

APPENDIX N

2017 No Build Kendrick Street Intersection Analysis

Route 128 Add-A-Lane
2: Kendrick St & Hunting Rd

AM 2017 No Build

10/28/2008

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	640	5	224	227	92	4	254	891	557	113	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	230		0	0		430	140		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.957				0.850		0.983	
Flt Protected		0.998		0.950				0.999		0.950		
Satd. Flow (prot)	0	3529	0	1770	1783	0	0	1861	1583	1770	1831	0
Flt Permitted		0.925		0.185				0.997		0.333		
Satd. Flow (perm)	0	3271	0	345	1783	0	0	1857	1583	620	1831	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					17				462		6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		212			1260			438			316	
Travel Time (s)		4.8			28.6			10.0			7.2	
Peak Hour Factor	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)	22	696	5	243	247	100	4	276	968	605	123	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	723	0	243	347	0	0	280	968	605	139	0
Turn Type	Perm			custom			Perm		custom	custom		
Protected Phases		6		5	2 5			8		7	4 7	
Permitted Phases	6			2	2 5		8		8 2	4	4 7	
Detector Phase	6	6		5	2 5		8	8	8 2	7	4 7	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			10.0	10.0		7.0		
Minimum Split (s)	12.0	12.0		12.0			15.0	15.0		12.0		
Total Split (s)	40.0	40.0	0.0	15.0	55.0	0.0	35.0	35.0	75.0	30.0	65.0	0.0
Total Split (%)	29.0%	29.0%	0.0%	10.9%	39.9%	0.0%	25.4%	25.4%	54.3%	21.7%	47.1%	0.0%
Maximum Green (s)	35.0	35.0		10.0			30.0	30.0		25.0		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	-1.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead		Lag			Lead	Lead		Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0		3.0		
Recall Mode	None	None		None			None	None		None		
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		32.6		47.9	47.9			25.6	77.5	56.1	56.1	
Actuated g/C Ratio		0.28		0.42	0.42			0.22	0.67	0.49	0.49	
v/c Ratio		0.78		0.86	0.46			0.68	0.80	1.07	0.16	
Control Delay		46.0		70.8	27.3			51.6	13.0	94.9	18.0	
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay		46.0		70.8	27.3			51.6	13.0	94.9	18.0	
LOS		D		E	C			D	B	F	B	

Lane Group	ø2	ø4	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	2	4	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	10.0	1.0
Minimum Split (s)	15.0	15.0	18.0
Total Split (s)	40.0	35.0	18.0
Total Split (%)	29%	25%	13%
Maximum Green (s)	35.0	30.0	16.0
Yellow Time (s)	4.0	4.0	2.0
All-Red Time (s)	1.0	1.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			6.0
Flash Dont Walk (s)			12.0
Pedestrian Calls (#/hr)			1
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			

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2: Kendrick St & Hunting Rd

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		46.0			45.3			21.7			80.5	
Approach LOS		D			D			C			F	
90th %ile Green (s)	35.0	35.0		10.0			30.0	30.0		25.0		
90th %ile Term Code	Max	Max		Max			Max	Max		Max		
70th %ile Green (s)	35.0	35.0		10.0			30.0	30.0		25.0		
70th %ile Term Code	Max	Max		Max			Max	Max		Max		
50th %ile Green (s)	34.7	34.7		10.0			25.9	25.9		25.0		
50th %ile Term Code	Gap	Gap		Max			Gap	Gap		Max		
30th %ile Green (s)	30.0	30.0		10.0			21.9	21.9		25.0		
30th %ile Term Code	Gap	Gap		Max			Gap	Gap		Max		
10th %ile Green (s)	23.4	23.4		10.0			16.2	16.2		25.0		
10th %ile Term Code	Gap	Gap		Max			Gap	Gap		Max		
Queue Length 50th (ft)		250		115	167			190	205	~382	53	
Queue Length 95th (ft)		#420		#349	335			340	647	#777	119	
Internal Link Dist (ft)		132			1180			358			236	
Turn Bay Length (ft)				230					430	140		
Base Capacity (vph)		1038		281	811			507	1266	565	987	
Starvation Cap Reductn		0		0	0			0	0	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.70		0.86	0.43			0.55	0.76	1.07	0.14	

Intersection Summary

Area Type: Other
 Cycle Length: 138
 Actuated Cycle Length: 115.4
 Natural Cycle: 140
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 44.5
 Intersection Capacity Utilization 114.5%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 140
 70th %ile Actuated Cycle: 120
 50th %ile Actuated Cycle: 115.6
 30th %ile Actuated Cycle: 106.9
 10th %ile Actuated Cycle: 94.6
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service H

Splits and Phases: 2: Kendrick St & Hunting Rd

 ø2	 ø4	 ø9
40 s	35 s	18 s
 ø6	 ø5	 ø8
40 s	15 s	35 s
		 ø7
		30 s

Lane Group	ø2	ø4	ø9
Approach Delay			
Approach LOS			
90th %ile Green (s)	50.0	60.0	18.0
90th %ile Term Code	Hold	Hold	Ped
70th %ile Green (s)	50.0	60.0	0.0
70th %ile Term Code	Hold	Hold	Skip
50th %ile Green (s)	49.7	55.9	0.0
50th %ile Term Code	Hold	Hold	Skip
30th %ile Green (s)	45.0	51.9	0.0
30th %ile Term Code	Hold	Hold	Skip
10th %ile Green (s)	38.4	46.2	0.0
10th %ile Term Code	Hold	Hold	Skip
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

Route 128 Add-A-Lane
3: Kendrick St & 3rd Ave

AM 2017 No Build

10/28/2008

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	388	1395	302	95	484	172	20	36	8	89	88	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	12	12	12	12	12	12
Storage Length (ft)	300		360	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.961			0.972				0.850
Flt Protected	0.950			0.950			0.950				0.975	
Satd. Flow (prot)	1652	3421	1531	1652	3288	0	1770	1811	0	0	1816	1583
Flt Permitted	0.950			0.950			0.341				0.816	
Satd. Flow (perm)	1652	3421	1531	1652	3288	0	635	1811	0	0	1520	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			328		40			9				48
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		588			1027			274			474	
Travel Time (s)		13.4			23.3			6.2			10.8	
Peak Hour Factor	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)	422	1516	328	103	526	187	22	39	9	97	96	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	422	1516	328	103	713	0	22	48	0	0	193	48
Turn Type	Prot		custom	Prot			custom			Perm		custom
Protected Phases	1	6		5	2		3	8 3			4	
Permitted Phases		6	6 3		2		8	8 3		4		4 1 3
Detector Phase	1	6	6 3	5	2		3	8 3		4	4	4 1 3
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0			7.0	7.0	
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0			12.0	12.0	
Total Split (s)	40.0	40.0	60.0	40.0	40.0	0.0	20.0	45.0	0.0	25.0	25.0	85.0
Total Split (%)	32.0%	32.0%	48.0%	32.0%	32.0%	0.0%	16.0%	36.0%	0.0%	20.0%	20.0%	68.0%
Maximum Green (s)	35.0	35.0		35.0	35.0		15.0			20.0	20.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0			4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0			2.0	2.0	
Recall Mode	None	Min		None	Min		None			None	None	
Walk Time (s)					5.0							
Flash Dont Walk (s)					11.0							
Pedestrian Calls (#/hr)					2							
Act Effct Green (s)	31.2	47.0	59.6	12.3	28.1		30.2	30.2			17.7	65.5
Actuated g/C Ratio	0.31	0.46	0.59	0.12	0.28		0.30	0.30			0.17	0.64
v/c Ratio	0.83	0.96	0.32	0.52	0.76		0.08	0.09			0.73	0.05
Control Delay	49.5	42.5	2.1	54.2	38.8		29.2	24.9			58.8	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	49.5	42.5	2.1	54.2	38.8		29.2	24.9			58.8	2.4

Lane Group	ø8
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	12.0
Total Split (s)	25.0
Total Split (%)	20%
Maximum Green (s)	20.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	2
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	A	D	D		C	C			E	A
Approach Delay		37.9			40.8			26.3			47.6	
Approach LOS		D			D			C			D	
90th %ile Green (s)	35.0	53.2		16.8	35.0		8.7			20.0	20.0	
90th %ile Term Code	Max	Hold		Gap	Max		Gap			Max	Max	
70th %ile Green (s)	35.0	51.3		13.5	29.8		7.1			20.0	20.0	
70th %ile Term Code	Max	Hold		Gap	Gap		Gap			Max	Max	
50th %ile Green (s)	34.3	49.5		11.3	26.5		7.0			18.8	18.8	
50th %ile Term Code	Gap	Hold		Gap	Gap		Min			Gap	Gap	
30th %ile Green (s)	27.8	41.4		9.0	22.6		7.0			15.2	15.2	
30th %ile Term Code	Gap	Hold		Gap	Gap		Min			Gap	Gap	
10th %ile Green (s)	20.1	35.0		7.0	21.9		7.0			10.4	10.4	
10th %ile Term Code	Gap	Max		Min	Hold		Min			Gap	Gap	
Queue Length 50th (ft)	257	498	0	67	228		11	19			124	0
Queue Length 95th (ft)	#473	#755	39	130	310		33	52			#243	14
Internal Link Dist (ft)		508			947			194			394	
Turn Bay Length (ft)	300		360	150								
Base Capacity (vph)	596	1580	1125	596	1213		371	750			320	1112
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.71	0.96	0.29	0.17	0.59		0.06	0.06			0.60	0.04

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 101.8

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

90th %ile Actuated Cycle: 118.7

70th %ile Actuated Cycle: 111.9

50th %ile Actuated Cycle: 106.6

30th %ile Actuated Cycle: 92.6

10th %ile Actuated Cycle: 79.4

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Kendrick St & 3rd Ave

 ø1	 ø2	 ø3	 ø4
40 s	40 s	20 s	25 s
 ø5	 ø6	 ø8	
40 s	40 s	25 s	

Lane Group	ø8
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	33.7
90th %ile Term Code	Hold
70th %ile Green (s)	32.1
70th %ile Term Code	Hold
50th %ile Green (s)	30.8
50th %ile Term Code	Hold
30th %ile Green (s)	27.2
30th %ile Term Code	Hold
10th %ile Green (s)	22.4
10th %ile Term Code	Hold
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	204	1103	5	5	474	516	5	5	5	202	5	62
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	222	1199	5	5	515	561	5	5	5	220	5	67
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)		1027										
pX, platoon unblocked				0.61			0.61	0.61	0.61	0.61	0.61	
vC, conflicting volume	1076			1204			1984	2732	602	1858	2454	538
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1076			61			1337	2561	0	1130	2107	538
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	66			99			84	47	99	0	73	86
cM capacity (veh/h)	644			941			34	10	663	42	20	488
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2					
Volume Total	821	605	263	818	16	225	67					
Volume Left	222	0	5	0	5	220	0					
Volume Right	0	5	0	561	5	0	67					
cSH	644	1700	941	1700	24	41	488					
Volume to Capacity	0.34	0.36	0.01	0.48	0.69	5.47	0.14					
Queue Length 95th (ft)	38	0	0	0	52	Err	12					
Control Delay (s)	8.9	0.0	0.2	0.0	318.1	Err	13.6					
Lane LOS	A		A		F	F	B					
Approach Delay (s)	5.1		0.1		318.1	7697.5						
Approach LOS					F	F						

Intersection Summary

Average Delay	803.6		
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

Route 128 Add-A-Lane
2: Kendrick St & Hunting Rd

PM 2017 No Build

10/28/2008

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	252	5	823	629	493	5	93	173	223	268	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	230		0	0		430	140		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.998			0.934				0.850		0.983	
Fl _t Protected		0.992		0.950				0.998		0.950		
Satd. Flow (prot)	0	3504	0	1770	1740	0	0	1859	1583	1770	1831	0
Fl _t Permitted		0.535		0.419				0.500		0.609		
Satd. Flow (perm)	0	1890	0	780	1740	0	0	931	1583	1134	1831	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			39				188		5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		212			1253			438			316	
Travel Time (s)		4.8			28.5			10.0			7.2	
Peak Hour Factor	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)	51	274	5	895	684	536	5	101	188	242	291	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	330	0	895	1220	0	0	106	188	242	329	0
Turn Type	Perm			custom			Perm		custom	custom		
Protected Phases		6		5	2 5			8		7	4 7	
Permitted Phases	6			2	2 5		8		8 2	4	4 7	
Detector Phase	6	6		5	2 5		8	8	8 2	7	4 7	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			10.0	10.0		7.0		
Minimum Split (s)	12.0	12.0		12.0			15.0	15.0		12.0		
Total Split (s)	25.0	25.0	0.0	50.0	75.0	0.0	25.0	25.0	50.0	25.0	50.0	0.0
Total Split (%)	17.5%	17.5%	0.0%	35.0%	52.4%	0.0%	17.5%	17.5%	35.0%	17.5%	35.0%	0.0%
Maximum Green (s)	20.0	20.0		45.0			20.0	20.0		20.0		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	-1.0	-1.0	-1.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead		Lag			Lead	Lead		Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0		3.0		
Recall Mode	None	None		None			None	None		None		
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		21.3		72.2	72.2			15.7	91.9	31.0	31.0	
Actuated g/C Ratio		0.19		0.63	0.63			0.14	0.80	0.27	0.27	
v/c Ratio		0.93		1.00	1.10			0.83	0.14	0.65	0.66	
Control Delay		81.0		58.4	80.5			94.9	1.2	48.1	43.5	
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay		81.0		58.4	80.5			94.9	1.2	48.1	43.5	
LOS		F		E	F			F	A	D	D	

Lane Group	ø2	ø4	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	2	4	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	10.0	1.0
Minimum Split (s)	15.0	15.0	18.0
Total Split (s)	25.0	25.0	18.0
Total Split (%)	17%	17%	13%
Maximum Green (s)	20.0	20.0	16.0
Yellow Time (s)	4.0	4.0	2.0
All-Red Time (s)	1.0	1.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			6.0
Flash Dont Walk (s)			12.0
Pedestrian Calls (#/hr)			1
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		81.0			71.2			35.0			45.5	
Approach LOS		F			E			C			D	
90th %ile Green (s)	20.0	20.0		45.0			20.0	20.0		20.0		
90th %ile Term Code	Max	Max		Max			Max	Max		Max		
70th %ile Green (s)	20.0	20.0		45.0			17.5	17.5		11.4		
70th %ile Term Code	Max	Max		Max			Gap	Gap		Gap		
50th %ile Green (s)	20.0	20.0		45.0			14.5	14.5		8.1		
50th %ile Term Code	Max	Max		Max			Gap	Gap		Gap		
30th %ile Green (s)	20.0	20.0		45.0			12.0	12.0		7.0		
30th %ile Term Code	Max	Max		Max			Gap	Gap		Min		
10th %ile Green (s)	20.0	20.0		45.0			10.0	10.0		7.0		
10th %ile Term Code	Max	Max		Max			Min	Min		Min		
Queue Length 50th (ft)		117		426	~912			72	0	142	200	
Queue Length 95th (ft)		#304		#1202	#1794			#203	26	265	359	
Internal Link Dist (ft)		132			1173			358			236	
Turn Bay Length (ft)				230					430	140		
Base Capacity (vph)		353		896	1111			174	1377	525	751	
Starvation Cap Reductn		0		0	0			0	0	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.93		1.00	1.10			0.61	0.14	0.46	0.44	

Intersection Summary

Area Type: Other

Cycle Length: 143

Actuated Cycle Length: 114.5

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 64.5

Intersection LOS: E

Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

90th %ile Actuated Cycle: 145

70th %ile Actuated Cycle: 113.9

50th %ile Actuated Cycle: 107.6

30th %ile Actuated Cycle: 104

10th %ile Actuated Cycle: 102

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Kendrick St & Hunting Rd

 ø2	 ø4	 ø9
25 s	25 s	18 s
 ø6	 ø5	 ø8
25 s	50 s	25 s

Lane Group	ø2	ø4	ø9
Approach Delay			
Approach LOS			
90th %ile Green (s)	70.0	45.0	18.0
90th %ile Term Code	Hold	Hold	Ped
70th %ile Green (s)	70.0	33.9	0.0
70th %ile Term Code	Hold	Hold	Skip
50th %ile Green (s)	70.0	27.6	0.0
50th %ile Term Code	Hold	Hold	Skip
30th %ile Green (s)	70.0	24.0	0.0
30th %ile Term Code	Hold	Hold	Skip
10th %ile Green (s)	70.0	22.0	0.0
10th %ile Term Code	Hold	Hold	Skip
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	461	43	8	1211	100	240	43	57	253	15	482
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	12	12	12	12	12	12
Storage Length (ft)	300		360	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.989			0.915				0.850
Flt Protected	0.950			0.950			0.950				0.955	
Satd. Flow (prot)	1652	3421	1531	1652	3384	0	1770	1704	0	0	1779	1583
Flt Permitted	0.950			0.950			0.201				0.660	
Satd. Flow (perm)	1652	3421	1531	1652	3384	0	374	1704	0	0	1229	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		8			62				8
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		596			1027			274			474	
Travel Time (s)		13.5			23.3			6.2			10.8	
Peak Hour Factor	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)	157	501	47	9	1316	109	261	47	62	275	16	524
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	501	47	9	1425	0	261	109	0	0	291	524
Turn Type	Prot		custom	Prot			custom			Perm		custom
Protected Phases	1	6		5	2		3	8 3			4	
Permitted Phases		6	6 3		2		8	8 3		4		4 1 3
Detector Phase	1	6	6 3	5	2		3	8 3		4	4	4 1 3
Switch Phase												
Minimum Initial (s)	7.0	10.0		7.0	10.0		7.0			7.0	7.0	
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0			12.0	12.0	
Total Split (s)	20.0	50.0	75.0	20.0	50.0	0.0	25.0	55.0	0.0	30.0	30.0	75.0
Total Split (%)	16.0%	40.0%	60.0%	16.0%	40.0%	0.0%	20.0%	44.0%	0.0%	24.0%	24.0%	60.0%
Maximum Green (s)	15.0	45.0		15.0	45.0		20.0			25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0			4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	0.0	-1.0	-1.0	0.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0			2.0	2.0	
Recall Mode	None	Min		None	Min		None			None	None	
Walk Time (s)					5.0							
Flash Dont Walk (s)					11.0							
Pedestrian Calls (#/hr)					2							
Act Effct Green (s)	14.8	62.4	87.4	8.0	46.0		51.0	51.0			26.0	69.8
Actuated g/C Ratio	0.12	0.50	0.71	0.06	0.37		0.41	0.41			0.21	0.56
v/c Ratio	0.80	0.29	0.04	0.08	1.13		0.67	0.15			1.13	0.58
Control Delay	80.8	19.0	2.2	57.0	105.1		34.5	11.4			139.3	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	80.8	19.0	2.2	57.0	105.1		34.5	11.4			139.3	20.5

Lane Group	ø8
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	12.0
Total Split (s)	30.0
Total Split (%)	24%
Maximum Green (s)	25.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	2
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	B	A	E	F		C	B			F	C
Approach Delay		31.6			104.8			27.7			62.9	
Approach LOS		C			F			C			E	
90th %ile Green (s)	15.0	53.0		7.0	45.0		20.0			25.0	25.0	
90th %ile Term Code	Max	Hold		Min	Max		Max			Max	Max	
70th %ile Green (s)	15.0	65.0		0.0	45.0		20.0			25.0	25.0	
70th %ile Term Code	Max	Hold		Skip	Max		Max			Max	Max	
50th %ile Green (s)	15.0	65.0		0.0	45.0		20.0			25.0	25.0	
50th %ile Term Code	Max	Hold		Skip	Max		Max			Max	Max	
30th %ile Green (s)	14.1	64.1		0.0	45.0		20.0			25.0	25.0	
30th %ile Term Code	Gap	Hold		Skip	Max		Max			Max	Max	
10th %ile Green (s)	10.1	60.1		0.0	45.0		20.0			25.0	25.0	
10th %ile Term Code	Gap	Hold		Skip	Max		Max			Max	Max	
Queue Length 50th (ft)	124	113	0	7	~707		145	23			~274	257
Queue Length 95th (ft)	#227	183	14	25	#848		217	60			#454	366
Internal Link Dist (ft)		516			947			194			394	
Turn Bay Length (ft)	300		360	150								
Base Capacity (vph)	213	1725	1095	213	1262		391	738			258	911
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.74	0.29	0.04	0.04	1.13		0.67	0.15			1.13	0.58

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 123.8

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 70.4

Intersection Capacity Utilization 89.8%

Analysis Period (min) 15

90th %ile Actuated Cycle: 125

70th %ile Actuated Cycle: 125

50th %ile Actuated Cycle: 125

30th %ile Actuated Cycle: 124.1

10th %ile Actuated Cycle: 120.1

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: E

ICU Level of Service E

Splits and Phases: 3: Kendrick St & 3rd Ave

 ø1	 ø2	 ø3	 ø4
20 s	50 s	25 s	30 s
 ø5	 ø6	 ø8	
20 s	50 s	30 s	

Lane Group	ø8
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	50.0
90th %ile Term Code	Hold
70th %ile Green (s)	50.0
70th %ile Term Code	Hold
50th %ile Green (s)	50.0
50th %ile Term Code	Hold
30th %ile Green (s)	50.0
30th %ile Term Code	Hold
10th %ile Green (s)	50.0
10th %ile Term Code	Hold
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	94	665	5	10	1089	311	8	7	14	282	8	286
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	723	5	11	1184	338	9	8	15	307	9	311
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)		1027										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	1522			728			1859	2473	364	1959	2307	761
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1522			610			1800	2446	227	1905	2271	761
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			99			0	66	98	0	70	11
cM capacity (veh/h)	434			917			3	22	737	23	29	348
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2					
Volume Total	464	367	603	930	32	315	311					
Volume Left	102	0	11	0	9	307	0					
Volume Right	0	5	0	338	15	0	311					
cSH	434	1700	917	1700	10	24	348					
Volume to Capacity	0.24	0.22	0.01	0.55	3.08	13.40	0.89					
Queue Length 95th (ft)	23	0	1	0	Err	Err	218					
Control Delay (s)	7.2	0.0	0.3	0.0	Err	Err	60.1					
Lane LOS	A		A		F	F	F					
Approach Delay (s)	4.0		0.1		Err	5064.1						
Approach LOS					F	F						

Intersection Summary

Average Delay	1155.1		
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		