























# HCM Signalized Intersection Capacity Analysis

## 1: Gage Blvd & Leslie Rd

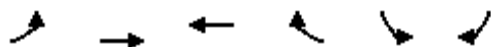
2008 No Build

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.92		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1693	1782	1515	1693	3321		1693	3111		1676	3234	
Flt Permitted	0.26	1.00	1.00	0.18	1.00		0.42	1.00		0.46	1.00	
Satd. Flow (perm)	472	1782	1515	324	3321		743	3111		810	3234	
Volume (vph)	70	425	240	195	475	70	190	135	160	165	290	90
Peak-hour factor, PHF	0.84	0.84	0.84	0.73	0.73	0.73	0.81	0.81	0.81	0.93	0.93	0.93
Adj. Flow (vph)	83	506	286	267	651	96	235	167	198	177	312	97
RTOR Reduction (vph)	0	0	191	0	20	0	0	145	0	0	49	0
Lane Group Flow (vph)	83	506	95	267	727	0	235	220	0	177	360	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	21.0	18.0	18.0	25.0	20.0		17.0	14.0		17.0	14.0	
Effective Green, g (s)	25.0	20.0	20.0	29.0	22.0		21.0	16.0		21.0	16.0	
Actuated g/C Ratio	0.42	0.33	0.33	0.48	0.37		0.35	0.27		0.35	0.27	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	298	594	505	316	1218		339	830		356	862	
v/s Ratio Prot	0.02	0.28		c0.10	0.22		c0.06	0.07		0.04	0.11	
v/s Ratio Perm	0.09		0.06	c0.31			c0.18			0.13		
v/c Ratio	0.28	0.85	0.19	0.84	0.60		0.69	0.26		0.50	0.42	
Uniform Delay, d1	11.0	18.6	14.2	12.0	15.4		15.4	17.4		14.2	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	14.3	0.8	23.3	2.2		11.1	0.8		4.9	1.5	
Delay (s)	13.4	33.0	15.1	35.2	17.6		26.6	18.1		19.1	19.6	
Level of Service	B	C	B	D	B		C	B		B	B	
Approach Delay (s)		25.2			22.2			21.4			19.5	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			22.4	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			60.0	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			71.0%	ICU Level of Service				C				
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 2: Gage Blvd & Steptoe St

2008 No Build



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑↑	↑↑	↘	↙↘	↘
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1693	3386	3386	1499	3317	1530
Flt Permitted	0.25	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	442	3386	3386	1499	3317	1530
Volume (vph)	140	555	785	465	415	155
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.96	0.96
Adj. Flow (vph)	151	597	892	528	432	161
RTOR Reduction (vph)	0	0	0	83	0	126
Lane Group Flow (vph)	151	597	892	445	432	35
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Turn Type	pm+pt			pm+ov		Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	62.0	62.0	51.2	68.5	17.3	17.3
Effective Green, g (s)	64.7	64.7	54.0	73.3	19.3	19.3
Actuated g/C Ratio	0.72	0.72	0.60	0.81	0.21	0.21
Clearance Time (s)	3.5	5.7	5.8	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	425	2434	2032	1271	711	328
v/s Ratio Prot	c0.03	0.18	c0.26	0.08	c0.13	
v/s Ratio Perm	0.23			0.22		0.02
v/c Ratio	0.36	0.25	0.44	0.35	0.61	0.11
Uniform Delay, d1	5.1	4.3	9.8	2.2	31.9	28.4
Progression Factor	1.00	1.00	1.70	3.18	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.5	0.0	1.0	0.1
Delay (s)	5.3	4.6	17.1	6.9	32.9	28.5
Level of Service	A	A	B	A	C	C
Approach Delay (s)		4.7	13.3		31.7	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 3: Gage Blvd & Grandridge Blvd

2008 No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑	↗	↙	↑↑		↙	↕			↗	↗
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95			1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95			0.98	1.00
Satd. Flow (prot)	1692	3386	1480	1692	3366		1608	1612			1739	1492
Flt Permitted	0.34	1.00	1.00	0.33	1.00		0.95	0.95			0.98	1.00
Satd. Flow (perm)	606	3386	1480	582	3366		1608	1612			1739	1492
Volume (vph)	60	620	355	10	575	20	665	10	5	20	20	60
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.83	0.83	0.83	0.59	0.59	0.59
Adj. Flow (vph)	66	681	390	11	632	22	801	12	6	34	34	102
RTOR Reduction (vph)	0	0	189	0	2	0	0	1	0	0	0	92
Lane Group Flow (vph)	66	681	202	11	652	0	410	408	0	0	68	10
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm		Perm	Perm			Split			Split		Perm
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	44.0	44.0	44.0	44.0	44.0		24.0	24.0			6.5	6.5
Effective Green, g (s)	46.5	46.5	46.5	46.5	46.5		26.0	26.0			8.5	8.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.29	0.29			0.09	0.09
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	313	1749	765	301	1739		465	466			164	141
v/s Ratio Prot		c0.20			0.19		c0.25	0.25			c0.04	
v/s Ratio Perm	0.11		0.14	0.02								0.01
v/c Ratio	0.21	0.39	0.26	0.04	0.37		0.88	0.88			0.41	0.07
Uniform Delay, d1	11.8	13.2	12.2	10.7	13.0		30.5	30.5			38.4	37.1
Progression Factor	0.99	0.90	1.79	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.1	0.0	0.1	0.2	0.6		17.1	16.2			0.6	0.1
Delay (s)	11.7	11.9	21.8	10.9	13.7		47.7	46.7			39.0	37.2
Level of Service	B	B	C	B	B		D	D			D	D
Approach Delay (s)		15.3			13.6			47.2			37.9	
Approach LOS		B			B			D			D	

### Intersection Summary

HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Grandridge Blvd & Columbia Center Blvd

2008 No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.99		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1608	1687	1502		3162		1644	3288	1471	1676	3353	1500
Flt Permitted	0.95	1.00	1.00		0.99		0.16	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	1608	1687	1502		3162		284	3288	1471	450	3353	1500
Volume (vph)	160	145	170	50	155	100	155	660	35	115	845	95
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.85	0.89	0.89	0.89	0.94	0.94	0.94
Adj. Flow (vph)	174	158	185	59	182	118	174	742	39	122	899	101
RTOR Reduction (vph)	0	0	131	0	91	0	0	0	17	0	0	45
Lane Group Flow (vph)	162	170	54	0	268	0	174	742	22	122	899	56
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Split		pm+ov	Split			D.P+P		pm+ov	D.P+P		pm+ov
Protected Phases	3	3	5	4	4		5	2	4	1	6	3
Permitted Phases			3				6		2	2		6
Actuated Green, G (s)	10.6	10.6	16.4		9.7		29.9	26.2	35.9	30.4	24.1	34.7
Effective Green, g (s)	12.4	12.4	20.3		11.5		34.1	27.9	39.4	34.1	26.2	38.6
Actuated g/C Ratio	0.18	0.18	0.29		0.16		0.49	0.40	0.56	0.49	0.37	0.55
Clearance Time (s)	4.8	4.8	5.1		4.8		5.1	4.7	4.8	5.0	5.1	4.8
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	285	299	500		519		292	1311	828	328	1255	827
v/s Ratio Prot	0.10	c0.10	0.01		c0.08		0.07	c0.23	0.00	0.03	c0.27	0.01
v/s Ratio Perm			0.02				0.22		0.01	0.15		0.03
v/c Ratio	0.57	0.57	0.11		0.52		0.60	0.57	0.03	0.37	0.72	0.07
Uniform Delay, d1	26.4	26.4	18.2		26.7		21.9	16.3	6.8	10.6	18.7	7.3
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	1.5	0.0		0.4		2.2	1.8	0.0	0.3	3.5	0.0
Delay (s)	27.9	27.8	18.2		27.1		24.1	18.1	6.8	10.8	22.2	7.3
Level of Service	C	C	B		C		C	B	A	B	C	A
Approach Delay (s)		24.4			27.1			18.8			19.7	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
6: Clearwater Ave & Columbia Center Blvd

2008 No Build

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.95		1.00	0.95	0.88	1.00	*0.60		0.91	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1613	3173		1676	3353	2640	1660	3123		1526	3204	1485
Flt Permitted	0.45	1.00		0.63	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	769	3173		1115	3353	2640	1660	3123		1526	3204	1485
Volume (vph)	235	160	20	20	230	435	55	490	25	385	700	260
Peak-hour factor, PHF	0.94	0.94	0.94	0.82	0.82	0.82	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	250	170	21	24	280	530	64	570	29	438	795	295
RTOR Reduction (vph)	0	13	0	0	0	56	0	5	0	0	0	185
Lane Group Flow (vph)	250	178	0	24	280	474	64	594	0	397	836	110
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	pm+pt			pm+pt		pt+ov	Split			Split		pm+ov
Protected Phases	1	6		5	2	2 3	4	4		3	3	1
Permitted Phases	6			2								3
Actuated Green, G (s)	20.3	16.3		15.8	14.2	37.9	13.0	13.0		18.3	18.3	22.3
Effective Green, g (s)	24.0	19.0		19.2	16.6	40.6	15.4	15.4		21.0	21.0	26.0
Actuated g/C Ratio	0.34	0.27		0.27	0.24	0.58	0.22	0.22		0.30	0.30	0.37
Clearance Time (s)	4.0	5.7		4.0	5.4		5.4	5.4		5.7	5.7	4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	324	861		327	795	1531	365	687		458	961	552
v/s Ratio Prot	c0.06	0.06		0.00	0.08	0.18	0.04	c0.19		0.26	c0.26	0.01
v/s Ratio Perm	c0.21			0.02								0.06
v/c Ratio	0.77	0.21		0.07	0.35	0.31	0.18	0.87		0.87	0.87	0.20
Uniform Delay, d1	19.9	19.7		18.7	22.2	7.5	22.1	26.3		23.2	23.2	14.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.9	0.5		0.0	1.2	0.0	0.1	10.7		15.3	8.2	0.1
Delay (s)	29.9	20.2		18.7	23.5	7.6	22.2	37.0		38.4	31.4	15.0
Level of Service	C	C		B	C	A	C	D		D	C	B
Approach Delay (s)		25.7			13.2			35.6			30.1	
Approach LOS		C			B			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			26.5				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			70.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			65.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
7: Clearwater Ave & Clodfelter Rd

2008 No Build

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑		↘	↑↑	↘	↗		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Volume (veh/h)	300	25	60	495	15	30		
Peak Hour Factor	0.88	0.88	0.90	0.90	0.69	0.69		
Hourly flow rate (vph)	341	28	67	550	22	43		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None							
Median storage (veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			369		763	185		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			369		763	185		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			94		93	95		
cM capacity (veh/h)			1186		325	832		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	
Volume Total	227	142	67	275	275	22	43	
Volume Left	0	0	67	0	0	22	0	
Volume Right	0	28	0	0	0	0	43	
cSH	1700	1700	1186	1700	1700	325	832	
Volume to Capacity	0.13	0.08	0.06	0.16	0.16	0.07	0.05	
Queue Length 95th (ft)	0	0	4	0	0	5	4	
Control Delay (s)	0.0	0.0	8.2	0.0	0.0	16.9	9.6	
Lane LOS			A				C	A
Approach Delay (s)	0.0		0.9			12.0		
Approach LOS							B	
Intersection Summary								
Average Delay			1.3					
Intersection Capacity Utilization			26.4%	ICU Level of Service		A		
Analysis Period (min)			15					

# HCM Unsignalized Intersection Capacity Analysis

## 8: 10th Ave & Clodfelter Rd

2008 No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL2	NEL	NER
Lane Configurations		↕			↕		↕				↕	
Sign Control		Stop			Stop		Stop				Stop	
Volume (vph)	5	40	5	40	100	5	5	30	10	5	20	60
Peak Hour Factor	0.75	0.75	0.75	0.65	0.65	0.65	0.66	0.66	0.66	0.77	0.77	0.77
Hourly flow rate (vph)	7	53	7	62	154	8	8	45	15	6	26	78

Direction, Lane #	EB 1	WB 1	SB 1	NE 1
Volume Total (vph)	67	223	68	110
Volume Left (vph)	7	62	8	6
Volume Right (vph)	7	8	15	78
Hadj (s)	0.16	0.07	-0.03	-0.33
Departure Headway (s)	4.7	4.5	4.7	4.3
Degree Utilization, x	0.09	0.28	0.09	0.13
Capacity (veh/h)	719	768	708	771
Control Delay (s)	8.2	9.2	8.2	8.0
Approach Delay (s)	8.2	9.2	8.2	8.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay		8.6	
HCM Level of Service		A	
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis  
 9: Canyon St & Steptoe St

2008 No Build




Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	100	120	190	605	615	110
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	111	133	211	672	683	122
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1503	403	806			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1503	403	806			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	78	74			
cM capacity (veh/h)	83	597	815			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	244	211	336	336	456	350
Volume Left	111	211	0	0	0	0
Volume Right	133	0	0	0	0	122
cSH	157	815	1700	1700	1700	1700
Volume to Capacity	1.56	0.26	0.20	0.20	0.27	0.21
Queue Length 95th (ft)	413	26	0	0	0	0
Control Delay (s)	332.2	11.0	0.0	0.0	0.0	0.0
Lane LOS	F	B				
Approach Delay (s)	332.2	2.6	0.0			
Approach LOS	F					

Intersection Summary						
Average Delay			43.2			
Intersection Capacity Utilization	56.4%		ICU Level of Service	B		
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 10: Tapteal Dr & Steptoe St

2008 No Build

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↶	↷	↶	↷	↶	↶↷	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	95	95	575	130	25	630	
Peak Hour Factor	0.89	0.89	0.91	0.91	0.94	0.94	
Hourly flow rate (vph)	107	107	632	143	27	670	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	1020	632			775		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1020	632			775		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	53	75			97		
cM capacity (veh/h)	225	423			837		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	107	107	632	143	27	335	335
Volume Left	107	0	0	0	27	0	0
Volume Right	0	107	0	143	0	0	0
cSH	225	423	1700	1700	837	1700	1700
Volume to Capacity	0.47	0.25	0.37	0.08	0.03	0.20	0.20
Queue Length 95th (ft)	58	25	0	0	2	0	0
Control Delay (s)	34.6	16.4	0.0	0.0	9.4	0.0	0.0
Lane LOS	D	C			A		
Approach Delay (s)	25.5		0.0		0.4		
Approach LOS	D						
Intersection Summary							
Average Delay			3.4				
Intersection Capacity Utilization			44.8%	ICU Level of Service		A	
Analysis Period (min)			15				



08\_PM\_NB\_Center-Gage. OUT

42                      50                      2                      56                      2                      19                      1                      1.00                      0.78

Based on unit time = 60 minutes.  
Flow Scale and Peak Hour Factor effects included in flow values.

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Island Diam (ft)	Circ Width (ft)	Insc Diam. (ft)	No. of Circ. Lanes	No. of Entry Lanes	Av. Ent Lane Width (ft)	Circulating/Exiting Stream						
						Flow (veh/h)	%HV	Adjust. Flow (pcu/h)	%Exit Incl.	Cap. Constr. Effect	O-D Factor	
West: EB: Gage Blvd												
96	18	132	1	1	13.00	138	2.6	138	0	N	0.985	
South: NB: Center Pkwy												
96	18	132	1	2	13.00	348	2.1	348	0	N	0.976	
East: WB: Gage Blvd												
96	30	156	2	2	13.00	525	1.0	525	0	N	0.939	
North: SB: Center Pkwy												
96	30	156	2	1	13.00	779	1.0	779	0	N	0.943	

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Circulating/Exiting Stream					Critical Gap		Follow-up Headway (s)
			Flow Rate (pcu/h)	Aver Speed (mph)	Aver Dist (ft)	In-Bnch Headway (s)	Prop Bunched	Hdwy (s)	Dist (ft)	
West: EB: Gage Blvd										
Left	1	Dominant	138	19.1	729.8	2.00	0.155	4.60	128.9	2.40
Thru	1	Dominant	138	19.1	729.8	2.00	0.155	4.60	128.8	2.39
Right	2	Continuous								
South: NB: Center Pkwy										
Left	1	Subdominant	348	22.4	340.0	2.00	0.345	4.34	142.4	2.34
	2	Dominant	348	22.4	340.0	2.00	0.345	3.73	122.4	2.01
Thru	2	Dominant	348	22.4	340.0	2.00	0.345	3.73	122.4	2.01
Right	2	Dominant	348	22.4	340.0	2.00	0.345	3.73	122.4	2.01
East: WB: Gage Blvd										
Left	1	Subdominant	525	16.3	164.5	1.07	0.289	3.72	89.2	2.45
Thru	1	Subdominant	525	16.3	164.5	1.07	0.289	3.72	89.1	2.44
	2	Dominant	525	16.3	164.5	1.07	0.289	3.35	80.3	2.20
Right	2	Dominant	525	16.3	164.5	1.07	0.289	3.35	80.3	2.20

08\_PM\_NB\_Center-Gage. OUT

---

North: SB: Center Pkwy										
Left	1	Dominant	779	18.8	127.5	1.05	0.392	3.61	99.7	2.48
Thru	1	Dominant	779	18.8	127.5	1.05	0.392	3.61	99.7	2.48
Right	1	Dominant	779	18.8	127.5	1.05	0.392	3.62	100.0	2.49

---

Environment Factor: 1.00  
 Entry/Circulating Flow Adjustment: Medium

Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap). The O-D Factor (Table R.0) allows for priority sharing and priority emphasis.

\* Critical gap or follow-up headway set to MINIMUM value

Dist (Distance): Spacing, i.e. distance between the front ends of two successive vehicles across all lanes in the circulating or exiting stream

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - aaSIDRA & HCM MODELS

---

Mov No.	Dem Flow (veh /h)	aaSIDRA				HCM 2000 Lower				HCM 2000 Upper				
		Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	
West: EB: Gage Blvd														
12	L	25	110	0.227	12.9	B	87	0.287	12.9	B	105	0.238	12.7	B
11	T	271	1191	0.228	5.8	A	945	0.287	5.9	A	1138	0.238	5.7	A
13	R	561	-	-	NA	-	-	-	NA	-	-	-	NA	-
South: NB: Center Pkwy														
32	L	454	2053	0.221	13.8	B	1457	0.312	14.4	B	1782	0.255	13.9	B
31	TR	83	375	0.221	7.2	A	266	0.312	8.0	A	326	0.255	7.5	A
East: WB: Gage Blvd														
22	L	30	170	0.176	13.8	B	-	-	NA	-	-	-	NA	-
21	T	297	1680	0.177	6.7	A	-	-	NA	-	-	-	NA	-
23	R	41	232	0.177	7.8	A	-	-	NA	-	-	-	NA	-
North: SB: Center Pkwy														
42	LTR	130	828	0.157	10.6	B	-	-	NA	-	-	-	NA	-

---

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table R.6 - ROUNDABOUT ALTERNATIVE CAPACITY MODELS

Mov No.	Dem Flow (veh /h)	aaSIDRA		NAASRA 1986		Ger. Linear		Ger. GapAcc		
		Cap. (veh /h)	Deg. Satn x	Cap. (veh /h)	% Diff from aaSIDRA	Cap. (veh /h)	% Diff from aaSIDRA	Cap. (veh /h)	% Diff from aaSIDRA	
West: EB: Gage Blvd										
12 L	25	110	0.227	135	22.7	94	-14.5	95	-13.6	
11 T	271	1191	0.228	1464	22.9	1021	-14.3	1029	-13.6	
13 R	561	-	NA	-	NA	-	NA	-	NA	
South: NB: Center Pkwy										
32 L	454	2053	0.221	2226	8.4	-	NA	-	NA	
31 TR	83	375	0.221	407	8.5	-	NA	-	NA	
East: WB: Gage Blvd										
22 L	30	170	0.176	189	11.2	100	-41.2	161	-5.3	
21 T	297	1680	0.177	1869	11.2	991	-41.0	1595	-5.1	
23 R	41	232	0.177	258	11.2	137	-40.9	220	-5.2	
North: SB: Center Pkwy										
42 LTR	130	828	0.157	931	12.4	942	13.8	785	-5.2	

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the NAASRA model is not applicable for circulating flows above 1800 veh/h in a single lane and the German models are not applicable for high values of circulating flow (actual values depend on number of lanes at roundabout) or for roundabout approaches with more than two entry lanes, or two entry lanes with a single circulating lane. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table S.2 - MOVEMENT CAPACITY PARAMETERS

Mov No.	Demand Flow (veh/h)	Opposing Movement				Total Cap. (veh /h)	Prac. Deg. Satn xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
		HV (%)	Flow (veh/h)	HV (%)	Flow (pcu/h)					
West: EB: Gage Blvd										
12 L	25	4.0	138	2.6	138	110	0.85	274	100	0.227
11 T	271	1.8	138	2.6	138	1191	0.85	274	100	0.228
13 R	561	2.0	0			1900	0.98	232	100	0.295*
South: NB: Center Pkwy										
32 L	454	1.1	348	2.1	348	2053	0.85	284	100	0.221

08_PM_NB_Center-Gage. OUT											
31 TR	83	2.4	348	2.1	348	375	0.85	284	100	0.221	
-----											
East: WB: Gage Blvd											
22 L	30	3.3	525	1.0	525	170	0.85	382	100	0.176	
21 T	297	1.0	525	1.0	525	1680	0.85	381	100	0.177	
23 R	41	2.4	525	1.0	525	232	0.85	381	100	0.177	
-----											
North: SB: Center Pkwy											
42 LTR	130	3.8	779	1.0	779	828	0.85	441	100	0.157	
-----											

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S.3 - INTERSECTION PARAMETERS

Intersection Level of Service	=	A
Worst movement Level of Service	=	B
Average intersection delay (s)	=	8.6
Largest average movement delay (s)	=	13.8
Largest back of queue, 95% (ft)	=	44
Performance Index	=	33.32
Degree of saturation (highest)	=	0.295
Practical Spare Capacity (lowest)	=	232 %
Effective intersection capacity, (veh/h)	=	6408
Total vehicle flow (veh/h)	=	1892
Total person flow (pers/h)	=	2838
Total vehicle delay (veh-h/h)	=	4.52
Total person delay (pers-h/h)	=	6.78
Total effective vehicle stops (veh/h)	=	1108
Total effective person stops (pers/h)	=	1663
Total vehicle travel (veh-mi/h)	=	805.9
Total cost (\$/h)	=	651.12
Total fuel (gal/h)	=	29.4
Total CO2 (kg/h)	=	278.69

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	Queue (ft)	Perf. Index	Aver. Speed (mph)
-----									
West: EB: Gage Blvd									
12 L	0.09	0.13	12.9	0.35	0.66	1.7	44	0.51	29.7
11 T	0.44	0.66	5.8	0.35	0.47	1.7	44	4.49	33.4
13 R	0.94	1.42	6.1		0.50	14.3#		8.34	34.5
-----									
South: NB: Center Pkwy									
32 L	1.74	2.61	13.8	0.51	0.71	1.7	44	9.50	29.3
31 TR	0.17	0.25	7.2	0.50	0.58	1.7	44	1.46	32.3
-----									
East: WB: Gage Blvd									

08_PM_NB_Center-Gage. OUT									
22 L	0.12	0.17	13.8	0.51	0.78	1.0	25	0.63	29.3
21 T	0.56	0.83	6.7	0.50	0.57	1.0	26	5.11	32.6
23 R	0.09	0.13	7.8	0.49	0.64	1.0	26	0.73	32.0
-----									
North: SB: Center Pkwy									
42 LTR	0.38	0.57	10.6	0.55	0.73	0.8	21	2.56	30.9
-----									
# Largest density (passenger cars per km or mile) for any lane									

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Deg. Satn x	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue (ft)	Perf. Index	Aver. Speed (mph)
-----									
West: EB: Gage Blvd									
857	0.295	1.47	2.21	6.2	0.12	0.49	225	13.33	34.0
-----									
South: NB: Center Pkwy									
537	0.221	1.90	2.85	12.8	0.51	0.69	44	10.96	29.7
-----									
East: WB: Gage Blvd									
368	0.177	0.76	1.14	7.4	0.50	0.59	26	6.47	32.3
-----									
North: SB: Center Pkwy									
130	0.157	0.38	0.57	10.6	0.55	0.73	21	2.56	30.9
-----									
ALL VEHICLES:									
1892	0.295	4.52	6.78	8.6	0.33	0.59	44	33.32	32.1
-----									
INTERSECTION (persons):									
2838	0.295		6.78	8.6	0.33	0.59		33.32	32.1

Queue values in this table are 95% back of queue (feet).

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table S.7 - LANE PERFORMANCE

Lane No.	Mov No.	Dem Flow (veh/h)	Cap (veh/h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	Queue (ft)	Short Lane (ft)
-----									
West: EB: Gage Blvd									
1 LT	12, 11	296	1301	0.228	6.4	0.49	1.7	44	
2 R	13	561	1900	0.295	6.1	0.50	14.3#		
-----									
South: NB: Center Pkwy									
1 L	32	243	1100	0.221	14.0	0.72	1.6	42	

08_PM_NB_Center-Gage. OUT								
2 LTR	32, 31	294	1328	0.221	11.8	0.67	1.7	44

East: WB: Gage Blvd								
1 LT	22, 21	171	970	0.177	8.1	0.62	1.0	25
2 TR	21, 23	197	1111	0.177	6.9	0.57	1.0	26

North: SB: Center Pkwy								
1 LTR	42	130	828	0.157	10.6	0.73	0.8	21

# Density (passenger cars per km or mile)

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S. 8A - LANE FLOW AND CAPACITY INFORMATION

Lane No.	Mov No.	Dem Flow (veh/h)			Min Cap (veh/h)	Tot Cap (veh/h)	Deg. Satn x	Lane Util %	
		Lef	Thru	Rig					Tot
West: EB: Gage Blvd									
1 LT	12, 11	25	271	0	296	150	1301	0.228	100
2 R	13	0	0	561	561	150	1900	0.295	100
South: NB: Center Pkwy									
1 L	32	243	0	0	243	150	1100	0.221	100
2 LTR	32, 31	211	47	36	294	150	1328	0.221	100
East: WB: Gage Blvd									
1 LT	22, 21	30	141	0	171	150	970	0.177	100
2 TR	21, 23	0	156	41	197	150	1111	0.177	100
North: SB: Center Pkwy									
1 LTR	42	52	58	20	130	130	828	0.157	100

For roundabouts, the capacity value for continuous movements is obtained as the basic saturation flow without any adjustments. Saturation flow scale applies if specified.

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S. 12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total	Cost Total	HC Total	CO Total	NOX Total	CO2 Total

		gal /h	\$/h	08_PM_NB_Center-Gage. OUT kg/h	kg/h	kg/h	kg/h
-----							
West: EB: Gage Blvd							
12	L	0.4	9.67	0.006	0.21	0.008	4.0
11	T	4.1	88.09	0.057	1.84	0.078	38.7
13	R	8.3	176.34	0.116	3.69	0.157	78.6
		12.8	274.10	0.179	5.74	0.242	121.3
-----							
South: NB: Center Pkwy							
32	L	7.6	178.15	0.114	3.79	0.144	72.1
31	TR	1.3	27.75	0.018	0.60	0.024	11.9
		8.9	205.90	0.132	4.38	0.168	84.0
-----							
East: WB: Gage Blvd							
22	L	0.5	11.76	0.008	0.25	0.009	4.8
21	T	4.5	98.77	0.064	2.06	0.086	42.2
23	R	0.6	13.80	0.009	0.31	0.012	5.9
		5.6	124.33	0.081	2.62	0.107	52.9
-----							
North: SB: Center Pkwy							
42	LTR	2.2	46.79	0.031	1.06	0.041	20.5
		2.2	46.79	0.031	1.06	0.041	20.5
-----							
INTERSECTION:		29.4	651.12	0.424	13.80	0.559	278.7
-----							

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	0.900
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	27.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (1000 lb)	=	1.4
Heavy vehicle mass (1000 lb)	=	11.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

The idle fuel and vehicle mass parameters given above are the default values (data given in RIDES may override some of these parameters).

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)		Deg Sat x	Aver. Delay (sec)	Longest Queue (ft)	Shrt Lane (ft)
	L	T	R	Tot			1st	2nd				
-----												
West: EB: Gage Blvd												
1	LT	25	271	296	2				0.228	6.4	44	

08_PM_NB_Center-Gage. OUT									
2 R		561	561	2	1900	0.295	6.1		
	25	271	561	857	2	0.295	6.2	44	
-----									
South: NB: Center Pkwy									
1 L		243		243	1	0.221	14.0	42	
2 LTR		211	47	36	294	1	0.221	11.8	44
	454	47	36	537	1	0.221	12.8	44	
-----									
East: WB: Gage Bl vd									
1 LT		30	141		171	1	0.177	8.1	25
2 TR			156	41	197	1	0.177	6.9	26
	30	297	41	368	1	0.177	7.4	26	
-----									
North: SB: Center Pkwy									
1 LTR		52	58	20	130	4	0.157	10.6	21
	52	58	20	130	4	0.157	10.6	21	
=====									
ALL VEHICLES				Total	%	Max	Aver.	Max	
				Flow	HV	X	Del ay	Queue	
				1892	2	0.295	8.6	44	
=====									

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (feet).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Bl vd  
 Intersection ID:  
 Roundabout

Table S.15 - CAPACITY AND LEVEL OF SERVICE

Mov No.	Mov Typ	Total Flow (veh/h)	Total Cap. (veh/h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	Queue (ft)
West: EB: Gage Bl vd								
12	L	25	110	0.227	12.9	B	1.7	44
11	T	271	1191	0.228	5.8	A	1.7	44
13	R (Con)	561	1900	0.295*	6.1	B#	14.3#	
		857		0.295	6.2	A	1.7	44
-----								
South: NB: Center Pkwy								
32	L	454	2053	0.221	13.8	B	1.7	44
31	TR	83	375	0.221	7.2	A	1.7	44
		537		0.221	12.8	B	1.7	44
-----								
East: WB: Gage Bl vd								
22	L	30	170	0.176	13.8	B	1.0	25
21	T	297	1680	0.177	6.7	A	1.0	26
23	R	41	232	0.177	7.8	A	1.0	26

08\_PM\_NB\_Center-Gage. OUT

	368		0.177	7.4	A	1.0	26
North: SB: Center Pkwy	130	828	0.157	10.6	B	0.8	21
42 LTR	130		0.157	10.6	B	0.8	21
ALL VEHICLES:	1892		0.295	8.6	A	1.7	44

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.

- # Continuous movements: Level Of Service based on density, Density (passenger cars per km or mile) instead of queue.
- \* Maximum v/c ratio, or critical green periods

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D.0 - GEOMETRIC DELAY DATA

From Approach	To Approach	Negn Radius (ft)	Negn Speed (mph)	Negn Dist. (ft)	Appr. Dist. (ft)	Downstream Distance (ft)
West: EB: Gage Blvd						
	South	135.0	21.4	50.8	1800	403
	East	188.6	24.3	127.0	1800	411
	North	56.8	15.4	223.1	1800	549
South: NB: Center Pkwy						
	West	58.4	15.6	229.3	1800	554
	East	102.2	19.3	51.0	1800	397
	North	183.6	24.1	137.2	1800	410
East: WB: Gage Blvd						
	West	182.9	24.1	147.5	1800	413
	South	58.4	15.6	229.3	1800	554
	North	110.4	19.9	60.5	1800	398
North: SB: Center Pkwy						
	West	123.4	20.7	60.3	1800	403
	South	183.6	24.1	137.2	1800	412
	East	56.8	15.4	223.1	1800	550

Maximum Negotiation (Design) Speed = 50.0 mph  
 Downstream Distance calculated by aaSIDRA

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

08\_PM\_NB\_Center-Gage. OUT

Intersection ID:  
Roundabout

Table D.1 - LANE DELAYS

Lane No.	Mov No.	Deg. Satn x	Stop-Line		Delay Total dSL	Delay (seconds/veh)				Geom dig	Control dic	
			1st d1	2nd d2		Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di			
West: EB: Gage Blvd												
1	LT	12, 11	0.228	0.7	0.0	0.7	2.2	0.0	0.0	0.0	12.2	6.4
2	R	13	0.295			0.0					5.1	6.1
South: NB: Center Pkwy												
1	L	32	0.221	1.8	0.0	1.8	2.5	0.0	0.0	0.0	12.2	14.0
2	LTR	32, 31	0.221	1.4	0.0	1.4	2.6	0.0	0.0	0.0	12.2	11.8
East: WB: Gage Blvd												
1	LT	22, 21	0.177	1.6	0.0	1.6	3.2	0.0	0.0	0.0	12.2	8.1
2	TR	21, 23	0.177	1.3	0.0	1.3	3.1	0.0	0.0	0.0	5.3	6.9
North: SB: Center Pkwy												
1	LTR	42	0.157	2.4	0.0	2.4	3.2	0.0	0.0	0.0	8.2	10.6

dn is average stop-start delay for all vehicles queued and unqueued

Steptoe Street Extension  
2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
Intersection ID:  
Roundabout

Table D.2 - LANE STOPS

Lane No.	Deg. Satn x	Effective		Stop Geom. hig	Rate Overall h	Prop. Queued pq	Queue Move-up Rate hqm
		he1	he2				
West: EB: Gage Blvd							
1	LT	0.228	0.19	0.00	0.30	0.49	0.347
2	R	0.295			0.50	0.50	0.00
South: NB: Center Pkwy							
1	L	0.221	0.38	0.00	0.34	0.72	0.523
2	LTR	0.221	0.34	0.00	0.32	0.67	0.503
East: WB: Gage Blvd							
1	LT	0.177	0.37	0.00	0.24	0.62	0.506
2	TR	0.177	0.34	0.00	0.23	0.57	0.493
North: SB: Center Pkwy							
1	LTR	0.157	0.48	0.00	0.25	0.73	0.554

hig is the average value for all movements in a shared lane  
hqm is average queue move-up rate for all vehicles queued and unqueued

08\_PM\_NB\_Center-Gage. OUT

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D. 3A - LANE QUEUES (veh)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: Gage Blvd											
1 LT	0.228	0.0	0.6	0.0	0.6	1.0	1.2	1.4	1.7	2.0	0.02
2 R	0.295				8.9#						0.05#
South: NB: Center Pkwy											
1 L	0.221	0.0	0.5	0.0	0.5	1.0	1.2	1.3	1.6	1.9	0.02
2 LTR	0.221	0.0	0.5	0.0	0.5	1.0	1.2	1.4	1.7	2.0	0.02
East: WB: Gage Blvd											
1 LT	0.177	0.0	0.3	0.0	0.3	0.6	0.7	0.8	1.0	1.1	0.01
2 TR	0.177	0.0	0.3	0.0	0.3	0.6	0.7	0.8	1.0	1.2	0.01
North: SB: Center Pkwy											
1 LTR	0.157	0.0	0.3	0.0	0.3	0.5	0.6	0.7	0.8	0.9	0.01

Values printed in this table are back of queue (vehicles).

# Continuous movements: Density (passenger cars per km or mile) instead of queue, Space Occupancy Ratio instead of Queue Storage Ratio

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D. 3B - LANE QUEUES (feet)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: Gage Blvd											
1 LT	0.228	0	14	0	14	26	32	36	44	51	0.02
2 R	0.295				5.5#						0.05#
South: NB: Center Pkwy											
1 L	0.221	0	13	0	13	24	30	34	42	48	0.02
2 LTR	0.221	0	14	0	14	26	31	35	44	50	0.02
East: WB: Gage Blvd											
1 LT	0.177	0	8	0	8	15	18	20	25	29	0.01
2 TR	0.177	0	8	0	8	15	18	21	26	30	0.01
North: SB: Center Pkwy											
1 LTR	0.157	0	7	0	7	12	15	17	21	24	0.01

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Values printed in this table are back of queue (feet).

# Continuous movements: Density (passenger cars per km or mile) instead of queue, Space Occupancy Ratio instead of Queue Storage Ratio

Steptoe Street Extension  
 2008 PM Peak Hour\_No Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D.4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd	
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Running	Overall
-----								
West: EB: Gage Blvd								
12	40.0	15.4	15.4	40.0			29.7	29.7
11	40.0	24.3	24.3	40.0			33.4	33.4
13	40.0	21.4	21.4	40.0			34.5	34.5
-----								
South: NB: Center Pkwy								
32	40.0	15.6	15.6	40.0			29.3	29.3
31	40.0	22.0	22.0	40.0			32.3	32.3
-----								
East: WB: Gage Blvd								
22	40.0	15.6	15.6	40.0			29.3	29.3
21	40.0	24.1	24.1	40.0			32.6	32.6
23	40.0	19.9	19.9	40.0			32.0	32.0
-----								
North: SB: Center Pkwy								
42	40.0	20.1	20.1	40.0			30.9	30.9
-----								

"Running Speed" is the average speed excluding stopped periods.

--- End of aaSIDRA Output ---























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# HCM Signalized Intersection Capacity Analysis

## 1: Gage Blvd & Leslie Rd

2008 Build (Signal @ Clearwater/Step toe)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1693	1782	1515	1693	3317		1693	3079		1676	3209	
Flt Permitted	0.30	1.00	1.00	0.17	1.00		0.45	1.00		0.53	1.00	
Satd. Flow (perm)	536	1782	1515	305	3317		797	3079		938	3209	
Volume (vph)	70	445	235	180	480	75	180	85	130	165	225	90
Peak-hour factor, PHF	0.84	0.84	0.84	0.73	0.73	0.73	0.81	0.81	0.81	0.93	0.93	0.93
Adj. Flow (vph)	83	530	280	247	658	103	222	105	160	177	242	97
RTOR Reduction (vph)	0	0	176	0	18	0	0	123	0	0	62	0
Lane Group Flow (vph)	83	530	104	247	743	0	222	142	0	177	277	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	27.0	24.0	24.0	35.0	28.0		19.0	14.0		19.0	14.0	
Effective Green, g (s)	31.0	26.0	26.0	38.0	30.0		23.0	16.0		23.0	16.0	
Actuated g/C Ratio	0.44	0.37	0.37	0.54	0.43		0.33	0.23		0.33	0.23	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	320	662	563	344	1422		351	704		382	733	
v/s Ratio Prot	0.02	c0.30		c0.09	0.22		c0.06	0.05		0.05	0.09	
v/s Ratio Perm	0.10		0.07	0.30			c0.14			0.11		
v/c Ratio	0.26	0.80	0.18	0.72	0.52		0.63	0.20		0.46	0.38	
Uniform Delay, d1	11.6	19.7	14.8	12.0	14.7		18.3	21.8		17.7	22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	9.8	0.7	12.2	1.4		8.4	0.6		4.0	1.5	
Delay (s)	13.5	29.5	15.6	24.1	16.1		26.7	22.5		21.7	24.3	
Level of Service	B	C	B	C	B		C	C		C	C	
Approach Delay (s)		23.7			18.1			24.4			23.4	
Approach LOS		C			B			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			21.8			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			70.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			68.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c	Critical Lane Group											

# HCM Signalized Intersection Capacity Analysis

## 2: Gage Blvd & Steptoe St

2008 Build (Signal @ Clearwater/Steptoe)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1693	3265		1676	3386	1494	1676	3289		1710	3222	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1693	3265		1676	3386	1494	1676	3289		1710	3222	
Volume (vph)	125	455	130	30	670	335	150	240	35	235	305	135
Peak-hour factor, PHF	0.93	0.93	0.92	0.92	0.88	0.88	0.92	0.92	0.92	0.96	0.92	0.96
Adj. Flow (vph)	134	489	141	33	761	381	163	261	38	245	332	141
RTOR Reduction (vph)	0	37	0	0	0	273	0	19	0	0	74	0
Lane Group Flow (vph)	134	593	0	33	761	108	163	280	0	245	399	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	2%	2%	1%	1%	2%	2%	2%	0%	2%	0%
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases						2						
Actuated Green, G (s)	7.7	20.5		1.5	15.7	15.7	8.2	10.7		11.6	14.1	
Effective Green, g (s)	8.2	23.2		3.5	18.5	18.5	10.2	12.7		13.6	16.1	
Actuated g/C Ratio	0.13	0.36		0.05	0.28	0.28	0.16	0.20		0.21	0.25	
Clearance Time (s)	3.5	5.7		5.0	5.8	5.8	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	214	1165		90	964	425	263	643		358	798	
v/s Ratio Prot	c0.08	0.18		0.02	c0.22		0.10	0.09		c0.14	c0.12	
v/s Ratio Perm						0.07						
v/c Ratio	0.63	0.51		0.37	0.79	0.26	0.62	0.44		0.68	0.50	
Uniform Delay, d1	26.9	16.4		29.7	21.5	17.9	25.6	23.0		23.7	21.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	1.6		0.9	6.5	1.4	3.0	0.2		4.3	0.2	
Delay (s)	31.0	18.0		30.6	28.0	19.4	28.6	23.2		28.0	21.2	
Level of Service	C	B		C	C	B	C	C		C	C	
Approach Delay (s)		20.3			25.3			25.1			23.5	
Approach LOS		C			C			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			23.6				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			65.0				Sum of lost time (s)				9.0	
Intersection Capacity Utilization			62.4%				ICU Level of Service				B	
Analysis Period (min)			15									
c	Critical Lane Group											

# HCM Signalized Intersection Capacity Analysis

## 3: Gage Blvd & Grandridge Blvd

2008 Build (Signal @ Clearwater/Step toe)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑		↘	↕			↗	↗
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95			1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95			0.98	1.00
Satd. Flow (prot)	1692	3386	1481	1692	3365		1608	1612			1739	1493
Flt Permitted	0.37	1.00	1.00	0.37	1.00		0.95	0.95			0.98	1.00
Satd. Flow (perm)	652	3386	1481	662	3365		1608	1612			1739	1493
Volume (vph)	55	540	210	10	530	20	505	10	5	20	20	55
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.83	0.83	0.83	0.59	0.59	0.59
Adj. Flow (vph)	60	593	231	11	582	22	608	12	6	34	34	93
RTOR Reduction (vph)	0	0	118	0	3	0	0	1	0	0	0	83
Lane Group Flow (vph)	60	593	113	11	601	0	313	312	0	0	68	10
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm		Perm	Perm			Split			Split		Perm
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6		6	2								3
Actuated Green, G (s)	31.8	31.8	31.8	31.8	31.8		16.8	16.8			5.9	5.9
Effective Green, g (s)	34.3	34.3	34.3	34.3	34.3		18.8	18.8			7.9	7.9
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49		0.27	0.27			0.11	0.11
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	319	1659	726	324	1649		432	433			196	168
v/s Ratio Prot		0.18			c0.18		c0.19	0.19			c0.04	
v/s Ratio Perm	0.09		0.08	0.02								0.01
v/c Ratio	0.19	0.36	0.16	0.03	0.36		0.72	0.72			0.35	0.06
Uniform Delay, d1	10.0	11.0	9.9	9.3	11.1		23.2	23.2			28.7	27.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0	0.2	0.6		5.1	4.7			0.4	0.1
Delay (s)	10.1	11.1	9.9	9.5	11.7		28.3	27.9			29.1	27.8
Level of Service	B	B	A	A	B		C	C			C	C
Approach Delay (s)		10.7			11.7			28.1			28.3	
Approach LOS		B			B			C			C	

### Intersection Summary

HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: Grandridge Blvd & Columbia Center Blvd

2008 Build (Signal @ Clearwater/Step toe)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.95	0.95	1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.99		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1608	1688	1501		3156		1644	3288	1471	1676	3353	1500
Flt Permitted	0.95	1.00	1.00		0.99		0.21	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1608	1688	1501		3156		357	3288	1471	549	3353	1500
Volume (vph)	150	140	15	50	145	100	100	570	35	115	815	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.85	0.89	0.89	0.89	0.94	0.94	0.94
Adj. Flow (vph)	163	152	16	59	171	118	112	640	39	122	867	96
RTOR Reduction (vph)	0	0	12	0	98	0	0	0	17	0	0	41
Lane Group Flow (vph)	153	162	4	0	250	0	112	640	22	122	867	55
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Turn Type	Split		pm+ov	Split			D.P+P		pm+ov	D.P+P		pm+ov
Protected Phases	3	3	5	4	4		5	2	4	1	6	3
Permitted Phases			3				6		2	2		6
Actuated Green, G (s)	8.2	8.2	10.5		8.8		26.1	22.8	31.6	26.6	23.8	32.0
Effective Green, g (s)	10.0	10.0	14.4		10.6		30.3	24.5	35.1	30.3	25.9	35.9
Actuated g/C Ratio	0.16	0.16	0.23		0.17		0.48	0.39	0.56	0.48	0.41	0.57
Clearance Time (s)	4.8	4.8	5.1		4.8		5.1	4.7	4.8	5.0	5.1	4.8
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	256	268	415		532		262	1281	821	368	1381	856
v/s Ratio Prot	0.10	c0.10	0.00		c0.08		0.03	c0.19	0.00	0.03	c0.26	0.01
v/s Ratio Perm			0.00				0.18		0.01	0.13		0.03
v/c Ratio	0.60	0.60	0.01		0.47		0.43	0.50	0.03	0.33	0.63	0.06
Uniform Delay, d1	24.6	24.6	18.7		23.6		17.6	14.6	6.2	9.4	14.7	6.0
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	2.6	0.0		0.2		0.4	1.4	0.0	0.2	2.2	0.0
Delay (s)	27.1	27.2	18.7		23.9		18.0	15.9	6.2	9.6	16.8	6.0
Level of Service	C	C	B		C		B	B	A	A	B	A
Approach Delay (s)		26.8			23.9			15.8			15.1	
Approach LOS		C			C			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			18.0				HCM Level of Service			B		
HCM Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			62.9				Sum of lost time (s)			9.0		
Intersection Capacity Utilization			60.5%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 6: Clearwater Ave & Columbia Center Blvd

2008 Build (Signal @ Clearwater/Step toe)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕		↘	↕	↗	↘	↕		↘	↕	↗
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.95		1.00	0.95	0.88	1.00	*0.60		0.91	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1613	3159		1676	3353	2640	1660	3121		1526	3207	1485
Flt Permitted	0.33	1.00		0.56	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	568	3159		995	3353	2640	1660	3121		1526	3207	1485
Volume (vph)	160	250	40	20	335	370	65	445	25	335	645	190
Peak-hour factor, PHF	0.94	0.94	0.94	0.82	0.82	0.82	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	170	266	43	24	409	451	76	517	29	381	733	216
RTOR Reduction (vph)	0	17	0	0	0	79	0	6	0	0	0	136
Lane Group Flow (vph)	170	292	0	24	409	372	76	540	0	359	755	80
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	pm+pt			pm+pt		pt+ov	Split			Split		pm+ov
Protected Phases	1	6		5	2	2 3	4	4		3	3	1
Permitted Phases	6			2								3
Actuated Green, G (s)	23.7	18.7		17.2	15.6	38.8	12.7	12.7		17.8	17.8	22.8
Effective Green, g (s)	27.0	21.4		20.6	18.0	41.5	15.1	15.1		20.5	20.5	26.5
Actuated g/C Ratio	0.38	0.30		0.29	0.25	0.58	0.21	0.21		0.29	0.29	0.37
Clearance Time (s)	4.0	5.7		4.0	5.4		5.4	5.4		5.7	5.7	4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	302	944		311	843	1530	350	658		437	918	550
v/s Ratio Prot	c0.05	0.09		0.00	0.12	0.14	0.05	c0.17		0.24	c0.24	0.01
v/s Ratio Perm	c0.17			0.02								0.04
v/c Ratio	0.56	0.31		0.08	0.49	0.24	0.22	0.82		0.82	0.82	0.15
Uniform Delay, d1	16.0	19.4		18.4	22.8	7.4	23.4	27.0		23.8	23.9	15.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	0.9		0.0	2.0	0.0	0.1	7.8		11.2	5.7	0.0
Delay (s)	17.4	20.2		18.5	24.8	7.4	23.5	34.7		35.1	29.6	15.1
Level of Service	B	C		B	C	A	C	C		D	C	B
Approach Delay (s)		19.2			15.8			33.3			28.7	
Approach LOS		B			B			C			C	

























### Intersection Summary

HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 7: Clearwater Ave & Steptoe St

2008 Build (Signal @ Clearwater/Steptoe)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.96		1.00	0.96		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	3244		1676	3216		1710	3249		1676	3014	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1676	3244		1676	3216		1710	3249		1676	3014	
Volume (vph)	160	250	25	40	440	165	15	65	15	165	85	175
Peak-hour factor, PHF	0.92	0.88	0.88	0.90	0.90	0.90	0.69	0.92	0.69	0.92	0.92	0.92
Adj. Flow (vph)	174	284	28	44	489	183	22	71	22	179	92	190
RTOR Reduction (vph)	0	9	0	0	53	0	0	18	0	0	150	0
Lane Group Flow (vph)	174	303	0	44	619	0	22	75	0	179	132	0
Heavy Vehicles (%)	2%	4%	4%	2%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.0	19.8		1.5	15.3		5.3	8.0		7.3	10.0	
Effective Green, g (s)	8.0	21.8		3.5	17.3		7.3	10.0		9.3	12.0	
Actuated g/C Ratio	0.14	0.39		0.06	0.31		0.13	0.18		0.16	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	237	1249		104	983		221	574		275	639	
v/s Ratio Prot	c0.10	0.09		0.03	c0.19		0.01	0.02		c0.11	c0.04	
v/s Ratio Perm												
v/c Ratio	0.73	0.24		0.42	0.63		0.10	0.13		0.65	0.21	
Uniform Delay, d1	23.3	11.8		25.6	16.9		21.8	19.6		22.1	18.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.7	0.0		1.0	0.9		0.1	0.0		4.2	0.1	
Delay (s)	33.0	11.8		26.6	17.8		21.8	19.7		26.3	18.4	
Level of Service	C	B		C	B		C	B		C	B	
Approach Delay (s)		19.4			18.3			20.1			21.5	
Approach LOS		B			B			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			19.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			56.6			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			54.1%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 9: Canyon St & Steptoe St

2008 Build (Signal @ Clearwater/Steptoe)



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	100	125	205	685	710	110
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	111	139	228	761	789	122
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1686	456	911			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1686	456	911			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	75	69			
cM capacity (veh/h)	59	552	743			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	250	228	381	381	526	385
Volume Left	111	228	0	0	0	0
Volume Right	139	0	0	0	0	122
cSH	117	743	1700	1700	1700	1700
Volume to Capacity	2.14	0.31	0.22	0.22	0.31	0.23
Queue Length 95th (ft)	527	32	0	0	0	0
Control Delay (s)	601.8	12.0	0.0	0.0	0.0	0.0
Lane LOS	F	B				
Approach Delay (s)	601.8	2.8			0.0	
Approach LOS	F					

Intersection Summary						
Average Delay			71.2			
Intersection Capacity Utilization		60.4%		ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 10: Tapteal Dr & Steptoe St

2008 Build (Signal @ Clearwater/Steptoe)

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↙	↘	↑	↘	↙	↑↑	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	100	95	645	140	25	720	
Peak Hour Factor	0.89	0.89	0.91	0.91	0.94	0.94	
Hourly flow rate (vph)	112	107	709	154	27	766	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	1145	709			863		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1145	709			863		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	40	72			97		
cM capacity (veh/h)	186	377			775		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	112	107	709	154	27	383	383
Volume Left	112	0	0	0	27	0	0
Volume Right	0	107	0	154	0	0	0
cSH	186	377	1700	1700	775	1700	1700
Volume to Capacity	0.60	0.28	0.42	0.09	0.03	0.23	0.23
Queue Length 95th (ft)	84	29	0	0	3	0	0
Control Delay (s)	49.9	18.3	0.0	0.0	9.8	0.0	0.0
Lane LOS	E	C			A		
Approach Delay (s)	34.5		0.0		0.3		
Approach LOS	D						
Intersection Summary							
Average Delay			4.2				
Intersection Capacity Utilization			48.7%		ICU Level of Service		A
Analysis Period (min)			15				



08\_PM\_Bui ld\_Center-Gage. OUT

42                      155                      5                      155                      5                      155                      5                      1.00                      0.78

Based on unit time = 60 minutes.  
Flow Scale and Peak Hour Factor effects included in flow values.

Steptoe Street Extension  
2008 PM Peak Hour\_Bui ld\_Center Pkwy & Gage Bl vd  
Intersecti on ID:  
Roundabout

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Isl and Di am (ft)	Circ Width (ft)	Insc Di am. (ft)	No. of Circ. Lanes	No. of Entry Lanes	Av. Ent Lane Width (ft)	Circulating/Exi ting Stream					
						Flow (veh/ h)	%HV	Adjust. Flow (pcu/h)	%Exi t Incl .	Cap. Constr. Effect	O-D Factor
West: 96	EB: 18	Gage Bl vd 132	1	1	13.00	344	2.9	344	0	N	0.947
South: 96	NB: 18	Center Pkwy 132	1	2	13.00	537	2.3	537	0	N	0.936
East: 96	WB: 30	Gage Bl vd 156	2	2	13.00	654	1.2	654	0	N	0.915
North: 96	SB: 30	Center Pkwy 156	2	1	13.00	628	1.0	628	0	N	0.944

Steptoe Street Extension  
2008 PM Peak Hour\_Bui ld\_Center Pkwy & Gage Bl vd  
Intersecti on ID:  
Roundabout

Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Circulating/Exi ting Stream					Cri tical Gap		Fol l-up Headway (s)
			Flow Rate (pcu/h)	Aver Speed (mph)	Aver Dist (ft)	In-Bnch Headway (s)	Prop Bunched	Hdwy (s)	Dist (ft)	
West: Left	1	Domi nant	344	19.5	299.1	2.00	0.342	4.42	126.2	2.38
Thru	1	Domi nant	344	19.5	299.1	2.00	0.342	4.42	126.2	2.38
Right	2	Conti nuous								
South: Left	1	Subdomi nant	537	19.1	188.0	2.00	0.483	4.14	116.1	2.30
	2	Domi nant	537	19.1	188.0	2.00	0.483	3.49	97.8	1.94
Thru	2	Domi nant	537	19.1	188.0	2.00	0.483	3.49	97.8	1.94
Right	2	Domi nant	537	19.1	188.0	2.00	0.483	3.49	97.9	1.94
East: Left	1	Subdomi nant	654	17.4	140.8	1.27	0.398	3.60	92.2	2.42
Thru	1	Subdomi nant	654	17.4	140.8	1.27	0.398	3.60	92.1	2.42
	2	Domi nant	654	17.4	140.8	1.27	0.398	3.20	82.0	2.15
Right	2	Domi nant	654	17.4	140.8	1.27	0.398	3.20	82.0	2.15

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---

North: SB: Center Pkwy										
Left	1	Dominant	628	19.0	159.5	1.29	0.390	3.79	105.3	2.54
Thru	1	Dominant	628	19.0	159.5	1.29	0.390	3.79	105.3	2.54
Right	1	Dominant	628	19.0	159.5	1.29	0.390	3.79	105.3	2.54

---

Environment Factor: 1.00  
 Entry/Circulating Flow Adjustment: Medium

Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap). The O-D Factor (Table R.0) allows for priority sharing and priority emphasis.

\* Critical gap or follow-up headway set to MINIMUM value

Dist (Distance): Spacing, i.e. distance between the front ends of two successive vehicles across all lanes in the circulating or exiting stream

Steptoe Street Extension  
 2008 PM Peak Hour\_Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - aaSIDRA & HCM MODELS

---

Mov No.	Dem Flow (veh /h)	aaSIDRA				HCM 2000 Lower				HCM 2000 Upper				
		Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	
West: EB: Gage Blvd														
12	L	154	429	0.359	14.2	B	354	0.435	14.7	B	433	0.356	14.1	B
11	T	222	619	0.359	7.2	A	510	0.435	7.6	A	624	0.356	7.0	A
13	R	426	-	-	NA	-	-	-	NA	-	-	-	NA	-
South: NB: Center Pkwy														
32	L	355	1380	0.257	15.0	B	978	0.363	16.2	B	1214	0.292	15.4	B
31	TR	175	680	0.257	7.8	A	482	0.363	9.5	A	598	0.293	8.6	A
East: WB: Gage Blvd														
22	L	24	102	0.235	14.4	B	-	-	NA	-	-	-	NA	-
21	T	250	1064	0.235	7.4	A	-	-	NA	-	-	-	NA	-
23	R	175	745	0.235	8.3	A	-	-	NA	-	-	-	NA	-
North: SB: Center Pkwy														
42	LTR	480	865	0.555	12.0	B	-	-	NA	-	-	-	NA	-

---

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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Roundabout

Table R.6 - ROUNDABOUT ALTERNATIVE CAPACITY MODELS

Mov No.	Dem Flow (veh/h)	aaSIDRA		NAASRA 1986		Ger. Linear		Ger. GapAcc		
		Cap. (veh/h)	Deg. Satn x	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA	
West: EB: Gage Blvd										
12 L	154	429	0.359	541	26.1	395	-7.9	387	-9.8	
11 T	222	619	0.359	780	26.0	569	-8.1	558	-9.9	
13 R	426	-	NA	-	NA	-	NA	-	NA	
South: NB: Center Pkwy										
32 L	355	1380	0.257	1452	5.2	-	NA	-	NA	
31 TR	175	680	0.257	716	5.3	-	NA	-	NA	
East: WB: Gage Blvd										
22 L	24	102	0.235	111	8.8	62	-39.2	95	-6.9	
21 T	250	1064	0.235	1155	8.6	646	-39.3	987	-7.2	
23 R	175	745	0.235	809	8.6	453	-39.2	691	-7.2	
North: SB: Center Pkwy										
42 LTR	480	865	0.555	1061	22.7	998	15.4	860	-0.6	

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the NAASRA model is not applicable for circulating flows above 1800 veh/h in a single lane and the German models are not applicable for high values of circulating flow (actual values depend on number of lanes at roundabout) or for roundabout approaches with more than two entry lanes, or two entry lanes with a single circulating lane. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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Intersection ID:  
Roundabout

Table S.2 - MOVEMENT CAPACITY PARAMETERS

Mov No.	Demand Flow (veh/h)	Opposing Movement				Total Cap. (veh/h)	Prac. Deg. Satn xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
		HV (%)	Flow (veh/h)	HV (%)	Flow (pcu/h)					
West: EB: Gage Blvd										
12 L	154	1.9	344	2.9	344	429	0.85	137	100	0.359
11 T	222	1.8	344	2.9	344	619	0.85	137	100	0.359
13 R	426	2.1	0			1900	0.98	337	100	0.224
South: NB: Center Pkwy										
32 L	355	1.1	537	2.3	537	1380	0.85	230	100	0.257

08_PM_Buid_Center-Gage. OUT											
31 TR	175	1.1	537	2.3	537	680	0.85	230	100	0.257	
-----											
East: WB: Gage Blvd											
22 L	24	4.2	654	1.2	654	102	0.85	261	100	0.235	
21 T	250	0.8	654	1.2	654	1064	0.85	262	100	0.235	
23 R	175	1.1	654	1.2	654	745	0.85	262	100	0.235	
-----											
North: SB: Center Pkwy											
42 LTR	480	3.1	628	1.0	628	865	0.85	53	100	0.555*	
-----											

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Roundabout

Table S.3 - INTERSECTION PARAMETERS

Intersection Level of Service	=	A
Worst movement Level of Service	=	B
Average intersection delay (s)	=	9.9
Largest average movement delay (s)	=	15.0
Largest back of queue, 95% (ft)	=	117
Performance Index	=	43.87
Degree of saturation (highest)	=	0.555
Practical Spare Capacity (lowest)	=	53 %
Effective intersection capacity, (veh/h)	=	4075
Total vehicle flow (veh/h)	=	2261
Total person flow (pers/h)	=	3392
Total vehicle delay (veh-h/h)	=	6.24
Total person delay (pers-h/h)	=	9.36
Total effective vehicle stops (veh/h)	=	1581
Total effective person stops (pers/h)	=	2372
Total vehicle travel (veh-mi/h)	=	963.2
Total cost (\$/h)	=	798.76
Total fuel (gal/h)	=	36.0
Total CO2 (kg/h)	=	341.38

Steptoe Street Extension  
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Intersection ID:  
Roundabout

Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	Queue (ft)	Perf. Index	Aver. Speed (mph)
-----									
West: EB: Gage Blvd									
12 L	0.61	0.91	14.2	0.62	0.75	3.1	79	3.37	29.0
11 T	0.44	0.67	7.2	0.62	0.61	3.1	79	4.11	32.1
13 R	0.72	1.07	6.1		0.50	10.8#		6.33	34.5
-----									
South: NB: Center Pkwy									
32 L	1.48	2.22	15.0	0.67	0.78	2.2	56	7.92	28.9
31 TR	0.38	0.57	7.8	0.66	0.65	2.2	56	3.27	31.8
-----									
East: WB: Gage Blvd									

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22 L	0.10	0.14	14.4	0.59	0.83	1.4	36	0.53	29.1
21 T	0.51	0.77	7.4	0.59	0.62	1.5	37	4.52	32.2
23 R	0.40	0.61	8.3	0.58	0.68	1.5	37	3.22	31.7

---

North: SB: Center Pkwy									
42 LTR	1.60	2.40	12.0	0.70	0.90	4.6	117	10.61	30.4

---

# Largest density (passenger cars per km or mile) for any lane

Steptoe Street Extension  
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 Intersection ID:  
 Roundabout

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Deg. Satn x	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue (ft)	Perf. Index	Aver. Speed (mph)
West: EB: Gage Blvd									
802	0.359	1.77	2.65	7.9	0.29	0.58	171	13.81	32.6
South: NB: Center Pkwy									
530	0.257	1.86	2.79	12.6	0.67	0.74	56	11.18	29.8
East: WB: Gage Blvd									
449	0.235	1.01	1.52	8.1	0.58	0.66	37	8.27	31.8
North: SB: Center Pkwy									
480	0.555	1.60	2.40	12.0	0.70	0.90	117	10.61	30.4
ALL VEHICLES:									
2261	0.555	6.24	9.36	9.9	0.52	0.70	117	43.87	31.3
INTERSECTION (persons):									
3392	0.555		9.36	9.9	0.52	0.70		43.87	31.3

Queue values in this table are 95% back of queue (feet).

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 Intersection ID:  
 Roundabout

Table S.7 - LANE PERFORMANCE

Lane No.	Mov No.	Dem Flow (veh/h)	Cap (veh/h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	Queue (ft)	Short Lane (ft)
West: EB: Gage Blvd									
1 LT	12, 11	376	1048	0.359	10.1	0.67	3.1	79	
2 R	13	426	1900	0.224	6.1	0.50	10.8#		
South: NB: Center Pkwy									
1 L	32	235	915	0.257	15.2	0.79	2.1	52	

08_PM_Build_Center-Gage. OUT								
2 LTR	32, 31	295	1145	0.257	10.6	0.70	2.2	56

---

East: WB: Gage Blvd								
1 LT	22, 21	207	880	0.235	8.3	0.66	1.4	36
2 TR	21, 23	242	1030	0.235	8.0	0.66	1.5	37

---

North: SB: Center Pkwy								
1 LTR	42	480	865	0.555	12.0	0.90	4.6	117

# Density (passenger cars per km or mile)

Steptoe Street Extension  
 2008 PM Peak Hour\_Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table S. 8A - LANE FLOW AND CAPACITY INFORMATION

---

Lane No.	Mov No.	Dem Flow (veh/h)			Min Cap (veh/h)	Tot Cap (veh/h)	Deg. Satn x	Lane Util %	
		Lef	Thru	Rig					Tot
West: EB: Gage Blvd									
1 LT	12, 11	154	222	0	376	150	1048	0.359	100
2 R	13	0	0	426	426	150	1900	0.224	100
South: NB: Center Pkwy									
1 L	32	235	0	0	235	150	915	0.257	100
2 LTR	32, 31	120	145	30	295	150	1145	0.257	100
East: WB: Gage Blvd									
1 LT	22, 21	24	183	0	207	150	880	0.235	100
2 TR	21, 23	0	67	175	242	150	1030	0.235	100
North: SB: Center Pkwy									
1 LTR	42	160	160	160	480	150	865	0.555	100

For roundabouts, the capacity value for continuous movements is obtained as the basic saturation flow without any adjustments. Saturation flow scale applies if specified.

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 Intersection ID:  
 Roundabout

Table S. 12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

---

Mov No.	Fuel Total	Cost Total	HC Total	CO Total	NOX Total	CO2 Total
---------	------------	------------	----------	----------	-----------	-----------

		gal /h	\$/h	kg/h	kg/h	kg/h	kg/h
-----							
West: EB: Gage Blvd							
12	L	2.7	60.97	0.040	1.34	0.050	25.2
11	T	3.5	75.02	0.050	1.65	0.067	32.8
13	R	6.3	133.89	0.088	2.80	0.119	59.7
		12.4	269.88	0.177	5.80	0.236	117.6
-----							
South: NB: Center Pkwy							
32	L	6.0	141.19	0.090	3.01	0.114	56.9
31	TR	2.7	59.53	0.039	1.29	0.052	25.4
		8.7	200.72	0.130	4.30	0.166	82.3
-----							
East: WB: Gage Blvd							
22	L	0.4	9.48	0.006	0.20	0.008	3.8
21	T	3.8	84.16	0.055	1.79	0.073	35.9
23	R	2.7	59.50	0.040	1.33	0.052	25.5
		6.9	153.13	0.101	3.32	0.133	65.2
-----							
North: SB: Center Pkwy							
42	LTR	8.0	175.02	0.117	4.05	0.155	76.3
		8.0	175.02	0.117	4.05	0.155	76.3
-----							
INTERSECTION:		36.0	798.76	0.524	17.47	0.690	341.4
-----							

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	0.900
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	27.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (1000 lb)	=	1.4
Heavy vehicle mass (1000 lb)	=	11.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

The idle fuel and vehicle mass parameters given above are the default values (data given in RIDES may override some of these parameters).

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 Roundabout

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)		Deg Sat x	Aver. Delay (sec)	Longest Queue (ft)	Shrt Lane (ft)
	L	T	R	Tot			1st	2nd				
-----												
West: EB: Gage Blvd												
1	LT	154	222	376	2				0.359	10.1	79	

08_PM_Buid_Center-Gage. OUT										
2 R			426	426	2	1900		0.224	6.1	
	154	222	426	802	2			0.359	7.9	79
-----										
South: NB: Center Pkwy										
1 L			235	235	1			0.257	15.2	52
2 LTR	120	145	30	295	1			0.257	10.6	56
	355	145	30	530	1			0.257	12.6	56
-----										
East: WB: Gage Blvd										
1 LT	24	183		207	1			0.235	8.3	36
2 TR		67	175	242	1			0.235	8.0	37
	24	250	175	449	1			0.235	8.1	37
-----										
North: SB: Center Pkwy										
1 LTR	160	160	160	480	3			0.555	12.0	117
	160	160	160	480	3			0.555	12.0	117
=====										
ALL VEHICLES			Total	%				Max	Aver.	Max
			Flow	HV				X	Del ay	Queue
			2261	2				0.555	9.9	117
=====										

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (feet).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

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Roundabout

Table S.15 - CAPACITY AND LEVEL OF SERVICE

Mov No.	Mov Typ	Total Flow (veh/h)	Total Cap. (veh/h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	Queue (ft)
West: EB: Gage Blvd								
12	L	154	429	0.359	14.2	B	3.1	79
11	T	222	619	0.359	7.2	A	3.1	79
13	R (Con)	426	1900	0.224	6.1	A#	10.8#	
		802		0.359	7.9	A	3.1	79
-----								
South: NB: Center Pkwy								
32	L	355	1380	0.257	15.0	B	2.2	56
31	TR	175	680	0.257	7.8	A	2.2	56
		530		0.257	12.6	B	2.2	56
-----								
East: WB: Gage Blvd								
22	L	24	102	0.235	14.4	B	1.4	36
21	T	250	1064	0.235	7.4	A	1.5	37
23	R	175	745	0.235	8.3	A	1.5	37

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	449		0.235	8.1	A	1.5	37
North: SB: Center Pkwy	480	865	0.555*	12.0	B	4.6	117
42 LTR	480		0.555	12.0	B	4.6	117
ALL VEHICLES:	2261		0.555	9.9	A	4.6	117

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.

# Continuous movements: Level Of Service based on density, Density (passenger cars per km or mile) instead of queue.

\* Maximum v/c ratio, or critical green periods

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 Intersection ID:  
 Roundabout

Table D.0 - GEOMETRIC DELAY DATA

From Approach	To Approach	Negn Radius (ft)	Negn Speed (mph)	Negn Dist. (ft)	Appr. Dist. (ft)	Downstream Distance (ft)
West: EB: Gage Blvd						
	South	135.0	21.4	50.8	1800	403
	East	188.6	24.3	127.0	1800	411
	North	56.8	15.4	223.1	1800	549
South: NB: Center Pkwy						
	West	58.4	15.6	229.3	1800	554
	East	102.2	19.3	51.0	1800	397
	North	183.6	24.1	137.2	1800	410
East: WB: Gage Blvd						
	West	182.9	24.1	147.5	1800	413
	South	58.4	15.6	229.3	1800	554
	North	110.4	19.9	60.5	1800	398
North: SB: Center Pkwy						
	West	123.4	20.7	60.3	1800	403
	South	183.6	24.1	137.2	1800	412
	East	56.8	15.4	223.1	1800	550

Maximum Negotiation (Design) Speed = 50.0 mph  
 Downstream Distance calculated by aaSIDRA

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Intersection ID:  
Roundabout

Table D.1 - LANE DELAYS

Lane No.	Mov No.	Deg. Satn x	Stop-Line		Del ay Total dSL	Del ay Acc. Dec. dn	Del ay (seconds/veh)		Stopd (Idle) di	Geom di g	Control di c	
			1st d1	2nd d2			Queui ng Total dq	MvUp dqm				
West: EB: Gage Blvd												
1	LT	12, 11	0.359	2.1	0.0	2.1	3.6	0.0	0.0	0.0	12.2	10.1
2	R	13	0.224			0.0					5.1	6.1
South: NB: Center Pkwy												
1	L	32	0.257	3.1	0.0	3.1	3.3	0.0	0.0	0.0	12.2	15.2
2	LTR	32, 31	0.257	2.4	0.0	2.4	3.8	0.0	0.0	0.0	12.2	10.6
East: WB: Gage Blvd												
1	LT	22, 21	0.235	2.2	0.0	2.2	3.7	0.0	0.0	0.0	12.2	8.3
2	TR	21, 23	0.235	1.8	0.0	1.8	3.5	0.0	0.0	0.0	5.3	8.0
North: SB: Center Pkwy												
1	LTR	42	0.555	3.1	1.0	4.1	4.1	0.2	0.0	0.2	7.9	12.0

dn is average stop-start delay for all vehicles queued and unqueued

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Roundabout

Table D.2 - LANE STOPS

Lane No.	Deg. Satn x	Effective		Stop Geom. hig	Rate Overall h	Prop. Queued pq	Queue Move-up Rate hqm
		he1	he2				
West: EB: Gage Blvd							
1	LT	0.359	0.46	0.00	0.21	0.67	0.619
2	R	0.224			0.50	0.50	0.00
South: NB: Center Pkwy							
1	L	0.257	0.56	0.00	0.23	0.79	0.674
2	LTR	0.257	0.51	0.00	0.19	0.70	0.663
East: WB: Gage Blvd							
1	LT	0.235	0.46	0.00	0.20	0.66	0.590
2	TR	0.235	0.44	0.00	0.21	0.66	0.579
North: SB: Center Pkwy							
1	LTR	0.555	0.69	0.05	0.16	0.90	0.704

hig is the average value for all movements in a shared lane  
hqm is average queue move-up rate for all vehicles queued and unqueued

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 Intersection ID:  
 Roundabout

Table D. 3A - LANE QUEUES (veh)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: Gage Blvd											
1 LT	0.359	0.0	1.0	0.0	1.0	1.8	2.2	2.5	3.1	3.6	0.04
2 R	0.224				6.7#						0.04#
South: NB: Center Pkwy											
1 L	0.257	0.0	0.7	0.0	0.7	1.2	1.5	1.7	2.1	2.4	0.03
2 LTR	0.257	0.0	0.7	0.0	0.7	1.3	1.6	1.8	2.2	2.6	0.03
East: WB: Gage Blvd											
1 LT	0.235	0.0	0.4	0.0	0.4	0.8	1.0	1.1	1.4	1.6	0.02
2 TR	0.235	0.0	0.5	0.0	0.5	0.9	1.1	1.2	1.5	1.7	0.02
North: SB: Center Pkwy											
1 LTR	0.555	0.2	1.3	0.2	1.5	2.6	3.2	3.7	4.6	5.3	0.06

Values printed in this table are back of queue (vehicles).

# Continuous movements: Density (passenger cars per km or mile) instead of queue, Space Occupancy Ratio instead of Queue Storage Ratio

Steptoe Street Extension  
 2008 PM Peak Hour\_Buid\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D. 3B - LANE QUEUES (feet)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: Gage Blvd											
1 LT	0.359	0	25	0	25	46	56	64	79	92	0.04
2 R	0.224				4.2#						0.04#
South: NB: Center Pkwy											
1 L	0.257	0	17	0	17	31	37	42	52	60	0.03
2 LTR	0.257	0	18	0	18	33	40	45	56	65	0.03
East: WB: Gage Blvd											
1 LT	0.235	0	11	0	11	21	25	29	36	41	0.02
2 TR	0.235	0	12	0	12	22	27	30	37	43	0.02
North: SB: Center Pkwy											
1 LTR	0.555	5	32	6	38	68	83	94	117	136	0.06

08\_PM\_Build\_Center-Gage. OUT

Values printed in this table are back of queue (feet).  
 # Continuous movements: Density (passenger cars per km or mile)  
 instead of queue, Space Occupancy Ratio instead of Queue Storage Ratio

Steptoe Street Extension  
 2008 PM Peak Hour\_Build\_Center Pkwy & Gage Blvd  
 Intersection ID:  
 Roundabout

Table D.4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd	
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Running	Overall
-----								
West: EB: Gage Blvd								
12	40.0	15.4	15.4	40.0			29.0	29.0
11	40.0	24.3	24.3	40.0			32.1	32.1
13	40.0	21.4	21.4	40.0			34.5	34.5
-----								
South: NB: Center Pkwy								
32	40.0	15.6	15.6	40.0			28.9	28.9
31	40.0	23.3	23.3	40.0			31.8	31.8
-----								
East: WB: Gage Blvd								
22	40.0	15.6	15.6	40.0			29.1	29.1
21	40.0	24.1	24.1	40.0			32.2	32.2
23	40.0	19.9	19.9	40.0			31.7	31.7
-----								
North: SB: Center Pkwy								
42	40.0	20.1	20.1	40.0	12.4		30.5	30.4
-----								

"Running Speed" is the average speed excluding stopped periods.

--- End of aaSIDRA Output ---

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 Documents\aaTraffic\Steptoe\08\_PM\_Build\_Center-Gage. OUT  
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31	0	0	94	0	0	0	1.00	0.69
33	0	0	0	0	22	0	1.00	0.69

East: WB: W. Clearwater Avenue

22	44	1	0	0	0	0	1.00	0.90
21	0	0	479	10	0	0	1.00	0.90
23	0	0	0	0	180	4	1.00	0.90

North: SB: Steptoe Street Ext.

42	176	4	0	0	0	0	1.00	0.92
41	0	0	91	2	0	0	1.00	0.92
43	0	0	0	0	186	4	1.00	0.92

Based on unit time = 60 minutes.

Flow Scale and Peak Hour Factor effects included in flow values.

Steptoe Street Extension

2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.

Intersection ID:

Roundabout

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Island Diam (ft)	Circ Width (ft)	Insc Diam (ft)	No. of Circ Lanes	No. of Entry Lanes	Av. Ent Lane Width (ft)	Circulating/Exiting Stream					O-D Factor
						Flow (veh/h)	%HV	Adjust. Flow (pcu/h)	%Exit Incl.	Cap. Constr. Effect	
West: EB: W. Clearwater Avenue											
115	30	175	2	2	13.00	316	2.0	316	0	N	0.964
South: NB: Clodfelter Road											
115	30	175	2	2	13.00	645	3.4	646	0	N	0.949
East: WB: W. Clearwater Avenue											
115	30	175	2	2	13.00	298	2.4	298	0	N	0.981
North: SB: Steptoe Street Ext.											
115	30	175	2	2	13.00	555	1.9	555	0	N	0.946

Steptoe Street Extension

2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.

Intersection ID:

Roundabout

Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Circulating/Exiting Stream					Critical Gap		Follow-up Headway (s)
			Flow Rate (pcu/h)	Aver Speed (mph)	Aver Dist (ft)	In-Bnch Headway (s)	Prop Bunched	Hdwy (s)	Dist (ft)	
West: EB: W. Clearwater Avenue										
Left	1	Subdominant	316	19.1	319.0	1.48	0.248	3.87	108.5	2.45
Thru	1	Subdominant	316	19.1	319.0	1.48	0.248	3.87	108.5	2.45
	2	Dominant	316	19.1	319.0	1.48	0.248	3.51	98.2	2.22
Right	2	Dominant	316	19.1	319.0	1.48	0.248	3.51	98.2	2.22

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South: NB: Clodfel ter Road										
Left	1	Subdomi nant	646	20.3	166.3	1.28	0.396	3.56	106.1	2.39
Thru	1	Subdomi nant	646	20.3	166.3	1.28	0.396	3.56	106.1	2.39
	2	Domi nant	646	20.3	166.3	1.28	0.396	3.11	92.9	2.09
Right	2	Domi nant	646	20.3	166.3	1.28	0.396	3.11	92.9	2.09
East: WB: W. Clearwater Avenue										
Left	1	Subdomi nant	298	19.3	342.2	1.64	0.256	3.89	110.2	2.45
Thru	1	Subdomi nant	298	19.3	342.2	1.64	0.256	3.89	110.2	2.45
	2	Domi nant	298	19.3	342.2	1.64	0.256	3.52	99.7	2.22
Right	2	Domi nant	298	19.3	342.2	1.64	0.256	3.52	99.7	2.22
North: SB: Steptoe Street Ext.										
Left	1	Subdomi nant	555	24.0	228.3	1.23	0.339	3.64	128.1	2.40
Thru	1	Subdomi nant	555	24.0	228.3	1.23	0.339	3.64	128.1	2.40
	2	Domi nant	555	24.0	228.3	1.23	0.339	3.21	113.2	2.12
Right	2	Domi nant	555	24.0	228.3	1.23	0.339	3.21	113.2	2.12

Environment Factor: 1.00  
 Entry/Ci rcul ating Flow Adjustment: Medi um

Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap). The 0-D Factor (Table R.0) allows for priority sharing and priority emphasis.

Dist (Distance): Spacing, i.e. distance between the front ends of two successive vehicles across all lanes in the circulating or exiting stream

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - aaSIDRA & HCM MODELS

Mov No.	Dem Flow (veh /h)	aaSIDRA				HCM 2000 Lower				HCM 2000 Upper									
		Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS						
West: EB: W. Clearwater Avenue																			
12	L	182	881	0.207	6.7	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
11	T	284	1374	0.207	1.0	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
13	R	28	135	0.207	2.2	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
South: NB: Clodfel ter Road																			
32	L	22	327	0.067	7.5	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
31	T	94	1397	0.067	1.6	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
33	R	22	327	0.067	2.7	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
East: WB: W. Clearwater Avenue																			
22	L	45	154	0.292	6.8	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
21	T	489	1671	0.293	1.1	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
23	R	184	629	0.293	2.2	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-
North: SB: Steptoe Street Ext.																			

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42 L	180	825	0.218	7.4	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-	-
41 T	93	426	0.218	1.6	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-	-
43 R	190	871	0.218	2.7	A	-	-	-	-	NA	-	-	-	-	NA	-	-	-	-

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table R.6 - ROUNDABOUT ALTERNATIVE CAPACITY MODELS

Mov No.	Dem Flow (veh/h)	aaSIDRA		NAASRA 1986		Ger. Linear		Ger. GapAcc		
		Cap. (veh/h)	Deg. Satn x	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA	
West: EB: W. Clearwater Avenue										
12 L	182	881	0.207	1017	15.4	450	-48.9	721	-18.2	
11 T	284	1374	0.207	1587	15.5	702	-48.9	1124	-18.2	
13 R	28	135	0.207	156	15.6	69	-48.9	111	-17.8	
South: NB: Clodfel ter Road										
32 L	22	327	0.067	333	1.8	169	-48.3	237	-27.5	
31 T	94	1397	0.067	1424	1.9	720	-48.5	1011	-27.6	
33 R	22	327	0.067	333	1.8	169	-48.3	237	-27.5	
East: WB: W. Clearwater Avenue										
22 L	45	154	0.292	176	14.3	77	-50.0	124	-19.5	
21 T	489	1671	0.293	1910	14.3	838	-49.9	1353	-19.0	
23 R	184	629	0.293	719	14.3	315	-49.9	509	-19.1	
North: SB: Steptoe Street Ext.										
42 L	180	825	0.218	877	6.3	428	-48.1	624	-24.4	
41 T	93	426	0.218	453	6.3	221	-48.1	322	-24.4	
43 R	190	871	0.218	926	6.3	452	-48.1	659	-24.3	

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
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Table S.2 - MOVEMENT CAPACITY PARAMETERS

Mov No.	Demand Flow (veh/h)	HV (%)	Opposi ng Movement		Total Cap. (veh/h)	Prac. Deg. xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
			Flow (veh/h)	HV (%)					

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West: EB: W. Clearwater Avenue										
12 L	182	3.8	316	2.0	316	881	0.85	311	100	0.207
11 T	284	3.9	316	2.0	316	1374	0.85	311	100	0.207
13 R	28	3.6	316	2.0	316	135	0.85	310	100	0.207
South: NB: Clodfelder Road										
32 L	22	0.0	645	3.4	646	327	0.85	1163	100	0.067
31 T	94	0.0	645	3.4	646	1397	0.85	1163	100	0.067
33 R	22	0.0	645	3.4	646	327	0.85	1163	100	0.067
East: WB: W. Clearwater Avenue										
22 L	45	2.2	298	2.4	298	154	0.85	191	100	0.292
21 T	489	2.0	298	2.4	298	1671	0.85	190	100	0.293*
23 R	184	2.2	298	2.4	298	629	0.85	191	100	0.293*
North: SB: Steptoe Street Ext.										
42 L	180	2.2	555	1.9	555	825	0.85	290	100	0.218
41 T	93	2.2	555	1.9	555	426	0.85	289	100	0.218
43 R	190	2.1	555	1.9	555	871	0.85	290	100	0.218

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table S.3 - INTERSECTION PARAMETERS

Intersection Level of Service	=	A
Worst movement Level of Service	=	A
Average intersection delay (s)	=	2.9
Largest average movement delay (s)	=	7.5
Largest back of queue, 95% (ft)	=	48
Performance Index	=	35.42
Degree of saturation (highest)	=	0.293
Practical Spare Capacity (lowest)	=	190 %
Effective intersection capacity, (veh/h)	=	6195
Total vehicle flow (veh/h)	=	1813
Total person flow (pers/h)	=	2720
Total vehicle delay (veh-h/h)	=	1.45
Total person delay (pers-h/h)	=	2.17
Total effective vehicle stops (veh/h)	=	590
Total effective person stops (pers/h)	=	884
Total vehicle travel (veh-mi/h)	=	691.3
Total cost (\$/h)	=	757.80
Total fuel (gal/h)	=	23.2
Total CO2 (kg/h)	=	219.90

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (ft)	Perf. Index	Aver. Speed (mph)
---------	-----------------------	------------------------	-------------------	--------------	----------------	-----------------------------	-------------	-------------------

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West: EB: W. Clearwater Avenue										
12 L	0.34	0.51	6.7	0.43	0.61	1.3	33	4.26	22.1	
11 T	0.08	0.11	1.0	0.42	0.14	1.3	33	4.99	23.7	
13 R	0.02	0.03	2.2	0.42	0.30	1.3	33	0.52	23.4	
-----										
South: NB: Clodfelter Road										
32 L	0.05	0.07	7.5	0.51	0.66	0.4	9	0.53	22.0	
31 T	0.04	0.06	1.6	0.50	0.25	0.4	9	1.72	23.5	
33 R	0.02	0.02	2.7	0.49	0.37	0.4	9	0.42	23.2	
-----										
East: WB: W. Clearwater Avenue										
22 L	0.09	0.13	6.8	0.43	0.61	1.9	47	1.06	22.1	
21 T	0.15	0.23	1.1	0.43	0.17	1.9	48	8.72	23.7	
23 R	0.11	0.17	2.2	0.42	0.31	1.9	48	3.46	23.4	
-----										
North: SB: Steptoe Street Ext.										
42 L	0.37	0.56	7.4	0.53	0.70	1.3	32	4.36	21.9	
41 T	0.04	0.06	1.6	0.52	0.24	1.3	33	1.71	23.5	
43 R	0.14	0.21	2.7	0.51	0.37	1.3	33	3.67	23.1	
-----										

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 Roundabout

Table S. 6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Deg. Satn x	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue (ft)	Perf. Index	Aver. Speed (mph)	
West: EB: W. Clearwater Avenue										
494	0.207	0.43	0.65	3.2	0.43	0.32	33	9.77	23.0	
-----										
South: NB: Clodfelter Road										
138	0.067	0.11	0.16	2.7	0.50	0.33	9	2.67	23.2	
-----										
East: WB: W. Clearwater Avenue										
718	0.293	0.35	0.53	1.8	0.43	0.23	48	13.23	23.5	
-----										
North: SB: Steptoe Street Ext.										
463	0.218	0.55	0.83	4.3	0.52	0.47	33	9.74	22.7	
-----										
ALL VEHICLES:										
1813	0.293	1.45	2.17	2.9	0.46	0.33	48	35.42	23.1	
-----										
INTERSECTION (persons):										
2720	0.293		2.17	2.9	0.46	0.33		35.42	23.1	
-----										

Queue values in this table are 95% back of queue (feet).

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table S. 7 - LANE PERFORMANCE

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Lane No.	Mov No.	Dem Flow (veh/h)	Cap (veh/h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	Queue (ft)	Short Lane (ft)
-----									
West: EB: W. Clearwater Avenue									
1	LT	12, 11	232	1124	0.207	5.5	0.51	1.3	33
2	TR	11, 13	262	1266	0.207	1.1	0.16	1.3	33
-----									
South: NB: Clodfel ter Road									
1	LT	32, 31	63	935	0.067	3.8	0.41	0.4	9
2	TR	31, 33	75	1116	0.067	1.8	0.26	0.4	9
-----									
East: WB: W. Clearwater Avenue									
1	LT	22, 21	338	1154	0.293	2.0	0.24	1.9	47
2	TR	21, 23	380	1299	0.293	1.6	0.23	1.9	48
-----									
North: SB: Steptoe Street Ext.									
1	LT	42, 41	213	976	0.218	6.6	0.63	1.3	32
2	TR	41, 43	250	1147	0.218	2.4	0.33	1.3	33
-----									

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 Roundabout

Table S.8A - LANE FLOW AND CAPACITY INFORMATION

Lane No.	Mov No.	Dem Flow (veh/h)			Deg. Satn x	Lane Util %				
		Left	Thru	Right						
-----										
West: EB: W. Clearwater Avenue										
1	LT	12, 11	182	50	0	232	150	1124	0.207	100
2	TR	11, 13	0	234	28	262	150	1266	0.207	100
-----										
South: NB: Clodfel ter Road										
1	LT	32, 31	22	41	0	63	63	935	0.067	100
2	TR	31, 33	0	53	22	75	75	1116	0.067	100
-----										
East: WB: W. Clearwater Avenue										
1	LT	22, 21	45	293	0	338	150	1154	0.293	100
2	TR	21, 23	0	196	184	380	150	1299	0.293	100
-----										
North: SB: Steptoe Street Ext.										

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1 LT	42,	180	33	0	213	150	976	0.218	100
	41								
2 TR	41,	0	60	190	250	150	1147	0.218	100
	43								

For roundabouts, the capacity value for continuous movements is obtained as the basic saturation flow without any adjustments. Saturation flow scale applies if specified.

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table S.12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total gal/h	Cost Total \$/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h
West: EB: W. Clearwater Avenue						
12 L	2.7	85.84	0.038	0.91	0.032	25.2
11 T	3.6	113.21	0.050	1.12	0.041	33.9
13 R	0.4	11.33	0.005	0.12	0.004	3.4
	6.6	210.38	0.093	2.15	0.077	62.5
South: NB: Clodfelter Road						
32 L	0.3	10.40	0.005	0.10	0.004	2.8
31 T	1.1	37.66	0.017	0.37	0.014	10.6
33 R	0.3	8.93	0.004	0.09	0.003	2.5
	1.7	56.99	0.025	0.56	0.020	15.9
East: WB: W. Clearwater Avenue						
22 L	0.6	21.19	0.009	0.22	0.008	6.0
21 T	6.0	194.70	0.085	1.88	0.070	56.4
23 R	2.3	74.29	0.033	0.75	0.027	21.5
	8.9	290.18	0.127	2.85	0.105	84.0
North: SB: Steptoe Street Ext.						
42 L	2.6	85.36	0.037	0.89	0.031	24.2
41 T	1.1	37.43	0.017	0.38	0.014	10.9
43 R	2.4	77.47	0.034	0.81	0.029	22.5
	6.1	200.26	0.088	2.07	0.074	57.5
INTERSECTION:	23.2	757.80	0.333	7.63	0.276	219.9

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	0.900
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	27.00
Time value factor	=	0.60

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Average occupancy (persons/veh)	=	1.5
Light vehicle mass (1000 lb)	=	1.4
Heavy vehicle mass (1000 lb)	=	11.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

The idle fuel and vehicle mass parameters given above are the default values (data given in RIDES may override some of these parameters).

Steptoe Street Extension

2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.

Intersection ID:

Roundabout

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (ft)	Shrt Lane (ft)
	L	T	R	Tot							
West: EB: W. Clearwater Avenue											
1 LT	182	50		232	4			0.207	5.5	33	
2 TR		234	28	262	4			0.207	1.1	33	
	182	284	28	494	4			0.207	3.2	33	
South: NB: Clodfel ter Road											
1 LT	22	41		63	0			0.067	3.8	9	
2 TR		53	22	75	0			0.067	1.8	9	
	22	94	22	138	0			0.067	2.7	9	
East: WB: W. Clearwater Avenue											
1 LT	45	293		338	2			0.293	2.0	47	
2 TR		196	184	380	2			0.293	1.6	48	
	45	489	184	718	2			0.293	1.8	48	
North: SB: Steptoe Street Ext.											
1 LT	180	33		213	2			0.218	6.6	32	
2 TR		60	190	250	2			0.218	2.4	33	
	180	93	190	463	2			0.218	4.3	33	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				1813	2			0.293	2.9	48	
=====											

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (feet).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Steptoe Street Extension

2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.

Intersection ID:

Roundabout

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Table S.15 - CAPACITY AND LEVEL OF SERVICE

Mov No.	Mov Typ	Total Flow (veh/h)	Total Cap. (veh/h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	(ft)
West: EB: W. Clearwater Avenue								
12	L	182	881	0.207	6.7	A	1.3	33
11	T	284	1374	0.207	1.0	A	1.3	33
13	R	28	135	0.207	2.2	A	1.3	33
		494		0.207	3.2	A	1.3	33
South: NB: Clodfelder Road								
32	L	22	327	0.067	7.5	A	0.4	9
31	T	94	1397	0.067	1.6	A	0.4	9
33	R	22	327	0.067	2.7	A	0.4	9
		138		0.067	2.7	A	0.4	9
East: WB: W. Clearwater Avenue								
22	L	45	154	0.292	6.8	A	1.9	47
21	T	489	1671	0.293*	1.1	A	1.9	48
23	R	184	629	0.293*	2.2	A	1.9	48
		718		0.293	1.8	A	1.9	48
North: SB: Steptoe Street Ext.								
42	L	180	825	0.218	7.4	A	1.3	32
41	T	93	426	0.218	1.6	A	1.3	33
43	R	190	871	0.218	2.7	A	1.3	33
		463		0.218	4.3	A	1.3	33
ALL VEHICLES:		1813		0.293	2.9	A	1.9	48

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.

\* Maximum v/c ratio, or critical green periods

Steptoe Street Extension  
 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table D.0 - GEOMETRIC DELAY DATA

From Approach	To Approach	Negn Radius (ft)	Negn Speed (mph)	Negn Dist. (ft)	Appr. Dist. (ft)	Downstream Distance (ft)
West: EB: W. Clearwater Avenue						
	South	133.3	21.3	67.7	1800	165
	East	219.5	25.0	166.5	1800	167
	North	69.5	16.7	272.9	1800	368

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South: NB: Clodfel ter Road

West	69.5	16.7	272.9	1800	367
East	133.3	21.3	67.7	1800	163
North	219.5	25.0	166.5	1800	167

East: WB: W. Clearwater Avenue

West	219.5	25.0	166.5	1800	167
South	69.5	16.7	272.9	1800	368
North	133.3	21.3	67.7	1800	164

North: SB: Steptoe Street Ext.

West	133.3	21.3	67.7	1800	164
South	219.5	25.0	166.5	1800	167
East	69.5	16.7	272.9	1800	368

Maximum Negotiation (Design) Speed = 50.0 mph  
Downstream Distance calculated by aaSIDRA

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Steptoe Street Extension  
2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
Intersection ID:  
Roundabout

Table D.1 - LANE DELAYS

Lane No.	Mov No.	Deg. Satn x	Stop-Line Delay			Delay (seconds/veh)				Geom dig	Control dic	
			1st d1	2nd d2	Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di			
West: EB: W. Clearwater Avenue												
1	LT	12, 11	0.207	1.1	0.0	1.1	2.3	0.0	0.0	0.0	5.6 0.0	5.5
2	TR	11, 13	0.207	0.9	0.0	0.9	2.8	0.0	0.0	0.0	0.0 1.2	1.1
South: NB: Clodfel ter Road												
1	LT	32, 31	0.067	1.9	0.0	1.9	3.1	0.0	0.0	0.0	5.6 0.0	3.8
2	TR	31, 33	0.067	1.5	0.0	1.5	3.2	0.0	0.0	0.0	0.0 1.2	1.8
East: WB: W. Clearwater Avenue												
1	LT	22, 21	0.293	1.2	0.0	1.2	2.8	0.0	0.0	0.0	5.6 0.0	2.0
2	TR	21, 23	0.293	1.0	0.0	1.0	2.7	0.0	0.0	0.0	0.0 1.2	1.6
North: SB: Steptoe Street Ext.												
1	LT	42, 41	0.218	1.8	0.0	1.8	2.8	0.0	0.0	0.0	5.6 0.0	6.6
2	TR	41, 43	0.218	1.5	0.0	1.5	3.2	0.0	0.0	0.0	0.0 1.2	2.4

dn is average stop-start delay for all vehicles queued and unqueued

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Geometric delay is less than 2 seconds for some movements. The negotiation speed may be too high or the approach and exit speeds may be too low for given geometric design (e.g. for a large roundabout). Check Tables D.0, D.1 and D.4 for geometric delay data including negotiation speeds. If necessary, specify appropriate values of approach and exit speeds (RIDES Approach Data screen), and negotiation radius or negotiation speed data (RIDES Extra Data - Geometric Delay data screen).

Steptoe Street Extension  
 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table D.2 - LANE STOPS

Lane No.	Deg. Satn x	Effective Stop		Geom. High	Rate Overall h	Prop. Queued pq	Queue Move-up Rate hqm
West: EB: W. Clearwater Avenue							
1 LT	0.207	0.28	0.00	0.23	0.51	0.432	0.00
2 TR	0.207	0.15	0.00	0.01	0.16	0.419	0.00
South: NB: Clodfel ter Road							
1 LT	0.067	0.32	0.00	0.09	0.41	0.506	0.00
2 TR	0.067	0.24	0.00	0.03	0.26	0.491	0.00
East: WB: W. Clearwater Avenue							
1 LT	0.293	0.20	0.00	0.04	0.24	0.435	0.00
2 TR	0.293	0.18	0.00	0.05	0.23	0.420	0.00
North: SB: Steptoe Street Ext.							
1 LT	0.218	0.42	0.00	0.21	0.63	0.528	0.00
2 TR	0.218	0.27	0.00	0.06	0.33	0.512	0.00

high is the average value for all movements in a shared lane  
 hqm is average queue move-up rate for all vehicles queued and unqueued

Steptoe Street Extension  
 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
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Table D.3A - LANE QUEUES (veh)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: W. Clearwater Avenue											
1 LT	0.207	0.0	0.4	0.0	0.4	0.7	0.9	1.0	1.3	1.5	0.02
2 TR	0.207	0.0	0.4	0.0	0.4	0.8	0.9	1.1	1.3	1.5	0.02
South: NB: Clodfel ter Road											
1 LT	0.067	0.0	0.1	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.00
2 TR	0.067	0.0	0.1	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.01

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East: WB: W. Clearwater Avenue												
1	LT	0.293	0.0	0.6	0.0	0.6	1.1	1.3	1.5	1.9	2.2	0.03
2	TR	0.293	0.0	0.6	0.0	0.6	1.1	1.4	1.5	1.9	2.2	0.03

---

North: SB: Steptoe Street Ext.												
1	LT	0.218	0.0	0.4	0.0	0.4	0.7	0.9	1.0	1.3	1.5	0.02
2	TR	0.218	0.0	0.4	0.0	0.4	0.8	0.9	1.1	1.3	1.5	0.02

Values printed in this table are back of queue (vehicles).

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Table D. 3B - LANE QUEUES (feet)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio	
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%		
West: EB: W. Clearwater Avenue												
1	LT	0.207	0	10	0	10	19	23	26	33	38	0.02
2	TR	0.207	0	11	0	11	20	24	27	33	39	0.02
South: NB: Clodfel ter Road												
1	LT	0.067	0	3	0	3	5	6	7	9	10	0.00
2	TR	0.067	0	3	0	3	5	7	7	9	11	0.01
East: WB: W. Clearwater Avenue												
1	LT	0.293	0	15	0	15	28	34	38	47	55	0.03
2	TR	0.293	0	15	0	15	28	35	39	48	56	0.03
North: SB: Steptoe Street Ext.												
1	LT	0.218	0	10	0	10	19	23	26	32	37	0.02
2	TR	0.218	0	10	0	10	20	24	27	33	38	0.02

Values printed in this table are back of queue (feet).

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 2008 PM Peak Hour - W. Clearwater Avenue & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table D. 4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd	
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Runni ng	Overall
West: EB: W. Clearwater Avenue								
12	25.0	16.7	16.7	25.0			22.1	22.1
11	25.0	25.0	25.0	25.0			23.7	23.7
13	25.0	21.3	21.3	25.0			23.4	23.4
South: NB: Clodfel ter Road								

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32	25.0	16.7	16.7	25.0	22.0	22.0
31	25.0	25.0	25.0	25.0	23.5	23.5
33	25.0	21.3	21.3	25.0	23.2	23.2

-----  
 East: WB: W. Clearwater Avenue

22	25.0	16.7	16.7	25.0	22.1	22.1
21	25.0	25.0	25.0	25.0	23.7	23.7
23	25.0	21.3	21.3	25.0	23.4	23.4

-----  
 North: SB: Steptoe Street Ext.

42	25.0	16.7	16.7	25.0	21.9	21.9
41	25.0	25.0	25.0	25.0	23.5	23.5
43	25.0	21.3	21.3	25.0	23.1	23.1

-----

"Running Speed" is the average speed excluding stopped periods.

--- End of aaSIDRA Output ---

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31	0	0	25	1	0	0	1.00	0.77
33	0	0	0	0	74	4	1.00	0.77
-----								
East: WB: W. 10th Avenue								
22	60	1	0	0	0	0	1.00	0.65
21	0	0	143	3	0	0	1.00	0.65
23	0	0	0	0	53	1	1.00	0.65
-----								
NorthEast: SB: Ci odfel ter Road								
62	144	8	0	0	0	0	1.00	0.66
61	0	0	29	2	0	0	1.00	0.66

Based on unit t ime = 60 mi nutes.  
Flow Scale and Peak Hour Factor effects i ncl uded i n fl ow val ues.

Steptoe Street Extension  
2008 PM Peak Hour - Ci odfel ter Road & W. 10th Avenue  
Intersecti on ID:  
Roundabout

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Isl and Di am (ft)	Circ Wi dth (ft)	Insc Di am. (ft)	No. of Circ. Lanes	No. of Entry Lanes	Av. Ent Lane Wi dth (ft)	Ci rcul ati ng/Exi ti ng Stream					
						Fl ow (veh/h)	%HV	Adj ust. Fl ow (pcu/h)	%Exi t Incl .	Cap. Constr. Effect	O-D Factor
-----											
West: EB: W. 10th Avenue											
115	30	175	2	2	13.00	213	4.1	213	0	N	0.987
-----											
South: NB: Ci odfel ter Road											
115	30	175	2	2	13.00	152	7.5	156	0	N	0.990
-----											
East: WB: W. 10th Avenue											
115	30	175	2	1	13.00	46	7.0	47	0	N	0.998
Excl usi ve Sl ip lane (exi ti ng fl ow):						39	7.4	40	0	N	0.998
-----											
NorthEast: SB: Ci odfel ter Road											
115	30	175	2	2	13.00	214	2.1	214	0	N	0.993

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Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Ci rcul ati ng/Exi ti ng Stream					Cri ti cal Gap		
			Fl ow Rate (pcu/h)	Aver Speed (mph)	Aver Dist (ft)	In-Bnch Headway (s)	Prop Bunched	Hdwy (s)	Dist (ft)	Fol l -up Headway (s)
-----										
West: EB: W. 10th Avenue										
Left	1	Subdomi nant	213	16.7	412.7	1.37	0.162	5.48	133.9	3.39
Thru	2	Domi nant	213	16.7	412.7	1.37	0.162	3.92	95.7	2.42
Right	2	Domi nant	213	16.7	412.7	1.37	0.162	3.98	97.3	2.46

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South: NB: Ci odfel ter Road										
Left	1	Subdomi nant	156	18.9	639.9	1.20	0.107	5.09	140.8	3.11
Thru	1	Subdomi nant	156	18.9	639.9	1.20	0.107	4.66	128.9	2.85
Ri ght	2	Domi nant	156	18.9	639.9	1.20	0.107	3.74	103.4	2.28
East: WB: W. 10th Avenue										
Left	1	Domi nant	47	21.4	2415.3	2.00	0.055	4.17	130.9	2.49
Thru	1	Domi nant	47	21.4	2415.3	2.00	0.055	4.17	130.9	2.49
Ri ght	2	Excl . Slip	40E	22.2	2907.5	2.00	0.048	4.17	135.7	2.49
NorthEast: SB: Ci odfel ter Road										
Left	1	Subdomi nant	214	22.4	551.0	2.00	0.229	4.00	131.0	2.47
	2	Domi nant	214	22.4	551.0	2.00	0.229	3.66	119.9	2.26
Thru	2	Domi nant	214	22.4	551.0	2.00	0.229	3.70	121.2	2.29

Environment Factor: 1.00  
 Entry/Ci rcul ati ng Flow Adj ustm ent: Medi um

Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap). The O-D Factor (Table R.0) allows for priority sharing and priority emphasis.

E Exiting flow for slip lane traffic

Dist (Distance): Spacing, i.e. distance between the front ends of two successive vehicles across all lanes in the circulating or exiting stream

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 Intersecti on ID:  
 Roundabout

Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - aaSIDRA & HCM MODELS

Mov No.	Dem Flow (veh /h)	aaSIDRA				HCM 2000 Lower				HCM 2000 Upper							
		Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS	Cap. (veh /h)	Deg. Satn x	Av. Del ay (sec)	LOS				
West: EB: W. 10th Avenue																	
12	L	14	843	0.017	6.0	A	-	-	-	NA	-	-	-	NA	-	-	-
11	T	40	1063	0.038	0.6	A	-	-	-	NA	-	-	-	NA	-	-	-
13	R	7	186	0.038	1.9	A	-	-	-	NA	-	-	-	NA	-	-	-
South: NB: Ci odfel ter Road																	
32	L	7	226	0.031	6.2	A	-	-	-	NA	-	-	-	NA	-	-	-
31	T	26	841	0.031	0.6	A	-	-	-	NA	-	-	-	NA	-	-	-
33	R	78	1397	0.056	1.6	A	-	-	-	NA	-	-	-	NA	-	-	-
East: WB: W. 10th Avenue																	
22	L	61	409	0.149	5.8	A	-	-	-	NA	-	-	-	NA	-	-	-
21	T	146	979	0.149	0.2	A	-	-	-	NA	-	-	-	NA	-	-	-
23	R	54	-	-	NA	-	-	-	-	NA	-	-	-	NA	-	-	-
NorthEast: SB: Ci odfel ter Road																	
62	L	152	2133	0.071	6.5	A	-	-	-	NA	-	-	-	NA	-	-	-
61	T	31	435	0.071	0.6	A	-	-	-	NA	-	-	-	NA	-	-	-

2008\_PM\_Clodfel ter-W10th. OUT

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
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 Roundabout

Table R.6 - ROUNDABOUT ALTERNATIVE CAPACITY MODELS

Mov No.	Dem Flow (veh /h)	aaSIDRA		NAASRA 1986		Ger. Linear		Ger. GapAcc		
		Cap. (veh /h)	Deg. Satn x	Cap. (veh /h)	% Diff from aaSIDRA	Cap. (veh /h)	% Diff from aaSIDRA	Cap. (veh /h)	% Diff from aaSIDRA	
West: EB: W. 10th Avenue										
12 L	14	843	0.017	1355	60.7	582	-31.0	957	13.5	
11 T	40	1063	0.038	1172	10.3	503	-52.7	828	-22.1	
13 R	7	186	0.038	205	10.2	88	-52.7	145	-22.0	
South: NB: Clodfel ter Road										
32 L	7	226	0.031	328	45.1	135	-40.3	230	1.8	
31 T	26	841	0.031	1217	44.7	503	-40.2	856	1.8	
33 R	78	1397	0.056	1573	12.6	648	-53.6	1106	-20.8	
East: WB: W. 10th Avenue										
22 L	61	409	0.149	510	24.7	361	-11.7	356	-13.0	
21 T	146	979	0.149	1221	24.7	864	-11.7	851	-13.1	
23 R	54	-	NA	-	NA	-	NA	-	NA	
NorthEast: SB: Clodfel ter Road										
62 L	152	2133	0.071	2480	16.3	1050	-50.8	1749	-18.0	
61 T	31	435	0.071	506	16.3	214	-50.8	357	-17.9	

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the NAASRA model is not applicable for circulating flows above 1800 veh/h in a single lane and the German models are not applicable for high values of circulating flow (actual values depend on number of lanes at roundabout) or for roundabout approaches with more than two entry lanes, or two entry lanes with a single circulating lane. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table S.2 - MOVEMENT CAPACITY PARAMETERS

2008\_PM\_Ci odfel ter-W10th. OUT

Mov No.	Demand Flow (veh/h)	HV (%)	Opposing Flow (veh/h)	HV (%)	Movement Adjust. Flow (pcu/h)	Total Cap. (veh/h)	Prac. Deg. Satn xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
West: EB: W. 10th Avenue										
12 L	14	14.3	213	4.1	213	843	0.85	5018	100	0.017
11 T	40	12.5	213	4.1	213	1063	0.85	2159	100	0.038
13 R	7	14.3	213	4.1	213	186	0.85	2159	100	0.038
South: NB: Cl odfel ter Road										
32 L	7	14.3	152	7.5	156	226	0.85	2644	55	0.031
31 T	26	3.8	152	7.5	156	841	0.85	2649	55	0.031
33 R	78	5.1	152	7.5	156	1397	0.85	1422	100	0.056
East: WB: W. 10th Avenue										
22 L	61	1.6	46	7.0	47	409	0.85	470	100	0.149*
21 T	146	2.1	46	7.0	47	979	0.85	470	100	0.149*
23 R	54	1.9	39	7.4	40	1396	0.85	2097	100	0.039
NorthEast: SB: Cl odfel ter Road										
62 L	152	5.3	214	2.1	214	2133	0.85	1093	100	0.071
61 T	31	6.5	214	2.1	214	435	0.85	1093	100	0.071

Steptoe Street Extension  
 2008 PM Peak Hour - Cl odfel ter Road & W. 10th Avenue  
 Intersecti on ID:  
 Roundabout

Table S.3 - INTERSECTION PARAMETERS

Intersecti on Level of Service	=	A
Worst movement Level of Service	=	A
Average intersecti on delay (s)	=	2.9
Largest average movement delay (s)	=	6.5
Largest back of queue, 95% (ft)	=	21
Performance Index	=	11.74
Degree of saturati on (hi ghest)	=	0.149
Practical Spare Capaci ty (l owest)	=	470 %
Effective intersecti on capaci ty, (veh/h)	=	4130
Total vehi cle flow (veh/h)	=	616
Total person flow (pers/h)	=	924
Total vehi cle delay (veh-h/h)	=	0.49
Total person delay (pers-h/h)	=	0.74
Total effective vehi cle stops (veh/h)	=	165
Total effective person stops (pers/h)	=	248
Total vehi cle travel (veh-mi/h)	=	238.5
Total cost (\$/h)	=	258.61
Total fuel (gal/h)	=	8.1
Total CO2 (kg/h)	=	77.05

Steptoe Street Extension  
 2008 PM Peak Hour - Cl odfel ter Road & W. 10th Avenue  
 Intersecti on ID:  
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Table S.5 - MOVEMENT PERFORMANCE

2008\_PM\_Ci odfel ter-W10th. OUT

Mov No.	Total Del ay (veh-h/h)	Total Del ay (pers-h/h)	Aver. Del ay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	Queue (ft)	Perf. Index	Aver. Speed (mph)
West: EB: W. 10th Avenue									
12 L	0.02	0.04	6.0	0.33	0.51	0.1	2	0.31	22.5
11 T	0.01	0.01	0.6	0.29	0.09	0.2	5	0.67	24.1
13 R	0.00	0.01	1.9	0.29	0.25	0.2	5	0.13	23.7
South: NB: Ci odfel ter Road									
32 L	0.01	0.02	6.2	0.27	0.52	0.2	4	0.16	22.4
31 T	0.00	0.01	0.6	0.27	0.09	0.2	4	0.44	24.2
33 R	0.04	0.05	1.6	0.24	0.22	0.3	7	1.38	23.8
East: WB: W. 10th Avenue									
22 L	0.10	0.15	5.8	0.14	0.50	0.8	21	1.35	22.6
21 T	0.01	0.01	0.2	0.14	0.02	0.8	21	2.39	24.6
23 R	0.02	0.03	1.5	0.12	0.20	0.2	5	0.95	24.1
NorthEast: SB: Ci odfel ter Road									
62 L	0.28	0.41	6.5	0.30	0.54	0.4	10	3.45	22.3
61 T	0.01	0.01	0.6	0.30	0.09	0.4	10	0.52	24.1

Steptoe Street Extension  
 2008 PM Peak Hour - Ci odfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Deg. Satn x	Total Del ay (veh-h/h)	Total Del ay (pers-h/h)	Aver. Del ay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue (ft)	Perf. Index	Aver. Speed (mph)
West: EB: W. 10th Avenue									
61	0.038	0.03	0.05	2.0	0.30	0.20	5	1.11	23.6
South: NB: Ci odfel ter Road									
111	0.056	0.05	0.08	1.7	0.25	0.21	7	1.98	23.8
East: WB: W. 10th Avenue									
261	0.149	0.13	0.19	1.7	0.14	0.17	21	4.68	23.9
NorthEast: SB: Ci odfel ter Road									
183	0.071	0.28	0.42	5.5	0.30	0.46	10	3.97	22.5
ALL VEHICLES:									
616	0.149	0.49	0.74	2.9	0.22	0.27	21	11.74	23.4
INTERSECTION (persons):									
924	0.149		0.74	2.9	0.22	0.27		11.74	23.4

Queue values in this table are 95% back of queue (feet).

Steptoe Street Extension  
 2008 PM Peak Hour - Ci odfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

2008\_PM\_Clodfel ter-W10th. OUT

Table S. 7 - LANE PERFORMANCE

Lane No.	Mov No.	Dem Flow (veh /h)	Cap (veh /h)	Deg. Satn x	Aver. Del ay (sec)	Eff. Stop Rate	Q u e u e		Short Lane (ft)
							95% (vehs)	Back (ft)	
West: EB: W. 10th Avenue									
1 L	12	14	843	0.017	6.0	0.51	0.1	2	
2 TR	11, 13	47	1249	0.038	0.8	0.11	0.2	5	
South: NB: Clodfel ter Road									
1 LT	32, 31	33	1068	0.031	1.8	0.18	0.2	4	
2 R	31, 33	78	1397	0.056	1.6	0.22	0.3	7	
East: WB: W. 10th Avenue									
1 LT	22, 21	207	1388	0.149	1.8	0.16	0.8	21	
2 R	23	54	1396	0.039	1.5	0.20	0.2	5	
NorthEast: SB: Clodfel ter Road									
1 L	62	87	1221	0.071	6.6	0.54	0.4	10	
2 LT	62, 61	96	1346	0.071	4.6	0.39	0.4	10	

Steptoe Street Extensi on  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersecti on ID:  
 Roundabout

Table S. 8A - LANE FLOW AND CAPACITY INFORMATION

Lane No.	Mov No.	Dem Flow (veh/h)				Min Cap (veh /h)	Tot Cap (veh /h)	Deg. Satn x	Lane Util %
		Lef	Thru	Rig	Tot				
West: EB: W. 10th Avenue									
1 L	12	14	0	0	14	14	843	0.017	100
2 TR	11, 13	0	40	7	47	47	1249	0.038	100
South: NB: Clodfel ter Road									
1 LT	32, 31	7	26	0	33	33	1068	0.031	55P
2 R	31, 33	0	0	78	78	78	1397	0.056	100
East: WB: W. 10th Avenue									
1 LT	22, 21	61	146	0	207	150	1388	0.149	100
2 R	23	0	0	54	54	54	1396	0.039	100
NorthEast: SB: Clodfel ter Road									
1 L	62	87	0	0	87	87	1221	0.071	100

2 LT 62, 65 31 0 96 96 1346 0.071 100  
 61

2008\_PM\_Cio dfe lter-W10th. OUT

P Lane under-utilisation found by the "Program"

For roundabouts, the capacity value for continuous movements is obtained as the basic saturation flow without any adjustments. Saturation flow scale applies if specified.

Steptoe Street Extension  
 2008 PM Peak Hour - Cio dfe lter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table S.12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total gal/h	Cost Total \$/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h
West: EB: W. 10th Avenue						
12 L	0.2	6.38	0.003	0.08	0.003	2.1
11 T	0.6	15.81	0.007	0.15	0.006	5.3
13 R	0.1	2.82	0.001	0.03	0.001	1.0
	0.9	25.01	0.011	0.26	0.009	8.4
South: NB: Cio dfe lter Road						
32 L	0.1	3.26	0.001	0.03	0.001	1.0
31 T	0.3	10.13	0.004	0.09	0.004	3.1
33 R	1.0	31.00	0.014	0.30	0.011	9.4
	1.4	44.38	0.019	0.43	0.016	13.5
East: WB: W. 10th Avenue						
22 L	0.8	28.08	0.012	0.28	0.010	8.0
21 T	1.7	56.11	0.024	0.45	0.019	16.1
23 R	0.6	21.14	0.009	0.19	0.007	6.1
	3.2	105.34	0.045	0.92	0.036	30.1
NorthEast: SB: Cio dfe lter Road						
62 L	2.3	71.76	0.032	0.75	0.026	21.3
61 T	0.4	12.12	0.005	0.11	0.004	3.7
	2.6	83.88	0.037	0.87	0.031	25.0
INTERSECTION:	8.1	258.61	0.112	2.48	0.092	77.0

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	0.900
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	27.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (1000 lb)	=	1.4

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Heavy vehicle mass (1000 lb)	=	11.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

The idle fuel and vehicle mass parameters given above are the default values (data given in RIDES may override some of these parameters).

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table S. 14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)		Deg Sat x	Aver. Delay (sec)	Longest Queue (ft)	Shrt Lane (ft)
	L	T	R	Tot			1st	2nd				
West: EB: W. 10th Avenue												
1 L	14			14	14				0.017	6.0	2	
2 TR		40	7	47	13				0.038	0.8	5	
	14	40	7	61	13				0.038	2.0	5	
South: NB: Clodfel ter Road												
1 LT	7	26		33	6				0.031	1.8	4	
2 R			78	78	5				0.056	1.6	7	
	7	26	78	111	5				0.056	1.7	7	
East: WB: W. 10th Avenue												
1 LT	61	146		207	2				0.149	1.8	21	
2 R			54	54	2				0.039	1.5	5	
	61	146	54	261	2				0.149	1.7	21	
NorthEast: SB: Clodfel ter Road												
1 L	87			87	5				0.071	6.6	10	
2 LT	65	31		96	6				0.071	4.6	10	
	152	31	0	183	5				0.071	5.5	10	
=====												
ALL VEHICLES				Total Flow	% HV				Max X	Aver. Delay	Max Queue	
				616	5				0.149	2.9	21	
=====												

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (feet).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table S. 15 - CAPACITY AND LEVEL OF SERVICE

2008\_PM\_CIOdfel ter-W10th. OUT

Mov No.	Mov Typ	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	Queue (ft)
West: EB: W. 10th Avenue								
12	L	14	843	0.017	6.0	A	0.1	2
11	T	40	1063	0.038	0.6	A	0.2	5
13	R	7	186	0.038	1.9	A	0.2	5
		61		0.038	2.0	A	0.2	5
South: NB: CIOdfel ter Road								
32	L	7	226	0.031	6.2	A	0.2	4
31	T	26	841	0.031	0.6	A	0.2	4
33	R	78	1397	0.056	1.6	A	0.3	7
		111		0.056	1.7	A	0.3	7
East: WB: W. 10th Avenue								
22	L	61	409	0.149*	5.8	A	0.8	21
21	T	146	979	0.149*	0.2	A	0.8	21
23	R	54	1396	0.039	1.5	A	0.2	5
		261		0.149	1.7	A	0.8	21
NorthEast: SB: CIOdfel ter Road								
62	L	152	2133	0.071	6.5	A	0.4	10
61	T	31	435	0.071	0.6	A	0.4	10
		183		0.071	5.5	A	0.4	10
ALL VEHICLES:		616		0.149	2.9	A	0.8	21

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.

\* Maximum v/c ratio, or critical green periods

Steptoe Street Extension  
 2008 PM Peak Hour - CIOdfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table D.0 - GEOMETRIC DELAY DATA

From Approach	To Approach	Negn Radius (ft)	Negn Speed (mph)	Negn Dist. (ft)	Appr. Dist. (ft)	Downstream Distance (ft)
West: EB: W. 10th Avenue						
	South	133.3	21.3	67.7	1800	168
	East	219.5	25.0	166.5	1800	169
	NorthEast	69.5	16.7	218.3	1800	315
South: NB: CIOdfel ter Road						
	West	69.5	16.7	272.9	1800	368
	East	133.3	21.3	67.7	1800	165

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NorthEast	219.5	25.0	124.9	1800	157
-----------	-------	------	-------	------	-----

-----

East: WB: W. 10th Avenue

West	219.5	25.0	166.5	1800	167
South	69.5	16.7	272.9	1800	368
NorthEast	127.9	21.0	34.2	1800	164

-----

NorthEast: SB: Clodfel ter Road

West	219.5	25.0	124.9	1800	157
South	69.5	16.7	218.3	1800	385
East	69.5	16.7	327.5	1800	385

-----

Maximum Negoti ati on (Desi gn) Speed = 50.0 mph  
Downstream Di stance cal cul ated by aaSI DRA

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negoti ati on di stance). Accelerati on di stance is weighted for light and heavy vehi cl es. The same di stance appli es for both stopped and unstopped vehi cl es.

-----

Steptoe Street Extension  
2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
Intersecti on ID:  
Roundabout

Table D.1 - LANE DELAYS

Lane No.	Mov No.	Deg. Satn x	Stop-line		Del ay Total dSL	Del ay (seconds/veh)		Geom di g	Control di c		
			1st d1	2nd d2		Acc. Dec. dn	Queui ng Total d q MvUp d q m			Stopd (Idle) di	
-----											
West: EB: W. 10th Avenue											
1 L	12	0.017	1.1	0.0	1.1	1.7	0.0	0.0	0.0	4.9	6.0
2 TR	11, 13	0.038	0.6	0.0	0.6	1.9	0.0	0.0	0.0	0.0	0.8
										1.3	
-----											
South: NB: Clodfel ter Road											
1 LT	32, 31	0.031	0.6	0.0	0.6	1.7	0.0	0.0	0.0	5.6	1.8
2 R	31, 33	0.056	0.4	0.0	0.4	1.5	0.0	0.0	0.0	0.0	1.6
										1.2	
-----											
East: WB: W. 10th Avenue											
1 LT	22, 21	0.149	0.2	0.0	0.2	0.9	0.0	0.0	0.0	5.6	1.8
2 R	23	0.039	0.1	0.0	0.1	0.7	0.0	0.0	0.0	0.0	1.5
										1.3	
-----											
NorthEast: SB: Clodfel ter Road											
1 L	62	0.071	0.7	0.0	0.7	1.6	0.0	0.0	0.0	5.8	6.6
2 LT	62, 61	0.071	0.6	0.0	0.6	1.7	0.0	0.0	0.0	5.8	4.6
										0.0	

-----

dn is average stop-start delay for all vehi cl es queued and unqueued

Geometric delay is less than 2 seconds for some movements. The negoti ati on speed may be too high or the approach and exit speeds may be too low for given geometric design (e.g. for a large roundabout). Check Tables D.0, D.1 and D.4 for geometric delay data including negoti ati on speeds. If necessary, specify appropriate values of approach and exit speeds (RIDES Approach Data screen), and negoti ati on radius or negoti ati on speed data

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 (RIDES Extra Data - Geometric Delay data screen).

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table D. 2 - LANE STOPS

Lane No.	Deg. Satn x	Effective Stop		Geom. High	Rate Overall h	Prop. Queued pq	Queue
		he1	he2				Move-up Rate hqm
West: EB: W. 10th Avenue							
1 L	0.017	0.19	0.00	0.32	0.51	0.333	0.00
2 TR	0.038	0.10	0.00	0.02	0.11	0.292	0.00
South: NB: Clodfel ter Road							
1 LT	0.031	0.10	0.00	0.08	0.18	0.267	0.00
2 R	0.056	0.09	0.00	0.13	0.22	0.244	0.00
East: WB: W. 10th Avenue							
1 LT	0.149	0.03	0.00	0.13	0.16	0.142	0.00
2 R	0.039	0.03	0.00	0.16	0.20	0.117	0.00
NorthEast: SB: Clodfel ter Road							
1 L	0.071	0.17	0.00	0.37	0.54	0.308	0.00
2 LT	0.071	0.14	0.00	0.25	0.39	0.297	0.00

high is the average value for all movements in a shared lane  
 hqm is average queue move-up rate for all vehicles queued and unqueued

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table D. 3A - LANE QUEUES (veh)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: W. 10th Avenue											
1 L	0.017	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.00
2 TR	0.038	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.00
South: NB: Clodfel ter Road											
1 LT	0.031	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.00
2 R	0.056	0.0	0.1	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.00
East: WB: W. 10th Avenue											
1 LT	0.149	0.0	0.3	0.0	0.3	0.5	0.6	0.7	0.8	1.0	0.01
2 R	0.039	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.00
NorthEast: SB: Clodfel ter Road											
1 L	0.071	0.0	0.1	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.01

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2 LT 0.071 0.0 0.1 0.0 0.1 0.2 0.3 0.3 0.4 0.4 0.01

Values printed in this table are back of queue (vehicles).

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table D.3B - LANE QUEUES (feet)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB: W. 10th Avenue											
1 L	0.017	0	1	0	1	1	2	2	2	3	0.00
2 TR	0.038	0	2	0	2	3	4	4	5	6	0.00
South: NB: Clodfel ter Road											
1 LT	0.031	0	1	0	1	2	3	3	4	5	0.00
2 R	0.056	0	2	0	2	4	5	6	7	9	0.00
East: WB: W. 10th Avenue											
1 LT	0.149	0	7	0	7	13	15	17	21	25	0.01
2 R	0.039	0	2	0	2	3	4	4	5	6	0.00
NorthEast: SB: Clodfel ter Road											
1 L	0.071	0	3	0	3	6	7	8	10	12	0.01
2 LT	0.071	0	3	0	3	6	7	8	10	12	0.01

Values printed in this table are back of queue (feet).

Steptoe Street Extension  
 2008 PM Peak Hour - Clodfel ter Road & W. 10th Avenue  
 Intersection ID:  
 Roundabout

Table D.4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd	
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Runni ng	Overall
West: EB: W. 10th Avenue								
12	25.0	16.7	16.7	25.0			22.5	22.5
11	25.0	25.0	25.0	25.0			24.1	24.1
13	25.0	21.3	21.3	25.0			23.7	23.7
South: NB: Clodfel ter Road								
32	25.0	16.7	16.7	25.0			22.4	22.4
31	25.0	25.0	25.0	25.0			24.2	24.2
33	25.0	21.3	21.3	25.0			23.8	23.8
East: WB: W. 10th Avenue								
22	25.0	16.7	16.7	25.0			22.6	22.6

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21	25.0	25.0	25.0	25.0	24.6	24.6
23	25.0	21.0	21.0	25.0	24.1	24.1
-----						
NorthEast: SB: Clodfel ter Road						
62	25.0	16.7	16.7	25.0	22.3	22.3
61	25.0	25.0	25.0	25.0	24.1	24.1
-----						

"Runni ng Speed" is the average speed excl udi ng stopped peri ods.

--- End of aaSIDRA Output ---

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Documents\aaTraffi c\Steptoe\2008\_PM\_Clodfel ter-W10th. OUT  
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2008\_PM\_Center-Steptoe.OUT

Steptoe Street Extension  
 2008 PM Peak Hour - Center Parkway & Steptoe Street Ext.  
 Intersection ID:  
 Roundabout

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Island Diam (ft)	Circ Width (ft)	Insc Diam (ft)	No. of Circ. Lanes	No. of Entry Lanes	Av. Ent Lane Width (ft)	Circulating/Exiting Stream					
						Flow (veh/h)	%HV	Adjust. Flow (pcu/h)	%Exit Incl.	Cap. Constr. Effect	O-D Factor
South: NB: Steptoe Street Ext.											
115	30	175	1	2	13.00	87	2.0	87	0	N	0.996
East: WB: Center Parkway											
115	30	175	2	1	13.00	347	2.0	347	0	N	0.981
North: SB: Steptoe Street Ext.											
115	30	175	1	2	13.00	43	2.0	43	0	N	0.995

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Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Circulating/Exiting Stream					Critical Gap		Follow-up Headway (s)
			Flow Rate (pcu/h)	Aver Speed (mph)	Aver Dist (ft)	In-Bunch Headway (s)	Prop Bunched	Hdwy (s)	Dist (ft)	
South: NB: Steptoe Street Ext.										
Thru	1	Subdominant	87	16.7	1012.0	2.00	0.100	4.45	108.8	2.29
	2	Dominant	87	16.7	1012.0	2.00	0.100	3.75	91.7	1.93
Right	2	Dominant	87	16.7	1012.0	2.00	0.100	3.75	91.6	1.93
East: WB: Center Parkway										
Left	1	Dominant	347	25.0	379.9	1.06	0.200	4.05	148.4	2.57
Right	1	Dominant	347	25.0	379.9	1.06	0.200	4.05	148.4	2.57
North: SB: Steptoe Street Ext.										
Left	1	Subdominant	43	16.7	2023.9	2.00	0.052	4.48	109.4	2.29
Thru	1	Subdominant	43	16.7	2023.9	2.00	0.052	4.48	109.4	2.29
	2	Dominant	43	16.7	2023.9	2.00	0.052	3.76	92.0	1.92

Environment Factor: 1.00  
 Entry/Circulating Flow Adjustment: Medium

Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap). The O-D Factor (Table R.0) allows for priority sharing and priority emphasis.

Dist (Distance): Spacing, i.e. distance between the front ends of two successive vehicles across all lanes in the circulating

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or exiting stream

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Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - aaSIDRA & HCM MODELS

Mov No.	Dem Flow (veh/h)	aaSIDRA				HCM 2000 Lower				HCM 2000 Upper			
		Cap. (veh/h)	Deg. Satn x	Av. Delay (sec)	LOS	Cap. (veh/h)	Deg. Satn x	Av. Delay (sec)	LOS	Cap. (veh/h)	Deg. Satn x	Av. Delay (sec)	LOS
South: NB: Steptoe Street Ext.													
31 T	347	2690	0.129	4.1	A	1825	0.190	4.2	A	2190	0.158	4.1	A
33 R	63	488	0.129	5.2	A	331	0.190	5.4	A	398	0.158	5.3	A
East: WB: Center Parkway													
22 LR	147	1059	0.139	3.5	A	-	-	NA	-	-	-	NA	-
North: SB: Steptoe Street Ext.													
42 L	87	584	0.149	5.8	A	396	0.220	5.8	A	473	0.184	5.8	A
41 T	405	2721	0.149	3.9	A	1842	0.220	4.0	A	2203	0.184	3.9	A

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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Table R.6 - ROUNDABOUT ALTERNATIVE CAPACITY MODELS

Mov No.	Dem Flow (veh/h)	aaSIDRA			NAASRA 1986		Ger. Linear		Ger. GapAcc	
		Cap. (veh/h)	Deg. Satn x	Av. Delay (sec)	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA	Cap. (veh/h)	% Diff from aaSIDRA
South: NB: Steptoe Street Ext.										
31 T	347	2690	0.129	2830	5.2	-	NA	-	-	NA
33 R	63	488	0.129	514	5.3	-	NA	-	-	NA
East: WB: Center Parkway										
22 LR	147	1059	0.139	1345	27.0	1115	5.3	1028	-2.9	
North: SB: Steptoe Street Ext.										
42 L	87	584	0.149	614	5.1	-	NA	-	-	NA
41 T	405	2721	0.149	2857	5.0	-	NA	-	-	NA

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NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the NAASRA model is not applicable for circulating flows above 1800 veh/h in a single lane and the German models are not applicable for high values of circulating flow (actual values depend on number of lanes at roundabout) or for roundabout approaches with more than two entry lanes, or two entry lanes with a single circulating lane. Also note that results are not calculated for any of the models for slip lane or continuous movements. See the aaSIDRA Traffic Model Reference Guide for roundabout limits.

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Table S.2 - MOVEMENT CAPACITY PARAMETERS

Mov No.	Demand Flow (veh/h)	HV (%)	Opposing Movement Flow (veh/h)	HV (%)	Opposing Movement Adjust. Flow (pcu/h)	Total Cap. (veh/h)	Prac. Deg. Satn xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
South: NB: Steptoe Street Ext.										
31 T	347	2.0	87	2.0	87	2690	0.85	559	100	0.129
33 R	63	1.6	87	2.0	87	488	0.85	558	100	0.129
East: WB: Center Parkway										
22 LR	147	2.0	347	2.0	347	1059	0.85	512	100	0.139
North: SB: Steptoe Street Ext.										
42 L	87	2.3	43	2.0	43	584	0.85	471	100	0.149*
41 T	405	2.0	43	2.0	43	2721	0.85	471	100	0.149*

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Table S.3 - INTERSECTION PARAMETERS

Intersection Level of Service	=	A
Worst movement Level of Service	=	A
Average intersection delay (s)	=	4.2
Largest average movement delay (s)	=	5.8
Largest back of queue, 95% (ft)	=	28
Performance Index	=	16.15
Degree of saturation (highest)	=	0.149
Practical Spare Capacity (lowest)	=	471 %
Effective intersection capacity, (veh/h)	=	7042
Total vehicle flow (veh/h)	=	1049
Total person flow (pers/h)	=	1574
Total vehicle delay (veh-h/h)	=	1.21
Total person delay (pers-h/h)	=	1.81
Total effective vehicle stops (veh/h)	=	399
Total effective person stops (pers/h)	=	599
Total vehicle travel (veh-mi/h)	=	395.5

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Total cost (\$/h)	=	328.13
Total fuel (gal/h)	=	12.0
Total CO2 (kg/h)	=	113.53

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Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	Queue (ft)	Perf. Index	Aver. Speed (mph)
South: NB: Steptoe Street Ext.									
31 T	0.39	0.59	4.1	0.22	0.37	0.9	22	4.81	34.4
33 R	0.09	0.14	5.2	0.21	0.44	0.9	22	0.91	33.6
East: WB: Center Parkway									
22 LR	0.14	0.22	3.5	0.40	0.39	0.7	18	2.94	23.0
North: SB: Steptoe Street Ext.									
42 L	0.14	0.21	5.8	0.17	0.49	1.1	27	1.94	22.5
41 T	0.44	0.66	3.9	0.16	0.35	1.1	28	5.56	34.7

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Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Deg. Satn x	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue (ft)	Perf. Index	Aver. Speed (mph)
South: NB: Steptoe Street Ext.									
410	0.129	0.48	0.73	4.3	0.22	0.38	22	5.72	34.2
East: WB: Center Parkway									
147	0.139	0.14	0.22	3.5	0.40	0.39	18	2.94	23.0
North: SB: Steptoe Street Ext.									
492	0.149	0.58	0.87	4.3	0.16	0.38	28	7.50	31.5
ALL VEHICLES:									
1049	0.149	1.21	1.81	4.2	0.22	0.38	28	16.15	30.8
INTERSECTION (persons):									
1574	0.149		1.81	4.2	0.22	0.38		16.15	30.8

Queue values in this table are 95% back of queue (feet).

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Table S. 7 - LANE PERFORMANCE

Lane No.	Mov No.	Dem Flow (veh /h)	Cap (veh /h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% (vehs)	Back (ft)	Short Lane (ft)
South: NB: Steptoe Street Ext.									
1	T	31	186	1444	0.129	4.1	0.37	0.9	22
2	TR	31, 33	224	1735	0.129	4.4	0.39	0.9	22
East: WB: Center Parkway									
1	LR	22	147	1059	0.139	3.5	0.39	0.7	18
North: SB: Steptoe Street Ext.									
1	LT	42, 41	224	1504	0.149	4.7	0.41	1.1	27
2	T	41	268	1801	0.149	3.9	0.35	1.1	28

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Table S. 8A - LANE FLOW AND CAPACITY INFORMATION

Lane No.	Mov No.	Dem Flow (veh/h)			Min Cap (veh /h)	Tot Cap (veh /h)	Deg. Satn x	Lane Util %		
		Lef	Thru	Rig	Tot					
South: NB: Steptoe Street Ext.										
1	T	31	0	186	0	186	150	1444	0.129	100
2	TR	31, 33	0	161	63	224	150	1735	0.129	100
East: WB: Center Parkway										
1	LR	22	44	0	103	147	147	1059	0.139	100
North: SB: Steptoe Street Ext.										
1	LT	42, 41	87	137	0	224	150	1504	0.149	100
2	T	41	0	268	0	268	150	1801	0.149	100

For roundabouts, the capacity value for continuous movements is obtained as the basic saturation flow without any adjustments. Saturation flow scale applies if specified.

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Table S. 12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total gal/h	Cost Total \$/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h
South: NB: Steptoe Street Ext.						
31 T	3.8	96.58	0.050	0.84	0.058	36.0
33 R	0.7	17.94	0.009	0.18	0.011	6.7
	4.5	114.52	0.060	1.02	0.070	42.7
East: WB: Center Parkway						
22 LR	1.9	61.96	0.027	0.62	0.022	17.8
	1.9	61.96	0.027	0.62	0.022	17.8
North: SB: Steptoe Street Ext.						
42 L	1.2	40.13	0.017	0.39	0.014	11.4
41 T	4.4	111.52	0.058	0.92	0.067	41.6
	5.6	151.65	0.075	1.31	0.081	53.0
INTERSECTION:	12.0	328.13	0.162	2.95	0.173	113.5

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	0.900
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	27.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (1000 lb)	=	1.4
Heavy vehicle mass (1000 lb)	=	11.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

The idle fuel and vehicle mass parameters given above are the default values (data given in RIDES may override some of these parameters).

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Table S. 14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (ft)	Shrt Lane (ft)
	L	T	R	Tot							
South: NB: Steptoe Street Ext.											
1 T		186		186	2			0.129	4.1	22	
2 TR		161	63	224	2			0.129	4.4	22	
	0	347	63	410	2			0.129	4.3	22	

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East: WB: Center Parkway									
1 LR	44	103	147	2		0.139	3.5	18	
	44	0	103	147	2	0.139	3.5	18	
North: SB: Steptoe Street Ext.									
1 LT	87	137		224	2	0.149	4.7	27	
2 T		268		268	2	0.149	3.9	28	
	87	405	0	492	2	0.149	4.3	28	
ALL VEHICLES		Total Flow		% HV		Max X	Aver. Delay	Max Queue	
		1049		2		0.149	4.2	28	

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (feet).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

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Table S.15 - CAPACITY AND LEVEL OF SERVICE

Mov No.	Mov Typ	Total Flow (veh/h)	Total Cap. (veh/h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS	Longest Queue 95% Back (vehs)	Longest Queue (ft)
South: NB: Steptoe Street Ext.								
31 T		347	2690	0.129	4.1	A	0.9	22
33 R		63	488	0.129	5.2	A	0.9	22
		410		0.129	4.3	A	0.9	22
East: WB: Center Parkway								
22 LR		147	1059	0.139	3.5	A	0.7	18
		147		0.139	3.5	A	0.7	18
North: SB: Steptoe Street Ext.								
42 L		87	584	0.149*	5.8	A	1.1	27
41 T		405	2721	0.149*	3.9	A	1.1	28
		492		0.149	4.3	A	1.1	28
ALL VEHICLES:		1049		0.149	4.2	A	1.1	28

Level of Service calculations are based on average control delay including geometric delay (HCM criteria), independent of the current delay definition used.

For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.

\* Maximum v/c ratio, or critical green periods

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Table D.0 - GEOMETRIC DELAY DATA

From Approach	To Approach	Negn Radius (ft)	Negn Speed (mph)	Negn Dist. (ft)	Appr. Dist. (ft)	Downstream Distance (ft)
South: NB: Steptoe Street Ext.						
	East	133.3	21.3	67.7	1800	164
	North	219.5	25.0	166.5	1800	167
East: WB: Center Parkway						
	South	69.5	16.7	272.9	1800	368
	North	146.3	22.1	67.6	1800	163
North: SB: Steptoe Street Ext.						
	South	219.5	25.0	166.5	1800	167
	East	69.5	16.7	272.9	1800	368

Maximum Negotiation (Design) Speed = 50.0 mph  
 Downstream Distance calculated by aaSIDRA

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

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Table D.1 - LANE DELAYS

Lane No.	Mov No.	Deg. Satn x	Stop-Line		Del ay Total dSL	Del ay (seconds/veh)					Geom dig	Control dic	
			1st d1	2nd d2		Acc. Dec. dn	Queui ng Total dq	MvUp dqm	Stopd (Idle) di				
South: NB: Steptoe Street Ext.													
1	T	31	0.129	0.3	0.0	0.3	1.5	0.0	0.0	0.0	0.0	3.8	4.1
2	TR	31, 33	0.129	0.3	0.0	0.3	1.4	0.0	0.0	0.0	0.0	3.8	4.4
East: WB: Center Parkway													
1	LR	22	0.139	1.2	0.0	1.2	2.3	0.0	0.0	0.0	0.0	2.3	3.5
North: SB: Steptoe Street Ext.													
1	LT	42, 41	0.149	0.2	0.0	0.2	1.0	0.0	0.0	0.0	0.0	5.6	4.7
2	T	41	0.149	0.1	0.0	0.1	1.0	0.0	0.0	0.0	0.0	3.8	3.9

dn is average stop-start delay for all vehicles queued and unqueued

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Table D. 2 - LANE STOPS

Lane No.	Deg. Satn x	Effective he1	Effective he2	Stop Geom. hig	Rate Overall h	Prop. Queued pq	Queue Move-up Rate hqm
South: NB: Steptoe Street Ext.							
1 T	0.129	0.10	0.00	0.28	0.37	0.228	0.00
2 TR	0.129	0.08	0.00	0.30	0.39	0.210	0.00
East: WB: Center Parkway							
1 LR	0.139	0.24	0.00	0.15	0.39	0.398	0.00
North: SB: Steptoe Street Ext.							
1 LT	0.149	0.06	0.00	0.35	0.41	0.167	0.00
2 T	0.149	0.05	0.00	0.30	0.35	0.154	0.00

hig is the average value for all movements in a shared lane  
 hqm is average queue move-up rate for all vehicles queued and unqueued

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Table D. 3A - LANE QUEUES (veh)

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
South: NB: Steptoe Street Ext.											
1 T	0.129	0.0	0.3	0.0	0.3	0.5	0.6	0.7	0.9	1.0	0.01
2 TR	0.129	0.0	0.3	0.0	0.3	0.5	0.6	0.7	0.9	1.0	0.01
East: WB: Center Parkway											
1 LR	0.139	0.0	0.2	0.0	0.2	0.4	0.5	0.6	0.7	0.8	0.01
North: SB: Steptoe Street Ext.											
1 LT	0.149	0.0	0.3	0.0	0.3	0.6	0.8	0.9	1.1	1.2	0.02
2 T	0.149	0.0	0.3	0.0	0.3	0.6	0.8	0.9	1.1	1.3	0.02

Values printed in this table are back of queue (vehicles).

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Table D. 3B - LANE QUEUES (feet)

Lane No.	Deg. Satn x	Ovrfl. Queue No	2008_PM_Center-Steptoe. OUT					70%	85%	90%	95%	98%	Queue Stor. Ratio
			Average (feet)			Percentile (feet)							
			Nb1	Nb2	Nb								
South: NB: Steptoe Street Ext.													
1 T	0.129	0	7	0	7	13	16	18	22	25	0.01		
2 TR	0.129	0	7	0	7	13	16	18	22	26	0.01		
East: WB: Center Parkway													
1 LR	0.139	0	6	0	6	11	13	15	18	21	0.01		
North: SB: Steptoe Street Ext.													
1 LT	0.149	0	9	0	9	16	20	22	27	32	0.02		
2 T	0.149	0	9	0	9	16	20	23	28	32	0.02		

Values printed in this table are back of queue (feet).

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Table D.4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd	
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Running	Overall
South: NB: Steptoe Street Ext.								
31	40.0	25.0	25.0	25.0			34.4	34.4
33	40.0	21.3	21.3	25.0			33.6	33.6
East: WB: Center Parkway								
22	25.0	20.5	20.5	25.0			23.0	23.0
North: SB: Steptoe Street Ext.								
42	25.0	16.7	16.7	25.0			22.5	22.5
41	40.0	25.0	25.0	25.0			34.7	34.7

"Running Speed" is the average speed excluding stopped periods.

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