

HCM Signalized Intersection Capacity Analysis
 1: University Rd & 32nd Ave

2040 AM W-O Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↗	↕↕		↗	↕↕	
Volume (vph)	3	155	7	34	538	146	26	91	76	92	33	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frt		0.99			0.97		1.00	0.93		1.00	0.98	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3514			3423		1770	3298		1770	3468	
Flt Permitted		0.94			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3310			3200		1770	3298		1770	3468	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	4	182	8	40	633	172	31	107	89	108	39	6
RTOR Reduction (vph)	0	3	0	0	20	0	0	72	0	0	4	0
Lane Group Flow (vph)	0	191	0	0	825	0	31	124	0	108	41	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		26.4			26.4		3.0	11.4		7.9	16.3	
Effective Green, g (s)		26.4			26.4		3.0	11.4		7.9	16.3	
Actuated g/C Ratio		0.44			0.44		0.05	0.19		0.13	0.27	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Grp Cap (vph)		1463			1415		88	629		234	946	
v/s Ratio Prot							0.02	c0.04		c0.06	0.01	
v/s Ratio Perm		0.06			c0.26							
v/c Ratio		0.13			0.58		0.35	0.20		0.46	0.04	
Uniform Delay, d1		9.9			12.5		27.4	20.3		23.9	16.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.0		3.3	0.3		2.0	0.0	
Delay (s)		9.9			13.5		30.7	20.6		25.9	16.0	
Level of Service		A			B		C	C		C	B	
Approach Delay (s)		9.9			13.5			22.0			23.0	
Approach LOS		A			B			C			C	

Intersection Summary

HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 2: Schafer Rd/University Rd & Dishman-Mica Rd

2040 AM W-O Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↕		↖	↗		↖	↑	↗
Volume (vph)	8	103	45	14	461	34	269	117	41	14	47	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3503		1770	1791		1770	1863	1583
Fit Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3503		1770	1791		1770	1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	9	121	53	16	542	40	316	138	48	16	55	31
RTOR Reduction (vph)	0	0	40	0	4	0	0	8	0	0	0	27
Lane Group Flow (vph)	9	121	13	16	578	0	316	178	0	16	55	4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		7	4		3		
Permitted Phases			6								8	8
Actuated Green, G (s)	1.2	17.3	17.3	1.3	17.4		21.1	28.4		1.3	8.6	8.6
Effective Green, g (s)	1.2	17.3	17.3	1.3	17.4		21.1	28.4		1.3	8.6	8.6
Actuated g/C Ratio	0.02	0.25	0.25	0.02	0.25		0.31	0.42		0.02	0.13	0.13
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	31	471	400	33	892		546	744		33	234	199
v/s Ratio Prot	0.01	0.06		c0.01	c0.16		c0.18	c0.10		0.01		
v/s Ratio Perm			0.01								0.03	0.00
v/c Ratio	0.29	0.26	0.03	0.48	0.65		0.58	0.24		0.48	0.24	0.02
Uniform Delay, d1	33.1	20.4	19.2	33.2	22.7		19.9	12.9		33.2	26.9	26.2
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	7.0	0.4	0.0	14.5	1.8		1.8	0.2		14.5	0.7	0.1
Delay (s)	40.1	20.8	19.3	47.7	24.5		21.6	13.2		47.7	27.6	26.2
Level of Service	D	C	B	D	C		C	B		D	C	C
Approach Delay (s)		21.3			25.1			18.5			30.3	
Approach LOS		C			C			B			C	

Intersection Summary		
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.55	
Actuated Cycle Length (s)	68.3	Sum of lost time (s) 20.0
Intersection Capacity Utilization	45.4%	ICU Level of Service A
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 3: Bowdish Rd & 32nd Ave

2040 AM W-O Proj.
 6/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	281	12	63	450	35	116	155	122	60	33	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Fr _t	1.00	0.99		1.00	0.99			0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1770	1851		1770	1842			1759			1776	
Flt Permitted	0.19	1.00		0.47	1.00			0.87			0.65	
Satd. Flow (perm)	358	1851		872	1842			1550			1181	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	109	319	14	72	511	40	132	176	139	68	38	19
RTOR Reduction (vph)	0	2	0	0	3	0	0	19	0	0	7	0
Lane Group Flow (vph)	109	331	0	72	548	0	0	428	0	0	118	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	31.1	25.0		29.9	24.4			22.8			22.8	
Effective Green, g (s)	31.1	25.0		29.9	24.4			22.8			22.8	
Actuated g/C Ratio	0.46	0.37		0.44	0.36			0.34			0.34	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	293	687		460	667			525			400	
v/s Ratio Prot	c0.03	0.18		0.01	c0.30							
v/s Ratio Perm	0.14			0.06				c0.28			0.10	
v/c Ratio	0.37	0.48		0.16	0.82			0.81			0.29	
Uniform Delay, d ₁	12.2	16.2		11.0	19.5			20.3			16.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d ₂	0.8	0.7		0.2	8.4			9.9			0.6	
Delay (s)	13.0	16.9		11.1	27.9			30.2			16.9	
Level of Service	B	B		B	C			C			B	
Approach Delay (s)		15.9			25.9			30.2			16.9	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Bowdish Rd & Dishman-Mica Rd

2040 AM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	104	34	37	300	30	126	162	55	32	71	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.96		1.00	0.99			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.98	1.00
Satd. Flow (prot)	1770	1794		1770	1838			1790			1834	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.83			0.85	1.00
Satd. Flow (perm)	1770	1794		1770	1838			1511			1580	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	9	120	39	43	345	34	145	186	63	37	82	13
RTOR Reduction (vph)	0	15	0	0	5	0	0	7	0	0	0	9
Lane Group Flow (vph)	9	144	0	43	374	0	0	387	0	0	119	4
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4			4	
Permitted Phases							4			4		4
Actuated Green, G (s)	1.1	14.5		2.9	16.3			16.6			16.6	16.6
Effective Green, g (s)	1.1	14.5		2.9	16.3			16.6			16.6	16.6
Actuated g/C Ratio	0.02	0.30		0.06	0.34			0.34			0.34	0.34
Clearance Time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Grp Cap (vph)	40	536		105	617			517			540	541
v/s Ratio Prot	0.01	0.08		c0.02	c0.20							
v/s Ratio Perm								c0.26			0.08	0.00
v/c Ratio	0.23	0.27		0.41	0.61			0.75			0.22	0.01
Uniform Delay, d1	23.3	13.0		22.0	13.4			14.1			11.3	10.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	3.9	0.4		3.5	2.0			6.2			0.3	0.0
Delay (s)	27.2	13.3		25.5	15.4			20.3			11.6	10.5
Level of Service	C	B		C	B			C			B	B
Approach Delay (s)		14.1			16.4			20.3			11.5	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	48.5	Sum of lost time (s)	14.5
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Dishman-Mica Rd & Thorpe Rd

2040 AM W-O Proj.
6/12/2015



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			L
Volume (veh/h)	9	122	234	20	80	104
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	10	142	272	23	93	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	591	284			295	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	591	284			295	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	81			93	
cM capacity (veh/h)	435	755			1266	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	152	295	214
Volume Left	10	0	93
Volume Right	142	23	0
cSH	719	1700	1266
Volume to Capacity	0.21	0.17	0.07
Queue Length 95th (ft)	20	0	6
Control Delay (s)	11.3	0.0	3.9
Lane LOS	B		A
Approach Delay (s)	11.3	0.0	3.9
Approach LOS	B		

Intersection Summary			
Average Delay		3.9	
Intersection Capacity Utilization		41.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 AM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶			↷			↕			↕	
Volume (veh/h)	0	297	54	64	269	0	33	0	266	0	181	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	338	61	73	306	0	38	0	302	0	206	47
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					129							
pX, platoon unblocked	0.85						0.85	0.85		0.85	0.85	0.85
vC, conflicting volume	306			399			969	819	368	1122	850	306
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	90			399			873	696	368	1053	732	90
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			54	100	55	100	26	94
cM capacity (veh/h)	1275			1160			81	290	677	91	276	820

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	399	378	340	252
Volume Left	0	73	38	0
Volume Right	61	0	302	47
cSH	1700	1160	374	315
Volume to Capacity	0.23	0.06	0.91	0.80
Queue Length 95th (ft)	0	5	234	164
Control Delay (s)	0.0	2.1	60.0	50.0
Lane LOS		A	F	E
Approach Delay (s)	0.0	2.1	60.0	50.0
Approach LOS			F	E

Intersection Summary			
Average Delay		24.7	
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 AM W-O Proj IMP
6/12/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Volume (veh/h)	297	54	245	310	33	266
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	316	57	261	330	35	283
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				129		
pX, platoon unblocked					0.87	
vC, conflicting volume			373		1196	345
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			373		1150	345
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			78		76	59
cM capacity (veh/h)			1185		149	698

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	373	590	318
Volume Left	0	261	35
Volume Right	57	0	283
cSH	1700	1185	496
Volume to Capacity	0.22	0.22	0.64
Queue Length 95th (ft)	0	21	112
Control Delay (s)	0.0	5.3	24.4
Lane LOS		A	C
Approach Delay (s)	0.0	5.3	24.4
Approach LOS			C

Intersection Summary			
Average Delay		8.5	
Intersection Capacity Utilization		77.0%	ICU Level of Service D
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 AM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↕		↖	↕	
Volume (vph)	229	246	30	7	247	89	75	593	24	51	146	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	
Fit Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583		1860	1583	1770	3519		1770	3536	
Fit Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1819	1583		1860	1583	1770	3519		1770	3536	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	269	289	35	8	291	105	88	698	28	60	172	1
RTOR Reduction (vph)	0	0	22	0	0	105	0	2	0	0	0	0
Lane Group Flow (vph)	0	558	13	0	299	0	88	724	0	60	173	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		47.7	47.7		26.2	0.0	12.1	30.5		8.3	26.7	
Effective Green, g (s)		47.7	47.7		26.2	0.0	12.1	30.5		8.3	26.7	
Actuated g/C Ratio		0.36	0.36		0.20	0.00	0.09	0.23		0.06	0.20	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		653	569		367	0	161	808		110	711	
v/s Ratio Prot		c0.31			c0.16		c0.05	c0.21		0.03	0.05	
v/s Ratio Perm			0.01									
v/c Ratio		0.85	0.02		0.81	0.00	0.55	0.90		0.55	0.24	
Uniform Delay, d1		39.3	27.4		50.9	66.3	57.7	49.6		60.4	44.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.6	0.0		13.0	0.0	3.8	12.5		5.4	0.1	
Delay (s)		49.9	27.5		63.9	66.3	61.4	62.1		65.8	44.6	
Level of Service		D	C		E	E	E	E		E	D	
Approach Delay (s)		48.6			64.5			62.0			50.0	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	57.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	132.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 AM W-O Proj IMP
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↗	↕↗		↗	↕↗	
Volume (vph)	229	246	30	7	247	89	75	593	24	51	146	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.91	
Flt Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583		1860	1583	1770	3518		1770	3219	
Flt Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1819	1583		1860	1583	1770	3518		1770	3219	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	236	254	31	7	255	92	77	611	25	53	151	230
RTOR Reduction (vph)	0	0	21	0	0	92	0	2	0	0	164	0
Lane Group Flow (vph)	0	490	10	0	262	0	77	634	0	53	217	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		38.9	38.9		22.9	0.0	8.9	28.3		7.5	26.9	
Effective Green, g (s)		38.9	38.9		22.9	0.0	8.9	28.3		7.5	26.9	
Actuated g/C Ratio		0.33	0.33		0.19	0.00	0.08	0.24		0.06	0.23	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		601	523		362	0	133	846		112	736	
v/s Ratio Prot		c0.27			c0.14		c0.04	c0.18		0.03	0.07	
v/s Ratio Perm			0.01									
v/c Ratio		0.82	0.02		0.72	0.00	0.58	0.75		0.47	0.30	
Uniform Delay, d1		36.1	26.5		44.4	58.8	52.5	41.4		53.1	37.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.4	0.0		7.0	0.0	6.0	3.5		3.1	0.1	
Delay (s)		44.4	26.5		51.4	58.8	58.5	44.9		56.3	37.6	
Level of Service		D	C		D	E	E	D		E	D	
Approach Delay (s)		43.4			53.3			46.3			39.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	117.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Pines Rd & 32nd Ave

2040 AM W-O Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	488	17	64	514	49	30	62	141	242	35	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1854		1770	1838		1770	1669		1770	1718	
Flt Permitted	0.13	1.00		0.17	1.00		0.70	1.00		0.25	1.00	
Satd. Flow (perm)	249	1854		312	1838		1305	1669		473	1718	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	45	588	20	77	619	59	36	75	170	292	42	45
RTOR Reduction (vph)	0	1	0	0	2	0	0	57	0	0	24	0
Lane Group Flow (vph)	45	607	0	77	676	0	36	188	0	292	63	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	51.6	46.0		55.0	47.7		23.4	19.2		42.1	33.4	
Effective Green, g (s)	51.6	46.0		55.0	47.7		23.4	19.2		42.1	33.4	
Actuated g/C Ratio	0.47	0.42		0.50	0.43		0.21	0.17		0.38	0.30	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	194	776		252	797		295	291		398	522	
v/s Ratio Prot	0.01	0.33		c0.02	c0.37		0.00	0.11		c0.12	0.04	
v/s Ratio Perm	0.10			0.13			0.02			c0.16		
v/c Ratio	0.23	0.78		0.31	0.85		0.12	0.65		0.73	0.12	
Uniform Delay, d1	20.5	27.6		18.7	27.9		34.7	42.2		26.2	27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	7.7		0.7	10.9		0.2	6.6		6.9	0.2	
Delay (s)	21.1	35.4		19.3	38.7		34.9	48.8		33.1	27.9	
Level of Service	C	D		B	D		C	D		C	C	
Approach Delay (s)		34.4			36.7			47.0			31.9	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	109.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
Description: Plan 2			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 14: Madison Rd & Thorpe Rd

2040 AM W-O Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	105	0	14	0	0	0	66	80	0	0	33	85
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.92	0.82	0.92	0.92	0.92	0.82	0.82	0.92	0.92	0.82	0.82
Hourly flow rate (vph)	128	0	17	0	0	0	80	98	0	0	40	104
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	351	351	92	368	402	98	144			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	351	351	92	368	402	98	144			98		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	100	98	100	100	100	94			100		
cM capacity (veh/h)	578	542	965	554	507	959	1439			1496		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	145	0	178	144								
Volume Left	128	0	80	0								
Volume Right	17	0	0	104								
cSH	607	1700	1439	1496								
Volume to Capacity	0.24	0.00	0.06	0.00								
Queue Length 95th (ft)	23	0	4	0								
Control Delay (s)	12.8	0.0	3.7	0.0								
Lane LOS	B	A	A									
Approach Delay (s)	12.8	0.0	3.7	0.0								
Approach LOS	B	A										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			27.9%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 15: Hwy 27 & 32nd Ave

2040 AM W-O Proj.
 6/12/2015





















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	298	93	74	283	84	171	397	152	28	120	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.97		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3413		1770	1799		1770	3392		1770	3307	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3413		1770	1799		1770	3392		1770	3307	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	187	343	107	85	325	97	197	456	175	32	138	107
RTOR Reduction (vph)	0	16	0	0	6	0	0	25	0	0	91	0
Lane Group Flow (vph)	187	434	0	85	416	0	197	606	0	32	154	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	17.1	40.8		8.9	32.6		17.7	28.7		4.5	15.5	
Effective Green, g (s)	17.1	40.8		8.9	32.6		17.7	28.7		4.5	15.5	
Actuated g/C Ratio	0.17	0.40		0.09	0.32		0.17	0.28		0.04	0.15	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.5		3.0	2.7	
Lane Grp Cap (vph)	294	1353		153	569		304	946		77	498	
v/s Ratio Prot	c0.11	0.13		0.05	c0.23		c0.11	c0.18		0.02	0.05	
v/s Ratio Perm												
v/c Ratio	0.64	0.32		0.56	0.73		0.65	0.64		0.42	0.31	
Uniform Delay, d1	40.0	21.5		45.1	31.2		39.7	32.6		47.9	38.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.1		4.3	4.8		4.7	1.3		3.6	0.3	
Delay (s)	44.5	21.6		49.4	36.1		44.4	33.9		51.5	39.2	
Level of Service	D	C		D	D		D	C		D	D	
Approach Delay (s)		28.3			38.3			36.4			40.7	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	102.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 16: 32nd Ave & Evergreen Rd

2040 AM W-O Proj.
 6/18/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	276	269	3	0	267	28	0	0	0	7	0	134
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	307	299	3	0	297	31	0	0	0	8	0	149
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	328			302			1375	1242	301	1224	1228	312
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	328			302			1375	1242	301	1224	1228	312
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	75			100			100	100	100	94	100	80
cM capacity (veh/h)	1232			1259			79	131	739	126	134	728
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	307	302	328	0	8	149						
Volume Left	307	0	0	0	8	0						
Volume Right	0	3	31	0	0	149						
cSH	1232	1700	1259	1700	126	728						
Volume to Capacity	0.25	0.18	0.00	0.00	0.06	0.20						
Queue Length 95th (ft)	25	0	0	0	5	19						
Control Delay (s)	8.9	0.0	0.0	0.0	35.5	11.2						
Lane LOS	A			A	E	B						
Approach Delay (s)	4.5		0.0	0.0	12.4							
Approach LOS				A	B							
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			49.3%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 17: Sullivan Rd & 32nd Ave

2040 AM W-O Proj.
 6/12/2015





















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	↑
Volume (veh/h)	264	5	18	97	29	201
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	334	6	23	123	37	254
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	205	37	291			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205	37	291			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	57	99	98			
cM capacity (veh/h)	769	1036	1271			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	341	146	37	254
Volume Left	334	23	0	0
Volume Right	6	0	0	254
cSH	773	1271	1700	1700
Volume to Capacity	0.44	0.02	0.02	0.15
Queue Length 95th (ft)	57	1	0	0
Control Delay (s)	13.3	1.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.3	1.4	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay		6.1	
Intersection Capacity Utilization		34.4%	ICU Level of Service A
Analysis Period (min)		15	























HCM Signalized Intersection Capacity Analysis
 1: University Rd & 32nd Ave

2040 PM W-O Proj.
 6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	459	21	79	223	75	16	70	74	108	109	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frt		0.99			0.97		1.00	0.92		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3515			3398		1770	3265		1770	3509	
Flt Permitted		0.95			0.77		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3351			2642		1770	3265		1770	3509	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	3	488	22	84	237	80	17	74	79	115	116	7
RTOR Reduction (vph)	0	3	0	0	21	0	0	62	0	0	5	0
Lane Group Flow (vph)	0	510	0	0	380	0	17	91	0	115	118	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		21.2			21.2		1.3	11.9		7.9	18.5	
Effective Green, g (s)		21.2			21.2		1.3	11.9		7.9	18.5	
Actuated g/C Ratio		0.39			0.39		0.02	0.22		0.14	0.34	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Grp Cap (vph)		1291			1018		41	706		254	1180	
v/s Ratio Prot							0.01	c0.03		c0.06	0.03	
v/s Ratio Perm		c0.15			0.14							
v/c Ratio		0.39			0.37		0.41	0.13		0.45	0.10	
Uniform Delay, d1		12.3			12.1		26.5	17.4		21.6	12.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.5		9.0	0.2		1.7	0.1	
Delay (s)		12.7			12.6		35.5	17.5		23.3	12.6	
Level of Service		B			B		D	B		C	B	
Approach Delay (s)		12.7			12.6			19.3			17.8	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			14.4			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.33									
Actuated Cycle Length (s)			55.0			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			50.4%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 2: Schafer Rd/University Rd & Dishman-Mica Rd

2040 PM W-O Proj.
 6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	406	193	29	143	25	108	88	9	43	135	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3460		1770	1838		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3460		1770	1838		1770	1863	1583
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	16	472	224	34	166	29	126	102	10	50	157	9
RTOR Reduction (vph)	0	0	134	0	9	0	0	3	0	0	0	7
Lane Group Flow (vph)	16	472	90	34	186	0	126	109	0	50	157	2
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		7	4		3		
Permitted Phases			6								8	8
Actuated Green, G (s)	1.4	28.1	28.1	4.6	31.3		9.5	17.3		5.1	12.9	12.9
Effective Green, g (s)	1.4	28.1	28.1	4.6	31.3		9.5	17.3		5.1	12.9	12.9
Actuated g/C Ratio	0.02	0.37	0.37	0.06	0.42		0.13	0.23		0.07	0.17	0.17
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	32	697	592	108	1442		223	423		120	320	271
v/s Ratio Prot	0.01	c0.25		c0.02	c0.05		c0.07	0.06		0.03		
v/s Ratio Perm			0.06								c0.08	0.00
v/c Ratio	0.50	0.68	0.15	0.31	0.13		0.57	0.26		0.42	0.49	0.01
Uniform Delay, d1	36.5	19.7	15.6	33.7	13.5		30.9	23.6		33.6	28.1	25.8
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	15.8	2.9	0.2	2.3	0.1		3.9	0.4		3.2	1.6	0.0
Delay (s)	52.3	22.6	15.8	36.0	13.6		34.8	24.1		36.7	29.7	25.8
Level of Service	D	C	B	D	B		C	C		D	C	C
Approach Delay (s)		21.1			16.9			29.8			31.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			23.4	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			75.1	Sum of lost time (s)				20.0				
Intersection Capacity Utilization			50.5%	ICU Level of Service				A				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 3: Bowdish Rd & 32nd Ave

2040 PM W-O Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	415	64	114	309	51	42	116	87	49	135	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.95			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1826		1770	1823			1758			1801	
Flt Permitted	0.54	1.00		0.26	1.00			0.92			0.86	
Satd. Flow (perm)	1000	1826		484	1823			1622			1570	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	40	437	67	120	325	54	44	122	92	52	142	39
RTOR Reduction (vph)	0	6	0	0	6	0	0	26	0	0	10	0
Lane Group Flow (vph)	40	498	0	120	373	0	0	232	0	0	223	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	25.9	23.6		34.0	27.7			14.6			14.6	
Effective Green, g (s)	25.9	23.6		34.0	27.7			14.6			14.6	
Actuated g/C Ratio	0.44	0.40		0.58	0.47			0.25			0.25	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	472	735		421	861			404			391	
v/s Ratio Prot	0.00	c0.27		c0.03	0.20							
v/s Ratio Perm	0.03			0.13				c0.14			0.14	
v/c Ratio	0.08	0.68		0.29	0.43			0.57			0.57	
Uniform Delay, d1	9.3	14.4		7.1	10.2			19.3			19.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	2.7		0.4	0.5			2.4			2.4	
Delay (s)	9.4	17.1		7.5	10.7			21.6			21.7	
Level of Service	A	B		A	B			C			C	
Approach Delay (s)		16.5			9.9			21.6			21.7	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Bowdish Rd & Dishman-Mica Rd

2040 PM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	305	139	28	137	29	51	109	24	18	135	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.95		1.00	0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)	1770	1775		1770	1813			1805			1852	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.86			0.94	1.00
Satd. Flow (perm)	1770	1775		1770	1813			1578			1760	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	332	151	30	149	32	55	118	26	20	147	9
RTOR Reduction (vph)	0	17	0	0	9	0	0	6	0	0	0	7
Lane Group Flow (vph)	14	466	0	30	172	0	0	193	0	0	167	2
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4			4	
Permitted Phases							4			4		4
Actuated Green, G (s)	1.2	21.3		2.6	22.7			12.7			12.7	12.7
Effective Green, g (s)	1.2	21.3		2.6	22.7			12.7			12.7	12.7
Actuated g/C Ratio	0.02	0.42		0.05	0.44			0.25			0.25	0.25
Clearance Time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Grp Cap (vph)	41	739		90	805			392			437	393
v/s Ratio Prot	0.01	c0.26		c0.02	0.09							
v/s Ratio Perm								c0.12			0.09	0.00
v/c Ratio	0.34	0.63		0.33	0.21			0.49			0.38	0.01
Uniform Delay, d1	24.6	11.8		23.4	8.7			16.4			15.9	14.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	6.7	1.9		3.0	0.2			1.3			0.8	0.0
Delay (s)	31.2	13.7		26.4	8.9			17.8			16.7	14.5
Level of Service	C	B		C	A			B			B	B
Approach Delay (s)		14.2			11.4			17.8			16.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	14.5
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 6: Dishman-Mica Rd & Thorpe Rd

2040 PM W-O Proj.
 6/12/2015



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		B			B
Volume (veh/h)	13	58	125	12	104	263
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	15	67	145	14	121	306
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	700	152			159	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	700	152			159	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	92			91	
cM capacity (veh/h)	371	894			1420	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	83	159	427
Volume Left	15	0	121
Volume Right	67	14	0
cSH	710	1700	1420
Volume to Capacity	0.12	0.09	0.09
Queue Length 95th (ft)	10	0	7
Control Delay (s)	10.7	0.0	2.8
Lane LOS	B		A
Approach Delay (s)	10.7	0.0	2.8
Approach LOS	B		

Intersection Summary			
Average Delay		3.1	
Intersection Capacity Utilization		41.2%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 PM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗			↖			↕			↕	
Volume (veh/h)	0	364	39	58	222	0	24	0	143	0	326	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	387	41	62	236	0	26	0	152	0	347	113
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					129							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	236			429			1054	768	408	920	788	236
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	63			429			993	667	408	840	691	63
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			0	100	76	100	0	87
cM capacity (veh/h)	1354			1131			0	316	643	183	306	881
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	429	298	178	460								
Volume Left	0	62	26	0								
Volume Right	41	0	152	113								
cSH	1700	1131	0	364								
Volume to Capacity	0.25	0.05	Err	1.26								
Queue Length 95th (ft)	0	4	Err	509								
Control Delay (s)	0.0	2.2	Err	169.1								
Lane LOS		A	F	F								
Approach Delay (s)	0.0	2.2	Err	169.1								
Approach LOS			F	F								
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			78.4%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 PM W-O Proj IMP
6/12/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖		↗
Volume (veh/h)	364	39	384	328	24	143
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	387	41	409	349	26	152
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	129					
pX, platoon unblocked	0.88					
vC, conflicting volume	429			1574	408	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	429			1584	408	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	64			62	76	
cM capacity (veh/h)	1131			67	643	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	429	757	178			
Volume Left	0	409	26			
Volume Right	41	0	152			
cSH	1700	1131	288			
Volume to Capacity	0.25	0.36	0.62			
Queue Length 95th (ft)	0	42	95			
Control Delay (s)	0.0	7.5	35.8			
Lane LOS	A		E			
Approach Delay (s)	0.0	7.5	35.8			
Approach LOS	E					
Intersection Summary						
Average Delay	8.8					
Intersection Capacity Utilization	80.2%			ICU Level of Service	D	
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 PM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Volume (vph)	162	335	88	12	223	5	34	308	9	108	460	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Fit Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583		1858	1583	1770	3525		1770	3538	
Fit Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583		1858	1583	1770	3525		1770	3538	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	167	345	91	12	230	5	35	318	9	111	474	1
RTOR Reduction (vph)	0	0	53	0	0	5	0	2	0	0	0	0
Lane Group Flow (vph)	0	512	38	0	242	0	35	325	0	111	475	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		39.1	39.1		20.9	0.0	4.9	18.8		13.2	27.1	
Effective Green, g (s)		39.1	39.1		20.9	0.0	4.9	18.8		13.2	27.1	
Actuated g/C Ratio		0.35	0.35		0.19	0.00	0.04	0.17		0.12	0.24	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		639	552		346	0	77	591		208	856	
v/s Ratio Prot		c0.28			c0.13		0.02	0.09		c0.06	c0.13	
v/s Ratio Perm			0.02									
v/c Ratio		0.80	0.07		0.70	0.00	0.45	0.55		0.53	0.55	
Uniform Delay, d1		32.9	24.3		42.6	56.0	52.2	42.7		46.5	37.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.2	0.1		6.1	0.0	4.2	0.9		2.6	0.4	
Delay (s)		40.1	24.4		48.7	56.0	56.5	43.6		49.1	37.6	
Level of Service		D	C		D	E	E	D		D	D	
Approach Delay (s)		37.7			48.8			44.9			39.8	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 PM W-O Proj IMP
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↕		↖	↕	
Volume (vph)	162	335	88	12	223	5	34	308	9	108	460	433
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.93	
Fl _t Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583		1858	1583	1770	3525		1770	3282	
Fl _t Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583		1858	1583	1770	3525		1770	3282	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	167	345	91	12	230	5	35	318	9	111	474	446
RTOR Reduction (vph)	0	0	54	0	0	5	0	2	0	0	96	0
Lane Group Flow (vph)	0	512	37	0	242	0	35	325	0	111	824	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		40.2	40.2		21.4	0.0	4.9	22.8		13.4	31.3	
Effective Green, g (s)		40.2	40.2		21.4	0.0	4.9	22.8		13.4	31.3	
Actuated g/C Ratio		0.34	0.34		0.18	0.00	0.04	0.19		0.11	0.27	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		625	540		337	0	73	682		201	872	
v/s Ratio Prot		c0.28			c0.13		0.02	0.09		c0.06	c0.25	
v/s Ratio Perm			0.02									
v/c Ratio		0.82	0.07		0.72	0.00	0.48	0.48		0.55	0.94	
Uniform Delay, d ₁		35.5	26.2		45.4	58.9	55.2	42.2		49.4	42.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d ₂		8.2	0.1		7.1	0.0	4.9	0.4		3.3	18.2	
Delay (s)		43.7	26.2		52.5	58.9	60.1	42.6		52.6	60.6	
Level of Service		D	C		D	E	E	D		D	E	
Approach Delay (s)		41.1			52.6			44.3			59.7	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Pines Rd & 32nd Ave

2040 PM W-O Proj.
 6/12/2015



















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	448	29	95	408	22	54	46	85	47	88	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1846		1770	1849		1770	1682		1770	1749	
Flt Permitted	0.34	1.00		0.26	1.00		0.52	1.00		0.66	1.00	
Satd. Flow (perm)	635	1846		484	1849		965	1682		1238	1749	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	63	498	32	106	453	24	60	51	94	52	98	67
RTOR Reduction (vph)	0	2	0	0	1	0	0	60	0	0	23	0
Lane Group Flow (vph)	63	528	0	106	476	0	60	85	0	52	142	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	37.4	32.0		39.4	33.0		21.0	15.0		17.6	13.3	
Effective Green, g (s)	37.4	32.0		39.4	33.0		21.0	15.0		17.6	13.3	
Actuated g/C Ratio	0.49	0.42		0.51	0.43		0.27	0.20		0.23	0.17	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	389	770		355	795		327	328		313	303	
v/s Ratio Prot	0.01	c0.29		c0.02	0.26		c0.01	0.05		0.01	c0.08	
v/s Ratio Perm	0.07			0.13			0.04			0.03		
v/c Ratio	0.16	0.69		0.30	0.60		0.18	0.26		0.17	0.47	
Uniform Delay, d1	11.1	18.2		11.2	16.8		21.0	26.1		23.5	28.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	4.9		0.5	3.3		0.3	0.6		0.3	1.6	
Delay (s)	11.3	23.2		11.7	20.1		21.3	26.7		23.7	30.1	
Level of Service	B	C		B	C		C	C		C	C	
Approach Delay (s)		21.9			18.6			25.1			28.6	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	76.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
Description: Plan 1			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 14: Madison Rd & Thorpe Rd

2040 PM W-O Proj.
 6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	0	64	0	0	0	33	43	0	0	96	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.92	0.86	0.92	0.92	0.92	0.86	0.86	0.92	0.92	0.86	0.86
Hourly flow rate (vph)	58	0	74	0	0	0	38	50	0	0	112	52
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	265	265	138	339	291	50	164			50		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	265	265	138	339	291	50	164			50		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	92	100	100	100	97			100		
cM capacity (veh/h)	674	623	911	553	603	1018	1414			1557		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	133	0	88	164								
Volume Left	58	0	38	0								
Volume Right	74	0	0	52								
cSH	789	1700	1414	1557								
Volume to Capacity	0.17	0.00	0.03	0.00								
Queue Length 95th (ft)	15	0	2	0								
Control Delay (s)	10.5	0.0	3.4	0.0								
Lane LOS	B	A	A									
Approach Delay (s)	10.5	0.0	3.4	0.0								
Approach LOS	B	A										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			28.6%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
15: Hwy 27 & 32nd Ave

2040 PM W-O Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Volume (vph)	58	401	248	238	386	39	174	216	162	72	309	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.99		1.00	0.94		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3336		1770	1837		1770	3312		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3336		1770	1837		1770	3312		1770	3439	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	62	427	264	253	411	41	185	230	172	77	329	77
RTOR Reduction (vph)	0	61	0	0	2	0	0	86	0	0	15	0
Lane Group Flow (vph)	62	630	0	253	450	0	185	316	0	77	391	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.9	29.0		21.9	43.0		17.4	28.5		8.7	19.8	
Effective Green, g (s)	7.9	29.0		21.9	43.0		17.4	28.5		8.7	19.8	
Actuated g/C Ratio	0.07	0.27		0.20	0.40		0.16	0.26		0.08	0.18	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.5		3.0	2.7	
Lane Grp Cap (vph)	129	894		358	730		284	873		142	629	
v/s Ratio Prot	0.04	c0.19		c0.14	0.25		c0.10	0.10		0.04	c0.11	
v/s Ratio Perm												
v/c Ratio	0.48	0.70		0.71	0.62		0.65	0.36		0.54	0.62	
Uniform Delay, d1	48.1	35.7		40.1	26.0		42.5	32.4		47.8	40.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	2.5		6.2	1.6		5.3	0.2		4.2	1.8	
Delay (s)	50.9	38.2		46.4	27.5		47.8	32.6		52.0	42.5	
Level of Service	D	D		D	C		D	C		D	D	
Approach Delay (s)		39.3			34.3			37.4			44.0	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	108.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 16: 32nd Ave & Evergreen Rd

2040 PM W-O Proj.
 6/18/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘			↔			↔		↗	↘	
Volume (veh/h)	213	401	7	0	434	5	0	1	0	14	1	291
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	248	466	8	0	505	6	0	1	0	16	1	338
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		1052										
pX, platoon unblocked				0.87			0.87	0.87	0.87	0.87	0.87	
vC, conflicting volume	510			474			1812	1476	470	1470	1477	508
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	510			317			1860	1473	313	1465	1474	508
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			100			100	99	100	78	99	40
cM capacity (veh/h)	1055			1078			16	84	631	75	84	565

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2
Volume Total	248	474	510	1	16	340
Volume Left	248	0	0	0	16	0
Volume Right	0	8	6	0	0	338
cSH	1055	1700	1078	84	75	554
Volume to Capacity	0.23	0.28	0.00	0.01	0.22	0.61
Queue Length 95th (ft)	23	0	0	1	19	103
Control Delay (s)	9.5	0.0	0.0	48.4	66.2	21.2
Lane LOS	A			E	F	C
Approach Delay (s)	3.2		0.0	48.4	23.3	
Approach LOS				E	C	

Intersection Summary		
Average Delay		6.7
Intersection Capacity Utilization	72.7%	ICU Level of Service C
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis
 17: Sullivan Rd & 32nd Ave

2040 PM W-O Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	↑
Volume (veh/h)	344	13	20	97	160	359
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	362	14	21	102	168	378
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	313	168	546			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	313	168	546			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	46	98	98			
cM capacity (veh/h)	666	876	1023			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	376	123	168	378
Volume Left	362	21	0	0
Volume Right	14	0	0	378
cSH	672	1023	1700	1700
Volume to Capacity	0.56	0.02	0.10	0.22
Queue Length 95th (ft)	87	2	0	0
Control Delay (s)	16.9	1.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.9	1.6	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay		6.3	
Intersection Capacity Utilization		44.5%	ICU Level of Service A
Analysis Period (min)		15	

**LEVEL OF SERVICE
CALCULATIONS
YEAR 2040
WITH PROJECT**

HCM Signalized Intersection Capacity Analysis
 1: University Rd & 32nd Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↕	↕↕		↕	↕↕	
Volume (vph)	3	158	7	34	544	154	26	101	76	93	39	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frt		0.99			0.97		1.00	0.94		1.00	0.98	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3514			3420		1770	3312		1770	3478	
Flt Permitted		0.94			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3310			3197		1770	3312		1770	3478	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	4	186	8	40	640	181	31	119	89	109	46	6
RTOR Reduction (vph)	0	3	0	0	21	0	0	72	0	0	4	0
Lane Group Flow (vph)	0	195	0	0	840	0	31	136	0	109	48	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		26.6			26.6		3.0	11.6		8.0	16.6	
Effective Green, g (s)		26.6			26.6		3.0	11.6		8.0	16.6	
Actuated g/C Ratio		0.44			0.44		0.05	0.19		0.13	0.28	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Grp Cap (vph)		1462			1412		88	638		235	959	
v/s Ratio Prot							0.02	c0.04		c0.06	0.01	
v/s Ratio Perm		0.06			c0.26							
v/c Ratio		0.13			0.60		0.35	0.21		0.46	0.05	
Uniform Delay, d1		10.0			12.7		27.7	20.5		24.1	16.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.0		3.3	0.4		2.0	0.0	
Delay (s)		10.1			13.7		31.0	20.8		26.1	16.1	
Level of Service		B			B		C	C		C	B	
Approach Delay (s)		10.1			13.7			22.1			22.8	
Approach LOS		B			B			C			C	

Intersection Summary

HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 2: Schafer Rd/University Rd & Dishman-Mica Rd

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗↘		↖	↗		↖	↗	↘
Volume (vph)	8	133	45	14	573	44	269	117	41	20	47	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Fr _t	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	1.00	0.85
Fl _t Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3501		1770	1791		1770	1863	1583
Fl _t Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3501		1770	1791		1770	1863	1583
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	9	156	53	16	674	52	316	138	48	24	55	31
RTOR Reduction (vph)	0	0	36	0	4	0	0	9	0	0	0	28
Lane Group Flow (vph)	9	156	17	16	722	0	316	177	0	24	55	3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		7	4		3		
Permitted Phases			6								8	8
Actuated Green, G (s)	1.3	23.2	23.2	1.4	23.3		20.7	25.5		3.0	7.8	7.8
Effective Green, g (s)	1.3	23.2	23.2	1.4	23.3		20.7	25.5		3.0	7.8	7.8
Actuated g/C Ratio	0.02	0.32	0.32	0.02	0.32		0.28	0.35		0.04	0.11	0.11
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	31	591	502	33	1115		501	624		72	198	168
v/s Ratio Prot	0.01	0.08		c0.01	c0.21		c0.18	c0.10		0.01		
v/s Ratio Perm			0.01								0.03	0.00
v/c Ratio	0.29	0.26	0.03	0.48	0.65		0.63	0.28		0.33	0.28	0.02
Uniform Delay, d ₁	35.4	18.6	17.2	35.5	21.4		22.9	17.2		34.1	30.1	29.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d ₂	7.0	0.3	0.0	14.5	1.5		2.9	0.3		3.7	1.0	0.1
Delay (s)	42.4	18.9	17.3	50.0	22.8		25.8	17.5		37.8	31.1	29.3
Level of Service	D	B	B	D	C		C	B		D	C	C
Approach Delay (s)		19.5			23.4			22.7			32.0	
Approach LOS		B			C			C			C	

Intersection Summary		
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.60	
Actuated Cycle Length (s)	73.1	Sum of lost time (s) 20.0
Intersection Capacity Utilization	48.8%	ICU Level of Service A
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 3: Bowdish Rd & 32nd Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	284	13	66	459	39	121	165	129	62	38	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1770	1850		1770	1841			1759			1779	
Flt Permitted	0.16	1.00		0.45	1.00			0.87			0.64	
Satd. Flow (perm)	301	1850		845	1841			1548			1175	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	109	323	15	75	522	44	138	188	147	70	43	19
RTOR Reduction (vph)	0	2	0	0	3	0	0	19	0	0	7	0
Lane Group Flow (vph)	109	336	0	75	563	0	0	454	0	0	125	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	31.0	24.8		29.8	24.2			24.1			24.1	
Effective Green, g (s)	31.0	24.8		29.8	24.2			24.1			24.1	
Actuated g/C Ratio	0.45	0.36		0.44	0.35			0.35			0.35	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	269	669		443	650			544			413	
v/s Ratio Prot	c0.04	0.18		0.01	c0.31							
v/s Ratio Perm	0.15			0.06				c0.29			0.11	
v/c Ratio	0.41	0.50		0.17	0.87			0.83			0.30	
Uniform Delay, d1	13.1	17.0		11.6	20.6			20.4			16.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.0	0.8		0.2	12.0			11.1			0.6	
Delay (s)	14.1	17.9		11.8	32.6			31.5			16.7	
Level of Service	B	B		B	C			C			B	
Approach Delay (s)		16.9			30.2			31.5			16.7	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Bowdish Rd & Dishman-Mica Rd

2040 AM W- Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	140	34	66	422	52	126	162	66	40	71	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Fr _t	1.00	0.97		1.00	0.98			0.97			1.00	0.85
Fl _t Protected	0.95	1.00		0.95	1.00			0.98			0.98	1.00
Satd. Flow (prot)	1770	1808		1770	1832			1784			1830	1583
Fl _t Permitted	0.95	1.00		0.95	1.00			0.83			0.79	1.00
Satd. Flow (perm)	1770	1808		1770	1832			1507			1477	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	9	161	39	76	485	60	145	186	76	46	82	13
RTOR Reduction (vph)	0	11	0	0	6	0	0	9	0	0	0	9
Lane Group Flow (vph)	9	189	0	76	539	0	0	398	0	0	128	4
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4			4	
Permitted Phases							4			4		4
Actuated Green, G (s)	1.2	16.6		5.3	20.7			16.4			16.4	16.4
Effective Green, g (s)	1.2	16.6		5.3	20.7			16.4			16.4	16.4
Actuated g/C Ratio	0.02	0.31		0.10	0.39			0.31			0.31	0.31
Clearance Time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Grp Cap (vph)	40	568		177	718			468			458	491
v/s Ratio Prot	0.01	0.10		c0.04	c0.29							
v/s Ratio Perm								c0.26			0.09	0.00
v/c Ratio	0.23	0.33		0.43	0.75			0.85			0.28	0.01
Uniform Delay, d ₁	25.3	13.9		22.3	13.8			17.1			13.7	12.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d ₂	3.9	0.5		2.3	4.7			14.3			0.5	0.0
Delay (s)	29.2	14.3		24.6	18.5			31.3			14.2	12.6
Level of Service	C	B		C	B			C			B	B
Approach Delay (s)		15.0			19.3			31.3			14.0	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	14.5
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 5: Dishman-Mica Rd & Sundown Drive

2040 AM W- Proj.
 6/12/2015



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			Y
Volume (veh/h)	8	132	395	2	37	202
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	143	429	2	40	220
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						1112
pX, platoon unblocked						
vC, conflicting volume	730	430			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	430			432	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	77			96	
cM capacity (veh/h)	375	625			1128	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	152	432	260
Volume Left	9	0	40
Volume Right	143	2	0
cSH	602	1700	1128
Volume to Capacity	0.25	0.25	0.04
Queue Length 95th (ft)	25	0	3
Control Delay (s)	13.0	0.0	1.6
Lane LOS	B		A
Approach Delay (s)	13.0	0.0	1.6
Approach LOS	B		

Intersection Summary			
Average Delay		2.8	
Intersection Capacity Utilization		52.2%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 6: Dishman-Mica Rd & Thorpe Rd

2040 AM W- Proj.
 6/12/2015



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			R
Volume (veh/h)	13	138	236	21	88	113
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	15	160	274	24	102	131
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	623	287			299	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	623	287			299	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	79			92	
cM capacity (veh/h)	414	752			1262	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	176	299	234
Volume Left	15	0	102
Volume Right	160	24	0
cSH	703	1700	1262
Volume to Capacity	0.25	0.18	0.08
Queue Length 95th (ft)	25	0	7
Control Delay (s)	11.8	0.0	3.9
Lane LOS	B		A
Approach Delay (s)	11.8	0.0	3.9
Approach LOS	B		

Intersection Summary			
Average Delay		4.2	
Intersection Capacity Utilization		43.8%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 AM W- Proj.
6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	297	55	65	269	0	36	0	289	0	186	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	338	62	74	306	0	41	0	328	0	211	47
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					129							
pX, platoon unblocked	0.85						0.85	0.85		0.85	0.85	0.85
vC, conflicting volume	306			400			974	822	369	1151	853	306
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			400			878	698	369	1087	735	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			46	100	51	100	23	94
cM capacity (veh/h)	1275			1159			75	288	677	80	275	821
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	400	380	369	258								
Volume Left	0	74	41	0								
Volume Right	62	0	328	47								
cSH	1700	1159	359	312								
Volume to Capacity	0.24	0.06	1.03	0.83								
Queue Length 95th (ft)	0	5	311	176								
Control Delay (s)	0.0	2.1	90.1	53.8								
Lane LOS		A	F	F								
Approach Delay (s)	0.0	2.1	90.1	53.8								
Approach LOS			F	F								
Intersection Summary												
Average Delay			34.1									
Intersection Capacity Utilization			82.2%	ICU Level of Service	E							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 AM W- Proj. IMP
6/12/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Volume (veh/h)	297	55	251	310	36	289
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	316	59	267	330	38	307
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				129		
pX, platoon unblocked					0.87	
vC, conflicting volume			374		1209	345
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			374		1165	345
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			77		73	56
cM capacity (veh/h)			1184		144	698

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	374	597	346
Volume Left	0	267	38
Volume Right	59	0	307
cSH	1700	1184	490
Volume to Capacity	0.22	0.23	0.71
Queue Length 95th (ft)	0	22	138
Control Delay (s)	0.0	5.4	28.1
Lane LOS		A	D
Approach Delay (s)	0.0	5.4	28.1
Approach LOS			D

Intersection Summary			
Average Delay		9.8	
Intersection Capacity Utilization		79.0%	ICU Level of Service D
Analysis Period (min)		15	

Intersection			
Intersection Delay, s/veh	10.1		
Intersection LOS	B		
Approach	EB	NB	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	375	345	597
Demand Flow Rate, veh/h	382	352	609
Vehicles Circulating, veh/h	272	322	39
Vehicles Exiting, veh/h	376	332	635
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	9.8	10.0	10.4
Approach LOS	A	A	B
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	382	352	609
Cap Entry Lane, veh/h	861	819	1087
Entry HV Adj Factor	0.982	0.980	0.980
Flow Entry, veh/h	375	345	597
Cap Entry, veh/h	845	803	1065
V/C Ratio	0.444	0.430	0.560
Control Delay, s/veh	9.8	10.0	10.4
LOS	A	A	B
95th %tile Queue, veh	2	2	4

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 AM W- Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↗	↕↗		↕	↕↗	
Volume (vph)	242	256	30	7	248	89	75	609	24	51	148	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	
Fl _t Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583		1860	1583	1770	3519		1770	3536	
Fl _t Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1819	1583		1860	1583	1770	3519		1770	3536	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	285	301	35	8	292	105	88	716	28	60	174	1
RTOR Reduction (vph)	0	0	22	0	0	105	0	2	0	0	0	0
Lane Group Flow (vph)	0	586	13	0	300	0	88	742	0	60	175	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		50.4	50.4		26.3	0.0	12.1	30.2		8.5	26.6	
Effective Green, g (s)		50.4	50.4		26.3	0.0	12.1	30.2		8.5	26.6	
Actuated g/C Ratio		0.37	0.37		0.19	0.00	0.09	0.22		0.06	0.20	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		677	589		361	0	158	784		111	694	
v/s Ratio Prot		c0.32			c0.16		c0.05	c0.21		0.03	0.05	
v/s Ratio Perm			0.01									
v/c Ratio		0.87	0.02		0.83	0.00	0.56	0.95		0.54	0.25	
Uniform Delay, d ₁		39.4	26.9		52.4	67.7	59.1	51.8		61.6	46.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d ₂		11.2	0.0		14.9	0.0	4.2	20.1		5.3	0.1	
Delay (s)		50.6	26.9		67.3	67.7	63.3	71.9		66.8	46.1	
Level of Service		D	C		E	E	E	E		E	D	
Approach Delay (s)		49.2			67.4			71.0			51.4	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	61.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	135.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 AM W- Proj. IMP
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↖	↕↗		↖	↕↗	
Volume (vph)	242	256	30	7	248	89	75	609	24	51	148	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.91	
Flt Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1819	1583		1860	1583	1770	3519		1770	3218	
Flt Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1819	1583		1860	1583	1770	3519		1770	3218	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	249	264	31	7	256	92	77	628	25	53	153	235
RTOR Reduction (vph)	0	0	20	0	0	92	0	2	0	0	167	0
Lane Group Flow (vph)	0	513	11	0	263	0	77	651	0	53	221	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		41.3	41.3		23.1	0.0	9.0	29.5		7.6	28.1	
Effective Green, g (s)		41.3	41.3		23.1	0.0	9.0	29.5		7.6	28.1	
Actuated g/C Ratio		0.34	0.34		0.19	0.00	0.07	0.24		0.06	0.23	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		618	538		353	0	131	854		110	744	
v/s Ratio Prot		c0.28			c0.14		c0.04	c0.19		0.03	0.07	
v/s Ratio Perm			0.01									
v/c Ratio		0.83	0.02		0.75	0.00	0.59	0.76		0.48	0.30	
Uniform Delay, d1		36.9	26.6		46.4	60.8	54.5	42.7		55.0	38.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.2	0.0		8.3	0.0	6.6	3.9		3.3	0.1	
Delay (s)		46.1	26.7		54.7	60.8	61.0	46.6		58.3	38.6	
Level of Service		D	C		D	E	E	D		E	D	
Approach Delay (s)		45.0			56.3			48.2			41.0	
Approach LOS		D			E			D			D	

Intersection Summary		
HCM 2000 Control Delay	47.2	HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio	0.78	
Actuated Cycle Length (s)	121.5	Sum of lost time (s) 20.0
Intersection Capacity Utilization	78.7%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

Intersection									
Intersection Delay, s/veh	12.5								
Intersection LOS	B								
Approach	WB		NB		SB		NE		
Entry Lanes	2		2		2		2		
Conflicting Circle Lanes	2		2		2		2		
Adj Approach Flow, veh/h	405		832		502		621		
Demand Flow Rate, veh/h	413		849		511		634		
Vehicles Circulating, veh/h	1111		659		396		246		
Vehicles Exiting, veh/h	397		221		1128		661		
Follow-Up Headway, s	3.186		3.186		3.186		3.186		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	19.0		16.1		7.7		7.5		
Approach LOS	C		C		A		A		
Lane	Left	Right	Left	Right	Left	Right	Left	Right	
Designated Moves	L	TR	LT	TR	LT	TR	LTR	R	
Assumed Moves	L	TR	LT	TR	LT	R	LTR	R	
RT Channelized									
Lane Util	0.741	0.259	0.470	0.530	0.466	0.534	0.470	0.530	
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113	
Entry Flow, veh/h	306	107	399	450	238	273	298	336	
Cap Entry Lane, veh/h	491	519	689	712	840	856	940	951	
Entry HV Adj Factor	0.980	0.981	0.980	0.980	0.981	0.982	0.979	0.980	
Flow Entry, veh/h	300	105	391	441	234	268	292	329	
Cap Entry, veh/h	481	509	675	698	824	841	920	932	
V/C Ratio	0.623	0.206	0.579	0.632	0.283	0.319	0.317	0.353	
Control Delay, s/veh	22.2	9.9	15.3	16.7	7.5	7.9	7.3	7.7	
LOS	C	A	C	C	A	A	A	A	
95th %tile Queue, veh	4	1	4	5	1	1	1	2	

HCM Signalized Intersection Capacity Analysis
 9: Pines Rd & 32nd Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	37	494	22	81	517	49	43	88	197	242	42	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.90		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1851		1770	1839		1770	1670		1770	1732	
Flt Permitted	0.10	1.00		0.09	1.00		0.69	1.00		0.17	1.00	
Satd. Flow (perm)	193	1851		167	1839		1294	1670		310	1732	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	45	595	27	98	623	59	52	106	237	292	51	45
RTOR Reduction (vph)	0	1	0	0	2	0	0	53	0	0	19	0
Lane Group Flow (vph)	45	621	0	98	680	0	52	290	0	292	77	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	52.3	46.4		61.5	51.1		33.4	27.2		52.1	41.4	
Effective Green, g (s)	52.3	46.4		61.5	51.1		33.4	27.2		52.1	41.4	
Actuated g/C Ratio	0.42	0.38		0.50	0.41		0.27	0.22		0.42	0.33	
Clearance Time (s)	4.5	5.0		4.5	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)	156	694		220	760		373	367		371	580	
v/s Ratio Prot	0.01	0.34		c0.04	c0.37		0.01	0.17		c0.13	0.04	
v/s Ratio Perm	0.11			0.18			0.03			c0.20		
v/c Ratio	0.29	0.89		0.45	0.89		0.14	0.79		0.79	0.13	
Uniform Delay, d1	26.2	36.3		24.0	33.7		33.9	45.5		27.5	28.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	16.4		1.4	15.2		0.2	12.5		10.5	0.2	
Delay (s)	27.3	52.6		25.4	48.9		34.1	58.1		38.1	28.8	
Level of Service	C	D		C	D		C	E		D	C	
Approach Delay (s)		50.9			46.0			54.9			35.8	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	123.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		
Description: Plan 2			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 10: Madison Rd & Painted Hills Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↓	
Volume (veh/h)	19	0	0	261	143	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	0	0	284	155	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	441	158	155			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441	158	155			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	573	888	1425			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	21	284	160			
Volume Left	21	0	0			
Volume Right	0	0	4			
cSH	573	1425	1700			
Volume to Capacity	0.04	0.00	0.09			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	11.5	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.5	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			23.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Madison Rd & 41st Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Volume (veh/h)	29	3	1	232	133	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	3	1	252	145	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	404	150	145			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404	150	145			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	602	896	1438			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	35	253	155
Volume Left	32	1	0
Volume Right	3	0	11
cSH	621	1438	1700
Volume to Capacity	0.06	0.00	0.09
Queue Length 95th (ft)	4	0	0
Control Delay (s)	11.1	0.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		23.0%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 12: Madison Rd & 43rd Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑	↓	
Volume (veh/h)	34	3	1	199	130	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	3	1	216	141	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	365	147	141			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	365	147	141			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	100			
cM capacity (veh/h)	634	900	1442			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	40	217	152
Volume Left	37	1	0
Volume Right	3	0	11
cSH	649	1442	1700
Volume to Capacity	0.06	0.00	0.09
Queue Length 95th (ft)	5	0	0
Control Delay (s)	10.9	0.0	0.0
Lane LOS	B	A	
Approach Delay (s)	10.9	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization		21.3%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Madison Rd & 44th Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Volume (veh/h)	12	12	4	188	125	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	13	4	204	136	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	351	138	136			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	351	138	136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	100			
cM capacity (veh/h)	644	910	1448			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	26	209	140
Volume Left	13	4	0
Volume Right	13	0	4
cSH	755	1448	1700
Volume to Capacity	0.03	0.00	0.08
Queue Length 95th (ft)	3	0	0
Control Delay (s)	9.9	0.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		23.1%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 14: Madison Rd & Thorpe Rd

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	112	0	14	0	0	0	66	80	0	0	33	104
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.92	0.82	0.92	0.92	0.92	0.82	0.82	0.92	0.92	0.82	0.82
Hourly flow rate (vph)	137	0	17	0	0	0	80	98	0	0	40	127
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	362	362	104	379	426	98	167			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	362	362	104	379	426	98	167			98		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	100	98	100	100	100	94			100		
cM capacity (veh/h)	568	533	951	543	491	959	1411			1496		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	154	0	178	167
Volume Left	137	0	80	0
Volume Right	17	0	0	127
cSH	594	1700	1411	1496
Volume to Capacity	0.26	0.00	0.06	0.00
Queue Length 95th (ft)	26	0	5	0
Control Delay (s)	13.2	0.0	3.7	0.0
Lane LOS	B	A	A	
Approach Delay (s)	13.2	0.0	3.7	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay		5.4	
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
15: Hwy 27 & 32nd Ave

2040 AM W- Proj.
6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↕↕		↵	↕		↵	↕↕		↵	↕↕	
Volume (vph)	179	336	99	74	298	84	174	397	152	28	120	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.97		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3418		1770	1801		1770	3392		1770	3305	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3418		1770	1801		1770	3392		1770	3305	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	206	386	114	85	343	97	200	456	175	32	138	109
RTOR Reduction (vph)	0	14	0	0	6	0	0	26	0	0	93	0
Lane Group Flow (vph)	206	486	0	85	434	0	200	605	0	32	154	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.3	44.2		9.1	35.0		18.1	28.9		4.6	15.4	
Effective Green, g (s)	18.3	44.2		9.1	35.0		18.1	28.9		4.6	15.4	
Actuated g/C Ratio	0.17	0.41		0.09	0.33		0.17	0.27		0.04	0.14	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.5		3.0	2.7	
Lane Grp Cap (vph)	303	1414		150	590		299	917		76	476	
v/s Ratio Prot	c0.12	0.14		0.05	c0.24		c0.11	c0.18		0.02	0.05	
v/s Ratio Perm												
v/c Ratio	0.68	0.34		0.57	0.74		0.67	0.66		0.42	0.32	
Uniform Delay, d1	41.5	21.4		47.0	31.8		41.5	34.6		49.8	41.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	0.1		4.8	4.7		5.6	1.6		3.7	0.3	
Delay (s)	47.5	21.5		51.8	36.5		47.1	36.2		53.5	41.4	
Level of Service	D	C		D	D		D	D		D	D	
Approach Delay (s)		29.1			39.0			38.8			42.7	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	106.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
16: 32nd Ave & Evergreen Rd

2040 AM W- Proj.
6/18/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘			↔			↔		↗	↘	
Volume (veh/h)	295	288	3	0	279	28	0	0	0	7	0	137
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	328	320	3	0	310	31	0	0	0	8	0	152
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	341			323			1455	1318	322	1301	1304	326
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	341			323			1455	1318	322	1301	1304	326
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	73			100			100	100	100	93	100	79
cM capacity (veh/h)	1218			1236			67	115	719	109	117	716

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2
Volume Total	328	323	341	0	8	152
Volume Left	328	0	0	0	8	0
Volume Right	0	3	31	0	0	152
cSH	1218	1700	1236	1700	109	716
Volume to Capacity	0.27	0.19	0.00	0.00	0.07	0.21
Queue Length 95th (ft)	27	0	0	0	6	20
Control Delay (s)	9.0	0.0	0.0	0.0	40.5	11.4
Lane LOS	A			A	E	B
Approach Delay (s)	4.6		0.0	0.0	12.8	
Approach LOS				A	B	

Intersection Summary		
Average Delay		4.3
Intersection Capacity Utilization	51.2%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis
 17: Sullivan Rd & 32nd Ave

2040 AM W- Proj.
 6/12/2015



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	LT	RT	LT	LT	TH	RT
Volume (veh/h)	284	5	18	97	29	213
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	359	6	23	123	37	270
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	205	37	306			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205	37	306			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	53	99	98			
cM capacity (veh/h)	769	1036	1254			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	366	146	37	270
Volume Left	359	23	0	0
Volume Right	6	0	0	270
cSH	773	1254	1700	1700
Volume to Capacity	0.47	0.02	0.02	0.16
Queue Length 95th (ft)	64	1	0	0
Control Delay (s)	13.8	1.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.8	1.4	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay		6.4	
Intersection Capacity Utilization		35.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 1: University Rd & 32nd Ave

2040 PM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Volume (vph)	3	470	21	79	230	79	16	89	74	114	127	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Util. Factor		0.95			0.95		1.00	0.95		1.00	0.95	
Frt		0.99			0.97		1.00	0.93		1.00	0.99	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3516			3397		1770	3298		1770	3513	
Flt Permitted		0.95			0.77		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3352			2643		1770	3298		1770	3513	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	3	500	22	84	245	84	17	95	79	121	135	7
RTOR Reduction (vph)	0	3	0	0	22	0	0	62	0	0	4	0
Lane Group Flow (vph)	0	522	0	0	391	0	17	112	0	121	138	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		22.5			22.5		1.3	12.1		8.2	19.0	
Effective Green, g (s)		22.5			22.5		1.3	12.1		8.2	19.0	
Actuated g/C Ratio		0.40			0.40		0.02	0.21		0.14	0.33	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Lane Grp Cap (vph)		1327			1046		40	702		255	1175	
v/s Ratio Prot							0.01	c0.03		c0.07	0.04	
v/s Ratio Perm		c0.16			0.15							
v/c Ratio		0.39			0.37		0.42	0.16		0.47	0.12	
Uniform Delay, d1		12.3			12.2		27.4	18.2		22.3	13.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.5		9.6	0.2		1.9	0.1	
Delay (s)		12.7			12.6		37.0	18.4		24.2	13.2	
Level of Service		B			B		D	B		C	B	
Approach Delay (s)		12.7			12.6			20.1			18.3	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 2: Schafer Rd/University Rd & Dishman-Mica Rd

2040 PM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗↘		↖	↗		↖	↗	↘
Volume (vph)	14	546	193	29	220	44	108	88	9	61	135	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3451		1770	1838		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3451		1770	1838		1770	1863	1583
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	16	635	224	34	256	51	126	102	10	71	157	9
RTOR Reduction (vph)	0	0	100	0	10	0	0	3	0	0	0	7
Lane Group Flow (vph)	16	635	124	34	297	0	126	109	0	71	157	2
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		7	4		3		
Permitted Phases			6								8	8
Actuated Green, G (s)	1.4	28.1	28.1	4.6	31.3		9.5	14.8		7.6	12.9	12.9
Effective Green, g (s)	1.4	28.1	28.1	4.6	31.3		9.5	14.8		7.6	12.9	12.9
Actuated g/C Ratio	0.02	0.37	0.37	0.06	0.42		0.13	0.20		0.10	0.17	0.17
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	32	697	592	108	1438		223	362		179	320	271
v/s Ratio Prot	0.01	c0.34		c0.02	c0.09		c0.07	0.06		0.04		
v/s Ratio Perm			0.08								c0.08	0.00
v/c Ratio	0.50	0.91	0.21	0.31	0.21		0.57	0.30		0.40	0.49	0.01
Uniform Delay, d1	36.5	22.3	16.0	33.7	14.0		30.9	25.7		31.6	28.1	25.8
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	15.8	16.4	0.2	2.3	0.1		3.9	0.6		2.0	1.6	0.0
Delay (s)	52.3	38.7	16.2	36.0	14.1		34.8	26.4		33.6	29.7	25.8
Level of Service	D	D	B	D	B		C	C		C	C	C
Approach Delay (s)		33.2			16.3			30.8			30.7	
Approach LOS		C			B			C			C	

Intersection Summary		
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.69	
Actuated Cycle Length (s)	75.1	Sum of lost time (s) 20.0
Intersection Capacity Utilization	55.2%	ICU Level of Service B
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 3: Bowdish Rd & 32nd Ave

2040 PM W- Proj.
 6/12/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Volume (vph)	38	432	64	120	318	54	44	125	91	54	148	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.95			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1827		1770	1822			1760			1803	
Flt Permitted	0.53	1.00		0.24	1.00			0.91			0.84	
Satd. Flow (perm)	988	1827		454	1822			1612			1540	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	40	455	67	126	335	57	46	132	96	57	156	39
RTOR Reduction (vph)	0	5	0	0	6	0	0	25	0	0	9	0
Lane Group Flow (vph)	40	517	0	126	386	0	0	249	0	0	243	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	27.0	24.6		35.2	28.8			15.6			15.6	
Effective Green, g (s)	27.0	24.6		35.2	28.8			15.6			15.6	
Actuated g/C Ratio	0.44	0.40		0.58	0.47			0.26			0.26	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	469	739		405	863			413			395	
v/s Ratio Prot	0.00	c0.28		c0.03	0.21							
v/s Ratio Perm	0.03			0.15				0.15			c0.16	
v/c Ratio	0.09	0.70		0.31	0.45			0.60			0.62	
Uniform Delay, d1	9.6	15.0		7.6	10.7			19.9			20.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	3.1		0.4	0.5			2.9			3.2	
Delay (s)	9.7	18.2		8.1	11.2			22.7			23.2	
Level of Service	A	B		A	B			C			C	
Approach Delay (s)		17.6			10.4			22.7			23.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Bowdish Rd & Dishman-Mica Rd

2040 PM W- Proj.
6/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	463	139	31	233	44	51	109	34	37	135	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.97		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)	1770	1798		1770	1818			1795			1843	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.86			0.91	1.00
Satd. Flow (perm)	1770	1798		1770	1818			1567			1686	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	503	151	34	253	48	55	118	37	40	147	9
RTOR Reduction (vph)	0	10	0	0	8	0	0	9	0	0	0	7
Lane Group Flow (vph)	14	644	0	34	293	0	0	201	0	0	187	2
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4			4	
Permitted Phases							4			4		4
Actuated Green, G (s)	1.3	26.5		3.0	28.2			13.4			13.4	13.4
Effective Green, g (s)	1.3	26.5		3.0	28.2			13.4			13.4	13.4
Actuated g/C Ratio	0.02	0.46		0.05	0.49			0.23			0.23	0.23
Clearance Time (s)	4.0	5.5		4.0	5.5			5.0			5.0	5.0
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Grp Cap (vph)	40	830		92	893			365			393	369
v/s Ratio Prot	0.01	c0.36		c0.02	0.16							
v/s Ratio Perm								c0.13			0.11	0.00
v/c Ratio	0.35	0.78		0.37	0.33			0.55			0.48	0.01
Uniform Delay, d1	27.6	13.0		26.3	8.9			19.3			19.0	16.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	7.1	4.8		3.4	0.3			2.2			1.2	0.0
Delay (s)	34.7	17.8		29.7	9.2			21.6			20.2	16.9
Level of Service	C	B		C	A			C			C	B
Approach Delay (s)		18.2			11.2			21.6			20.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	14.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 5: Dishman-Mica Rd & Sundown Drive

2040 PM W- Proj.
 6/12/2015



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		Y			Y
Volume (veh/h)	3	74	224	6	131	423
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	80	243	7	142	460
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						1112
pX, platoon unblocked	0.76					
vC, conflicting volume	991	247			250	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	833	247			250	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	90			89	
cM capacity (veh/h)	230	792			1316	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	84	250	602
Volume Left	3	0	142
Volume Right	80	7	0
cSH	723	1700	1316
Volume to Capacity	0.12	0.15	0.11
Queue Length 95th (ft)	10	0	9
Control Delay (s)	10.6	0.0	2.8
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	2.8
Approach LOS	B		

Intersection Summary			
Average Delay		2.8	
Intersection Capacity Utilization		56.4%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 6: Dishman-Mica Rd & Thorpe Rd

2040 PM W- Proj.
 6/12/2015



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		B			B
Volume (veh/h)	18	73	132	18	126	267
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	21	85	153	21	147	310
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	767	164			174	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	767	164			174	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	90			90	
cM capacity (veh/h)	331	881			1402	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	106	174	457
Volume Left	21	0	147
Volume Right	85	21	0
cSH	663	1700	1402
Volume to Capacity	0.16	0.10	0.10
Queue Length 95th (ft)	14	0	9
Control Delay (s)	11.5	0.0	3.2
Lane LOS	B		A
Approach Delay (s)	11.5	0.0	3.2
Approach LOS	B		

Intersection Summary			
Average Delay		3.6	
Intersection Capacity Utilization		44.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 PM W- Proj.
6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	364	42	63	222	0	27	0	157	0	350	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	387	45	67	236	0	29	0	167	0	372	113
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					129							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	236			432			1079	780	410	947	802	236
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	58			432			1019	679	410	869	704	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			0	100	74	100	0	87
cM capacity (veh/h)	1355			1128			0	308	642	169	298	883
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	432	303	196	485								
Volume Left	0	67	29	0								
Volume Right	45	0	167	113								
cSH	1700	1128	0	352								
Volume to Capacity	0.25	0.06	Err	1.38								
Queue Length 95th (ft)	0	5	Err	603								
Control Delay (s)	0.0	2.3	Err	216.3								
Lane LOS		A	F	F								
Approach Delay (s)	0.0	2.3	Err	216.3								
Approach LOS			F	F								
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			82.7%	ICU Level of Service					E			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
7: Pines Rd & 16th Ave

2040 PM W- Proj.
6/12/2015



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Volume (veh/h)	364	42	413	328	27	157
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	387	45	439	349	29	167
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				129		
pX, platoon unblocked					0.88	
vC, conflicting volume			432		1637	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			432		1657	410
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			61		50	74
cM capacity (veh/h)			1128		58	642

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	432	788	196
Volume Left	0	439	29
Volume Right	45	0	167
cSH	1700	1128	258
Volume to Capacity	0.25	0.39	0.76
Queue Length 95th (ft)	0	47	138
Control Delay (s)	0.0	7.9	52.6
Lane LOS		A	F
Approach Delay (s)	0.0	7.9	52.6
Approach LOS			F

Intersection Summary			
Average Delay		11.7	
Intersection Capacity Utilization		83.0%	ICU Level of Service E
Analysis Period (min)		15	

Intersection			
Intersection Delay, s/veh	14.6		
Intersection LOS	B		
Approach	EB	NB	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	432	196	788
Demand Flow Rate, veh/h	441	200	804
Vehicles Circulating, veh/h	448	395	30
Vehicles Exiting, veh/h	386	494	565
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	15.8	7.9	15.6
Approach LOS	C	A	C
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	441	200	804
Cap Entry Lane, veh/h	722	761	1097
Entry HV Adj Factor	0.980	0.980	0.980
Flow Entry, veh/h	432	196	788
Cap Entry, veh/h	707	746	1075
V/C Ratio	0.611	0.263	0.733
Control Delay, s/veh	15.8	7.9	15.6
LOS	C	A	C
95th %tile Queue, veh	4	1	7

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 PM W- Proj.
6/12/2015























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↖	↕↗		↖	↕↗	
Volume (vph)	168	344	88	12	228	5	34	312	9	108	466	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Flt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583		1858	1583	1770	3525		1770	3538	
Flt Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583		1858	1583	1770	3525		1770	3538	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	173	355	91	12	235	5	35	322	9	111	480	1
RTOR Reduction (vph)	0	0	53	0	0	5	0	2	0	0	0	0
Lane Group Flow (vph)	0	528	38	0	247	0	35	329	0	111	481	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		41.1	41.1		21.4	0.0	4.9	19.1		13.2	27.4	
Effective Green, g (s)		41.1	41.1		21.4	0.0	4.9	19.1		13.2	27.4	
Actuated g/C Ratio		0.36	0.36		0.19	0.00	0.04	0.17		0.11	0.24	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		656	566		346	0	75	586		203	844	
v/s Ratio Prot		c0.29			c0.13		0.02	0.09		c0.06	c0.14	
v/s Ratio Perm			0.02									
v/c Ratio		0.80	0.07		0.71	0.00	0.47	0.56		0.55	0.57	
Uniform Delay, d1		33.2	24.2		43.8	57.4	53.7	44.0		48.0	38.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.1	0.1		6.8	0.0	4.5	1.0		3.0	0.5	
Delay (s)		40.4	24.3		50.7	57.4	58.2	45.0		51.0	39.0	
Level of Service		D	C		D	E	E	D		D	D	
Approach Delay (s)		38.0			50.8			46.3			41.3	
Approach LOS		D			D			D			D	

Intersection Summary		
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio	0.72	
Actuated Cycle Length (s)	114.8	Sum of lost time (s) 20.0
Intersection Capacity Utilization	73.8%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
8: Hwy 27 & 16th Ave

2040 PM W- Proj.
6/12/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	344	88	12	228	5	34	312	9	108	466	457
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0	4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.93	
Flt Protected		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1833	1583		1858	1583	1770	3525		1770	3276	
Flt Permitted		0.98	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1833	1583		1858	1583	1770	3525		1770	3276	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	173	355	91	12	235	5	35	322	9	111	480	471
RTOR Reduction (vph)	0	0	53	0	0	5	0	2	0	0	101	0
Lane Group Flow (vph)	0	528	38	0	247	0	35	329	0	111	850	0
Turn Type	Split	NA	Perm	Split	NA	NA	Prot	NA		Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)		42.1	42.1		21.8	0.0	5.0	23.0		13.4	31.4	
Effective Green, g (s)		42.1	42.1		21.8	0.0	5.0	23.0		13.4	31.4	
Actuated g/C Ratio		0.35	0.35		0.18	0.00	0.04	0.19		0.11	0.26	
Clearance Time (s)		5.0	5.0		5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	2.5		3.0	1.9	
Lane Grp Cap (vph)		641	553		336	0	73	673		197	855	
v/s Ratio Prot		c0.29			c0.13		0.02	0.09		c0.06	c0.26	
v/s Ratio Perm			0.02									
v/c Ratio		0.82	0.07		0.74	0.00	0.48	0.49		0.56	0.99	
Uniform Delay, d1		35.7	26.0		46.5	60.1	56.4	43.4		50.7	44.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.4	0.1		8.1	0.0	4.9	0.4		3.7	29.3	
Delay (s)		44.2	26.1		54.6	60.1	61.3	43.8		54.3	73.6	
Level of Service		D	C		D	E	E	D		D	E	
Approach Delay (s)		41.5			54.7			45.5			71.6	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			57.5				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			120.3				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			88.5%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection										
Intersection Delay, s/veh	14.2									
Intersection LOS	B									
Approach	WB	NB	SB	NE						
Entry Lanes	2	2	2	2						
Conflicting Circle Lanes	2	2	2	2						
Adj Approach Flow, veh/h	288	418	1213	707						
Demand Flow Rate, veh/h	293	426	1298	721						
Vehicles Circulating, veh/h	617	745	328	703						
Vehicles Exiting, veh/h	554	679	582	863						
Follow-Up Headway, s	3.186	3.186	3.186	3.186						
Ped Vol Crossing Leg, #/h	0	0	0	0						
Ped Cap Adj	1.000	1.000	1.000	1.000						
Approach Delay, s/veh	10.5	9.8	16.6	14.1						
Approach LOS	B	A	C	B						
Lane	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L TR	TR	LT TR	TR	LT TR	TR	LT TR	TR	LTR	R
Assumed Moves	L TR	TR	LT TR	TR	LT TR	TR	LT TR	TR	LTR	R
RT Channelized										
Lane Util	0.980	0.020	0.469	0.531	0.470	0.530	0.470	0.530	0.470	0.530
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	287	6	200	226	582	656	339	382	667	691
Cap Entry Lane, veh/h	711	734	646	671	884	898	667	691	667	691
Entry HV Adj Factor	0.982	1.000	0.982	0.979	0.980	0.980	0.980	0.981	0.980	0.981
Flow Entry, veh/h	282	6	196	221	570	643	332	375	654	678
Cap Entry, veh/h	698	734	634	657	866	880	654	678	654	678
V/C Ratio	0.403	0.008	0.309	0.337	0.659	0.730	0.508	0.553	0.508	0.553
Control Delay, s/veh	10.6	5.0	9.7	9.9	15.1	18.0	13.6	14.4	13.6	14.4
LOS	B	A	A	A	C	C	B	B	B	B
95th %tile Queue, veh	2	0	1	1	5	7	3	3	3	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	57	452	52	141	414	22	67	63	132	47	120	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0	4.5	5.0	5.0	4.5	5.0	5.0	4.5	5.0	5.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	1.00	0.98	1.00	1.00	0.99	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1770	1834	1770	1770	1849	1770	1673	1673	1770	1769	1769	1770
Fit Permitted	0.37	1.00	0.17	0.17	1.00	0.43	1.00	0.55	1.00	0.55	1.00	0.37
Satd. Flow (perm)	684	1834	324	1849	803	1673	1673	1030	1769	1030	1769	684
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	63	502	58	157	460	24	74	70	147	52	133	67
RTOR Reduction (vph)	0	3	0	0	1	0	0	67	0	0	16	0
Lane Group Flow (vph)	63	557	0	157	483	0	74	150	0	52	184	0
Turn Type	pm+pt	NA	NA	pm+pt	NA	NA	pm+pt	NA	NA	pm+pt	NA	NA
Protected Phases	1	6	5	2	2	7	4	3	8	8	8	6
Permitted Phases	6	31.9	46.1	36.2	24.3	17.7	19.9	15.5	37.5	31.9	46.1	36.2
Actuated Green, G (s)	37.5	31.9	46.1	36.2	24.3	17.7	19.9	15.5	37.5	31.9	46.1	36.2
Effective Green, g (s)	0.45	0.38	0.56	0.44	0.29	0.21	0.24	0.19	0.45	0.38	0.56	0.44
Actuated g/C Ratio	4.5	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5	5.0
Clearance Time (s)	3.0	5.0	3.0	5.0	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
Vehicle Extension (s)	382	705	352	807	312	357	286	330	382	705	352	807
Lane Grp Cap (vph)	0.01	c0.30	c0.05	0.26	c0.02	0.09	0.01	c0.10	0.01	c0.30	0.01	c0.10
v/s Ratio Prot	0.06	0.79	0.19	0.60	0.24	0.42	0.18	0.56	0.06	0.79	0.19	0.60
v/c Ratio Perm	13.3	22.5	12.7	17.8	21.8	28.2	24.7	30.6	13.3	22.5	12.7	17.8
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	0.2	8.8	0.9	3.3	0.4	1.1	0.3	2.5	0.2	8.8	0.9	3.3
Incremental Delay, d2	13.5	31.3	13.6	21.1	22.2	29.3	25.0	33.1	13.5	31.3	13.6	21.1
Delay (s)	B	C	B	C	C	C	C	C	B	C	B	C
Level of Service	29.5	19.2	27.5	31.4	27.5	31.4	27.5	31.4	29.5	19.2	27.5	31.4
Approach Delay (s)	C	B	C	C	C	C	C	C	C	B	C	C
Approach LOS	Intersection Summary											
HCM 2000 Control Delay	25.8			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.62			Sum of lost time (s)			19.0					
Actuated Cycle Length (s)	82.9			ICU Level of Service			C					
Intersection Capacity Utilization	65.3%			Analysis Period (min)			15					
Description: Plan 1	c Critical Lane Group											



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Volume (veh/h)	9	0	0	141	223	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	0	153	242	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	406	253	242			
VC1, stage 1 cont vol						
VC2, stage 2 cont vol						
VCu, unblocked vol	406	253	242			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	601	786	1324			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	10	153	263			
Volume Left	10	0	0			
Volume Right	0	0	21			
cSH	601	1324	1700			
Volume to Capacity	0.02	0.00	0.15			
Queue Length 95th (ft)	1	0	0			
Control Delay (s)	11.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.3		ICU Level of Service		A	
Intersection Capacity Utilization	22.9%		Analysis Period (min)		15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	18	2	3	123	192	31
Volume (veh/h)	18	2	3	123	192	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	2	3	134	209	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	366	226	209			
VC1, stage 1 cont vol						
VC2, stage 2 cont vol						
VCu, unblocked vol	366	226	209			
IC, single (s)	6.4	6.2	4.1			
IC, 2 stage (s)						
IF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	632	814	1362			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	22	137	242			
Volume Left	20	3	0			
Volume Right	2	0	34			
cSH	647	1362	1700			
Volume to Capacity	0.03	0.00	0.14			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	10.8	0.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.8	0.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.7					
Intersection Capacity Utilization	22.0%					
ICU Level of Service	A					
Analysis Period (min)	15					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y ^T			4	4	
Volume (veh/h)	21	2	3	105	157	37
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (yph)	23	2	3	114	171	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	311	191	171			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCU, unblocked vol	311	191	171			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	680	851	1407			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	25	117	211			
Volume Left	23	3	0			
Volume Right	2	0	40			
cSH	692	1407	1700			
Volume to Capacity	0.04	0.00	0.12			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	10.4	0.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.4	0.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.8		ICU Level of Service			
Intersection Capacity Utilization	20.5%		A			
Analysis Period (min)	15					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	8	8	13	100	146	13
Volume (veh/h)	8	8	13	100	146	13
Sign Control	Stop	Stop	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	14	109	159	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
VC, conflicting volume	303	166	159			
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	303	166	159			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	682	879	1421			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	17	123	173			
Volume Left	9	14	0			
Volume Right	9	0	14			
cSH	768	1421	1700			
Volume to Capacity	0.02	0.01	0.10			
Queue Length 95th (ft)	2	1	0			
Control Delay (s)	9.8	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	0.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.9		ICU Level of Service			
Intersection Capacity Utilization	26.2%		A			
Analysis Period (min)	15					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	70	0	64	0	0	0	33	43	0	0	96	58
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.92	0.86	0.92	0.92	0.92	0.86	0.86	0.92	0.92	0.86	0.86
Hourly flow rate (vph)	81	0	74	0	0	0	38	50	0	0	112	67
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
VC, conflicting volume	272	272	145	347	306	50	179			50		
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
vCu, unblocked vol	272	272	145	347	306	50	179			50		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	92	100	100	100	97			100		
cM capacity (veh/h)	666	617	902	546	591	1018	1397			1557		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	156	0	88	179								
Volume Left	81	0	38	0								
Volume Right	74	0	0	67								
cSH	761	1700	1397	1557								
Volume to Capacity	0.20	0.00	0.03	0.00								
Queue Length 95th (ft)	19	0	2	0								
Control Delay (s)	10.9	0.0	3.4	0.0								
Lane LOS	B	A	A	A								
Approach Delay (s)	10.9	0.0	3.4	0.0								
Approach LOS	B	A	A	A								
Intersection Summary												
Average Delay	4.7			ICU Level of Service			A					
Intersection Capacity Utilization	30.5%											
Analysis Period (min)	15											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	62	421	255	238	421	39	185	216	162	72	309	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
FtI	1.00	0.94	1.00	1.00	0.99	1.00	0.95	1.00	0.94	1.00	0.97	1.00
Ft Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	3339	1770	1839	1770	1839	1770	3312	1770	3432	1770	3432
Ft Permitted	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	3339	1770	1839	1770	1839	1770	3312	1770	3432	1770	3432
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	66	448	271	253	448	41	197	230	172	77	329	83
RTOR Reduction (vph)	0	57	0	0	2	0	0	86	0	0	16	0
Lane Group Flow (vph)	66	662	0	253	487	0	197	316	0	77	396	0
Turn Type	Prot	NA	NA	Prot	NA	NA	Prot	NA	NA	Prot	NA	NA
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.2	30.7		22.2	44.7		18.5	30.0		8.8	20.3	
Effective Green, g (s)	8.2	30.7		22.2	44.7		18.5	30.0		8.8	20.3	
Actuated g/C Ratio	0.07	0.27		0.20	0.40		0.17	0.27		0.08	0.18	
Clearance Time (s)	4.5	4.5		4.5	4.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.5		3.0	2.7	
Lane Grp Cap (vph)	129	917		351	735		293	889		139	623	
v/s Ratio Prot	0.04	c0.20		c0.14	0.26		c0.11	0.10		0.04	c0.12	
v/s Ratio Perm												
w/c Ratio	0.51	0.72		0.72	0.66		0.67	0.36		0.55	0.64	
Uniform Delay, d1	49.8	36.6		41.9	27.3		43.8	33.0		49.6	42.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	2.8		7.1	2.3		6.0	0.2		4.7	2.0	
Delay (s)	53.2	39.5		49.0	29.6		49.7	33.2		54.3	44.3	
Level of Service	D	D		D	C		D	C		D	D	
Approach Delay (s)		40.6			36.2			38.6			45.8	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay	39.9			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.69			Sum of lost time (s)			20.0					
Actuated Cycle Length (s)	111.7			Intersection Capacity Utilization			70.9%					
Intersection Capacity Utilization	70.9%			ICU Level of Service			C					
Analysis Period (min)	15			Critical Lane Group			c					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	220	413	7	0	454	5	0	1	0	14	1	306
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	256	480	8	0	528	6	0	1	0	16	1	356
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None									None	
Median storage (veh)												
Upstream signal (ft)												
PX, platoon unblocked												
VC, conflicting volume	534			488			1883	1530	484	1523	1531	531
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	534			488			1883	1530	484	1523	1531	531
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	75			100			100	99	100	79	99	35
cM capacity (veh/h)	1034			1075			15	88	583	78	88	548
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	256	488	534	1	16	357						
Volume Left	256	0	0	0	16	0						
Volume Right	0	8	6	0	0	356						
cSH	1034	1700	1075	88	78	539						
Volume to Capacity	0.25	0.29	0.00	0.01	0.21	0.66						
Queue Length 95th (ft)	24	0	0	1	18	121						
Control Delay (s)	9.6	0.0	0.0	46.4	63.4	23.8						
Lane LOS	A			E	F	C						
Approach Delay (s)	3.3		0.0	46.4	25.5							
Approach LOS				E	D							
Intersection Summary												
Average Delay	7.3		ICU Level of Service		D							
Intersection Capacity Utilization	75.4%		Analysis Period (min)		15							



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y ^T			4 ^T	4 ^T	Y ^T
Volume (veh/h)	356	13	20	97	160	379
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	375	14	21	102	168	399
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	313	168	567			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	313	168	567			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	44	98	98			
cM capacity (veh/h)	666	876	1005			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2		
Volume Total	388	123	168	399		
Volume Left	375	21	0	0		
Volume Right	14	0	0	399		
cSH	671	1005	1700	1700		
Volume to Capacity	0.58	0.02	0.10	0.23		
Queue Length 95th (ft)	93	2	0	0		
Control Delay (s)	17.5	1.6	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	17.5	1.6	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay	6.5		ICU Level of Service		A	
Intersection Capacity Utilization	45.1%		Analysis Period (min)		15	

**WOODLAWN DRIVE
TUBE COUNTS**

MIKE MCCLUSKEY - WEE COUNT LLC
 1110 E. EXCELSIOR RD.
 SPOKANE WA, 99224
 (509) 979-3331

WOODLAWN DR. :
 S. OF 32TH :
 35 MPH :

Site: SPOKANE VALLEY
 3/11/2015
 Wednesday

Daily Volume

Interval Start	SB	NB	Combined	Interval Start	SB	NB	Combined
12:00 AM	1	0	1	12:00 PM	17	12	29
12:15 AM	0	0	0	12:15 PM	10	5	15
12:30 AM	0	1	1	12:30 PM	6	15	21
12:45 AM	0	0	0	12:45 PM	5	13	18
1:00 AM	0	0	0	1:00 PM	5	39	44
1:15 AM	0	0	0	1:15 PM	14	7	21
1:30 AM	0	0	0	1:30 PM	6	6	12
1:45 AM	0	0	0	1:45 PM	14	7	21
2:00 AM	0	1	1	2:00 PM	13	91	104
2:15 AM	0	1	1	2:15 PM	41	11	52
2:30 AM	1	0	1	2:30 PM	26	16	42
2:45 AM	0	0	0	2:45 PM	11	29	40
3:00 AM	0	0	0	3:00 PM	20	56	76
3:15 AM	1	0	1	3:15 PM	16	13	29
3:30 AM	0	0	0	3:30 PM	11	12	23
3:45 AM	0	0	0	3:45 PM	9	6	15
4:00 AM	0	1	1	4:00 PM	19	67	86
4:15 AM	0	1	1	4:15 PM	12	9	21
4:30 AM	0	1	1	4:30 PM	18	12	30
4:45 AM	0	3	3	4:45 PM	18	14	32
5:00 AM	2	2	4	5:00 PM	32	109	141
5:15 AM	1	2	3	5:15 PM	26	12	38
5:30 AM	1	4	5	5:30 PM	19	15	34
5:45 AM	1	5	6	5:45 PM	32	11	43
6:00 AM	0	8	8	6:00 PM	17	66	83
6:15 AM	1	7	8	6:15 PM	13	14	27
6:30 AM	1	13	14	6:30 PM	17	12	29
6:45 AM	6	15	21	6:45 PM	19	12	31
7:00 AM	9	21	30	7:00 PM	7	41	48
7:15 AM	18	26	44	7:15 PM	6	5	11
7:30 AM	36	28	64	7:30 PM	11	9	20
7:45 AM	20	38	58	7:45 PM	17	6	23
8:00 AM	13	17	30	8:00 PM	10	35	45
8:15 AM	4	16	20	8:15 PM	11	4	15
8:30 AM	5	11	16	8:30 PM	6	5	11
8:45 AM	3	12	15	8:45 PM	8	3	11
9:00 AM	4	10	14	9:00 PM	9	24	33
9:15 AM	9	12	21	9:15 PM	9	2	11
9:30 AM	4	12	16	9:30 PM	4	1	5
9:45 AM	2	9	11	9:45 PM	2	1	3
10:00 AM	3	13	16	10:00 PM	1	8	9
10:15 AM	5	8	13	10:15 PM	4	0	4
10:30 AM	3	8	11	10:30 PM	3	3	6
10:45 AM	8	8	16	10:45 PM	0	1	1
11:00 AM	4	8	12	11:00 PM	2	5	7
11:15 AM	10	9	19	11:15 PM	1	1	2
11:30 AM	8	9	17	11:30 PM	1	1	2
11:45 AM	13	4	17	11:45 PM	1	1	2

Volume Totals

SB	NB	Combined
197 (36.4%)	344 (63.6%)	541
12:00 AM - 12:00 PM	579 (60.5%)	957
12:00 PM - 12:00 AM	776 (51.8%)	1498

Peak Hours

SB	NB	Combined
12:00 AM - 12:00 PM	7:15 AM	7:00 AM
Volume	87	196
Factor	0.60	0.77
12:00 PM - 12:00 AM	5:00 PM	2:15 PM
Volume	109	165
Factor	0.85	0.79

7AM
 SB NB
 83 48

MIKE McCLUSKEY - WEE COUNT LLC
 1110 E. EXCELSIOR RD.
 SPOKANE WA. 99224
 (509) 979-3331

WOODLAWN DR.
 N. OF 40TH

Site: SPOKANE VALLEY
 3/11/2015
 Wednesday

Daily Volume

Interval Start	SB	NB	Combined	Interval Start	SB	NB	Combined
12:00 AM	0	0	0	12:00 PM	9	7	23
12:15 AM	0	0	0	12:15 PM	7	5	16
12:30 AM	0	0	0	12:30 PM	4	5	12
12:45 AM	0	0	0	12:45 PM	3	4	9
1:00 AM	0	0	0	1:00 PM	5	9	21
1:15 AM	0	0	0	1:15 PM	5	3	18
1:30 AM	0	0	0	1:30 PM	2	2	14
1:45 AM	0	0	0	1:45 PM	9	4	13
2:00 AM	0	0	0	2:00 PM	5	4	9
2:15 AM	0	0	0	2:15 PM	27	4	57
2:30 AM	0	0	0	2:30 PM	29	17	31
2:45 AM	0	0	0	2:45 PM	5	32	46
3:00 AM	0	0	0	3:00 PM	17	9	37
3:15 AM	0	0	0	3:15 PM	5	12	26
3:30 AM	0	0	0	3:30 PM	1	13	17
3:45 AM	0	0	0	3:45 PM	6	7	14
4:00 AM	0	0	0	4:00 PM	11	7	13
4:15 AM	0	0	0	4:15 PM	6	8	40
4:30 AM	0	0	0	4:30 PM	15	14	18
4:45 AM	0	0	0	4:45 PM	8	11	14
5:00 AM	0	0	0	5:00 PM	18	15	29
5:15 AM	1	0	1	5:15 PM	10	8	33
5:30 AM	1	0	1	5:30 PM	7	7	18
5:45 AM	0	1	1	5:45 PM	6	2	14
6:00 AM	1	2	3	6:00 PM	5	6	8
6:15 AM	2	1	3	6:15 PM	2	3	13
6:30 AM	1	0	1	6:30 PM	5	2	11
6:45 AM	3	0	3	6:45 PM	5	2	7
7:00 AM	8	7	15	7:00 PM	1	14	20
7:15 AM	24	6	30	7:15 PM	5	6	7
7:30 AM	49	24	73	7:30 PM	2	8	8
7:45 AM	34	30	64	7:45 PM	6	3	10
8:00 AM	16	12	28	8:00 PM	1	6	9
8:15 AM	2	8	10	8:15 PM	3	1	4
8:30 AM	12	6	18	8:30 PM	0	0	0
8:45 AM	20	10	30	8:45 PM	2	4	6
9:00 AM	12	7	19	9:00 PM	0	4	4
9:15 AM	4	4	8	9:15 PM	3	1	4
9:30 AM	2	3	5	9:30 PM	1	2	3
9:45 AM	3	7	10	9:45 PM	0	1	1
10:00 AM	3	5	8	10:00 PM	0	1	1
10:15 AM	1	2	3	10:15 PM	1	0	1
10:30 AM	1	7	8	10:30 PM	0	1	2
10:45 AM	3	4	7	10:45 PM	0	1	1
11:00 AM	0	2	2	11:00 PM	0	0	0
11:15 AM	4	4	8	11:15 PM	0	1	1
11:30 AM	6	5	11	11:30 PM	1	0	1
11:45 AM	5	4	9	11:45 PM	0	1	1

Volume Totals

SB	NB	Combined
12:00 AM - 12:00 PM	218 (57.5%)	161 (42.5%)
12:00 PM - 12:00 AM	263 (50.3%)	260 (49.7%)
24 Hours	481 (53.3%)	421 (46.7%)

Peak Hours

SB	NB	Combined
12:00 AM - 12:00 PM	74	195
12:00 PM - 12:00 AM	78	140
Factor	0.63	0.67
Factor	0.67	0.55

MIKE McCLUSKEY - WEE COUNT LLC
 1110 E. EXCELSIOR RD.
 SPOKANE WA. 99224
 (509) 979-3331

32TH
 W. OF WOODLAWN
 20 MPH

Site: SPOKANE VALLEY
 3/11/2015
 Wednesday

Daily Volume

Interval Start	WB	EB	Combined	Interval Start	WB	EB	Combined
12:00 AM	4	3	7	12:00 PM	45	59	232
12:15 AM	6	3	9	12:15 PM	73	55	104
12:30 AM	3	8	11	12:30 PM	52	56	128
12:45 AM	3	6	9	12:45 PM	52	62	108
1:00 AM	1	1	2	1:00 PM	38	213	62
1:15 AM	2	4	6	1:15 PM	59	60	245
1:30 AM	5	1	6	1:30 PM	48	57	98
1:45 AM	1	2	3	1:45 PM	68	70	116
2:00 AM	2	3	5	2:00 PM	83	73	138
2:15 AM	1	2	3	2:15 PM	66	199	287
2:30 AM	1	4	5	2:30 PM	65	116	265
2:45 AM	0	2	2	2:45 PM	73	88	181
3:00 AM	3	2	5	3:00 PM	99	82	161
3:15 AM	1	1	2	3:15 PM	70	114	184
3:30 AM	3	2	5	3:30 PM	70	103	173
3:45 AM	0	3	3	3:45 PM	87	88	175
4:00 AM	1	1	2	4:00 PM	81	343	100
4:15 AM	5	4	9	4:15 PM	81	86	413
4:30 AM	10	7	17	4:30 PM	83	110	181
4:45 AM	6	7	13	4:45 PM	98	117	193
5:00 AM	12	12	24	5:00 PM	91	117	215
5:15 AM	12	13	25	5:15 PM	119	468	214
5:30 AM	14	24	38	5:30 PM	140	135	498
5:45 AM	16	19	35	5:45 PM	118	116	254
6:00 AM	31	24	55	6:00 PM	77	124	256
6:15 AM	36	36	72	6:15 PM	106	92	242
6:30 AM	41	38	79	6:30 PM	65	75	169
6:45 AM	57	33	90	6:45 PM	60	91	181
7:00 AM	99	54	153	7:00 PM	65	68	156
7:15 AM	151	102	253	7:15 PM	55	211	128
7:30 AM	142	131	273	7:30 PM	35	57	122
7:45 AM	72	55	127	7:45 PM	36	168	223
8:00 AM	53	49	102	8:00 PM	38	69	104
8:15 AM	50	41	91	8:15 PM	51	59	115
8:30 AM	75	46	121	8:30 PM	45	38	76
8:45 AM	69	77	146	8:45 PM	55	49	100
9:00 AM	60	83	143	9:00 PM	33	52	95
9:15 AM	49	60	109	9:15 PM	33	99	107
9:30 AM	41	48	89	9:30 PM	28	26	71
9:45 AM	59	55	114	9:45 PM	18	12	59
10:00 AM	36	48	84	10:00 PM	20	40	40
10:15 AM	42	43	85	10:15 PM	10	21	26
10:30 AM	44	39	83	10:30 PM	5	15	20
10:45 AM	39	58	97	10:45 PM	7	3	10
11:00 AM	51	61	112	11:00 PM	10	40	23
11:15 AM	76	55	131	11:15 PM	16	13	28
11:30 AM	57	67	124	11:30 PM	6	3	9
11:45 AM	48	72	120	11:45 PM	8	6	14

Volume Totals

WB	EB	Combined
12:00 AM - 12:00 PM	1590 (51.3%)	3099
12:00 PM - 12:00 AM	2761 (45.5%)	6068
24 Hours	4351 (47.5%)	9167

Peak Hours

WB	EB	Combined
12:00 AM - 12:00 PM	7:00 AM	7:00 AM
Volume	464	806
Factor	0.77	0.74
12:00 PM - 12:00 AM	5:00 PM	5:00 PM
Volume	468	966
Factor	0.84	0.94

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 1110 E. EXCELSIOR RD.
 SPOKANE WA. 99224
 (509) 979-3331

PINES
 N. OF 38TH
 20 MPH

Site: SPOKANE VALLEY
 3/18/2015
 Wednesday

Daily Volume

Interval Start	SB	NB	Combined	Interval Start	SB	NB	Combined
12:00 AM	4	7	11	12:00 PM	19	11	30
12:15 AM	2	4	6	12:15 PM	16	14	30
12:30 AM	1	0	1	12:30 PM	16	17	33
12:45 AM	0	0	0	12:45 PM	18	10	28
1:00 AM	0	0	0	1:00 PM	15	24	39
1:15 AM	0	0	0	1:15 PM	15	16	31
1:30 AM	0	1	1	1:30 PM	14	18	32
1:45 AM	0	0	0	1:45 PM	16	13	29
2:00 AM	0	5	5	2:00 PM	15	105	120
2:15 AM	0	0	0	2:15 PM	29	16	45
2:30 AM	4	0	4	2:30 PM	38	24	62
2:45 AM	1	0	1	2:45 PM	23	44	67
3:00 AM	0	0	0	3:00 PM	29	129	158
3:15 AM	0	1	1	3:15 PM	36	19	55
3:30 AM	0	0	0	3:30 PM	34	12	46
3:45 AM	0	0	0	3:45 PM	30	27	57
4:00 AM	0	1	1	4:00 PM	23	112	135
4:15 AM	0	0	0	4:15 PM	26	24	50
4:30 AM	1	2	3	4:30 PM	30	19	49
4:45 AM	0	0	0	4:45 PM	33	14	47
5:00 AM	0	0	0	5:00 PM	40	109	149
5:15 AM	0	16	16	5:15 PM	23	20	43
5:30 AM	0	5	5	5:30 PM	22	13	35
5:45 AM	0	6	6	5:45 PM	24	19	43
6:00 AM	4	21	25	6:00 PM	18	16	34
6:15 AM	5	9	14	6:15 PM	24	29	53
6:30 AM	8	10	18	6:30 PM	19	20	39
6:45 AM	8	9	17	6:45 PM	19	15	34
7:00 AM	20	103	123	7:00 PM	13	18	31
7:15 AM	13	46	59	7:15 PM	14	48	62
7:30 AM	34	64	98	7:30 PM	11	2	13
7:45 AM	36	56	92	7:45 PM	10	7	17
8:00 AM	24	67	91	8:00 PM	16	47	63
8:15 AM	12	19	31	8:15 PM	10	5	15
8:30 AM	15	26	41	8:30 PM	10	4	14
8:45 AM	16	34	50	8:45 PM	11	5	16
9:00 AM	23	49	72	9:00 PM	11	33	44
9:15 AM	4	18	22	9:15 PM	2	3	5
9:30 AM	12	18	30	9:30 PM	7	3	10
9:45 AM	10	15	25	9:45 PM	13	4	17
10:00 AM	9	39	48	10:00 PM	7	16	23
10:15 AM	14	10	24	10:15 PM	5	3	8
10:30 AM	7	16	23	10:30 PM	3	2	5
10:45 AM	9	13	22	10:45 PM	1	1	2
11:00 AM	12	69	81	11:00 PM	5	8	13
11:15 AM	18	21	39	11:15 PM	0	1	1
11:30 AM	15	21	36	11:30 PM	2	0	2
11:45 AM	24	16	40	11:45 PM	1	1	2

Volume Totals

SB	NB	Combined	SB	NB	Combined
12:00 AM - 12:00 PM	362 (37.6%)	601 (62.4%)	963	1450	2413
12:00 PM - 12:00 AM	816 (56.3%)	634 (43.7%)	1450	1235 (51.2%)	2685
24 Hours	1178 (48.8%)	1235 (51.2%)	2413		

447 x 1.4 = 269 MS

ES 12:00 AM - 12:00 PM

Volume 107

Factor 0.74

12:00 PM - 12:00 AM

Volume 129

Factor 0.90

Peak Hours

SB 7:15 AM

NB 7:15 AM

Combined 7:15 AM

SB 3:00 PM

NB 2:30 PM

Combined 2:30 PM

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 SPOKANE WA. 99224
 (509) 979-3331

PINES
 N. OF 38TH
 20 MPH

Site: SPOKANE VALLEY
 3/19/2015
 Thursday

Daily Volume

Interval Start	SB	NB	Combined	Interval Start	SB	NB	Combined
12:00 AM	0	0	0	12:00 PM	23	16	39
12:15 AM	1	0	1	12:15 PM	24	19	43
12:30 AM	1	0	1	12:30 PM	19	19	38
12:45 AM	2	1	3	12:45 PM	22	20	42
1:00 AM	1	0	1	1:00 PM	13	58	71
1:15 AM	0	0	0	1:15 PM	15	15	30
1:30 AM	0	1	1	1:30 PM	13	20	33
1:45 AM	0	0	0	1:45 PM	17	12	29
2:00 AM	0	0	0	2:00 PM	13	120	133
2:15 AM	1	2	3	2:15 PM	30	14	44
2:30 AM	2	0	2	2:30 PM	50	14	64
2:45 AM	0	0	0	2:45 PM	27	58	85
3:00 AM	2	1	3	3:00 PM	34	145	179
3:15 AM	0	0	0	3:15 PM	49	29	78
3:30 AM	0	1	1	3:30 PM	34	12	46
3:45 AM	0	0	0	3:45 PM	28	15	43
4:00 AM	0	0	0	4:00 PM	35	127	162
4:15 AM	0	1	1	4:15 PM	33	36	69
4:30 AM	0	0	0	4:30 PM	33	46	79
4:45 AM	2	0	2	4:45 PM	26	28	54
5:00 AM	0	4	4	5:00 PM	40	24	64
5:15 AM	0	1	1	5:15 PM	43	44	87
5:30 AM	0	7	7	5:30 PM	37	27	64
5:45 AM	2	5	7	5:45 PM	36	39	75
6:00 AM	2	7	9	6:00 PM	39	153	192
6:15 AM	5	14	19	6:15 PM	31	32	63
6:30 AM	4	11	15	6:30 PM	41	14	55
6:45 AM	1	18	19	6:45 PM	42	12	54
7:00 AM	9	9	18	7:00 PM	17	32	49
7:15 AM	9	21	30	7:15 PM	18	7	25
7:30 AM	10	25	35	7:30 PM	14	11	25
7:45 AM	13	26	39	7:45 PM	21	12	33
8:00 AM	9	32	41	8:00 PM	19	49	68
8:15 AM	10	17	27	8:15 PM	20	22	42
8:30 AM	33	31	64	8:30 PM	5	9	14
8:45 AM	34	53	87	8:45 PM	5	3	8
9:00 AM	26	31	57	9:00 PM	11	26	37
9:15 AM	12	16	28	9:15 PM	4	4	8
9:30 AM	10	35	45	9:30 PM	4	1	5
9:45 AM	18	28	46	9:45 PM	7	2	9
10:00 AM	16	26	42	10:00 PM	5	15	20
10:15 AM	9	13	22	10:15 PM	3	1	4
10:30 AM	17	22	39	10:30 PM	5	2	7
10:45 AM	15	14	29	10:45 PM	2	2	4
11:00 AM	13	18	31	11:00 PM	1	5	6
11:15 AM	18	18	36	11:15 PM	1	0	1
11:30 AM	10	15	25	11:30 PM	2	2	4
11:45 AM	13	15	28	11:45 PM	1	0	1

Volume Totals

SB	NB	Combined
330 (38.0%)	539 (62.0%)	869
1012 (55.1%)	825 (44.9%)	1837
1342 (49.6%)	1364 (50.4%)	2706

Handwritten: 282, 65, 347, 209, 139, 65

Peak Hours

SB	NB	Combined
12:00 AM - 12:00 PM	8:30 AM - 8:45 AM	8:30 AM - 8:30 AM
Volume 105	Volume 135	Volume 236
Factor 0.77	Factor 0.64	Factor 0.68
12:00 PM - 12:00 AM	2:30 PM - 4:30 PM	5:00 PM - 5:00 PM
Volume 160	Volume 142	Volume 290
Factor 0.80	Factor 0.77	Factor 0.83

Handwritten: 290, 60, 350, 210, 140, 140

MIKE McCLUSKEY - WEE COUNT LLC
 1110 E. EXCELSIOR RD.
 SPOKANE WA. 99224
 (509) 979-3331

40TH
 W. OF WOODLAWN
 25 MPH

Site: SPOKANE VALLEY
 3/12/2015
 Thursday

Daily Volume

Interval Start	WB	EB	Combined	Interval Start	WB	EB	Combined
12:00 AM	0	0	0	12:00 PM	8	27	35
12:15 AM	0	0	0	12:15 PM	5	4	9
12:30 AM	0	0	0	12:30 PM	10	2	12
12:45 AM	0	0	0	12:45 PM	4	4	8
1:00 AM	0	0	0	1:00 PM	3	74	77
1:15 AM	0	0	0	1:15 PM	36	4	40
1:30 AM	0	0	0	1:30 PM	22	11	33
1:45 AM	0	0	0	1:45 PM	13	27	40
2:00 AM	0	0	0	2:00 PM	19	50	69
2:15 AM	0	0	0	2:15 PM	12	17	29
2:30 AM	0	0	0	2:30 PM	10	8	18
2:45 AM	0	0	0	2:45 PM	9	8	17
3:00 AM	1	1	2	3:00 PM	6	33	39
3:15 AM	0	0	0	3:15 PM	7	8	15
3:30 AM	0	0	0	3:30 PM	5	13	18
3:45 AM	0	0	0	3:45 PM	15	18	33
4:00 AM	0	2	2	4:00 PM	8	26	34
4:15 AM	1	0	1	4:15 PM	5	14	19
4:30 AM	0	1	1	4:30 PM	6	4	10
4:45 AM	1	1	2	4:45 PM	7	25	32
5:00 AM	1	0	1	5:00 PM	7	28	35
5:15 AM	1	0	1	5:15 PM	4	9	13
5:30 AM	1	0	1	5:30 PM	6	5	11
5:45 AM	0	0	0	5:45 PM	11	4	15
6:00 AM	6	43	49	6:00 PM	5	21	26
6:15 AM	8	3	11	6:15 PM	5	4	9
6:30 AM	15	5	20	6:30 PM	3	11	14
6:45 AM	14	6	20	6:45 PM	8	13	21
7:00 AM	18	78	96	7:00 PM	4	13	17
7:15 AM	9	6	15	7:15 PM	2	1	3
7:30 AM	12	11	23	7:30 PM	4	2	6
7:45 AM	39	29	68	7:45 PM	3	0	3
8:00 AM	9	32	41	8:00 PM	2	11	13
8:15 AM	6	3	9	8:15 PM	4	1	5
8:30 AM	6	5	11	8:30 PM	3	0	3
8:45 AM	11	11	22	8:45 PM	2	1	3
9:00 AM	15	22	37	9:00 PM	3	5	8
9:15 AM	3	5	8	9:15 PM	0	1	1
9:30 AM	1	2	3	9:30 PM	0	0	0
9:45 AM	3	4	7	9:45 PM	0	1	1
10:00 AM	1	12	13	10:00 PM	0	0	0
10:15 AM	4	5	9	10:15 PM	0	0	0
10:30 AM	4	7	11	10:30 PM	0	0	0
10:45 AM	3	3	6	10:45 PM	0	1	1
11:00 AM	9	22	31	11:00 PM	0	0	0
11:15 AM	8	7	15	11:15 PM	0	0	0
11:30 AM	2	5	7	11:30 PM	0	1	1
11:45 AM	3	5	8	11:45 PM	0	0	0

Volume Totals

WB	EB	Combined
215 (55.3%)	174 (44.7%)	389
288 (49.8%)	290 (50.2%)	578
503 (52.0%)	464 (48.0%)	967

Handwritten: $347 \times .6 = 209 \text{ MS}$
 $\times .4 = 139 \text{ ES}$

Peak Hours

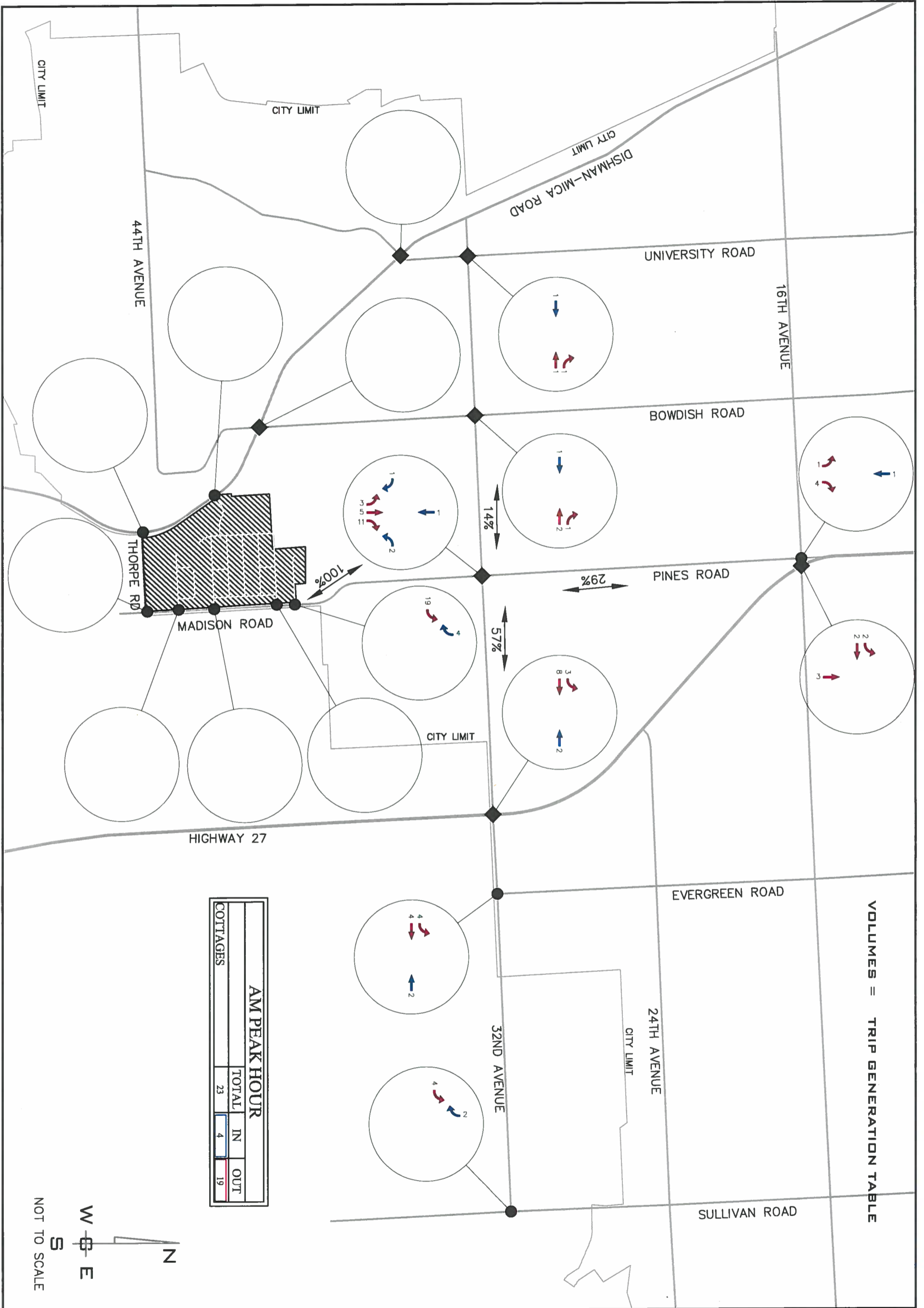
WB	EB	Combined
12:00 AM - 12:00 PM	7:00 AM	7:00 AM
Volume	78	60
Factor	0.50	0.49
12:00 PM - 12:00 AM	1:15 PM	1:15 PM
Volume	90	63
Factor	0.63	0.88

Handwritten: $350 \times .6 = 210 \text{ MS}$
 $\times .4 = 140 \text{ ES}$

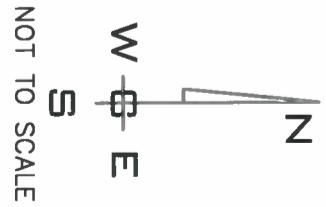
129
 318
 $\frac{447}{129} \times .6 = 269 \text{ MS}$
 $\times .4 = 179 \text{ ES}$

PRD LANDUSE DISTRIBUTION FIGURES

**7A THROUGH 7F
8A THROUGH 8F**



VOLUMES = TRIP GENERATION TABLE



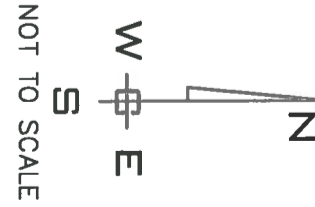
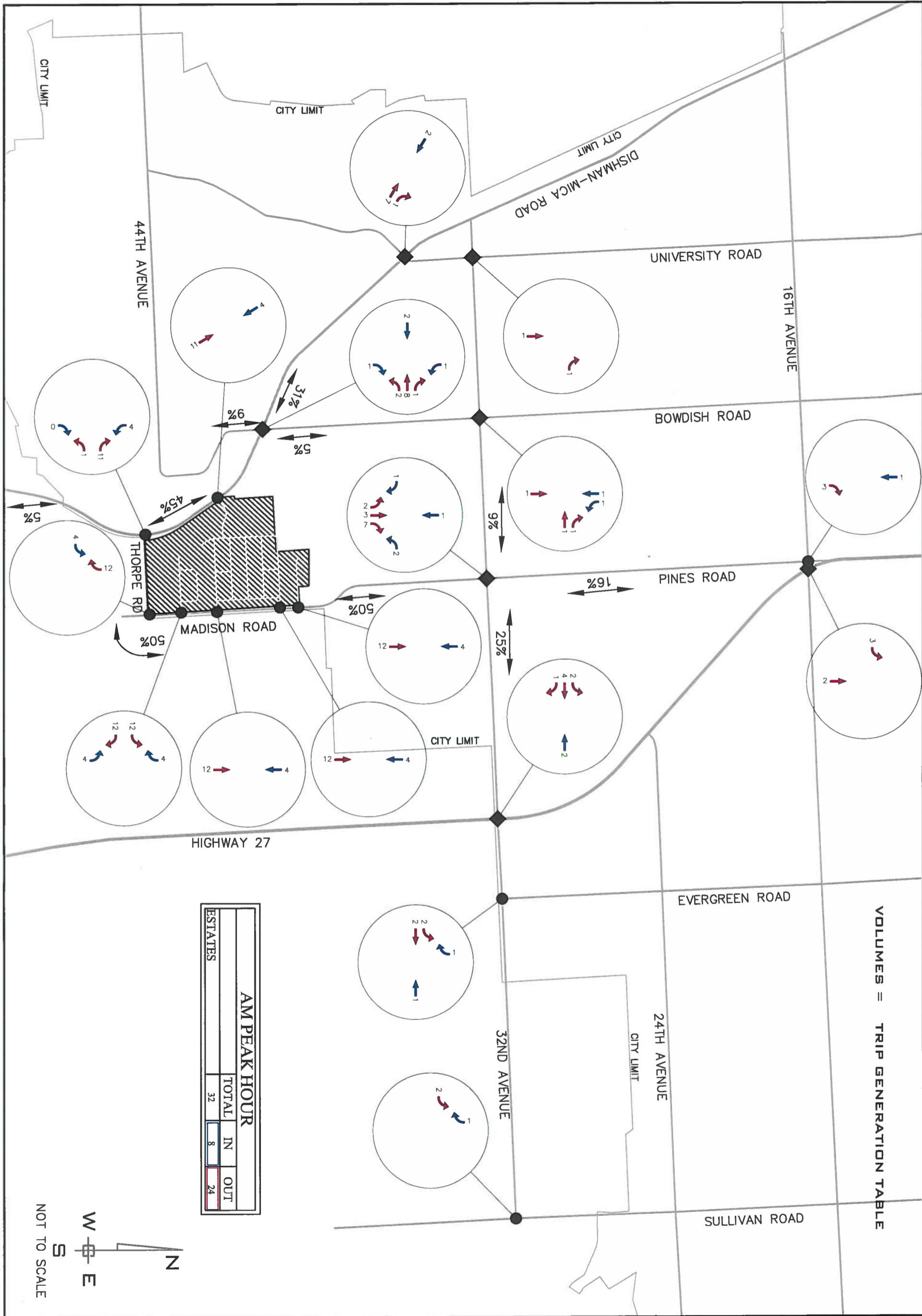
**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

AM COTTAGES TRIP DISTRIBUTION

PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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CIVIL, STRUCTURAL AND
TRANSPORTATION ENGINEERING
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WASHINGTON 99216
PH: 509-893-2617 FAX: 509-926-0227

FIGURE
7A



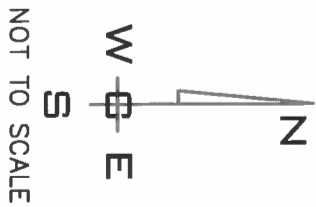
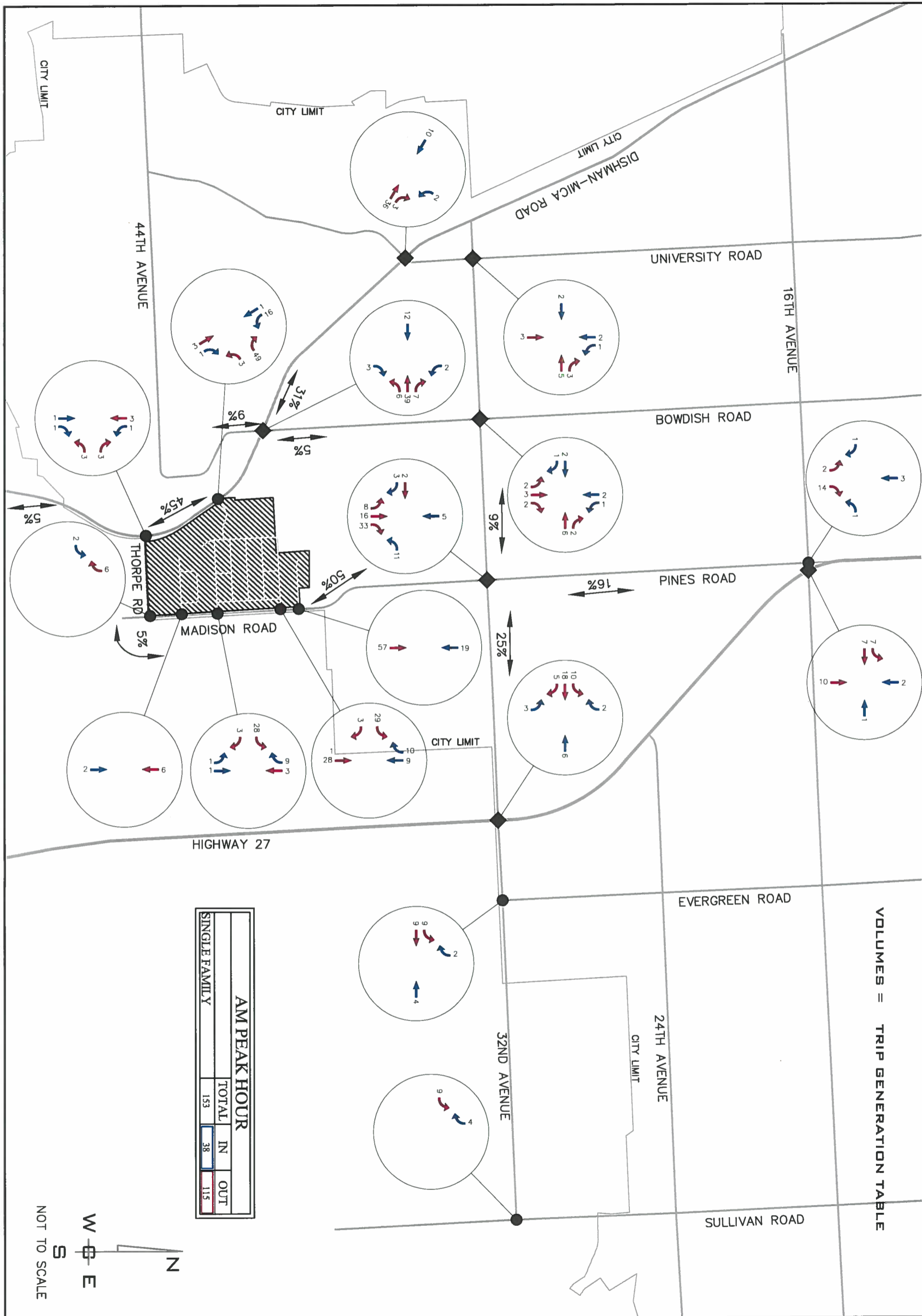
**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
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SPOKANE VALLEY, WASHINGTON**

AM ESTATES TRIP DISTRIBUTION

PROJ #: 13-1166
DATE: 04/13/15
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FIGURE
7B



7C

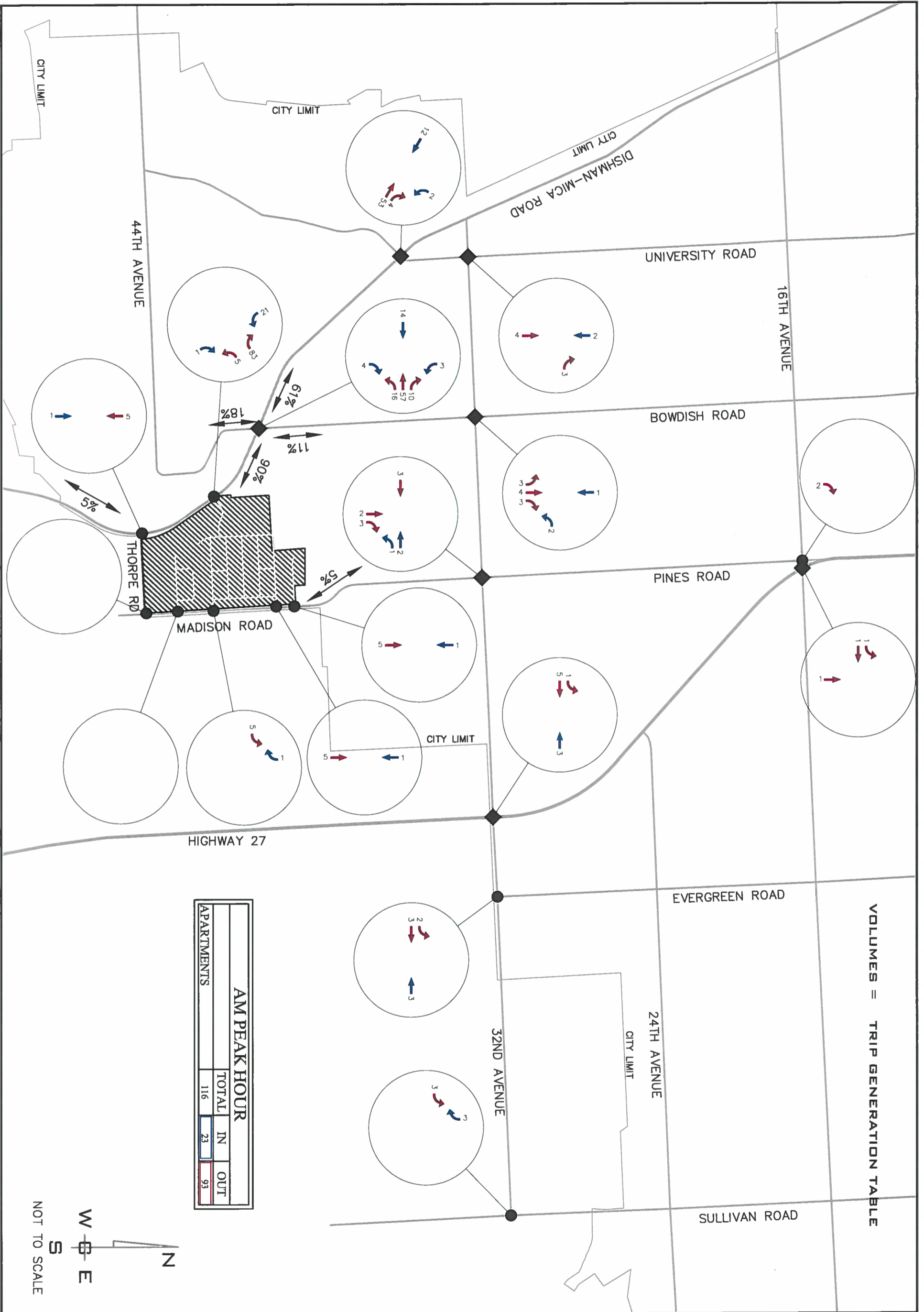
FIGURE

**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
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AM SINGLE FAMILY TRIP DISTRIBUTION

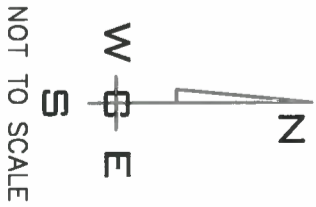
PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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VOLUMES = TRIP GENERATION TABLE

AM PEAK HOUR		
APARTMENTS	TOTAL	OUT
	116	93
		23



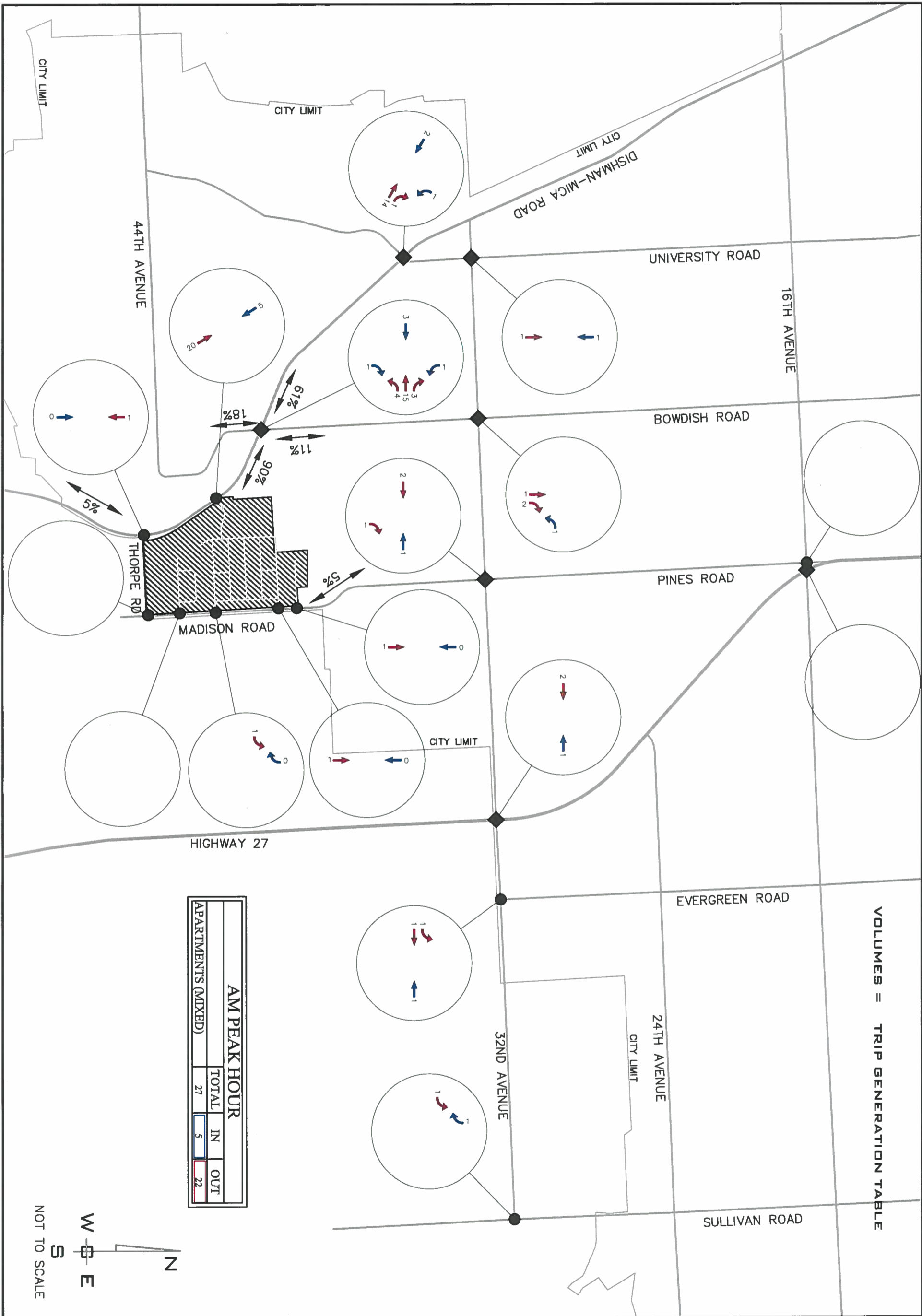
**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

AM APARTMENTS TRIP DISTRIBUTION

PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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FIGURE
7D



VOLUMES = TRIP GENERATION TABLE

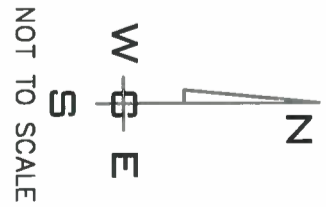


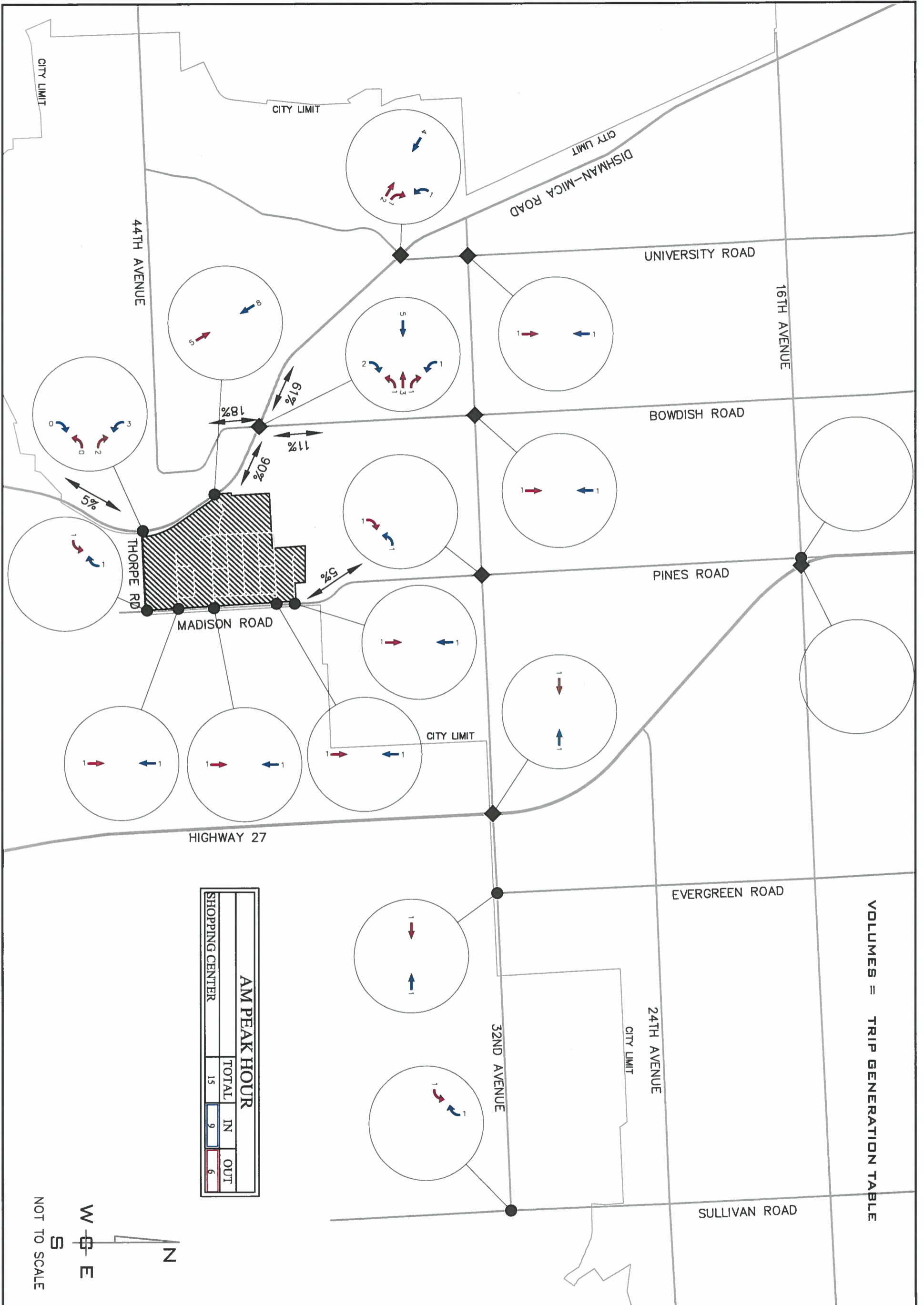
FIGURE
7E

**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

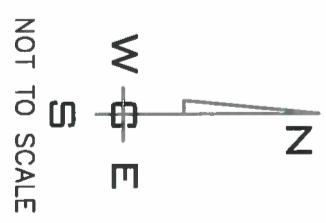
AM APARTMENTS (MIXED) TRIP DISTRIBUTION

PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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AM PEAK HOUR		
TOTAL	15	
IN	9	
OUT		6



VOLUMES = TRIP GENERATION TABLE

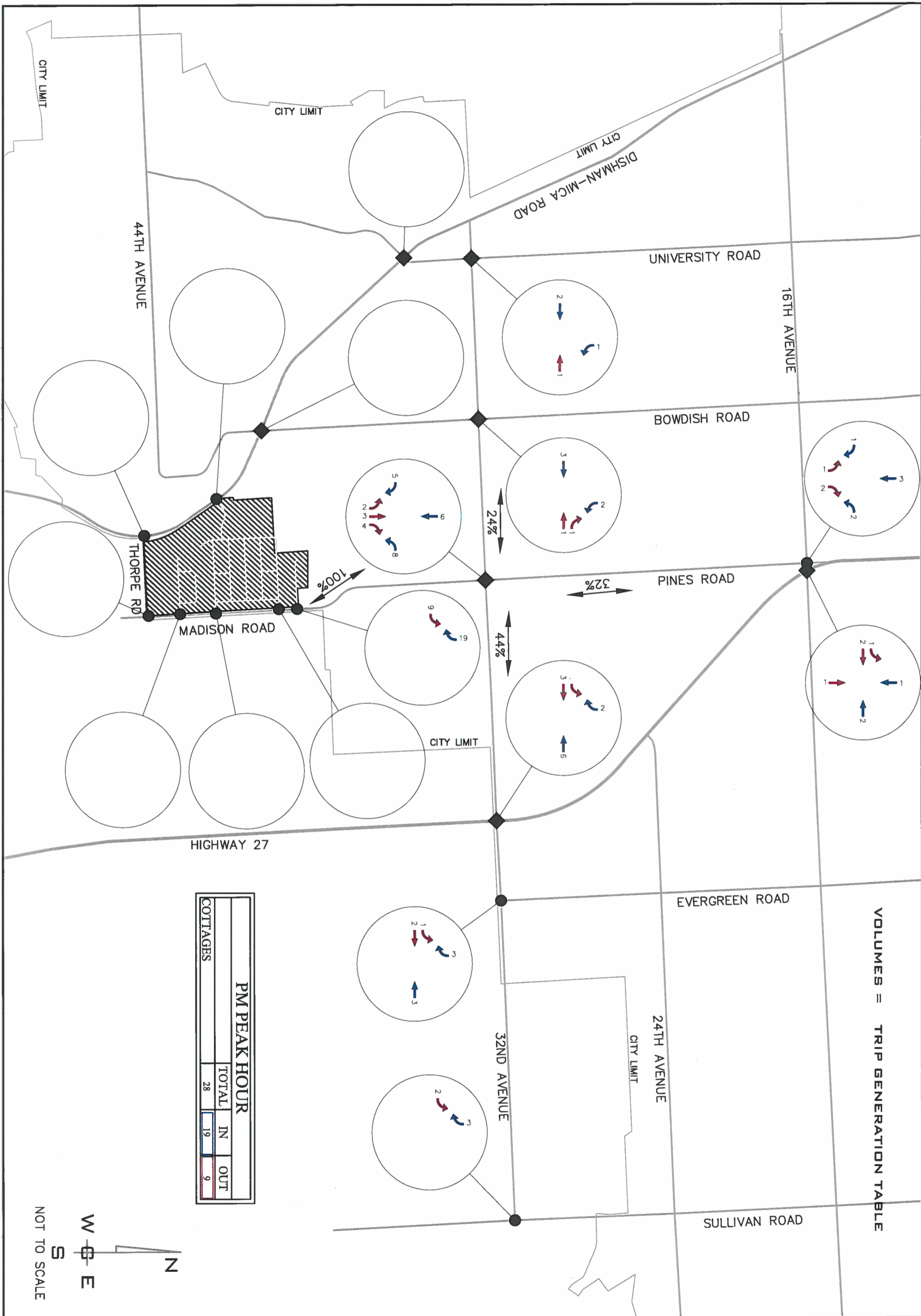
FIGURE
7F

**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

AM SHOPPING CENTER TRIP DISTRIBUTION

PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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NOT TO SCALE
 W - E
 S - N

**TRAFFIC IMPACT ANALYSIS
 PAINTED HILLS PRD
 MADISON ROAD & THORPE ROAD
 SPOKANE VALLEY, WASHINGTON**

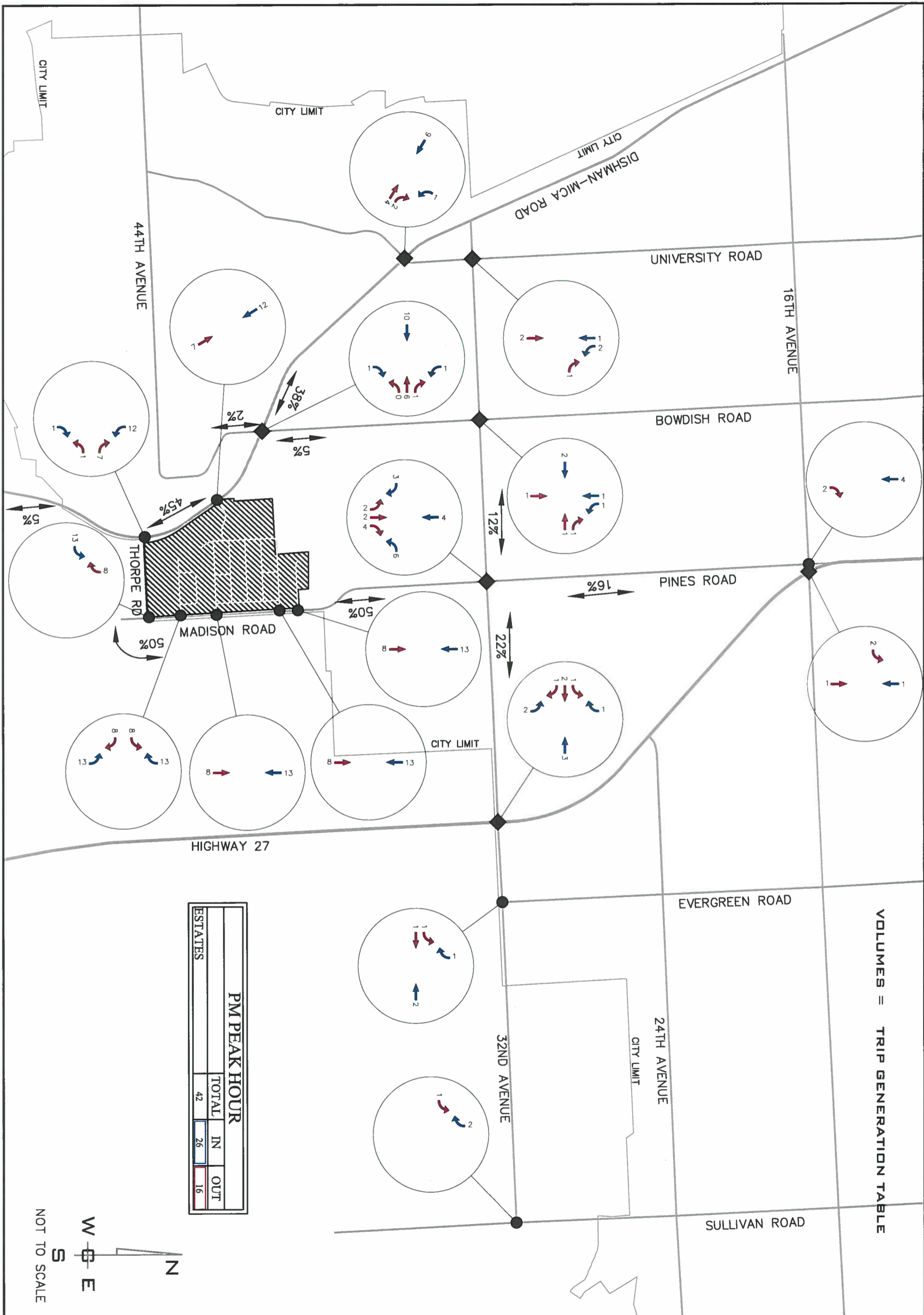
PM COTTAGES TRIP DISTRIBUTION

PROJ #: 13-1166
 DATE: 04/13/15
 DRAWN: RMA
 APPROVED: TRW

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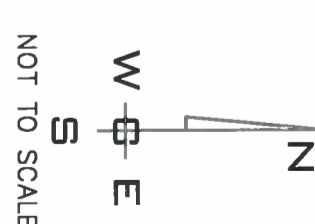
BA

FIGURE



VOLUMES = TRIP GENERATION TABLE

PM PEAK HOUR			
ESTATES	TOTAL	IN	OUT
	42	26	16



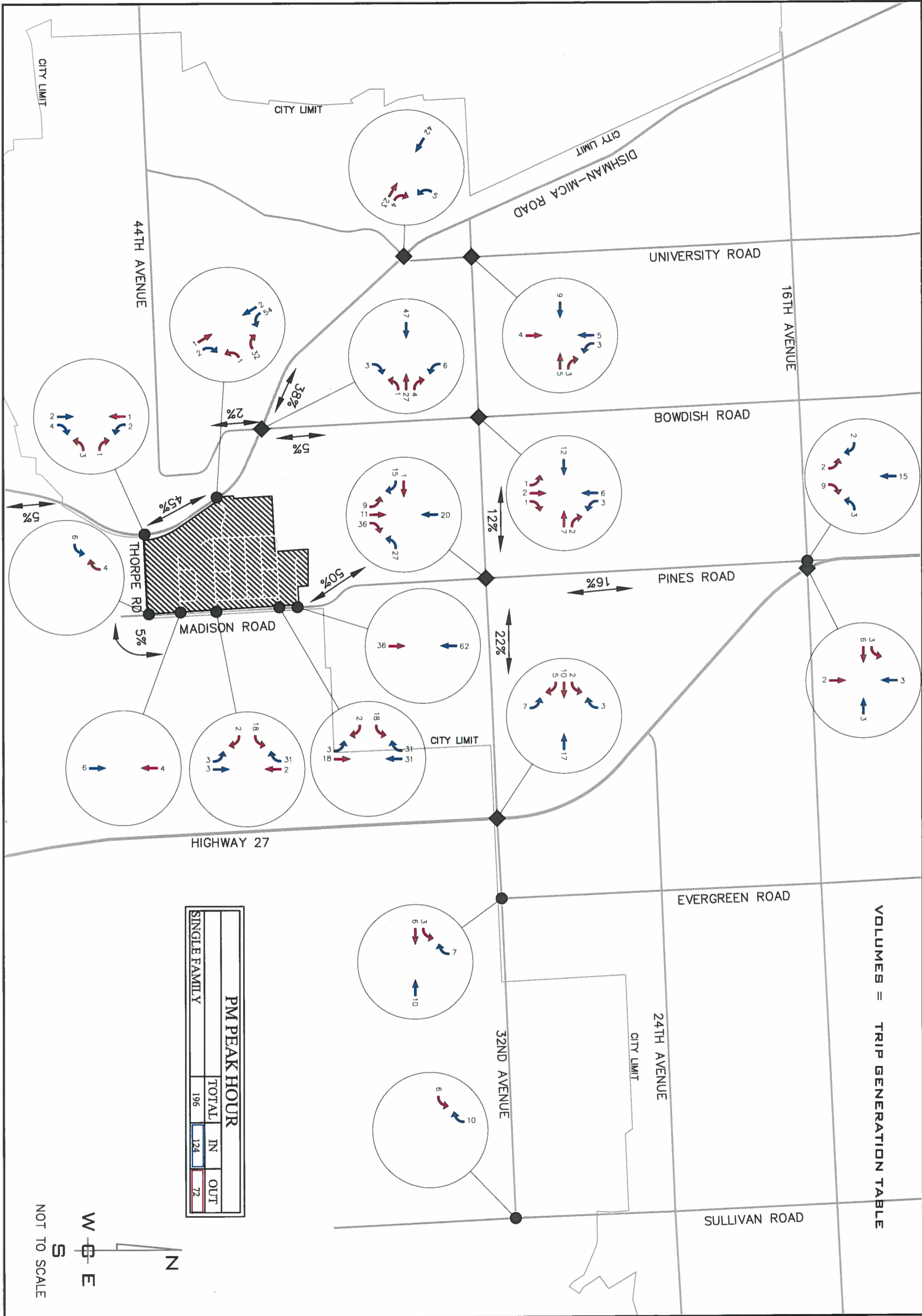
**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

PM ESTATES TRIP DISTRIBUTION

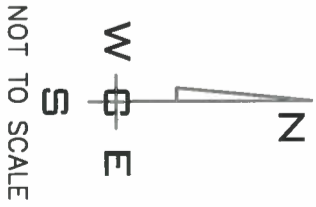
PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW

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TRANSPORTATION ENGINEERING
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WASHINGTON 99216
PH: 509-893-2617 FAX: 509-926-0227

FIGURE
BB



PM PEAK HOUR		
TOTAL	IN	OUT
196	124	72



VOLUMES = TRIP GENERATION TABLE

80

FIGURE

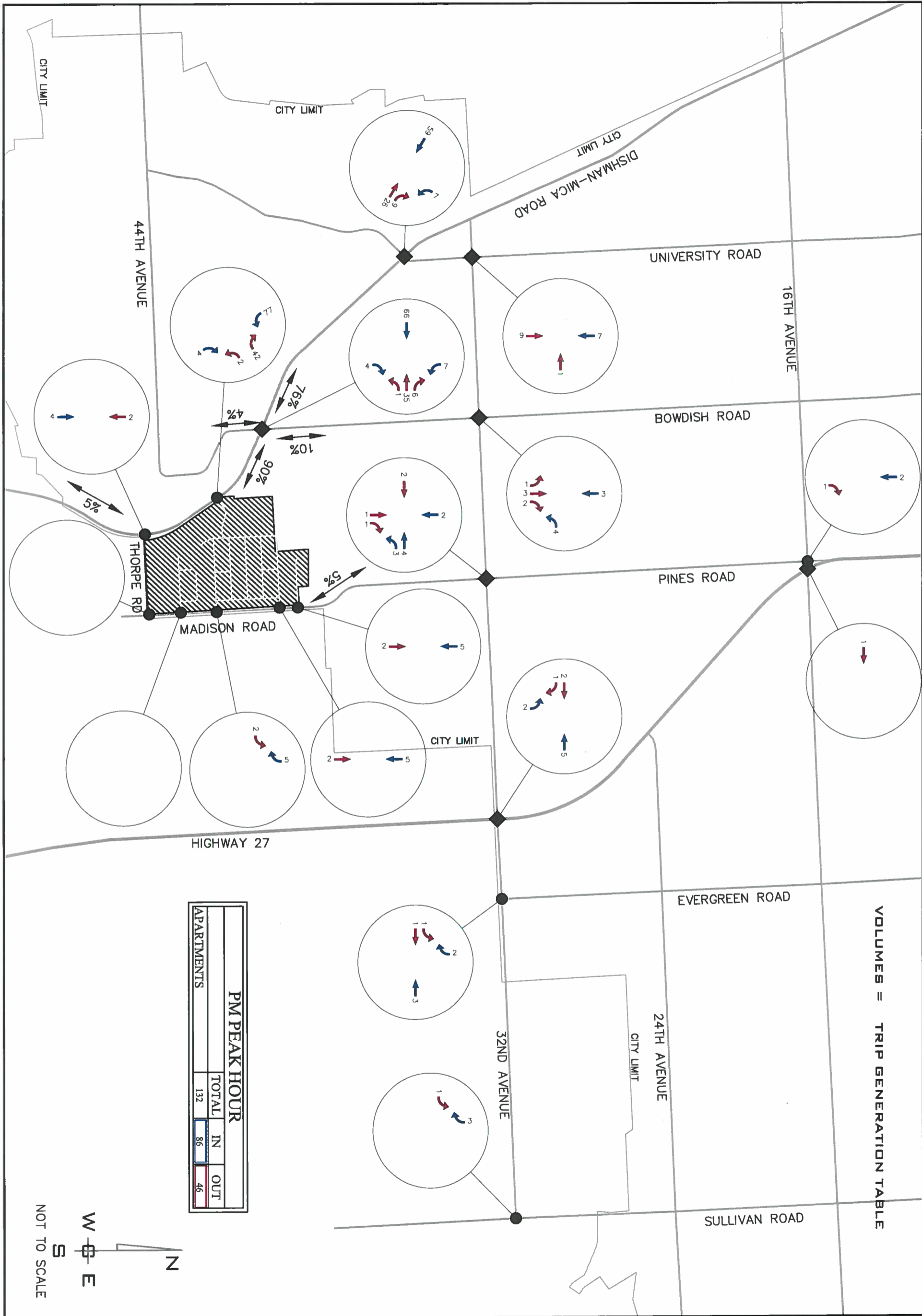
**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
MADISON ROAD & THORPE ROAD
SPOKANE VALLEY, WASHINGTON**

PM SINGLE FAMILY TRIP DISTRIBUTION

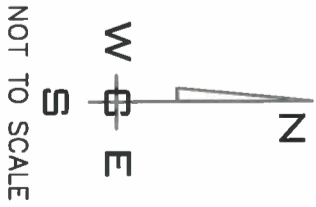
PROJ #: 13-1166
DATE: 04/13/15
DRAWN: RMA
APPROVED: TRW



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TRANSPORTATION ENGINEERING
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WASHINGTON 99216
PH: 509-893-2617 FAX: 509-926-0227



PM PEAK HOUR		
APARTMENTS	TOTAL	OUT
	132	46
		86



VOLUMES = TRIP GENERATION TABLE

8D

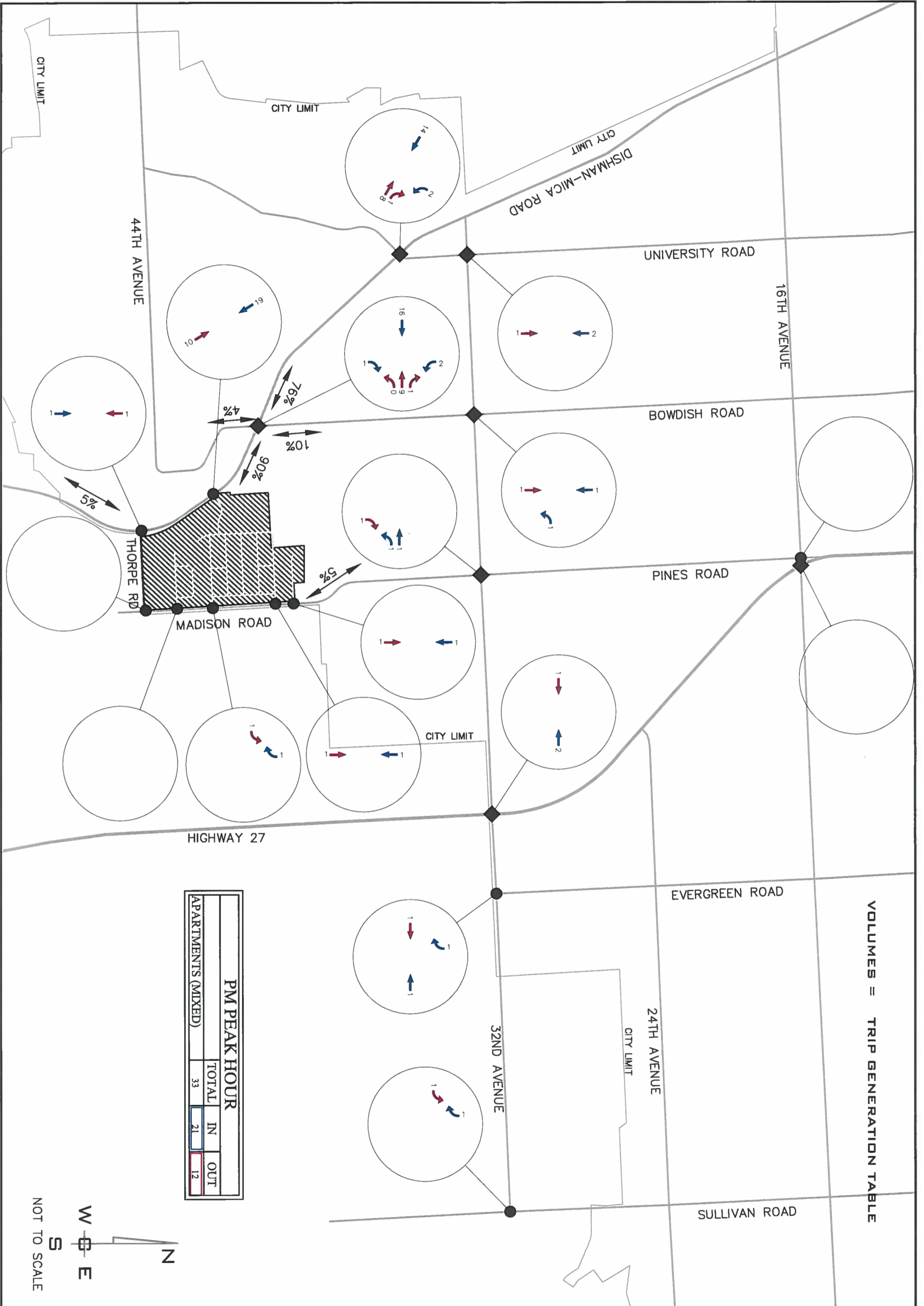
FIGURE

**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
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SPOKANE VALLEY, WASHINGTON**

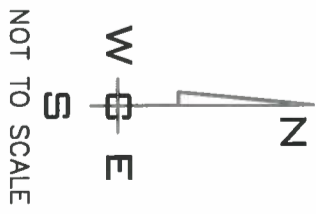
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VOLUMES = TRIP GENERATION TABLE

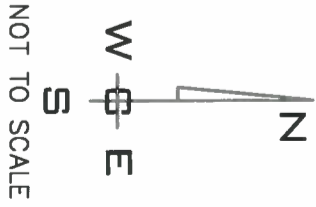
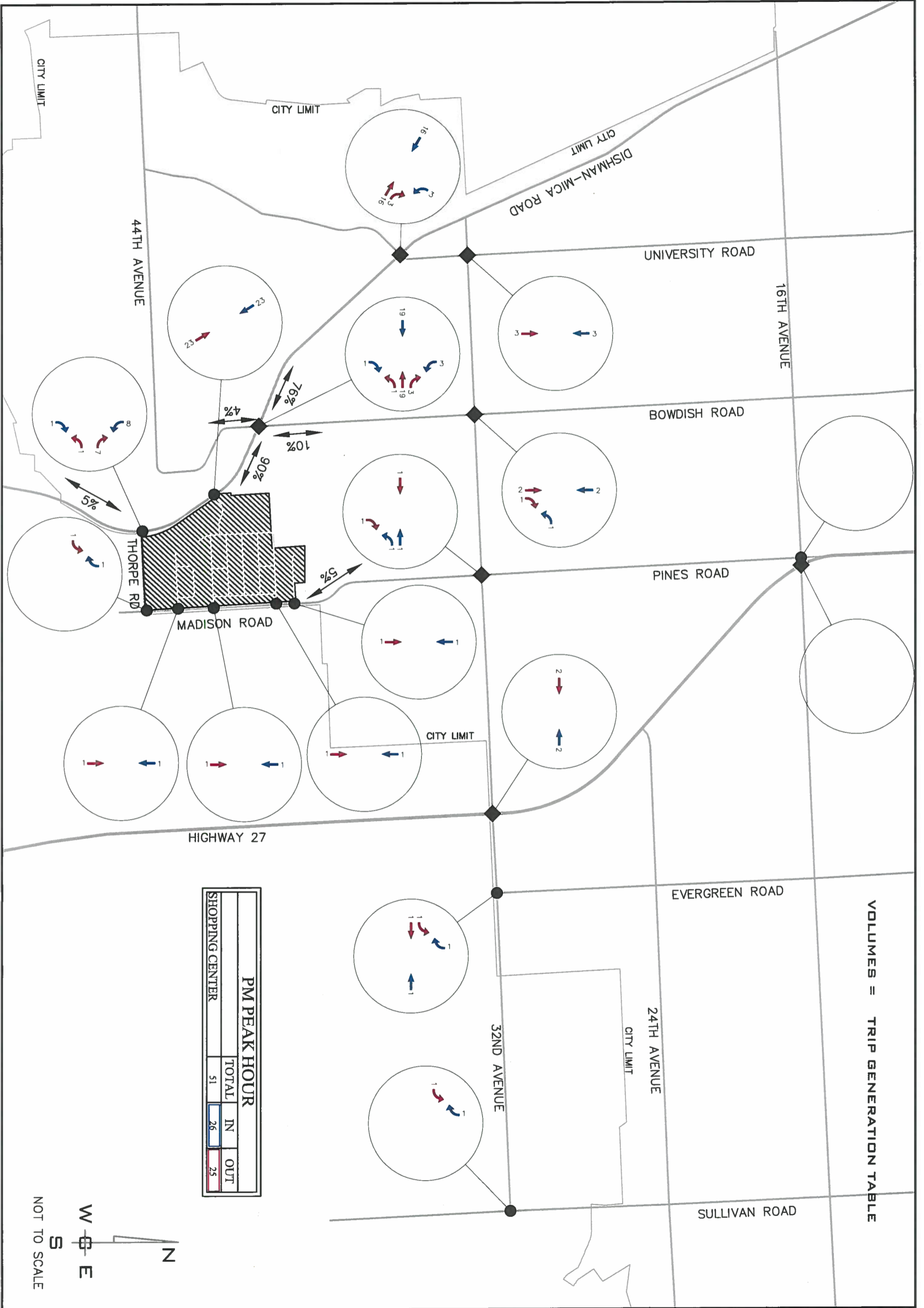


**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
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VOLUMES = TRIP GENERATION TABLE

8F

FIGURE

**TRAFFIC IMPACT ANALYSIS
PAINTED HILLS PRD
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