

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**.

Table 5				
Sparks Road Access				
LOS and Queue Summary				
<u>2011 With Project</u>				
	LOS ¹	Delay	V/C	Queue ² Length (ft)
<i>Sparks Road/Project Access</i>				
<u>AM Peak Hour</u>				
Southbound Left-Right (outbound)	A	8.8	0.11	25
Eastbound Left-through (inbound)	A	7.4	0.06	25
<u>PM Peak Hour</u>				
Southbound Left-Right (outbound)	A	8.6	0.07	25
Eastbound Left-through (inbound)	A	7.5	0.12	25
1. The level of service at stop-controlled intersections is reported for each movement. Therefore, the reported LOS does not represent a measure of the overall operations of the intersection. 2. Queue lengths are 95 th percentile queues, which represent a condition that is exceeded only five percent of the time. 25 feet = 1 vehicle				



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



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 EB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/9/2006	Analysis Year	2006 Existing
Analysis Time Period	AM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Eastbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	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 vehicles, P _{HV}	0	--	--	6	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	0	0	9	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	11	0	4
Proportion of heavy vehicles, P _{HV}	0	0	0	15	15	15
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
Volume, v (vph)		38					15	
Capacity, c _m (vph)		1551					850	
v/c ratio		0.02					0.02	
Queue length (95%)		0.08					0.05	
Control Delay (s/veh)		7.4					9.3	
LOS		A					A	
Approach delay (s/veh)	--	--					9.3	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 WB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2006 Existing
Analysis Time Period	AM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	15	0	0	39	19
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	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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
Hourly Flow Rate (veh/h)	1	1	25	0	0	0
Proportion of heavy vehicles, P _{HV}	15	15	15	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration		<i>LTR</i>				

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>			<i>LTR</i>				
Volume, v (vph)	1			27				
Capacity, c _m (vph)	1447			995				
v/c ratio	0.00			0.03				
Queue length (95%)	0.00			0.08				
Control Delay (s/veh)	7.5			8.7				
LOS	<i>A</i>			<i>A</i>				
Approach delay (s/veh)	--	--		8.7				
Approach LOS	--	--		<i>A</i>				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/Sparks Rd
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2006 Existing
Analysis Time Period	AM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>Sparks Road</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	10	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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 vehicles, P _{HV}	18	18	0	0	11	11
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	5		63					19
Capacity, c _m (vph)	1572		914					1030
v/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
LOS	A		A					A
Approach delay (s/veh)	--	--	9.2			8.6		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Sparks Rd/Country Dr
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2006 Existing
Analysis Time Period	AM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Sparks Road</i>		North/South Street: <i>Country Drive</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
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 vehicles, P _{HV}	33	--	--	0	--	--
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	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 vehicles, P _{HV}	0	0	0	17	0	17
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

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

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 EB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/9/2006	Analysis Year	2006 Existing
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Eastbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	0	--	--	6	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			<i>TR</i>	<i>LT</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	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 vehicles, P _{HV}	0	0	0	8	8	8
Percent grade (%)	0			0		
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					<i>LTR</i>	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		<i>LT</i>					<i>LTR</i>	
Volume, v (vph)		32					55	
Capacity, c _m (vph)		1523					850	
v/c ratio		0.02					0.06	
Queue length (95%)		0.06					0.21	
Control Delay (s/veh)		7.4					9.5	
LOS		A					A	
Approach delay (s/veh)	--	--					9.5	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 WB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2006 Existing
Analysis Time Period	PM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

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 vehicles, P _{HV}	13	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	0	25	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	27	0	0	0
Proportion of heavy vehicles, P _{HV}	7	7	7	0	0	0
Percent grade (%)	0			0		
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration		<i>LTR</i>				

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>			<i>LTR</i>				
Volume, v (vph)	4			31				
Capacity, c _m (vph)	1457			982				
v/c ratio	0.00			0.03				
Queue length (95%)	0.01			0.10				
Control Delay (s/veh)	7.5			8.8				
LOS	A			A				
Approach delay (s/veh)	--	--	8.8					
Approach LOS	--	--	A					

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information		
Analyst	TENW		Intersection	Railroad St/Sparks Rd	
Agency/Co.			Jurisdiction		
Date Performed	11/29/2006		Analysis Year	2006 Existing	
Analysis Time Period	PM Peak Hour				
Project Description <i>Marian Meadows Development</i>					
East/West Street: <i>Railroad Street</i>			North/South Street: <i>Sparks Road</i>		
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>		

Vehicle Volumes and Adjustments						
Major Street Movement	Eastbound			Westbound		
	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	10	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street Movement	Northbound			Southbound		
	7	8	9	10	11	12
	L	T	R	L	T	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 vehicles, P _{HV}	8	8	0	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service								
Approach Movement	EB	WB	Northbound			Southbound		
	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	7		59					15
Capacity, c _m (vph)	1572		908					1020
v/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
LOS	A		A					A
Approach delay (s/veh)	--	--	9.2			8.6		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
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 <i>Marian Meadows Development</i>			
East/West Street: <i>Sparks Road</i>		North/South Street: <i>Country Drive</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	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
Hourly Flow Rate (veh/h)	7	7	0	0	6	1
Proportion of heavy vehicles, P _{HV}	0	--	--	0	--	--
Median type	<i>Undivided</i>					
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	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 vehicles, P _{HV}	0	0	0	0	0	0
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	7						8	
Capacity, c _m (vph)	1627						1083	
v/c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.2						8.3	
LOS	A						A	
Approach delay (s/veh)	--	--					8.3	
Approach LOS	--	--					A	

2011 Baseline Conditions



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 EB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/9/2006	Analysis Year	2011 Without Project
Analysis Time Period	AM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Eastbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	0	--	--	6	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			<i>TR</i>	<i>LT</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	0	0	10	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	12	0	4
Proportion of heavy vehicles, P _{HV}	0	0	0	15	15	15
Percent grade (%)	0			0		
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					<i>LTR</i>	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		<i>LT</i>					<i>LTR</i>	
Volume, v (vph)		40					16	
Capacity, c _m (vph)		1547					838	
v/c ratio		0.03					0.02	
Queue length (95%)		0.08					0.06	
Control Delay (s/veh)		7.4					9.4	
LOS		A					A	
Approach delay (s/veh)	--	--					9.4	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
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	AM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	16	0	0	42	20
Peak-hour factor, PHF	0.57	0.57	1.00	1.00	0.69	0.69
Hourly Flow Rate (veh/h)	1	28	0	0	60	28
Proportion of heavy vehicles, P _{HV}	13	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	19	0	0	0
Peak-hour factor, PHF	0.71	0.71	0.71	1.00	1.00	1.00
Hourly Flow Rate (veh/h)	1	1	26	0	0	0
Proportion of heavy vehicles, P _{HV}	15	15	15	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration		<i>LTR</i>				

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>			<i>LTR</i>				
Volume, v (vph)	1			28				
Capacity, c _m (vph)	1441			992				
v/c ratio	0.00			0.03				
Queue length (95%)	0.00			0.09				
Control Delay (s/veh)	7.5			8.7				
LOS	<i>A</i>			<i>A</i>				
Approach delay (s/veh)	--	--		8.7				
Approach LOS	--	--		<i>A</i>				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/Sparks Rd
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 Without Project
Analysis Time Period	AM Peak Hour		

Project Description <i>Marian Meadows Development</i>	
East/West Street: <i>Railroad Street</i>	North/South Street: <i>Sparks Road</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>0.25</i>

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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 vehicles, P _{HV}	18	18	0	0	11	11
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	5		68					22
Capacity, c _m (vph)	1572		909					1033
v/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
LOS	A		A					A
Approach delay (s/veh)	--	--	9.3			8.6		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Sparks Rd/Country Dr
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 Without Project
Analysis Time Period	AM Peak Hour		

Project Description <i>Marian Meadows Development</i>	
East/West Street: <i>Sparks Road</i>	North/South Street: <i>Country Drive</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>0.25</i>

Vehicle Volumes and Adjustments

Major Street Movement	Eastbound			Westbound		
	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	33	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street Movement	Northbound			Southbound		
	7	8	9	10	11	12
	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 vehicles, P _{HV}	0	0	0	17	0	17
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue Length, Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
			7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	5						8	
Capacity, c _m (vph)	1419						1019	
v/c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.5						8.6	
LOS	A						A	
Approach delay (s/veh)	--	--					8.6	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 EB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/9/2006	Analysis Year	2011 Without Project
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Eastbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	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	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			<i>TR</i>	<i>LT</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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 vehicles, P _{HV}	0	0	0	8	8	8
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					<i>LTR</i>	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		<i>LT</i>					<i>LTR</i>	
Volume, v (vph)		35					60	
Capacity, c _m (vph)		1520					840	
v/c ratio		0.02					0.07	
Queue length (95%)		0.07					0.23	
Control Delay (s/veh)		7.4					9.6	
LOS		<i>A</i>					<i>A</i>	
Approach delay (s/veh)	--	--					9.6	
Approach LOS	--	--					<i>A</i>	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
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 <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	13	--	--	0	--	--
Median type	<i>Undivided</i>					
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	T	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 vehicles, P _{HV}	7	7	7	0	0	0
Percent grade (%)		0			0	
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
Volume, v (vph)	4			33				
Capacity, c _m (vph)	1450			977				
v/c ratio	0.00			0.03				
Queue length (95%)	0.01			0.10				
Control Delay (s/veh)	7.5			8.8				
LOS	A			A				
Approach delay (s/veh)	--	--		8.8				
Approach LOS	--	--		A				

TWO-WAY STOP CONTROL SUMMARY

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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	0
Proportion of heavy vehicles, P _{HV}	10	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	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 vehicles, P _{HV}	8	8	0	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	8		64					17
Capacity, c _m (vph)	1572		900					1026
v/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
LOS	A		A					A
Approach delay (s/veh)	--	--	9.3			8.6		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Sparks Rd/Country Dr
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 Without Project
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Sparks Road</i>		North/South Street: <i>Country Drive</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	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
Hourly Flow Rate (veh/h)	7	7	0	0	6	1
Proportion of heavy vehicles, P _{HV}	0	-	-	0	-	-
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	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 vehicles, P _{HV}	0	0	0	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					<i>LR</i>	

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>						<i>LR</i>	
Volume, v (vph)	7						8	
Capacity, c _m (vph)	1627						1083	
v/c ratio	0.00						0.01	
Queue length (95%)	0.01						0.02	
Control Delay (s/veh)	7.2						8.3	
LOS	<i>A</i>						<i>A</i>	
Approach delay (s/veh)	-	-					8.3	
Approach LOS	-	-					<i>A</i>	

2011 With-Project Conditions



TWO-WAY STOP CONTROL SUMMARY

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

Project Description <i>Marian Meadows Development</i>	
East/West Street: <i>Railroad Street</i>	North/South Street: <i>I-90 Eastbound Ramps</i>
Intersection Orientation: <i>East-West</i>	Study Period (hrs): <i>0.25</i>

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	0	--	--	6	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			<i>TR</i>	<i>LT</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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 vehicles, P _{HV}	0	0	0	15	15	15
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					<i>LTR</i>	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		<i>LT</i>					<i>LTR</i>	
Volume, v (vph)		128					32	
Capacity, c _m (vph)		1509					532	
v/c ratio		0.08					0.06	
Queue length (95%)		0.28					0.19	
Control Delay (s/veh)		7.6					12.2	
LOS		<i>A</i>					<i>B</i>	
Approach delay (s/veh)	--	--					12.2	
Approach LOS	--	--					<i>B</i>	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
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	AM Peak		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	43	0	0	130	58
Peak-hour factor, PHF	0.57	0.57	1.00	1.00	0.69	0.69
Hourly Flow Rate (veh/h)	1	75	0	0	188	84
Proportion of heavy vehicles, P _{HV}	13	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	34	0	0	0
Peak-hour factor, PHF	0.71	0.71	0.71	1.00	1.00	1.00
Hourly Flow Rate (veh/h)	1	1	47	0	0	0
Proportion of heavy vehicles, P _{HV}	15	15	15	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration		<i>LTR</i>				

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>			<i>LTR</i>				
Volume, v (vph)	1			49				
Capacity, c _m (vph)	1230			929				
v/c ratio	0.00			0.05				
Queue length (95%)	0.00			0.17				
Control Delay (s/veh)	7.9			9.1				
LOS	<i>A</i>			<i>A</i>				
Approach delay (s/veh)	--	--		9.1				
Approach LOS	--	--		<i>A</i>				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/Sparks Rd
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 With Project
Analysis Time Period	AM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>Sparks Road</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	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)	5	0	72	0	0	0
Proportion of heavy vehicles, P _{HV}	10	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	180	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)	224	1	0	0	2	20
Proportion of heavy vehicles, P _{HV}	18	18	0	0	11	11
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	5		225					22
Capacity, c _m (vph)	1572		881					1027
v/c ratio	0.00		0.26					0.02
Queue length (95%)	0.01		1.02					0.07
Control Delay (s/veh)	7.3		10.5					8.6
LOS	<i>A</i>		<i>B</i>					<i>A</i>
Approach delay (s/veh)	--	--	10.5			8.6		
Approach LOS	--	--	<i>B</i>			<i>A</i>		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/I-90 EB Ramps
Agency/Co.		Jurisdiction	
Date Performed	11/28/06	Analysis Year	2011 With Project
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Eastbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	0	--	--	6	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration			<i>TR</i>	<i>LT</i>		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	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 vehicles, P _{HV}	0	0	0	8	8	8
Percent grade (%)	0			0		
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	1	0
Configuration					<i>LTR</i>	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		<i>LT</i>					<i>LTR</i>	
Volume, v (vph)		73					119	
Capacity, c _m (vph)		1413					624	
v/c ratio		0.05					0.19	
Queue length (95%)		0.16					0.70	
Control Delay (s/veh)		7.7					12.1	
LOS		<i>A</i>					<i>B</i>	
Approach delay (s/veh)	--	--					12.1	
Approach LOS	--	--					<i>B</i>	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
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 <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>I-90 Westbound Ramps</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	13	--	--	0	--	--
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	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 vehicles, P _{HV}	7	7	7	0	0	0
Percent grade (%)	0			0		
Flared approach	N			N		
Storage	0			0		
RT Channelized?			0			0
Lanes	0	1	0	0	0	0
Configuration	LTR					

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
Volume, v (vph)	4			87				
Capacity, c _m (vph)	1306			868				
v/c ratio	0.00			0.10				
Queue length (95%)	0.01			0.33				
Control Delay (s/veh)	7.8			9.6				
LOS	A			A				
Approach delay (s/veh)	--	--		9.6				
Approach LOS	--	--		A				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Railroad St/Sparks Rd
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 With Project
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Railroad Street</i>		North/South Street: <i>Sparks Road</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	8	0	212	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	212	0	0	0
Proportion of heavy vehicles, P _{HV}	10	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration	<i>LTR</i>	<i>LR</i>				
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	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 vehicles, P _{HV}	8	8	0	0	0	0
Percent grade (%)		0			0	
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LTR</i>		<i>LT</i>					<i>TR</i>
Volume, v (vph)	8		164					17
Capacity, c _m (vph)	1572		811					983
v/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
LOS	<i>A</i>		<i>B</i>					<i>A</i>
Approach delay (s/veh)	--	--	10.6			8.7		
Approach LOS	--	--	<i>B</i>			<i>A</i>		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	TENW	Intersection	Sparks Rd/Country Dr
Agency/Co.		Jurisdiction	
Date Performed	11/29/2006	Analysis Year	2011 With Project
Analysis Time Period	PM Peak Hour		
Project Description <i>Marian Meadows Development</i>			
East/West Street: <i>Sparks Road</i>		North/South Street: <i>Country Drive</i>	
Intersection Orientation: <i>East-West</i>		Study Period (hrs): <i>0.25</i>	

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	19	131	0	0	79	1
Peak-hour factor, PHF	0.63	0.63	1.00	1.00	0.63	0.63
Hourly Flow Rate (veh/h)	30	207	0	0	125	1
Proportion of heavy vehicles, P _{HV}	0	--	--	0	--	--
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	T	R	L	T	R
Volume (veh/h)	0	0	0	0	0	14
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	18
Proportion of heavy vehicles, P _{HV}	0	0	0	0	0	0
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	30						18	
Capacity, c _m (vph)	1473						930	
v/c ratio	0.02						0.02	
Queue length (95%)	0.06						0.06	
Control Delay (s/veh)	7.5						8.9	
LOS	A						A	
Approach delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

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



TWO-WAY STOP CONTROL SUMMARY

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

Vehicle Volumes and Adjustments						
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	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	0.50
Hourly Flow Rate (veh/h)	100	2	0	0	18	0
Proportion of heavy vehicles, P _{HV}	0	--	--	0	--	--
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	T	R	L	T	R
Volume (veh/h)	0	0	0	0	0	113
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	122
Proportion of heavy vehicles, P _{HV}	0	0	0	0	0	0
Percent grade (%)	0			0		
Flared approach		N			N	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	100						122	
Capacity, c _m (vph)	1612						1066	
v/c ratio	0.06						0.11	
Queue length (95%)	0.20						0.39	
Control Delay (s/veh)	7.4						8.8	
LOS	A						A	
Approach delay (s/veh)	--	--					8.8	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	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 vehicles, P _{HV}	0	--	--	0	--	--
Median type	<i>Undivided</i>					
RT Channelized?			0			0
Lanes	0	1	0	0	1	0
Configuration	<i>LT</i>					<i>TR</i>
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	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 vehicles, P _{HV}	0	0	0	0	0	0
Percent grade (%)	0			0		
Flared approach		<i>N</i>			<i>N</i>	
Storage		0			0	
RT Channelized?			0			0
Lanes	0	0	0	0	0	0
Configuration					<i>LR</i>	

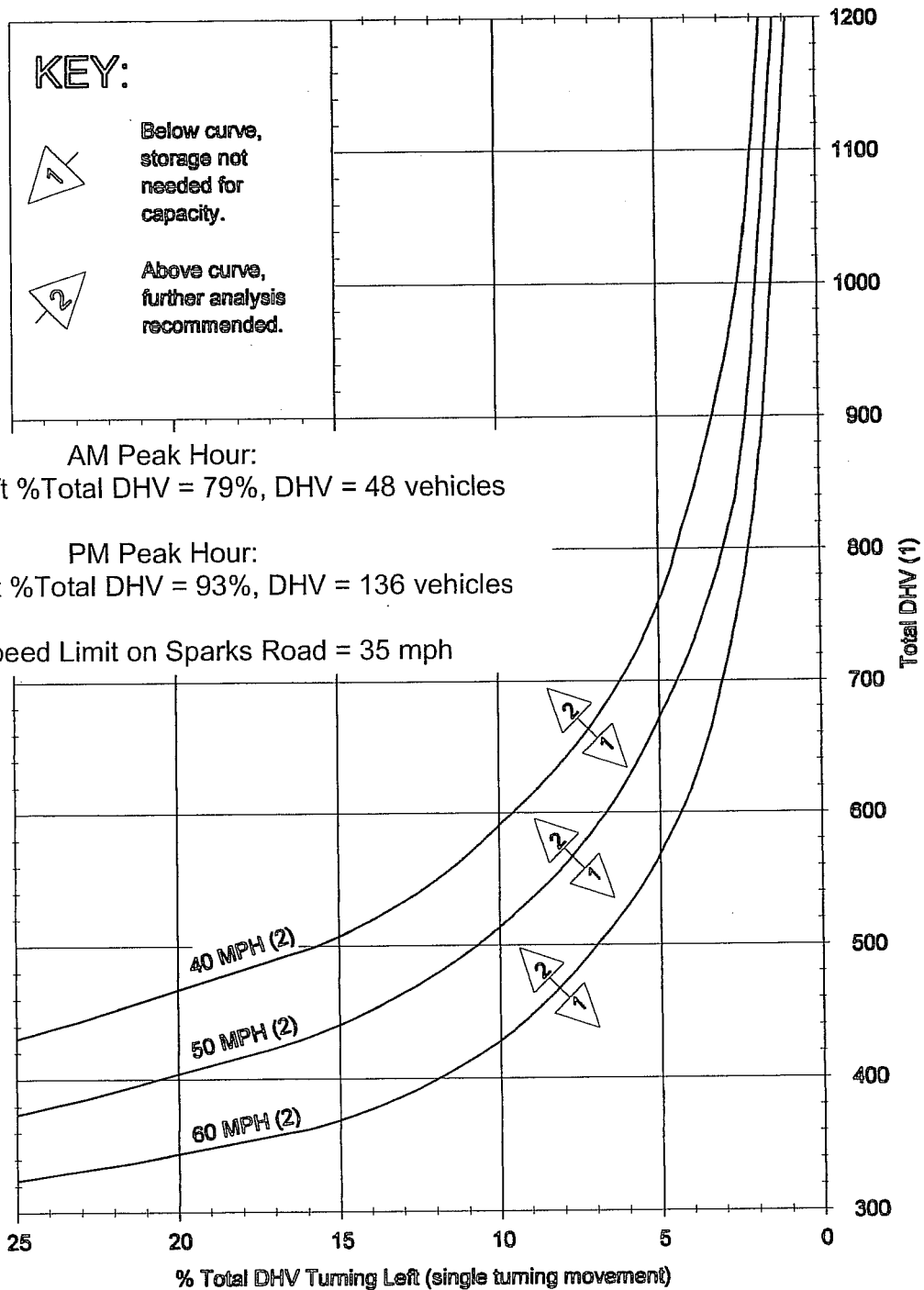
Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>						<i>LR</i>	
Volume, v (vph)	200						81	
Capacity, c _m (vph)	1627						1081	
v/c ratio	0.12						0.07	
Queue length (95%)	0.42						0.24	
Control Delay (s/veh)	7.5						8.6	
LOS	<i>A</i>						<i>A</i>	
Approach delay (s/veh)	--	--					8.6	
Approach LOS	--	--					<i>A</i>	

Appendix C: Left-Turn Lane Analysis

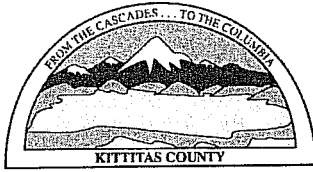


Marian Meadows PUD
 Left-Turn Lane Analysis on Sparks Road at Proposed Access
 (2011 with Project)



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

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



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.

DARRYL PIERCY, DIRECTOR

ALLISON KIMBALL, ASSISTANT DIRECTOR

COMMUNITY PLANNING • BUILDING INSPECTION • PLANS EXAMINATION • ADMINISTRATION • PERMIT SERVICES • INVESTIGATION • ENFORCEMENT • GIS

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.

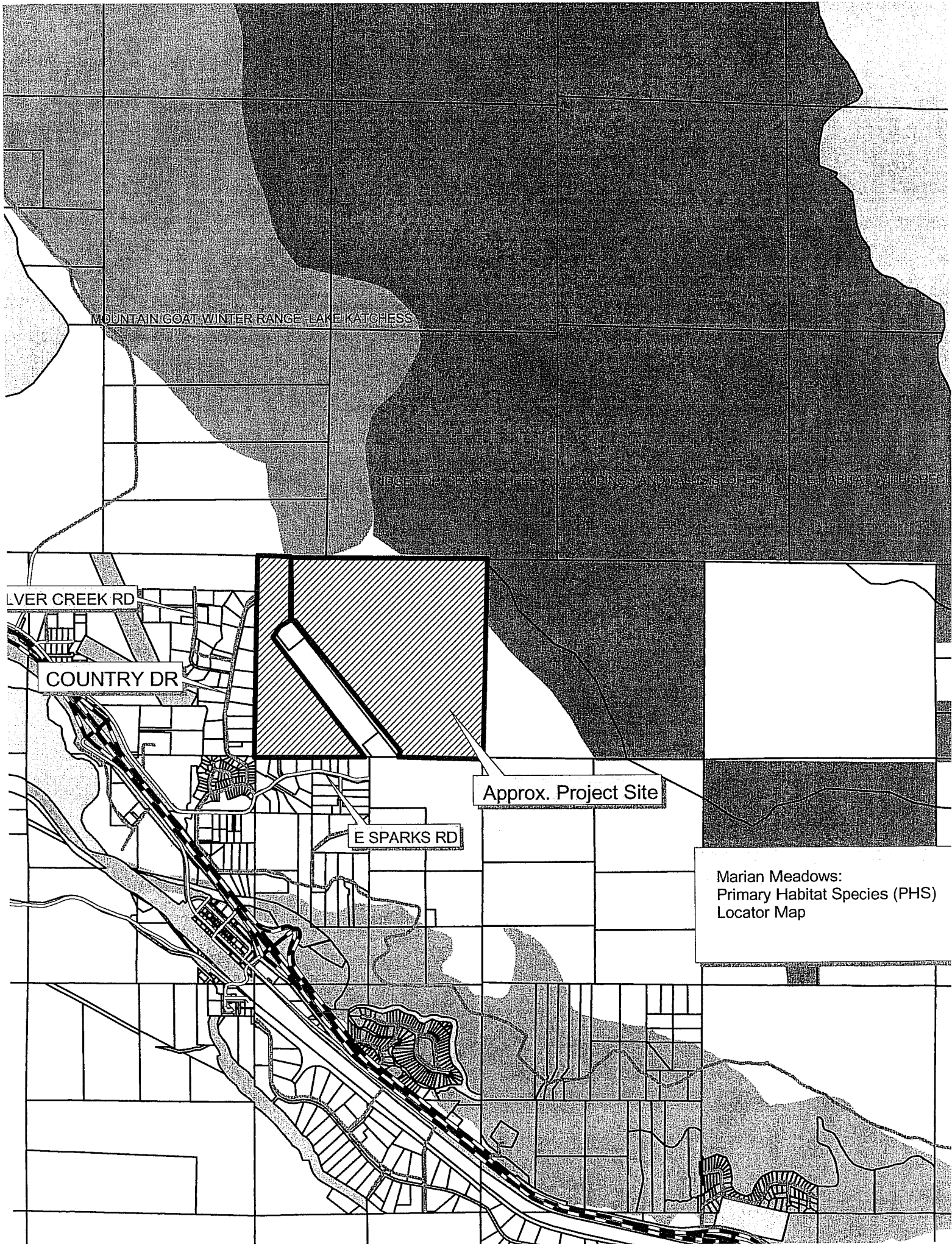
Sincerely,

Kittitas County Community Development Services



Joanna Valencia
Staff Planner

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



MOUNTAIN GOAT WINTER RANGE-LAKE KATCHESS

RIDGE TOP PEAKS CLIFFS-SOUTH FACING SANDTALS STORES UNIQUE HABITAT WITH SPECI

SLIVER CREEK RD

COUNTRY DR

E SPARKS RD

Approx. Project Site

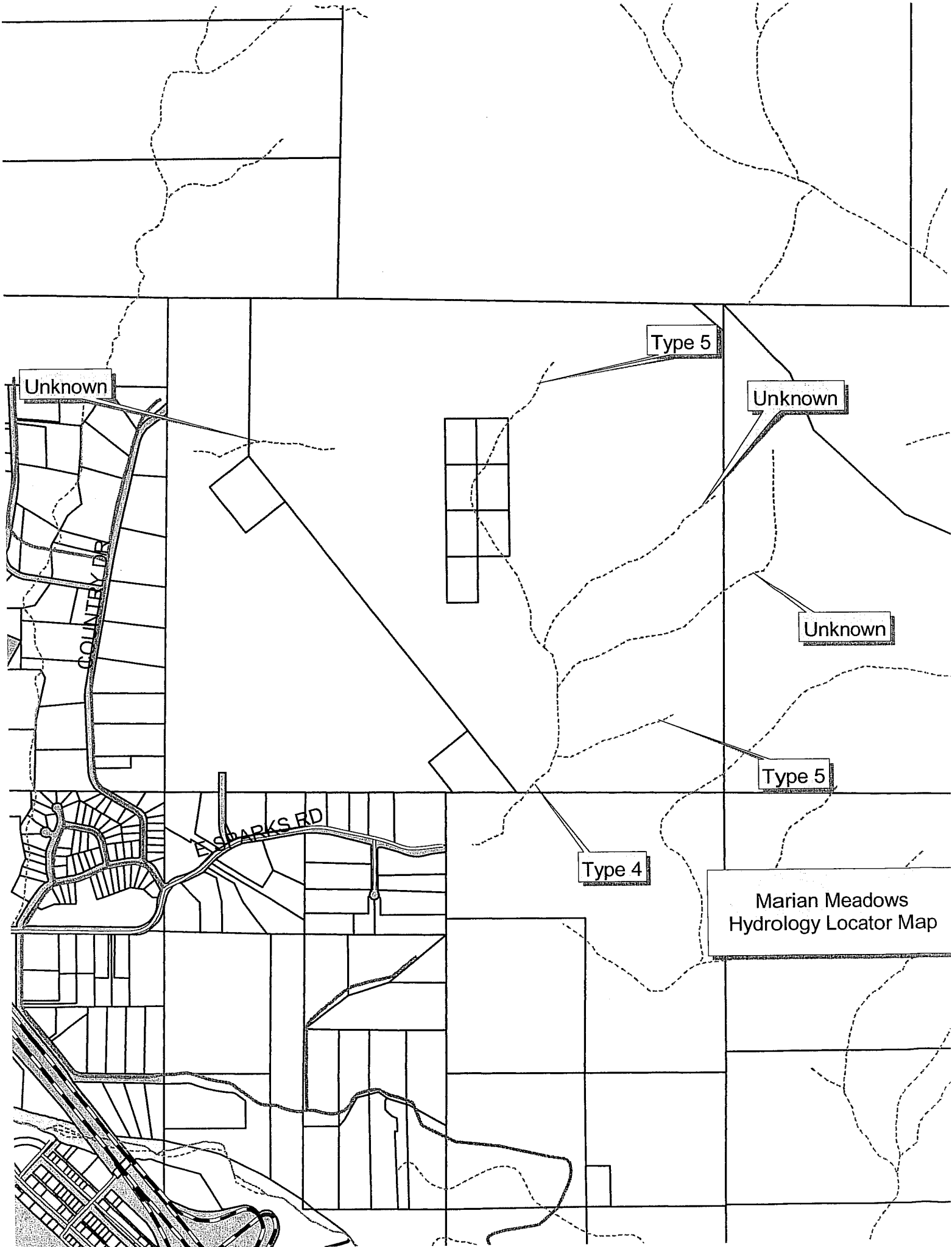
Marian Meadows:
Primary Habitat Species (PHS)
Locator Map



COUNTRY DR

E SPARKS RD

Marian Meadows:
Hazardous Slopes
Locator Map



Unknown

Type 5

Unknown

Unknown

Type 5

Type 4

Marian Meadows
Hydrology Locator Map

COUNTRY DR

E SPARKS RD