79th Street and Dean Road

Intersection Improvement Analysis

November 7, 2017

shrewsberry

Project Background

The intersection of 79th Street and Dean Road is located on the north side of Indianapolis. The purpose of this report is to evaluate existing traffic conditions, project future traffic conditions, identify any deficiencies, and recommend improvements to address the deficiencies.

Project Location

The intersection is currently a four-legged intersection with an all-way stop control (AWSC). The major road is Dean Road which runs north and south, and is classified as a major collector. Current posted speeds along Dean Road are 35 miles per hour (MPH) north of 79th Street and 40 MPH south of 79th Street. The intersecting road is 79th Street which runs east and west. 79th Street is classified as a minor collector and is posted at 40 MPH.

The area surrounding this intersection is developed with residential homes. In the northwest corner of the intersection is a stone wall that is a feature of the neighborhood and private road behind it. Running north and west from this stone wall is a wooden fence. This fence will have to be considered as a part of construction.

Figure 1. Location Map

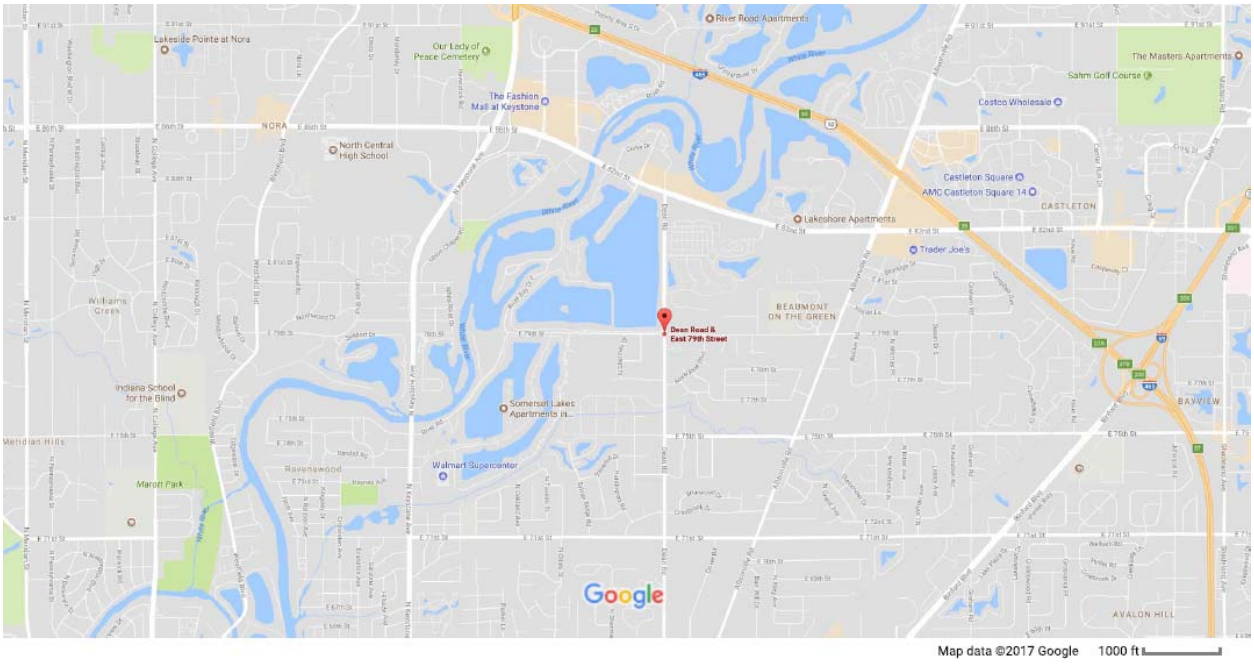
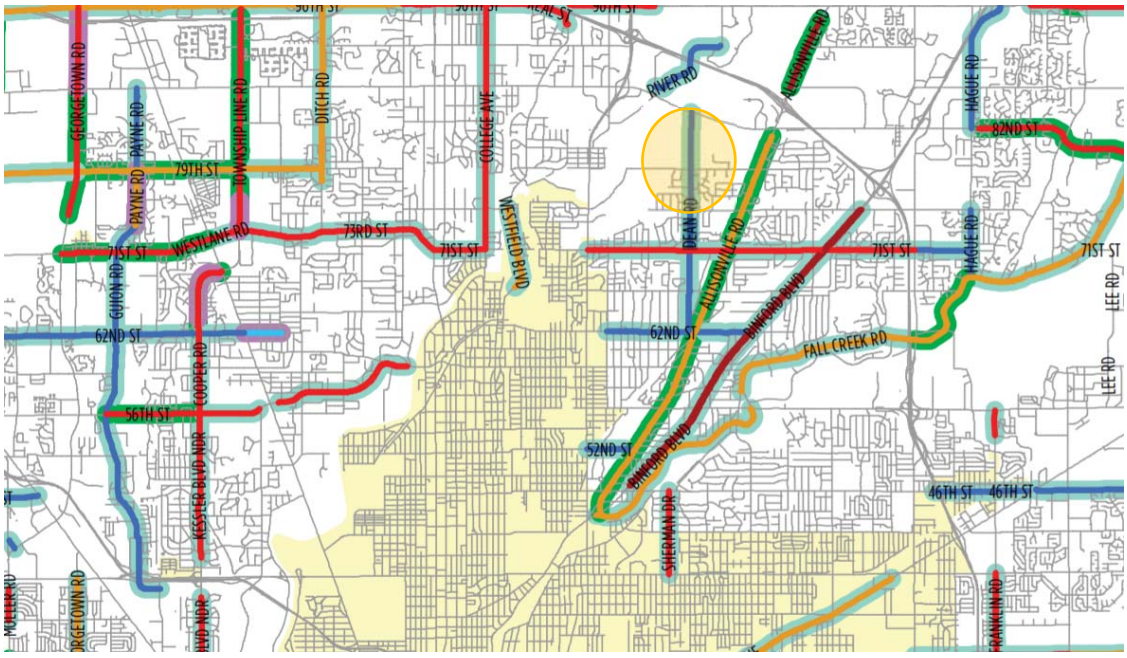


Figure 2. Aerial Photo

The *Thoroughfare Plan for Indianapolis and Marion County*, 2016 update, lists potential future widening for Dean Road from 62nd Street to 82nd Street, including this intersection. No timeframe is listed for the project.

Figure 3. Thoroughfare Plan Expansion Projects



Existing Conditions

Traffic counts were collected in 2017, and a growth rate of 2% per year was applied to estimate 2037 volumes. An operations analysis was performed, and the existing intersection LOS is F in the AM and PM peaks. The 2037 no-build LOS is also F in both peak periods, if no improvements are made. Synchro reports are included in Appendix C. In an urban area, LOS D or better is targeted during the peak hour, so these results indicate high congestion and a need for improvements.

Table 1. 2017 Existing and 2037 No-Build LOS Analysis

Movement	2017 LOS AM Peak	2017 LOS PM Peak	2037 LOS AM Peak	2037 LOS PM Peak
Eastbound	F	D	F	F
Westbound	D	C	F	F
Northbound	C	F	F	F
Southbound	C	F	F	F
Overall	**F**	**F**	**F**	**F**

The 2017 volumes and crash data were compared against traffic signal warrants[1] and found that a signal is warranted based on the Eight Hour Vehicular Volumes, Warrant 1, Condition A and Warrant 1, combination of Conditions A and B. The signal warrant worksheet can be found in Appendix B.

Crash Data Analysis

Crash data from ARIES was reviewed for a five-year period between 2012-2017. The crash history is summarized in Table 2. Seventeen crashes were reported during this period, with two injuries and no fatalities.

Table 2. Crash Data Summary

Intersection	5 Year Crashes			Crashes/ Year
	PDO	Injury	Fatal	
79th St. & Dean Rd.	15	2	0	3.0

The crashes are further summarized by Manner of Collision. This breakdown shows that most crashes at this intersection were rear angle collisions (35%) and ran off road (24%).

[1] *2011 Indiana Manual on Uniform Traffic Control Devices with Revisions 1, 2, and 3*

Table 3. Manner of Collision

Manner of Collision	Number of Crashes
Other - Explain In Narrative	2
Ran Off Road	4
Right Angle	6
Rear End	2
Backing Crash	1
Head On Between Two Motor Vehicles	1
Same Direction Sideswipe	1

Improvement Analysis

Two improvement alternatives were analyzed for this location, along with the no-build option. Alternative A evaluated the installation of a traffic signal with turn lanes, while Alternative B involved constructing a single-lane roundabout intersection. Alternative C is to do nothing. The future conditions assume that the widening of both streets has not taken place. The 2037 no-build LOS were listed in Table 1, while results for the improvement alternatives are listed in Table 4.

Table 4. 2037 Improved Conditions LOS Analysis

Movement	Signal AM Peak	Signal PM Peak	RAB AM Peak	RAB PM Peak
Eastbound	B	C	A	C
Westbound	B	B	C	A
Northbound	B	B	D	B
Southbound	B	B	A	C
Overall	**B**	**B**	**C**	**C**

With the installation of a traffic signal, the LOS improves from F to B in the AM and PM Peaks. With the construction of a roundabout, the LOS improves from F to C in both the AM and PM peak periods.

Appendix A contains preliminary layout exhibits for Alternative A, traffic signal, and Alternative B, roundabout.

Improvement Summary

Alternative A: *Traffic Signal with Left-Turn Lanes on All Approaches*

2023 construction estimate = $916,500

Total project cost (PE + CN + ROW + CE) = $1,198,000

Alternative B: *Single-Lane Roundabout*

2023 construction estimate = $1,437,000

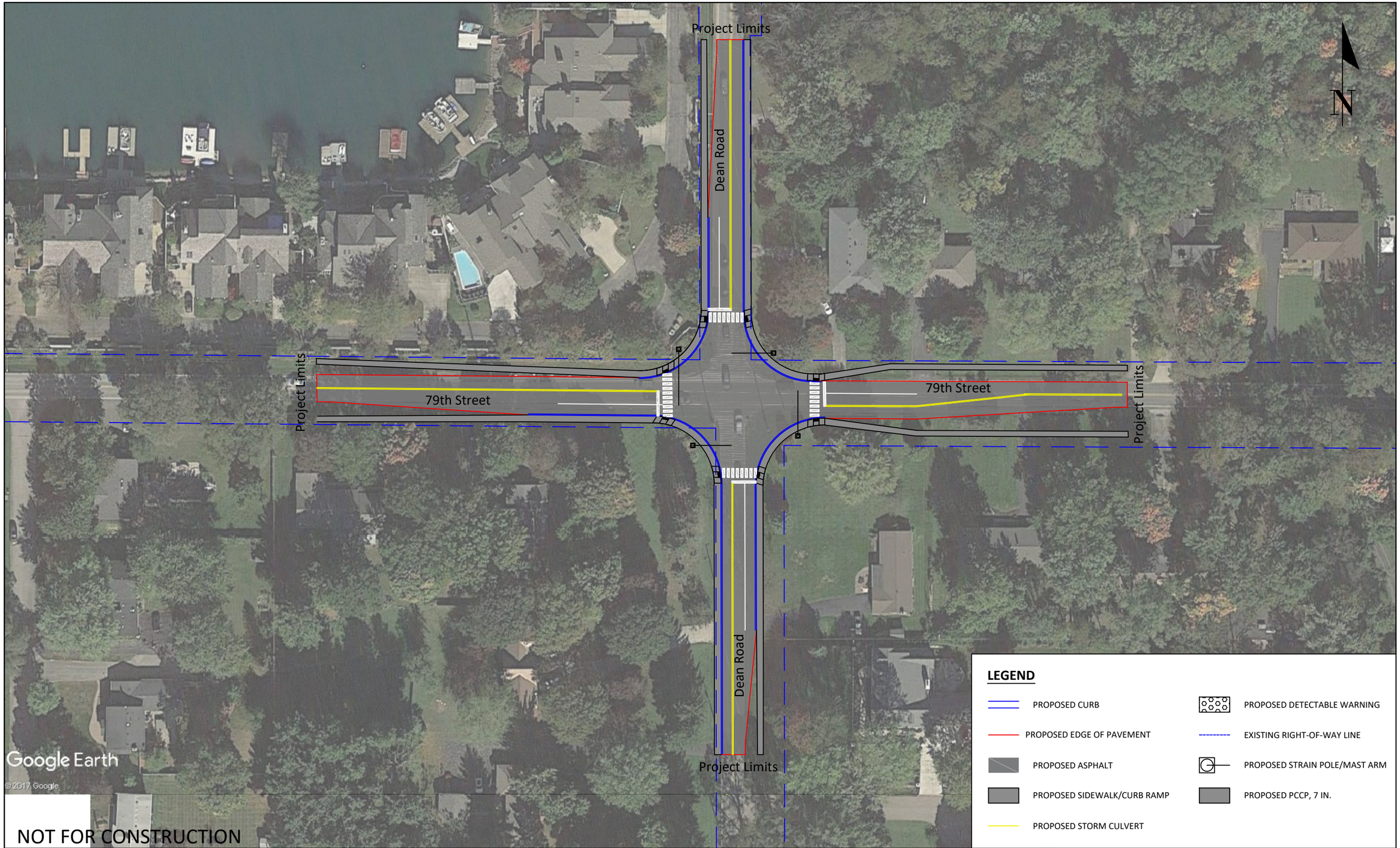
Total project cost (PE + CN + ROW + CE) = $1,983,000

Alternative C: Do nothing

Recommendations

The recommendation is to construct **Alternative B – Roundabout.** This alternative has additional safety benefits as compared to Alternative A, including an estimated 72% reduction in crashes as compared to a 44% reduction in crashes for a new signal with left turn lanes.

Appendix A



NOT FOR CONSTRUCTION

shrewsberry

Shrewsberry & Associates, LLC
7321 Shadeland Station; Suite 160
Indianapolis, IN 46256

79th Street and Dean Road
Signal Exhibit

Drawn By: MPS Date: 11/06/2017

Checked By: ACD Date: 11/06/2017

79th Street and Dean Road Signal

Cost Estimate

Project Number: 16-0229
Date: 10/31/2017
By: MPS
Checked By: ACD

shrewsberry

Inflation = 2.00%

INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
105-06845	CONSTRUCTION ENGINEERING	1	LS	$19,100.00	$19,100.00	$21,509.70
110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	$32,788.00	$32,788.00	$36,924.61
201-52370	CLEARING RIGHT-OF-WAY	1	LS	$19,100.00	$19,100.00	$21,509.70
202-96035	CONCRETE WALL, REMOVE	45	LFT	$54.00	$2,430.00	$2,736.57
203-02000	EXCAVATION, COMMON	660	CYS	$37.00	$24,420.00	$27,500.89
205-12108	STORM WATER MANAGEMENT BUDGET	25,000	DOL	$1.00	$25,000.00	$28,154.06
205-12109	SWQCP PREP AND IMPLEMENTATION	1	LS	$750.00	$750.00	$844.62
207-08264	SUBGRADE TREATMENT, TYPE II	100	SYS	$21.00	$2,100.00	$2,364.94
207-09935	SUBGRADE TREATMENT, TYPE 1C	1,320	SYS	$25.00	$33,000.00	$37,163.36
303-01180	COMPACTED AGGREGATE NO. 53	110	TON	$38.00	$4,180.00	$4,707.36
306-08034	MILLING, ASPHALT, 1 1/2 IN	3,400	SYS	$4.00	$13,600.00	$15,315.81
401-07325	QC/QA-HMA, 1, 70, SURFACE, 9.5 mm	390	TON	$90.00	$35,100.00	$39,528.30

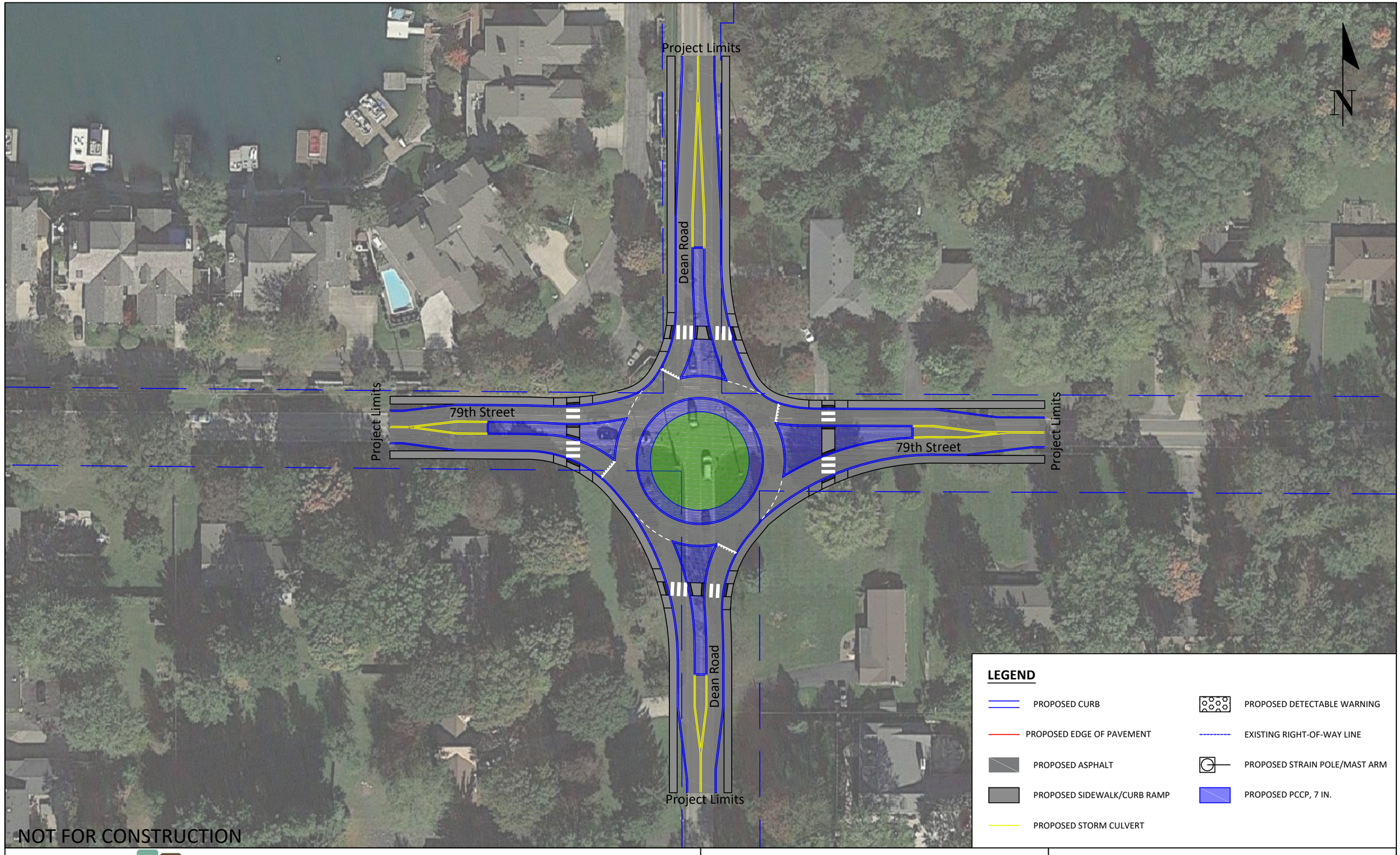
INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
401-07398	QC/QA-HMA, 3, 70, INTERMEDIATE, 19.0 mm	190	TON	$92.00	$17,480.00	$19,685.32
401-07413	QC/QA-HMA, 3, 64, BASE, 25.0 mm	290	TON	$86.00	$24,940.00	$28,086.49
603-02736	FENCE, WOOD, RESET	260	LFT	$70.00	$18,200.00	$20,496.16
604-06070	SIDEWALK, CONCRETE	1,450	SYS	$43.00	$62,350.00	$70,216.23
604-08086	CURB RAMP, CONCRETE	90	SYS	$160.00	$14,400.00	$16,216.74
604-11738	DETECTABLE WARNING SURFACES	10	SYS	$257.00	$2,570.00	$2,894.24
605-06120	CURB, CONCRETE	1,190	LFT	$29.00	$34,510.00	$38,863.87
621-06575	SODDING, NURSERY	1,080	SYS	$5.00	$5,400.00	$6,081.28
628-09402	FIELD OFFICE, B	12	MOS	$1,520.00	$18,240.00	$20,541.20
715-99999	DRAINAGE INFRASTRUCTURE	1	LS	$15,000.00	$15,000.00	$16,892.44
732-11810	MODULAR BLOCK WALL	40	SQFT	$455.00	$18,200.00	$20,496.16
732-11812	MODULAR BLOCK WALL WITH GROUND REINFORCEMENT	40	SQFT	$35.00	$1,400.00	$1,576.63
801-06775	MAINTAINING TRAFFIC	1	LS	$50,000.00	$50,000.00	$56,308.12
802-99999	SIGNING	1	LS	$3,000.00	$3,000.00	$3,378.49

INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
805-01842	HANDHOLE, SIGNAL	5	EA	$1,194.00	$5,970.00	$6,723.19
805-01844	CONDUIT, STEEL, GALVANIZED, 2 IN.	2,270	LFT	$18.00	$40,860.00	$46,015.00
805-07767	SIGNAL CABLE, 2C/14 GA	4,010	LFT	$3.00	$12,030.00	$13,547.73
805-11377	SIGNAL CANTILEVER STRUCTURE, SIGNAL ARM 35 FT.	1	EA	$9,085.00	$9,085.00	$10,231.19
805-11378	SIGNAL CANTILEVER STRUCTURE, SIGNAL ARM 40 FT.	2	EA	$11,950.00	$23,900.00	$26,915.28
805-11380	SIGNAL CANTILEVER STRUCTURE, SIGNAL ARM 50 FT.	1	EA	$13,256.00	$13,256.00	$14,928.41
805-11383	SIGNAL CANTILEVER STRUCTURE, DRILLED SHAFT FOUNDATION, TYPE A	4	EA	$3,155.00	$12,620.00	$14,212.17
805-78205	TRAFFIC SIGNAL HEAD, 3 FACE, 12 IN RED, AMBER, GREEN	4	EA	$718.00	$2,872.00	$3,234.34
805-78230	TRAFFIC SIGNAL HEAD, 5 FACE, 12" RED, AMBER, GREEN, A. ARROW, G. ARROW	4	EA	$1,366.00	$5,464.00	$6,153.35
805-78470	SIGNAL CABLE, ROADWAY LOOP, 1C/14GA	410	LFT	$0.50	$205.00	$230.86
805-78485	SIGNAL CABLE, 5C/14GA	1,550	LFT	$2.00	$3,100.00	$3,491.10
805-78490	SIGNAL CABLE, 7C/14GA	1,550	LFT	$2.00	$3,100.00	$3,491.10
805-78785	SIGNAL DETECTOR HOUSING	4	EA	$1,086.00	$4,344.00	$4,892.05
805-78925	CONTROLLER CABINET FOUNDATION, P1	1	EA	$1,570.00	$1,570.00	$1,768.07

INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
805-93067	CONTROLLER CABINET, P	1	EA	$12,000.00	$12,000.00	$13,513.95
807-04744	LIGHTING	1	LS	$50,000.00	$50,000.00	$56,308.12
808-99999	PAVEMENT MARKINGS	1	LS	$10,000.00	$10,000.00	$11,261.62

	2017	2023
CN	**$707,634.00**	**$796,910.82**
% CN for Bike/Ped Improvements	*11.8%*	*11.7%*
CN +15% Contingency	**$813,779.10**	**$916,447.44**
CE (12.5%)	**$101,722.39**	**$114,555.93**
PE (10%)	**$81,377.91**	**$91,644.74**
ROW	**$75,000.00**	
Total	**$1,071,879.40**	**$1,197,648.11**
2023 Total	**$1,198,000.00**	

Angela DeWees
11/9/2017



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79th Street and Dean Road
Roundabout Exhibit

Drawn By: MPS Date: 11/06/2017

Checked By: ACD Date: 11/06/2017

79th Street and Dean Road Roundabout

Cost Estimate

Project Number: 16-0229
Date: 11/03/2017
By: MPS
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shrewsberry

Inflation = 2.00%

INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
105-06845	CONSTRUCTION ENGINEERING	1	LS	$29,946.00	$29,946.00	$33,724.06
110-01001	MOBILIZATION AND DEMOBILIZATION	1	LS	$51,407.00	$51,407.00	$57,892.63
201-52370	CLEARING RIGHT-OF-WAY	1	LS	$29,946.00	$29,946.00	$33,724.06
202-96035	CONCRETE WALL, REMOVE	45	LFT	$54.00	$2,430.00	$2,736.57
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205-12108	STORM WATER MANAGEMENT BUDGET	25,000	DOL	$1.00	$25,000.00	$28,154.06
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207-08264	SUBGRADE TREATMENT, TYPE II	100	SYS	$21.00	$2,100.00	$2,364.94
207-09935	SUBGRADE TREATMENT, TYPE IB	5,950	SYS	$9.00	$53,550.00	$60,306.00
303-01180	COMPACTED AGGREGATE NO. 53	700	TON	$38.00	$26,600.00	$29,955.92
401-07325	QC/QA-HMA, 3, 70, SURFACE, 9.5 mm	500	TON	$90.00	$45,000.00	$50,677.31
401-07398	QC/QA-HMA, 3, 70, INTERMEDIATE, 19.0 mm	820	TON	$92.00	$75,440.00	$84,957.69

INDOT Item		Quantity		Item Cost	2017 Cost	2023 Cost
401-07413	QC/QA-HMA, 3, 64, BASE, 25.0 mm	1,310	TON	$86.00	$112,660.00	$126,873.46
505-11564	PCCP 7 IN	850	SYS	$60.00	$51,000.00	$57,434.28
603-02736	FENCE, WOOD, RESET	800	LFT	$70.00	$56,000.00	$63,065.10
604-06070	SIDEWALK, CONCRETE	950	SYS	$43.00	$40,850.00	$46,003.73
604-08086	CURB RAMP, CONCRETE	230	SYS	$160.00	$36,800.00	$41,442.78
604-11738	DETECTABLE WARNING SURFACES	40	SYS	$257.00	$10,280.00	$11,576.95
605-06140	CURB AND GUTTER, CONCRETE	3,050	LFT	$25.00	$76,250.00	$85,869.88
610-08446	PCCP FOR APPROACHES, 6 IN.	100	SYS	$77.00	$7,700.00	$8,671.45
621-06575	SODDING, NURSERY	1,240	SYS	$5.00	$6,200.00	$6,982.21
628-09402	FIELD OFFICE, B	12	MOS	$1,520.00	$18,240.00	$20,541.20
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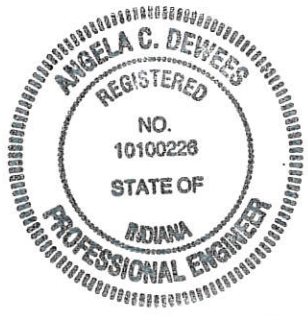
807-04744	LIGHTING	1	LS	$150,000.00	$150,000.00	$168,924.36
808-99999	PAVEMENT MARKINGS	1	LS	$12,000.00	$12,000.00	$13,513.95

	2017	2023
CN	**$1,109,479.00**	**$1,249,453.55**
% CN for Bike/Ped Improvements	*8.3%*	*8.2%*
CN +15% Contingency	**$1,275,900.85**	**$1,436,871.59**
CE (12.5%)	**$159,487.61**	**$179,608.95**
PE (15%)	**$191,385.13**	**$215,530.74**
ROW	**$150,000.00**	
Total	**$1,776,773.58**	**$1,982,011.27**
2023 Total	**$1,983,000.00**	



Angela DeWees
11/9/2017

Appendix B

ANALYSIS OF WARRANTS FOR TRAFFIC SIGNALS

Location: Indianapolis Major: Dean Road Minor: 79th Street Date: 10/12/2017

Major Street Approach Lanes: 1 Minor Street Approach Lanes: 1 By: Mark St. John

Major Street Posted Speed: 35/40 MPH Minor Street Posted Speed: 30 MPH Date of Count: 9/26/2017

Major Street 85th % Speed: >40 MPH

Time	Major Street Two-Way Volume - 50% of Right Turns	Minor Street Highest Volume Approach - 50% of Right Turns	Pedestrian Crossing Major Street	WARRANT 1 Condition A: 8-Hour Vehicular Volume		WARRANT 1 Condition B: Interruption of Continuous Traffic		WARRANT 4 Minimum Pedestrian Volume		WARRANT 1, combination of Conditions A and B, 80% Condition A: 8-Hour Vehicular Volume		WARRANT 1, combination of Conditions A and B, 80% Condition B: Interruption of Continuous Traffic		WARRANT 1, combination of Conditions A and B, 80% Minimum Pedestrian Volume	
				MINIMUM VEHICULAR VOLUMES											
				Major	Minor	Major	Minor	Major	Peds.	Major	Minor	Major	Minor	Major	Peds.
				500 (1)	150 (1)	750 (1)	75 (1)	600 (3)	150	400 (1)	120 (1)	600 (1)	60 (1)	480 (3)	120
				600 (2)	200 (2)	900 (2)	100 (2)	1000 (4)		480 (2)	160 (2)	720 (2)	80 (2)	800 (4)	
				MINIMUM VEHICULAR VOLUMES WHEN 85th % SPEED IS GREATER THAN 40 MPH											
				350 (1)	105 (1)	525 (1)	53 (1)	420 (3)	105	280 (1)	84 (1)	420 (1)	42 (1)	340 (3)	84
				420 (2)	140 (2)	630 (2)	70 (2)	700 (4)		340 (2)	112 (2)	500 (2)	56 (2)	560 (4)	
7-8	**499**	**174**		1	1	0	1	1		1	1	1	1	1	
8-9	**480**	**166**		1	1	0	1	1		1	1	1	1	1	
9-10	**335**	**123**		0	1	0	1	0		1	1	0	1	0	
10-11	**292**	**106**		0	1	0	1	0		1	1	0	1	0	
11-12	**362**	**124**		1	1	0	1	0		1	1	0	1	1	
12-1	**437**	**128**		1	1	0	1	1		1	1	1	1	1	
1-2	**389**	**112**		1	1	0	1	0		1	1	0	1	1	
2-3	**437**	**147**		1	1	0	1	1		1	1	1	1	1	
3-4	**517**	**161**		1	1	0	1	1		1	1	1	1	1	
4-5	**727**	**202**		1	1	1	1	1		1	1	1	1	1	
5-6	**825**	**233**		1	1	1	1	1		1	1	1	1	1	
6-7	**618**	**186**		1	1	1	1	1		1	1	1	1	1	
NUMBER OF HOURS WARRANT IS MET				10		3		0		12		8		0	
COMPLIANCE				YES		NO		NO		YES					

(1) one lane approach (2) two lane approach (3) undivided roadway (4) divided roadway

SOURCE: *Indiana Manual on Uniform Traffic Control Devices*, Indiana Department of Transportation, 2011.

Appendix C

Intersection	
Intersection Delay, s/veh	54.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Future Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Peak Hour Factor	0.72	0.74	0.73	0.83	0.52	0.69	0.61	0.72	0.65	0.65	0.84	0.64
Heavy Vehicles, %	2	1	3	7	4	10	3	1	15	10	5	3
Mvmt Flow	124	143	44	36	131	91	52	469	52	48	180	56
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	25.4	20.9	101.9	22.6
HCM LOS	D	C	F	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	39%	19%	14%
Vol Thru, %	84%	47%	42%	69%
Vol Right, %	8%	14%	39%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	404	227	161	218
LT Vol	32	89	30	31
Through Vol	338	106	68	151
RT Vol	34	32	63	36
Lane Flow Rate	574	311	258	284
Geometry Grp	1	1	1	1
Degree of Util (X)	1.118	0.659	0.555	0.604
Departure Headway (Hd)	7.008	8.076	8.197	8.045
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	517	451	444	451
Service Time	5.078	6.076	6.197	6.045
HCM Lane V/C Ratio	1.11	0.69	0.581	0.63
HCM Control Delay	101.9	25.4	20.9	22.6
HCM Lane LOS	F	D	C	C
HCM 95th-tile Q	18.8	4.7	3.3	3.9

Intersection	
Intersection Delay, s/veh	81.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Future Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Peak Hour Factor	0.86	0.78	0.89	0.75	0.90	0.73	0.76	0.94	0.64	0.92	0.93	0.70
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	4	0	0
Mvmt Flow	80	155	96	44	143	44	128	272	28	60	426	89
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	33.6	23.6	56.7	150.7
HCM LOS	D	C	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	25%	17%	11%
Vol Thru, %	69%	44%	66%	77%
Vol Right, %	5%	31%	16%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	371	275	194	513
LT Vol	97	69	33	55
Through Vol	256	121	129	396
RT Vol	18	85	32	62
Lane Flow Rate	428	331	231	574
Geometry Grp	1	1	1	1
Degree of Util (X)	0.928	0.746	0.556	1.241
Departure Headway (Hd)	8.421	8.817	9.437	7.781
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	432	414	386	465
Service Time	6.421	6.817	7.437	5.852
HCM Lane V/C Ratio	0.991	0.8	0.598	1.234
HCM Control Delay	56.7	33.6	23.6	150.7
HCM Lane LOS	F	D	C	F
HCM 95th-tile Q	10.4	6	3.3	23.1

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

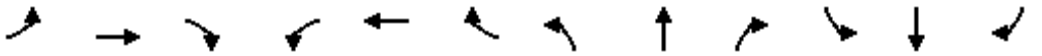
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	311	258	573	284
Demand Flow Rate, veh/h	315	275	588	300
Vehicles Circulating, veh/h	281	654	323	229
Vehicles Exiting, veh/h	248	257	273	700
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.6	10.8	11.9	6.2
Approach LOS	A	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	315	275	588	300
Cap Entry Lane, veh/h	1036	708	993	1092
Entry HV Adj Factor	0.986	0.937	0.975	0.947
Flow Entry, veh/h	311	258	573	284
Cap Entry, veh/h	1021	664	968	1034
V/C Ratio	0.304	0.388	0.592	0.275
Control Delay, s/veh	6.6	10.8	11.9	6.2
LOS	A	B	B	A
95th %tile Queue, veh	1	2	4	1

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	331	231	428	575
Demand Flow Rate, veh/h	334	234	428	577
Vehicles Circulating, veh/h	532	480	300	318
Vehicles Exiting, veh/h	363	248	566	396
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	7.3	8.2	11.4
Approach LOS	A	A	A	B

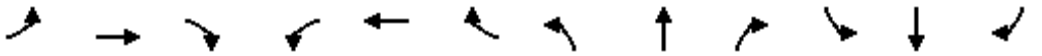
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	334	234	428	577
Cap Entry Lane, veh/h	802	846	1016	998
Entry HV Adj Factor	0.991	0.988	1.000	0.997
Flow Entry, veh/h	331	231	428	575
Cap Entry, veh/h	795	835	1016	994
V/C Ratio	0.416	0.277	0.421	0.578
Control Delay, s/veh	9.8	7.3	8.2	11.4
LOS	A	A	A	B
95th %tile Queue, veh	2	1	2	4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	106	32	30	68	63	32	338	34	31	151	36
Future Volume (veh/h)	89	106	32	30	68	63	32	338	34	31	151	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1885	1885	1796	1841	1841	1856	1885	1885	1752	1826	1826
Adj Flow Rate, veh/h	124	143	44	36	131	91	52	469	52	48	180	56
Peak Hour Factor	0.72	0.74	0.73	0.83	0.52	0.69	0.61	0.72	0.65	0.65	0.84	0.64
Percent Heavy Veh, %	2	1	1	7	4	4	3	1	1	10	5	5
Cap, veh/h	455	412	127	480	301	209	597	690	76	383	553	172
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1159	1383	426	1149	1012	703	1135	1667	185	825	1336	416
Grp Volume(v), veh/h	124	0	187	36	0	222	52	0	521	48	0	236
Grp Sat Flow(s),veh/h/ln	1159	0	1809	1149	0	1714	1135	0	1852	825	0	1751
Q Serve(g_s), s	3.0	0.0	2.5	0.8	0.0	3.3	1.0	0.0	7.2	1.6	0.0	2.9
Cycle Q Clear(g_c), s	6.3	0.0	2.5	3.3	0.0	3.3	3.9	0.0	7.2	8.7	0.0	2.9
Prop In Lane	1.00		0.24	1.00		0.41	1.00		0.10	1.00		0.24
Lane Grp Cap(c), veh/h	455	0	539	480	0	511	597	0	766	383	0	724
V/C Ratio(X)	0.27	0.00	0.35	0.07	0.00	0.43	0.09	0.00	0.68	0.13	0.00	0.33
Avail Cap(c_a), veh/h	800	0	1077	822	0	1021	1305	0	1922	897	0	1817
HCM Platoon 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.4	0.0	8.6	9.9	0.0	8.8	7.5	0.0	7.5	11.0	0.0	6.2
Incr Delay (d2), s/veh	0.3	0.0	0.4	0.1	0.0	0.6	0.1	0.0	1.1	0.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.7	0.2	0.0	0.9	0.2	0.0	1.8	0.2	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	0.0	9.0	9.9	0.0	9.4	7.6	0.0	8.5	11.2	0.0	6.5
LnGrp LOS	B	A	A	A	A	A	A	A	A	B	A	A
Approach Vol, veh/h		311			258			573			284	
Approach Delay, s/veh		10.0			9.5			8.5			7.3	
Approach LOS		B			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		17.4		13.8		17.4		13.8				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		32.4		18.6		32.4		18.6				
Max Q Clear Time (g_c+I1), s		9.2		8.3		10.7		5.3				
Green Ext Time (p_c), s		3.7		1.1		1.7		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	121	85	33	129	32	97	256	18	55	396	62
Future Volume (veh/h)	69	121	85	33	129	32	97	256	18	55	396	62
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1870	1870	1900	1870	1870	1900	1900	1900	1841	1900	1900
Adj Flow Rate, veh/h	80	155	96	44	143	44	128	272	28	60	426	89
Peak Hour Factor	0.86	0.78	0.89	0.75	0.90	0.73	0.76	0.94	0.64	0.92	0.93	0.70
Percent Heavy Veh, %	0	2	2	0	2	2	0	0	0	4	0	0
Cap, veh/h	422	269	167	367	342	105	462	794	82	615	714	149
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	1215	1081	669	1147	1372	422	900	1694	174	1062	1524	318
Grp Volume(v), veh/h	80	0	251	44	0	187	128	0	300	60	0	515
Grp Sat Flow(s),veh/h/ln	1215	0	1750	1147	0	1794	900	0	1869	1062	0	1843
Q Serve(g_s), s	1.9	0.0	4.0	1.1	0.0	2.8	3.9	0.0	3.2	1.2	0.0	6.6
Cycle Q Clear(g_c), s	4.7	0.0	4.0	5.1	0.0	2.8	10.5	0.0	3.2	4.5	0.0	6.6
Prop In Lane	1.00		0.38	1.00		0.24	1.00		0.09	1.00		0.17
Lane Grp Cap(c), veh/h	422	0	436	367	0	447	462	0	876	615	0	864
V/C Ratio(X)	0.19	0.00	0.58	0.12	0.00	0.42	0.28	0.00	0.34	0.10	0.00	0.60
Avail Cap(c_a), veh/h	805	0	987	728	0	1012	971	0	1933	1216	0	1906
HCM Platoon 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.0	0.0	10.5	12.7	0.0	10.0	10.1	0.0	5.4	6.8	0.0	6.3
Incr Delay (d2), s/veh	0.2	0.0	1.2	0.1	0.0	0.6	0.3	0.0	0.2	0.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	1.2	0.2	0.0	0.9	0.6	0.0	0.7	0.2	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	0.0	11.7	12.9	0.0	10.7	10.4	0.0	5.6	6.8	0.0	6.9
LnGrp LOS	B	A	B	B	A	B	B	A	A	A	A	A
Approach Vol, veh/h		331			231			428			575	
Approach Delay, s/veh		11.8			11.1			7.0			6.9	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.5		12.5		19.5		12.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0		33.0		18.0				
Max Q Clear Time (g_c+I1), s		12.5		6.7		8.6		7.1				
Green Ext Time (p_c), s		2.5		1.3		3.8		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			8.6									
HCM 6th LOS			A									

Intersection	
Intersection Delay, s/veh	277.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Future Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Peak Hour Factor	0.72	0.74	0.73	0.83	0.52	0.69	0.61	0.72	0.65	0.65	0.84	0.64
Heavy Vehicles, %	2	1	3	7	4	10	3	1	15	10	5	3
Mvmt Flow	173	201	61	51	183	128	73	657	73	67	252	79
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	133.5	83	528.3	106.7
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	39%	19%	14%
Vol Thru, %	84%	47%	42%	69%
Vol Right, %	8%	14%	39%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	404	227	161	218
LT Vol	32	89	30	31
Through Vol	338	106	68	151
RT Vol	34	32	63	36
Lane Flow Rate	804	435	362	397
Geometry Grp	1	1	1	1
Degree of Util (X)	2.103	1.139	0.956	1.048
Departure Headway (Hd)	10.193	12.708	13.384	13.223
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	362	291	275	278
Service Time	8.193	10.708	11.384	11.223
HCM Lane V/C Ratio	2.221	1.495	1.316	1.428
HCM Control Delay	528.3	133.5	83	106.7
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	53.9	13.7	9.1	11.2

Intersection	
Intersection Delay, s/veh	309.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Future Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Peak Hour Factor	0.86	0.78	0.89	0.75	0.90	0.73	0.76	0.94	0.64	0.92	0.93	0.70
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	4	0	0
Mvmt Flow	112	217	134	62	201	61	179	381	39	84	596	124
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	146.5	68.6	290.8	514.2
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	25%	17%	11%
Vol Thru, %	69%	44%	66%	77%
Vol Right, %	5%	31%	16%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	371	275	194	513
LT Vol	97	69	33	55
Through Vol	256	121	129	396
RT Vol	18	85	32	62
Lane Flow Rate	599	463	324	804
Geometry Grp	1	1	1	1
Degree of Util (X)	1.54	1.17	0.857	2.064
Departure Headway (Hd)	12.728	13.29	15.067	11.319
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	294	278	243	330
Service Time	10.728	11.29	13.067	9.319
HCM Lane V/C Ratio	2.037	1.665	1.333	2.436
HCM Control Delay	290.8	146.5	68.6	514.2
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	25.5	14.2	6.9	47.5

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

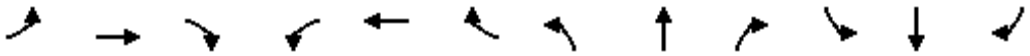
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	435	362	803	398
Demand Flow Rate, veh/h	442	386	823	420
Vehicles Circulating, veh/h	394	915	453	320
Vehicles Exiting, veh/h	346	361	383	981
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.5	17.0	25.5	7.7
Approach LOS	A	C	D	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.328	4.328	4.328
Entry Flow, veh/h	442	386	823	420
Cap Entry Lane, veh/h	1016	652	966	1082
Entry HV Adj Factor	0.984	0.937	0.976	0.949
Flow Entry, veh/h	435	362	803	398
Cap Entry, veh/h	1000	611	943	1026
V/C Ratio	0.435	0.592	0.852	0.388
Control Delay, s/veh	8.5	17.0	25.5	7.7
LOS	A	C	D	A
95th %tile Queue, veh	2	4	11	2

Intersection	
Intersection Delay, s/veh	16.4
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	463	324	599	804
Demand Flow Rate, veh/h	467	328	599	807
Vehicles Circulating, veh/h	745	672	420	446
Vehicles Exiting, veh/h	508	347	792	554
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	15.4	9.7	12.0	23.0
Approach LOS	C	A	B	C

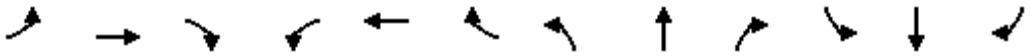
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.535	2.535	2.535	2.535
Critical Headway, s	4.328	4.328	4.328	4.328
Entry Flow, veh/h	467	328	599	807
Cap Entry Lane, veh/h	754	802	994	972
Entry HV Adj Factor	0.991	0.988	1.000	0.996
Flow Entry, veh/h	463	324	599	804
Cap Entry, veh/h	747	792	994	968
V/C Ratio	0.620	0.409	0.603	0.830
Control Delay, s/veh	15.4	9.7	12.0	23.0
LOS	C	A	B	C
95th %tile Queue, veh	4	2	4	10



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	106	32	30	68	63	32	338	34	31	151	36
Future Volume (veh/h)	89	106	32	30	68	63	32	338	34	31	151	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1885	1885	1796	1841	1841	1856	1885	1885	1752	1826	1826
Adj Flow Rate, veh/h	173	201	61	51	183	128	73	657	73	67	252	79
Peak Hour Factor	0.72	0.74	0.73	0.83	0.52	0.69	0.61	0.72	0.65	0.65	0.84	0.64
Percent Heavy Veh, %	2	1	1	7	4	4	3	1	1	10	5	5
Cap, veh/h	343	474	144	381	344	241	521	817	91	242	653	205
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1068	1388	421	1073	1008	705	1041	1667	185	680	1333	418
Grp Volume(v), veh/h	173	0	262	51	0	311	73	0	730	67	0	331
Grp Sat Flow(s),veh/h/ln	1068	0	1809	1073	0	1714	1041	0	1852	680	0	1751
Q Serve(g_s), s	8.3	0.0	6.0	2.1	0.0	7.8	2.5	0.0	17.7	4.9	0.0	6.3
Cycle Q Clear(g_c), s	16.1	0.0	6.0	8.0	0.0	7.8	8.9	0.0	17.7	22.6	0.0	6.3
Prop In Lane	1.00		0.23	1.00		0.41	1.00		0.10	1.00		0.24
Lane Grp Cap(c), veh/h	343	0	618	381	0	585	521	0	908	242	0	858
V/C Ratio(X)	0.50	0.00	0.42	0.13	0.00	0.53	0.14	0.00	0.80	0.28	0.00	0.39
Avail Cap(c_a), veh/h	351	0	630	389	0	597	642	0	1123	322	0	1062
HCM Platoon 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	13.5	16.6	0.0	14.2	11.4	0.0	11.5	21.0	0.0	8.6
Incr Delay (d2), s/veh	1.1	0.0	0.5	0.2	0.0	0.9	0.1	0.0	3.5	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.2	0.5	0.0	2.7	0.5	0.0	6.5	0.8	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	0.0	14.0	16.8	0.0	15.0	11.5	0.0	15.0	21.6	0.0	8.8
LnGrp LOS	C	A	B	B	A	B	B	A	B	C	A	A
Approach Vol, veh/h		435			362			803			398	
Approach Delay, s/veh		17.1			15.3			14.7			11.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.7		22.7		30.7		22.7				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		32.4		18.6		32.4		18.6				
Max Q Clear Time (g_c+I1), s		19.7		18.1		24.6		10.0				
Green Ext Time (p_c), s		4.5		0.1		1.5		1.4				

Intersection Summary												
HCM 6th Ctrl Delay			14.6									
HCM 6th LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	121	85	33	129	32	97	256	18	55	396	62
Future Volume (veh/h)	69	121	85	33	129	32	97	256	18	55	396	62
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1870	1870	1900	1870	1870	1900	1900	1900	1841	1900	1900
Adj Flow Rate, veh/h	112	217	134	62	201	61	179	381	39	84	596	124
Peak Hour Factor	0.86	0.78	0.89	0.75	0.90	0.73	0.76	0.94	0.64	0.92	0.93	0.70
Percent Heavy Veh, %	0	2	2	0	2	2	0	0	0	4	0	0
Cap, veh/h	306	303	187	232	386	117	335	950	97	539	855	178
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.56	0.56	0.56	0.56	0.56	0.56
Sat Flow, veh/h	1135	1082	668	1046	1377	418	744	1695	174	951	1525	317
Grp Volume(v), veh/h	112	0	351	62	0	262	179	0	420	84	0	720
Grp Sat Flow(s),veh/h/ln	1135	0	1750	1046	0	1795	744	0	1869	951	0	1843
Q Serve(g_s), s	5.2	0.0	10.2	3.2	0.0	7.0	12.9	0.0	7.2	3.1	0.0	15.9
Cycle Q Clear(g_c), s	12.2	0.0	10.2	13.4	0.0	7.0	28.9	0.0	7.2	10.3	0.0	15.9
Prop In Lane	1.00		0.38	1.00		0.23	1.00		0.09	1.00		0.17
Lane Grp Cap(c), veh/h	306	0	491	232	0	503	335	0	1047	539	0	1033
V/C Ratio(X)	0.37	0.00	0.72	0.27	0.00	0.52	0.54	0.00	0.40	0.16	0.00	0.70
Avail Cap(c_a), veh/h	349	0	557	271	0	571	351	0	1090	561	0	1075
HCM Platoon 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
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.3	0.0	18.3	24.4	0.0	17.2	19.4	0.0	7.1	10.0	0.0	9.0
Incr Delay (d2), s/veh	0.7	0.0	3.8	0.6	0.0	0.8	1.4	0.0	0.2	0.1	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	4.2	0.8	0.0	2.7	2.1	0.0	2.3	0.6	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.0	0.0	22.1	25.0	0.0	18.0	20.8	0.0	7.3	10.1	0.0	10.9
LnGrp LOS	C	A	C	C	A	B	C	A	A	B	A	B
Approach Vol, veh/h		463			324			599			804	
Approach Delay, s/veh		22.3			19.3			11.3			10.8	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.2		20.4		36.2		20.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0		33.0		18.0				
Max Q Clear Time (g_c+I1), s		30.9		14.2		17.9		15.4				
Green Ext Time (p_c), s		0.8		1.0		5.0		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			14.6									
HCM 6th LOS			B									

Intersection	
Intersection Delay, s/veh	78.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Future Vol, veh/h	89	106	32	30	68	63	32	338	34	31	151	36
Peak Hour Factor	0.72	0.74	0.73	0.83	0.52	0.69	0.61	0.72	0.65	0.65	0.84	0.64
Heavy Vehicles, %	2	1	3	7	4	10	3	1	15	10	5	3
Mvmt Flow	131	152	46	38	139	97	56	498	55	51	191	60
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	30.5	24.3	153.5	26.7
HCM LOS	D	C	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	39%	19%	14%
Vol Thru, %	84%	47%	42%	69%
Vol Right, %	8%	14%	39%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	404	227	161	218
LT Vol	32	89	30	31
Through Vol	338	106	68	151
RT Vol	34	32	63	36
Lane Flow Rate	609	329	274	301
Geometry Grp	1	1	1	1
Degree of Util (X)	1.253	0.716	0.605	0.659
Departure Headway (Hd)	7.409	8.593	8.755	8.579
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	493	425	416	424
Service Time	5.409	6.593	6.755	6.579
HCM Lane V/C Ratio	1.235	0.774	0.659	0.71
HCM Control Delay	153.5	30.5	24.3	26.7
HCM Lane LOS	F	D	C	D
HCM 95th-tile Q	24.6	5.5	3.9	4.6

Intersection	
Intersection Delay, s/veh	113.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Future Vol, veh/h	69	121	85	33	129	32	97	256	18	55	396	62
Peak Hour Factor	0.86	0.78	0.89	0.75	0.90	0.73	0.76	0.94	0.64	0.92	0.93	0.70
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	4	0	0
Mvmt Flow	85	164	101	47	152	46	135	289	30	63	451	94
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	44	28.3	83	210.4
HCM LOS	E	D	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	25%	17%	11%
Vol Thru, %	69%	44%	66%	77%
Vol Right, %	5%	31%	16%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	371	275	194	513
LT Vol	97	69	33	55
Through Vol	256	121	129	396
RT Vol	18	85	32	62
Lane Flow Rate	454	351	245	609
Geometry Grp	1	1	1	1
Degree of Util (X)	1.026	0.822	0.615	1.384
Departure Headway (Hd)	9.082	9.496	10.24	8.379
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	404	386	355	438
Service Time	7.082	7.496	8.24	6.379
HCM Lane V/C Ratio	1.124	0.909	0.69	1.39
HCM Control Delay	83	44	28.3	210.4
HCM Lane LOS	F	E	D	F
HCM 95th-tile Q	13	7.4	3.9	28.5

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	329	274	609	302
Demand Flow Rate, veh/h	335	293	624	319
Vehicles Circulating, veh/h	298	695	344	244
Vehicles Exiting, veh/h	265	273	289	744
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	12.0	13.6	6.5
Approach LOS	A	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	335	293	624	319
Cap Entry Lane, veh/h	1018	679	972	1076
Entry HV Adj Factor	0.984	0.937	0.976	0.948
Flow Entry, veh/h	329	274	609	302
Cap Entry, veh/h	1001	636	948	1020
V/C Ratio	0.329	0.431	0.642	0.297
Control Delay, s/veh	7.0	12.0	13.6	6.5
LOS	A	B	B	A
95th %tile Queue, veh	1	2	5	1

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	350	245	454	608
Demand Flow Rate, veh/h	353	248	454	611
Vehicles Circulating, veh/h	564	509	318	337
Vehicles Exiting, veh/h	384	263	599	420
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.8	7.9	8.9	12.8
Approach LOS	B	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	353	248	454	611
Cap Entry Lane, veh/h	776	821	998	979
Entry HV Adj Factor	0.991	0.988	1.000	0.995
Flow Entry, veh/h	350	245	454	608
Cap Entry, veh/h	769	811	998	974
V/C Ratio	0.455	0.302	0.455	0.624
Control Delay, s/veh	10.8	7.9	8.9	12.8
LOS	B	A	A	B
95th %tile Queue, veh	2	1	2	5