storage		0			0		
RT Channelized?			0			0	
anes	0	1	0	0	1	0	
Configuration	LT				-aco-ar-magaicas/4ci =tar-ar-ar-ar-ar-ar-ar-ar-ar-ar-ar-ar-ar-a	TR	

Control Delay, Queue L	enath Level c	of Service						
Approach	EB	WB		Northboun	d	Southbound		
Novement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
/olume, v (vph)	8		64					17
Capacity, c _m (vph)	1572		900					1026
//c ratio	0.01		0.07					0.02
Queue length (95%)	0.02		0.23					0.05
Control Delay (s/veh)	7.3		9.3					8.6
.OS	А		Α					A
Approach delay (s/veh)			9.3		8.6			
Approach LOS			Α			Α		
	L							Varnian 4

Analyst TENW Intersection Sparks Rd/Country Dr
Agency/Co.
Date Performed 11/29/2006 Analysis Time Period PM Peak Hour

Project Description Marian Meadows Development

East/West Street: Sparks Road North/South Street: Country Drive Intersection Orientation: East-West Study Period (hrs): 0.25

Zancie Zolomesane		A P				
Major Street		Eastbound			Westbound	
Movement	1	2	3	4	5	6
Wovernerit	L	T	R	L	Т	R
Volume (veh/h)	5	5	0	O	4	1
Peak-hour factor, PHF	0.63	0.63	1.00	1.00	0.63	0.63
Hourly Flow Rate (veh/h)	7	7	0	0	6	1
Proportion of heavy	^			o		
vehicles, P _{HV}	0					
Median type				ivided	,	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Jpstream Signal		0			0	
Minor Street		Northbound			Southbound	
Vlovement	7	8	9	10	11	12
ľ	L	T	R	L	T	R
Volume (veh/h)	0	0	0	0	0	6
Peak-hour factor, PHF	1.00	1.00	1.00	0.75	1.00	0.75
Hourly Flow Rate (veh/h)	0	0	0	0	0	8
Proportion of heavy		0	0	0	0	0
ehicles, P _{HV}	0	0	0			
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue L	ength Level	of Service					Southbound	
Approach	EB	WB		Northbound	d b			
Novement	1	4	7	8	9	10	11	12
Lane Configuration	LT					<u> </u>	LR	
/olume, v (vph)	7						8	
Capacity, c _m (vph)	1627						1083	
ı/c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.2						8.3	
.OS	A						A	
Approach delay (s/veh)							8.3	
Approach LOS							Α	

2011 With-Project Conditions

General Information Silentination Railroad St/I-90 EB Ramps Intersection Analyst **TENW** Jurisdiction Agency/Co. 2011 With Project 11/28/06 Analysis Year **Date Performed** Analysis Time Period AM Peak Marian Meadows Development

Project Description

North/South Street: I-90 Eastbound Ramps East/West Street: Railroad Street

Study Period (hrs): 0.25 Intersection Orientation: East-West

Velticle Volumes and Adjustments								
Major Street		Eastbound			Westbound			
Movement	1	2	3	4	5	6		
	L	T	R	<u> </u>	Т	R		
Volume (veh/h)	0	30	2	64	60	0		
Peak-hour factor, PHF	1.00	0.47	0.47	0.50	0.50	1.00		
Hourly Flow Rate (veh/h)	0	63	4	128	120	0		
Proportion of heavy	0			6				
vehicles, P _{HV}	0							
Median type			Undi	vided				
RT Channelized?			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street		Northbound			Southbound			
Vovement	7	8	9	10	11	12		
I	L	Т	R	L	T	R		
Volume (veh/h)	0	0	0	23	0	4		
Peak-hour factor, PHF	1.00	1.00	1.00	0.81	0.81	0.81		
Hourly Flow Rate (veh/h)	0	0	0	28	0	4		
Proportion of heavy /ehicles, P _{HV}	0	0	0	15	15	15		
Percent grade (%)		0			0			
clared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
anes	0	0	0	0	1	0		
Configuration					LTR	STATES SERVICE SERVICES SERVIC		

Control Delay, Queue I	engih Level o	f Service							
Approach	EB	WB		Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12	
Lane Configuration		LT					LTR		
√olume, v (vph)		128					32		
Capacity, c _m (vph)		1509					532		
//c ratio		0.08					0.06		
Queue length (95%)		0.28					0.19		
Control Delay (s/veh)		7.6					12.2		
OS		Α					В		
Approach delay (s/veh)							12.2		
Approach LOS							В	·	

Site Information General mornation Railroad St/I-90 WB Ramps Intersection **TENW** Analyst Jurisdiction Agency/Co. 2011 With Project Analysis Year 11/29/2006 **Date Performed** AM Peak Analysis Time Period Marian Meadows Development Project Description North/South Street: I-90 Westbound Ramps

Study Period (hrs):

0.25

Intersection Orientation: East-West Velájcie Vojcimes and Adjustiments Westbound Eastbound Major Street 6 5 4 3 2 Movement R T R T 58 130 0 0 43 1 Volume (veh/h) 0.69 1.00 0.69 1.00 Peak-hour factor, PHF 0.57 0.57 84 188 0 0 75 Hourly Flow Rate (veh/h) 1 Proportion of heavy 0 13 vehicles, P_{HV} Undivided Median type 0 RT Channelized? 0 0 1 0 1 0 Lanes TR LTConfiguration 0 0 Upstream Signal Southbound Northbound Minor Street 11 12 9 10 7 8 **Movement** Т R L R L T 0 0 0 1 34 1 Volume (veh/h) 1.00 1.00 1.00 0.71 0.71 Peak-hour factor, PHF 0.71 0 0 47 0 1 Hourly Flow Rate (veh/h) 1 Proportion of heavy 0 0 0 15 15 15 rehicles, PHV 0 0 Percent grade (%) Ν Ν ^{l⊏}lared approach 0 0 Storage 0 0 RT Channelized? 0 0 0 0 0 1 anes LTR

englii. Level c	f Service						
EB	WB Northbound Southbou				outhbound		
1	4	7	8	9	10	11	12
LT			LTR				
1			49				
1230			929				
0.00			0.05				<u> </u>
0.00	·		0.17				
7.9			9.1				
Α			A				
			9.1				
			Α				
	EB 1 LT 1 1230 0.00 0.00 7.9 A	1 4 LT 1 1230 0.00 0.00 7.9 A	EB WB 1 4 7 LT 1 1 1230 0.00 0.00 7.9 A	EB WB Northbound 1 4 7 8 LT LTR 49 1230 929 0.05 0.00 0.05 0.17 7.9 9.1 A A 9.1 A 9.1	EB WB Northbound 1 4 7 8 9 LT LTR 1 49 1 1230 929 0.005 0.05 0.05 0.00 0.17 9.1 4 7.9 A A A 9.1 9.1	EB WB Northbound S 1 4 7 8 9 10 LT LTR LTR 1 49 1 1230 929 0.05 0.05 0.05 0.07 0.17	EB WB Northbound Southbound 1 4 7 8 9 10 11 LT LTR 1 49 1 1 49 1

Configuration

East/West Street: Railroad Street

TWO-WAY STOP CONTROL SUMMARY Site injernation Gianeral Information Railroad St/Sparks Rd Intersection **TENW** Analyst Jurisdiction Agency/Co. 2011 With Project Analysis Year 11/29/2006 Date Performed Analysis Time Period AM Peak Hour Project Description Marian Meadows Development North/South Street: Sparks Road East/West Street: Railroad Street Study Period (hrs): 0.25 Intersection Orientation: East-West Vericle Volumes and Addustments Westbound Eastbound **Major Street** 6 4 3 5 1 2 Movement T R R T L 0 0 72 0 0 Volume (veh/h) 5 1.00 1.00 1.00 1.00 Peak-hour factor, PHF 1.00 1.00 0 72 0 Hourly Flow Rate (veh/h) 5 0 Proportion of heavy 0 10 lyehicles, P_{HV} Undivided Median type 0 RT Channelized? 0 0 0 0 0 0 anes LTR LR Configuration 0 Jpstream Signal Southbound Northbound **Minor Street** 12 9 10 11 8 Movement Т R R L Т L 0 1 9 1 0 180 /olume (veh/h) 0.45 1.00 0.45 1.00 0.80 Peak-hour factor, PHF 0.80 20 2 0 Hourly Flow Rate (veh/h) 224 0 1 Proportion of heavy 0 11 11 0 18 18 rehicles, P_{HV} 0 0 Percent grade (%) Ν Ν Flared approach 0 0 Storage 0 RT Channelized? 0 0 1 0 1 0 0 .anes TR \overline{LT} Configuration Control Delay, Queue Length, Level of Service Southbound Northbound EΒ **WB** Approach 9 10 11 12 4 8 1 7 Movement TR LT.ane Configuration LTR 22 5 225 /olume, v (vph) 1027 881 1572 Capacity, c_m (vph) 0.02 0.26 //c ratio 0.00 0.07 1.02 Queue length (95%) 0.01 8.6 10.5 Control Delay (s/veh) 7.3 Α В .OS Α 8.6 10.5 Approach delay (s/veh) Α Approach LOS

Situation in the solid Ceneral informations Railroad St/I-90 EB Ramps **TENW** Intersection Analyst Jurisdiction Agency/Co. 2011 With Project Analysis Year **Date Performed** 11/28/06 PM Peak Hour Analysis Time Period Marian Meadows Development Project Description North/South Street: I-90 Eastbound Ramps

East/West Street: Railroad Street North/South Street: I-90 East Intersection Orientation: East-West Study Period (hrs): 0.25

Zelfiele Volumes ene		L Company				Vehicle Volumes and Adjustments								
Major Street		Eastbound			Westbound									
Movement	1	2	3	4	5	6								
	L	Τ	R	L	Т	R								
Volume (veh/h)	0	79	4	54	55	0								
Peak-hour factor, PHF	1.00	0.57	0.57	0.73	0.73	1.00								
Hourly Flow Rate (veh/h)	0	138	7	73	75	0								
Proportion of heavy	0			6										
vehicles, P _{HV}	U			0										
vledian type			Undi	vided										
RT Channelized?			0			0								
I _{-anes}	0	1	0	0	1	0								
Configuration			TR	LT										
Upstream Signal		0			0									
Minor Street		Northbound			Southbound									
vlovement	7	88	9	10	11	12								
ľ	L	Т	R .	L	Т	R								
Volume (veh/h)	0	0	0	67	5	13								
Peak-hour factor, PHF	1.00	1.00	1.00	0.71	0.71	0.71								
Hourly Flow Rate (veh/h)	0	0	0	94	7	18								
Proportion of heavy	0	О	o	8	8	8								
rehicles, P _{HV}		0	U	0										
Percent grade (%)		0			0									
Flared approach		N			N .									
Storage		0			0									
RT Channelized?			0			0								
anes	0	0	0	0	1	0								
Configuration					LTR									

Control Delay, Queue I	engih, Level c	M.Service						
Approach	EB	WB		Northbound		Southbound		
ı _ı vlovement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
/olume, v (vph)		73					119	
Capacity, c _m (vph)		1413					624	
/c ratio		0.05					0.19	
Queue length (95%)	-	0.16					0.70	
Control Delay (s/veh)		7.7					12.1	
.OS		Α					В	
¡Approach delay (s/veh)							12.1	
Approach LOS							В	

Garleiel Information		Site de le					
Analyst	TENW	Intersection	Railroad St/I-90 WB Ramps				
Agency/Co.		Jurisdiction					
Date Performed	11/29/2006	Analysis Year	2011 With Project				
Analysis Time Period	PM Peak						
Project Description Mari	an Meadows Developme	ent					
¡East/West Street: Railroa	d Street	North/South Street: I-	North/South Street: I-90 Westbound Ramps				
Intersection Orientation:		Study Period (hrs): 0.	25				

Velme e Wellumes and		ie .				
Major Street		Eastbound			Westbound	
Movement	1	2	3	44	5	6
	L	Т	R	L	Т	R
Volume (veh/h)	4	144	0	0	100	45
Peak-hour factor, PHF	0.95	0.95	1.00	1.00	0.71	0.71
Hourly Flow Rate (veh/h)	4	151	0	0	140	63
Proportion of heavy	40			О		
vehicles, P _{HV}	13			U		
vledian type			Undi	vided		
RT Channelized?			0			0
Lanes	0	11	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	ļ
Minor Street		Northbound			Southbound	
Vovement	7	8	9	10	11	12
1	L	T	R	L	T	R
Volume (veh/h)	4	0	76	0	0	0
Peak-hour factor, PHF	0.91	0.91	0.91	1.00	1.00	1.00
Hourly Flow Rate (veh/h)	4	0	83	0	0	0
Proportion of heavy	7	7	7	0	0	0
rehicles, P _{HV}	/	/	,			
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
anes	0	1	0	0	0	0
Configuration		LTR				

Control Delay, Queue L	ength Level	of Service						
Approach	EB	WB	Northbound .		WB Northbound Southbound			d
Novement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
/olume, v (vph)	4			87				
Capacity, c _m (vph)	1306			868				
/c ratio	0.00			0.10				
Queue length (95%)	0.01			0.33				
Control Delay (s/veh)	7.8			9.6				
.OS	Α			Α				
Approach delay (s/veh)				9.6				
Approach LOS				Α				

General InformationSite InformationAnalystTENWIntersectionRailroad St/Sparks RdAgency/Co.JurisdictionDate Performed11/29/2006Analysis Year2011 With ProjectAnalysis Time PeriodPM Peak Hour

Project Description Marian Meadows Development

East/West Street: Railroad Street North/South Street: Sparks Road

Intersection Orientation: East-West Study Period (hrs): 0.25

velije is Vojumes and	enementa					
Major Street	Section Commission (Control of Control of Co	Eastbound			Westbound	
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
JVolume (veh/h)	8	0	212	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
lourly Flow Rate (veh/h)	8	0	212	0	0	0
Proportion of heavy	40			О		
vehicles, P _{HV}	10			0		
Vledian type			Undi	vided		
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	LTR	LR				
Upstream Signal		0			0	
Minor Street		Northbound			Southbound	
Vovement	7	8	9	10	11	12
	L	Т	R	L	Т	R
Volume (veh/h)	135	2	0	0	2	8
Peak-hour factor, PHF	0.83	0.83	1.00	1.00	0.56	0.56
Hourly Flow Rate (veh/h)	162	2	0	0	3	14
Proportion of heavy	8	8	0	0	0	o
/ehicles, P _{HV}	8	0	U			
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
_anes	0	1	0	0	1	0
Configuration	LT					TR

Control Delay Queue L	endth Level o	of Service						
Approach	EB	WB	Northbound		Southbound			
uvlovement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
/olume, v (vph)	8		164			-		17
Capacity, c _m (vph)	1572		811					983
//c ratio	0.01		0.20					0.02
Queue length (95%)	0.02		0.75					0.05
Control Delay (s/veh)	7.3		10.6					8.7
OS	Α		В					A
Approach delay (s/veh)				10.6			8.7	
Approach LOS				В			A	
				4 11 D 1 1 . D	. 1			Version 4

Sice information of General information Sparks Rd/Country Dr Intersection **TENW** -Analyst Jurisdiction Agency/Co. 2011 With Project Analysis Year 11/29/2006 Date Performed Analysis Time Period PM Peak Hour Marian Meadows Development Project Description Country Drive North/South Street: East/West Street: Sparks Road

Study Period (hrs):

0.25

/entele Velumes and Adjustments Westbound Eastbound Major Street 6 4 5 3 1 2 ^IMovement T R T R L L 0 79 1 0 131 19 Volume (veh/h) 0.63 0.63 1.00 1.00 0.63 Peak-hour factor, PHF 0.63 125 1 0 0 207 30 Hourly Flow Rate (veh/h) Proportion of heavy 0 0 vehicles, P_{HV} Undivided Median type 0 0 RT Channelized? 0 1 0 0 1 0 Lanes TR LT Configuration 0 0 **Upstream Signal** Southbound Northbound Minor Street 12 10 11 9 7 8 Vlovement Т R L Т R L 14 0 0 0 0 0 Volume (veh/h) 0.75 0.75 1.00 1.00 1.00 1.00 Peak-hour factor, PHF 18 0 0 0 0 Hourly Flow Rate (veh/h) 0 Proportion of heavy 0 0 0 0 0 0 /ehicles, P_{HV} 0 0 Percent grade (%) Ν Ν Flared approach 0 0 Storage 0 0 RT Channelized? 0 0 0 0 0 0 _anes

Sontrol Delay-Queue	EB	WB		Northboun	d	- Company Control Cont	Southbound	
Approach		1 4	7	8	9	10	11	12
Movement	1	4	<u> </u>	0	9	10	 	
Lane Configuration	LT						LR	<u> </u>
/olume, v (vph)	30						18	
Capacity, c _m (vph)	1473						930	
//c ratio	0.02						0.02	
Queue length (95%)	0.06						0.06	
Control Delay (s/veh)	7.5						8.9	
OS	А						Α	<u> </u>
Approach delay (s/veh)							8.9	
Approach LOS							<u> </u>	

Configuration

Intersection Orientation:

East-West

LR

Appendix B: Level of Service Calculations at Proposed Sparks Road Access

General Information		Site information					
Analyst	TENW	Intersection	Proposed Access/Sparks Rd				
Agency/Co.		Jurisdiction					
ı Date Performed	11/29/2006	Analysis Year	2011 With Project				
Analysis Time Period	AM Peak Hour						
Project Description Mar	ian Meadows Developmen	t					
East/West Street: Sparks	s Road	North/South Street: F	North/South Street: Proposed Access				
Intersection Orientation:		Study Period (hrs): 0.	25				

intersection onchation.					`				www.reservel	
Velocales Velones an		(-)								
Major Street	Eastbound			Westbound						
Movement	1	2	3			4	5		6	
	L	Т	R			L	T		R	
Volume (veh/h)	38	1	0			0	9		0	
Peak-hour factor, PHF	0.38	0.38	0.90		(0.90	0.50		.50	
Hourly Flow Rate (veh/h)	100	2	0			0	18		0	
Proportion of heavy	0					0				
vehicles, P _{HV}	U									
Median type	Undivided									
RT Channelized?			0						0	
Lanes	0	1	0			0	1		0	
Configuration	LT								TR	
Upstream Signal		0					0			
Minor Street	Northbound				Southbound					
Movement	7	8	9			10	11		12	
	L	Т	R			L	Т		R	
Volume (veh/h)	0	0	0			0	0		13	
Peak-hour factor, PHF	0.90	0.90	0.90			0.92	0.90			
Hourly Flow Rate (veh/h)	0	0	0			0	0		122	
Proportion of heavy vehicles, P _{HV}	О	0	0			0	0		0	
Percent grade (%)		0					0			
clared approach		N					N			
Storage		0					0			
RT Channelized?			0						0	
anes	0	0	0			0	0		0	
Configuration							LR			
Control Delay Queue	ength, Level o	Service								
Approach	EB	WB	North		nbound		S	outhbound		
Movement	1	4	7	8	3	9	10	11	12	
Lane Configuration	LT							LR		
Volume, v (vph)	100							122		
Capacity, c _m (vph)	1612							1066		

Approach LOS

//c ratio

_OS

Capacity, c_m (vph)

Queue length (95%)

Control Delay (s/veh)

Approach delay (s/veh)

0.06

0.20

7.4

Α

0.11

0.39

8.8

Α

8.8

Α

Sile informations General Information Proposed Access/Sparks Rd Intersection **TENW** Analyst Jurisdiction Agency/Co. 2011 With Project 11/29/2006 Analysis Year **Date Performed** PM Peak Hour Analysis Time Period Marian Meadows Development Project Description Proposed Access North/South Street: East/West Street: Sparks Road Study Period (hrs): 0.25

Velticle Vellines and	and							
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	Т	R		
Volume (veh/h)	126	5	0	0	5	0		
Peak-hour factor, PHF	0.63	0.63	0.90	0.90	0.63	0.63		
Hourly Flow Rate (veh/h)	200	7	0	0	7	0		
Proportion of heavy				0				
vehicles, P _{HV}	0	<u></u>						
Median type			Undi	vided				
RT Channelized?			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR '		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Vlovement	7	8	9	10	11	12		
1	L	Т	R	L	T	R		
Volume (veh/h)	0	0	0	0	0	75		
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.90	0.92		
Hourly Flow Rate (veh/h)	0	0	0	0	0	81		
Proportion of heavy		0	0	0	0	0		
/ehicles, P _{HV}	0	0						
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
anes	0	0	0	0	0	0		
Configuration					LR			

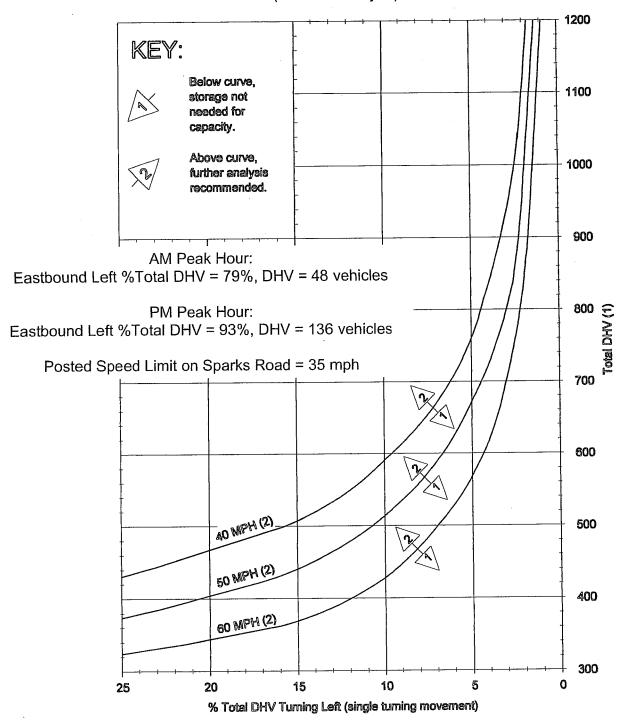
Control Delay, Queue L					_		Southbound	
Approach	EB	WB	Northbound					
.vlovement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
/olume, v (vph)	200						81	
Capacity, c _m (vph)	1627						1081	
//c ratio	0.12						0.07	
Queue length (95%)	0.42						0.24	
Control Delay (s/veh)	7.5						8.6	
OS	Α						A	
Approach delay (s/veh)							8.6	
Approach LOS							Α	

Intersection Orientation:

East-West

Appendix C: Left-Turn Lane Analysis

Marian Meadows PUD Left-Turn Lane Analysis on Sparks Road at Proposed Access (2011 with Project)



- (1) DHV is total volume from both directions.
- (2) Speeds are posted speeds.

Left-Turn Storage Guidelines (Two-Lane, Unsignalized)
Figure 910-8a

KITITIAS COUNTY

KITTITAS COUNTY COMMUNITY DEVELOPMENT SERVICES

411 N. Ruby St., Suite 2, Ellensburg, WA 98926 CDS@CO.KITTITAS.WA.US Office (509) 962-7506 Fax (509) 962-7682

September 5, 2006

Easton Ridge Land Company C/O Anne Watanabe PO Box 687 Roslyn, WA 98941

RE: Marian Meadows Rezone and Plat Applications (File # Z-06-35 and P-06-31)

Dear Ms. Watanabe:

This letter is in regards to the above referenced applications that Kittitas County Community Development Services has been in receipt of and subsequently reviewed. Upon review of the application the following issues have come to light in regards to the proposals as listed below. These items raise concerns regarding the project having significant environmental impacts. The items are as follows:

Hazardous Slopes

The subject property is encumbered by a large area of steep slopes. The impact of the proposed development and potential site work will need to be explored to address the potential for disturbance of such slopes (i.e. grading, cuts and fills) and erosion.

Commercial Development, Mini-Storage

The application mentions possible development of mini-storage as part of the proposal. Impacts to wildlife, traffic, and the area need to be addressed.

Forest Practices Act

This will need to be addressed as part of site preparations.

Wildlife- Connectivity-Silver Creek Basin

The proposed development is in an area that has been recognized as of critical importance for wildlife connectivity purposes. Address relation and impact of development to wildlife, connectivity, and migratory patterns.

Gravel Pits

Impacts of the proposed reclamations of the pits need to be addressed, including but not limited to noise, dust, and use and placement of spoils.

Density

Address impact of density, including but not limited to infrastructure, wildlife, services, traffic and adjoining properties.

Traffic

Address impact of increases in traffic to roads in the area and provisions for appropriate ingress/egress for the subject property. Traffic impact analysis is required

Water

There are Type 5 and 4 waters on-site. Address work in relation to these streams and mitigations for potential impacts.

Wetlands

An initial site assessment for wetlands and wetland impacts is necessary.

Cultural Resources

Address and/or provide a copy of any established plans for cultural/historical resources on-site.

These items and impacts need to be addressed as part of the processing of the application, and appropriate information needs to be submitted that adequately takes each into consideration (i.e. traffic studies, environmental assessments, wildlife studies, etc.). This information needs to be provided in order to be able to support the issuance of the appropriate SEPA determinations. Due to the apparent potential significant impacts associated with this application proposal a Determination of Significance is contemplated. Additional information will assist us in making a final determination on the likely potential impacts of this project application.

If you have any questions, please feel free to contact me at (509) 962-7046. Thank you in advance for addressing these.

Sincerely,

Kittitas County Community Development Services

Joanna Valencia Staff Planner

CC

Darryl Piercy, CDS Project Files, Z-06-35 and P-06-31

