APPENDIX C

CAPACITY CALCULATIONS

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*R Marvin*	Intersection	*Grvel Pit App to Little Bear*
Agency/Co.	*MArvin & Associates*	Jurisdiction	*Gallatin County*
Date Performed	*11/18/2008*	Analysis Year	*2013 Record Load Day*
Analysis Time Period	*Peak AM*		

Project Description *Huttinga Gravel Pit*

East/West Street: *Little Bear Road*	North/South Street: *Gravel Pit Approach*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*18*	*32*			*20*	*0*
Peak-Hour Factor, PHF	*0.60*	*0.60*	*1.00*	*1.00*	*0.60*	*0.60*
Hourly Flow Rate, HFR (veh/h)	*29*	*53*	*0*	*0*	*33*	*0*
Percent Heavy Vehicles	*100*	--	--	*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*		*18*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.60*	*1.00*	*0.60*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*0*	*0*	*29*
Percent Heavy Vehicles	*0*	*0*	*0*	*100*	*0*	*100*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*29*						*29*	
C (m) (veh/h)	*1124*						*818*	
v/c	*0.03*						*0.04*	
95% queue length	*0.08*						*0.11*	
Control Delay (s/veh)	*8.3*						*9.6*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--					*9.6*	
Approach LOS	--	--					*A*	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Grvel Pit App to Little Bear
Agency/Co.	MArvin & Associates	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2008 Record Load Day
Analysis Time Period	Peak PM		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Road | North/South Street: Gravel Pit Approach

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	23			23	0
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	29	38	0	0	38	0
Percent Heavy Vehicles	100	--	--	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		18
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.60	1.00	0.60
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	29
Percent Heavy Vehicles	0	0	0	100	0	100
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	29						29	
C (m) (veh/h)	1119						812	
v/c	0.03						0.04	
95% queue length	0.08						0.11	
Control Delay (s/veh)	8.3						9.6	
LOS	A						A	
Approach Delay (s/veh)	--	--					9.6	
Approach LOS	--	--					A	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Grvel Pit App to Little Bear
Agency/Co.	MArvin & Associates	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2008 Record Load Day
Analysis Time Period	Peak AM		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Road | North/South Street: Gravel Pit Approach

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	30			19	0
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	29	49	0	0	31	0
Percent Heavy Vehicles	100	--	--	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		18
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.60	1.00	0.60
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	29
Percent Heavy Vehicles	0	0	0	100	0	100
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	29						29	
C (m) (veh/h)	1126						820	
v/c	0.03						0.04	
95% queue length	0.08						0.11	
Control Delay (s/veh)	8.3						9.6	
LOS	A						A	
Approach Delay (s/veh)	--	--					9.6	
Approach LOS	--	--					A	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Little Bear & Little Bear Spur
Agency/Co.	Marvin & Assoc	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2008 AWT
Analysis Time Period	Peak PM Hour		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		1			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	1	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	21			21	3
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	6	34	0	0	34	4
Percent Heavy Vehicles	30	10	0	0	10	20
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	0		40					38
C (m) (veh/h)	1513		882					893
v/c	0.00		0.05					0.04
95% queue length	0.00		0.14					0.13
Control Delay (s/veh)	7.4		9.3					9.2
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.3			9.2		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*R Marvin*
Agency/Co.	*Marvin & Assoc*
Date Performed	*11/18/2008*
Analysis Time Period	*Peak PM Hour*

Site Information

Intersection	*Little Bear & Little Bear Spur*
Jurisdiction	*Gallatin County*
Analysis Year	*2013 AWT + Record Truck Day*

Project Description *Huttinga Gravel Pit*

East/West Street: *Little Bear Spur* | North/South Street: *Little Bear Road*

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

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*		*4*			
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*1*	*0*	*4*	*0*	*0*	*0*
Percent Heavy Vehicles	*20*	--	--	*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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*8*	*33*			*33*	*3*
Peak-Hour Factor, PHF	*0.60*	*0.60*	*1.00*	*1.00*	*0.60*	*0.60*
Hourly Flow Rate, HFR (veh/h)	*13*	*54*	*0*	*0*	*54*	*4*
Percent Heavy Vehicles	*80*	*20*	*0*	*0*	*20*	*100*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*		*LT*					*TR*
v (veh/h)	*1*		*67*					*58*
C (m) (veh/h)	*1513*		*837*					*854*
v/c	*0.00*		*0.08*					*0.07*
95% queue length	*0.00*		*0.26*					*0.22*
Control Delay (s/veh)	*7.4*		*9.7*					*9.5*
LOS	*A*		*A*					*A*
Approach Delay (s/veh)	--	--	*9.7*			*9.5*		
Approach LOS	--	--	*A*			*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Little Bear & Little Bear Spur
Agency/Co.	Marvin & Assoc	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2013 AWT
Analysis Time Period	Peak PM Hour		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		1			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	1	0	1	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	23			23	3
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	8	38	0	0	38	4
Percent Heavy Vehicles	30	10	0	0	10	20
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	1		46					42
C (m) (veh/h)	1513		879					889
v/c	0.00		0.05					0.05
95% queue length	0.00		0.17					0.15
Control Delay (s/veh)	7.4		9.3					9.3
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.3			9.3		
Approach LOS	--	--	A			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Little Bear & Little Bear Spur
Agency/Co.	Marvin & Assoc	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2008 AWT
Analysis Time Period	Peak AM Hour		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		2			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	1	0	2	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	3	15			20	1
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	4	24	0	0	33	1
Percent Heavy Vehicles	30	10	0	0	10	20
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	1		28					34
C (m) (veh/h)	1513		879					879
v/c	0.00		0.03					0.04
95% queue length	0.00		0.10					0.12
Control Delay (s/veh)	7.4		9.2					9.3
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.2			9.3		
Approach LOS	--	--	A			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	R Marvin
Agency/Co.	Marvin & Assoc
Date Performed	11/18/2008
Analysis Time Period	Peak AM Hour

Site Information

Intersection	Little Bear & Little Bear Spur
Jurisdiction	Gallatin County
Analysis Year	2013 AWT + Record Truck Day

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		5			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	1	0	5	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7	44			38	1
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	11	73	0	0	63	1
Percent Heavy Vehicles	80	20	0	0	20	100
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	1		84					64
C (m) (veh/h)	1513		842					853
v/c	0.00		0.10					0.08
95% queue length	0.00		0.33					0.24
Control Delay (s/veh)	7.4		9.7					9.6
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.7			9.6		
Approach LOS	--	--	A			A		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	R Marvin	Intersection	Little Bear & Little Bear Spur
Agency/Co.	Marvin & Assoc	Jurisdiction	Gallatin County
Date Performed	11/18/2008	Analysis Year	2013 AWT
Analysis Time Period	Peak AM Hour		

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		2			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	2	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	16			20	1
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	6	26	0	0	33	1
Percent Heavy Vehicles	30	10	0	0	10	20
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	0		32					34
C (m) (veh/h)	1513		883					882
v/c	0.00		0.04					0.04
95% queue length	0.00		0.11					0.12
Control Delay (s/veh)	7.4		9.2					9.2
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.2			9.2		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	R Marvin
Agency/Co.	Marvin & Assoc
Date Performed	11/18/2008
Analysis Time Period	Peak PM Hour

Site Information

Intersection	Little Bear & Little Bear Spur
Jurisdiction	Gallatin County
Analysis Year	2013 AWT + Record Truck Day

Project Description: Huttinga Gravel Pit

East/West Street: Little Bear Spur | North/South Street: Little Bear Road

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

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		4			
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	1	0	4	0	0	0
Percent Heavy Vehicles	20	--	--	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			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	8	41			41	3
Peak-Hour Factor, PHF	0.60	0.60	1.00	1.00	0.60	0.60
Hourly Flow Rate, HFR (veh/h)	13	68	0	0	68	4
Percent Heavy Vehicles	80	20	0	0	20	100
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR		LT					TR
v (veh/h)	1		81					72
C (m) (veh/h)	1513		836					854
v/c	0.00		0.10					0.08
95% queue length	0.00		0.32					0.28
Control Delay (s/veh)	7.4		9.8					9.6
LOS	A		A					A
Approach Delay (s/veh)	--	--	9.8			9.6		
Approach LOS	--	--	A			A		

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