

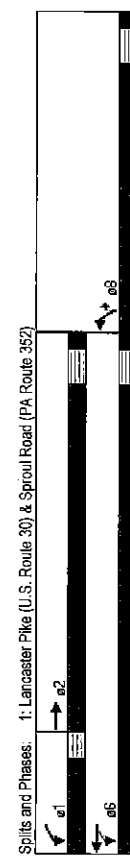
APPENDIX D

Future Capacity/Level-of-Service Analysis Worksheets

No Build

Date: 11-17-2016									
	←	→	↖	↗	↘	↙	↕	↔	↞
Lane Configurations	TB								
Volume (vph)	393	281	630	516	274	197			
Total Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12			
Grade (%)	0%			0%	0%				
Storage Length (ft)	0	110	0	270	0				
Storage Lanes	0	1		1					
Ramp Length (ft)	75	75		75	75				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Ped Bike Factor									
Ft	0.978					0.860			
Elr Protected		0.950		0.950		0.950			
Satd. Flow (prot)	1783	0	1671	1759	1787	1599			
Elr Permitted		0.093		0.093		0.093			
Satd. Flow (perm)	1783	0	164	1759	1787	1599			
Right-Turn-on-Red	No					No			
Satd. Flow (RTOR)	45		45	25					
Link Speed (mph)	2991		5292	872					
Link Distance (ft)	463		797	23.8					
Travel Time (s)									
Contl. Peds. (#/hr)									
Contl. Bikes (#/hr)									
Peak Hour Factor	0.92	0.92	0.93	0.93	0.81	0.81			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%			
Buses/Trucks (#/hr)	0	0	0	0	0	0			
Parking (#/hr)									
Mid-Block Traffic (%)	0%		0%	0%					
Adj. Flow (vph)	1427	305	677	587	335	607			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	1732	0	677	587	335	607			
Number of Detectors	2	1	2	1	1	1			
Detector Template	Thru	Left	Thru	Left	Right				
Leading Detector (ft)	300	20	100	20	20				
Trailing Detector (ft)	0	0	0	0	0				
Turn Type		Permit		Permit					
Protected Phases	2	1	6	8					
Permitted Phases		6			8				
Detector Phase	2	1	6	8	8				
Switch Phase									
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0				
Minimum Split (s)	21.0	33.0	21.0	21.0	21.0				
Total Split (s)	46.0	0.0	14.0	60.0	37.0	37.0			
Total Split (%)	47.4%	0.0%	14.3%	61.9%	38.1%	38.0%			
Maximum Green (s)	40.0	11.0	54.0	31.0	31.0				
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0				
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0				
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0				

Lead/Lag	Lag	Lead
Lead-Lag Optimize?		
Vehicle Extensions (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time-to-Begin Red (s)	0.0	0.0
Time To Reduce (s)	0.0	0.0
Recall (s)	None	None
Walk Time (s)	None	None
Eight-Point Walk (s)		
Pedestrian Calls (#/hr)	236	236
g/c Ratio	634.4	634.4
Control Delay	0.0	0.0
Queue Delay	0.0	0.0
Total Delay	634.4	634.4
Queue Length 50th (ft)	1763	1763
Queue Length 95th (ft)	#2024	#2024
Internal Delay (s)	2911	2911
Turn Bay Length (ft)	110	270
Base Capacity (vph)	736	736
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced g/c Ratio	236	236
Area Type	Other	Other
Cycle Length, 97		
Actuated Cycle Length, 97		
Natural Cycle, 120		
Control Type: Actuated Uncoordinated		
- 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		



McMahon Associates, Inc.
3: Lancaster Pike (U.S. Route 30) & Malin Road

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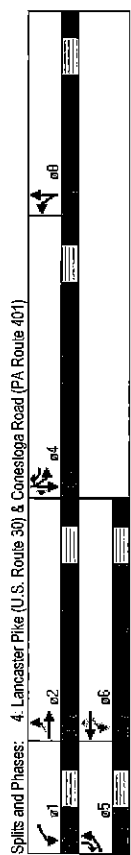
3: Lancaster Pike (U.S. Route 30) & Main Road
Synchro 7

McMahon Associates, Inc.
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)

Lane Group	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Configurations	←	→	↔	←	→	↔	←	→	↔
Volumes (vph)	57	1488	3	28	849	223	26	8	541
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	11	11	12
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	150	0	150	250	0	0	0	0	375
Storage Lanes	1	0	1	1	0	0	0	0	1
Stage Length (ft)	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Red Phase Secs	150	0	150	250	0	0	0	0	375
RTOR	F	P	F	F	P	F	F	P	F
Peak Hour Factor	0.93	0.93	0.93	0.94	0.94	0.94	0.84	0.81	0.81
Growth Factor	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Heavy Vehicles (%)	3%	3%	4%	4%	4%	0%	0%	3%	3%
Buses/Bikes (#hd)	0	0	0	0	0	0	0	0	0
Parking (#hr)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mile-Back Traffic (%)	61	1601	3	30	903	237	31	12	2
Shared Lane Traffic (%)	61	1504	0	30	903	237	0	45	0
Lane Group Flow (vph)	1	2	1	2	1	1	2	1	2
Number of Detectors	Left Thru	Left Thru	Right Left	Right Thru	Left Left	Left Thru	Left Right	Right Left	Right Right
Leading Detector (ft)	20	100	20	100	20	20	100	20	100
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0
Protected Phases	5	2	1	6	4	8	8	4	4
Permitted Phases	5	2	1	6	4	8	8	4	4
Detector Phase	5	2	1	6	4	8	8	4	4
Switch Phase	2	0	2	0	2	0	2	0	2
Minimum Initial (s)	20	20	20	30	20	20	20	20	20
Minimum Split (s)	90	360	90	250	300	90	90	300	360
Total Split (s)	120	260	0	120	260	300	220	220	0
Green Time (s)	13.3%	28.9%	0.0%	13.3%	28.9%	33.3%	24.4%	0.0%	33.3%
Maximum Green (s)	50	190	0	50	180	230	150	150	230
Yellow Time (s)	40	40	40	40	40	40	40	40	40
All Red Time (s)	30	30	0	30	30	30	30	30	30
Lost Time Adjus(s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	4.0	7.0	7.0	7.0	4.0	7.0	7.0

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 4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 40)
 Synchro 7

McMahon Associates, Inc.
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
2030 Future No Build Condition
Weekday Morning Peak Hour

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lanes, Volumes, Timings
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
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Synchro 7

McMahon Associates, Inc.
2030 Future No Build Condition
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Morning Peak Hour

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4. Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
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 Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29) Weekday Morning Peak Hour

Lane Configurations	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volumes (vph)	734	1483	0	0	963	1709	0	0	0	741	0	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	14	14	14	14	14	10
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	450	0	150	0	500	0	0	0	0	0	0	0
Storage Lanes	2	0	1	1	0	0	0	0	0	2	1	1
Taper Length (ft)	75	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Red-Bike Factor												
Fit												
Flt Protected	0.950											
Said Flow (prot)	3319	3421	0	1863	3539	1583	0	1987	0	3319	0	1478
Flt Permitted	0.950											
Said Flow (perm)	3319	3421	0	1863	3539	1583	0	1987	0	3319	0	1478
Right Turn on Red	No	No	No	No	No	No	No	No	No	No	No	No
Said Flow (RTOR)												
Link Speed (mph)	45	45	45	45	45	45	25	25	25	35	35	35
Link Distance (ft)	657	1347	1347	159	159	159	631	631	631	631	631	631
Travel Time (s)	100	207	207	43	43	43	123	123	123	123	123	123
Conf. Peds. (#/hr)												
Conf. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.91	0.91	0.91	0.91	0.25	0.25	0.25	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus/Bidapex (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	781	1556	0	0	955	1878	0	0	0	797	0	313
Shared Lane Traffic (%)												
Lane Group Flow (vph)	781	1556	0	0	955	1878	0	0	0	797	0	313
Number of Detectors	1	2	1	1	1	1	2	1	1	2	1	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	100	20	20	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Prot	Prot	Prot	Perm	Split	Prot	Prot	Prot	Prot	Prot	Prot	Prot
Protected Phases	5	2	1	6	8	8	4	4	4	4	4	4
Permitted Phases												
Detector Phase	5	2	1	6	8	8	4	4	4	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Split (s)	13.0	21.0	13.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	23.0	88.0	0.0	13.0	78.0	78.0	21.0	21.0	0.0	28.0	0.0	51.0
Total Split (%)	53%	98%	0.0%	8%	52%	52%	14%	14%	0.0%	18%	0.0%	34%
Maximum Green (s)	17.0	82.0	7.0	72.0	72.0	14.0	14.0	14.0	14.0	21.0	21.0	21.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Link Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0	7.0	7.0	4.0	7.0	4.0	7.0

Lanes, Volumes, Timings
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Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29) Weekday Morning Peak Hour

Lane Configurations	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Delay Reduction (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)												
Flt Don't Walk (s)												
Pedestrian Calls (#/hr)												
WCR Ratio	179	0.62		0.48	2.12		1.48	2.12		1.48	2.12	0.62
Control Delay	395.7	9.5		18.3	531.1		261.9	42.0		261.9	42.0	9.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	395.7	9.5		18.3	531.1		261.9	42.0		261.9	42.0	9.5
Queue Length 50th (ft)	503	292		243	2494		471	218		471	218	292
Queue Length 95th (ft)	4629	349		298	4756		4637	322		4637	322	349
Internal Link Dist (ft)		577		1287	79		79	551		551	79	577
Turn Bay Length (ft)	450			500			500			500		450
Base Capacity (vph)	437	2519		1975	884		540	504		540	504	437
Stallion 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	179	0.62		0.48	2.12		1.48	2.12		1.48	2.12	0.62
Area Type	Other											
Cycle Length	150											
Actual Cycle Length (s)	129											
Natural Cycle	120											
Control Type	Same As Adj Inbound											
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: 5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)

Lanes, Volumes, Timings
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Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
7: Old Lancaster Pike & Old Lincoln Highway Weekday Morning Peak Hour

Lane Configurations	3	9	6	1	19	18	878	6	38	390	242
Volume (vph)	436	3	9	6	1	19	18	878	6	38	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0
Friction Length (ft)	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bed Slope Factor	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.943
Fit	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.954	0.950
RT Permitted	0	1807	0	0	1634	0	0	1841	0	1736	1723
RT Permitted	0	1807	0	0	1634	0	0	1841	0	1736	1723
Link Speed (mph)	25	25	25	25	25	25	25	25	25	25	35
Link Distance (ft)	343	343	343	343	343	343	343	343	343	343	663
Travel Time (s)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	12.7
Conf. Peds. (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Conf. Bikes (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.84
Growth Factor	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	532	4	11	15	2	37	21	1021	7	45	464
Shared Lane Traffic (%)	0	547	0	0	54	0	0	1049	0	45	752
Lane Group Flow (vph)	0	547	0	0	54	0	0	1049	0	45	752
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Free
Area Type	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other
Control Type	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized

Lanes, Volumes, Timings
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7: Old Lancaster Pike & Old Lincoln Highway
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
7: Old Lancaster Pike & Old Lincoln Highway Weekday Morning Peak Hour

Lane Configurations	4	3	9	6	1	19	18	878	6	38	390	242
Volume (vph)	436	3	9	6	1	19	18	878	6	38	390	242
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.84	0.84
Hourly Flow Rate (vph)	532	4	11	15	2	37	21	1021	7	45	464	288
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0
Walking Speed (ft/s)	0	0	0	0	0	0	0	0	0	0	0	0
Percent Blockage	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn Lane (veh)	0	0	0	0	0	0	0	0	0	0	0	0
Median Type	None	None	None	None	None	None	None	None	None	None	None	None
Median Storage (veh)	0	0	0	0	0	0	0	0	0	0	0	0
Upstream Signal (ft)	0	0	0	0	0	0	0	0	0	0	0	0
pX, platoon unblocked	0	0	0	0	0	0	0	0	0	0	0	0
VC conflicting volume	1803	1769	608	1634	1903	1024	752	1028	1028	1028	1028	1028
VC1 stage 1 conf vol	1803	1769	608	1634	1903	1024	752	1028	1028	1028	1028	1028
VC2 stage 2 conf vol	1803	1769	608	1634	1903	1024	752	1028	1028	1028	1028	1028
VCu, unblocked vol	1803	1769	608	1634	1903	1024	752	1028	1028	1028	1028	1028
IC, 2 stage (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2	2.2	2.2	2.2	2.2
IC, 2 stage (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2	2.2	2.2	2.2	2.2
p0 queue free %	0	95	96	78	97	87	98	93	93	93	93	93
pl capacity (veh/h)	49	77	409	70	61	283	853	853	853	853	853	853
Volume Total	546	54	1049	45	752	752	752	752	752	752	752	752
Volume Left	532	15	21	45	0	0	0	0	0	0	0	0
Volume Right	532	37	7	0	288	0	0	0	0	0	0	0
CSH	50	142	853	668	1700	0	0	0	0	0	0	0
Volume to Capacity	10.35	0.38	0.02	0.07	0.44	0	0	0	0	0	0	0
Queue Length 95th (ft)	Err	40	2	5	0	0	0	0	0	0	0	0
Control Delay (s)	Err	45.7	0.8	10.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	E	A	B	E	A	B	E	A	B	E	E
Approach Delay (s)	Err	45.7	0.8	10.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Approach LOS	F	E	A	B	E	A	B	E	A	B	E	E
Average Delay	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3	2234.3
Intersection Capacity Utilization	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%	99.2%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15	15

HCM Unsignalized Intersection Capacity Analysis
I:\lang\809534\TrafficAnalysis\November 2010\2030 Three Tun Connection Only\Weekday AM.syn
7: Old Lancaster Pike & Old Lincoln Highway
Synchro 7

McMahon Associates, Inc.
9: Quaker Lane & Warren Avenue

2030 Future No Build Condition
Weekday Morning Peak Hour

Lane Configurations	4	6	27	336	250	29
Volume (veh)	4	6	27	336	250	29
Sign Control	Stop	Free	Free	Free	Free	Free
Grade (%)	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.50	0.50	0.79	0.79	0.90	0.90
Hourly Flow Rate (veh)	8	12	34	428	278	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Perpet Blockage						
Right turn lane (veh)						
Median type						None - None
Median storage (veh)						
Prosthes signal (ft)						
pX platoon unblocked						
vc1 stage 1 conf vol	790	294	310			
vc2 stage 2 conf vol						
vcu, unblocked vol	790	294	310			
IC, 1 stage (s)	6.5	6.3	4.1			
IC, 2 stage (s)	3.5	3.4	2.2			
p0 queue free %	98	98	97			
BM capacity (veh/h)	335	220	1256			
Volume Total	20	62	310			
Volume Left	8	34	0			
Volume Right	12	28	32			
cSH	493	1256	1700			
Volume to Capacity	0.04	0.03	0.18			
Queue Length 95th (ft)	3	2	0			
Control Delay (s)	12.6	0.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.6	0.9	0.0			
Approach LOS	B					
Average Delay			0.8			
Intersection Capacity Utilization			47.5%			A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
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Synchro 7

9: Quaker Lane & Warren Avenue
Synchro 7

McMahon Associates, Inc.
10: Pennsylvania Avenue & Warren Avenue

2030 Future No Build Condition
Weekday Morning Peak Hour

Lane Configurations	17	14	53	357	195	44
Volume (veh)	17	14	53	357	195	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	0	0	0	0
Travel Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Perpet Blockage						
Fit	0.947					0.975
Fit Protected	0.974			0.994		
Satd. Flow (prot)	1713	0	0	1852	1816	0
Fit Permitted	0.974			0.994		
Satd. Flow (perm)	1713	0	0	1852	1816	0
Link Speed (mph)	25	25	25	25	25	25
Link Distance (ft)	882			853	604	
Travel Time (s)	18.6			23.3	16.5	
Conf. Peds. (#/hr)						
Conf. Bikes (#/hr)						
Peak Hour Factor	0.50	0.50	0.86	0.86	0.76	0.76
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Backages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	22	62	415	257	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	56	0	0	477	315	0
Sign Control	Stop	Free	Free	Free	Free	Free
Area Type						
Control Type	Unsignalized					

Lanes, Volumes, Timings
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Synchro 7

10: Pennsylvania Avenue & Warren Avenue
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Lane Configs	999	328	473	1523	347	318
Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12	12	12	12	12	12
Lane Width (ft)	0%	0%	0%	0%	0%	0%
Grade (%)	0	0	110	270	0	0
Storage Length (ft)	0	0	1	1	1	1
Storage Lanes	0	0	1	1	1	1
Taper Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.966					0.850
Flt Protected			0.950	0.950		
Satd. Flow (prot)	1799	0	1787	1881	1770	1583
Flt Permitted			0.154	0.950		
Satd. Flow (perm)	1799	0	290	1881	1770	1583
Right Turn on Red	No	No	No	No	No	No
Satd. Flow (RTOR)	45	45	45	45	45	45
Link Speed (mph)	2951	5262	872			
Link Distance (ft)	45.3	79.7	23.8			
Concl. Posts. (W/H)						
Don't Bikes (W/H)						
Peak Hour Factor	0.97	0.97	0.96	0.96	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Bus Bldg Factor (W/H)	0	0	0	0	0	0
Parking (W/H)						
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	999	338	499	1586	408	374
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1327	0	499	1586	408	374
Number of Detectors	2	1	2	1	1	1
Detector Template	Thru	Left	Thru	Left	Right	Right
Leading Detector (ft)	100	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Tune Type	perm	perm	perm	perm	perm	perm
Protected Phases	2	1	6	8		
Permitted Phases	6	6	6	8	8	8
Detector Phase	2	1	6	8	8	8
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Split (s)	21.0	13.0	21.0	21.0	21.0	21.0
Total Split (s)	29.0	0.0	15.0	44.0	23.0	23.0
Total Split (%)	43.3%	0.0%	22.4%	65.7%	34.3%	34.3%
Maximum Green (s)	23.0	12.0	38.0	17.0	17.0	17.0
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0	2.0
East Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Lane Configs	999	328	473	1523	347	318
Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12	12	12	12	12	12
Lane Width (ft)	0%	0%	0%	0%	0%	0%
Grade (%)	0	0	110	270	0	0
Storage Length (ft)	0	0	1	1	1	1
Storage Lanes	0	0	1	1	1	1
Taper Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.966					0.850
Flt Protected			0.950	0.950		
Satd. Flow (prot)	1799	0	1787	1881	1770	1583
Flt Permitted			0.154	0.950		
Satd. Flow (perm)	1799	0	290	1881	1770	1583
Right Turn on Red	No	No	No	No	No	No
Satd. Flow (RTOR)	45	45	45	45	45	45
Link Speed (mph)	2951	5262	872			
Link Distance (ft)	45.3	79.7	23.8			
Concl. Posts. (W/H)						
Don't Bikes (W/H)						
Peak Hour Factor	0.97	0.97	0.96	0.96	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Bus Bldg Factor (W/H)	0	0	0	0	0	0
Parking (W/H)						
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	999	338	499	1586	408	374
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1327	0	499	1586	408	374
Number of Detectors	2	1	2	1	1	1
Detector Template	Thru	Left	Thru	Left	Right	Right
Leading Detector (ft)	100	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Tune Type	perm	perm	perm	perm	perm	perm
Protected Phases	2	1	6	8		
Permitted Phases	6	6	6	8	8	8
Detector Phase	2	1	6	8	8	8
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Split (s)	21.0	13.0	21.0	21.0	21.0	21.0
Total Split (s)	29.0	0.0	15.0	44.0	23.0	23.0
Total Split (%)	43.3%	0.0%	22.4%	65.7%	34.3%	34.3%
Maximum Green (s)	23.0	12.0	38.0	17.0	17.0	17.0
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0	2.0
East Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0	6.0



Splits and Phases: 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Lane Configurations	3	0	3	519	0	130	0	523	33	748	3
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	60	30	60	60	60	60	60	60	60	60	60
Initial Loss Time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Fit	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Fit Protected	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd Flow (vphpl)	1799	1799	1799	1799	1799	1799	1799	1799	1799	1799	1799
Peak-hour factor, P-H	0.97	0.97	0.96	0.96	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj Flow (vph)	989	338	498	1688	406	374	374	374	374	374	374
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1327	0	499	1688	406	374	374	374	374	374	374
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%	2%	2%	2%	2%	2%
Turn-type	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Permitted Phases	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Actuated Green, G (s)	23.0	38.0	38.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Effective Green, G (s)	23.0	38.0	38.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Actuated g/C Ratio	0.34	0.57	0.57	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Clearance Time (s)	60	30	60	60	60	60	60	60	60	60	60
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	518	492	687	449	402	402	402	402	402	402	402
v/s Ratio Prot	0.74	0.21	0.84	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24
v/s Ratio Perm	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
v/c Ratio	2.15	1.16	1.49	0.91	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Uniform Delay, d1	22.0	17.9	14.5	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	52.7	83.1	223.9	21.9	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Delay (s)	543.7	110.9	238.4	46.1	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Level of Service	F	F	F	D	D	D	D	D	D	D	D
Approach Delay (s)	543.7	207.9	49.1								
Approach LOS	F	F	D								
HCMA Average Control Delay	264.5	264.5	264.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
HCMA Volume to Capacity ratio	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
Actuated Cycle Length (s)	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0
Intersection Capacity Utilization	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15
c Critical Lane Group											

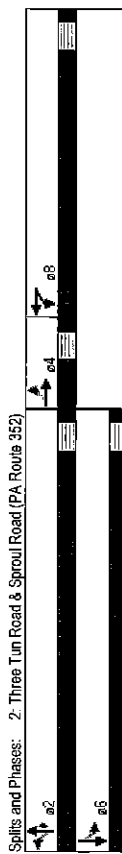
HCMA Signalized Intersection Capacity Analysis
Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
Weekday Afternoon Peak Hour
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition
2: Three Tun Road & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Lane Configurations	3	0	3	519	0	130	0	523	33	748	3
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	60	30	60	60	60	60	60	60	60	60	60
Initial Loss Time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Fit	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Fit Protected	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd Flow (vphpl)	1799	1799	1799	1799	1799	1799	1799	1799	1799	1799	1799
Peak-hour factor, P-H	0.97	0.97	0.96	0.96	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj Flow (vph)	989	338	498	1688	406	374	374	374	374	374	374
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1327	0	499	1688	406	374	374	374	374	374	374
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%	2%	2%	2%	2%	2%
Turn-type	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Permitted Phases	2	1	6	8	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Actuated Green, G (s)	23.0	38.0	38.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Effective Green, G (s)	23.0	38.0	38.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Actuated g/C Ratio	0.34	0.57	0.57	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Clearance Time (s)	60	30	60	60	60	60	60	60	60	60	60
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	518	492	687	449	402	402	402	402	402	402	402
v/s Ratio Prot	0.74	0.21	0.84	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24
v/s Ratio Perm	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
v/c Ratio	2.15	1.16	1.49	0.91	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Uniform Delay, d1	22.0	17.9	14.5	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	52.7	83.1	223.9	21.9	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Delay (s)	543.7	110.9	238.4	46.1	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Level of Service	F	F	F	D	D	D	D	D	D	D	D
Approach Delay (s)	543.7	207.9	49.1								
Approach LOS	F	F	D								
HCMA Average Control Delay	264.5	264.5	264.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
HCMA Volume to Capacity ratio	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
Actuated Cycle Length (s)	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0
Intersection Capacity Utilization	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%	129.5%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15
c Critical Lane Group											

HCMA Signalized Intersection Capacity Analysis
Three Tun Road & Sproul Road (PA Route 352)
Weekday Afternoon Peak Hour
Synchro 7

McMahon Associates, Inc.
2: Three Tun Road & Sproul Road (PA Route 352)

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Lanes: Volumes, Timings
 2: Three Tun Road & Sproul Road (PA Route 352)
 201/02/2030 Three Tun Connection Only/Weekday PM.syn
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 Synchro 7

McMahon Associates, Inc.
2: Three Tun Road & Sproul Road (PA Route 352)

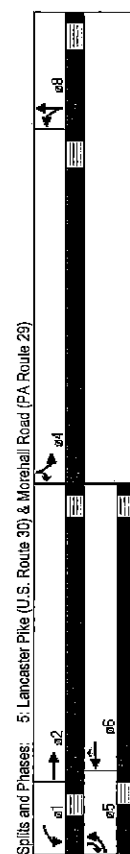
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McMahon Associates, Inc.
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)

Lead	Cap	Red	Ext	3rd	2nd	1st	Lead	Cap	Red	Ext	3rd	2nd	1st	Lead
Lead Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?														
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Balance Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Max	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)														
First Don't Walk (s)														
Vehicle v/c Ratio	0.46	1.21	0.14	1.78	1.30	0.50	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Pedestrian Calls (vhr)	18.1	85.9	20.2	381.2	80.2	44.1	61.5	10.7	61.5	10.7	61.5	10.7	61.5	10.7
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	85.9	20.2	381.2	80.2	44.1	61.5	10.7	61.5	10.7	61.5	10.7	61.5	10.7
Queue Length 50% (ft)	40	364	10	508	291	61	236	7	236	7	236	7	236	7
Queue Length 95% (ft)	m43	m#655	30	#1050	#1034	70	#413	18	#413	18	#413	18	#413	18
Internal Link Delay (s)	284.2	930	33	2760	33	2760	33	2760	33	2760	33	2760	33	2760
Turn Bay Length (ft)	150	150	150	250	250	375	375	375	375	375	375	375	375	375
Base Capacity (vph)	215	1146	210	1019	395	445	553	445	553	445	553	445	553	445
Survival Cap Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	1.15	0.14	1.78	1.30	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Area Type														
Other														
Cycle Length: 90														
Actuated Cycle Length: 90														
Offset: 0.0%	Referenced to phase 2 EBTL, Start of Green													
Natural Cycle: 115														
Control Type: Actuated-Coordinated														
Queue shown is maximum after two cycles. # 95% per cycle, no time exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. # 95% per cycle, no time exceeds capacity, queue may be longer. Volume for 95% per cycle, no time exceeds maximum signal														



Lanes, Volumes, Timings
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
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[illegible][illegible]

Lane Configurations		V ₁		V ₂		V ₃		V ₄		V ₅		V ₆		V ₇		V ₈		V ₉		V ₁₀		V ₁₁		V ₁₂		V ₁₃		V ₁₄		V ₁₅		V ₁₆		V ₁₇		V ₁₈		V ₁₉		V ₂₀		V ₂₁		V ₂₂		V ₂₃		V ₂₄		V ₂₅		V ₂₆		V ₂₇		V ₂₈		V ₂₉		V ₃₀		V ₃₁		V ₃₂		V ₃₃		V ₃₄		V ₃₅		V ₃₆		V ₃₇		V ₃₈		V ₃₉		V ₄₀		V ₄₁		V ₄₂		V ₄₃		V ₄₄		V ₄₅		V ₄₆		V ₄₇		V ₄₈		V ₄₉		V ₅₀		V ₅₁		V ₅₂		V ₅₃		V ₅₄		V ₅₅		V ₅₆		V ₅₇		V ₅₈		V ₅₉		V ₆₀		V ₆₁		V ₆₂		V ₆₃		V ₆₄		V ₆₅		V ₆₆		V ₆₇		V ₆₈		V ₆₉		V ₇₀		V ₇₁		V ₇₂		V ₇₃		V ₇₄		V ₇₅		V ₇₆		V ₇₇		V ₇₈		V ₇₉		V ₈₀		V ₈₁		V ₈₂		V ₈₃		V ₈₄		V ₈₅		V ₈₆		V ₈₇		V ₈₈		V ₈₉		V ₉₀		V ₉₁		V ₉₂		V ₉₃		V ₉₄		V ₉₅		V ₉₆		V ₉₇		V ₉₈		V ₉₉		V ₁₀₀		V ₁₀₁		V ₁₀₂		V ₁₀₃		V ₁₀₄		V ₁₀₅		V ₁₀₆		V ₁₀₇		V ₁₀₈		V ₁₀₉		V ₁₁₀		V ₁₁₁		V ₁₁₂		V ₁₁₃		V ₁₁₄		V ₁₁₅		V ₁₁₆		V ₁₁₇		V ₁₁₈		V ₁₁₉		V ₁₂₀		V ₁₂₁		V ₁₂₂		V ₁₂₃		V ₁₂₄		V ₁₂₅		V ₁₂₆		V ₁₂₇		V ₁₂₈		V ₁₂₉		V ₁₃₀		V ₁₃₁		V ₁₃₂		V ₁₃₃		V ₁₃₄		V ₁₃₅		V ₁₃₆		V ₁₃₇		V ₁₃₈		V ₁₃₉		V ₁₄₀		V ₁₄₁		V ₁₄₂		V ₁₄₃		V ₁₄₄		V ₁₄₅		V ₁₄₆		V ₁₄₇		V ₁₄₈		V ₁₄₉		V ₁₅₀		V ₁₅₁		V ₁₅₂		V ₁₅₃		V ₁₅₄		V ₁₅₅		V ₁₅₆		V ₁₅₇		V ₁₅₈		V ₁₅₉		V ₁₆₀		V ₁₆₁		V ₁₆₂		V ₁₆₃		V ₁₆₄		V ₁₆₅		V ₁₆₆		V ₁₆₇		V ₁₆₈		V ₁₆₉		V ₁₇₀		V ₁₇₁		V ₁₇₂		V ₁₇₃		V ₁₇₄		V ₁₇₅		V ₁₇₆		V ₁₇₇		V ₁₇₈		V ₁₇₉		V ₁₈₀		V ₁₈₁		V ₁₈₂		V ₁₈₃		V ₁₈₄		V ₁₈₅		V ₁₈₆		V ₁₈₇		V ₁₈₈		V ₁₈₉		V ₁₉₀		V ₁₉₁		V ₁₉₂		V ₁₉₃		V ₁₉₄		V ₁₉₅		V ₁₉₆		V ₁₉₇		V ₁₉₈		V ₁₉₉		V ₂₀₀		V ₂₀₁		V ₂₀₂		V ₂₀₃		V ₂₀₄		V ₂₀₅		V ₂₀₆		V ₂₀₇		V ₂₀₈		V ₂₀₉		V ₂₁₀		V ₂₁₁		V ₂₁₂		V ₂₁₃		V ₂₁₄		V ₂₁₅		V ₂₁₆		V ₂₁₇		V ₂₁₈		V ₂₁₉		V ₂₂₀		V ₂₂₁		V ₂₂₂		V ₂₂₃		V ₂₂₄		V ₂₂₅		V ₂₂₆		V ₂₂₇		V ₂₂₈		V ₂₂₉		V ₂₃₀		V ₂₃₁		V ₂₃₂	
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Lane Configurations														
Volume (vph)	8	1669	1066	501	1557	8	815	1	69	3	1	72	4	
Ideal Flow (vphpl)	1900	1300	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	9	12	14	11	11	14	12	13	14	14	14	14	0%	
Grade (%)	0%													
Storage Length (ft)	150	0	160	0	250	150	0	0	0	0	0	0	0	
Storage Lanes	1	1	1	1	1	1	1	1	0	0	0	0	0	
Travel Length (ft)	75	75	75	75	75	75	75	75	75	75	75	75	75	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	
Ped/Bike Factor	1.00													
Frt	0.850													
EF Protected	0.950													
Sat. Flow (prot)	1624	3610	1723	1728	3455	1706	1698	1730	0	0	1853	0	0	
EF Permitted	0.067													
Sat. Flow (perm)	115	3510	1723	111	3455	1706	1698	1730	0	0	1853	0	0	
Right Turn on Red	No													
Sat. Flow (RTOR)	No													
Link Speed (vph)	45	45	45	45	45	45	45	45	45	45	45	45	45	
Link Distance (ft)	1347	937	937	142	653	166	166	166	166	166	166	166	166	
Travel Time (s)	20.4	14.2	12.7	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	
Conf. Peds. (#/hr)	0													
Conf. Bikes (#/hr)	0													
Peak Hour Factor	0.96	0.96	0.96	0.93	0.93	0.93	0.87	0.87	0.87	0.78	0.78	0.78	0.78	
Growth Factor	1.00%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)	0													
WABock Traffic (%)	0%													
Add. Flow (vph)	8	1759	1110	109	1997	9	937	1	79	4	14	28	0%	
Shared Lane Traffic (%)	0%													
Lane Group Flow (vph)	8	1759	1110	109	1997	9	515	502	0	0	46	0	0	
Number of Detectors	1	2	1	2	1	1	2	1	2	1	2	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Left	Thru	Left	Thru	Left	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	100	20	100	20	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	
Detector Type	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	
Protected Phases	5	2	2	1	6	4	4	4	4	8	8	8	8	
Permitted Phases	2	2	2	6	6	6	6	6	6	6	6	6	6	
Detector Phase	5	2	2	1	6	6	4	4	4	8	8	8	8	
Switch Phase	0													
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Minimum Spill (s)	13.0	25.0	21.0	13.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	
Total Spill (s)	13.0	65.0	65.0	13.0	65.0	65.0	40.0	40.0	40.0	13.0	13.0	13.0	13.0	
Total Spill (%)	0.3%	48.6%	49.5%	9.9%	49.5%	46.8%	30.5%	30.5%	30.5%	9.9%	9.9%	9.9%	9.9%	
Maximum Green (s)	7.0	58.0	58.0	7.0	58.0	58.0	34.0	34.0	34.0	7.0	7.0	7.0	7.0	
Yellow 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	4.0	
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	7.0	7.0	6.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	

McMahon Associates, Inc.
7: Old Lancaster Pike & Old Lincoln Highway

2030 Future No Build Condition
Weekday Afternoon Peak Hour

Approach	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Volume (vph)	344	16	9	344	16	9	344	16	9	344	16	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Travel Length (ft)	75	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
RT	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355	0.355
RT Permitted	0	1786	0	0	1694	0	0	1877	0	1805	1746	0
RT Permitted	0	0.953	0	0.953	0	0.953	0	0.953	0	0.950	0.950	0
RT Permitted	0	1786	0	0	1694	0	0	1877	0	1805	1746	0
Link Distance (ft)	343	192	52	343	192	52	343	192	52	343	192	52
Travel Time (s)	94	52	12	94	52	12	94	52	12	94	52	12
Control Points (#/mi)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Control Block Length	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	0%	1%	0%	0%	1%	1%	1%	0%	0%	0%
Bus Blockages (#/mi)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/mi)	0	0	0	0	0	0	0	0	0	0	0	0
Micro-Signal Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	382	1	18	17	12	88	15	487	5	36	577	686
Shared Lane Traffic (%)	0	401	0	0	117	0	0	507	0	36	1263	0
Lane Group Flow (vph)	0	401	0	0	117	0	0	507	0	36	1263	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Other												
Control Type: Unsignalized												

Lanes, Volumes, Timings
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7: Old Lancaster Pike & Old Lincoln Highway
Synchro 7

McMahon Associates, Inc.
7: Old Lancaster Pike & Old Lincoln Highway

2030 Future No Build Condition
Weekday Afternoon Peak Hour

Approach	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Volume (vph)	344	16	9	344	16	9	344	16	9	344	16	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Travel Length (ft)	75	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	362	1	18	17	12	88	15	487	5	36	577	686
Pedestrians												
Walking Speed (ft/s)												
Percent Blockage												
Right turn lane (veh)												
Median Type												
Median storage (veh)												
Permitted signal (ft)												
pX, platoon unblocked												
VC conflicting volume	1606	1514	920	1187	1855	489	1263	492				
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu, unblocked vol	1606	1514	920	1187	1855	489	1263	492				
IC sample (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
IC 2 stage (s)	1.5	4.0	3.3	3.3	4.0	3.3	2.2	2.2				
IC 3 stage (s)	0	99	95	88	84	85	97	97				
p0 queue free %	60	113	330	149	70	563	554	1082				
IC capacity (veh/h)												
Volume Total	401	17	507	36	1263							
Volume Left	382	17	15	36	0							
Volume Right	18	88	5	0	586							
CSH	63	271	554	1092	1700							
Volume to Capacity	6.41	0.43	0.03	0.03	0.74							
Queue Length 90th (ft)	Err	52	2	3	0							
Control Delay (s)	Err	280	0.8	8.4	0.0							
Lane LOS	F	D	A	A								
Approach Delay (s)	Err	280	0.8	8.4								
Approach LOS	F	D										
Intersection Capacity Utilization					101.7%							
Analysis Period (min)					15							
Average Delay					1727.2							
IC Level of Service					G							

Lanes, Volumes, Timings
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7: Old Lancaster Pike & Old Lincoln Highway
Synchro 7

McMahon Associates, Inc.
8: Conestoga Road (PA Route 401) & Malin Road

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HCM Signalized Intersection Capacity Analysis
 8: Conestoga Road (PA Route 401) & Mallin Road
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Lanes, Volumes, Timings

McMahon Associates, Inc.
9: Quaker Lane & Warren Avenue
2030 Future No Build Condition
Weekday Afternoon Peak Hour



Lane Configurations	4	4	4	4
Volume (veh/h)	41	24	210	457
Sign Control	Stop	Free	Free	Free
Grade (%)	0%	0%	0%	0%
Peak Hour Factor	0.93	0.93	0.93	0.93
Hourly flow rate (veh/h)	21	41	233	508
Pedestrians				
Lane Width (ft)				
Walking Speed (ft/s)				
Percent Blockage				
Right turn lane (veh)				
Median type			None	None
Median storage (veh)				
Upstream Signal (ft)				
pX, platoon unblocked				
ICU conflicting volume	751	508	509	
ICU stage 1 conf vol				
ICU stage 2 conf vol	751	508	509	
ICU unblocked vol	64	62	41	
ICU stage (s)	3.5	3.3	2.2	
ICU queue free %	81	93	100	
ICU capacity (veh/h)	377	565	1031	
ICU LOS				
Approach Delay (s)	16.3	0.2	0.0	
Approach LOS	C	C		
ICU LOS				
Volume Total	112	238	509	
Volume Left	71	4	0	
Volume Right	41	0	1	
CSH	430	1061	1700	
Volume to Capacity	0.26	0.00	0.30	
Queue Length 95th (ft)	28	0	0	
Control Delay (s)	16.3	0.2	0.0	
Lane LOS	C	A		
Approach Delay (s)	16.3	0.2	0.0	
Approach LOS	C	C		
Average Delay	2.2			
Intersection Capacity Utilization	34.5%			
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
I:\eng\8095341\TrafficAnalysis\November 2010\2030 Three Tun Connection Only\Weekday PM.syn
Synchro 7

9: Quaker Lane & Warren Avenue
Synchro 7

McMahon Associates, Inc.
10: Pennsylvania Avenue & Warren Avenue
2030 Future No Build Condition
Weekday Afternoon Peak Hour



Lane Configurations	4	4	4	4
Volume (veh/h)	34	51	131	447
Ideal Flow (veh/h)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0
Storage Lanes	1	0	0	0
Taper Length (ft)	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00
Ped Bike Factor				
Flt	0.919		0.997	
Flt Pktd	0.990		0.997	
Satd. Flow (prot)	1678	0	1857	0
Flt Pktd	0.990		0.997	
Satd. Flow (perm)	1678	0	1857	0
Link Speed (mph)	25	25	25	25
Link Distance (ft)	682		917	604
Travel Time (s)	18.6		25.0	16.5
Conf. Pkts. (#/hr)				
Conf. Bikes (#/hr)				
Peak Hour Factor	0.73	0.73	0.91	0.96
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)	0%	0%	0%	0%
Adj. Flow (vph)	47	70	12	209
Shared Lane Traffic (%)				
Lane Group Flow (vph)	117	0	0	221
Sign Control	Stop	Free	Free	Free
Area Type				
Control Type	Unsignalized			

Lanes, Volumes, Timings
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Synchro 7

10: Pennsylvania Avenue & Warren Avenue
Synchro 7

McMahon Associates, Inc.
11: King Street & Warren Avenue

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Solits and Phases; 11: King Street & Warren Avenue



McMahon Associates, Inc.
11: King Street & Warren Avenue

Lane Configurations										
Volume (vph)	38	172	580	27	71	138	116	31	457	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	10	10	10	10
Grade (%)	-1%	2%		2%		-5%		10%		
Total Lost time (s)	5.6	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FFI	0.99	1.00	1.00	1.00	1.00	1.00	0.93	1.00	0.97	
FFI Protected	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.95	1.00	
FFI Permitted	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Satd. Flow (vph)	1895	1895	1895	1895	1895	1895	1660	1600	1631	
Permitted	1895	1895	1895	1895	1895	1895	1660	1600	1631	
Satd. Flow (perm)	1895	1895	1895	1895	1895	1895	1660	1600	1631	
PHF	0.83	0.79	0.79	0.20	1.00	1.00	0.52	1.00		
Peak-Hour factor, PHF	0.85	0.85	0.85	0.96	0.96	0.96	0.91	0.91	0.92	0.92
Peak-Hour Flow (vph)	58	344	45	179	604	28	78	152	772	34
RTOR Reduction (vph)	0	7	0	0	2	0	0	50	0	16
Heavy Vehicle Group Flow (vph)	0	457	0	0	809	0	73	278	0	34
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	0%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	6	6	6	8	8	4	4	4	4
Permitted Phases	2	6	6	6	8	8	4	4	4	4
Actuated Green, G (s)	30.0	30.0	30.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Effective Green, G (s)	30.0	30.0	30.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Actuated g/c Ratio	0.50	0.50	0.50	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Clearance time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	793	753	753	119	553	553	292	544	544	544
via Ratio Perm	0.28	0.54	0.54	0.22	0.14	0.14	0.04	0.04	0.04	0.04
via Ratio	0.57	1.07	1.07	0.66	0.41	0.41	0.12	0.12	0.12	0.12
Uniform Delay, d1	10.5	15.0	15.0	17.1	15.5	15.5	13.9	20.0	20.0	20.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.9	54.6	54.6	24.8	2.3	2.3	0.8	79.1	79.1	79.1
Delay (s)	3.4	69.6	69.6	41.9	17.7	17.7	14.7	99.1	99.1	99.1
Level of Service	B	E	E	D	D	D	B	F	F	F
Approach Delay (s)	13.1	59.6	59.6	23.0	17.7	17.7	14.7	99.1	99.1	99.1
Approach LOS	B	E	E	C	C	C	B	F	F	F
HCM Average Control Delay										
HCM Volume-to-Capacity ratio	1.10	E								
Actuated Cycle Length (s)	60.0	10.0								
Intersection-to-Capacity Utilization	112.4%	H								
Analysis Period (min)	15									
Critical Lane Group										

Lanes, Volumes, Timings
 11: King Street & Warren Avenue
 Synchro 7

11: King Street & Warren Avenue
Synchro 7

With Transit Oriented Development Traffic

McMahon Associates, Inc. 2030 Future No Build Condition w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour



Lane Configurations	Thru	Left	Thru	Left	Thru	Left	Thru	Left
Volumes (vph)	1313	288	420	558	284	984		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	12	12	12	12	12	12		
Grade (%)	0%	0%	0%	0%	0%	0%		
Storage Length (ft)	0	110	0	210	0	0		
Storage Lanes	0	1	0	1	0	1		
Travel Length (ft)	75	75	75	75	75	75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Packable Factor	0.976							
RT		0.950		0.950		0.850		
Satd. Flow (prot)	1793	0	1671	1759	1787	1599		
Elr Permitted			0.000		0.980			
Satd. Flow (perm)	1783	0	106	1759	1787	1599		
Right Turn on Red	No					No		
Satd. Flow (RTOR)	45		45	25				
Link Speed (mph)	29.1		56.2	872				
Travel Time (s)	45.3		79.7	23.8				
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.92	0.92	0.93	0.93	0.81	0.81		
Growth Factor	100%	100%	100%	100%	100%	100%		
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%		
Buse/Buses (vph)	0	0	0	0	0	0		
Parking (#/hr)								
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%		
Adj. Flow (vph)	1434	313	452	600	351	1215		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	1747	0	452	600	351	1215		
Number of Detectors	2	1	2	1	1	1		
Detector Template	Thru	Left	Thru	Left	Right			
Leading Detector (ft)	100	0	20	500	20	20		
Trailing Detector (ft)	0	0	0	0	0	0		
Turn Type	Thru	Left	Thru	Left	Right			
Protected Phases	2	1	6	8				
Permitted Phases								
Detector Phase	2	1	6	8	8			
Switch Phase								
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0			
Minimum Split (s)	21.0	13.0	21.0	21.0	21.0			
Total Split (s)	70.0	0.0	40.0	80.0	17.0			
Total Split (%)	72.2%	0.0%	40.3%	82.5%	17.5%			
Maximum Green (s)	64.0	7.0	74.0	11.0	11.0			
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0			
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0			
Lost Time Adjst (s)	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0			

Lanes, Volumes, Timings
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1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour



Lane Configurations	Thru	Left	Thru	Left	Thru	Left	Thru	Left
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0		
Time Before Red (s)	0.0	0.0	0.0	0.0	0.0	0.0		
Time to Red (s)	0.0	0.0	0.0	0.0	0.0	0.0		
Recall Mode	None	None	None	None	None	None		
Walk Time (s)								
Flash Don't Walk (s)								
Pedestrian Calls (#/hr)								
Wt Ratio	1.49	2.29	0.45	1.73	6.71			
Control Delay	243.8	617.2	5.4	376.9	2590.9			
Queue Delay	0.0	0.0	0.0	0.0	0.0			
Total Delay	243.8	617.2	5.4	376.9	2590.9			
Queue Length 50th (ft)	249.8	412	108	323	1453			
Queue Length 95th (ft)	#759	#606	159	#434	#1520			
Intersect Link Dist (ft)	29.1			5182	192			
Turn Bay Length (ft)		110		270				
Base Capacity (vph)	1176	197	1342	203	18			
Starvation Cap Reductn	0	0	0	0	0			
Spillback Cap Reductn	0	0	0	0	0			
Storage Cap Reductn	0	0	0	0	0			
Reultdly Wt Ratio	1.49	2.29	0.45	1.73	6.71			
Alpha Type	Other							
Cycle Length: 97								
Actual Cycle Length: 97								
Natural Cycle: 120								
Control Type: Actuated Uncoordinated								
~ 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: 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)

Lanes, Volumes, Timings
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1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition w/ TOD
 3: Lancaster Pike (U.S. Route 30) & Malin Road Weekday Morning Peak Hour

Lane Configurations	35	1580	9	14	937	32	23	1	11	73	14
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	16	12	11	11	14	14	14	12	12
Grade (%)	-1%	-1%	1%	1%	-2%	-2%	3%	3%	3%	3%	3%
Right-of-Way (ft)	60	60	50	50	50	50	50	50	50	50	50
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	0.99	0.99	0.99	0.99
Side-Flow (prot)	1761	3402	1678	3229	1678	3229	1743	1516	1516	1516	1516
Side-Flow (perm)	0.18	1.00	0.07	1.00	0.07	1.00	0.64	0.90	0.90	0.90	0.90
Peak-hour factor, PHF	0.94	0.94	0.94	0.81	0.81	0.81	0.75	0.75	0.75	0.83	0.83
Adj. Flow (vph)	373	1689	10	17	1687	40	31	3	35	88	17
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	373	1679	0	17	1679	0	0	51	0	0	372
Heavy Vehicles (%)	3%	3%	3%	7%	7%	7%	35%	35%	35%	6%	6%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	6	6	8	8	4	4	4	4	4
Actuated Green, G (s)	55.0	55.0	55.0	55.0	55.0	55.0	23.0	23.0	23.0	23.0	23.0
Effective Green, g (s)	55.0	55.0	55.0	55.0	55.0	55.0	23.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61	0.26	0.26	0.26	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane C/C Cap (vph)	204	2078	78	1873	238	238	968	968	968	968	968
vis Ratio Prot.	0.49	0.49	0.37	0.37	0.37	0.37	0.26	0.26	0.26	0.26	0.26
vis Ratio Perm	0.12	0.81	0.22	0.61	0.22	0.61	0.21	0.21	0.21	0.21	0.21
Uniform Delay, d1	17.5	13.4	7.9	10.8	26.4	26.4	33.5	33.5	33.5	33.5	33.5
Progression Factor	1.00	1.00	2.23	2.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	391.3	31.5	0.6	0.1	0.4	0.4	0.7	0.7	0.7	0.7	0.7
Delay (s)	408.8	16.9	18.1	24.8	26.8	26.8	83.2	83.2	83.2	83.2	83.2
Level of Service	F	B	B	C	C	C	F	F	F	F	F
Approach Delay (s)	88.2	24.7	26.8	26.8	83.2	83.2	83.2	83.2	83.2	83.2	83.2
Approach LOS	F	C	C	C	F	F	F	F	F	F	F
Summary Statistics											
HCM Average Control Delay	55.9	55.9	HCM Level of Service	F	F	F	F	F	F	F	F
HCM Volume to Capacity ratio	1.59	1.59									
Actuated Cycle Length (s)	90.0	90.0	Sum of Lost Times (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Intersection Capacity Utilization	80.6%	80.6%	CU Level of Service	D	D	D	D	D	D	D	D
Analysis Period (min)	15	15									
c Critical Lane Group											

McMahon Associates, Inc.
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway

Time Range													15:00-15:05												15:05-15:10												15:10-15:15												15:15-15:20												15:20-15:25												15:25-15:30												15:30-15:35												15:35-15:40												15:40-15:45												15:45-15:50												15:50-15:55												15:55-16:00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														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Lanes, Volumes, Timings
 6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway
 :h:809534:TrafficAnalysis:TOD analysis:2030 No Build Conditions:Weekday PM syn
 :h:809534:TrafficAnalysis:TOD analysis:2030 No Build Conditions:Weekday PM syn

McMahon Associates, Inc.
2030 Future No Build Condition w/TOD
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway
Weekday Afternoon Peak Hour

Lead Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension(s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap(s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Red(s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Note	None	C-Max	C-Max	None	C-Max	C-Max	None	None
Walk Time (s)								
Flash Don't Walk (s)								
Pedestrian Calls (#/hr)								
W/Ratio	0.06	1.06	1.48	0.73	1.06	0.01	1.24	1.17
Control Delay	14.6	72.6	251.0	50.2	70.5	17.2	166.2	141.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	72.6	251.0	50.2	70.5	17.2	166.2	141.2
Queue Length @ RPT (ft)	3	391	1406	43	395	3	305	561
Queue Length 95th (ft)	11	#1930	#1669	#45	#1273	15	#800	#754
Internal Link Delay (s)	1.267			8.57			5.73	
Turn Bay Length (ft)	150		150		250	150		86
Base Capacity (vph)	141	1680	197	149	1875	326	141	450
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced W/Ratio	0.06	1.06	1.48	0.73	1.06	0.01	1.24	1.17
Area Type	Other							
Cycle Length	131							
Actuated Cycle Length	131							
Offset: 77 (50%), Referenced to phase 2 EBTL and 6 WBTL Start of Green								
Natural Cycle	120							
Control Type	Actuated-Coordinated							
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								

Spills and Phases: 6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway



[illegible]

McMahon Associates, Inc. 2030 Future No Build Condition w/TOD
10: Pennsylvania Avenue & Warren Avenue Weekday Afternoon Peak Hour

Lane Configurations	34	51	11	239	512	11
Volume (veh/h)	1900	1900	1900	1900	1900	1900
Ideal Flow (veh/pl)	12	12	12	12	12	12
Lane Width (ft)	0%	0%	0%	0%	0%	0%
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	0	0	0	0
Taper Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor						
F1	0.919					0.997
Flt/Erred	0.980			0.998		
Satd. Flow (prot)	1878	0	0	1859	1857	0
Prt/Erred	0.980			0.998		
Satd. Flow (perm)	1878	0	0	1859	1857	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	682			917	604	
Travel Time (s)	18.6			25.0	16.3	
Conf. Posts (#/hr)						
Conf. Blkcs (#/hr)						
Peak Hour Factor	0.73	0.73	0.81	0.91	0.96	0.96
Growth Factor	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bldgcs (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	0%
Adj. Flow (vph)	47	70	12	263	533	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	0	0	275	544	0
Sign Control	Stop			Free	Free	
Area Type	Other					
Control Type	Unsignalized					

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
1:eng18095341TrafficAnalysisTOD analysis\2030 No Build Conditions\Weekday PM.syn
Synchro 7

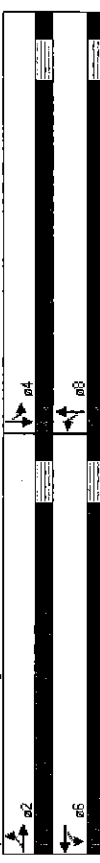
McMahon Associates, Inc. 2030 Future No Build Condition w/TOD
10: Pennsylvania Avenue & Warren Avenue Weekday Afternoon Peak Hour

Lane Configurations	34	51	11	239	512	11
Volume (veh/h)	1900	1900	1900	1900	1900	1900
Ideal Flow (veh/pl)	12	12	12	12	12	12
Lane Width (ft)	0%	0%	0%	0%	0%	0%
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	0	0	0	0
Taper Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor						
F1	0.919					0.997
Flt/Erred	0.980			0.998		
Satd. Flow (prot)	1878	0	0	1859	1857	0
Prt/Erred	0.980			0.998		
Satd. Flow (perm)	1878	0	0	1859	1857	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	682			917	604	
Travel Time (s)	18.6			25.0	16.3	
Conf. Posts (#/hr)						
Conf. Blkcs (#/hr)						
Peak Hour Factor	0.73	0.73	0.81	0.91	0.96	0.96
Growth Factor	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bldgcs (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	0%
Adj. Flow (vph)	47	70	12	263	533	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	0	0	275	544	0
Sign Control	Stop			Free	Free	
Area Type	Other					
Control Type	Unsignalized					

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
1:eng18095341TrafficAnalysisTOD analysis\2030 No Build Conditions\Weekday PM.syn
Synchro 7

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Splits and Phases: 11: King Street & Warren Avenue



Lane Configurations														
→ ↗ ↖ ← ↘ ↙ ↗ ↖ ← ↘ ↙ ↗ ↖ ← ↘ ↙														
Volume (vph)	59	309	40	172	603	48	74	43	16	47	460	122		
Ideal Flow (vphpl)	1300	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	13	13	13	13	13	13	10	10	10	10	10	10		
Grade (%)	-1%				2%					-5%				
Storage Length (ft)	0	0	0	0	0	0	90	0	0	50	0			
Storage Lanes	0	0	0	0	0	0	1	0	0	1	0			
Taper Length (ft)	0	75	75	75	75	75	75	75	75	75	75			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Red Blk/Sec/Color														
Frt	0.987	0.992			0.993						0.968			
ELP/Phase	0.993	0.990			0.980						0.990			
Satd Flow (prot)	0	1895	0	0	1890	0	1693	1663	0	1600	1631	0		
ELP/Permitted	0.995				0.750			0.187			0.549			
Satd Flow (norm)	0	1518	0	0	1432	0	333	1663	0	925	1631	0		
Right Turn/Contr		168			768			168		168				
Satd Flow (RTOR)	11				7			83		27				
Link Speed (mph)	25				25			25		25				
Link Distance (ft)	727				928			282		917				
Travel Time (s)	19.8				25.3			7.7		25.0				
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.85	0.85	0.85	0.96	0.96	0.91	0.91	0.91	0.91	0.92	0.92	0.92		
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	0%	0%	0%		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0		
Parking (#/hr)														
Mid-Block (ft) (%)	0%				0%			0%						
Adj. Flow (vph)	68	364	47	179	628	51	81	157	127	51	500	133		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	479	0	0	853	0	81	284	0	51	633	0		
Number of Detectors	1	2			1	2		1	2		1	2		
Detector Template	Left	Thru			Left	Thru		Left	Thru		Left	Thru		
Leading Detector (ft)	20	100			20	100		20	100		20	100		
Trailing Detector (ft)	0	0			0	0		0	0		0	0		
Turn Type	Perm				Perm			Perm			Perm			
Protected Phases	2													

Lanes, Volumes, Timings
11: King Street & Warren Avenue
I:eng18095341TrafficAnalysisTOD analysis:2030 No Build Conditions:Weekday PM, syn
Synchro 7

McMahon Associates, Inc. 2030 Future No Build Condition w/ TOD
 3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Morning Peak Hour

→ → → → → → → → → → → →											
Lane Configurations	351	580	9	34	937	32	23	4	4	73	222
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12	11	16	12	11	14	14	14	12	12	12
Lane Width	-1%										
Grade (%)	1%										
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit	1.00	1.00	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.97	0.97	0.99	0.99	0.99
Satd Flow (prot)	1781	3402	1678	3229	1678	3229	1413	1413	1516	1516	1516
Fit Permitted	0.18	1.00	0.07	1.00	0.07	1.00	0.64	0.64	0.90	0.90	0.90
Satd Flow (perm)	334	2402	126	3229	126	3229	935	935	1410	1410	1410
Peak-hour factor, PHF	0.94	0.94	0.94	0.81	0.81	0.81	0.75	0.75	0.83	0.83	0.83
Adj Flow (vph)	373	1688	10	17	157	40	31	5	45	38	17
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	373	1679	0	17	197	0	0	51	0	372	0
Heavy Vehicles (%)	3%	3%	3%	7%	7%	7%	35%	35%	35%	6%	6%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	6	6	8	8	4	4	4	4	4
Actuated Green, G (s)	55.0	55.0	55.0	55.0	55.0	55.0	23.0	23.0	23.0	23.0	23.0
Effective Green, G _E (s)	55.0	55.0	55.0	55.0	55.0	55.0	23.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61	0.26	0.26	0.26	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Cpl Cap (vph)	204	2075	78	1973	78	1973	368	368	368	368	368
vs Ratio Prot	0.45	0.45	0.13	0.13	0.05	0.05	0.05	0.05	0.05	0.05	0.05
vs Ratio Perm	0.12	0.12	0.13	0.13	0.05	0.05	0.05	0.05	0.05	0.05	0.05
w/c Ratio	1.83	0.81	0.22	0.61	0.21	0.21	1.01	1.01	1.01	1.01	1.01
Uniform Delay, d ₁	17.5	13.4	7.9	10.8	26.4	26.4	33.5	33.5	33.5	33.5	33.5
Progression Factor	1.00	1.00	2.23	2.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	391.3	31.5	15.6	10.1	0.4	0.4	29.7	29.7	29.7	29.7	29.7
Delay (s)	408.8	16.9	18.1	24.8	26.8	26.8	83.2	83.2	83.2	83.2	83.2
Level of Service	F	B	B	C	C	C	F	F	F	F	F
Approach Delay (s)	88.2	24.7	24.7	24.7	26.8	26.8	83.2	83.2	83.2	83.2	83.2
Approach LOS	F	C	C	C	C	C	F	F	F	F	F
→ → → → → → → → → → → →											
HCM Average Control Delay	55.9										
HCM Volume to Capacity ratio	1.59										
Actuated Cycle Length (s)	90.0										
Intersection Capacity Utilization	80.6%										
Analysis Period (min)	15										
c Critical Lane Group	D										

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Lane Configurations		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54		55		56		57		58		59		60		61		62		63		64		65		66		67		68		69		70		71		72		73		74		75		76		77		78		79		80		81		82		83		84		85		86		87		88		89		90		91		92		93		94		95		96		97		98		99		100		101		102		103		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118		119		120		121		122		123		124		125		126		127		128		129		130		131		132		133		134		135		136		137		138		139		140		141		142		143		144		145		146		147		148		149		150		151		152		153		154		155		156		157		158		159		160		161		162		163		164		165		166		167		168		169		170		171		172		173		174		175		176		177		178		179		180		181		182		183		184		185		186		187		188		189		190		191		192		193		194		195		196		197		198		199		200		201		202		203		204		205		206		207		208		209		210		211		212		213		214		215		216		217		218		219		220		221		222		223		224		225		226		227		228		229		230		231		232		233		234		235		236		237		238		239		240		241		242		243		244		245		246		247		248		249		250		251		252		253		254		255		256		257		258		259		260		261		262		263		264		265		266		267		268		269		270		271		272		273		274		275		276		277		278		279		280		281		282		283		284		285		286		287		288		289		290		291		292		293		294		295		296		297		298		299		300		301		302		303		304		305		306		307		308		309		310		311		312		313		314		315		316		317		318		319		320		321		322		323		324		325		326		327		328		329		330		331		332		333		334		335		336		337		338		339		340		341		342		343		344		345		346		347		348		349		350		351		352		353		354		355		356		357		358		359		360		361		362		363		364		365		366		367		368		369		370		371		372		373		374		375		376		377		378		379		380		381</	
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	HCM Level of Service	F
HCM Average Control Delay	165.0	
HCM Volume to Capacity Ratio	130	
Actualized Cycle Length (s)	131.0	
Sum of lost time (s)		25.0
Intersection Capacity Utilization	102.3%	
Analysis Period (min)	15	
Critical Lane Group		

	Approach A						Approach B						Approach C						Approach D					
	Lanes		Veh.		Vol.		Lanes		Veh.		Vol.		Lanes		Veh.		Vol.		Lanes		Veh.		Vol.	
	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow	Lane	Flow
Lane Configurations	4						4						4						4					
Volume (vph)	487	3	9	0	19	8	378	6	38	390	274													
Ideal Flow (voph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	60				60				60					60					60					60
Lane Util. Factor	1.00				1.00				1.00					1.00					1.00					1.00
FRT	1.00				0.91				1.00					0.94					1.00					0.94
FR Protected	0.95				0.99				1.00					0.95					1.00					0.95
Satd. Flow (prot.)	1807				1635				1841					1746					1714					1714
FR Permitted	0.69				0.88				0.83					0.83					0.83					0.83
Satd. Flow (perm)	1311				1451				1528					1528					1528					1528
Peak-hour factor, PHF	0.82	0.82	0.82	0.52	0.52	0.82	0.86	0.86	0.86	0.86	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
Adj. Flow (vph)	606	4	11	15	21	37	21	1021	7	45	464	326												
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	621	0	0	54	0	0	1049	0	45	700	0												
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	
Turn Type	Perm						Perm						Perm						Perm					
Protected Phases	4						8						2						6					
Permitted Phases	4						8						2						6					
Actuated Green, G (s)	39.0						39.0						59.0						59.0					
Effective Green, g (s)	39.0						39.0						59.0						59.0					
Actuated g/C Ratio	0.35						0.35						0.54						0.54					
Clearance Int (s)	6.0						6.0						6.0						6.0					
Vehicle Extension (s)	3.0						3.0						3.0						3.0					
Lane Grp Cap (vph)	465						574						820						319					
v/c Ratio Prot	0.47						0.44						0.69						0.46					
w/c Ratio	1.34						0.11						1.28						0.22					
Uniform Delay, d1	35.5						23.8						25.5						21.9					
Progression Factor	1.00						1.00						1.00						1.00					
Incremental Delay, d2	165						30.1						35.0						26					
Delay (s)	200.5						23.9						160.5						16.0					
Level of Service	F						C						F						B					
Approach Delay (s)	200.5						23.9						160.5						31.4					
Approach LOS	F						C												C					
HCM Average Control Delay	125.2						HCM Level of Service						F											
HCM Volume to Capacity ratio	1.30																							
Adjusted Cycle Length (s)	110.0						Summ lost time (s)						120.0						G					
Intersection Capacity Utilization	105.9%						ICU Level of Service						G											
Analytic Period (min)	15																							
Critical Lane Group																								

Report Header									
Lane Configurations		W		d		p		b	
Volume (veh/h)	17	11	53	418	277	44			
Sign Control	Sup		Free		Free		Free		
Grade	%		%		%		%		
Peak Hour Factor	0.50	0.50	0.86	0.86	0.76	0.76			
Hourly Flow Rate (vph)	34	22	82	496	298	58			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Breakage									
Right turn lane (veh)									
Median type	None		None		None				
Median storage (veh)									
Bus lanes signal (h)	853								
pX, platoon unlocked	937	328	357						
VC1, stage 1 conf vol									
VC2, stage 2 conf vol									
VC1, unblocked vol	937	328	357						
VC1, single (s)	6.4	6.2	4.1						
IC, 2 stage (s)									
IC (s)	3.5	3.3	2.2						
pl queue free %	86	97	95						
pl capacity (veh/h)	279	714	1202						
Approach									
Volume Total	66	508	357						
Volume Left	34	62	0						
Volume Right	22	0	58						
csH	357	1202	1700						
Volume IC Capacity	0.15	6.05	0.21						
Queue Length 95th (ft)	13	4	0						
Control Delay (s)	18.6	1.4	0.0						
Lane LOS	C	A							
Approach Delay (s)	16.8	1.4	0.0						
Approach LOS	C								
Overall System Summary									
Average Delay	1.8								
Intersection Capacity Utilization	52.3%								
Analysis Period (min)	15								
ICU Level of Service	A								

Parameter	Value	Unit
HCM Average Control Delay	150.9	s
HCM Volume to Capacity ratio	1.34	-
Actuated Cycle Length (s)	60.0	s
Intersection Capacity Utilization	106.7%	%
Analysis Period (min)	15	min
Effective Green Time	15	s

Scenario 1 – Malin Road Extension

McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour

Lane	Left	Thru	Right	Left	Thru	Right
Lane Configurations	1	1	1	1	1	1
Volume (vph)	1342	252	220	560	223	994
Ideal Flow (vphpl)	1300	1900	1900	1900	1900	1900
Excess Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	100	270	0	0	0
Storage Lanes	0	1	1	1	1	1
Travel Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.979					0.850
RT						0.850
RT Permitted	1789	0	1671	1759	1787	1599
Satd. Flow (prot)	1789	0	1671	1759	1787	1599
RT Permitted	1789	0	1671	1759	1787	1599
Satd. Flow (perm)	1789	0	1671	1759	1787	1599
Right Turn on Red	No	No	No	No	No	No
Satd. Flow (RTOR)	45	45	45	45	45	45
Link Speed (mph)	29.1	29.1	29.1	29.1	29.1	29.1
Link Distance (ft)	2991	2991	2991	2991	2991	2991
Travel Time (s)	45.3	45.3	45.3	45.3	45.3	45.3
Conf. Peds. (#/hr)						
Conf. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.93	0.93	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%
Bus/Bidapex (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1459	274	452	611	283	1215
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1733	0	452	611	283	1215
Number of Detectors	2	1	2	1	1	1
Detector Template	Thru	Left	Thru	Left	Right	Right
Leading Detector (ft)	100	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8		
Permitted Phases	2	1	6	8		
Detector Phase	2	1	6	8		
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Split (s)	21.0	13.0	21.0	21.0	21.0	21.0
Total Split (s)	46.0	0.0	14.0	60.0	37.0	37.0
Total Split (%)	47.4%	0.0%	14.4%	61.9%	38.1%	38.1%
Maximum Green (s)	40.0	11.0	54.0	31.0	31.0	31.0
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
East Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour

Lane	Left	Thru	Right	Left	Thru	Right
Lane Configurations	1	1	1	1	1	1
Volume (vph)	1342	252	220	560	223	994
Ideal Flow (vphpl)	1300	1900	1900	1900	1900	1900
Excess Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	100	270	0	0	0
Storage Lanes	0	1	1	1	1	1
Travel Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.979					0.850
RT						0.850
RT Permitted	1789	0	1671	1759	1787	1599
Satd. Flow (prot)	1789	0	1671	1759	1787	1599
RT Permitted	1789	0	1671	1759	1787	1599
Satd. Flow (perm)	1789	0	1671	1759	1787	1599
Right Turn on Red	No	No	No	No	No	No
Satd. Flow (RTOR)	45	45	45	45	45	45
Link Speed (mph)	29.1	29.1	29.1	29.1	29.1	29.1
Link Distance (ft)	2991	2991	2991	2991	2991	2991
Travel Time (s)	45.3	45.3	45.3	45.3	45.3	45.3
Conf. Peds. (#/hr)						
Conf. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.93	0.93	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%
Bus/Bidapex (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1459	274	452	611	283	1215
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1733	0	452	611	283	1215
Number of Detectors	2	1	2	1	1	1
Detector Template	Thru	Left	Thru	Left	Right	Right
Leading Detector (ft)	100	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8		
Permitted Phases	2	1	6	8		
Detector Phase	2	1	6	8		
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Split (s)	21.0	13.0	21.0	21.0	21.0	21.0
Total Split (s)	46.0	0.0	14.0	60.0	37.0	37.0
Total Split (%)	47.4%	0.0%	14.4%	61.9%	38.1%	38.1%
Maximum Green (s)	40.0	11.0	54.0	31.0	31.0	31.0
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
East Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0	6.0



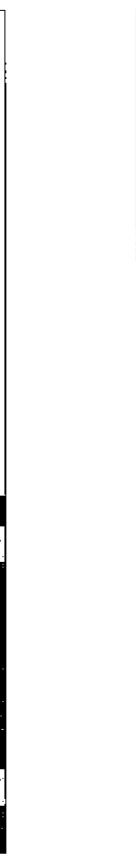
Splits and Phases: 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

Lanes, Volumes, Timings
 3: Lancaster Pike (U.S. Route 30) & Main Road
 Synchro 7
 (t:eng1903534)TrafficAnalysisNovember 201012030 Main Connection ConditionsWeekday AM.syn

Lanes, Volumes, Timings
 4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
 Synchro 7
 11/20/2010 10:20:30 AM
 Analysis is November 20, 2010
 Traffic Analysis is November 20, 2010
 Connection Conditions Weekday AM, syn

Splits and Phases: 4- Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 407)



lanes, Volumes, Timings
 6. Lancaster Pike (U.S. Route 30) & Old Lincoln Highway
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 Synchro 7

Solids and Phases: 6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway



lanes, Volumes, Timings

McMahon Associates, Inc.
 2030 Scenario 1 - Malin Extension
 7: Old Lancaster Pike & Old Lincoln Highway

Lead-Lag Optimize?	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min
Walk Time (s)											
Flash Don't Walk (s)											
Pedestrian Calls (#/hr)											
v/c Ratio	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.98	0.20	0.67	0.67
Control Delay	78.0	78.0	78.0	78.0	78.0	78.0	78.0	49.8	15.6	21.8	21.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.0	78.0	78.0	78.0	78.0	78.0	78.0	49.8	15.6	21.8	21.8
Queue Length 50th (ft)	302	302	302	302	302	302	302	473	14	237	237
Queue Length 95th (ft)	#422	#422	#422	#422	#422	#422	#422	#691	34	317	317
Interval Link Dist (ft)	263	263	263	263	263	263	263	538		573	573
Turn Bay Length (ft)											
Base Capacity (vph)	481	481	481	481	481	481	481	504	220	863	863
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.98	0.20	0.67	0.67
Area Type:	Other										
Cycle Length: 90											
Actuated Cycle Length: 90											
Natural Cycle: 90											
Control Type: Actuated-Uncoordinated											
- 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: 7: Old Lancaster Pike & Old Lincoln Highway											
a2											
a6											

Splits and Phases: 7: Old Lancaster Pike & Old Lincoln Highway

a2											
a3											
a4											
a5											
a6											
a7											
a8											

Lanes, Volumes, Timings
 7: Old Lancaster Pike & Old Lincoln Highway
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McMahon Associates, Inc.
 2030 Scenario 1 - Malin Extension
 7: Old Lancaster Pike & Old Lincoln Highway

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Peak	Off-Peak	Weekday	Weekend
Lane Configurations											
Volume (vph)	392	392	392	392	392	392	392	19	18	740	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	60	60	60	60	60	60	60	60	60	60	60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00
Satd Flow (vphpl)	1807	1807	1807	1807	1807	1807	1807	1841	156	1720	1720
Flt Permitted	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.98	0.24	1.00	1.00
Satd Flow (vphpl)	1313	1313	1313	1313	1313	1313	1313	1367	441	1720	1720
Peak-hour factor, P/H	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.86	0.86	0.84	0.84
Adj Flow (vph)	478	478	478	478	478	478	478	21	860	7	45
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	493	0	0	54	0	0	889	0	45	579
Heavy Vehicles (%)	0%	0%	0%	0%	4%	4%	4%	3%	3%	4%	4%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases											
Permitted Phases	4	8	8	8	8	8	8	2	2	6	6
Actuated Green, G (s)	33.0	33.0	33.0	33.0	33.0	33.0	33.0	45.0	45.0	45.0	45.0
Effective Green, B (s)	33.0	33.0	33.0	33.0	33.0	33.0	33.0	45.0	45.0	45.0	45.0
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.50	0.50	0.50	0.50
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	481	481	481	481	481	481	481	504	220	863	863
v/c Ratio Prot	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.49	0.10	0.67	0.67
v/c Ratio	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.98	0.20	0.67	0.67
Uniform Delay (s)	28.5	28.5	28.5	28.5	28.5	28.5	28.5	22.5	22.5	17.0	17.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay (s)	47.5	47.5	47.5	47.5	47.5	47.5	47.5	25.5	25.5	2.1	2.1
Delay (s)	76.0	76.0	76.0	76.0	76.0	76.0	76.0	47.6	47.6	13.0	13.0
Level of Service	E	E	E	E	E	E	E	D	D	B	B
Approach Delay (s)	76.0	76.0	76.0	76.0	76.0	76.0	76.0	47.6	47.6	18.6	18.6
Approach LOS	F	F	F	F	F	F	F	D	D	B	B
HCMAverage Control Delay	44.9	44.9	44.9	44.9	44.9	44.9	44.9	30.0	30.0	12.0	12.0
HCMAverage Cycle Length (s)	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
HCMAverage Volume to Capacity ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92	0.92	0.92
Intersection Capacity Utilization	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15
c Critical Lane Group											

HCMAverage Intersection Capacity Analysis
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 7: Old Lancaster Pike & Old Lincoln Highway
 Synchro 7

McMahon Associates, Inc.
9: Quaker Lane & Warren Avenue

2030 Scenario 1 - Malin Extension
Weekday Morning Peak Hour

Item	Volume	Speed	Control	Signal	Phase	Time	Notes
Lane Configurations	4	5	27	334	286	20	
Volume (vph)	4	5	27	334	286	20	
Sign Control	Stop	Free	Free	Free	Free	Free	
Grade (%)	0.50	0.50	0.79	0.79	0.50	0.90	
Peak Hour Factor	0.8	12	34	466	318	32	
Hourly Flow Rate (vph)	0.8	12	34	466	318	32	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median Type	None	None	None	None	None	None	
Median storage (veh)							
Upstream signal (ft)	0.88						
pX, platoon unblocked							
IC controlling volume	286	334	350				
vC1, stage 1 cont vol							
vC2, stage 2 cont vol	802	334	350				
vC3, unblocked vol	6.5	6.3	4.1				
IC, 2 stage (s)	3.5	3.4	2.2				
IC, 1 stage (s)	97	98	97				
p0 queue free %	286	683	1214				
p0 capacity (veh/h)							
Volume Total	20	520	350				
Volume Left	8	34	0				
Volume Right	12	0	32				
cSH	441	1214	1700				
Volume to Capacity	0.05	0.03	0.21				
Queue Length 95th (ft)	4	2	0				
Control Delay (s)	13.5	0.8	0.0				
Lane LOS	B	A					
Approach Delay (s)	3.5	0.8	0.0				
Approach LOS	B						
Average Delay	0.8						
Intersection Capacity Utilization	51.8%						
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis
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9: Quaker Lane & Warren Avenue
Synchro 7

McMahon Associates, Inc.
10: Pennsylvania Avenue & Warren Avenue

2030 Scenario 1 - Malin Extension
Weekday Morning Peak Hour

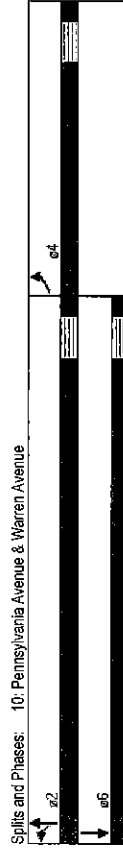
Item	Volume	Speed	Control	Signal	Phase	Time	Notes
Lane Configurations	4	5	27	334	286	20	
Volume (vph)	4	5	27	334	286	20	
Sign Control	Stop	Free	Free	Free	Free	Free	
Grade (%)	0.50	0.50	0.79	0.79	0.50	0.90	
Peak Hour Factor	0.8	12	34	466	318	32	
Hourly Flow Rate (vph)	0.8	12	34	466	318	32	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median Type	None	None	None	None	None	None	
Median storage (veh)							
Upstream signal (ft)	0.88						
pX, platoon unblocked							
IC controlling volume	286	334	350				
vC1, stage 1 cont vol							
vC2, stage 2 cont vol	802	334	350				
vC3, unblocked vol	6.5	6.3	4.1				
IC, 2 stage (s)	3.5	3.4	2.2				
IC, 1 stage (s)	97	98	97				
p0 queue free %	286	683	1214				
p0 capacity (veh/h)							
Volume Total	20	520	350				
Volume Left	8	34	0				
Volume Right	12	0	32				
cSH	441	1214	1700				
Volume to Capacity	0.05	0.03	0.21				
Queue Length 95th (ft)	4	2	0				
Control Delay (s)	13.5	0.8	0.0				
Lane LOS	B	A					
Approach Delay (s)	3.5	0.8	0.0				
Approach LOS	B						
Average Delay	0.8						
Intersection Capacity Utilization	51.8%						
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis
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10: Pennsylvania Avenue & Warren Avenue
Synchro 7



Item	Value	Unit	Value	Unit	Value	Unit
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	
Minimum Gap (s)	3.0		3.0		3.0	
Time Before Red (s)	0.0		0.0		0.0	
Time To Red (s)	0.0		0.0		0.0	
Recall Mode	None		Min		Min	
Walk Time (s)						
Flash Don't Walk (s)						
Pedestrian Calls (#/hr)	0.71		0.88		0.59	
W/Ratio	27.1		22.5		15.2	
Control Delay	27.1		22.5		15.2	
Queue Delay	0.0		0.0		0.0	
Total Delay	27.1		22.5		15.2	
Queue Length 50th (ft)	109		72		56	
Queue Length 95th (ft)	125		136		180	
Internal Link Dist (ft)	502		762		524	
Turn Bay Length (ft)						
Base Capacity (vph)	705		785		1653	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reductn Cap Ratio	0.58		0.35		0.30	
Area Type	Other					
Cycle Length	80					
Actuated Cycle Length	562					
Natural Cycle	50					
Control Type	Actuated Uncoordinated					



Item	Value	Unit	Value	Unit	Value	Unit
Lane Configurations						
Volume (vph)	57		136		237	
Ideal Flow (vphpl)	1900		1900		1900	
Flow Lost Time (s)	6.0		6.0		6.0	
Lane Util. Factor	1.00		1.00		1.00	
Flt Protected	0.98		0.95		1.00	
Satd Flow (prot)	1667		1770		1863	
Flt Permitted	0.98		0.90		1.00	
Satd Flow (perm)	1667		940		1863	
Peak-hour factor, PHF	0.50		0.50		0.86	
Adj. Flow (vph)	134		272		276	
RTOR Reduction (vph)	0		0		0	
Lane Group Flow (vph)	405		0		276	
Turn Type	Perm		Perm		Perm	
Protected Phases	4		2		6	
Permitted Phases						
Actuated Green (s)	18.8		23.6		23.6	
Effective Green (s)	18.8		23.6		23.6	
Actuated G/C Ratio	0.35		0.43		0.43	
Clearance Time (s)	6.0		6.0		6.0	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	576		408		808	
W/Ratio Box	0.24		0.25		0.20	
W/Ratio Perm			0.29			
W/Ratio	0.70		0.68		0.58	
Uniform Delay d1	15.4		12.3		11.7	
Progression Factor	1.00		1.00		1.00	
Incremental Delay d2	3.9		4.4		1.1	
Delays (s)	19.3		16.7		12.7	
Level of Service	B		B		B	
Approach Delay (s)	19.3		14.7		11.4	
Approach LOS	B		B		B	
HCM Average Control Delay			14.9		HCM Level of Service	B
HCM Volume to Capacity Ratio			0.69			
Actuated Cycle Length (s)			54.4		Sum of lost time (s)	12.0
Intersection Capacity Utilization			55.4%		ICU Level of Service	B
Analysis Period (min)			15			
Critical Lane Group						

McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Afternoon Peak Hour											
Area	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Right
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Right
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local Mode	None	C-Max	C-Max	None	None	None	None	None	None	None	None
Walk Time (s)											
Pedestrian Calls (#/hr)											
Vehicle Delay	0.70	0.52	0.14	0.94	0.43	0.53	0.90	0.36	0.54		
Control Delay	35.9	7.0	11.0	30.1	74.5	46.3	90.5	41.6	35.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	35.9	7.0	11.0	30.1	74.5	46.3	90.5	41.6	35.3		
Queue Length 50th (ft)	35	162	9	551	103	89	96	60	129		
Queue Length 95th (ft)	#124	204	25	#767	#199	145	#173	95	176		
Internal Link Dist (ft)		196		2842		338		716			
Turn Bay Length (ft)	150		150		125		75				
Base Capacity (vph)	199	244	244	2006	205	281	175	206	449		
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		
Reduction Ratio	0.70	0.52	0.14	0.94	0.43	0.53	0.87	0.36	0.54		

Splits and Phases: 3: Lancaster Pike (U.S. Route 30) & Malin Road

McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Afternoon Peak Hour											
Area	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Right
Lane Configurations	1A	1A	1A	1A	1A	1A	1A	1A	1A	1A	1A
Volume (vph)	243	991	143	33	1212	140	143	108	21	121	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	16	12	11	12	11	12	11	12	12
Grade (%)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Flt. Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd. Flow (vphpl)	1728	3373	2761	3366	1768	1816	1768	1816	1768	1816	1768
Flt. Permitted	0.08	1.00	0.22	1.00	0.08	1.00	0.08	1.00	0.08	1.00	0.08
Satd. Flow (perm)	114	3373	410	3366	1284	1816	1093	1853	1093	1853	1093
Peak Hour Factor, PHF	0.90	0.90	0.90	0.98	0.98	0.98	0.86	0.86	0.79	0.79	0.79
Adj. Flow (vphpl)	139	1107	159	34	1747	143	166	126	24	153	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vphpl)	139	1260	0	34	1890	0	166	150	0	153	144
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	10%	10%	1%	1%
Turn Type	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru
Protected Phases	5	2	6	6	8	8	8	8	8	8	8
Permitted Phases	2	2	6	6	8	8	8	8	8	8	8
Actuated Green, G (s)	72.5	72.5	59.6	59.6	59.6	59.6	15.5	15.5	15.5	15.5	22.4
Effective Green, g (s)	72.5	72.5	59.6	59.6	59.6	59.6	15.5	15.5	15.5	15.5	22.4
Actuated g/C Ratio	0.72	0.72	0.60	0.60	0.60	0.60	0.16	0.16	0.16	0.16	0.22
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Sp. Cap (vphpl)	197	2445	244	2006	199	281	169	287	447	169	287
v/c Ratio	0.05	0.37	0.05	0.06	0.13	0.08	0.08	0.08	0.08	0.08	0.04
v/c Ratio Perm.	0.06	0.37	0.06	0.06	0.13	0.08	0.08	0.08	0.08	0.08	0.04
v/c Ratio	0.71	0.52	0.14	0.94	0.83	0.53	0.91	0.36	0.54	0.91	0.36
Uniform Delay, d1	24.9	8.0	8.8	18.6	41.0	36.9	41.5	37.8	34.3	41.5	37.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.9	0.8	1.2	10.4	24.8	1.9	42.7	0.8	1.3	42.7	0.8
Delay (s)	35.9	6.8	10.1	29.0	65.9	40.9	84.2	38.6	35.6	84.2	38.6
Level of Service	D	A	B	C	F	D	F	D	D	F	D
Approach Delay (s)	9.7	28.7	28.7	28.7	54.0	54.0	51.1	51.1	51.1	51.1	51.1
Approach LOS	A	A	A	A	D	D	D	D	D	D	D

c Critical Lane Group

McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
3: Lancaster Pike (U.S. Route 30) & Malin Road

HCM Signalized Intersection Capacity Analysis
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McMahon Associates, Inc. 2030 Scenario 1 - Malin Extension
3: Lancaster Pike (U.S. Route 30) & Malin Road

HCM Signalized Intersection Capacity Analysis
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McMahon Associates, Inc.
2030 Scenario 1 - Malin Extension
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Afternoon Peak Hour

[illegible]

4; Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)

McMahon Associates, Inc.
2030 Scenario 1 - Malin Extension
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Afternoon Peak Hour

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Splits and Phases: 4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)

McMahon Associates, Inc.
2030 Scenario 1 - Malin Extension
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Afternoon Peak Hour

HCM Average Control Delay	57.9	HCM Level of Service	E
HCM Volume to Capacity Ratio	110		
Actual Cycle Length (s)	90.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	83.6%	CU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
Synchro 7

Splits and Phases: 7: Old Lancaster Pike & Old Lincoln Highway

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With Transit Oriented Development Traffic

McMahon Associates, Inc. 2030 Scenario 1 - Main Road Extension w/TOD
 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour

→ ↖ ↗ ← ↖ ↗ ← ↖ ↗ ← ↖ ↗									
Lane Configurations	1	2	3	4	5	6	7	8	9
Volume (vph)	1345	282	420	813	223	984			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Lost Time (s)	6.0	3.0	6.0	6.0	6.0	6.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
RT	0.98	1.00	1.00	1.00	1.00	0.95			
Flt Protected	1.00	0.95	1.00	0.95	1.00				
Satd Flow (prot)	1788	1671	1788	1787	1695				
Flt Permitted	1.00	0.06	1.00	0.95	1.00				
Satd Flow (perm)	1788	105	1788	1787	1695				
Peak-hour factor, PHE	0.92	0.92	0.93	0.93	0.81	0.81			
Adj Flow (vph)	1473	274	452	658	283	1215			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group Flow (vph)	1747	0	452	658	283	1215			
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%			
Turn Type	2	1	6	8					
Permitted Phases	8								
Actuated Green, G (s)	64.0	74.0	74.0	11.0	11.0				
Effective Green, E (s)	64.0	74.0	74.0	11.0	11.0				
Actuated g/C Ratio	0.66	0.76	0.76	0.11	0.11				
Clearance Time (s)	6.0	3.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	1180	493	1342	203	181				
v/s Ratio Prot	0.98	0.17	0.37	0.16					
v/s Ratio Perm		0.62		0.76					
v/c Ratio	1.48	2.34	0.49	1.39	6.71				
Uniform Delay, d1	18.5	34.3	4.4	43.0	43.0				
Progression Factor	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	220.8	619.7	0.3	204.5	2582.4				
Delay (s)	237.3	654.0	4.6	247.5	2625.4				
Level of Service	F	F	A	F	F				
Approach Delay (s)	237.3		268.8	2176.1					
Approach LOS	F		F	F					
→ ↖ ↗ ← ↖ ↗ ← ↖ ↗ ← ↖ ↗									
HCM Average Control Delay	812.1								
HCM Volume to Capacity ratio	2.79								
Actuated Cycle Length (s)	97.0								
Intersection Capacity Utilization	157.5%								
Analysis Period (min)	15								
c Critical Lane Group									

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McMahon Associates, Inc. 2030 Scenario 1 - Main Road Extension w/TOD
 7: Old Lancaster Pike & Old Lincoln Highway

Weekday Morning Peak Hour

Volume	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4	4
Volume (vph)	425	3	9	8	18	740	6	30	297	207			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Total Lost Time (s)	60	60	60	60	60	60	60	60	60	60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Fit	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Fit Protected	0.95	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Satd. Flow (prot)	1807	1635	1635	1635	1635	1635	1635	1635	1635	1635			
Fit Permitted	0.89	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85			
Satd. Flow (perm)	1312	1408	1408	1408	1408	1408	1408	1408	1408	1408			
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82			
Adj. Flow (vph)	518	4	11	15	2	37	21	860	7	45	354	246	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0			
Lane-Group Flow (vph)	0	533	0	0	54	0	0	588	0	45	630	0	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	4%	4%	4%	4%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm			
Protected Phases	4	8	8	8	8	8	8	8	8	8			
Permitted Phases	4	8	8	8	8	8	8	8	8	8			
Actuated Green, G (s)	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0			
Effective Green, G (s)	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0			
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38			
Clearance Time (s)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane-Group Cap (vph)	501	537	537	537	537	537	537	537	537	537			
v/s Ratio Prot	0.41	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64			
v/c Ratio Perm	1.06	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
Uniform Delay, d1	34.0	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	58.3	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7			
Delay (s)	92.3	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9			
Level of Service	F	C	C	C	C	C	C	C	C	C			
Approach Delay (s)	92.3	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9			
Approach LOS	F	C	C	C	C	C	C	C	C	C			
Signalized Intersection Capacity Analysis													
HCM Average Control Delay, s	92.3	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9			
HCM Level of Service	F	C	C	C	C	C	C	C	C	C			
HCM Volume to Capacity ratio	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01			
Actuated Cycle Length (s)	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0			
Intersection Capacity Utilization	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%			
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15			
Critical Lane Group													

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/TOD
 10: Pennsylvania Avenue & Warren Avenue
 Weekday Morning Peak Hour

	4	2	2	6	
Lane Configurations	Y	Y	Y	Y	Y
Volume (vph)	67	136	237	403	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost Time (s)	60	60	60	60	60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.98	0.98	0.98	0.98	0.98
Satd Flow (prot)	1867	1770	1863	1867	1867
Flt Permitted	0.98	0.50	1.00	1.00	1.00
Satd Flow (perm)	1867	940	1863	1867	1867
Peak-hour factor, PHF	0.50	0.50	0.86	0.76	0.76
Adj Flow (vph)	34	272	276	469	253
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	406	0	276	469	362
Turn Type	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	2	2	6	
Permitted Phases	2				
Actuated Green, G (s)	18.9	23.6	23.6	23.6	
Effective Green, g (s)	18.9	23.6	23.6	23.6	
Actuated g/C Ratio	0.35	0.43	0.43	0.43	
Clearance Time (s)	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	576	408	808	775	
W/S Ratio Prot	60/24	0/25	0/25	0/20	
W/S Ratio Perm	c0.29				
W/S Ratio	0.70	0.68	0.58	0.47	
Uniform Delay, d1	15.4	12.3	11.7	10.9	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.9	4.4	1.1	0.4	
Delay (s)	19.3	16.7	12.7	11.4	
Level of Service	B	B	B	B	
Approach Delay (s)	19.3		14.2	11.4	
Approach LOS	B		B	B	
Level of Service	B		B	B	
HCM Average Control Delay	14.9				
HCM Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	54.4				
Intersection Capacity Utilization	55.4%				
Analysis Period (min)	15				
Critical Lane Group					

McMahon Associates, Inc.
2030 Scenario 1 - Malin Road Extension w/TOD
11: King Street & Warren Avenue
Weekday Morning Peak Hour

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 11: King Street & Warren Avenue
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McMahon Associates, Inc.
11: King Street & Warren Avenue
2030 Scenario 1 - Malin Road Extension w/TOD
Weekday Morning Peak Hour

	→	↖	←	↗	↑	↘	↓
Lead Lag							
Vehicle Extension(s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Red(s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None
Walk Time (s)							
Jog/Dont Walk (s)							
Pedestrian Cals (#/hr)							
W/C Ratio	0.94	0.86	0.88	0.85	0.75	1.03	0.72
Control Delay	67.4	31.1	43.9	16.4	12.1	82.1	288.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.4	31.1	43.9	16.4	12.1	82.1	288.8
Queue Length 95th (ft)	75	96	76	98	16	206	263
Queue Length 95th (ft) #159	245	#66	188	38	#493	#130	79
Internal Link Dist (ft)	574		735		524		762
Turn Bay Length (ft)	100		100		90		50
Design Capacity (vph)	255	735	143	726	405	742	111
Starvation Cap Reduction	0	0	0	0	0	0	0
Saturation Cap Reduction	0	0	0	0	0	0	0
Storage Cap Reduction	0	0	0	0	0	0	0
Redundancy Ratio	0.40	0.82	0.64	0.63	0.75	1.03	0.72
Other							
Cycle Length: 60							
Actual Cycle Length: 58.9							
Natural Cycle: 45							
Control Type: Actuated/Uncoordinated							
- 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							
Spills and Phases:							
11: King Street & Warren Avenue							

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/TOD
11: King Street & Warren Avenue

Weekday Morning Peak Hour									
	←	→	↖	↗	↖	↗	↖	↗	↖
Lane Configurations	1A	1B	1C	1D	1E	1F	1G	1H	1I
Volume (vph)	178	454	18	38	227	196	65	534	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12
Grade (%)	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Total Lost time (s)	50	50	50	50	50	50	50	50	50
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.99	1.00	0.99	1.00	0.97	1.00	0.97	1.00
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Satd Flow (prot)	1594	1726	1570	1591	1676	1706	1550	1591	1550
Flt Permitted	0.36	1.00	0.20	1.00	0.62	1.00	0.16	1.00	0.16
Satd Flow (perm)	600	1726	337	1591	1093	1706	262	1591	262
Peak-hour factor, PHF	0.78	0.78	0.96	0.93	0.93	0.90	0.90	0.82	0.92
Adj Flow (vph)	229	582	23	92	244	211	72	593	172
RTOR Reduction (vph)	0	2	0	0	53	0	0	17	0
Lane Group Flow (vph)	229	603	0	92	402	0	72	749	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	3%	3%	3%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	6	5	6	8	8	4	4
Permitted Phases	2	2	6	5	6	8	8	4	4
Actuated Green, G (s)	23.9	23.9	23.9	23.9	25.0	25.0	25.0	25.0	25.0
Effective Green, E (s)	23.9	23.9	23.9	23.9	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	703	137	646	464	724	111	675	111
v/s Ratio Prot	0.35	0.35	0.27	0.25	0.07	0.07	0.07	0.13	0.13
v/s Ratio Perm	0.94	0.86	0.67	0.62	0.16	1.03	1.45	0.31	0.31
Uniform Delay d1	16.8	16.0	14.3	13.9	10.4	16.9	16.9	11.2	11.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay d2	41.9	10.6	12.9	13	0.2	42.2	245.8	0.3	0.3
Delay (s)	58.7	26.5	26.5	15.8	10.6	59.1	262.7	11.5	11.5
Level of Service	E	C	C	B	B	F	F	B	B
Approach Delay (s)	35.4		17.6		54.9		117.1		
Approach LOS	D		B		D		F		
HCM Average Control Delay									
HCM Average Control Delay	50.0								
HCM Volume to Capacity ratio	1.20								
Actuated Cycle Length (s)	58.9								
Intersection Capacity Utilization	95.4%								
Analysis Period (min)	15								
Critical Lane Group									

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Area	Proposed	Existing	Notes
Lane Configurations	1	1	
Volumes (vph)	1028	998	1579
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Grade (%)	0%	0%	0%
Storage Length (ft)	0	10	210
Storage Lanes	0	1	1
Trailer Length (ft)	75	75	75
Lane Util. Factor	1.00	1.00	1.00
Ped/Bike Factor	0.971	0.950	0.950
Flt Protected	0.950	0.950	0.950
Satd Flow (prot)	1809	0	1767
Flt Permitted	0.971	0.950	0.950
Satd Flow (perm)	1809	0	228
Right Turn on Red	No	No	No
Satd Flow (RTOR)	45	45	25
Link Speed (mph)	25	25	25
Link Distance (ft)	2991	5262	872
Travel Time (s)	453	787	23.8
Conf. Posts (fwh)			
Conf. Blk (fwh)			
Peak Hour Factor	0.97	0.96	0.85
Growth Factor	100%	100%	100%
Heavy Vehicles (%)	2%	1%	2%
Bus/Bldg Factor (fwh)	0	0	0
Parking (fwh)			
Mid-Block Traffic (%)	0%	0%	0%
Adj. Flow (vph)	1060	998	1645
Shared Lane Traffic (%)			
Lane Group Flow (vph)	1354	0	998
Number of Detectors	2	1	2
Detector Template	Thru	Left	Thru
Leading Detector (ft)	100	20	20
Trailing Detector (ft)	0	0	0
Turn Type	Perm	Perm	Perm
Protected Phases	2	1	6
Detector Phase	2	1	6
Switch Phase	3.0	3.0	3.0
Minimum Initial (s)	21.0	13.0	21.0
Minimum Split (s)	36.0	0.0	46.0
Total Split (s)	53.7%	0.0%	68.2%
Yellow Time (s)	4.0	3.0	4.0
All-Red Time (s)	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
1:eng:0095341TrafficAnalysisTOD analysis2030 Main Connection ConditionsWeekday PM, syn

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

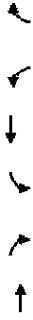
Area	Proposed	Existing	Notes
Lane Configurations	1	1	
Volumes (vph)	1028	998	1579
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Grade (%)	0%	0%	0%
Storage Length (ft)	0	10	210
Storage Lanes	0	1	1
Trailer Length (ft)	75	75	75
Lane Util. Factor	1.00	1.00	1.00
Ped/Bike Factor	0.971	0.950	0.950
Flt Protected	0.950	0.950	0.950
Satd Flow (prot)	1809	0	1767
Flt Permitted	0.971	0.950	0.950
Satd Flow (perm)	1809	0	228
Right Turn on Red	No	No	No
Satd Flow (RTOR)	45	45	25
Link Speed (mph)	25	25	25
Link Distance (ft)	2991	5262	872
Travel Time (s)	453	787	23.8
Conf. Posts (fwh)			
Conf. Blk (fwh)			
Peak Hour Factor	0.97	0.96	0.85
Growth Factor	100%	100%	100%
Heavy Vehicles (%)	2%	1%	2%
Bus/Bldg Factor (fwh)	0	0	0
Parking (fwh)			
Mid-Block Traffic (%)	0%	0%	0%
Adj. Flow (vph)	1060	998	1645
Shared Lane Traffic (%)			
Lane Group Flow (vph)	1354	0	998
Number of Detectors	2	1	2
Detector Template	Thru	Left	Thru
Leading Detector (ft)	100	20	20
Trailing Detector (ft)	0	0	0
Turn Type	Perm	Perm	Perm
Protected Phases	2	1	6
Detector Phase	2	1	6
Switch Phase	3.0	3.0	3.0
Minimum Initial (s)	21.0	13.0	21.0
Minimum Split (s)	36.0	0.0	46.0
Total Split (s)	53.7%	0.0%	68.2%
Yellow Time (s)	4.0	3.0	4.0
All-Red Time (s)	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
1:eng:0095341TrafficAnalysisTOD analysis2030 Main Connection ConditionsWeekday PM, syn



Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
1:eng:0095341TrafficAnalysisTOD analysis2030 Main Connection ConditionsWeekday PM, syn

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour



Volume	Peak	Peak	Peak	Peak	Peak
Lane Configurations	1	2	3	4	5
Volume (vph)	1028	285	958	3579	308
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.97	0.97	0.96	0.95	0.85
Flt Permitted	1.00	1.00	1.00	1.00	1.00
Satd Flow (vph)	1808	1787	1881	1770	1583
Satd Flow (vph)	1808	1787	1881	1770	1583
Peak-hour factor, PHF	0.97	0.97	0.96	0.95	0.85
Adj Flow (vph)	1060	284	998	1645	362
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	1354	0	998	1645	362
Heavy Vehicles (%)	2%	2%	1%	1%	2%
Turn Type	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8	
Permitted Phases		6			8
Actuated Green, G (s)	30.0	40.0	40.0	15.0	15.0
Effective Green, eG (s)	30.0	40.0	40.0	15.0	15.0
Actuated g/C Ratio	0.45	0.60	0.60	0.22	0.22
Clearance Time (s)	6.0	3.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	810	299	1123	395	354
v/s Ratio Prot	0.75	0.35	0.87	0.20	
v/s Ratio Perm		0.54		0.47	
v/c Ratio	1.67	3.34	1.46	0.91	2.11
Uniform Delay, d1	18.5	17.8	13.5	25.4	26.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	307.7	1060.5	214.1	25.1	510.3
Delay (s)	326.2	1078.3	227.6	50.5	536.3
Level of Service	F	F	F	D	F
Approach Delay (s)	326.2		548.8	377.9	
Approach LOS	F		F	F	
Level of Service					
HCM Average Control Delay	152.6				
HCM Volume to Capacity ratio	2.82				
Actuated Cycle Length (s)	67.0				
Intersection Capacity Utilization	154.9%				
Analysis Period (min)	15				
c Critical Lane Group					

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
 3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Afternoon Peak Hour

Lane Configurations											
Volume (vph)	123	991	143	33	1712	140	143	106	21	121	82
Peak Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	11	11	14	14	14	12	12	12
Grade (%)	-1%	-1%	1%	1%	1%	-2%	-2%	-2%	-2%	-2%	-2%
Total Lost Time (s)	60	60	60	60	60	60	60	60	60	60	60
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Signal Flow (vph)	1778	1373	1787	1388	1787	1816	1787	1816	1787	1816	1787
Fit Permitted	0.07	1.00	0.22	1.00	0.69	1.00	0.69	1.00	0.62	1.00	1.00
Signal Flow (vph)	123	3373	410	3366	410	284	1816	1143	1853	1575	1575
Peak hour factor, PHF	0.90	0.90	0.90	0.98	0.98	0.86	0.86	0.86	0.79	0.79	0.79
Adj. Flow (vph)	139	1101	139	342	1747	143	166	126	24	153	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	139	1260	0	34	1890	0	166	150	0	153	104
Heavy Vehicles (%)	2%	2%	2%	2%	2%	10%	10%	10%	10%	1%	1%
Turn Type	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm
Protected Phases	5	2	6	6	6	8	8	8	4	4	4
Permitted Phases	2	6	6	6	6	8	8	8	4	4	4
Actuated Green, G (s)	68.5	68.5	55.1	55.1	55.1	19.5	19.5	19.5	19.5	19.5	19.5
Effective Green, g (s)	68.5	68.5	55.1	55.1	55.1	19.5	19.5	19.5	19.5	19.5	19.5
Actuated g/C Ratio	0.68	0.68	0.55	0.55	0.55	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	2311	228	1855	228	354	223	361	307	307	307
v/c Ratio Prot	0.05	0.37	0.06	0.56	0.06	0.06	0.06	0.06	0.06	0.06	0.06
v/c Ratio Perm	0.41	0.08	0.08	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
v/c Ratio	0.67	0.55	0.15	1.02	0.66	0.42	0.69	0.29	0.79	0.79	0.79
Uniform Delay, d1	25.0	7.9	11.0	22.7	11.0	37.2	35.3	37.4	34.3	38.3	38.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.9	1.4	25.8	1.4	6.5	6.5	6.5	6.5	6.5	6.5
Delay (s)	33.3	8.8	12.4	48.2	12.4	43.7	41.8	43.9	40.8	44.8	44.8
Level of Service	C	A	B	D	D	D	D	D	D	D	D
Approach Delay (s)	11.3		47.6		40.1		46.0		46.0		46.0
Approach LOS	B		D		D		D		D		D
HCM Signalized Intersection Capacity Analysis											
HCM Average Control Delay											
HCM Volume to Capacity ratio											
Actuated Cycle Length (s)											
Intersection Capacity Utilization											
Analysis Period (min)											
Critical Lane Group											

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway

Weekday Afternoon Peak Hour													
Lane Configurations													
Lane	1	2	3	4	5	6	7	8	9	10	11	12	13
Volume (vph)	1536	1079	101	1857	8	845	1	60	5	11	22		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	12	12	12	12	12	12	12	12	12		
Total Lost time (s)	6.0	7.0	7.0	6.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	0.92				
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00				
Satd. Flow (prot)	1624	3610	1723	1728	3455	1706	1698	1724	1852				
Flt Permitted	0.07	1.00	1.00	0.06	1.00	1.00	0.95	0.95	1.00				
Satd. Flow (perm)	114	3610	1723	111	3455	1706	1698	1724	1852				
Peak Hour Factor, PHF	0.96	0.96	0.93	0.93	0.93	0.93	0.87	0.87	0.78				
Adj. Flow (vph)	8	1600	1124	109	1997	9	741	1	73	4	14		
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0		
Lane Group Flow (vph)	8	1600	1124	109	1997	9	415	406	0	0	46		
Heavy Vehicles (%)	0%	0%	0%	3%	1%	1%	1%	1%	0%	0%	0%		
Turn Type	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt	pm-pt		
Protected Phases	5	2	1	6	1	4	4	8	6				
Permitted Phases	2	2	6	6	6	6	6	6	6				
Actuated Green, G (s)	61.1	59.8	59.8	72.5	65.5	65.5	33.6	33.6	5.6				
Effective Green, g (s)	61.1	59.8	59.8	72.5	65.5	65.5	33.6	33.6	5.6				
Actuated G/C Ratio	0.47	0.46	0.46	0.35	0.50	0.50	0.26	0.26	0.04				
Clearance Time (s)	6.0	7.0	7.0	6.0	7.0	7.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	68	1648	787	148	1728	853	436	442	79				
Via Ratio Prot	0.00	0.44	0.04	0.58	0.24	0.24	0.02	0.02					
Via Ratio Perm	0.05	0.65	0.37	0.01	0.01	0.01	0.95	0.92					
Via Ratio	0.12	0.97	0.43	0.74	0.46	0.46	0.96	0.92					
Uniform Delay, d1	30.7	34.7	35.6	29.2	32.8	16.5	47.9	47.4	61.6				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.8	16.3	200.0	17.3	77.1	0.0	30.9	23.8	10.5				
Delay (s)	31.5	51.0	235.6	46.5	109.8	16.5	78.8	71.2	72.0				
Level of Service	C	D	F	D	F	B	E	E	E				
Approach Delay (s)	126.9	106.2	161	151	151	151	151	151	151				
Approach LOS	F	F	F	F	F	F	F	F	F				
Intersection Summary													
HCM Average Control Delay	111.3												
HCM Volume to Capacity ratio	129												
Actuated Cycle Length (s)	131.0												
Intersection Capacity Utilization	97.2%												
Analysis Period (min)	15												
Critical Lane Group													

McMahon Associates, Inc.
2030 Scenario 1 - Malin Road Extension w/ TOD
7: Old Lancaster Pike & Old Lincoln Highway

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Lanes, Volumes, Timings
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7: Old Lancaster Pike & Old Lincoln Highway
Synchro 7

McMahon Associates, Inc.
2030 Scenario 1 - Mallin Road Extension w/ TOD
7: Old Lancaster Pike & Old Lincoln Highway
Weekday Afternoon Peak Hour

15:31	15:34	15:37	15:40	15:43	15:46	15:49	15:52	15:55	15:58	16:01	16:04	16:07
Lead/Lag												
Lead-Lag Optimizer?												
Vehicle Expansion (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduci (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)												
Flash Point Walk (s)												
Pedestrian Calls (#/hr)												
W/Ratio	1.05	0.27		0.54		0.06		1.04				
Control Delay	102.4	33.4		13.7		8.7		59.6				
Queue Delay	0.0	0.0		0.0		0.0		48.0				
Total Delay	102.4	33.4		13.7		8.7		107.6				
Queue Length 50th (ft)	269	65		135		9		249				
Queue Length 95th (ft)	#51	63		199		23		#100				
Internal Link Dist (ft)	263	110		598		373						
Turn Bay Length (ft)												
Base Capacity (vph)	333	435		623		628		1074				
Starvation Cap Reducth	0	0		0		0		110				
Spillback Cap Reducth	0	0		0		0		0				
Storage Cap Reducth	0	0		0		0		0				
Reductd Cyclic Ratio	1.05	0.27		0.54		0.06		1.15				
Area Type: Other												
Cycle Length: 110												
Activated Cycle Length: 110												
Offset: 0 (0%), Referenced to phase 2-NBTL and 6-SBT, Start of Green												
Natural Cycle: 110												
Control Type: Actuated-Coordinated												
Volume exceeds capacity; queue is theoretically infinite												
Queue shown is maximum after two cycles.												
# 35th percentile volume exceeds capacity; queue is not as long.												
Queue shown is maximum after two cycles.												
Splits and Phases: 7: Old Lancaster Pike & Old Lincoln Highway												

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
 7: Old Lancaster Pike & Old Lincoln Highway Weekday Afternoon Peak Hour

Direction	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Volume (vph)	297	18	9	5	16	13	29	4	34	249	587	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Reduction Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RT	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Flt Protected	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Satd Flow (prot)	1764	1655	1655	1655	1655	1655	1655	1655	1655	1655	1655	1655
Flt Permitted	0.65	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Satd Flow (perm)	1222	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	330	18	10	5	16	13	32	38	15	342	536	536
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	330	0	0	0	17	0	0	262	0	236	113	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	0%	0%	0%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	2	2	6	6	6	6	6	6
Permitted Phases	4	4	8	8	2	2	6	6	6	6	6	6
Actuated Green, G (s)	30.0	30.0	30.0	30.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Effective Green, E (s)	30.0	30.0	30.0	30.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane-Grp Gap (vph)	333	437	437	437	673	673	673	673	673	673	673	673
v/s Ratio Prot	0.29	0.07	0.07	0.07	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
v/s Ratio Perm	1.05	0.27	0.27	0.27	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Unit Delay (s)	40.0	31.4	31.4	31.4	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay (s)	62.4	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Delay (s)	102.4	31.7	31.7	31.7	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Level of Service	F	C	C	C	B	B	B	B	B	B	B	B
Approach Delay (s)	102.4	31.7	31.7	31.7	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Approach LOS	F	C	C	C	B	B	B	B	B	B	B	B
HCN Level of Service	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6
HCN Average Control Delay	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
HCN Volume to Capacity ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Actuated Cycle Length (s)	100	100	100	100	100	100	100	100	100	100	100	100
Intersection Capacity Utilization	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15	15
c Critical Lane Group												

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
10: Pennsylvania Avenue & Warren Avenue
Weekday Afternoon Peak Hour



Lane Configurations	191	192	175	185	511	191
Volume (vph)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	1	1	0	0
Label Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Pack/Bike Factor						
Flt	0.914				0.997	
Flt Protected	0.982		0.960			
Satd. Flow (prot)	1872	0	1770	1863	1857	0
Flt Permitted	0.982		0.926			
Satd. Flow (perm)	1872	0	607	1863	1857	0
Right Turn on Red	No		No		No	
Satd. Flow (RTOR)	25		25		25	
Link Speed (mph)	25		25		25	
Link Distance (ft)	682		860		604	
Travel Time (s)	18.6		23.6		16.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.73	0.73	0.91	0.91	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bicycles (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%		0%	
Adj. Flow (vph)	152	263	192	203	532	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	415	0	192	203	543	0
Number of Detectors	1	1	2	2	2	2
Detector Template	Left	Left	Thru	Thru		
Leading Detector (ft)	20	20	100	100	100	100
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type		Perm				
Protected Phases	4		2	2	6	
Permitted Phases	4		2	2	6	
Detector Phase						
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	
Total Split (s)	21.0	0.0	49.0	49.0	0.0	
Total Split (%)	30.0%	0.0%	70.0%	70.0%	0.0%	
Maximum Green (s)	15.0	43.0	43.0	43.0	43.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	4.0	6.0	6.0	4.0	

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
10: Pennsylvania Avenue & Warren Avenue
Weekday Afternoon Peak Hour



Lane Configurations	191	192	175	185	511	191
Volume (vph)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	1	1	0	0
Label Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Pack/Bike Factor						
Flt	0.914				0.997	
Flt Protected	0.982		0.960			
Satd. Flow (prot)	1872	0	1770	1863	1857	0
Flt Permitted	0.982		0.926			
Satd. Flow (perm)	1872	0	607	1863	1857	0
Right Turn on Red	No		No		No	
Satd. Flow (RTOR)	25		25		25	
Link Speed (mph)	25		25		25	
Link Distance (ft)	682		860		604	
Travel Time (s)	18.6		23.6		16.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.73	0.73	0.91	0.91	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bicycles (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%		0%	
Adj. Flow (vph)	152	263	192	203	532	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	415	0	192	203	543	0
Number of Detectors	1	1	2	2	2	2
Detector Template	Left	Left	Thru	Thru		
Leading Detector (ft)	20	20	100	100	100	100
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type		Perm				
Protected Phases	4		2	2	6	
Permitted Phases	4		2	2	6	
Detector Phase						
Switch Phase						
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	
Total Split (s)	21.0	0.0	49.0	49.0	0.0	
Total Split (%)	30.0%	0.0%	70.0%	70.0%	0.0%	
Maximum Green (s)	15.0	43.0	43.0	43.0	43.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	4.0	6.0	6.0	4.0	

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
 10: Pennsylvania Avenue & Warren Avenue Weekday Afternoon Peak Hour

	←	↖	↗	↑	↓	↘	↙	→
Approach	20%	20%	20%	20%	20%	20%	20%	20%
Lane Configurations	W	W	W	W	W	W	W	W
Volume (vph)	111	192	175	185	511	111	192	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Flt Protected	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Satd Flow (prot)	1673	1770	1663	1858	5443	1673	1770	1663
Flt Permitted	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Satd Flow (perm)	1673	1770	1663	1858	5443	1673	1770	1663
Peak-hour factor, PHF	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Adj Flow (vph)	152	269	192	203	532	152	269	192
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	415	0	192	203	5443	415	0	192
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Prohibited Phases	4	7	7	6	6	4	7	7
Permitted Phases	2	2	2	2	2	2	2	2
Actuated Green, G (s)	15.2	19.6	19.6	19.6	19.6	15.2	19.6	19.6
Effective Green, g (s)	15.2	19.6	19.6	19.6	19.6	15.2	19.6	19.6
Actuated y/c Ratio	0.32	0.42	0.42	0.42	0.42	0.32	0.42	0.42
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	543	254	780	778	778	543	254	780
vis Ratio Prot	0.32	0.42	0.42	0.42	0.42	0.32	0.42	0.42
vis Ratio Perm	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Uniform Delay, d1	14.2	11.5	8.9	11.2	11.2	14.2	11.5	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.3	12.1	0.2	2.7	2.7	6.3	12.1	0.2
Delay (s)	20.5	23.6	9.1	13.9	13.9	20.5	23.6	9.1
Level of Service	C	C	A	B	B	C	C	A
Approach Delay (s)	20.5	16.1	13.9	13.9	13.9	20.5	16.1	13.9
Approach LOS	C	B	B	B	B	C	B	B
HCM Average Control Delay	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
HCM Volume Capacity Ratio	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Actuated Cycle Length (s)	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
Intersection Capacity Utilization	70.2%	70.2%	70.2%	70.2%	70.2%	70.2%	70.2%	70.2%
Analysis Period (min)	15	15	15	15	15	15	15	15
Critical Lane Group	6	6	6	6	6	6	6	6

McMahon Associates, Inc. 2030 Scenario 1 - Malin Road Extension w/ TOD
11: King Street & Warren Avenue

Weekday Afternoon Peak Hour											
Lane Configurations											
Volume (vph)	58	245	38	161	183	74	147	192	186	473	522
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	-1%										
Total Lost Time (s)	50	50	50	50	50	50	50	50	50	50	50
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.94	1.00	0.96	1.00	0.94	1.00	0.94	1.00	0.97	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd Flow (vph)	1719	1835	1710	1792	1693	1667	1600	1633	1600	1633	1633
Flt Permitted	0.14	1.00	0.48	1.00	0.17	1.00	0.54	1.00	0.54	1.00	1.00
Satd Flow (perm)	245	1835	870	1792	299	1667	901	1633	901	1633	1633
Peak-hour factor, PHF	0.85	0.85	0.85	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Adj Elbow (vph)	68	283	45	168	181	78	162	123	170	514	533
RTOR Reduction (vph)	0	8	0	17	0	0	39	0	0	13	0
Lane Group Flow (vph)	68	300	0	168	141	0	78	245	0	170	634
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	2%	2%	2%	0%	0%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2			6			8			4	
Permitted Phases	2	6	6	6	6	6	6	6	6	6	6
Actuated Green, G (s)	29.6	29.6	29.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
Effective Green, G (s)	29.6	29.6	29.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
Actuated p/c Ratio	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane-Grp Cap (vph)	106	785	377	777	777	777	777	777	777	777	777
v/c Ratio Prot	0.18			0.41			0.15			0.39	
v/c Ratio Perm	0.28	0.42	0.19	0.26	0.26	0.26	0.19	0.19	0.19	0.19	0.19
Uniform Delay, d1	15.2	13.4	13.8	18.7	15.5	13.5	14.1	18.8	14.1	18.8	18.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.28	7.04	0.8	21.6	8.7	0.3	9.8	18.1	9.8	18.1	18.1
Delay (s)	27.7	13.7	14.4	40.3	24.3	13.8	15.0	36.9	15.0	36.9	36.9
Level of Service	C	B	B	D	C	B	B	D	B	D	D
Approach Delay (s)	16.1		35.6		15.0		32.3		15.0		32.3
Approach LOS	B		D		B		C		B		C
Intersection Control Delay	28.5										
HCM Volume to Capacity ratio	0.94										
Adjusted Cycle Length (s)	68.3										
Intersection Capacity Utilization	96.0%										
Analysis Period (min)	15										
c Critical Lane Group											

Scenario 2 – Malin Road & Three Tun Road Extensions

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)

Level of Service									
	A	B	C	D	E	F	G	H	I
Lane Configurations	→ ↗ ↘ ← ↖ ↗ ↘ ← ↖ ↗ ↘ ← ↖								
Lane Volume (vph)	269	325	192	514	347	586			
Useful Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Initial Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
FL Protected	0.97	1.00	1.00	1.00	1.00	0.95			
FL Protected	1.00	0.95	1.00	0.95	1.00	1.00			
Satd Flow (prot)	1777	1971	1759	1787	1593	1593			
FL Permitted	1.00	0.98	1.00	0.95	1.00	1.00			
Satd Flow (perm)	1777	141	1759	1787	1593	1593			
Peak hour factor, PHF	0.92	0.92	0.93	0.93	0.81	0.81			
Adj Flow (vph)	379	353	208	553	428	723			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group (vphpl)	732	0	205	553	428	723			
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%			
Turn Type	Thru Thru Thru Thru Thru Thru Thru Thru Thru Thru								
Protected Phases	2 1 6 6								
Permitted Phases	6 6 6 6								
Actuated Green, G (s)	47.0	59.8	59.8	25.0	25.0	25.0			
Effective Green, E (s)	47.0	59.8	59.8	25.0	25.0	25.0			
Actuated Q/C Ratio	0.49	0.62	0.62	0.26	0.26	0.26			
Clearance Time (s)	6.0	3.0	5.0	6.0	6.0	5.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	863	242	1087	462	473	473			
Loss Ratio Prot	c0.97	c0.09	0.31	0.24					
Loss Ratio Perm		0.44				0.45			
Q/C Ratio	2.01	0.85	0.51	0.93	1.75				
Uniform Delay, d1	24.9	27.4	10.3	35.0	35.9				
Progression Factor	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	457.2	238	304	24.6	37.8				
Delay (s)	482.1	51.2	10.7	59.6	383.5				
Level of Service	F	D	B	E	F				
Approach Delay (s)	482.1	21.7	263.1						
Approach LOS	F	C	F						
Level of Service 317.0 Level of Service									
HCM Average Control Delay	317.0					Level of Service			
HCM Volume to Capacity ratio	1.79					Level of Service			
Adjusted Cycle Length (s)	96.8					Sum of lost time (s)			
Intersection Capacity Utilization	132.8%					ICU level of Service			
Analysis Period (min)	15					Level of Service			
c Critical Lane Group									

HCM Signalized Intersection Capacity Analysis
 File Path: \\0809534\TrafficAnalysis\November 2010\2030 Main-Three Tun Connection Conditions\Weekday AM.syn Synchro 7
 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
2: Three Tun Road & Sproul Road (PA Route 352) ^{Weekday Morning Peak Hour}

Lane Configurations														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Volume (vph)	0	0	0	23	0	101	3	763	225	159	358	114		
Ideal Flow (veh/s)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	1	1	1	1	1	1	1	1	1	1
Taper Length (ft)	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Peak Hour Factor	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850
RTT Produced	0	1863	0	0	1905	1615	1797	1881	1599	1736	1820	0		
Satd. Flow (prot)	0	1863	0	0	1905	1615	1797	1881	1599	1736	1820	0		
RTT Permitted	0	1863	0	0	1905	1615	1797	1881	1599	1736	1820	0		
Satd. Flow (perm)	0	1863	0	0	1905	1615	1797	1881	1599	1736	1820	0		
Right Turn on Red	0	0	0	0	0	0	0	0	0	0	0	0		
Right Flow (RTOR)	0	0	0	0	0	0	0	0	0	0	0	0		
Satd. Flow (RTOR)	0	0	0	0	0	0	0	0	0	0	0	0		
Link Speed (mph)	25	25	25	25	25	25	25	25	25	25	25	25		
Link Distance (ft)	695	695	695	695	695	695	695	695	695	695	695	695		
Travel Time (s)	180	180	180	180	180	180	180	180	180	180	180	180		
Conf. Peds. (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0		
Conf. Bikes (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		
Green Time Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	0%	1%	1%	1%	4%	4%		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0		
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0		
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Adm. Flow (vph)	0	0	0	246	0	202	3	812	452	179	402	12		
Shared Lane Traffic (%)	0	0	0	0	0	246	202	3	812	452	179	402		
Lane Group Flow (vph)	0	0	0	0	246	202	3	812	452	179	402	12		
Number of Detectors	1	2	1	2	1	2	1	2	1	2	1	2		
Detector Template	Left	Thru	Left	Thru	Right	Left	Thru	Right	Left	Thru	Left	Thru		
Leading Detector (ft)	20	100	20	100	20	20	100	20	100	20	20	100		
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0		
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm		
Protected Phases	4	4	8	8	8	8	8	2	2	2	2	6		
Permitted Phases	4	4	8	8	8	8	8	2	2	2	2	6		
Detector Phase	4	4	8	8	8	8	8	2	2	2	2	6		
Switch Phase	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Minimum Initial (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0		
Minimum Split (s)	27.0	27.0	0.0	27.0	27.0	27.0	63.0	63.0	63.0	63.0	63.0	63.0		
Total Split (s)	30.0%	30.0%	0.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%		
Maximum Green (s)	21.0	21.0	21.0	21.0	21.0	21.0	57.0	57.0	57.0	57.0	57.0	57.0		
Maximum Yellow 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		
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	6.0	6.0	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		

Lanes, Volumes, Timings

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
2: Three Tun Road & Sproul Road (PA Route 352) Weekday Morning Peak Hour

[illegible]

Splits and Phases: 2; Three Tun Road & Sprout Road (PA Route 352)



McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
2: Three Tun Road & Sproul Road (PA Route 352)
Weekday Morning Peak Hour

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Lanes, Volumes, Timings
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 2: Three Tun Road & Sproul Road (PA Route 352)
 Synchro 7

HCM Signalized Intersection Capacity Analysis
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 2: Three Tun Road & Sprout Road (PA Route 352)
 Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Morning Peak Hour											
Lane Configurations											
Volumes (vph)	267	1203	58	187	549	28	104	135	347	88	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	-1%	-1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Storage Length (ft)	150	0	150	0	150	0	150	0	150	0	150
Storage Lanes	1	0	1	0	1	0	1	0	1	0	1
Taper Length (ft)	75	75	75	75	75	75	75	75	75	75	75
Lane Util Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
RT	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (vph)	1761	3381	0	1878	3222	0	1602	1686	1483	1677	1631
RT Permitted	0.308	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397
Satd. Flow (perm)	571	3381	0	171	3222	0	582	1686	1483	1142	1631
Right Turn on Red	No	No	No	No	No	No	No	No	No	No	No
Satd. Flow (RTOR)	45	45	45	45	45	45	45	45	45	45	45
Link Speed (mph)	276	2922	418	418	418	418	418	418	418	418	418
Link Distance (ft)	472	44.3	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Conf. Posts (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Cont. Blkcs (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Factor	0.94	0.94	0.81	0.81	0.81	0.81	0.90	0.90	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	7%	7%	7%	7%	10%	10%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	284	1280	62	231	678	35	116	150	386	106	146
Start of Lag Traffic (%)	284	1342	0	231	713	0	116	150	386	106	295
Lane Group Flow (vph)	1	2	1	2	2	1	2	1	2	1	2
Number of Detectors	Left	Thru	Left	Thru	Left	Thru	Left	Thru	Left	Thru	Left
Detector Template	20	100	20	100	20	100	20	100	20	100	20
Leading Detector (ft)	0	0	0	0	0	0	0	0	0	0	0
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0
Turn Type	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm
Protected Phases	5	2	1	6	8	1	4	4	4	4	4
Detector Phase	5	2	1	6	8	1	4	4	4	4	4
Switch Phase	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Initial (s)	13.0	21.0	13.0	21.0	21.0	21.0	13.0	21.0	21.0	21.0	21.0
Minimum Split (s)	20.0	47.0	0.0	16.0	43.0	0.0	27.0	27.0	16.0	27.0	27.0
Total Split (s)	22.2%	52.2%	0.0%	17.8%	37.8%	0.0%	30.0%	30.0%	17.8%	30.0%	30.0%
Maximum Green (s)	14.0	41.0	10.0	37.0	21.0	21.0	10.0	21.0	21.0	21.0	21.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0

Lanes, Volumes, Timings
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
3: Lancaster Pike (U.S. Route 30) & Malin Road

Weekday Morning Peak Hour											
Lane Configurations											
Lead-Lag Optimize?	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Red (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Red (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Redall Mode	None	C-Max	None	C-Max	None	C-Max	None	C-Max	None	C-Max	None
Walk Time (s)	0.38	0.62	0.67	0.48	0.32	0.41	0.35	0.43	0.34	0.38	0.34
Pedestrian Calls (#/hr)	12.1	27.6	52.2	32.6	98.9	33.6	28.2	35.9	54.9	33.6	28.2
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	12.1	27.6	52.2	32.6	98.9	33.6	28.2	35.9	54.9	33.6	28.2
Total Delay	12.1	27.6	52.2	32.6	98.9	33.6	28.2	35.9	54.9	33.6	28.2
Queue Length 50th (ft)	84	350	1073	215	63	72	170	51	158	63	72
Queue Length 95th (ft)	101	456	1488	250	164	128	270	92	242	164	128
Internal Link Dist (ft)	150	150	150	150	150	150	150	150	150	150	150
Turn Bay Length (ft)	593	593	270	1473	136	393	593	265	381	136	393
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.88	0.66	0.48	0.85	0.36	0.66	0.40	0.77	0.85	0.36
Area Type	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other
Cycle Length: 90	90	90	90	90	90	90	90	90	90	90	90
Actuated Cycle Length: 90	90	90	90	90	90	90	90	90	90	90	90
Offset: 0 (0%)	0	0	0	0	0	0	0	0	0	0	0
Natural Cycle (s)	90	90	90	90	90	90	90	90	90	90	90
Control Type: Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated	Actuated-Coordinated
# 95th Percentile Volume Exceeds Capacity Queue May Be Longer	0	0	0	0	0	0	0	0	0	0	0
Queue shown is maximum after two cycles.	0	0	0	0	0	0	0	0	0	0	0
Splits and Phases: 3: Lancaster Pike (U.S. Route 30) & Malin Road											
a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12

Lanes, Volumes, Timings
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road and Three Tun Road Extensions
3: Lancaster Pike (U.S. Route 30) & Malin Road Weekday Morning Peak Hour

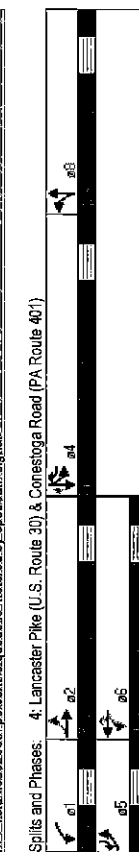
Lane Configurations														
Volume (vph)	267	205	59	87	549	28	104	135	347	98	224	124		
Ideal Flow (vphpl)	1300	1900	1900	1900	1900	1300	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	16	12	11	11	11	11	12	12	12	12		
Grade (%)	-1%				1%				-2%			3%		
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor	1.00	0.95			1.00	0.95			1.00	1.00	1.00	1.00		
FFI	100	0.99			100	0.99			100	1.00	0.85	100	0.92	
FF Protected	0.95	1.00			0.95	1.00			0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1761	338			1678	3224			1602	686	1483	677	1632	
FF Permitted	0.31	1.00			0.10	1.00			0.35	1.00	1.00	0.65	1.00	
Satd. Flow (perm)	570	391			172	222			593	1686	1483	1143	1632	
Peak-hour factor, PHF	0.94	0.94	0.94	0.81	0.81	0.81	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
RTOR Reduction (vph)	284	1290	62	231	678	35	116	306	386	106	146	149	149	
RTOR Reduction (vphpl)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	284	1342	0	231	713	0	116	306	386	106	295	0	0	0
Heavy Vehicles (%)	3%	3%	3%	7%	7%	7%	10%	10%	10%	10%	6%	6%	6%	6%
Turn type	pm-pt	pm-pt			pm-pt			pm	pm	pm	pm	pm		
Protected Phases	5	2			1	6		8	1			4		
Permitted Phases	2			6			8					4		
Actuated Green, G (s)	53.9	42.5		51.3	41.2		19.4	19.4	29.5	19.4	19.4	19.4	19.4	
Effective Green, G (s)	53.9	42.5		51.3	41.2		19.4	19.4	29.5	19.4	19.4	19.4	19.4	
Actuated y/c Ratio	0.60	0.47		0.57	0.46		0.22	0.22	0.33	0.22	0.22	0.22	0.22	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	492	1597		267	1475		126	363	695	246	362			
v/s Ratio Prot	0.07	c0.40		c0.10	0.22			0.03	0.07		0.18			
v/s Ratio Perm	0.72			0.40			0.20		0.19	0.09				
v/c Ratio	0.56	0.64		0.87	0.48		0.92	0.41	0.56	0.43	0.84			
Uniform Delay /pt	93	20.8		21.4	7.0		34.5	30.4	26.9	30.5	33.8			
Progression Factor	1.00	1.00		1.17	1.74		1.00	1.00	1.00	1.00	1.00			
Incremental Delay/c02	1.6	5.5		21.1	1.0		56.2	0.8	2.7	1.2	56.8			
Delay (s)	10.9	26.3		46.2	30.5		90.7	31.2	28.6	31.7	49.6			
Level of Service	B	C		D	C		F	C	C	C	C			
Approach Delay (s)	23.6			34.4			40.3				44.9			
Approach LOS	C			C			D				D			
HCM Average Control Delay														
HCM Average Control Delay	31.8													
HCM Volume to Capacity ratio	0.80													
Actuated Cycle Length (s)	90.0													
Sum of Lost Time (s)	90.0													
Intersection Capacity Utilization	85.2%													
CU level of Service	E													
Analysis Period (min)	15													
Critical Lane Group														

HCM Signalized Intersection Capacity Analysis
 3: Lancaster Pike (U.S. Route 30) & Main Road
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 Synchro 7

HCM Signalized Intersection Capacity Analysis
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HCM Signalized Intersection Capacity Analysis
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 Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Morning Peak Hour

[illegible]

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road and Three Tun Road Extensions
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Morning Peak Hour

lane Configurations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523
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McMahon Associates, Inc.
2030 Scenario 2 - Malin Road & Three Tun Road Extensions
5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)

[illegible]

Lanes, Volumes, Timings

5; Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)

Traffic Analysis November 2010 2030 Malin-Three Tun Connection Conditions Weekday AM syn

Synchro 7

McMahon Associates, Inc.
2030 Scenario 2 - Malin Road & Three Tun Road Extensions
05: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)

[illegible]

Splits and Phases: 5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)



lanes, Volumes, Timings
engr00905341@traffic-analysis.com 5: Lancaster Pike (U.S. Route 30) & Morehall Road (PA Route 29)
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Road and Three Tun Road Extensions
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway Weekday Morning Peak Hour

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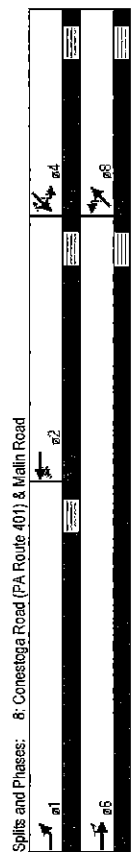
Lanes, Volumes, Timings
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway *Weekday Morning Peak Hour*

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Lane Configurations																	
Volume (vph)	15	285	523	55	452	4	128	6	52	1	4						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	12	14	11	11	14	12	13	13	14	14	14	14	14	14	14	14
Total Lost time (s)	6.0	7.0	7.0	6.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0						
Lost Time Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95						
RT	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.99	0.99						
HL Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	0.95						
Satd. Flow (prot)	1593	3539	1689	1694	3388	1672	1681	1727	1818								
RLP permitted	0.07	1.00	1.00	0.07	1.00	1.00	0.95	0.95	0.98								
Satd. Flow (perm)	117	3519	1689	117	3388	1672	1681	1727	1818								
Peak Hour Factor PHE	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.86	0.95	0.95						
Adj. Flow (vph)	16	1339	545	58	1528	4	1312	7	60	2	2						
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0						
Lane Group Flow (vph)	16	1339	545	58	1528	4	635	684	0	0	14						
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	0%	0%						
Turn Type	prn-pt	2	2	1	6	6	4	4	4	6	8						
Protected Phases																	
Permitted Phases	2	2	2	6	6												
Actual Green (s)	60.2	57.4	57.4	67.6	61.1	61.1	38.0	39.0									
Effective Green (s)	60.2	57.4	57.4	67.6	61.1	61.1	39.0	39.0									
Actual g/C Ratio	0.46	0.44	0.44	0.52	0.47	0.47	0.30	0.30									
Clearance Time (s)	6.0	7.0	7.0	6.0	7.0	7.0	6.0	6.0									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0									
Lane Grp Cap (vph)	85	1551	740	139	1580	780	500	514									
vs Ratio Prot	0.00	0.38	0.00	0.02	0.45	0.41	0.40	0.00									
vs Ratio Perm	0.08	0.32	0.20														
g/C Ratio	0.19	0.86	0.74	0.42	0.97	0.01	39	133									
Uniform Delay, d1	27.5	33.3	30.5	24.5	34.0	18.7	46.0	46.0									
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
Incremental Delay, d2	1.1	6.6	6.4	2.0	16.1	0.0	187.5	161.8									
Delay (s)	28.6	39.9	37.0	26.5	50.0	18.7	233.5	207.8									
Level of Service	C	D	D	C	D	B	F	F									
Approach Delay (s)	38.2																
Approach LOS	D																
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HCM Signalized Intersection Capacity Analysis
 \hcm\98095341TrafficAnalysis\November 2010\202030 Malin-Three Tun Connection Conditions\Weekday AM.syn
 6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway
 Synchro 7

McMahon Associates, Inc.

[illegible]

2030 Scenario 2 - Malin Road and Three Tun Road Extensions
McMahon Associates, Inc.
Conestoga Road (PA Route 401) & Malin Road
Weekday Morning Peak Hour

[illegible]

8: Conestoga Road (PA Route 401) & Mallin Road
Synchro 7

Lane Configurations	W	4	1
Volume (vph)	4	27	28
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Grade (%)	0%	0%	0%
Storage Length (ft)	0	0	0
Storage Lanes	1	0	0
Trailer Length (ft)	75	75	75
Lane Util. Factor	1.00	1.00	1.00
Per Bike Factor			
Frt	0.319		0.988
Flt Protected	0.988		0.997
Satd. Flow (prot)	1514	0	1876
Flt Permitted	0.988		0.997
Satd. Flow (perm)	1514	0	1876
Link Speed (mph)	25	25	25
Link Distance (ft)	642	604	1428
Travel Time (s)	17.5	16.5	38.9
Contn. Peds. (#/hr)			
Contn. Bikes (#/hr)			
Peak Hour Factor	0.50	0.79	0.79
Growth Factor	1.00%	1.00%	1.00%
Heavy Vehicles (%)	13%	1%	1%
BusB (buses/#hr)	0	0	0
Parking (#/hr)			
Mid Block Traffic (%)	0%	0%	0%
Adj. Flow (vph)	8	34	318
Shared Lane Traffic (%)			
Lane Group Flow (vph)	20	0	523
Sign Control	Stop	Free	Free
Area Type			Other
Control Type			Unsignalized

W	W	4	4	4
Lane Configurations	Volume (veh/h)	20	206	29
Sign Control	Stop	Free	Free	Free
Grade	10%	0%	0%	0%
Peak Hour Factor	0.50	0.50	0.79	0.90
Hourly flow rate (vph)	8	12	34	469
Pedestrians				
Lane Width (ft)				
Walking Speed (ft/s)				
Percent Blockage				
Right turn flare (veh)				
Median type		None	None	None
Median storage (veh)				
Upstream signal (ft)			604	
p/s, platoon unblocked				
VC1, stage 1 con vol	891	334	350	
VC2, stage 2 con vol	891	334	350	
VCu, unblocked vol	8.5	6.3	4.1	
IC, single (s)				
IC, 2 stage (s)	3.6	3.4	2.2	
IC (s)	97	98	97	
p0 queue free %	291	683	213	
GM capacity (veh/h)				
Volume Total	20	523	350	
Volume Left	8	34	0	
Volume Right	12	0	32	
CSH	444	1214	1700	
Volume (s capacity)	0.05	0.03	0.21	
Queue Length 95th (ft)	4	2	0	
Control Delay (s)	13.5	0.8	0.0	
Lane LOS	B	A		
Approach Delay (s)	13.5	0.8	0.0	
Approach LOS	B			
Intersection Capacity Utilization	92.0%	92.0%	ICU Level of Service	A
Analysis Period (min)	15			

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
10: Pennsylvania Avenue & Warren Avenue
Weekday Morning Peak Hour



Lane Configurations	W	A	P	S
Volume (vph)	68	147	257	192
Ideal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0
Storage Lanes	1	0	0	0
Factor Length (ft)	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00
Ped/Bike Factor				
Flt	0.908			0.969
Flt Protected	0.964		0.979	
Satd. Flow (prot)	1664	0	1824	1786
Flt Permitted	0.964			
Satd. Flow (perm)	1664	0	1231	1786
Right turn on Red	No	No	No	No
Satd. Flow (RTOR)				
Link Speed (mph)	25	25	25	25
Link Distance (ft)	682	872	604	
Travel Time (s)	18.6	23.8	16.5	
Control Peas. (vph)				
Control Bias (vph)				
Peak Hour Factor	0.50	0.50	0.86	0.76
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%
Bus Blockages (vmt)	0	0	0	0
Parking (vmt)				
Mid-Block Traffic (%)	0%	0%	0%	0%
Adj. Flow (vph)	138	294	299	253
Shared Lane Traffic (%)				
Lane Group Flow (vph)	432	0	709	362
Number of Detectors	1	2	2	2
Detector Template	Left	Left Thru	Thru	
Leading Detector (ft)	20	20	100	100
Trailing Detector (ft)	0	0	0	0
Split Type		Perm		
Protected Phases	4	2	2	6
Permitted Phases				
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	3.0	3.0	3.0	3.0
Minimum Split (s)	28.0	21.0	21.0	21.0
Total Split (s)	30.0	0.0	60.0	60.0
Total Split (%)	33.3%	0.0%	66.7%	66.7%
Maximum Green (s)	24.0	54.0	54.0	54.0
Yellow-Enter (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time-Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	4.0

Lanes, Volumes, Timings
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
10: Pennsylvania Avenue & Warren Avenue
Weekday Morning Peak Hour



Lane Configurations	W	A	P	S
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Red (s)	0.0	0.0	0.0	0.0
Time to Red (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Min	Min	Min
Walk Time (s)				
Flash Don't Walk (s)				
Pedestrian Calls (#/hr)				
W/C Ratio	0.95	0.96	0.34	
Control Delay	65.8	47.2	10.3	
Queue Delay	0.0	0.0	0.0	
Total Delay	65.8	47.2	10.3	
Queue Length 50th (ft)	243	346	96	
Queue Length 95th (ft)	168	4672	117	
Internal Link Dist (ft)	602	792	524	
Turn Bay Length (ft)				
Base Capacity (vph)	454	756	1097	
Starvation Cap Reductn	0	0	0	
Spillback Cap Reductn	0	0	0	
Storage Cap Reductn	0	0	0	
Reductn/C Ratio	0.35	0.94	0.33	
Area Type	Other			
Cycle Length: 90				
Actuated Cycle Length: 98.1				
Natural Cycle: 90				
Control Type: Actuated-Uncoordinated				
# 95th percentile volume exceeds capacity, queue may be longer.				
# Queue shown is maximum after bicyclist				

Splits and Phases: 10: Pennsylvania Avenue & Warren Avenue



Lanes, Volumes, Timings
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Main Road & Three Tun Road Extensions
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Lane Configurations	EB	WB	SB	NB
Volume (vph)	309	320	569	1486
Legal Flow (vphpl)	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12
Grade (%)	0%	0%	0%	0%
Storage Length (ft)	0	0	110	270
Storage Lanes	0	1	1	1
Travel Length (ft)	0	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00
Per-Bike Factor	0.966			
Fit	0.966			0.850
Fit Protected		0.950		0.950
Satd. Flow (prot)	1799	0	1787	1881
Fit Permitted		0.940		0.940
Satd. Flow (perm)	1799	0	228	1881
Right Turn on Red	No	No	No	No
Satd. Flow (RTOR)	45	45	45	25
Link Speed (mph)	45	45	45	25
Link Distance (ft)	2991	5262	872	2991
Travel Time (s)	45.3	79.7	23.6	45.3
Confl. Peds. (#/hr)				
Confl. Bikes (#/hr)				
Peak Hour Factor	0.97	0.97	0.96	0.85
Growth Factor	100%	100%	100%	100%
Heavy Vehicles (%)	2%	1%	1%	2%
BUS-BLACK (#/hr)	0	0	0	0
Parking (#/hr)				
Mid-Block Traffic (%)	0%	0%	0%	0%
Adj. Flow (vph)	969	336	593	1558
Shared Lane Traffic (%)				
Lane Group Flow (vph)	1327	0	593	1558
Number of Detectors	2	1	2	1
Detector Template	Thru	Left	Thru	Left
Leading Detector (ft)	100	20	100	20
Trailing Detector (ft)	0	0	0	0
Unit Type	Perm	Perm	Perm	Perm
Protected Phases	2	1	6	8
Permitted Phases		6		8
Detector Phase	2	1	6	8
Switch Phase				
Minimum Initial (s)	3.0	3.0	3.0	3.0
Minimum Split (s)	21.0	13.0	21.0	21.0
Total Split (s)	36.0	0.0	46.0	21.0
Total Split (%)	53.7%	0.0%	68.7%	31.3%
Maximum Green (s)	30.0	7.0	40.0	15.0
Yellow Time (s)	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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McMahon Associates, Inc. 2030 Scenario 2 - Main Road & Three Tun Road Extensions
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

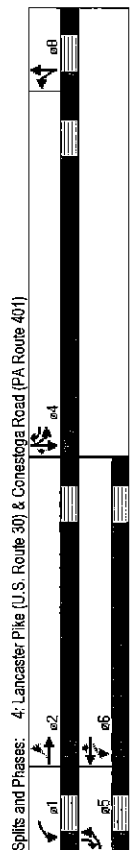
Lane Configurations	EB	WB	SB	NB
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None
Walk Time (s)				
Pedestrian Calls (#/hr)				
McRatio	1.85	1.92	1.39	1.11
Control Delay	317.6	443.6	199.0	107.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	317.6	443.6	199.0	107.6
Queue Length 95th (ft)	#039	#335	#673	#212
Queue Length 95th (ft)	#039	#620	#1112	#342
Internal Link Dist (ft)	2991	5182	872	2991
Tun Bay Length (ft)		110	270	
Base Capacity (vph)	806	309	1123	396
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced McRatio	1.85	1.92	1.39	1.11
Actual Cycle Length (s)	120	120	120	120
Actual Cycle Length (s)	120	120	120	120
Control Type	Uncoordinated	Uncoordinated	Uncoordinated	Uncoordinated
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.				



Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc.
2030 Scenano 2 - Malin Road & Three Tun Road Extensions
44: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Afternoon Peak Hour

	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Redout (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Redout (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	C-Mac	None	None	None	None	None	None
Walk Time (s)								
First Don't Walk (s)								
Pedestrian Calls (#/hr)								
% Ratio	0.82	0.92	0.24	1.70	0.92	3.24	0.59	0.08
Control Delay	73.4	49.5	22.8	345.1	25.2	1088.4	28.4	11.1
Queue Delay	0.0	0.0	33.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.4	49.5	22.8	345.1	25.2	1088.4	28.4	11.1
Queue Length 50th (ft)	42	352	10	753	399	148	17.5	12
Queue Length 95th (ft)	m#114	#472	28	#869	#791	#169	266	27
Internal Link Dist (ft)		2842		930		33		2760
Turn Bay Length (ft)	150		150		250		375	
Base Capacity (vph)	120	1124	123	998	1137	45	638	503
Stallion Cap Reductn	0	0	0	0	0	0	0	0
Stallion Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced % Ratio	0.82	0.92	0.24	1.70	0.92	3.24	0.59	0.08
Area Type								
Other								
Cycle Length: 90								
Actual Cycle Length: 90								
Offset: 0 (0%) Referenced to phase 2 EBTL Start of Green								
Natural Cycle: 115								
Control Type: Actuated-Coordinated								
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.								
95th percentile volume exceeds capacity: queue may be longer								
Queue shown is maximum after two cycles.								



4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401)
 Syncro 7

McMahon Associates, Inc. 2030 Scenano 2 - Malin Road & Three Tun Road Extensions
4: Lancaster Pike (U.S. Route 30) & Conestoga Road (PA Route 401) Weekday Afternoon Peak Hour

Lane Configurations		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54		55		56		57		58		59		60		61		62		63		64		65		66		67		68		69		70		71		72		73		74		75		76		77		78		79		80		81		82		83		84		85		86		87		88		89		90		91		92		93		94		95		96		97		98		99		100		101		102		103		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118		119		120		121		122		123		124		125		126		127		128		129		130		131		132		133		134		135		136		137		138		139		140		141		142		143		144		145		146		147		148		149		150		151		152		153		154		155		156		157		158		159		160		161		162		163		164		165		166		167		168		169		170		171		172		173		174		175		176		177		178		179		180		181		182		183		184		185		186		187		188		189		190		191		192		193		194		195		196		197		198		199		200		201		202		203		204		205		206		207		208		209		210		211		212		213		214		215		216		217		218		219		220		221		222		223		224		225		226		227		228		229		230		231		232		233		234		235		236		237		238		239		240		241		242		243		244		245		246		247		248		249		250		251		252		253		254		255		256		257		258		259		260		261		262		263		264		265		266		267		268		269		270		271		272		273		274		275		276		277		278		279		280		281		282		283		284		285		286		287		288		289		290		291		292		293		294		295		296		297		298		299		300		301		302		303		304		305		306		307		308		309		310		311		312		313		314		315		316		317		318		319		320		321		322		323		324		325		326		327		328		329		330		331		332		333		334		335		336		337		338		339		340		341		342		343		344		345		346		347		348	
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McMahon Associates, Inc.
2030 Scenario 2 - Malin Road and Three Tun Road Extensions
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway

[illegible]

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road and Three Tun Road Extensions
6: Lancaster Pike (U.S. Route 30) & Old Lincoln Highway

[illegible]

6. Lancaster Pike (U.S. Route 30) & Old Lincoln Highway

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HCM Signalized Intersection Capacity Analysis
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 Synchro 7

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McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
8: Conestoga Road (PA Route 401) & Malin Road

[illegible]

8: Conestoga Road (PA Route 401) & Main Road
Synchro 7

Lane Configurations	Volumes (vph)	1900	1800	1900	1900
Ideal Flow (vphpl)	1900	1800	1900	1900	1900
Lane Width (ft)	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0
Storage Lanes	1	0	0	0	0
Taper Length (ft)	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Ped-Bike Factor					
Frt	0.951				
Flt Protected	0.963				
Satd. Flow (prot)	1717	0	0	1879	1900
Flt Permitted	0.963				
Satd. Flow (perm)	1717	0	0	1879	1900
Link Speed (mph)	25	25	25	25	25
Link Distance (ft)	642	604	428		
Travel Time (s)	12.5	16.5	36.9		
Confl. Peds (#/hr)					
Confl. Bikes (#/hr)					
Peak Hour Factor	0.58	0.58	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0
Parking (#/hr)					
MISBlockRate (%)	0%		0%	0%	0%
Adj. Flow (vph)	71	41	4	313	579
Shaded Lane Traffic (%)					
Lane Group Flow (vph)	112	0	0	317	590
Sign Control	Stop		Free	Free	Free
Area Type	Other				
Control Type	Unsignalized				

Lane Configurations				W				A				P			
Volume (veh/h)				41				24				282			
Sign Control				Stop				Free				Free			
Grade				0%				0%				0%			
Peak Hour Factor				0.58				0.90				0.90			
Hourly flow rate (vph)				74				41				313			
Pedestrians															
Lane Width (ft)															
Walking Speed (ft/s)															
Percent Blockage															
Right turn lane (veh)															
Median type				None				None				None			
Median storage (veh)															
Upstream signal (ft)												504			
vC1, platoon unblocked				902				679				580			
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vC4, unblocked vol				902				679				580			
vC, single (s)				6.7				6.2				4.7			
vC, 2 stage (s)															
pD queue free %				77				92				100			
pD capacity (veh/min)				307				315				369			
pD, 2 stage (s)				3.5				3.3				2.2			
Volume Total				112				318				580			
Volume Left				71				4				0			
Volume Right				41				0				31			
csh				361				989				1700			
Volume to Capacity				0.31				0.00				0.34			
Queue Length 95th (ft)				32				0				0			
Control Delay (s)				19.4				0.2				0.0			
Lane LOS				C				A							
Approach Delay (s)				19.4				0.2				0.0			
Approach LOS				C											
Average Delay												2.2			
Intersection Capacity Utilization												37.0%			
Analysis Period (min)												15			
ICD Level of Service												A			

Lane Configurations									
Volume (vph)	W	1	4	4	1				
		119	251	185	185	442	90		
Ideal Flow (vphpl)		1300	1900	1300	1900	1900	1300		
Lane Width (ft)		12	12	12	12	12	12		
Grade (%)		0%				0%	0%		
Storage Length (ft)		0	0	0	0	0	0		
Storage Lanes		1	0	0	0	0	0		
Taper Length (ft)		25	75	75	75	75	75		
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00		
Red Bike Factor									
Frt		0.908				0.979			
Elg (oleg)		0.984				0.976			
Satd. Flow (prot)		1664	0	0	1813	1824	0		
Permitted		0.984				0.939			
Satd. Flow (perm)		1664	0	0	818	1824	0		
Right Turn on Red		No				No			
Satd. Flow (RTOR)									
Link Speed (mph)		25				25	25		
Link Distance (ft)		682				868	604		
Travel Time (s)		18.6				23.7	16.5		
Cont. Peds. (#/hr)									
Cont. Bikes (#/hr)									
Peak Hour Factor		0.73	0.73	0.91	0.91	0.96	0.96		
Growth Factor		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%		
Heavy Vehicles (%)		2%	2%	2%	2%	2%	2%		
Bus Blockages (#/hr)		0	0	0	0	0	0		
Parking (#/hr)									
Mid-Block Traffic (%)		0%				0%	0%		
Adj. Flow (vph)		163	344	204	203	450	83		
Shared Lane Traffic (%)									
Number of Detectors		507	0	0	407	543	0		
Detector Templates		Left	Left	Thru	Thru	Thru			
Leading Detector (ft)		20	20	700	700	100			
Trailing Detector (ft)		0	0	0	0	0			
Turn Type			Perm						
Protected Phases		4		2	2	6			
Permitted Phases			2						
Detector Phase		4		2	2	6			
Signal Phase									
Minimum Initial (s)		3.0	3.0	3.0	3.0	3.0			
Minimum Split (s)		21.0	21.0	21.0	21.0	21.0			
Total Split (s)		36.0	0.0	54.0	54.0	54.0	0.0		
Total Split (%)		40.0%	0.0%	60.0%	60.0%	60.0%	0.0%		
Maximum Green (s)		30.0	48.0	48.0	48.0	48.0			
Yellow Time (s)		4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0			
Lost Time Adj (s)		0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		6.0	4.0	6.0	6.0	6.0	4.0		

Lead-Lag Optimizer?					
Vehicle Extension(s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	Min	Min	Min
Walk Time (s)					
Flash-Don't Walk (s)					
Pedestrian Calls (#/hr)					
wvRatio	0.92		0.95	0.57	
Control Delay	52.8		54.0	16.6	
Queue Delay	0.0		0.0	0.0	
Total Delay	52.8		54.0	16.6	
Queue Length 50th (ft)	273		203	194	
Queue Length 95th (ft)	301		#403	289	
Internal Link Delay (s)	602		788	524	
Turn Bay Length (ft)					
Base Capacity (vph)	594		467	1041	
Starvation Cap Reduction	0		0	0	
Sillback Cap Reduction	0		0	0	
Storage Cap Reduction	0		0	0	
Reduced wv Ratio	0.85		0.87	0.52	
Area Type = Other					
Cycle Length 90					
Actual Cycle Length 88.3					
Natural Cycle 90					
Control Type Actuated-Uncoord (rated)					
# 95th percentile volume exceeds capacity, queue may be longer.					
Queue shown is maximum after two cycles					

Split and Phases: 10. Pennsylvania Avenue & Warren Avenue

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
10: Pennsylvania Avenue & Warren Avenue Weekday Afternoon Peak Hour

Accession									
Lane Configurations									
Volume (vph)	19	251	96	186	442	80			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Total Cost (mins/s)	6.0	6.0	6.0	6.0	6.0	6.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Flt	0.91			1.00	0.98				
Flt Protected	0.98			0.98	1.00				
Satd. Flow (prot)	1665			1617	1824				
Flt Permitted	0.98			0.44	1.00				
Satd. Flow (perm)	1665			816	1824				
Peak-hour factor, P/H	0.73	0.73	0.91	0.91	0.96	0.96			
Adj. Flow (vph)	163	344	204	203	460	83			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group Flow (vph)	507	0	0	407	543	0			
Turn Type	Perm								
Protected Phases	7	2		6					
Permitted Phases	2								
Actuated Green, G (s)	28.2	44.9		44.9					
Effective Green, g (s)	28.2	44.9		44.9					
Actuated g/C Ratio	0.33	0.53		0.53					
Clearance Time (s)	6.0	6.0		6.0					
Vehicle Extension (s)	3.0	3.0		3.0					
Lane Grp Cap (vph)	532	432		952					
vs Ratio Prot	0.30	0.30		0.30					
vs Ratio Perm	0.50								
vs Ratio	0.92	0.94		0.56					
Uniform Delay, d1	27.3	18.9		13.5					
Progression Factor	1.00	1.00		1.00					
Incremental Delay, d2	20.3	29.0		0.8					
Delay (s)	47.6	47.9		14.3					
Level of Service	D	D		B					
Approach Delay (s)	47.6	47.9		14.3					
Approach LOS	D	D		B					
Summary									
H/W Average Control Delay	35.3		H/M Level of Service		D				
H/W Volume-to-Capacity Ratio	0.93								
Actuated Cycle Length (s)	85.1		Sum of lost time (s)		12.0				
Intersection Capacity Utilization	85.2%		ICU Level of Service		E				
Analysis Period (min)	15								
Critical Lane Group									

HCM Signalized Intersection Capacity Analysis
 I-495/1304/1306/1307/1308/1309/1310/1311/1312/1313/1314/1315/1316/1317/1318/1319/1320/1321/1322/1323/1324/1325/1326/1327/1328/1329/1330/1331/1332/1333/1334/1335/1336/1337/1338/1339/1340/1341/1342/1343/1344/1345/1346/1347/1348/1349/1350/1351/1352/1353/1354/1355/1356/1357/1358/1359/1360/1361/1362/1363/1364/1365/1366/1367/1368/1369/1370/1371/1372/1373/1374/1375/1376/1377/1378/1379/1380/1381/1382/1383/1384/1385/1386/1387/1388/1389/1390/1391/1392/1393/1394/1395/1396/1397/1398/1399/1400/1401/1402/1403/1404/1405/1406/1407/1408/1409/1410/1411/1412/1413/1414/1415/1416/1417/1418/1419/1420/1421/1422/1423/1424/1425/1426/1427/1428/1429/1430/1431/1432/1433/1434/1435/1436/1437/1438/1439/1440/1441/1442/1443/1444/1445/1446/1447/1448/1449/1450/1451/1452/1453/1454/1455/1456/1457/1458/1459/1460/1461/1462/1463/1464/1465/1466/1467/1468/1469/1470/1471/1472/1473/1474/1475/1476/1477/1478/1479/1480/1481/1482/1483/1484/1485/1486/1487/1488/1489/1490/1491/1492/1493/1494/1495/1496/1497/1498/1499/1500/1501/1502/1503/1504/1505/1506/1507/1508/1509/1510/1511/1512/1513/1514/1515/1516/1517/1518/1519/1520/1521/1522/1523/1524/1525/1526/1527/1528/1529/1530/1531/1532/1533/1534/1535/1536/1537/1538/1539/1540/1541/1542/1543/1544/1545/1546/1547/1548/1549/1550/1551/1552/1553/1554/1555/1556/1557/1558/1559/1560/1561/1562/1563/1564/1565/1566/1567/1568/1569/1570/1571/1572/1573/1574/1575/1576/1577/1578/1579/1580/1581/1582/1583/1584/1585/1586/1587/1588/1589/1590/1591/1592/1593/1594/1595/1596/1597/1598/1599/1600/1601/1602/1603/1604/1605/1606/1607/1608/1609/1610/1611/1612/1613/1614/1615/1616/1617/1618/1619/1620/1621/1622/1623/1624/1625/1626/1627/1628/1629/1630/1631/1632/1633/1634/1635/1636/1637/1638/1639/1640/1641/1642/1643/1644/1645/1646/1647/1648/1649/1650/1651/1652/1653/1654/1655/1656/1657/1658/1659/1660/1661/1662/1663/1664/1665/1666/1667/1668/1669/1670/1671/1672/1673/1674/1675/1676/1677/1678/1679/1680/1681/1682/1683/1684/1685/1686/1687/1688/1689/1690/1691/1692/1693/1694/1695/1696/1697/1698/1699/1700/1701/1702/1703/1704/1705/1706/1707/1708/1709/1710/1711/1712/1713/1714/1715/1716/1717/1718/1719/1720/1721/1722/1723/1724/1725/1726/1727/1728/1729/1730/1731/1732/1733/1734/1735/1736/1737/1738/1739/1740/1741/1742/1743/1744/1745/1746/1747/1748/1749/1750/1751/1752/1753/1754/1755/1756/1757/1758/1759/1760/1761/1762/1763/1764/1765/1766/1767/1768/1769/1770/1771/1772/1773/1774/1775/1776/1777/1778/1779/1780/1781/1782/1783/1784/1785/1786/1787/1788/1789/1790/1791/1792/1793/1794/1795/1796/1797/1798/1799/1800/1801/1802/1803/1804/1805/1806/1807/1808/1809/1810/1811/1812/1813/1814/1815/1816/1817/1818/1819/1820/1821/1822/1823/1824/1825/1826/1827/1828/1829/1830/1831/1832/1833/1834/1835/1836/1837/1838/1839/1840/1841/1842/1843/1844/1845/1846/1847/1848/1849/1850/1851/1852/1853/1854/1855/1856/1857/1858/1859/1860/1861/1862/1863/1864/1865/1866/1867/1868/1869/1870/1871/1872/1873/1874/1875/1876/1877/1878/1879/1880/1881/1882/1883/1884/1885/1886/1887/1888/1889/1890/1891/1892/1893/1894/1895/1896/1897/1898/1899/1900/1901/1902/1903/1904/1905/1906/1907/1908/1909/1910/1911/1912/1913/1914/1915/1916/1917/1918/1919/1920/1921/1922/1923/1924/1925/1926/1927/1928/1929/1930/1931/1932/1933/1934/1935/1936/1937/1938/1939/1940/1941/1942/1943/1944/1945/1946/1947/1948/1949/1950/1951/1952/1953/1954/1955/1956/1957/1958/1959/1960/1961/1962/1963/1964/1965/1966/1967/1968/1969/1970/1971/1972/1973/1974/1975/1976/1977/1978/1979/1980/1981/1982/1983/1984/1985/1986/1987/1988/1989/1990/1991/1992/1993/1994/1995/1996/1997/1998/1999/2000/2001/2002/2003/2004/2005/2006/2007/2008/2009/2010/2011/2012/2013/2014/2015/2016/2017/2018/2019/2020/2021/2022/2023/2024/2025/2026/2027/2028/2029/2030/2031/2032/2033/2034/2035/2036/2037/2038/2039/2040/2041/2042/2043/2044/2045/2046/2047/2048/2049/2050/2051/2052/2053/2054/2055/2056/2057/2058/2059/2060/2061/2062/2063/2064/2065/2066/2067/2068/2069/2070/2071/2072/2073/2074/2075/2076/2077/2078/2079/2080/2081/2082/2083/2084/2085/2086/2087/2088/2089/2090/2091/2092/2093/2094/2095/2096/2097/2098/2099/2100/2101/2102/2103/2104/2105/2106/2107/2108/2109/2110/2111/2112/2113/2114/2115/2116/2117/2118/2119/212

McMahon Associates, Inc.
11: King Street & Warren Avenue
2030 Scenario 2 - Malin Road & Three Tun Road Extensions
Weekday Afternoon Peak Hour

[illegible]

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
11: King Street & Warren Avenue

Weekday Afternoon Peak Hour											
Signal Group	East	West	South	North	East	West	South	North	East	West	South
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Walk Time (s)											
Flash Don't Walk (s)											
Pedestrian Calls (#/hr)											
W/C Ratio	0.71	0.40	0.42	0.94	0.63	0.36	0.60	0.92			
Control Delay	60.5	15.4	18.6	41.8	44.9	13.1	24.7	41.5			
Queue Delay	60.5	15.4	18.6	41.8	44.9	13.1	24.7	41.5			
Total Delay	60.5	15.4	18.6	41.8	44.9	13.1	24.7	41.5			
Queue Length 50th (ft)	25	24	30	312	27	67	78	271			
Queue Length 95th (ft)	#89	144	100	#500	#88	124	154	#468			
Internal Link Delay (s)	585		746		328			788			
Turn Bay Length (ft)	100		100		50			50			
Base Capacity (vph)	96	874	389	894	123	748	378	708			
Starvation Cap Reduction	0	0	0	0	0	0	0	0			
Spillback Cap Reduction	0	0	0	0	0	0	0	0			
Storage Cap Reduction	0	0	0	0	0	0	0	0			
Reduced W/C Ratio	0.71	0.40	0.42	0.94	0.63	0.36	0.60	0.92			
Area Type	Other										
Cycle Length: 75											
Actuated Cycle Length: 75											
Offset: 0 (0%), Referenced to phase 2 EBTL and 6 WBTL, Start of Green											
Natural Cycle: 75											
Control Type: Preliminary											
# 95th percentile volume exceeds capacity; queue may be longer.											
Queue shown is maximum after two cycles.											
Splits and Phases: 11: King Street & Warren Avenue											

Lanes, Volumes, Timings
Heng18095341TrafficAnalysisNovember 2010/2030 Malin-Three Tun Connection Conditions/Weekday PM Lsyn
11: King Street & Warren Avenue
Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Road & Three Tun Road Extensions
11: King Street & Warren Avenue

Weekday Afternoon Peak Hour											
Signal Group	East	West	South	North	East	West	South	North	East	West	South
Lane Configurations											
Volume (vph)	36	238	38	56	536	192	71	149	512	208	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	13	11	12	13	10	10	10	10	10
Grade (%)	-1%	-5%	2%	2%	-5%	-5%	5%	5%	-5%	-5%	10%
Initial Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.98	1.00	0.98	1.00	0.98	1.00	0.98	1.00	0.98	0.97
Satd Flow (prot)	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95
Flt Permitted	7719	8833	7710	7789	1593	1667	1800	1633	1800	1633	1800
Satd Flow (perm)	2318	8833	884	1769	289	667	897	1633	897	1633	1633
Peak-hour factor, PHF	0.85	0.85	0.85	0.96	0.96	0.91	0.91	0.91	0.91	0.92	0.92
Adj Flow (vph)	68	280	45	162	557	200	78	164	123	226	521
RTOR Reduction (vph)	0	8	0	0	17	0	0	36	0	0	12
Lane Group Flow (vph)	68	317	0	162	740	0	78	251	0	226	642
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	0%	0%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	5	5	8	8	4	4	8	8	4
Permitted Phases	2	2	5	5	8	8	4	4	8	8	4
Actuated Green, G (s)	33.0	33.0	33.0	33.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Effective Green, E (s)	33.0	33.0	33.0	33.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Actuated W/C Ratio	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Cycle Length (s)	50	50	50	50	50	50	50	50	50	50	50
Lane Grp Cap (vph)	96	807	389	787	123	711	378	597	123	711	597
W/C Ratio Perm	0.31	0.17	0.18	0.41	0.15	0.15	0.25	0.25	0.15	0.15	0.25
W/C Ratio	0.71	0.39	0.42	0.94	0.63	0.35	0.60	0.92	0.63	0.35	0.60
Uniform Delay, d1	17.1	14.2	14.4	20.1	16.9	14.5	16.5	20.3	16.9	14.5	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.8	1.4	3.3	20.4	22.3	1.4	5.8	19.5	22.3	1.4	5.8
Delay (s)	52.9	15.7	17.7	40.4	39.2	15.9	23.4	39.8	39.2	15.9	23.4
Level of Service	D	B	B	D	D	B	C	D	D	B	C
Approach Delay (s)	22.1	36.4	36.4	20.9	20.9	36.6	36.6	20.9	20.9	36.6	36.6
Approach LOS	C	C	D	C	C	D	D	C	C	D	D
HCM Average Control Delay	31.7										
HCM Volume to Capacity Ratio	0.33										
Actuated Cycle Length (s)	75.0										
Intersection Capacity Utilization	95.4%										
Analysis Period (min)	15										
Critical Lane Group											

HCMSignalized Intersection Capacity Analysis
Heng18095341TrafficAnalysisNovember 2010/2030 Malin-Three Tun Connection Conditions/Weekday PM Lsyn
11: King Street & Warren Avenue
Synchro 7

With Transit Oriented Development Traffic

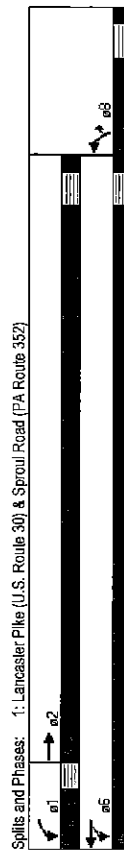
McMahon Associates, Inc. 2030 Scenario 2 - Main Rd & Three Tun Rd Rd Extensions w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour

Signal	SP	30	352	30	352	30	352	30	352
Lane Configurations	4	4	4	4	4	4	4	4	4
Volume (vph)	1275	332	192	575	360	386			
Ideal Flow (vphpl)	1900	1900	1900	1800	1900				
Lane Width (ft)	12	12	12	12	12	12			
Grade (%)	0%			0%	0%				
Storage Length (ft)	0	0	110	0	270	0			
Storage Lanes	0	1	1	1	1				
Lane Length (ft)	75	75	75	75	75				
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Ped-Bike Factor									
RT	0.972					0.850			
RT Protected			0.950		0.950				
Satd. Flow (prot)	1776	0	1571	1759	1787	1599			
RT Permitted			0.059		0.950				
Satd. Flow (perm)	1776	0	105	1759	1787	1599			
Right-Turn-on-Red	No					No			
Satd. Flow (RTOR)	45		45	25					
Lane Speed (mph)	29.91		52.62	872					
Link Distance (ft)	46.3		29.7	23.8					
Travel Time (s)									
Conf. Prob. (#/hr)									
Cont. Bikes (#/hr)									
Peak Hour Factor	0.92	0.92	0.93	0.93	0.81	0.81			
Growth Factor	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%			
Bus Blockages (#/hr)	0	0	0	0	0	0			
Parking (#/hr)									
Mid-Block Traffic (%)	0%		10%	10%	0%				
Adj. Flow (vph)	1395	361	205	566	444	723			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	1747	0	206	566	444	723			
Number of Detectors	2	1	2	1	1				
Detector Template	Thru	Left	Thru	Left	Right				
Leading Detector (ft)	100	20	100	20	20				
Trailing Detector (ft)	0	0	0	0	0				
Turnal Type	permitted	permitted	permitted	permitted	permitted				
Protected Phases	2	1	6	8					
Detector Phase	2	1	6	8	8				
Switch Phase									
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0				
Minimum Split (s)	24.0	13.0	21.0	21.0	21.0				
Total Split (s)	70.0	0.0	10.0	80.0	17.0				
Total Split (%)	72.2%	0.0%	10.3%	82.5%	17.5%				
Maximum Green (s)	64.0	7.0	74.0	11.0	11.0				
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0				
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0				
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0				

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Main Rd & Three Tun Rd Rd Extensions w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour

Signal	SP	30	352	30	352	30	352	30	352
Lane Config	4	4	4	4	4	4	4	4	4
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0			
Time Before Red (s)	0.0	0.0	0.0	0.0	0.0	0.0			
Time To Red (s)	0.0	0.0	0.0	0.0	0.0	0.0			
Recall Mode	None	None	None	None	None	None			
Walk Time (s)									
Flash Don't Walk (s)									
Pedestrian Cals (#/hr)									
W/Ratio	1.43		1.05	0.42	2.19	3.99			
Control Delay	246.0		101.8	5.1	574.0	1374.6			
Queue Delay	30.0		0.0	0.0	0.0	0.0			
Total Delay	246.0		101.8	5.1	574.0	1374.6			
Queue Length 95th (ft)	1501		38	39	243	817			
Queue Length 50th (ft)	#1762		#231	145	#555	#922			
Internal Link Dist (ft)	2941		5182	792					
Turn Bay Length (ft)			110	270					
Base Capacity (vph)	1172		197	342	203	181			
Starvation Cap Reductn	0		0	0	0	0			
Spillback Cap Reductn	0		0	0	0	0			
Storage Cap Reductn	0		0	0	0	0			
Reduced W/Ratio	1.48		1.05	0.42	2.19	3.99			
Area Type	Other								
Cycle Length: 97									
Adjusted Cycle Length: 97									
Natural Cycle: 120									
Control Type: Actuated Uncoordinated									
Volume exceeds capacity, queue is theoretically infinite.									
Queues shown are maximum after two cycles.									
# 95th percentile volume exceeds capacity, queue may be longer.									
Queues shown are maximum after two cycles.									



Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
 1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Morning Peak Hour



Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)									
Lane Configurations	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)	1275	332	192	526	360	586			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Adjustment Factor	0.60	0.60	0.60	0.60	0.60	0.60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Fit	0.97	1.00	1.00	1.00	1.00	0.85			
Fit Protected	1.00	0.95	1.00	0.95	1.00				
Satd Flow (prot)	1776	1671	1758	1787	1599				
Flt Permitted	1.00	0.06	1.00	0.95	1.00				
Satd Flow (perm)	1776	105	1758	1787	1599				
Peak-hour factor, P/H	0.92	0.92	0.93	0.93	0.81	0.81			
Adj. Flow (vph)	1366	361	206	566	444	723			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group Flow (vph)	1747	0	206	566	444	723			
Heavy Vehicles (%)	4%	4%	8%	8%	1%	1%			
Turn Type	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Protected Phases	2	1	6	8					
Permitted Phases		6		8					
Actuated Green, G (s)	64.0	74.0	74.0	11.0	11.0				
Effective Green, g (s)	64.0	74.0	74.0	11.0	11.0				
Actuated g/C Ratio	0.66	0.76	0.76	0.11	0.11				
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	1322	193	494	203	181				
v/s Ratio Prot	c0.98	c0.08	0.32	0.25					
v/s Ratio Perm		0.74		c0.45					
v/c Ratio	1.49	1.07	0.42	2.19	3.99				
Uniform Delay, d1	16.5	34.3	4.0	43.0	43.0				
Progression Factor	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	225.3	83.8	0.2	550.1	1360.7				
Delay (s)	241.8	118.1	4.2	593.1	1403.7				
Level of Service	F	F	A	F	F				
Approach Delay (s)	241.8			34.6	1095.3				
Approach LOS	F			C	F				
Signalized Intersection Capacity Analysis									
HCM Average Control Delay	168.6								
HCM Volume to Capacity ratio	1.79								
Adjusted Cycle Length (s)	97.0								
Intersection Capacity Utilization	133.6%								
Analysis Period (min)	15								

c Critical Lane Group

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd and Three Tun Rd Extensions w/ TOD
3: Lancaster Pike (U.S. Route 30) & Malin Road
Weekday Morning Peak Hour

[illegible]

Lane Configurations	257	2005	54	187	549	28	115	151	347	88	128	124
Volume (vph)	1300	1900	1800	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vph)	32	11	16	12	11	17	11	11	12	12	12	12
Lane Width	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Grade (%)	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Total Lost time (s)	50	50	50	50	50	50	50	50	50	50	50	50
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Fr	1.00	0.99	1.00	0.99	1.00	0.99	1.00	1.00	0.85	1.00	0.93	0.93
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95
Sat'd Flow (vph)	161	330	161	330	161	330	160	168	143	157	136	136
Flt Permitted	0.32	1.00	0.11	1.00	0.11	1.00	0.38	1.00	1.00	0.82	1.00	1.00
Sat'd Flow (perft)	501	379	501	379	501	379	501	379	501	379	501	379
Peak-hour factor, PHF	0.94	0.94	0.94	0.81	0.81	0.81	0.90	0.90	0.90	0.83	0.83	0.83
Adj. Sat'd Flow (vph)	284	1280	284	68	231	576	35	129	168	386	105	105
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	284	5348	0	2314	713	0	129	168	386	105	304	304
Heavy Vehicles (%)	3%	3%	3%	7%	7%	7%	10%	10%	10%	10%	6%	6%
Turn Type	through	through	through	through	through	through	through	through	through	through	through	through
Permitted Phases	5	2	1	6	1	6	8	1	8	1	4	4
Permitted Phases	2	2	1	6	1	6	8	1	8	1	4	4
Actuated Green, G (s)	47.1	35.3	52.1	37.8	52.1	37.8	22.4	22.4	36.7	22.4	22.4	22.4
Effective Green, G (s)	47.1	35.3	52.1	37.8	52.1	37.8	22.4	22.4	36.7	22.4	22.4	22.4
Actuated y/c Ratio	0.32	0.39	0.58	0.42	0.58	0.42	0.25	0.25	0.41	0.25	0.25	0.25
Clearance Time (s)	50	60	50	60	50	60	30	30	60	30	30	30
Vehicle Extension (s)	30	30	30	30	30	30	30	30	30	30	30	30
Lane Grp-Cap (vph)	487	1325	345	1353	345	1353	158	420	704	274	402	402
v/s Ratio Prot	0.08	0.40	0.11	0.22	0.11	0.22	0.10	0.09	0.17	0.10	0.19	0.19
v/s Ratio Perm	0.24	0.28	0.28	0.28	0.28	0.28	0.20	0.20	0.17	0.10	0.19	0.19
v/s Ratio	0.61	1.02	0.67	0.63	0.67	0.63	0.32	0.40	0.55	0.39	0.75	0.75
Uniform Delay, d1	12.4	27.4	198	64	119	28.7	20.3	28.1	20.3	28.1	31.2	31.2
Progression Factor	1.00	1.00	1.13	1.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	29.3	305	0.1	287	0.6	50.8	50.8	50.8	0.8	7.3	7.3
Delay (s)	14.7	56.5	22.8	34.5	58.5	28.8	21.2	29.0	38.5	38.5	38.5	38.5
Level of Service	B	E	C	C	F	C	F	C	D	D	D	D
Approach Delay (s)	49.2	31.7	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Approach LOS	D	C	C	C	C	C	C	C	C	C	C	C
HCM Average Control Delay												
HCM Level of Service			D									
HCM Volume to Capacity ratio												
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)												
Actuated Cycle Length (s)			90.0									
Sum of lost time (s)												
Sum of lost time (s)			18.0									
Intersection Capacity Utilization												
Intersection Capacity Utilization			86.4%									
Analysis Period (min)												
Analysis Period (min)			15									
Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
[http://809534/TrafficAnalysis/TOD analysis%2030 Malin-Three Tun Connection Conditions/Weekday AM.syn
3: Lancaster Pike (U.S. Route 30) & Malin Road
Synchro 7

Average 4

0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00

[illegible]

	2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD	Weekday Morning Peak Hour
McMahon Associates, Inc.	2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD	
7: Old Lancaster Pike & Old Lincoln Highway	2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD	

[illegible]

Lanes, Volumes, Timings
7-Old Lancaster Pike & Old Lincoln Highway
Synchro 7
Tun Connection Conditions/Weekday AM.syn
analysis2030 Malin-Three
TOD analysisTrafficAnalysis

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
7: Old Lancaster Pike & Old Lincoln Highway Weekday Morning Peak Hour

[illegible]

Splits and Phases: 7: Old Lancaster Pike & Old Lincoln Highway



Lane Configurations	4	3	9	0	1	9	18	740	6	38	294	205
Volume (vph)	425	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Flt Protected	0.95	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1807	1635	1635	1635	1635	1635	1635	1635	1635	1635	1635	1635
Flt Permitted	0.69	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Satd. Flow (perm)	1312	1406	1406	1406	1406	1406	1406	1406	1406	1406	1406	1406
Peak-hour factor, PHF	0.82	0.82	0.82	0.52	0.52	0.52	0.86	0.86	0.86	0.84	0.84	0.84
Adj. Flow (vph)	518	4	11	15	2	37	21	860	7	45	890	244
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	533	0	0	34	0	0	888	0	45	594	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	2	2	2	2	2	2	2	2
Permitted Phases	4	4	8	8	2	2	2	2	2	2	2	2
Actuated Green, G (s)	42.0	42.0	42.0	42.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0
Effective Green, g (s)	42.0	42.0	42.0	42.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0
Actual v/c Ratio	0.38	0.38	0.38	0.38	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap. (vph)	501	527	527	527	919	919	919	919	919	919	919	919
v/s Ratio Prot	0.34	0.34	0.34	0.34	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.35
vs Ratio Prot	1.06	1.06	1.06	1.06	0.10	0.10	0.97	0.20	0.20	0.68	0.68	0.68
Uniform Delay, d1	11.0	21.9	21.9	21.9	26.1	26.1	26.1	14.8	14.8	20.3	20.3	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incoming Delay, d2	58.3	94.7	94.7	94.7	0.0	0.0	22.6	2.0	2.0	14.3	14.3	14.3
Delay (s)	92.3	92.3	92.3	92.3	21.9	21.9	48.7	16.8	16.8	24.5	24.5	24.5
Level of Service	F	F	F	F	C	C	D	B	B	C	C	C
Approach Delay (s)	92.3	92.3	92.3	92.3	21.9	21.9	48.7	24.0	24.0	24.0	24.0	24.0
Approach LOS	F	F	F	F	C	C	D	B	B	C	C	C
HCM Average Control Delay												
HCM Volume to Capacity ratio	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Actual Cycle Length (s)	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
Intersection Capacity Utilization	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15	15
Critical Lane Group												

Lanes, Volumes, Timings
[heng08095341TrafficAnalysisTOD analysis2030 Main-Three Tun Connection ConditionsWeekday AM.syn](#)
 10: Pennsylvania Avenue & Warren Avenue
 Synchro 7

Spills and Phases: 10; Pennsylvania Avenue & Warren Avenue

Spills and Phases: 10: Pennsylvania Avenue & Warren Avenue



lanes, Volumes, Timings
 10. Pennsylvania Avenue & Warren Avenue
 Syncro 7
 analysis20230 Malin-Three Tun Connection ConditionsWeekday AM syn

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
 10: Pennsylvania Avenue & Warren Avenue
 Weekday Morning Peak Hour

Signalized Intersection Capacity Analysis									
10: Pennsylvania Avenue & Warren Avenue									
Weekday Morning Peak Hour									
Lane Configurations	W	A	P	P	P	W	A	P	P
Volume (vph)	69	169	298	306	210	83			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Flt	0.30	0.90	0.90	0.90	0.90	0.90			
Flt Protected	0.99	0.99	0.95	1.00	1.00	1.00			
Satd Flow (vph)	1660	1710	1663	1792	1792	1792			
Flt Permitted	0.99	0.47	1.00	1.00	1.00	1.00			
Satd Flow (Permi)	1660	871	1663	1792	1792	1792			
Peak-hour factor, PHF	0.50	0.50	0.86	0.86	0.76	0.76			
Adj Flow (vph)	138	338	347	449	276	209			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group Flow (vph)	476	0	347	449	385	0			
Turn Type	Perm								
Protected Phases	2								
Permitted Phases	2								
Actuated Green, G (s)	24.8	32.4	32.4	32.4	32.4				
Effective Green, g (s)	24.8	32.4	32.4	32.4	32.4				
Acquiesced Ratio	0.36	0.47	0.47	0.47	0.47				
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	595	408	872	839					
vs Ratio Prot	0.29	0.24	0.24	0.24					
vs Ratio Perm	0.40								
vs Ratio	0.80	0.85	0.51	0.46					
Uniform Delay, d1	20.0	16.3	12.9	12.5					
Progression Factor	1.00	1.00	1.00	1.00					
Incremental Delay, d2	7.6	15.5	0.5	0.4					
Delay (s)	27.6	31.8	13.4	12.9					
Level of Service	C	C	B	B					
Approach Delay (s)	27.6	21.4	12.9						
Approach LOS	C	C	B						
Summary									
HCM Average Control Delay	21.2				HCM Level of Service				C
HCM Volume to Capacity Ratio	0.83								
Actuated Cycle Length (s)	89.2				Sum of lost time (s)				12.0
Intersection Capacity Utilization	61.8%				ICU Level of Service				B
Analysis Period (min)	15								
Critical Lane Group									

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
11: King Street & Warren Avenue

Weekday Morning Peak Hour														
Lane Configurations	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Volume (vph)	179	470	21	34	216	63	547	155	157	155	33			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Flow Ratio (%)	11	32	11	11	32	11	30	10	10	10	10			
Grade (%)	-1%				2%			-5%						
Storage Length (ft)	100	0	100	0	90	0	50	0	50	0	0			
Storage Lanes	1	0	1	0	1	0	1	0	1	0	1			
Travel Length (ft)	75	75	75	75	75	75	75	75	75	75	75			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Peak Bike Factor														
Fit	0.994				0.928									
ElitProtected	0.950				0.950									
Satd. Flow (prot)	1594	1725	0	1570	1587	0	1676	1705	0	1559	1609			
ElitPermitted	0.952				0.990									
Satd. Flow (perm)	591	1725	0	314	1587	0	1062	1705	0	264	1609			
Right-Turn-Loaded		Yes			Yes					Yes				
Satd. Flow (RTOR)	5				96			29		22				
Link Speed (mph)	25				25			25		25				
Link Distance (ft)	743				995			451		872				
Travel Time (s)	20.3				27.1			12.3		23.8				
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.78	0.78	0.96	0.96	0.96	0.90	0.90	0.90	0.82	0.82	0.82			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	3%	3%	2%	2%	2%			
Bus/Bicycles (#/hr)	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)														
Mid-Block Traffic (%)	0%				10%			0%		0%				
Adj. Flow (vph)	229	603	27	88	241	225	77	508	172	191	189			
Shared Lane Traffic (%)														
Lane Group Flow (vph)	229	630	0	88	466	0	77	780	0	191	229			
Numbered Detectors	2	1	2	1	2	1	2	1	2	1	2			
Detector Template	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru			
Leading Detector (ft)	20	100	20	100	20	100	20	100	20	100	20			
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0			
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm			
Protected Phases	2				6			8			4			
Permitted Phases	2	2	6	6	6	6	6	8	8	4	4			
Detector Phases	2	2	6	6	6	6	6	8	8	4	4			
Spillback Phase														
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0			
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%			
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjunct (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0			

Lanes, Volumes, Timings
11: King Street & Warren Avenue
Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
11: King Street & Warren Avenue

Weekday Morning Peak Hour														
Lane Configurations	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Volume (vph)	179	470	21	34	216	63	547	155	157	155	33			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Flow Ratio (%)	11	32	11	11	32	11	30	10	10	10	10			
Grade (%)	-1%				2%			-5%						
Storage Length (ft)	100	0	100	0	90	0	50	0	50	0	0			
Storage Lanes	1	0	1	0	1	0	1	0	1	0	1			
Travel Length (ft)	75	75	75	75	75	75	75	75	75	75	75			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Peak Bike Factor														
Fit	0.994				0.928									
ElitProtected	0.950				0.950									
Satd. Flow (prot)	1594	1725	0	1570	1587	0	1676	1705	0	1559	1609			
ElitPermitted	0.952				0.990									
Satd. Flow (perm)	591	1725	0	314	1587	0	1062	1705	0	264	1609			
Right-Turn-Loaded		Yes			Yes					Yes				
Satd. Flow (RTOR)	5				96			29		22				
Link Speed (mph)	25				25			25		25				
Link Distance (ft)	743				995			451		872				
Travel Time (s)	20.3				27.1			12.3		23.8				
Confl. Peds. (#/hr)														
Confl. Bikes (#/hr)														
Peak Hour Factor	0.78	0.78	0.96	0.96	0.96	0.90	0.90	0.90	0.82	0.82	0.82			
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	3%	3%	2%	2%	2%			
Bus/Bicycles (#/hr)	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)														
Mid-Block Traffic (%)	0%				10%			0%		0%				
Adj. Flow (vph)	229	603	27	88	241	225	77	508	172	191	189			
Shared Lane Traffic (%)														
Lane Group Flow (vph)	229	630	0	88	466	0	77	780	0	191	229			
Numbered Detectors	2	1	2	1	2	1	2	1	2	1	2			
Detector Template	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru			
Leading Detector (ft)	20	100	20	100	20	100	20	100	20	100	20			
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0			
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm			
Protected Phases	2				6			8			4			
Permitted Phases	2	2	6	6	6	6	6	8	8	4	4			
Detector Phases	2	2	6	6	6	6	6	8	8	4	4			
Spillback Phase														
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0			
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0			
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%			
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
All Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjunct (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0			



Lanes, Volumes, Timings
11: King Street & Warren Avenue
Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
11: King Street & Warren Avenue

Weekday Morning Peak Hour

Lane Configurations											
Volume (vph)											
Ideal Flow (vphpl)											
Lane Width											
Grade (%)											
Total Lost Time (s)											
Lane Util. Factor											
Fit Protected											
Satd Flow (prot)											
Fit Permitted											
Satd Flow (perm)											
Peak-hour factor, PHF											
Adj Flow (vph)											
RTOR Reduction (vph)											
Lane Group Flow (vph)											
Heavy Vehicles (%)											
Turn Type											
Protected Phases											
Actuated Green, G (s)											
Effective Green, g (s)											
Actuated g/C Ratio											
Clearance Time (s)											
Lane Grp Cap (vph)											
g/s Ratio Prot											
v/s Ratio Perm											
v/c Ratio											
Uniform Delay, d1											
Progression Factor											
Incremental Delay, d2											
Delay (s)											
Level of Service											
Approach Delay (s)											
Approach LOS											
Analysis Summary											
HCM Average Control Delay											
HCM Volume to Capacity Ratio											
Actuated Cycle Length (s)											
Intersection Capacity Utilization											
Analysis Period (min)											
Critical Lane Group											

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Item	Left	Thru	Right	Left	Thru	Right
Lane Configurations	1	1	1	1	1	1
Volume (vph)	971	342	563	1905	394	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	110	0	270	0	0
Storage Lanes	0	1	0	1	0	0
Tapot Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Pad Bike Factor	0.985					
Fit	0.950			0.950		0.850
Flt Protected						
Satd. Flow (prot)	1798	0	1787	1881	1770	1583
Flt Permitted						
Satd. Flow (perm)	1798	0	228	1881	1770	1583
Right Turn on Red	No					No
Satd. Flow (TOR)	45			45		26
Link Speed (mph)	45			45		26
Link Distance (ft)	2991			5282		872
Travel Time (s)	45.3			79.7		23.8
Conf. Peds. (#/hr)						
Conf. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.96	0.96	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Bus Reduc. (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%		0%
Adj. Flow (vph)	1001	353	593	1568	452	406
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1354	0	593	1568	452	406
Number of Detectors	2	1	2	2	1	1
Detector Template	Thru	Left	Thru	Left	Right	Right
Leading Detector (ft)	100	20	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Lane Type	Permitted	Permitted	Permitted	Permitted	Permitted	Permitted
Protected Phases	2	1	6	8		
Permitted Phases		6	6	8	8	8
Detector Phase	2	1	6	8	8	8
Switch Phase						
Minimum Initia (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Spill (s)	210	130	210	210	210	210
Total Split (s)	36.0	0.0	10.0	46.0	21.0	21.0
Total Split (%)	63.7%	0.0%	14.9%	68.7%	31.3%	31.3%
Maximum Green (s)	30.0	7.0	40.0	15.0	15.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	3.0	6.0	6.0	6.0

Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352) Weekday Afternoon Peak Hour

Item	Left	Thru	Right	Left	Thru	Right
Lead-Lag	1	1	1	1	1	1
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduces (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None
Walk Time (s)						
Flash Don't Walk (s)						
Pedestrian Calls (#/hr)						
W/C Ratio	1.58		1.92	1.40	1.14	1.15
Control Delay	333.3		443.6	202.9	119.0	122.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	333.3		443.6	202.9	119.0	122.5
Queue Length 50th (ft)	833		435	881	222	200
Queue Length 95th (ft)	#1064		#520	#1121	#354	#328
Intersect Delay (ft)	2911		5182	792		
Turn Bay Length (ft)			110	270		
Base Capacity (vph)	805		309	123	296	354
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced W/C Ratio	1.58		1.92	1.40	1.14	1.15
Area Type	Other					
Cycle Length: 67						
Actuated Cycle Length: 67						
Natural Cycle: 120						
Control Type: Actuated Uncoordinated						
Volume exceeds capacity, queue is theoretically infinite.						
Queue shown is maximum at effective cycles						
# 95th percentile volume exceeds capacity, queue may be longer.						
Queue shown is maximum at effective cycles						



Lanes, Volumes, Timings
1: Lancaster Pike (U.S. Route 30) & Sproul Road (PA Route 352)
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd and Three Tun Rd Extensions w/ TOD
 1: Lancaster Pike (U.S. Route 30) & Sprout Road (PA Route 352) Weekday Afternoon Peak Hour

	→	↗	↖	←	↘	↙
Lane Configurations	↑	↑	↑	↑	↑	↑
Volume (vph)	372	340	565	1505	364	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.95	1.00	0.95	1.00	1.00
Satd Flow (prot)	1797	1787	1881	1770	1583	1583
Flt Permitted	1.00	0.12	1.00	0.95	1.00	1.00
Satd Flow (perm)	1797	228	1881	1770	1583	1583
Peak-hour factor, PHF	0.97	0.97	0.96	0.96	0.85	0.85
Adj Flow (vph)	1001	333	593	1568	152	406
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1354	0	593	1568	452	406
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Turn Type	2	1	6	8		
Permitted Phases	2	1	6	8		
Actuated Green, G (s)	30.0	40.0	40.0	15.0	15.0	15.0
Effective Green, G (s)	30.0	40.0	40.0	15.0	15.0	15.0
Actuated g/C Ratio	0.45	0.60	0.60	0.22	0.22	0.22
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Group Gap (vph)	805	299	123	396	354	354
vis Ratio Prot	0.75	0.21	0.83	0.26		
vis Ratio Perm	0.98	0.98	0.98	0.26		
v/c Ratio	1.68	1.38	1.40	1.14	1.15	1.15
Uniform Delay, d1	19.5	17.5	13.5	28.0	28.0	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	312.3	454.3	483.8	89.7	94.0	94.0
Delay (s)	330.8	471.8	197.3	115.7	120.0	120.0
Level of Service	F	F	F	F	F	F
Approach Delay (s)	330.8		272.7	117.7		
Approach LOS	F		F	F		
HCM Average Control Delay	260.3		260.3			
HCM Volume to Capacity ratio	1.65		1.65			
Actuated Cycle Length (s)	67.0		67.0			
Intersection Capacity Utilization	138.0%		138.0%			
Analysis Period (min)	15		15			
c Critical Lane Group						

[illegible]

	HCM Level of Service	F
HCM Average Control Delay	111.3	
HCM Value to Capacity ratio	0.29	
Actuated Cycle Length (s)	131.0	32.0
Intersection Capacity Utilization	97.2%	F
Analysis Period (min)	15	
g Critical Lane Group		

McMahon Associates, Inc. 2030 Scenario 2 - Main Rd & Three Tun Rd Extensions w/ TOD
 7: Old Lancaster Pike & Old Lincoln Highway

Weekday Afternoon Peak Hour											
Volume (vph)	16	9	6	46	13	28	4	3	449	537	
Lane Configurations	4	4	4	4	4	4	4	4	4	4	
Volume (vph)	297	16	9	6	46	13	28	4	3	449	537
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	60	60	60	60	60	60	60	60	60	60	60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Fit Protected	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Satd Flow (prot)	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784	1784
Fit Permitted	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Satd Flow (perm)	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227
Peak hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj Flow (vph)	330	18	17	12	388	15	342	3	36	478	535
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	349	0	0	177	0	362	0	36	1133	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	0%	0%
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	2	2	2	2	6	6	6
Permitted Phases	4	4	8	8	2	2	2	2	6	6	6
Actuated Green, G (s)	30.0	30.0	30.0	30.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Effective Green, g (s)	30.0	30.0	30.0	30.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	60	60	60	60	60	60	60	60	60	60	60
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	333	333	437	437	673	673	673	673	626	1074	1074
vis Ratio Prot	0.29	0.29	0.07	0.07	0.33	0.33	0.33	0.33	0.04	0.04	0.04
vis Ratio Perm	1.05	1.05	0.27	0.27	0.54	0.54	0.54	0.54	0.06	0.06	0.06
Uniform Delay, d1	40.0	40.0	31.4	31.4	12.0	12.0	12.0	12.0	83.3	21.0	21.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	62.4	62.4	0.3	0.3	3.1	3.1	3.1	3.1	0.2	37.3	37.3
Delay (s)	102.4	102.4	31.7	31.7	15.1	15.1	15.1	15.1	8.5	58.3	58.3
Level of Service	F	F	C	C	B	B	B	B	A	A	A
Approach Delay (s)	102.4	102.4	31.7	31.7	15.1	15.1	15.1	15.1	56.7	56.7	56.7
Approach LOS	F	F	C	C	B	B	B	B	A	A	A
HCM Average Control Delay	55.7	55.7	35.7	35.7	15.1	15.1	15.1	15.1	56.7	56.7	56.7
HCM Volume to Capacity ratio	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Actuated Cycle Length (s)	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
Intersection Capacity Utilization	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%
Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15
Critical Lane Group											

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
10: Pennsylvania Avenue & Warren Avenue
Weekday Afternoon Peak Hour

Area	Left	Thru	Right	Left	Thru	Right
Lane Configurations	1	1	1	1	1	1
Volume (vph)	119	284	218	212	477	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	1	0	1	0
Travel Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.904				0.981	
RT Prohibited	0.986		0.950			
Satd. Flow (prot)	1850	0	1770	1853	1827	0
RT Permitted	0.986		0.784			
Satd. Flow (perm)	1650	0	529	1653	1827	0
Right Turn on Red	No		No		No	
Satd. Flow (RTOR)	25		25		25	
Link Speed (mph)	692		868		604	
Link Distance (ft)	18.6		23.7		16.5	
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.73	0.73	0.91	0.91	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bidoadges (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%		0%	
Adj. Flow (vph)	163	403	240	233	437	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	566	0	240	233	560	0
Number of Detectors	1	1	2	2	2	2
Detector Template	Left	Left	Thru	Thru		
Leading Detector (ft)	20	20	100	100		
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type			Perm			
Protected Phases	4		2	2	6	
Permitted Phases			2	2	6	
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	3.0		3.0	3.0	3.0	
Minimum Split (s)	21.0		21.0	21.0	21.0	
Total Split (s)	39.0		51.0	51.0	51.0	
Total Split (%)	43.3%		56.7%	56.7%	56.7%	
Maximum Green (s)	33.0		45.0	45.0	45.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		4.0	6.0	6.0	

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
10: Pennsylvania Avenue & Warren Avenue
Weekday Afternoon Peak Hour

Area	Left	Thru	Right	Left	Thru	Right
Lane Configurations	1	1	1	1	1	1
Volume (vph)	119	284	218	212	477	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0	0	0	0	0	0
Storage Lanes	1	0	1	0	1	0
Travel Length (ft)	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.904				0.981	
RT Prohibited	0.986		0.950			
Satd. Flow (prot)	1850	0	1770	1853	1827	0
RT Permitted	0.986		0.784			
Satd. Flow (perm)	1650	0	529	1653	1827	0
Right Turn on Red	No		No		No	
Satd. Flow (RTOR)	25		25		25	
Link Speed (mph)	692		868		604	
Link Distance (ft)	18.6		23.7		16.5	
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.73	0.73	0.91	0.91	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus/Bidoadges (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%		0%	
Adj. Flow (vph)	163	403	240	233	437	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	566	0	240	233	560	0
Number of Detectors	1	1	2	2	2	2
Detector Template	Left	Left	Thru	Thru		
Leading Detector (ft)	20	20	100	100		
Trailing Detector (ft)	0	0	0	0	0	0
Turn Type			Perm			
Protected Phases	4		2	2	6	
Permitted Phases			2	2	6	
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	3.0		3.0	3.0	3.0	
Minimum Split (s)	21.0		21.0	21.0	21.0	
Total Split (s)	39.0		51.0	51.0	51.0	
Total Split (%)	43.3%		56.7%	56.7%	56.7%	
Maximum Green (s)	33.0		45.0	45.0	45.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		4.0	6.0	6.0	

Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time-to-Reduces (s)	0.0
Time To Reduce (s)	0.0
Recall Mode	None
Walk Time (s)	Min
Flash Cont Walk (s)	Min
Pedestrian Calls (#/hr)	0.91
VC Ratio	0.35
Control Delay	48.1
Queue Delay	0.0
Total Delay	48.1
Queue Length 50th (ft)	304
Queue Length 95th (ft)	119
Internal Link Dist (ft)	602
Turn Bay Length (ft)	296
Base Capacity (vph)	0
Stallion Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced Cycle Ratio	0.33
Area Type	Other
Cycle Length: 90	
Actual Cycle Length: 82.9	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles	

Lanes, Volumes, Timings
10: Pennsylvania Avenue & Warren Avenue
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Synchro 7

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
 10. Pennsylvania Avenue & Warren Avenue
 Weekday Afternoon Peak Hour



Analysis	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Configurations	LT	LT	LT	LT	LT	LT	LT	LT	LT
Volumes (vph)	193	294	218	212	477	80	1900	1900	1900
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Initial Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	0.90	1.00	1.00	1.00	0.98				
Flt Protected	0.99	0.95	1.00	1.00					
Satd Flow (vph)	1660	1770	1663	1827					
Flt Permitted	0.99	0.28	1.00	1.00					
Satd Flow (perm)	1660	829	1663	1827					
Peak-hour factor, PHF	0.73	0.73	0.91	0.91	0.96	0.96			
Adj Flow (vph)	163	403	240	233	497	83			
RTOR Reduction (vph)	0	0	0	0	0	0			
Lane Group Flow (vph)	566	0	240	233	580	0			
Turn Type	Perm	Perm	2	6					
Protected Phases	4								
Permitted Phases	2								
Actuated Green, G (s)	30.9	39.6	39.6	39.6					
Effective Green, g (s)	30.9	39.6	39.6	39.6					
Actuated G/C Ratio	0.37	0.48	0.48	0.48					
Clearance Time (s)	6.0	6.0	6.0	6.0					
Vehicle Extension (s)	3.0	3.0	3.0	3.0					
Lane Grp Cap (vph)	622	254	894	877					
Y/S Ratio Prot	0.34		0.13	0.32					
v/s Ratio Perm		0.45							
v/c Ratio	0.91	0.94	0.26	0.86					
Uniform Delay, d1	24.5	20.4	12.7	16.3					
Progression Factor	1.00	1.00	1.00	1.00					
Incremental Delay, d2	17.2	41.2	0.2	1.9					
Delay (s)	41.7	61.7	12.9	18.2					
Level of Service	D	E	B	B					
Approach Delay (s)	41.7		31.6	18.2					
Approach LOS	D		D	B					
Analysis									
HCM Average Control Delay	32.1								
HCM Volume Capacity Ratio	0.93								
Actuated Cycle Length (s)	82.5								
Intersection Capacity Utilization	87%								
Analysis Period (min)	15								
Critical Lane Group									

McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
11: King Street & Warren Avenue

Weekday Afternoon Peak Hour											
Lane Configurations	58	255	40	156	568	243	74	154	12	224	482
Volumes (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Storage Length (ft)	100	100	100	100	100	100	100	100	100	100	100
Storage Lanes	1	1	1	1	1	1	1	1	1	1	1
Signal Length (ft)	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980
Fit	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1719	1835	0	1710	1784	0	1693	1670	0	1600	1634
Flow Permitted	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218
Satd. Flow (perm)	214	1835	0	855	1784	0	255	1670	0	868	1634
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	14	34	34	60	60	60	21	21	21	21	21
Link Speed (mph)	25	25	25	25	25	25	25	25	25	25	25
Link Distance (ft)	665	665	665	825	408	868	868	868	868	868	868
Travel Time (s)	18.7	18.7	18.7	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7
Conf. Peds. (#/hr)											
Conf. Bikes (#/hr)											
Peak Hour Factor	0.85	0.85	0.85	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)											
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	68	300	47	162	561	223	81	163	123	243	524
Signal Lane Traffic (%)											
Lane Group Flow (vph)	68	347	0	162	804	0	81	292	0	243	657
Number of Detectors	1	2	1	2	1	2	1	2	1	2	1
Detector Template	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru
Leading Detector (ft)	20	100	20	100	20	100	20	100	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Initial (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Split (s)	39.0	39.0	0.0	39.0	39.0	0.0	36.0	36.0	0.0	36.0	0.0
Total Split (s)	52.0%	52.0%	0.0%	52.0%	52.0%	0.0%	46.0%	46.0%	0.0%	46.0%	0.0%
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	4.0

Lanes, Volumes, Timings
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McMahon Associates, Inc. 2030 Scenario 2 - Malin Rd & Three Tun Rd Extensions w/ TOD
11: King Street & Warren Avenue

Weekday Afternoon Peak Hour											
Lane Configurations	58	255	40	156	568	243	74	154	12	224	482
Volumes (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Storage Length (ft)	100	100	100	100	100	100	100	100	100	100	100
Storage Lanes	1	1	1	1	1	1	1	1	1	1	1
Signal Length (ft)	75	75	75	75	75	75	75	75	75	75	75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped/Bike Factor	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980
Fit	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1719	1835	0	1710	1784	0	1693	1670	0	1600	1634
Flow Permitted	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218
Satd. Flow (perm)	214	1835	0	855	1784	0	255	1670	0	868	1634
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	14	34	34	60	60	60	21	21	21	21	21
Link Speed (mph)	25	25	25	25	25	25	25	25	25	25	25
Link Distance (ft)	665	665	665	825	408	868	868	868	868	868	868
Travel Time (s)	18.7	18.7	18.7	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7
Conf. Peds. (#/hr)											
Conf. Bikes (#/hr)											
Peak Hour Factor	0.85	0.85	0.85	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)											
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	68	300	47	162	561	223	81	163	123	243	524
Signal Lane Traffic (%)											
Lane Group Flow (vph)	68	347	0	162	804	0	81	292	0	243	657
Number of Detectors	1	2	1	2	1	2	1	2	1	2	1
Detector Template	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru	Left Thru
Leading Detector (ft)	20	100	20	100	20	100	20	100	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2
Detector Phase	2	2	2	2	2	2	2	2	2	2	2
Switch Phase	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Initial (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Split (s)	39.0	39.0	0.0	39.0	39.0	0.0	36.0	36.0	0.0	36.0	0.0
Total Split (s)	52.0%	52.0%	0.0%	52.0%	52.0%	0.0%	46.0%	46.0%	0.0%	46.0%	0.0%
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	4.0

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