DRAFT INTERSECTION CONTROL EVALUATION

(UIHLEIN ROAD AT SR 70)

Florida Department of Transportation

District 1

SR 70

Limits of Project: from Lorraine Road to CR 675/Waterbury Road

Manatee County, Florida

Financial Management Number: 414506-2

ETDM Number: 14263

Date: JUNE 2019

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Memorandum

Date:	June 24, 2019		
To:	David C. Turley, PE FDOT District 1	From:	Christopher Benitez, PE, PTOE Stantec Consulting Services, Inc.
Project:	414506-2: SR 70 between Lorraine Road and CR 675		
Subject:	Intersection Control Evaluation (ICE) Uihlein Road at SR 70		

Reference: Intersection Control Evaluation (ICE): Uihlein Road at SR 70

The purpose of this memorandum is to document the Florida Department of Transportation (FDOT) Intersection Control Evaluation (ICE) for the intersection of SR 70 and Uihlein Road. This ICE has been completed as part of the FDOT District 1 project: 414506-2 – SR 70 between Lorraine Road to CR 675. The project proposes to increase capacity along SR 70 by widening from a two-lane undivided to a four-lane divided facility along with traffic operational improvements at the intersections. The ICE analysis was initiated during the Project Development & Environment (PD&E) phase of the project due to the failing traffic operations during future conditions. According to the project Design Traffic Technical Memorandum (dated October 2018), the intersection of Uihlein Road and SR 70 will operate at Level of Service (LOS) F as a two-way stop-controlled intersection.

An FDOT ICE for the intersection of Uihlein Road and SR 70 was completed for both Stage 1 and Stage 2 for several alternative intersection configurations. Based on an interpretation of the results of the ICE analysis, the roundabout is the recommended option. The analysis included an evaluation of the traffic operations, safety, cost, multimodal accommodations, and other impacts such as environmental, utility, and right of way. The evaluation focused on the SR 70 future build conditions as a four-lane divided facility with a design speed of 55 mph. The results are provided in the Stage 2 ICE Form in **Attachment A.** The memorandum is organized as follows:

- Attachment A: ICE Stage 2 Form and Results
- Attachment B: Conceptual Plans
- Attachment C: Traffic Operational Analysis
- Attachment D: Safety Performance for Intersection Control Evaluation (SPICE)
- Attachment E: Cost Estimates
- Attachment F: Delay Calculations
- Attachment G: Benefit/Cost Summary
- Attachment H: ICE Stage 1 Form, Capacity Analysis for Planning of Junctions (CAP-X), and Stage 1 SPICE

ATTACHMENT A

FDOT ICE Stage 2 Form and Results

Florida Department of Transportation
Intersection Control Evaluation (ICE) Form
Stage 2: Intial Control Strategy Assessment

To fulfill the requirements of Stage 2 (Intersection Control Strategy) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval.

Project Name	SR 70 from Lorraine Rd to CR 675	FDOT Project #	414506-2-22-01	Date	06/25/19
Submitted By	Nicole Harris, PE	Agency/Company	Stantec	Email	nicole.harris@stantec.com

List all viable intersection control strategies identified in Stage 1 (Screening):

Signalized Control	Roundabout	Displaced Left-Turn
Continuous Green Tee		

Operational Analyses

Summarize the results of the peak hour analysis performed for each control strategy. Select analysis year based on guidance in the ICE procedures document. Refer to Exhibit 19-8 of the *Highway Capacity Manual, 6th Edition* (HCM6) to determine the appropriate LOS based on intersection delay (*hover over this cell for Exhibit 19-8*).

Design Vehicle	Interstate Semitrailer (WB-62)	Control Vehicle	Interstate Semitrailer (WB-62)

Opening Year: 2025

Control Strategy	Peak Hour	Weekday AM Peak		Peak Hour	Weekday PM Peak		Peak Hour	Saturday Midday Peak	
	LOS	Delay (sec.)	All Queues Accommodated?	LOS	Delay (sec.)	All Queues Accommodated?	LOS	Delay (sec.)	All Queues Accommodated?
Signalized Control	B	11.5	Yes	A	7.8	Yes			
Roundabout	A	5.8	Yes	A	6.2	Yes			
Displaced Left-Turn	B	11.6	Yes	B	15.6	Yes			
Continuous Green Tee	B	12.7	Yes	A	10.0	Yes			

Design Year: 2045

Control Strategy	Peak Hour	Weekday AM Peak		Peak Hour	Weekday PM Peak		Peak Hour	Saturday Midday Peak	
	LOS	Delay (sec.)	All Queues Accommodated?	LOS	Delay (sec.)	All Queues Accommodated?	LOS	Delay (sec.)	All Queues Accommodated?
Signalized Control	D	47.7	Yes	D	36.5	Yes			
Roundabout	C	15.2	Yes	C	19.6	Yes			
Displaced Left-Turn	B	17.6	Yes	C	25.1	Yes			
Continuous Green Tee	C	29.3	Yes	B	17.9	Yes			

Provide any additional discussion necessary regarding the results of the operational analysis:	Roundabout, Displaced Left-Turn, and Continuous Green Tee are operating at LOS C or better during both AM and PM Peak hours. The delay that is shown for the Displaced Left-Turn and Continuous Green T were recalculated as Experience Travel Time (ETT) based on guidance from the Highway Capacity Manual (HCM) 6th Edition, Chapter 23. Refer to Attachment F for the Delay Calculations.

Safety Performance

Enter the most recent five (5) years of crash data from the CAR System. | Most recent year of crash data available: 2018

Crash Type		2014	2015	2016	2017	2018	Total
Combined	Total						
	Fatal/Injury						
	PDO						
Single-Vehicle	Total	0	1	1	0	2	4
	Fatal/Injury	0	0	0	0	1	1
	PDO	0	1	1	0	1	3
Multi-Vehicle	Total	0	0	1	1	2	4
	Fatal/Injury	0	0	0	1	2	3
	PDO	0	0	1	0	0	1
Vehicle-Pedestrian	Fatal/Injury	0	0	0	0	0	0
Vehicle-Bicycle	Fatal/Injury	0	0	0	0	0	0
Total	All	0	1	2	1	4	8

Apply the FDOT SPICE Tool to model anticipated safety performance of each control strategy. For intersection types not accommodated in the tool, manually apply crash modification factors detailed in the ICE procedures document or qualitatively describe anticipated safety impacts.

Control Strategy	Anticipated Impact on Safety Performance	Opening Year		Design Year	
		Predicted Total Crashes	Predicted Fatal+Injury Crashes	Predicted Total Crashes	Predicted Fatal+Injury Crashes
Signalized Control	This option is comparable to the Displaced Left-Turn and Continuous Green Tee options.	5.18	1.84	12.50	3.90
Roundabout	This option has the lowest Predicted Fatal+Injury crashes during both Opening and Design years	7.00	1.23	14.82	2.98
Displaced Left-Turn	This option is comparable to the Signalized and Continuous Green Tee options.	4.56	1.62	11.00	3.43
Continuous Green Tee	This option is comparable to the Signalized and Displaced Left-Turn options.	4.97	1.56	12.00	3.31

Costs and Benefit/Cost Ratios

Remaining cognizant of the current level of detail of each control strategy's conceptual design, provide a cost estimate for each. You may want to include costs for preliminary engineering, required right-of-way acquisitions, construction, and a contingency. Apply the FDOT ICE Tool to determine the delay benefit-cost ratio (B/C), safety B/C, overall B/C, and net-present value for each control stratetgy.

Control Strategy	ROW Costs ($)	Construction Costs ($)	FDOT ICE Tool Outputs			
			Delay B/C	Safety B/C	Overall B/C	Net Present Value
Signalized Control	$0	$2,090,000	Base	Base	Base	Base
Roundabout	$30,000	$1,750,000	Preferred	Preferred	Preferred	$11,947,931
Displaced Left-Turn	$1,820,000	$2,390,000	1.82	1.69	3.50	$2,012,798
Continuous Green Tee	$2,150,000	$2,150,000	50.79	26.98	77.77	$4,606,421

Multimodal Accomodations								
Note the existing/anticipated level of pedestrian/bicyclist activity at the study intersection during the peak hours of the typical day. See ICE procedures document for activity level thresholds:								
Peak Hour:	Weekday AM Peak		Weekday PM Peak		Saturday Midday Peak		Acitivity Level	
	Major Street	Minor Street	Major Street	Minor Street	Major Street	Minor Street	Ped.	Bicycles
# of ped. crossings (both approaches, if app.):							Low	Low
# of cyclists (both approaches, if app.):								

Summarize the ability of each viable control strategy to accommodate the exisitng/anticipated level of:

Control Strategy	Pedestrians and Bicyclists	Transit Services	Freight Needs
Signalized Control	Crosswalks and a bicycle lane can be safely accommmodated with this option.	There is no transit service in the vicinity of this intersection.	This option was designed to accommodate the design trucks at the turns.
Roundabout	Crosswalks and a bicycle lane can be safely accommmodated with this option.	There is no transit service in the vicinity of this intersection.	This option was designed to accommodate the design trucks at the turns.
Displaced Left-Turn	Crosswalks and a bicycle lane can be safely accommmodated with this option.	There is no transit service in the vicinity of this intersection.	This option was designed to accommodate the design trucks at the turns.
Continuous Green Tee	Crosswalks and a bicycle lane can be safely accommmodated with this option.	There is no transit service in the vicinity of this intersection.	This option was designed to accommodate the design trucks at the turns.

Environmental, Utility, and Right-of-Way Impacts	
Summarize any issues related to environmental, utility, or right-of-way (including relocation) impacts specific to each control strategy. Be sure to consider the NEPA requirements for each control type.	
Signalized Control	Improvements are within right-of-way and no new environmental impacts are anticipated. The overhead transmission lines on the north side of the corridor are not expected to be impacted.
Roundabout	Minor right of way needs. No new environmental impacts are anticipated. The overhead transmission lines on the north side of the corridor are not expected to be impacted.
Displaced Left-Turn	Right of way acquisition may be needed. There is also potential impacts to the overhead transmission lines on the north side. A driveway/connection will also be impacted.
Continuous Green Tee	Improvements are within right-of-way and no new environmental impacts are anticipated. The overhead transmission lines on the north side of the corridor are not expected to be impacted.

Public Input/Feedback (if appropriate)
Summarize any agency or public input regarding the control strategies:
None performed to date.

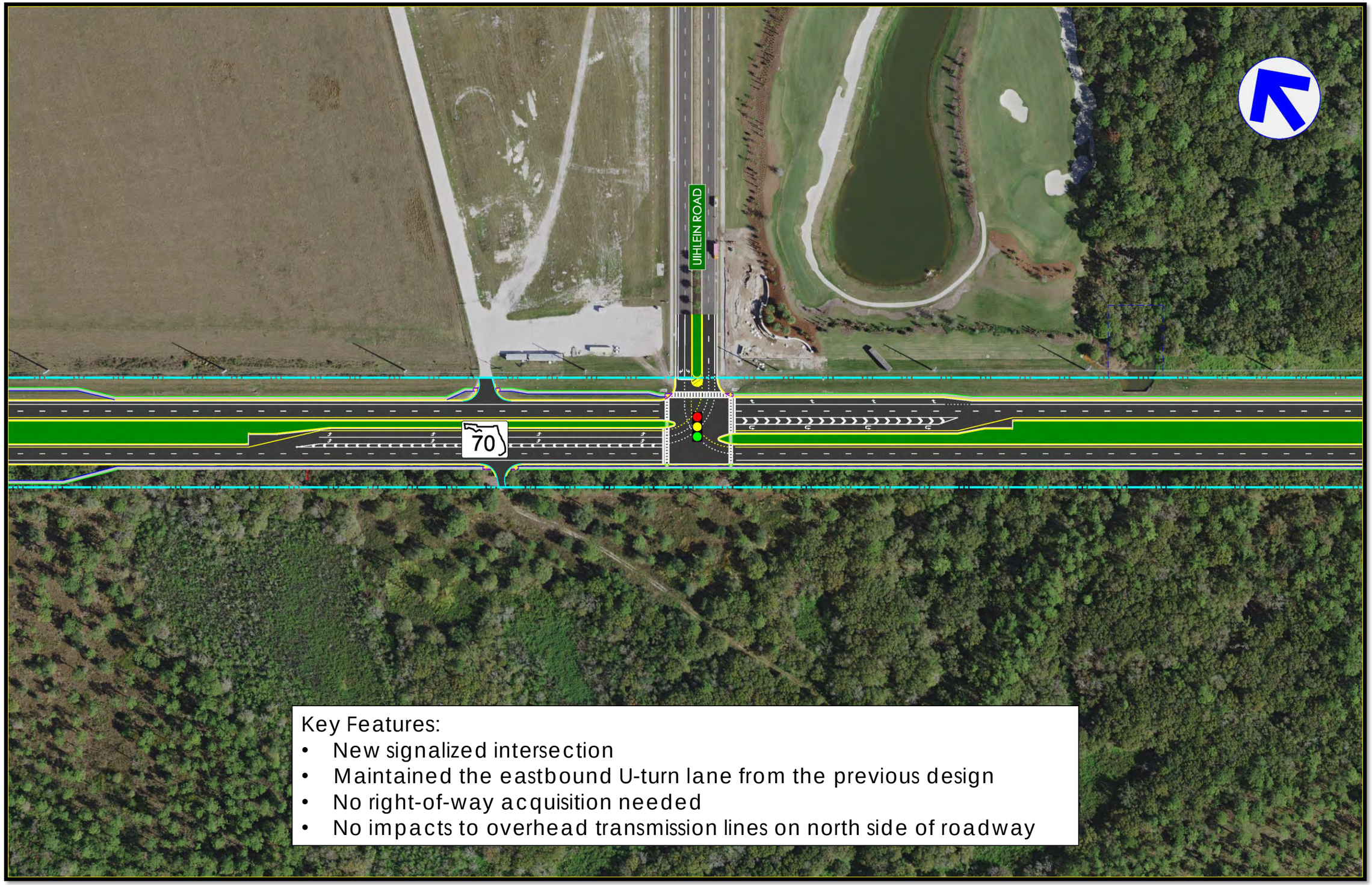
Control Strategy Evaluation		
Provide a brief justification as to why each of the following is either viable or not viable. If a single control strategy is recommended, select it as the only strategy to be advanced.		
Control Strategy	Strategy to be Advanced?	Justification
Signalized Control	No	This option was analyzed as the base intersection control. Comparing the B/C, NPV, and traffic operations to other options, this is not the recommended strategy.
Roundabout	Yes	1) Preferred option based on B/C and NPV compared to base; 2) less severe crashes ; 3) traffic operations at LOS C or better; 4) no right of way impacts; and, 5) enhances the livable communities characteristic by lowering vehicle speeds.
Displaced Left-Turn	No	This option has the highest costs and potential impacts to utilities. Although, it does have a B/C greater than 1 and a positive NPV which indicates that it is a better than the base option (signalized).
Continuous Green Tee	No	This option is the second best option from a B/C and NPV perspective.
	No	
	No	

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination					
Comments					
DTOE Name		Signature		Date	
DDE Name		Signature		Date	

ATTACHMENT B

Conceptual Plans

SR 70 and Uihlein Road
Signalized Intersection



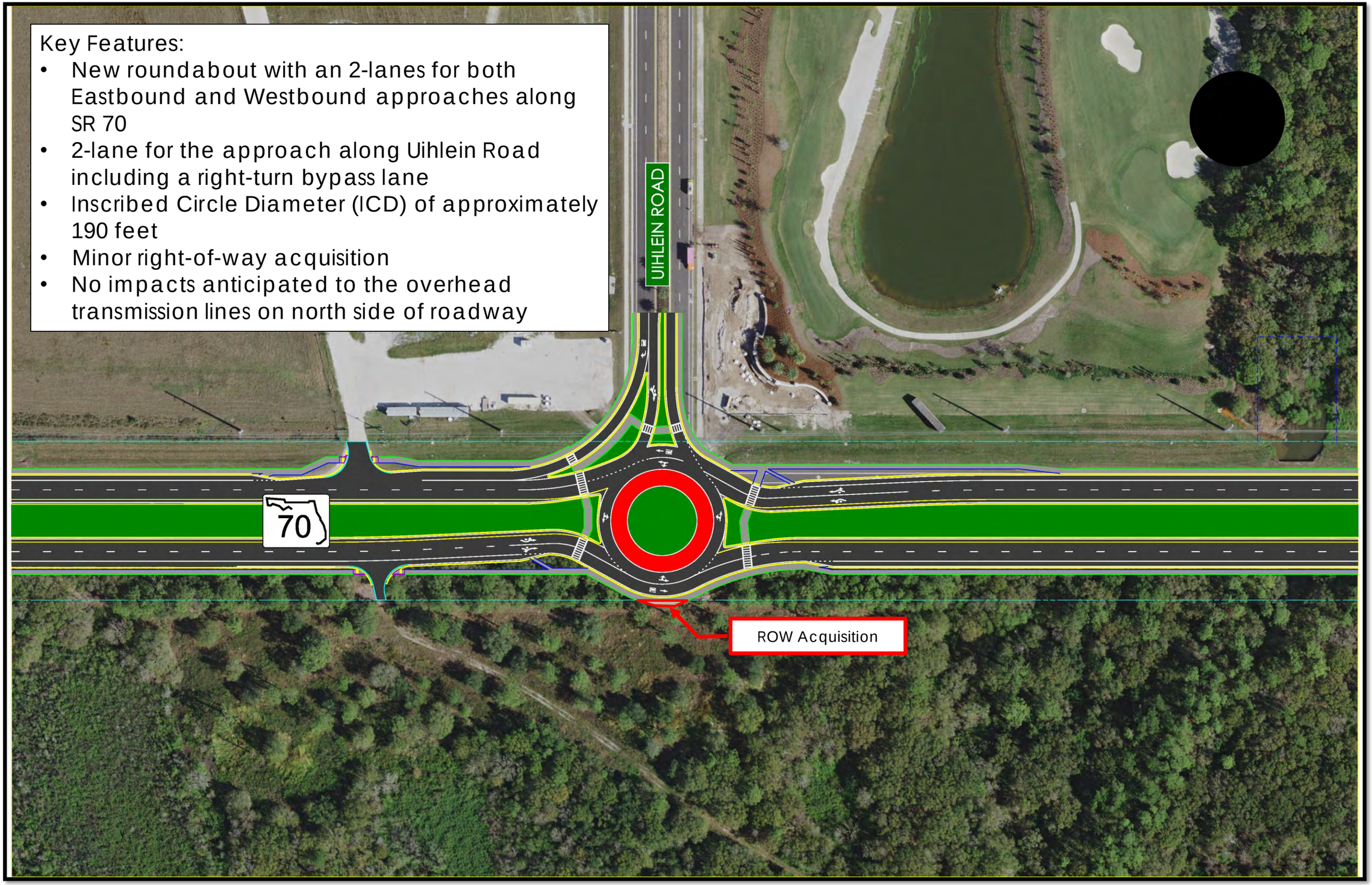
Key Features:

- New signalized intersection
- Maintained the eastbound U-turn lane from the previous design
- No right-of-way acquisition needed
- No impacts to overhead transmission lines on north side of roadway

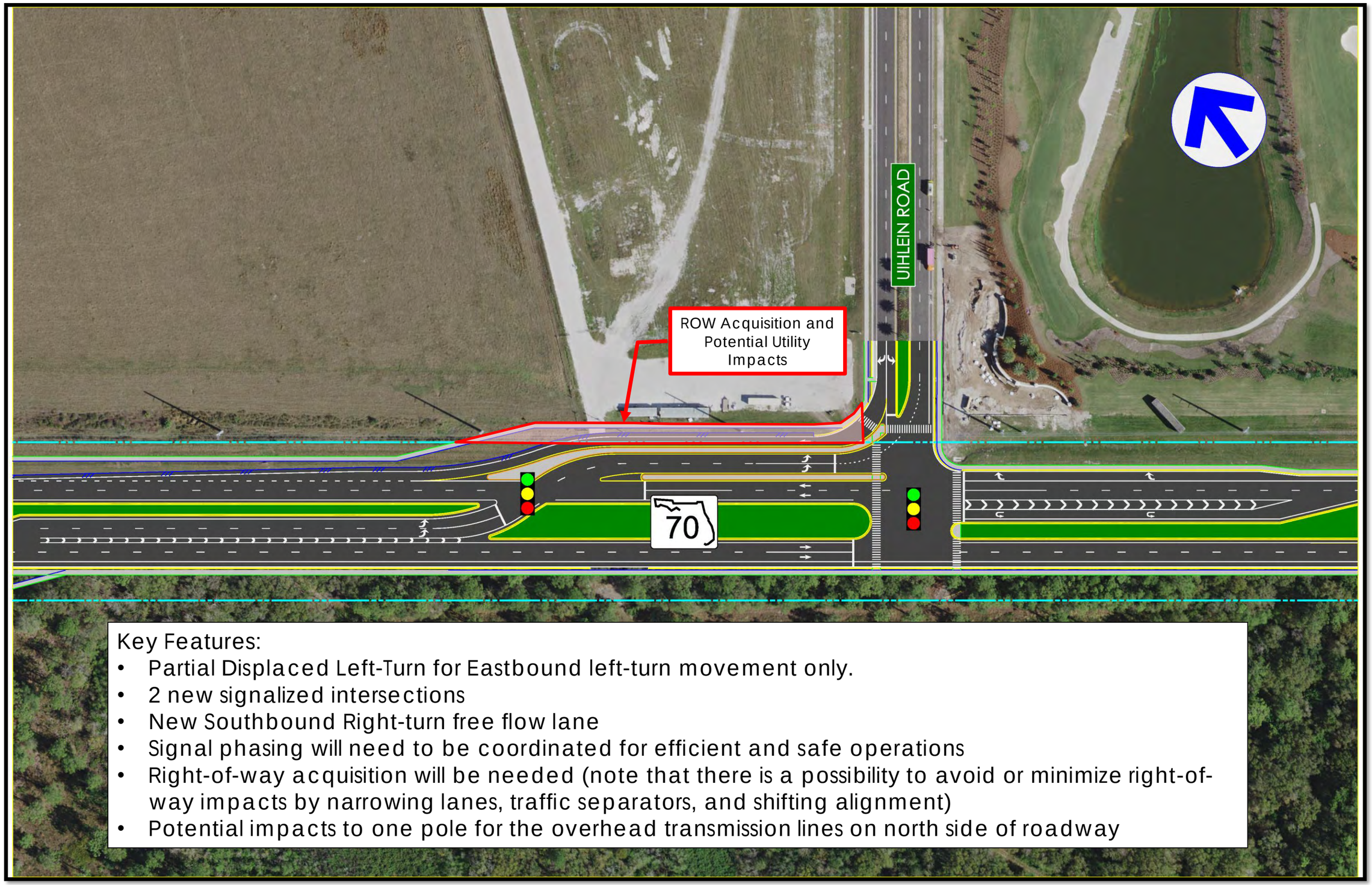
SR 70 and Uihlein Road
Roundabout

Key Features:

- New roundabout with an 2-lanes for both Eastbound and Westbound approaches along SR 70
- 2-lane for the approach along Uihlein Road including a right-turn bypass lane
- Inscribed Circle Diameter (ICD) of approximately 190 feet
- Minor right-of-way acquisition
- No impacts anticipated to the overhead transmission lines on north side of roadway



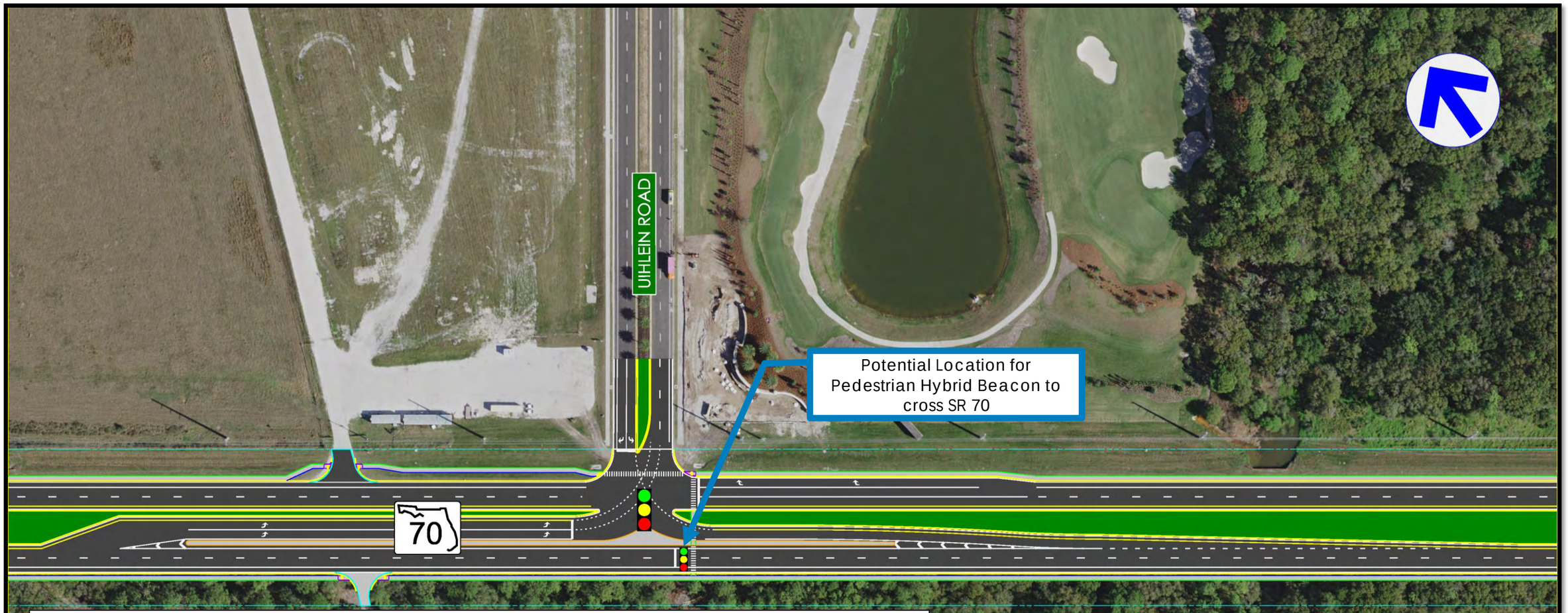
SR 70 and Uihlein Road
Partial Displaced Left-Turn



Key Features:

- Partial Displaced Left-Turn for Eastbound left-turn movement only.
- 2 new signalized intersections
- New Southbound Right-turn free flow lane
- Signal phasing will need to be coordinated for efficient and safe operations
- Right-of-way acquisition will be needed (note that there is a possibility to avoid or minimize right-of-way impacts by narrowing lanes, traffic separators, and shifting alignment)
- Potential impacts to one pole for the overhead transmission lines on north side of roadway

SR 70 and Uihlein Road
Continuous Green-Tee



Key Features:

- Eastbound through movement remains free flow
- Dual left-turns can be accommodated within the median.
- 1 new signalized intersection
- 3 phase signal operation
- Southbound left-turn will need an acceleration lane to merge with eastbound travel lanes
- No additional right-of-way needed
- No impacts to overhead transmission lines on north side of roadway

ATTACHMENT C

Traffic Operational Analysis

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (veh/h)	44	206	133	542	0	865	43
Future Volume (veh/h)	44	206	133	542	0	865	43
Number	7	14	1	6		2	12
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1776	1776		1776	1776
Adj Flow Rate, veh/h	46	217	140	571		911	45
Adj No. of Lanes	1	1	1	2		2	1
Peak Hour Factor	0.95	0.95	0.95	0.95		0.95	0.95
Percent Heavy Veh, %	2	2	7	7		7	7
Cap, veh/h	276	352	413	2309		1814	1046
Arrive On Green	0.16	0.16	0.07	0.68		0.54	0.54
Sat Flow, veh/h	1774	1583	1691	3463		3463	1509
Grp Volume(v), veh/h	46	217	140	571		911	45
Grp Sat Flow(s),veh/h/ln	1774	1583	1691	1687		1687	1509
Q Serve(g_s), s	1.7	9.3	2.5	4.8		12.8	0.7
Cycle Q Clear(g_c), s	1.7	9.3	2.5	4.8		12.8	0.7
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	276	352	413	2309		1814	1046
V/C Ratio(X)	0.17	0.62	0.34	0.25		0.50	0.04
Avail Cap(c_a), veh/h	426	486	706	2309		1814	1046
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	27.4	26.3	7.5	4.5		11.0	3.6
Incr Delay (d2), s/veh	0.3	1.8	0.5	0.3		1.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	8.1	1.2	2.3		6.2	0.5
LnGrp Delay(d),s/veh	27.7	28.0	8.0	4.8		12.0	3.7
LnGrp LOS	C	C	A	A		B	A
Approach Vol, veh/h	263			711		956	
Approach Delay, s/veh	28.0			5.4		11.6	
Approach LOS	C			A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	11.0	46.3		17.7		57.3		
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	18.0	21.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	4.5	14.8		11.3		6.8		
Green Ext Time (p_c), s	0.3	3.0		0.5		3.8		

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Notes

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (veh/h)	35	128	217	830	0	549	37
Future Volume (veh/h)	35	128	217	830	0	549	37
Number	7	14	1	6		2	12
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1776	1776		1776	1776
Adj Flow Rate, veh/h	37	135	228	874		578	39
Adj No. of Lanes	1	1	1	2		2	1
Peak Hour Factor	0.95	0.95	0.95	0.95		0.95	0.95
Percent Heavy Veh, %	2	2	7	7		7	7
Cap, veh/h	185	296	607	2483		1934	1023
Arrive On Green	0.10	0.10	0.08	0.74		0.57	0.57
Sat Flow, veh/h	1774	1583	1691	3463		3463	1509
Grp Volume(v), veh/h	37	135	228	874		578	39
Grp Sat Flow(s),veh/h/ln	1774	1583	1691	1687		1687	1509
Q Serve(g_s), s	1.4	5.7	3.7	6.9		6.6	0.6
Cycle Q Clear(g_c), s	1.4	5.7	3.7	6.9		6.6	0.6
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	185	296	607	2483		1934	1023
V/C Ratio(X)	0.20	0.46	0.38	0.35		0.30	0.04
Avail Cap(c_a), veh/h	426	511	873	2483		1934	1023
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	30.7	27.1	5.1	3.5		8.2	4.0
Incr Delay (d2), s/veh	0.5	1.1	0.4	0.4		0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	5.2	1.7	3.3		3.2	0.4
LnGrp Delay(d),s/veh	31.3	28.2	5.5	3.9		8.6	4.1
LnGrp LOS	C	C	A	A		A	A
Approach Vol, veh/h	172			1102		617	
Approach Delay, s/veh	28.9			4.2		8.3	
Approach LOS	C			A		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.2	49.0		13.8		61.2		
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	18.0	21.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	5.7	8.6		7.7		8.9		
Green Ext Time (p_c), s	0.5	2.9		0.3		6.5		

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Notes

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (veh/h)	142	663	430	846	0	1242	137
Future Volume (veh/h)	142	663	430	846	0	1242	137
Number	7	14	1	6		2	12
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1776	1776		1776	1776
Adj Flow Rate, veh/h	149	698	453	891		1307	144
Adj No. of Lanes	1	1	1	2		2	1
Peak Hour Factor	0.95	0.95	0.95	0.95		0.95	0.95
Percent Heavy Veh, %	2	2	7	7		7	7
Cap, veh/h	355	651	438	2249		1312	889
Arrive On Green	0.20	0.20	0.21	0.67		0.39	0.39
Sat Flow, veh/h	1774	1583	1691	3463		3463	1509
Grp Volume(v), veh/h	149	698	453	891		1307	144
Grp Sat Flow(s),veh/h/ln	1774	1583	1691	1687		1687	1509
Q Serve(g_s), s	6.6	18.0	19.0	10.8		34.8	3.9
Cycle Q Clear(g_c), s	6.6	18.0	19.0	10.8		34.8	3.9
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	355	651	438	2249		1312	889
V/C Ratio(X)	0.42	1.07	1.03	0.40		1.00	0.16
Avail Cap(c_a), veh/h	355	651	438	2249		1312	889
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	31.4	26.5	27.5	6.8		27.4	8.4
Incr Delay (d2), s/veh	0.8	56.3	52.2	0.5		23.9	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	35.8	17.2	5.1		20.5	2.5
LnGrp Delay(d),s/veh	32.2	82.8	79.7	7.3		51.4	8.8
LnGrp LOS	C	F	F	A		D	A
Approach Vol, veh/h	847			1344		1451	
Approach Delay, s/veh	73.9			31.7		47.2	
Approach LOS	E			C		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	25.0	41.0		24.0		66.0		
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	19.0	35.0		18.0		60.0		
Max Q Clear Time (g_c+I1), s	21.0	36.8		20.0		12.8		
Green Ext Time (p_c), s	0.0	0.0		0.0		6.9		

Intersection Summary	
HCM 2010 Ctrl Delay	47.7
HCM 2010 LOS	D

Notes

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (veh/h)	114	411	698	1256	0	781	120
Future Volume (veh/h)	114	411	698	1256	0	781	120
Number	7	14	1	6		2	12
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1776	1776		1776	1776
Adj Flow Rate, veh/h	120	433	735	1322		822	126
Adj No. of Lanes	1	1	1	2		2	1
Peak Hour Factor	0.95	0.95	0.95	0.95		0.95	0.95
Percent Heavy Veh, %	2	2	7	7		7	7
Cap, veh/h	353	843	662	2253		904	704
Arrive On Green	0.20	0.20	0.33	0.67		0.27	0.27
Sat Flow, veh/h	1774	1583	1691	3463		3463	1509
Grp Volume(v), veh/h	120	433	735	1322		822	126
Grp Sat Flow(s),veh/h/ln	1774	1583	1691	1687		1687	1509
Q Serve(g_s), s	5.2	15.9	30.0	19.3		21.2	4.4
Cycle Q Clear(g_c), s	5.2	15.9	30.0	19.3		21.2	4.4
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	353	843	662	2253		904	704
V/C Ratio(X)	0.34	0.51	1.11	0.59		0.91	0.18
Avail Cap(c_a), veh/h	355	844	662	2253		904	704
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	31.0	13.6	22.7	8.2		31.9	14.0
Incr Delay (d2), s/veh	0.6	0.5	69.4	1.1		14.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	15.9	29.1	9.2		11.7	2.6
LnGrp Delay(d),s/veh	31.6	14.1	92.1	9.3		46.6	14.5
LnGrp LOS	C	B	F	A		D	B
Approach Vol, veh/h	553			2057		948	
Approach Delay, s/veh	17.9			38.9		42.3	
Approach LOS	B			D		D	

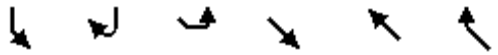
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	36.0	30.1		23.9		66.1		
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	30.0	24.0		18.0		60.0		
Max Q Clear Time (g_c+I1), s	32.0	23.2		17.9		21.3		
Green Ext Time (p_c), s	0.0	0.5		0.0		11.9		

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (vph)	44	0	0	542	0	865	43
Future Volume (vph)	44	0	0	542	0	865	43
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0		6.0	6.0
Lane Util. Factor	1.00			0.95		0.95	1.00
Frt	1.00			1.00		1.00	0.85
Flt Protected	0.95			1.00		1.00	1.00
Satd. Flow (prot)	1635			3116		3116	1394
Flt Permitted	0.95			1.00		1.00	1.00
Satd. Flow (perm)	1635			3116		3116	1394
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	0	0	571	0	911	45
RTOR Reduction (vph)	0	0	0	0	0	0	26
Lane Group Flow (vph)	46	0	0	571	0	911	19
Heavy Vehicles (%)	2%	2%	7%	7%	2%	7%	7%
Turn Type	Prot			NA	Perm	NA	custom
Protected Phases	7 8			1 2		1 2	1
Permitted Phases					1 2		
Actuated Green, G (s)	22.5			60.5		60.5	34.1
Effective Green, g (s)	22.5			60.5		60.5	34.1
Actuated g/C Ratio	0.24			0.64		0.64	0.36
Clearance Time (s)							6.0
Vehicle Extension (s)							3.0
Lane Grp Cap (vph)	387			1984		1984	500
v/s Ratio Prot	c0.03			0.18		c0.29	0.01
v/s Ratio Perm							
v/c Ratio	0.12			0.29		0.46	0.04
Uniform Delay, d1	28.5			7.7		8.9	19.8
Progression Factor	0.15			1.00		1.00	1.00
Incremental Delay, d2	0.1			0.1		0.2	0.0
Delay (s)	4.5			7.8		9.0	19.8
Level of Service	A			A		A	B
Approach Delay (s)	4.5			7.8		9.5	
Approach LOS	A			A		A	

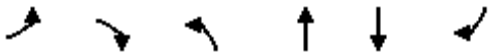
Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	0	206	133	542	865	0
Future Volume (vph)	0	206	133	542	865	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		4.0	6.0	4.0	6.0	
Lane Util. Factor		1.00	0.97	0.95	0.95	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1654	3359	3463	3463	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1654	3359	3463	3463	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	217	140	571	911	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	217	140	571	911	0
Heavy Vehicles (%)	2%	2%	7%	7%	7%	7%
Turn Type		custom	Prot	NA	NA	
Protected Phases		Free!	3 4	Free	1 2!	
Permitted Phases						
Actuated Green, G (s)		95.0	22.5	95.0	60.5	
Effective Green, g (s)		95.0	22.5	95.0	60.5	
Actuated g/C Ratio		1.00	0.24	1.00	0.64	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		1654	795	3463	2205	
v/s Ratio Prot		0.13	c0.04	0.16	c0.26	
v/s Ratio Perm						
v/c Ratio		0.13	0.18	0.16	0.41	
Uniform Delay, d1		0.0	28.9	0.0	8.5	
Progression Factor		1.00	1.00	1.00	0.23	
Incremental Delay, d2		0.2	0.1	0.1	0.1	
Delay (s)		0.2	29.0	0.1	2.1	
Level of Service		A	C	A	A	
Approach Delay (s)	0.2			5.8	2.1	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



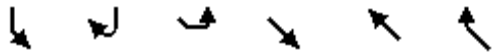
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	133	0	0	43	44	206
Future Volume (vph)	133	0	0	43	44	206
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3523			3632	1912	1625
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3523			3632	1912	1625
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	0	0	45	46	217
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	140	0	0	45	46	217
Turn Type	Prot			NA	NA	Free
Protected Phases	1 2			7 8	3 4	
Permitted Phases						Free
Actuated Green, G (s)	60.5			22.5	22.5	95.0
Effective Green, g (s)	60.5			22.5	22.5	95.0
Actuated g/C Ratio	0.64			0.24	0.24	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	2243			860	452	1625
v/s Ratio Prot	0.04			0.01	0.02	
v/s Ratio Perm						c0.13
v/c Ratio	0.06			0.05	0.10	0.13
Uniform Delay, d1	6.5			28.0	28.3	0.0
Progression Factor	1.72			1.36	1.00	1.00
Incremental Delay, d2	0.0			0.0	0.1	0.2
Delay (s)	11.3			38.1	28.4	0.2
Level of Service	B			D	C	A
Approach Delay (s)	11.3			38.1	5.1	
Approach LOS	B			D	A	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (vph)	35	0	0	830	0	549	37
Future Volume (vph)	35	0	0	830	0	549	37
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0		6.0	6.0
Lane Util. Factor	1.00			0.95		0.95	1.00
Frt	1.00			1.00		1.00	0.85
Flt Protected	0.95			1.00		1.00	1.00
Satd. Flow (prot)	1635			3116		3116	1394
Flt Permitted	0.95			1.00		1.00	1.00
Satd. Flow (perm)	1635			3116		3116	1394
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	0	0	874	0	578	39
RTOR Reduction (vph)	0	0	0	0	0	0	31
Lane Group Flow (vph)	37	0	0	874	0	578	8
Heavy Vehicles (%)	2%	2%	7%	7%	2%	7%	7%
Turn Type	Prot			NA	Perm	NA	custom
Protected Phases	7 8			1 2		1 2	3 4
Permitted Phases					1 2		
Actuated Green, G (s)	19.2			63.8		63.8	19.2
Effective Green, g (s)	19.2			63.8		63.8	19.2
Actuated g/C Ratio	0.20			0.67		0.67	0.20
Clearance Time (s)							
Vehicle Extension (s)							
Lane Grp Cap (vph)	330			2092		2092	281
v/s Ratio Prot	c0.02			c0.28		0.19	0.01
v/s Ratio Perm							
v/c Ratio	0.11			0.42		0.28	0.03
Uniform Delay, d1	30.9			7.1		6.3	30.4
Progression Factor	0.15			1.00		1.00	1.00
Incremental Delay, d2	0.2			0.1		0.1	0.0
Delay (s)	4.9			7.3		6.4	30.5
Level of Service	A			A		A	C
Approach Delay (s)	4.9			7.3		7.9	
Approach LOS	A			A		A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

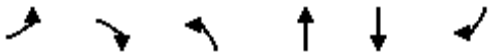


Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	0	128	217	830	549	0
Future Volume (vph)	0	128	217	830	549	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		4.0	6.0	4.0	6.0	
Lane Util. Factor		1.00	0.97	0.95	0.95	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1654	3359	3463	3463	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1654	3359	3463	3463	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	135	228	874	578	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	135	228	874	578	0
Heavy Vehicles (%)	2%	2%	7%	7%	7%	7%
Turn Type		custom	Prot	NA	NA	
Protected Phases		Free!	1	Free	2!	
Permitted Phases						
Actuated Green, G (s)		95.0	25.2	95.0	32.6	
Effective Green, g (s)		95.0	25.2	95.0	32.6	
Actuated g/C Ratio		1.00	0.27	1.00	0.34	
Clearance Time (s)			6.0		6.0	
Vehicle Extension (s)			3.0		3.0	
Lane Grp Cap (vph)		1654	891	3463	1188	
v/s Ratio Prot		0.08	0.07	0.25	c0.17	
v/s Ratio Perm						
v/c Ratio		0.08	0.26	0.25	0.49	
Uniform Delay, d1		0.0	27.5	0.0	24.6	
Progression Factor		1.00	1.00	1.00	0.71	
Incremental Delay, d2		0.1	0.2	0.2	1.4	
Delay (s)		0.1	27.7	0.2	18.9	
Level of Service		A	C	A	B	
Approach Delay (s)	0.1			5.9	18.9	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group



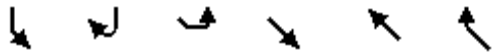
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	217	0	0	37	35	128
Future Volume (vph)	217	0	0	37	35	128
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3523			3632	1912	1625
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3523			3632	1912	1625
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	228	0	0	39	37	135
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	228	0	0	39	37	135
Turn Type	Prot			NA	NA	Free
Protected Phases	1 2			7 8	3 4	
Permitted Phases						Free
Actuated Green, G (s)	63.8			19.2	19.2	95.0
Effective Green, g (s)	63.8			19.2	19.2	95.0
Actuated g/C Ratio	0.67			0.20	0.20	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	2365			734	386	1625
v/s Ratio Prot	c0.06			0.01	0.02	
v/s Ratio Perm						c0.08
v/c Ratio	0.10			0.05	0.10	0.08
Uniform Delay, d1	5.5			30.6	30.8	0.0
Progression Factor	0.00			0.78	1.00	1.00
Incremental Delay, d2	0.0			0.0	0.1	0.1
Delay (s)	0.0			23.8	30.9	0.1
Level of Service	A			C	C	A
Approach Delay (s)	0.0			23.8	6.7	
Approach LOS	A			C	A	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (vph)	142	0	0	846	0	1242	137
Future Volume (vph)	142	0	0	846	0	1242	137
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0		6.0	6.0
Lane Util. Factor	1.00			0.95		0.95	1.00
Frt	1.00			1.00		1.00	0.85
Flt Protected	0.95			1.00		1.00	1.00
Satd. Flow (prot)	1635			3116		3116	1394
Flt Permitted	0.95			1.00		1.00	1.00
Satd. Flow (perm)	1635			3116		3116	1394
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	149	0	0	891	0	1307	144
RTOR Reduction (vph)	0	0	0	0	0	0	87
Lane Group Flow (vph)	149	0	0	891	0	1307	57
Heavy Vehicles (%)	2%	2%	7%	7%	2%	7%	7%
Turn Type	Prot			NA	Perm	NA	custom
Protected Phases	7 8			1 2		1 2	3 4
Permitted Phases					1 2		
Actuated Green, G (s)	27.5			55.5		55.5	27.5
Effective Green, g (s)	27.5			55.5		55.5	27.5
Actuated g/C Ratio	0.29			0.58		0.58	0.29
Clearance Time (s)							
Vehicle Extension (s)							
Lane Grp Cap (vph)	473			1820		1820	403
v/s Ratio Prot	c0.09			0.29		c0.42	0.04
v/s Ratio Perm							
v/c Ratio	0.32			0.49		0.72	0.14
Uniform Delay, d1	26.4			11.5		14.1	25.0
Progression Factor	0.16			1.00		1.00	1.00
Incremental Delay, d2	0.4			0.2		1.4	0.2
Delay (s)	4.7			11.7		15.5	25.2
Level of Service	A			B		B	C
Approach Delay (s)	4.7			11.7		16.5	
Approach LOS	A			B		B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

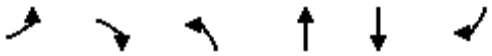


Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	0	663	430	846	1242	0
Future Volume (vph)	0	663	430	846	1242	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		4.0	6.0	4.0	6.0	
Lane Util. Factor		1.00	0.97	0.95	0.95	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1654	3359	3463	3463	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1654	3359	3463	3463	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	698	453	891	1307	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	698	453	891	1307	0
Heavy Vehicles (%)	2%	2%	7%	7%	7%	7%
Turn Type		custom	Prot	NA	NA	
Protected Phases		Free!	3 4	Free	1 2!	
Permitted Phases						
Actuated Green, G (s)		95.0	27.5	95.0	55.5	
Effective Green, g (s)		95.0	27.5	95.0	55.5	
Actuated g/C Ratio		1.00	0.29	1.00	0.58	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		1654	972	3463	2023	
v/s Ratio Prot		0.42	0.13	0.26	c0.38	
v/s Ratio Perm						
v/c Ratio		0.42	0.47	0.26	0.65	
Uniform Delay, d1		0.0	27.7	0.0	13.2	
Progression Factor		1.00	1.00	1.00	0.25	
Incremental Delay, d2		0.7	0.4	0.2	0.5	
Delay (s)		0.7	28.1	0.2	3.8	
Level of Service		A	C	A	A	
Approach Delay (s)	0.7			9.6	3.8	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group



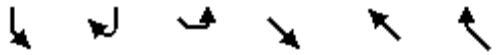
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	430	0	0	137	142	663
Future Volume (vph)	430	0	0	137	142	663
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3523			3632	1912	1625
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3523			3632	1912	1625
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	453	0	0	144	149	698
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	453	0	0	144	149	698
Turn Type	Prot			NA	NA	Free
Protected Phases	1 2			7 8	3 4	
Permitted Phases						Free
Actuated Green, G (s)	55.5			27.5	27.5	95.0
Effective Green, g (s)	55.5			27.5	27.5	95.0
Actuated g/C Ratio	0.58			0.29	0.29	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	2058			1051	553	1625
v/s Ratio Prot	0.13			0.04	0.08	
v/s Ratio Perm						c0.43
v/c Ratio	0.22			0.14	0.27	0.43
Uniform Delay, d1	9.4			25.0	26.0	0.0
Progression Factor	1.80			0.80	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.3	0.8
Delay (s)	17.0			20.0	26.3	0.8
Level of Service	B			B	C	A
Approach Delay (s)	17.0			20.0	5.3	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBR	SEL	SET	NWU	NWT	NWR
Lane Configurations							
Traffic Volume (vph)	114	0	0	1256	0	781	120
Future Volume (vph)	114	0	0	1256	0	781	120
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0		6.0	6.0
Lane Util. Factor	1.00			0.95		0.95	1.00
Frt	1.00			1.00		1.00	0.85
Flt Protected	0.95			1.00		1.00	1.00
Satd. Flow (prot)	1635			3116		3116	1394
Flt Permitted	0.95			1.00		1.00	1.00
Satd. Flow (perm)	1635			3116		3116	1394
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	120	0	0	1322	0	822	126
RTOR Reduction (vph)	0	0	0	0	0	0	80
Lane Group Flow (vph)	120	0	0	1322	0	822	46
Heavy Vehicles (%)	2%	2%	7%	7%	2%	7%	7%
Turn Type	Prot			NA	Perm	NA	custom
Protected Phases	7 8			1 2		1 2	3 4
Permitted Phases					1 2		
Actuated Green, G (s)	34.6			48.4		48.4	34.6
Effective Green, g (s)	34.6			48.4		48.4	34.6
Actuated g/C Ratio	0.36			0.51		0.51	0.36
Clearance Time (s)							
Vehicle Extension (s)							
Lane Grp Cap (vph)	595			1587		1587	507
v/s Ratio Prot	c0.07			c0.42		0.26	0.03
v/s Ratio Perm							
v/c Ratio	0.20			0.83		0.52	0.09
Uniform Delay, d1	20.7			19.9		15.5	19.9
Progression Factor	0.18			1.00		1.00	1.00
Incremental Delay, d2	0.2			3.7		0.3	0.1
Delay (s)	3.9			23.6		15.8	19.9
Level of Service	A			C		B	B
Approach Delay (s)	3.9			23.6		16.4	
Approach LOS	A			C		B	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

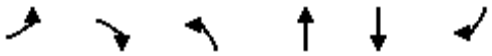


Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	0	411	698	1256	781	0
Future Volume (vph)	0	411	698	1256	781	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		4.0	6.0	4.0	6.0	
Lane Util. Factor		1.00	0.97	0.95	0.95	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1654	3359	3463	3463	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1654	3359	3463	3463	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	433	735	1322	822	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	433	735	1322	822	0
Heavy Vehicles (%)	2%	2%	7%	7%	7%	7%
Turn Type		custom	Prot	NA	NA	
Protected Phases		Free!	3 4	Free	1 2!	
Permitted Phases						
Actuated Green, G (s)		95.0	34.6	95.0	48.4	
Effective Green, g (s)		95.0	34.6	95.0	48.4	
Actuated g/C Ratio		1.00	0.36	1.00	0.51	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		1654	1223	3463	1764	
v/s Ratio Prot		0.26	c0.22	0.38	c0.24	
v/s Ratio Perm						
v/c Ratio		0.26	0.60	0.38	0.47	
Uniform Delay, d1		0.0	24.6	0.0	15.0	
Progression Factor		1.00	1.00	1.00	0.19	
Incremental Delay, d2		0.4	0.8	0.3	0.2	
Delay (s)		0.4	25.4	0.3	3.1	
Level of Service		A	C	A	A	
Approach Delay (s)	0.4			9.3	3.1	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	698	0	0	120	114	411
Future Volume (vph)	698	0	0	120	114	411
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	6.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3523			3632	1912	1625
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3523			3632	1912	1625
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	735	0	0	126	120	433
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	735	0	0	126	120	433
Turn Type	Prot			NA	NA	Free
Protected Phases	1 2			7 8	3 4	
Permitted Phases						Free
Actuated Green, G (s)	48.4			34.6	34.6	95.0
Effective Green, g (s)	48.4			34.6	34.6	95.0
Actuated g/C Ratio	0.51			0.36	0.36	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	1794			1322	696	1625
v/s Ratio Prot	c0.21			0.03	0.06	
v/s Ratio Perm						c0.27
v/c Ratio	0.41			0.10	0.17	0.27
Uniform Delay, d1	14.4			19.9	20.5	0.0
Progression Factor	1.67			0.85	1.00	1.00
Incremental Delay, d2	0.1			0.0	0.1	0.4
Delay (s)	24.3			16.9	20.6	0.4
Level of Service	C			B	C	A
Approach Delay (s)	24.3			16.9	4.8	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBT	SBR2	NWT	NWR	NEL
Lane Configurations					
Traffic Volume (vph)	44	206	865	43	133
Future Volume (vph)	44	206	865	43	133
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	0.95	1.00	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1863	1583	3374	1509	3273
Flt Permitted	1.00	1.00	1.00	1.00	0.95
Satd. Flow (perm)	1863	1583	3374	1509	3273
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	217	911	45	140
RTOR Reduction (vph)	0	35	0	11	0
Lane Group Flow (vph)	46	182	911	34	140
Heavy Vehicles (%)	2%	2%	7%	7%	7%
Turn Type	NA	custom	NA	custom	Prot
Protected Phases	4	4 1	2	2 4	1
Permitted Phases					
Actuated Green, G (s)	13.1	28.3	49.7	68.8	9.2
Effective Green, g (s)	13.1	28.3	49.7	68.8	9.2
Actuated g/C Ratio	0.15	0.31	0.55	0.76	0.10
Clearance Time (s)	6.0		6.0		6.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	271	497	1863	1153	334
v/s Ratio Prot	0.02	c0.11	c0.27	0.02	0.04
v/s Ratio Perm					
v/c Ratio	0.17	0.37	0.49	0.03	0.42
Uniform Delay, d1	33.7	23.9	12.4	2.6	37.9
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.5	0.9	0.0	0.9
Delay (s)	34.0	24.4	13.3	2.6	38.7
Level of Service	C	C	B	A	D
Approach Delay (s)	26.0		12.8		38.7
Approach LOS	C		B		D

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR2	NWT	NWR	NEL
Lane Configurations					
Traffic Volume (vph)	35	128	549	37	217
Future Volume (vph)	35	128	549	37	217
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	0.95	1.00	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1863	1583	3374	1509	3273
Flt Permitted	1.00	1.00	1.00	1.00	0.95
Satd. Flow (perm)	1863	1583	3374	1509	3273
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	135	578	39	228
RTOR Reduction (vph)	0	86	0	10	0
Lane Group Flow (vph)	37	49	578	29	228
Heavy Vehicles (%)	2%	2%	7%	7%	7%
Turn Type	NA	custom	NA	custom	Prot
Protected Phases	4	4 1	2	2 4	1
Permitted Phases					
Actuated Green, G (s)	7.5	25.1	52.9	66.4	11.6
Effective Green, g (s)	7.5	25.1	52.9	66.4	11.6
Actuated g/C Ratio	0.08	0.28	0.59	0.74	0.13
Clearance Time (s)	6.0		6.0		6.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	155	441	1983	1113	421
v/s Ratio Prot	c0.02	0.03	c0.17	0.02	c0.07
v/s Ratio Perm					
v/c Ratio	0.24	0.11	0.29	0.03	0.54
Uniform Delay, d1	38.6	24.2	9.2	3.2	36.7
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.1	0.4	0.0	1.4
Delay (s)	39.4	24.3	9.6	3.2	38.1
Level of Service	D	C	A	A	D
Approach Delay (s)	27.5		9.2		38.1
Approach LOS	C		A		D

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR2	NWT	NWR	NEL
Lane Configurations					
Traffic Volume (vph)	142	663	1242	137	430
Future Volume (vph)	142	663	1242	137	430
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	0.95	1.00	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1863	1583	3374	1509	3273
Flt Permitted	1.00	1.00	1.00	1.00	0.95
Satd. Flow (perm)	1863	1583	3374	1509	3273
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	149	698	1307	144	453
RTOR Reduction (vph)	0	19	0	17	0
Lane Group Flow (vph)	149	679	1307	127	453
Heavy Vehicles (%)	2%	2%	7%	7%	7%
Turn Type	NA	custom	NA	custom	Prot
Protected Phases	4	4 1	2	2 4	1
Permitted Phases					
Actuated Green, G (s)	18.0	41.8	36.2	60.2	17.8
Effective Green, g (s)	18.0	41.8	36.2	60.2	17.8
Actuated g/C Ratio	0.20	0.46	0.40	0.67	0.20
Clearance Time (s)	6.0		6.0		6.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	372	735	1357	1009	647
v/s Ratio Prot	0.08	c0.43	c0.39	0.08	0.14
v/s Ratio Perm					
v/c Ratio	0.40	0.92	0.96	0.13	0.70
Uniform Delay, d1	31.3	22.6	26.2	5.4	33.6
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	17.2	17.1	0.1	3.4
Delay (s)	32.0	39.8	43.3	5.4	37.0
Level of Service	C	D	D	A	D
Approach Delay (s)	38.4		39.6		37.0
Approach LOS	D		D		D

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR2	NWT	NWR	NEL
Lane Configurations					
Traffic Volume (vph)	114	411	781	120	698
Future Volume (vph)	114	411	781	120	698
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	0.95	1.00	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	1.00	1.00	0.95
Satd. Flow (prot)	1863	1583	3374	1509	3273
Flt Permitted	1.00	1.00	1.00	1.00	0.95
Satd. Flow (perm)	1863	1583	3374	1509	3273
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	120	433	822	126	735
RTOR Reduction (vph)	0	17	0	14	0
Lane Group Flow (vph)	120	416	822	112	735
Heavy Vehicles (%)	2%	2%	7%	7%	7%
Turn Type	NA	custom	NA	custom	Prot
Protected Phases	4	4 1	2	2 4	1
Permitted Phases					
Actuated Green, G (s)	17.3	47.3	30.7	54.0	24.0
Effective Green, g (s)	17.3	47.3	30.7	54.0	24.0
Actuated g/C Ratio	0.19	0.53	0.34	0.60	0.27
Clearance Time (s)	6.0		6.0		6.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	358	831	1150	905	872
v/s Ratio Prot	0.06	c0.26	c0.24	0.07	c0.22
v/s Ratio Perm					
v/c Ratio	0.34	0.50	0.71	0.12	0.84
Uniform Delay, d1	31.4	13.7	25.8	7.8	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.5	3.8	0.1	7.5
Delay (s)	31.9	14.2	29.6	7.8	38.7
Level of Service	C	B	C	A	D
Approach Delay (s)	18.1		26.7		38.7
Approach LOS	B		C		D

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

SR 70 @ UIHLEIN RD ROUNDABOUT ANALYSIS

2025 OPENING YEAR (HCM 6th Edition)

Approach	Delay (s)		Level of Service		v/c Ratio		95th % Queue (ft)	
	AM	PM	AM	PM	AM	PM	AM	PM
Overall	**5.8**	**6.2**	**A**	**A**				
SR 70 EB	5.3	7.1	A	A	0.28	0.43	35	65
SR 70 WB	7.3	6.2	A	A	0.41	0.29	60	35
Uihlein Rd SB	1.2	1.0	A	A	0.13	0.08	25	25

2025 OPENING YEAR (Sidra Standard)

Approach	Delay (s)		Level of Service		v/c Ratio		95th % Queue (ft)	
	AM	PM	AM	PM	AM	PM	AM	PM
Overall	**4.6**	**4.8**	**A**	**A**				
SR 70 EB	4.7	4.8	A	A	0.25	0.38	45	75
SR 70 WB	4.4	4.7	A	A	0.36	0.25	65	40
Uihlein Rd SB	5.0	5.2	A	A	0.13	0.08	25	25

2045 DESIGN YEAR (HCM 6th Edition)

Approach	Delay (s)		Level of Service		v/c Ratio		95th % Queue (ft)	
	AM	PM	AM	PM	AM	PM	AM	PM
Overall	**15.2**	**19.6**	**C**	**C**				
SR 70 EB	10.3	23.0	B	C	0.58	0.87	105	585
SR 70 WB	27.1	22.7	D	C	0.85	0.73	435	180
Uihlein Rd SB	2.7	1.7	A	A	0.43	0.26	35	25

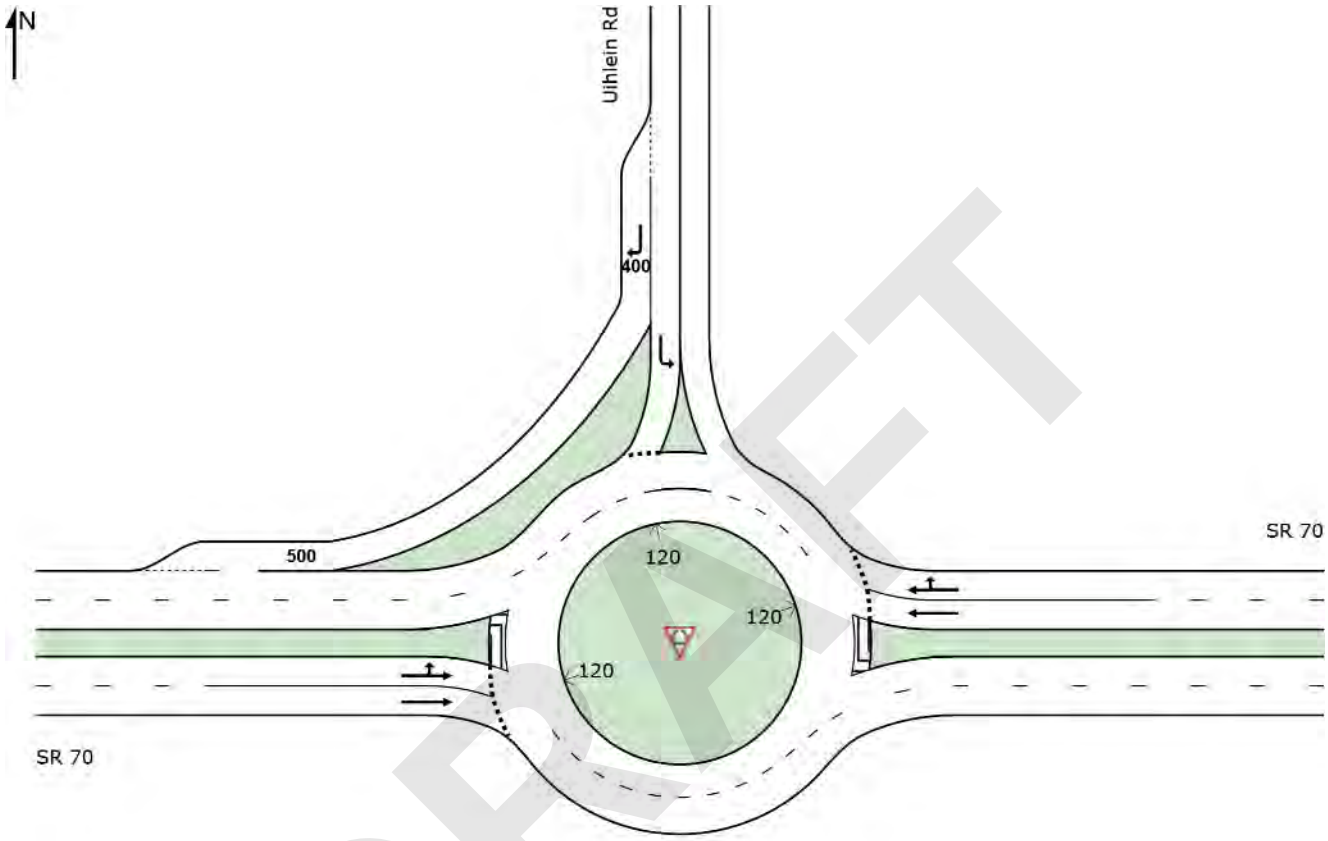
2045 DESIGN YEAR (Sidra Standard)

Approach	Delay (s)		Level of Service		v/c Ratio		95th % Queue (ft)	
	AM	PM	AM	PM	AM	PM	AM	PM
Overall	**7.9**	**8.9**	**A**	**A**				
SR 70 EB	6.5	7.1	A	A	0.52	0.76	125	280
SR 70 WB	10.6	14.8	B	B	0.72	0.67	255	230
Uihlein Rd SB	5.5	5.4	A	A	0.43	0.26	40	25

SITE LAYOUT

Site: [SR 70 & Uihlein Rd]

Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2025 AM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	911	7.0	0.413	7.3	LOS A	2.2	58.2	0.38	0.24	0.38	34.5
12	R2	45	7.0	0.413	7.3	LOS A	2.2	58.2	0.38	0.24	0.38	33.2
Approach		956	7.0	0.413	7.3	LOS A	2.2	58.2	0.38	0.24	0.38	34.4
North: Uihlein Rd												
3	L2	46	2.0	0.076	6.8	LOS A	0.3	6.4	0.59	0.59	0.59	32.1
18	R2	217	2.0	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.7
Approach		263	2.0	0.132	1.2	LOS A	0.3	6.4	0.10	0.10	0.10	36.5
West: SR 70												
1	L2	140	7.0	0.279	5.3	LOS A	1.3	35.3	0.17	0.07	0.17	34.4
8	T1	571	7.0	0.279	5.3	LOS A	1.3	35.3	0.17	0.07	0.17	35.2
Approach		711	7.0	0.279	5.3	LOS A	1.3	35.3	0.17	0.07	0.17	35.0
All Vehicles		1929	6.3	0.413	5.8	LOS A	2.2	58.2	0.26	0.16	0.26	34.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2025 AM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	911	7.0	0.356	4.4	LOS A	2.4	62.8	0.39	0.43	0.39	37.2
12	R2	45	7.0	0.356	4.6	LOS A	2.4	62.8	0.37	0.42	0.37	35.8
Approach		956	7.0	0.356	4.4	LOS A	2.4	62.8	0.39	0.43	0.39	37.1
North: Uihlein Rd												
3	L2	46	2.0	0.063	12.8	LOS B	0.2	6.3	0.58	0.80	0.58	33.9
18	R2	217	2.0	0.132	3.4	LOS A	0.0	0.0	0.00	0.41	0.00	37.7
Approach		263	2.0	0.132	5.0	LOS A	0.2	6.3	0.10	0.48	0.10	36.9
West: SR 70												
1	L2	140	7.0	0.245	10.3	LOS B	1.6	42.9	0.22	0.49	0.22	36.6
8	T1	571	7.0	0.245	3.4	LOS A	1.7	43.9	0.21	0.38	0.21	37.6
Approach		711	7.0	0.245	4.7	LOS A	1.7	43.9	0.21	0.40	0.21	37.4
All Vehicles		1929	6.3	0.356	4.6	LOS A	2.4	62.8	0.28	0.43	0.28	37.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2025 PM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	578	7.0	0.290	6.2	LOS A	1.3	34.3	0.42	0.30	0.42	35.1
12	R2	39	7.0	0.290	6.2	LOS A	1.3	34.3	0.42	0.30	0.42	33.7
Approach		617	7.0	0.290	6.2	LOS A	1.3	34.3	0.42	0.30	0.42	35.0
North: Uihlein Rd												
3	L2	37	2.0	0.045	4.8	LOS A	0.2	3.9	0.49	0.41	0.49	33.0
18	R2	135	2.0	0.082	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.7
Approach		172	2.0	0.082	1.0	LOS A	0.2	3.9	0.11	0.09	0.11	36.5
West: SR 70												
1	L2	228	7.0	0.430	7.1	LOS A	2.5	66.5	0.18	0.07	0.18	33.5
8	T1	874	7.0	0.430	7.1	LOS A	2.5	66.5	0.18	0.07	0.18	34.2
Approach		1102	7.0	0.430	7.1	LOS A	2.5	66.5	0.18	0.07	0.18	34.1
All Vehicles		1891	6.5	0.430	6.2	LOS A	2.5	66.5	0.25	0.15	0.25	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2025 PM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	578	7.0	0.246	4.7	LOS A	1.5	39.2	0.44	0.47	0.44	37.0
12	R2	39	7.0	0.246	4.9	LOS A	1.5	39.2	0.43	0.45	0.43	35.6
Approach		617	7.0	0.246	4.7	LOS A	1.5	39.2	0.44	0.46	0.44	36.9
North: Uihlein Rd												
3	L2	37	2.0	0.043	11.9	LOS B	0.2	4.2	0.50	0.72	0.50	34.1
18	R2	135	2.0	0.082	3.4	LOS A	0.0	0.0	0.00	0.41	0.00	37.7
Approach		172	2.0	0.082	5.2	LOS A	0.2	4.2	0.11	0.48	0.11	36.8
West: SR 70												
1	L2	228	7.0	0.376	10.3	LOS B	2.9	75.7	0.22	0.49	0.22	36.5
8	T1	874	7.0	0.376	3.4	LOS A	2.9	76.6	0.21	0.38	0.21	37.5
Approach		1102	7.0	0.376	4.8	LOS A	2.9	76.6	0.21	0.40	0.21	37.3
All Vehicles		1891	6.5	0.376	4.8	LOS A	2.9	76.6	0.28	0.43	0.28	37.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2045 AM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	1307	7.0	0.850	27.1	LOS D	16.5	436.7	0.93	1.52	2.45	26.5
12	R2	144	7.0	0.850	27.1	LOS D	16.5	436.7	0.93	1.52	2.45	25.7
Approach		1452	7.0	0.850	27.1	LOS D	16.5	436.7	0.93	1.52	2.45	26.5
North: Uihlein Rd												
3	L2	149	2.0	0.353	14.8	LOS B	1.3	34.3	0.78	0.84	1.01	29.0
18	R2	698	2.0	0.425	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.6
Approach		847	2.0	0.425	2.7	LOS A	1.3	34.3	0.14	0.15	0.18	35.6
West: SR 70												
1	L2	453	7.0	0.581	10.3	LOS B	3.9	103.2	0.48	0.31	0.48	31.3
8	T1	891	7.0	0.581	10.3	LOS B	3.9	103.2	0.48	0.31	0.48	32.6
Approach		1343	7.0	0.581	10.3	LOS B	3.9	103.2	0.48	0.31	0.48	32.2
All Vehicles		3642	5.8	0.850	15.2	LOS C	16.5	436.7	0.58	0.76	1.19	30.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2045 AM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	1307	7.0	0.723	10.6	LOS B	9.7	255.6	0.92	0.96	1.19	34.6
12	R2	144	7.0	0.723	10.0	LOS B	9.7	255.6	0.91	0.92	1.15	33.7
Approach		1452	7.0	0.723	10.6	LOS B	9.7	255.6	0.92	0.96	1.19	34.5
North: Uihlein Rd												
3	L2	149	2.0	0.324	15.0	LOS B	1.7	42.0	0.82	0.95	0.85	32.9
18	R2	698	2.0	0.425	3.4	LOS A	0.0	0.0	0.00	0.41	0.00	37.6
Approach		847	2.0	0.425	5.5	LOS A	1.7	42.0	0.14	0.51	0.15	36.6
West: SR 70												
1	L2	453	7.0	0.515	11.2	LOS B	4.6	121.4	0.55	0.61	0.55	34.7
8	T1	891	7.0	0.515	4.1	LOS A	4.8	126.0	0.53	0.46	0.53	36.4
Approach		1343	7.0	0.515	6.5	LOS A	4.8	126.0	0.53	0.51	0.53	35.8
All Vehicles		3642	5.8	0.723	7.9	LOS A	9.7	255.6	0.60	0.69	0.71	35.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2045 PM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	822	7.0	0.731	22.7	LOS C	6.7	178.1	0.84	1.16	1.83	28.0
12	R2	126	7.0	0.731	22.7	LOS C	6.7	178.1	0.84	1.16	1.83	27.1
Approach		948	7.0	0.731	22.7	LOS C	6.7	178.1	0.84	1.16	1.83	27.8
North: Uihlein Rd												
3	L2	120	2.0	0.182	7.6	LOS A	0.6	16.4	0.61	0.61	0.61	31.8
18	R2	433	2.0	0.264	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.6
Approach		553	2.0	0.264	1.7	LOS A	0.6	16.4	0.13	0.13	0.13	36.1
West: SR 70												
1	L2	735	7.0	0.866	23.0	LOS C	22.2	585.2	0.81	0.67	1.10	26.7
8	T1	1322	7.0	0.866	23.0	LOS C	22.2	585.2	0.81	0.69	1.10	27.7
Approach		2057	7.0	0.866	23.0	LOS C	22.2	585.2	0.81	0.68	1.10	27.3
All Vehicles		3558	6.2	0.866	19.6	LOS C	22.2	585.2	0.71	0.73	1.15	28.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [SR 70 & Uihlein Rd]

2045 PM Peak-Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
East: SR 70												
4	T1	822	7.0	0.673	14.9	LOS B	8.6	227.6	1.00	1.12	1.38	32.5
12	R2	126	7.0	0.673	13.9	LOS B	8.6	227.6	1.00	1.09	1.36	31.9
Approach		948	7.0	0.673	14.8	LOS B	8.6	227.6	1.00	1.12	1.38	32.4
North: Uihlein Rd												
3	L2	120	2.0	0.184	12.8	LOS B	0.9	22.1	0.68	0.85	0.68	33.6
18	R2	433	2.0	0.264	3.4	LOS A	0.0	0.0	0.00	0.41	0.00	37.6
Approach		553	2.0	0.264	5.4	LOS A	0.9	22.1	0.15	0.51	0.15	36.6
West: SR 70												
1	L2	735	7.0	0.763	11.6	LOS B	10.5	276.4	0.74	0.60	0.74	34.1
8	T1	1322	7.0	0.763	4.5	LOS A	10.7	281.5	0.69	0.49	0.69	35.9
Approach		2057	7.0	0.763	7.1	LOS A	10.7	281.5	0.71	0.53	0.71	35.2
All Vehicles		3558	6.2	0.763	8.9	LOS A	10.7	281.5	0.70	0.68	0.80	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ATTACHMENT D

Safety Performance for Intersection Control Evaluation (SPICE)

Federal Highway Administration (FHWA)
Safety Performance for Intersection Control Evaluation Tool

Results

Summary of crash prediction results for each alternative

Project Information

Project Name:	SR 70 from Lorraine Rd to CR 675	**Intersection Type**	At-Grade Intersections
Intersection:	SR 70 @ Uihlein	**Opening Year**	2025
Agency:	D1	**Design Year**	2045
Project Reference:	414506-2-22-01	**Facility Type**	On Urban and Suburban Arterial
City:	Unincorporated Manatee County	**Number of Legs**	3-leg
State:	FL	**1-Way/2-Way**	2-way Intersecting 2-way
Date:	6/24/2019	**# of Major Street Lanes (both directions)**	5 or fewer
Analyst:	Nicole Harris, PE	**Major Street Approach Speed**	Less than 55 mph

Crash Prediction Summary

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Rank	AADT Within Prediction Range?	Source of Prediction
Traffic Signal	Total	5.18	12.50	184.09	4	Yes	Calibrated SPF
	Fatal & Injury	1.84	3.90	60.20			
2-lane Roundabout	Total	7.00	14.82	228.09	1	N/A	Uncalibrated SPF
	Fatal & Injury	1.23	2.98	43.57			
Displaced Left Turn (DLT)	Total	4.56	11.00	162.00	3	N/A	CMF
	Fatal & Injury	1.62	3.43	52.98			
Continuous Green-T Intersection	Total	4.97	12.00	176.72	2	N/A	CMF
	Fatal & Injury	1.56	3.31	51.17			

ATTACHMENT E

Cost Estimates

SR 70 and Uihlein
Signalized Intersection
Cost Estimate

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Notes
ROADWAY: Area of influence of intersection is 1800-ft or 0.34 miles along SR 70						This area area will be fully reconstructed
101-1	MOBILIZATION	10.00	%		$ 158,192.57	
102-1	MAINTENANCE OF TRAFFIC	10.00	%		$ 158,192.57	
110-1-1	CLEARING & GRUBBING	8.27	AC	$ 11,000.00	$ 90,970.00	Clear area within the right of way in the 1800-ft limits: (1800 * 200 ft)/43560=8.27 AC
120-1	REGULAR EXCAVATION	3,291.20	CY	$ 5.10	$ 16,785.12	Cost per mile from model @ 0.34 miles
160-4	TYPE B STABILIZATION	20,206.67	SY	$ 3.80	$ 76,785.33	Area to be constructed and stabilized including shoulders -2x [1800*(2.5+6.5+24+4+2.5)] + 24 (500) + 30(750)+12*430 /9
285-709	OPTIONAL BASE,BASE GROUP 09	18,206.67	SY	$ 17.00	$ 309,513.33	Paved area to be constructed:Use typical section 2x [1800*(6.5+24+4)] + 24 (500) + 30(750)+12*430 /9
327-70-4	MILLING EXIST ASPH PAVT, 3" AVG DEPTH	270.78	SY	$ 2.40	$ 649.87	Area to be milled and resurfaced: Use typical section (8388 SF/9) for side street - shape
334-1-24	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA	3,668.41	TN	$ 100.00	$ 366,841.11	Assume Traffic C: Area to be contructed +Area to be millied: (17000 *400)/2000
337-7-41	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22	739.10	TN	$ 105.00	$ 77,605.27	Assume Traffic C: (17000*80)/2000
430-175-112	PIPE CULV, OPT MATL, ROUND, 12"S/CD	658.24	LF	$ 91.00	$ 59,899.84	Cost per mile from model @ 0.34 miles
520-1-10	CONCRETE CURB & GUTTER, TYPE E	3,590.40	LF	$ 20.00	$ 71,808.00	Cost per mile from model @ 0.34 miles
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 5"	1,994.44	SY	$ 38.00	$ 75,788.72	Cost per mile from model @ 0.34 miles
570-1-2	PERFORMANCE TURF, SOD	4,438.13	SY	$ 2.60	$ 11,539.14	Cost per mile from model @ 0.34 miles
715-511-140	LIGHT POLE COMP,F&I,SGL ARM SM, AL,40'	11.90	EA	$ 14,600.00	$ 173,740.00	Cost per mile from model @ 0.34 miles
	Signalization	1.00	PI	$ 250,000.00	$ 250,000.00	$250,000 for SR 70 @ Uihlein
	Partial Total				$ 1,581,925.73	
	Roadway Total				$ 1,898,310.88	
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	10%			$ 189,831.09	
Intersection Grand Total					$ 2,088,142	

Notes:

PAY ITEM list was created based on FDOT LRE Cost per Mile: MODEL WUUA24-U-19-BB. Contingency covers all other items not shown in Table

Pavement design was assumed to be 4-in for travel lanes and 2-in for shoulders

MOT and MOBILIZATION 10% EACH

No right of way impacts. Potential minor utility impacts to be covered by contingency pay item

SR 70 and Uihlein Road
Roundabout
Cost Estimate

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Notes
ROADWAY: Area of influence of intersection is 1800-ft or 0.34 miles along SR 70						This area area will be fully reconstructed
101-1	MOBILIZATION	10.00	%		$ 132,869.04	
102-1	MAINTENANCE OF TRAFFIC	10.00	%		$ 132,869.04	
110-1-1	CLEARING & GRUBBING	8.27	AC	$ 11,000.00	$ 90,970.00	Clear area within the right of way in the 1800-ft limits: (1800 * 200 ft)/43560=8.27 AC
120-1	REGULAR EXCAVATION	3,291.20	CY	$ 5.10	$ 16,785.12	Cost per mile from model @ 0.34 miles
160-4	TYPE B STABILIZATION	24,675.56	SY	$ 3.80	$ 93,767.11	Area to be constructed and stabilized including unpaved shoulders - Use shapes from DGN
285-709	OPTIONAL BASE,BASE GROUP 09	17,716.56	SY	$ 17.00	$ 301,181.44	Paved area to be constructed
327-70-4	MILLING EXIST ASPH PAVT, 3" AVG DEPTH	270.78	SY	$ 2.40	$ 649.87	Area to be milled and resurfaced: Use typical section (2437 SF/9) for side street - shape
334-1-24	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA	3,570.20	TN	$ 100.00	$ 357,020.00	Assume Traffic C: Area to be contructed +Area to be milled: (17716*400 + 270*200)/2000 - Use Optional Base Group Area for new construction
337-7-41	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22	719.44	TN	$ 105.00	$ 75,541.20	Assume Traffic C: (17716*80 + 270 SY*80)/2000
430-175-112	PIPE CULV, OPT MATL, ROUND, 12"S/CD	658.24	LF	$ 91.00	$ 59,899.84	Cost per mile from model @ 0.34 miles
520-1-10	CONCRETE CURB & GUTTER, TYPE E	3,590.40	LF	$ 20.00	$ 71,808.00	Cost per mile from model @ 0.34 miles
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 5"	1,994.44	SY	$ 38.00	$ 75,788.72	Cost per mile from model @ 0.34 miles
570-1-2	PERFORMANCE TURF, SOD	4,438.13	SY	$ 2.60	$ 11,539.14	Cost per mile from model @ 0.34 miles
715-511-140	LIGHT POLE COMP,F&I,SGL ARM SM, AL,40'	11.90	EA	$ 14,600.00	$ 173,740.00	Cost per mile from model @ 0.34 miles
	Signalization	-	PI	$ 250,000.00	$ -	
	Partial Total				$ 1,328,690.45	
	Roadway Total				$ 1,594,428.54	
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	10%			$ 159,442.85	
-	Right of Way Cost Estimate	-	-	-	$ 30,000.00	Details of the right of way estimate are included in Attachment E.
Intersection Grand Total					$ 1,783,871	

Notes:

PAY ITEM list was created based on FDOT LRE Cost per Mile: MODEL WUUA24-U-19-BB. Contingency covers all other items not shown in Table

Pavement design was assumed to be 4-in for travel lanes and 2-in for shoulders

MOT and MOBILIZATION 10% EACH

Minor right of way impacts (236 square feet). Potential utility impacts to be covered by contingency pay item

SR 70 and Uihlein Road
Partial Displaced Left-turn Intersection
Cost Estimate

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Notes
ROADWAY: Area of influence of intersection is 1800-ft or 0.34 miles along SR 70						This area area will be fully reconstructed
101-1	MOBILIZATION	10.00	%		$ 181,258.17	
102-1	MAINTENANCE OF TRAFFIC	10.00	%		$ 181,258.17	
110-1-1	CLEARING & GRUBBING	8.27	AC	$ 11,000.00	$ 90,970.00	Clear area within the right of way in the 1800-ft limits: (1800 * 200 ft)/43560=8.27 AC
120-1	REGULAR EXCAVATION	3,291.20	CY	$ 5.10	$ 16,785.12	Cost per mile from model @ 0.34 miles
160-4	TYPE B STABILIZATION	22,173.78	SY	$ 3.80	$ 84,260.36	Area to be constructed and stabilized including unpaved shoulders - Use shapes from DGN
285-709	OPTIONAL BASE,BASE GROUP 09	19,955.00	SY	$ 17.00	$ 339,235.00	Paved area to be constructed - Stabilization minus 10%
327-70-4	MILLING EXIST ASPH PAVT, 3" AVG DEPTH	340.22	SY	$ 2.40	$ 816.53	Area to be milled and resurfaced: Use typical section (3062 SF/9) for side street - shape
334-1-24	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA	4,025.00	TN	$ 100.00	$ 402,500.00	Assume Traffic C: Area to be contructed +Area to be millied: (19955*400 + 340*200)/2000 - Use Optional Base Group Area for new construction
337-7-41	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22	811.80	TN	$ 105.00	$ 85,239.00	Assume Traffic C: (19955*80 + 340 SY*80)/2000
430-175-112	PIPE CULV, OPT MATL, ROUND, 12"S/CD	658.24	LF	$ 91.00	$ 59,899.84	Cost per mile from model @ 0.34 miles
520-1-10	CONCRETE CURB & GUTTER, TYPE E	3,590.40	LF	$ 20.00	$ 71,808.00	Cost per mile from model @ 0.34 miles
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 5"	1,994.44	SY	$ 38.00	$ 75,788.72	Cost per mile from model @ 0.34 miles
570-1-2	PERFORMANCE TURF, SOD	4,438.13	SY	$ 2.60	$ 11,539.14	Cost per mile from model @ 0.34 miles
715-511-140	LIGHT POLE COMP,F&I,SGL ARM SM, AL,40'	11.90	EA	$ 14,600.00	$ 173,740.00	Cost per mile from model @ 0.34 miles
	Signalization	2.00	PI	$ 400,000.00	$ 400,000.00	$250,000 for SR 70 @ Uihlein and $150,000 for 1 displaced left intersections along SR 70) = $400,000
	Partial Total				$ 1,812,581.71	
	Roadway Total				$ 2,175,098.06	
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	10%			$ 217,509.81	
-	Right of Way Cost Estimate	-	-	-	$ 1,820,000.00	Details of the right of way estimate are included in Attachment E.
Intersection Grand Total					$ 4,212,608	

Notes:

PAY ITEM list was created based on FDOT LRE Cost per Mile: MODEL WUUA24-U-19-BB. Contingency covers all other items not shown in Table

Pavement design was assumed to be 4-in for travel lanes and 2-in for shoulders

MOT and MOBILIZATION 10% EACH

Right of way impacts are anticipated.

Potential impacts to one pole of the overhead transmission lines.

SR 70 and Uihlein Road
Continuous Green Tee Intersection
Cost Estimate

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Notes
ROADWAY: Area of influence of intersection is 1800-ft or 0.34 miles along SR 70						This area area will be fully reconstructed
101-1	MOBILIZATION	10.00	%		$ 162,734.89	
102-1	MAINTENANCE OF TRAFFIC	10.00	%		$ 162,734.89	
110-1-1	CLEARING & GRUBBING	8.27	AC	$ 11,000.00	$ 90,970.00	Clear area within the right of way in the 1800-ft limits: (1800 * 200 ft)/43560=8.27 AC
120-1	REGULAR EXCAVATION	3,291.20	CY	$ 5.10	$ 16,785.12	Cost per mile from model @ 0.34 miles
160-4	TYPE B STABILIZATION	21,339.00	SY	$ 3.80	$ 81,088.20	Area to be constructed and stabilized including unpaved shoulders - Use shapes from DGN
285-709	OPTIONAL BASE,BASE GROUP 09	19,205.00	SY	$ 17.00	$ 326,485.00	Paved area to be constructed
327-70-4	MILLING EXIST ASPH PAVT, 3" AVG DEPTH	270.78	SY	$ 2.40	$ 649.87	Area to be milled and resurfaced: Use typical section (2437 SF/9) for side street - shape
334-1-24	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA	3,868.00	TN	$ 100.00	$ 386,800.00	Assume Traffic C: Area to be contructed +Area to be milled: (19205*400 + 270*200)/2000 - Use Optional Base Group Area for new construction
337-7-41	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22	779.00	TN	$ 105.00	$ 81,795.00	Assume Traffic C: (19205*80 + 270 SY*80)/2000
430-175-112	PIPE CULV, OPT MATL, ROUND, 12"S/CD	658.24	LF	$ 91.00	$ 59,899.84	Cost per mile from model @ 0.34 miles
520-1-10	CONCRETE CURB & GUTTER, TYPE E	3,590.40	LF	$ 20.00	$ 71,808.00	Cost per mile from model @ 0.34 miles
522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 5"	1,994.44	SY	$ 38.00	$ 75,788.72	Cost per mile from model @ 0.34 miles
570-1-2	PERFORMANCE TURF, SOD	4,438.13	SY	$ 2.60	$ 11,539.14	Cost per mile from model @ 0.34 miles
715-511-140	LIGHT POLE COMP,F&I,SGL ARM SM, AL,40'	11.90	EA	$ 14,600.00	$ 173,740.00	Cost per mile from model @ 0.34 miles
	Signalization	1.00	PI	$ 250,000.00	$ 250,000.00	$250,000 for SR 70 @ Uihlein
	Partial Total				$ 1,627,348.89	
	Roadway Total				$ 1,952,818.67	
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	10%			$ 195,281.87	
Intersection Grand Total					$ 2,148,101	

Notes:

PAY ITEM list was created based on FDOT LRE Cost per Mile: MODEL WUUA24-U-19-BB. Contingency covers all other items not shown in Table

Pavement design was assumed to be 4-in for travel lanes and 2-in for shoulders

MOT and MOBILIZATION 10% EACH

No right of way impacts. Potential minor utility impacts to be covered by contingency pay item

SR 70 - ROW Cost Estimates for the Intersection Control Evaluation

Intersection	Configuration	Square footage or ROW Aquisition	ROW Cost Per Square Foot	ROW Cost Estimate
Uihlein at SR 70	Partial Displaced Left-Turn (DLT)	15178	$120	$ 1,820,000
	Roundabout	236	$120	$ 30,000
Del Webb at SR 70	Partial Displaced Left-Turn (DLT)	3456	$120	$ 410,000
Bourneside at SR 70	Partial Displaced Left-Turn (DLT)	9921	$120	$ 1,190,000
		9430	$120	$ 1,130,000
	Quadrant roadway	439976	$120	$ 52,800,000
CR 675 at SR 70 (2)	Quadrant roadway	68504	$2,750	$ 10,000

(1) ROW cost estimates are based on the table below

(2) For ROW needs for CR 675, it is assumed that the property will require a full take. The actual property value was used for this estimate.

Property Value Estimates

Folio	Total Just Value as of 2018	Property Size (sq ft.)	Cost Per Sq. Ft.	Inflated cost (factor by 3)	Recommended Cost/Sq Ft to Apply to ROW
586104409	$ 291,876.00	7640.424	$ 38.20	114.6046345	120
586109109	$ 425,015.00	10672.2	$ 39.82	119.4734919	

(1) Property cost estimates were obtained from 2 residential properties near the Lakewood Ranch area. Currently, the Lakewood Ranch residential area is under development and there are no property values from the Manatee County Property Appraiser. The alternative intersection ROW needs are impacting the residential area under development; therefore, there are no property values that could be use for ROW estimates.

(2) These property estimates are used for the intersections of Uihlein, Del Webb, and Bourneside. Since CR 675 is a full take, the property appraised value for that property will be used.

ATTACHMENT F

Delay Calculations

Delay Information

Use this sheet to enter the delay information for each of the included control strategies.

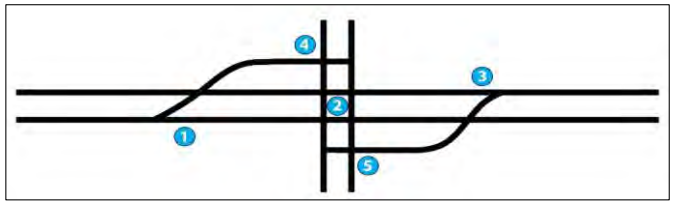
Note: Delay calculations for Displaced Left-Turn and Continuous Green-T Intersection have been adjusted to account for Experienced Travel Time (ETT) based on guidance from the Highway Capacity Manual, Chapter 23, Ramp Terminals and Alternative Intersections. The ETT method accounts for origin-destination (O-D) path of a distributed network of closely space intersections that operate in a cluster. This method results in a single LOS/delay for an alternative intersection configuration with multiple signalized intersections which include multiple LOS/delay results (e.g. Displaced left turns are modeled as multiple signalized intersections with separate LOS/delay results for each; this method computes the LOS/delay as one intersection). The HCM describes direct application of this concept to Displaced Left-Turns and RCUTs, however, it may also be extended to continuous green-t intersections to account for the major-street through movement which separated from the rest of the intersection and not accounted for in the Synchro analysis.

				Opening Year			Design Year		
At-Grade Intersections				Average vehicle delay			Average vehicle delay		
Control Strategy		Delay Type	Units	AM peak	PM peak	Weekend peak	AM peak	PM peak	Weekend peak
Traffic Signal	Single Input	Single Input	sec/veh	11.5	7.8		47.7	36.5	
Roundabout	Single Input	Single Input	sec/veh	5.8	6.2		15.2	19.6	
Displaced Left Turn (DLT)	Single Input	Worksheet (Partial E-W)	sec/veh	11.6	15.6		17.6	25.1	
Continuous Green-T Intersection	Single Input	Attached worksheet	sec/veh	12.7	10.0		29.3	17.9	

DLT E-W

Use this sheet to enter the delay information for a partial DLT with the displaced lefts on the East-West street. (Requires turning movement count demand inputs)

User must enter value on this sheet



Note: Intersections 2, 4, and 5 are a single intersection at an actual DTL.
Modeling in SYNCHRO requires 3 separate intersections

Movement nomenclature refers to equivalent movement at conventional intersection.

Opening Year AM Peak										TEV:	1833
Intersection 1	EB Left	WB Thru*	SB Right								
Volume	133	865	206								
Delay	29	2.1	0.2								
Intersection 2	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right	NB Left&U	NB Thru	SB Left&U	SB Thru	
Volume	133	542	0	0	865	43	0	0	44	0	
Delay (Intx 2)		7.8	0		9	19.8	0	0	4.5	0	
Delay (Intx 4)	11.3								28.4	28.4	
Delay (Intx 5)								0			
Intersection 3	EB Thru**	WB Left	NB Right								
Volume	542	0	0								
Delay	0										

* Delay entered for this movement also applied to NB Left Turn movement — **Average delay for DLT: 11.6**

** Delay entered for this movement also applied to SB Left Turn movment

Opening Year PM Peak										TEV:	1796
Intersection 1	EB Left	WB Thru*	SB Right								
Volume	217	549	128								
Delay	27.7	18.9	0.1								
Intersection 2	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right	NB Left&U	NB Thru	SB Left&U	SB Thru	
Volume	217	830	0	0	549	37	0	0	35	0	
Delay (Intx 2)		7.3	0		6.4	30.5	0	0	4.9	0	
Delay (Intx 4)	0								28.2	30.9	
Delay (Intx 5)								0			
Intersection 3	EB Thru**	WB Left	NB Right								
Volume	830	0	0								
Delay	0										

* Delay entered for this movement also applied to NB Left Turn movement — **Average delay for DLT: 15.6**

** Delay entered for this movement also applied to SB Left Turn movment

Design Year AM Peak										TEV:	3460
Intersection 1	EB Left	WB Thru*	SB Right								
Volume	430	1242	663								
Delay	28.1	3.8	0.7								
Intersection 2	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right	NB Left&U	NB Thru	SB Left&U	SB Thru	
Volume	430	846	0	0	1242	137	0	0	142	0	
Delay (Intx 2)		11.7	0		15.5	25.2	0	0	4.7	0	
Delay (Intx 4)	17								27.3	0	
Delay (Intx 5)								0			
Intersection 3	EB Thru**	WB Left	NB Right								
Volume	846	0	0								
Delay	0										

* Delay entered for this movement also applied to NB Left Turn movement — **Average delay for DLT: 17.6**

** Delay entered for this movement also applied to SB Left Turn movment

Design Year PM Peak										TEV:	3380
Intersection 1	EB Left	WB Thru*	SB Right								
Volume	698	781	411								
Delay	25.4	3.1	0.4								
Intersection 2	EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right	NB Left&U	NB Thru	SB Left&U	SB Thru	
Volume	698	1256	0	0	781	120	0	0	114	0	
Delay (Intx 2)		23.6	0		15.8	19.9	0	0	3.9	0	
Delay (Intx 4)	24.3								27.5	0	
Delay (Intx 5)								0			
Intersection 3	EB Thru**	WB Left	NB Right								
Volume	1256	0	0								
Delay	0										

* Delay entered for this movement also applied to NB Left Turn movement — **Average delay for DLT: 25.1**

** Delay entered for this movement also applied to SB Left Turn movment

This worksheet computes a DLT delay value in a manner consistent with the Highway Capacity Manual 6th Edition. This worksheet assumes coordination of certain movements within the DLT and relies in SYNCHRO to capture the delay-related effects of coordination.

Continuous Green T Intersection - Delay Calculation
Uihlein and SR 70

Opening Year (2025)
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume	133	542			865	43				44		206
Delay	38.7	0			13.3	2.6				34		24.4
TEV	1833											
Delay * Volume	5147.1	0	0	0	11504.5	111.8	0	0	0	1496	0	5026.4
Intersection Delay	12.70366											

Design Year (2045)
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume	430	846			1242	137				142		663
Delay	37	0			43.3	5.4				32		39.8
TEV	3460											
Delay * Volume	15910	0	0	0	53778.6	739.8	0	0	0	4544	0	26387.4
Intersection Delay	29.29474											

Opening Year (2025)
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume	217	830			549	37				35		128
Delay	38.1	0			9.2	3.2				39.4		24.3
TEV	1796											
Delay * Volume	8267.7	0	0	0	5050.8	118.4	0	0	0	1379	0	3110.4
Intersection Delay	9.981236											

Design Year (2045)
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume	698	1256			781	120				114		411
Delay	38.7	0			29.6	7.8				31.9		14.2
TEV	3380											
Delay * Volume	27012.6	0	0	0	23117.6	936	0	0	0	3636.6	0	5836.2
Intersection Delay	17.91095											

ATTACHMENT G

Benefit / Cost Summary

Outputs

This sheet compiles the data from summary tables in individual alternatives sheets. To populate the output sheet press the "Setup Wor
the Alternatives_MasterList tab.

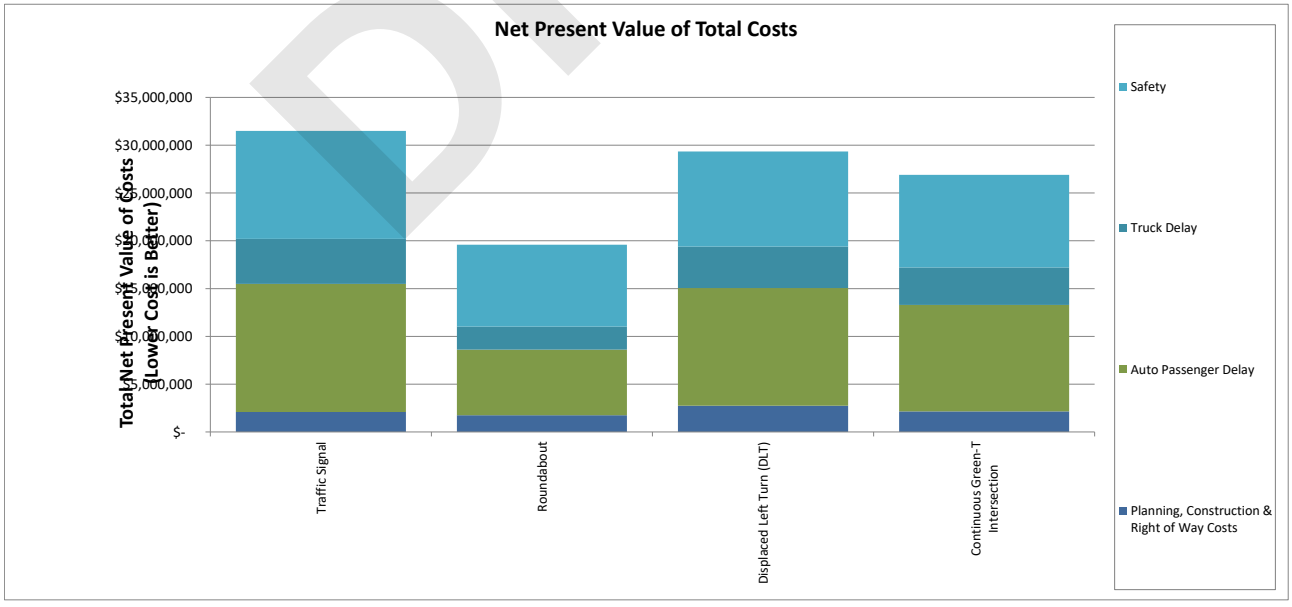
Agency:	FDOT District 1
Project Name:	SR 70 from Lorraine Rd to CR 675
Project Reference:	FDOT Project #414506-2-22-01
Intersection:	SR 70 and Uihlein Rd
City:	Unincorporated Manatee County
State:	Florida
Performing Department or Organization:	Florida Department of Transportation District 1
Date:	6/24/2019
Analyst:	CB
Analysis Type	At-Grade Intersection

Analysis Summary

Cost Categories	Net Present Value of Costs			
	Traffic Signal	Roundabout	Displaced Left Turn (DLT)	Continuous Green-T Intersection
Planning, Construction & Right of Way Costs	$ 2,090,000	$ 1,756,000	$ 2,754,000	$ 2,150,000
Auto Passenger Delay	$ 13,405,170	$ 6,852,422	$ 12,303,784	$ 11,135,355
Truck Delay	$ 4,700,485	$ 2,409,071	$ 4,342,152	$ 3,922,714
Safety	$ 11,307,425	$ 8,562,933	$ 9,950,298	$ 9,688,590
Total cost	**$31,601,308**	**$19,653,377**	**$29,588,511**	**$26,994,888**

Select Base Case for Benefit-Cost Comparison: (Choose from list)	Traffic Signal

Benefit Categories	Net Present Value of Benefits Relative to Base Case			
	Traffic Signal	Roundabout	Displaced Left Turn (DLT)	Continuous Green-T Intersection
Auto Passenger Delay		$ 6,552,749	$ 1,101,386	$ 2,269,815
Truck Delay		$ 2,291,414	$ 358,332	$ 777,771
Safety		$ 2,744,491	$ 1,357,127	$ 1,618,835
Net Present Value of Benefits		**$ 11,588,654**	**$ 2,816,845**	**$ 4,666,421**
Net Present Value of Costs		**$ (359,277)**	**$ 804,048**	**$ 60,000**
Net Present Value of Improvement		**$ 11,947,931**	**$ 2,012,798**	**$ 4,606,421**
Benefit-Cost (B/C) Ratio		**Control strategy preferred. Benefits are greater than base case and cost is less than base case.**	**3.50**	**77.77**
Delay B/C		**Control strategy preferred. Benefits are greater than base case and cost is less than base case.**	**1.82**	**50.79**
Safety B/C		**Control strategy preferred. Benefits are greater than base case and cost is less than base case.**	**1.69**	**26.98**



ATTACHMENT H

FDOT ICE Stage 1 Form, Capacity Analysis for Planning of Junctions (CAP-X), and Stage 1 SPICE

Florida Department of Transportation
Intersection Control Evaluation (ICE) Form
Stage 1: Screening

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval.

Project Name	SR 70 from Lorraine Rd to CR 675	FDOT Project #	414506-2-22-01	Date	06/14/19
Submitted By	Nicole Harris, PE	Agency/Company	Stantec	Email	nicole.harris@stantec.com
FDOT Context Classification	C3R - Suburban Residential	FDOT District	District 1	County	Manatee
Project Locality (*City/Town/Village*)	Unincorporated Manatee County	Project Type	Corridor Improvement Project		
Project Purpose (*What is the catalyst for this project and why is it being undertaken?*)	A PD&E Study is being completed with the purpose of increasing capacity and improving traffic operational conditions along the SR 70 corridor from Lorraine Road to CR 675/Waterbury Road. The Intersection Control Evaluation (ICE) is based on the future build improvements of the project which widen SR 70 to 4-lanes. This ICE will focus on the intersection with Uihlein Road.				
Project Setting Description (*Describe the area surrounding the intersection*)	SR 70 at Uihlein Rd Future Land Use is comprised of Mixed Use -Commerical. There is a major residential development that is changing the setting from rural to suburban/residential.				
Multimodal Context (*Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns*)	There are paved sidewalks on the both sides of Uihlein Road along with marked bike lanes. For SR 70, there are proposed sidewalks and paved shoulders on both sides of the road.				

Major Street Information								
Route #:	SR 70	Route Name(s)				Milepost	10.813	
Existing Control Type	Two-way Stop-Control	Existing AADT	10,000	Design Year AADT	34,000			
Design Vehicle	Interstate Semitrailer (WB-62)	Control Vehicle	Interstate Semitrailer (WB-62)					
Primary Functional Classification	Urban Principal Arterial			Design Speed (mph)	55			
Secondary Functional Classification (if app.)				Target Speed (mph) [if app.]				

Approach #1	Direction	Eastbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along	Both sides of the approach	Left-Turn	2				
	Crosswalk on Approach?	No	Left-Through		Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?	Yes	Through	2	Left	430	Left	698
	Multi-Use Path?	No	Left-Through-Right		Through	846	Through	1,256
	Scheduled Bus Service?	No	Through-Right		Right		Right	
	Bus Stop on Approach?	No	Right-Turn		Daily Truck %		14.0%	
Approach #2	Direction	Westbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:	Both sides of the approach	Left-Turn					
	Crosswalk on Approach?	No	Left-Through		Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?	Yes	Through	2	Left		Left	
	Multi-Use Path?	No	Left-Through-Right		Through	1,242	Through	781
	Scheduled Bus Service?	No	Through-Right		Right	137	Right	120
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		14.0%	

Minor Street Information											
Route #:		Route Name(s)	Uihlein Rd					Milepost (if app.)			
Existing Control Type	Two-way Stop-Control			Existing AADT	2,000			Design Year AADT	14,000		
Design Vehicle	Interstate Semitrailer (WB-62)			Control Vehicle	Interstate Semitrailer (WB-62)						
Primary Functional Classification	Urban Local							Design Speed (mph)			
Secondary Functional Classification (if app.)								Target Speed (mph) [if app.]	45		
Approach #1	Direction	Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes			
	Sidewalks along:	Both sides of the approach		Left-Turn	1						
	Crosswalk on Approach?	No		Left-Through		Weekday AM Peak		Weekday PM Peak			
	On-Street Bike Facilities?	Yes		Through		Left	142	Left	114		
	Multi-Use Path?	No		Left-Through-Right		Through		Through			
	Scheduled Bus Service?	No		Through-Right		Right	663	Right	411		
	Bus Stop on Approach?	No		Right-Turn	1	Daily Truck %		4.0%			
Approach #2	Direction			Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes			
	Sidewalks along:			Left-Turn							
	Crosswalk on Approach?			Left-Through		Weekday AM Peak		Weekday PM Peak			
	On-Street Bike Facilities?			Through		Left		Left			
	Multi-Use Path?			Left-Through-Right		Through		Through			
	Scheduled Bus Service?			Through-Right		Right		Right			
	Bus Stop on Approach?			Right-Turn		Daily Truck %					
Approach #3	Direction			Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes			
	Sidewalks along:			Left-Turn							
	Crosswalk on Approach?			Left-Through		Weekday AM Peak		Weekday PM Peak			
	On-Street Bike Facilities?			Through		Left		Left			
	Multi-Use Path?			Left-Through-Right		Through		Through			
	Scheduled Bus Service?			Through-Right		Right		Right			
	Bus Stop on Approach?			Right-Turn		Daily Truck %					

Crash History (Existing Intersections Only)
Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:
The crash history was not included in the analysis since the future conditions of SR 70 changes significantly from a 2 lane undivided to a 4-lane divided. Instead, a predictive crash model was used for the analysis.

Control Strategy Evaluation						
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.						
	CAP-X Outputs					
	V/C Ratio					
Control Strategy	Weekday AM Peak	Weekday PM Peak	Multimodal Score	SPICE Ranking	Strategy to Be Advanced?	Justification
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	No	Future volumes exceed Peak Hour Volume Thresholds based on FDOT ICE Manual, Figure A1
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	No	Future volumes exceed Peak Hour Volume Thresholds according to FDOT ICE Manual.
Signalized Control	0.83	0.54	4.8	7	Yes	Move to Stage 2 based on v/c for am and pm hours
Roundabout	2x2: 1.52 1x2: 1.84 1x1: 2.33	2x2: 0.89 1x2: 0.89 1x1: 1.72	5.6 / 6.7	1 Lane: 1	Yes	Although the CAP-X shows the V/C greater than one, this could be mitigated by a SB right-turn bypass lane which cannot be modeled in CAP-X
Median U-Turn	N/A	N/A	N/A	2 Lane: 4	No	Not applicable since this is a T-intersection.
RCUT (Signalized)	0.91	0.66	6.3	3	No	The future volumes seem to be near the limit fo Peak Hour Volume thresholds based on FDOT ICE Manual, Figure A3
RCUT (Unsignalized)	5.66	1.72	4.4	2	No	V/C ratio exceeded during the PM Peak.
Jughandle				N/A	No	Not included in the analysis.
Displaced Left-Turn	.70 (Partial)	.45 (Partial)	4.8	6	Yes	Move to Stage 2 for Partial DLT
Continuous Green Tee	0.61	0.53	3.0	5	Yes	Move to Stage 2
Quadrant Roadway	N/A	N/A	N/A		No	Not applicable since this is a T-intersection.
Partial MUT	N/A	N/A	N/A	N/A	No	Not applicable since this is a T-intersection.
Other 2 (Type)	N/A	N/A	N/A	N/A	No	No additional alternative intersection configurations were included in this analysis.

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination	Multiple Viable Alternatives Identified: Continue to Stage 2				
Comments					
DTOE Name		Signature		Date	
DDE Name		Signature		Date	

Capacity Analysis for Planning of Junctions

Summary Report - Page 1 of 2

Project Name:	SR 70 @ Uihlein
Project Number:	0
Location:	Unincorporated Manatee County
Date:	2045 AM
Number of Intersection Legs:	3
Which leg is the minor street?	N

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	**Left**	**Thru**	**Right**	Heavy Vehicles	Volume Growth
Eastbound	0	430	846	0	7.00%	0.00%
Westbound	0	0	1242	137	7.00%	0.00%
Southbound	0	142	0	663	2.00%	0.00%
Northbound	0	0	0	0	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
FDOT Context Zone	**C3R-Suburban Residential**	
Critical Lane Volume Threshold — 2-phase signal	**Suggested = 1800**	**1800**
Critical Lane Volume Threshold — 3-phase signal	**Suggested = 1750**	**1750**
Critical Lane Volume Threshold — 4-phase signal	**Suggested = 1700**	**1700**

Capacity Analysis for Planning of Junctions

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Continuous Green T N	0.61	1	3.0	Poor	Poor	Good
Partial Displaced Left Turn E-W	0.70	2	4.8	Fair	Fair	Good
Traffic Signal	0.83	3	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn E-W	0.91	4	6.3	Good	Good	Fair
2 X 2	1.52	5	5.6	Fair	Good	Good
1 X 2	1.84	6	5.6	Fair	Good	Good
1 X 1	2.33	7	6.7	Good	Good	Good
Unsignalized Restricted Crossing U-Turn E-W	5.66	8	4.4	Fair	Fair	Fair
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Capacity Analysis for Planning of Junctions

Project Name:	SR 70 @ Uihlein
Project Number:	0
Location:	Unincorporated Manatee County
Date:	2045 AM
Number of Intersection Legs:	3
Major Street Direction:	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	430	846	0	7.00%	0.00%
Westbound	0	0	1242	137	7.00%	0.00%
Southbound	0	142	0	663	2.00%	0.00%
Northbound	0	0	0	0	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor		**Suggested = 2.00**	2.00
FDOT Context Zone		**C3R-Suburban Residential**	
Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800**	**1800**
	3-phase signal	**Suggested = 1750**	**1750**
	4-phase signal	**Suggested = 1700**	**1700**

Capacity Analysis for Planning of Junctions

Number of Lanes for Non-roundabout Intersections																			
TYPE OF INTERSECTION	Sheet	Northbound				Southbound				Eastbound				Westbound					
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Traffic Signal	FULL		0	0	0		1	0	1		2	2	0		0	2	1		
Continuous Green T	N						1		1		2	2				2	1		
Partial Displaced Left Turn	E-W		0	1	0		1	1	1		2	2	0		0	2	1		
Signalized Restricted Crossing U-Turn	E-W				0				1	1	2	2	0	1	0	2	1		
Unsignalized Restricted Crossing U-Turn	E-W				0				1	1	2	2	0	1	0	2	1		

Number of Lanes for Interchanges																			
TYPE OF INTERCHANGE	Sheet	Northbound				Southbound				Eastbound				Westbound					
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		

Capacity Analysis for Planning of Junctions

Results for Non-roundabout Intersections

TYPE OF INTERSECTION	Sheet	Zone 1 (North)		Zone 2 (South)		Zone 3 (East)		Zone 4 (West)		Zone 5 (Center)		Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
		CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C				
Traffic Signal	FULL									1460	0.83	0.83	Fair	Fair	Good
Continuous Green T	N									1059	0.61	0.61	Poor	Poor	Good
Partial Displaced Left Turn	E-W					525	*0.29*	907	*0.50*	1218	0.70	0.70	Fair	Fair	Good
Signalized Restricted Crossing U-Turn	E-W	1630	0.91	525	*0.29*	738	*0.41*	864	*0.48*			0.91	Good	Good	Fair
Unsignalized Restricted Crossing U-Turn	E-W	1329	5.66	1050	*0.00*	1476	*0.00*	1365	*0.38*			5.66	Fair	Fair	Fair

Capacity Analysis for Planning of Junctions

Results for Roundabouts

TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (East)			Zone 2 (South)			Zone 4 (West)			Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3				
1 X 1	2.33			1.16			0.00			1.73			2.33	Good	Good	Good
1 X 2	1.84			0.56	0.59		0.00			0.81	0.84		1.84	Fair	Good	Good
2 X 2	0.38	1.52		0.81	0.84		0.00	0.00		0.56	0.59		1.52	Fair	Good	Good

Results for Interchanges

TYPE OF INTERCHANGE	Sheet	Zone 1 (Rt Mrg)		Zone 2 (Lt Mrg)		Zone 3 (Ctr. 1)		Zone 4 (Ctr. 2)		Zone 5 (Lt Mrg)		Zone 6 (Rt Mrg)		Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
		CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C				

Capacity Analysis for Planning of Junctions

Summary Report - Page 1 of 2

Project Name:	SR 70 @ Uihlein
Project Number:	0
Location:	Unincorporated Manatee County
Date:	2045 PM
Number of Intersection Legs:	3
Which leg is the minor street?	N

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	**Left**	**Thru**	**Right**	Heavy Vehicles	Volume Growth
Eastbound	0	698	1256	0	7.00%	0.00%
Westbound	0	0	781	120	7.00%	0.00%
Southbound	0	114	0	411	2.00%	0.00%
Northbound	0	0	0	0	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor	**Suggested = 2.00**	2.00
FDOT Context Zone	**C3R-Suburban Residential**	
Critical Lane Volume Threshold — 2-phase signal	**Suggested = 1800**	**1800**
Critical Lane Volume Threshold — 3-phase signal	**Suggested = 1750**	**1750**
Critical Lane Volume Threshold — 4-phase signal	**Suggested = 1700**	**1700**

Capacity Analysis for Planning of Junctions

TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.45	1	4.8	Fair	Fair	Good
Continuous Green T N	0.53	2	3.0	Poor	Poor	Good
Traffic Signal	0.54	3	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn E-W	0.66	4	6.3	Good	Good	Fair
1 X 2	0.89	5	5.6	Fair	Good	Good
2 X 2	0.89	5	5.6	Fair	Good	Good
1 X 1	1.72	7	6.7	Good	Good	Good
Unsignalized Restricted Crossing U-Turn E-W	1.72	8	4.4	Fair	Fair	Fair
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Capacity Analysis for Planning of Junctions

Project Name:	SR 70 @ Uihlein
Project Number:	0
Location:	Unincorporated Manatee County
Date:	2045 PM
Number of Intersection Legs:	3
Major Street Direction:	North-South

Traffic Volume Demand

	Volume (Veh/hr)				Percent (%)	
	U-Turn	Left	Thru	Right	Heavy Vehicles	Volume Growth
Eastbound	0	698	1256	0	7.00%	0.00%
Westbound	0	0	781	120	7.00%	0.00%
Southbound	0	114	0	411	2.00%	0.00%
Northbound	0	0	0	0	0.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	**0.80**	**0.95**		**0.85**		

Truck to PCE Factor		**Suggested = 2.00**	2.00
FDOT Context Zone		**C3R-Suburban Residential**	
Critical Lane Volume Threshold	2-phase signal	**Suggested = 1800**	**1800**
	3-phase signal	**Suggested = 1750**	**1750**
	4-phase signal	**Suggested = 1700**	**1700**

Capacity Analysis for Planning of Junctions

Number of Lanes for Non-roundabout Intersections																			
TYPE OF INTERSECTION	Sheet	Northbound				Southbound				Eastbound				Westbound					
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Traffic Signal	FULL		0	0	0		1	0	1		2	2	0		0	2	1		
Continuous Green T	N						1		1		2	2				2	1		
Partial Displaced Left Turn	E-W		0	1	0		1	1	1		2	2	0		0	2	1		
Signalized Restricted Crossing U-Turn	E-W				0				1	1	2	2	0	1	0	2	1		
Unsignalized Restricted Crossing U-Turn	E-W				0				1	1	2	2	0	1	0	2	1		

Number of Lanes for Interchanges																			
TYPE OF INTERCHANGE	Sheet	Northbound				Southbound				Eastbound				Westbound					
		U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		

Capacity Analysis for Planning of Junctions

Results for Non-roundabout Intersections

TYPE OF INTERSECTION	Sheet	Zone 1 (North)		Zone 2 (South)		Zone 3 (East)		Zone 4 (West)		Zone 5 (Center)		Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
		CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C				
Traffic Signal	FULL									940	0.54	0.54	Fair	Fair	Good
Continuous Green T	N									933	0.53	0.53	Poor	Poor	Good
Partial Displaced Left Turn	E-W					730	0.41	811	0.45	794	0.45	0.45	Fair	Fair	Good
Signalized Restricted Crossing U-Turn	E-W	1047	0.58	730	0.41	482	0.27	1191	0.66			0.66	Good	Good	Fair
Unsignalized Restricted Crossing U-Turn	E-W	836	1.72	1460	0.00	964	0.00	2091	0.61			1.72	Fair	Fair	Fair

Capacity Analysis for Planning of Junctions

Results for Roundabouts

TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (East)			Zone 2 (South)			Zone 4 (West)			Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3				
1 X 1	0.92			1.72			0.00			1.51			1.72	Good	Good	Good
1 X 2	0.79			0.84	0.89		0.00			0.69	0.70		0.89	Fair	Good	Good
2 X 2	0.19	0.62		0.69	0.70		0.00	0.00		0.84	0.89		0.89	Fair	Good	Good

Results for Interchanges

TYPE OF INTERCHANGE	Sheet	Zone 1 (Rt Mrg)		Zone 2 (Lt Mrg)		Zone 3 (Ctr. 1)		Zone 4 (Ctr. 2)		Zone 5 (Lt Mrg)		Zone 6 (Rt Mrg)		Overall v/c Ratio	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
		CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C				

Federal Highway Administration (FHWA)
Safety Performance for Intersection Control Evaluation Tool

Results

Summary of crash prediction results for each alternative

Project Information

Project Name:	SR 70 from Lorraine Rd to CR 675	**Intersection Type**	At-Grade Intersections
Intersection:	SR 70 @ Uihlein	**Opening Year**	2025
Agency:	D1	**Design Year**	2045
Project Reference:	414506-2-22-01	**Facility Type**	On Urban and Suburban Arterial
City:	Unincorporated Manatee County	**Number of Legs**	3-leg
State:	FL	**1-Way/2-Way**	2-way Intersecting 2-way
Date:	6/14/2019	**# of Major Street Lanes (both directions)**	5 or fewer
Analyst:	Nicole Harris, PE	**Major Street Approach Speed**	Less than 55 mph

Crash Prediction Summary

Control Strategy	Crash Type	Opening Year	Design Year	Total Project Life Cycle	Rank	AADT Within Prediction Range?	Source of Prediction
Traffic Signal	Total	5.18	12.49	184.01	7	Yes	Calibrated SPF
	Fatal & Injury	1.84	3.90	60.18			
1-lane Roundabout	Total	1.22	1.96	33.58	1	N/A	Uncalibrated SPF
	Fatal & Injury	0.38	0.79	12.19			
2-lane Roundabout	Total	7.38	15.64	240.61	4	N/A	Uncalibrated SPF
	Fatal & Injury	1.32	3.22	47.04			
Displaced Left Turn (DLT)	Total	4.56	10.99	161.93	6	N/A	CMF
	Fatal & Injury	1.62	3.43	52.96			
Signalized RCUT	Total	4.40	10.62	156.41	3	N/A	CMF
	Fatal & Injury	1.43	3.04	46.94			
Unsignalized RCUT	Total	2.29	6.45	90.34	2	N/A	CMF
	Fatal & Injury	0.55	1.31	19.38			
Continuous Green-T Intersection	Total	4.97	11.99	176.65	5	N/A	CMF
	Fatal & Injury	1.56	3.31	51.15			