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Appendix

HCM Reports

Preliminary Warrant Analysis

Methodology Memorandum

HCM Reports

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	10	20	10	10	10	0	705	25	50	380	5
Future Vol, veh/h	40	10	20	10	10	10	0	705	25	50	380	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Free	-	-	Stop	-	-	Yield	-	-	Free
Storage Length	-	-	-	-	-	150	225	-	150	225	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	37	12	57	45	44	49	4	7	15	7	62
Mvmt Flow	43	11	22	11	11	11	0	766	27	54	413	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1294	1288	-	1293	1288	766	413	0	0	766	0	0
Stage 1	522	522	-	766	766	-	-	-	-	-	-	-
Stage 2	772	766	-	527	522	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.87	-	7.67	6.95	6.64	4.59	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.87	-	6.67	5.95	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.87	-	6.67	5.95	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.333	-	4.013	4.405	3.696	2.641	-	-	2.335	-	-
Pot Cap-1 Maneuver	134	140	0	108	135	342	933	-	-	792	-	0
Stage 1	524	478	0	323	355	-	-	-	-	-	-	0
Stage 2	380	365	0	447	467	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	115	130	-	96	126	342	933	-	-	792	-	-
Mov Cap-2 Maneuver	115	130	-	96	126	-	-	-	-	-	-	-
Stage 1	524	445	-	323	355	-	-	-	-	-	-	-
Stage 2	357	365	-	406	435	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s		36	0	1.1
HCM LOS	-	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	933	-	-	-	109	342	792	-
HCM Lane V/C Ratio	-	-	-	-	0.199	0.032	0.069	-
HCM Control Delay (s)	0	-	-	-	46.1	15.9	9.9	-
HCM Lane LOS	A	-	-	-	E	C	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.7	0.1	0.2	-

Intersection	
Int Delay, s/veh	10.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	5	75	5	70	0	790	165	80	580	5
Future Vol, veh/h	5	5	5	75	5	70	0	790	165	80	580	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	35	225	-	225	215	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	5	0	2	0	6	4	13	10	0
Mvmt Flow	5	5	5	77	5	71	0	806	168	82	592	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1567	1564	594	1569	1566	806	597	0	0	806	0	0
Stage 1	758	758	-	806	806	-	-	-	-	-	-	-
Stage 2	809	806	-	763	760	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.5	6.22	4.1	-	-	4.23	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4	3.318	2.2	-	-	2.317	-	-
Pot Cap-1 Maneuver	91	113	509	88	112	382	989	-	-	772	-	-
Stage 1	402	418	-	371	398	-	-	-	-	-	-	-
Stage 2	377	398	-	392	417	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	65	101	509	77	100	382	989	-	-	772	-	-
Mov Cap-2 Maneuver	65	101	-	77	100	-	-	-	-	-	-	-
Stage 1	402	374	-	371	398	-	-	-	-	-	-	-
Stage 2	303	398	-	342	373	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	42.9	119.4	0	1.2
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	989	-	-	110	78	382	772	-	-
HCM Lane V/C Ratio	-	-	-	0.139	1.047	0.187	0.106	-	-
HCM Control Delay (s)	0	-	-	42.9	209.4	16.6	10.2	-	-
HCM Lane LOS	A	-	-	E	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	5.8	0.7	0.4	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	15	0	5	0	950	25	0	660	0
Future Vol, veh/h	0	0	0	15	0	5	0	950	25	0	660	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	35	-	-	150	250	-	215
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	7	0	7	0	5	6	13	9	0
Mvmt Flow	0	0	0	16	0	5	0	1022	27	0	710	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1732	1732	710	1732	1732	1022	710	0	0	1022	0	0
Stage 1	710	710	-	1022	1022	-	-	-	-	-	-	-
Stage 2	1022	1022	-	710	710	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.17	6.5	6.27	4.1	-	-	4.23	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.563	4	3.363	2.2	-	-	2.317	-	-
Pot Cap-1 Maneuver	70	89	437	67	89	280	899	-	-	638	-	-
Stage 1	428	440	-	279	316	-	-	-	-	-	-	-
Stage 2	287	316	-	417	440	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	69	89	437	67	89	280	899	-	-	638	-	-
Mov Cap-2 Maneuver	69	89	-	67	89	-	-	-	-	-	-	-
Stage 1	428	440	-	279	316	-	-	-	-	-	-	-
Stage 2	281	316	-	417	440	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	60.8	0	0
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	899	-	-	-	67	280	638	-	-
HCM Lane V/C Ratio	-	-	-	-	0.241	0.019	-	-	-
HCM Control Delay (s)	0	-	-	0	75	18.1	0	-	-
HCM Lane LOS	A	-	-	A	F	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.8	0.1	0	-	-

Intersection	
Int Delay, s/veh	92.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	10	15	135	10	55	5	910	280	70	595	10
Future Vol, veh/h	10	10	15	135	10	55	5	910	280	70	595	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	30	-	-	40
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	11	0	0	2	5	0	11	5	1	0	9	3
Mvmt Flow	11	11	16	147	11	60	5	989	304	76	647	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1804	1799	647	1804	1799	989	647	0	0	989	0	0
Stage 1	799	799	-	1000	1000	-	-	-	-	-	-	-
Stage 2	1005	1000	-	804	799	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.2	7.12	6.55	6.2	4.21	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.12	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.12	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.3	3.518	4.045	3.3	2.299	-	-	2.2	-	-
Pot Cap-1 Maneuver	58	81	475	~ 61	79	302	897	-	-	707	-	-
Stage 1	366	401	-	293	317	-	-	-	-	-	-	-
Stage 2	280	324	-	377	393	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	35	66	475	~ 44	64	302	897	-	-	707	-	-
Mov Cap-2 Maneuver	35	66	-	~ 44	64	-	-	-	-	-	-	-
Stage 1	358	333	-	286	310	-	-	-	-	-	-	-
Stage 2	212	317	-	292	326	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	85.4	$ 957.9	0	1.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	897	-	-	46	475	45	302	707	-	-
HCM Lane V/C Ratio	0.006	-	-	0.473	0.034	3.502	0.198	0.108	-	-
HCM Control Delay (s)	9	0	-	139.9	12.8	$ 1313.7	19.8	10.7	0	-
HCM Lane LOS	A	A	-	F	B	F	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	1.7	0.1	17.5	0.7	0.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	100	80	110	105	40	70	935	225	30	535	30
Future Volume (vph)	115	100	80	110	105	40	70	935	225	30	535	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.96			0.98		1.00	0.97		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1597			1613		1599	1637		1568	1625	
Flt Permitted		0.70			0.63		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1141			1045		1599	1637		1568	1625	
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)	125	109	87	120	114	43	76	1016	245	33	582	33
RTOR Reduction (vph)	0	11	0	0	5	0	0	7	0	0	2	0
Lane Group Flow (vph)	0	310	0	0	272	0	76	1254	0	33	613	0
Heavy Vehicles (%)	3%	3%	5%	4%	2%	9%	4%	4%	3%	6%	7%	4%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		26.5			26.5		8.7	75.6		2.4	69.3	
Effective Green, g (s)		27.0			27.0		9.2	77.6		2.9	71.3	
Actuated g/C Ratio		0.23			0.23		0.08	0.65		0.02	0.60	
Clearance Time (s)		4.5			4.5		4.5	6.0		4.5	6.0	
Vehicle Extension (s)		2.5			2.5		2.5	5.4		2.5	5.4	
Lane Grp Cap (vph)		257			236		123	1063		38	969	
v/s Ratio Prot							c0.05	c0.77		0.02	0.38	
v/s Ratio Perm		c0.27			0.26							
v/c Ratio		1.21			1.15		0.62	1.18		0.87	0.63	
Uniform Delay, d1		46.2			46.2		53.4	21.0		58.1	15.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		123.8			105.3		7.7	90.8		93.2	2.0	
Delay (s)		170.1			151.6		61.1	111.7		151.4	17.7	
Level of Service		F			F		E	F		F	B	
Approach Delay (s)		170.1			151.6			108.8			24.5	
Approach LOS		F			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	99.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	119.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	55	40	20	240	310	10
Future Vol, veh/h	55	40	20	240	310	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
Storage Length	0	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	7	11	27	9	6	3
Mvmt Flow	58	42	21	253	326	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	621	326	326	0	-	0
Stage 1	326	-	-	-	-	-
Stage 2	295	-	-	-	-	-
Critical Hdwy	6.47	6.31	4.37	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.399	2.443	-	-	-
Pot Cap-1 Maneuver	443	695	1106	-	-	0
Stage 1	720	-	-	-	-	0
Stage 2	744	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	433	695	1106	-	-	-
Mov Cap-2 Maneuver	433	-	-	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	728	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.7	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	1106	-	515	-
HCM Lane V/C Ratio	0.019	-	0.194	-
HCM Control Delay (s)	8.3	0	13.7	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	70	60	245	325	25
Future Vol, veh/h	15	70	60	245	325	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	250	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	19	15	9	7	7
Mvmt Flow	16	76	65	266	353	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	764	367	380	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Critical Hdwy	6.62	6.39	4.25	-	-	-
Critical Hdwy Stg 1	5.62	-	-	-	-	-
Critical Hdwy Stg 2	5.62	-	-	-	-	-
Follow-up Hdwy	3.698	3.471	2.335	-	-	-
Pot Cap-1 Maneuver	345	642	1111	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	325	642	1111	-	-	-
Mov Cap-2 Maneuver	325	-	-	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	601	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1111	-	548	-	-
HCM Lane V/C Ratio	0.059	-	0.169	-	-
HCM Control Delay (s)	8.4	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	255	5	10	350
Future Vol, veh/h	5	10	255	5	10	350
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	48	3	9	46	11	8
Mvmt Flow	6	11	283	6	11	389

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	697	286	0	0	289	0
Stage 1	286	-	-	-	-	-
Stage 2	411	-	-	-	-	-
Critical Hdwy	6.88	6.23	-	-	4.21	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.932	3.327	-	-	2.299	-
Pot Cap-1 Maneuver	345	751	-	-	1223	-
Stage 1	668	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	341	751	-	-	1223	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	536	1223	-
HCM Lane V/C Ratio	-	-	0.031	0.009	-
HCM Control Delay (s)	-	-	11.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	10	0	0	0	15	240	0	0	340	15
Future Vol, veh/h	15	0	10	0	0	0	15	240	0	0	340	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	20	-	-	20	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	34	100	12	0	0	100	13	7	0	0	10	25
Mvmt Flow	16	0	10	0	0	0	16	250	0	0	354	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	643	643	362	643	651	250	370	0	0	250	0	0
Stage 1	362	362	-	281	281	-	-	-	-	-	-	-
Stage 2	281	281	-	362	370	-	-	-	-	-	-	-
Critical Hdwy	7.44	7.5	6.32	7.1	6.5	7.2	4.23	-	-	4.1	-	-
Critical Hdwy Stg 1	6.44	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.44	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.806	4.9	3.408	3.5	4	4.2	2.317	-	-	2.2	-	-
Pot Cap-1 Maneuver	345	289	661	389	390	599	1130	-	-	1327	-	-
Stage 1	596	484	-	730	682	-	-	-	-	-	-	-
Stage 2	661	532	-	661	624	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	341	284	661	378	384	599	1130	-	-	1327	-	-
Mov Cap-2 Maneuver	341	284	-	378	384	-	-	-	-	-	-	-
Stage 1	586	484	-	718	671	-	-	-	-	-	-	-
Stage 2	650	523	-	651	624	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.9	0	0.5	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1130	-	-	341	661	-	-	1327	-	-
HCM Lane V/C Ratio	0.014	-	-	0.046	0.016	-	-	-	-	-
HCM Control Delay (s)	8.2	0	-	16.1	10.5	0	0	0	-	-
HCM Lane LOS	A	A	-	C	B	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	-	-	0	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	5	5	245	330	15
Future Vol, veh/h	10	5	5	245	330	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	33	7	8	8	0
Mvmt Flow	11	5	5	266	359	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	644	367	375	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.43	6.53	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.597	2.263	-	-	-
Pot Cap-1 Maneuver	436	614	1157	-	-	-
Stage 1	699	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	434	614	1157	-	-	-
Mov Cap-2 Maneuver	434	-	-	-	-	-
Stage 1	699	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1157	-	481	-	-
HCM Lane V/C Ratio	0.005	-	0.034	-	-
HCM Control Delay (s)	8.1	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	50	65	375	360	20
Future Vol, veh/h	15	50	65	375	360	20
Conflicting Peds, #/hr	0	0	4	0	0	4
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	1	3	7	10	2
Mvmt Flow	16	53	68	395	379	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	925	393	404	0	-	0
Stage 1	393	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Critical Hdwy	6.45	6.21	4.13	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.309	2.227	-	-	-
Pot Cap-1 Maneuver	295	658	1149	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	271	655	1149	-	-	-
Mov Cap-2 Maneuver	271	-	-	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	537	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.5	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1149	-	494	-	-
HCM Lane V/C Ratio	0.06	-	0.139	-	-
HCM Control Delay (s)	8.3	0	13.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	15	10	340	330	80
Future Vol, veh/h	105	15	10	340	330	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	170	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	11	6	9	7	10	11
Mvmt Flow	108	15	10	351	340	82

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	752	381	423	0	-	0
Stage 1	381	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.51	6.26	4.19	-	-	-
Critical Hdwy Stg 1	5.51	-	-	-	-	-
Critical Hdwy Stg 2	5.51	-	-	-	-	-
Follow-up Hdwy	3.599	3.354	2.281	-	-	-
Pot Cap-1 Maneuver	365	657	1100	-	-	-
Stage 1	671	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	361	657	1100	-	-	-
Mov Cap-2 Maneuver	361	-	-	-	-	-
Stage 1	671	-	-	-	-	-
Stage 2	672	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.1	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1100	-	361	657	-	-
HCM Lane V/C Ratio	0.009	-	0.3	0.024	-	-
HCM Control Delay (s)	8.3	0	19.2	10.6	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	340	5	15	330
Future Vol, veh/h	5	10	340	5	15	330
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	9	8	6	20	3	10
Mvmt Flow	5	10	351	5	15	340

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	724	353	0	0	356	0
Stage 1	353	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.49	6.28	-	-	4.13	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.372	-	-	2.227	-
Pot Cap-1 Maneuver	382	677	-	-	1197	-
Stage 1	696	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	376	677	-	-	1197	-
Mov Cap-2 Maneuver	376	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	534	1197	-
HCM Lane V/C Ratio	-	-	0.029	0.013	-
HCM Control Delay (s)	-	-	11.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	2050	1760	850	645	35
Future Volume (vph)	60	2050	1760	850	645	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1630	3228	3228	1444	1583	1439
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1630	3228	3228	1444	1583	1439
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	61	2092	1796	867	658	36
RTOR Reduction (vph)	0	0	0	147	0	17
Lane Group Flow (vph)	61	2092	1796	720	658	19
Confl. Peds. (#/hr)						1
Heavy Vehicles (%)	2%	3%	3%	3%	5%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	4.7	58.1	58.1	58.1	42.6	42.6
Effective Green, g (s)	4.7	59.1	59.1	59.1	43.1	43.1
Actuated g/C Ratio	0.04	0.50	0.50	0.50	0.36	0.36
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Vehicle Extension (s)	2.5	5.0	6.0	6.0	2.5	2.5
Lane Grp Cap (vph)	64	1604	1604	717	573	521
v/s Ratio Prot	c0.04	c0.65	0.56		c0.42	
v/s Ratio Perm				0.50		0.01
v/c Ratio	0.95	1.30	1.12	1.00	1.15	0.04
Uniform Delay, d1	57.0	29.9	29.9	29.9	37.9	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	95.3	141.6	62.9	34.7	85.7	0.0
Delay (s)	152.3	171.5	92.8	64.6	123.6	24.5
Level of Service	F	F	F	E	F	C
Approach Delay (s)		170.9	83.6		118.5	
Approach LOS		F	F		F	

Intersection Summary			
HCM 2000 Control Delay	122.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	118.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	1530	5	5	1100	690	0	5	5	575	5	145
Future Volume (vph)	165	1530	5	5	1100	690	0	5	5	575	5	145
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		3.5		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	0.95	1.00
Satd. Flow (prot)	1614	3227		1662	3228	1458		1600		1504	1510	1430
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00		0.95	0.95	1.00
Satd. Flow (perm)	1614	3227		1662	3228	1458		1600		1504	1510	1430
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)	174	1611	5	5	1158	726	0	5	5	605	5	153
RTOR Reduction (vph)	0	0	0	0	0	383	0	5	0	0	0	118
Lane Group Flow (vph)	174	1616	0	5	1158	343	0	5	0	302	308	35
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	3%	3%	0%	0%	3%	2%	0%	0%	4%	5%	0%	4%
Turn Type	Prot	NA		Prot	NA	Perm		NA		Split	NA	Prot
Protected Phases	5	2		1	6		8	8		4	4	4
Permitted Phases						6						
Actuated Green, G (s)	19.8	65.4		0.8	46.4	46.4		0.8		24.8	24.8	24.8
Effective Green, g (s)	20.3	67.1		1.3	48.1	48.1		1.8		25.3	25.3	25.3
Actuated g/C Ratio	0.18	0.60		0.01	0.43	0.43		0.02		0.23	0.23	0.23
Clearance Time (s)	4.5	5.7		4.5	5.7	5.7		4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.7		2.5	4.7	4.7		2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	295	1950		19	1398	631		25		342	344	325
v/s Ratio Prot	c0.11	c0.50		0.00	0.36			c0.00		0.20	c0.20	0.02
v/s Ratio Perm						0.24						
v/c Ratio	0.59	0.83		0.26	0.83	0.54		0.20		0.88	0.90	0.11
Uniform Delay, d1	41.5	17.4		54.4	27.8	23.3		53.9		41.4	41.6	33.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	3.4		5.3	4.6	1.5		2.9		22.4	24.3	0.1
Delay (s)	44.0	20.8		59.7	32.4	24.9		56.8		63.8	65.8	34.0
Level of Service	D	C		E	C	C		E		E	E	C
Approach Delay (s)		23.0			29.6			56.8			58.7	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	111.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	39.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	225	1670	5	5	1080	145	5	0	5	35	0	65
Future Vol, veh/h	225	1670	5	5	1080	145	5	0	5	35	0	65
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	190	-	-	-	-	90	-	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	3	3	2	2	2	0	0	0	0	0	0
Mvmt Flow	250	1856	6	6	1200	161	6	0	6	39	0	72

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1201	0	0	1861	0	0	2969	3570	931	2640	3573	601
Stage 1	-	-	-	-	-	-	2358	2358	-	1212	1212	-
Stage 2	-	-	-	-	-	-	611	1212	-	1428	2361	-
Critical Hdwy	4.16	-	-	4.14	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.23	-	-	2.22	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	571	-	-	321	-	-	6	6	272	~ 12	6	448
Stage 1	-	-	-	-	-	-	37	69	-	196	257	-
Stage 2	-	-	-	-	-	-	453	257	-	144	69	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	571	-	-	321	-	-	~ 3	3	272	~ 7	3	448
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 3	3	-	~ 7	3	-
Stage 1	-	-	-	-	-	-	21	39	-	110	235	-
Stage 2	-	-	-	-	-	-	348	235	-	79	39	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0.4	$ 1529.3	$ 1085
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	6	571	-	-	321	-	-	7	448
HCM Lane V/C Ratio	1.852	0.438	-	-	0.017	-	-	5.556	0.161
HCM Control Delay (s)	$ 1529.3	16.1	-	-	16.4	0.4		$ 3072.8	14.6
HCM Lane LOS	F	C	-	-	C	A	-	F	B
HCM 95th %tile Q(veh)	2.4	2.2	-	-	0.1	-	-	6.3	0.6

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	183.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	115	1835	1010	135	60	50
Future Vol, veh/h	115	1835	1010	135	60	50
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	540	-	-	330	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	6	9	3
Mvmt Flow	125	1995	1098	147	65	54

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1099	0	-	0	3344	1099
Stage 1	-	-	-	-	1099	-
Stage 2	-	-	-	-	2245	-
Critical Hdwy	4.11	-	-	-	6.49	6.23
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	2.209	-	-	-	3.581	3.327
Pot Cap-1 Maneuver	639	-	-	0	~ 8	257
Stage 1	-	-	-	0	309	-
Stage 2	-	-	-	0	82	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	639	-	-	-	~ 6	257
Mov Cap-2 Maneuver	-	-	-	-	~ 6	-
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	66	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	$ 5108.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	639	-	-	11
HCM Lane V/C Ratio	0.196	-	-	10.87
HCM Control Delay (s)	12	-	-	$ 5108.7
HCM Lane LOS	B	-	-	F
HCM 95th %tile Q(veh)	0.7	-	-	16.3

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	378.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	130	0	15	0	0	5	20	1815	5	0	870	195
Future Vol, veh/h	130	0	15	0	0	5	20	1815	5	0	870	195
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	-	-	15	-	-	-	445	-	-	400	-	339
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	0	6	100	0	0	2	2	0	0	2	2
Mvmt Flow	140	0	16	0	0	5	22	1952	5	0	935	210

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2935	2935	935	2932	2932	1954	935	0	0	1957	0	0
Stage 1	935	935	-	1997	1997	-	-	-	-	-	-	-
Stage 2	2000	2000	-	935	935	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.5	6.26	8.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4	3.354	4.4	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 9	15	316	4	15	81	732	-	-	302	-	0
Stage 1	320	347	-	43	106	-	-	-	-	-	-	0
Stage 2	~ 78	106	-	217	347	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 8	15	316	4	15	81	732	-	-	302	-	-
Mov Cap-2 Maneuver	~ 8	15	-	4	15	-	-	-	-	-	-	-
Stage 1	310	347	-	42	103	-	-	-	-	-	-	-
Stage 2	~ 71	103	-	206	347	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	7459.2	52.6	0.1	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT
Capacity (veh/h)	732	-	-	8	316	81	302	-
HCM Lane V/C Ratio	0.029	-	-	17.473	0.051	0.066	-	-
HCM Control Delay (s)	10.1	-	$	8317.9	17	52.6	0	-
HCM Lane LOS	B	-	-	F	C	F	A	-
HCM 95th %tile Q(veh)	0.1	-	-	19.2	0.2	0.2	0	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	15	20	1830	885	5
Future Vol, veh/h	5	15	20	1830	885	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	3	2	3	0
Mvmt Flow	5	16	22	1989	962	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2995	962	962	0	-	0
Stage 1	962	-	-	-	-	-
Stage 2	2033	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.13	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.227	-	-	-
Pot Cap-1 Maneuver	15	313	711	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	112	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	15	313	711	-	-	-
Mov Cap-2 Maneuver	15	-	-	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	112	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	117	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	711	-	52	-	-
HCM Lane V/C Ratio	0.031	-	0.418	-	-
HCM Control Delay (s)	10.2	0	117	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	1.5	-	-

Intersection Level Of Service Report
Intersection 4: US20/OR34 & 53rd St

Control Type:	Signalized	Delay (sec / veh):	117.6
Analysis Method:	HCM 2000	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.019

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			45.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	155	270	81	201	265	121	121	673	86	121	730	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	0.00	2.00	2.00	0.00	5.00	4.00	2.00	1.00	4.00	1.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	8	0	0	11	0	0	9	0	0	65
Total Hourly Volume [veh/h]	155	270	73	201	265	110	121	673	77	121	730	194
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	40	69	19	51	68	28	31	172	20	31	186	49
Total Analysis Volume [veh/h]	158	276	74	205	270	112	123	687	79	123	745	198
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			16			0			16		
Bicycle Volume [bicycles/h]	2			1			1			1		

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	110	5	15	105
Future Vol, veh/h	5	10	110	5	15	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	8	9	18	7	3
Mvmt Flow	5	11	120	5	16	114

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	269	122	0	0	125	0
Stage 1	122	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Critical Hdwy	6.45	6.28	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.372	-	-	2.263	-
Pot Cap-1 Maneuver	714	913	-	-	1431	-
Stage 1	896	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	705	913	-	-	1431	-
Mov Cap-2 Maneuver	705	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	831	1431	-
HCM Lane V/C Ratio	-	-	0.02	0.011	-
HCM Control Delay (s)	-	-	9.4	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	45	10	35	55	5	5	5	40	5	5	0
Future Vol, veh/h	0	45	10	35	55	5	5	5	40	5	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	20	-	-	20	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	7	22	4	2	0	4	0	7	0	0	0
Mvmt Flow	0	61	14	47	74	7	7	7	54	7	7	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	74	0	0	61	0	0	233	230	61	260	230	74
Stage 1	-	-	-	-	-	-	61	61	-	169	169	-
Stage 2	-	-	-	-	-	-	172	169	-	91	61	-
Critical Hdwy	4.1	-	-	4.14	-	-	7.14	6.5	6.27	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.236	-	-	3.536	4	3.363	3.5	4	3.3
Pot Cap-1 Maneuver	1538	-	-	1530	-	-	718	673	990	697	673	993
Stage 1	-	-	-	-	-	-	945	848	-	838	763	-
Stage 2	-	-	-	-	-	-	825	763	-	921	848	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1538	-	-	1530	-	-	695	651	990	638	651	993
Mov Cap-2 Maneuver	-	-	-	-	-	-	695	651	-	638	651	-
Stage 1	-	-	-	-	-	-	945	848	-	838	739	-
Stage 2	-	-	-	-	-	-	791	739	-	864	848	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.7	9.3	10.7
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	905	1538	-	-	1530	-	-	644
HCM Lane V/C Ratio	0.075	-	-	-	0.031	-	-	0.021
HCM Control Delay (s)	9.3	0	-	-	7.4	0	-	10.7
HCM Lane LOS	A	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	15	25	5	10	30
Future Vol, veh/h	5	15	25	5	10	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	10	10	0	15	7
Mvmt Flow	5	16	27	5	11	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	84	30	0	0	33	0
Stage 1	30	-	-	-	-	-
Stage 2	54	-	-	-	-	-
Critical Hdwy	6.4	6.3	-	-	4.25	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.39	-	-	2.335	-
Pot Cap-1 Maneuver	923	1022	-	-	1499	-
Stage 1	998	-	-	-	-	-
Stage 2	974	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	917	1022	-	-	1499	-
Mov Cap-2 Maneuver	917	-	-	-	-	-
Stage 1	998	-	-	-	-	-
Stage 2	967	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	1.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	994	1499	-
HCM Lane V/C Ratio	-	-	0.022	0.007	-
HCM Control Delay (s)	-	-	8.7	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			✥			✥			✥	
Traffic Vol, veh/h	65	185	0	25	100	30	5	10	10	20	5	30
Future Vol, veh/h	65	185	0	25	100	30	5	10	10	20	5	30
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	4	5	0	0	3	0	0	0	0	2	0	3
Mvmt Flow	68	195	0	26	105	32	5	11	11	21	5	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	138	0	-	196	0	0	525	523	196	517	508	122
Stage 1	-	-	-	-	-	-	333	333	-	175	175	-
Stage 2	-	-	-	-	-	-	192	190	-	342	333	-
Critical Hdwy	4.14	-	-	4.1	-	-	7.1	6.5	6.2	7.12	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	3.5	4	3.3	3.518	4	3.327
Pot Cap-1 Maneuver	1433	-	0	1389	-	-	466	462	850	469	471	926
Stage 1	-	-	0	-	-	-	685	647	-	827	758	-
Stage 2	-	-	0	-	-	-	814	747	-	673	647	-
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	1433	-	-	1389	-	-	421	428	849	429	436	925
Mov Cap-2 Maneuver	-	-	-	-	-	-	421	428	-	429	436	-
Stage 1	-	-	-	-	-	-	648	612	-	782	742	-
Stage 2	-	-	-	-	-	-	765	731	-	619	612	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	1.2	12.1	11.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	532	1433	-	1389	-	-	608
HCM Lane V/C Ratio	0.049	0.048	-	0.019	-	-	0.095
HCM Control Delay (s)	12.1	7.6	-	7.6	0	-	11.5
HCM Lane LOS	B	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	-	0.1	-	-	0.3

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	155	50	115	110	80	130
Future Vol, veh/h	155	50	115	110	80	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	3	1	0	4	0
Mvmt Flow	182	59	135	129	94	153

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	241	0	612	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	400	-
Critical Hdwy	-	-	4.11	-	6.44	6.2
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.209	-	3.536	3.3
Pot Cap-1 Maneuver	-	-	1331	-	453	833
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	673	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1331	-	404	833
Mov Cap-2 Maneuver	-	-	-	-	404	-
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	600	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.1	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	593	-	-	1331	-
HCM Lane V/C Ratio	0.417	-	-	0.102	-
HCM Control Delay (s)	15.3	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	205	170	5	5	5
Future Vol, veh/h	15	205	170	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	20	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	8	6	2	0	0	19
Mvmt Flow	18	241	200	6	6	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	200	0	-	0	476	206
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	276	-
Critical Hdwy	4.18	-	-	-	6.4	6.39
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.272	-	-	-	3.5	3.471
Pot Cap-1 Maneuver	1337	-	-	-	551	793
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1329	-	-	-	542	788
Mov Cap-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	763	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1329	-	-	-	642
HCM Lane V/C Ratio	0.013	-	-	-	0.018
HCM Control Delay (s)	7.7	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	110	35	45	115	145	130
Future Vol, veh/h	110	35	45	115	145	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	5	7	0	0	0
Mvmt Flow	116	37	47	121	153	137

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	437	221	289	0	-	0
Stage 1	221	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.42	6.25	4.17	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.345	2.263	-	-	-
Pot Cap-1 Maneuver	577	811	1245	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	820	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	554	811	1245	-	-	-
Mov Cap-2 Maneuver	554	-	-	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	787	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1245	-	600	-	-
HCM Lane V/C Ratio	0.038	-	0.254	-	-
HCM Control Delay (s)	8	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	25	10	200	35	35	10	10	200	30	5	0
Future Vol, veh/h	55	25	10	200	35	35	10	10	200	30	5	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	0	8	0	2	4	0	0	0	0	6	0	0
Mvmt Flow	58	26	11	211	37	37	11	11	211	32	5	0
Number of Lanes	0	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	8.8	10.7	9.3	8.9
HCM LOS	A	B	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	50%	0%	61%	74%	86%
Vol Thru, %	50%	0%	28%	13%	14%
Vol Right, %	0%	100%	11%	13%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	200	90	270	35
LT Vol	10	0	55	200	30
Through Vol	10	0	25	35	5
RT Vol	0	200	10	35	0
Lane Flow Rate	21	211	95	284	37
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.033	0.278	0.13	0.377	0.056
Departure Headway (Hd)	5.714	4.756	4.956	4.769	5.502
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	624	752	719	750	646
Service Time	3.469	2.51	3.019	2.818	3.575
HCM Lane V/C Ratio	0.034	0.281	0.132	0.379	0.057
HCM Control Delay	8.7	9.4	8.8	10.7	8.9
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.1	1.1	0.4	1.8	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	370	30	10	530	595	425
Future Volume (vph)	370	30	10	530	595	425
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1614	1444	1409	1716	1571	
Flt Permitted	0.95	1.00	0.07	1.00	1.00	
Satd. Flow (perm)	1614	1444	99	1716	1571	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	385	31	10	552	620	443
RTOR Reduction (vph)	0	24	0	0	21	0
Lane Group Flow (vph)	385	7	10	552	1042	0
Confl. Peds. (#/hr)	20		13			13
Heavy Vehicles (%)	3%	3%	18%	2%	2%	4%
Turn Type	Prot	Prot	pm+pt	NA	NA	
Protected Phases	8	8	1	6	2	
Permitted Phases			6			
Actuated Green, G (s)	26.0	26.0	73.7	73.1	73.1	
Effective Green, g (s)	28.0	28.0	77.7	75.1	75.1	
Actuated g/C Ratio	0.24	0.24	0.66	0.64	0.64	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	2.5	2.5	2.5	0.2	0.2	
Lane Grp Cap (vph)	383	343	94	1094	1002	
v/s Ratio Prot	c0.24	0.01	c0.00	0.32	c0.66	
v/s Ratio Perm			0.07			
v/c Ratio	1.01	0.02	0.11	0.50	1.04	
Uniform Delay, d1	44.9	34.4	21.2	11.4	21.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	47.3	0.0	0.4	0.1	39.4	
Delay (s)	92.1	34.4	21.6	11.5	60.7	
Level of Service	F	C	C	B	E	
Approach Delay (s)	87.8			11.7	60.7	
Approach LOS	F			B	E	

Intersection Summary			
HCM 2000 Control Delay	52.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	117.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Generated with PTV VISTRO
Version 5.00-03

Intersection Level Of Service Report
Intersection 1: SW 53rd St & Country Club Dr

Control Type:	Roundabout	Delay (sec / veh):	5.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	SW 53rd St			SW 53rd St			SW Country Club Dr			SW Country Club Dr		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			35.00			35.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	SW 53rd St			SW 53rd St			SW Country Club Dr			SW Country Club Dr		
Base Volume Input [veh/h]	10	180	30	45	270	40	75	75	5	0	45	80
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	0.00	5.00	1.00	5.00	2.00	8.00	3.00	0.00	0.00	3.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	180	30	45	270	40	75	75	5	0	45	80
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	49	8	12	73	11	20	20	1	0	12	22
Total Analysis Volume [veh/h]	11	196	33	49	293	43	82	82	5	0	49	87
Pedestrian Volume [ped/h]	2			2			0			0		

Intersection Level Of Service Report
Intersection 20: Harrison & 53rd

Control Type:	Signalized	Delay (sec / veh):	19.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.785

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	1	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			50.00			50.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	56	444	255	39	527	56	33	83	39	389	100	44
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	27	0	0	5	0	0	4	0	0	4
Total Hourly Volume [veh/h]	56	444	228	39	527	51	33	83	35	389	100	40
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	117	60	10	139	13	9	22	9	102	26	11
Total Analysis Volume [veh/h]	59	467	240	41	555	54	35	87	37	409	105	42
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	15			0			8			0		
Bicycle Volume [bicycles/h]	0			0			0			2		

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	5	25	515	495	5
Future Vol, veh/h	45	5	25	515	495	5
Conflicting Peds, #/hr	1	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	64	64	64	64	64	64
Heavy Vehicles, %	1	0	0	1	2	4
Mvmt Flow	70	8	39	805	773	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1661	777	781	0	-	0
Stage 1	777	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	108	400	845	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	405	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	99	400	845	-	-	-
Mov Cap-2 Maneuver	99	-	-	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	371	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	99.3	0.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	845	-	107	-	-
HCM Lane V/C Ratio	0.046	-	0.73	-	-
HCM Control Delay (s)	9.5	0	99.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	3.9	-	-

Intersection	
Int Delay, s/veh	14.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	40	55	165	40	5	125	10	320	5	0	0
Future Vol, veh/h	0	40	55	165	40	5	125	10	320	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	130	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	8	1	2	5	0	1	0	1	0	0	0
Mvmt Flow	0	44	61	183	44	6	139	11	356	6	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	50	0	0	106	0	0	489	492	75	672	520	47
Stage 1	-	-	-	-	-	-	75	75	-	414	414	-
Stage 2	-	-	-	-	-	-	414	417	-	258	106	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.11	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.509	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	1570	-	-	1485	-	-	491	481	989	372	463	1028
Stage 1	-	-	-	-	-	-	937	836	-	620	597	-
Stage 2	-	-	-	-	-	-	618	595	-	751	811	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1570	-	-	1485	-	-	445	422	989	212	406	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	445	422	-	212	406	-
Stage 1	-	-	-	-	-	-	937	836	-	620	523	-
Stage 2	-	-	-	-	-	-	542	522	-	475	811	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	6.1	20.6	22.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	724	1570	-	-	1485	-	-	212
HCM Lane V/C Ratio	0.698	-	-	-	0.123	-	-	0.026
HCM Control Delay (s)	20.6	0	-	-	7.8	-	-	22.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	5.7	0	-	-	0.4	-	-	0.1

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	340	105	10	480	0	155	0	15	0	0	0
Future Vol, veh/h	0	340	105	10	480	0	155	0	15	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	70	-	-	-	-	-	25	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	4	12	15	3	0	5	0	0	0	0	0
Mvmt Flow	0	374	115	11	527	0	170	0	16	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	527	0	0	374	0	0	923	923	374	923	923	527
Stage 1	-	-	-	-	-	-	374	374	-	549	549	-
Stage 2	-	-	-	-	-	-	549	549	-	374	374	-
Critical Hdwy	4.1	-	-	4.25	-	-	7.15	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.335	-	-	3.545	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1050	-	-	1117	-	-	247	272	677	252	272	555
Stage 1	-	-	-	-	-	-	641	621	-	524	520	-
Stage 2	-	-	-	-	-	-	515	520	-	651	621	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1050	-	-	1117	-	-	244	268	677	243	268	555
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	268	-	243	268	-
Stage 1	-	-	-	-	-	-	641	621	-	524	513	-
Stage 2	-	-	-	-	-	-	508	513	-	635	621	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	44.7	0
HCM LOS			E	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	677	1050	-	-	1117	-	-	-
HCM Lane V/C Ratio	0.698	0.024	-	-	-	0.01	-	-	-
HCM Control Delay (s)	48	10.5	0	-	-	8.3	0	-	0
HCM Lane LOS	E	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	4.6	0.1	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	130	50	55	95	30
Future Vol, veh/h	20	130	50	55	95	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	200	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	13	6	4	22	7	1
Mvmt Flow	22	141	54	60	103	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	323	84	0	0	114	0
Stage 1	84	-	-	-	-	-
Stage 2	239	-	-	-	-	-
Critical Hdwy	6.53	6.26	-	-	4.17	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.354	-	-	2.263	-
Pot Cap-1 Maneuver	649	964	-	-	1445	-
Stage 1	912	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	602	964	-	-	1445	-
Mov Cap-2 Maneuver	602	-	-	-	-	-
Stage 1	912	-	-	-	-	-
Stage 2	719	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	5.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	602	964	1445	-
HCM Lane V/C Ratio	-	-	0.036	0.147	0.071	-
HCM Control Delay (s)	-	-	11.2	9.4	7.7	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.5	0.2	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	45	50	60	25	25
Future Vol, veh/h	45	45	50	60	25	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	35	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	27	12	14	4	5	4
Mvmt Flow	50	50	56	67	28	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	220	42	56	0	-	0
Stage 1	42	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.67	6.32	4.24	-	-	-
Critical Hdwy Stg 1	5.67	-	-	-	-	-
Critical Hdwy Stg 2	5.67	-	-	-	-	-
Follow-up Hdwy	3.743	3.408	2.326	-	-	-
Pot Cap-1 Maneuver	716	1001	1475	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	688	1001	1475	-	-	-
Mov Cap-2 Maneuver	688	-	-	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	765	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	3.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1475	-	688	1001	-	-
HCM Lane V/C Ratio	0.038	-	0.073	0.05	-	-
HCM Control Delay (s)	7.5	0	10.6	8.8	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	90	195	185	100	50	35
Future Vol, veh/h	90	195	185	100	50	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	3	0	8	10	0
Mvmt Flow	102	222	210	114	57	40

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	611	77	97	0	-	0
Stage 1	77	-	-	-	-	-
Stage 2	534	-	-	-	-	-
Critical Hdwy	6.41	6.23	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.327	2.2	-	-	-
Pot Cap-1 Maneuver	459	981	1509	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	391	981	1509	-	-	-
Mov Cap-2 Maneuver	391	-	-	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	502	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1509	-	391	981	-	-
HCM Lane V/C Ratio	0.139	-	0.262	0.226	-	-
HCM Control Delay (s)	7.8	0	17.4	9.7	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.5	-	1	0.9	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	45	240	245	130	115
Future Vol, veh/h	65	45	240	245	130	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	30	90	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	3	7	3	5	10
Mvmt Flow	71	49	264	269	143	126

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	676	264	0	0	264	0
Stage 1	264	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Critical Hdwy	6.41	6.23	-	-	4.15	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.327	-	-	2.245	-
Pot Cap-1 Maneuver	420	772	-	-	1283	-
Stage 1	783	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	373	772	-	-	1283	-
Mov Cap-2 Maneuver	373	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	596	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	4.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	473	1283	-
HCM Lane V/C Ratio	-	-	0.256	0.111	-
HCM Control Delay (s)	-	-	15.2	8.2	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1	0.4	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	35	15	15	50	40	15	90	10	40	105	30
Future Vol, veh/h	20	35	15	15	50	40	15	90	10	40	105	30
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	20	-	-	20	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	10	0	1	0	17	11	5	7	12	2
Mvmt Flow	21	37	16	16	53	42	16	95	11	42	111	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	370	348	126	361	358	101	142	0	0	105	0	0
Stage 1	211	211	-	132	132	-	-	-	-	-	-	-
Stage 2	159	137	-	229	226	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.3	7.1	6.51	6.2	4.27	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.39	3.5	4.009	3.3	2.353	-	-	2.263	-	-
Pot Cap-1 Maneuver	587	576	903	598	570	960	1354	-	-	1456	-	-
Stage 1	791	728	-	876	789	-	-	-	-	-	-	-
Stage 2	843	783	-	778	719	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	502	551	903	539	545	959	1354	-	-	1455	-	-
Mov Cap-2 Maneuver	502	551	-	539	545	-	-	-	-	-	-	-
Stage 1	781	705	-	865	779	-	-	-	-	-	-	-
Stage 2	741	773	-	702	697	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.9	11.2	1	1.7
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1354	-	-	532	903	544	959	1455	-	-
HCM Lane V/C Ratio	0.012	-	-	0.109	0.017	0.126	0.044	0.029	-	-
HCM Control Delay (s)	7.7	0	-	12.6	9.1	12.6	8.9	7.5	0	-
HCM Lane LOS	A	A	-	B	A	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0.4	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	55	10	5	20	0	5	20	5	0	20	5
Future Vol, veh/h	55	55	10	5	20	0	5	20	5	0	20	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	13	13	14	5	21	12	12	6	9	0	6	17
Mvmt Flow	63	63	11	6	23	0	6	23	6	0	23	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	23	0	0	74	0	0	241	227	68	241	233	23
Stage 1	-	-	-	-	-	-	193	193	-	34	34	-
Stage 2	-	-	-	-	-	-	48	34	-	207	199	-
Critical Hdwy	4.23	-	-	4.15	-	-	7.22	6.56	6.29	7.1	6.56	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	6.22	5.56	-	6.1	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.22	5.56	-	6.1	5.56	-
Follow-up Hdwy	2.317	-	-	2.245	-	-	3.608	4.054	3.381	3.5	4.054	3.453
Pot Cap-1 Maneuver	1524	-	-	1507	-	-	693	665	976	717	660	1012
Stage 1	-	-	-	-	-	-	786	733	-	987	859	-
Stage 2	-	-	-	-	-	-	941	859	-	800	729	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1524	-	-	1507	-	-	646	634	976	669	629	1012
Mov Cap-2 Maneuver	-	-	-	-	-	-	646	634	-	669	629	-
Stage 1	-	-	-	-	-	-	752	701	-	945	856	-
Stage 2	-	-	-	-	-	-	907	856	-	736	698	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.4	1.5	10.6	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	676	1524	-	-	1507	-	-	681
HCM Lane V/C Ratio	0.05	0.041	-	-	0.004	-	-	0.042
HCM Control Delay (s)	10.6	7.5	0	-	7.4	0	-	10.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	30	5	5	40	40	5	10	5	40	10	5
Future Vol, veh/h	10	30	5	5	40	40	5	10	5	40	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	7	17	0	9	2	10	11	20	7	4	29
Mvmt Flow	11	33	5	5	43	43	5	11	5	43	11	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	87	0	0	38	0	0	141	155	35	141	136	65
Stage 1	-	-	-	-	-	-	57	57	-	76	76	-
Stage 2	-	-	-	-	-	-	84	98	-	65	60	-
Critical Hdwy	4.2	-	-	4.1	-	-	7.2	6.61	6.4	7.17	6.54	6.49
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.61	-	6.17	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.61	-	6.17	5.54	-
Follow-up Hdwy	2.29	-	-	2.2	-	-	3.59	4.099	3.48	3.563	4.036	3.561
Pot Cap-1 Maneuver	1460	-	-	1585	-	-	811	721	989	817	751	928
Stage 1	-	-	-	-	-	-	935	830	-	921	828	-
Stage 2	-	-	-	-	-	-	905	797	-	933	841	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1585	-	-	791	713	989	796	743	928
Mov Cap-2 Maneuver	-	-	-	-	-	-	791	713	-	796	743	-
Stage 1	-	-	-	-	-	-	928	823	-	914	826	-
Stage 2	-	-	-	-	-	-	885	795	-	908	834	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0.4	9.7	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	787	1460	-	-	1585	-	-	796
HCM Lane V/C Ratio	0.028	0.007	-	-	0.003	-	-	0.075
HCM Control Delay (s)	9.7	7.5	0	-	7.3	0	-	9.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	5	50	0	0	0	35	80	0	0	110	45
Future Vol, veh/h	45	5	50	0	0	0	35	80	0	0	110	45
Conflicting Peds, #/hr	1	0	0	0	0	1	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	9	0	0	0	0	2	11	0	0	8	3
Mvmt Flow	48	5	53	0	0	0	37	85	0	0	117	48

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	303	302	142	330	326	86	166	0	0	85	0	0
Stage 1	142	142	-	160	160	-	-	-	-	-	-	-
Stage 2	161	160	-	170	166	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.59	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.59	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.59	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.081	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	647	599	911	627	596	978	1412	-	-	1524	-	-
Stage 1	859	766	-	847	769	-	-	-	-	-	-	-
Stage 2	839	752	-	837	765	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	632	582	910	574	579	977	1412	-	-	1523	-	-
Mov Cap-2 Maneuver	632	582	-	574	579	-	-	-	-	-	-	-
Stage 1	834	765	-	823	747	-	-	-	-	-	-	-
Stage 2	815	731	-	783	764	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	0	2.3	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1412	-	-	742	-	1523	-	-
HCM Lane V/C Ratio	0.026	-	-	0.143	-	-	-	-
HCM Control Delay (s)	7.6	0	-	10.7	0	0	-	-
HCM Lane LOS	A	A	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	-	0	-	-

Intersection	
Int Delay, s/veh	5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	75	0	10	45	5	35
Future Vol, veh/h	75	0	10	45	5	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	-	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	0	15	5	13	3
Mvmt Flow	85	0	11	51	6	40

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	62	11	0	-	11	0
Stage 1	11	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Critical Hdwy	6.43	6.2	-	-	4.23	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.3	-	-	2.317	-
Pot Cap-1 Maneuver	942	1076	-	0	1539	-
Stage 1	1009	-	-	0	-	-
Stage 2	969	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	938	1076	-	-	1539	-
Mov Cap-2 Maneuver	938	-	-	-	-	-
Stage 1	1009	-	-	-	-	-
Stage 2	965	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	WBLn1	SBL	SBT
Capacity (veh/h)	-	938	1539	-
HCM Lane V/C Ratio	-	0.091	0.004	-
HCM Control Delay (s)	-	9.2	7.3	0
HCM Lane LOS	-	A	A	A
HCM 95th %tile Q(veh)	-	0.3	0	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	50	5	5	65	10	5	0	10	5	0	10
Future Vol, veh/h	10	50	5	5	65	10	5	0	10	5	0	10
Conflicting Peds, #/hr	2	0	8	8	0	2	3	0	5	5	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	21	1	0	0	3	0	0	0	0	8	0	11
Mvmt Flow	12	59	6	6	76	12	6	0	12	6	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	90	0	0	73	0	0	196	195	75	192	192	87
Stage 1	-	-	-	-	-	-	93	93	-	96	96	-
Stage 2	-	-	-	-	-	-	103	102	-	96	96	-
Critical Hdwy	4.31	-	-	4.1	-	-	7.1	6.5	6.2	7.18	6.5	6.31
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.18	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.18	5.5	-
Follow-up Hdwy	2.389	-	-	2.2	-	-	3.5	4	3.3	3.572	4	3.399
Pot Cap-1 Maneuver	1394	-	-	1540	-	-	767	704	992	755	707	947
Stage 1	-	-	-	-	-	-	919	822	-	896	819	-
Stage 2	-	-	-	-	-	-	908	815	-	896	819	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1390	-	-	1533	-	-	742	688	980	734	691	942
Mov Cap-2 Maneuver	-	-	-	-	-	-	742	688	-	734	691	-
Stage 1	-	-	-	-	-	-	904	808	-	886	814	-
Stage 2	-	-	-	-	-	-	891	810	-	873	805	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0.5	9.2	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	885	1390	-	-	1533	-	-	861
HCM Lane V/C Ratio	0.02	0.008	-	-	0.004	-	-	0.02
HCM Control Delay (s)	9.2	7.6	0	-	7.4	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	240	45	45	320	35	25
Future Vol, veh/h	240	45	45	320	35	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	5	5	6	12	7
Mvmt Flow	282	53	53	376	41	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	335	0	791	309
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	482	-
Critical Hdwy	-	-	4.15	-	6.52	6.27
Critical Hdwy Stg 1	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	-	5.52	-
Follow-up Hdwy	-	-	2.245	-	3.608	3.363
Pot Cap-1 Maneuver	-	-	1208	-	345	719
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	601	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1208	-	326	719
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	15.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	422	-	-	1208	-
HCM Lane V/C Ratio	0.167	-	-	0.044	-
HCM Control Delay (s)	15.2	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-

Intersection	
Int Delay, s/veh	19.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	135	5	335	5	5	5	200	245	5	0	205	65
Future Vol, veh/h	135	5	335	5	5	5	200	245	5	0	205	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	80	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	5	0	3	0	0	0	4	1	0	0	3	5
Mvmt Flow	159	6	394	6	6	6	235	288	6	0	241	76

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1047	1044	279	1044	1080	291	318	0	0	294	0	0
Stage 1	279	279	-	762	762	-	-	-	-	-	-	-
Stage 2	768	765	-	282	318	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.5	6.23	7.1	6.5	6.2	4.14	-	-	4.1	-	-
Critical Hdwy Stg 1	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4	3.327	3.5	4	3.3	2.236	-	-	2.2	-	-
Pot Cap-1 Maneuver	203	231	757	209	220	753	1231	-	-	1279	-	-
Stage 1	721	683	-	400	416	-	-	-	-	-	-	-
Stage 2	390	415	-	729	657	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	168	187	757	83	178	753	1231	-	-	1279	-	-
Mov Cap-2 Maneuver	168	187	-	83	178	-	-	-	-	-	-	-
Stage 1	583	683	-	324	337	-	-	-	-	-	-	-
Stage 2	308	336	-	346	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45	30.6	3.8	0
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1231	-	-	169	757	158	1279	-	-
HCM Lane V/C Ratio	0.191	-	-	0.975	0.521	0.112	-	-	-
HCM Control Delay (s)	8.6	-	-	117.4	14.8	30.6	0	-	-
HCM Lane LOS	A	-	-	F	B	D	A	-	-
HCM 95th %tile Q(veh)	0.7	-	-	7.6	3.1	0.4	0	-	-

Intersection	
Int Delay, s/veh	23.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	155	165	110	295	85
Future Vol, veh/h	20	155	165	110	295	85
Conflicting Peds, #/hr	0	0	0	1	1	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	60	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	0	0	3	3
Mvmt Flow	22	172	183	122	328	94

Major/Minor	Minor1		Minor2		Major2	
Conflicting Flow All	905	-	751	95	1	0
Stage 1	1	-	750	-	-	-
Stage 2	904	-	1	-	-	-
Critical Hdwy	7.12	-	6.5	6.2	4.13	-
Critical Hdwy Stg 1	-	-	5.5	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	-	4	3.3	2.227	-
Pot Cap-1 Maneuver	257	0	342	967	1615	-
Stage 1	-	0	422	-	-	-
Stage 2	331	0	-	-	-	-
Platoon blocked, %						-
Mov Cap-1 Maneuver	87	-	269	967	1615	-
Mov Cap-2 Maneuver	87	-	269	-	-	-
Stage 1	-	-	332	-	-	-
Stage 2	102	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60	44.4	6.1
HCM LOS	F	E	

Minor Lane/Major Mvmt	NBLn1	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	378	87	-	1615	-
HCM Lane V/C Ratio	0.808	0.255	-	0.203	-
HCM Control Delay (s)	44.4	60	0	7.8	0
HCM Lane LOS	E	F	A	A	A
HCM 95th %tile Q(veh)	7.1	0.9	-	0.8	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	95	25	10	10	150	485	25	10	290	15
Future Vol, veh/h	15	10	95	25	10	10	150	485	25	10	290	15
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	20	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	3	2	2	25	20	2	3	1	8	8	0
Mvmt Flow	16	11	104	27	11	11	165	533	27	11	319	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1233	1241	330	1284	1235	547	337	0	0	560	0	0
Stage 1	351	351	-	876	876	-	-	-	-	-	-	-
Stage 2	882	890	-	408	359	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.53	6.22	7.12	6.75	6.4	4.12	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.53	-	6.12	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.53	-	6.12	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.027	3.318	3.518	4.225	3.48	2.218	-	-	2.272	-	-
Pot Cap-1 Maneuver	155	174	712	142	159	504	1222	-	-	982	-	-
Stage 1	670	630	-	344	337	-	-	-	-	-	-	-
Stage 2	344	360	-	620	588	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	138	710	96	126	504	1221	-	-	982	-	-
Mov Cap-2 Maneuver	119	138	-	96	126	-	-	-	-	-	-	-
Stage 1	537	620	-	276	271	-	-	-	-	-	-	-
Stage 2	259	289	-	512	579	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.6	48.9	1.9	0.3
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1221	-	-	361	103	504	982	-	-
HCM Lane V/C Ratio	0.135	-	-	0.365	0.373	0.022	0.011	-	-
HCM Control Delay (s)	8.4	0	-	20.6	59.4	12.3	8.7	0	-
HCM Lane LOS	A	A	-	C	F	B	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	1.6	1.5	0.1	0	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	25	15	10	0
Future Vol, veh/h	0	60	25	15	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	13	13	21	12	0	17
Mvmt Flow	0	68	28	17	11	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	105	-
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	68	-
Critical Hdwy	-	-	-	-	6.4	-
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	-
Pot Cap-1 Maneuver	0	-	-	-	898	0
Stage 1	0	-	-	-	991	0
Stage 2	0	-	-	-	960	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	898	-
Mov Cap-2 Maneuver	-	-	-	-	898	-
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	960	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	898
HCM Lane V/C Ratio	-	-	-	0.013
HCM Control Delay (s)	-	-	-	9.1
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0

Preliminary Warrant Analysis

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	OR 99W	**Minor Street:**	Arnold Ave
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
	100 percent of standard warrants				
X	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	16200	N
	Minor	1	1850	800	
Case B	Major	1	9300	16200	N
	Minor	1	950	800	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	OR 99W	**Minor Street:**	Ryals Ave
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
	100 percent of standard warrants				
X	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	18700	N
	Minor	1	1850	1450	
Case B	Major	1	9300	18700	Y
	Minor	1	950	1450	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Scenic	**Minor Street:**	Oak Grove Dr
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
	100 percent of standard warrants				
X	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	7200	N
	Minor	1	1850	1400	
Case B	Major	1	9300	7200	N
	Minor	1	950	1400	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	US 20	**Minor Street:**	Granger
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

	100 percent of standard warrants
X	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	29050	N
	Minor	1	1850	1300	
Case B	Major	1	9300	29050	Y
	Minor	1	950	1300	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	US 20	**Minor Street:**	Independence Hwy
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
	100 percent of standard warrants				
X	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	30950	N
	Minor	1	1850	600	
Case B	Major	1	9300	30950	N
	Minor	1	950	600	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	US 20	**Minor Street:**	Scenic Dr
Project:	Benton County TSP Update	**City/County:**	Benton County
Year:	2040	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
	100 percent of standard warrants				
X	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	6200	31200	N
	Minor	1	1850	350	
Case B	Major	1	9300	31200	N
	Minor	1	950	350	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Analysis Methodology Memorandum

DKS

ANALYSIS METHODOLOGY MEMORANDUM

DATE: October 5, 2017

TO: Christina McDaniel-Wilson | TPAU

Keith Blair | Region 2 Traffic

FROM: John Bosket, PE | DKS Associates

Ben Chaney, EI | DKS Associates

SUBJECT: Benton County TSP Analysis Methodology Memorandum

The purpose of this memorandum is to gain concurrence from the Benton County Transportation System Plan (TSP) Update Project Management Team (PMT) on the proposed methodology and assumptions used for existing conditions, future conditions, and alternative analysis for the project. Topics include:

- Seasonal factors used to calculate the 30th highest annual hour of traffic (30-HV) volumes and average day volumes based on four-hour weekday PM peak period traffic counts collected generally in late May and early June of 2017.
- Future forecasting methods and assumptions for State and County roads including CALM model post-processing methodology.
- Alternative analysis methods and assumption for peak hour factors and multimodal evaluations.

STUDY LOCATIONS

The Benton County TSP Update will use traffic volumes at a variety of locations throughout the county including rural and urban roads, state and local jurisdictions, four-hour turn movement counts and 24-hour tube counts. The locations are summarized in Table 1 below.

Table 1: Traffic Count Summary

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
1	State Highway Intersections	OR 99W/Coffin Butte Road/Camp Adair Road	Wednesday, May 31, 2017	4:45 PM	931
2	State Highway Intersections	OR 99W/Blake Drive/NE Arnold Avenue	Tuesday, June 6, 2017	5:00 PM	1,146
3	State Highway Intersections	OR 99W/NE Vandenberg Ave	Tuesday, June 6, 2017	4:45 PM	1,065

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
4	State Highway Intersections	OR 99W/NW Arboretum Road/NW Ryals Avenue	Tuesday, June 6, 2017	4:45 PM	1,149
5	State Highway Intersections	OR 99W/NW Lewisburg Avenue/NE Granger Avenue	Wednesday, May 31, 2017	4:45 PM	1,803
6	State Highway Intersections	OR 99W/Llewellyn Road	Tuesday, June 6, 2017	4:45 PM	527
7	State Highway Intersections	OR 99W/Greenberry Road	Tuesday, June 6, 2017	4:45 PM	556
8	State Highway Intersections	OR 99W/Old River Road	Tuesday, June 6, 2017	4:45 PM	515
9	State Highway Intersections	OR 99W/Dawson Road/Hubbard Road	Tuesday, June 6, 2017	4:45 PM	520
10	State Highway Intersections	OR 99W/Alpine Road	Tuesday, June 6, 2017	4:45 PM	495
11	State Highway Intersections	OR 99W/Orchard Street	Tuesday, June 6, 2017	4:30 PM	684
12	State Highway Intersections	OR 99W/Territorial Highway	Tuesday, June 6, 2017	4:30 PM	692
13	State Highway Intersections	OR 99W/W Ingram Island Road	Tuesday, June 6, 2017	4:30 PM	522
14	State Highway Intersections	US 20/NW Springhill Drive	Thursday, May 25, 2017	4:45 PM	3,678
15	State Highway Intersections	US 20/NW North Albany Rd	Thursday, May 25, 2017	4:45 PM	2,806
16	State Highway Intersections	US 20/NW Scenic Drive	Thursday, May 25, 2017	5:00 PM	1,853

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
17	State Highway Intersections	US 20/NW Independence Highway	Wednesday, May 31, 2017	4:45 PM	1,924
18	State Highway Intersections	US 20/NE Granger Avenue	Wednesday, May 31, 2017	4:45 PM	1,941
19	State Highway Intersections	US 20/NE Merloy Avenue	Wednesday, May 31, 2017	4:45 PM	1,747
20	State Highway Intersections	US 20/SW 53rd Street	Tuesday, May 23, 2017	4:45 PM	2,160
21	State Highway Intersections	Alsea Highway/Decker Road	Thursday, June 1, 2017	3:15 PM	197
22	State Highway Intersections	Alsea Highway/Alsea-Deadwood Highway	Thursday, June 1, 2017	2:15 PM	151
23	State Highway Intersections	Alsea Deadwood Highway/South Fork Road	Thursday, June 1, 2017	2:15 PM	73
24	Adair Village Intersections	NE Arnold Avenue/NE William Carr Avenue	Wednesday, May 31, 2017	5:00 PM	273
25	Adair Village Intersections	NW Ryals Avenue/NE Arnold Avenue	Wednesday, May 31, 2017	3:00 PM	275
26	Adair Village Intersections	NE Arnold Avenue/NE Laurel Drive	Wednesday, May 31, 2017	2:45 PM	239
27	Philomath Intersections	Bellfountain Road/Chapel Drive	Thursday, June 1, 2017	4:15 PM	318
28	Philomath Intersections	Bellfountain Road/Southwood Drive/SW Plymouth Drive	Thursday, June 1, 2017	5:00 PM	350
29	Corvallis Intersections	SW Reservoir Road/SW 53rd Street	Tuesday, May 23, 2017	4:45 PM	1,422

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
30	Corvallis Intersections	SW County Club Drive/SW 53rd Street	Thursday, June 1, 2017	4:15 PM	587
31	Corvallis Intersections	NW Harrison Boulevard/NW Walnut Boulevard/SW 53rd Street	Tuesday, May 23, 2017	4:45 PM	1,561
32	Corvallis Intersections	NW Lester Avenue/NW Highland Drive	Thursday, June 1, 2017	2:15 PM	723
33	Corvallis Intersections	NW Lewisburg Rd/NW Highland Drive	Wednesday, May 31, 2017	4:30 PM	528
34	Corvallis Intersections	SW Reservoir Avenue/SW West Hills Road	Thursday, June 1, 2017	4:45 PM	793
35	County Intersections	NW Springhill Drive/NW Independence Highway	Wednesday, May 31, 2017	5:00 PM	268
36	County Intersections	Camp Adair Road/NW Independence Highway	Friday, June 23, 2017	5:00 PM	193
37	County Intersections	NW Ryals Avenue/NW Independence Highway	Wednesday, May 31, 2017	2:30 PM	359
38	County Intersections	NW Metge Avenue/NW Independence Highway	Wednesday, May 31, 2017	4:30 PM	425
39	County Intersections	SW Airport Avenue/Bellfountain Road	Thursday, June 1, 2017	3:45 PM	313
40	County Intersections	Bellfountain Road/Dawson Road	Thursday, June 1, 2017	3:00 PM	173

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
41	County Intersections	Bellfountain Road/Alpine Road/Foster Road	Thursday, June 1, 2017	3:45 PM	140
42	County Intersections	Grange Hall Road/Fern Road	Thursday, June 1, 2017	5:00 PM	257
43	County Intersections	Alpine Road/Alpine Cutoff Road	Thursday, June 1, 2017	5:00 PM	129
44	Monroe Intersections	Orchard Street/S 6th Street	Tuesday, June 6, 2017	2:30 PM	120
45	North Albany Intersections	NW Springhill Drive/NW Scenic Drive	Thursday, May 25, 2017	4:45 PM	414
46	North Albany Intersections	NW Oak Grove Drive/NW Scenic Drive	Thursday, May 25, 2017	3:15 PM	576
47	North Albany Intersections	NW Gibson Hill Road/Scenic Drive	Thursday, May 25, 2017	3:30 PM	556
48	North Albany Intersections	NW Quarry Road/NE South Nebergall Loop/NW Springhill Drive	Thursday, June 1, 2017	3:45 PM	653
C-1a	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.69 mile north of Independence Hwy)	Wednesday, May 24, 2017	4:45 PM	1,886
C-1b	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.16 mile north of NE Asbahr Ave)	Wednesday, May 24, 2017	4:45 PM	1,729
C-1c	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.61 mile south of Circle Blvd)	Wednesday, May 24, 2017	4:45 PM	861
C-2a	Corridor Tube Count (County)	Bellfountain Road between Alpine Road and Airport Road (0.05 mile south of Llewellyn Rd)	Thursday, June 8, 2017	4:00 PM*	170*

Study ID	Category	Location	Count Date	PM Peak Hour Start	Peak Hour Total Entering Volume (Unadjusted)
C-2b	Corridor Tube Count (County)	Bellfountain Road between Alpine Road and Airport Road (0.10 mile south of Smittys Place)	Wednesday, May 24, 2017	3:00 PM	59
C-3	Corridor Tube Count (State)	US20/34 between Corvallis and Philomath (0.17 mile west of SW 71st St)	Wednesday, May 24, 2017	4:15 PM	1,317
C-4	Corridor Tube Count (State)	Hwy 99W between Corvallis and Adair Village (0.24 mile south of Crane Ln)	Thursday, June 8, 2017	4:45 PM	1,062
C-5	Corridor Tube Count (State)	Highway 223 between US 20 and the Benton County Line	No count taken, ATR 02-005 is available on corridor.	n/a	n/a

* C-2a count showed a true peak in the AM of 189 VPH, from 7:30 AM to 9:00 AM, due to high volumes from 8:15-8:30 AM likely attributable to the nearby Muddy Creek Charter School.

SEASONAL FACTORS

The traffic count data collected in Benton County at 48 study intersections and five corridors near the beginning of June generally represented a period where traffic is expected to be within one or two months of peak seasonal conditions. These counts were taken before the expected peak seasonal conditions to capture the impact of school traffic, since many of the count locations are near schools it is expected that school traffic will be significant. Based on the dates of collection, the counts should require minimal adjustments to reach the 30-HV and average day values using methodology from the ODOT Analysis Procedures Manual (APM) Version 2 Chapter 5.

State Highway Seasonal Factor Development

To determine when the peak seasonal and average weekday conditions occur, a three-tier process based on the APM was used to develop seasonal factors for each of the 23 State Highway locations:

1. On-Site Automatic Traffic recorder (ATR) method, or
2. ATR Characteristic Table method, or
3. ATR Seasonal Trend Table method.

On-Site ATR Method

Automatic Traffic Recorder (ATR) stations record highway traffic volumes year-round. For Benton County as of 2016, seven ATRs exist in or adjacent to Benton County, as shown in Table 2 and Figure 1.

Table 2: Automatic Traffic Recorder (ATR) Locations In or Adjacent to Benton County

ATR Number	ATR Name	Highway	Milepoint	Location	Seasonal Trend	2015 AADT	OHP Classification	County
02-003	Alsea	Alsea Highway No. 27	53.89	4.67 miles southwest of Corvallis-Newport Highway No. 33 (US20/OR34)	Coastal Destination	2,100	District Hwy	Benton
02-005	Kings Valley	Kings Valley Highway No. 191	26.43	1.41 miles south of Hoskins-Summit Road	Summer	1,100	District Hwy	Benton
02-007	Monroe	Pacific Highway West No. 91	94.9	5.47 miles north of Monroe Cemetery Road	Commuter	5,300	Regional Hwy	Benton
21-006	Burnt Woods	Corvallis-Newport Highway No. 33	34.24	0.11 mile west of Lincoln-Benton County Line	Coastal Destination	5,400	Statewide Hwy	Lincoln
22-020	Riverside Drive	Corvallis-Lebanon Highway No. 210	3.92	0.89 mile east of Riverside Drive	Commuter	29,600	Statewide Hwy	Linn
22-022	Central Albany	Albany-Junction City Highway No. 58	2.14	0.28 mile northeast of Albany-Corvallis Highway No. 31 (US20)	Commuter	37,900	Regional Hwy	Linn
27-005	Monmouth	Pacific Highway West No. 91	70.9	1.43 miles north of Polk-Benton County Line	Commuter	7,800	Regional Hwy	Polk

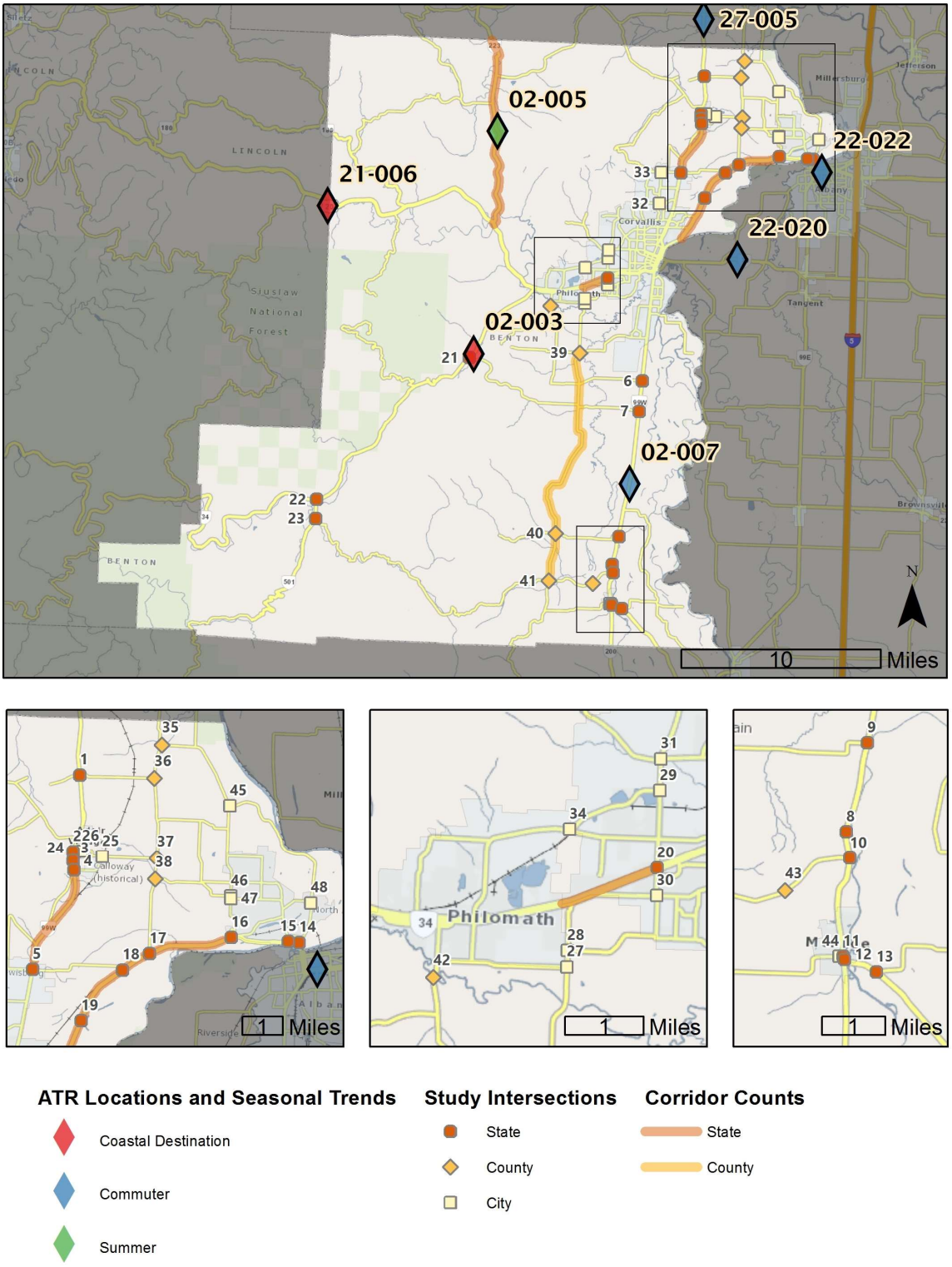

Figure 1: Automatic Traffic Recorder (ATR) Locations In or Adjacent to Benton County and TSP Study Locations

Section 5.4.1 of the APM specifies three criteria for using the On-Site ATR Method:

1. There should be no major intersections between the ATR and the study location
2. Traffic characteristics at the ATR and the study location should be comparable (road class, rural/urban, etc)
3. The study location's AADT in the Transportation Volume Table should be within +/- 10% of the ATR's AADT.

Following this procedure, we propose using three On-Site ATRs to adjust highway volumes at three study locations as shown in Table 3.

Table 3: On-Site ATR Method Locations

ATR Number	Adjacent Study Location IDs	Study Location Road Class	Study Location Rural/Urban	Study Location AADT (2015 TVT)
02-003	• 21	District Highway	Rural	2,100 (+0%)
02-005	• None	-	-	-
02-007	• 7	Regional Highway	Rural	5,700 (+7.5%)
21-006	• None	-	-	-
22-020	• None	-	-	-
22-022	• None	-	-	-
27-005	• 1	Regional Highway	Rural	7,800 (+0%)

ATR Characteristic Table Method

Next, the ATR Characteristic Table was reviewed for the remaining 20 State Highway study intersections to identify any ATRs with similar characteristics. The review included seasonal trend, area type, number of lanes, OHP Highway Classification, and AADT ranges. Characteristics at the study intersections include:

- Commuter, Coastal Destination, and Summer <2,500 seasonal trends
- Urbanized, Urban Fringe, Rural, and Rural Populated area types
- 2-lane and 4-lane roadways
- Statewide, Regional, and District Highways
- AADTs Less than 2,500, between 5,001 and 10,000, between 10,001 and 15,000, between 15,001 and 20,000, and between 20,001 and 30,000 AADT.

Based on these characteristics, there are eight unique combinations as shown in Table 4. Of these combinations, two similar ATRs were found in the Characteristic Table within acceptable AADT deviation. These are the Monroe ATR (02-007) in Benton County and the Salem Parkway ATR (24-022) in Marion County. Together, these ATRs will be used for seasonal adjustments at seven locations.

Table 4: ATR Characteristic Combinations

Seasonal Traffic Trend	Area Type	Lanes	OHP Class	AADT Range	Similar ATRs	Study Location IDs
Coastal Destination	Rural Populated	2	District	1,001 - 2,500	None	
Commuter	Rural	2	Regional	5,001 - 10,000	02-007	6, 8, 9, 10, 13,
Commuter	Rural Populated	2	Regional	5,001 - 10,000	None	
Commuter	Urban Fringe	2	Regional	10,001 - 15,000	None	
Commuter	Urbanized	2	Regional	15,001 - 20,000	None	
Commuter	Urbanized	2	Statewide	15,001 - 20,000	None	
Commuter	Urbanized	4	Regional	20,001 - 30,000	24-022	14, 15
Summer <2500	Rural	2	District	0 - 1,000	None	

ATR Seasonal Trend Table Method

For the remaining 13 intersections and six corridor counts, we propose using the seasonal trend method to develop seasonal factors at these locations. The seasonal trend method averages seasonal trend groupings from the ATR Characteristics Table. Seasonal trends to be used include:

- Commuter for remaining locations on 99W and on US 20 between Albany and Corvallis
- An average of Commuter and Summer for US 20/OR 34 between Corvallis and Philomath
- Coastal Destination for Alsea Highway (OR 34) in Alsea
- Summer (<2,500) for Alsea-Deadwood Highway

County Roads Seasonal Factor Development

Benton County lies between I-5 and the Oregon Coast, and includes major urban areas with school and University traffic as well as forest areas with recreational traffic and natural resource uses. Just as state highways experience traffic trends from commuters, coastal destinations, and summer uses, the local roadway system is expected to have seasonal variations. Local trip generators, as well as spillover from the state highway system, impact the off-highway roadway system in Benton County. Therefore, to best represent 30-HV and average day volumes for off-highway roadways, seasonal factoring will be applied.

- Commuter seasonal factors will be used for off-highway locations within cities or UGBs
- Summer (<2,500) seasonal factors will be used for off-highway locations in the rural county

Proposed Seasonal Factors

Using the methodologies described above, several seasonal factors were developed for the May/June traffic counts, shown in Table 5. These factors will result in up to an 18.7% increase to the counts to adjust for seasonal variations in traffic, replicating 30-HV conditions. To replicate an average day, the factors will result in up to an 15.1% percent decrease to the counts. However, none of the study intersections would require an adjustment greater than the APM's recommended +/- 30%.

Table 5: Proposed Seasonal Adjustment Factors

Study ID	Category	Location	Method Used	Method Details	30-HV Factor	Average Day Factor
1	State Highway Intersections	OR 99W/Coffin Butte Road/Camp Adair Road	On-Site ATR	27-005	1.030	0.948
2	State Highway Intersections	OR 99W/Blake Drive/NE Arnold Avenue	Seasonal Trends	Commuter	1.039	0.953
3	State Highway Intersections	OR 99W/NE Vandenberg Ave	Seasonal Trends	Commuter	1.039	0.953
4	State Highway Intersections	OR 99W/NW Arboretum Road/NW Ryals Avenue	Seasonal Trends	Commuter	1.039	0.953
5	State Highway Intersections	OR 99W/NW Lewisburg Avenue/NE Granger Avenue	Seasonal Trends	Commuter	1.035	0.949
6	State Highway Intersections	OR 99W/Llewellyn Road	ATR Characteristic Table	02-007	1.039	0.947
7	State Highway Intersections	OR 99W/Greenberry Road	On-Site ATR	02-007	1.039	0.947
8	State Highway Intersections	OR 99W/Old River Road	ATR Characteristic Table	02-007	1.039	0.947
9	State Highway Intersections	OR 99W/Dawson Road/Hubbard Road	ATR Characteristic Table	02-007	1.039	0.947
10	State Highway Intersections	OR 99W/Alpine Road	ATR Characteristic Table	02-007	1.039	0.947
11	State Highway Intersections	OR 99W/Orchard Street	Seasonal Trends	Commuter	1.039	0.953
12	State Highway Intersections	OR 99W/Territorial Highway	Seasonal Trends	Commuter	1.039	0.953
13	State Highway Intersections	OR 99W/W Ingram Island Road	ATR Characteristic Table	02-007	1.039	0.947

Study ID	Category	Location	Method Used	Method Details	30-HV Factor	Average Day Factor
14	State Highway Intersections	US 20/NW Springhill Drive	ATR Characteristic Table	24-022	1.027	0.966
15	State Highway Intersections	US 20/NW North Albany Rd	ATR Characteristic Table	24-022	1.027	0.966
16	State Highway Intersections	US 20/NW Scenic Drive	Seasonal Trends	Commuter	1.032	0.946
17	State Highway Intersections	US 20/NW Independence Highway	Seasonal Trends	Commuter	1.035	0.949
18	State Highway Intersections	US 20/NE Granger Avenue	Seasonal Trends	Commuter	1.035	0.949
19	State Highway Intersections	US 20/NE Merloy Avenue	Seasonal Trends	Commuter	1.035	0.949
20	State Highway Intersections	US 20/SW 53rd Street	Seasonal Trends	Avg. of Commuter and Summer	1.079	0.944
21	State Highway Intersections	Alsea Highway/Decker Road	On-Site ATR	02-003	1.159	0.971
22	State Highway Intersections	Alsea Highway/Alsea-Deadwood Highway	Seasonal Trends	Coastal Destination	1.187	0.983
23	State Highway Intersections	Alsea Deadwood Highway/South Fork Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
24	Adair Village Intersections	NE Arnold Avenue/NE William Carr Avenue	Seasonal Trends	Commuter	1.035	0.949
25	Adair Village Intersections	NW Ryals Avenue/NE Arnold Avenue	Seasonal Trends	Commuter	1.035	0.949
26	Adair Village Intersections	NE Arnold Avenue/NE Laurel Drive	Seasonal Trends	Commuter	1.035	0.949
27	Philomath Intersections	Bellfountain Road/Chapel Drive	Seasonal Trends	Commuter	1.036	0.950
28	Philomath Intersections	Bellfountain Road/Southwood Drive/SW Plymouth Drive	Seasonal Trends	Commuter	1.036	0.950
29	Corvallis Intersections	SW Reservoir Road/SW 53rd Street	Seasonal Trends	Commuter	1.031	0.945
30	Corvallis Intersections	SW County Club Drive/SW 53rd Street	Seasonal Trends	Commuter	1.036	0.950
31	Corvallis Intersections	NW Harrison Boulevard/NW Walnut Boulevard/SW 53rd Street	Seasonal Trends	Commuter	1.031	0.945

Study ID	Category	Location	Method Used	Method Details	30-HV Factor	Average Day Factor
32	Corvallis Intersections	NW Lester Avenue/NW Highland Drive	Seasonal Trends	Commuter	1.036	0.950
33	Corvallis Intersections	NW Lewisburg Rd/NW Highland Drive	Seasonal Trends	Commuter	1.035	0.949
34	Corvallis Intersections	SW Reservoir Avenue/SW West Hills Road	Seasonal Trends	Commuter	1.036	0.950
35	County Intersections	NW Springhill Drive/NW Independence Highway	Seasonal Trends	Summer (<2,500)	1.094	0.893
36	County Intersections	Camp Adair Road/NW Independence Highway	Seasonal Trends	Summer (<2,500)	1.040	0.849
37	County Intersections	NW Ryals Avenue/NW Independence Highway	Seasonal Trends	Summer (<2,500)	1.094	0.893
38	County Intersections	NW Metge Avenue/NW Independence Highway	Seasonal Trends	Summer (<2,500)	1.094	0.893
39	County Intersections	SW Airport Avenue/Bellfountain Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
40	County Intersections	Bellfountain Road/Dawson Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
41	County Intersections	Bellfountain Road/Alpine Road/Foster Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
42	County Intersections	Grange Hall Road/Fern Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
43	County Intersections	Alpine Road/Alpine Cutoff Road	Seasonal Trends	Summer (<2,500)	1.092	0.891
44	Monroe Intersections	Orchard Street/S 6th Street	Seasonal Trends	Commuter	1.039	0.953
45	North Albany Intersections	NW Springhill Drive/NW Scenic Drive	Seasonal Trends	Commuter	1.032	0.946
46	North Albany Intersections	NW Oak Grove Drive/NW Scenic Drive	Seasonal Trends	Commuter	1.032	0.946
47	North Albany Intersections	NW Gibson Hill Road/Scenic Drive	Seasonal Trends	Commuter	1.032	0.946
48	North Albany Intersections	NW Quarry Road/NE South Nebergall Loop/NW Springhill Drive	Seasonal Trends	Commuter	1.036	0.950
C-1a	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.69 mile north of Independence Hwy)	Seasonal Trends	Commuter	1.031	0.946

Study ID	Category	Location	Method Used	Method Details	30-HV Factor	Average Day Factor
C-1b	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.16 mile north of NE Asbahr Ave)	Seasonal Trends	Commuter	1.031	0.946
C-1c	Corridor Tube Count (State)	US 20 between Corvallis and Albany (0.61 mile south of Circle Blvd)	Seasonal Trends	Commuter	1.031	0.946
C-2a	Corridor Tube Count (County)	Bellfountain Road between Alpine Road and Airport Road (0.05 mile south of Llewellyn Rd)	Seasonal Trends	Summer (<2,500)	1.072	0.875
C-2b	Corridor Tube Count (County)	Bellfountain Road between Alpine Road and Airport Road (0.10 mile south of Smittys Place)	Seasonal Trends	Summer (<2,500)	1.110	0.906
C-3	Corridor Tube Count (State)	US20/34 between Corvallis and Philomath (0.17 mile west of SW 71st St)	Seasonal Trends	Avg. of Commuter and Summer	1.079	0.944
C-4	Corridor Tube Count (State)	Hwy 99W between Corvallis and Adair Village (0.24 mile south of Crane Ln)	Seasonal Trends	Commuter	1.041	0.954
C-5	Corridor Tube Count (State)	Highway 223 between US 20 and the Benton County Line	n/a	n/a	n/a	n/a

SYSTEM PEAK HOUR

Based on the geographic distribution of the study intersections, the selection of an overall system peak hour is not necessary in the development of the design hour volumes. The majority of study intersections have access points in between, and are distributed between multiple urban areas, and thus these adjustments would not be appropriate at this scale. We recommend using the individual peak hour for most locations, with subarea system peaks in the following areas:

- A 4:45 PM peak for locations on 99W, US 20 between North Albany and Corvallis, and off-system locations near Philomath
- A 2:15 PM peak for Alsea (this is reflected in the counts as-is)
- A 3:30 PM peak for off-system locations in North Albany
- A 2:45 PM peak for the off-system corridor between Adair Village and Independence Hwy. (#25, 26, 37)

FUTURE CONDITIONS FORECASTING

Traffic forecasting is an important step in the transportation planning process because it provides estimates of future travel demand. The planning horizon year for Benton County's transportation system plan (TSP) is 2040.

Methodology Overview

The forecasting methodology varies based on the forecasting tools available, as well as the location, characteristic, and jurisdiction of the facility. The following provides a summary of the forecasting tools that will be used for the Benton County TSP:

- **For State highways and County facilities in the Corvallis-Albany-Lebanon-Millersburg (CALM) area:** Model growth rates post-processed from the CALM regional travel demand model will be utilized for areas within the model boundaries.
- **For State Highways outside of the CALM area:** Growth Rates derived from the ODOT Future Volume Tables will be utilized.
- **For rural County facilities:** A 0.9% annual growth rate will be utilized based on an assessment of ODOT Future Volume Tables near characteristic communities.

CALM Travel Demand Model

The CALM regional travel demand model[1] is utilized as the primary tool to estimate future travel demand in the Corvallis, Albany, Lebanon and Millersburg areas. Land use data within the model area is divided into transportation analysis zones (TAZs), which represent the origins and destinations for motor vehicle trips throughout the region. Estimates of trips generated from each TAZ are based on associated land use data. In addition, regional trip growth on facilities connecting to the CALM area is accounted for by extrapolating historic growth trends. The 2010 base and 2040 future scenarios of the CALM model were used for this study.

Application of Regional Demand Model

The CALM regional travel demand model has a regional scale and the roadway network includes the primary arterial and collector roadways in North Albany, Adair Village, Corvallis, Philomath, and the adjacent rural county roads. Many local roadways are commonly not included in regional models because they are not significant to regional travel patterns. As a result, regional models like the CALM model have limited accuracy in forecasting circulation and routing on local streets and should be used carefully. Regional models also do not typically have sufficient detail to directly forecast intersection turn movements, even on roadways included in the model. Engineering judgment and "post-processing" techniques are used to convert link-based model results to estimates of turn movement volumes and to account for circulation and routing at the local level.

Post-Processing

While the travel demand models were calibrated to local conditions and volumes, raw volumes from the travel demand model were not used for capacity analysis. Rather, motor vehicle turn movement volume forecasts were developed using post-processing methods consistent with the ODOT Analysis Procedures Manual Chapter 6. This approach is derived from methodologies in the National Cooperative Highway Research Program (NCHRP) Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design*.

The post-processing methodology involves estimating model growth using the difference method (i.e., volume differences between base and future models), scaling the growth by the number of forecast years (i.e., forecast

[1] The CALM regional travel demand model is managed by the Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU).

years divided by difference in model years), and adding these volumes to seasonally-adjusted existing traffic counts. Traffic growth on links in the travel demand models are applied to individual turn movements using a Fratar method to account for growth on both inbound and outbound links. Engineering judgment is used as part of the post-processing methodology. The result of this process is future year forecasts derived from the CALM regional travel demand model that are calibrated to observed data.

ODOT Future Volume Tables

For State highways and County facilities outside of the CALM model boundaries, future traffic growth will be estimated based on ODOT's 2035 Future Highway Volume Table (FHVT). Annual Average daily traffic (AADT) volumes are provided for various mile points along State highways for the base year (2013, 2014, or 2015 depending on the location) and future year (2035). These volumes were utilized to determine an expected growth trend, suggesting an annual growth rate to be applied to applicable roadways and intersections in Benton County. The annual growth rate will be applied to the seasonally factored base year volumes to develop traffic volumes for 2040. Although two of the locations have an R-squared (RSQ) value below the APM recommended minimum 0.5 value, there are no appropriate alternative locations in the FHVT with adequate RSQ values. Table 6 lists the highway locations used and the resulting linear annual growth rate. None of the values are at or above 1% annual growth, and the lowest is under 0.1% annual growth.

Table 6: Annual Growth Rates for ODOT Facilities Outside CALM Model Coverage

ODOT Highway	MP	Location	2013	2015	2035	RSQ	Linear Annual Growth Rate
027	39.71	0.10 mile west of Alsea-Deadwood Highway		1100	1200	0.6803	0.45%
091	100.35	0.02 mile north of Monroe Cemetery Road	6400		7500	0.6057	0.78%
091	101.10	0.05 mile north of Territorial Highway	7200		8700	0.7524	0.95%
191	26.43	Kings Valley Automatic Traffic Recorder, Sta. 02-005, 1.41 miles south of Hoskins-Summit Road		1100	1200	0.2483	0.45%
201	0.02	0.02 mile south of Alsea Highway (OR34)		630	640	0.4950	0.08%

County Facility Growth Estimates

For County facilities outside the CALM model area, the ODOT Future Volume tables were consulted for characteristic highways. The only study locations outside the CALM model area and off-system are in and near Monroe. A growth rate of 0.9% is proposed for these locations, considering the 0.78% and 0.95% growth rates on nearby and characteristic Highway 091.

MULTIMODAL PERFORMANCE ANALYSIS

As a component of both the existing conditions and future conditions analysis, the multimodal performance of the transportation system will be evaluated using standard defined methodology. The analysis will include motor vehicle intersection operations, transit service, and adequacy of infrastructure for people walking and bicycling.

Motor Vehicle Intersection Operations

The motor vehicle intersection operations analysis will follow the guidance in the ODOT APMv1 Chapter 7, using Synchro 8 software. Existing and future volume preparation will follow the guidance in the ODOT APMv2 Chapters 5 and 6. For reporting Highway Capacity Manual results, the 2000 Edition will be used for signalized intersections and the 2010 Edition will be used for unsignalized intersections.

Motor Vehicle Crash Analysis

The motor vehicle crash analysis will include calculations of study intersection crash rates and critical crash rates, following the guidance in the ODOT APMv2 Chapter 4. Reference populations will follow the breakdowns defined in the chapter based on Urban/Rural land use, traffic control type, and number of approach legs. Where a reference population includes less than 5 locations of a type, the crash rates will be compared to the 90th Percentile values in Table 4-1. Excess proportions of specific crash types analysis, where statistically valid, will also be included at rate-flagged locations.

Transit Service

The transit service analysis will be adapted from the recommendations for a Qualitative Transit LTS analysis as described in the ODOT APMv2 Chapter 14. The methodology has been modified to address demand-responsive (DR) transit as well as fixed-route (FR) transit, and to account for data availability. This will include, as available:

- Number of rides provided
- Number of revenue miles
- Rides per hour
- Operating cost per hour and ride
- Frequency
- Average schedule speed
- Transit stop amenities and pedestrian facility connections

People Walking and Bicycling

The analysis for people walking and bicycling will vary depending on the land use context. For urban locations, the Pedestrian Level of Traffic Stress and Bicycle Level of Traffic Stress will be used following the guidance in the ODOT APMv2 Chapter 14. For rural locations, shoulder minimum adequacy will be based on ODOT Highway Design Manual rural design 3-R standards for minimum shoulder width. Recommended shoulder widths will be based on the ODOT Bicycle and Pedestrian Design Guide recommendations for rural road shoulder widths. Data for this analysis will be based on ODOT and County GIS resources and desk surveys.