DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
TRAFFIC ENGINEERING REPORT

For the intersection of:
SR 9 at Dalrymple Rd
Fulton County
At Mile Post 13.58

Report prepared by:
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Date report prepared: February 24, 2020

LOCATION

The intersection is located along SR 9 at Dalrymple Road, at approximately milepost 13.58 of SR 9 in Fulton County. SR 9 is the principal arterial, with a north-south orientation.

REASON FOR THE INVESTIGATION

This Traffic Engineering Report is submitted to Georgia Department of Transportation (GDOT) by KCI Technologies on behalf of the City of Sandy Springs Public Works Division. In an effort to improve operations and safety, the City of Sandy Springs proposes to install an additional dedicated eastbound left-turn lane along Dalrymple Road (minor street). The existing signal phasing at this location is proposed to be modified to include a protected-only left-turn phase for the eastbound approach. The intersection modifications are part of a special encroachment permit request.

DESCRIPTION OF INTERSECTION

SR 9: The major street is a four-lane, divided roadway (center TWLTL) with a north-south orientation at the study intersection. The roadway has an urban section with curb and gutter and a 45 MPH posted speed limit. Georgia DOT classifies the road as a principal arterial. There are sidewalks along both sides of the road.

Dalrymple Road: The minor street is a two-lane, undivided roadway with an east-west orientation at the study intersection. The roadway has an urban section with curb and gutter. Dalrymple Road has a 35 MPH posted speed limit.

Adjacent to the intersection is retail development.

TRAFFIC VOLUMES

As part of the study, a traffic count was performed on Wednesday, November 7, 2018 at the study intersection. Turning movement counts were performed during the weekday 2-hour AM period (7-9am), and 2-hour PM period (4-6pm). The AM peak hour occurred from 7:15-8:15am. The PM peak hour occurred from 4:30-5:30pm. Figure 1 illustrates the existing traffic volumes and the intersection conditions (see Appendix A). The turning movement counts are included in Appendix B.

The roadway daily volumes were obtained from GDOT historic data. In 2018, the average daily traffic recorded along SR 9 was 32,300 vpd and along Dalrymple Road was 10,000 vpd.

EXISTING TRAFFIC CONTROL

SR 9 at Dalrymple Road is a signalized intersection. There are currently crosswalks and signalized pedestrian phases/equipment at all approaches of this intersection.

The signal operation for left-turn movements are:

- SR 9 northbound: protected only operation
- SR 9 southbound: protected/permitted operation (FYA)
- Dalrymple Road westbound: protected/permitted operation (FYA)
- Dalrymple eastbound: protected/permitted operation (FYA)

VEHICLE SPEEDS

The posted speed limit for SR 9 is 45 mph and Dalrymple Road is 35 mph. No vehicle speed data was collected as part of this report.

PEDESTRIAN AND BICYCLE VOLUMES

Pedestrian counts were performed as part of the count data. The count reported 4 pedestrians during the AM peak hour and 29 pedestrians during the PM peak hour.

EXISTING CONDITIONS CAPACITY ANALYSIS

The existing intersection is signal controlled. The delay method that was used to evaluate the existing operations at this intersection is found in the Highway Capacity Manual (HCM) 2010 edition. The City provided the existing signal controller settings, which were utilized in the analysis. The intersection level of service (LOS) and delay is reported in **Table 1** for both the AM and PM peak periods. LOS thresholds are based on average vehicle delay at signalized intersections, as defined in the HCM 2010 methodology. Synchro reports for the AM and PM conditions are found in Appendix C.

Table 1: Existing Conditions Capacity Results

Overall Intersection	Existing Conditions	
	LOS	Delay (sec/veh)
AM Peak Hour	F	90.0
PM Peak Hour	F	82.1

PARKING

There is no on-street parking located in proximity of this intersection.

CRASH HISTORY

Crashes were obtained from the Georgia Electronic Accident Reporting System (GEARS). Crash records for a 5-year period (6/1/2014-5/31/2019) are summarized in **Table 2**. The records indicate there were a total of 149 crashes; 32 with injuries, and no fatalities. These crashes took place at or within proximity of the study intersection. One crash included a pedestrian (a vehicle traveling along SR 9 ran off the road and hit a pedestrian, resulting in an injury).

Table 2 - Intersection 5-year Crash History				
Five Year Period (6/1/2014 - 5/31/2019)				
Manner of Collision	PDO	Injury	Fatality	Total Crashes
Angle	44	13	0	57
Head On	2	1	0	3
Rear End	38	14	0	52
Sideswipe Same Direction	30	2	0	32
Sideswipe Opposite Direction	2	0	0	2
Not a Collision with Motor Vehicle	1	2	0	3
Total	117	32	0	149

PROPOSED INTERSECTION GEOMETRY

The proposed modifications to this intersection include the following:

- The proposed plan includes adding an additional dedicated eastbound left-turn lane along Dalrymple Road (minor street).
- The existing signal phasing at this location is proposed to be modified to include a protected-only left-turn phase for the eastbound approach.

Figure 1 illustrates the proposed geometry (see Appendix A).

PROPOSED CONDITIONS CAPACITY ANALYSIS

Expected intersection operations under the proposed signalized conditions is summarized in **Table 3** for the existing year volume conditions. These results include adding the additional eastbound left-turn lane (along Dalrymple Road) described above. Synchro reports for the AM and PM conditions are found in Appendix D.

Table 3: Signalized Conditions Capacity Results		
Overall Intersection	Proposed Conditions	
	LOS	Delay (sec/veh)
AM Peak	D	49.5
PM Peak	E	64.3

ADJACENT SIGNALIZED INTERSECTIONS

The nearest adjacent signal along SR 9 located to the north is at Trowbridge Road at approximately 1,710 feet from the study location. The nearest adjacent signal along SR 9 located to the south is at Spalding Drive at approximately 3,950 feet from the study location.

ROUNDABOUT

In accordance with GDOT policy, the feasibility of a roundabout was considered at this intersection. SR 9 is a four-lane divided roadway with high traffic volumes. A multi-lane roundabout would be required at this location. Considering the existing conditions along the SR 9 corridor, a roundabout is not recommended.

ICE POLICY

In accordance with GDOT Policy 4A-5 an ICE review was performed for the intersection. The request is for a signal permit revision; therefore a Level 1 approval is required. Based on the project scope, it was determined that an ICE Waiver was appropriate. The project does not substantially alter the character of the intersection. The ICE Waiver is included in Appendix E.

RECOMMENDATIONS

It is recommended that a signal revision permit be issued to City of Sandy Springs for the modifications listed below:

- The proposed plan includes adding an additional dedicated eastbound left-turn lane along Dalrymple Road (minor street).
- The existing signal phasing at this location is proposed to be modified to include a protected-only left-turn phase for the eastbound approach.

RECOMMENDED BY: _____ DATE: 2/24/20

Andrew Antweiler, PE
Consulting Engineer

RECOMMENDED BY: _____ DATE: _____

District Traffic Engineer

RECOMMENDED BY: _____ DATE: _____

State Traffic Engineer

APPROVED BY: _____ DATE: _____

Director of Operations

Appendix

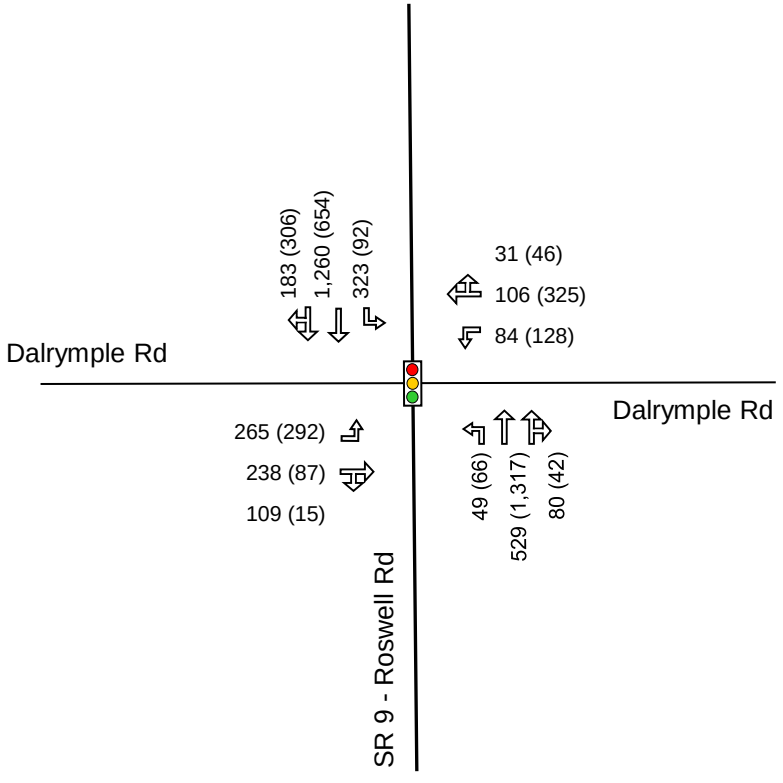
A: Figure 1 – Intersection Conditions and Volumes
B: Traffic Volumes Counts
C: Synchro Reports, HCM 2010 – Existing Signal Conditions
D: Synchro Reports, HCM 2010 – Proposed Signal Conditions
E: GDOT ICE Waiver Form

TE Report

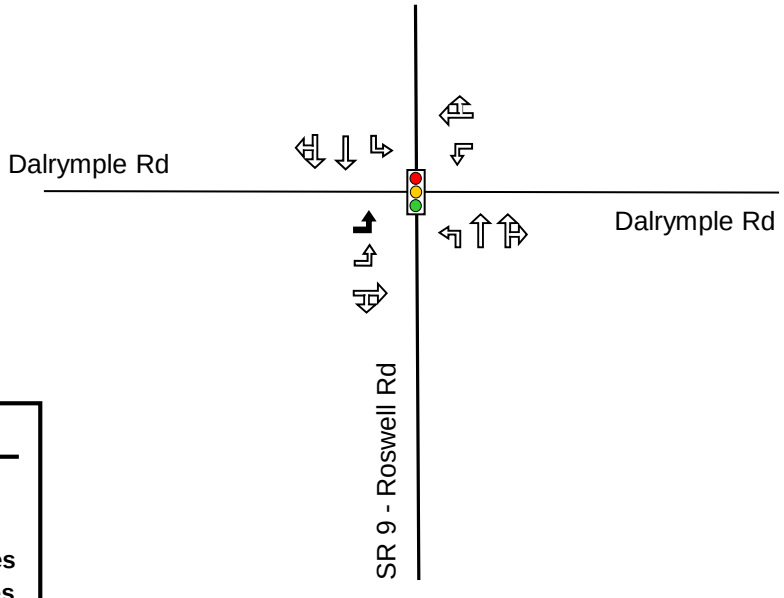
Appendix A

Existing Conditions and Volumes

Not to Scale



Proposed Geometry



LEGEND

- ⇨ **Existing Roadway Laneage**
- ➡ **Proposed Project Laneage**
- **XX AM Peak Hour Traffic Volumes**
- **(XX) PM Peak Hour Traffic Volumes**

KCI TECHNOLOGIES

SR 9 at Dalrymple Road Improvement Project City of Sandy Springs, Georgia

Traffic Conditions & Volumes

Figure 1

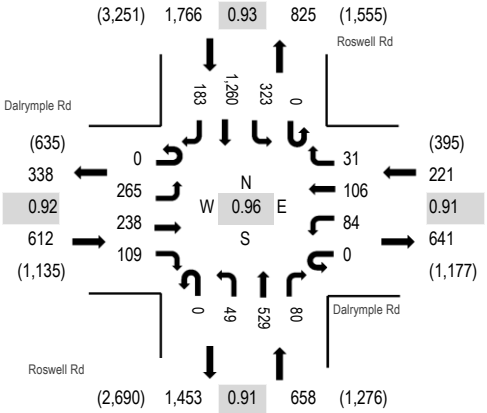
TE Report

Appendix B

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

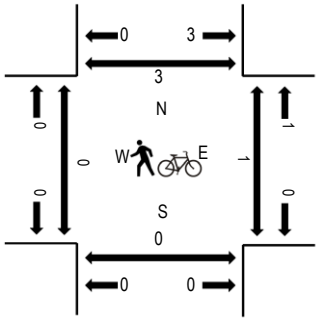
Location: #1 Roswell Rd & Dalrymple Rd AM
Date and Start Time: Wednesday, November 07, 2018
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Dalrymple Rd Eastbound				Dalrymple Rd Westbound				Roswell Rd Northbound				Roswell Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	1	68	60	20	0	12	12	5	0	10	116	21	0	91	277	22	715	3,198	1	1	0	0
7:15 AM	0	68	41	30	0	31	21	7	0	16	123	11	0	71	343	37	799	3,257	0	0	0	0
7:30 AM	0	71	52	33	0	21	24	10	0	11	135	15	0	82	350	44	848	3,165	0	0	0	2
7:45 AM	0	53	76	22	0	18	33	10	0	8	148	26	0	103	283	56	836	3,018	0	1	0	1
8:00 AM	0	73	69	24	0	14	28	4	0	14	123	28	0	67	284	46	774	2,859	0	0	0	0
8:15 AM	0	55	46	30	0	14	28	5	0	12	116	23	0	65	269	44	707		0	1	0	4
8:30 AM	0	52	46	27	0	16	29	9	0	14	120	14	0	54	278	42	701		0	3	0	1
8:45 AM	0	48	49	21	0	17	23	4	0	16	132	24	0	43	256	44	677		0	2	1	0

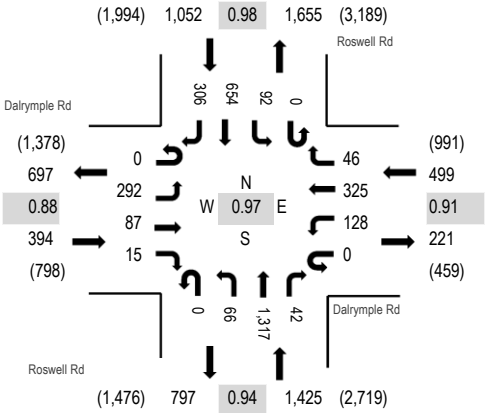
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Lights	0	261	234	106	0	80	103	22	0	49	516	75	0	308	1,235	173	3,162
Mediums	0	4	3	3	0	4	3	9	0	0	13	5	0	15	25	10	94
Total	0	265	238	109	0	84	106	31	0	49	529	80	0	323	1,260	183	3,257

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

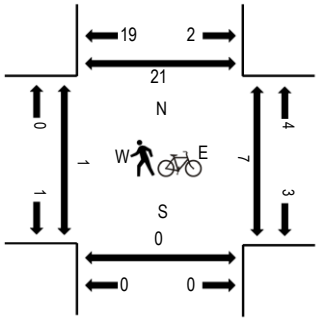
Location: #1 Roswell Rd & Dalrymple Rd PM
Date and Start Time: Wednesday, November 07, 2018
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Dalrymple Rd Eastbound				Dalrymple Rd Westbound				Roswell Rd Northbound				Roswell Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	92	26	5	0	25	73	8	0	11	311	15	0	17	145	88	816	3,314	1	0	1	1
4:15 PM	0	75	27	6	0	34	87	6	0	11	325	10	0	32	175	61	849	3,350	0	0	0	0
4:30 PM	0	77	22	2	0	27	80	7	0	12	312	10	0	16	172	74	811	3,370	1	0	0	9
4:45 PM	0	77	22	4	0	32	90	9	0	18	308	11	0	20	172	75	838	3,319	0	7	0	8
5:00 PM	0	70	23	5	0	29	80	14	0	18	344	11	0	28	155	75	852	3,188	0	0	0	1
5:15 PM	0	68	20	4	0	40	75	16	0	18	353	10	0	28	155	82	869		0	0	0	3
5:30 PM	0	55	19	8	0	34	99	13	0	18	283	14	0	20	125	72	760		0	0	0	0
5:45 PM	0	73	15	3	0	19	73	21	0	15	272	9	0	34	100	73	707		1	0	1	3

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9
Lights	0	289	85	14	0	125	322	45	0	66	1,291	38	0	86	627	300	3,288
Mediums	0	3	2	1	0	3	3	1	0	0	17	4	0	6	27	6	73
Total	0	292	87	15	0	128	325	46	0	66	1,317	42	0	92	654	306	3,370

TE Report

Appendix C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	238	109	84	106	31	49	529	80	323	1260	183
Future Volume (veh/h)	265	238	109	84	106	31	49	529	80	323	1260	183
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	288	259	118	91	115	34	53	575	87	351	1370	199
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	156	71	139	185	55	67	1941	293	549	1994	287
Arrive On Green	0.05	0.13	0.13	0.06	0.13	0.13	0.04	0.63	0.63	0.05	0.64	0.64
Sat Flow, veh/h	1774	1213	553	1774	1382	409	1774	3085	466	1774	3106	447
Grp Volume(v), veh/h	288	0	377	91	0	149	53	329	333	351	775	794
Grp Sat Flow(s),veh/h/ln	1774	0	1765	1774	0	1791	1774	1770	1781	1774	1770	1784
Q Serve(g_s), s	8.7	0.0	23.1	7.9	0.0	14.2	5.3	15.3	15.3	9.1	50.2	51.7
Cycle Q Clear(g_c), s	8.7	0.0	23.1	7.9	0.0	14.2	5.3	15.3	15.3	9.1	50.2	51.7
Prop In Lane	1.00		0.31	1.00		0.23	1.00		0.26	1.00		0.25
Lane Grp Cap(c), veh/h	193	0	227	139	0	239	67	1114	1120	549	1136	1145
V/C Ratio(X)	1.49	0.00	1.66	0.66	0.00	0.62	0.79	0.30	0.30	0.64	0.68	0.69
Avail Cap(c_a), veh/h	193	0	227	327	0	429	139	1114	1120	549	1136	1145
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	75.7	0.0	78.5	64.6	0.0	73.7	85.9	15.2	15.2	16.7	20.5	20.8
Incr Delay (d2), s/veh	245.4	0.0	317.6	2.0	0.0	1.0	7.3	0.7	0.7	1.9	3.3	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.6	0.0	31.3	3.9	0.0	7.1	2.8	7.6	7.7	6.6	25.4	26.5
LnGrp Delay(d),s/veh	321.1	0.0	396.1	66.6	0.0	74.7	93.2	15.9	15.9	18.6	23.9	24.3
LnGrp LOS	F		F	E		E	F	B	B	B	C	C
Approach Vol, veh/h		665			240			715			1920	
Approach Delay, s/veh		363.6			71.6			21.6			23.1	
Approach LOS		F			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	119.1	15.9	30.0	12.7	121.3	15.0	30.9
Change Period (Y+Rc), s	5.9	* 5.8	5.9	* 6.9	5.9	* 5.8	* 6.3	* 6.9
Max Green Setting (Gmax), s	9.1	* 94	29.1	* 23	14.1	* 89	* 8.7	* 43
Max Q Clear Time (g_c+I1), s	11.1	17.3	9.9	25.1	7.3	53.7	10.7	16.2
Green Ext Time (p_c), s	0.0	63.6	0.1	0.0	0.0	32.3	0.0	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	90.0
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	292	87	15	128	325	46	66	1317	42	92	654	306
Future Volume (veh/h)	292	87	15	128	325	46	66	1317	42	92	654	306
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	317	95	16	139	353	50	72	1432	46	100	711	333
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	320	54	366	311	44	89	1919	62	189	1253	587
Arrive On Green	0.08	0.21	0.21	0.07	0.20	0.20	0.05	0.55	0.55	0.04	0.53	0.53
Sat Flow, veh/h	1774	1555	262	1774	1597	226	1774	3500	112	1774	2342	1097
Grp Volume(v), veh/h	317	0	111	139	0	403	72	723	755	100	537	507
Grp Sat Flow(s),veh/h/ln	1774	0	1817	1774	0	1823	1774	1770	1843	1774	1770	1669
Q Serve(g_s), s	14.7	0.0	9.3	11.0	0.0	35.1	7.2	56.2	56.4	4.6	36.5	36.5
Cycle Q Clear(g_c), s	14.7	0.0	9.3	11.0	0.0	35.1	7.2	56.2	56.4	4.6	36.5	36.5
Prop In Lane	1.00		0.14	1.00		0.12	1.00		0.06	1.00		0.66
Lane Grp Cap(c), veh/h	185	0	374	366	0	355	89	970	1010	189	947	893
V/C Ratio(X)	1.71	0.00	0.30	0.38	0.00	1.13	0.81	0.75	0.75	0.53	0.57	0.57
Avail Cap(c_a), veh/h	185	0	374	435	0	355	149	970	1010	272	947	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.7	0.0	60.4	51.0	0.0	72.5	84.6	31.1	31.1	28.8	27.9	28.0
Incr Delay (d2), s/veh	343.5	0.0	0.2	0.2	0.0	89.2	6.5	5.2	5.0	0.9	2.5	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.6	0.0	4.7	5.4	0.0	26.5	3.7	28.7	30.2	2.3	18.4	17.4
LnGrp Delay(d),s/veh	400.2	0.0	60.6	51.3	0.0	161.6	91.1	36.3	36.2	29.6	30.4	30.6
LnGrp LOS	F		E	D		F	F	D	D	C	C	C
Approach Vol, veh/h		428			542			1550			1144	
Approach Delay, s/veh		312.1			133.3			38.8			30.4	
Approach LOS		F			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	104.5	19.0	44.0	14.9	102.1	21.0	42.0
Change Period (Y+Rc), s	5.9	* 5.8	5.9	* 6.9	5.9	* 5.8	* 6.3	* 6.9
Max Green Setting (Gmax), s	15.1	* 90	20.1	* 30	15.1	* 90	* 15	* 35
Max Q Clear Time (g_c+I1), s	6.6	58.4	13.0	11.3	9.2	38.5	16.7	37.1
Green Ext Time (p_c), s	0.1	30.1	0.1	1.9	0.0	47.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	82.1
HCM 2010 LOS	F

Notes

TE Report

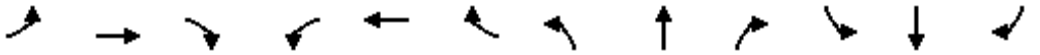
Appendix D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	238	109	84	106	31	49	529	80	323	1260	183
Future Volume (veh/h)	265	238	109	84	106	31	49	529	80	323	1260	183
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	288	259	118	91	115	34	53	575	87	351	1370	199
Adj No. of Lanes	2	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	272	124	144	245	72	67	1660	251	462	1711	246
Arrive On Green	0.10	0.22	0.22	0.05	0.18	0.18	0.04	0.54	0.54	0.05	0.55	0.55
Sat Flow, veh/h	3442	1213	553	1774	1382	409	1774	3085	466	1774	3106	447
Grp Volume(v), veh/h	288	0	377	91	0	149	53	329	333	351	775	794
Grp Sat Flow(s),veh/h/ln	1721	0	1765	1774	0	1791	1774	1770	1781	1774	1770	1784
Q Serve(g_s), s	14.9	0.0	37.9	7.5	0.0	13.4	5.3	19.0	19.1	9.1	63.0	64.9
Cycle Q Clear(g_c), s	14.9	0.0	37.9	7.5	0.0	13.4	5.3	19.0	19.1	9.1	63.0	64.9
Prop In Lane	1.00		0.31	1.00		0.23	1.00		0.26	1.00		0.25
Lane Grp Cap(c), veh/h	329	0	397	144	0	318	67	952	958	462	975	982
V/C Ratio(X)	0.88	0.00	0.95	0.63	0.00	0.47	0.79	0.35	0.35	0.76	0.80	0.81
Avail Cap(c_a), veh/h	453	0	423	144	0	318	139	952	958	462	975	982
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	80.3	0.0	68.8	59.2	0.0	66.4	85.9	23.6	23.6	30.4	32.3	32.7
Incr Delay (d2), s/veh	10.7	0.0	29.9	6.7	0.0	0.4	7.3	1.0	1.0	6.5	6.7	7.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	21.8	3.9	0.0	6.7	2.8	9.5	9.7	10.8	32.6	33.7
LnGrp Delay(d),s/veh	91.0	0.0	98.7	65.9	0.0	66.8	93.2	24.6	24.6	36.8	39.0	39.9
LnGrp LOS	F		F	E		E	F	C	C	D	D	D
Approach Vol, veh/h		665			240			715			1920	
Approach Delay, s/veh		95.4			66.5			29.7			39.0	
Approach LOS		F			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	102.7	15.0	47.3	12.7	104.9	23.5	38.8
Change Period (Y+Rc), s	5.9	* 5.8	5.9	* 6.9	5.9	* 5.8	* 6.3	* 6.9
Max Green Setting (Gmax), s	9.1	* 94	9.1	* 43	14.1	* 89	* 24	* 28
Max Q Clear Time (g_c+I1), s	11.1	21.1	9.5	39.9	7.3	66.9	16.9	15.4
Green Ext Time (p_c), s	0.0	10.9	0.0	0.5	0.0	18.6	0.3	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	49.5
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	292	87	15	128	325	46	66	1317	42	92	654	306
Future Volume (veh/h)	292	87	15	128	325	46	66	1317	42	92	654	306
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	317	95	16	139	353	50	72	1432	46	100	711	333
Adj No. of Lanes	2	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	354	306	51	358	267	38	89	1946	62	192	1269	594
Arrive On Green	0.10	0.20	0.20	0.08	0.17	0.17	0.05	0.56	0.56	0.04	0.54	0.54
Sat Flow, veh/h	3442	1555	262	1774	1597	226	1774	3500	112	1774	2342	1097
Grp Volume(v), veh/h	317	0	111	139	0	403	72	723	755	100	537	507
Grp Sat Flow(s),veh/h/ln	1721	0	1817	1774	0	1823	1774	1770	1843	1774	1770	1669
Q Serve(g_s), s	16.4	0.0	9.4	11.6	0.0	30.1	7.2	55.2	55.5	4.4	36.0	36.0
Cycle Q Clear(g_c), s	16.4	0.0	9.4	11.6	0.0	30.1	7.2	55.2	55.5	4.4	36.0	36.0
Prop In Lane	1.00		0.14	1.00		0.12	1.00		0.06	1.00		0.66
Lane Grp Cap(c), veh/h	354	0	357	358	0	305	89	984	1025	192	959	904
V/C Ratio(X)	0.90	0.00	0.31	0.39	0.00	1.32	0.81	0.73	0.74	0.52	0.56	0.56
Avail Cap(c_a), veh/h	377	0	357	373	0	305	149	984	1025	277	959	904
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	79.8	0.0	61.9	56.0	0.0	75.0	84.6	30.0	30.0	27.8	27.1	27.2
Incr Delay (d2), s/veh	21.4	0.0	0.2	0.3	0.0	166.1	6.5	4.9	4.7	0.8	2.4	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.0	4.8	5.7	0.0	29.2	3.7	28.2	29.5	2.2	18.2	17.2
LnGrp Delay(d),s/veh	101.2	0.0	62.1	56.3	0.0	241.0	91.1	34.9	34.8	28.6	29.5	29.7
LnGrp LOS	F		E	E		F	F	C	C	C	C	C
Approach Vol, veh/h		428			542			1550			1144	
Approach Delay, s/veh		91.1			193.7			37.4			29.5	
Approach LOS		F			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.3	105.9	19.5	42.3	14.9	103.3	24.8	37.0
Change Period (Y+Rc), s	5.9	* 5.8	5.9	* 6.9	5.9	* 5.8	* 6.3	* 6.9
Max Green Setting (Gmax), s	15.1	* 90	15.1	* 35	15.1	* 90	* 20	* 30
Max Q Clear Time (g_c+I1), s	6.4	57.5	13.6	11.4	9.2	38.0	18.4	32.1
Green Ext Time (p_c), s	0.1	24.1	0.0	0.4	0.0	20.6	0.1	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	64.3
HCM 2010 LOS	E

Notes

TE Report

Appendix E

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): n/a | Request By: City of Sandy Springs

County: Fulton | GDOT District: 7 - Metro Atlanta

Major (State) Road: SR 9 | Speed Limit: 45 mph

Minor (Crossing) ST: Dalrymple Road | Speed Limit: 35 mph

Major ST Direction: North/South | Area Type: Urban

Intersection Control: Signal (turn lanes on mainline)

Prepared By: KCI | Analyst: Antweiler

Date: 2/24/2020 | Project ID:

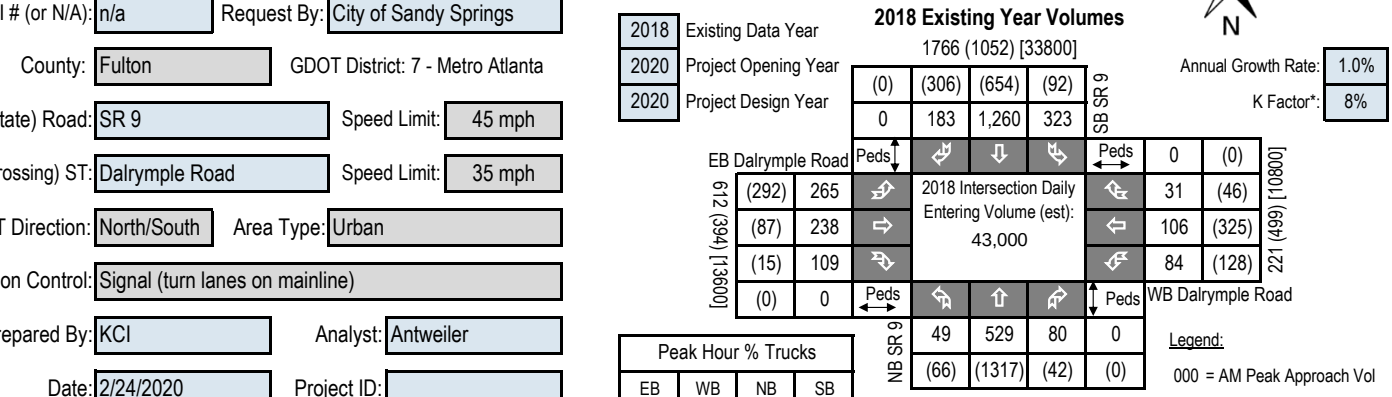
Project Purpose: Add additional eastbound left-turn lane

2018	Existing Data Year
2020	Project Opening Year
2020	Project Design Year

Annual Growth Rate: 1.0%

K Factor*: 8%

2018 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
1%	3%	4%	4%

Legend:

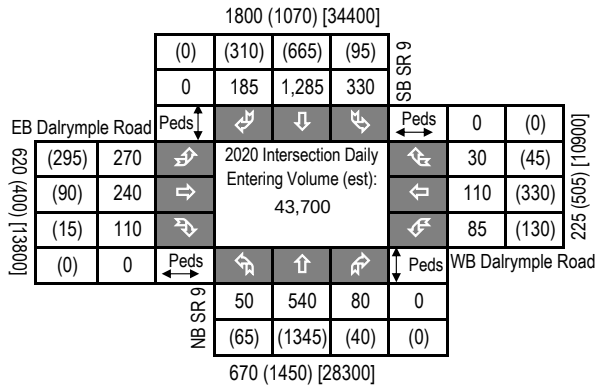
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

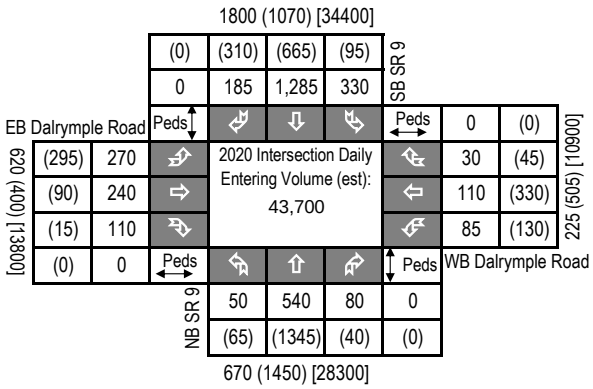
[000] = ADT Volume (Estimate)

Approach Splits: SR 9 - 0.71 / Dalrymple Road - 0.29

2020 Opening Year Volumes



2020 Design Year Volumes



Introduction: In 2005, SAFETEA-LU established the Highway Safety Improvement Program (HSIP) and mandated that each state prepare a Strategic Highway Safety Plan (SHSP) to prioritize safety funding investments. Intersections quickly became a common component of most states' SHSP emphasis areas and HSIP project lists, including Georgia's SHSP. Intersection Control Evaluation (ICE) policies and procedures represent a traceable and transparent procedure to streamline the evaluation of intersection control alternatives, and further leverage safety advancements for intersection improvements beyond just the safety program. Approximately one-third of all traffic fatalities and roughly seventy five percent of all traffic crashes in Georgia occur at or adjacent to intersections. Accordingly, the Georgia SHSP includes an emphasis on enhancing intersection safety to advance the *Toward Zero Deaths* vision embraced by the Georgia Governor's Office of Highway Safety (GOHS). This ICE tool was developed to support the ICE policy, developed and adopted to help ensure that intersection investments across the entire Georgia highway system are selected, prioritized and implemented with defensible benefits for safety towards those ends.

Tool Goal: The goal of this ICE tool is to provide a simplified and consistent way of importing traffic, safety, cost, environmental impact and stakeholder posture data to assess and quantify intersection control improvement benefits. The tool supports the ICE policy and procedures to provide traceability, transparency, consistency and accountability when identifying and selecting an intersection control solution that both meets project purpose and reflects overall best value in terms of specific performance-based criteria.

Requirements: An ICE is required for any intersection improvement (e.g. new or modified intersection, widening/reconstruction or corridor project, or work accomplished through a driveway or encroachment permit that affects an intersection) where: **1)** the intersection includes at least one roadway designated as a State Route (State Highway System) or as part of the National Highway System; or **2)** the intersection will be designed or constructed using State or Federal funding. In certain circumstances where an ICE would otherwise be required, the requirement may be waived based on appropriate evidence presented with a written request. (See the "**Waiver**" tab to review criteria that may make a project waiver eligible and for instructions to submit a waiver request to the Department). An ICE is not required when the proposed work does not include any changes to the intersection design, involves only routine traffic signal timing and equipment maintenance, or for driveway permits where the driveway is not a new leg to an already existing intersection on either 1) a divided, multi-lane highway with a closed median and only right-in/right-out access or 2) an undivided roadway where the development is not required to construct left and/or right turn lanes (as per the Driveway Manual and District Traffic Engineer).

Two-Stage Process: A complete ICE process consists of two (2) distinct stages, and it is expected that the respective level of effort for completing both stages of ICE will correspond to the magnitude and complexity of the intersection. Prior to starting an ICE, the District Traffic Engineer and/or State Traffic Engineer should be consulted for advice on an appropriate level of effort. The Stage 1 and Stage 2 ICE forms are designed minimize required data inputs using drop-down menu choices and limiting text entry. All fields shaded grey include drop down menu choices and all fields shaded blue require data entry. All other cells in the worksheet are locked.

Stage 1: Screening Decision Record Stage 1 should be conducted early in the project development process and is intended to inform which alternatives are worthy of further evaluation in Stage 2. Stage 1 serves as a screening effort meant to *eliminate* non-competitive options and identify which alternatives merit further considerations based on their practical feasibility. Users should use good engineering judgement in responding to the seven policy questions by selecting "Yes" or "No" in the drop-down boxes. Alternatives should not be summarily eliminated without due consideration, and reasons for eliminating or advancing an alternative should be documented in the "Screening Decision Justification" column.

Stage 2: Alternative Selection Decision Record Stage 2 involves a more detailed and familiar evaluation of the alternatives identified in Stage 1 in order to support the selection of a preferred alternative that may be advanced to detailed design. Stage 2 data entry may require the use of external analysis tools to determine costs, operations and/or safety data that, combined with environmental and stakeholder posture data, form the basis of the ICE evaluation. A separate "CostEst" worksheet tab helps users develop pre-planning-level cost estimates for each Stage 2 alternative evaluated, and a separate Users Guide has been prepared to give guidance on Stage 1 and Stage 2 data entry. Once all data is entered, each alternative is scored and ranked, with the results reported at the bottom of the Stage 2 worksheet to inform on the best of the intersection controls evaluated for project recommendation.

Documentation: A complete ICE document consists of the combination of the outputs from either a completed and signed waiver form or both Stage 1 and Stage 2 worksheets (along with supporting costing and/or environmental documentation), to be included in the approved project Concept Report (or equivalent) or as a stand-alone document.

GDOT ICE STAGE 1: SCREENING DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI #	n/a
Project Location:	SR 9 @ Dalrymple Road
Existing Control:	Signal (turn lanes on mainline)
Prepared by:	KCI
Date:	2/24/2020

Answer "Yes" or "No" to each policy question for each control type to identify which alternatives should be evaluated in the Stage 2 Decision Record; enter justification in the rightmost column

Note: Up to 5 alternatives may be selected and evaluated; Use this ICE Stage 1 to screen 5 or fewer alternatives to evaluate in Stage 2

	Intersection Alternative (see "Intersections" tab for detailed description of intersection/interchange type)	1. Does alternative address the project need in a balanced manner and in scale with the project?	2. Does alternative improve safety performance in terms of reducing severe crashes?	3. Does alternative incorporate safety, convenience and accessibility for pedestrians and/or bicyclists?	4. Does alternative improve (or preserve) traffic operations (congestion, delay, reliability, etc.)?	5. Does alternative appear feasible given the site characteristics, constrains & location context?	6. Does alternative appear feasible with respect to other project factors?	7. Overall feasible alternative (select alternative for further evaluation in Stage 2)?	**Screening Decision Justification:**
Unsignalized Intersections	Conventional (Minor Stop)	No	No	No	No	No	No	No	n/a
	Conventional (All-Way Stop)	No	No	No	No	No	No	No	n/a
	Mini Roundabout	No	No	No	No	No	No	No	n/a
	Single Lane Roundabout	No	No	No	No	No	No	No	n/a
	Multilane Roundabout	No	No	No	No	No	No	No	n/a
	RCUT (stop control)	No	No	No	No	No	No	No	n/a
	RIRO w/down stream U-Turn	No	No	No	No	No	No	No	n/a
	High-T (unsignalized)	No	No	No	No	No	No	No	n/a
	Offset-T Intersections	No	No	No	No	No	No	No	n/a
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	n/a
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	n/a
	No LT Lane Improvements	No	No	No	No	No	No	No	n/a
	No RT Lane Improvements								n/a
	Other unsignalized (provide description):	No	No	No	No	No	No	No	n/a
Signalized Intersections	Traffic Signal	No	No	**Yes**	**Yes**	**Yes**	**Yes**	No	Existing Condition
	Median U-Turn (Indirect Left)	No	No	No	No	No	No	No	Volumes do not require alternative geometry
	RCUT (signalized)	No	No	No	No	No	No	No	Volumes do not require alternative geometry
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	Volumes do not require alternative geometry
	Continuous Green-T	No	No	No	No	No	No	No	Existing 4-leg intersection
	Jughandle	No	No	No	No	No	No	No	Adjacent development does not allow
	Quadrant Roadway	No	No	No	No	No	No	No	Adjacent development does not allow
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not a grade separated intersection
	Diverging Diamond	No	No	No	No	No	No	No	Not a grade separated intersection
	Single Point Interchange	No	No	No	No	No	No	No	Not a grade separated intersection
	No LT Lane Improvements	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Proposed Condition - maintain traffic signal and add one side-street left-turn lane
	Add one RT Lane on Dalrymple Road								
	Other Signalized (provide description):	No	No	No	No	No	No	No	n/a

= Intersection type selected for more detailed analysis in Stage 2 Alternative Selection Decision Record

GDOT INTERSECTION CONTROL EVALUATION (ICE) WAIVER FORM

ICE Version 2.15 | Revised 07/01/2019

Waiver Request - Level 1

In certain circumstances where an ICE would otherwise be required, an ICE may be waived based on appropriate evidence presented with a written request. Scenarios in which an ICE waiver request may be considered include:

1. Proposed improvements do not substantially alter the character of the intersection, and are considered minor in nature, such as extending existing turn lane(s) or modifying signal phasing at an existing traffic signal
2. The intersection consists of a public roadway intersecting a divided, multilane roadway where the access will be limited to a closed median with only right-in/right-out access that will operate acceptably; or
3. The intersection is along an undivided, two-lane roadway that will not be widened and meets the following criteria:
   - Low risk in terms of exposure (total intersection entering volume less than 1,000 vehicles /day)
   - Latest 5 years of crash history is not indicative of a crash problem (no discernible crash patterns coupled with low crash frequency and severity)
   - Layout has no unusual or undesirable geometric features (such as restricted sight distance)
   - The proposed changes are not expected to adversely affect safety

If only one alternative is determined to be feasible from the ICE Stage 1, then a waiver may be submitted in lieu of completing ICE Stage 2. The waiver must clearly explain why there is no other feasible alternative. A Waiver Form should also be submitted to document an agreed upon decision to select a preferred alternative other than the highest scoring alternative in Stage 2.

ICE waiver forms with supporting documentation should be submitted for approval to the Office of Traffic Operations or District Engineer (depending on Waiver level). Questions regarding the waiver process should be routed to the State Traffic Engineer.

Project Information:

Location:	SR 9 @ Dalrymple Road	GDOT PI # (or N/A):	n/a
County:	Fulton	Requested By:	City of Sandy Springs
GDOT District:	7 - Metro Atlanta	Prepared By:	KCI
Area Type:	Urban	Analyst:	Antweiler
Existing Intersection Control:	Signal (turn lanes on mainline)	Date:	2/24/2020
		Waiver Request Type:	New or Revised Signal Permit

Traffic and Operations Data:[1]

Intersection meets signal/AWS warrants?	Meets Signal Warrants	
Traffic Analysis Type:	Intersection Delay	
Existing Avg Daily Traffic (Major Street):	32,300	
Existing Avg Daily Traffic (Minor Street):	10,000	
Analysis Period:	AM Peak	PM Peak
2020 Opening Yr Peak Hour Intersection Delay:	49.5 sec	64.3 sec
2020 Opening Yr Peak Hour Intersection V/C:	0.88	0.89
2020 Design Yr Peak Hour Intersection Delay:	49.5 sec	64.3 sec
2020 Design Yr Peak Hour Intersection V/C:	0.88	0.89

[1]Crash data required for all existing intersections. ADT's required if available (from data collected or nearest GDOT count station site). Capacity data is optional unless needed to justify basis of the waiver request.

Crash Data (Required):[1]

Crash Data: Enter most recent 5 years of crash data	*Crash Severity*		
Crash Type	PDO	Injury Crash*	Fatal Crash*
Angle	44	13	0 <-
Head-On	2	1	0
Rear End	38	14	0
Sideswipe - same	30	2	0
Sideswipe - opposite	2	0	0
Not Collision w/Motor Veh	1	2	0
TOTALS:	**117**	**32**	**0**

* Number of crashes resulting in injuries / fatalities, not number of persons

Description of Work / Justification for Waiver (Required):	City of Sandy Springs Intersection Improvement project - additional eastbound left-turn lane on Dalrymple Road with protected only left-turn phase; maintain existing traffic signal
Proposed Intersection Control:	Add Turn Ln/Median (Signal)

REQUESTED BY: Andrew Antweiler Date: 2/24/2020

Title: Consultant Traffic Engineer

APPROVED BY: _____ Date: _____

Name: _____

Chief Engineer or (Approved Delegate)