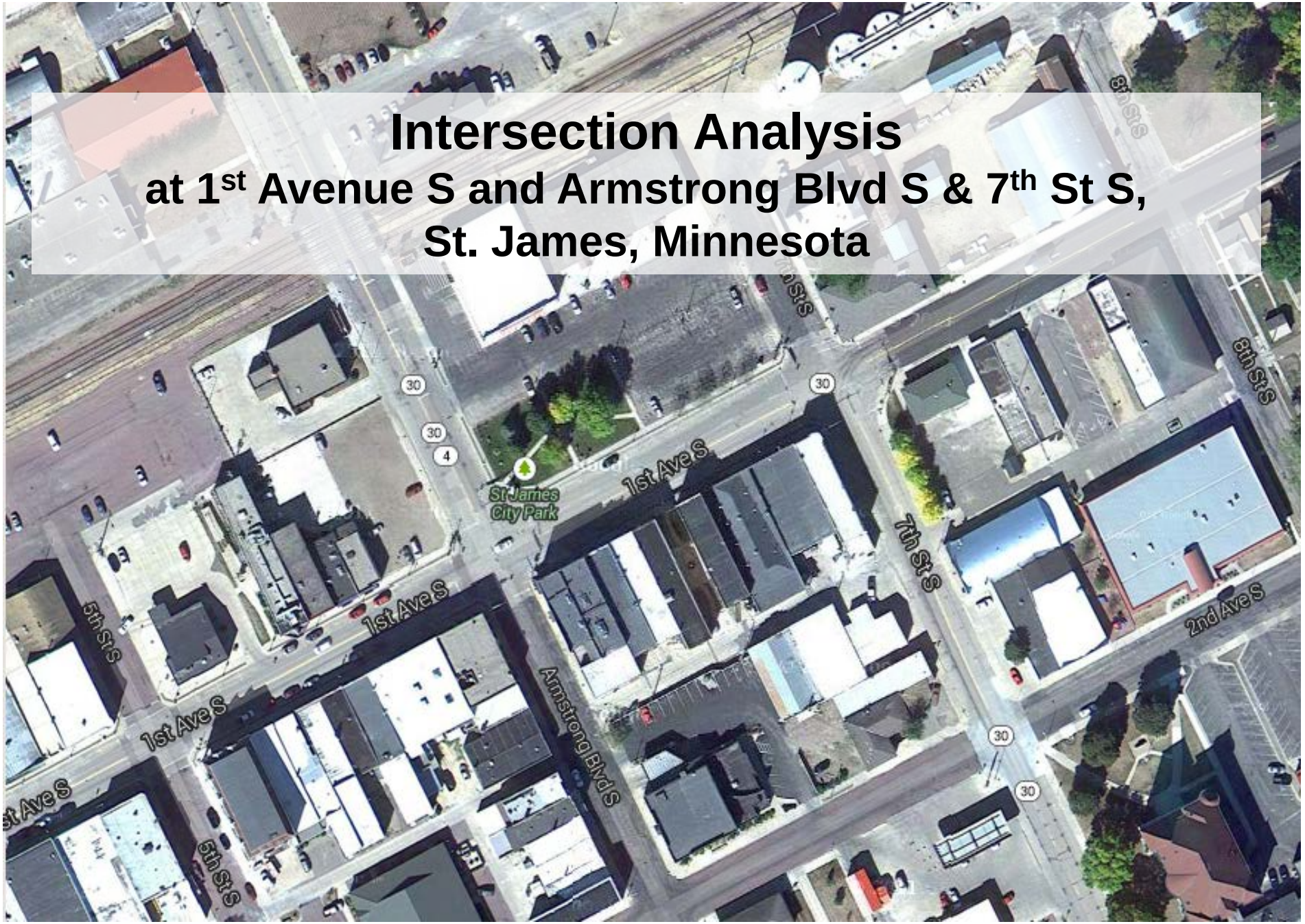
Intersection Analysis
at 1st Avenue S and Armstrong Blvd S & 7th St S, St. James, Minnesota

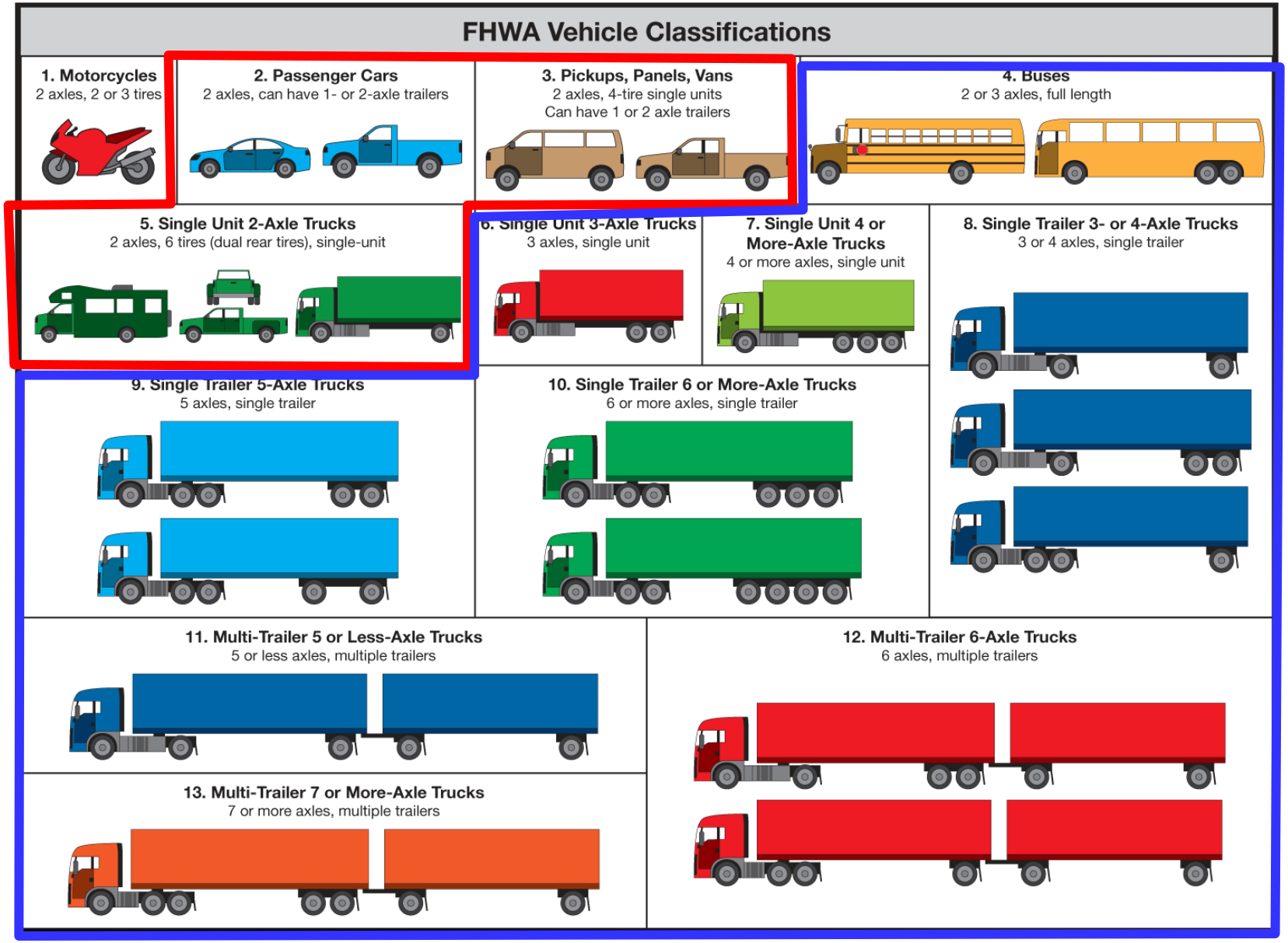


Why alternatives

- Opportunity while the road is completely replaced
- Review options for optimizing traffic flow through the intersections
- Providing St. James with a sustainable and safe Highway

Today's Conditions

Vehicle Classification



Vehicle Classification

Vehicle Type	AM (8:00-9:00 AM)	Mid-day (12:00-1:00 PM)	PM (4:00-5:00 PM)	Daily
Bike 	1.6%	1.9%	1.7%	2.1%
Passenger Car 	32.2%	29.5%	39.2%	36.6%
2-Axle Long 	34.4%	36.6%	38.3%	34.1%
2-Axle, 6-Tire 	16.9%	15.4%	10.6%	13.6%
Bus / Schoolbus 	7.2%	6.3%	5.0%	6.5%
3-Axle Single 	0.3%	0.0%	0.2%	0.3%
4-Axle Single 	0.0%	0.0%	0.0%	0.1%
<5-Axle Double 	5.3%	8.3%	3.5%	5.4%
≥5-Axle Double 	2.2%	1.1%	1.2%	1.2%
Multiple 	0.0%	0.9%	0.2%	0.2%
TOTAL	**100%**	**100%**	**100%**	**100%**

Option 1 - Signals

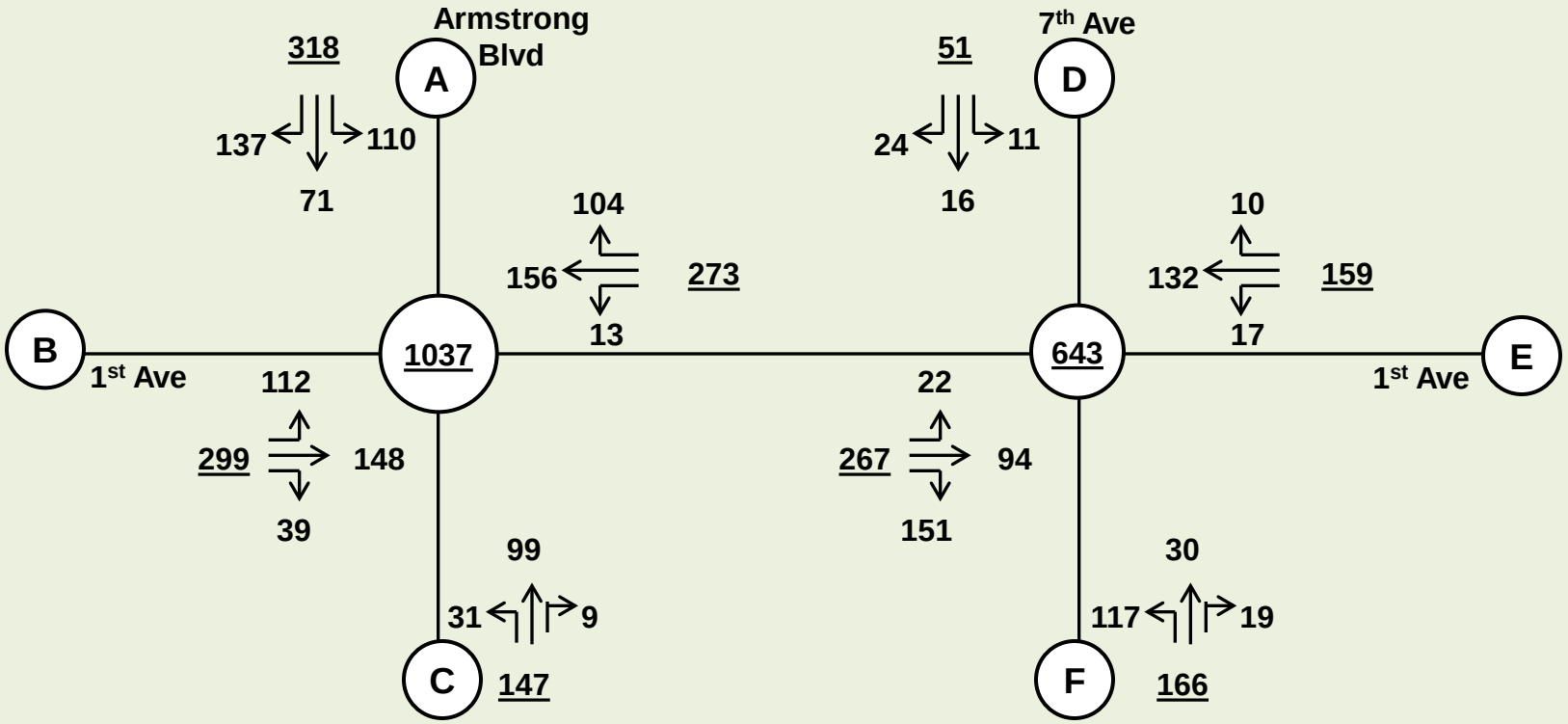
Option 2 – Mini-roundabout w/ parallel parking

Option 3 – Mini-roundabout w/ diagonal parking

Existing PM Peak Hourly Volumes

Existing PM Peak Hourly Volume
4:00 – 5:00 PM

O/D	A	B	C	D	E	F	Total
A	0	137	71	8	34	68	318
B	112	0	39	14	60	74	299
C	99	39	0	0	0	9	147
D	14	10	0	0	11	16	51
E	58	74	0	10	0	17	159
F	32	72	13	30	19	0	166
Total	115	131	123	62	124	185	**1140**

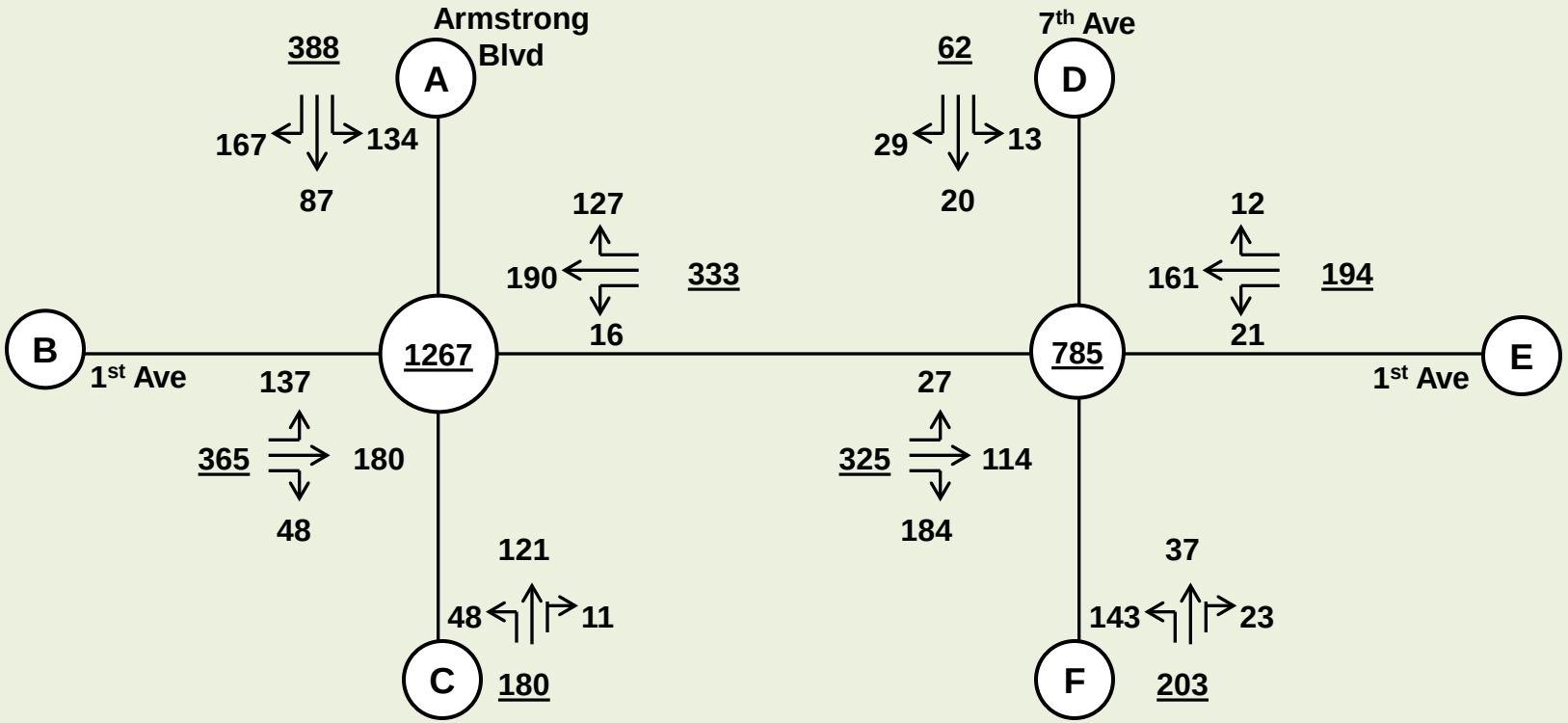


Forecasted PM Peak Hourly Volumes

Forecasted PM Peak Hourly Volume
4:00 – 5:00 PM

Growth Rate = 22%

O/D	A	B	C	D	E	F	Total
A	0	167	87	10	41	83	388
B	137	0	48	17	73	90	365
C	121	48	0	0	0	11	179
D	17	12	0	0	13	20	62
E	71	90	0	12	0	21	194
F	39	88	16	37	23	0	203
Total	384	405	150	76	151	224	**1391**



Operational Performances (Existing PM Peak Period)

Signalized Intersections (80-sec signal cycle)

PM Peak Classification

Approach		Queue Length (ft)		# Stops	Throughput (veh/hr)	Average Stop per vehicle	Approach Delay (sec)	Approach LOS	Intersection Delay (sec)	Intersection LOS
		Average	95-percent							
ARMSTRONG BLVD	EB	34	294	198	124 / 153 / 28	0.7	18	B	15.5	B
	WB	7	132	107	6 / 146 / 97	0.4	7	A		
	NB	12	136	81	27 / 76 / 18	0.7	17	B		
	SB	36	246	156	69 / 95 / 147	0.7	19	B		
7th AVENUE	EB	18	255	148	7 / 109 / 126	0.5	12	B	10.2	B
	WB	1	71	10	10 / 98 / 2	0.1	2	A		
	NB	14	179	90	142 / 9 / 20	0.5	13	B		
	SB	1	56	10	4 / 5 / 9	0.7	8	A		

Mini-Roundabouts

Approach		Queue Length (ft)		# Stops	Throughput (veh/hr)	Average Stop per vehicle	Approach Delay (sec)	Approach LOS	Intersection Delay (sec)	Intersection LOS
		Average	95-percent							
ARMSTRONG BLVD	EB	5	159	98	110 / 150 / 38	0.2	5	A	5.8	A
	WB	8	176	125	11 / 158 / 104	0.3	6	A		
	NB	5	118	74	39 / 100 / 9	0.4	6	A		
	SB	8	247	112	113 / 71 / 138	0.2	5	A		
7th AVENUE	EB	1	81	32	22 / 98 / 153	0.0	2	A	2.0	A
	WB	1	69	26	16 / 131 / 10	0.1	2	A		
	NB	1	79	30	118 / 31 / 18	0.1	2	A		
	SB	1	57	17	12 / 16 / 25	0.2	3	A		

Operational Performances (Forecasted PM Peak Period)

Signalized Intersections (80-sec signal cycle)

PM Peak Classification

Approach		Queue Length (ft)		# Stops	Throughput (veh/hr)	Average Stop per vehicle	Approach Delay (sec)	Approach LOS	Intersection Delay (sec)	Intersection LOS
		Average	95-percent							
ARMSTRONG BLVD	EB	69	504	314	137 / 180 / 47	0.9	25.5	C	27.0	C
	WB	12	172	155	15 / 184 / 125	0.5	8.6	A		
	NB	25	218	140	45 / 124 / 11	0.9	23.6	C		
	SB	119	278	364	134 / 81 / 164	1.4	45.8	D		
7th AVENUE	EB	30	387	229	24 / 118 / 185	0.7	14.3	B	11.3	B
	WB	3	144	27	20 / 160 / 13	0.2	3.3	A		
	NB	18	214	111	133 / 43 / 23	0.5	14.6	B		
	SB	3	87	34	14 / 17 / 31	0.6	9.6	A		

Mini-Roundabouts

Approach		Queue Length (ft)		# Stops	Throughput (veh/hr)	Average Stop per vehicle	Approach Delay (sec)	Approach LOS	Intersection Delay (sec)	Intersection LOS
		Average	95-percent							
ARMSTRONG BLVD	EB	19	281	213	135 / 182 / 47	0.4	10	B	11.4	B
	WB	27	327	251	14 / 190 / 125	0.6	12	B		
	NB	16	184	143	45 / 125 / 11	0.8	14	B		
	SB	28	431	244	138 / 82 / 168	0.4	11	B		
7th AVENUE	EB	2	103	48	26 / 118 / 188	0.1	2	A	3.0	A
	WB	2	85	49	20 / 159 / 11	0.2	3	A		
	NB	1	82	43	142 / 40 / 23	0.1	3	A		
	SB	1	68	28	14 / 19 /30	0.4	5	A		

Demonstration at GM Runge

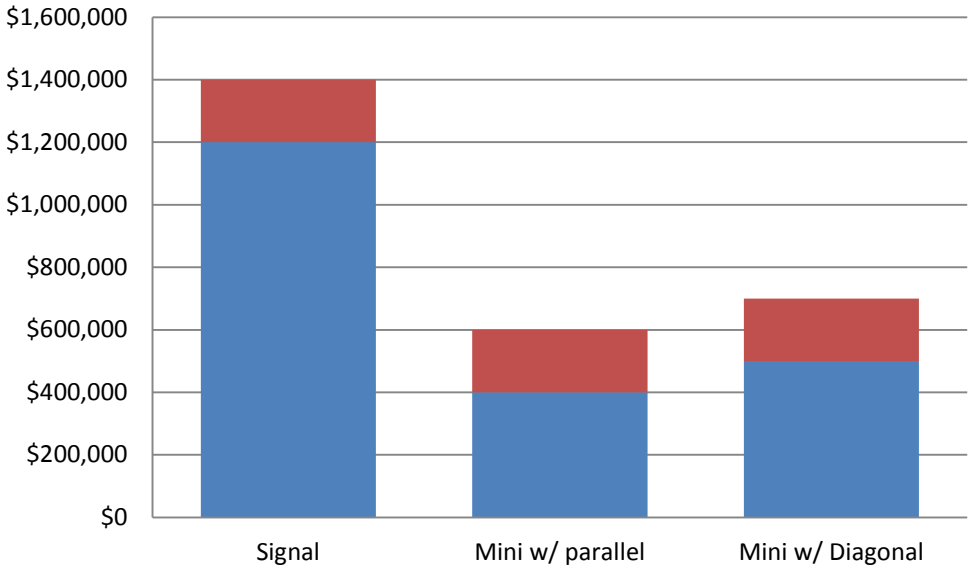
Mini-roundabout demonstration in St. James - *Photos by Robert Jones*

[Bus Demonstration]
[Semi Demonstration]

Construction Costs

Options	MnDOT	City	County
Signal	$1.2M-$1.4M	$25,000-$35,000	$10,000-$20,000
Mini w/ parallel	$0.4M-$0.6M	$5,000-$15,000	$5,000-$15,000
Mini w/ Diagonal	$0.5M-$0.7M	$5,000-$15,000	$5,000-$15,000

MnDOT Construction Costs



City and County Construction Costs