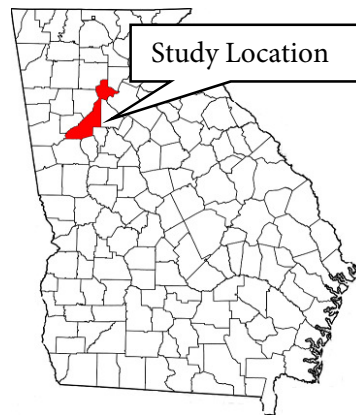


City of Sandy Springs  
Traffic Engineering Study  
January 2018



Primary Route: Northside Drive

Secondary Route: Old Powers Ferry Road/Riverview Road

County: Fulton

City: Sandy Springs

Prepared by: HNTB



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# Northside Drive at Old Powers Ferry Road and Riverview Road Traffic Engineering Study

## 1. Introduction

This memorandum summarizes the methodology and factors used to forecast future traffic volumes and conduct crash and traffic operations analysis for the proposed intersection improvements of Northside Drive at Old Powers Ferry Road and Riverview Road.

The Existing Year, Opening Year and Design Year for this project are 2017, 2019 and 2039 respectively. The forecasting process results in Build/No-Build Annual Average Daily Traffic (AADT) volumes and AM and PM Design Hourly Volumes (DHV) for 2017, 2019 and 2039. Operational analysis was also conducted for Existing, Opening, and Design years.

## 2. Existing Conditions

The intersection of Northside Drive at Old Powers Ferry Road and Riverview Road is two-way stop controlled. Northside Drive is classified as an urban minor arterial, while Riverview Road and Old Powers Ferry Road are both classified as urban local collectors. Northside Drive, Riverview Road, and Old Powers Ferry Road, are all undivided two-lane roads. Riverview Road and Old Powers Ferry Road are slightly offset at the Northside Drive intersection. The existing intersection location is shown in **Figure 1**.

**Figure 1. Existing Overview of Study Area**



### 3. Forecasting Methodology

The forecasting methodology for establishing Build and No-Build traffic projections uses the following data sets:

- 2017 Turning Movement Counts
- 2017 Tube Counts
- 2017 Vehicle Classification Counts
- 2016 GDOT Traffic Adjustment Factors
- Historical AADT (2000 to 2016)
- Population Growth projections from 2010 to 2040.
- Atlanta Regional Commission (ARC) Model for 2010 and 2040 E+C Scenarios

The traffic forecasting process consisted of the following steps:

- Collect weekday directional daily and hourly counts (volume and classification) and hourly turning movement counts
- Compare collected volumes to GDOT historical counts.
- Apply adjustment factors to traffic counts to adjust for daily and monthly variations
- Balance adjusted traffic counts
- Collect information related to programmed projects and population growth and review their potential impacts to future traffic growth.
- Review GDOT historical traffic counts to assess traffic growth trends.
- Review ARC Model outputs to estimate future growth rates.
- Apply growth factors to estimate AADT and DHV for 2019 and 2039 while maintaining existing K & Directional Distribution (D) factors.

### 4. Data Collection

#### 4.1 Traffic Counts

Traffic counts at the intersection of Northside Drive at Old Powers Ferry Road and Riverview Road were collected November 14<sup>th</sup>-15<sup>th</sup>, 2017. The daily counts are factored to represent Average Annual Daily Traffic (AADT). The factors were obtained from the GDOT 2016 factor sheet. The factors used for this project are shown in **Table 1** below.

**Table 1. Applied 2016 GDOT Factors**

Group	Roadway & Classification	Axle	Day 1	Day 2	Monthly
8	Northside Dr <i>Urban Minor/Major Arterials (ATL)</i>	0.98	0.94	0.93	1.05
4	Riverview Dr & Old Powers Ferry Rd <i>Small Urban/Urban Local Collectors</i>	0.96	0.92	0.92	1.06

**Table 2** shows the types of counts collected to develop existing 2017 volumes.

**Table 2. Summary of Traffic Data Collected**

Quantity	Description
1	13-Hr Turning Movement Count
3	48-Hr Bidirectional Automatic Machine Count
1	48-Hr Bidirectional Automatic Machine Count with Classification

#### 4.2 Peak Hour K & D Factors

The peak hours of 7:30-8:30 AM and 5:00-6:00 PM were selected based on analysis of Northside Drive at Old Powers Ferry Road and Riverview Road count locations. The existing K-factors and D-factors for AM and PM peak hours were calculated based on the collected counts that were balanced and rounded. When balancing the traffic counts, greater weight was given to classification count station 01. **Table 3** summarizes the Existing 2017 Counts with Applied Factors (Daily, Monthly and Axle), Existing 2017 Balanced Counts, Peak Hour Balanced Counts, K & D Factors. A count map with count stations is included as Attachment A.

**Table 3. Existing Volume, AM & PM K Factors and D Factors**

Count Station	Existing 2017 Daily Volumes				Existing 2017 Peak Hour Volumes							
	Raw Counts with Applied Factors		Balanced Counts		AM 7:30 - 8:30				PM 5:00 - 6:00			
	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB	K	D	EB/NB	WB/SB	K	D
<b>01</b>	<b>3,500</b>	<b>5,000</b>	<b>3,550</b>	<b>5,000</b>	<b>250</b>	<b>670</b>	<b>10.76%</b>	<b>0.73</b>	<b>455</b>	<b>510</b>	<b>11.29%</b>	<b>0.53</b>
02	325	325	325	325	35	20	8.46%	0.64	20	25	6.92%	0.56
03	1,575	1,900	1,575	1,950	235	140	10.64%	0.63	155	345	14.18%	0.69
<b>04</b>	<b>5,500</b>	<b>6,500</b>	<b>5,425</b>	<b>6,500</b>	<b>380</b>	<b>880</b>	<b>10.57%</b>	<b>0.70</b>	<b>780</b>	<b>650</b>	<b>11.99%</b>	<b>0.55</b>

Notes:

- Count stations shown in bold are on Northside Drive.
- Applied Factors include daily and monthly factors at all count locations. In addition, axle factors are applied at non-classification count locations.

#### 5. Corridor Growth Rates

Growth rates from several sources were summarized in the section below, the sources include: historical traffic counts, population projections and the Atlanta Regional Commission Model. Based on these sources a recommended project growth rate is presented.

##### 5.1 GDOT Historical Traffic Data and Growth Trends

Historical traffic data (2000-2016) was collected from the GDOT Geocounts database. Data from one station on Northside drive was collected and analyzed.

**Table 4** below shows the summary of the growth rates from historical traffic data around the project area.

**Table 4. GDOT Historical Traffic Growth Rates**

Roadway	Stations	15 year	10 year	5 year
Northside Drive	1	7.94%	6.3%	11.28%

### 5.2 Census Population Data

The data from US Census Bureau was reviewed for Fulton County. The data indicates that the population growth rate for Fulton County was 1.21% between 2000 and 2010 and 1.78% between 2010 and 2016. The Governor’s Office of Planning and Budget estimates that the population growth rate between 2015 and 2045 will be 1.39% for Fulton County.

### 5.3 Travel Demand Model Review

The Atlanta Regional Commission (ARC) travel demand models for year 2015 and 2040 were reviewed. Traffic volumes from two links in the project area were collected and analyzed. Annual growth rates were calculated for the selected links. Based on the model, Northside Drive showed a compounded annual growth rate of 1.70% from 2015 to 2040 for the Build/No-Build Scenario. ARC overview is shown below in **Table 5**.

**Table 5. Atlanta Regional Commission Model Analysis**

ARC Model, Northside Dr			
Location	Model Traffic Volume		Growth Rate
	2015	2040	Build/No-Build
Northside Dr NB N/O Mt Vernon Hwy	3282	4644	1.4%
Northside Dr SB N/O Mt Vernon Hwy	3253	5421	2.1%
Average Growth Rate			1.7%

### 5.4 Recommended Growth Rates

Based on the review of GDOT historic data, the ARC Model, and the region population forecasts, the recommended growth rates for Build/No-Build are shown in **Table 6** below. Build/No-Build growth rates are equal because the addition of turning lanes and reconfiguration of the intersection will not lead to a significant increase in demand.

**Table 6. Proposed Build/No-Build 2017-2039 Annual Growth Rates**

Roadway	Build/No-Build	
	2017-2019	2019-2039
Northside Dr	1.70%	1.70%
Side Roads	1.70%	1.70%

## 6. 2019 & 2039 Forecasts

The 2019 and 2039 traffic projections apply the recommended growth rates to the Existing AADT and Peak Hour DHVs to derive future forecasts, thereby keeping the K-factors and D-factors to be the same as existing.

## 7. Crash Analysis

Crash data was downloaded from the Georgia Electronic Accident Reporting System (GEARS) database for a five-year period (2013-2017) at the study intersection. During this time, a total of 12 crashes and 2 injuries were recorded at the intersection. The crash data indicates there was an average of 2.4 crashes per year between 2013 and 2017. Rear end crashes accounted for half of the total crashes. The vast majority of crashes happened during the day in dry conditions. **Table 7** shows the summary of crashes at the study intersection.

**Table 7: Crash History (2013-2017)**

Collision Type	Year					Total
	2013	2014	2015	2016	2017	
Angle	2	1	-	1	1	5
Head-On	-	-	-	-	-	-
Rear End	2	-	2	1	1	6
Sideswipe	-	-	-	-	1	1
Not a Collision with Motor Vehicle	-	-	-	-	-	-
Unknown	-	-	-	-	-	-
Total Crashes	4	1	2	2	3	12
Total Non-Fatal Injuries	1	1	-	-	-	2
Total Fatalities	-	-	-	-	-	-
Average Crashes (per year)						2.4
HSM Predicted Crashes (per year)						1.9
Average Daily Traffic	8,320	8,320	9,990	10,300	12,000	
Crash Rate (per 100 MEV)	1317	329	548	531	685	
Non-Fatality Injury Rate (per 100 MEV)	329	329	-	-	-	
Fatality Rate (per 100 MEV)	-	-	-	-	-	

In 2013, the crash rate of 1317 at the study intersection was very high compared to the statewide crash rate of 606 for a similar intersection corridor. The 2014 crash rate was low with a rate of 329 compared to the statewide average of 604. The 2015 statewide crash rate of 637 is higher than the 2015 and 2016 study intersection crash rates and similar to the 2017 crash rate. The non-fatality injury rate for 2013 and 2014 are significantly higher than the statewide rates of 128 and 124, respectively. There were no reported fatalities during the five-year period at the intersection.

## 8. Two-Way Stop-Control Traffic Analysis

An analysis of Northside Drive at Old Powers Ferry Road and Riverview Road was conducted to calculate the performance of the intersection as a Two-Way Stop-Controlled intersection. The side road delay and LOS results of the HCS analysis is shown in **Table 8**.

**Table 8. Two-Way Stop-Control Traffic Analysis**

Northside Dr At:	2017 Existing		2019 No-Build		2039 No-Build	
	AM	PM	AM	PM	AM	PM
Riverview Rd	48.2/E	74.5/F	55.0/F	89.6/F	901.0/F	-/F
Old Powers Ferry Rd	16.3/C	20.1/C	17.2/C	21.5/C	138.3/F	112.7/F

The Level of service (LOS) for the Riverview Road approach would be F in both the AM and PM peak hours in both 2019 and 2039. The Old Powers Ferry Road approach would have a LOS C in the AM and PM peak hours in 2019 but would worsen to LOS F for both peak hours in 2039.

**9. Roundabout Analysis**

The GDOT Roundabout Analysis Tool, version 4.1, was used to determine the performance of a roundabout at Northside Drive at Old Powers Ferry Road and Riverview Road. The results of the Roundabout Analysis tool are shown in **Table 9**.

**Table 9. Roundabout Analysis**

Northside Dr At:	2019 Build		2039 Build	
	AM	PM	AM	PM
Old Powers Ferry Rd/ Riverview Rd	10.7/B	8.4/A	33.8/D	16.7/C

The results show that a roundabout would operate with a LOS D in AM peak hour and a LOS C in the PM peak hour for the 2039 design year. However, it should be noted that by 2039 the SB approach would be at capacity.

**10. Signal Warrant Analysis**

Northside Drive at Old Powers Ferry Road and Riverview Road was reviewed for possible signal installation. Analysis was performed for the intersection using MUTCD Warrant 1, Eight-Hour Vehicular Volume. Using the 2019 volumes, the results of the signal warrant analysis performed using HCS is shown in **Table 10**.

**Table 10. 2019 Build Signal Warrant Analysis**

Warrant 1	Volume	Condition A		Condition B	
Major Street 1 Combined	1,011	500	Pass	750	Pass
Minor Street 1 (1 approach)	306	150	Pass	75	Pass
Major Street (Total of both approaches with right turns excluded)	984	500	Pass	750	Pass
Minor Street 1 (1 approach right turn excluded)	25	150	Fail	75	Fail
Major Street 1 (NB Approach)	473	500	Fail	750	Fail
Minor Street 1 (SB Left Turn)	99	150	Fail	75	Pass

Notes: Both Major and Minor conditions must pass to warrant a traffic signal



Based on Chapter 4C of the MUTCD, it is typical not to include side street right turn traffic in the warrant analysis. The results highlight that the major and minor street volumes do not both meet the minimum volumes to warrant a signal when minor street right turns are excluded.

**Table 11** below shows the signal warrant analysis for the 2039 Build scenario.

**Table 11. 2039 Build Signal Warrant Analysis**

Warrant 1	Volume	Condition A		Condition B	
Major Street 1 Combined	1,464	500	Pass	750	Pass
Minor Street 1 (1 approach)	444	150	Pass	75	Pass
Major Street (Total of both approaches with right turns excluded)	1,425	500	Pass	750	Pass
Minor Street 1 (1 approach right turn excluded)	36	150	Fail	75	Fail
Major Street 1 (NB Approach)	663	500	Pass	750	Fail
Minor Street 1 (SB Left Turn)	139	150	Fail	75	Pass

Notes: Both Major and Minor conditions must pass to warrant a traffic signal

The results indicate that a signal is not warranted in the 2039 Build scenario for Warrant 1. In addition to Warrant 1, other signal warrants were analyzed using the HCS signal warrant software. No signal warrants were met for the 2019 or 2039 Build scenarios.

### 11. Signalized Intersection Analysis

An analysis of Northside Drive at Old Powers Ferry Road and Riverview Road was conducted to calculate the performance of the intersection as a signalized intersection in the Opening and Build years. The results of the HCS analysis for the Open year, 2019, is shown in **Table 12**.

**Table 12. 2019 Build Signalized Intersection Analysis**

Northside Dr At:	2019 Build	
	AM	PM
Old Powers Ferry Rd/ Riverview Rd	8.9/A	13.1/B

For the Open year, the analysis shows a LOS A for the AM peak hour and a LOS B for the PM peak hour. HCS analysis results for the Design year, 2039, can be seen in **Table 13**.

**Table 13. 2039 Build Signalized Intersection Analysis**

Northside Dr At:	2039 Build	
	AM	PM
Old Powers Ferry Rd/ Riverview Rd	11.4/B	22.4/C

The results show that when the intersections are aligned together and a traffic signal is installed, the intersection will be operating with a LOS B in the AM peak period and LOS C in the PM peak period for the 2039 Build scenario. For this scenario, 100-foot left turn lanes were proposed for the northbound and southbound approaches. The southbound left turn was analyzed as protected/permissive, while all other turns were permissive only.

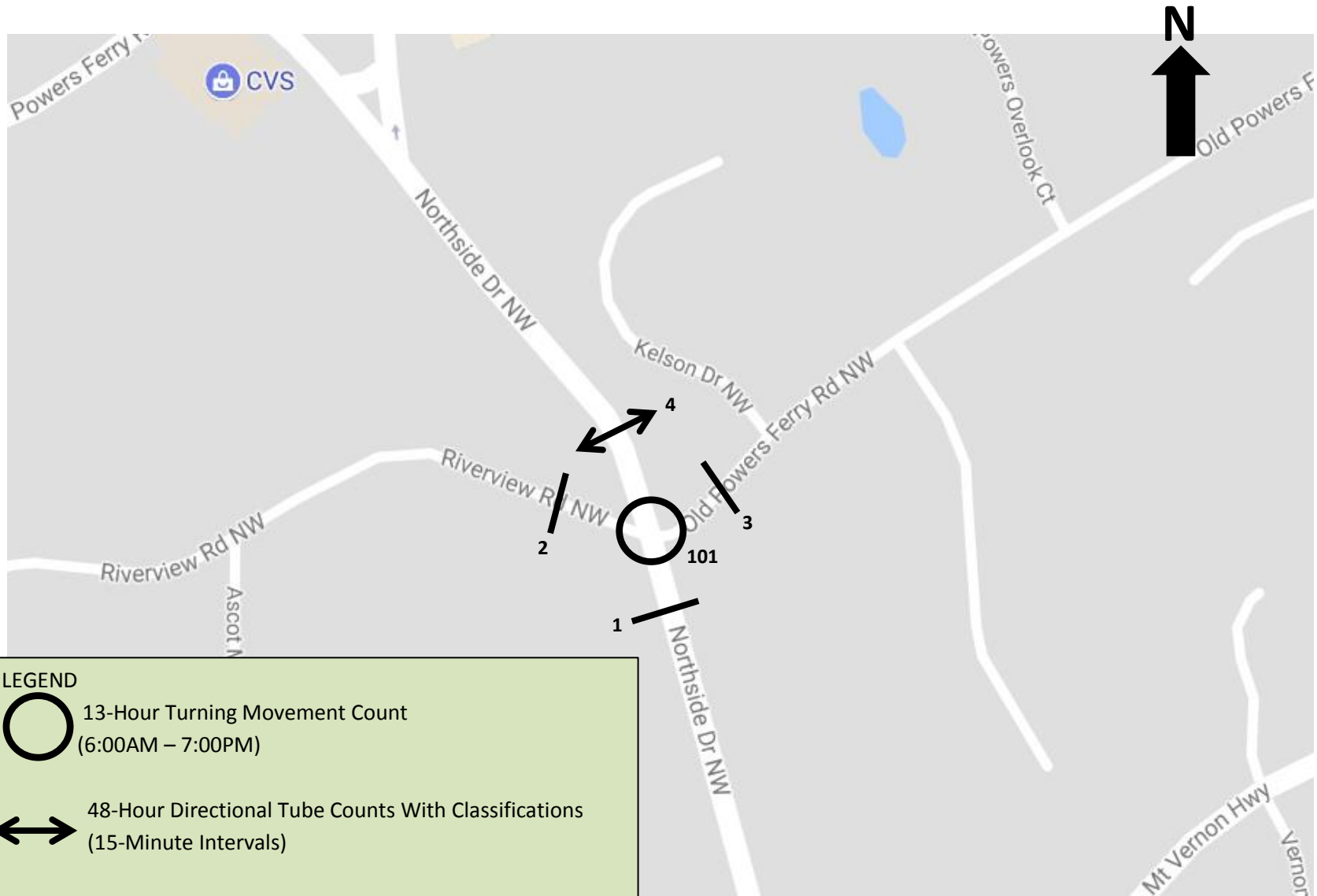
## **12. Conclusion**

A Two-Way Stop-Control analysis of the study intersection showed a LOS of F in Open and Design year for the No-Build scenario on the Riverview Road approach for the AM and PM peak hours. The Old Powers Ferry Road approach would perform adequately in the AM and PM peak hours in 2019 but would worsen to LOS F for both in 2039. Roundabout analysis shows that in 2039 the intersection would operate with a LOS D in the AM peak hour and a LOS C in the PM peak hour. Traffic signal analysis was also conducted for the intersection. Based on 2039 volumes the study intersection would operate with a LOS B in the AM peak hour and a LOS C in the PM peak hour.


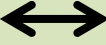

# ATTACHMENT A

Count Location Map

Project Number: TS 106  
Northside Dr at Old Powers Ferry Rd/Riverview Rd  
Count Location Map



**LEGEND**

-  13-Hour Turning Movement Count (6:00AM – 7:00PM)
-  48-Hour Directional Tube Counts With Classifications (15-Minute Intervals)
-  48-Hour Directional Tube Counts (15- Minutes Intervals)

**Project Number: TS 106**  
**Northside Dr at Old Powers Ferry Rd/Riverview Rd**  
**Count Location Map**

City of Sandy Springs TS 106 Turning Movement Counts	
Int #	Intersection Improvement at Northside Dr at Old Powers Ferry Rd/Riverview Rd
101	Northside Dr @ Old Powers Ferry Rd/Riverview Rd

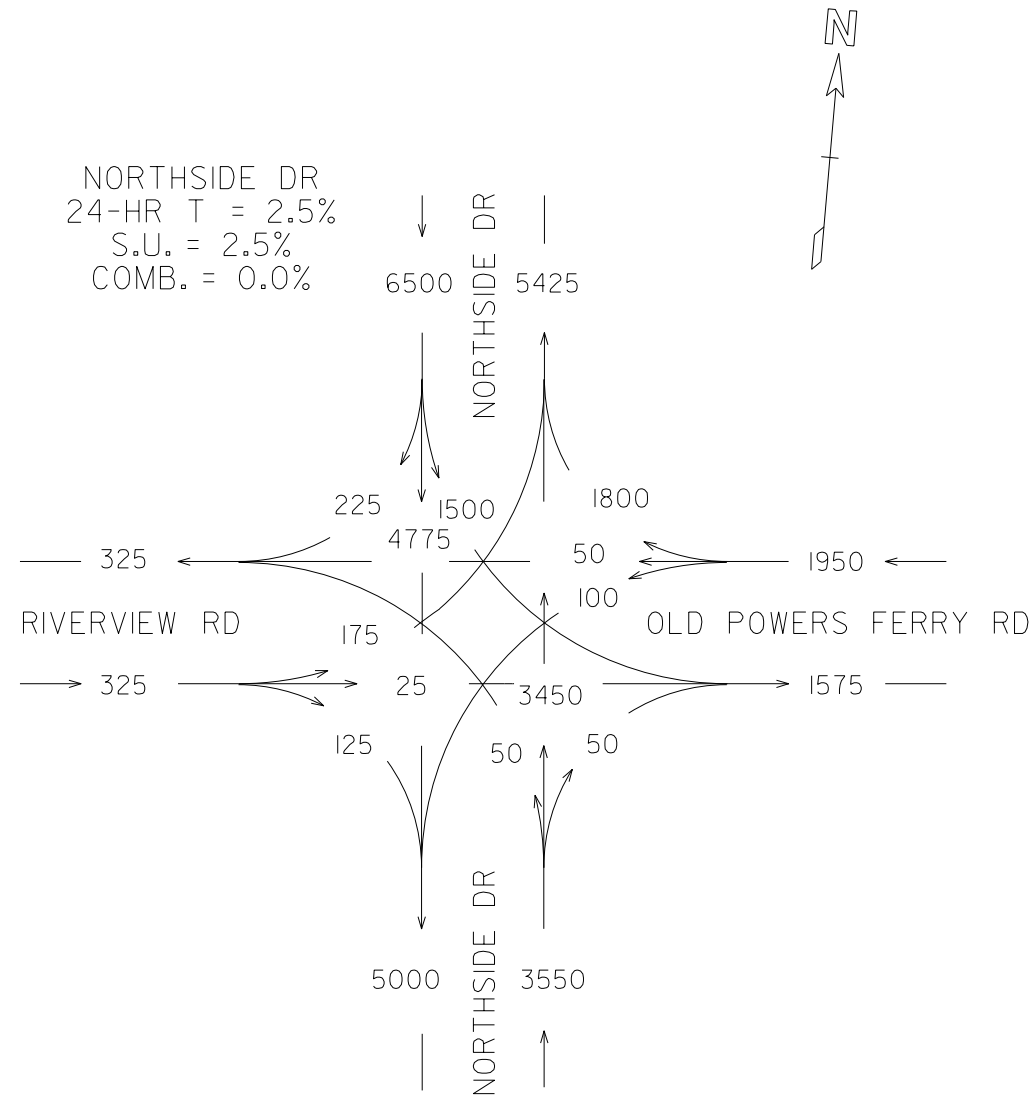
City of Sandy Springs TS 106 Tube Counts	
Tube	Intersection Improvement at Northside Dr at Old Powers Ferry Rd/Riverview Rd
1	Northside Dr, South of Old Powers Ferry Rd
2	Riverview Rd, West of Northside Dr
3	Old Powers Ferry Rd, East of Northside Dr
4	Northside Dr, North of Old Powers Ferry Rd

**Additionally, Queue Analysis for all approaches is required for the entire 13-hour Turning Movement Count period listed above.**

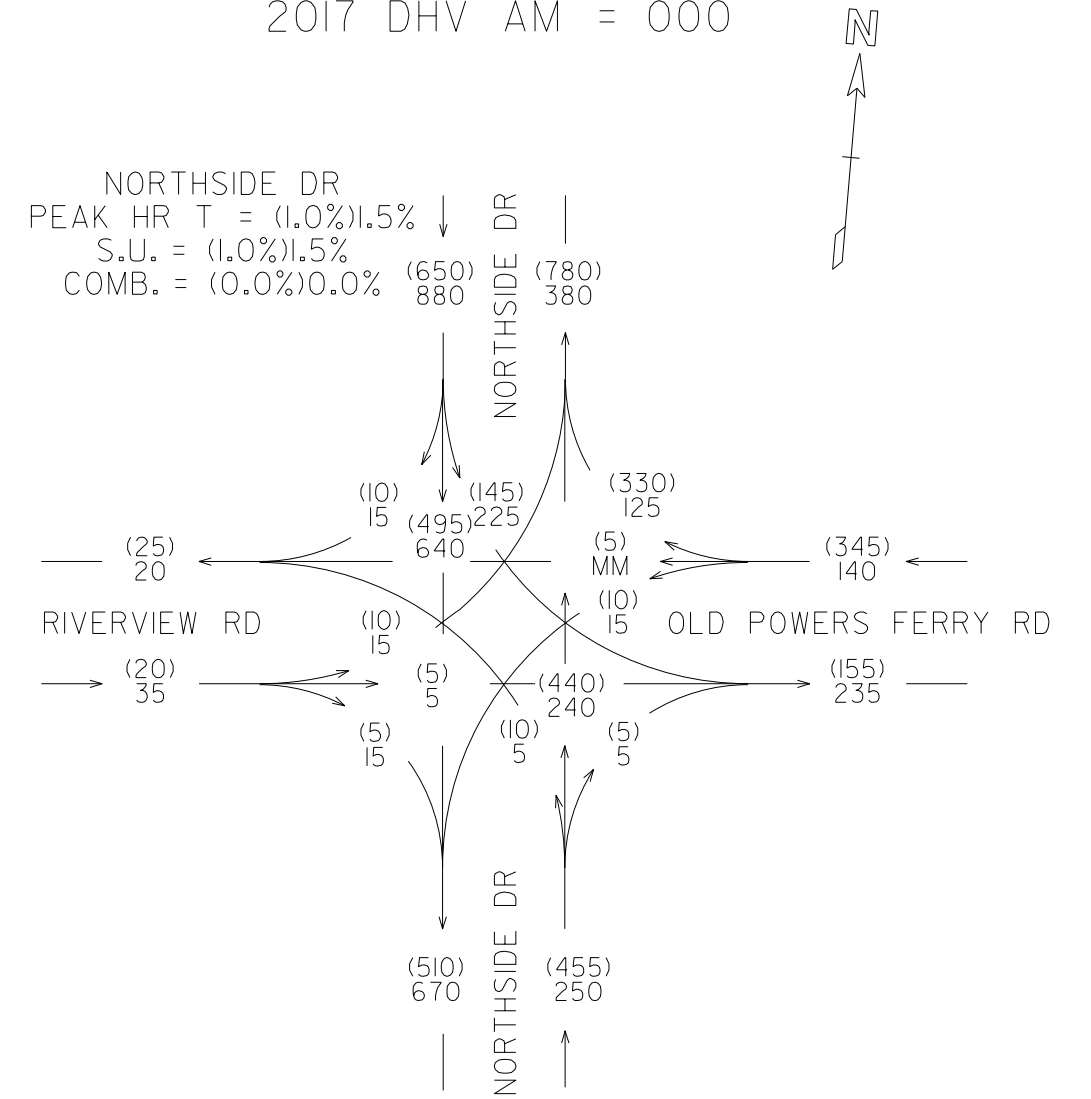
# ATTACHMENT B

Traffic Diagrams

EXISTING  
 2017 AADT = 000



EXISTING  
 2017 DHV PM = (000)  
 2017 DHV AM = 000



CH 12/2017

FULTON COUNTY  
 INTERSECTION IMPROVEMENTS  
 OF NORTHSIDE DR AT  
 RIVERVIEW RD/OLD POWERS FERRY RD

2017 EXISTING



191 PEACHTREE ST, NE  
 SUITE 3300  
 ATLANTA, GEORGIA 30303

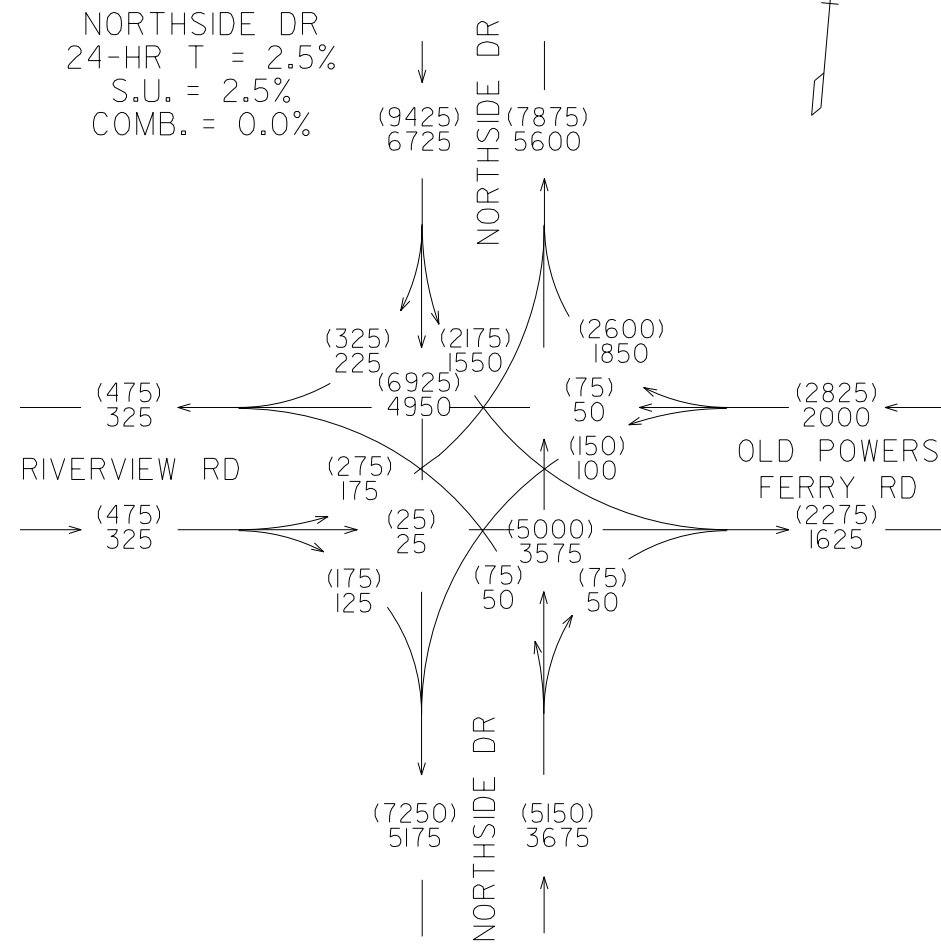
REVISION DATES

NO.	DATE	DESCRIPTION

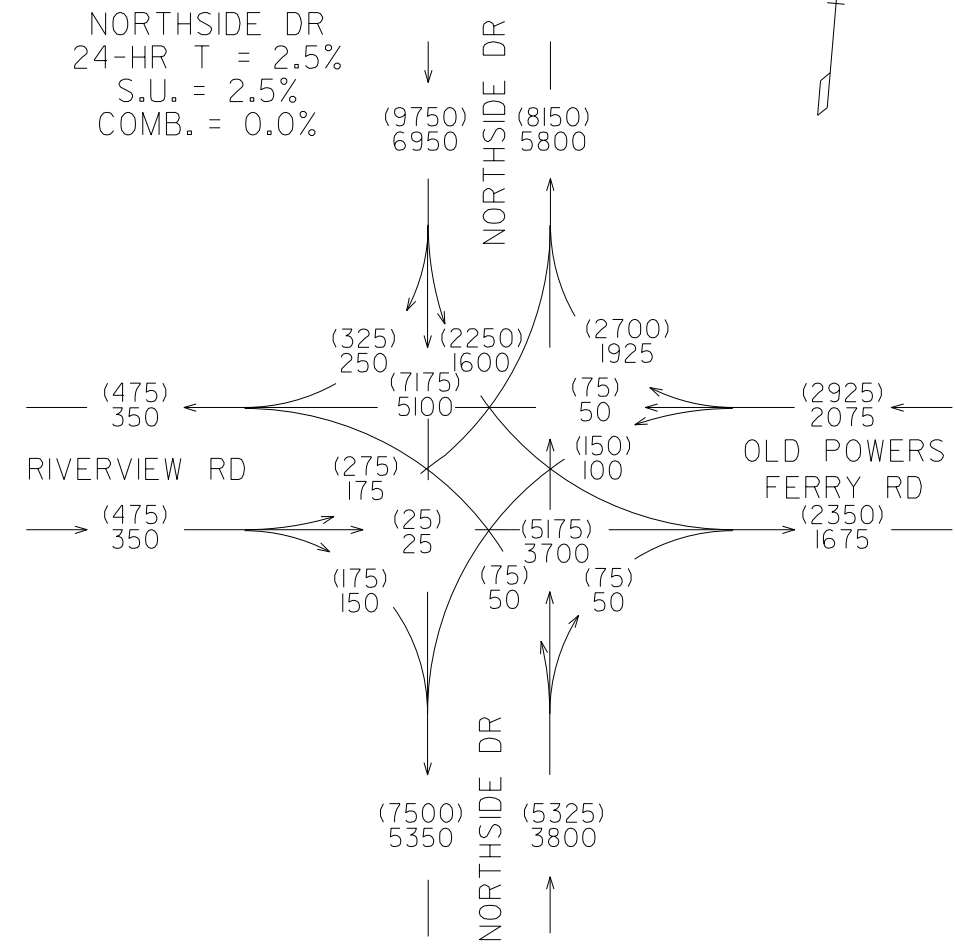
TRAFFIC DIAGRAM

DRAWING No.  
 10-01

BUILD/NO-BUILD  
 2039 AADT = (000)  
 2019 AADT = 000



BUILD/NO-BUILD  
 2041 AADT = (000)  
 2021 AADT = 000



CH 12/2017

FULTON COUNTY  
 INTERSECTION IMPROVEMENTS  
 OF NORTHSIDE DR AT  
 RIVERVIEW RD/OLD POWERS FERRY RD

BUILD/NO-BUILD  
 2019/2039 AADT  
 2021/2041 AADT



191 PEACHTREE ST, NE  
 SUITE 3300  
 ATLANTA, GEORGIA 30303

REVISION DATES

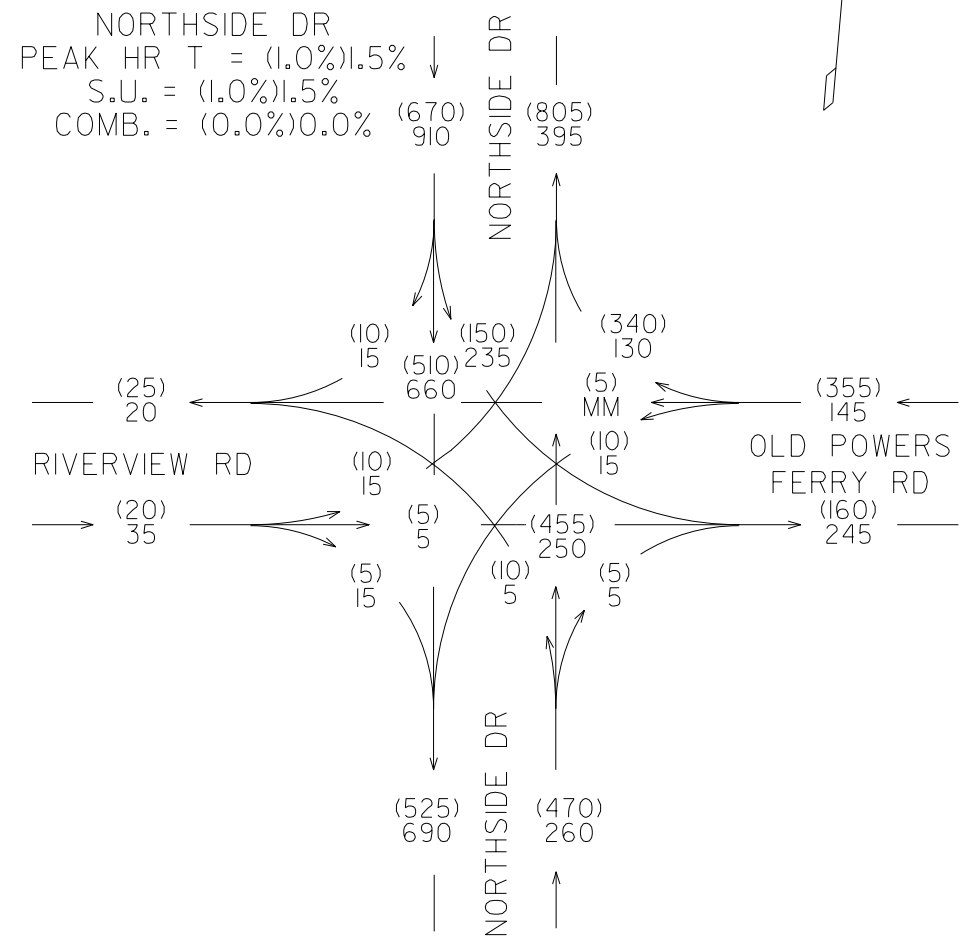

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION

**TRAFFIC DIAGRAM**

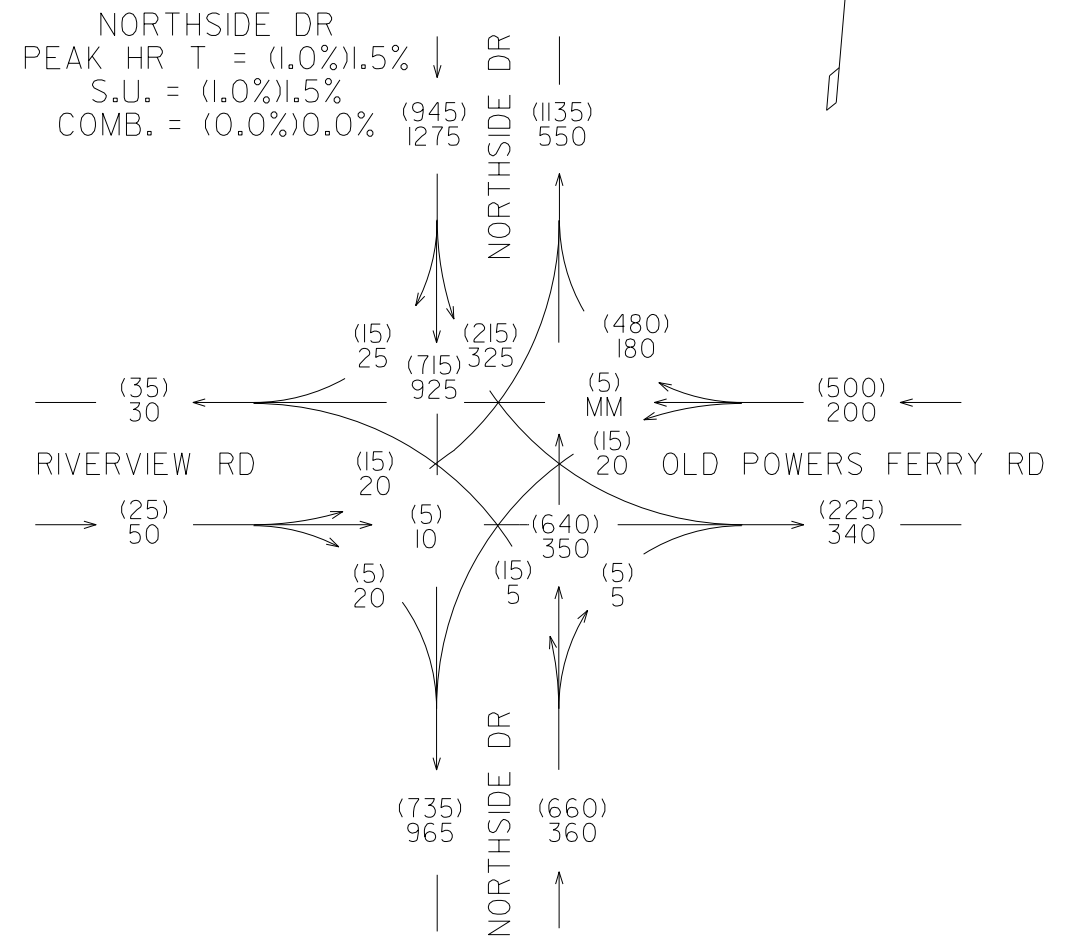
DRAWING No.  
**10-02**



BUILD/NO-BUILD  
 2019 DHV PM = (000)  
 2019 DHV AM = 000



BUILD/NO-BUILD  
 2039 DHV PM = (000)  
 2039 DHV AM = 000



CH 12/2017

FULTON COUNTY  
 INTERSECTION IMPROVEMENTS  
 OF NORTHSIDE DR AT  
 RIVERVIEW RD/OLD POWERS FERRY RD

BUILD/NO-BUILD  
 2019/2039 DHV

**HNTB**  
 191 PEACHTREE ST, NE  
 SUITE 3300  
 ATLANTA, GEORGIA 30303

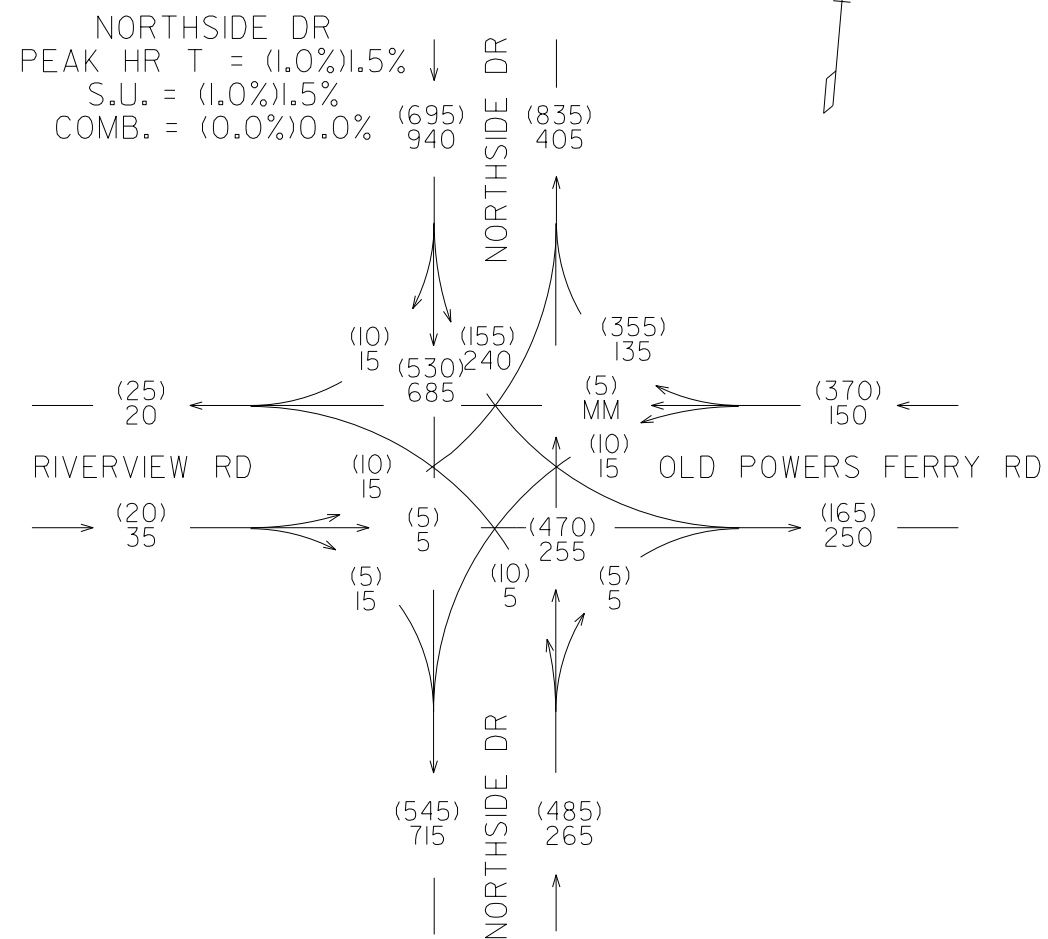
REVISION DATES		

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION

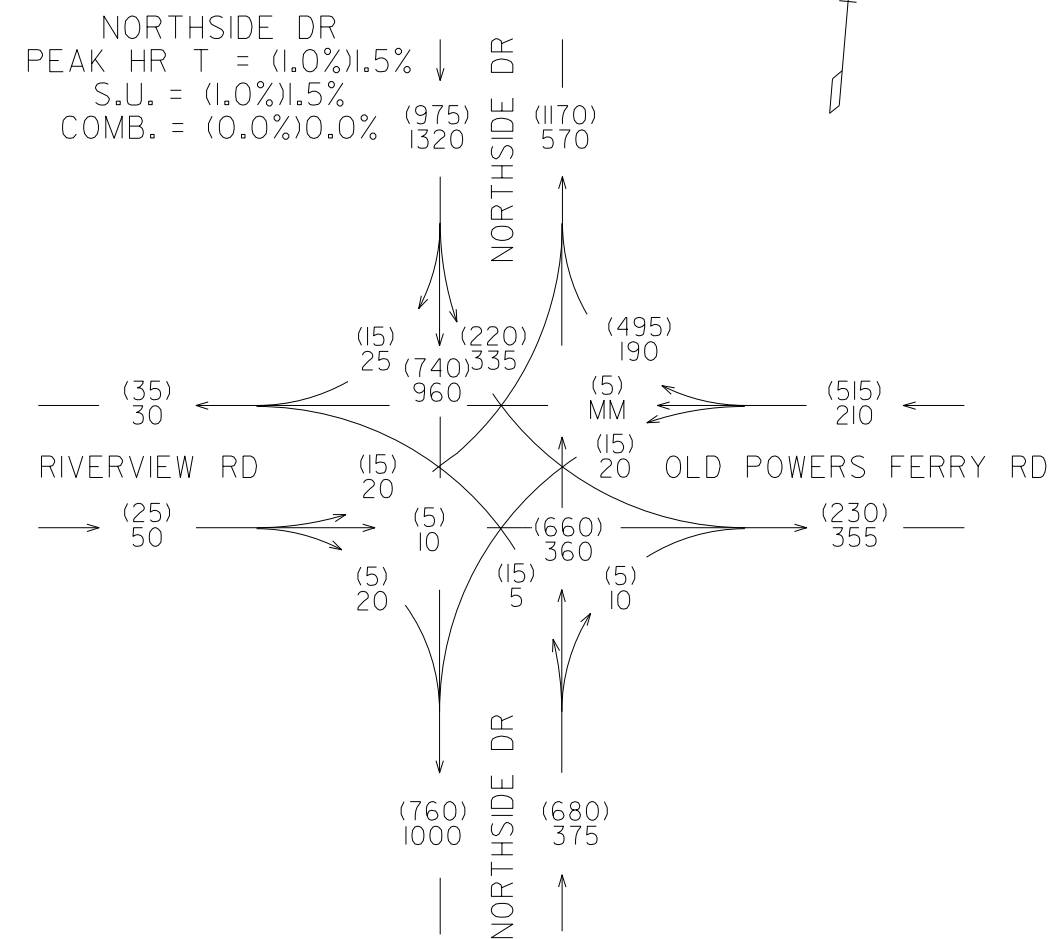
**TRAFFIC DIAGRAM**

DRAWING No.  
**10-03**

BUILD/NO-BUILD  
 2021 DHV PM = (000)  
 2021 DHV AM = 000



BUILD/NO-BUILD  
 2041 DHV PM = (000)  
 2041 DHV AM = 000



CH 12/2017

FULTON COUNTY  
 INTERSECTION IMPROVEMENTS  
 OF NORTHSIDE DR AT  
 RIVERVIEW RD/OLD POWERS FERRY RD

BUILD/NO-BUILD  
 2021/2041 DHV



191 PEACHTREE ST, NE  
 SUITE 3300  
 ATLANTA, GEORGIA 30303

REVISION DATES

NO.	DATE	DESCRIPTION

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION

TRAFFIC DIAGRAM

DRAWING No.  
 10-04

# ATTACHMENT C

## Summary of Findings

Project Number: TS 106  
 Northside Dr at Old Powers Ferry Rd/Riverview Rd

HCS 7 TWSC Analysis

2017	AM		PM	
	Eastbound	Westbound	Eastbound	Westbound
Approach Delay (sec)	48.2	16.3	74.5	20.1
LOS	E	C	F	C

2019	AM		PM	
	Eastbound	Westbound	Eastbound	Westbound
Approach Delay (sec)	55	17.2	89.6	21.5
LOS	F	C	F	C

2039	AM		PM	
	Eastbound	Westbound	Eastbound	Westbound
Approach Delay (sec)	901.0	138.3	-	112.7
LOS	F	F	F	F

Note: Northside Dr is North-South, Riverview Rd/Old Powers Ferry Rd is East-West

Project Number: TS 106  
Northside Dr at Old Powers Ferry Rd/Riverview Rd

Roundabout Analysis Summary

2019	AM				PM			
	Northbound	Southbound	Eastbound	Westbound	Northbound	Southbound	Eastbound	Westbound
V/C Ratio	0.27	0.72	0.07	0.15	0.43	0.53	0.03	0.46
Control Delay (sec)	6	13	8	5	8	8	6	10
LOS	A	B	A	A	A	A	A	B
Overall Delay (sec)	10.7				8.4			
Overall LOS	B				A			

2039	AM				PM			
	Northbound	Southbound	Eastbound	Westbound	Northbound	Southbound	Eastbound	Westbound
V/C Ratio	0.41	1.01	0.15	0.23	0.66	0.76	0.05	0.80
Control Delay (sec)	9	46	13	6	13	14	8	27
LOS	A	E	B	A	B	B	A	D
Overall Delay (sec)	33.8				16.7			
Overall LOS	D				C			

GDOT Roundabout Analysis Tool v4.1: V/C Ratio & Approach Delay  
HCS 7: Overall Delay & LOS  
HCS 7 Equation 22-19 used to determine overall delay

Equation 22-19

$$d_{\text{intersection}} = \frac{\sum d_i v_i}{\sum v_i}$$

where

$d_{\text{intersection}}$  = control delay for the entire intersection (s/veh),

$d_i$  = control delay for approach  $i$  (s/veh), and

$v_i$  = flow rate for approach  $i$  (veh/h).

Project Number: TS 106  
Northside Dr at Old Powers Ferry Rd/Riverview Rd

Actual 8th Hour

Signal Warrant Analysis 2019					
Warrant 1	Volume	Condition A		Condition B	
		Min. Volume	Pass/Fail	Min. Volume	Pass/Fail
Major Street 1 (total of both approaches)	1,011	500	Pass	750	Pass
Minor Street 1 (higher volume approach, 1 direction)	306	150	Pass	75	Pass
Major Street 1 (total of both approaches, right turn excluded)	984	500	Pass	750	Pass
Minor Street 1 (1 approach right turn excluded)	25	150	Fail	75	Fail
Major Street 1 (NB approach)	473	500	Fail	750	Fail
Minor Street 1 (SB LT)	99	150	Fail	75	Pass

Both Major and Minor conditions must pass to warrant a traffic signal

Signal Warrant Analysis 2039					
Warrant 1	Volume	Condition A		Condition B	
		Min. Volume	Pass/Fail	Min. Volume	Pass/Fail
Major Street 1 (total of both approaches)	1,464	500	Pass	750	Pass
Minor Street 1 (higher volume approach, 1 direction)	444	150	Pass	75	Pass
Major Street 1 (total of both approaches, right turn excluded)	1,425	500	Pass	750	Pass
Minor Street 1 (1 approach right turn excluded)	36	150	Fail	75	Fail
Major Street 1 (NB approach)	663	500	Pass	750	Fail
Minor Street 1 (SB LT)	139	150	Fail	75	Pass

Both Major and Minor conditions must pass to warrant a traffic signal

Project Number: TS 106  
Northside Dr at Old Powers Ferry Rd/Riverview Rd

Synchro Analysis

2019	AM	PM
V/C Ratio	0.53	0.46
Control Delay (sec)	8.9	13.1
LOS	A	B

2039	AM	PM
V/C Ratio	0.74	0.77
Control Delay (sec)	11.4	22.4
LOS	B	C

Assumes NB & SB left turn lanes  
90 Second Cycle length  
Ideal Saturated Flow Rate: 1800 vphpl  
PHF: 0.95

# ATTACHMENT D

Crash History



Northside Dr @ Old Powers Ferry Rd and Riverview Rd Crash History  
(2013-2017)

AccidentNumber	Date	Time	Route	Milelog	Injuries	Fatalities	MannerOfCollision
4343425	1/17/2013	19:33:00	NORTHSIDE DR	1.96	0	0	Angle
5773459	1/24/2013	15:47:00	OLD POWERS FERRY RD	3.54	0	0	Rear End
4358445	2/2/2013	14:12:00	NORTHSIDE DR	3.54	1	0	Rear End
4393504	3/12/2013	17:40:00	NORTHSIDE DR	0	0	0	Angle
4853597	5/20/2014	18:05:00	OLD POWERS FERRY RD	3.54	1	0	Angle
5134508	1/20/2015	10:50:00	NORTHSIDE DR	10.01	0	0	Rear End
5461194	10/7/2015	17:03:00	NORTHSIDE DR	3.55	0	0	Rear End
5816254	6/29/2016	15:25:00	OLD POWERS FERRY RD	3.55	0	0	Rear End
5862177	8/3/2016	7:52:00	NORTHSIDE DR	3.55	0	0	Angle
6095008	1/22/2017	19:04:00	NORTHSIDE DR	3.55	0	0	Sideswipe-Same Direction
6254669	5/26/2017	16:37:00	OLD POWERS FERRY RD	0	0	0	Rear End
6399128	9/20/2017	10:43:00	OLD POWERS FERRY RD	0	0	0	Angle

AccidentNumber	Light	Surface	DirVeh1	DirVeh2	MnvrVeh1	MnvrVeh2	U1Factors
4343425	DarkLightec	Wet	East	South	Turning Left	Straight	Failed to Yield
5773459	Daylight	Dry	West	West	Straight	Stopped	Following too Close
4358445	Daylight	Dry	South	South	Straight	Turning Left	Following too Close
4393504	Daylight	Dry	East	South	Leaving Driveway	Straight	Failed to Yield
4853597	Daylight	Dry	West	North	Turning Left	Straight	Failed to Yield
5134508	Daylight	Dry	North	North	Backing	Stopped	Improper Backing
5461194	Daylight	Dry	West	West	Straight	Straight	Following too Close
5816254	Daylight	Dry	West	West	Straight	Stopped	Following too Close
5862177	Daylight	Dry	East	South	Straight	Straight	Failed to Yield
6095008	arkNot Light	Wet	South	South	Changing Lanes	Straight	Changed Lanes Improperly
6254669	Daylight	Dry	West	West	Straight	Stopped	Following too Close
6399128	Daylight	Dry	West	North	Turning Left	Straight	Failed to Yield

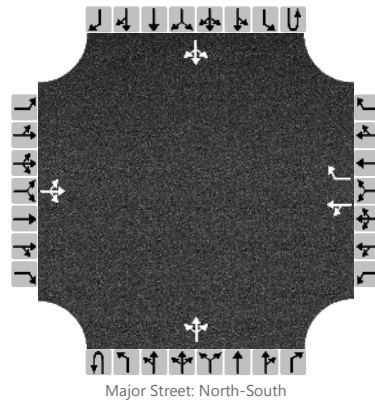
# ATTACHMENT E

HCS Two-Way Stop-Control Analysis

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Keith McCage	Intersection	Northside Dr at Riverview
Agency/Co.	HNTB	Jurisdiction	COSS
Date Performed	1/9/18	East/West Street	Riverview Rd/Old Powers F
Analysis Year	2017	North/South Street	Northside Drive
Time Analyzed	AM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		15	5	15		15	1	125		5	240	5		225	640	15
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

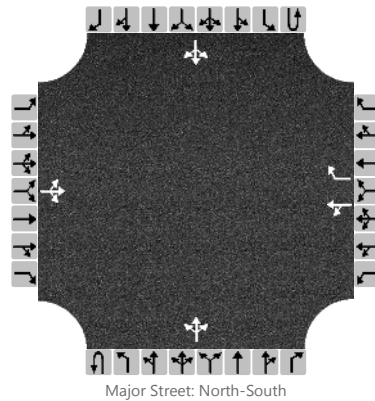
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			37			17		132		5					237	
Capacity, c (veh/h)			119			80		782		904					1306	
v/c Ratio			0.31			0.21		0.17		0.01					0.18	
95% Queue Length, Q <sub>95</sub> (veh)			1.2			0.7		0.6		0.0					0.7	
Control Delay (s/veh)			48.2			61.3		10.5		9.0					8.4	
Level of Service, LOS			E			F		B		A					A	
Approach Delay (s/veh)	48.2				16.3				0.2				4.0			
Approach LOS	E				C											

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Keith McCage	Intersection	Northside Dr at Riverview
Agency/Co.	HNTB	Jurisdiction	COSS
Date Performed	1/9/18	East/West Street	Riverview Rd/Old Powers F
Analysis Year	2017	North/South Street	Northside Drive
Time Analyzed	PM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		10	5	5		10	5	330		10	440	5		145	495	10
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

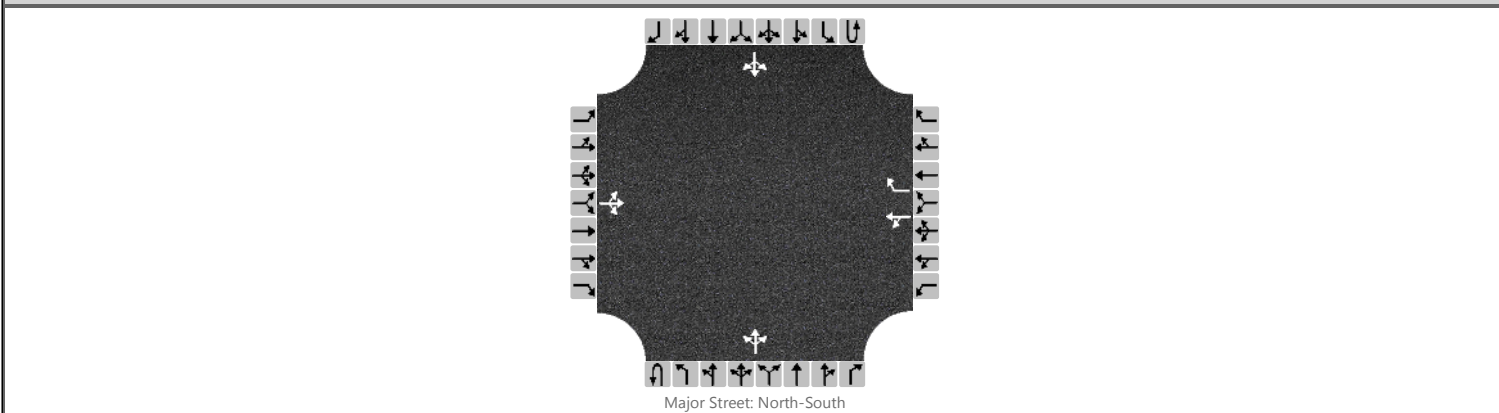
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			21			16		347		11				153		
Capacity, c (veh/h)			72			111		596		1035				1093		
v/c Ratio			0.29			0.14		0.58		0.01				0.14		
95% Queue Length, Q <sub>95</sub> (veh)			1.1			0.5		3.7		0.0				0.5		
Control Delay (s/veh)			74.5			42.6		19.1		8.5				8.8		
Level of Service, LOS			F			E		C		A				A		
Approach Delay (s/veh)	74.5				20.1				0.3				3.3			
Approach LOS	F				C											

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Keith McCage	Intersection	Northside Dr at Riverview
Agency/Co.	HNTB	Jurisdiction	COSS
Date Performed	1/9/18	East/West Street	Riverview Rd/Old Powers F
Analysis Year	2019	North/South Street	Northside Drive
Time Analyzed	AM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound						
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R			
Movement																			
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6			
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0			
Configuration			LTR			LT		R			LTR				LTR				
Volume, V (veh/h)		15	5	15		15	1	130		5	250	5		235	660	15			
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2					
Proportion Time Blocked																			
Percent Grade (%)		0				0													
Right Turn Channelized		No				Yes					No					No			
Median Type/Storage		Undivided																	

## Critical and Follow-up Headways

Base Critical Headway (sec)																	
Critical Headway (sec)																	
Base Follow-Up Headway (sec)																	
Follow-Up Headway (sec)																	

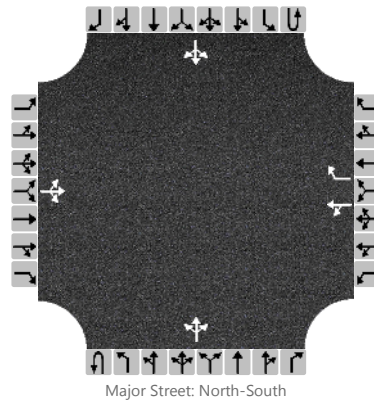
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			37			17		137		5					247		
Capacity, c (veh/h)			108			72		772		888					1295		
v/c Ratio			0.34			0.24		0.18		0.01					0.19		
95% Queue Length, Q <sub>95</sub> (veh)			1.4			0.8		0.6		0.0					0.7		
Control Delay (s/veh)			55.0			69.5		10.7		9.1					8.4		
Level of Service, LOS			F			F		B		A					A		
Approach Delay (s/veh)		55.0				17.2				0.2				4.2			
Approach LOS		F				C											

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Keith McCage			Intersection	Northside Dr at Riverview		
Agency/Co.	HNTB			Jurisdiction	COSS		
Date Performed	1/9/18			East/West Street	Riverview Rd/Old Powers F		
Analysis Year	2019			North/South Street	Northside Drive		
Time Analyzed	PM			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description							

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		10	5	5		10	5	340		10	455	5		150	510	10
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

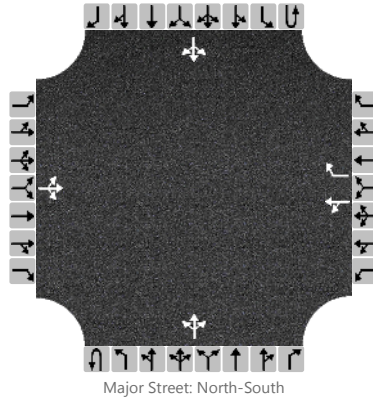
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			21			16		358		11				158		
Capacity, c (veh/h)			62			103		584		1021				1078		
v/c Ratio			0.34			0.16		0.61		0.01				0.15		
95% Queue Length, Q <sub>95</sub> (veh)			1.2			0.5		4.1		0.0				0.5		
Control Delay (s/veh)			89.6			46.3		20.4		8.6				8.9		
Level of Service, LOS			F			E		C		A				A		
Approach Delay (s/veh)	89.6				21.5				0.3				3.5			
Approach LOS	F				C											

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Keith McCage	Intersection	Northside Dr at Riverview
Agency/Co.	HNTB	Jurisdiction	COSS
Date Performed	1/9/18	East/West Street	Riverview Rd/Old Powers F
Analysis Year	2039	North/South Street	Northside Drive
Time Analyzed	AM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		20	10	20		20	1	180		5	350	5		325	925	25
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

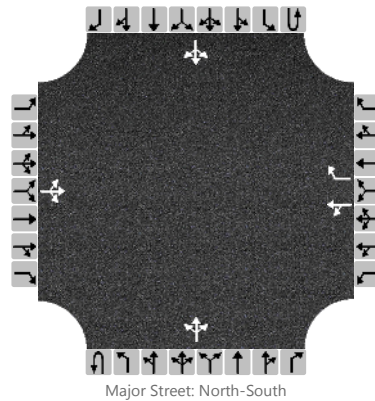
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			53			22		189		5				342		
Capacity, c (veh/h)			24			10		675		692				1185		
v/c Ratio			2.21			2.10		0.28		0.01				0.29		
95% Queue Length, Q <sub>95</sub> (veh)			6.6			3.7		1.1		0.0				1.2		
Control Delay (s/veh)			901.0			1219.6		12.4		10.2				9.3		
Level of Service, LOS			F			F		B		B				A		
Approach Delay (s/veh)	901.0				138.3				0.2				6.9			
Approach LOS	F				F											

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Keith McCage	Intersection	Northside Dr at Riverview
Agency/Co.	HNTB	Jurisdiction	COSS
Date Performed	1/9/18	East/West Street	Riverview Rd/Old Powers F
Analysis Year	2039	North/South Street	Northside Drive
Time Analyzed	PM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		15	5	5		15	5	480		15	640	5		215	715	15
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				No				No			
Median Type/Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

## Delay, Queue Length, and Level of Service

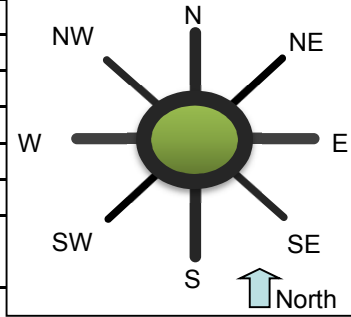
Flow Rate, v (veh/h)			26			21		505		16				226		
Capacity, c (veh/h)						31		453		845				913		
v/c Ratio						0.69		1.11		0.02				0.25		
95% Queue Length, Q <sub>95</sub> (veh)						2.3		17.4		0.1				1.0		
Control Delay (s/veh)						255.9		106.7		9.3				10.2		
Level of Service, LOS						F		F		A				B		
Approach Delay (s/veh)					112.7				0.5				5.8			
Approach LOS					F											



# ATTACHMENT F

Roundabout Analysis

General & Site Information		v 4.1
Analyst:	Daniel Moss	
Agency/Co:	HNTB	
Date:	1/4/2018	
Project or PI#:	Northside Dr @ Riverview	
Year, Peak Hour:	2019, AM	
County/District:	Fulton/7	
Intersection Name:	Northside Dr @ Riverview	



		Volumes							
		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
<b>Exit Legs (TO)</b>	N (1), vph			130		250		15	
	NE (2), vph								
	E (3), vph	235				5		5	
	SE (4), vph								
	S (5), vph	660		15				15	
	SW (6), vph								
	W (7), vph	15		0		5			
	NW (8), vph								
Output	Total Vehicles	910	0	145	0	260	0	35	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98.5%	100.0%	98.5%	100.0%	98.5%	100.0%	98.5%	100.0%
% Heavy Vehicles	1.5%	0.0%	1.5%	0.0%	1.5%	0.0%	1.5%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
F <sub>HV</sub>	0.985	1.000	0.985	1.000	0.985	1.000	0.985	1.000
F <sub>ped</sub>	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	139	0	267	0	16	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	251	0	0	0	5	0	5	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	705	0	16	0	0	0	16	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	16	0	0	0	5	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	972	0	155	0	278	0	37	0
Conflicting flow, pcu/h	21	0	288	0	272	0	972	0

Results: Approach Measures of Effectiveness								
HCM 6th Edition	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	1330	NA	1013	NA	1030	NA	504	NA
Entry Flow Rates, vph	958	NA	153	NA	274	NA	37	NA

V/C ratio	0.72		0.15		0.27		0.07	
Control Delay, sec/pcu	13		5		6		8	
LOS	B		A		A		A	
95th % Queue (ft)	171		13		27		6	

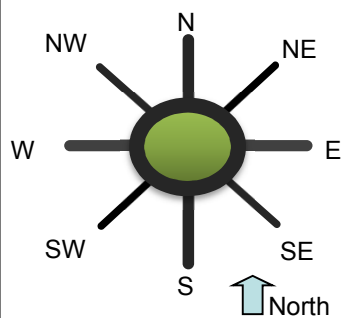
Notes: v 4.0

Unit Legend:  
vph = vehicles per hour  
PHF = peak hour factor  
F<sub>HV</sub> = heavy vehicle factor  
pcu = passenger car unit

**Bypass Lane Merge Point Analysis (if applicable)**

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
<i>Volumes</i>						
Right Turn Volume removed from Entry Leg						
<i>Volume Characteristics (for entry leg)</i>						
PHF						
F <sub>HV</sub>						
F <sub>ped</sub>						
<b>NOTE: Volume Characteristics for Exit Leg are already taken into account</b>						
<i>Entry/Conflicting Flows</i>						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
<b>Bypass Lane Results (HCM 6th Edition)</b>						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information		v 4.1
Analyst:	Daniel Moss	
Agency/Co:	HNTB	
Date:	1/4/2018	
Project or PI#:	Northside Dr @ Riverview	
Year, Peak Hour:	2019, PM	
County/District:	Fulton/7	
Intersection Name:	Northside Dr @ Riverview	



		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
<b>Exit Legs (TO)</b>	N (1), vph			340		455		10	
	NE (2), vph								
	E (3), vph	150				5		5	
	SE (4), vph								
	S (5), vph	510		10				5	
	SW (6), vph								
	W (7), vph	10		5		10			
	NW (8), vph								
Output	Total Vehicles	670	0	355	0	470	0	20	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	99.0%	100.0%	99.0%	100.0%	99.0%	100.0%	99.0%	100.0%
% Heavy Vehicles	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
F <sub>HV</sub>	0.990	1.000	0.990	1.000	0.990	1.000	0.990	1.000
F <sub>ped</sub>	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	361	0	484	0	11	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	159	0	0	0	5	0	5	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	542	0	11	0	0	0	5	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	11	0	5	0	11	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	712	0	377	0	500	0	21	0
Conflicting flow, pcu/h	27	0	505	0	175	0	712	0

Results: Approach Measures of Effectiveness								
HCM 6th Edition	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	1330	NA	816	NA	1142	NA	661	NA
Entry Flow Rates, vph	705	NA	374	NA	495	NA	21	NA

V/C ratio	0.53		0.46		0.43		0.03	
Control Delay, sec/pcu	8		10		8		6	
LOS	A		B		A		A	
95th % Queue (ft)	82		61		56		2	

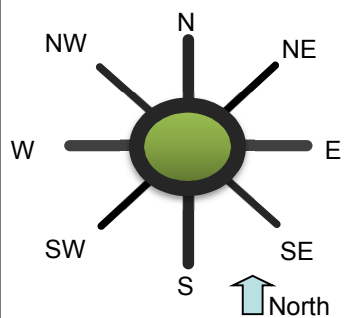
Notes: v 4.0

Unit Legend:  
vph = vehicles per hour  
PHF = peak hour factor  
F<sub>HV</sub> = heavy vehicle factor  
pcu = passenger car unit

**Bypass Lane Merge Point Analysis (if applicable)**

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
<i>Volumes</i>						
Right Turn Volume removed from Entry Leg						
<i>Volume Characteristics (for entry leg)</i>						
PHF						
F <sub>HV</sub>						
F <sub>ped</sub>						
<b>NOTE: Volume Characteristics for Exit Leg are already taken into account</b>						
<i>Entry/Conflicting Flows</i>						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
<b>Bypass Lane Results (HCM 6th Edition)</b>						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information		v 4.1
Analyst:	Daniel Moss	
Agency/Co:	HNTB	
Date:	1/4/2018	
Project or PI#:	Northside Dr @ Riverview	
Year, Peak Hour:	2039, AM	
County/District:	Fulton/7	
Intersection Name:	Northside Dr @ Riverview	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
<b>Exit Legs (TO)</b>	N (1), vph			180		350		20	
	NE (2), vph								
	E (3), vph	325				5		10	
	SE (4), vph								
	S (5), vph	925		20				20	
	SW (6), vph								
	W (7), vph	25		0		5			
	NW (8), vph								
Output	Total Vehicles	1275	0	200	0	360	0	50	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98.5%	100.0%	98.5%	100.0%	98.5%	100.0%	98.5%	100.0%
% Heavy Vehicles	1.5%	0.0%	1.5%	0.0%	1.5%	0.0%	1.5%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
F <sub>HV</sub>	0.985	1.000	0.985	1.000	0.985	1.000	0.985	1.000
F <sub>ped</sub>	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	192	0	374	0	21	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	347	0	0	0	5	0	11	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	988	0	21	0	0	0	21	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	27	0	0	0	5	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	1362	0	214	0	385	0	53	0
Conflicting flow, pcu/h	27	0	401	0	379	0	1357	0

Results: Approach Measures of Effectiveness								
HCM 6th Edition	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	1323	NA	904	NA	923	NA	341	NA
Entry Flow Rates, vph	1342	NA	211	NA	379	NA	53	NA

<b>V/C ratio</b>	<b>1.01</b>		<b>0.23</b>		<b>0.41</b>		<b>0.15</b>	
<b>Control Delay, sec/pcu</b>	<b>46</b>		<b>6</b>		<b>9</b>		<b>13</b>	
LOS	E		A		A		B	
<b>95th % Queue (ft)</b>	<b>600</b>		<b>23</b>		<b>51</b>		<b>14</b>	

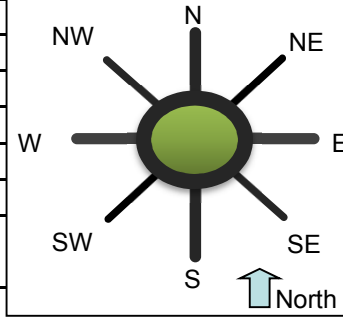
**Notes:** v 4.0

Unit Legend:  
vph = vehicles per hour  
PHF = peak hour factor  
F<sub>HV</sub> = heavy vehicle factor  
pcu = passenger car unit

***Bypass Lane Merge Point Analysis (if applicable)***

<b>Bypass Characteristics</b>	<b>Bypass #1</b>	<b>Bypass #2</b>	<b>Bypass #3</b>	<b>Bypass #4</b>	<b>Bypass #5</b>	<b>Bypass #6</b>
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
<b>Does the bypass have a dedicated receiving lane?</b>						
<b>Volumes</b>						
Right Turn Volume removed from Entry Leg						
<b>Volume Characteristics (for entry leg)</b>						
PHF						
F <sub>HV</sub>						
F <sub>ped</sub>						
<b>NOTE: Volume Characteristics for Exit Leg are already taken into account</b>						
<b>Entry/Conflicting Flows</b>						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
<b>Bypass Lane Results (HCM 6th Edition)</b>						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
<b>V/C ratio</b>						
<b>Control Delay, s/veh</b>						
LOS						
<b>95th % Queue (ft)</b>						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

<b>General &amp; Site Information</b>		v 4.1
Analyst:	Daniel Moss	
Agency/Co:	HNTB	
Date:	1/4/2018	
Project or PI#:	Northside Dr @ Riverview	
Year, Peak Hour:	2039, PM	
County/District:	Fulton/7	
Intersection Name:	Northside Dr @ Riverview	



<b>Volumes</b>		<b>Entry Legs (FROM)</b>							
		<b>N (1)</b>	<b>NE (2)</b>	<b>E (3)</b>	<b>SE (4)</b>	<b>S (5)</b>	<b>SW (6)</b>	<b>W (7)</b>	<b>NW (8)</b>
<b>Exit Legs (TO)</b>	N (1), vph			480		640		15	
	NE (2), vph								
	E (3), vph	215				5		5	
	SE (4), vph								
	S (5), vph	715		15				5	
	SW (6), vph								
	W (7), vph	15		5		15			
	NW (8), vph								
Output	Total Vehicles	945	0	500	0	660	0	25	0

<b>Volume Characteristics</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
% Cars	99.0%	100.0%	99.0%	100.0%	99.0%	100.0%	99.0%	100.0%
% Heavy Vehicles	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
F <sub>HV</sub>	0.990	1.000	0.990	1.000	0.990	1.000	0.990	1.000
F <sub>ped</sub>	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

<b>Entry/Conflicting Flows</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
Flow to Leg # N (1), pcu/h	0	0	510	0	680	0	16	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	229	0	0	0	5	0	5	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	760	0	16	0	0	0	5	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	16	0	5	0	16	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	1005	0	532	0	702	0	27	0
Conflicting flow, pcu/h	37	0	712	0	250	0	1005	0

<b>Results: Approach Measures of Effectiveness</b>								
<b>HCM 6th Edition</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
Entry Capacity, vph	1315	NA	661	NA	1059	NA	490	NA
Entry Flow Rates, vph	995	NA	526	NA	695	NA	26	NA



V/C ratio	0.76		0.80		0.66		0.05	
Control Delay, sec/pcu	14		27		13		8	
LOS	B		D		B		A	
95th % Queue (ft)	197		201		130		4	

Notes: v 4.0

Unit Legend:  
vph = vehicles per hour  
PHF = peak hour factor  
F<sub>HV</sub> = heavy vehicle factor  
pcu = passenger car unit

**Bypass Lane Merge Point Analysis (if applicable)**

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
<i>Volumes</i>						
Right Turn Volume removed from Entry Leg						
<i>Volume Characteristics (for entry leg)</i>						
PHF						
F <sub>HV</sub>						
F <sub>ped</sub>						
<b>NOTE: Volume Characteristics for Exit Leg are already taken into account</b>						
<i>Entry/Conflicting Flows</i>						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
<b>Bypass Lane Results (HCM 6th Edition)</b>						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

# ATTACHMENT G

Signal Warrant Analysis

Analyst: Dan Moss  
 Agency: HNTB  
 Date: 1/4/2018  
 Project ID: 69542  
 EW Street: Riverview Rd/Old Powers Ferry Street: Northside Dr

Intersection: Northside Dr @ Riverview  
 Jurisdiction: Fulton County  
 Units: U.S. Customary  
 Analysis Year: 2019

-----General Information-----

Major St. Speed (mph): 35  
 Nearest Signal (ft): 1530  
 Crashes per Yr: 2

Population: Not less than 10000  
 Coordinated Signal System: N

-----School Crossing-----

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

-----Roadway Network-----

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 1

-----Geometry and Traffic-----

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	0	1	0	0	1	0
LaneUsage	LTR			LT R			LTR			LTR		

-----Results-----

Warrant 1: Eight-Hour Vehicular Volume [ ]  
 1 A. Minimum Vehicular Volumes [ ]  
 1 B. Interruption of Continuous Traffic [ ]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume [ ]  
 2 A. Four-Hour Vehicular Volumes [ ]

Warrant 3: Peak Hour [ ]  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [ ]

Warrant 4: Pedestrian Volume [ ]  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System [ ]  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]  
 7 A. Adequate trials of alternatives [ ]





Analyst: Dan Moss  
 Agency: HNTB  
 Date: 1/4/2018  
 Project ID: 69542  
 EW Street: Riverview Rd/Old Powers Ferry Street: Northside Dr

Intersection: Northside Dr @ Riverview  
 Jurisdiction: Fulton County  
 Units: U.S. Customary  
 Analysis Year: 2039

-----General Information-----

Major St. Speed (mph): 35  
 Nearest Signal (ft): 1530  
 Crashes per Yr: 2

Population: Not less than 10000  
 Coordinated Signal System: N

-----School Crossing-----

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

-----Roadway Network-----

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 1

-----Geometry and Traffic-----

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	0	1	0	0	1	0
LaneUsage	LTR			LT R			LTR			LTR		

-----Results-----

Warrant 1: Eight-Hour Vehicular Volume [ ]  
 1 A. Minimum Vehicular Volumes [ ]  
 1 B. Interruption of Continuous Traffic [ ]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume [ ]  
 2 A. Four-Hour Vehicular Volumes [ ]

Warrant 3: Peak Hour [ ]  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [ ]

Warrant 4: Pedestrian Volume [ ]  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System [ ]  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]  
 7 A. Adequate trials of alternatives [ ]







# ATTACHMENT H




















Synchro 9 Analysis

# HCM Signalized Intersection Capacity Analysis

2019 AM

3:

01/19/2018

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	15	5	15	15	0	130	5	250	5	235	660	15	
Future Volume (vph)	15	5	15	15	0	130	5	250	5	235	660	15	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Total Lost time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Fr <sub>t</sub>		0.94			1.00	0.85	1.00	1.00		1.00	1.00		
Fl <sub>t</sub> Protected		0.98			0.95	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1627			1676	1500	1676	1760		1676	1759		
Fl <sub>t</sub> Permitted		0.85			0.73	1.00	0.39	1.00		0.53	1.00		
Satd. Flow (perm)		1417			1293	1500	697	1760		934	1759		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	16	5	16	16	0	137	5	263	5	247	695	16	
RTOR Reduction (vph)	0	15	0	0	0	124	0	0	0	0	1	0	
Lane Group Flow (vph)	0	22	0	0	16	13	5	268	0	247	710	0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)		7.2			7.2	7.2	45.7	45.7		59.7	59.7		
Effective Green, g (s)		7.2			7.2	7.2	45.7	45.7		59.7	59.7		
Actuated g/C Ratio		0.09			0.09	0.09	0.59	0.59		0.77	0.77		
Clearance Time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		131			120	139	411	1037		802	1354		
v/s Ratio Prot								0.15		0.03	c0.40		
v/s Ratio Perm		c0.02			0.01	0.01	0.01			0.20			
v/c Ratio		0.17			0.13	0.09	0.01	0.26		0.31	0.52		
Uniform Delay, d1		32.4			32.3	32.2	6.6	7.7		2.7	3.4		
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		0.6			0.5	0.3	0.1	0.6		0.2	1.5		
Delay (s)		33.0			32.8	32.4	6.6	8.3		2.9	4.9		
Level of Service		C			C	C	A	A		A	A		
Approach Delay (s)		33.0			32.5			8.3			4.4		
Approach LOS		C			C			A			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			8.9									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53										
Actuated Cycle Length (s)			77.5									Sum of lost time (s)	15.9
Intersection Capacity Utilization			63.8%									ICU Level of Service	B
Analysis Period (min)			15										




















c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

2019 PM

3:

01/19/2018

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	10	5	5	10	5	340	10	455	5	150	510	10	
Future Volume (vph)	10	5	5	10	5	340	10	455	5	150	510	10	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Total Lost time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Fr <sub>t</sub>		0.97			1.00	0.85	1.00	1.00		1.00	1.00		
Fl <sub>t</sub> Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1664			1706	1500	1676	1762		1676	1759		
Fl <sub>t</sub> Permitted		0.84			0.80	1.00	0.46	1.00		0.37	1.00		
Satd. Flow (perm)		1441			1416	1500	811	1762		649	1759		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	11	5	5	11	5	358	11	479	5	158	537	11	
RTOR Reduction (vph)	0	4	0	0	0	317	0	0	0	0	1	0	
Lane Group Flow (vph)	0	17	0	0	16	41	11	484	0	158	547	0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)		8.6			8.6	8.6	42.9	42.9		55.9	55.9		
Effective Green, g (s)		8.6			8.6	8.6	42.9	42.9		55.9	55.9		
Actuated g/C Ratio		0.11			0.11	0.11	0.57	0.57		0.74	0.74		
Clearance Time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		165			162	171	463	1006		588	1309		
v/s Ratio Prot								c0.27		0.03	c0.31		
v/s Ratio Perm		0.01			0.01	c0.03	0.01			0.17			
v/c Ratio		0.10			0.10	0.24	0.02	0.48		0.27	0.42		
Uniform Delay, d <sub>1</sub>		29.8			29.8	30.3	7.0	9.5		3.9	3.6		
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d <sub>2</sub>		0.3			0.3	0.7	0.1	1.6		0.2	1.0		
Delay (s)		30.1			30.0	31.0	7.1	11.2		4.1	4.5		
Level of Service		C			C	C	A	B		A	A		
Approach Delay (s)		30.1			31.0			11.1			4.4		
Approach LOS		C			C			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.1									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.46										
Actuated Cycle Length (s)			75.1									Sum of lost time (s)	15.9
Intersection Capacity Utilization			65.2%									ICU Level of Service	C
Analysis Period (min)			15										




















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# HCM Signalized Intersection Capacity Analysis

2039 AM

3:

01/19/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	10	20	20	0	180	5	350	5	325	925	25
Future Volume (vph)	20	10	20	20	0	180	5	350	5	325	925	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Fr <sub>t</sub>		0.95			1.00	0.85	1.00	1.00		1.00	1.00	
Fl <sub>t</sub> Protected		0.98			0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1638			1676	1500	1676	1761		1676	1758	
Fl <sub>t</sub> Permitted		0.86			0.72	1.00	0.29	1.00		0.44	1.00	
Satd. Flow (perm)		1439			1275	1500	509	1761		784	1758	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	11	21	21	0	189	5	368	5	342	974	26
RTOR Reduction (vph)	0	19	0	0	0	170	0	0	0	0	1	0
Lane Group Flow (vph)	0	34	0	0	21	19	5	373	0	342	999	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		7.8			7.8	7.8	45.4	45.4		61.2	61.2	
Effective Green, g (s)		7.8			7.8	7.8	45.4	45.4		61.2	61.2	
Actuated g/C Ratio		0.10			0.10	0.10	0.57	0.57		0.77	0.77	
Clearance Time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		141			124	146	290	1004		720	1351	
v/s Ratio Prot								0.21		0.06	c0.57	
v/s Ratio Perm		c0.02			0.02	0.01	0.01			0.30		
v/c Ratio		0.24			0.17	0.13	0.02	0.37		0.47	0.74	
Uniform Delay, d1		33.2			32.9	32.8	7.4	9.3		3.5	4.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			0.6	0.4	0.1	1.1		0.5	3.7	
Delay (s)		34.1			33.6	33.2	7.5	10.4		4.0	8.6	
Level of Service		C			C	C	A	B		A	A	
Approach Delay (s)		34.1			33.2			10.3			7.4	
Approach LOS		C			C			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.4								HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			79.6								Sum of lost time (s)	15.9
Intersection Capacity Utilization			80.1%								ICU Level of Service	D
Analysis Period (min)			15									






















c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

2039 PM

3:

01/19/2018

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	15	5	5	15	5	480	15	640	5	215	715	15	
Future Volume (vph)	15	5	5	15	5	480	15	640	5	215	715	15	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Total Lost time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Fr <sub>t</sub>		0.97			1.00	0.85	1.00	1.00		1.00	1.00		
Fl <sub>t</sub> Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1668			1700	1500	1676	1763		1676	1759		
Fl <sub>t</sub> Permitted		0.86			0.83	1.00	0.37	1.00		0.20	1.00		
Satd. Flow (perm)		1477			1467	1500	660	1763		351	1759		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	16	5	5	16	5	505	16	674	5	226	753	16	
RTOR Reduction (vph)	0	4	0	0	0	282	0	0	0	0	1	0	
Lane Group Flow (vph)	0	22	0	0	21	223	16	679	0	226	768	0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA		
Protected Phases		4			8			2		1	6		
Permitted Phases	4			8		8	2			6			
Actuated Green, G (s)		15.9			15.9	15.9	43.3	43.3		57.8	57.8		
Effective Green, g (s)		15.9			15.9	15.9	43.3	43.3		57.8	57.8		
Actuated g/C Ratio		0.19			0.19	0.19	0.51	0.51		0.69	0.69		
Clearance Time (s)		5.3			5.3	5.3	5.3	5.3		5.3	5.3		
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		278			276	282	339	905		385	1206		
v/s Ratio Prot								c0.38		0.06	c0.44		
v/s Ratio Perm		0.01			0.01	c0.15	0.02			0.34			
v/c Ratio		0.08			0.08	0.79	0.05	0.75		0.59	0.64		
Uniform Delay, d1		28.2			28.2	32.6	10.2	16.2		10.2	7.4		
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		0.1			0.1	13.6	0.3	5.7		2.3	2.6		
Delay (s)		28.3			28.3	46.2	10.5	21.9		12.4	10.0		
Level of Service		C			C	D	B	C		B	A		
Approach Delay (s)		28.3			45.5			21.6			10.5		
Approach LOS		C			D			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			22.4									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77										
Actuated Cycle Length (s)			84.3									Sum of lost time (s)	15.9
Intersection Capacity Utilization			84.7%									ICU Level of Service	E
Analysis Period (min)			15										

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