Georgia Department of Transportation

Interoffice Memo
Office of Design Policy & Support

DATE: 4/21/2020

FILE: P.I.# 0016387
Walton County / GDOT District 1 - Gainesville
SR 20 from CS 660/Sharon Church Road to SR 10/US 78 – Widening & Roundabout

FROM: Dave Peters for R. Christopher Rudd, PE, State Design Policy Engineer

TO: SEE DISTRIBUTION

SUBJECT: APPROVED CONCEPT REPORT

Attached is the approved Concept Report for the above subject project.

Attachment

Distribution:

Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3
Albert Shelby, Director of Program Delivery
Carol Comer, Director, Division of Intermodal
Darryl VanMeter, Assistant Director of P3/State Innovative Delivery Administrator
Kim Nesbitt, Program Delivery Administrator
Bobby Hilliard, Program Control Administrator
Radney Simpson, Assistant State Transportation Planning Administrator
Eric Duff, State Environmental Administrator
Bill DuVall, State Bridge Engineer
Andrew Heath, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Erik Rohde, State Project Review Engineer
Monica Flournoy, State Materials Engineer
Patrick Allen, State Utilities Engineer
Eric Conklin, State Transportation Data Administrator
Attn: Systems & Classification Branch
Benny Walden, Statewide Location Bureau Chief
Ed David Adams, State Safety Program Manager
Kelvin Mullins, District Engineer
SueAnne Decker, District Preconstruction Engineer
Yulonda Pride-Foster, District Utilities Manager
Kimberly Kimbrough, Project Manager
BOARD MEMBER - 10th Congressional District

Project Concept Report

Project Type:	Reconstruction/Rehabilitation	P.I. Number:	0016387
GDOT District:	1	County:	Walton
Federal Route Number:	NA	State Route Number:	20
Project Number:	NA		

SR 20 FROM CS 660/N SHARON CHURCH ROAD TO SR 10/US 78

Submitted for approval: *** Concept Report Resubmitted 03/03/2020**

Joel Jones P.E. – Gresham Smith — 11-14-19 Date

State Program Delivery Administrator — 2/25/2020 Date

GDOT Project Manager — 11/15/19 Date

Recommendation for approval: *** Recommendations are on file ~OB**

*** Eric Duff** — **08/09/2019**
State Environmental Administrator — Date

*** Chris Raymond** — **03/24/2020**
for State Traffic Engineer — Date

*** Erik Rohde** — **11/13/2019**
Project Review Engineer — Date

*** Stevonn Dilligard** — **08/09/2019**
for State Utilities Engineer — Date

*** SueAnne Decker** — **11/25/2019**
for District Engineer — Date

☒ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

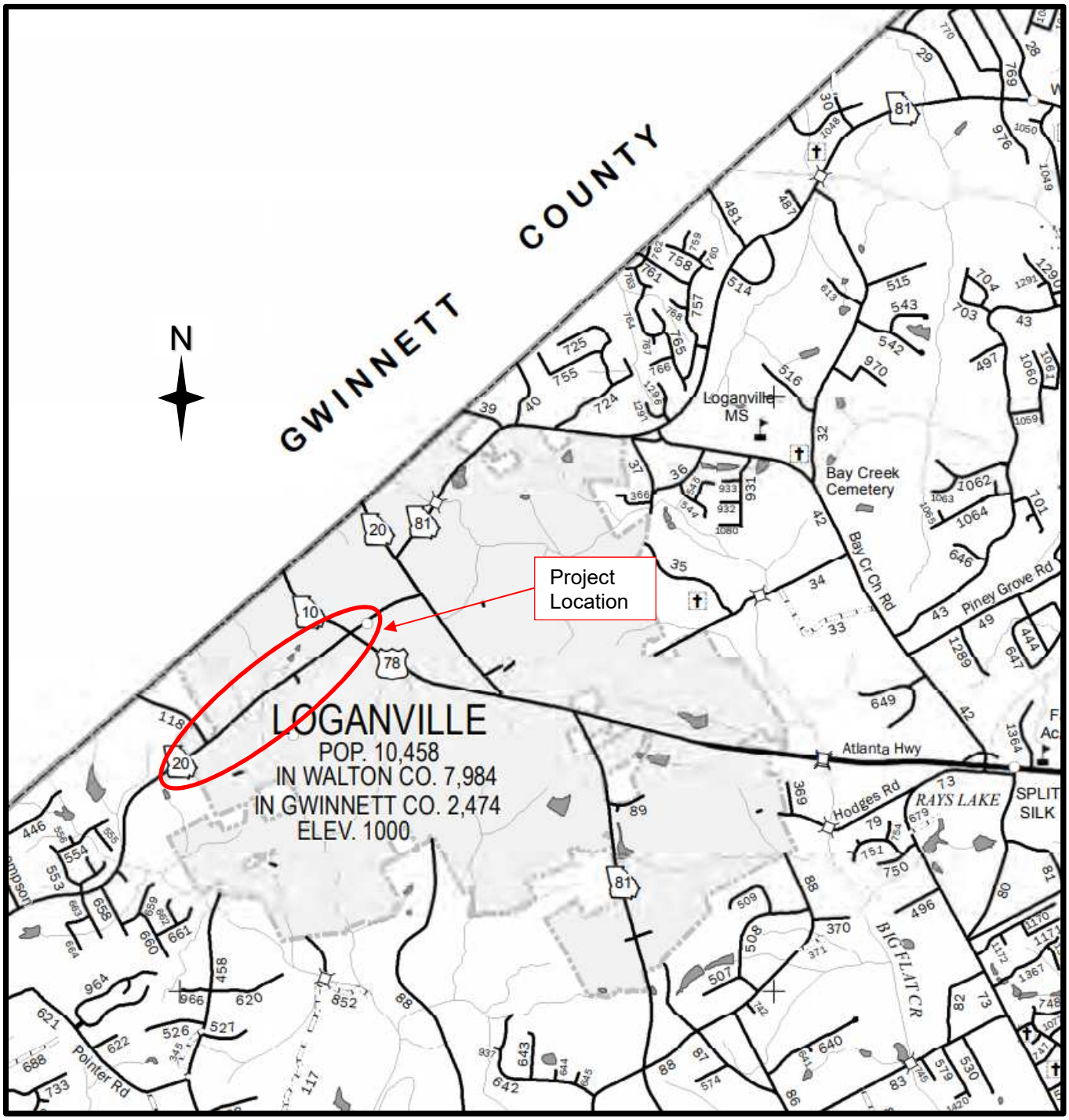
☐ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

*** Paul Tanner** — **08/13/2019**
State Transportation Planning Administrator — Date

*** Recommendations were also received from the following: ~OB**

Office of Intermodal: Alan Hood (08/09/2019)

PROJECT LOCATION MAP



Project: PI 0016387
SR 20 from CS 660/N Sharon Church Road to SR 10/US 78
Walton County, GA

PLANNING AND BACKGROUND

Project Justification Statement (Prepared by GDOT Office of Planning):

GDOT Project Identification (P.I.) No. 0016387 is located within the Atlanta Metropolitan Planning Organization (MPO) boundary on State Route (SR) 20. This project originated from P.I. No. 142000- SR 20 FM N Sharon Church RD to Brand RD; inc 3 Locs - PE only. P.I. No. 142000- originated from a study conducted by District 7. SR 20 is a suburban minor arterial that provides north-south access in Walton County. SR 20 is a two lane facility, one in each direction with intermittent turn lanes throughout the corridor. There are multiple churches and municipal buildings located along this section of the corridor. The predominant land use along the corridor is residential and commercial properties. SR 20 is identified on the Atlanta Regional Strategic Transportation System (RSTS) by the Atlanta MPO. The project's purpose is to address operational, congestion, and reduce crash rates.

According to GDOT's 2017 traffic data, the Annual Average Daily Traffic (AADT) on this segment of SR 20 is 16,200 vehicles per day with 5% truck traffic along the entire route. SR 20 operates at a level of service (LOS) E in 2017, per the Highway Capacity Software (HCS). Assuming a conservative 1% annual growth rate, the future year 2040 AADT is projected to be 20,366 vehicles per day on SR 20, which translates into a LOS E, for no build conditions.

The crash rates for this segment of SR 20 are higher compared to the statewide averages for a suburban minor arterial. The statewide average crash rates are 370, 370 and 378 per 100 million vehicle miles (MVM) for years 2014, 2015, and 2016 respectively. The crash rates for this segment of SR 20 are 376, 710, and 793 per 100 MVM for years 2014, 2015, and 2016 respectively. There were no fatalities.

SR20	2014	2014 Statewide Average	2015	2015 Statewide Average	2016	2016 Statewide Average
# of Crashes	50		74		87	
Crash Rate	713	601	1056	637	1241	655
# of Injuries	8		8		4	
Injury Rate	114	145	114	156	57	156
# of Fatalities	0		0		0	
Fatality Rate	0	1.21	0	1.68	0	1.53

On SR 20, 59.4% of the crashes were rear end which is associated with congestion and frequent stops. 28.4% of the crashes were angle movements which is associated with turning movements.

The performance goals of this project is to address reducing congestion and reducing crash frequency and severity.

Existing conditions: Existing SR 20 from CS 660/N Sharon Church Road to Publix Drive consists of a two lane rural shoulder highway with 12 ft travel lanes and 2 ft paved shoulders with widening in sections for left and right turn lanes. Existing SR 20 from Publix Drive to SR 10/US 78 consists of a two lane urban shoulder highway with 12 ft travel lanes and widening in sections for left and right turn lanes. SR 20 is currently classified as an suburban minor arterial with posted speeds along SR 20 of 45 mph west of Huntington Drive, 35 mph east of Huntington Drive, and 25 mph east of SR 10/ US 78. There are several visible overhead and underground utilities that are present throughout the entirety of the project.

Other projects in the area:
The following projects are in proximity of PI 0016387;

Coordination Required:
PI 0012674 – SR 10; SR 10BU; SR 11; SR 20; SR 81; SR 138 @ 13 Locations in Walton County (8/2019 Let)
No Coordination Required:
PI 0000415 – SR10/US 78 From Gwinnett County Line to SR 10BU in Monroe (Long Range)
PI 0000416 – SR 20 from N Sharon Church Rd to Pleasant Hill Rd/Rockdale (Long Range)
PI 0016386 - SR 20 at 3 Locations In Walton County (Concept Phase)
PI 0016388 - SR 20 & SR 81 From SR 10/US 78 to CR 8321/Brand Road (Concept Phase)

MPO: N/A **TIP #:** N/A

Congressional District(s): 10

Federal Oversight: ☐ PoDI ☐ Exempt ☒ State Funded ☐ Other

Projected Traffic SR 20: AADT 24 HR T: 5 %
Current Year (2017): 19,200 Open Year (2023): 21,150 Design Year (2043): 31,450

Projected Traffic US 78/SR 10: AADT 24 HR T: 4.5 %
Current Year (2017): 17,050 Open Year (2023): 18,750 Design Year (2043): 25,750

Traffic Projections Performed by: Gresham Smith
Date approved by the GDOT Office of Planning: 2/21/19

AASHTO Functional Classification (Mainline): *Minor Arterial*

AASHTO Context Classification (Mainline): *Rural Town*

AASHTO Project Type (Mainline): *Reconstruction*

Complete Streets - Bicycle, Pedestrian, and/or Transit Standard Warrants:
Warrants met: ☐None ☐ Bicycle ☒Pedestrian ☐Transit
Standard Pedestrian Warrants:

- Along corridors with pedestrian travel generators and destinations (i.e. residential neighborhoods, commercial areas, schools, public parks, transit stops and stations, etc.), or areas where such generators and destinations can be expected prior to the design year of the project.

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes

Pavement Evaluation and Recommendations
Initial Pavement Evaluation Summary Report Required? ☐ No ☒ Yes
Feasible Pavement Alternatives: ☒ HMA ☐ PCC ☐ HMA & PCC

DESIGN AND STRUCTURAL

Description of the proposed project: The project begins 1000 ft south of the existing intersection of CR 118/Tuck Road and SR 20 (MP 2.1) and ends at the intersection of SR 20 and Covington Street (MP 0.8) for a total project length of approximately 1.3 miles. The project lies completely within Walton County and completely within the City of Loganville. Along SR 20, the existing two-lane section will be widened to a four-lane section with a raised median that varies between 20-ft to 24-ft. CR 118/Tuck Road and CS 660/N Sharon Church Road will be realigned to

intersect SR 20 with a multilane roundabout. The realigned CR 118/Tuck Road and CS 660/Sharon Church Road will intersect SR 20 approximately 80 ft south of the existing intersection of CS 660/N Sharron Church Road and SR 20. Fesco Way will also be realigned approximately 360-ft to the east to **improve operations for** conflicting u-turning truck traffic from SR 20 WB and traffic entering SR 20 from Overlook Dr. Turn lanes will be added and access will be restricted along the project to improve traffic flow along the corridor. Intersection improvements will be made at the intersection of SR 20 and US 78 / SR 10 to improve traffic flow. ***~OB***

Major Structures:

Structure	Existing	Proposed
6 ft x 6 ft Culvert	Existing bottomless 6-ft x 6-ft culvert crossing under SR 20 with an existing skew angle of approximately 90 degrees.	*Replace existing culvert with a new 6-ft x 6-ft culvert equal to approximately 150-ft long.
7 ft x 6 ft Culvert	Existing 7-ft x 6-ft culvert crossing under SR 20 with an existing skew angle of approximately 60 degrees.	*Replace existing culvert with a new 7-ft x 6-ft culvert equal to approximately 200-ft long.
Retaining Walls	N/A	Two retaining walls (0 ft to 10 ft) will possibly be needed to avoid the sanitary sewer pump station and impacts to adjacent properties.

**A culvert inspection will be required & coordinated with the GDOT District 1 to analyze the existing condition to identify if the existing culverts can be retrofitted and extended.*

Is the project located on a NHS roadway? ☐ No ☒ Yes

US 78/ SR 10 is located on a NHS

Is the project located on a Special Roadway or Network? ☐ No ☒ Yes Oversize Truck Route

SR 20 & US 78/SR 10 is an Oversize/Overweight Truck Route.

Mainline Design Features: SR 20 (Minor Arterial)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2 to 4
- **Lane Width(s)**	**12 ft**	**11 ft to 12 ft**	**12 ft**
- **Median Width & Type**	**None**	**20 ft or 24 ft Raised Median**	**0 to 24 ft Flush Median (Rural Section) 20 to 24 ft Raised Median (Urban Section)**
- **Outside Shoulder Width**	**2 ft Paved**	**N/A**	**N/A**
- **Border Area Width**	**N/A**	**10 ft Minimum, 16 ft Preferred**	**N/A (Rural Section) 16 ft (Urban Section)**
- **Outside Shoulder Slope**	**6%**	**6%**	**6% (Rural Section) N/A (Urban Section)**
- **Sidewalks**	**5 ft**	**5 ft**	**N/A (Rural Section) 5 ft (Urban Section)**
- Auxiliary Lanes	N/A		Left/Right Turn Lanes at Various Locations
- **Bike Accommodation**	**None**	**Not required per warrants**	**None**
Posted Speed (mph)	55 / 45 / 35 / 25		55 / 45 / 35 / 25

Design Speed (mph)	**55 / 45 / 35 / 25**	**55 / 45 / 35 / 25**	55 / 45 / 35 / 25
Minimum Horizontal Curve Radius (ft)	**4250**	**1190 / 711 / 371 / 154**	**6500 / 5300 / 5300 / Tangent**
Maximum Superelevation Rate	**4%**	**4%**	**RC / RC / NC / NC**
Maximum Grade	**6%**	**5% / 7% / 7% / 7%**	**6%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-67
Check Vehicle	N/A		OSOW
Pavement Type	HMA		HMA

**According to current GDOT design policy if applicable*

Sideroad Design Features: Tuck Road (Local Road)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12 ft**	**11 ft to 12 ft**	**12 ft**
- **Median Width & Type**	**None**	**None**	**None**
- **Outside Shoulder Width**	**2 ft Paved**	**6 ft or 8 ft (2 ft paved)**	**6 ft (2ft paved)**
- **Border Area Width**	**N/A**	**NA**	**NA**
- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**N/A**	**Not required per warrants**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**Not required per warrants**	**N/A**
Posted Speed	35 mph		35 mph
Design Speed	**35 mph**	**35 mph**	**35 mph**
Minimum Horizontal Curve Radius	**1425 ft**	**314 ft**	**1200 ft**
Maximum Superelevation Rate	**7.6%**	**6% or 8%**	**3.8%**
Maximum Grade	**3.5%**	**7%**	**3.5%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-67
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

Sideroad Design Features: N Sharon Church Road (Major Collector)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12 ft**	**11 ft to 12 ft**	**12 ft**
- **Median Width & Type**	**None**	**None**	**None**
- **Outside Shoulder Width**	**2 ft Paved**	**6 ft or 8 ft (2 ft or 6.5 ft paved)**	**8 ft (4ft paved)**
- **Border Area Width**	**N/A**	**N/A**	**N/A**

- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**None**	**Not required per warrants**	**None**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**Not required per warrants**	**N/A**
Posted Speed	45 mph		45 mph
Design Speed	**45 mph**	**45 mph**	**45 mph**
Minimum Horizontal Curve Radius	**N/A**	**643 ft**	**1200 ft**
Maximum Superelevation Rate	**NC**	**6% or 8%**	**6%**
Maximum Grade	**2.2%**	**7%**	**5%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-67
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

Sideroad Design Features: Fesco Way (Local Road)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**10 ft**	**11 ft to 12 ft**	**12 ft**
- **Median Width & Type**	**None**	**None**	**None**
- **Outside Shoulder Width**	**2 ft (unpaved)**	**N/A**	**N/A**
- **Border Area Width**	**N/A**	**10 ft Minimum, 16 ft Preferred**	**10 ft Minimum**
- **Outside Shoulder Slope**	**6%**	**6%**	**N/A**
- **Sidewalks**	**N/A**	**Not required per warrants**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**Not required per warrants**	**N/A**
Posted Speed	25 mph		25 mph
Design Speed	**25 mph**	**25 mph**	**25 mph**
Minimum Horizontal Curve Radius	**N/A**	**154 ft**	**154 ft**
Maximum Superelevation Rate	**NC**	**4%**	**4%**
Maximum Grade	**2.0%**	**11%**	**4%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-67
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

Sideroad Design Features: US 78 / SR 10 (Principal Arterial)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	4		4
- **Lane Width(s)**	**12 ft**	**11 ft to 12 ft**	**12 ft**

- **Median Width & Type**	**14 ft Flush**	**20 to 24 ft Raised Median**	**24 ft Flush (Footprint designed to incorporate a future 24-ft raised median)**
- **Border Area Width**	**10 ft**	**10 ft Minimum, 16 ft Preferred**	**10 ft**
- **Sidewalks**	**5 ft**	**5 ft**	**5 ft**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**Not required per warrants**	**N/A**
Posted Speed	45 mph		45 mph
Design Speed	**45 mph**	**45 mph**	**45 mph**
Minimum Horizontal Curve Radius	**1500 ft**	**711 ft**	**1500 ft**
Maximum Superelevation Rate	**5 %**	**4%**	**3.4%**
Maximum Grade	**3%**	**6%**	**4%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-67
Check Vehicle	N/A		OSOW
Pavement Type	HMA		HMA

Design Exceptions/Design Variances to FHWA or GDOT Controlling Criteria anticipated:

FHWA or GDOT Controlling Criteria	No	Undetermined	Yes	DE or DV	Approval Date (if applicable)
1. Design Speed	☒	☐	☐		
2. Design Loading Structural Capacity	☒	☐	☐		
3. Stopping Sight Distance	☒	☐	☐		
4. Horizontal Curve Radius	☒	☐	☐		
5. Maximum Grade	☒	☐	☐		
6. Vertical Clearance	☒	☐	☐		
7. Superelevation Rate	☒	☐	☐		
8. Lane Width	☒	☐	☐		
9. Cross Slope	☒	☐	☐		
10. Shoulder Width	☒	☐	☐		

Design Variances to GDOT Standard Criteria anticipated:

GDOT Standard Criteria	Reviewing Office	No	Undetermined	Yes	Approval Date (if applicable)
1. Access Control	DP&S	☒	☐	☐	
2. Shoulder Width	DP&S	☒	☐	☐	
3. Intersection Sight Distance	DP&S	☒	☐	☐	
4. Intersection Skew Angle	DP&S	☐	☐	☒	
5. Tangent Lengths on Reverse Curves	DP&S	☒	☐	☐	
6. Lateral Offset to Obstruction	DP&S	☒	☐	☐	
7. Rumble Strips	DP&S	☒	☐	☐	
8. Safety Edge	DP&S	☒	☐	☐	
9. Median Usage	DP&S	☒	☐	☐	
10. Roundabout Illumination Levels	DP&S	☒	☐	☐	
11. Complete Streets Warrants	DP&S	☒	☐	☐	

12. ADA Requirements in PROWAG	DP&S	☒	☐	☐	
13. GDOT Construction Standards	DP&S	☐	☐	☒	
14. GDOT Drainage Manual	DP&S	☒	☐	☐	

A design variance for the intersection skew angle for SR 20 and US 78 / SR 10 will be requested since the existing intersection angle is equal to 69º43'12" which less than the required 75º requirement. Realigning the intersection would increase impacts to the surrounding businesses significantly and even result in total takes in some instances.

A design variance is needed for median spacing that falls below GDOT Construction Standards requiring between 660-ft to 1000-ft in urban areas. Currently there are median openings being proposed at less than the standard requirement at Huntington Dr, Fesco Way, & Publix Drive which have a median spacing of 600'& 430' respectively.

VE Study anticipated: ☒ No ☐ Yes ☐ Completed – Date: _____

Lighting Required: ☐ No ☒ Yes
Lighting is required per the GDOT Design Policy Manual for the proposed roundabout at the intersection of North Sharon Church/ Tuck Road and SR 20.

Off-site Detours Anticipated: ☒ No ☐ Undetermined ☐ Yes
If yes: Roadway type to be closed: ☐ Local Road ☐ State Route
Detour Route selected: ☐ Local Road ☐ State Route
District Concurrence w/Detour Route: ☐ No/Pending ☐ Received *Select a date*

Transportation Management Plan [TMP] Required: ☐ No ☒ Yes
If Yes: Project classified as: ☒ Non-Significant ☐ Significant
TMP Components Anticipated: ☒ TTC ☐ TO ☐ PI

INTERSECTIONS AND INTERCHANGES

Interchanges/Major Intersections:
SR 20 at Tuck Road /N Sharon Church Road – Proposed Roundabout
SR 20 at US 78/ SR 10 – Proposed Dual Left Tun Lanes on the Southeast and Southwest Legs
SR 20 at Tommy Lee Fuller Dr – Proposed Left In/Right Out with Raised Median on SR 20.

Intersection Control Evaluation (ICE) Required: ☐ No ☒ Yes

Roundabout Concept Validation Required: ☐ No ☒ Yes ☐ Completed – Date: TBD

UTILITY AND PROPERTY

Utility Involvements: Utilities owners within the project area include:

- AT&T (telephone)
- Atlanta Gas Light (gas)
- City of Lawrenceville (gas)
- City of Loganville (sewer and water)
- City of Monroe (fiber)
- Comcast (cable tv)
- Georgia Power Distribution (electricity)
- Walton County Water Authority (water)
- Walton EMC (electricity)
- Zayo Fiber Solutions (fiber).

SUE Required: ☐ No ☒ Yes ☐ Undetermined

Public Interest Determination Policy and Procedure recommended: ☒No ☐Yes

Right-of-Way (ROW): Existing width: 90 to 100ft. Proposed width: 100 to 150ft.

Required Right-of-Way anticipated: ☐None ☒Yes ☐Undetermined

Easements anticipated: ☐None ☒Temporary ☒Permanent * ☐Utility ☐Other

** Permanent easements will include the right to place utilities.*

Anticipated total number of impacted parcels:		63
	Businesses:	0
Displacements anticipated:	Residences:	2
	Other:	
	Total Displacements:	2

Location and Design approval: ☐ Not Required ☒ Required

Impacts to USACE property anticipated: ☒ No ☐ Yes ☐ Undetermined

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern: No context sensitive design issues are projected.

Context Sensitive Solutions Proposed: Reduction of border area width in areas where construction is near to structures will be utilized where practical to pull construction further from the structures. Impacts to businesses will be evaluated and revised as practical so that changes in existing access to the business will be minimized. Walls will be added in areas where practical to avoid excessive RW takes.

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document: GEPA ~ None

Level of Environmental Analysis:

☒ The environmental considerations noted below are based on preliminary desktop or screening level environmental analysis and are subject to revision after the completion of resource identification, delineation, and agency concurrence.

☐ The environmental considerations noted below are based on the completion of resource identification, delineation, and agency concurrence.

Water Quality Requirements:
MS4 Permit Compliance – Is the project located in a MS4 area? ☐ No ☒ Yes

Is Non-MS4 water quality mitigation anticipated? ☒ No ☐ Yes

Environmental Permits/Variances/Commitments/Coordination anticipated:

Permit/Variance/Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	☒	☐	

2. Forest Service/NPS	☒	☐	
3. CWA Section 404 Permit	☒	☐	
4. Tennessee Valley Authority Permit	☒	☐	
5. USACE Real Estate Outgrant	☒	☐	
6. Buffer Variance	☒	☐	
7. Coastal Zone Management Coordination	☒	☐	
8. NPDES	☐	☒	
9. FEMA	☒	☐	
10. Cemetery Permit	☒	☐	
11. Other Permits	☒	☐	
12. Other Commitments	☒	☐	
13. Other Coordination	☐	☒	Section 7 Coordination for federally protected species.

Is a PAR required? ☒ No ☐ Yes ☐ Completed – Date:

Environmental Comments and Information:

NEPA/GEPA: The proposed project is state funded. There is no environmental document.

Ecology:
The project corridor was surveyed in August 2011 and May 2007 to identify the presence of wetlands, streams, protected species and general terrestrial communities within the proposed project area.

Waters of the United States (WOTUS)
Waters of the United States are located within the project corridor. Previously two streams (Streams 3 and 4) and two wetlands (WL 2 and WL 8) were identified in the project corridor between Tuck Road and Highway 78.

Essential Fish Habitat
This project is not located in counties where Essential Fish Habitat (EFH) is designated for species managed by the National Marine Fisheries Service (NMFS).

Invasive Species
Invasive species including Chinese privet, multiflora rose, mimosa, kudzu, and Japanese honeysuckle were previously identified within the project corridor. Measures should be taken during project construction to prevent or minimize the spread of these species as appropriate for the time of year.

Protected Species
Previous reporting disclosed several known protected species have been previously recorded within a three mile radius of the project corridor; however, no protected species individuals or populations have been recorded in the project area (Sorenson 2008). There is no critical habitat designated within Walton or Gwinnett Counties for any protected species. *Addendum #1 to the Ecology Assessment of Effects Report, August 2015* (Ellett 2015) summarizes protected species in the corridor in the table below.

Protected Species				
Species Name	Common Name	Federal Rank	State Rank	Habitat Present
Allium speculae	Flatrock onion	-	T	Y
Amphianthus pusillus	Little amphianthus	T	T	Y
Cyprinella xaenura	Altamaha shiner	-	T	N
Eriocaulon koernickianum	Dwarf hatpins	-	E	Y

Isoetes melanospora	Black-spored quillwort	E	E	Y
Rhus michauxii	Dwarf sumac	E	E	Y
Sedum pusillum	Granite rock stonecrop	-	T	Y

History:
Previous survey of the project area identified several eligible historic resources in the project corridor: The Tuck Farm, Harrison House, and Loganville Historic District. The resources are located in the immediate vicinity of the Center Hill Church Road at SR 20 intersection. Concurrence on resource's eligibility for the National Register of Historic Places (NRHP) was received February 6, 2006.

The project corridor should be resurveyed for historic resources due to time and scope changes. Every effort should be made to avoid the eligible resources and their boundary.

Archeology:
The proposed project is located within the limits of previous project PI 142000, as such the survey reports for that project were referenced for information regarding previously identified archaeological resources in the current project corridor, especially those on or eligible for inclusion in the NRHP. Review of the October 4, 2010, Archaeological Assessment (Lotti) and the July 14, 2015, In-House Survey Report (Perrine) reveal no existing or eligible NRHP archaeological resources within the project corridor.

Air Quality:
Is the project located in an Ozone Non-attainment area? ☒ No ☐ Yes
Is a Carbon Monoxide hotspot analysis required? ☐ No ☒ Yes

The proposed project would create a signalized intersection and traffic volumes in the project corridor exceed 10,000 vpd with the level of service of D, E or F therefore a CO hotspot analysis is required.

Noise Effects:
A traffic noise analysis would be limited to the level of evaluation needed to determine the degree of audible impact of the proposed project in support of the cultural resources assessment of effect analysis.

Public Involvement:
A public information meeting is needed to solicit public input on the current project in the corridor and is anticipated to take place in **January of 2021. ~OB**

Major stakeholders: Anticipated major stakeholders include the following; City of Loganville, area residents, business owners, Loganville Towne Green, True Partnership Christian Academy, and the traveling public.

CONSTRUCTION

Issues potentially affecting constructability/construction schedule: During construction SR 20 will likely require lane width reduction as well as temporary removal of some of the right and left turn lanes along the project. Since widening is mostly symmetrical along the project, the option to build half of the roadway and shift traffic to the complete portion may not be able to be utilized since the additional two lanes will not be constructed to one side of the existing roadway. An existing deficient sag curve at the intersection of SR 20 and Magnolia Street may prove to be challenging to raise the existing grade to meet vertical curve requirements. Temporary pavement or shoring may be needed in this area during construction. The two existing culverts that will be extended could also require shoring and temporary barrier during construction.

Early Completion Incentives recommended for consideration: ☒ No ☐ Yes

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Federal Aviation Administration (FAA) coordination anticipated: ☒No ☐ Yes

Initial Concept Team Meeting: An initial concept team meeting for PIs 0016386, 0016387, and 0016388 was held on December 12, 2018. Minutes are attached.

Concept Team Meeting: A concept team meeting was held on June 27, 2019. Minutes are attached.

Other coordination to date: An additional coordination meeting to discuss comments made by GDOT District 1 in regards to the preferred alternative that was presented at the Concept Team Meeting was held on July 23, 2019.

Project Activity	Party Responsible for Performing Task(s)
Concept Development	Gresham Smith
Design	Gresham Smith
Right-of-Way Acquisition	GDOT
Utility Coordination (Preconstruction)	GDOT
Utility Relocation (Construction)	Utility Owners
Letting to Contract	GDOT
Construction Supervision	GDOT
Providing Material Pits	Contractor
Providing Detours	Contractor
Environmental Studies, Documents, & Permits	GDOT
Environmental Mitigation	GDOT
Construction Inspection & Materials Testing	GDOT

Project Cost Estimate Summary and Funding Responsibilities:

	PE Activities		ROW	Reimbursable Utilities	CST*	Total Cost
	PE Funding	Section 404 Mitigation				
Programmed Cost:	$1,000,000		$3,090,000	$4,386,250	$8,511,743	$15,987,993.00
Funded By:	HB 170	HB 170	HB 170	HB 170	HB 170	
Estimated Amount:	$1,000,000	$104,000	$5,220,500**	$3,519,337.50	$10,051,577.42	$18,791,414.92
Date of Estimate:	3/2018	8/19/19	02/20/2020	2/14/2019	02/20/2020	
Cost Difference:						$2,803,421.92

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.
**ROW Cost Estimated by Designer. An updated ROW Cost Estimate is required and currently being generated.

ALTERNATIVES DISCUSSION

Alternative selection:

Preferred Alternative: The alternative proposes widening the SR 20 corridor with a urban 4-lane typical section that consist of a raised median that varies from 20-ft to 24-ft, curb, gutter, and 5-ft sidewalks on each side of the corridor beginning at the intersection of SR 20 & N Sharon Church Rd and extends to the intersection of SR 20 & SR10/US78. This alternative proposes modifying and improvements the two intersections of SR 20 & Tuck Rd/N Sharon Church Rd and SR 20 & SR10/US78. The intersection of SR 20 & Tuck Rd/N Sharon Rd is proposed to be modified to realign Tuck Rd with N Sharon Church Rd and providing a multi-lane roundabout intersection type. This roundabout consists of a 190-ft inscribed diameter, (2) 14-ft lanes, a 16-ft truck apron. The intersection of SR 20 & SR10/US78 is proposed to accommodate dual lefts at both SR 20 traffic turning northbound on to SR10/US78 and SR10/US78 traffic turning on to SR 20 westbound. Additionally, median access along SR 20 is managed by providing various median break types along the corridor. These median access points propose an R-Cut at Overlook Rd, a full access median break with raised eyebrows to allow for U-Turns at Huntington Dr, and R-Cut with the realigned Fesco Way, an R-Cut with a raised eyebrow to allow for U-Turns at Publix Dr, and removing access to SR 20 from Magnolia St with a newly constructed cul-de-sac.			
Estimated Property Impacts:	**63**	**Estimated Total Cost:**	**$18,791,414.92**
Estimated ROW Cost*:	**$5,220,500**	**Estimated CST Time:**	**24 Months**
Rationale: The overall need and purpose of this project is to provide better operational improvement, ease congestion, and reduce crash rates associated with turning movements. This alternative accomplishes these needs by implementing the following solutions; The typical section of this project is proposed to widen SR 20 from a two-lane roadway to a four-lane sections with a raised median. This proposed typical section will increase capacity with the lane addition and the raised median reduces the number of turning movements which addressed the crash rates associated with these movements. To accommodate the restricted turning movements caused by the raised median R-Cuts with Raised Eyebrows have been proposed along the corridor at locations that provide adequate sight distance and can accommodate proper vehicle types. The realignment of Tuck Rd with North Sharon Church Rd eliminates an offset intersection and proposing a multi-lane roundabout intersection type provides adequate operational level of service while reducing the number of conflict points and the severity of those conflict points. Providing dual left turn movements at the intersection location of SR 20 & US 78/SR 10 provides a balanced approach of addressing the operational concerns while keeping cost close to the programmed cost of this project. The proposed dual left solution provides an acceptable level of service until 2038 (15 years after the opening) before the intersection level of service fails. Although this alternative has a failing level of service in the design year, a detailed cost-benefit analysis has been conducted and this alternative provides a b/c ratio approximately 3 times greater than that of other alternatives. *(Note: The Cost-Benefit Analysis can be found in Attachment 4 of this report.)*			

** Estimated ROW costs estimated by Designer*

No-Build Alternative: Make no improvements.			
Estimated Property Impacts:	**0**	**Estimated Total Cost:**	**$0**
Estimated ROW Cost:	**$0**	**Estimated CST Time:**	**0 Months**
Rationale: This alternative produces the least beneficial operational analysis in the design year.			

Alternative 1: This alternative is similar to the preferred alternative layout apart from the SR 20 & SR10/US 78 intersection. This alternative proposes a displaced left for SR10/US 78 traffic turning on to SR 20 westbound and dual lefts of SR 20 traffic turning northbound on to SR10/US 78.

Estimated Property Impacts:	**66**	**Estimated Total Cost:**	**$21,631,320**
Estimated ROW Cost*:	**$7,353,100**	**Estimated CST Time:**	**24 Months**

Rationale:
While this alternative addresses the projects needs and purpose much like the preferred alternative, the overall benefit of providing a displaced left in terms of traffic operations are minimum when compared to the cost incurred by the intersection's overall footprint. A detailed cost-benefit analysis and traffic analysis had been conducted on this alternative and determined that the intersection of SR 20 & SR10/US 78 would have a failing level of service in the design year (2043) and the cost-benefit of this intersection scores approximately 1/3rd of the preferred alternative. Additionally, this alternative would require 3 additional displacements of commercial parcels located within the city limits of Loganville. Due to this increased construction cost, additional displacements, and limited operation improvements in comparison to the cost incurred by this alternative that this alternative was not selected.

** Estimated ROW costs estimated by Designer*

Alternative 2: This alternative is similar to the preferred alternative layout along SR 20 up to Overlook Dr. This alternative proposes the realignment of SR 20 from Overlook Dr to align with CS Floyd Rd at SR10/US 78 on new location. Additionally, CS Floyd Rd would also require full depth pavement reconstructed to upgrade the pavement to state route pavement design standards. This alternative would maintain the existing alignment of SR 20 from the realignment to the existing SR10/US 78 to maintain access to adjacent parcels.

Estimated Property Impacts:	**41**	**Estimated Total Cost:**	**$19,890,630**
Estimated ROW Cost*:	**$3,120,000**	**Estimated CST Time:**	**24 Months**

Rationale: This alternate is the most impactful alternate to environmentally sensitive areas as it goes directly through parcels that are historic, have environmental features such as wetlands & perennial streams, and pose potential impacts a cemetery located along CS Floyd Rd. Additionally, the existing intersection of SR10/US78 & CS Floyd Rd is currently at a substandard intersection skew angle (approximately 56 degrees) and cannot be upgraded without causing additional impacts to the adjacent cemetery located along CS Floyd Rd. Due to this alternative impacting several environmental resources and the cost exceeding the preferred alternative that this alternative was not selected.

** Estimated ROW costs estimated by Designer*

Alternative 3: This alternative is similar to the preferred alternative layout along SR 20 up to Huntington Dr. This alternative proposes diverting SR 20 to one-way pairs where eastbound traffic extends down the existing alignment of SR 20 to the intersection of SR10/US78 while the westbound traffic is realigned onto a new location alignment that intersects with CS Floyd Rd. The one-way pairs are both proposed as two lanes with a urban shoulder. This alternative would also require CS Floyd Rd & Main St though downtown Loganville to be converted to one-way operations.

Estimated Property Impacts:	**69**	**Estimated Total Cost:**	**$19,376,385**
Estimated ROW Cost*:	**$5,110,000**	**Estimated CST Time:**	**24 Months**

Rationale: Similarly, to Alternative 2, this alternate creates several undesirable conditions in terms of environmental impacts and substandard geometric conditions. This alternative is the second most impactful alternate to environmentally sensitive areas as it goes directly through parcels that are historic, have environmental features such as wetlands & perennial streams, and pose potential impacts a cemetery located along CS Floyd Rd. Additionally, this alternative is similar to the previous project (PI 142000) that was proposed along this section of SR 20 which received extensive opposition from the public residing in this area. Due to this alternative impacting several environmental resources, public opposition, and the cost exceeding that of the preferred alternative that this alternative was not selected.

** Estimated ROW costs estimated by Designer*

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Typical sections
3. Detailed Cost Estimates:
    a. Construction including Engineering and Inspection and Contingencies
    b. Revisions to Programmed Costs forms, & Liquid AC Cost Adjustment forms
    c. Right-of-Way
    d. Utilities
    e. Utility Concept Report
    f. Environmental Mitigation Cost
4. Cost-Benefit Analysis
5. Crash summaries
6. Design Traffic diagrams
7. ICE Report(s)
    a. Stage 1 Screening Decision Record
    b. Concurrence Memo
    c. Stage 2 Alternative Selection Decision Record
    d. Approved Waiver Request
8. Roundabout Data
    a. Roundabout Support Letter
    b. Roundabout Design Checks
9. MS4 Concept Report Summary
10. Initial Pavement Evaluation Summary
11. Minutes of Concept meetings

APPROVALS

Concur: _____ 4/21/2020
Director of Engineering Date

Approve: Margaret B. Pirkle Digitally signed by Margaret B. Pirkle DN: cn=Margaret B. Pirkle, o=GDOT, ou=Chief Engineer, email=mpirkle@dot.ga.gov, c=US Date: 2020.04.21 17:16:18 -04'00' 4-21-2020
Chief Engineer Date

Gresham Smith

Genuine Ingenuity

ATTACHMENT 1

Concept Layouts

LIMIT OF CONSTRUCTION

TUCK ROAD

OLD TUCK ROAD

BIOSLOPE

BIOSLOPE

BIORETENTION

LIMIT OF CONSTRUCTION

160' INSCRIBED DIAMETER

BIORETENTION

2' PAVED SHOULDER

BIORETENTION

SR 20

SR 20 TRUCK APRON

MATCH LINE (SEE DISPLAY 2)

PERENNIAL STREAM 01

BEGIN PROJECT
PI #0016387

BIOSLOPE

6.5' PAVED SHOULDER

BIOSLOPE

BIOSLOPE

SHARON CHURCH ROAD

LIMIT OF CONSTRUCTION

PERENNIAL STREAM 03

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES
POTENTIAL DISPLACEMENT

SCALE IN FEET
0 100 200 400

GDOT

PREFERRED ALTERNATE
SR 20
DISPLAY 1

MATCH LINE (SEE DISPLAY 1)

PERENNIAL STREAM 03

PERENNIAL STREAM 04

BEGIN WALL

END WALL

5' SIDEWALK

24' RAISED MEDIAN

8' RAISED MEDIAN

SR 20

BIORETENTION

INTERMITTENT STREAM 04A

LIMIT OF CONSTRUCTION

ENHANCED SWALE

OVERLOOK DRIVE

PERENNIAL STREAM 04

WETLAND 5A

PERENNIAL STREAM 07

WETLAND 5A

WETLAND 6

PUBLIX DRIVE

INTERMITTENT STREAM 09

PERENNIAL STREAM 07

WETLAND 08

BIORETENTION

LIMIT OF CONSTRUCTION

8' RAISED MEDIAN

5' SIDEWALK

SR 20

20' RAISED MEDIAN

LIMIT OF CONSTRUCTION

HUNTINGTON DRIVE

LIMIT OF CONSTRUCTION

8' RAISED MEDIAN

FESCO WAY

LIMIT OF CONSTRUCTION

BIORETENTION

TOMMY LEE FULLER DRIVE

MATCH LINE (SEE DISPLAY 3A & 3B)

PROPERTY AND EXISTING R/W LINE

REQUIRED R/W LINE

CONSTRUCTION LIMITS

EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES

EASEMENT FOR CONSTR OF SLOPES

EASEMENT FOR CONSTR OF DRIVES

POTENTIAL DISPLACEMENT

SCALE IN FEET

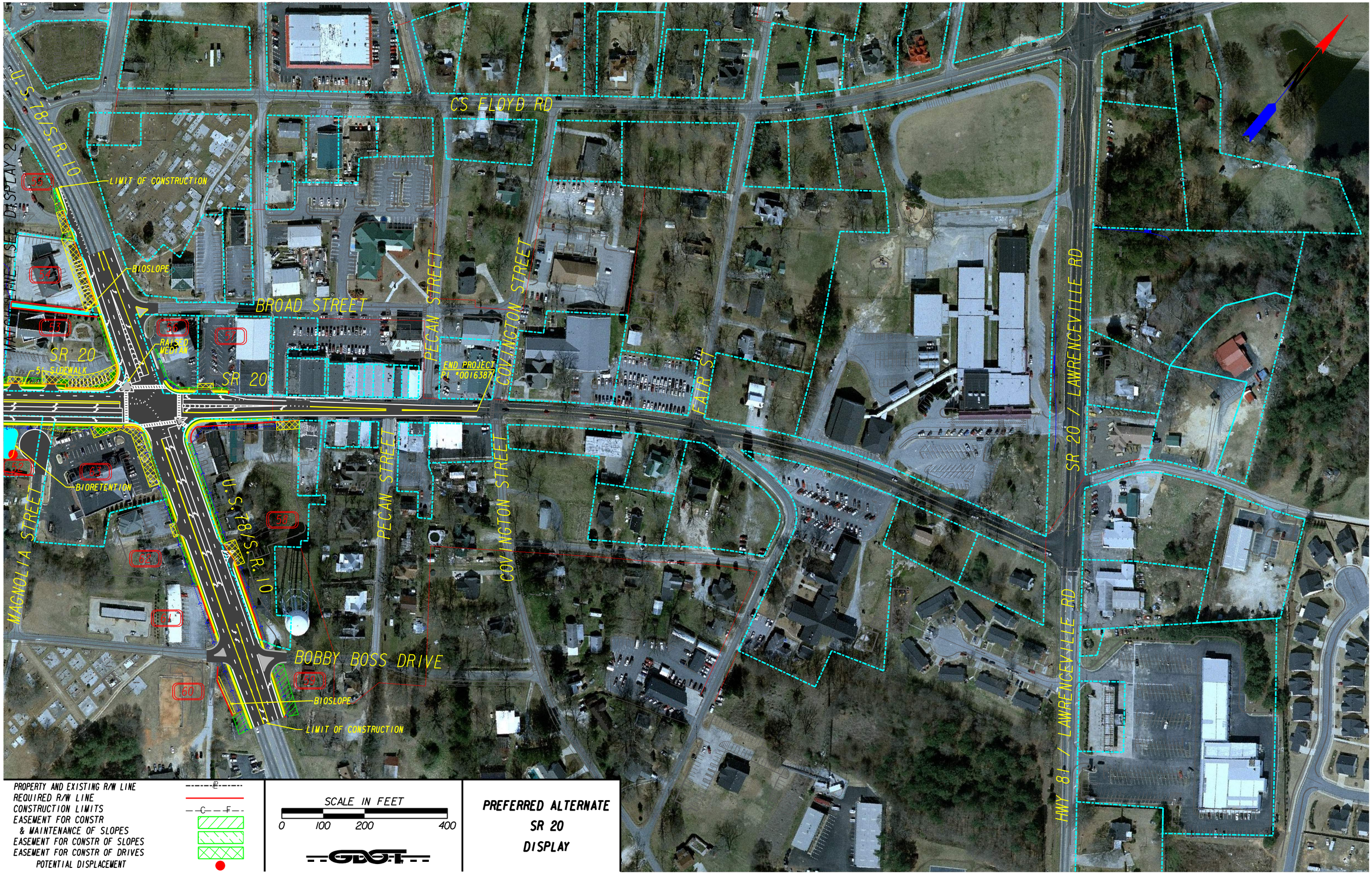
0 100 200 400

GDOT

PREFERRED ALTERNATE

SR 20

DISPLAY 2



PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES
POTENTIAL DISPLACEMENT

SCALE IN FEET

0 100 200 400

GDOT

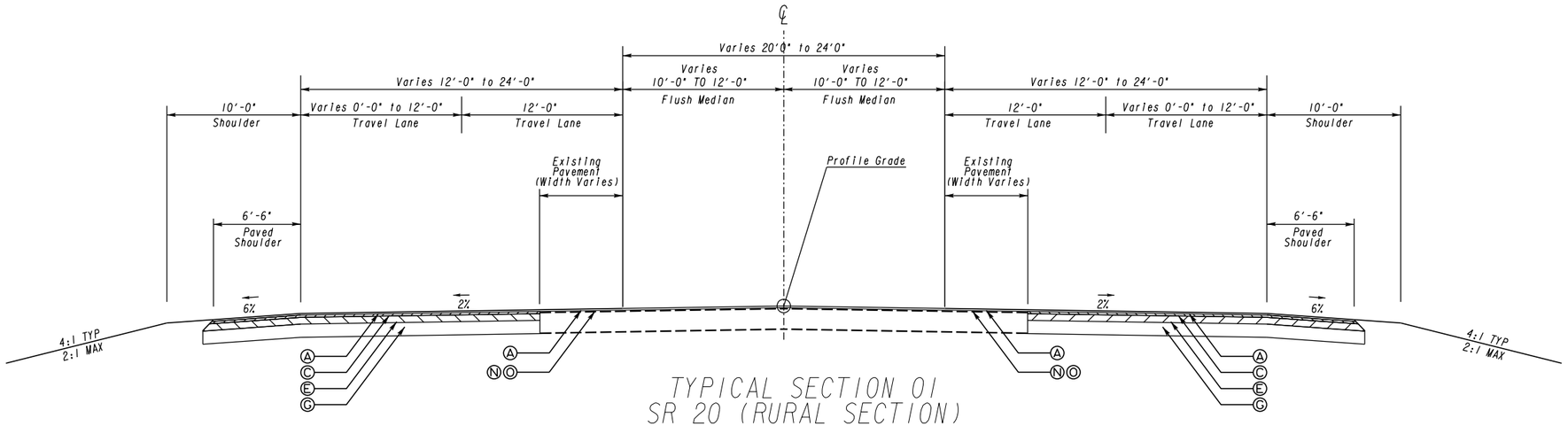
PREFERRED ALTERNATE
SR 20
DISPLAY

Gresham Smith

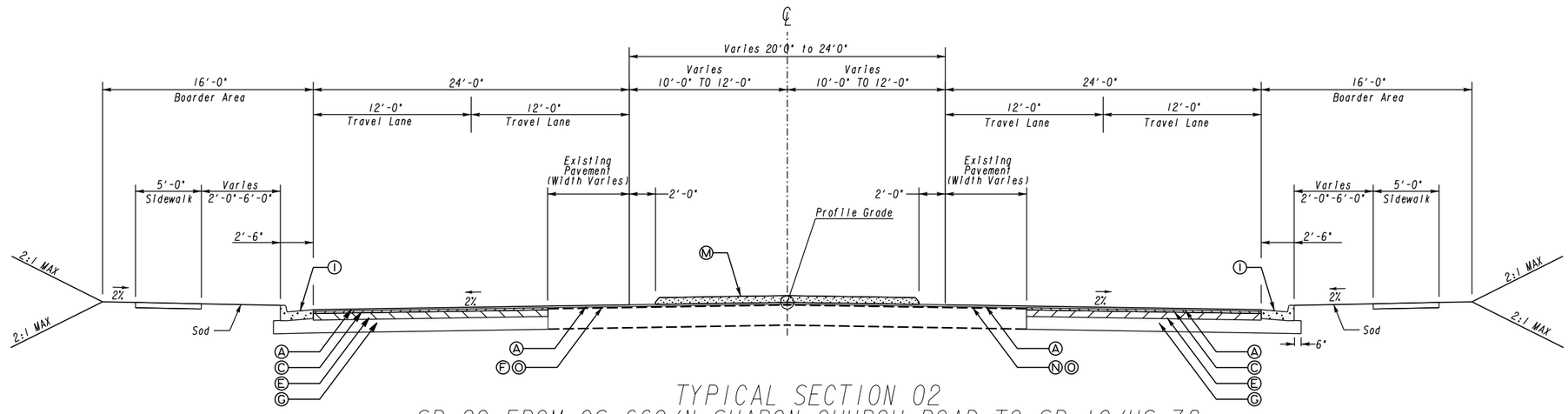
Genuine Ingenuity

ATTACHMENT 2

Typical Sections



TYPICAL SECTION 01
SR 20 (RURAL SECTION)
SR 20 TO CS 660/N SHARON CHURCH ROAD
DESIGN SPEED = 55/45 MPH



TYPICAL SECTION 02
SR 20 FROM CS 660/N SHARON CHURCH ROAD TO SR 10/US 78
DESIGN SPEED = 45/35/25 MPH

REQUIRED PAVEMENT

- (A) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (B) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, POLYMER MODIFIED, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (C) RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)
- (D) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)
- (E) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (440 LB/ SQ. YD.)
- (F) GR AGGR BASE CRS, 8 INCH, INCL MATL
- (G) GR AGGR BASE CRS, 10 INCH, INCL MATL
- (H) PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK
- (I) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2
- (J) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 7
- (K) CONCRETE HEADER CURB, 4 IN, TP 9
- (L) CONCRETE HEADER CURB, 6 IN, TP 7
- (M) CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE
- (N) RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)
- (O) MILL ASPH CONC PVMT (VARIABLE DEPTH)

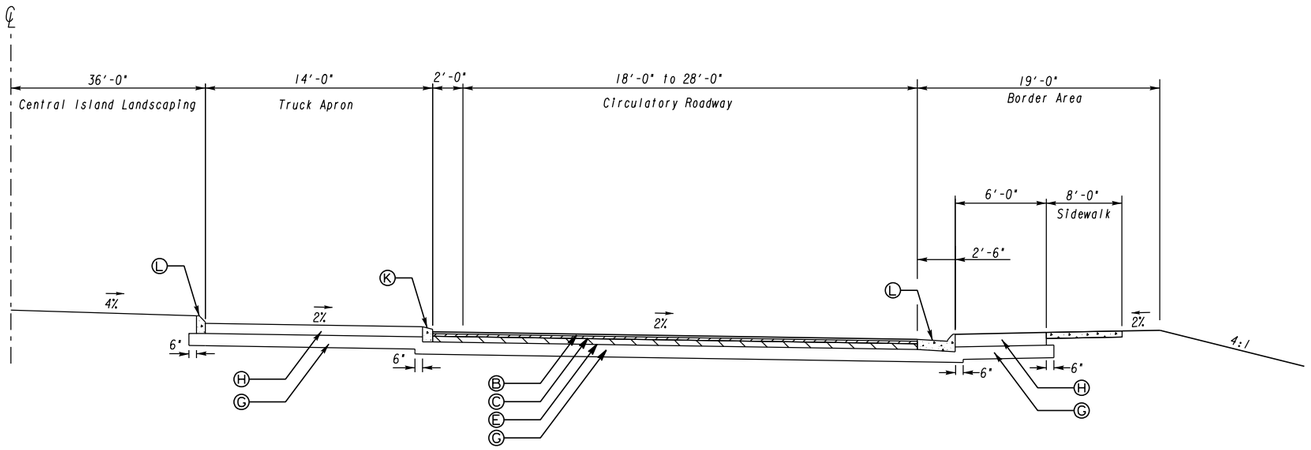
NOT TO SCALE

REVISION DATES

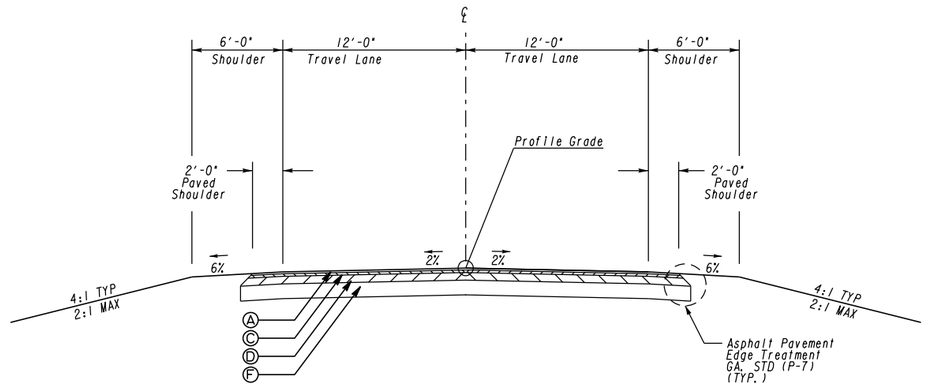
TYPICAL SECTIONS

PREFERED ALTERNATE PI 0016387

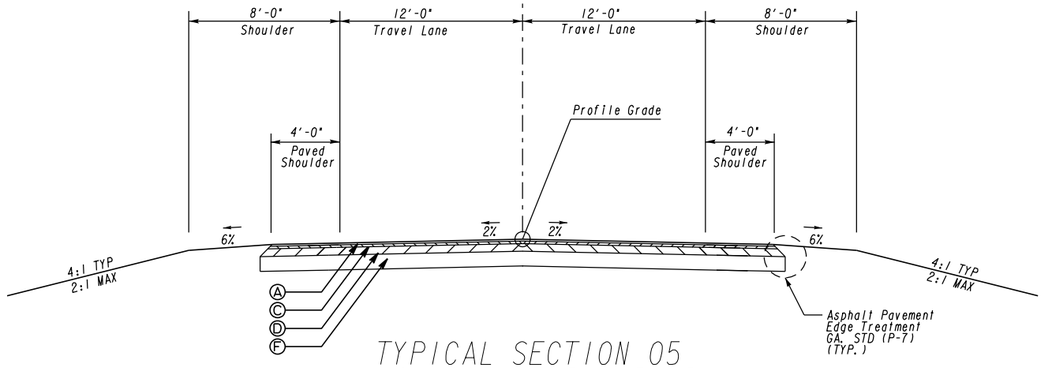
CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		05-0001
CORRECTED:		DATE:		
VERIFIED:		DATE:		



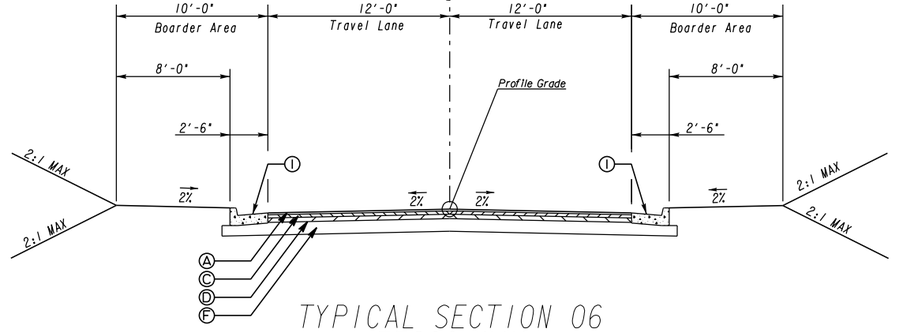
TYPICAL SECTION 03
ROUNDABOUT - SR 20 AT TUCK RD/N SHARON CHURCH RD
DESIGN SPEED = 25 MPH



TYPICAL SECTION 04
TUCK ROAD
DESIGN SPEED = 35 MPH



TYPICAL SECTION 05
N SHARON CHURCH ROAD
DESIGN SPEED = 45 MPH



TYPICAL SECTION 06
FESCO WAY
DESIGN SPEED = 25 MPH

REQUIRED PAVEMENT

- (A) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (B) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, POLYMER MODIFIED, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (C) RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)
- (D) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)
- (E) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (440 LB/ SQ. YD.)
- (F) GR AGGR BASE CRS, 8 INCH, INCL MATL
- (G) GR AGGR BASE CRS, 10 INCH, INCL MATL
- (H) PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK
- (I) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2
- (J) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 7
- (K) CONCRETE HEADER CURB, 4 IN, TP 9
- (L) CONCRETE HEADER CURB, 6 IN, TP 7
- (M) CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE
- (N) RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)
- (O) MILL ASPH CONC PVMT (VARIABLE DEPTH)

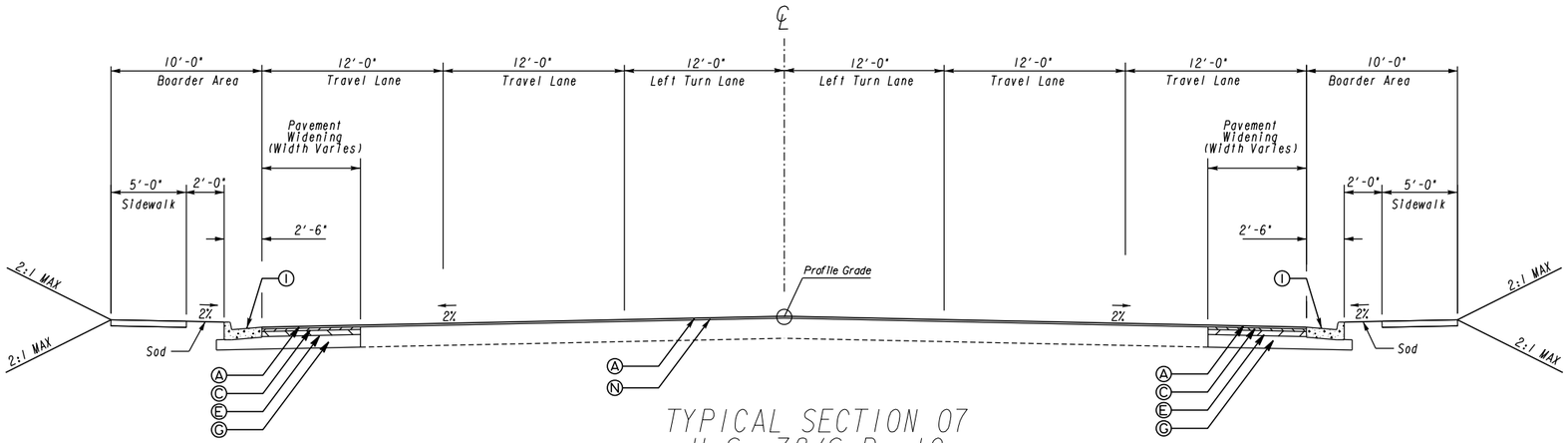
NOT TO SCALE

REVISION DATES

TYPICAL SECTIONS

PREFERED ALTERNATE PI 0016387

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		
CORRECTED:		DATE:		05-0002
VERIFIED:		DATE:		



TYPICAL SECTION 07
U.S. 78/S.R. 10
DESIGN SPEED = 45 MPH

REQUIRED PAVEMENT

- (A) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (B) RECYCLED ASPH CONC 12.5 MM SUPERPAVE, POLYMER MODIFIED, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- (C) RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)
- (D) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)
- (E) RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (440 LB/ SQ. YD.)
- (F) GR AGGR BASE CRS, 8 INCH, INCL MATL
- (G) GR AGGR BASE CRS, 10 INCH, INCL MATL
- (H) PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK
- (I) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2
- (J) CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 7
- (K) CONCRETE HEADER CURB, 4 IN, TP 9
- (L) CONCRETE HEADER CURB, 6 IN, TP 7
- (M) CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE
- (N) RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)
- (O) MILL ASPH CONC PVMT (VARIABLE DEPTH)

NOT TO SCALE

REVISION DATES

TYPICAL SECTIONS

PREFERED ALTERNATE PI 0016387

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		05-0003
CORRECTED:		DATE:		
VERIFIED:		DATE:		

Gresham Smith

Genuine Ingenuity

ATTACHMENT 3

Detailed Cost Estimate

- Construction Including Engineering and Inspection Contingencies
- Revisions to Programmed Cost Forms, & Liquid AC Cost Adjustment Forms
- Right-of-Way
  (This attachment is currently being updated by GDOT Office of ROW and will be provide upon receipt of updated ROW Cost Estimate)
- Utilities
- Utility Concept Report
- Environmental Mitigation Cost

Georgia Department of Transportation

Interoffice Memo

FILE

PI NUMBER	0016387	PROJECT DESCRIPTION	SR 20 FROM CS 660/SHARON CHURCH ROAD TO SR 10/US 78
OFFICE	Program Delivery		
DATE	Thursday, February 20, 2020		

From: Kimberly W. Nesbitt, State Program Delivery Adminstrator

To: Erik Rohde, P.E., State Project Review Engineer
via email Mailbox: CostEstimatesandUpdates@dot.ga.gov

Subject: **REVISIONS TO PROGRAMMED COSTS**

Project Manager:	Kimberly Kimbrough
Management Let Date:	6/15/2022
Management Right of Way Date:	9/15/2020

Summary of Programmed Costs and Proposed Revised Costs:

Estimate Type	Programmed Costs (T-Pro Without Inflation)	Last Estimate Date	Revised Cost Estimate
CONSTRUCTION	$8,511,743.00	11/11/2019	$10,051,577.42
RIGHT OF WAY	$3,090,000.00	11/11/2019	$5,220,500.00
UTILITIES	$4,386,250.00	02/14/2019	$3,519,337.50

Explanation for Cost Increase and Contingency Justification:

Contingency set at 15% per GDOT policy based on project type.

Attachments:

Georgia Department of Transportation

Interoffice Memo

Design Phase Leader Validation of Final QC/QA for Construction Cost Estimate Used In This Revision to Programmed Costs:

Consultant Company or GDOT Design Office:	Gresham Smith
Printed Name:	Joel Jones, PE
Title:	Designer
Signature:	Joel Jones
Date:	2/20/2020

Georgia Department of Transportation

Interoffice Memo

Cost Estimate Worksheet:

CONSTRUCTION COST ESTIMATE (Required base estimate entered from CES and should not include E&I). →	**A**	$ 8,057,824.19
ENGINEERING AND INSPECTION (The default E&I percentage is 5.0%, but may be adjusted per project scope.) →	**D**	$ 402,891.21

Construction Cost	E&I Percentage	E&I Cost
B	C	D = B x C
$ 8,057,824.19	5%	$ 402,891.21

CONTINGENCY (Refer to the Risk and Contingencies Table included in GDOT Policy 3A-9 Cost Estimating Purpose) →	**I**	$ 1,269,107.31

Construction Cost	E&I Cost	Construction + E&I	Contingency Percentage	Contingency Cost
E	F	G = E + F	H	I = G x H
$ 8,057,824.19	$ 402,891.21	$ 8,460,715.40	15%	$ 1,269,107.31

ASPHALT FUEL PRICE ADJUSTMENT (Leave blank if not applicable) →	**Q**	$ 321,754.71

Date	Feb 2019
Regular Unleaded	$2.322/ GAL
Diesel	$2.907/ GAL
Liquid AC	$500.00/ TON

Current Asphalt Fuel Index Prices can be found at the link below:

http://www.dot.ga.gov/PS/Materials/AsphaltFuelIndex

Liquid AC	Description	Tons	Percentage of Asphaltic Concrete	Tons of Asphaltic Concrete	Total Monthly Tonnage of Asphalt Cement (TMT)	Monthly Asphalt Cement Price month project let (APL)	Max. Cap	Monthly Asphalt Cement Price month placed (APM)	Price Adjustment (PA)
		J	K	L = J x K	M = Sum of Columns L, T & W	N	O	P = (N x O)+N	Q = [((P - N) / N)] x M x N
	Leveling	1000.00 TN	5.00%	50.00 TN	1072.52 TN	$500.00/ TON	60%	$ 800.00	$ 321,754.71
	9.5 mm SP								
	12.5 OGFC								
	12.5 PEM								
	12.5 mm SP	6383.00 TN	5.00%	319.15 TN					
	19 mm SP	4862.00 TN	5.00%	243.10 TN					
	25 mm SP	8604.00 TN	5.00%	430.20 TN					

Bituminous Tack Coat	Description	Tack Coat	GL/TN	Tons
		R	S	T = R/S
	Tack Coat	7000.00 GL	232.8234 GL/TN	30.07 TN

Bituminous Tack Coat (Surface Treatment)	Description	SY	GL/SY	TN
		U	V	W = (U x V) / (232.8234 GL/TN)
	Single Surface Treatment		0.20 Gl/SY	
	Double Surface Treatment		0.44 Gl/SY	
	Triple Surface Treatment		0.71 Gl/SY	

CONSTRUCTION TOTAL COST →	**X = A+D+I+Q**	$ 10,051,577.42
RIGHT OF WAY COST →	**Y**	$ 5,220,500.00
UTILITIES COST (Provided by Utility Office) →	**Z = Sum of Reimbursable Costs**	$ 3,519,337.50

Utility Owner	Reimbursable Cost	Utility Owner	Reimbursable Cost
City of Lawrenceville Gas	$ 9,450.00		
City of Loganville Sewer	$ 1,598,887.50		
Georgia Power Distribution	$ 1,911,000.00		

Detailed Cost Estimate

Job ID: 0016387

Detailed Cost Estimate

Time Processed: Feb-20-2020 03:34:49 PM

JOB NUMBER: 0016387
FED/STATE PROJECT NUMBER:
SPEC YEAR: 13
ITEM HISTORY: ALL_2018Q3_24MO
DESCRIPTION: SR 20 FROM CS 660/SHARON CHURCH ROAD TO SR 10/US 78
ASSIGNED CONTROL GROUP: GRESHAM SMITH AND PARTNERS CONSULTANTS

ITEMS FOR JOB 0016387

-

Line Number	Item	Quantity	Units	Price	Description	Amount
0005	150-1000	1.00	LS	$650,000.00000	TRAFFIC CONTROL - PI 0016387	$650,000.00
0009	150-5010	2.00	EA	$9,028.39773	TRAF CTRL,PORTABLE IMPACT ATTN	$18,056.80
0010	153-1300	1.00	EA	$90,202.19984	FIELD ENGINEERS OFFICE TP 3	$90,202.20
0015	156-0100	1.00	LS	$25,000.00000	GPS DATA COLLECTION & SUBMITTAL	$25,000.00
0016	210-0100	1.00	LS	$1,500,000.00000	GRADING COMPLETE - PI 0016387	$1,500,000.00
0018	005-0002	1.00	LS	$225,000.00000	INSTALL/LIGHTING FACILITIES	$225,000.00
0020	682-9950	1000.00	LF	$16.42000	DIRECTIONAL BORE - 4 INCH	$16,420.00
0021	682-6233	1000.00	LF	$6.93000	CONDUIT, NONMETL, TP 3, 2 IN	$6,930.00
0022	647-1000	1.00	LS	$75,000.00000	TRAF SIGNAL INSTALLATION NO - PI 0016387	$75,000.00
0024	937-6000	10.00	EA	$2,500.00000	MICROWAVE RADAR DETECTION ASSEMBLY	$25,000.00
0035	402-3190	4862.00	TN	$79.11601	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	$384,662.04
0040	402-3130	6259.00	TN	$81.84239	RECYL AC 12.5MM SP,GP2,BM&HL	$512,251.52
0045	402-3121	8604.00	TN	$74.74164	RECYL AC 25MM SP,GP1/2,BM&HL	$643,077.07
0050	402-1812	1000.00	TN	$93.56966	RECYL AC LEVELING,INC BM&HL	$93,569.66
0054	402-4510	124.00	TN	$75.55252	RECYL AC 12.5 MM SP,GP2ONLY,INC P-MBM&HL	$9,368.51
0055	432-5010	31300.00	SY	$2.72322	MILL ASPH CONC PVMT,VARB DEPTH	$85,236.79
0059	318-3000	180.00	TN	$31.62794	AGGR SURF CRS	$5,693.03
0060	310-1101	25579.00	TN	$26.38990	GR AGGR BASE CRS, INCL MATL	$675,027.25
0065	413-0750	7000.00	GL	$2.84000	TACK COAT	$19,880.00
0069	429-1000	9.00	EA	$840.81530	RUMBLE STRIPS	$7,567.34
0070	439-0022	410.00	SY	$75.26003	PLN PC CONC PVMT CL3 10 THK	$30,856.61
0074	441-0016	300.00	SY	$48.21820	DRIVEWAY CONCRETE, 6 IN TK	$14,465.46
0075	441-6222	11000.00	LF	$17.31607	CONC CURB & GUTTER/ 8X30TP2	$190,476.77
0080	441-6740	1000.00	LF	$24.77626	CONC CURB & GUTTER/ 8X30 TP7	$24,776.26
0084	441-5008	225.00	LF	$17.47006	CONC HEADER CURB, 6 IN, TP 7	$3,930.76
0085	441-5025	300.00	LF	$18.34000	CONC HEADER CURB, 4, TP 9	$5,502.00
0090	441-0740	4953.00	SY	$30.24861	CONC MEDIAN, 4 IN	$149,821.37
0093	456-2015	0.22	GLM	$1,386.45799	INDENT. RUMB. STRIPS - GRND-IN-PL (SKIP)	$305.02
0094	456-2022	0.10	GLM	$656.96000	INDENT, EDG LN RUMB STRP GND-IN-PL (SKP)	$65.70
0095	641-1200	400.00	LF	$23.22258	GUARDRAIL, TP W	$9,289.03
0100	641-5001	2.00	EA	$1,052.72127	GUARDRAIL ANCHORAGE, TP 1	$2,105.44
0105	641-5015	2.00	EACH	$3,535.59000	GUARDRL ANCHOR, TP 12A, 31 IN, TANG, E/A	$7,071.18
0110	446-1100	15300.00	LF	$4.53328	PVMT REF FAB STRIPS, TP2,18 INCH WIDTH	$69,359.18
0117	500-3110	45.00	LF	$203.46000	CLASS A CONCRETE, TYPE P1, RETAINING WAL	$9,155.70
0118	500-3115	85.00	LF	$558.54000	CLASS A CONCRETE, TYPE P2, RETAINING WAL	$47,475.90
0119	620-0100	1000.00	LF	$34.64032	TEMP BARRIER, METHOD NO. 1	$34,640.32
0120	653-0120	55.00	EA	$76.78562	THERM PVMT MARK, ARROW, TP 2	$4,223.21
0121	653-0130	6.00	EA	$131.01417	THERM PVMT MARK, ARROW, TP 3	$786.09
0122	653-0160	3.00	EA	$204.32523	THERM PVMT MARK, ARROW, TP 6	$612.98
0124	653-0170	6.00	EA	$142.21993	THERM PVMT MARK, ARROW, TP 7	$853.32
0125	653-0210	18.00	EA	$167.99457	THERM PVMT MARK, WORD , TP 1	$3,023.90
0129	653-0296	6.00	EA	$156.49034	THERMO PVMT MARKING,WORD,TP 15	$938.94
0130	653-1804	4400.00	LF	$2.25628	THERM SOLID TRAF STRIPE, 8,WH	$9,927.63
0135	653-1704	250.00	LF	$6.96788	THERM SOLID TRAF STRIPE,24,WH	$1,741.97
0140	653-2501	6.60	LM	$2,218.15673	THERMO SOLID TRAF ST, 5 IN, WH	$14,639.83
0145	653-2502	5.10	LM	$2,206.29253	THERMO SOLID TRAF ST, 5 IN YE	$11,252.09
0150	653-3501	11000.00	GLF	$0.32505	THERMO SKIP TRAF ST, 5 IN, WHI	$3,575.55
0160	653-6004	500.00	SY	$4.66713	THERM TRAF STRIPING, WHITE	$2,333.57
0165	653-6006	800.00	SY	$4.56370	THERM TRAF STRIPING, YELLOW	$3,650.96
0170	654-1001	500.00	EA	$3.95615	RAISED PVMT MARKERS TP 1	$1,978.08
0175	654-1003	500.00	EA	$4.19629	RAISED PVMT MARKERS TP 3	$2,098.15

Line Number	Item	Quantity	Units	Price	Description	Amount
0180	441-0104	7500.00	SY	$25.00000	CONC SIDEWALK, 4 IN	$187,500.00
0198	500-3002	263.80	CY	$768.19447	CL AA CONCRETE	$202,649.70
0199	511-1000	46958.00	LB	$0.97053	BAR REINF STEEL	$45,574.15
0200	550-1180	5000.00	LF	$40.65534	STM DR PIPE 18,H 1-10	$203,276.70
0205	550-1240	200.00	LF	$69.69837	STM DR PIPE 24,H 1-10	$13,939.67
0220	550-2180	200.00	LF	$39.65241	SIDE DR PIPE 18,H 1-10	$7,930.48
0225	550-2300	50.00	LF	$67.14176	SIDE DR PIPE 30,H 1-10	$3,357.09
0230	550-3618	14.00	EA	$579.40671	SAFETY END SECTION 18,SD,6:1	$8,111.69
0240	550-3630	4.00	EA	$1,692.00000	SAFETY END SECTION 30,SD,6:1	$6,768.00
0255	550-4218	3.00	EA	$656.31503	FLARED END SECT 18 IN, ST DR	$1,968.95
0260	550-4224	2.00	EA	$815.75674	FLARED END SECT 24 IN, ST DR	$1,631.51
0275	603-2181	150.00	SY	$53.45352	STN DUMPED RIP RAP, TP 3, 18	$8,018.03
0280	603-7000	150.00	SY	$4.53915	PLASTIC FILTER FABRIC	$680.87
0285	668-2100	5.00	EA	$2,852.34750	DROP INLET, GP 1	$14,261.74
0299	668-1100	50.00	EA	$3,213.14564	CATCH BASIN, GP 1	$160,657.28
0300	634-1200	100.00	EA	$116.09205	RIGHT OF WAY MARKERS	$11,609.21
0305	636-1033	500.00	SF	$15.27033	HWY SIGNS, TP1MAT,REFL SH TP 9	$7,635.17
0310	636-1036	400.00	SF	$21.99000	HWY SGN,TP1MAT,REFL SH TP 11	$8,796.00
0315	636-2070	450.00	LF	$8.53137	GALV STEEL POSTS, TP 7	$3,839.12
0320	636-2090	560.00	LF	$7.25759	GALV STEEL POSTS, TP 9	$4,064.25
0325	639-3004	4.00	EA	$13,639.11686	STEEL STRAIN POLE, TP IV	$54,556.47
0330	163-0232	34.00	AC	$417.91719	TEMPORARY GRASSING	$14,209.18
0335	163-0240	600.00	TN	$158.88692	MULCH	$95,332.15
0340	163-0300	6.00	EA	$1,821.15780	CONSTRUCTION EXIT	$10,926.95
0350	163-0503	10.00	EA	$490.74916	CONSTR AND REMOVE SILT CONTROL GATE,TP 3	$4,907.49
0355	163-0520	100.00	LF	$18.69327	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN	$1,869.33
0360	163-0527	30.00	EA	$425.73183	CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG	$12,771.95
0365	163-0528	420.00	LF	$11.39964	CONSTR AND REM FAB CK DAM -TP C SLT FN	$4,787.85
0370	163-0531	1.00	EA	$18,738.18623	CONSTR & REM SEDIMENT BASIN,TP 1,STA NO- PI 0016386 - PH 1	$18,738.19
0375	163-0539	1.00	EA	$1,528.85000	CONST AND REM RETROFIT-SL BD DM/W STN FL	$1,528.85
0380	163-0541	10.00	EA	$849.85744	CONSTR & REM ROCK FILTER DAMS	$8,498.57
0385	163-0550	55.00	EA	$168.82022	CONS & REM INLET SEDIMENT TRAP	$9,285.11
0395	165-0030	10000.00	LF	$0.61456	MAINT OF TEMP SILT FENCE, TP C	$6,145.60
0400	165-0041	780.00	LF	$4.47336	MAINT OF CHECK DAMS - ALL TYPES	$3,489.22
0405	165-0060	1.00	EA	$3,691.51821	MAINT OF TEMP SEDIMENT BASIN,STA NO -	$3,691.52
0415	165-0087	10.00	EA	$136.19115	MAINT OF SILT CONTROL GATE, TP 3	$1,361.91
0420	165-0096	1.00	EA	$983.28000	MAINT OF RETROFIT-SLOT BD DAM/W ST FLT	$983.28
0425	165-0101	15.00	EA	$664.02429	MAINT OF CONST EXIT	$9,960.36
0430	165-0105	55.00	EA	$69.78131	MAINT OF INLET SEDIMENT TRAP	$3,837.97
0435	165-0110	10.00	EA	$260.09964	MAINT OF ROCK FILTER DAM	$2,601.00
0440	167-1000	10.00	EA	$246.38493	WATER QUALITY MONITORING AND SAMPLING	$2,463.85
0445	167-1500	24.00	MO	$554.11064	WATER QUALITY INSPECTIONS	$13,298.66
0455	171-0030	20000.00	LF	$3.22517	TEMPORARY SILT FENCE, TYPE C	$64,503.40
0460	207-0203	150.00	CY	$57.52193	FOUND BKFILL MATL, TP II	$8,628.29
0464	632-0003	9.00	EA	$8,728.96052	CHANGEABLE MESS SIGN,PORT,TP 3	$78,560.64
0465	643-8200	200.00	LF	$2.64106	BARRIER FENCE (ORANGE), 4 FT	$528.21
0470	700-6910	34.00	AC	$387.05007	PERMANENT GRASSING	$13,159.70
0475	700-7000	105.00	TN	$9.71480	AGRICULTURAL LIME	$1,020.05
0480	700-8000	25.00	TN	$574.71705	FERTILIZER MIXED GRADE	$14,367.93
0485	700-8100	1700.00	LB	$2.33748	FERTILIZER NITROGEN CONTENT	$3,973.72
0490	711-0100	3500.00	SY	$5.48000	TURF REINFORCING MATTING, TP 1	$19,180.00
0500	716-2000	85000.00	SY	$0.82290	EROSION CONTROL MATS, SLOPES	$69,946.50
0503	700-9300	317.00	SY	$9.76059	SOD	$3,094.11
0504	702-0212	3.00	EA	$680.57783	CRATAEGUS VIRIDIS - RAB LANDSCAPING	$2,041.73
0505	702-0470	245.00	EA	$28.97735	ILEX VOMITORIA NANA - RAB LANDSCAPING	$7,099.45
0506	702-9005	158.00	LB	$6.80770	SPRING APPLICATION FERTILIZER	$1,075.62
0507	702-9025	572.00	SY	$7.48355	LANDSCAPE MULCH	$4,280.59
0508	169-0020	1.00	EA	$52,000.00000	ENHANCED DRY SWALE, NO. - MS4 - 1 DRY SWALE	$52,000.00
0513	169-0021	1.00	EA	$2,600.00000	ENHANCED DRY SWALE MAINTENANCE	$2,600.00
0514	169-0010	5.00	EA	$22,500.00000	BIOSLOPE, NO. - MS4 - 5 BIOSLOPES	$112,500.00
0518	169-0011	5.00	EA	$1,125.00000	BIOSLOPE MAINTENANCE	$5,625.00
0519	169-0005	7.00	EA	$92,142.85714	BIORETENTION BASIN, NO. - MS4 - 7 BIORETENTION BASINS	$645,000.00
0524	169-0006	7.00	EA	$4,607.00000	BIORETENTION BASIN MAINTENANCE	$32,249.00
Total						**$8,057,824.19**

TOTALS FOR JOB 0016387

ITEMS COST:	$8,057,824.19
COST GROUP COST:	$0.00
ESTIMATED COST:	$8,057,824.19
CONTINGENCY PERCENT:	0.00%
ENGINEERING AND INSPECTION:	0.00%
ESTIMATED COST WITH CONTINGENCY AND E&I:	$8,057,824.19

File Location: Div of Preconstruction > CES

GEORGIA DEPARTMENT OF TRANSPORTATION

** PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 02/20/2020 Project: Operational Improvement

Revised: County: Walton

PI: 0016387

Description: SR 20 From CS 660/Sharon Church Road to SR 10/US 78

Project Termini:

Existing ROW: Varies

Parcels: 63 Required ROW: Varies

Land and Improvements		$4,196,825.04
Proximity Damage	$126,000.00	
Consequential Damage	$121,275.00	
Cost to Cures	$266,490.00	
Trade Fixtures	$157,500.00	
Improvements	$22,050.00	
Valuation Services		$378,000.00
Legal Services		$409,500.00
Relocation		$50,000.00
Demolition		$60,000.00
Administrative		$126,000.00
TOTAL ESTIMATED COSTS		$5,220,325.04
TOTAL ESTIMATED COSTS (ROUNDED)		$5,220,500.00

Prepared By: Joel Jones CG#: N/A 02/20/2020

Approved By: CG#:

NOTE: No Market Appreciation is Included in this Preliminary Cost Estimate

*** Updated ROW Cost Estimate developed by Design Team.*

Georgia Department of Transportation

Interoffice Memo

FILE

Project No: **n/a** Office: **GAINESVILLE**
County **Walton** Date: **February 14, 2019**
P.I.# **0016387**

Description: ***SR 20 from CS 660/Sharon Church Road to SR 10/US 78***

FROM Robby Oliver, District Utilities Manager

TO Bryan Lott., Project Manager

SUBJECT **REVISED UTILITY COST ESTIMATE**

A review of utilities located on the above referenced project has been conducted with Concept Layout plans. Listed below is a breakdown of the anticipated reimbursable and non-reimbursable cost.

Utility Owner		Reimbursable	Non-eimbursa l	Estimate Based on
AT & T Telephone (Local)		$0.00	$775,506.90	Site Visit / Available Drawings
Atlanta gas light		$0.00	$0.00	Site Visit / Available Drawings
City of Lawrenceville-Gas	**	$9,450.00	$155,662.50	Site Visit / Available Drawings
City of Loganville-Sewer	**	$1,598,887.50	$437,403.75	Site Visit / Available Drawings
ity of Loganville-Water	**	$0.00	$515,077.50	Site Visit / Available Drawings
ity of Monroe (Fiber)		$0.00	$0.00	Site Visit / Available Drawings
omcast CATV		$0.00	$94,500.00	Site Visit / Available Drawings
eorgia Power Distribution		$1,911,000.00	$0.00	Site Visit / Available Drawings
alton County Water Authority		$0.00	$0.00	Site Visit / Available Drawings
alton EMC		$0.00	$0.00	Site Visit / Available Drawings
yo Fiber Solutions		$0.00	$0.00	
Total	100.00 o	$3,519,337.50	$1,978,150.65	
Department Responsibility	100.00 o	$3,519,337.50		
Local Sponsor Responsibility	0.00 o	$0.00		PFA Dated N/A with N/A

** I ı at P ti t y Aı R t l G v't

Estımate i ba ed on the be t a ilab e information at the current stage, unforeseen prior rights information may be pro ided by the tility Company at a later date that could cause some non-reimbur able co t to shift to the reimbur able cost column.

Addıt'o a o ent o here needed. Hid th 'n (and the blank one below this one) if not needed.

If add t'ona informatıon ı eeded, p e cont t Robby Oliver at 770-533-8320.

cc: Patrıc Allen, State tı ıtıe Ad in' rator
Yu ond Pride Fo er, State tilitie Pr on tru tıo Manager
Brandon Kirby, Di tr' t Precon t ct'on En 'neer
Shan o Gile , Are M n er
File

Original Version: May 24, 2013
Revision: Feb. April 5, 2018

Concept Utility Report

Project Number: Click here to enter text.

District: 1

County: Walton

Prepared by: Terri Holbrook

P.I. # 0016387

Date: June 26, 2019

Project Description: SR 20 from Sharon Church Road to US 78

The information provided herein has been gathered from Georgia811and/or field visits and serves as an estimate. Nothing contained in this report is to be used as a substitute for 1st Submission or SUE.

Are SUE services recommended? Yes

Level: ☐A ☒B ☐C ☐D

Public Interest Determination (PID):

☐Automatic ☐Mandatory ☐Consideration ☒No Use ☐Exempt

Is a separate utility funding phase recommended? No

Potential Project (Schedule/Budget) Impacts: slick site and a possible pump station near Overlook Drive

Capital Improvement Projects (Utilities) Anticipated in the Area: N/A

Project Specific Recommendations for Avoidance/Mitigation: slick site and a possible pump station near Overlook Drive

Right of Way Coordination: include utilities in the easements

Environmental Coordination: N/A

Additional Remarks: Click here to enter text.

Original Version: May 24, 2013
Revision: Feb. March 8, 2018

Utilities have facilities within the project limits.

Utilities have been identified using Georgia811 and/or field visits.

Facility Owner	**Facility Owner Contact Email Address**	**Existing Facilities/ Appurtenances**	**General Description of Location**	**Facilities to Avoid** *approx. limits*	**Facilities Retention Recommended** *approx. limits*	**Comments**
AT & T	Clay Johnson cj3079@att.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Comcast	Christopher Bates Christopher_Bates2@cable.comcast.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Georgia Power	Galen Davis gdavis@southern.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Gwinnett County Publis Utilities	Derrick Kemp derrick.kemp@gwinnettcounty.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
City of Loganville	Chris Yancy cyancey@loganville-ga.gov	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
City of Lawerencville	Mike Hutchins mike.hutchins@lawrencevillega.org	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
City of Monroe	Brian Thompson bkt@monroega.gov	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Walton County water	Morris Jordan morris.jordan@co.walton.ga.us	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Walton EMC	Ron Marshall rmarshall@waltonemc.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

Original Version: May 24, 2013
Revision: Feb. March 8, 2018

Zayo Fiber Solutions	Rusty Perdieu rusty.perdieu@zayo.com	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

Note: *To add additional rows, click the bottom right corner of the box above, then click the blue* + *that will appear. Please add additional rows prior to entering text.*

Jones, Joel

From: Westberry, Lisa <lwestberry@dot.ga.gov>
Sent: Monday, August 19, 2019 11:47 AM
To: Hall, Sharon R; Jones, Joel
Cc: Jackson, Keisha; Jackson, Keisha
Subject: PI 0016387, Walton County - Estimated Mitigation Cost for Concept Report

Follow Up Flag: Follow up
Flag Status: Flagged

As requested, the estimated mitigation costs for the subject project is **$104,000.00**. This estimate is based on a review of aerial photography, NWI mapping, and NRCS soil surveys and not an actual field verification. The total cost of mitigation credits could remain the same or change once the ecology field survey is complete.

If you should have any questions or need any additional information, please do not hesitate to contact me.

Lisa Westberry
Special Projects Coordinator

GDOT Georgia Department of Transportation

Office of Environmental Services
One Georgia Center, 16th Floor
600 West Peachtree Street, NW
Atlanta, GA, 30308
404.631.1772

Gresham Smith

Genuine Ingenuity

ATTACHMENT 4

Cost-Benefit Analysis

Gresham Smith

November 14, 2019

Concept Alternatives Cost-Benefit

PI 0016387
SR 20 FROM CS 660/N SHARON CHURCH ROAD TO SR 10/ US 78

The purpose of this Cost-Benefit Analysis, which has been prepared by Gresham Smith, is to further clarify the recommendation of the "preferred alternative" use of dual lefts with a traditional signalized intersection vs "alternative 1" use of a displaced left along SR 20 in the PI 0016387 concept report.

The following information is the summation of the findings of this Cost-Benefit Analysis:

- Level of Service (LOS) - "Preferred Alternative" vs "Alternative 1"
  - Traffic analysis has concluded that the traditional signal with dual lefts being proposed as apart of the "Preferred Alternative" has a design life of 15 years before reaching a failing level of service whereas the displaced left turn being proposed by the "Alternative 1" has a design life of 20 years before reaching a failing level of service.
- Cost-Benefit Analysis Ratios
  - A Cost-Benefit Analysis was performed based on the congestion benefit for each alternative. The total congestion benefit includes the benefit from the time saved, commercial cost, and fuel savings based on the congestion benefit at the intersection. The "preferred alternative" has a B/C ratio of 71.54 whereas "alternative 1" has a B/C ratio of 20.11. This indicates that the "preferred alternative" scores nearly 3 times higher than the "alternative 1". (Please see the attached Cost-Benefit Analysis for more information)
- SR 10 / US 78 Future Traffic Volumes
  - A primary contributor to the congestion at the intersection of SR 20 at SR 10 / US 78 is the mainline through volumes along SR 10 / US 78. Currently SR 10 / US 78 has 2 through lanes in each direction and the AADT volume in the 2043 Design Year is project to be 60,150. This volume exceeds the capacity of a four-lane facility. If a future project is programmed to widen SR 10/US 78 to accommodate the design year traffic the displaced left improvement made under the "alternative 1" concept would likely need to be reconstructed.
- Existing Project Conflict
  - Gresham Smith was informed by District 1 Traffic Ops that a quick response project request has been submitted to add a protected left turn phase for the southbound left turns from SR 10 / US 78 onto SR 20 / Main St. Currently this left turn phase is permitted only phase. Per District 1 Traffic Ops, vehicles attempting to make this left turn do not experience a sufficient gap in opposing traffic to make the turn at the intersection and are currently using the surrounding business driveways and side streets as cut-thoughts. Therefore, the District is seeking the addition of a protected left turn phase at this location. For a displaced left turn intersection, the key operation benefit results from relocating turn movements on an approach to the to the other side of the opposing traffic flow which allows the left turn phase for that approach to be eliminated from the signal and more green time to be reallocated to other movements. With the addition of a protected left turn phase for the southbound left turns, a left turn phase for SR 10 / US 78 would remain in the signal under the displaced left turn alternative. This would reduce the overall effectiveness of this alternative.

It is based on these findings that the “Preferred Alternative” provides the greatest benefit to scope and programmed cost of this project.

Prepared by: Gresham Smith

List of Attachments:

1. Cost-Benefit Analysis
2. Traffic Analysis of Alternatives
3. Alternative 1 – Concept Layout

The benefit-cost calculation worksheet developed by the Georgia Department of Transportation is based on "The Urban Mobility Report" published by the Texas Transportation Institute (TTI). The detailed calculations and explanations of variables are presented below:

The Benefit from saved **time** is:

Time Benefit (T_b) = D_b{hrs/veh)} * (.5*ADT {veh/day}) * 250 {days/yr}* 20 {yrs} * 13.45 {$/hr}

- ⇒ **D_b** - difference in the Peak Hour travel time through the corridor using 20 yr traffic with and without the proposed improvement
- ⇒ **0.5*ADT** – in order to compensate for the fact that various corridors have peak hours ranging from 2 to 6 hours in both the AM and PM peak periods, the TTI study[2] recommends ½ of the ADT as an appropriate amount of traffic volume to use as opposed to the peak DHV.
- ⇒ **250 days** – a measure of high volume days
- ⇒ **20 yrs** – the life of the project
- ⇒ **$13.45 /hr** – the value of time

The Benefit from saved **Commercial Cost** is:

Commercial Benefit (CM_b) = D_b {hrs/veh)} * (% truck traffic) * (.5*ADT {veh/day}) * 250 {days/yr} * 20 {yrs} * 71.05 {$/hr}

- ⇒ **% truck traffic** – an assumption is made that the majority of the commercial traffic is in trucks; therefore this benefit is limited to the trucks through the corridor
- ⇒ **$71.05/hr** – the cost of delay to Commercial vehicles

The Benefit from **fuel saved** is:

Fuel Benefit (F_b) = D_b {hrs/veh)} * (.5*ADT {veh/day}) * 250 {days/yr} * 20 {yrs} * 38.25 {miles/hour} * 2.3 {$/gallon} / 18.36 {miles/gallon}

- ⇒ **38.25 miles/hour** – the average running speed in the region
- ⇒ **$2.3 gallon** – the average cost of fuel in the region
- ⇒ **18.36 miles/gallon** – the average fuel economy in the region

Benefit Cost Analysis Work Sheet CONGESTION Benefit *Traffic Signal Alternative* SR 10/US 78 @ SR 20	
Congestion Benefit = Tb + CMb + Fb	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0943
2043 ADT	79,675
Tb ($s)	$56,172,211.37
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0943
% Truck Traffic	4%
ADT	79,675
CMb	$10,098,589.64
Fuel Savings Benefit (Fb)	
ADT	79,675
Fb ($s)	$19,575,164.57
Total Congestion Benefit	$85,845,965.58
Total Project Cost	$1,200,000.00
B-C Ratio	71.54

*Reduction in delay or Delay Benefit (D_b) can be defined as the difference between the peak hour travel time through the corridor without the proposed improvement and the peak hour travel time through the corridor with the proposed improvement.

SR 20 EB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0258
2043 ADT	14,650
Tb ($s)	$12,981,527.78
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0258
% Truck Traffic	4%
ADT	14,650
CMb	$2,743,586.89
Fuel Savings Benefit (Fb)	
ADT	14,650
Fb ($s)	$4,523,865.74

SR 20 WB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0321
2043 ADT	6,825
Tb ($s)	$7,533,567.71
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0321
% Truck Traffic	4.5%
ADT	6,825
CMb	$1,791,208.45
Fuel Savings Benefit (Fb)	
ADT	6,825
Fb ($s)	$2,625,334.20

SR 10/US 78 NB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	-0.0016
2043 ADT	29,625
Tb ($s)	-$1,668,977.86
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	-0.0016
% Truck Traffic	4%
ADT	29,625
CMb	-$352,730.89
Fuel Savings Benefit (Fb)	
ADT	29,625
Fb ($s)	-$581,613.50

SR 10/US 78 SB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0380
2043 ADT	28,575
Tb ($s)	$37,326,093.75
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0380
% Truck Traffic	3%
ADT	28,575
CMb	$5,916,525.19
Fuel Savings Benefit (Fb)	
ADT	28,575
Fb ($s)	$13,007,578.13

Benefit Cost Analysis Work Sheet CONGESTION Benefit *Displaced Left Turn Alternative* SR 10/US 78 @ SR 20	
Congestion Benefit = Tb + CMb + Fb	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.1082
2043 ADT	79,675
Tb ($s)	$71,268,565.54
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.1082
% Truck Traffic	4%
ADT	79,675
CMb	$12,474,611.68
Fuel Savings Benefit (Fb)	
ADT	79,675
Fb ($s)	$24,836,015.26
Total Congestion Benefit	$108,579,192.48
Total Project Cost	$5,400,000.00
B-C Ratio	20.11

*Reduction in delay or Delay Benefit (D_b) can be defined as the difference between the peak hour travel time through the corridor without the proposed improvement and the peak hour travel time through the corridor with the proposed improvement.

SR 20 EB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0439
2043 ADT	14,650
Tb ($s)	$22,130,147.57
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0439
% Truck Traffic	4%
ADT	14,650
CMb	$4,677,106.10
Fuel Savings Benefit (Fb)	
ADT	14,650
Fb ($s)	$7,712,021.12

SR 20 WB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0184
2043 ADT	6,825
Tb ($s)	$4,314,205.73
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0184
% Truck Traffic	4.5%
ADT	6,825
CMb	$1,025,761.24
Fuel Savings Benefit (Fb)	
ADT	6,825
Fb ($s)	$1,503,435.33

SR 10/US 78 NB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	-0.0062
2043 ADT	29,625
Tb ($s)	-$6,308,170.57
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	-0.0062
% Truck Traffic	4%
ADT	29,625
CMb	-$1,333,203.18
Fuel Savings Benefit (Fb)	
ADT	29,625
Fb ($s)	-$2,198,301.87

SR 10/US 78 SB	
Person Time Savings Benefit (Tb)	
*Db (hrs)	0.0521
2043 ADT	28,575
Tb ($s)	$51,132,382.81
Commercial or Truck Time Savings Benefit (CMb)	
Db (hrs)	0.0521
% Truck Traffic	3%
ADT	28,575
CMb	$8,104,947.52
Fuel Savings Benefit (Fb)	
ADT	28,575
Fb ($s)	$17,818,860.68

Gresham Smith

Genuine Ingenuity

SIGNAL ANALYSIS

2043 Design Year

Synchro Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	380	420	370	95	405	30	555	1365	20	25	985	205
Future Volume (veh/h)	380	420	370	95	405	30	555	1365	20	25	985	205
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	1810	1810	1810	1792	1792	1900	1810	1810	1900	1845	1845	1845
Adj Flow Rate, veh/h	413	457	402	103	440	33	603	1484	22	27	1071	223
Adj No. of Lanes	2	1	1	1	2	0	2	2	0	1	2	1
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, %	5	5	5	6	6	6	5	5	5	3	3	3
Cap, veh/h	371	462	393	196	678	51	557	1447	21	147	1013	453
Arrive On Green	0.11	0.26	0.26	0.07	0.21	0.21	0.17	0.42	0.42	0.04	0.29	0.29
Sat Flow, veh/h	3343	1810	1538	1707	3213	240	3343	3468	51	1757	3505	1568
Grp Volume(v), veh/h	413	457	402	103	233	240	603	735	771	27	1071	223
Grp Sat Flow(s),veh/h/ln	1672	1810	1538	1707	1703	1750	1672	1719	1800	1757	1752	1568
Q Serve(g_s), s	10.0	22.6	23.0	4.2	11.2	11.3	15.0	37.5	37.5	0.9	26.0	10.6
Cycle Q Clear(g_c), s	10.0	22.6	23.0	4.2	11.2	11.3	15.0	37.5	37.5	0.9	26.0	10.6
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	371	462	393	196	359	369	557	717	751	147	1013	453
V/C Ratio(X)	1.11	0.99	1.02	0.52	0.65	0.65	1.08	1.02	1.03	0.18	1.06	0.49
Avail Cap(c_a), veh/h	371	462	393	196	359	369	557	717	751	197	1013	453
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.0	33.4	33.5	27.0	32.4	32.5	37.5	26.2	26.2	24.4	32.0	26.5
Incr Delay (d2), s/veh	80.4	38.7	51.3	2.6	4.0	4.0	62.2	40.1	39.8	0.6	44.9	3.8
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(95%),veh/ln	15.7	22.9	27.6	3.8	9.6	9.9	21.1	46.3	48.4	0.9	33.9	8.8
LnGrp Delay(d),s/veh	120.4	72.0	84.8	29.5	36.4	36.5	99.7	66.3	66.0	25.0	76.9	30.3
LnGrp LOS	F	E	F	C	D	D	F	F	F	C	F	C
Approach Vol, veh/h		1272			576			2109			1321	
Approach Delay, s/veh		91.8			35.2			75.8			67.9	
Approach LOS		F			D			E			E	

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	8.5	42.5	11.0	28.0	20.0	31.0	15.0	24.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	22.0	14.0	25.0	9.0	18.0
Max Q Clear Time (g_c+I1), s	2.9	39.5	6.2	25.0	17.0	28.0	12.0	13.3
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	73.2
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	495	330	155	280	40	585	1335	20	100	1840	245
Future Volume (veh/h)	320	495	330	155	280	40	585	1335	20	100	1840	245
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	1845	1845	1845	1863	1863	1900	1845	1845	1900	1845	1845	1845
Adj Flow Rate, veh/h	333	516	344	161	292	42	609	1391	21	104	1917	255
Adj No. of Lanes	2	1	1	1	2	0	2	2	0	1	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	396	418	355	119	468	67	477	1942	29	233	1612	721
Arrive On Green	0.12	0.23	0.23	0.04	0.15	0.15	0.14	0.55	0.55	0.05	0.46	0.46
Sat Flow, veh/h	3408	1845	1568	1774	3111	443	3408	3534	53	1757	3505	1568
Grp Volume(v), veh/h	333	516	344	161	165	169	609	689	723	104	1917	255
Grp Sat Flow(s),veh/h/ln	1704	1845	1568	1774	1770	1785	1704	1752	1835	1757	1752	1568
Q Serve(g_s), s	14.4	34.0	32.6	6.0	13.1	13.4	21.0	43.8	43.9	4.6	69.0	15.7
Cycle Q Clear(g_c), s	14.4	34.0	32.6	6.0	13.1	13.4	21.0	43.8	43.9	4.6	69.0	15.7
Prop In Lane	1.00		1.00	1.00		0.25	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	396	418	355	119	266	268	477	963	1008	233	1612	721
V/C Ratio(X)	0.84	1.23	0.97	1.35	0.62	0.63	1.28	0.72	0.72	0.45	1.19	0.35
Avail Cap(c_a), veh/h	409	418	355	119	266	268	477	963	1008	273	1612	721
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.9	58.0	57.5	59.8	59.7	59.8	64.5	25.1	25.1	23.4	40.5	26.1
Incr Delay (d2), s/veh	14.1	124.5	39.1	204.2	4.3	4.7	139.8	4.6	4.4	1.3	91.6	1.4
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(95%),veh/ln	12.0	57.2	25.0	15.7	11.0	11.2	34.5	30.0	31.2	4.2	97.0	11.4
LnGrp Delay(d),s/veh	79.1	182.5	96.6	263.9	64.0	64.5	204.3	29.7	29.5	24.7	132.1	27.5
LnGrp LOS	E	F	F	F	E	E	F	C	C	C	F	C
Approach Vol, veh/h		1193			495			2021			2276	
Approach Delay, s/veh		128.9			129.2			82.2			115.5	
Approach LOS		F			F			F			F	

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	12.6	87.4	11.0	39.0	26.0	74.0	22.4	27.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	10.0	78.0	5.0	33.0	20.0	68.0	17.0	21.0
Max Q Clear Time (g_c+I1), s	6.6	45.9	8.0	36.0	23.0	71.0	16.4	15.4
Green Ext Time (p_c), s	0.1	28.9	0.0	0.0	0.0	0.0	0.1	3.1

Intersection Summary			
HCM 2010 Ctrl Delay		108.0	
HCM 2010 LOS		F	

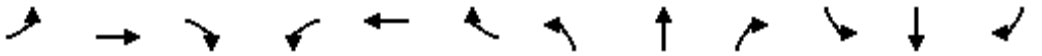
Gresham Smith

Genuine Ingenuity

DISPLACED LEFT TURN ANALYSIS

2043 Design Year

Synchro Output



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	985	205	0	1365	20	380	420	0	95	405	30
Future Volume (vph)	25	985	205	0	1365	20	380	420	0	95	405	30
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	4.0	4.0	4.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00		0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1799	3597	1609		3521		3423	1857		1748	1820	
Flt Permitted	0.07	1.00	1.00		1.00		0.95	1.00		0.17	1.00	
Satd. Flow (perm)	133	3597	1609		3521		3423	1857		315	1820	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	1071	223	0	1484	22	413	457	0	103	440	33
RTOR Reduction (vph)	0	0	87	0	1	0	0	0	0	0	2	0
Lane Group Flow (vph)	27	1071	136	0	1505	0	413	457	0	103	471	0
Heavy Vehicles (%)	3%	3%	3%	5%	5%	5%	5%	5%	5%	6%	6%	6%
Turn Type	pm+pt	NA	Perm		NA		Prot	NA		pm+pt	NA	
Protected Phases	1	1 2			2		3	8		7	4	
Permitted Phases	1 2		1 2							4		
Actuated Green, G (s)	75.0	79.0	79.0		57.0		18.0	42.8		47.2	36.0	
Effective Green, g (s)	75.0	79.0	79.0		57.0		18.0	42.8		47.2	36.0	
Actuated g/C Ratio	0.50	0.53	0.53		0.38		0.12	0.29		0.31	0.24	
Clearance Time (s)	4.0				5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0				3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	1894	847		1337		410	529		206	436	
v/s Ratio Prot	0.01	c0.30			c0.43		c0.12	c0.25		0.04	c0.26	
v/s Ratio Perm	0.04		0.08							0.12		
v/c Ratio	0.10	0.57	0.16		1.13		1.01	0.86		0.50	1.08	
Uniform Delay, d1	28.5	23.9	18.4		46.5		66.0	50.8		39.5	57.0	
Progression Factor	1.00	1.00	1.00		1.00		0.41	1.01		1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.1		66.2		44.6	12.8		1.9	66.7	
Delay (s)	28.7	24.3	18.5		112.7		71.4	64.4		41.4	123.7	
Level of Service	C	C	B		F		E	E		D	F	
Approach Delay (s)		23.4			112.7			67.7			109.0	
Approach LOS		C			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	75.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1080	0	555	1385	0	370
Future Volume (vph)	1080	0	555	1385	0	370
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		5.0	4.0		5.0
Lane Util. Factor	0.95		0.97	0.95		1.00
Frt	1.00		1.00	1.00		0.86
Flt Protected	1.00		0.95	1.00		1.00
Satd. Flow (prot)	3529		3423	3529		1606
Flt Permitted	1.00		0.95	1.00		1.00
Satd. Flow (perm)	3529		3423	3529		1606
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1174	0	603	1505	0	402
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1174	0	603	1505	0	402
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		Prot	NA		pm+ov
Protected Phases	2		1	Free		1
Permitted Phases						2
Actuated Green, G (s)	88.0		52.0	150.0		140.0
Effective Green, g (s)	88.0		52.0	150.0		140.0
Actuated g/C Ratio	0.59		0.35	1.00		0.93
Clearance Time (s)	5.0		5.0			5.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	2070		1186	3529		1606
v/s Ratio Prot	c0.33		c0.18	0.43		0.09
v/s Ratio Perm						0.16
v/c Ratio	0.57		0.51	0.43		0.25
Uniform Delay, d1	19.2		38.9	0.0		0.4
Progression Factor	0.67		1.00	1.00		1.00
Incremental Delay, d2	1.0		1.6	0.4		0.4
Delay (s)	13.9		40.4	0.4		0.8
Level of Service	B		D	A		A
Approach Delay (s)	13.9			11.8	0.8	
Approach LOS	B			B	A	

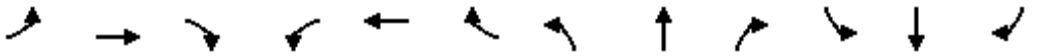
Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	0	800	370	0	610
Future Volume (vph)	555	0	800	370	0	610
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		6.0	4.0		4.0
Lane Util. Factor	0.97		0.91	1.00		0.95
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	3423		5070	1579		3529
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	3423		5070	1579		3529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	0	870	402	0	663
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	603	0	870	402	0	663
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	Prot		NA	Free		NA
Protected Phases	2		3 4			1 7 8
Permitted Phases				Free		
Actuated Green, G (s)	84.8		43.6	150.0		56.2
Effective Green, g (s)	84.8		43.6	150.0		44.2
Actuated g/C Ratio	0.57		0.29	1.00		0.29
Clearance Time (s)	5.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	1935		1473	1579		1039
v/s Ratio Prot	c0.18		c0.17			c0.19
v/s Ratio Perm				0.25		
v/c Ratio	0.31		0.59	0.25		0.64
Uniform Delay, d1	17.2		45.6	0.0		46.0
Progression Factor	0.01		1.00	1.00		1.80
Incremental Delay, d2	0.4		0.6	0.4		0.8
Delay (s)	0.5		46.2	0.4		83.6
Level of Service	A		D	A		F
Approach Delay (s)	0.5		31.7			83.6
Approach LOS	A		C			F

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: SR 20 & SR 10/US 78

10/28/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1840	245	0	1335	20	320	495	0	155	280	40
Future Volume (vph)	100	1840	245	0	1335	20	320	495	0	155	280	40
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	4.0	4.0	4.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00		0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1799	3597	1609		3624		3489	1893		1799	1857	
Flt Permitted	0.08	1.00	1.00		1.00		0.95	1.00		0.11	1.00	
Satd. Flow (perm)	151	3597	1609		3624		3489	1893		213	1857	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	104	1917	255	0	1391	21	333	516	0	161	292	42
RTOR Reduction (vph)	0	0	56	0	1	0	0	0	0	0	4	0
Lane Group Flow (vph)	104	1917	199	0	1411	0	333	516	0	161	330	0
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm		NA		Prot	NA		pm+pt	NA	
Protected Phases	1	1 2			2		3	8		7	4	
Permitted Phases	1 2		1 2							4		
Actuated Green, G (s)	76.0	80.0	80.0		50.0		17.4	38.3		50.3	35.6	
Effective Green, g (s)	76.0	80.0	80.0		50.0		17.4	38.3		50.3	35.6	
Actuated g/C Ratio	0.51	0.53	0.53		0.33		0.12	0.26		0.34	0.24	
Clearance Time (s)	4.0				5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0				3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	1918	858		1208		404	483		226	440	
v/s Ratio Prot	0.05	c0.53			c0.39		c0.10	c0.27		0.07	0.18	
v/s Ratio Perm	0.10		0.12							0.17		
v/c Ratio	0.29	1.00	0.23		1.17		0.82	1.07		0.71	0.75	
Uniform Delay, d1	26.8	35.0	18.6		50.0		64.8	55.9		40.0	53.1	
Progression Factor	1.00	1.00	1.00		1.00		0.40	1.03		1.00	1.00	
Incremental Delay, d2	0.4	20.3	0.1		84.5		12.0	58.9		10.1	7.1	
Delay (s)	27.3	55.2	18.8		134.5		37.8	116.4		50.2	60.1	
Level of Service	C	E	B		F		D	F		D	E	
Approach Delay (s)		49.9			134.5			85.6			56.9	
Approach LOS		D			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	80.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1995	0	585	1355	0	330
Future Volume (vph)	1995	0	585	1355	0	330
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		5.0	4.0		5.0
Lane Util. Factor	0.95		0.97	0.95		1.00
Frt	1.00		1.00	1.00		0.86
Flt Protected	1.00		0.95	1.00		1.00
Satd. Flow (prot)	3632		3523	3632		1638
Flt Permitted	1.00		0.95	1.00		1.00
Satd. Flow (perm)	3632		3523	3632		1638
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2078	0	609	1411	0	344
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	2078	0	609	1411	0	344
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Turn Type	NA		Prot	NA		pm+ov
Protected Phases	2		1	Free		1
Permitted Phases						2
Actuated Green, G (s)	103.0		37.0	150.0		140.0
Effective Green, g (s)	103.0		37.0	150.0		140.0
Actuated g/C Ratio	0.69		0.25	1.00		0.93
Clearance Time (s)	5.0		5.0			5.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	2493		869	3632		1638
v/s Ratio Prot	c0.57		c0.17	0.39		0.05
v/s Ratio Perm						0.16
v/c Ratio	0.83		0.70	0.39		0.21
Uniform Delay, d1	17.2		51.5	0.0		0.4
Progression Factor	0.52		1.00	1.00		1.00
Incremental Delay, d2	1.1		4.7	0.3		0.3
Delay (s)	10.1		56.1	0.3		0.7
Level of Service	B		E	A		A
Approach Delay (s)	10.1			17.1	0.7	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	585	0	815	330	0	525
Future Volume (vph)	585	0	815	330	0	525
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		6.0	4.0		4.0
Lane Util. Factor	0.97		0.91	1.00		0.95
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	3489		5168	1609		3597
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	3489		5168	1609		3597
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	609	0	849	344	0	547
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	609	0	849	344	0	547
Turn Type	Prot		NA	Free		NA
Protected Phases	2		3 4			1 7 8
Permitted Phases				Free		
Actuated Green, G (s)	86.1		42.7	150.0		54.9
Effective Green, g (s)	86.1		42.7	150.0		42.9
Actuated g/C Ratio	0.57		0.28	1.00		0.29
Clearance Time (s)	5.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	2002		1471	1609		1028
v/s Ratio Prot	c0.17		c0.16			c0.15
v/s Ratio Perm				0.21		
v/c Ratio	0.30		0.58	0.21		0.53
Uniform Delay, d1	16.5		45.9	0.0		45.1
Progression Factor	0.01		1.00	1.00		1.71
Incremental Delay, d2	0.3		0.6	0.3		0.5
Delay (s)	0.4		46.5	0.3		77.5
Level of Service	A		D	A		E
Approach Delay (s)	0.4		33.2			77.5
Approach LOS	A		C			E

Intersection Summary			
HCM 2000 Control Delay	35.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

LIMIT OF CONSTRUCTION

U.S. 78/S.R. 10

BROAD STREET

SR 20

SR 20 SIDEWALK

PECAN STREET

COVINGTON STREET

END PROJECT
PI #0016387

RAISED MEDIAN

MAGNOLIA STREET

CONCRETE BARRIER WITH G-11 ATTENUATORS

RAISED MEDIAN

LIMIT OF CONSTRUCTION

BOBBY BOSS DRIVE

CONCRETE BARRIER WITH G-11 ATTENUATORS

U.S. 78/S.R. 10

LIMIT OF CONSTRUCTION

MATCH LINE (SEE DISPLAY 2)

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES
POTENTIAL DISPLACEMENT

SCALE IN FEET

0 100 200 400

GDOT

PREFERRED ALTERNATE
SR 20
DISPLAY 3B

Gresham Smith

Genuine Ingenuity

ATTACHMENT 5

Crash Summary

CRASH SUMMARY

Crash data along SR 20, from west of Tuck Road to east of SR 10/US 78 in Walton County, was obtained from the Georgia Electronic Accident Reporting System (GEARS) for the period between January 1, 2014 and December 31, 2018. A detailed analysis of the crashes was completed to determine the type and severity of crashes along this section of roadway. Crash rates for this section of SR 20 were also calculated and compared to statewide average crash rates for urban minor arterials. Detailed summaries of these analyses are attached.

There were 409 total crashes along this section of roadway over the five year period (2014 - 2018). By manner of collision, the majority of the crashes recorded were "Rear End" collisions, which accounted for nearly 60% of the total number of crashes. Approximately 26% of the total number of crashes were "Angle" crashes, 6% were "Single Vehicle" crashes, 6% were "Sideswipe" crashes, and the remaining 2% were "Head On" crashes. When compared to statewide crash averages for urban minor arterials, this section of SR 20 exceeds the statewide average crash rates for total number of crashes in 2014, 2015, 2016 and 2017. Average crash rates are not yet available for 2018. No fatalities were reported along this section of SR 20 over the five year period (2014 – 2018).

The crash data was also reviewed to determine the number and types of crashes that occurred at each of the intersections along this section of SR 20 over the five year period (2014-2018). Detailed summaries of these analyses are also attached and are summarized in the table below.

Intersection Cross Street	Crash Type					Severity			Total
	Angle	Head On	Rear End	Side-swipe	Single Vehicle	PDO	Injury	Fatal	
Tuck Rd	9	2	5	1	3	17	3	0	20
N Sharon Church Rd	8	0	27	1	0	32	4	0	36
Overlook Dr	1	4	16	0	4	22	3	0	25
Huntington Dr	0	2	47	2	10	55	6	0	61
Fesco Way	1	0	3	0	2	6	0	0	6
Loganville Town Center	0	0	3	0	0	3	0	0	3
Tommy Lee Fuller Dr	42	1	36	5	1	71	14	0	85
Magnolia St	11	1	7	2	1	21	1	0	22
SR 10/US 78	36	0	99	14	2	131	20	0	151
Total	108	10	243	25	23	358	51	0	409

Crash Analysis
SR 20, from Tuck Rd to SR 10/US 78, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	13	1	28	3	0	5	50
2015	22	1	44	3	0	4	74
2016	21	1	52	5	3	5	87
2017	21	5	55	6	1	3	91
2018	31	2	64	4	0	6	107
Total	108	10	243	21	4	23	409
	26.4%	2.4%	59.4%	5.1%	1.0%	5.6%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	42	8	0	50
2015	66	8	0	74
2016	83	4	0	87
2017	70	21	0	91
2018	97	10	0	107
Total	358	51	0	409
	88%	12%	0%	100.0%

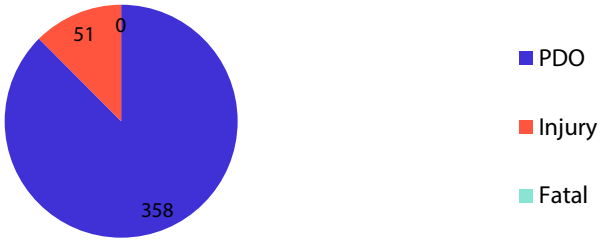
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	41	8	0	1	50
2015	45	28	0	1	74
2016	79	6	0	2	87
2017	79	11	0	1	91
2018	86	17	0	4	107
Total	330	70	0	9	409
	81%	17%	0%	2%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	42	0	0	0	8	50
2015	1	54	2	0	0	17	74
2016	1	69	2	0	0	15	87
2017	1	70	0	0	0	20	91
2018	0	81	2	0	0	24	107
Total	3	316	6	0	0	84	409
	1%	77%	1%	0%	0%	21%	100.0%

Crash Analysis
SR 20, from Tuck Rd to SR 10/US 78, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Summary of Traffic Crash History
SR 20, from Tuck Rd to SR 10/US 78, Walton County

Milelogs: 1.00 to 2.00

Year	Crashes			Crashes Per 100 Million Vehicle Miles		
	Total	Injury	Fatal	Total	Injury	Fatal
2014	50	8	0	713 (601)	114 (145)	0.00 (1.21)
2015	74	8	0	1056 (637)	114 (156)	0.00 (1.68)
2016	87	4	0	1241 (655)	57 (156)	0.00 (1.53)
2017	91	21	0	1299 (623)	300 (153)	0.00 (1.35)
2018	107	10	0	1527 (--)	143 (--)	0.00 (--)
Total	409	51	0			
Average	82	10	0	1170 (629)	143 (153)	0.00 (1.44)

Note: The number in parentheses represents the statewide average crash rates for Urban Minor Arterials. Statewide average crash rates are not yet available for 2018.

Crash Analysis
SR 20 @ Tuck Rd, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	0	1	1	1	0	1	4
2015	1	0	0	0	0	0	1
2016	2	0	0	0	0	0	2
2017	1	1	2	0	0	1	5
2018	5	0	2	0	0	1	8
Total	9	2	5	1	0	3	20
	45.0%	10.0%	25.0%	5.0%	0.0%	15.0%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	3	1	0	4
2015	1	0	0	1
2016	2	0	0	2
2017	3	2	0	5
2018	8	0	0	8
Total	17	3	0	20
	85%	15%	0%	100.0%

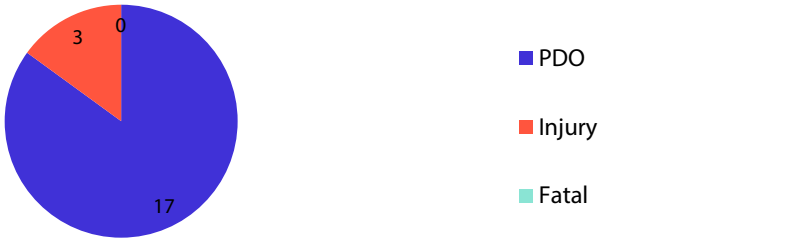
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	3	1	0	0	4
2015	0	1	0	0	1
2016	2	0	0	0	2
2017	5	0	0	0	5
2018	6	2	0	0	8
Total	16	4	0	0	20
	80%	20%	0%	0%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	3	0	0	0	1	4
2015	0	1	0	0	0	0	1
2016	0	2	0	0	0	0	2
2017	0	5	0	0	0	0	5
2018	0	3	0	0	0	5	8
Total	0	14	0	0	0	6	20
	0%	70%	0%	0%	0%	30%	100.0%

Crash Analysis
SR 20 @ Tuck Rd, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ N Sharon Church Rd, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	3	0	3	0	0	0	6
2015	1	0	4	0	0	0	5
2016	2	0	6	0	0	0	8
2017	1	0	5	0	0	0	6
2018	1	0	9	1	0	0	11
Total	8	0	27	1	0	0	36
	22.2%	0.0%	75.0%	2.8%	0.0%	0.0%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	5	1	0	6
2015	5	0	0	5
2016	7	1	0	8
2017	5	1	0	6
2018	10	1	0	11
Total	32	4	0	36
	89%	11%	0%	100.0%

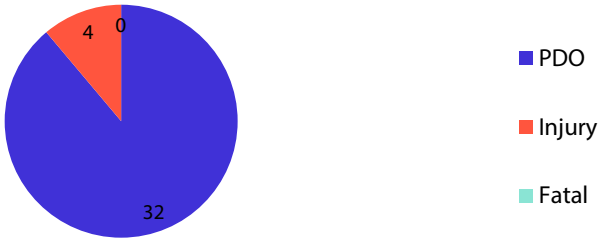
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	5	1	0	0	6
2015	4	1	0	0	5
2016	7	1	0	0	8
2017	5	1	0	0	6
2018	9	0	0	2	11
Total	30	4	0	2	36
	83%	11%	0%	6%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	6	0	0	0	0	6
2015	0	4	0	0	0	1	5
2016	0	7	0	0	0	1	8
2017	0	4	0	0	0	2	6
2018	0	9	0	0	0	2	11
Total	0	30	0	0	0	6	36
	0%	83%	0%	0%	0%	17%	100.0%

Crash Analysis
SR 20 @ N Sharon Church Rd, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ Overlook Dr, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	0	0	0	0	0	0	0
2015	0	1	4	0	0	0	5
2016	0	0	1	0	0	2	3
2017	0	2	4	0	0	0	6
2018	1	1	7	0	0	2	11
Total	1	4	16	0	0	4	25
	4.0%	16.0%	64.0%	0.0%	0.0%	16.0%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	0	0	0	0
2015	3	2	0	5
2016	3	0	0	3
2017	5	1	0	6
2018	11	0	0	11
Total	22	3	0	25
	88%	12%	0%	100.0%

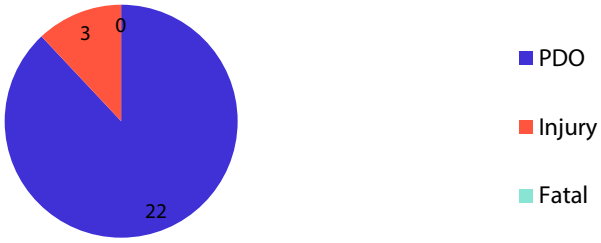
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	0	0
2015	1	4	0	0	5
2016	2	0	0	1	3
2017	4	2	0	0	6
2018	8	3	0	0	11
Total	15	9	0	1	25
	60%	36%	0%	4%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	0	0	0	0	0	0
2015	0	2	1	0	0	2	5
2016	1	1	0	0	0	1	3
2017	0	4	0	0	0	2	6
2018	0	9	0	0	0	2	11
Total	1	16	1	0	0	7	25
	4%	64%	4%	0%	0%	28%	100.0%

Crash Analysis
SR 20 @ Overlook Dr, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ Huntington Dr, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	0	0	4	0	0	2	6
2015	0	0	10	0	0	3	13
2016	0	1	10	0	0	1	12
2017	0	0	10	1	0	1	12
2018	0	1	13	1	0	3	18
Total	0	2	47	2	0	10	61
	0.0%	3.3%	77.0%	3.3%	0.0%	16.4%	100.0%

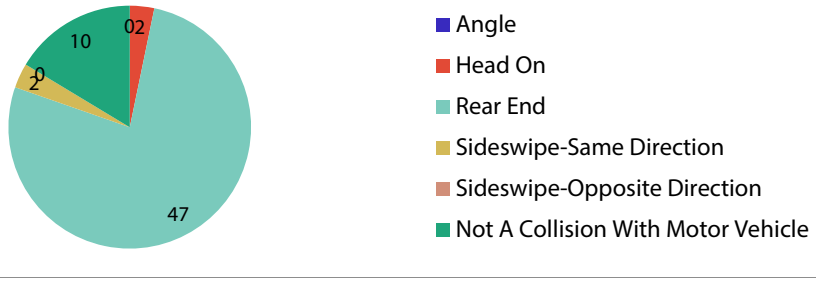
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	6	0	0	6
2015	13	0	0	13
2016	11	1	0	12
2017	10	2	0	12
2018	15	3	0	18
Total	55	6	0	61
	90%	10%	0%	100.0%

Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	6	0	0	0	6
2015	9	4	0	0	13
2016	10	2	0	0	12
2017	9	3	0	0	12
2018	12	5	0	1	18
Total	46	14	0	1	61
	75%	23%	0%	2%	100.0%

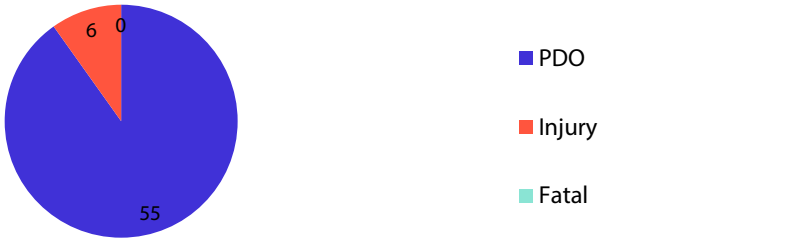
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	6	0	0	0	0	6
2015	0	10	0	0	0	3	13
2016	0	9	0	0	0	3	12
2017	0	10	0	0	0	2	12
2018	0	12	1	0	0	5	18
Total	0	47	1	0	0	13	61
	0%	77%	2%	0%	0%	21%	100.0%

Crash Analysis
SR 20 @ Huntington Dr, Walton County
Years 2014 to 2018

Crash Type



Severity



Road Surface

Lighting

Crash Analysis
SR 20 @ Fesco Way, Walton County
Years 2014 to 2018

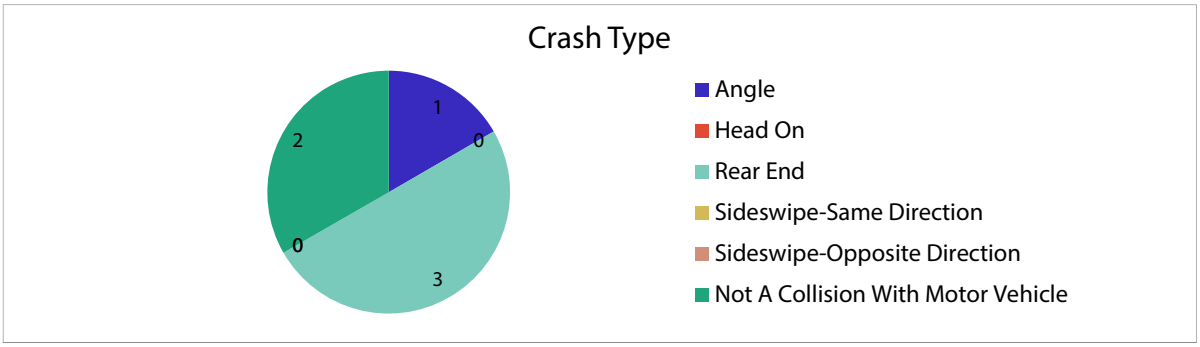
Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	0	0	0	0	0	0	0
2015	0	0	1	0	0	0	1
2016	0	0	1	0	0	1	2
2017	0	0	0	0	0	1	1
2018	1	0	1	0	0	0	2
Total	1	0	3	0	0	2	6
	16.7%	0.0%	50.0%	0.0%	0.0%	33.3%	100.0%

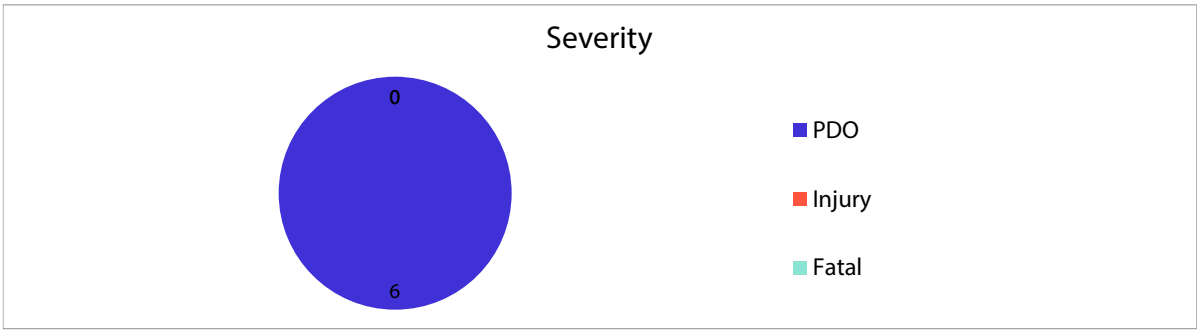
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	0	0	0	0
2015	1	0	0	1
2016	2	0	0	2
2017	1	0	0	1
2018	2	0	0	2
Total	6	0	0	6
	100%	0%	0%	100.0%

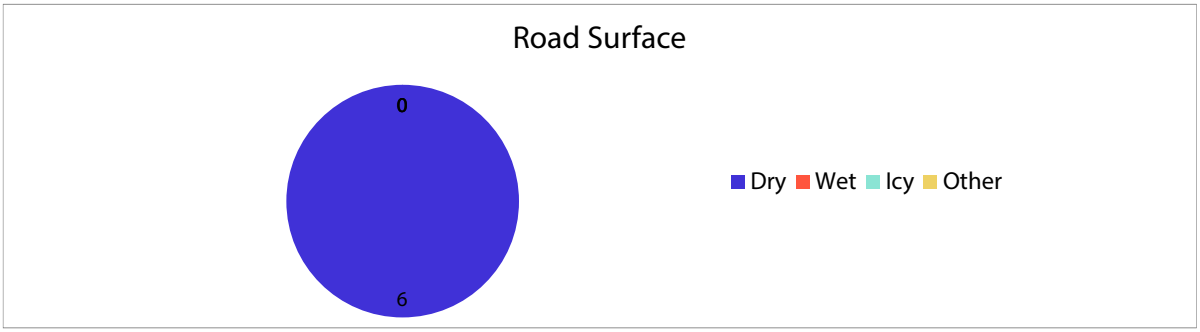
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	0	0
2015	1	0	0	0	1
2016	2	0	0	0	2
2017	1	0	0	0	1
2018	2	0	0	0	2
Total	6	0	0	0	6
	100%	0%	0%	0%	100.0%

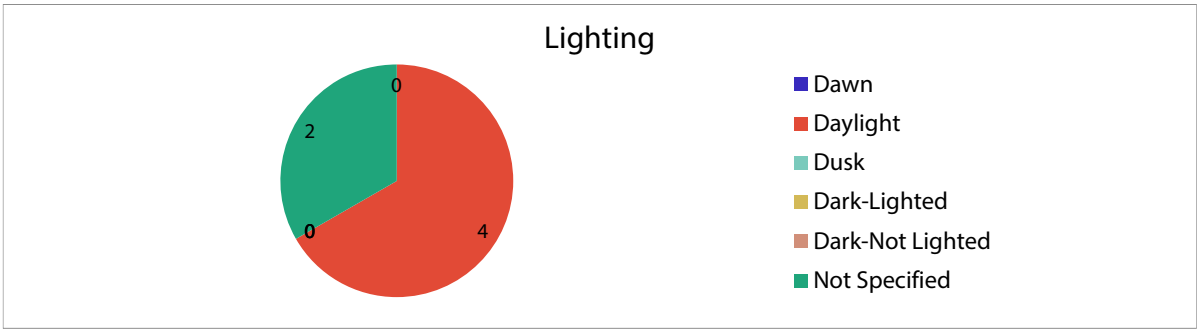
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	0	0	0	0	0	0
2015	0	1	0	0	0	0	1
2016	0	1	0	0	0	1	2
2017	0	0	0	0	0	1	1
2018	0	2	0	0	0	0	2
Total	0	4	0	0	0	2	6
	0%	67%	0%	0%	0%	33%	100.0%

Crash Analysis
SR 20 @ Fesco Way, Walton County
Years 2014 to 2018









GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ Loganville Town Center Driveway, Walton County
Years 2014 to 2018

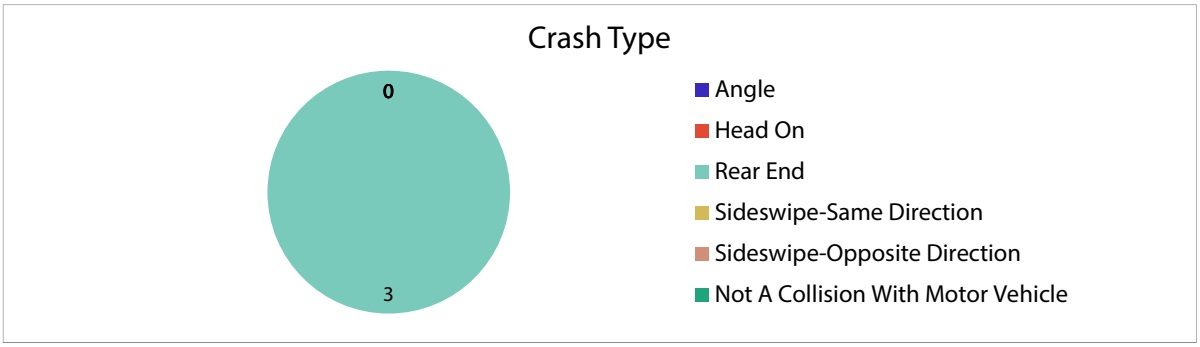
Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0
2016	0	0	1	0	0	0	1
2017	0	0	0	0	0	0	0
2018	0	0	2	0	0	0	2
Total	0	0	3	0	0	0	3
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%

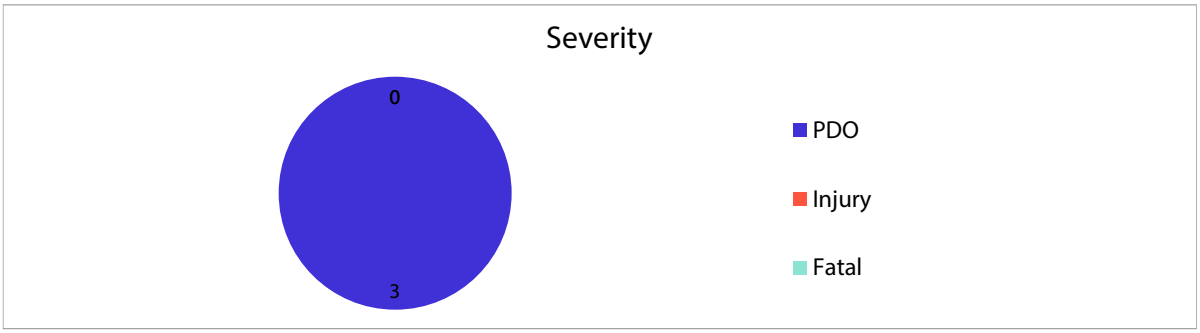
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	0	0	0	0
2015	0	0	0	0
2016	1	0	0	1
2017	0	0	0	0
2018	2	0	0	2
Total	3	0	0	3
	100%	0%	0%	100.0%

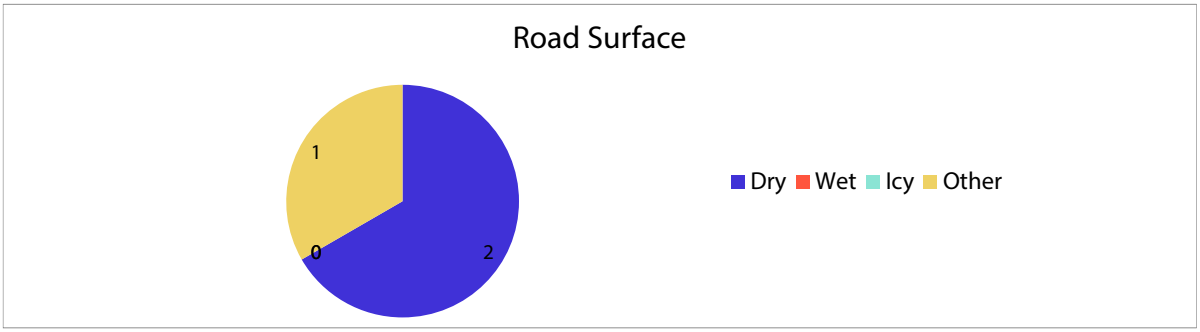
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	1	0	0	0	1
2017	0	0	0	0	0
2018	1	0	0	1	2
Total	2	0	0	1	3
	67%	0%	0%	33%	100.0%

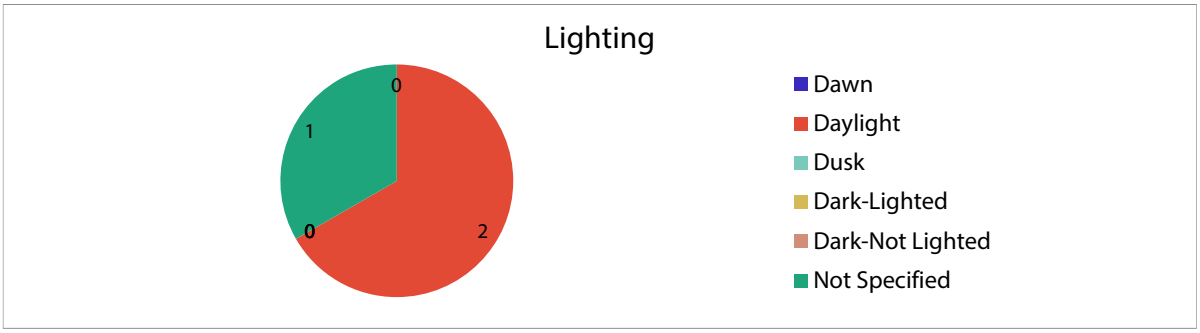
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0
2016	0	1	0	0	0	0	1
2017	0	0	0	0	0	0	0
2018	0	1	0	0	0	1	2
Total	0	2	0	0	0	1	3
	0%	67%	0%	0%	0%	33%	100.0%

Crash Analysis
SR 20 @ Loganville Town Center Driveway, Walton County
Years 2014 to 2018









Crash Analysis
SR 20 @ Tommy Lee Fuller Dr, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	4	0	4	1	0	1	10
2015	11	0	4	0	0	0	15
2016	7	0	10	2	0	0	19
2017	9	1	11	1	0	0	22
2018	11	0	7	1	0	0	19
Total	42	1	36	5	0	1	85
	49.4%	1.2%	42.4%	5.9%	0.0%	1.2%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	8	2	0	10
2015	12	3	0	15
2016	18	1	0	19
2017	16	6	0	22
2018	17	2	0	19
Total	71	14	0	85
	84%	16%	0%	100.0%

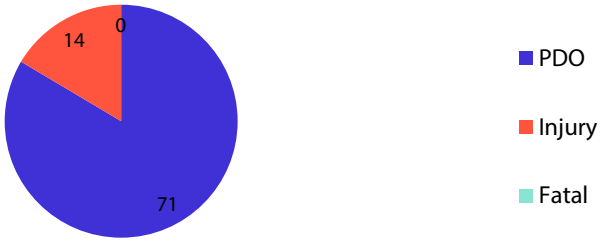
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	5	5	0	0	10
2015	9	6	0	0	15
2016	18	0	0	1	19
2017	17	5	0	0	22
2018	15	4	0	0	19
Total	64	20	0	1	85
	75%	24%	0%	1%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	6	0	0	0	4	10
2015	0	12	0	0	0	3	15
2016	0	13	2	0	0	4	19
2017	0	18	0	0	0	4	22
2018	0	16	1	0	0	2	19
Total	0	65	3	0	0	17	85
	0%	76%	4%	0%	0%	20%	100.0%

Crash Analysis
SR 20 @ Tommy Lee Fuller Dr, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ Magnolia St, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	1	0	1	1	0	0	3
2015	2	0	3	0	0	0	5
2016	2	0	0	0	0	1	3
2017	3	1	0	1	0	0	5
2018	3	0	3	0	0	0	6
Total	11	1	7	2	0	1	22
	50.0%	4.5%	31.8%	9.1%	0.0%	4.5%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	3	0	0	3
2015	5	0	0	5
2016	3	0	0	3
2017	4	1	0	5
2018	6	0	0	6
Total	21	1	0	22
	95%	5%	0%	100.0%

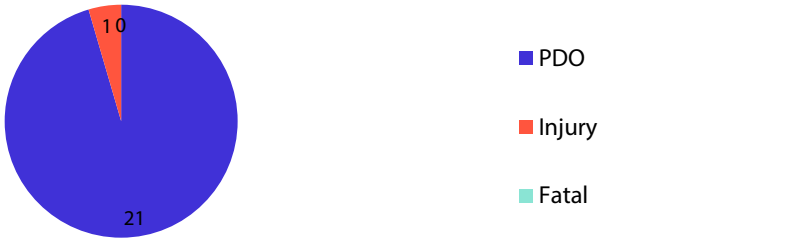
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	3	0	0	0	3
2015	4	1	0	0	5
2016	3	0	0	0	3
2017	5	0	0	0	5
2018	4	2	0	0	6
Total	19	3	0	0	22
	86%	14%	0%	0%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	3	0	0	0	0	3
2015	0	5	0	0	0	0	5
2016	0	3	0	0	0	0	3
2017	0	4	0	0	0	1	5
2018	0	5	0	0	0	1	6
Total	0	20	0	0	0	2	22
	0%	91%	0%	0%	0%	9%	100.0%

Crash Analysis
SR 20 @ Magnolia St, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Crash Analysis
SR 20 @ SR 10/US 78, Walton County
Years 2014 to 2018

Year	Crash Type						Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	
2014	5	0	15	0	0	1	21
2015	7	0	18	3	0	1	29
2016	8	0	23	3	3	0	37
2017	7	0	23	3	1	0	34
2018	9	0	20	1	0	0	30
Total	36	0	99	10	4	2	151
	23.8%	0.0%	65.6%	6.6%	2.6%	1.3%	100.0%

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	17	4	0	21
2015	26	3	0	29
2016	36	1	0	37
2017	26	8	0	34
2018	26	4	0	30
Total	131	20	0	151
	87%	13%	0%	100.0%

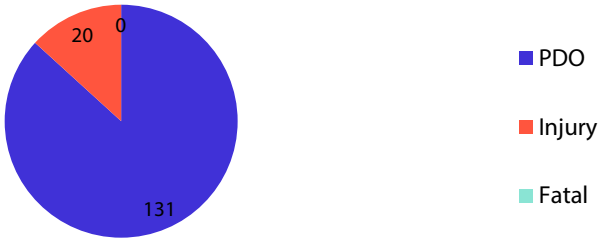
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	19	1	0	1	21
2015	17	11	0	1	29
2016	34	3	0	0	37
2017	33	0	0	1	34
2018	29	1	0	0	30
Total	132	16	0	3	151
	87%	11%	0%	2%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	18	0	0	0	3	21
2015	1	19	1	0	0	8	29
2016	0	32	0	0	0	5	37
2017	1	25	0	0	0	8	34
2018	0	24	0	0	0	6	30
Total	2	118	1	0	0	30	151
	1%	78%	1%	0%	0%	20%	100.0%

Crash Analysis
SR 20 @ SR 10/US 78, Walton County
Years 2014 to 2018

Crash Type

Severity



Road Surface

Lighting

GDOT Georgia Department of Transportation

Gresham Smith

Gresham Smith

Genuine Ingenuity

ATTACHMENT 6

Design Traffic Diagrams

Georgia Department of Transportation

Interoffice Memo

FILE: Walton County
P.I. # 0016387

DATE: February 21, 2019

FROM: Paul Tanner, State Transportation Planning Administrator

TO: Kimberly Nesbitt, State Program Delivery Administrator
Attention: Bryan Lott

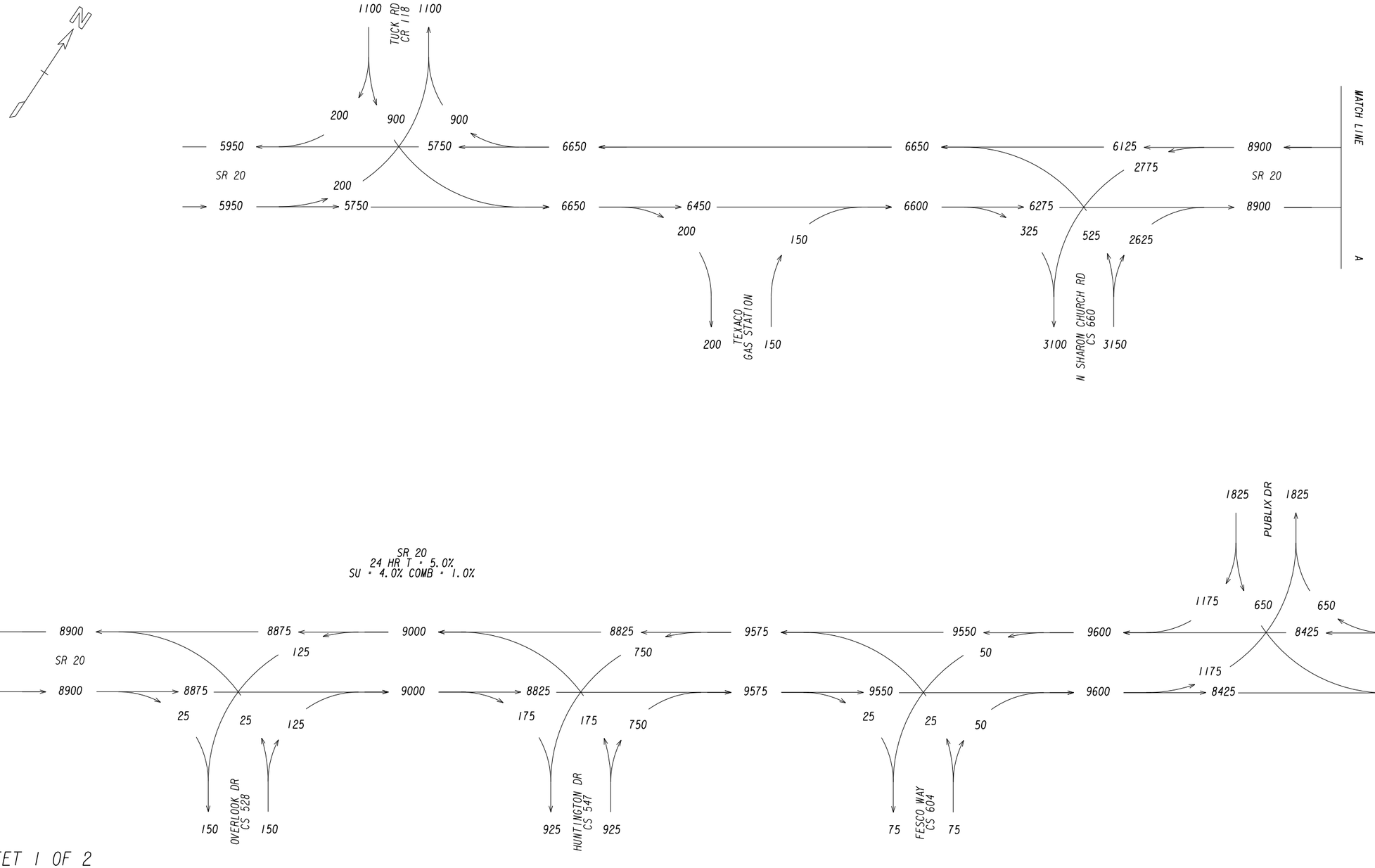
SUBJECT: **Design Traffic Forecasts** for SR 20 FROM CS 660/N SHARON CHURCH ROAD TO SR 10/US 78

Per request, we have reviewed the consultant's design traffic forecasts for the above project. Based on the information furnished, we find the design traffic forecasts to be satisfactory, and the design traffic forecasting task to be complete for the above project. The reviewed and approved design traffic forecasts for the above project is attached in 0016387_10.pdf and 0016387_10.dgn.

If you have any questions concerning this information please contact Andre Washington at 404-631-1925.

Keith McCage
HNTB
Design Traffic Consultant to GDOT
404-946-5731

RPT/KAM



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2017 AADT = 000
EXISTING

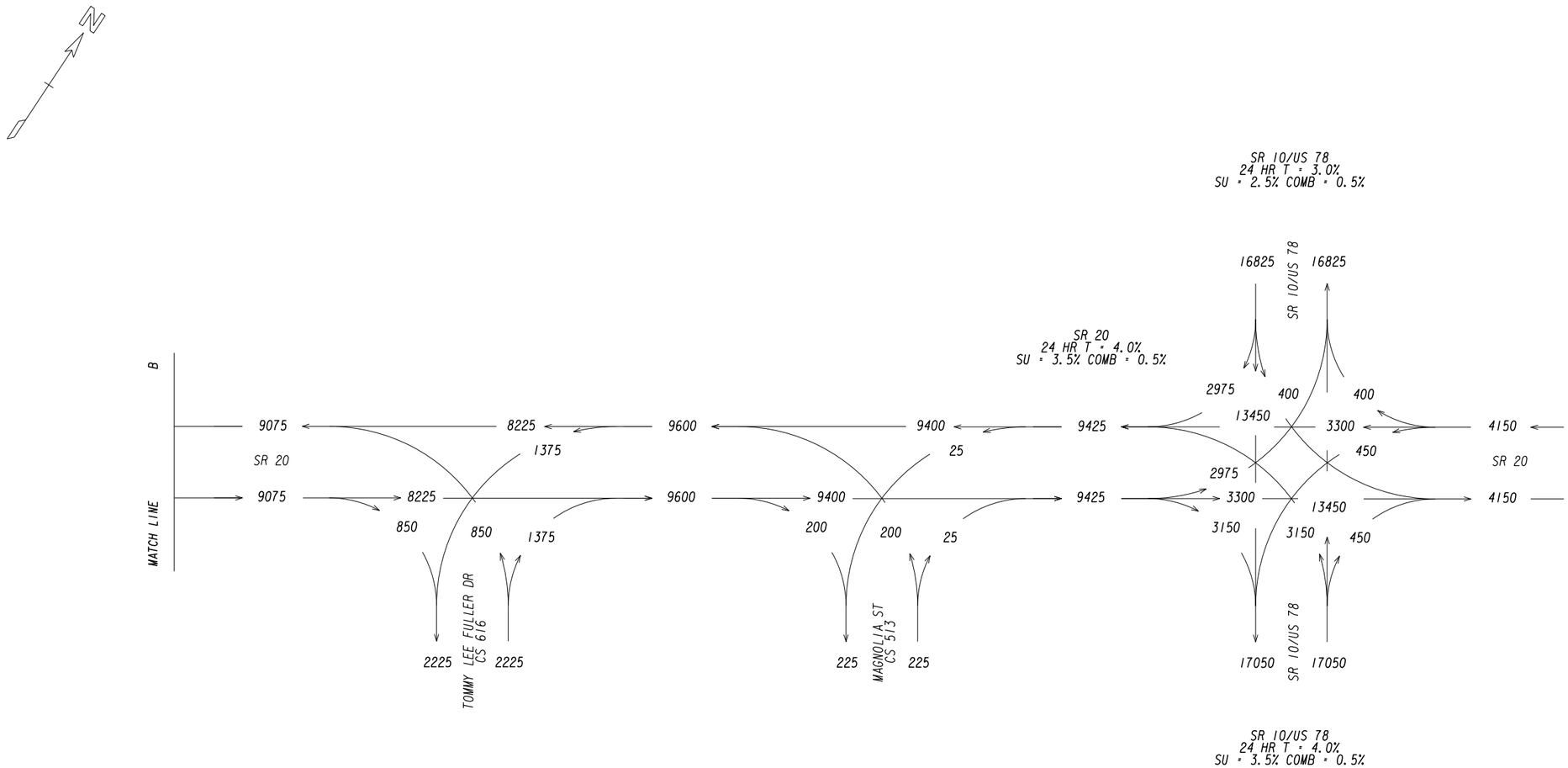
PROGRAM DELIVERY

Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE: 01/31/19	DRAWING No.
BACKCHECKED:	AWC	DATE: 01/31/19	
CORRECTED:	CBL	DATE: 01/31/19	10-0001
VERIFIED:	AWC	DATE: 01/31/19	



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2017 AADT = 000
EXISTING

PROGRAM DELIVERY

Gresham Smith

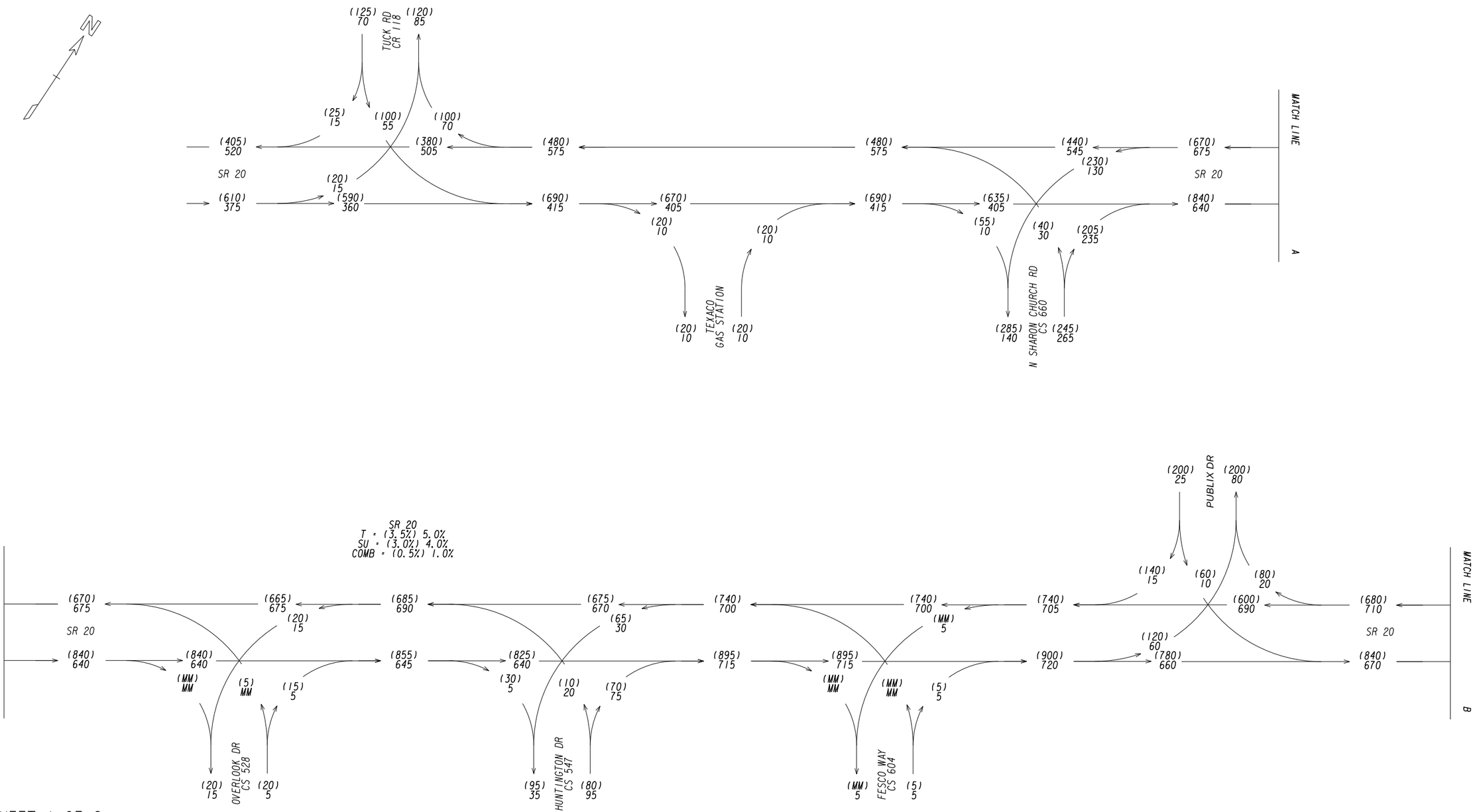
REVISION DATES

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0002

10/23/2015 GPLN



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

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

PROGRAM DELIVERY

Gresham Smith

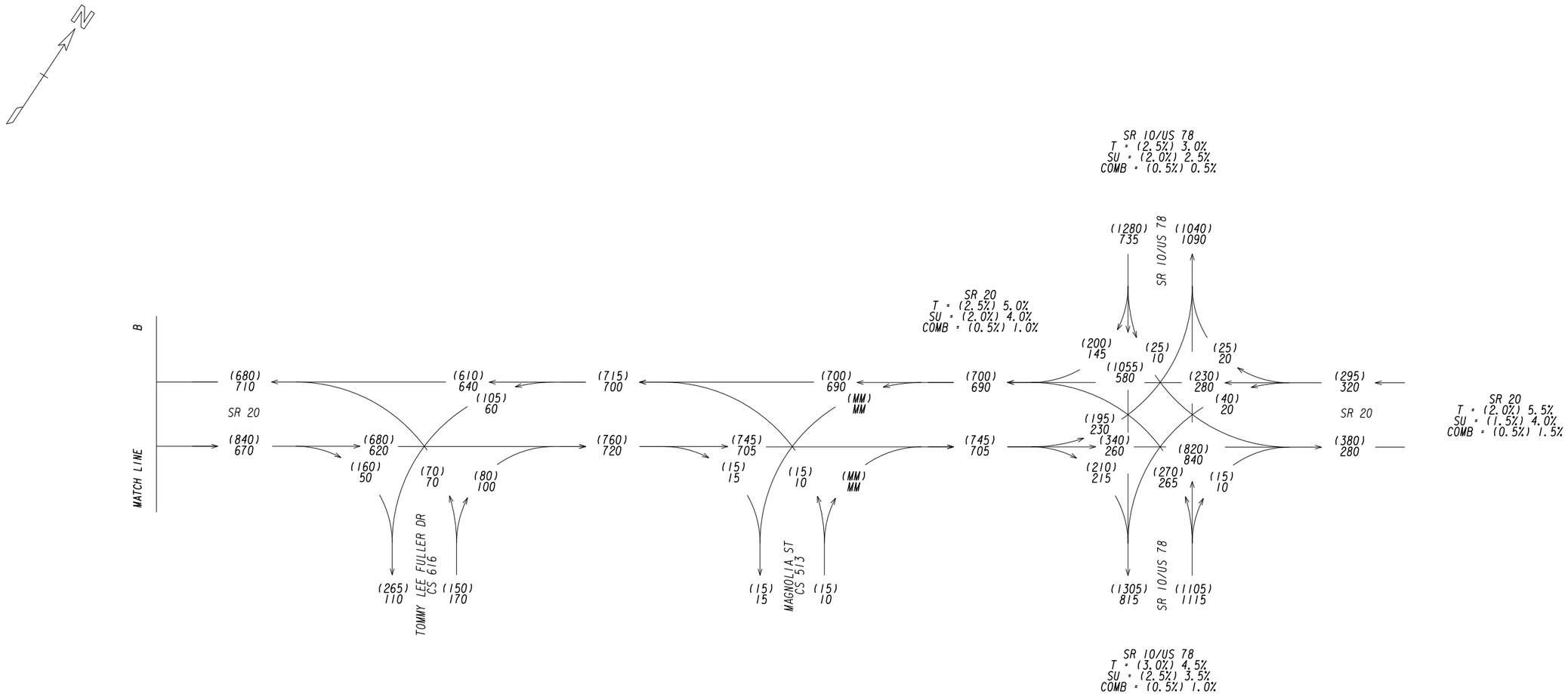
REVISION DATES		

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0003



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

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

GDOT
PROGRAM DELIVERY

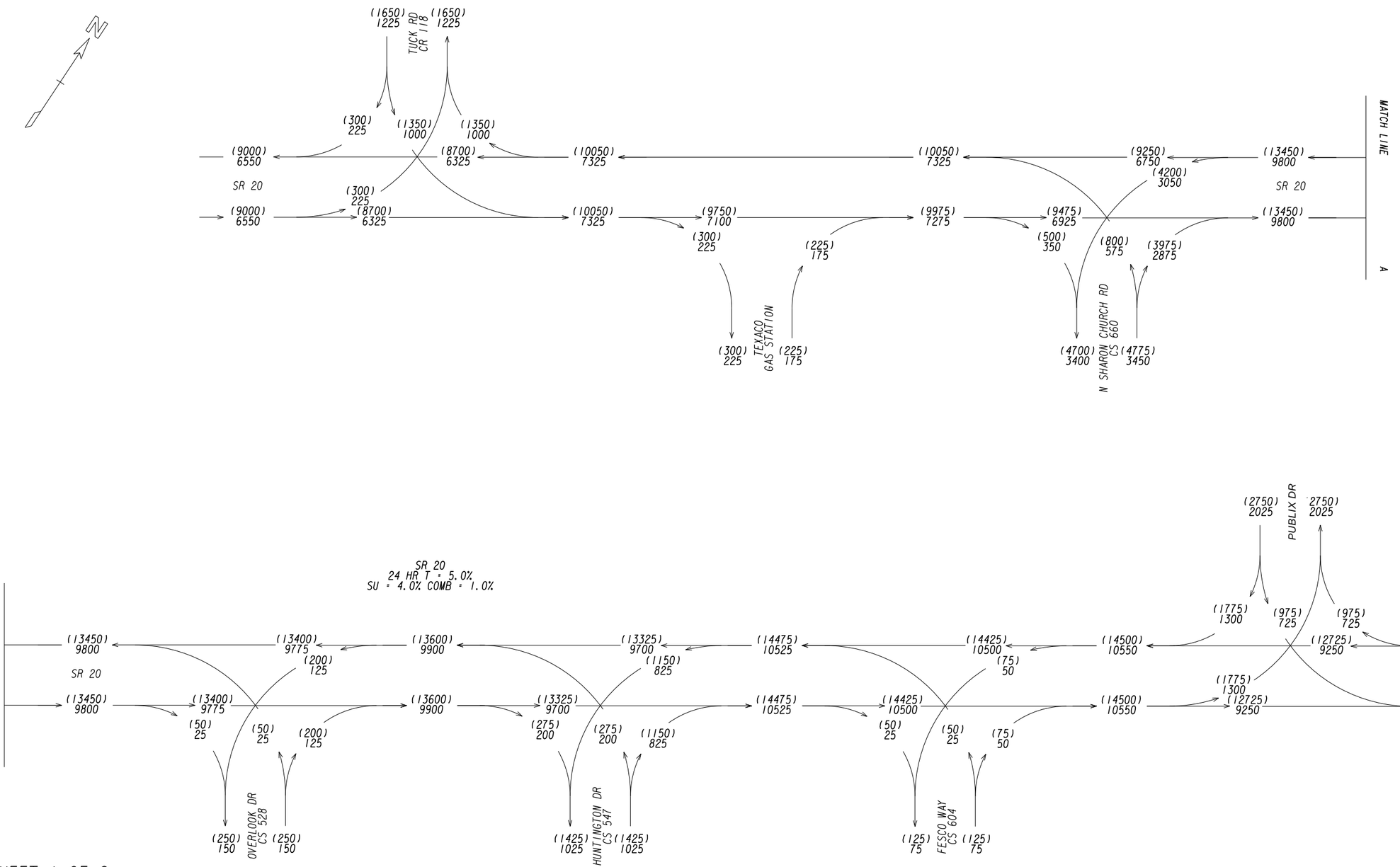
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0004



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 AADT = (000)
2023 AADT = 000
NO BUILD

PROGRAM DELIVERY

Gresham Smith

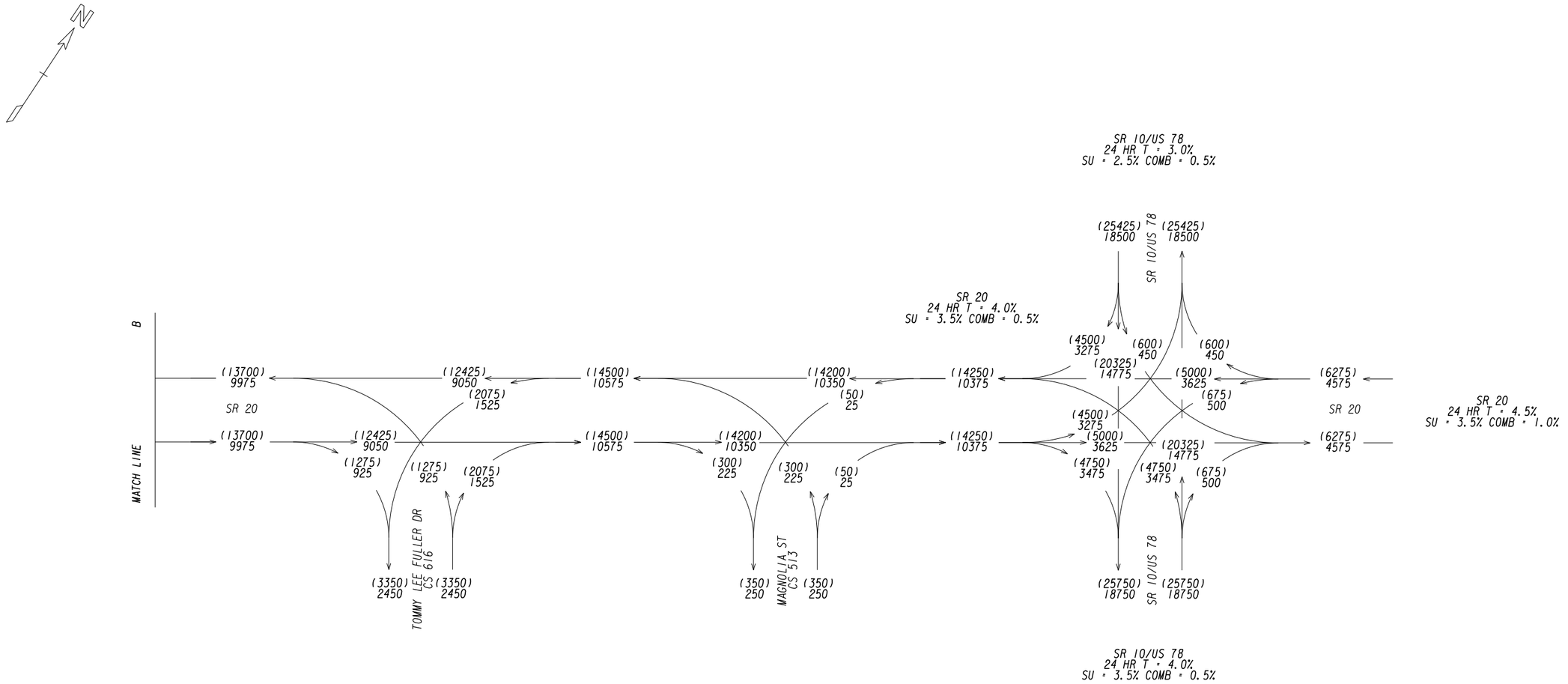
REVISION DATES

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0005



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 AADT = (000)
2023 AADT = 000
NO BUILD

PROGRAM DELIVERY

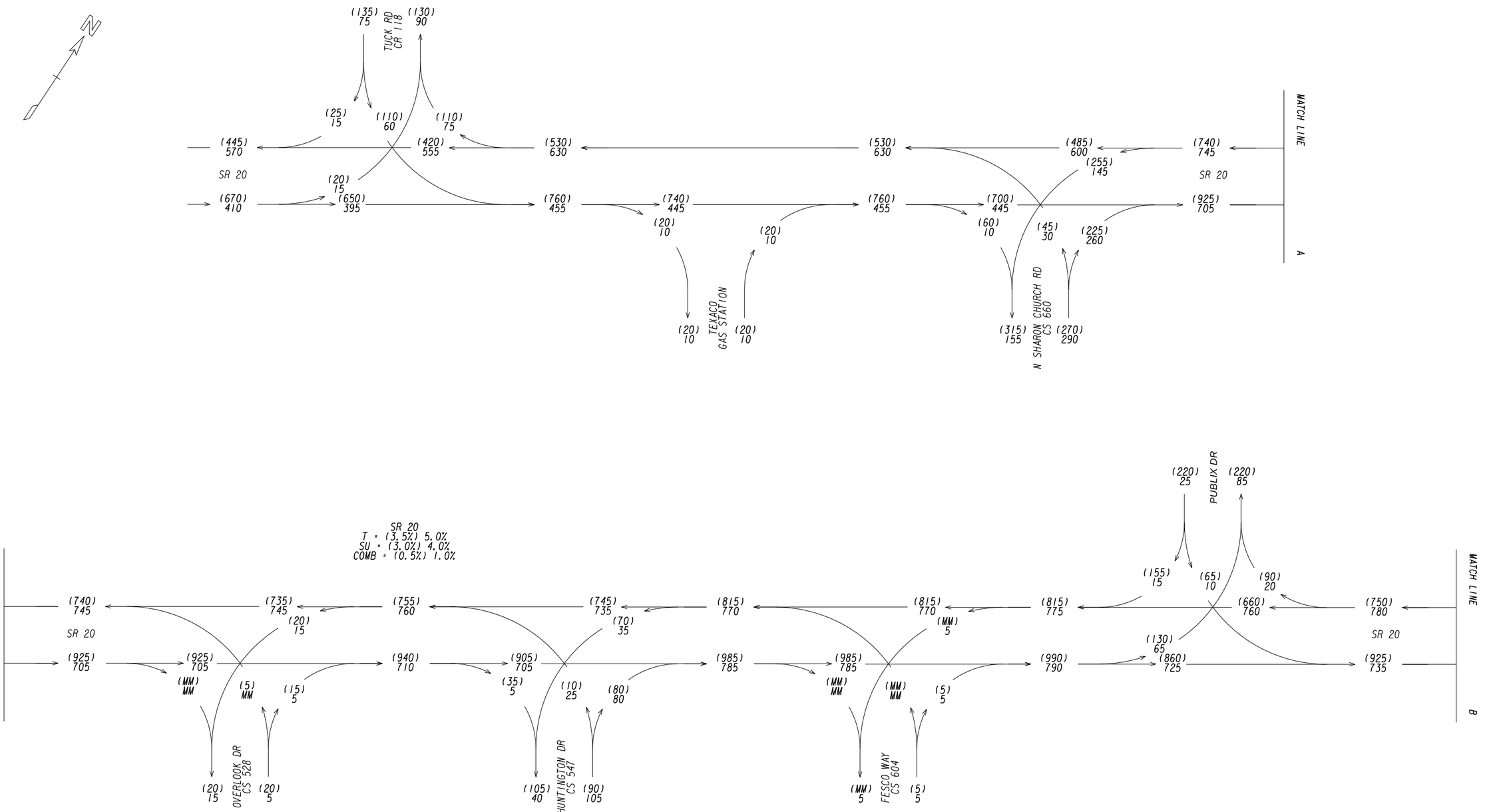
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0006



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2023 PM DHV = (000)
2023 AM DHV = 000
NO BUILD

PROGRAM DELIVERY

Gresham Smith

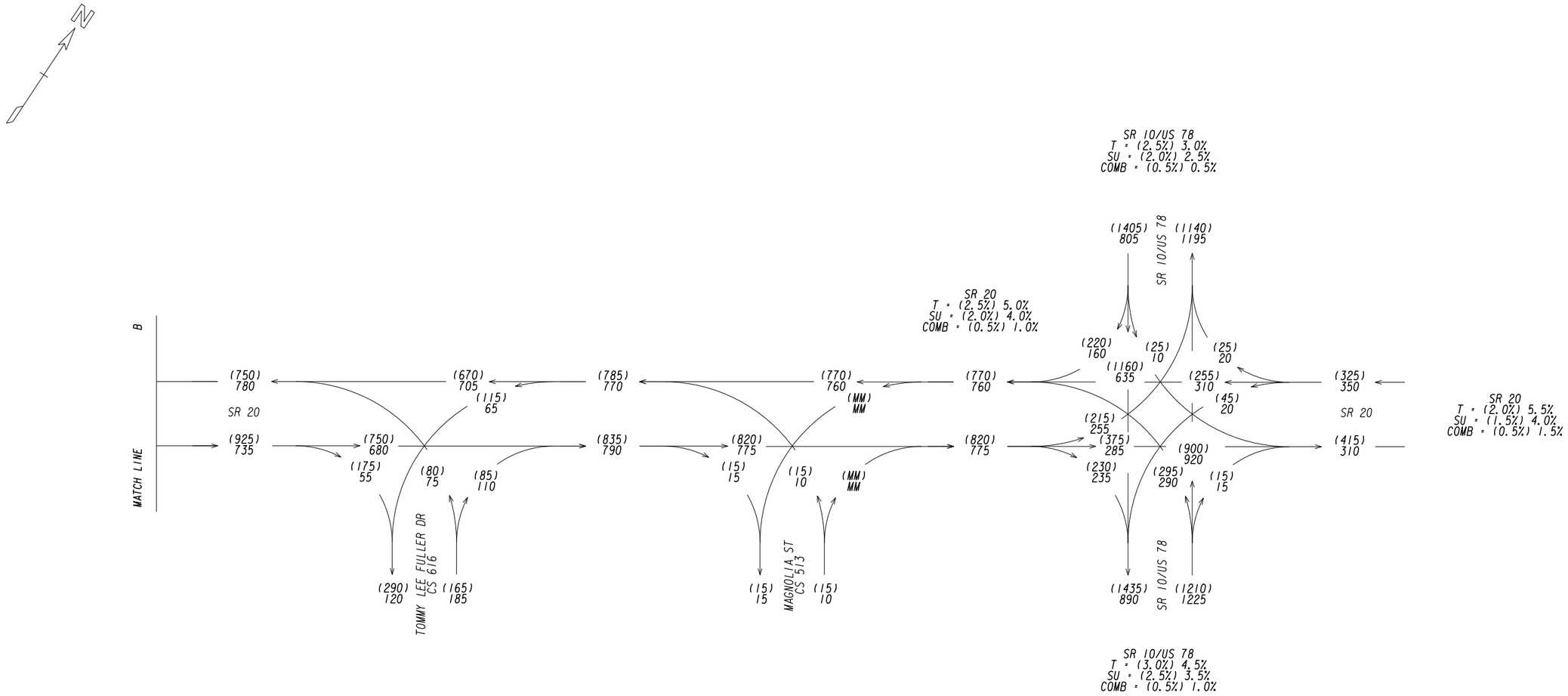
REVISION DATES		

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE: 01/31/19	DRAWING No.
BACKCHECKED:	AWC	DATE: 01/31/19	
CORRECTED:	CBL	DATE: 01/31/19	10-0007
VERIFIED:	AWC	DATE: 01/31/19	

10/23/2015 GPLN



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2023 PM DHV = (000)
2023 AM DHV = 000
NO BUILD

GDOT
PROGRAM DELIVERY

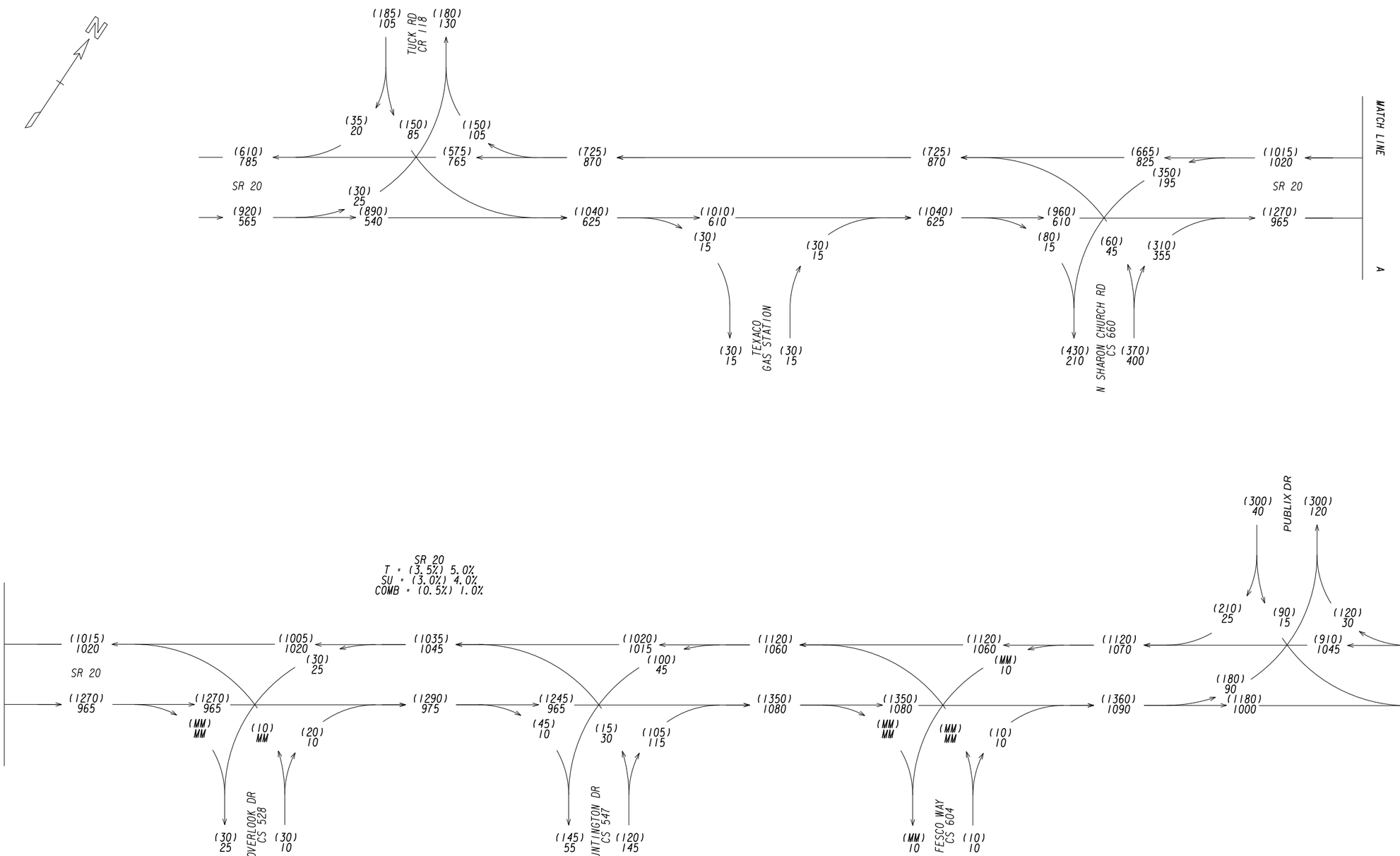
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0008



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 PM DHV = (000)
2043 AM DHV = 000
NO BUILD

PROGRAM DELIVERY

Gresham Smith

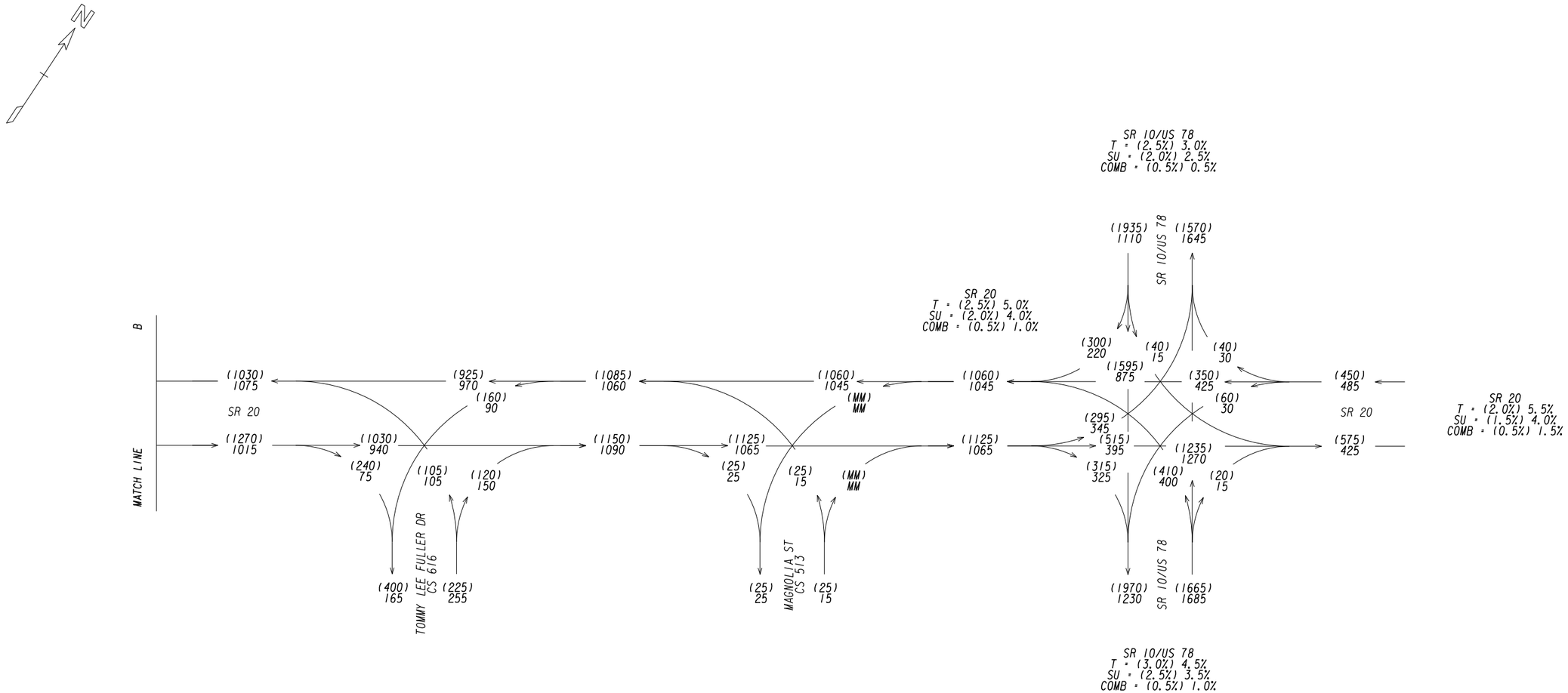
REVISION DATES

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0009

10/23/2015 GPLN



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 PM DHV = (000)
2043 AM DHV = 000
NO BUILD

GDOT
PROGRAM DELIVERY

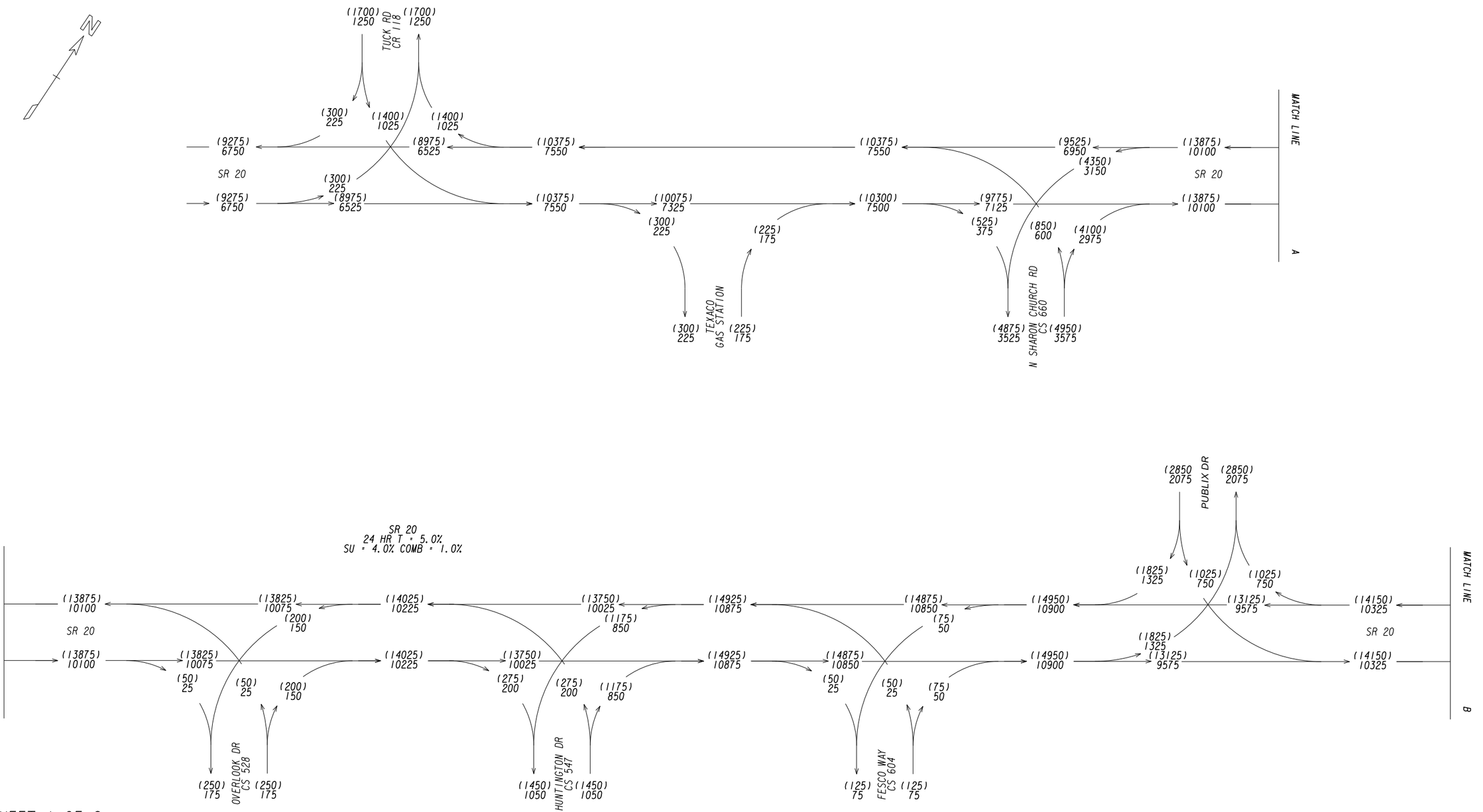
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0010



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 AADT = (000)
2025 AADT = 000
NO BUILD

PROGRAM DELIVERY

Gresham Smith

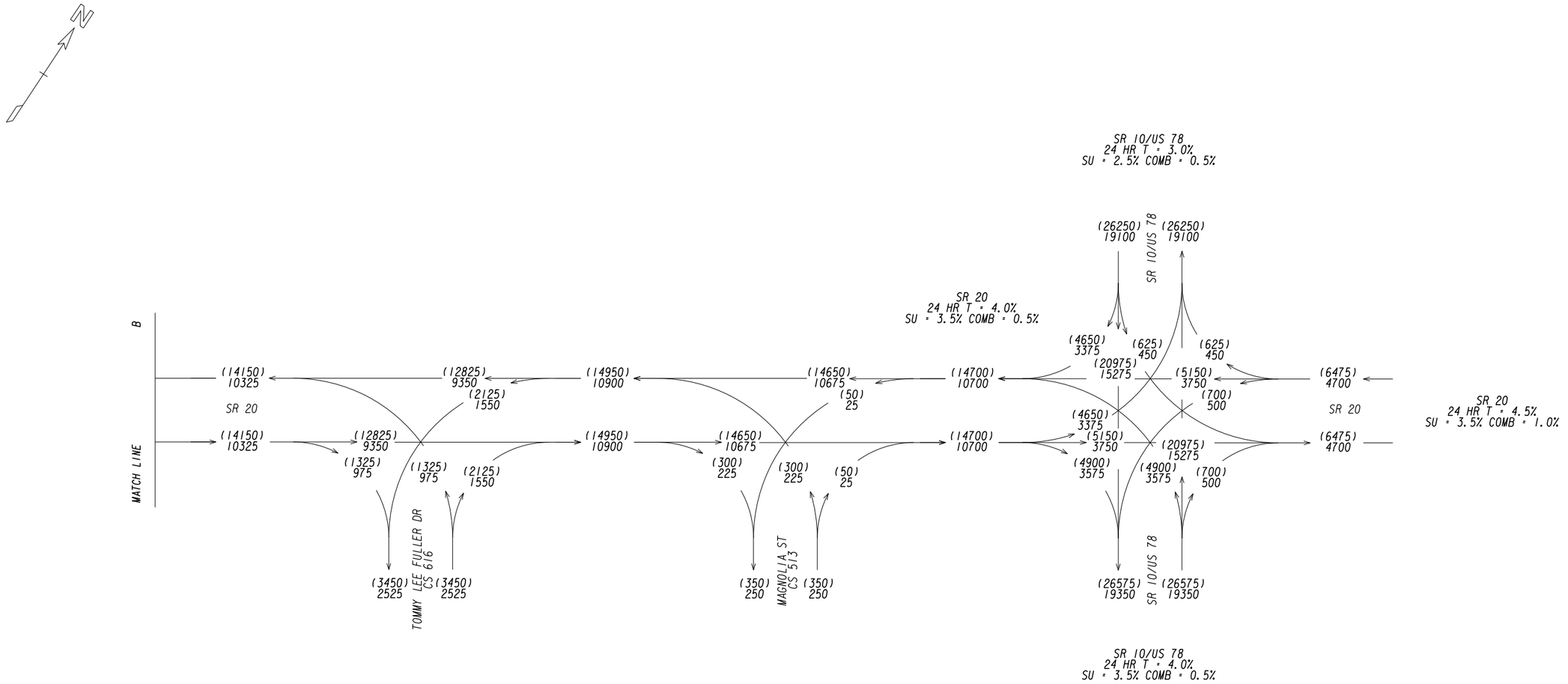
REVISION DATES		

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0011



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 AADT = (000)
2025 AADT = 000
NO BUILD

PROGRAM DELIVERY

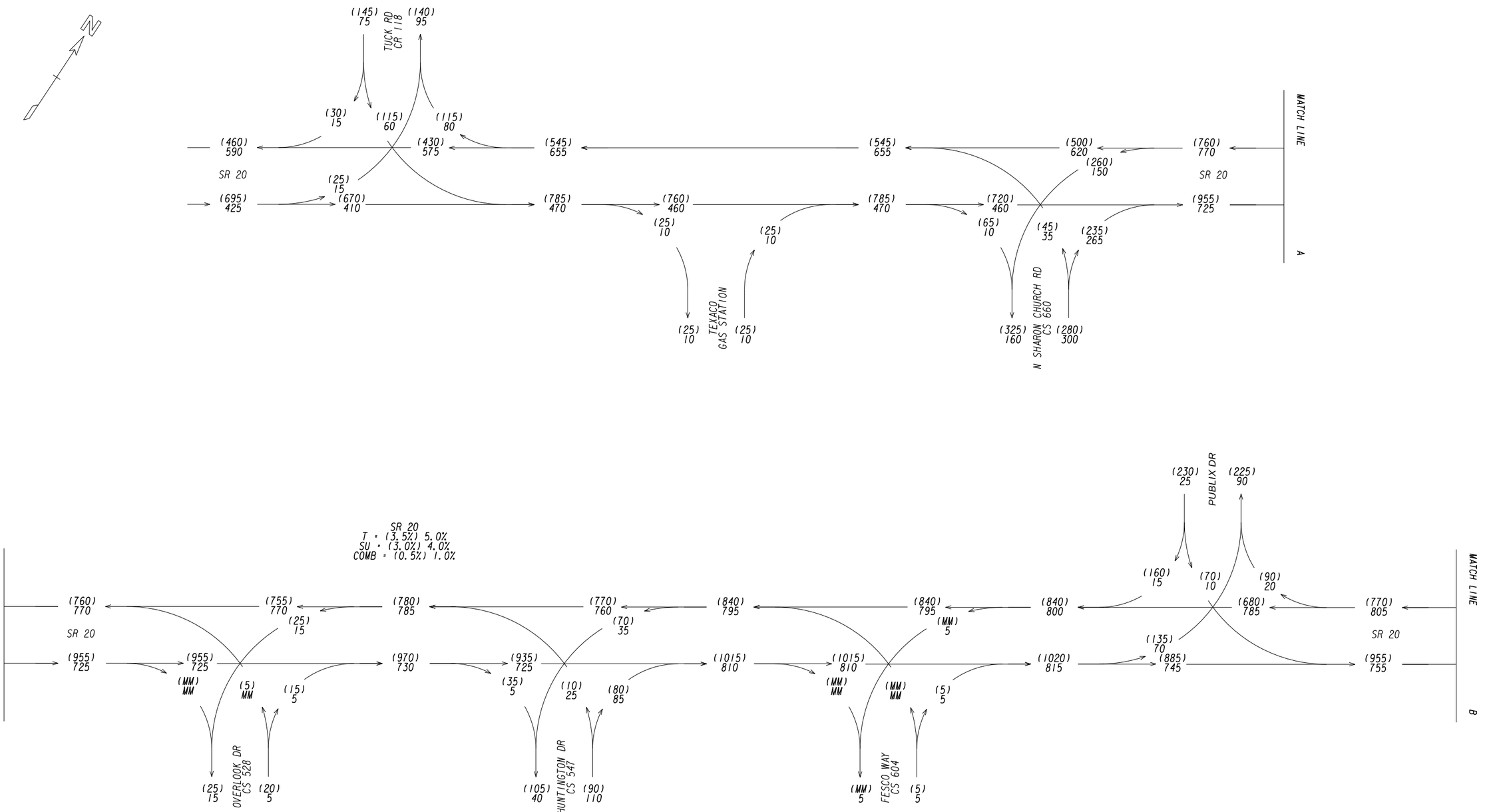
Gresham Smith

REVISION DATES

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0012



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2025 PM DHV = (000)
2025 AM DHV = 000
NO BUILD

PROGRAM DELIVERY

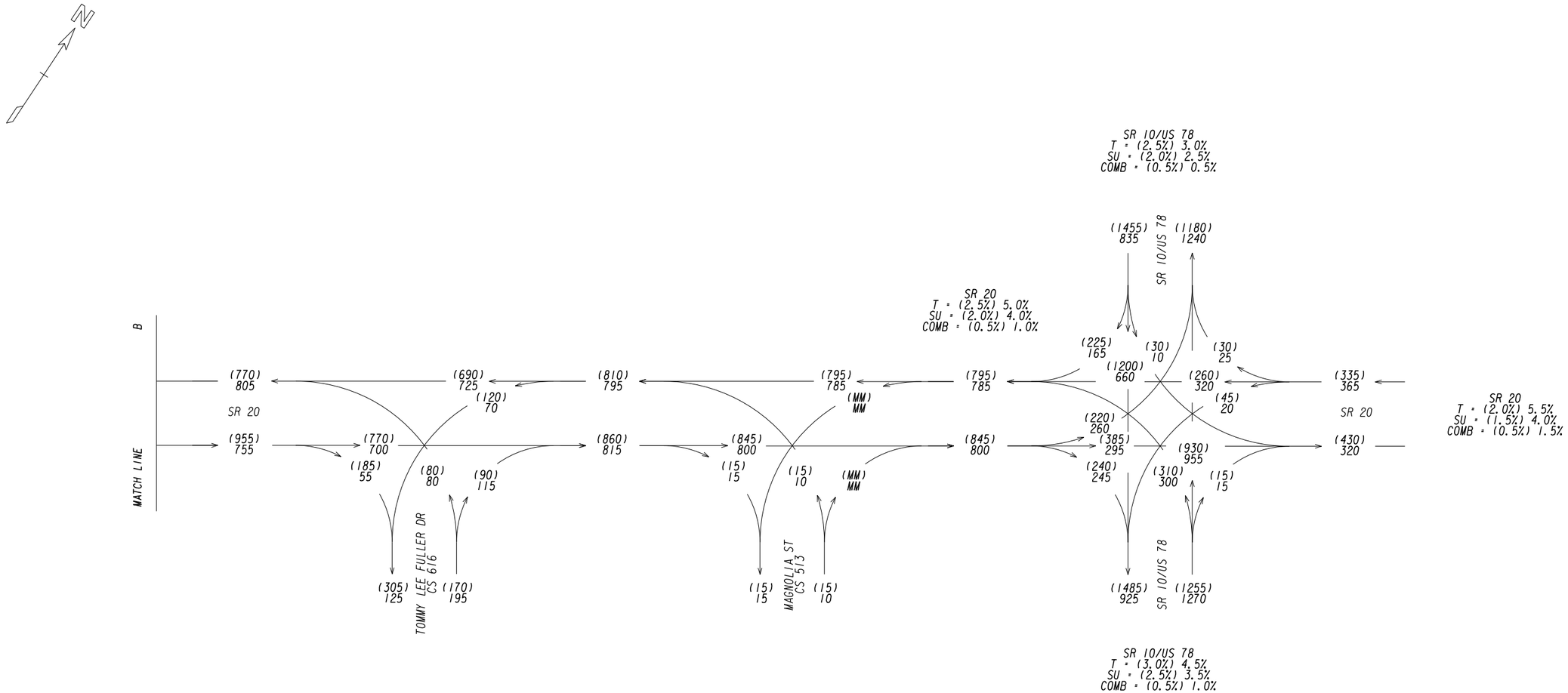
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0013



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2025 PM DHV = (000)
2025 AM DHV = 000
NO BUILD

GDOT
PROGRAM DELIVERY

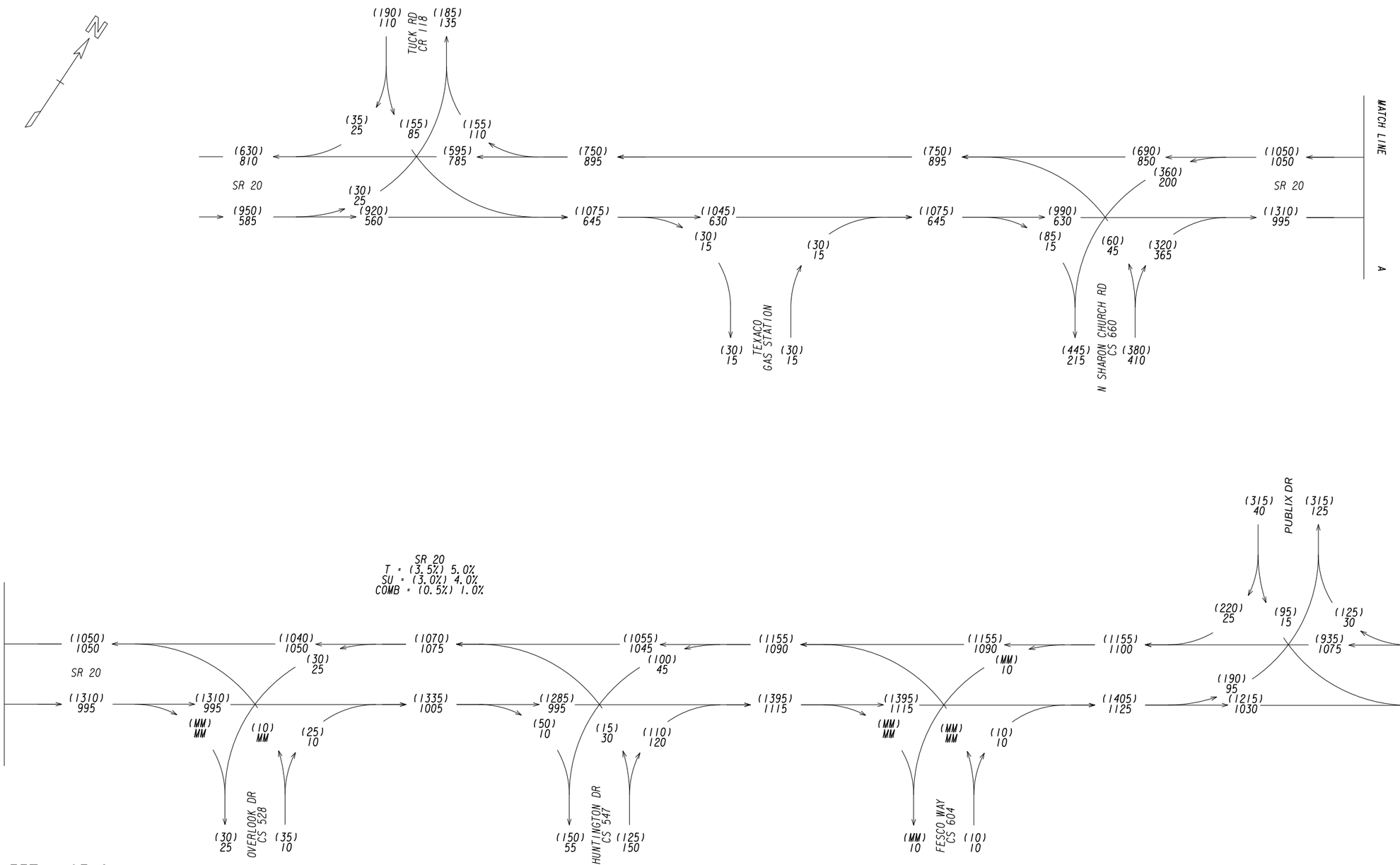
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0014



SHEET 1 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 PM DHV = (000)
2045 AM DHV = 000
NO BUILD

PROGRAM DELIVERY

Gresham Smith

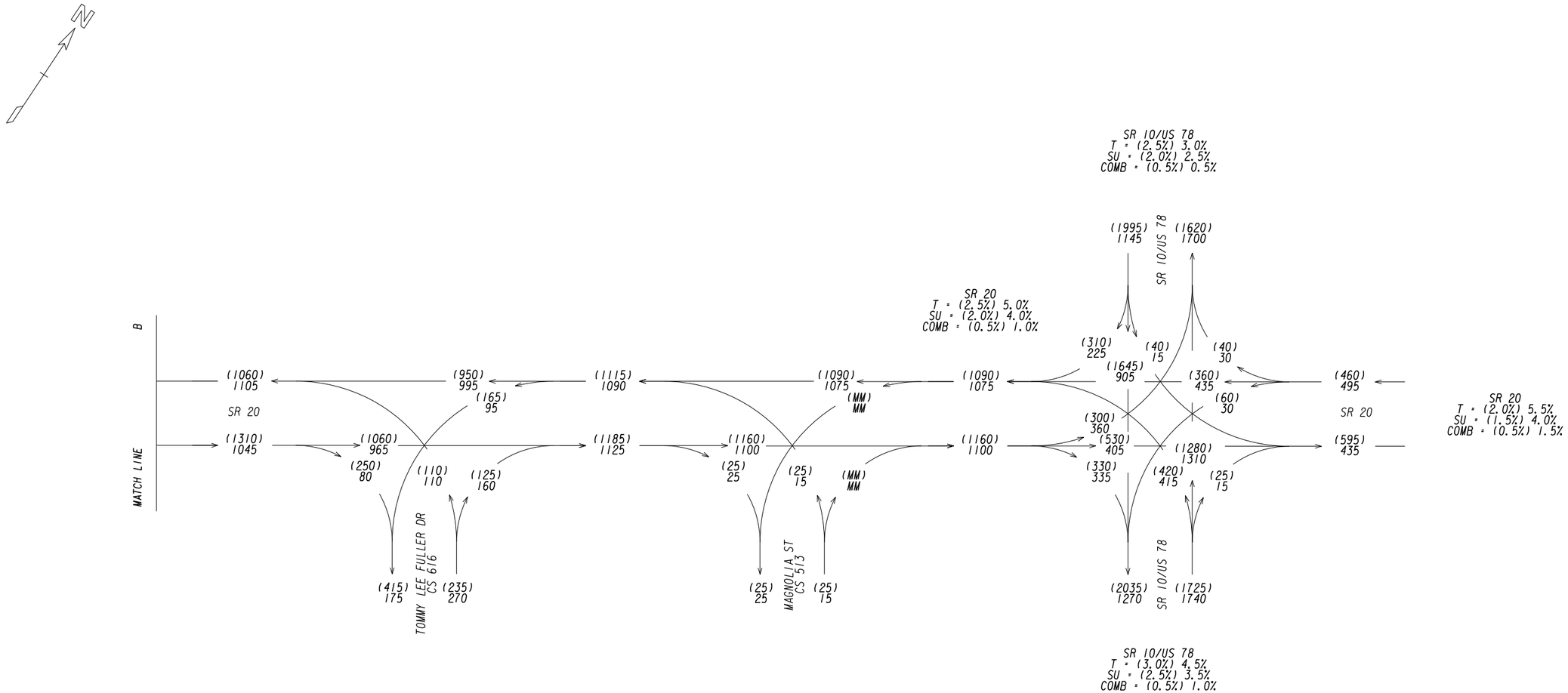
REVISION DATES		

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0015



SHEET 2 OF 2

PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 PM DHV = (000)
2045 AM DHV = 000
NO BUILD

PROGRAM DELIVERY

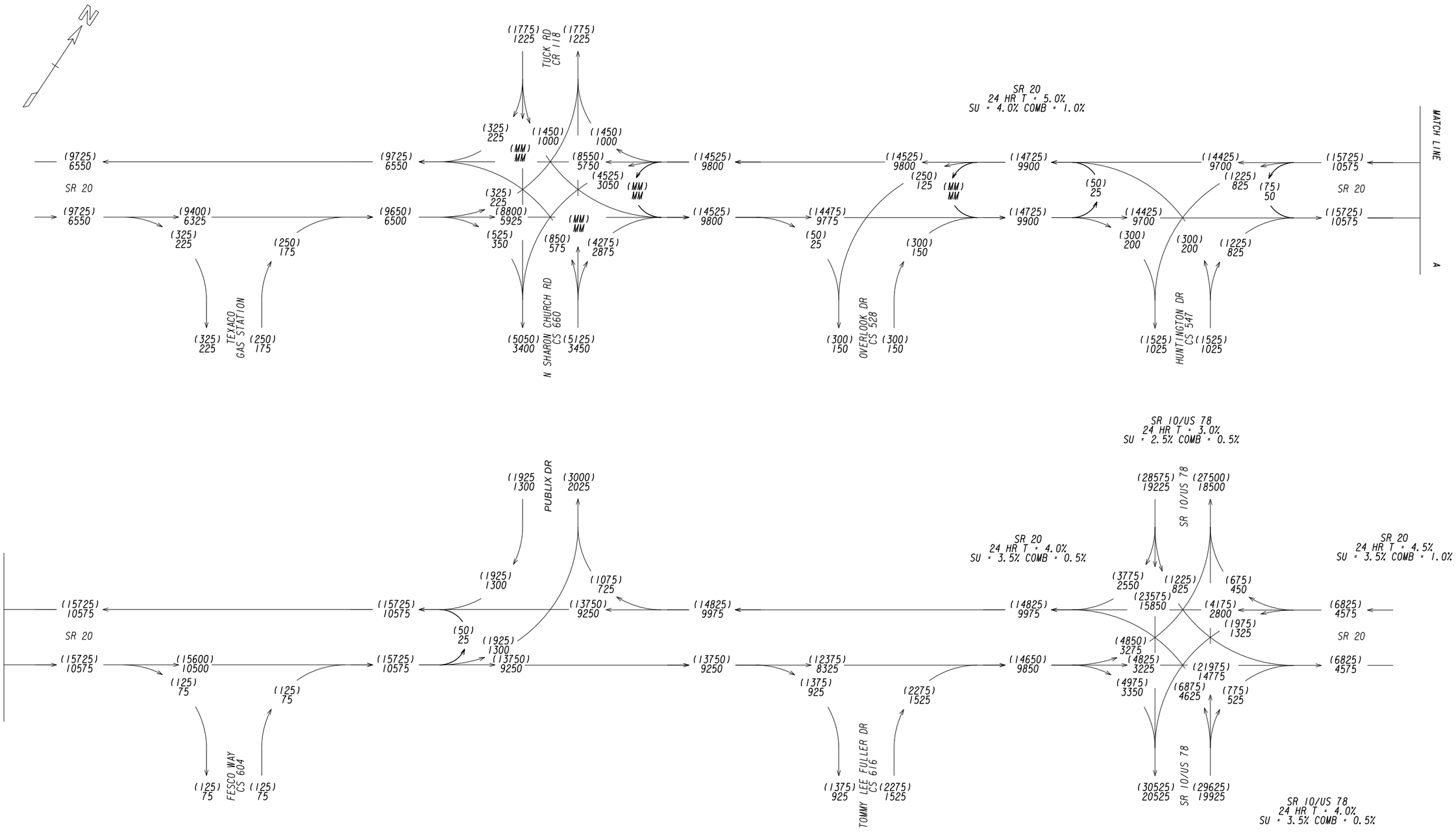
Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No.
10-0016



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 AADT = (000)
2023 AADT = 000
BUILD

PROGRAM DELIVERY

Gresham Smith

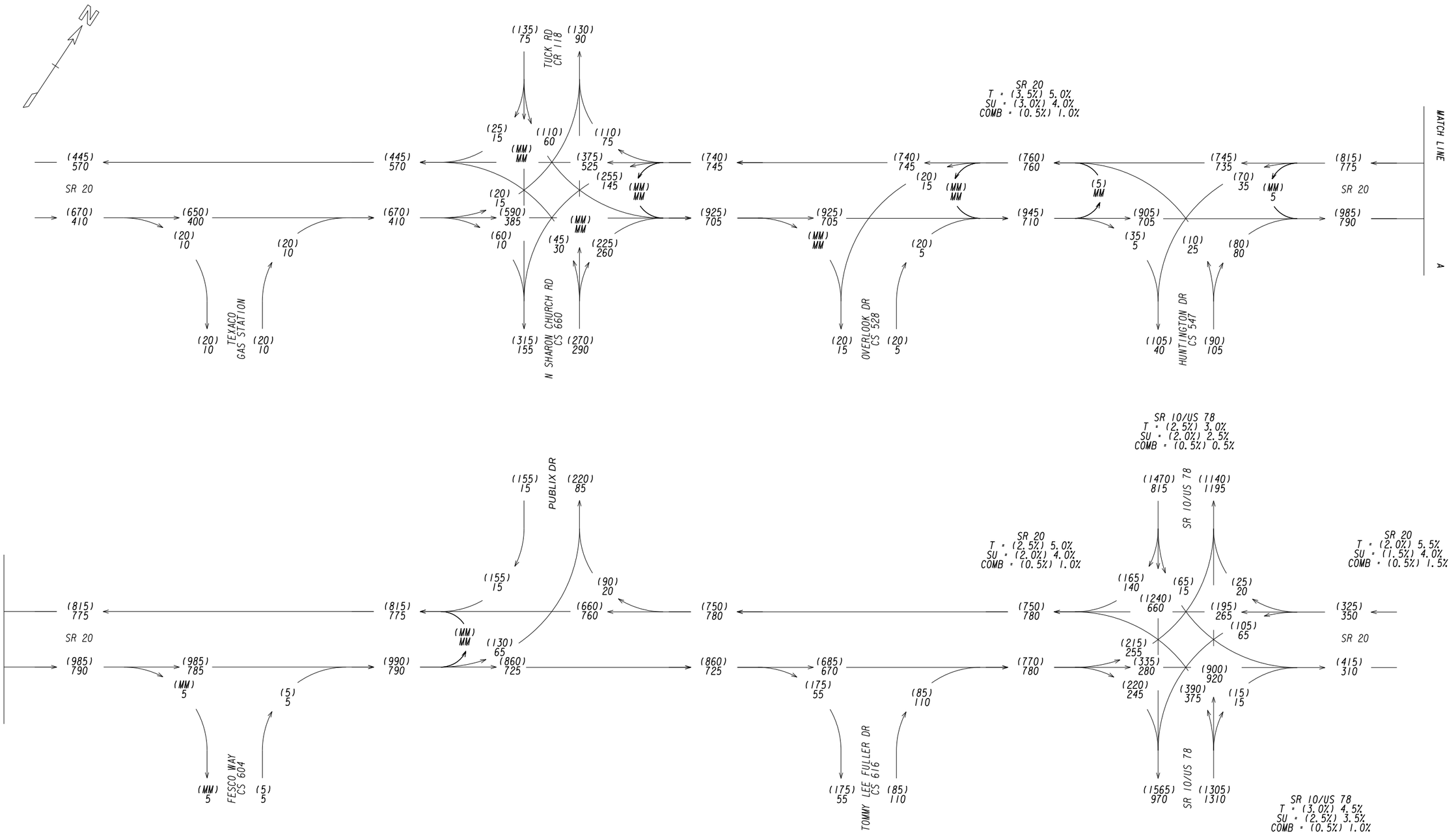
REVISION DATES

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0017



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2023 PM DHV = (000)
2023 AM DHV = 000
BUILD

PROGRAM DELIVERY

Gresham Smith

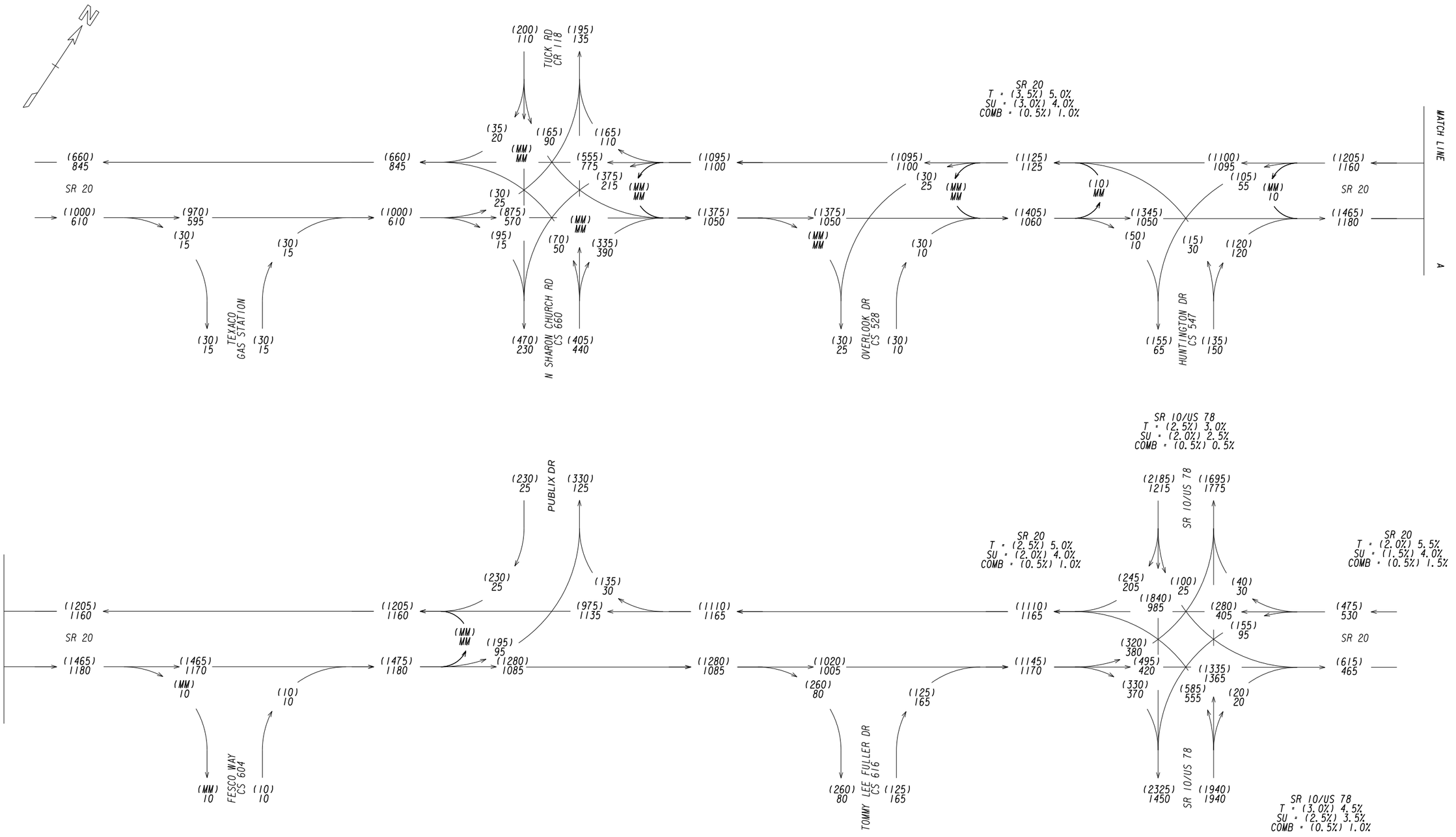
REVISION DATES

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0018



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2043 PM DHV = (000)
2043 AM DHV = 000
BUILD

GDOT
PROGRAM DELIVERY

Gresham Smith

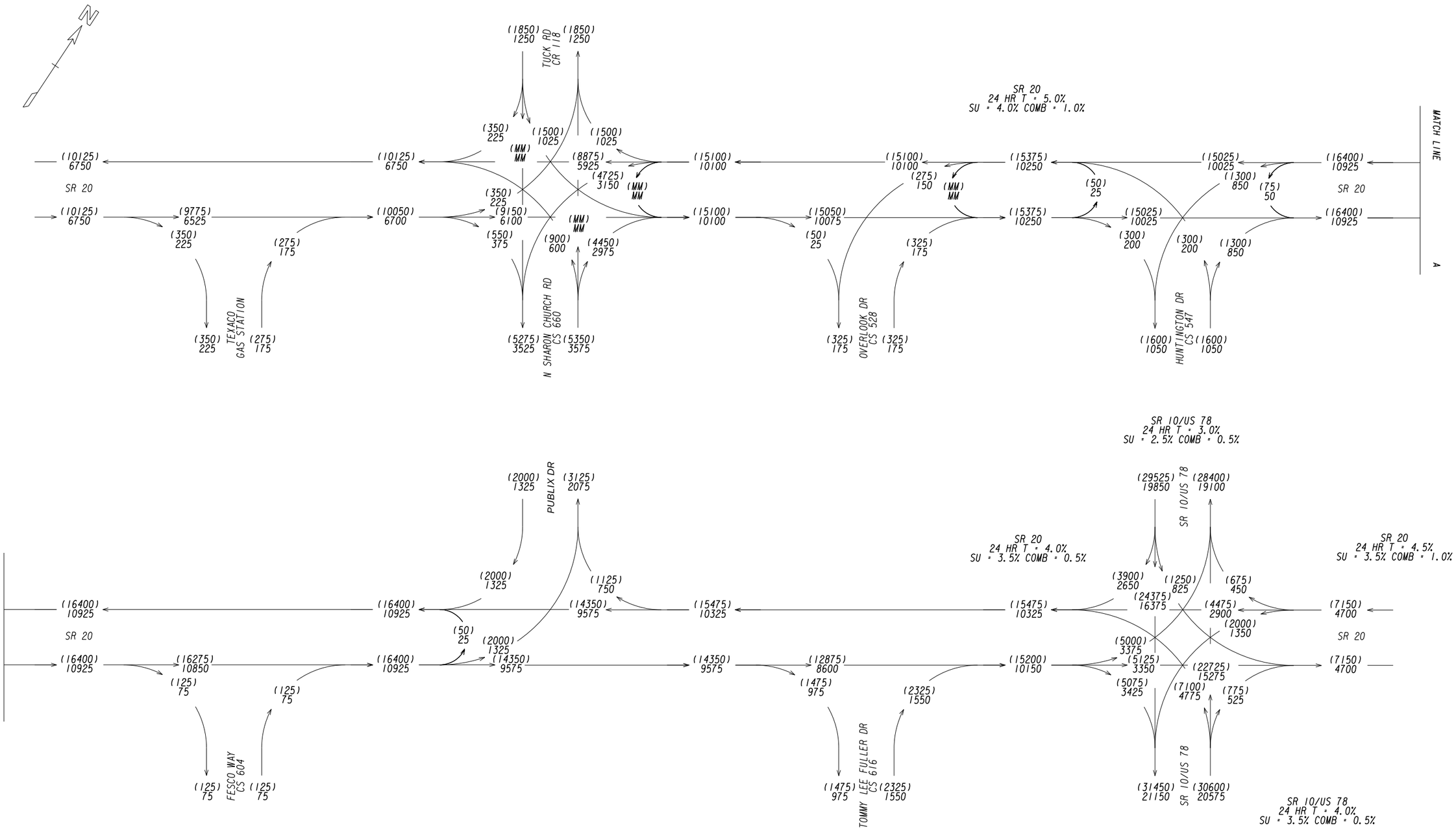
REVISION DATES

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0019

10/23/2015 GPLN



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 AADT = (000)
2025 AADT = 000
BUILD

GDOT PROGRAM DELIVERY

Gresham Smith

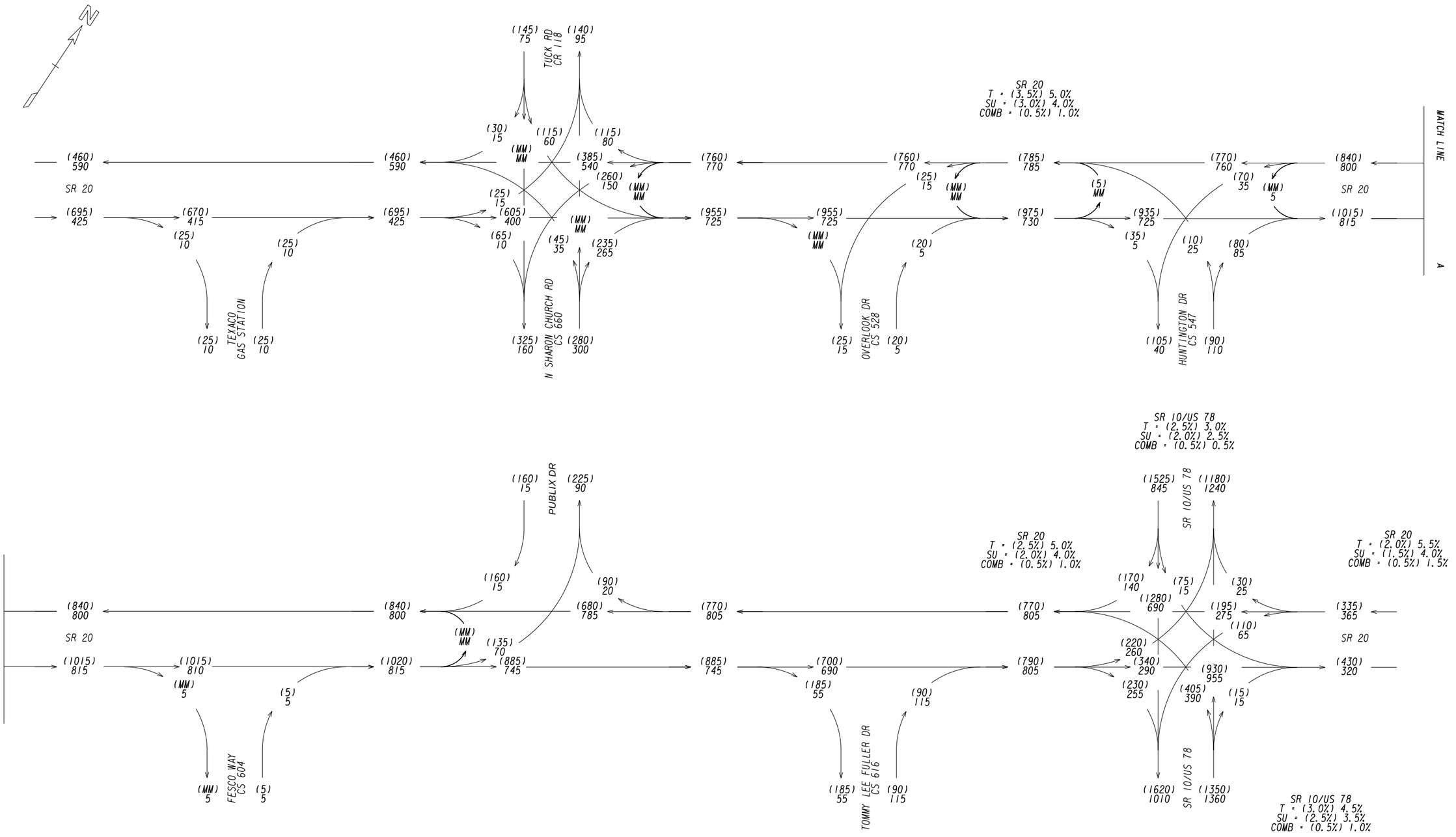
REVISION DATES		

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0020



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2025 PM DHV = (000)
2025 AM DHV = 000
BUILD

GDOT
PROGRAM DELIVERY

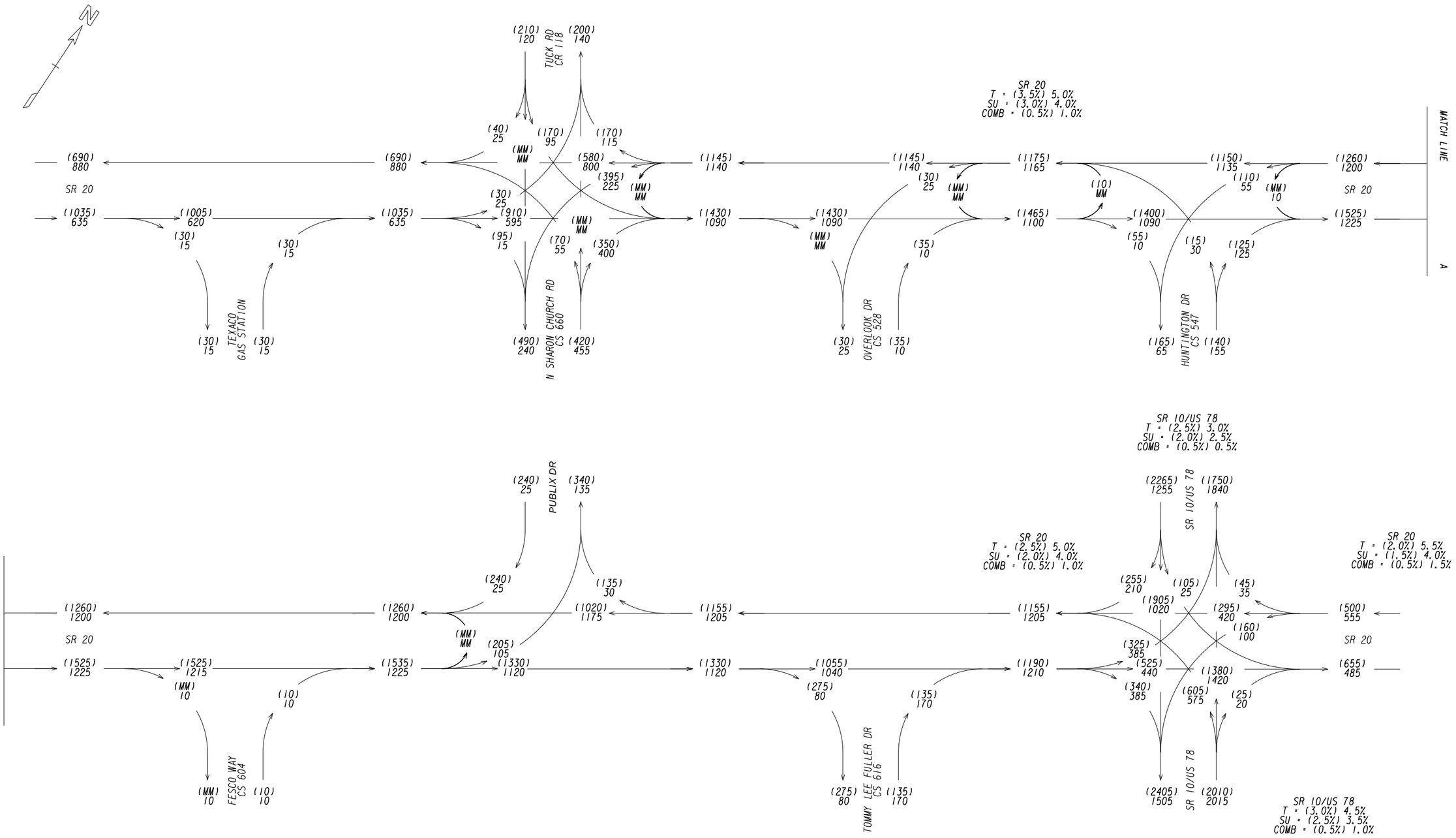
Gresham Smith

REVISION DATES

TRAFFIC DIAGRAM
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0021



PI# 0016387
WALTON COUNTY
SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

2045 PM DHV = (000)
2045 AM DHV = 000
BUILD

PROGRAM DELIVERY

Gresham Smith

REVISION DATES

TRAFFIC DIAGRAM

SR 20 FROM CS 660/N SHARON
CHURCH ROAD TO SR 10/US 78

CHECKED:	CBL	DATE:	01/31/19
BACKCHECKED:	AWC	DATE:	01/31/19
CORRECTED:	CBL	DATE:	01/31/19
VERIFIED:	AWC	DATE:	01/31/19

DRAWING No. 10-0022

Gresham Smith

Genuine Ingenuity

ATTACHMENT 7

ICE Reports

a. Stage 1 Screening Decision Record

b. Concurrence Memo

c. Stage 2 Alternative Selection Decision Record

d. Approved Waiver Request

GDOT ICE Tool: Summary Report for Multiple Locations

ICE Version 2.14 | Revised 08/22/2018

Stage 1 Decision Document PI# 0016387

			UNSIGNALIZED												SIGNALIZED											
Study Intersection	**Existing Intersection Type**	**Waiver Request Type**	Conventional (Minor Stop)	Conventional (All-Way Stop)	Mini Roundabout	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	RIRO w/down stream U-Turn	High-T (unsignalized)	Offset-T Intersections	Diamond Interch (Stop Control)	Diamond Interch (RAB Control)	Add Turn Ln/Median (Unsig)	Other Unsignalized	Traffic Signal	Median U-Turn (Indirect Left)	RCUT (signalized)	Displaced Left Turn (CFI)	Continuous Green-T	Jughandle	Quadrant Roadway	Diamond Interch (Signal Control)	Diverging Diamond	Single Point Interchange	Add Turn Ln/Median (Signal)	Other Signalized
SR 20 @ Fesco Way	Conventional (Minor Stop)	N/A						x	x					x												
SR 20 @ Huntington Dr	Conventional (Minor Stop)	N/A						x						x		x										
SR 20 @ N Sharon & Tuck	Signal (turn lanes on mainline)	N/A					x											x								x	
SR 20 @ Overlook Dr	Conventional (Minor Stop)	N/A						x	x	x				x													
SR 10/US 78 @ SR 20	Signal (turn lanes on mainline)	N/A																	x							x	

Concur with: _____ **Date:** 1/14/20 **Name:** Andrew Heath, P.E.

Chief Engineer or (Approved Delegate)

GDOT ICE Tool: Summary Report for Multiple Locations

ICE Version 2.15
Revised 07/01/2019

Stage 2 Decision Document PI# 0016387

			UNSIGNALIZED												SIGNALIZED											
Study Intersection	**Existing Intersection Type**	**Waiver Request Type**	Conventional (Minor Stop)	Conventional (All-Way Stop)	Mini Roundabout	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	RIRO w/down stream U-Turn	High-T (unsignalized)	Offset-T Intersections	Diamond Interch (Stop Control)	Diamond Interch (RAB Control)	Add Turn Ln/Median (Unsig)	Other Unsignalized	Traffic Signal	Median U-Turn (Indirect Left)	RCUT (signalized)	Displaced Left Turn (CFI)	Continuous Green-T	Jughandle	Quadrant Roadway	Diamond Interch (Signal Control)	Diverging Diamond	Single Point Interchange	Add Turn Ln/Median (Signal)	Other Signalized
SR 20 @ Fesco Way	Conventional (Minor Stop)	N/A						7.6	7.4					7.0												
SR 20 @ Huntington Dr	Conventional (Minor Stop)	N/A						5.9						5.9		-										
SR 20 @ N Sharon & Tuck	Signal (turn lanes on mainline)	Multilane Roundabout					5.9											-								6.0	
SR 20 @ Overlook Dr	Conventional (Minor Stop)	N/A						7.7	7.6	7.3				7.0												
SR 10/US 78 @ SR 20	Signal (turn lanes on mainline)	N/A																	3.5							4.4	

Approved By: _____ **Date:** 2/17/20 **Name:** Andrew Heath, P.E.

Chief Engineer (or Approved Delegate)

GDOT ICE Tool: Waiver Form for Multiple RIRO Intersections

ICE Version 2.14 | Revised 08/22/2018

Project PI# (if applicable): 0016387

Study Intersection	Existing Intersection Type	Avg Daily Traffic (ADT)		Traffic Operations (optional):[1] Opening Year		Design Year	
		Major Rd	Minor Rd	Delay	V/C	Delay	V/C
SR 20 @ Publix Driveway	Conventional (Minor Stop)	30,500	3,000				
SR 20 @ Tommy Lee Fuller	Conventional (Minor Stop)	20,550	2,450				

[1] Capacity data is optional unless needed to justify basis of the waiver request.

Approved By: Andrew Heath, P.E. Date: 1/14/20 Name:

Chief Engineer or (Approved Delegate)

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

Georgia Department of Transportation

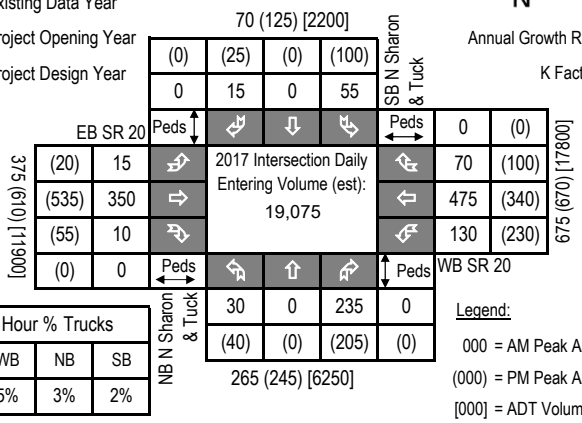
GDOT PI # (or N/A):	0016387	Request By:	GDOT Project Manager
County:	Walton	GDOT District:	1 - Gainesville
Major (State) Road:	SR 20	Speed Limit:	45 mph
Minor (Crossing) ST:	N Sharon & Tuck	Speed Limit:	45 mph
Major ST Direction:	East/West	Area Type:	Urban
Intersection Control:	Signal (turn lanes on mainline)		
Prepared By:	Gresham Smith	Analyst:	C. Lincoln
Date:	2/4/2020	Project ID:	
Project Purpose:	Widening/Re-alignment		

2017	Existing Data Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 8%

2017 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
5%	5%	3%	2%

Legend:

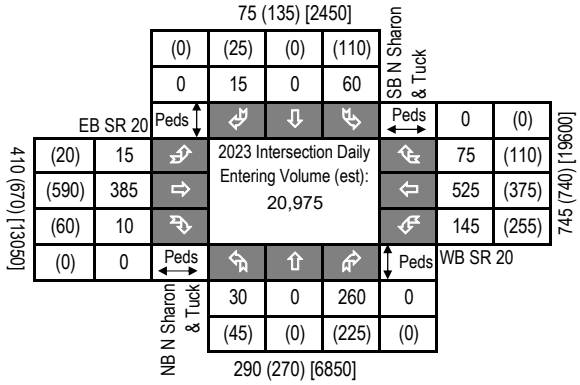
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

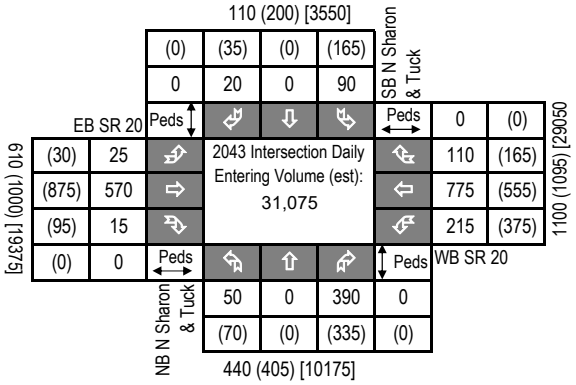
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.77 / N Sharon & Tuck - 0.23

2023 Opening Year Volumes



2043 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 #	0016387
Project Location:	SR 20 @ N Sharon & Tuck
Existing Control:	Signal (turn lanes on mainline)
Prepared by:	Gresham Smith
Date:	2/4/2020

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	Signalized intersection
	Conventional (All-Way Stop)	No	No	**Yes**	No	No	No	No	Not in scale w/ mainline volumes; significant mainline delay
	Mini Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 15,000; not compatible with a 4-lane section
	Single Lane Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 25,000; not compatible with a 4-lane section
	Multilane Roundabout	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RCUT (stop control)	**Yes**	**Yes**	No	No	No	No	No	Not in scale w/ minor street volumes; significant minor street delay
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Not in scale w/ minor street volumes; significant minor street delay
	High-T (unsignalized)	No	No	**Yes**	No	No	No	No	Not applicable; not a T intersection
	Offset-T Intersections	No	No	No	No	No	No	No	Existing condition
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	N/A
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	No	No	No	No	No	No	No	Existing condition
	Median U-Turn (Indirect Left)	No	No	No	No	No	No	No	Not in scale w/ mainline LT volumes; significant mainline LT delay
	RCUT (signalized)	**No**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	Not in scale with mainline LT demands
	Continuous Green-T	No	No	**Yes**	No	No	No	No	Not applicable; not a T intersection
	Jughandle	No	**Yes**	**Yes**	No	No	No	No	Increased mainline LT delay; significant r/w impact to multiple quadrants
	Quadrant Roadway	No	**Yes**	**Yes**	No	No	No	No	Increased LT delay; significant r/w impact to multiple quadrants
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diverging Diamond	No	No	No	No	No	No	No	Not applicable; not an interchange
	Single Point Interchange	No	No	No	No	No	No	No	Not applicable; not an interchange
	Add LT Lanes on Both Roads Add RT Lanes on Both Roads	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	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 ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 | GDOT District: 1 - Gainesville | Date: 2/4/2020
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ N Sharon & Tuck | Analyst: C. Lincoln
Existing Intersection Control: Signal (turn lanes on mainline) | Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2023 Opening Yr No-Build Peak Hr Intersection Delay	14.7 sec	27.9 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.68	1.04
2043 Design Yr No-Build Peak Hr Intersection Delay	25.9 sec	191.4 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	0.93	3.26

Complete Streets Warrants Met?
- [x] PEDESTRIANS
- [ ] BICYCLES
- [ ] TRANSIT

Crash Type: Crash Data: Enter most recent 5 years of crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	10	3	0	27%
Head-On	2	0	0	4%
Rear End	25	2	0	56%
Sideswipe - same	1	1	0	4%
Sideswipe - opposite	1	0	0	2%
Not Collision w/Motor Veh	1	2	0	6%
TOTALS:	40	8	0	48

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

Alternatives Analysis:

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	Multilane Roundabout	RCUT (signalized)	Add LT and RT Lanes	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Additional description here*	*Additional description here*		
Construction Cost	$1,946,000	$1,380,000	$962,000		
ROW Cost	$273,000	$51,000	$0		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$25,000	$54,000	$15,000		
Design & Contingency Cost	$610,000	$383,000	$267,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$2,854,000	$1,868,000	$1,244,000		
Traffic Operations:					
Traffic Analysis Software Used	SIDRA 7	Synchro 9	Synchro 9		
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr		
2043 Design Yr Build Intersection Delay	9.0 sec / 14.4 sec	17.2 sec / 23.8 sec	18.2 sec / 21.9 sec		
2043 Design Yr Build Intersection V/C	0.62 / 0.80	0.76 / 0.78	0.87 / 0.88		
Safety Analysis:					
Predefined CRF: PDO	26%	15%	41%		
Predefined CRF: Fatal/Inj	71%	22%	33%		
Predefined CRF Source:	FHWA Clearinghouse #s 4196 / 4195	FHWA-HRT-17-083	FHWA Clearinghouse #s 270&285 / 274&288		
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None	None		
Archaeology Resources	None	None	None		
Graveyard	None	None	None		
Stream	None	None	None		
Underground Tank/Hazmat	None	None	None		
Park Land	None	None	None		
EJ Community	None	None	None		
Wooded Area	None	None	None		
Wetland	None	None	None		
Stakeholder Posture:					
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	5.9	-	6.0		
Rank of Control Type Alternatives:	2	-	1		

*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*

[1] *Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report*

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary):

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.15 | Revised 07/01/2019

Project Information

Location:	SR 20 @ N Sharon & Tuck	County:	Walton	Date:	2/4/2020
GDOT PI # (or N/A):	0016387	Area Type:	Urban	Agency/Firm:	Gresham Smith
Existing Intersection Control:	Signal (turn lanes on mainline	GDOT District:	1 - Gainesville	Analyst:	C. Lincoln
Type of Analysis:	Conventional Non-Safety Funded Project			Major Street Direction:	East/West

Table 1: Existing Conditions

	EB SR 20			WB SR 20			NB N Sharon & Tuck			SB N Sharon & Tuck		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	0	1	0	1	1	0	0	1	0	0	0	0
Lane Widths*	0'	12'	0'	12'	12'	0'	0'	11'	0'	0'	0'	0'
Bay Length**	0'		0'	300'		0'	0'		0'	0'		0'
Median Width		12'			0'			0'			0'	
Right-of-Way	100'						100'					

Table 2: Proposed Conditions

	Multilane Roundabout	RCUT (signalized)	Add LT and RT Lanes	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	11	11	11	0	0
Modify/Replace Traffic Signal	0	3	1	0	0
Lighting Poles (ea)	22	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Corridor (5+ intersections)

Intersections

Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	-10%
Prelim Engineering:	15%
Project Contingency:	20%

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$128,625
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	Multilane Roundabout		RCUT (signalized)		Add LT and RT Lanes		N/A		N/A	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	57,344	$733,093	26,870	$254,449	33,600	$318,182	#N/A	#N/A		
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	3431	$88,363	3,680	$70,214	3,800	$72,504	#N/A	#N/A		
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Concrete Island (sqyd)	n/a	$51.58/syd	450	$31,335	500	$25,790	0	$0	#N/A	#N/A		
Median Landscaping	$100K/LM	$1.89/LF	3600	$9,205	5,520	$10,455	0	$0	#N/A	#N/A		
Typical Driveways Impacted (ea)	n/a	$7,500 ea	11	$111,375	11	$82,500	11	$82,500	#N/A	#N/A		
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1200	$55,227	1,840	$62,727	1,900	$64,773	#N/A	#N/A		
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	4273	$59,126	0	$0	0	$0	#N/A	#N/A		
Signing & Marking	$0	$22.73/LF	1,200	$36,823	1,840	$41,823	1,900	$43,187	#N/A	#N/A		
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	3	$547,725	1	$182,575	#N/A	#N/A		
Lighting (per pole)	n/a	$5,607 ea	22	$166,528	0	$0	0	$0	#N/A	#N/A		
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0	#N/A	#N/A		
Grading Complete - 20%	n/a	n/a		$522,885		$219,137		$152,744		#N/A		
Traffic Control - 20%	n/a	n/a		$348,590		$219,137		$152,744		#N/A		
Reimbrusable Utility	n/a	n/a		$25,821		$54,784		$15,274		#N/A		
Preliminary Engineering - 15%	n/a	n/a		$261,442		$164,352		$114,558		#N/A		
Contigency - 20%	n/a	n/a		$348,590		$219,137		$152,744		#N/A		
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$171,146		$32,339		$0		#N/A		
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0		#N/A		
ROW Multiplier - 1.6	n/a	n/a		$102,687		$19,404		$0		#N/A		
-Project Scale Reduction - 10.0%	n/a	n/a		-$216,255		-$153,396		-$106,921		#N/A		
Grand Total Costs				**$2,856,000**		**$1,871,000**		**$1,245,000**		#N/A		

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
Multilane Roundabout	High Speed Roundabout	F.D. Asphalt	1.33	0.0	57,344	0.0	600	0.0	600	0.0
RCUT (signalized)	Loons/Leftovers Only	F.D. Asphalt	0.25	0.0	26,870	0.0	1,330	0.0	510	0.0
Add LT and RT Lanes	N/A	F.D. Asphalt	0.00	0.0	33,600	0.0	1,000	0.0	900	0.0
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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 20 @ N Sharon & Tuck
County: Walton
GDOT District: 1 - Gainesville
Area Type: Urban
Existing Intersection Control: Signal (turn lanes on mainline)

GDOT PI # (or N/A): 0016387
Requested By: GDOT Project Manager
Prepared By: Gresham Smith
Analyst: C. Lincoln
Date: 2/4/2020
Waiver Request Type: GDOT PDP Project

Traffic and Operations Data:[1]

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Type:	Intersection Delay	
Existing Avg Daily Traffic (Major Street):	14,850	
Existing Avg Daily Traffic (Minor Street):	4,250	
Analysis Period:	AM Peak	PM Peak
2023 Opening Yr Peak Hour Intersection Delay:	14.7 sec	27.9 sec
2023 Opening Yr Peak Hour Intersection V/C:	0.68	1.04
2043 Design Yr Peak Hour Intersection Delay:	25.9 sec	191.4 sec
2043 Design Yr Peak Hour Intersection V/C:	0.93	3.26

[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 Type	Crash Data: Enter most recent 5 years of crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
	Angle	10	3	0	<-
	Head-On	2	0	0	
	Rear End	25	2	0	
	Sideswipe - same	1	1	0	
	Sideswipe - opposite	1	0	0	
	Not Collision w/Motor Veh	1	2	0	
	TOTALS:	**40**	**8**	**0**	

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

Description of Work / Justification for Waiver (Required):	Since signal warrants are not met at this intersection, Alt 3 (Add LT & RT Lanes) should not be scored/ranked. Therefore, Alt 1 (Multilane Roundabout) is the proposed control for this intersection. Note, ops values on this waiver are for the no-build condition. Roundabout analysis shows design year results of 9.0sec and 14.4sec delay in design year AM and PM peaks respectively, and v/c values of 0.62 and 0.80 in design year AM and PM peaks respectively.
Proposed Intersection Control:	Multilane Roundabout

REQUESTED BY: _____ Date: _____

Title: _____

APPROVED BY: _____ Date: 2/17/20

Name: Andrew Heath, P.E.

Chief Engineer or (Approved Delegate)

WARRANT ANALYSIS

Signal warrant analysis was performed for the intersection. The Warrant 1 – Eight-Hour Vehicular Volume of the Manual of Uniform Traffic Control Devices (MUTCD) was used to determine the need for a traffic signal at each location. Since the design volumes provided by GDOT are limited to peak hour and daily volumes, the analysis was conducted using the methodologies outlined in GDOT's Design Policy Manual (Section 13.5.3). Per the Manual, the eighth-highest hourly volume of the day can be compared to the MUTCD requirement of Warrant 1 to determine if the warrant is met. Additionally, the eighth-highest hourly volume of the day can be estimated as 5.6% of the daily volume.

The warrant analysis was conducted using 100% volume thresholds for a 2-lane major street approach and 1-lane minor street approach. Since the intersection improvements would incorporate an exclusive right-turn lane on the minor street, the right-turn volume was excluded from the minor approach volume.

The signal warrant analysis is shown in the following tables. As shown, signal **warrants are not met** in the 2023 Opening year at this intersection. However, warrants will be met by the 2043 Design Year.

Traffic Signal & AWSC Warrant Analysis

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ N Sharon Church Rd	69	913	No	No	No	No	Yes	No	No

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ N Sharon Church Rd	99	1354	No	Yes	No	No	Yes	Yes	No

Per the MUTCD, at an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor approach" volume and the corresponding single direction of opposing traffic on the major street as the "mainline total" volume. Therefore, the warrant analysis was also conducted in this manner, using 100% volume thresholds for a 2-lane major street approach and 1-lane minor street approach.

This signal warrant analysis is shown in the following tables. As shown, signal **warrants are not met** in the 2023 Opening year at this intersection. However, warrants will be met by the 2043 Design Year.

Traffic Signal & AWSC Warrant Analysis – Mainline Left Turn

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants					
	Mainline Left	Opposing Traffic	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?
SR 20 @ N Sharon Church Rd	171	351	No	No	No	No	No	No

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants					
	Mainline Left	Opposing Traffic	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?
SR 20 @ N Sharon Church Rd	253	522	Yes	No	No	Yes	No	Yes

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	445	10	145	600	30	260
Future Volume (veh/h)	445	10	145	600	30	260
Number	2	12	1	6	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1845	1900
Adj Flow Rate, veh/h	468	11	153	632	32	274
Adj No. of Lanes	1	0	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	0	0
Cap, veh/h	910	21	423	935	52	448
Arrive On Green	0.52	0.52	0.52	0.52	0.32	0.32
Sat Flow, veh/h	1761	41	886	1810	165	1416
Grp Volume(v), veh/h	0	479	153	632	307	0
Grp Sat Flow(s),veh/h/ln	0	1802	886	1810	1587	0
Q Serve(g_s), s	0.0	10.5	8.2	15.6	9.8	0.0
Cycle Q Clear(g_c), s	0.0	10.5	18.7	15.6	9.8	0.0
Prop In Lane		0.02	1.00		0.10	0.89
Lane Grp Cap(c), veh/h	0	931	423	935	502	0
V/C Ratio(X)	0.00	0.51	0.36	0.68	0.61	0.00
Avail Cap(c_a), veh/h	0	931	423	935	502	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	9.5	15.7	10.8	17.4	0.0
Incr Delay (d2), s/veh	0.0	2.0	0.5	2.0	5.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	9.6	3.7	12.9	8.7	0.0
LnGrp Delay(d),s/veh	0.0	11.6	16.2	12.7	22.8	0.0
LnGrp LOS		B	B	B	C	
Approach Vol, veh/h	479			785	307	
Approach Delay, s/veh	11.6			13.4	22.8	
Approach LOS	B			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.0		24.0		36.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		30.0		18.0		30.0		
Max Q Clear Time (g_c+I1), s		12.5		11.8		20.7		
Green Ext Time (p_c), s		7.2		0.5		4.9		

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	700	60	255	485	45	225
Future Volume (veh/h)	700	60	255	485	45	225
Number	2	12	1	6	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1900	1827	1827	1845	1900
Adj Flow Rate, veh/h	722	62	263	500	46	232
Adj No. of Lanes	1	0	1	1	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	4	4	4	4	0	0
Cap, veh/h	919	79	252	1012	77	388
Arrive On Green	0.55	0.55	0.55	0.55	0.29	0.29
Sat Flow, veh/h	1659	142	674	1827	263	1328
Grp Volume(v), veh/h	0	784	263	500	279	0
Grp Sat Flow(s),veh/h/ln	0	1802	674	1827	1597	0
Q Serve(g_s), s	0.0	22.3	13.7	10.9	9.7	0.0
Cycle Q Clear(g_c), s	0.0	22.3	36.0	10.9	9.7	0.0
Prop In Lane		0.08	1.00		0.16	0.83
Lane Grp Cap(c), veh/h	0	998	252	1012	467	0
V/C Ratio(X)	0.00	0.79	1.04	0.49	0.60	0.00
Avail Cap(c_a), veh/h	0	998	252	1012	467	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	11.5	28.7	8.9	19.7	0.0
Incr Delay (d2), s/veh	0.0	6.2	68.0	0.4	5.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	18.4	16.7	9.4	8.6	0.0
LnGrp Delay(d),s/veh	0.0	17.7	96.7	9.3	25.3	0.0
LnGrp LOS		B	F	A	C	
Approach Vol, veh/h	784			763	279	
Approach Delay, s/veh	17.7			39.4	25.3	
Approach LOS	B			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		41.0		24.0		41.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		35.0		18.0		35.0		
Max Q Clear Time (g_c+I1), s		24.3		11.7		38.0		
Green Ext Time (p_c), s		6.9		0.5		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	27.9
HCM 2010 LOS	C

Notes

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	15	195	825	45	355
Future Volume (veh/h)	610	15	195	825	45	355
Number	2	12	1	6	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1845	1900
Adj Flow Rate, veh/h	642	16	205	868	47	374
Adj No. of Lanes	1	0	1	1	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	0	0
Cap, veh/h	908	23	299	935	56	446
Arrive On Green	0.52	0.52	0.52	0.52	0.32	0.32
Sat Flow, veh/h	1758	44	751	1810	177	1407
Grp Volume(v), veh/h	0	658	205	868	422	0
Grp Sat Flow(s),veh/h/ln	0	1802	751	1810	1588	0
Q Serve(g_s), s	0.0	16.7	14.3	26.7	14.8	0.0
Cycle Q Clear(g_c), s	0.0	16.7	31.0	26.7	14.8	0.0
Prop In Lane		0.02	1.00		0.11	0.89
Lane Grp Cap(c), veh/h	0	931	299	935	503	0
V/C Ratio(X)	0.00	0.71	0.69	0.93	0.84	0.00
Avail Cap(c_a), veh/h	0	931	299	935	503	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	11.0	23.7	13.5	19.1	0.0
Incr Delay (d2), s/veh	0.0	4.5	6.4	15.1	15.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	14.4	7.0	23.7	13.4	0.0
LnGrp Delay(d),s/veh	0.0	15.5	30.1	28.6	34.5	0.0
LnGrp LOS		B	C	C	C	
Approach Vol, veh/h	658			1073	422	
Approach Delay, s/veh	15.5			28.9	34.5	
Approach LOS	B			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		36.0		24.0		36.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		30.0		18.0		30.0		
Max Q Clear Time (g_c+I1), s		18.7		16.8		33.0		
Green Ext Time (p_c), s		7.8		0.2		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	25.9
HCM 2010 LOS	C

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	960	80	350	665	60	310
Future Volume (veh/h)	960	80	350	665	60	310
Number	2	12	1	6	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1900	1827	1827	1845	1900
Adj Flow Rate, veh/h	990	82	361	686	62	320
Adj No. of Lanes	1	0	1	1	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	4	4	4	4	0	0
Cap, veh/h	922	76	111	1012	76	390
Arrive On Green	0.55	0.55	0.55	0.55	0.29	0.29
Sat Flow, veh/h	1665	138	514	1827	258	1334
Grp Volume(v), veh/h	0	1072	361	686	383	0
Grp Sat Flow(s),veh/h/ln	0	1803	514	1827	1596	0
Q Serve(g_s), s	0.0	36.0	0.0	17.4	14.5	0.0
Cycle Q Clear(g_c), s	0.0	36.0	36.0	17.4	14.5	0.0
Prop In Lane		0.08	1.00		0.16	0.84
Lane Grp Cap(c), veh/h	0	998	111	1012	467	0
V/C Ratio(X)	0.00	1.07	3.26	0.68	0.82	0.00
Avail Cap(c_a), veh/h	0	998	111	1012	467	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	14.5	32.5	10.4	21.4	0.0
Incr Delay (d2), s/veh	0.0	50.5	1039.5	1.8	14.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	56.6	61.1	14.0	13.0	0.0
LnGrp Delay(d),s/veh	0.0	65.0	1072.0	12.2	36.3	0.0
LnGrp LOS		F	F	B	D	
Approach Vol, veh/h	1072			1047	383	
Approach Delay, s/veh	65.0			377.6	36.3	
Approach LOS	E			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		41.0		24.0		41.0		
Change Period (Y+Rc), s		6.0		6.0		6.0		
Max Green Setting (Gmax), s		35.0		18.0		35.0		
Max Q Clear Time (g_c+I1), s		38.0		16.5		38.0		
Green Ext Time (p_c), s		0.0		0.2		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	191.4
HCM 2010 LOS	F

Notes

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

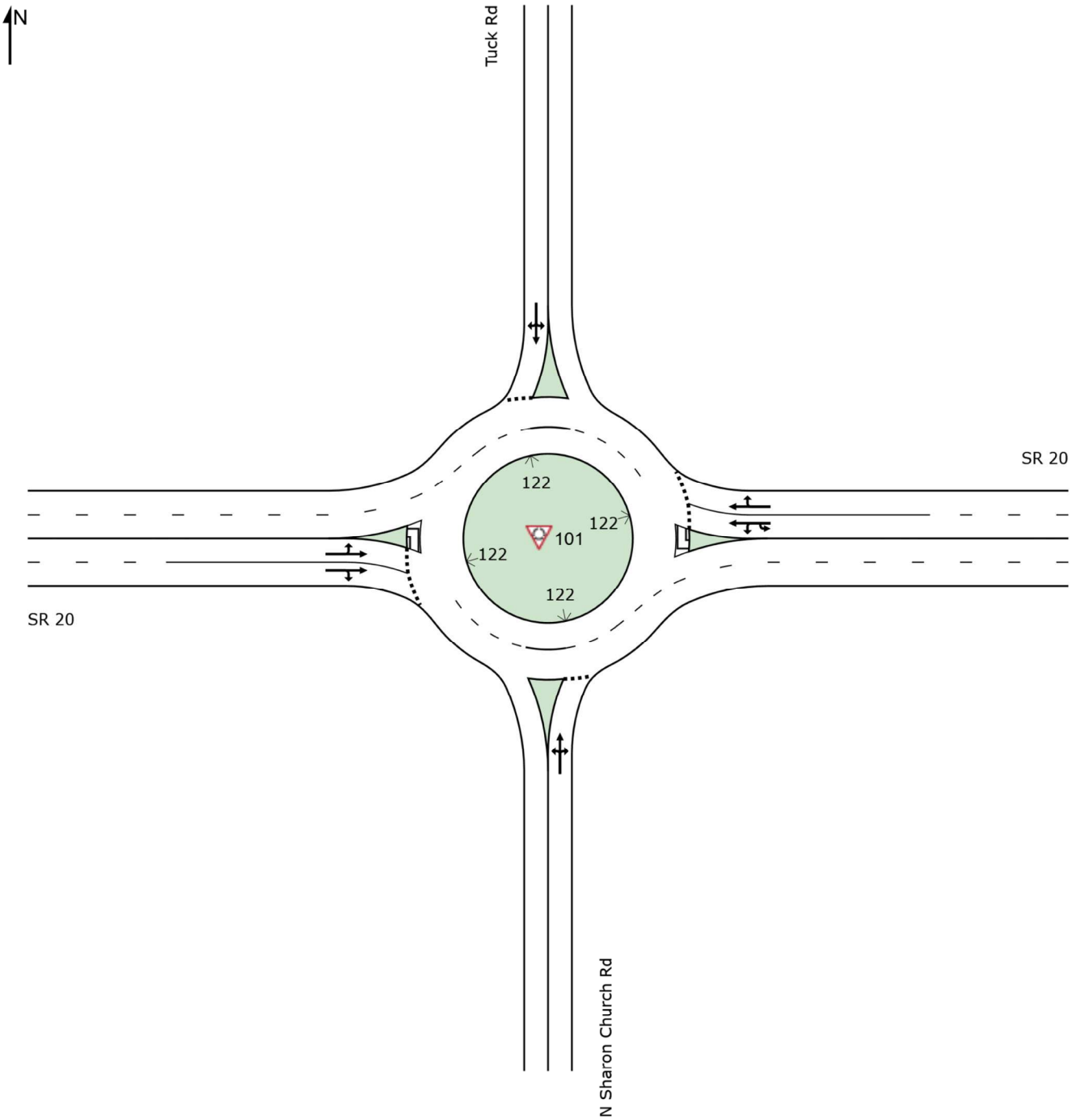
2043 Design Year Multi-Lane Analysis

Single Lane Design Life Analysis

SITE LAYOUT

Site: 101 [2043 AM - Multi Lane - Copy]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout



LANE SUMMARY

Site: 101 [2043 AM - Multi Lane - Copy]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: N Sharon Church Rd													
Lane 1[d]	455	3.0	735	0.618	100	15.6	LOS C	4.7	120.8	Full	1600	0.0	0.0
Approach	455	3.0		0.618		15.6	LOS C	4.7	120.8				
East: SR 20													
Lane 1	568	5.0	1256	0.452	100	7.5	LOS A	2.7	71.2	Full	1600	0.0	0.0
Lane 2[d]	568	5.0	1256	0.452	100	7.5	LOS A	2.7	71.2	Full	1600	0.0	0.0
Approach	1135	5.0		0.452		7.5	LOS A	2.7	71.2				
North: Tuck Rd													
Lane 1[d]	114	2.0	535	0.214	100	9.6	LOS A	0.7	18.8	Full	1600	0.0	0.0
Approach	114	2.0		0.214		9.6	LOS A	0.7	18.8				
West: SR 20													
Lane 1	314	5.0	1002	0.314	100	6.8	LOS A	1.4	37.1	Full	1600	0.0	0.0
Lane 2[d]	314	5.0	1002	0.314	100	6.8	LOS A	1.4	37.1	Full	1600	0.0	0.0
Approach	629	5.0		0.314		6.8	LOS A	1.4	37.1				
Intersection	2333	4.5		0.618		9.0	LOS A	4.7	120.8				

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

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 101 [2043 PM - Multi Lane - Copy]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: N Sharon Church Rd													
Lane 1[d]	419	3.0	523	0.800	100	33.0	LOS D	6.9	176.0	Full	1600	0.0	0.0
Approach	419	3.0		0.800		33.0	LOS D	6.9	176.0				
East: SR 20													
Lane 1	565	3.5	1244	0.454	100	7.5	LOS A	2.8	71.3	Full	1600	0.0	0.0
Lane 2[d]	565	3.5	1244	0.454	100	7.5	LOS A	2.8	71.3	Full	1600	0.0	0.0
Approach	1130	3.5		0.454		7.5	LOS A	2.8	71.3				
North: Tuck Rd													
Lane 1[d]	207	2.0	562	0.369	100	12.0	LOS B	1.6	39.8	Full	1600	0.0	0.0
Approach	207	2.0		0.369		12.0	LOS B	1.6	39.8				
West: SR 20													
Lane 1	515	3.5	812	0.634	100	15.0	LOS B	5.8	149.4	Full	1600	0.0	0.0
Lane 2[d]	515	3.5	812	0.634	100	15.0	LOS B	5.8	149.4	Full	1600	0.0	0.0
Approach	1031	3.5		0.634		15.0	LOS B	5.8	149.4				
Intersection	2787	3.3		0.800		14.4	LOS B	6.9	176.0				

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

d Dominant lane on roundabout approach

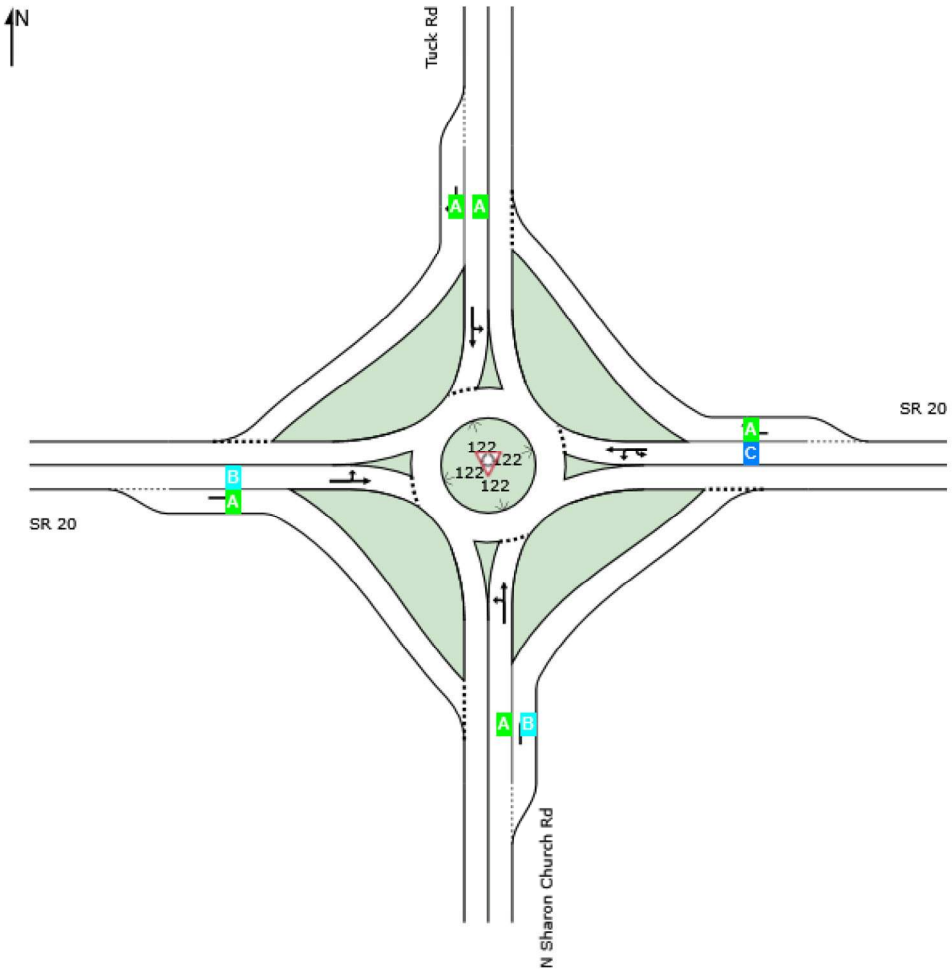
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [2023 AM - Single Lane - DL]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years

	Approaches				Intersection
	South	East	North	West	
LOS	B	C	A	B	B



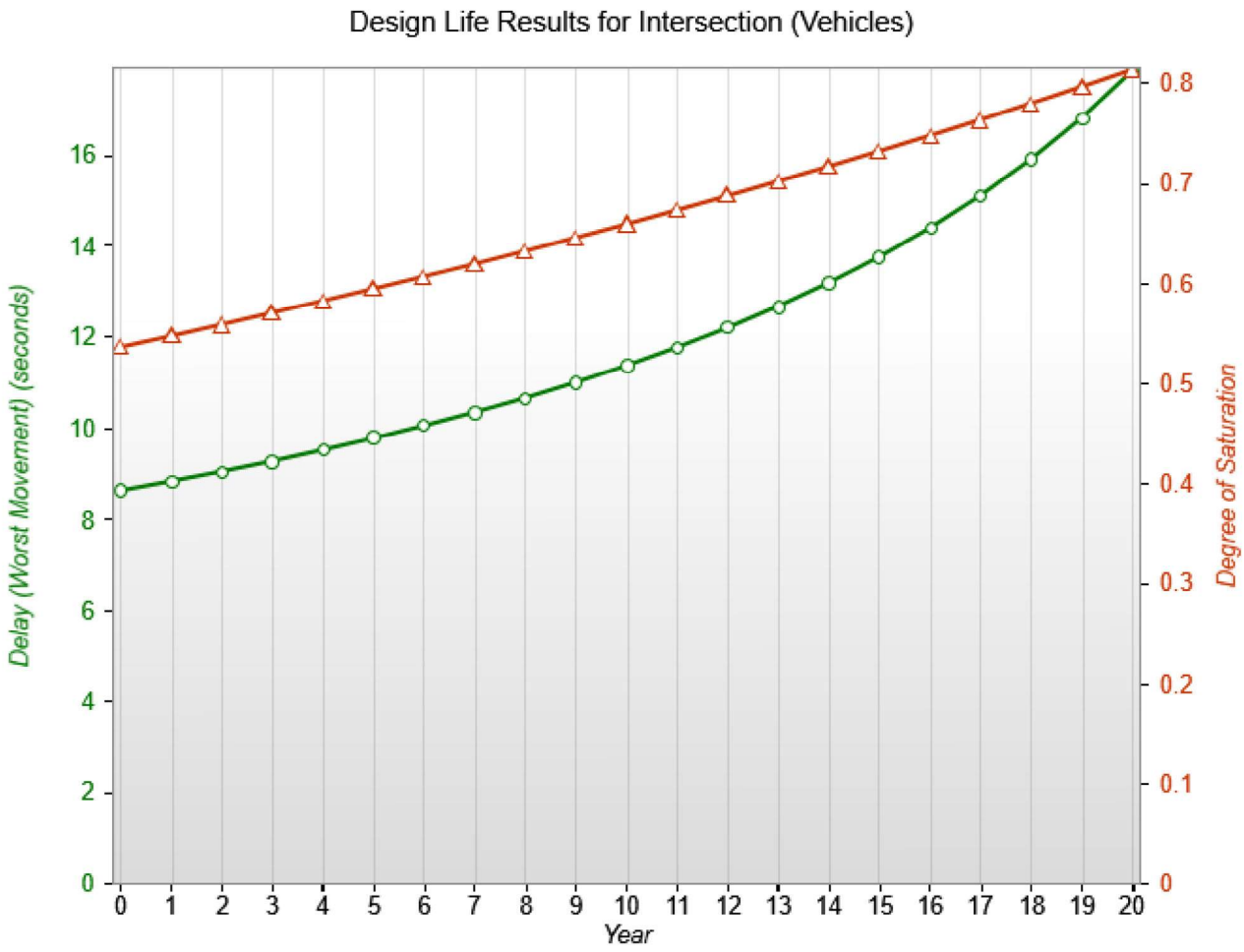
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

SITE GRAPHS - Demand (Design Life) Analysis

Average control delay per vehicle for the worst vehicle movement (seconds) and Highest degree of saturation in any lane

Site: 101 [2023 AM - Single Lane - DL]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years



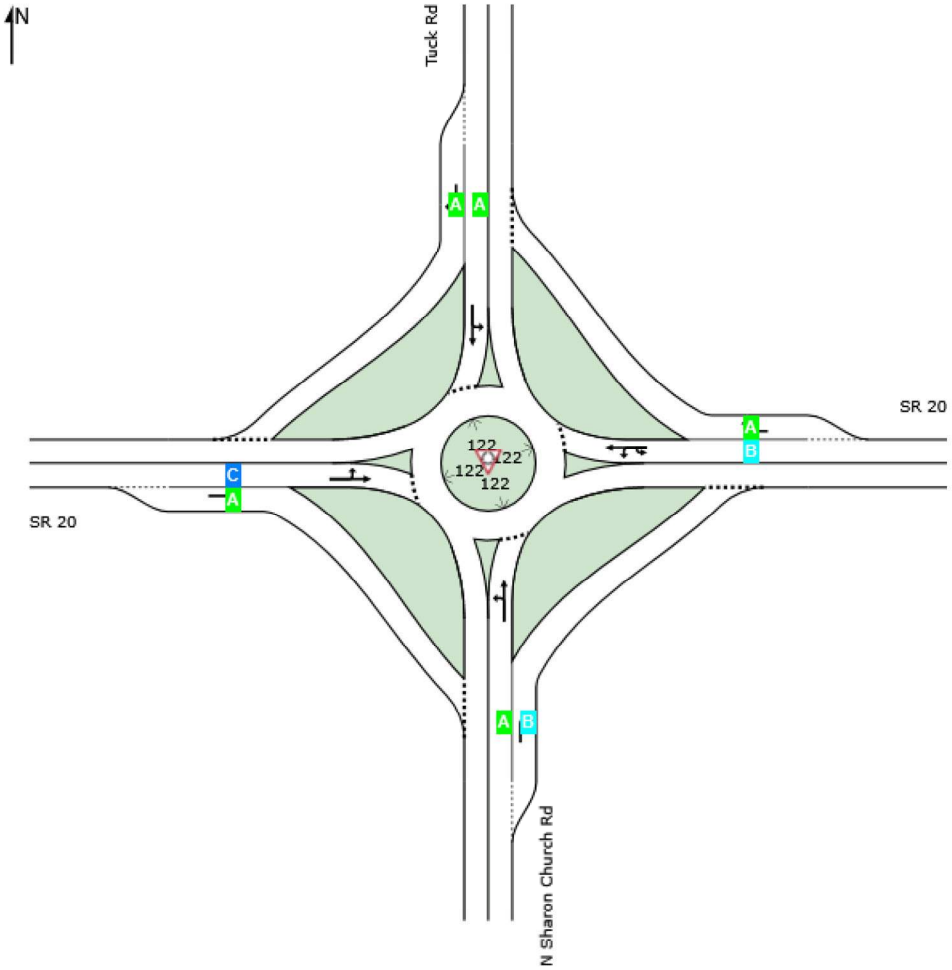
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [2023 PM - Single Lane - DL]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout
Design Life Analysis (Practical Capacity): Results for 9 years

	Approaches				Intersection
	South	East	North	West	
LOS	B	A	A	C	B



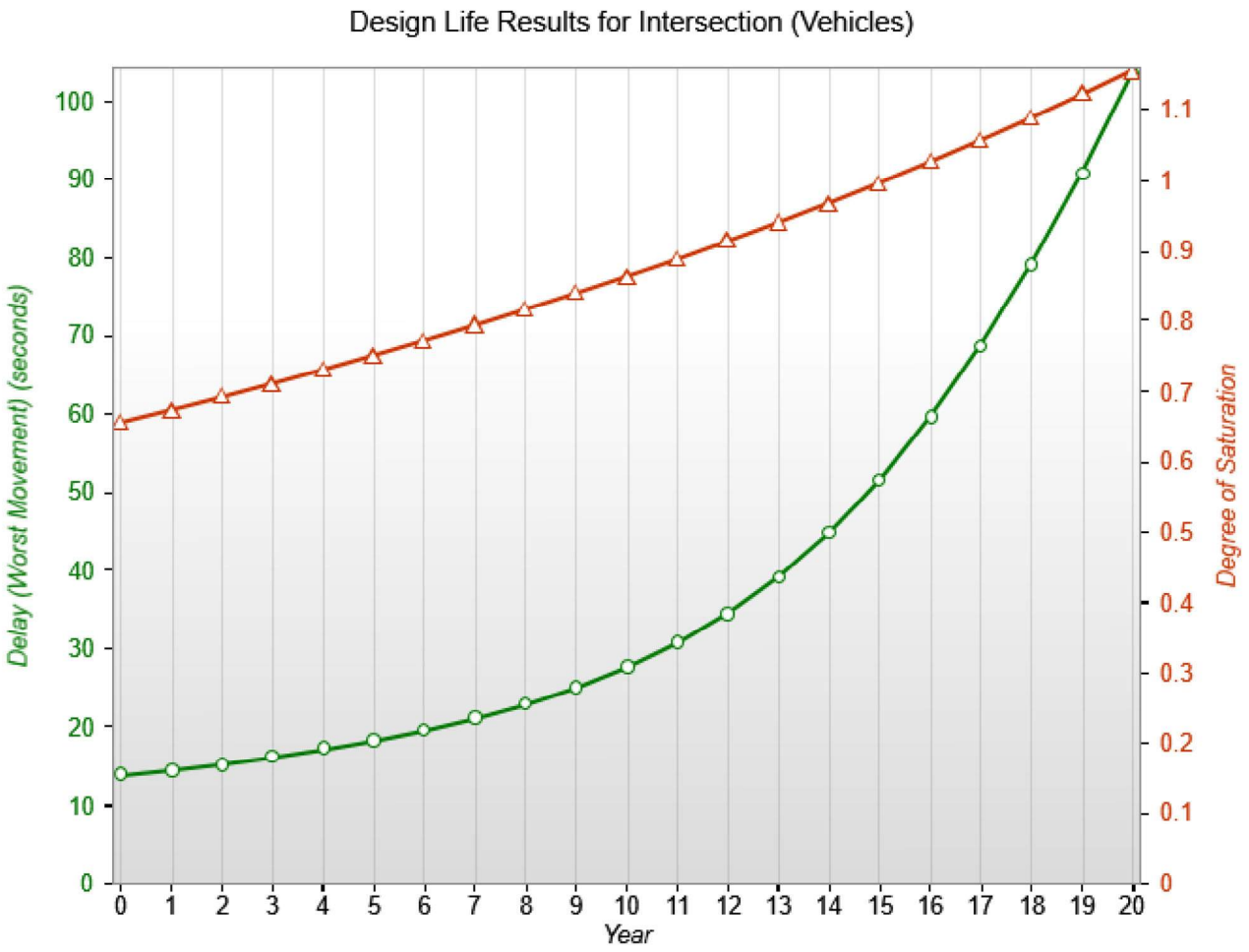
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

SITE GRAPHS - Demand (Design Life) Analysis

Average control delay per vehicle for the worst vehicle movement (seconds) and Highest degree of saturation in any lane

Site: 101 [2023 PM - Single Lane - DL]

SR 20 @ N Sharon Church Rd & Tuck Rd
Site Category: (None)
Roundabout
Design Life Analysis (Practical Capacity): Results for 9 years



Gresham Smith

Genuine Ingenuity

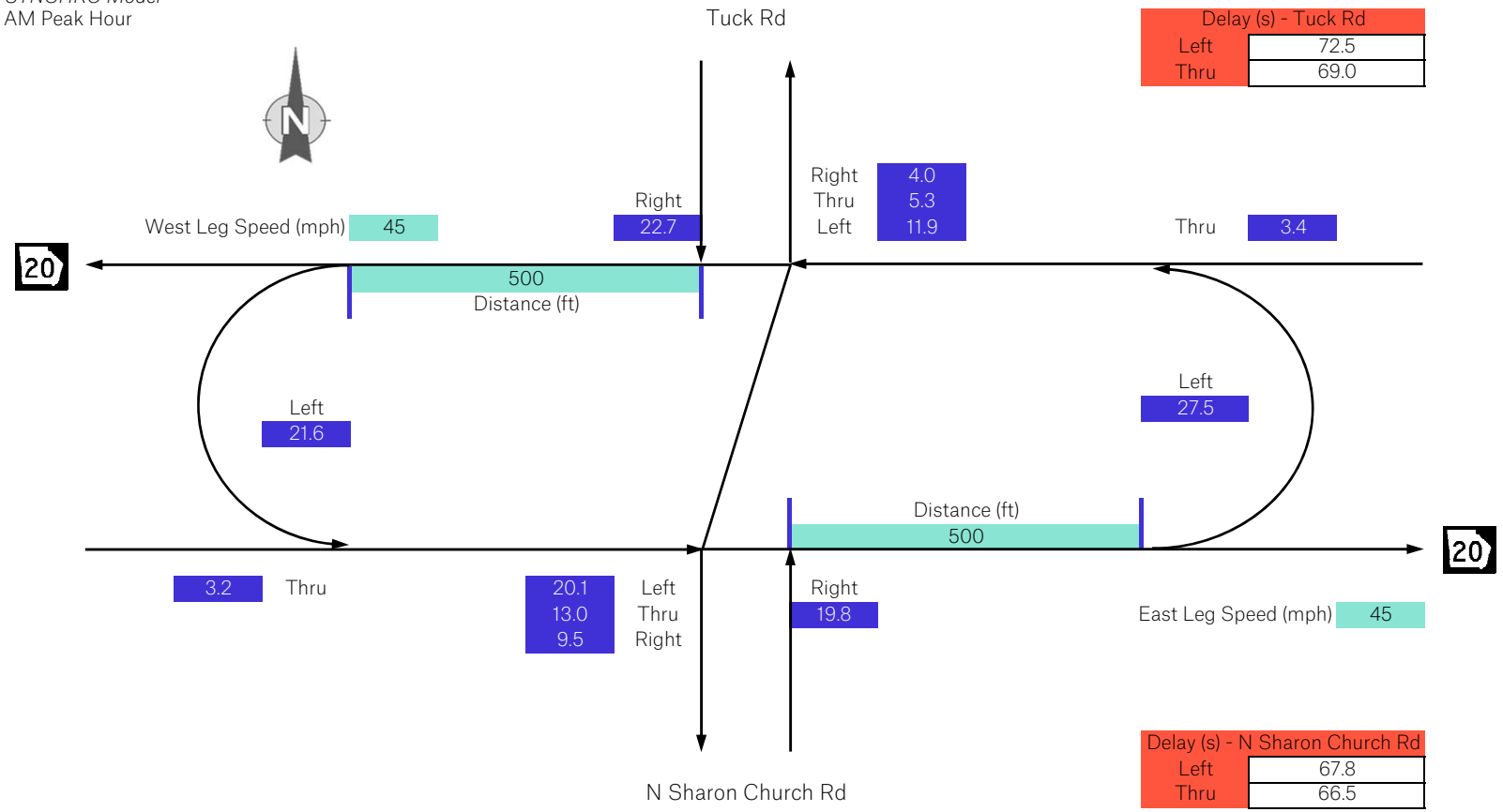
ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model
2043 AM Peak Hour



Delay (s) - Tuck Rd	
Left	72.5
Thru	69.0

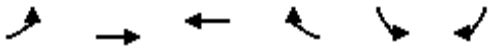
Delay (s) - N Sharon Church Rd	
Left	67.8
Thru	66.5

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	25	570	15	215	775	110	50	0	390	90	0	20
Delay (s)	23.3	16.2	12.7	15.3	8.7	7.4	67.8	66.5	19.8	72.5	69.0	22.7

	EB	WB	NB	SB
Volume	610	1100	440	110
Delay (s)	16.4	9.9	25.2	63.4

Overall Delay (s)
17.2

Gresham Smith



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	610	0	0	90	0
Future Volume (vph)	0	610	0	0	90	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		6.0			6.0	
Lane Util. Factor		0.95			1.00	
Frt		1.00			1.00	
Flt Protected		1.00			0.85	
Satd. Flow (prot)		3529			1625	
Flt Permitted		1.00			0.85	
Satd. Flow (perm)		3529			1625	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	642	0	0	95	0
RTOR Reduction (vph)	0	0	0	0	88	0
Lane Group Flow (vph)	0	642	0	0	7	0
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		33.8			3.5	
Effective Green, g (s)		33.8			3.5	
Actuated g/C Ratio		0.69			0.07	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		2419			115	
v/s Ratio Prot		c0.18			c0.00	
v/s Ratio Perm						
v/c Ratio		0.27			0.06	
Uniform Delay, d1		3.0			21.4	
Progression Factor		1.00			1.00	
Incremental Delay, d2		0.3			0.2	
Delay (s)		3.2			21.6	
Level of Service		A			C	
Approach Delay (s)		3.2	0.0		21.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	49.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Traffic Volume (vph)	0	660	15	0	0	0	0	0	440	215	0
Future Volume (vph)	0	660	15	0	0	0	0	0	440	215	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)		6.0	6.0						6.0	6.0	
Lane Util. Factor		0.95	1.00						1.00	1.00	
Frt		1.00	0.85						0.86	1.00	
Flt Protected		1.00	1.00						1.00	0.95	
Satd. Flow (prot)		3529	1579						1638	1764	
Flt Permitted		1.00	1.00						1.00	0.95	
Satd. Flow (perm)		3529	1579						1638	1764	
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
Adj. Flow (vph)	0	695	16	0	0	0	0	0	463	226	0
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	695	6	0	0	0	0	0	463	226	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	3%	3%	3%	5%	5%
Turn Type		NA	Perm						Perm	Prot	
Protected Phases		2								4	
Permitted Phases			2						8		
Actuated Green, G (s)		20.2	20.2						19.0	19.0	
Effective Green, g (s)		20.2	20.2						19.0	19.0	
Actuated g/C Ratio		0.39	0.39						0.37	0.37	
Clearance Time (s)		6.0	6.0						6.0	6.0	
Vehicle Extension (s)		3.0	3.0						3.0	3.0	
Lane Grp Cap (vph)		1392	622						607	654	
v/s Ratio Prot		c0.20								0.13	
v/s Ratio Perm			0.00						c0.28		
v/c Ratio		0.50	0.01						0.76	0.35	
Uniform Delay, d1		11.7	9.4						14.1	11.6	
Progression Factor		1.00	1.00						1.00	1.00	
Incremental Delay, d2		1.3	0.0						5.7	0.3	
Delay (s)		13.0	9.5						19.8	11.9	
Level of Service		B	A						B	B	
Approach Delay (s)		12.9			0.0		19.8			11.9	
Approach LOS		B			A		B			B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL	NER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	825	110	0	0	110	25	0
Future Volume (vph)	0	0	0	0	825	110	0	0	110	25	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)					6.0	6.0			6.0	6.0	
Lane Util. Factor					0.95	1.00			1.00	1.00	
Frt					1.00	0.85			0.86	1.00	
Flt Protected					1.00	1.00			1.00	0.95	
Satd. Flow (prot)					3529	1579			1654	1764	
Flt Permitted					1.00	1.00			1.00	0.95	
Satd. Flow (perm)					3529	1579			1654	1764	
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
Adj. Flow (vph)	0	0	0	0	868	116	0	0	116	26	0
RTOR Reduction (vph)	0	0	0	0	0	22	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	868	94	0	0	116	26	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	2%	2%	2%	5%	5%
Turn Type					NA	Perm			Perm	Prot	
Protected Phases					6					8	
Permitted Phases						6			4		
Actuated Green, G (s)					33.8	33.8			7.7	7.7	
Effective Green, g (s)					33.8	33.8			7.7	7.7	
Actuated g/C Ratio					0.63	0.63			0.14	0.14	
Clearance Time (s)					6.0	6.0			6.0	6.0	
Vehicle Extension (s)					3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)					2229	997			238	253	
v/s Ratio Prot					c0.25					0.01	
v/s Ratio Perm						0.06			c0.07		
v/c Ratio					0.39	0.09			0.49	0.10	
Uniform Delay, d1					4.8	3.9			21.1	19.9	
Progression Factor					1.00	1.00			1.00	1.00	
Incremental Delay, d2					0.5	0.2			1.6	0.2	
Delay (s)					5.3	4.0			22.7	20.1	
Level of Service					A	A			C	C	
Approach Delay (s)		0.0			5.2		22.7			20.1	
Approach LOS		A			A		C			C	

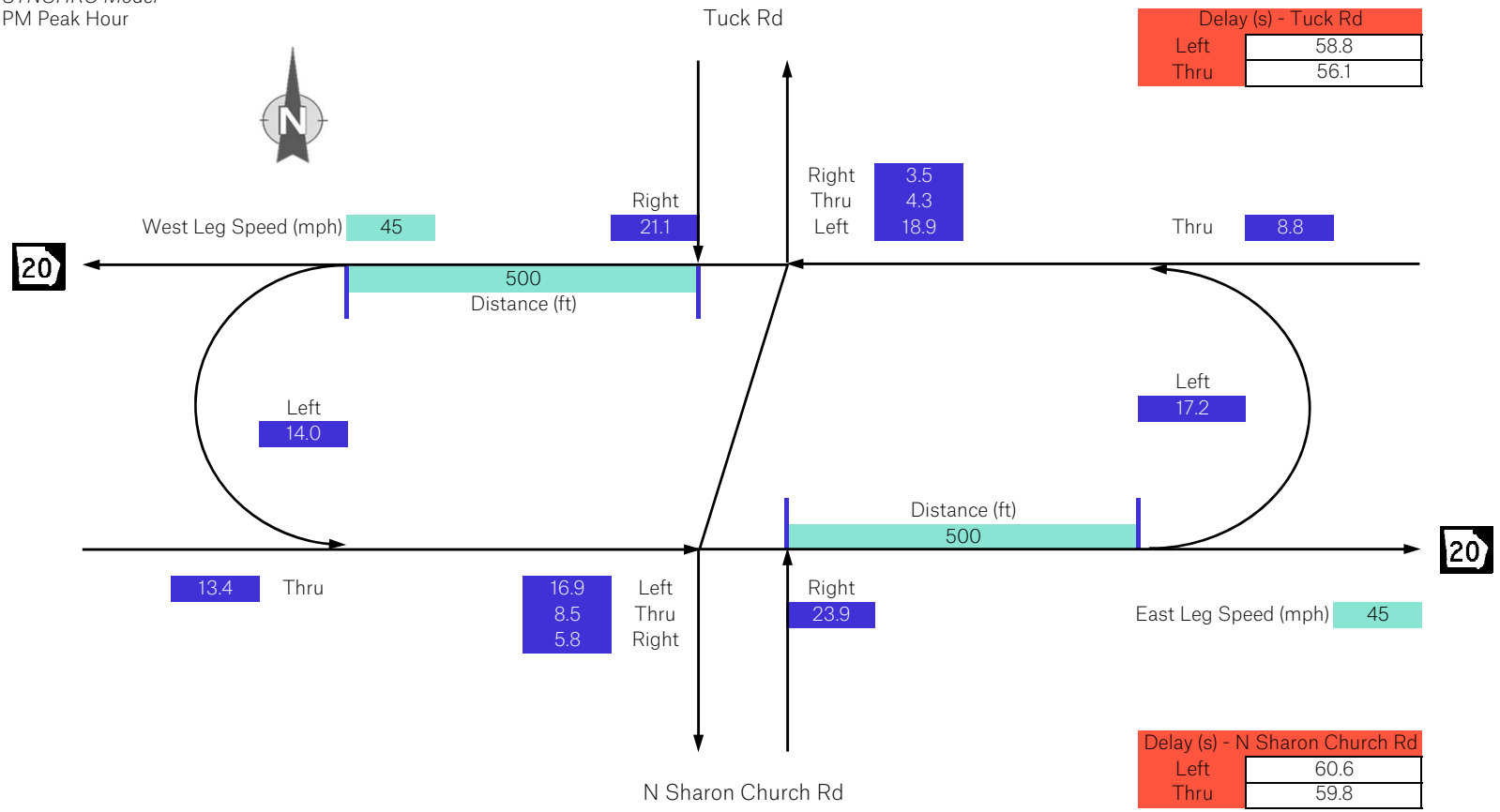
Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1100	50	0
Future Volume (vph)	0	0	0	1100	50	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)				6.0	6.0	
Lane Util. Factor				0.95	1.00	
Frt				1.00	1.00	
Flt Protected				1.00	0.85	
Satd. Flow (prot)				3529	1609	
Flt Permitted				1.00	0.85	
Satd. Flow (perm)				3529	1609	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	1158	53	0
RTOR Reduction (vph)	0	0	0	0	32	0
Lane Group Flow (vph)	0	0	0	1158	21	0
Heavy Vehicles (%)	5%	5%	5%	5%	3%	3%
Turn Type				NA	Prot	
Protected Phases				6	8	
Permitted Phases						
Actuated Green, G (s)				41.5	2.8	
Effective Green, g (s)				41.5	2.8	
Actuated g/C Ratio				0.74	0.05	
Clearance Time (s)				6.0	6.0	
Vehicle Extension (s)				3.0	3.0	
Lane Grp Cap (vph)				2601	80	
v/s Ratio Prot				c0.33	c0.01	
v/s Ratio Perm						
v/c Ratio				0.45	0.26	
Uniform Delay, d1				2.9	25.8	
Progression Factor				1.00	1.00	
Incremental Delay, d2				0.6	1.7	
Delay (s)				3.4	27.5	
Level of Service				A	C	
Approach Delay (s)	0.0			3.4	27.5	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Peak Hour Delays

Based on SYNCHRO Model
2043 PM Peak Hour



Delay (s) - Tuck Rd	
Left	58.8
Thru	56.1

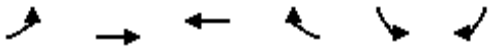
Delay (s) - N Sharon Church Rd	
Left	60.6
Thru	59.8

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	30	875	95	375	555	165	70	0	335	165	0	35
Delay (s)	30.3	21.9	19.2	27.7	13.1	12.3	60.6	59.8	23.9	58.8	56.1	21.1

	EB	WB	NB	SB
Volume	1000	1095	405	200
Delay (s)	21.9	18.0	30.2	52.2

Overall Delay (s)
23.8

Gresham Smith



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1000	0	0	165	0
Future Volume (vph)	0	1000	0	0	165	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)		6.0			6.0	
Lane Util. Factor		0.95			1.00	
Frt		1.00			1.00	
Flt Protected		1.00			0.85	
Satd. Flow (prot)		3562			1625	
Flt Permitted		1.00			0.85	
Satd. Flow (perm)		3562			1625	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1031	0	0	170	0
RTOR Reduction (vph)	0	0	0	0	26	0
Lane Group Flow (vph)	0	1031	0	0	144	0
Heavy Vehicles (%)	4%	4%	4%	4%	2%	2%
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		25.2			18.1	
Effective Green, g (s)		25.2			18.1	
Actuated g/C Ratio		0.46			0.33	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		1623			531	
v/s Ratio Prot		c0.29			c0.09	
v/s Ratio Perm						
v/c Ratio		0.64			0.27	
Uniform Delay, d1		11.5			13.7	
Progression Factor		1.00			1.00	
Incremental Delay, d2		1.9			0.3	
Delay (s)		13.4			14.0	
Level of Service		B			B	
Approach Delay (s)		13.4	0.0		14.0	
Approach LOS		B	A		B	

Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR
Lane Configurations											
Traffic Volume (vph)	0	1040	95	0	0	0	0	0	405	375	0
Future Volume (vph)	0	1040	95	0	0	0	0	0	405	375	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)		6.0	6.0						6.0	6.0	
Lane Util. Factor		0.95	1.00						1.00	1.00	
Frt		1.00	0.85						0.86	1.00	
Flt Protected		1.00	1.00						1.00	0.95	
Satd. Flow (prot)		3562	1594						1638	1781	
Flt Permitted		1.00	1.00						1.00	0.95	
Satd. Flow (perm)		3562	1594						1638	1781	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1072	98	0	0	0	0	0	418	387	0
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1072	65	0	0	0	0	0	418	387	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	4%	4%
Turn Type		NA	Perm						Perm	Prot	
Protected Phases		2								4	
Permitted Phases			2						8		
Actuated Green, G (s)		25.2	25.2						18.1	18.1	
Effective Green, g (s)		25.2	25.2						18.1	18.1	
Actuated g/C Ratio		0.46	0.46						0.33	0.33	
Clearance Time (s)		6.0	6.0						6.0	6.0	
Vehicle Extension (s)		3.0	3.0						3.0	3.0	
Lane Grp Cap (vph)		1623	726						536	582	
v/s Ratio Prot		c0.30								0.22	
v/s Ratio Perm			0.04						c0.26		
v/c Ratio		0.66	0.09						0.78	0.66	
Uniform Delay, d1		11.7	8.5						16.8	16.0	
Progression Factor		0.57	0.65						1.00	1.00	
Incremental Delay, d2		1.7	0.2						7.1	2.9	
Delay (s)		8.5	5.8						23.9	18.9	
Level of Service		A	A						C	B	
Approach Delay (s)		8.2			0.0		23.9			18.9	
Approach LOS		A			A		C			B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL	NER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	625	165	0	0	200	30	0
Future Volume (vph)	0	0	0	0	625	165	0	0	200	30	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)					6.0	6.0			6.0	6.0	
Lane Util. Factor					0.95	1.00			1.00	1.00	
Frt					1.00	0.85			0.86	1.00	
Flt Protected					1.00	1.00			1.00	0.95	
Satd. Flow (prot)					3562	1594			1654	1781	
Flt Permitted					1.00	1.00			1.00	0.95	
Satd. Flow (perm)					3562	1594			1654	1781	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	0	644	170	0	0	206	31	0
RTOR Reduction (vph)	0	0	0	0	0	26	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	644	144	0	0	206	31	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	4%	4%
Turn Type					NA	Perm			Perm	Prot	
Protected Phases					6					8	
Permitted Phases						6			4		
Actuated Green, G (s)					30.3	30.3			11.8	11.8	
Effective Green, g (s)					30.3	30.3			11.8	11.8	
Actuated g/C Ratio					0.56	0.56			0.22	0.22	
Clearance Time (s)					6.0	6.0			6.0	6.0	
Vehicle Extension (s)					3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)					1994	892			360	388	
v/s Ratio Prot					c0.18					0.02	
v/s Ratio Perm						0.09			c0.12		
v/c Ratio					0.32	0.16			0.57	0.08	
Uniform Delay, d1					6.4	5.8			18.9	16.8	
Progression Factor					0.61	0.55			1.00	1.00	
Incremental Delay, d2					0.4	0.3			2.2	0.1	
Delay (s)					4.3	3.5			21.1	16.9	
Level of Service					A	A			C	B	
Approach Delay (s)		0.0			4.1		21.1			16.9	
Approach LOS		A			A		C			B	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Volume (vph)	0	0	0	1095	70	0
Future Volume (vph)	0	0	0	1095	70	0
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)				6.0	6.0	
Lane Util. Factor				0.95	1.00	
Frt				1.00	1.00	
Flt Protected				1.00	0.85	
Satd. Flow (prot)				3562	1609	
Flt Permitted				1.00	0.85	
Satd. Flow (perm)				3562	1609	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	1129	72	0
RTOR Reduction (vph)	0	0	0	0	29	0
Lane Group Flow (vph)	0	0	0	1129	43	0
Heavy Vehicles (%)	4%	4%	4%	4%	3%	3%
Turn Type				NA	Prot	
Protected Phases				6	8	
Permitted Phases						
Actuated Green, G (s)				30.3	11.8	
Effective Green, g (s)				30.3	11.8	
Actuated g/C Ratio				0.56	0.22	
Clearance Time (s)				6.0	6.0	
Vehicle Extension (s)				3.0	3.0	
Lane Grp Cap (vph)				1994	350	
v/s Ratio Prot				c0.32	c0.03	
v/s Ratio Perm						
v/c Ratio				0.57	0.12	
Uniform Delay, d1				7.7	17.0	
Progression Factor				1.00	1.00	
Incremental Delay, d2				1.2	0.2	
Delay (s)				8.8	17.2	
Level of Service				A	B	
Approach Delay (s)	0.0			8.8	17.2	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

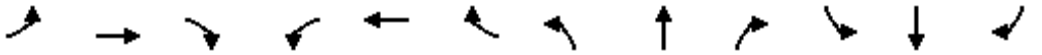
Gresham Smith

Genuine Ingenuity

ALTERNATIVE 3 ANALYSIS

2043 Design Year

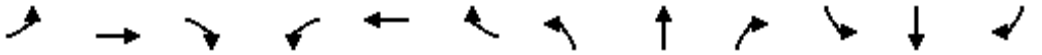
Synchro Output



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	570	15	215	775	110	50	0	390	90	0	20
Future Volume (veh/h)	25	570	15	215	775	110	50	0	390	90	0	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	1810	1810	1810	1810	1810	1810	1900	1845	1845	1863	1863	1900
Adj Flow Rate, veh/h	26	600	16	226	816	116	53	0	0	95	0	21
Adj No. of Lanes	1	2	1	1	1	1	0	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	3	3	3	2	2	2
Cap, veh/h	180	1146	513	442	935	769	519	0	497	557	0	475
Arrive On Green	0.32	0.33	0.33	0.10	0.52	0.50	0.32	0.00	0.00	0.30	0.00	0.30
Sat Flow, veh/h	581	3438	1538	1723	1810	1538	1331	0	1568	1412	0	1583
Grp Volume(v), veh/h	26	600	16	226	816	116	53	0	0	95	0	21
Grp Sat Flow(s),veh/h/ln	581	1719	1538	1723	1810	1538	1331	0	1568	1412	0	1583
Q Serve(g_s), s	2.5	8.5	0.4	4.8	23.8	2.4	1.7	0.0	0.0	0.2	0.0	0.6
Cycle Q Clear(g_c), s	15.3	8.5	0.4	4.8	23.8	2.4	2.2	0.0	0.0	2.4	0.0	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	1146	513	442	935	769	541	0	497	557	0	475
V/C Ratio(X)	0.14	0.52	0.03	0.51	0.87	0.15	0.10	0.00	0.00	0.17	0.00	0.04
Avail Cap(c_a), veh/h	180	1146	513	442	935	769	541	0	497	557	0	475
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	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	16.2	13.5	11.1	12.8	8.1	15.3	0.0	0.0	15.5	0.0	14.9
Incr Delay (d2), s/veh	1.7	1.7	0.1	1.0	9.1	0.1	0.1	0.0	0.0	0.7	0.0	0.2
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(95%),veh/ln	0.9	7.7	0.3	4.2	20.0	1.9	1.1	0.0	0.0	2.3	0.0	0.5
LnGrp Delay(d),s/veh	27.0	17.9	13.6	12.1	21.9	8.2	15.4	0.0	0.0	16.2	0.0	15.1
LnGrp LOS	C	B	B	B	C	A	B			B		B
Approach Vol, veh/h		642			1158			53			116	
Approach Delay, s/veh		18.1			18.6			15.4			16.0	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.0	25.0		24.0		36.0		24.0
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	5.0	19.0		18.0		30.0		18.0
Max Q Clear Time (g_c+I1), s	6.8	17.3		4.4		25.8		4.2
Green Ext Time (p_c), s	0.0	1.3		0.5		3.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	875	95	375	555	165	70	0	335	165	0	35
Future Volume (veh/h)	30	875	95	375	555	165	70	0	335	165	0	35
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	1827	1827	1827	1827	1827	1827	1900	1845	1845	1863	1863	1900
Adj Flow Rate, veh/h	31	902	98	387	572	170	72	0	0	170	0	36
Adj No. of Lanes	1	2	1	1	1	1	0	1	1	1	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	4	4	4	4	4	4	3	3	3	2	2	2
Cap, veh/h	316	1068	478	441	1012	836	464	0	458	523	0	438
Arrive On Green	0.29	0.31	0.31	0.17	0.55	0.54	0.29	0.00	0.00	0.28	0.00	0.28
Sat Flow, veh/h	701	3471	1553	1740	1827	1553	1275	0	1568	1412	0	1583
Grp Volume(v), veh/h	31	902	98	387	572	170	72	0	0	170	0	36
Grp Sat Flow(s),veh/h/ln	701	1736	1553	1740	1827	1553	1275	0	1568	1412	0	1583
Q Serve(g_s), s	2.1	15.8	3.0	9.2	13.2	3.7	2.6	0.0	0.0	1.6	0.0	1.1
Cycle Q Clear(g_c), s	2.1	15.8	3.0	9.2	13.2	3.7	3.7	0.0	0.0	5.3	0.0	1.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	316	1068	478	441	1012	836	484	0	458	523	0	438
V/C Ratio(X)	0.10	0.84	0.21	0.88	0.57	0.20	0.15	0.00	0.00	0.33	0.00	0.08
Avail Cap(c_a), veh/h	316	1068	478	441	1012	836	484	0	458	523	0	438
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	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.0	21.0	16.6	13.7	9.4	7.8	18.4	0.0	0.0	18.8	0.0	17.4
Incr Delay (d2), s/veh	0.6	8.2	1.0	17.9	0.7	0.1	0.1	0.0	0.0	1.7	0.0	0.4
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(95%),veh/ln	0.8	13.6	2.5	10.5	11.0	2.9	1.8	0.0	0.0	4.9	0.0	0.9
LnGrp Delay(d),s/veh	17.7	29.2	17.6	31.6	10.2	7.9	18.5	0.0	0.0	20.5	0.0	17.8
LnGrp LOS	B	C	B	C	B	A	B			C		B
Approach Vol, veh/h		1031			1129			72			206	
Approach Delay, s/veh		27.8			17.2			18.5			20.0	
Approach LOS		C			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	16.0	25.0		24.0		41.0		24.0
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s	10.0	19.0		18.0		35.0		18.0
Max Q Clear Time (g_c+I1), s	11.2	17.8		7.3		15.2		5.7
Green Ext Time (p_c), s	0.0	1.0		0.7		9.9		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	21.9
HCM 2010 LOS	C

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 Request By: GDOT Project Manager

County: Walton GDOT District: 1 - Gainesville

Major (State) Road: SR 20 Speed Limit: 45 mph

Minor (Crossing) ST: Overlook Dr Speed Limit: < 35 mph

Major ST Direction: East/West Area Type: Urban

Intersection Control: Conventional (Minor Stop)

Prepared By: Gresham Smith Analyst: C. Lincoln

Date: 2/4/2020 Project ID:

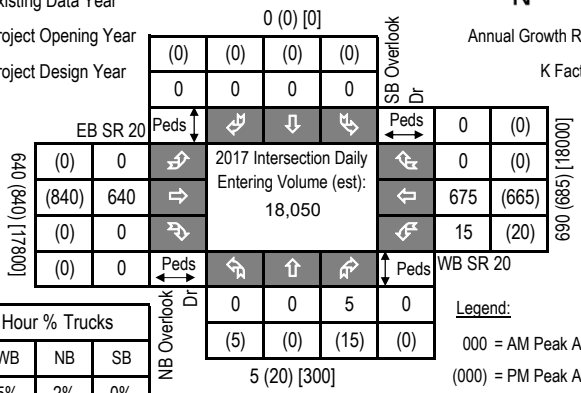
Project Purpose: Widening

2017	Existing Data Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 8%

2017 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
5%	5%	2%	0%

Legend:

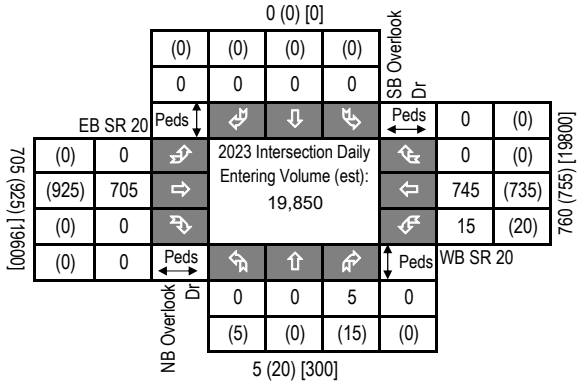
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

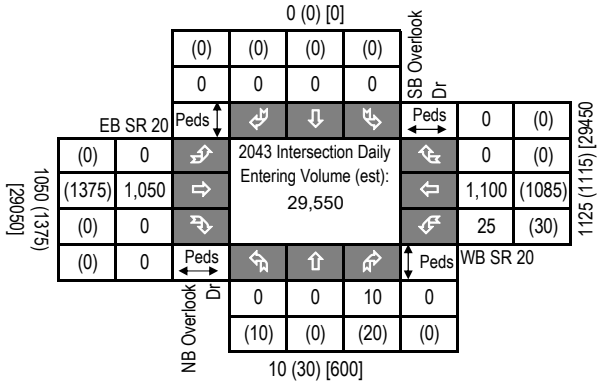
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.99 / Overlook Dr - 0.01

2023 Opening Year Volumes



2043 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 #	0016387
Project Location:	SR 20 @ Overlook Dr
Existing Control:	Conventional (Minor Stop)
Prepared by:	Gresham Smith
Date:	2/4/2020

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	Existing Condition
	Conventional (All-Way Stop)	No	No	**Yes**	No	No	No	No	Not in scale w/ mainline volumes; significant mainline delay
	Mini Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 15,000; mainline entering volume > 90%; not compatible
	Single Lane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 18,750; mainline entering volume > 90%; not compatible
	Multilane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Mainline entering volume > 90%
	RCUT (stop control)	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	Potential Solution to Evaluate
	RIRO w/down stream U-Turn	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**	Potential Solution to Evaluate
	High-T (unsignalized)	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential Solution to Evaluate
	Offset-T Intersections	No	No	No	No	No	No	No	Not applicable; 3-legged intersection
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Add one LT Lane on SR 20 Add one RT Lane on SR 20	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	Minor street volumes too low to meet warrants
	Median U-Turn (Indirect Left)	No	**Yes**	No	No	**Yes**	No	No	Not applicable; 3-legged intersection
	RCUT (signalized)	No	**Yes**	No	No	**Yes**	No	No	Minor street volumes too low to meet warrants
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	Minor street volumes too low to meet warrants
	Continuous Green-T	No	No	**Yes**	No	No	No	No	Minor street volumes too low to meet warrants
	Jughandle	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Quadrant Roadway	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diverging Diamond	No	No	No	No	No	No	No	Not applicable; not an interchange
	Single Point Interchange	No	No	No	No	No	No	No	Not applicable; not an interchange
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	N/A
	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 ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 | GDOT District: 1 - Gainesville | Date: 2/4/2020
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ Overlook Dr | Analyst: C. Lincoln
Existing Intersection Control: Conventional (Minor Stop) | Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2023 Opening Yr No-Build Peak Hr Intersection Delay	0.1 sec	0.5 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.02	0.12
2043 Design Yr No-Build Peak Hr Intersection Delay	0.2 sec	1.6 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	0.04	0.51

Complete Streets Warrants Met?
- [x] PEDESTRIANS
- [ ] BICYCLES
- [ ] TRANSIT

Crash Type: Crash Data: Enter most recent 5 years of crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	0	0	0	0%
Head-On	1	2	0	23%
Rear End	7	1	0	62%
Sideswipe - same	0	0	0	0%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	2	0	0	15%
TOTALS:	10	3	0	13

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

Alternatives Analysis:

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	RCUT (stop control)	RIRO w/down stream U-Turn	High-T (unsignalized)	Add LT and RT Lanes	N/A
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Additional description here*	*Additional description here*	*Additional description here*	
Construction Cost	$576,000	$559,000	$541,000	$310,000	
ROW Cost	$60,000	$60,000	$61,000	$41,000	
Environmental Cost	$0	$0	$0	$0	
Reimbursable Utility Cost	$9,000	$22,000	$8,000	$4,000	
Design & Contingency Cost	$160,000	$155,000	$150,000	$86,000	
Cost Adjustment (justification req'd)	0%	0%	0%	0%	
Total Cost	$805,000	$796,000	$760,000	$441,000	
Traffic Operations:					
Traffic Analysis Software Used	Synchro 9	Synchro 9	Synchro 9	Synchro 9	
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	
2043 Design Yr Build Intersection Delay	0.2 sec / 0.6 sec	0.4 sec / 1.0 sec	0.2 sec / 0.7 sec	0.2 sec / 0.9 sec	
2043 Design Yr Build Intersection V/C	0.04 / 0.09	0.09 / 0.20	0.04 / 0.26	0.04 / 0.32	
Safety Analysis:					
Predefined CRF: PDO	31%	35%	23%	16%	
Predefined CRF: Fatal/Inj	53%	54%	45%	13%	
Predefined CRF Source:	NC/MO Table 4-7	FHWA Clearinghouse #s 5555 / 5556	FHWA Clearinghouse #s 2753 / 2755	FHWA Clearinghouse #s 270&285 / 274&288	
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None	None	None	
Archaeology Resources	None	None	None	None	
Graveyard	None	None	None	None	
Stream	None	None	None	None	
Underground Tank/Hazmat	None	None	None	None	
Park Land	None	None	None	None	
EJ Community	None	None	None	None	
Wooded Area	None	None	None	None	
Wetland	None	None	None	None	

*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*
[1] Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report

Stakeholder Posture:					
Local Community Support	Unknown	Unknown	Unknown	Unknown	
GDOT Support	Unknown	Unknown	Unknown	Unknown	
Final ICE Stage 2 Score:	7.7	7.6	7.3	7.0	
Rank of Control Type Alternatives:	1	2	3	4	

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary):

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.15 | Revised 07/01/2019

Project Information

Location:	SR 20 @ Overlook Dr	County:	Walton	Date:	2/4/2020
GDOT PI # (or N/A):	0016387	Area Type:	Urban	Agency/Firm:	Gresham Smith
Existing Intersection Control:	Conventional (Minor Stop)	GDOT District:	1 - Gainesville	Analyst:	C. Lincoln
Type of Analysis:	Conventional Non-Safety Funded Project			Major Street Direction:	East/West

Table 1: Existing Conditions

	EB SR 20			WB SR 20			NB Overlook Dr			SB Overlook Dr		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	0	1	0	0	1	0	1	0	0	0	0	0
Lane Widths*	0'	12'	0'	0'	12'	0'	13'	0'	0'	0'	0'	0'
Bay Length**	0'		0'	0'		0'	0'		0'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	100'						50'					

Table 2: Proposed Conditions

	RCUT (stop control)	RIRO w/down stream U-Turn	High-T (unsignalized)	Add LT and RT Lanes	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	5	5	5	5	0
Modify/Replace Traffic Signal	0	0	0	0	0
Lighting Poles (ea)	0	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Corridor (5+ intersections)

Intersections

Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	-10%
Prelim Engineering:	15%
Project Contingency:	20%

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$128,625
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	RCUT (stop control)		Turn		High-T (unsignalized)		Add LT and RT Lanes		N/A	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	22,158	$209,831	22,158	$209,831	30,000	$284,091	12,000	$113,636		
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0	0	$0		
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	3660	$69,833	3,660	$69,833	2,120	$40,450	2,000	$38,160		
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0	0	$0		
Concrete Island (sqyd)	n/a	$51.58/syd	500	$25,790	250	$12,895	150	$7,737	0	$0		
Median Landscaping	$100K/LM	$1.89/LF	5490	$10,398	5,490	$10,398	0	$0	0	$0		
Typical Driveways Impacted (ea)	n/a	$7,500 ea	5	$37,500	5	$37,500	5	$37,500	5	$37,500		
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1830	$62,386	1,830	$62,386	1,060	$36,136	1,000	$34,091		
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	0	$0	0	$0	0	$0	0	$0		
Signing & Marking	$0	$22.73/LF	1,830	$41,596	1,830	$41,596	1,060	$24,094	1,000	$22,730		
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0	0	$0		
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	0	$0	0	$0		
Lighting (per pole)	n/a	$5,607 ea	0	$0	0	$0	0	$0	0	$0		
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0	0	$0		
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0	0	$0		
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0	0	$0		
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0	0	$0		
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0	0	$0		
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0	0	$0		
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0	0	$0		
Grading Complete - 20%	n/a	n/a		$91,467		$88,888		$86,002		$49,223		
Traffic Control - 20%	n/a	n/a		$91,467		$88,888		$86,002		$49,223		
Reimbrusable Utility	n/a	n/a		$9,147		$22,222		$8,600		$4,922		
Preliminary Engineering - 15%	n/a	n/a		$68,600		$66,666		$64,501		$36,918		
Contigency - 20%	n/a	n/a		$91,467		$88,888		$86,002		$49,223		
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$37,796		$37,796		$38,588		$25,725		
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0		$0		
ROW Multiplier - 1.6	n/a	n/a		$22,678		$22,678		$23,153		$15,435		
-Project Scale Reduction - 10.0%	n/a	n/a		-$64,027		-$62,221		-$60,201		-$34,456		
Grand Total Costs				**$806,000**		**$798,000**		**$763,000**		**$442,000**		

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
RCUT (stop control)	Loons/Leftovers Only	F.D. Asphalt	0.29	0.0	29,358	22,158.1	1,320	0.0	510	0.0
RIRO w/down stream U-Turn	Loons/Leftovers Only	F.D. Asphalt	0.29	0.0	22,158	0.0	1,320	0.0	510	0.0
High-T (unsignalized)	Narrow Median	F.D. Asphalt	0.00	0.3	4,800	30,000.0	800	0.0	260	0.0
Add LT and RT Lanes	N/A	F.D. Asphalt	0.00	0.2	9,000	12,000.0	1,000	0.0	0	0.0
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

WARRANT ANALYSIS

Signal warrant analysis was performed for the intersection. The Warrant 1 – Eight-Hour Vehicular Volume of the Manual of Uniform Traffic Control Devices (MUTCD) was used to determine the need for a traffic signal at each location. Since the design volumes provided by GDOT are limited to peak hour and daily volumes, the analysis was conducted using the methodologies outlined in GDOT's Design Policy Manual (Section 13.5.3). Per the Manual, the eighth-highest hourly volume of the day can be compared to the MUTCD requirement of Warrant 1 to determine if the warrant is met. Additionally, the eighth-highest hourly volume of the day can be estimated as 5.6% of the daily volume.

The warrant analysis was conducted using 100% volume thresholds for a 2-lane major street approach and 1-lane minor street approach. Since the intersection improvements would incorporate an exclusive right-turn lane on the minor street, the right-turn volume was excluded from the minor approach volume.

The signal warrant analysis is shown in the following tables. As shown, signal **warrants are not met** at this intersection.

Traffic Signal & AWSC Warrant Analysis

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Overlook Dr	8	1103	No	No	No	No	No	No	No

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Overlook Dr	17	1638	No	No	No	No	No	No	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	705	0	15	745	0	5
Future Vol, veh/h	705	0	15	745	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	712	0	15	753	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	712	0	1495	712
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	783	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	874	-	135	432
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	450	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	874	-	131	432
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	437	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	13.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	432	-	-	874	-
HCM Lane V/C Ratio	0.012	-	-	0.017	-
HCM Control Delay (s)	13.4	-	-	9.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	925	0	20	735	5	15
Future Vol, veh/h	925	0	20	735	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	984	0	21	782	5	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	984	0	1808	984
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	824	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	694	-	87	301
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	431	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	694	-	82	301
Mov Cap-2 Maneuver	-	-	-	-	82	-
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	408	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	27.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	180	-	-	694	-
HCM Lane V/C Ratio	0.118	-	-	0.031	-
HCM Control Delay (s)	27.7	-	-	10.4	0
HCM Lane LOS	D	-	-	B	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	965	0	25	1020	0	10
Future Vol, veh/h	965	0	25	1020	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	975	0	25	1030	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	975	0	2056	975
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	1081	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	696	-	61	305
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	326	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	696	-	56	305
Mov Cap-2 Maneuver	-	-	-	-	56	-
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	299	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	305	-	-	696	-
HCM Lane V/C Ratio	0.033	-	-	0.036	-
HCM Control Delay (s)	17.2	-	-	10.4	0
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1270	0	30	1005	10	20
Future Vol, veh/h	1270	0	30	1005	10	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1351	0	32	1069	11	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1351	0	2484	1351
Stage 1	-	-	-	-	1351	-
Stage 2	-	-	-	-	1133	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	503	-	32	184
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	307	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	503	-	27	184
Mov Cap-2 Maneuver	-	-	-	-	27	-
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	259	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	110.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	63	-	-	503	-
HCM Lane V/C Ratio	0.507	-	-	0.063	-
HCM Control Delay (s)	110.3	-	-	12.6	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	2	-	-	0.2	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

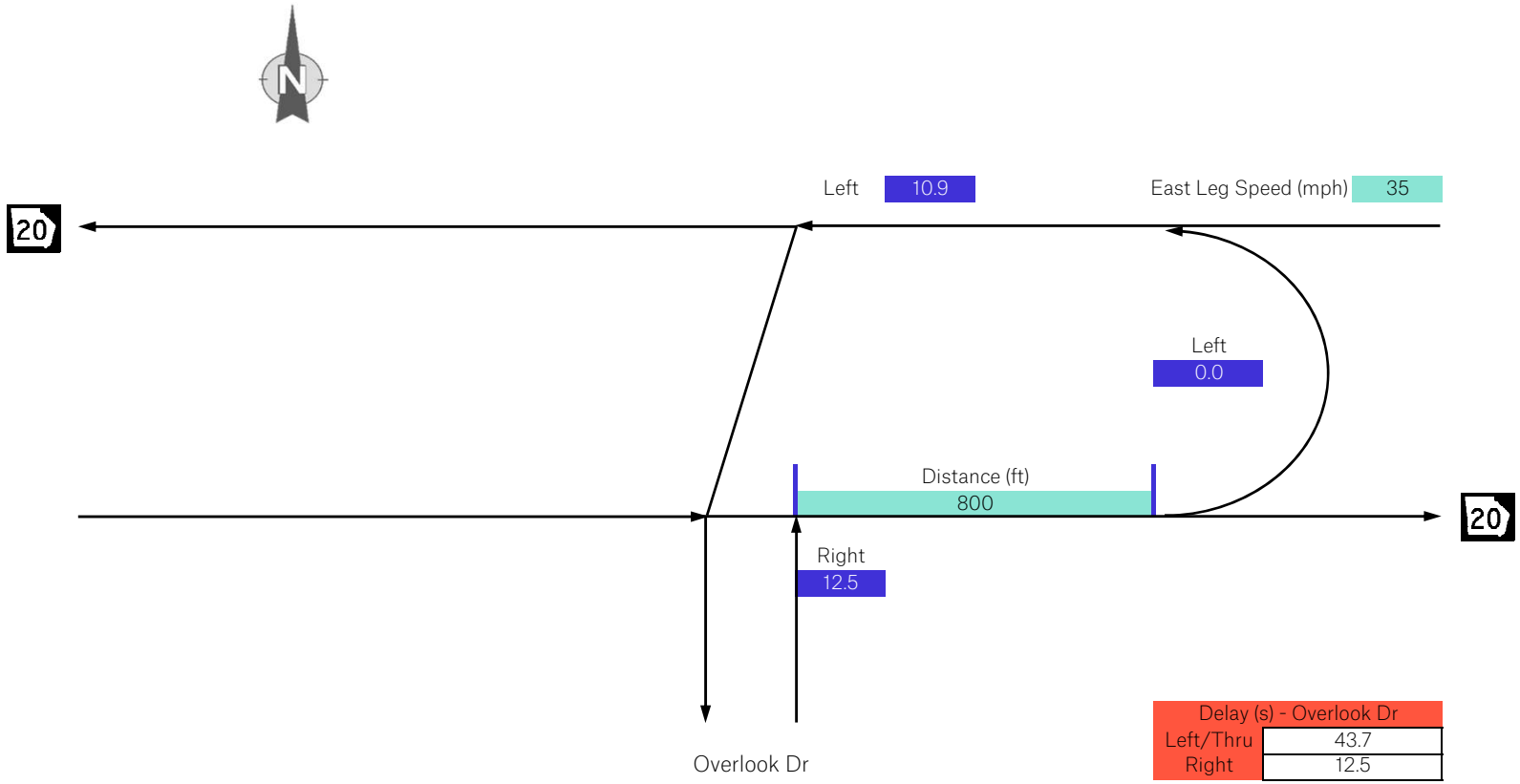
2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model

2043 AM Peak Hour



Delay (s) - Overlook Dr	
Left/Thru	43.7
Right	12.5

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1050	0	25	1100	0	0	0	10	0	0	0
Delay (s)	0	0	0	10.9	0	0	43.7	43.7	12.5	0.0	0.0	0

	EB	WB	NB	SB
Volume	1050	1125	10	0
Delay (s)	0.0	0.2	12.5	0.0

Overall Delay (s)
0.2

Gresham Smith

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1050	0	25	1100	0	10
Future Vol, veh/h	1050	0	25	1100	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	200	225	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1061	0	25	1111	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1061	0	-	531
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.2	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.25	-	-	3.32
Pot Cap-1 Maneuver	-	-	635	-	0	493
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	635	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	493	-	-	635	-
HCM Lane V/C Ratio	0.02	-	-	0.04	-
HCM Control Delay (s)	12.5	-	-	10.9	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1050	10	55	1095	30	120
Future Vol, veh/h	0	1050	10	55	1095	30	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	5	2	2
Mvmt Flow	0	1129	11	59	1177	32	129

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1177	0	0	1140	0	1836	565
Stage 1	-	-	-	-	-	1129	-
Stage 2	-	-	-	-	-	707	-
Critical Hdwy	6.5	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	249	-	-	592	-	67	468
Stage 1	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	450	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	249	-	-	592	-	60	468
Mov Cap-2 Maneuver	-	-	-	-	-	60	-
Stage 1	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	405	-

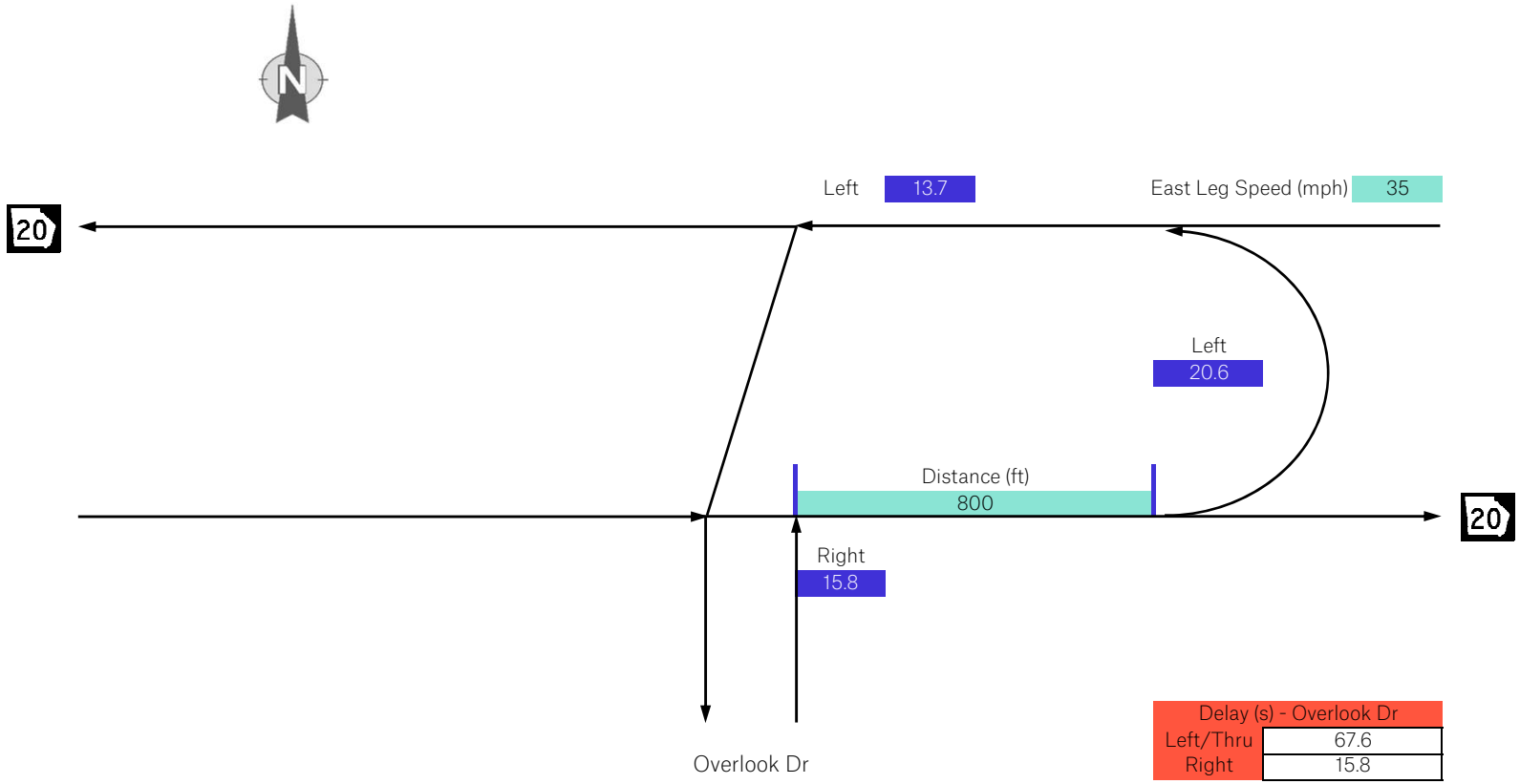
Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	30.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	300	249	-	-	592	-
HCM Lane V/C Ratio	0.538	-	-	-	0.1	-
HCM Control Delay (s)	30.1	0	-	-	11.8	-
HCM Lane LOS	D	A	-	-	B	-
HCM 95th %tile Q(veh)	3	0	-	-	0.3	-

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour



Delay (s) - Overlook Dr	
Left/Thru	67.6
Right	15.8

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1375	0	30	1085	0	10	0	20	0	0	0
Delay (s)	0	0	0	13.7	0	0	67.6	67.6	15.8	0.0	0.0	0

	EB	WB	NB	SB
Volume	1375	1115	30	0
Delay (s)	0.0	0.4	33.1	0.0

Overall Delay (s)
0.6

Gresham Smith

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1375	0	30	1095	0	30
Future Vol, veh/h	1375	0	30	1095	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	200	225	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1463	0	32	1165	0	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1463	0	-	732
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.18	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.24	-	-	3.32
Pot Cap-1 Maneuver	-	-	448	-	0	364
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	448	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	364	-	-	448	-
HCM Lane V/C Ratio	0.088	-	-	0.071	-
HCM Control Delay (s)	15.8	-	-	13.7	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	10	1345	50	105	1100	15	120
Future Vol, veh/h	10	1345	50	105	1100	15	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	92	92	92	92	92	92
Heavy Vehicles, %	5	4	4	4	4	2	2
Mvmt Flow	11	1462	54	114	1196	16	130

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1196	0	0	1516	0	2310	731
Stage 1	-	-	-	-	-	1484	-
Stage 2	-	-	-	-	-	826	-
Critical Hdwy	6.5	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	242	-	-	427	-	32	364
Stage 1	-	-	-	-	-	175	-
Stage 2	-	-	-	-	-	390	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	242	-	-	427	-	22	364
Mov Cap-2 Maneuver	-	-	-	-	-	22	-
Stage 1	-	-	-	-	-	167	-
Stage 2	-	-	-	-	-	286	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	1.4	62.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	198	242	-	-	427	-
HCM Lane V/C Ratio	0.741	0.044	-	-	0.267	-
HCM Control Delay (s)	62.2	20.6	-	-	16.5	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	4.9	0.1	-	-	1.1	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

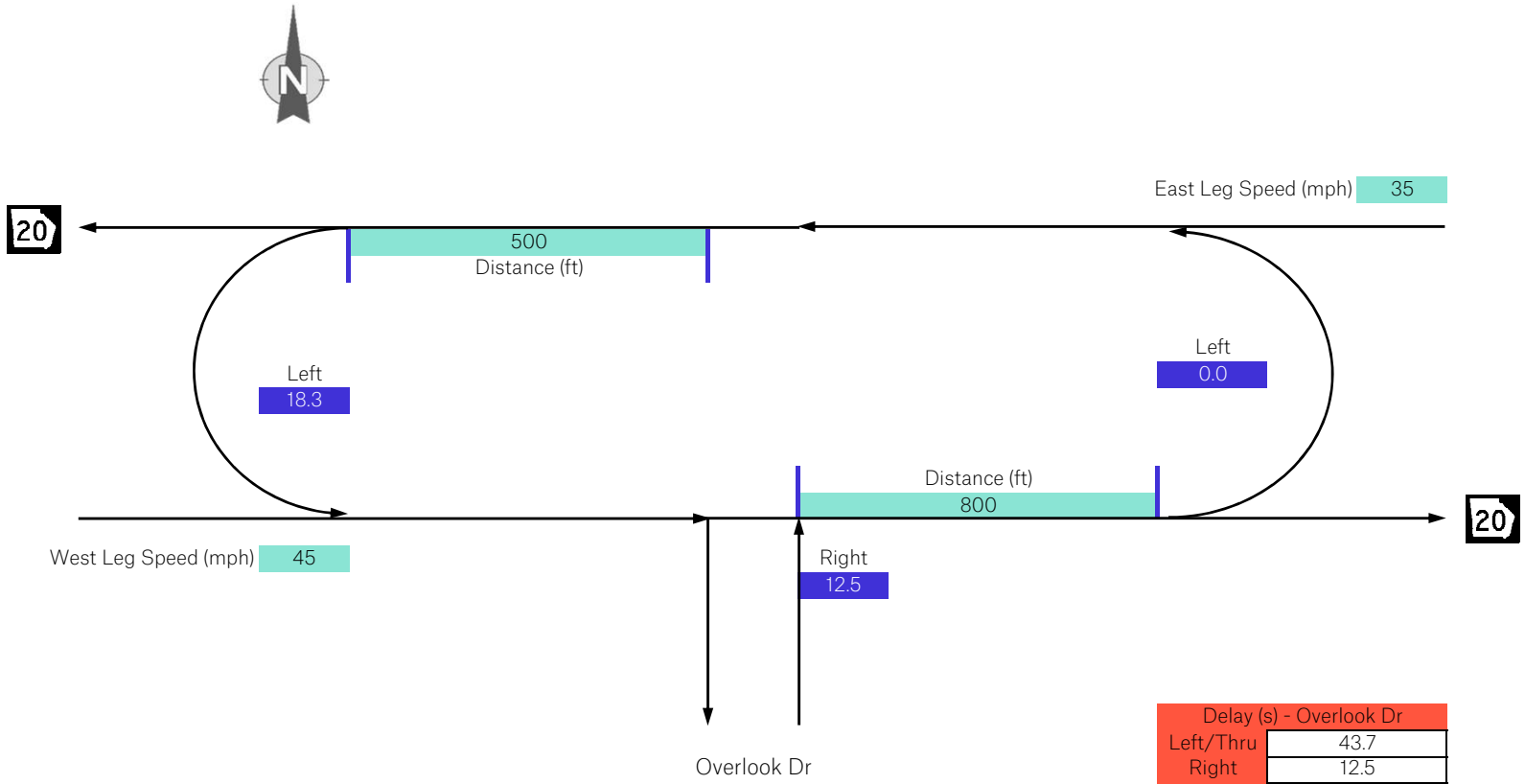
2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model

2043 AM Peak Hour



Delay (s) - Overlook Dr	
Left/Thru	43.7
Right	12.5
Left-In	33.5

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1050	0	25	1100	0	0	0	10	0	0	0
Delay (s)	0.0	0.0	0.0	33.5	0.0	0.0	43.7	43.7	12.5	0.0	0.0	0.0

	EB	WB	NB	SB
Volume	1050	1125	10	0
Delay (s)	0.0	0.7	12.5	0.0

Overall Delay (s)
0.4

Gresham Smith

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱		↑↑		↱
Traffic Vol, veh/h	1050	25	0	1125	0	10
Future Vol, veh/h	1050	25	0	1125	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	200	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1061	25	0	1136	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	531
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	493
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	493	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-
HCM Control Delay (s)	12.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations								
Traffic Vol, veh/h	0	1050	10	10	55	1095	30	120
Future Vol, veh/h	0	1050	10	10	55	1095	30	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	Yield
Storage Length	200	-	150	-	0	-	0	-
Veh in Median Storage, #	-	0	-	-	-	0	0	-
Grade, %	-	0	-	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	5	5	2	2
Mvmt Flow	0	1129	11	11	59	1177	32	129

Major/Minor	Major1			Major2			Minor1	
Conflicting Flow All	1177	0	0	1129	1140	0	1858	565
Stage 1	-	-	-	-	-	-	1129	-
Stage 2	-	-	-	-	-	-	729	-
Critical Hdwy	6.5	-	-	6.5	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.55	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	249	-	-	267	592	-	65	468
Stage 1	-	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	-	438	-
Platoon blocked, %		-	-			-		
Mov Cap-1 Maneuver	249	-	-	454	454	-	55	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	55	-
Stage 1	-	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	-	371	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	35.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	275	249	-	-	454	-
HCM Lane V/C Ratio	0.587	-	-	-	0.154	-
HCM Control Delay (s)	35.1	0	-	-	14.4	-
HCM Lane LOS	E	A	-	-	B	-
HCM 95th %tile Q(veh)	3.4	0	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	1050	0	25	0	1100	0	0
Future Vol, veh/h	1050	0	25	0	1100	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	225	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	5	2	2
Mvmt Flow	1061	0	25	0	1111	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	1061	1061	0	-	531
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.5	4.2	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.55	2.25	-	-	3.32
Pot Cap-1 Maneuver	-	0	296	635	-	0	493
Stage 1	-	0	-	-	-	0	-
Stage 2	-	0	-	-	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	296	296	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

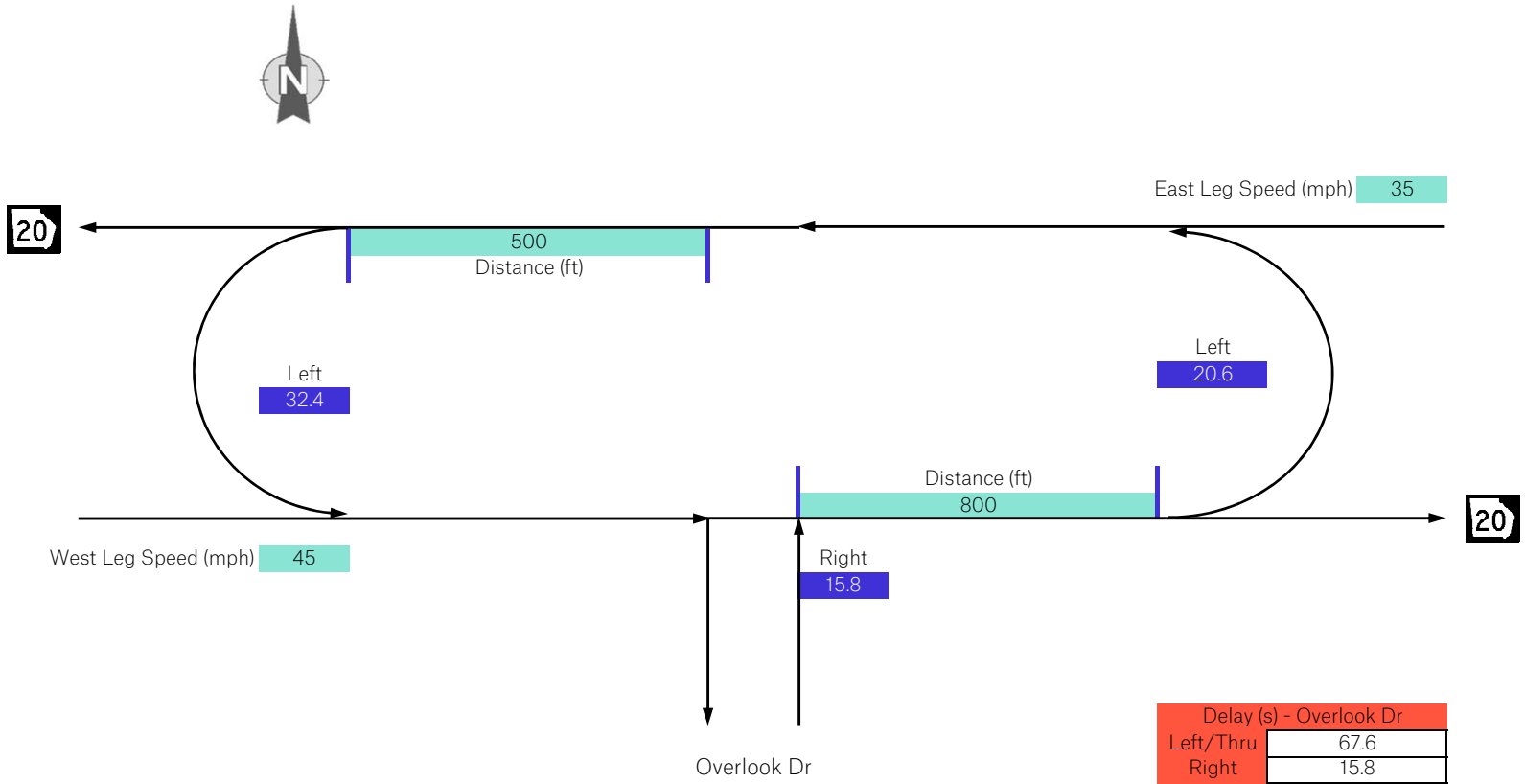
Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	-	-	296	-
HCM Lane V/C Ratio	-	-	0.085	-
HCM Control Delay (s)	0	-	18.3	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	-	-	0.3	-

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour



Delay (s) - Overlook Dr	
Left/Thru	67.6
Right	15.8
Left-In	47.6

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1375	0	30	1085	0	10	0	20	0	0	0
Delay (s)	0.0	0.0	0.0	47.6	0.0	0.0	67.6	67.6	15.8	0.0	0.0	0.0

	EB	WB	NB	SB
Volume	1375	1115	30	0
Delay (s)	0.0	1.3	33.1	0.0

Overall Delay (s)
1.0

Gresham Smith

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1375	30	0	1125	0	30
Future Vol, veh/h	1375	30	0	1125	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	200	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1463	32	0	1197	0	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	732
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	364
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	364	-	-	-
HCM Lane V/C Ratio	0.088	-	-	-
HCM Control Delay (s)	15.8	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	10	1345	50	105	1100	15	120
Future Vol, veh/h	10	1345	50	105	1100	15	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	0	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	92	92	92	92	92	92
Heavy Vehicles, %	5	4	4	4	4	2	2
Mvmt Flow	11	1462	54	114	1196	16	130

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1196	0	0	1516	0	2310	731
Stage 1	-	-	-	-	-	1484	-
Stage 2	-	-	-	-	-	826	-
Critical Hdwy	6.5	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	242	-	-	427	-	32	364
Stage 1	-	-	-	-	-	175	-
Stage 2	-	-	-	-	-	390	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	242	-	-	427	-	22	364
Mov Cap-2 Maneuver	-	-	-	-	-	22	-
Stage 1	-	-	-	-	-	167	-
Stage 2	-	-	-	-	-	286	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	1.4	62.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	198	242	-	-	427	-
HCM Lane V/C Ratio	0.741	0.044	-	-	0.267	-
HCM Control Delay (s)	62.2	20.6	-	-	16.5	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	4.9	0.1	-	-	1.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	1375	0	30	0	1095	0	0
Future Vol, veh/h	1375	0	30	0	1095	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	225	-	-	0
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	2	2
Mvmt Flow	1463	0	32	0	1165	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	1463	1463	0	-	732
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.48	4.18	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.54	2.24	-	-	3.32
Pot Cap-1 Maneuver	-	0	163	448	-	0	364
Stage 1	-	0	-	-	-	0	-
Stage 2	-	0	-	-	-	0	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	163	163	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	-	-	163	-
HCM Lane V/C Ratio	-	-	0.196	-
HCM Control Delay (s)	0	-	32.4	-
HCM Lane LOS	A	-	D	-
HCM 95th %tile Q(veh)	-	-	0.7	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 3 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1050	0	25	1100	0	10
Future Vol, veh/h	1050	0	25	1100	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	200	225	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1061	0	25	1111	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1061	0	1667	530
Stage 1	-	-	-	-	1061	-
Stage 2	-	-	-	-	606	-
Critical Hdwy	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	635	-	87	493
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	635	-	84	493
Mov Cap-2 Maneuver	-	-	-	-	84	-
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	487	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	493	-	-	635	-
HCM Lane V/C Ratio	0.02	-	-	0.04	-
HCM Control Delay (s)	12.5	-	-	10.9	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1375	0	30	1085	10	20
Future Vol, veh/h	1375	0	30	1085	10	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	200	225	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1463	0	32	1154	11	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1463	0	2104	731
Stage 1	-	-	-	-	1463	-
Stage 2	-	-	-	-	641	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	448	-	44	364
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	487	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	448	-	41	364
Mov Cap-2 Maneuver	-	-	-	-	41	-
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	44.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	123	-	-	448	-
HCM Lane V/C Ratio	0.259	-	-	0.071	-
HCM Control Delay (s)	44.2	-	-	13.7	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	1	-	-	0.2	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 4 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1050	0	25	1100	0	10
Future Vol, veh/h	1050	0	25	1100	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	225	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1061	0	25	1111	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1061	0	1667	530
Stage 1	-	-	-	-	1061	-
Stage 2	-	-	-	-	606	-
Critical Hdwy	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	635	-	87	493
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	635	-	84	493
Mov Cap-2 Maneuver	-	-	-	-	84	-
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	487	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	493	-	-	635	-
HCM Lane V/C Ratio	0.02	-	-	0.04	-
HCM Control Delay (s)	12.5	-	-	10.9	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1375	0	30	1085	10	20
Future Vol, veh/h	1375	0	30	1085	10	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	225	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1463	0	32	1154	11	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1463	0	2104	731
Stage 1	-	-	-	-	1463	-
Stage 2	-	-	-	-	641	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	448	-	44	364
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	487	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	448	-	41	364
Mov Cap-2 Maneuver	-	-	-	-	41	-
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	57
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	100	-	-	448	-
HCM Lane V/C Ratio	0.319	-	-	0.071	-
HCM Control Delay (s)	57	-	-	13.7	-
HCM Lane LOS	F	-	-	B	-
HCM 95th %tile Q(veh)	1.2	-	-	0.2	-

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

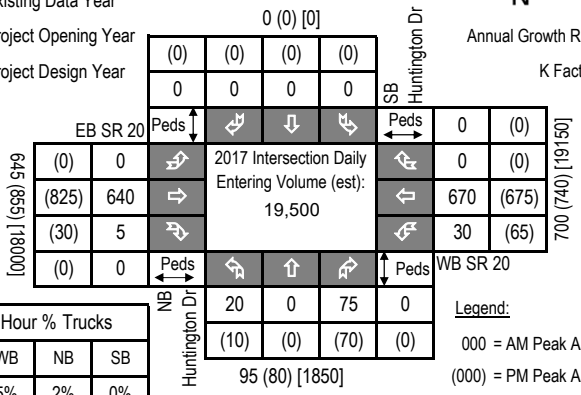
GDOT PI # (or N/A):	0016387	Request By:	GDOT Project Manager
County:	Walton	GDOT District:	1 - Gainesville
Major (State) Road:	SR 20	Speed Limit:	45 mph
Minor (Crossing) ST:	Huntington Dr	Speed Limit:	< 35 mph
Major ST Direction:	East/West	Area Type:	Urban
Intersection Control:	Conventional (Minor Stop)		
Prepared By:	Gresham Smith	Analyst:	C. Lincoln
Date:	2/4/2020	Project ID:	
Project Purpose:	Widening		

2017	Existing Data Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 8%

2017 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
5%	5%	2%	0%

Legend:

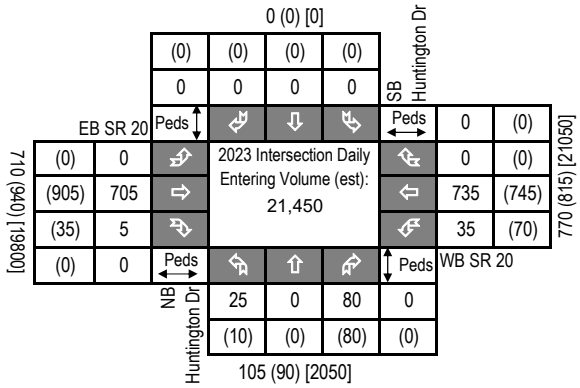
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

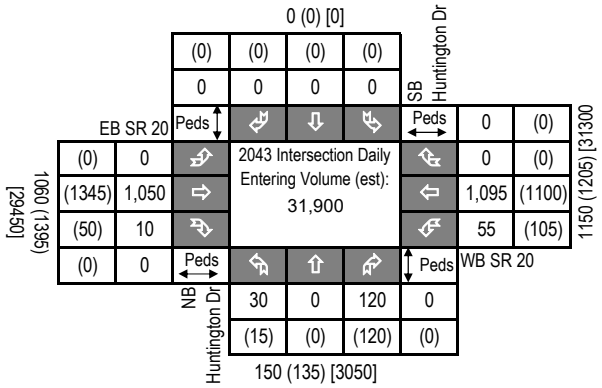
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.95 / Huntington Dr - 0.05

2023 Opening Year Volumes



2043 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 #	0016387
Project Location:	SR 20 @ Huntington Dr
Existing Control:	Conventional (Minor Stop)
Prepared by:	Gresham Smith
Date:	2/4/2020

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	Existing Condition
	Conventional (All-Way Stop)	No	No	**Yes**	No	No	No	No	Not in scale w/ mainline volumes; significant mainline delay
	Mini Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 15,000; mainline entering volume > 90%; not compatible
	Single Lane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 18,750; mainline entering volume > 90%; not compatible
	Multilane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Mainline entering volume > 90%
	RCUT (stop control)	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	Potential Solution to Evaluate
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Not in scale w/ minor street volumes; significant minor street delay
	High-T (unsignalized)	No	No	**Yes**	No	No	No	No	Creates conflict w/ acceleration/merge lane & adj drwys/turn lanes
	Offset-T Intersections	No	No	No	No	No	No	No	Not applicable; 3-legged intersection
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Add one LT Lane on SR 20 No RT Lane Improvements	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Median U-Turn (Indirect Left)	No	**Yes**	No	No	**Yes**	No	No	Not applicable; 3-legged intersection
	RCUT (signalized)	No	**Yes**	No	No	**Yes**	No	No	Minor street AADT < 5,000; unsig. alternative recommended per FHWA
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	Not in scale with mainline left turn demands
	Continuous Green-T	No	No	**Yes**	No	No	No	No	Creates conflict w/ acceleration/merge lane & adj drwys/turn lanes
	Jughandle	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Quadrant Roadway	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diverging Diamond	No	No	No	No	No	No	No	Not applicable; not an interchange
	Single Point Interchange	No	No	No	No	No	No	No	Not applicable; not an interchange
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	N/A
	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 ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 | GDOT District: 1 - Gainesville | Date: 2/4/2020
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ Huntington Dr | Analyst: C. Lincoln
Existing Intersection Control: Conventional (Minor Stop) | Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2023 Opening Yr No-Build Peak Hr Intersection Delay	1.8 sec	1.8 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.26	0.29
2043 Design Yr No-Build Peak Hr Intersection Delay	5.3 sec	8.9 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	0.85	1.63

Complete Streets Warrants Met?
- [x] PEDESTRIANS
- [ ] BICYCLES
- [ ] TRANSIT

Crash Type: Crash Data: Enter most recent 5 years of crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	1	0	0	2%
Head-On	1	0	0	2%
Rear End	37	2	0	74%
Sideswipe - same	0	1	0	2%
Sideswipe - opposite	0	1	0	2%
Not Collision w/Motor Veh	10	0	0	19%
TOTALS:	49	4	0	53

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

Alternatives Analysis:

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	RCUT (stop control)	Add Left Turn Lanes	Traffic Signal	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Additional description here*	*Add LT bays all approaches*		
Construction Cost	$619,000	$113,000	$307,000		
ROW Cost	$60,000	$0	$0		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$9,000	$4,000	$6,000		
Design & Contingency Cost	$172,000	$31,000	$119,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$860,000	$148,000	$432,000		
Traffic Operations:					
Traffic Analysis Software Used	Synchro 9	Synchro 9	Synchro 9		
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr		
2043 Design Yr Build Intersection Delay	1.9 sec / 1.9 sec	2.2 sec / 3.7 sec	5.8 sec / 10.3 sec		
2043 Design Yr Build Intersection V/C	0.35 / 0.40	0.54 / 0.74	0.66 / 0.86		
Safety Analysis:					
Predefined CRF: PDO	31%	10%	39%		
Predefined CRF: Fatal/Inj	53%	9%	40%		
Predefined CRF Source:	NC/MO Table 4-7	FHWA Clearinghouse #s 270 / 274	FHWA Clearinghouse #s 7982 / 7984		
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None	None		
Archaeology Resources	None	None	None		
Graveyard	None	None	None		
Stream	None	None	None		
Underground Tank/Hazmat	None	None	None		
Park Land	None	None	None		
EJ Community	None	None	None		
Wooded Area	None	None	None		
Wetland	None	None	None		
Stakeholder Posture:	*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*				
	[1] Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report				
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	5.9	5.9	-		
Rank of Control Type Alternatives:	2	1	-		

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary):

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.15 | Revised 07/01/2019

Project Information

Location: SR 20 @ Huntington Dr
GDOT PI # (or N/A): 0016387
Existing Intersection Control: Conventional (Minor Stop)
Type of Analysis: Conventional Non-Safety Funded Project
County: Walton
Area Type: Urban
GDOT District: 1 - Gainesville
Date: 2/4/2020
Agency/Firm: Gresham Smith
Analyst: C. Lincoln
Major Street Direction: East/West

Table 1: Existing Conditions

	EB SR 20			WB SR 20			NB Huntington Dr			SB Huntington Dr		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	0	1	1	0	1	0	0	1	1	0	0	0
Lane Widths*	0'	12'	12'	0'	12'	0'	0'	15'	14'	0'	0'	0'
Bay Length**	0'		0'	0'		0'	0'		75'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	100'						70'					

Table 2: Proposed Conditions

	RCUT (stop control)	Add Left Turn Lanes	Traffic Signal	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	0	0	0	0	0
Modify/Replace Traffic Signal	0	0	0	0	0
Lighting Poles (ea)	0	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Corridor (5+ intersections)

Intersections

Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	-10%
Prelim Engineering:	15%
Project Contingency:	20%

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$128,625
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	RCUT (stop control)		Add Left Turn Lanes		Traffic Signal		N/A		N/A	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	29,358	$278,012	4,500	$42,614	16,000	$151,515	#N/A	#N/A		
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	3740	$71,359	1,000	$19,080	4,000	$76,320	#N/A	#N/A		
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Concrete Island (sqyd)	n/a	$51.58/syd	500	$25,790	0	$0	0	$0	#N/A	#N/A		
Median Landscaping	$100K/LM	$1.89/LF	5610	$10,625	0	$0	0	$0	#N/A	#N/A		
Typical Driveways Impacted (ea)	n/a	$7,500 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1870	$63,750	500	$17,045	2,000	$68,182	#N/A	#N/A		
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Signing & Marking	$0	$22.73/LF	1,870	$42,505	500	$11,365	2,000	$45,460	#N/A	#N/A		
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	0	$0	#N/A	#N/A		
Lighting (per pole)	n/a	$5,607 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0	#N/A	#N/A		
Grading Complete - 20%	n/a	n/a		$98,408		$18,021		$0		#N/A		
Traffic Control - 20%	n/a	n/a		$98,408		$18,021		$0		#N/A		
Reimbrusable Utility	n/a	n/a		$9,841		$4,505		$6,830		#N/A		
Preliminary Engineering - 15%	n/a	n/a		$73,806		$13,516		$51,222		#N/A		
Contigency - 20%	n/a	n/a		$98,408		$18,021		$68,295		#N/A		
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$37,796		$0		$0		#N/A		
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0		#N/A		
ROW Multiplier - 1.6	n/a	n/a		$22,678		$0		$0		#N/A		
-Project Scale Reduction - 10.0%	n/a	n/a		-$68,886		-$12,615		-$34,148		#N/A		
Grand Total Costs				**$863,000**		**$150,000**		**$434,000**		#N/A		

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
RCUT (stop control)	Loons/Leftovers Only	F.D. Asphalt	0.29	0.0	29,358	0.0	1,340	0.0	530	0.0
Add Left Turn Lanes	N/A	F.D. Asphalt	0.00	0.0	4,500	0.0	500	0.0	0	0.0
Traffic Signal	Pave/Overlay Intersection	F.D. Asphalt	0.00	0.0	16,000	0.0	1,000	0.0	1,000	0.0
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

WARRANT ANALYSIS

Signal warrant analysis was performed for the intersection. The Warrant 1 – Eight-Hour Vehicular Volume of the Manual of Uniform Traffic Control Devices (MUTCD) was used to determine the need for a traffic signal at each location. Since the design volumes provided by GDOT are limited to peak hour and daily volumes, the analysis was conducted using the methodologies outlined in GDOT's Design Policy Manual (Section 13.5.3). Per the Manual, the eighth-highest hourly volume of the day can be compared to the MUTCD requirement of Warrant 1 to determine if the warrant is met. Additionally, the eighth-highest hourly volume of the day can be estimated as 5.6% of the daily volume.

The warrant analysis was conducted using 100% volume thresholds for a 2-lane major street approach and 1-lane minor street approach. Since the intersection improvements would incorporate an exclusive right-turn lane on the minor street, the right-turn volume was excluded from the minor approach volume.

The signal warrant analysis is shown in the following tables. As shown, signal **warrants are not met** at this intersection.

Traffic Signal & AWSC Warrant Analysis

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Huntington Dr	11	1144	No	No	No	No	No	No	No

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Huntington Dr	17	1701	No	No	No	No	No	No	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	705	5	35	735	25	80
Future Vol, veh/h	705	5	35	735	25	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	758	5	38	790	27	86

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	758	0	1624	758
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	866	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	840	-	113	407
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	412	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	840	-	104	407
Mov Cap-2 Maneuver	-	-	-	-	104	-
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	379	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	24.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	104	407	-	-	840	-
HCM Lane V/C Ratio	0.258	0.211	-	-	0.045	-
HCM Control Delay (s)	51.3	16.2	-	-	9.5	0
HCM Lane LOS	F	C	-	-	A	A
HCM 95th %tile Q(veh)	1	0.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	905	35	70	745	10	80
Future Vol, veh/h	905	35	70	745	10	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	984	38	76	810	11	87

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	984	0	1946	984
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	962	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	694	-	71	301
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	371	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	694	-	57	301
Mov Cap-2 Maneuver	-	-	-	-	57	-
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	297	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	28.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	57	301	-	-	694	-
HCM Lane V/C Ratio	0.191	0.289	-	-	0.11	-
HCM Control Delay (s)	82.5	21.7	-	-	10.8	0
HCM Lane LOS	F	C	-	-	B	A
HCM 95th %tile Q(veh)	0.6	1.2	-	-	0.4	-

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	965	10	45	1015	30	115
Future Vol, veh/h	965	10	45	1015	30	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1038	11	48	1091	32	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1038	0	2226	1038
Stage 1	-	-	-	-	1038	-
Stage 2	-	-	-	-	1188	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	658	-	47	280
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	289	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	658	-	38	280
Mov Cap-2 Maneuver	-	-	-	-	38	-
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	236	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	75.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	38	280	-	-	658	-
HCM Lane V/C Ratio	0.849	0.442	-	-	0.074	-
HCM Control Delay (s)	259	27.6	-	-	10.9	0
HCM Lane LOS	F	D	-	-	B	A
HCM 95th %tile Q(veh)	3.1	2.1	-	-	0.2	-

Intersection	
Int Delay, s/veh	8.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1245	45	100	1020	15	105
Future Vol, veh/h	1245	45	100	1020	15	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1353	49	109	1109	16	114

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1353	0	2679	1353
Stage 1	-	-	-	-	1353	-
Stage 2	-	-	-	-	1326	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	502	-	24	183
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	248	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	502	-	~ 10	183
Mov Cap-2 Maneuver	-	-	-	-	~ 10	-
Stage 1	-	-	-	-	241	-
Stage 2	-	-	-	-	108	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	176.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	10	183	-	-	502	-
HCM Lane V/C Ratio	1.63	0.624	-	-	0.217	-
HCM Control Delay (s)	$ 1040	52.7	-	-	14.1	0
HCM Lane LOS	F	F	-	-	B	A
HCM 95th %tile Q(veh)	2.9	3.5	-	-	0.8	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

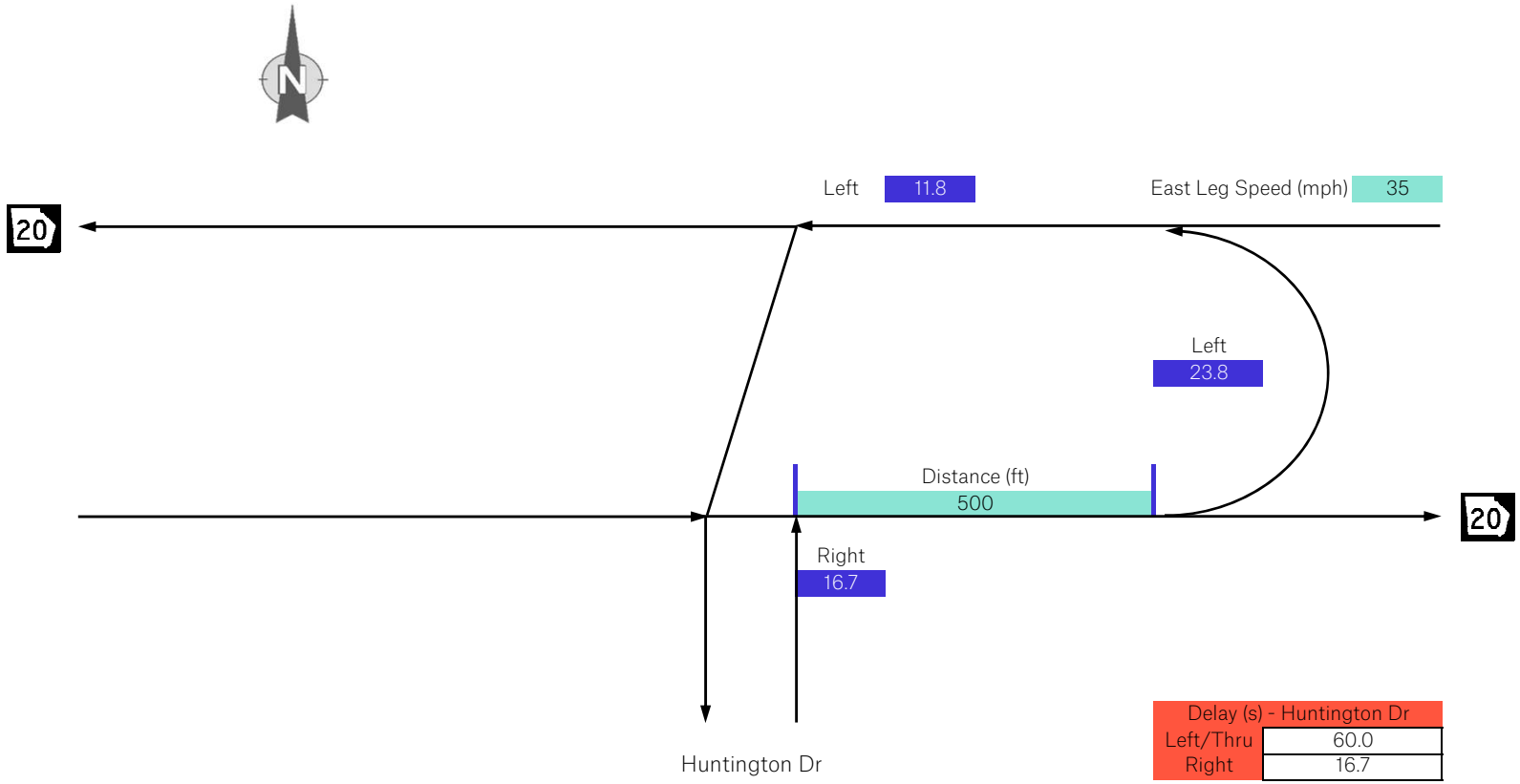
2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model

2043 AM Peak Hour



Delay (s) - Huntington Dr	
Left/Thru	60.0
Right	16.7

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1050	10	55	1095	0	30	0	120	0	0	0
Delay (s)	0	0	0	11.8	0	0	60.0	60.0	16.7	0.0	0.0	0

	EB	WB	NB	SB
Volume	1060	1150	150	0
Delay (s)	0.0	0.6	25.4	0.0

Overall Delay (s)
1.9

Gresham Smith

Intersection	
Int Delay, s/veh	1.3

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1050	10	55	1125	0	150
Future Vol, veh/h	0	1050	10	55	1125	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	5	2	2
Mvmt Flow	0	1129	11	59	1210	0	161

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1210	0	0	1140	0	-	565
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.5	-	-	4.2	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.55	-	-	2.25	-	-	3.32
Pot Cap-1 Maneuver	237	-	-	592	-	0	468
Stage 1	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	237	-	-	592	-	-	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	16.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	468	237	-	-	592	-
HCM Lane V/C Ratio	0.345	-	-	-	0.1	-
HCM Control Delay (s)	16.7	0	-	-	11.8	-
HCM Lane LOS	C	A	-	-	B	-
HCM 95th %tile Q(veh)	1.5	0	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	30	1170	0	10	1150	0	10
Future Vol, veh/h	30	1170	0	10	1150	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	100	-	-	200	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	91	91	91	91	91	91
Heavy Vehicles, %	2	5	5	5	5	2	2
Mvmt Flow	33	1286	0	11	1264	0	11

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1264	0	0	1286	0	-	643
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	4.2	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	2.25	-	-	3.32
Pot Cap-1 Maneuver	224	-	-	519	-	0	416
Stage 1	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	224	-	-	519	-	-	416
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

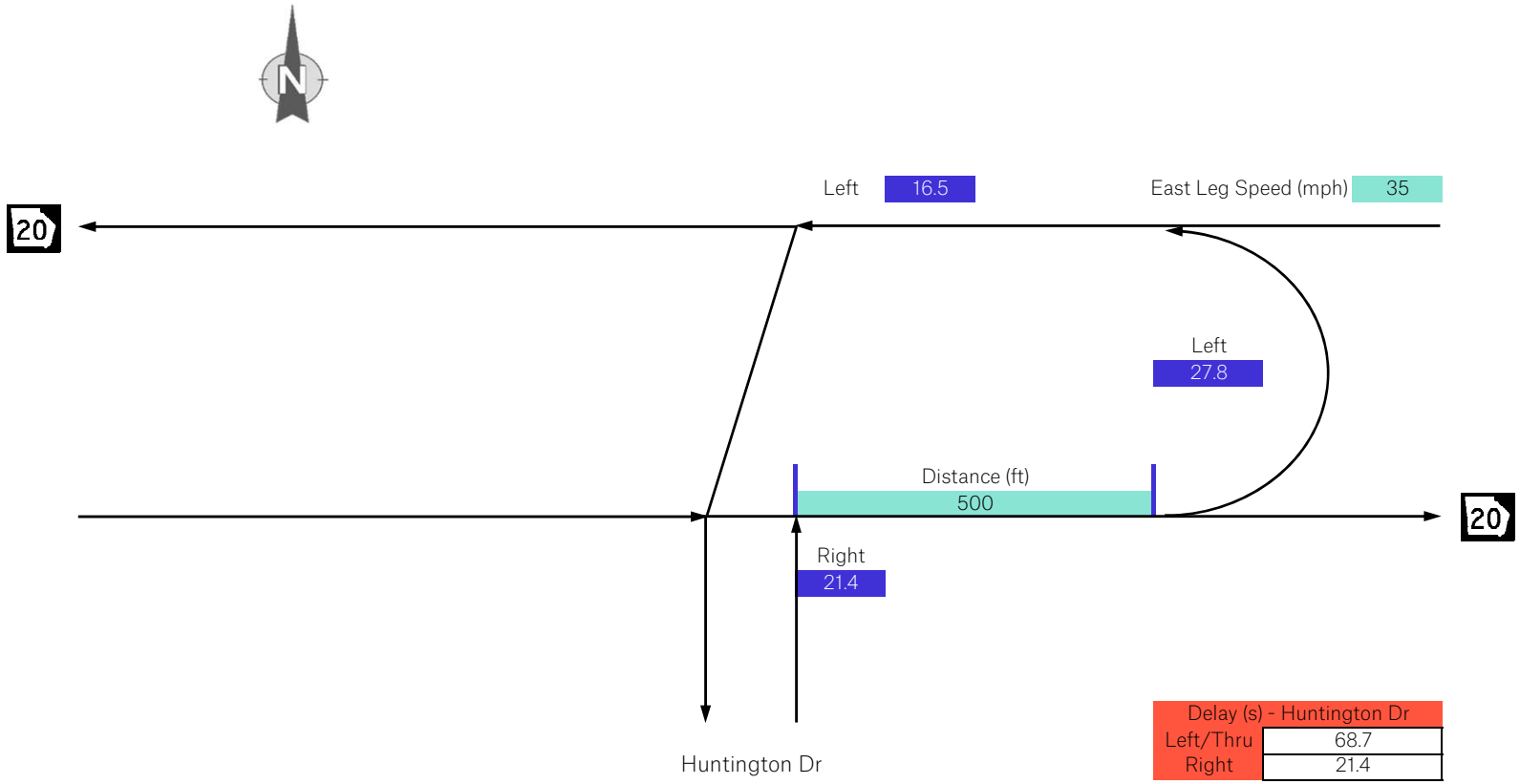
Approach	EB	WB	NB
HCM Control Delay, s	0.6	0.1	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	224	-	-	519	-
HCM Lane V/C Ratio	0.026	0.146	-	-	0.021	-
HCM Control Delay (s)	13.9	23.8	-	-	12.1	-
HCM Lane LOS	B	C	-	-	B	-
HCM 95th %tile Q(veh)	0.1	0.5	-	-	0.1	-

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour



Delay (s) - Huntington Dr	
Left/Thru	68.7
Right	21.4

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1345	50	105	1100	0	15	0	120	0	0	0
Delay (s)	0	0	0	16.5	0	0	68.7	68.7	21.4	0.0	0.0	0

	EB	WB	NB	SB
Volume	1395	1205	135	0
Delay (s)	0.0	1.4	26.7	0.0

Overall Delay (s)
1.9

Gresham Smith

Intersection	
Int Delay, s/veh	1.7

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	10	1345	50	105	1115	0	135
Future Vol, veh/h	10	1345	50	105	1115	0	135
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	92	92	92	92	92	92
Heavy Vehicles, %	5	4	4	4	4	2	2
Mvmt Flow	11	1462	54	114	1212	0	147

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1212	0	0	1516	0	-	731
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.5	-	-	4.18	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.55	-	-	2.24	-	-	3.32
Pot Cap-1 Maneuver	236	-	-	427	-	0	364
Stage 1	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	236	-	-	427	-	-	364
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	1.4	21.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	364	236	-	-	427	-
HCM Lane V/C Ratio	0.403	0.046	-	-	0.267	-
HCM Control Delay (s)	21.4	21	-	-	16.5	-
HCM Lane LOS	C	C	-	-	C	-
HCM 95th %tile Q(veh)	1.9	0.1	-	-	1.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	15	1465	0	0	1205	0	10
Future Vol, veh/h	15	1465	0	0	1205	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	100	-	-	200	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	84	84	84	84	84	84
Heavy Vehicles, %	2	4	4	4	4	2	2
Mvmt Flow	16	1744	0	0	1435	0	12

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1435	0	0	1744	0	-	872
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	4.18	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	2.24	-	-	3.32
Pot Cap-1 Maneuver	174	-	-	348	-	0	294
Stage 1	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	174	-	-	348	-	-	294
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.3	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	294	174	-	-	348	-
HCM Lane V/C Ratio	0.04	0.094	-	-	-	-
HCM Control Delay (s)	17.8	27.8	-	-	0	-
HCM Lane LOS	C	D	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.3	-	-	0	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	2.2

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1050	10	55	1095	30	120
Future Vol, veh/h	0	1050	10	55	1095	30	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	5	2	2
Mvmt Flow	0	1129	11	59	1177	32	129

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1177	0	0	1140	0	1836	565
Stage 1	-	-	-	-	-	1129	-
Stage 2	-	-	-	-	-	707	-
Critical Hdwy	6.5	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	249	-	-	592	-	67	468
Stage 1	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	450	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	249	-	-	592	-	60	468
Mov Cap-2 Maneuver	-	-	-	-	-	60	-
Stage 1	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	405	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	30.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	300	249	-	-	592	-
HCM Lane V/C Ratio	0.538	-	-	-	0.1	-
HCM Control Delay (s)	30.1	0	-	-	11.8	-
HCM Lane LOS	D	A	-	-	B	-
HCM 95th %tile Q(veh)	3	0	-	-	0.3	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	10	1345	50	105	1100	15	120
Future Vol, veh/h	10	1345	50	105	1100	15	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	92	92	92	92	92	92
Heavy Vehicles, %	5	4	4	4	4	2	2
Mvmt Flow	11	1462	54	114	1196	16	130

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1196	0	0	1516	0	2310	731
Stage 1	-	-	-	-	-	1484	-
Stage 2	-	-	-	-	-	826	-
Critical Hdwy	6.5	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	242	-	-	427	-	32	364
Stage 1	-	-	-	-	-	175	-
Stage 2	-	-	-	-	-	390	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	242	-	-	427	-	22	364
Mov Cap-2 Maneuver	-	-	-	-	-	22	-
Stage 1	-	-	-	-	-	167	-
Stage 2	-	-	-	-	-	286	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	1.4	62.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	198	242	-	-	427	-
HCM Lane V/C Ratio	0.741	0.044	-	-	0.267	-
HCM Control Delay (s)	62.2	20.6	-	-	16.5	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	4.9	0.1	-	-	1.1	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 3 ANALYSIS

2043 Design Year

Synchro Output

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (veh/h)	0	1050	10	55	1095	30	120
Future Volume (veh/h)	0	1050	10	55	1095	30	120
Number		4	14	3	8	5	12
Initial Q (Qb), veh		0	0	0	0	0	0
Ped-Bike Adj(A_pbT)			1.00	1.00		1.00	1.00
Parking Bus, Adj		1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1810	1810	1810	1810	1863	1900
Adj Flow Rate, veh/h		1129	11	59	1177	32	0
Adj No. of Lanes		2	1	1	2	0	0
Peak Hour Factor		0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %		5	5	5	5	0	0
Cap, veh/h		1721	770	392	2316	259	0
Arrive On Green		0.50	0.50	0.09	0.67	0.15	0.00
Sat Flow, veh/h		3529	1538	1723	3529	1723	0
Grp Volume(v), veh/h		1129	11	59	1177	33	0
Grp Sat Flow(s),veh/h/ln		1719	1538	1723	1719	1777	0
Q Serve(g_s), s		9.7	0.1	0.3	6.8	0.6	0.0
Cycle Q Clear(g_c), s		9.7	0.1	0.3	6.8	0.6	0.0
Prop In Lane			1.00	1.00		0.97	0.00
Lane Grp Cap(c), veh/h		1721	770	392	2316	268	0
V/C Ratio(X)		0.66	0.01	0.15	0.51	0.12	0.00
Avail Cap(c_a), veh/h		2114	946	505	2316	847	0
HCM Platoon Ratio		1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh		7.4	5.0	7.8	3.2	14.6	0.0
Incr Delay (d2), s/veh		0.5	0.0	0.2	0.2	0.2	0.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln		8.2	0.1	0.7	5.7	0.6	0.0
LnGrp Delay(d),s/veh		7.9	5.0	8.0	3.4	14.8	0.0
LnGrp LOS		A	A	A	A	B	
Approach Vol, veh/h		1140			1236	33	
Approach Delay, s/veh		7.9			3.6	14.8	
Approach LOS		A			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		9.5	6.9	23.4				30.3
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		18.0	5.0	23.5				23.5
Max Q Clear Time (g_c+I1), s		2.6	2.3	11.7				8.8
Green Ext Time (p_c), s		0.0	0.0	7.2				11.7

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

Notes

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (veh/h)	10	1345	50	105	1100	15	120
Future Volume (veh/h)	10	1345	50	105	1100	15	120
Number		4	14	3	8	5	12
Initial Q (Qb), veh		0	0	0	0	0	0
Ped-Bike Adj(A_pbT)			1.00	1.00		1.00	1.00
Parking Bus, Adj		1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1827	1827	1827	1827	1863	1900
Adj Flow Rate, veh/h		1462	54	114	1196	16	0
Adj No. of Lanes		2	1	1	2	0	0
Peak Hour Factor		0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		4	4	4	4	0	0
Cap, veh/h		1705	763	352	2384	197	0
Arrive On Green		0.49	0.49	0.10	0.69	0.12	0.00
Sat Flow, veh/h		3563	1553	1740	3563	1674	0
Grp Volume(v), veh/h		1462	54	114	1196	17	0
Grp Sat Flow(s),veh/h/ln		1736	1553	1740	1736	1779	0
Q Serve(g_s), s		18.9	0.9	0.8	8.4	0.4	0.0
Cycle Q Clear(g_c), s		18.9	0.9	0.8	8.4	0.4	0.0
Prop In Lane			1.00	1.00		0.94	0.00
Lane Grp Cap(c), veh/h		1705	763	352	2384	209	0
V/C Ratio(X)		0.86	0.07	0.32	0.50	0.08	0.00
Avail Cap(c_a), veh/h		1902	851	386	2384	557	0
HCM Platoon Ratio		1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh		11.4	6.9	12.2	3.8	20.1	0.0
Incr Delay (d2), s/veh		3.8	0.0	0.5	0.2	0.2	0.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln		15.0	0.7	2.1	7.0	0.4	0.0
LnGrp Delay(d),s/veh		15.3	6.9	12.8	4.0	20.3	0.0
LnGrp LOS		B	A	B	A	C	
Approach Vol, veh/h		1516			1310	17	
Approach Delay, s/veh		15.0			4.7	20.3	
Approach LOS		B			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		11.0	10.0	30.1				40.1
Change Period (Y+Rc), s		6.0	6.0	6.0				6.0
Max Green Setting (Gmax), s		15.0	5.0	27.0				27.0
Max Q Clear Time (g_c+I1), s		2.4	2.8	20.9				10.4
Green Ext Time (p_c), s		0.0	0.0	3.2				14.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

Notes

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

Georgia Department of Transportation

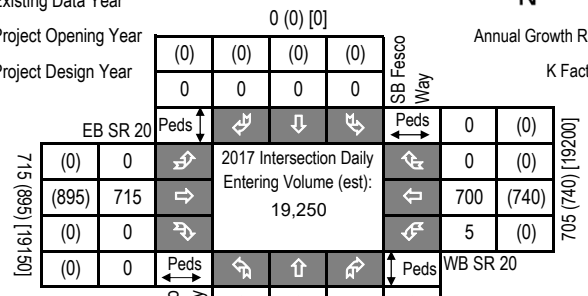
GDOT PI # (or N/A):	0016387	Request By:	GDOT Project Manager
County:	Walton	GDOT District:	1 - Gainesville
Major (State) Road:	SR 20	Speed Limit:	35 mph
Minor (Crossing) ST:	Fesco Way	Speed Limit:	< 35 mph
Major ST Direction:	East/West	Area Type:	Urban
Intersection Control:	Conventional (Minor Stop)		
Prepared By:	Gresham Smith	Analyst:	C. Lincoln
Date:	2/4/2020	Project ID:	
Project Purpose:	Widening		

2017	Existing Data Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 8%

2017 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
5%	5%	2%	0%

Legend:

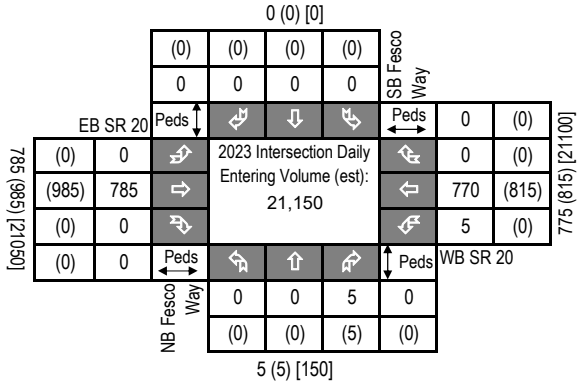
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

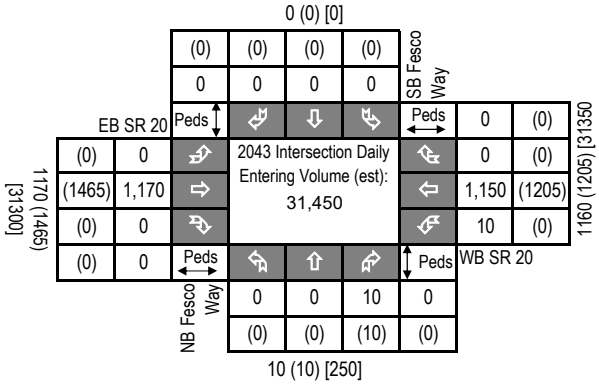
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.99 / Fesco Way - 0.01

2023 Opening Year Volumes



2043 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 #	0016387
Project Location:	SR 20 @ Fesco Way
Existing Control:	Conventional (Minor Stop)
Prepared by:	Gresham Smith
Date:	2/4/2020

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	Existing Condition
	Conventional (All-Way Stop)	No	No	**Yes**	No	No	No	No	Not in scale w/ mainline volumes; significant mainline delay
	Mini Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 15,000; mainline entering volume > 90%; not compatible
	Single Lane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 18,750; mainline entering volume > 90%; not compatible
	Multilane Roundabout	No	**Yes**	**Yes**	No	No	No	No	Design Year AADT > 30,000; mainline entering volume > 90%
	RCUT (stop control)	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	Potential Solution to Evaluate
	RIRO w/down stream U-Turn	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes**	Potential Solution to Evaluate
	High-T (unsignalized)	No	No	**Yes**	No	No	No	No	Creates conflict w/ acceleration/merge lane & adj drwys/turn lanes
	Offset-T Intersections	No	No	No	No	No	No	No	Not applicable; 3-legged intersection
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Add one LT Lane on SR 20 No RT Lane Improvements	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	Minor street volumes too low to meet warrants
	Median U-Turn (Indirect Left)	No	**Yes**	No	No	**Yes**	No	No	Not applicable; 3-legged intersection
	RCUT (signalized)	No	**Yes**	No	No	**Yes**	No	No	Minor street volumes too low to meet warrants
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	Not in scale with mainline left turn demands
	Continuous Green-T	No	No	**Yes**	No	No	No	No	Creates conflict w/ acceleration/merge lane & adj drwys/turn lanes
	Jughandle	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Quadrant Roadway	No	**Yes**	**Yes**	No	No	No	No	Not in scale with traffic volumes; significant impact in multiple quadrants
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diverging Diamond	No	No	No	No	No	No	No	Not applicable; not an interchange
	Single Point Interchange	No	No	No	No	No	No	No	Not applicable; not an interchange
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	N/A
	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 ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 | GDOT District: 1 - Gainesville | Date: 2/4/2020
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ Fesco Way | Analyst: C. Lincoln
Existing Intersection Control: Conventional (Minor Stop) | Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2023 Opening Yr No-Build Peak Hr Intersection Delay	0.1 sec	0.1 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.02	0.03
2043 Design Yr No-Build Peak Hr Intersection Delay	0.1 sec	0.1 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	0.05	0.09

Complete Streets Warrants Met?
- [x] PEDESTRIANS
- [ ] BICYCLES
- [ ] TRANSIT

Crash Type: Crash Data: Enter most recent 5 years of crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	9	1	0	50%
Head-On	0	1	0	5%
Rear End	5	0	0	25%
Sideswipe - same	3	0	0	15%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	1	0	0	5%
TOTALS:	18	2	0	20

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

Alternatives Analysis:

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	RCUT (stop control)	RIRO w/down stream U-Turn	Add Left Turn Lanes	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Additional description here*	*Additional description here*		
Construction Cost	$346,000	$384,000	$202,000		
ROW Cost	$76,000	$102,000	$61,000		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$5,000	$15,000	$3,000		
Design & Contingency Cost	$96,000	$106,000	$56,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$523,000	$607,000	$322,000		
Traffic Operations:					
Traffic Analysis Software Used	Synchro 9	Synchro 9	Synchro 9		
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr		
2043 Design Yr Build Intersection Delay	0.1 sec / 0.1 sec	0.2 sec / 0.1 sec	0.1 sec / 0.1 sec		
2043 Design Yr Build Intersection V/C	0.03 / 0.04	0.15 / 0.04	0.03 / 0.04		
Safety Analysis:					
Predefined CRF: PDO	31%	35%	10%		
Predefined CRF: Fatal/Inj	53%	54%	9%		
Predefined CRF Source:	NC/MO Table 4-7	FHWA Clearinghouse #s 5555 / 5556	FHWA Clearinghouse #s 270 / 274		
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None	None		
Archaeology Resources	None	None	None		
Graveyard	None	None	None		
Stream	None	None	None		
Underground Tank/Hazmat	None	None	None		
Park Land	None	None	None		
EJ Community	None	None	None		
Wooded Area	None	None	None		
Wetland	None	None	None		
Stakeholder Posture:	*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*				
	[1] Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report				
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	7.6	7.4	7.0		
Rank of Control Type Alternatives:	1	2	3		

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary):

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.15 | Revised 07/01/2019

Project Information

Location:	SR 20 @ Fesco Way	County:	Walton	Date:	2/4/2020
GDOT PI # (or N/A):	0016387	Area Type:	Urban	Agency/Firm:	Gresham Smith
Existing Intersection Control:	Conventional (Minor Stop)	GDOT District:	1 - Gainesville	Analyst:	C. Lincoln
Type of Analysis:	Conventional Non-Safety Funded Project			Major Street Direction:	East/West

Table 1: Existing Conditions

	EB SR 20			WB SR 20			NB Fesco Way			SB Fesco Way		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0
Lane Widths*	0'	12'	12'	0'	12'	0'	0'	10'	0'	0'	0'	0'
Bay Length**	0'		225'	0'		0'	0'		0'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	90'						0'					

Table 2: Proposed Conditions

	RCUT (stop control)	RIRO w/down stream U-Turn	Add Left Turn Lanes	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	3	3	3	0	0
Modify/Replace Traffic Signal	0	0	0	0	0
Lighting Poles (ea)	0	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Corridor (5+ intersections)

Intersections

Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	-10%
Prelim Engineering:	15%
Project Contingency:	20%

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$128,625
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	RCUT (stop control) Quantity	RCUT (stop control) Cost	Turn Quantity	Turn Cost	Add Left Turn Lanes Quantity	Add Left Turn Lanes Cost	N/A Quantity	N/A Cost	N/A Quantity	N/A Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	4,500	$42,614	9,000	$85,227	4,500	$42,614	#N/A	#N/A		
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	3660	$69,833	3,660	$69,833	2,020	$38,542	#N/A	#N/A		
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Concrete Island (sqyd)	n/a	$51.58/syd	500	$25,790	250	$12,895	0	$0	#N/A	#N/A		
Median Landscaping	$100K/LM	$1.89/LF	5490	$10,398	5,490	$10,398	0	$0	#N/A	#N/A		
Typical Driveways Impacted (ea)	n/a	$7,500 ea	3	$22,500	3	$22,500	3	$22,500	#N/A	#N/A		
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1830	$62,386	1,830	$62,386	1,010	$34,432	#N/A	#N/A		
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Signing & Marking	$0	$22.73/LF	1,830	$41,596	1,830	$41,596	1,010	$22,957	#N/A	#N/A		
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	0	$0	#N/A	#N/A		
Lighting (per pole)	n/a	$5,607 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0	#N/A	#N/A		
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0	#N/A	#N/A		
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0	#N/A	#N/A		
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0	#N/A	#N/A		
Grading Complete - 20%	n/a	n/a		$55,023		$60,967		$32,209		#N/A		
Traffic Control - 20%	n/a	n/a		$55,023		$60,967		$32,209		#N/A		
Reimbrusable Utility	n/a	n/a		$5,502		$15,242		$3,221		#N/A		
Preliminary Engineering - 15%	n/a	n/a		$41,267		$45,725		$24,157		#N/A		
Contigency - 20%	n/a	n/a		$55,023		$60,967		$32,209		#N/A		
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$47,836		$64,313		$38,588		#N/A		
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0		#N/A		
ROW Multiplier - 1.6	n/a	n/a		$28,701		$38,588		$23,153		#N/A		
-Project Scale Reduction - 10.0%	n/a	n/a		-$38,516		-$42,677		-$22,546		#N/A		
Grand Total Costs				**$525,000**		**$609,000**		**$324,000**		#N/A		

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
RCUT (stop control)	Loons/Leftovers Only	F.D. Asphalt	0.37	0.0	29,358	4,500.0	1,320	0.0	510	0.0
RIRO w/down stream U-Turn	Loons/Leftovers Only	F.D. Asphalt	0.37	0.5	22,158	9,000.0	1,320	0.0	510	0.0
Add Left Turn Lanes	N/A	F.D. Asphalt	0.00	0.3	4,500	0.0	500	0.0	0	510.0
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

WARRANT ANALYSIS

Signal warrant analysis was performed for the intersection. The Warrant 1 – Eight-Hour Vehicular Volume of the Manual of Uniform Traffic Control Devices (MUTCD) was used to determine the need for a traffic signal at each location. Since the design volumes provided by GDOT are limited to peak hour and daily volumes, the analysis was conducted using the methodologies outlined in GDOT's Design Policy Manual (Section 13.5.3). Per the Manual, the eighth-highest hourly volume of the day can be compared to the MUTCD requirement of Warrant 1 to determine if the warrant is met. Additionally, the eighth-highest hourly volume of the day can be estimated as 5.6% of the daily volume.

The warrant analysis was conducted using 100% volume thresholds for a 2-lane major street approach and 1-lane minor street approach. Since the intersection improvements would incorporate an exclusive right-turn lane on the minor street, the right-turn volume was excluded from the minor approach volume.

The signal warrant analysis is shown in the following tables. As shown, signal **warrants are not met** at this intersection.

Traffic Signal & AWSC Warrant Analysis

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Fesco Way	1	1180	No	No	No	No	No	No	No

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ Fesco Way	3	1754	No	No	No	No	No	No	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	0	5	770	0	5
Future Vol, veh/h	785	0	5	770	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	863	0	5	846	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	863	0	1720	863
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	857	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	767	-	98	354
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	416	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	767	-	97	354
Mov Cap-2 Maneuver	-	-	-	-	97	-
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	411	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	354	-	-	767	-
HCM Lane V/C Ratio	0.016	-	-	0.007	-
HCM Control Delay (s)	15.3	-	-	9.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	985	0	0	815	0	5
Future Vol, veh/h	985	0	0	815	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1173	0	0	970	0	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1173	0	2143	1173
Stage 1	-	-	-	-	1173	-
Stage 2	-	-	-	-	970	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	588	-	54	234
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	368	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	588	-	54	234
Mov Cap-2 Maneuver	-	-	-	-	54	-
Stage 1	-	-	-	-	294	-
Stage 2	-	-	-	-	368	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	234	-	-	588	-
HCM Lane V/C Ratio	0.025	-	-	-	-
HCM Control Delay (s)	20.8	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1080	0	10	1060	0	10
Future Vol, veh/h	1080	0	10	1060	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1187	0	11	1165	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1187	0	2374	1187
Stage 1	-	-	-	-	1187	-
Stage 2	-	-	-	-	1187	-
Critical Hdwy	-	-	4.15	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.245	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	578	-	38	230
Stage 1	-	-	-	-	290	-
Stage 2	-	-	-	-	290	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	578	-	36	230
Mov Cap-2 Maneuver	-	-	-	-	36	-
Stage 1	-	-	-	-	290	-
Stage 2	-	-	-	-	274	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	21.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	230	-	-	578	-
HCM Lane V/C Ratio	0.048	-	-	0.019	-
HCM Control Delay (s)	21.4	-	-	11.3	0
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1350	0	0	1120	0	10
Future Vol, veh/h	1350	0	0	1120	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1607	0	0	1333	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1607	0	2940	1607
Stage 1	-	-	-	-	1607	-
Stage 2	-	-	-	-	1333	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	401	-	16	129
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	246	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	401	-	16	129
Mov Cap-2 Maneuver	-	-	-	-	16	-
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	246	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	35.7
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	129	-	-	401	-
HCM Lane V/C Ratio	0.092	-	-	-	-
HCM Control Delay (s)	35.7	-	-	0	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

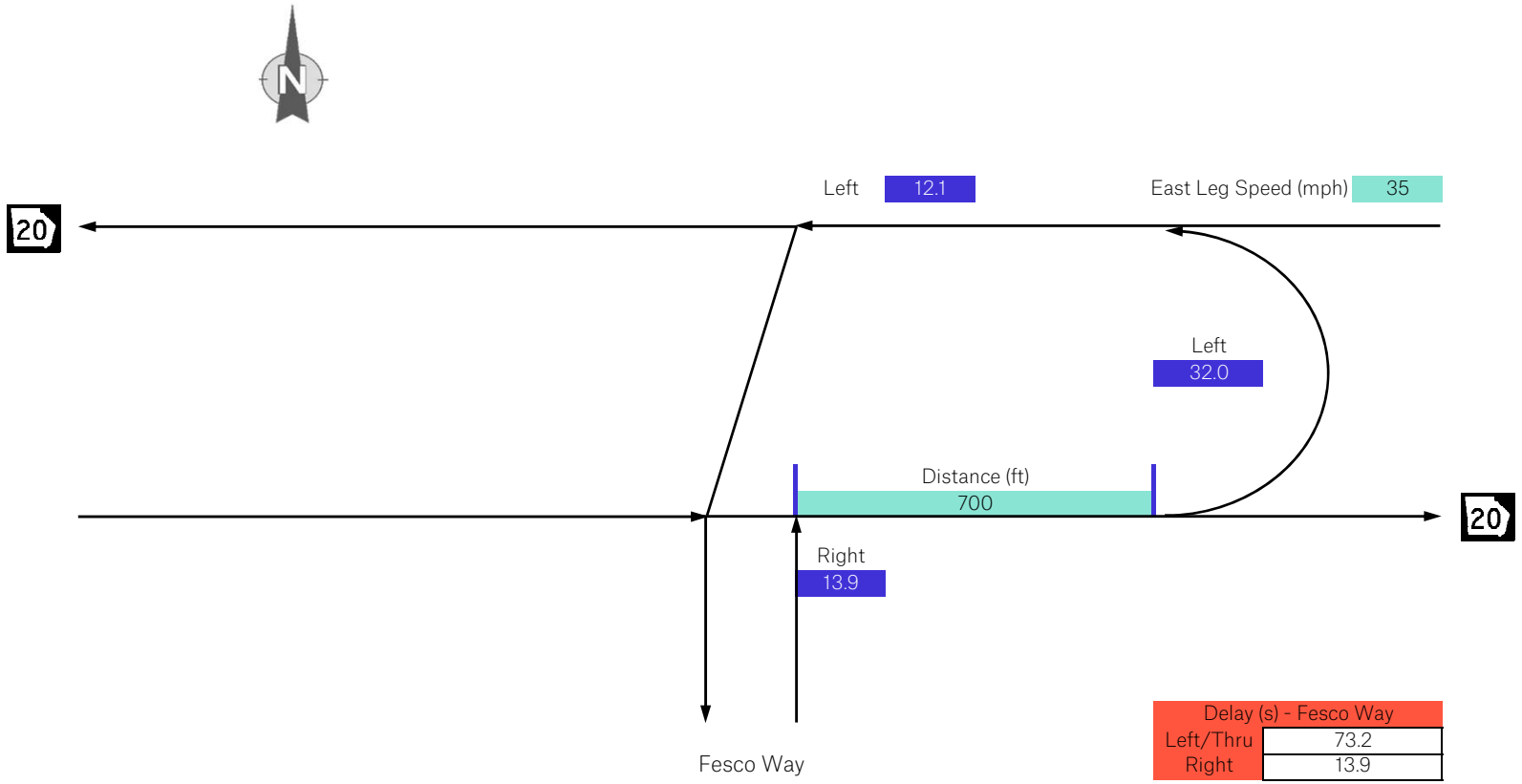
2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model

2043 AM Peak Hour



Delay (s) - Fesco Way	
Left/Thru	73.2
Right	13.9

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1170	0	10	1150	0	0	0	10	0	0	0
Delay (s)	0	0	0	12.1	0	0	73.2	73.2	13.9	0.0	0.0	0

	EB	WB	NB	SB
Volume	1170	1160	10	0
Delay (s)	0.0	0.1	13.9	0.0

Overall Delay (s)
0.1

Gresham Smith

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1170	0	10	1150	0	10
Future Vol, veh/h	1170	0	10	1150	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1286	0	11	1264	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1286	0	-	643
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.2	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.25	-	-	3.32
Pot Cap-1 Maneuver	-	-	519	-	0	416
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	519	-	-	416
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	-	-	519	-
HCM Lane V/C Ratio	0.026	-	-	0.021	-
HCM Control Delay (s)	13.9	-	-	12.1	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	95	0	1085	1165	0	0	0
Future Vol, veh/h	95	0	1085	1165	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	100	0	1142	1226	0	0	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	1226	1226	0	-	0	-	613
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.5	4.2	-	-	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.55	2.25	-	-	-	-	3.35
Pot Cap-1 Maneuver	231	548	-	-	0	0	428
Stage 1	-	-	-	-	0	0	-
Stage 2	-	-	-	-	0	0	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	231	231	-	-	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

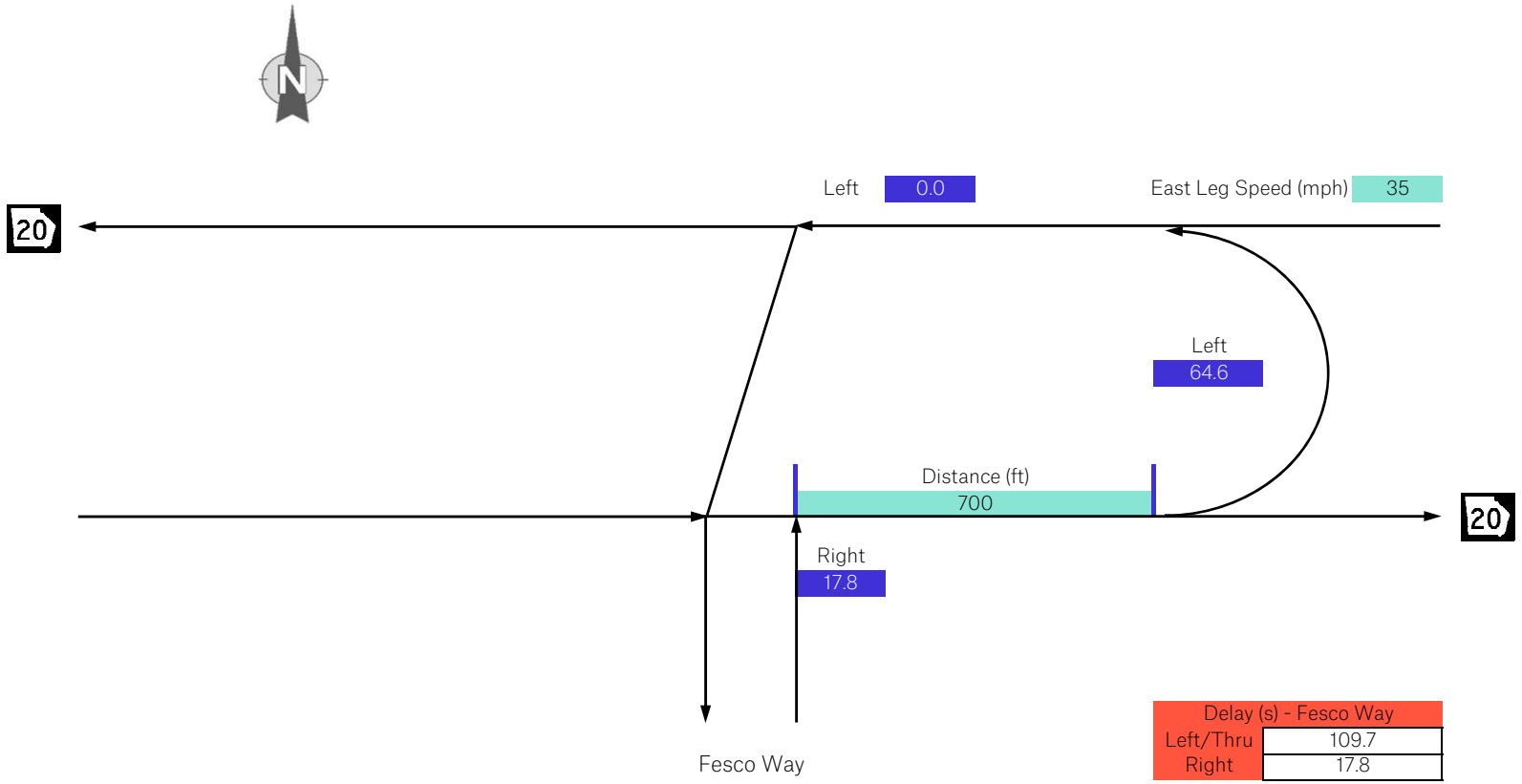
Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	231	-	-	-
HCM Lane V/C Ratio	0.433	-	-	-
HCM Control Delay (s)	32	-	-	0
HCM Lane LOS	D	-	-	A
HCM 95th %tile Q(veh)	2	-	-	-

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour



Delay (s) - Fesco Way	
Left/Thru	109.7
Right	17.8

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1465	0	0	1205	0	0	0	10	0	0	0
Delay (s)	0	0	0	0	0	0	109.7	109.7	17.8	0.0	0.0	0

	EB	WB	NB	SB
Volume	1465	1205	10	0
Delay (s)	0.0	0.0	17.8	0.0

Overall Delay (s)
0.1

Gresham Smith

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1465	0	0	1205	0	10
Future Vol, veh/h	1465	0	0	1205	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1744	0	0	1435	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1744	0	-	872
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.18	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.24	-	-	3.32
Pot Cap-1 Maneuver	-	-	348	-	0	294
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	348	-	-	294
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	294	-	-	348	-
HCM Lane V/C Ratio	0.04	-	-	-	-
HCM Control Delay (s)	17.8	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	195	0	1280	1110	0	0	0
Future Vol, veh/h	195	0	1280	1110	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4
Mvmt Flow	207	0	1362	1181	0	0	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	1181	1181	0	-	0	-	591
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.48	4.18	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.54	2.24	-	-	-	-	3.34
Pot Cap-1 Maneuver	249	576	-	-	0	0	445
Stage 1	-	-	-	-	0	0	-
Stage 2	-	-	-	-	0	0	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	249	249	-	-	-	-	445
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	249	-	-	-
HCM Lane V/C Ratio	0.833	-	-	-
HCM Control Delay (s)	64.6	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	6.6	-	-	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

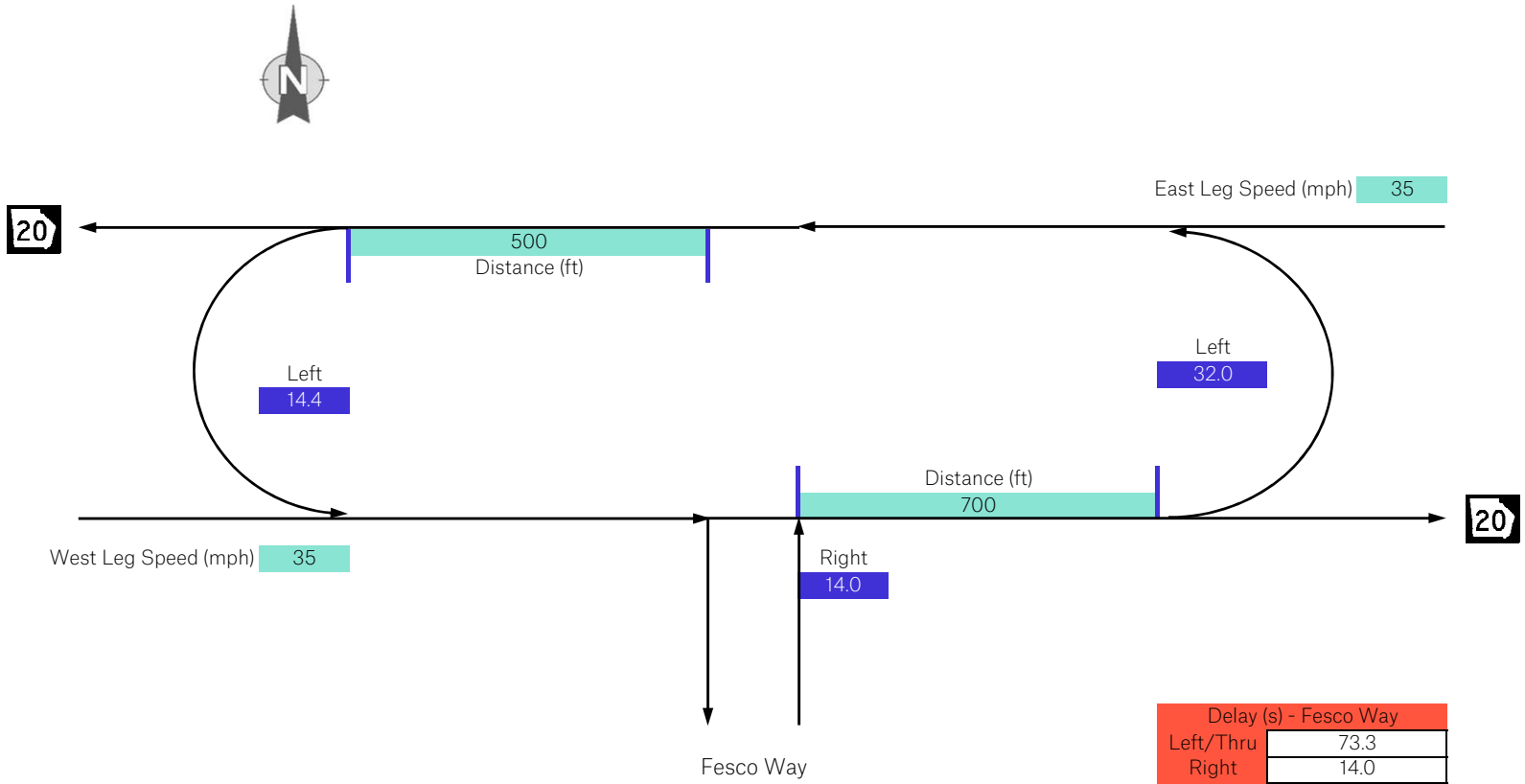
2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model

2043 AM Peak Hour



Delay (s) - Fesco Way	
Left/Thru	73.3
Right	14.0
Left-In	33.9

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1170	0	10	1150	0	0	0	10	0	0	0
Delay (s)	0.0	0.0	0.0	33.9	0.0	0.0	73.3	73.3	14.0	0.0	0.0	0.0

	EB	WB	NB	SB
Volume	1170	1160	10	0
Delay (s)	0.0	0.3	14.0	0.0

Overall Delay (s)
0.2

Gresham Smith

Intersection	
Int Delay, s/veh	2.6

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations								
Traffic Vol, veh/h	0	1050	10	10	55	1095	30	120
Future Vol, veh/h	0	1050	10	10	55	1095	30	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	Yield
Storage Length	200	-	150	-	300	-	0	-
Veh in Median Storage, #	-	0	-	-	-	0	0	-
Grade, %	-	0	-	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93
Heavy Vehicles, %	5	5	5	5	5	5	2	2
Mvmt Flow	0	1129	11	11	59	1177	32	129

Major/Minor	Major1			Major2			Minor1	
Conflicting Flow All	1177	0	0	1129	1140	0	1858	565
Stage 1	-	-	-	-	-	-	1129	-
Stage 2	-	-	-	-	-	-	729	-
Critical Hdwy	6.5	-	-	6.5	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.55	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	249	-	-	267	592	-	65	468
Stage 1	-	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	-	438	-
Platoon blocked, %		-	-			-		
Mov Cap-1 Maneuver	249	-	-	454	454	-	55	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	55	-
Stage 1	-	-	-	-	-	-	271	-
Stage 2	-	-	-	-	-	-	371	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	35.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	275	249	-	-	454	-
HCM Lane V/C Ratio	0.587	-	-	-	0.154	-
HCM Control Delay (s)	35.1	0	-	-	14.4	-
HCM Lane LOS	E	A	-	-	B	-
HCM 95th %tile Q(veh)	3.4	0	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1170	10	0	1160	0	10
Future Vol, veh/h	1170	10	0	1160	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1286	11	0	1275	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	649
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	412
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	412
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	412	-	-	-
HCM Lane V/C Ratio	0.027	-	-	-
HCM Control Delay (s)	14	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	95	0	1085	1165	0	0	0
Future Vol, veh/h	95	0	1085	1165	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	100	0	1142	1226	0	0	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	1226	1226	0	-	0	-	613
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.5	4.2	-	-	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.55	2.25	-	-	-	-	3.35
Pot Cap-1 Maneuver	231	548	-	-	0	0	428
Stage 1	-	-	-	-	0	0	-
Stage 2	-	-	-	-	0	0	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	231	231	-	-	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

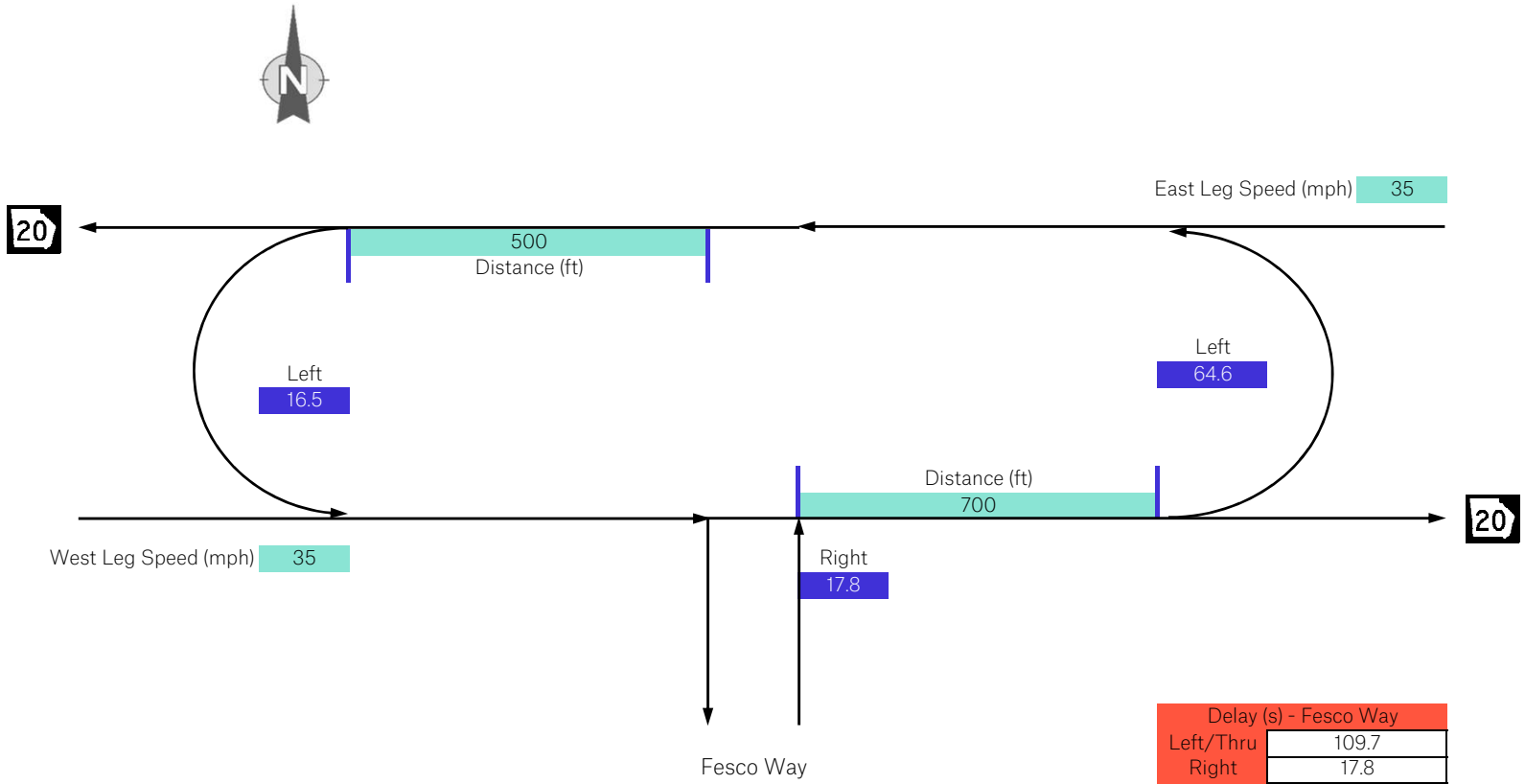
Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	231	-	-	-
HCM Lane V/C Ratio	0.433	-	-	-
HCM Control Delay (s)	32	-	-	0
HCM Lane LOS	D	-	-	A
HCM 95th %tile Q(veh)	2	-	-	-

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour



Delay (s) - Fesco Way	
Left/Thru	109.7
Right	17.8
Left-In	36.0

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	0	1465	0	0	1205	0	0	0	10	0	0	0
Delay (s)	0.0	0.0	0.0	36.0	0.0	0.0	109.7	109.7	17.8	0.0	0.0	0.0

	EB	WB	NB	SB
Volume	1465	1205	10	0
Delay (s)	0.0	0.0	17.8	0.0

Overall Delay (s)
0.1

Gresham Smith

Intersection	
Int Delay, s/veh	3.7

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	10	1345	50	105	1100	15	120
Future Vol, veh/h	10	1345	50	105	1100	15	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	Yield
Storage Length	200	-	150	300	-	0	-
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	93	92	92	92	92	92	92
Heavy Vehicles, %	5	4	4	4	4	2	2
Mvmt Flow	11	1462	54	114	1196	16	130

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1196	0	0	1516	0	2310	731
Stage 1	-	-	-	-	-	1484	-
Stage 2	-	-	-	-	-	826	-
Critical Hdwy	6.5	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.55	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	242	-	-	427	-	32	364
Stage 1	-	-	-	-	-	175	-
Stage 2	-	-	-	-	-	390	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	242	-	-	427	-	22	364
Mov Cap-2 Maneuver	-	-	-	-	-	22	-
Stage 1	-	-	-	-	-	167	-
Stage 2	-	-	-	-	-	286	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	1.4	62.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBL	WBT
Capacity (veh/h)	198	242	-	-	427	-
HCM Lane V/C Ratio	0.741	0.044	-	-	0.267	-
HCM Control Delay (s)	62.2	20.6	-	-	16.5	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	4.9	0.1	-	-	1.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1465	0	0	1205	0	10
Future Vol, veh/h	1465	0	0	1205	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1744	0	0	1435	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	872
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	294
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	294
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	294	-	-	-
HCM Lane V/C Ratio	0.04	-	-	-
HCM Control Delay (s)	17.8	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	195	0	1280	1110	0	0	0
Future Vol, veh/h	195	0	1280	1110	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	4	4	4	4
Mvmt Flow	207	0	1362	1181	0	0	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	1181	1181	0	-	0	-	591
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.48	4.18	-	-	-	-	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.54	2.24	-	-	-	-	3.34
Pot Cap-1 Maneuver	249	576	-	-	0	0	445
Stage 1	-	-	-	-	0	0	-
Stage 2	-	-	-	-	0	0	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	249	249	-	-	-	-	445
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	249	-	-	-
HCM Lane V/C Ratio	0.833	-	-	-
HCM Control Delay (s)	64.6	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	6.6	-	-	-

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 3 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1170	0	10	1150	0	10
Future Vol, veh/h	1170	0	10	1150	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1286	0	11	1264	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1286	0	1940	643
Stage 1	-	-	-	-	1286	-
Stage 2	-	-	-	-	654	-
Critical Hdwy	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	519	-	57	416
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	479	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	519	-	56	416
Mov Cap-2 Maneuver	-	-	-	-	56	-
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	469	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	-	-	519	-
HCM Lane V/C Ratio	0.026	-	-	0.021	-
HCM Control Delay (s)	13.9	-	-	12.1	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1465	0	0	1205	0	10
Future Vol, veh/h	1465	0	0	1205	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1744	0	0	1435	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1744	0	2462	872
Stage 1	-	-	-	-	1744	-
Stage 2	-	-	-	-	718	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	348	-	25	294
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	444	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	348	-	25	294
Mov Cap-2 Maneuver	-	-	-	-	25	-
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	444	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	294	-	-	348	-
HCM Lane V/C Ratio	0.04	-	-	-	-
HCM Control Delay (s)	17.8	-	-	0	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.15 | Revised 07/01/2019

Georgia Department of Transportation

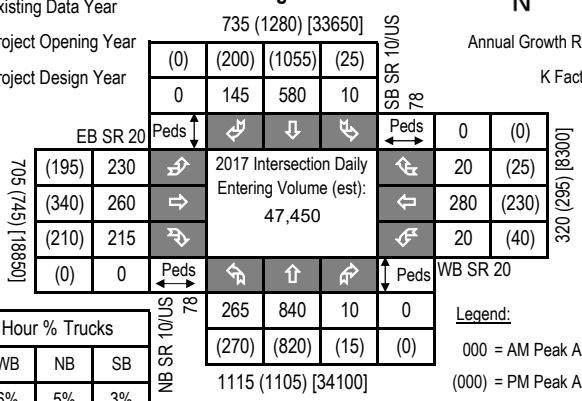
GDOT PI # (or N/A):	0016387	Request By:	GDOT Project Manager
County:	Walton	GDOT District:	1 - Gainesville
Major (State) Road:	SR 10/US 78	Speed Limit:	45 mph
Minor (Crossing) ST:	SR 20	Speed Limit:	35 mph
Major ST Direction:	North/South	Area Type:	Urban
Intersection Control:	Signal (turn lanes on mainline)		
Prepared By:	Gresham Smith	Analyst:	C. Lincoln
Date:	2/4/2020	Project ID:	
Project Purpose:	Widening		

2017	Existing Data Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 7%

2017 Existing Year Volumes



Peak Hour % Trucks			
EB	WB	NB	SB
5%	6%	5%	3%

Legend:

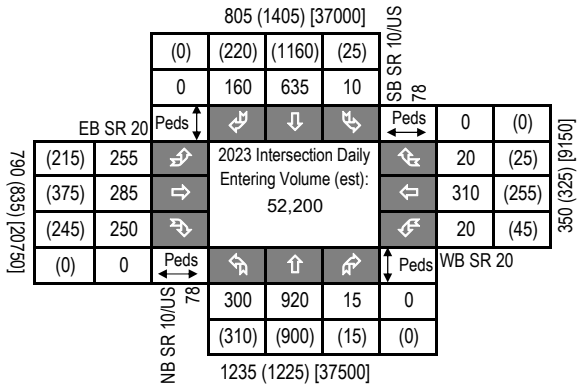
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

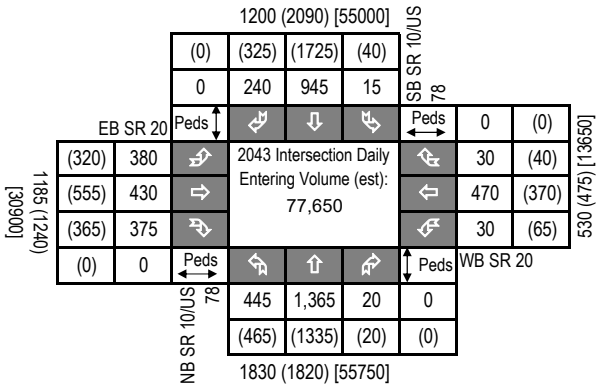
[000] = ADT Volume (Estimate)

Approach Splits: SR 10/US 78 - 0.71 / SR 20 - 0.29

2023 Opening Year Volumes



2043 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 #	0016387
Project Location:	SR 10/US 78 @ SR 20
Existing Control:	Signal (turn lanes on mainline)
Prepared by:	Gresham Smith
Date:	2/4/2020

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	Signalized intersection
	Conventional (All-Way Stop)	No	No	**Yes**	No	No	No	No	Not in scale w/ mainline volumes; significant mainline delay
	Mini Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 15,000; not compatible with a 4-lane section
	Single Lane Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 25,000; not compatible with a 4-lane section
	Multilane Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 40,000
	RCUT (stop control)	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay
	High-T (unsignalized)	No	No	**Yes**	No	No	No	No	Not applicable; not a T intersection
	Offset-T Intersections	No	No	No	No	No	No	No	Intersection is properly aligned
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	N/A
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	No	No	No	No	No	No	No	Existing condition
	Median U-Turn (Indirect Left)	No	No	No	No	No	No	No	Increased minor street left turn delay
	RCUT (signalized)	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay
	Displaced Left Turn (CFI)	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Continuous Green-T	No	No	**Yes**	No	No	No	No	Not applicable; not a T intersection
	Jughandle	No	**Yes**	**Yes**	No	No	No	No	Increased mainline left turn delay; significant r/w impact to multiple
	Quadrant Roadway	No	**Yes**	**Yes**	No	No	No	No	Increased left turn delay; significant r/w impact to multiple quadrants
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	Not applicable; not an interchange
	Diverging Diamond	No	No	No	No	No	No	No	Not applicable; not an interchange
	Single Point Interchange	No	No	No	No	No	No	No	Not applicable; not an interchange
	Add LT Lanes on Both Roads Add RT Lanes on Both Roads	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	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 ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.15 | Revised 07/01/2019

GDOT PI # (or N/A): 0016387 | GDOT District: 1 - Gainesville | Date: 2/4/2020
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 10/US 78 @ SR 20 | Analyst: C. Lincoln
Existing Intersection Control: Signal (turn lanes on mainline) | Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	Meets Signal Warrants	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2023 Opening Yr No-Build Peak Hr Intersection Delay	40.6 sec	65.6 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.93	1.07
2043 Design Yr No-Build Peak Hr Intersection Delay	107.4 sec	177.7 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	1.31	1.51

Complete Streets Warrants Met?
- [x] PEDESTRIANS
- [ ] BICYCLES
- [ ] TRANSIT

Crash Data: Enter most recent 5 years of crash data	*Crash Severity* PDO	Injury Crash*	Fatal Crash*	
Crash Type Angle	23	6	0	23%
Head-On	0	0	0	0%
Rear End	71	10	0	65%
Sideswipe - same	9	0	0	7%
Sideswipe - opposite	4	0	0	3%
Not Collision w/Motor Veh	2	0	0	2%
TOTALS:	109	16	0	125

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

Alternatives Analysis:

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	Displaced Left Turn (CFI)	Add LT and RT Lanes	N/A	N/A	N/A
Project Cost: (From CostEst Worksheet)	*One-legged CFI*	*Additional description here*			
Construction Cost	$1,405,000	$905,000			
ROW Cost	$3,400,000	$0			
Environmental Cost	$0	$0			
Reimbursable Utility Cost	$22,000	$35,000			
Design & Contingency Cost	$390,000	$251,000			
Cost Adjustment (justification req'd)	0%	0%			
Total Cost	$5,217,000	$1,191,000			
Traffic Operations:					
Traffic Analysis Software Used	Synchro 9	Synchro 9			
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr			
2043 Design Yr Build Intersection Delay	71.6 sec / 80.7 sec	68.4 sec / 111.3 sec			
2043 Design Yr Build Intersection V/C	1.13 / 1.17	1.03 / 1.35			
Safety Analysis:					
Predefined CRF: PDO	33%	43%			
Predefined CRF: Fatal/Inj	50%	35%			
Predefined CRF Source:	FHWA-HRT-09-055	FHWA Clearinghouse #s 270&285 / 274&288			
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None			
Archaeology Resources	None	None			
Graveyard	None	None			
Stream	None	None			
Underground Tank/Hazmat	None	None			
Park Land	None	None			
EJ Community	None	None			
Wooded Area	None	None			
Wetland	None	None			
Stakeholder Posture:	*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*				
	[1] Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report				
Local Community Support	Unknown	Unknown			
GDOT Support	Unknown	Unknown			
Final ICE Stage 2 Score:	3.5	4.4			
Rank of Control Type Alternatives:	2	1			

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary):

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.15 | Revised 07/01/2019

Project Information

Location:	SR 10/US 78 @ SR 20	County:	Walton	Date:	2/4/2020
GDOT PI # (or N/A):	0016387	Area Type:	Urban	Agency/Firm:	Gresham Smith
Existing Intersection Control:	Signal (turn lanes on mainline	GDOT District:	1 - Gainesville	Analyst:	C. Lincoln
Type of Analysis:	Conventional Non-Safety Funded Project			Major Street Direction:	North/South

Table 1: Existing Conditions

	NB SR 10/US 78			SB SR 10/US 78			EB SR 20			WB SR 20		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Lane Widths*	12'	12'	0'	12'	12'	0'	12'	12'	0'	12'	12'	0'
Bay Length**	200'		0'	200'		0'	225'		0'	275'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	75'						60'					

Table 2: Proposed Conditions

	Displaced Left Turn (CFI)	Add LT and RT Lanes	N/A	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	5	5	0	0	0
Modify/Replace Traffic Signal	3	1	0	0	0
Lighting Poles (ea)	0	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$2,000,000	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Corridor (5+ intersections)

Intersections

Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	-10%
Prelim Engineering:	15%
Project Contingency:	20%

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$128,625
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	Displaced Left Turn (CFI)		Add LT and RT Lanes		N/A		N/A		N/A	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	24,000	$227,273	33,600	$318,182						
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0						
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	5080	$96,926	3,800	$72,504						
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0						
Concrete Island (sqyd)	n/a	$51.58/syd	1200	$61,896	0	$0						
Median Landscaping	$100K/LM	$1.89/LF	0	$0	0	$0						
Typical Driveways Impacted (ea)	n/a	$7,500 ea	5	$37,500	5	$37,500						
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	2540	$86,591	1,900	$64,773						
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	0	$0	0	$0						
Signing & Marking	$0	$22.73/LF	2,540	$57,734	1,900	$43,187						
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0						
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	3	$547,725	1	$182,575						
Lighting (per pole)	n/a	$5,607 ea	0	$0	0	$0						
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0						
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0						
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0						
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0						
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0						
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0						
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0						
Grading Complete - 20%	n/a	n/a		$223,129		$143,744						
Traffic Control - 20%	n/a	n/a		$223,129		$143,744						
Reimbrusable Utility	n/a	n/a		$22,313		$35,936						
Preliminary Engineering - 15%	n/a	n/a		$167,347		$107,808						
Contigency - 20%	n/a	n/a		$223,129		$143,744						
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$125,495		$0						
Add'l ROW / Displacement / Demo	n/a	n/a		$2,000,000		$0						
ROW Multiplier - 1.6	n/a	n/a		$1,275,297		$0						
-Project Scale Reduction - 10.0%	n/a	n/a		-$156,190		-$100,621						
Grand Total Costs				**$5,219,000**		**$1,193,000**						

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
Displaced Left Turn (CFI)	2-approach CFI	F.D. Asphalt	0.98	0.0	48,000	24,000.0	2,000	0.0	540	0.0
Add LT and RT Lanes	N/A	F.D. Asphalt	0.00	0.0	33,600	0.0	1,000	0.0	900	0.0
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	F.D. Asphalt	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

WARRANT ANALYSIS

Signal warrant analysis was performed for the intersection. The Warrant 1 – Eight-Hour Vehicular Volume of the Manual of Uniform Traffic Control Devices (MUTCD) was used to determine the need for a traffic signal at each location. Since the design volumes provided by GDOT are limited to peak hour and daily volumes, the analysis was conducted using the methodologies outlined in GDOT's Design Policy Manual (Section 13.5.3). Per the Manual, the eighth-highest hourly volume of the day can be compared to the MUTCD requirement of Warrant 1 to determine if the warrant is met. Additionally, the eighth-highest hourly volume of the day can be estimated as 5.6% of the daily volume.

The warrant analysis was conducted using 100% volume thresholds for a 2-lane major street approach and 2-lane minor street approach. Since the intersection improvements would incorporate an exclusive right-turn lane on the minor street, the right-turn volume was excluded from the minor approach volume.

The signal warrant analysis is shown in the following tables. As shown, signal **warrants are met** at this intersection by the 2023 Opening Year.

Traffic Signal & AWSC Warrant Analysis

2023 Opening Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ SR 10/US 78	581	2100	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2043 Design Year

Intersection	8th Highest Hourly Volume		Traffic Signal - 8 Hour Warrants						AWSC Warrant Met?
	Minor Approach	Mainline Total	Condition A	Condition B	Condition C	Condition A @ 80%	Condition B @ 80%	Condition Met?	
SR 20 @ SR 10/US 78	865	3122	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	285	235	20	310	20	290	920	15	10	635	160
Future Volume (veh/h)	255	285	235	20	310	20	290	920	15	10	635	160
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	1810	1810	1900	1792	1792	1900	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	277	310	255	22	337	22	315	1000	16	11	690	174
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, %	5	5	5	6	6	6	5	5	5	3	3	3
Cap, veh/h	322	368	303	137	361	24	374	1789	29	235	924	233
Arrive On Green	0.14	0.40	0.40	0.22	0.22	0.22	0.14	0.52	0.52	0.33	0.33	0.33
Sat Flow, veh/h	1723	920	756	811	1665	109	1723	3463	55	547	2774	699
Grp Volume(v), veh/h	277	0	565	22	0	359	315	496	520	11	436	428
Grp Sat Flow(s),veh/h/ln	1723	0	1676	811	0	1773	1723	1719	1800	547	1752	1721
Q Serve(g_s), s	14.4	0.0	36.6	3.0	0.0	23.9	13.6	23.5	23.5	1.7	26.5	26.5
Cycle Q Clear(g_c), s	14.4	0.0	36.6	17.6	0.0	23.9	13.6	23.5	23.5	3.2	26.5	26.5
Prop In Lane	1.00		0.45	1.00		0.06	1.00		0.03	1.00		0.41
Lane Grp Cap(c), veh/h	322	0	670	137	0	384	374	888	930	235	584	573
V/C Ratio(X)	0.86	0.00	0.84	0.16	0.00	0.93	0.84	0.56	0.56	0.05	0.75	0.75
Avail Cap(c_a), veh/h	322	0	670	137	0	384	431	888	930	235	584	573
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	31.1	0.0	32.6	50.5	0.0	46.2	24.8	19.7	19.7	28.3	35.5	35.5
Incr Delay (d2), s/veh	20.4	0.0	9.6	0.5	0.0	29.8	12.6	2.5	2.4	0.4	8.4	8.6
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(95%),veh/ln	13.4	0.0	25.8	1.3	0.0	21.2	12.2	17.4	18.1	0.5	20.4	20.1
LnGrp Delay(d),s/veh	51.5	0.0	42.1	51.1	0.0	76.0	37.4	22.2	22.1	28.6	44.0	44.1
LnGrp LOS	D		D	D		E	D	C	C	C	D	D
Approach Vol, veh/h		842			381			1331			875	
Approach Delay, s/veh		45.2			74.5			25.8			43.9	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		67.0		53.0	22.0	45.0	22.0	31.0
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s		61.0		47.0	20.0	35.0	16.0	25.0
Max Q Clear Time (g_c+I1), s		25.5		38.6	15.6	28.5	16.4	25.9
Green Ext Time (p_c), s		15.4		3.9	0.4	4.9	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		40.6
HCM 2010 LOS		D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	215	375	230	45	255	25	295	900	15	25	1160	220
Future Volume (veh/h)	215	375	230	45	255	25	295	900	15	25	1160	220
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	1845	1845	1900	1863	1863	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	224	391	240	47	266	26	307	938	16	26	1208	229
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	284	366	225	60	348	34	309	2028	35	287	1153	217
Arrive On Green	0.09	0.34	0.34	0.21	0.21	0.21	0.14	0.57	0.57	0.39	0.39	0.39
Sat Flow, veh/h	1757	1071	657	792	1671	163	1757	3526	60	580	2945	554
Grp Volume(v), veh/h	224	0	631	47	0	292	307	466	488	26	715	722
Grp Sat Flow(s),veh/h/ln	1757	0	1729	792	0	1834	1757	1752	1834	580	1752	1747
Q Serve(g_s), s	11.0	0.0	41.0	0.0	0.0	18.0	16.8	18.5	18.5	3.4	47.0	47.0
Cycle Q Clear(g_c), s	11.0	0.0	41.0	25.0	0.0	18.0	16.8	18.5	18.5	3.4	47.0	47.0
Prop In Lane	1.00		0.38	1.00		0.09	1.00		0.03	1.00		0.32
Lane Grp Cap(c), veh/h	284	0	591	60	0	382	309	1008	1055	287	686	684
V/C Ratio(X)	0.79	0.00	1.07	0.78	0.00	0.76	0.99	0.46	0.46	0.09	1.04	1.05
Avail Cap(c_a), veh/h	284	0	591	60	0	382	309	1008	1055	287	686	684
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	35.7	0.0	39.5	60.0	0.0	44.7	39.2	14.8	14.8	23.2	36.5	36.5
Incr Delay (d2), s/veh	13.9	0.0	56.6	48.0	0.0	8.9	49.5	1.5	1.5	0.6	45.8	49.8
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(95%),veh/ln	11.0	0.0	51.9	4.2	0.0	15.2	20.6	14.4	14.9	1.1	56.6	57.7
LnGrp Delay(d),s/veh	49.6	0.0	96.1	108.0	0.0	53.6	88.7	16.3	16.2	23.9	82.3	86.3
LnGrp LOS	D		F	F		D	F	B	B	C	F	F
Approach Vol, veh/h		855			339			1261			1463	
Approach Delay, s/veh		83.9			61.1			33.9			83.2	
Approach LOS		F			E			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		74.0		46.0	22.0	52.0	16.0	30.0
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s		68.0		40.0	16.0	46.0	10.0	24.0
Max Q Clear Time (g_c+I1), s		20.5		43.0	18.8	49.0	13.0	27.0
Green Ext Time (p_c), s		26.1		0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.6
HCM 2010 LOS	E

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	345	395	325	30	425	30	400	1270	15	15	875	220
Future Volume (veh/h)	345	395	325	30	425	30	400	1270	15	15	875	220
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	1810	1810	1900	1792	1792	1900	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	375	429	353	33	462	33	435	1380	16	16	951	239
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, %	5	5	5	6	6	6	5	5	5	3	3	3
Cap, veh/h	290	375	309	60	386	28	333	1770	21	131	856	215
Arrive On Green	0.13	0.41	0.41	0.23	0.23	0.23	0.16	0.51	0.51	0.31	0.31	0.31
Sat Flow, veh/h	1723	919	757	662	1654	118	1723	3481	40	381	2778	697
Grp Volume(v), veh/h	375	0	782	33	0	495	435	681	715	16	599	591
Grp Sat Flow(s),veh/h/ln	1723	0	1676	662	0	1772	1723	1719	1802	381	1752	1722
Q Serve(g_s), s	16.0	0.0	49.0	0.0	0.0	28.0	19.0	38.7	38.8	4.3	37.0	37.0
Cycle Q Clear(g_c), s	16.0	0.0	49.0	28.0	0.0	28.0	19.0	38.7	38.8	19.1	37.0	37.0
Prop In Lane	1.00		0.45	1.00		0.07	1.00		0.02	1.00		0.40
Lane Grp Cap(c), veh/h	290	0	684	60	0	413	333	874	916	131	540	531
V/C Ratio(X)	1.29	0.00	1.14	0.55	0.00	1.20	1.31	0.78	0.78	0.12	1.11	1.11
Avail Cap(c_a), veh/h	290	0	684	60	0	413	333	874	916	131	540	531
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	35.0	0.0	35.5	60.0	0.0	46.0	37.6	24.0	24.0	41.6	41.5	41.5
Incr Delay (d2), s/veh	155.6	0.0	80.9	10.3	0.0	110.2	158.2	6.8	6.5	1.9	72.1	73.8
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(95%),veh/ln	39.8	0.0	68.4	2.3	0.0	47.4	46.1	27.3	28.4	0.9	51.6	51.2
LnGrp Delay(d),s/veh	190.6	0.0	116.4	70.3	0.0	156.2	195.8	30.8	30.6	43.5	113.6	115.3
LnGrp LOS	F		F	E		F	F	C	C	D	F	F
Approach Vol, veh/h		1157			528			1831			1206	
Approach Delay, s/veh		140.5			150.8			69.9			113.5	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		66.0		54.0	24.0	42.0	21.0	33.0
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s		60.0		48.0	18.0	36.0	15.0	27.0
Max Q Clear Time (g_c+I1), s		40.8		51.0	21.0	39.0	18.0	30.0
Green Ext Time (p_c), s		15.2		0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		107.4
HCM 2010 LOS		F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	515	315	60	350	40	410	1235	20	40	1595	300
Future Volume (veh/h)	295	515	315	60	350	40	410	1235	20	40	1595	300
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	1845	1845	1900	1863	1863	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	307	536	328	62	365	42	427	1286	21	42	1661	312
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	250	375	230	60	328	38	309	2000	33	192	1136	207
Arrive On Green	0.11	0.35	0.35	0.20	0.20	0.20	0.14	0.57	0.57	0.38	0.38	0.38
Sat Flow, veh/h	1757	1073	656	638	1641	189	1757	3529	58	415	2962	539
Grp Volume(v), veh/h	307	0	864	62	0	407	427	638	669	42	961	1012
Grp Sat Flow(s),veh/h/ln	1757	0	1729	638	0	1829	1757	1752	1834	415	1752	1749
Q Serve(g_s), s	13.0	0.0	42.0	0.0	0.0	24.0	17.0	29.8	29.8	9.2	46.0	46.0
Cycle Q Clear(g_c), s	13.0	0.0	42.0	24.0	0.0	24.0	17.0	29.8	29.8	17.0	46.0	46.0
Prop In Lane	1.00		0.38	1.00		0.10	1.00		0.03	1.00		0.31
Lane Grp Cap(c), veh/h	250	0	605	60	0	366	309	993	1040	192	672	671
V/C Ratio(X)	1.23	0.00	1.43	1.03	0.00	1.11	1.38	0.64	0.64	0.22	1.43	1.51
Avail Cap(c_a), veh/h	250	0	605	60	0	366	309	993	1040	192	672	671
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	35.3	0.0	39.0	60.0	0.0	48.0	39.2	17.7	17.7	31.0	37.0	37.0
Incr Delay (d2), s/veh	132.0	0.0	202.0	125.8	0.0	81.0	191.1	3.2	3.1	2.6	202.4	236.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	28.0	0.0	97.1	7.3	0.0	36.6	47.9	21.6	22.5	2.2	108.0	119.2
LnGrp Delay(d),s/veh	167.3	0.0	241.0	186.4	0.0	129.0	230.2	20.9	20.8	33.6	239.4	273.6
LnGrp LOS	F		F	F		F	F	C	C	C	F	F
Approach Vol, veh/h		1171			469			1734			2015	
Approach Delay, s/veh		221.7			136.6			72.4			252.3	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		73.0		47.0	22.0	51.0	18.0	29.0
Change Period (Y+Rc), s		6.0		6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s		67.0		41.0	16.0	45.0	12.0	23.0
Max Q Clear Time (g_c+I1), s		31.8		44.0	19.0	48.0	15.0	26.0
Green Ext Time (p_c), s		30.8		0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		177.7
HCM 2010 LOS		F

Gresham Smith

Genuine Ingenuity

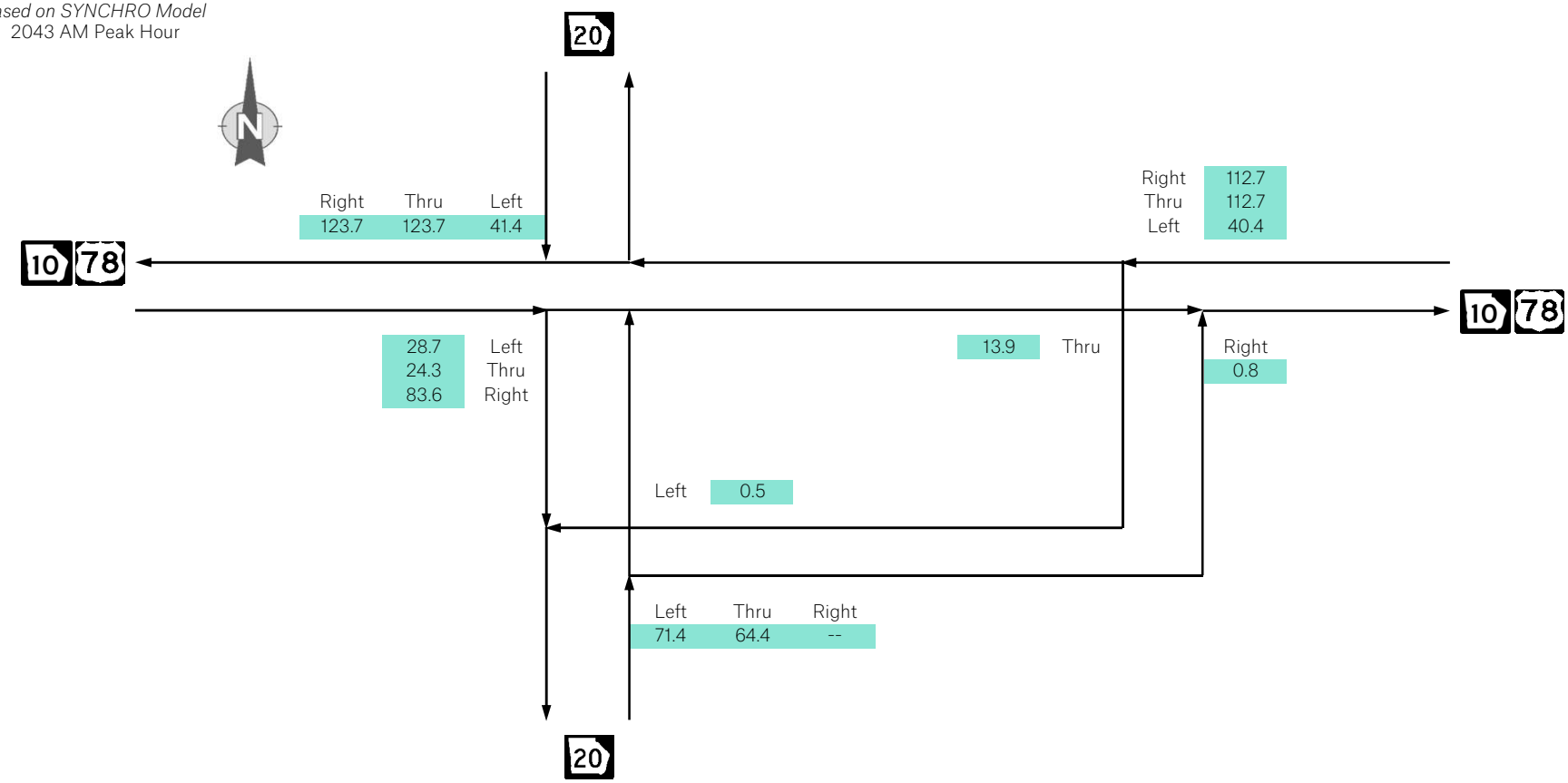
ALTERNATIVE 1 ANALYSIS

2043 Design Year

Synchro Output

Peak Hour Delays

Based on SYNCHRO Model
2043 AM Peak Hour

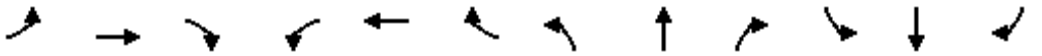


	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	25	985	205	555	1365	20	380	420	370	95	405	30
Delay (s)	28.7	38.2	83.6	40.9	112.7	112.7	71.4	64.4	0.8	55.3	123.7	123.7

	EB	WB	NB	SB
Volume	1215	1940	1170	530
Delay (s)	45.7	92.2	46.6	111.4

Overall Delay (s)
71.6

Gresham Smith



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	985	205	0	1365	20	380	420	0	95	405	30
Future Volume (vph)	25	985	205	0	1365	20	380	420	0	95	405	30
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	4.0	4.0	4.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00		0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1799	3597	1609		3521		3423	1857		1748	1820	
Flt Permitted	0.07	1.00	1.00		1.00		0.95	1.00		0.17	1.00	
Satd. Flow (perm)	133	3597	1609		3521		3423	1857		315	1820	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	1071	223	0	1484	22	413	457	0	103	440	33
RTOR Reduction (vph)	0	0	87	0	1	0	0	0	0	0	2	0
Lane Group Flow (vph)	27	1071	136	0	1505	0	413	457	0	103	471	0
Heavy Vehicles (%)	3%	3%	3%	5%	5%	5%	5%	5%	5%	6%	6%	6%
Turn Type	pm+pt	NA	Perm		NA		Prot	NA		pm+pt	NA	
Protected Phases	1	1 2			2		3	8		7	4	
Permitted Phases	1 2		1 2							4		
Actuated Green, G (s)	75.0	79.0	79.0		57.0		18.0	42.8		47.2	36.0	
Effective Green, g (s)	75.0	79.0	79.0		57.0		18.0	42.8		47.2	36.0	
Actuated g/C Ratio	0.50	0.53	0.53		0.38		0.12	0.29		0.31	0.24	
Clearance Time (s)	4.0				5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0				3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	1894	847		1337		410	529		206	436	
v/s Ratio Prot	0.01	c0.30			c0.43		c0.12	c0.25		0.04	c0.26	
v/s Ratio Perm	0.04		0.08							0.12		
v/c Ratio	0.10	0.57	0.16		1.13		1.01	0.86		0.50	1.08	
Uniform Delay, d1	28.5	23.9	18.4		46.5		66.0	50.8		39.5	57.0	
Progression Factor	1.00	1.00	1.00		1.00		0.41	1.01		1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.1		66.2		44.6	12.8		1.9	66.7	
Delay (s)	28.7	24.3	18.5		112.7		71.4	64.4		41.4	123.7	
Level of Service	C	C	B		F		E	E		D	F	
Approach Delay (s)		23.4			112.7			67.7			109.0	
Approach LOS		C			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	75.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1080	0	555	1385	0	370
Future Volume (vph)	1080	0	555	1385	0	370
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		5.0	4.0		5.0
Lane Util. Factor	0.95		0.97	0.95		1.00
Frt	1.00		1.00	1.00		0.86
Flt Protected	1.00		0.95	1.00		1.00
Satd. Flow (prot)	3529		3423	3529		1606
Flt Permitted	1.00		0.95	1.00		1.00
Satd. Flow (perm)	3529		3423	3529		1606
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1174	0	603	1505	0	402
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1174	0	603	1505	0	402
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		Prot	NA		pm+ov
Protected Phases	2		1	Free		1
Permitted Phases						2
Actuated Green, G (s)	88.0		52.0	150.0		140.0
Effective Green, g (s)	88.0		52.0	150.0		140.0
Actuated g/C Ratio	0.59		0.35	1.00		0.93
Clearance Time (s)	5.0		5.0			5.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	2070		1186	3529		1606
v/s Ratio Prot	c0.33		c0.18	0.43		0.09
v/s Ratio Perm						0.16
v/c Ratio	0.57		0.51	0.43		0.25
Uniform Delay, d1	19.2		38.9	0.0		0.4
Progression Factor	0.67		1.00	1.00		1.00
Incremental Delay, d2	1.0		1.6	0.4		0.4
Delay (s)	13.9		40.4	0.4		0.8
Level of Service	B		D	A		A
Approach Delay (s)	13.9			11.8	0.8	
Approach LOS	B			B	A	

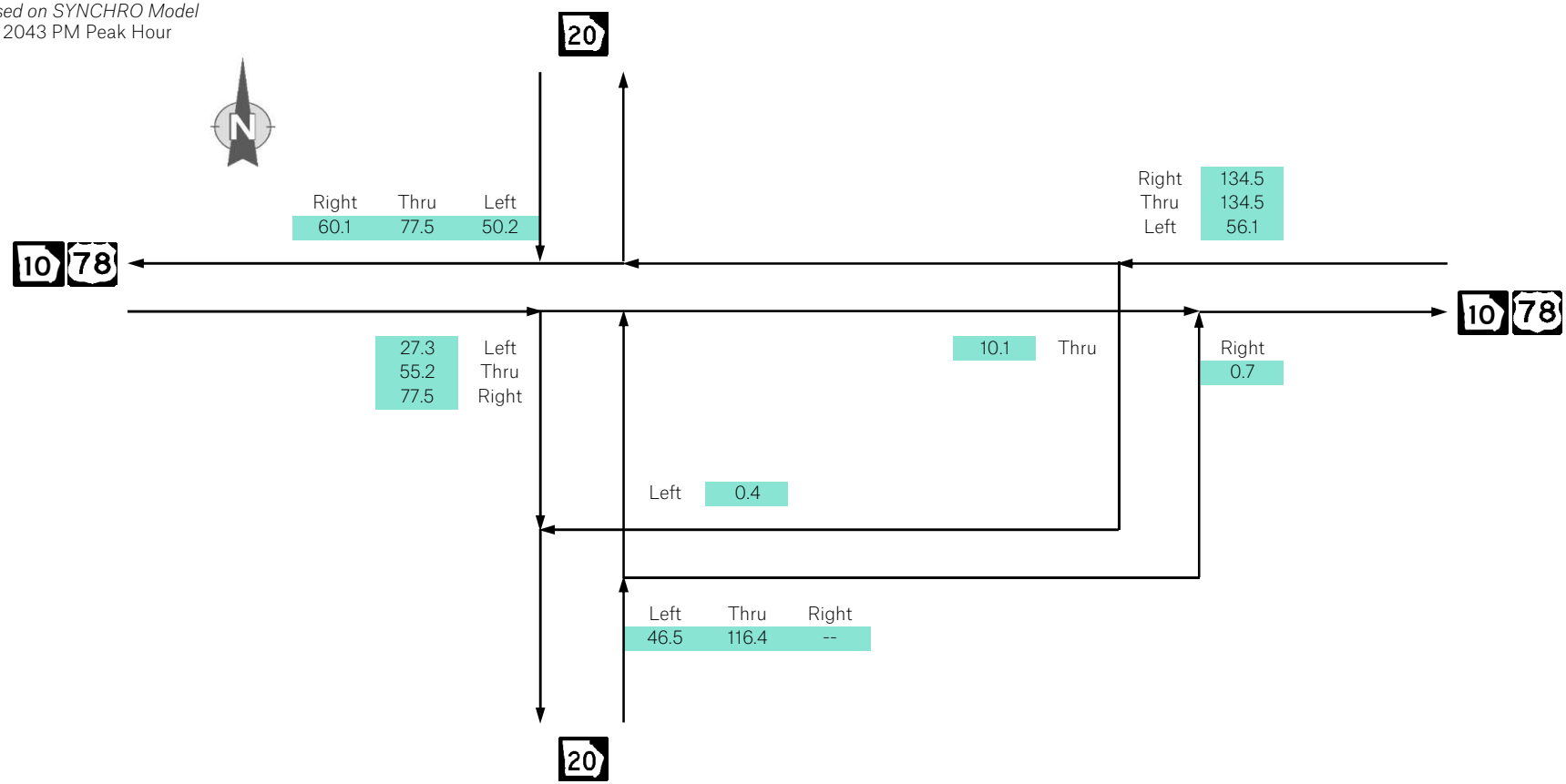
Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	0	800	370	0	610
Future Volume (vph)	555	0	800	370	0	610
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		6.0	4.0		4.0
Lane Util. Factor	0.97		0.91	1.00		0.95
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	3423		5070	1579		3529
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	3423		5070	1579		3529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	0	870	402	0	663
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	603	0	870	402	0	663
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	Prot		NA	Free		NA
Protected Phases	2		3 4			1 7 8
Permitted Phases				Free		
Actuated Green, G (s)	84.8		43.6	150.0		56.2
Effective Green, g (s)	84.8		43.6	150.0		44.2
Actuated g/C Ratio	0.57		0.29	1.00		0.29
Clearance Time (s)	5.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	1935		1473	1579		1039
v/s Ratio Prot	c0.18		c0.17			c0.19
v/s Ratio Perm				0.25		
v/c Ratio	0.31		0.59	0.25		0.64
Uniform Delay, d1	17.2		45.6	0.0		46.0
Progression Factor	0.01		1.00	1.00		1.80
Incremental Delay, d2	0.4		0.6	0.4		0.8
Delay (s)	0.5		46.2	0.4		83.6
Level of Service	A		D	A		F
Approach Delay (s)	0.5		31.7			83.6
Approach LOS	A		C			F

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Peak Hour Delays

Based on SYNCHRO Model
2043 PM Peak Hour



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	100	1840	245	585	1335	20	320	495	330	155	280	40
Delay (s)	27.3	65.3	77.5	56.5	134.5	134.5	46.5	116.4	0.7	60.3	77.5	60.1

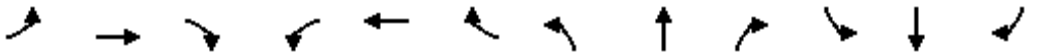
	EB	WB	NB	SB
Volume	2185	1940	1145	475
Delay (s)	64.9	111.0	63.5	70.4

Overall Delay (s)
80.7

Gresham Smith

HCM Signalized Intersection Capacity Analysis
1: SR 20 & SR 10/US 78

10/28/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1840	245	0	1335	20	320	495	0	155	280	40
Future Volume (vph)	100	1840	245	0	1335	20	320	495	0	155	280	40
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Total Lost time (s)	4.0	4.0	4.0		5.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00		0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1799	3597	1609		3624		3489	1893		1799	1857	
Flt Permitted	0.08	1.00	1.00		1.00		0.95	1.00		0.11	1.00	
Satd. Flow (perm)	151	3597	1609		3624		3489	1893		213	1857	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	104	1917	255	0	1391	21	333	516	0	161	292	42
RTOR Reduction (vph)	0	0	56	0	1	0	0	0	0	0	4	0
Lane Group Flow (vph)	104	1917	199	0	1411	0	333	516	0	161	330	0
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm		NA		Prot	NA		pm+pt	NA	
Protected Phases	1	1 2			2		3	8		7	4	
Permitted Phases	1 2		1 2							4		
Actuated Green, G (s)	76.0	80.0	80.0		50.0		17.4	38.3		50.3	35.6	
Effective Green, g (s)	76.0	80.0	80.0		50.0		17.4	38.3		50.3	35.6	
Actuated g/C Ratio	0.51	0.53	0.53		0.33		0.12	0.26		0.34	0.24	
Clearance Time (s)	4.0				5.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0				3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	1918	858		1208		404	483		226	440	
v/s Ratio Prot	0.05	c0.53			c0.39		c0.10	c0.27		0.07	0.18	
v/s Ratio Perm	0.10		0.12							0.17		
v/c Ratio	0.29	1.00	0.23		1.17		0.82	1.07		0.71	0.75	
Uniform Delay, d1	26.8	35.0	18.6		50.0		64.8	55.9		40.0	53.1	
Progression Factor	1.00	1.00	1.00		1.00		0.40	1.03		1.00	1.00	
Incremental Delay, d2	0.4	20.3	0.1		84.5		12.0	58.9		10.1	7.1	
Delay (s)	27.3	55.2	18.8		134.5		37.8	116.4		50.2	60.1	
Level of Service	C	E	B		F		D	F		D	E	
Approach Delay (s)		49.9			134.5			85.6			56.9	
Approach LOS		D			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	80.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1995	0	585	1355	0	330
Future Volume (vph)	1995	0	585	1355	0	330
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		5.0	4.0		5.0
Lane Util. Factor	0.95		0.97	0.95		1.00
Frt	1.00		1.00	1.00		0.86
Flt Protected	1.00		0.95	1.00		1.00
Satd. Flow (prot)	3632		3523	3632		1638
Flt Permitted	1.00		0.95	1.00		1.00
Satd. Flow (perm)	3632		3523	3632		1638
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2078	0	609	1411	0	344
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	2078	0	609	1411	0	344
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Turn Type	NA		Prot	NA		pm+ov
Protected Phases	2		1	Free		1
Permitted Phases						2
Actuated Green, G (s)	103.0		37.0	150.0		140.0
Effective Green, g (s)	103.0		37.0	150.0		140.0
Actuated g/C Ratio	0.69		0.25	1.00		0.93
Clearance Time (s)	5.0		5.0			5.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	2493		869	3632		1638
v/s Ratio Prot	c0.57		c0.17	0.39		0.05
v/s Ratio Perm						0.16
v/c Ratio	0.83		0.70	0.39		0.21
Uniform Delay, d1	17.2		51.5	0.0		0.4
Progression Factor	0.52		1.00	1.00		1.00
Incremental Delay, d2	1.1		4.7	0.3		0.3
Delay (s)	10.1		56.1	0.3		0.7
Level of Service	B		E	A		A
Approach Delay (s)	10.1			17.1	0.7	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	585	0	815	330	0	525
Future Volume (vph)	585	0	815	330	0	525
Ideal Flow (vphpl)	1950	1950	1950	1950	1950	1950
Total Lost time (s)	5.0		6.0	4.0		4.0
Lane Util. Factor	0.97		0.91	1.00		0.95
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	3489		5168	1609		3597
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	3489		5168	1609		3597
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	609	0	849	344	0	547
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	609	0	849	344	0	547
Turn Type	Prot		NA	Free		NA
Protected Phases	2		3 4			1 7 8
Permitted Phases				Free		
Actuated Green, G (s)	86.1		42.7	150.0		54.9
Effective Green, g (s)	86.1		42.7	150.0		42.9
Actuated g/C Ratio	0.57		0.28	1.00		0.29
Clearance Time (s)	5.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	2002		1471	1609		1028
v/s Ratio Prot	c0.17		c0.16			c0.15
v/s Ratio Perm				0.21		
v/c Ratio	0.30		0.58	0.21		0.53
Uniform Delay, d1	16.5		45.9	0.0		45.1
Progression Factor	0.01		1.00	1.00		1.71
Incremental Delay, d2	0.3		0.6	0.3		0.5
Delay (s)	0.4		46.5	0.3		77.5
Level of Service	A		D	A		E
Approach Delay (s)	0.4		33.2			77.5
Approach LOS	A		C			E

Intersection Summary			
HCM 2000 Control Delay	35.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	380	420	370	95	405	30	555	1365	20	25	985	205
Future Volume (veh/h)	380	420	370	95	405	30	555	1365	20	25	985	205
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	1810	1810	1810	1792	1792	1792	1810	1810	1900	1845	1845	1845
Adj Flow Rate, veh/h	413	457	402	103	440	33	603	1484	22	27	1071	223
Adj No. of Lanes	2	1	1	1	1	1	2	2	0	1	2	1
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, %	5	5	5	6	6	6	5	5	5	3	3	3
Cap, veh/h	411	571	485	186	427	363	592	1571	23	126	1078	482
Arrive On Green	0.12	0.32	0.32	0.05	0.24	0.24	0.18	0.45	0.45	0.03	0.31	0.31
Sat Flow, veh/h	3343	1810	1538	1707	1792	1524	3343	3468	51	1757	3505	1568
Grp Volume(v), veh/h	413	457	402	103	440	33	603	735	771	27	1071	223
Grp Sat Flow(s),veh/h/ln	1672	1810	1538	1707	1792	1524	1672	1719	1800	1757	1752	1568
Q Serve(g_s), s	16.0	30.1	31.5	6.0	31.0	2.2	23.0	53.1	53.3	1.3	39.6	14.9
Cycle Q Clear(g_c), s	16.0	30.1	31.5	6.0	31.0	2.2	23.0	53.1	53.3	1.3	39.6	14.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	411	571	485	186	427	363	592	779	816	126	1078	482
V/C Ratio(X)	1.00	0.80	0.83	0.55	1.03	0.09	1.02	0.94	0.95	0.21	0.99	0.46
Avail Cap(c_a), veh/h	411	571	485	186	427	363	592	779	816	151	1078	482
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.0	40.8	41.2	37.3	49.5	38.5	53.5	34.0	34.0	33.7	44.9	36.3
Incr Delay (d2), s/veh	45.3	8.0	11.4	3.5	51.3	0.1	42.0	21.2	20.7	0.8	25.8	3.2
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(95%),veh/ln	17.9	22.9	21.3	5.3	38.5	1.7	25.3	38.6	40.2	1.2	30.9	11.2
LnGrp Delay(d),s/veh	102.3	48.8	52.7	40.8	100.8	38.6	95.5	55.1	54.7	34.6	70.7	39.5
LnGrp LOS	F	D	D	D	F	D	F	E	D	C	E	D
Approach Vol, veh/h		1272			576			2109			1321	
Approach Delay, s/veh		67.4			86.5			66.5			64.7	
Approach LOS		E			F			E			E	

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	9.1	63.9	11.0	46.0	28.0	45.0	21.0	36.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	5.0	56.0	5.0	40.0	22.0	39.0	15.0	30.0
Max Q Clear Time (g_c+I1), s	3.3	55.3	8.0	33.5	25.0	41.6	18.0	33.0
Green Ext Time (p_c), s	0.0	0.7	0.0	3.7	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	68.4
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	495	330	155	280	40	585	1335	20	100	1840	245
Future Volume (veh/h)	320	495	330	155	280	40	585	1335	20	100	1840	245
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	1845	1845	1845	1863	1863	1863	1845	1845	1900	1845	1845	1845
Adj Flow Rate, veh/h	333	516	344	161	292	42	609	1391	21	104	1917	255
Adj No. of Lanes	2	1	1	1	1	1	2	2	0	1	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	341	418	355	119	310	264	477	1942	29	233	1612	721
Arrive On Green	0.10	0.23	0.23	0.04	0.17	0.17	0.14	0.55	0.55	0.05	0.46	0.46
Sat Flow, veh/h	3408	1845	1568	1774	1863	1583	3408	3534	53	1757	3505	1568
Grp Volume(v), veh/h	333	516	344	161	292	42	609	689	723	104	1917	255
Grp Sat Flow(s),veh/h/ln	1704	1845	1568	1774	1863	1583	1704	1752	1835	1757	1752	1568
Q Serve(g_s), s	14.6	34.0	32.6	6.0	23.2	3.4	21.0	43.8	43.9	4.6	69.0	15.7
Cycle Q Clear(g_c), s	14.6	34.0	32.6	6.0	23.2	3.4	21.0	43.8	43.9	4.6	69.0	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	341	418	355	119	310	264	477	963	1008	233	1612	721
V/C Ratio(X)	0.98	1.23	0.97	1.35	0.94	0.16	1.28	0.72	0.72	0.45	1.19	0.35
Avail Cap(c_a), veh/h	341	418	355	119	310	264	477	963	1008	273	1612	721
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.3	58.0	57.5	58.3	61.8	53.5	64.5	25.1	25.1	23.4	40.5	26.1
Incr Delay (d2), s/veh	42.4	124.5	39.1	204.2	35.7	0.3	139.8	4.6	4.4	1.3	91.6	1.4
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(95%),veh/ln	13.8	57.2	25.0	15.7	21.4	2.7	34.5	30.0	31.2	4.2	97.0	11.4
LnGrp Delay(d),s/veh	109.8	182.5	96.6	262.5	97.4	53.8	204.3	29.7	29.5	24.7	132.1	27.5
LnGrp LOS	F	F	F	F	F	D	F	C	C	C	F	C
Approach Vol, veh/h		1193			495			2021			2276	
Approach Delay, s/veh		137.4			147.4			82.2			115.5	
Approach LOS		F			F			F			F	

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	12.6	87.4	11.0	39.0	26.0	74.0	20.0	30.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	10.0	78.0	5.0	33.0	20.0	68.0	14.0	24.0
Max Q Clear Time (g_c+I1), s	6.6	45.9	8.0	36.0	23.0	71.0	16.6	25.2
Green Ext Time (p_c), s	0.1	28.9	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		111.3
HCM 2010 LOS		F

Gresham Smith

Genuine Ingenuity

ATTACHMENT 8

Roundabout Data

a. Roundabout Support Letter

b. Roundabout Design Checks

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INDICATION OF ROUNDABOUT SUPPORT

Georgia Department of Transportation
Office of Program Delivery
600 West Peachtree Street, 25th Floor
Atlanta, Georgia 30308
ATTN: Kimberly Kimbrough, Project Manager

Location

Walton County supports the consideration of a roundabout at the location specified below.

Description: SR 20 @ Sharon Church Road/Tuck Road

State/County Route Numbers: See above

Project: PI 0016387-Walton County

Associated Conditions

The undersigned agrees to participate in the following maintenance of the intersection in the event that the roundabout is selected as the preferred concept alternative:

- The full and entire cost to energize the lighting system installed and to provide for the operation/maintenance thereof.

We agree to participate in a formal *Local Government Lighting Project Agreement* during the preliminary design phase. This indication of support is submitted and all the conditions are hereby agreed to. The undersigned are duly authorized to execute this agreement.

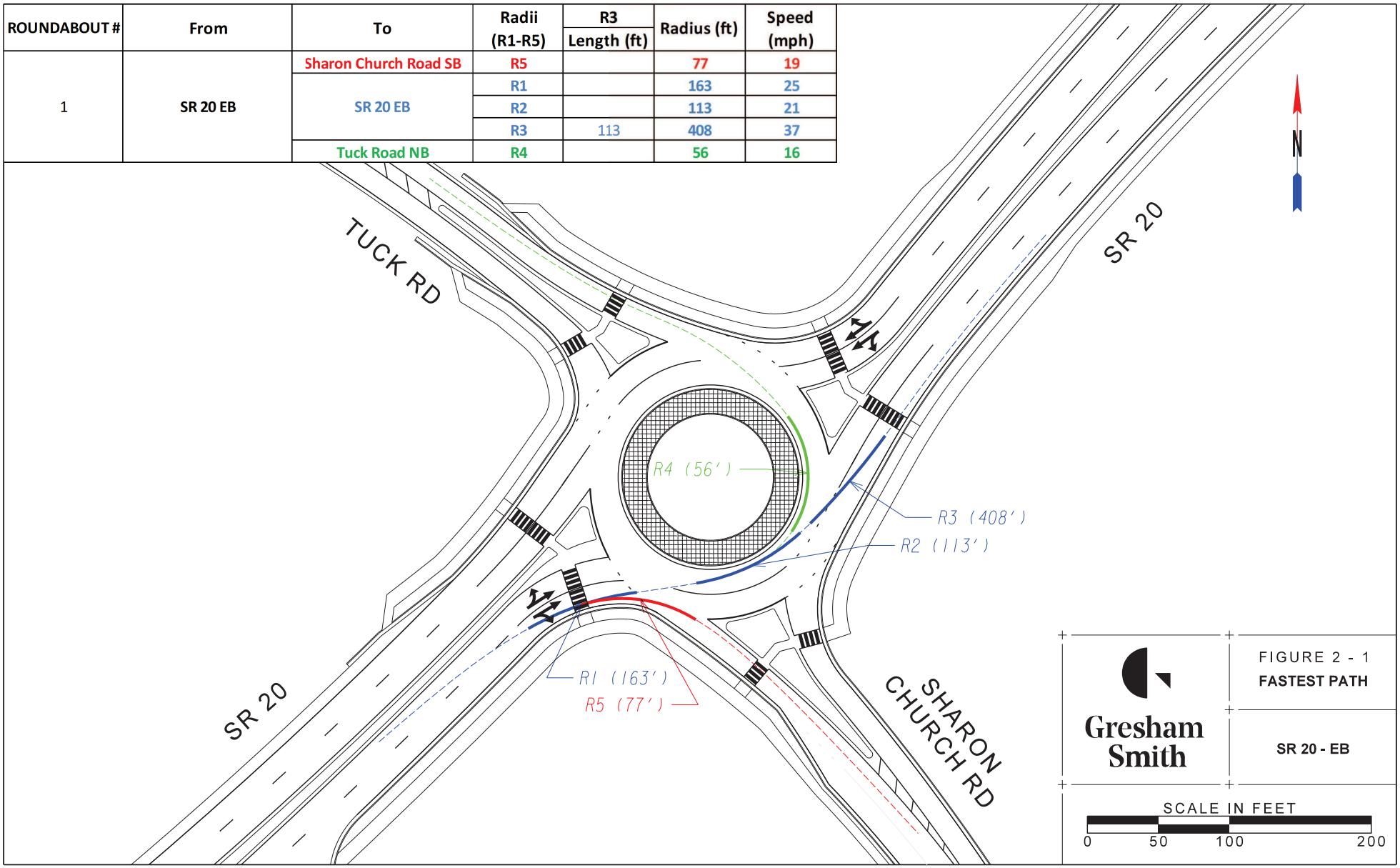
This 18 day of September, 2019

Attest: [signature]
County or City Clerk

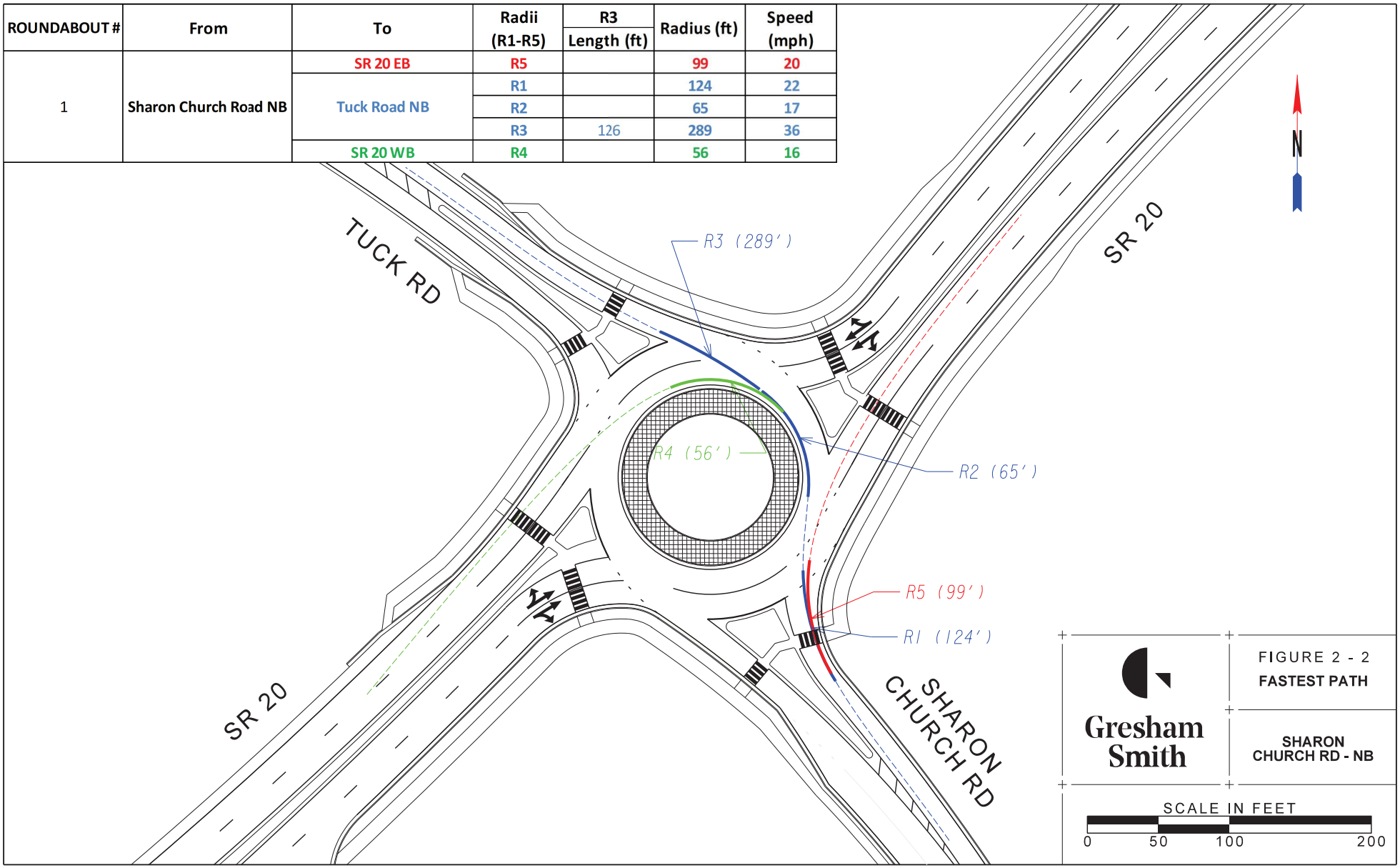
By: [signature]

Title: CHAIRMAN, BOC

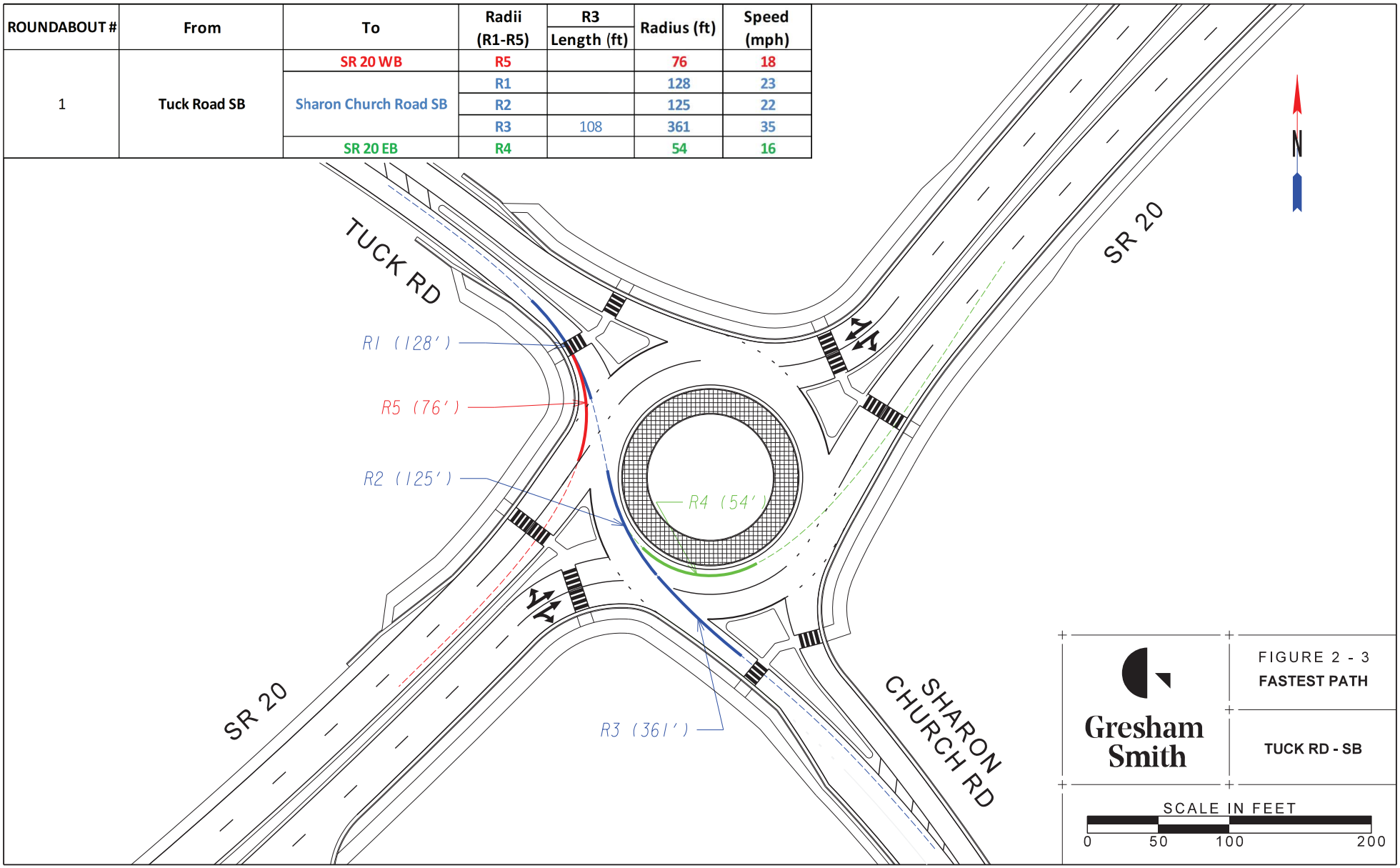
ROUNDABOUT #	From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
1	SR 20 EB	Sharon Church Road SB	R5		77	19
		SR 20 EB	R1		163	25
			R2		113	21
			R3	113	408	37
		Tuck Road NB	R4		56	16



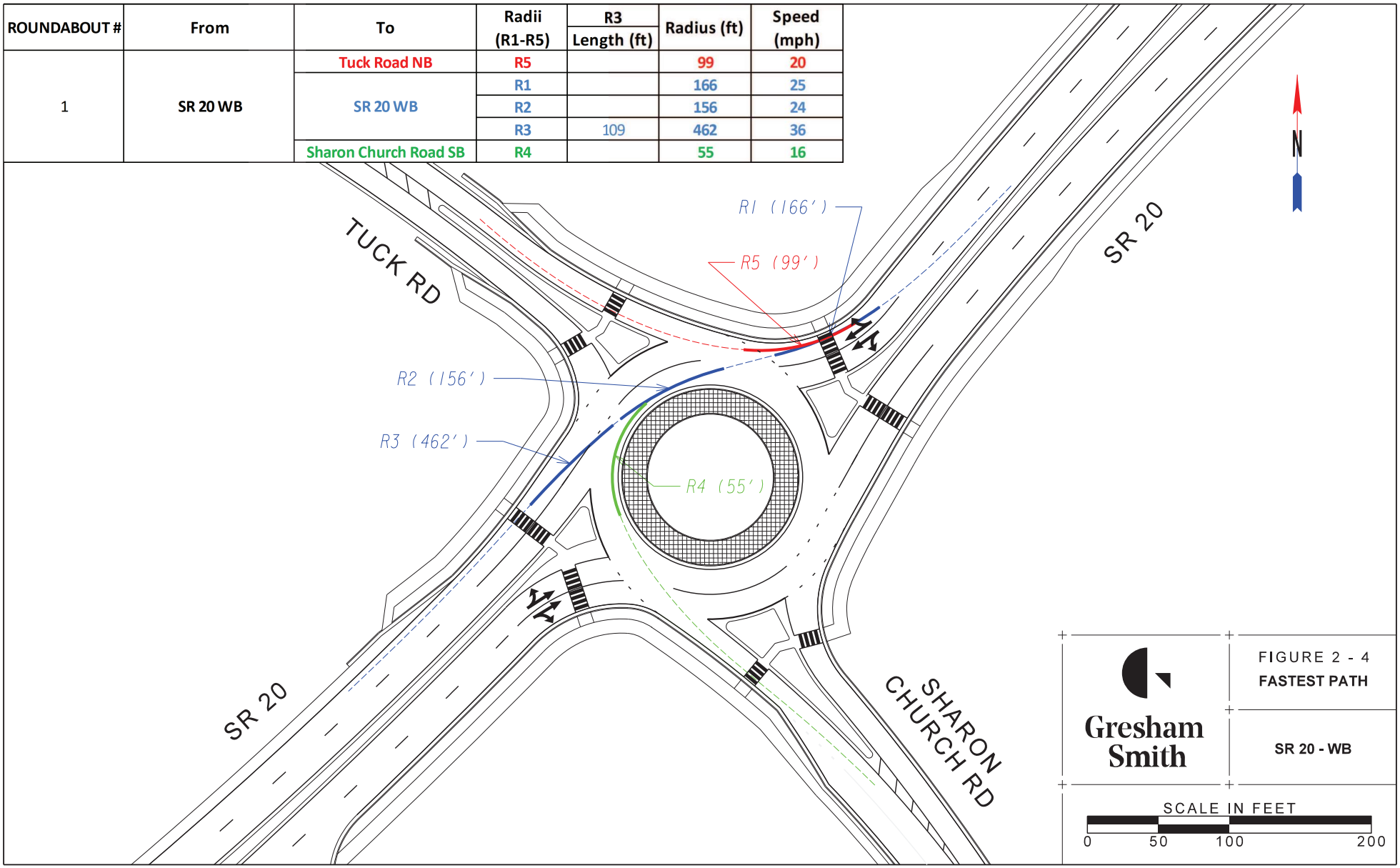
ROUNDABOUT #	From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
1	Sharon Church Road NB	SR 20 EB	R5		99	20
		Tuck Road NB	R1		124	22
			R2		65	17
			R3	126	289	36
		SR 20 WB	R4		56	16

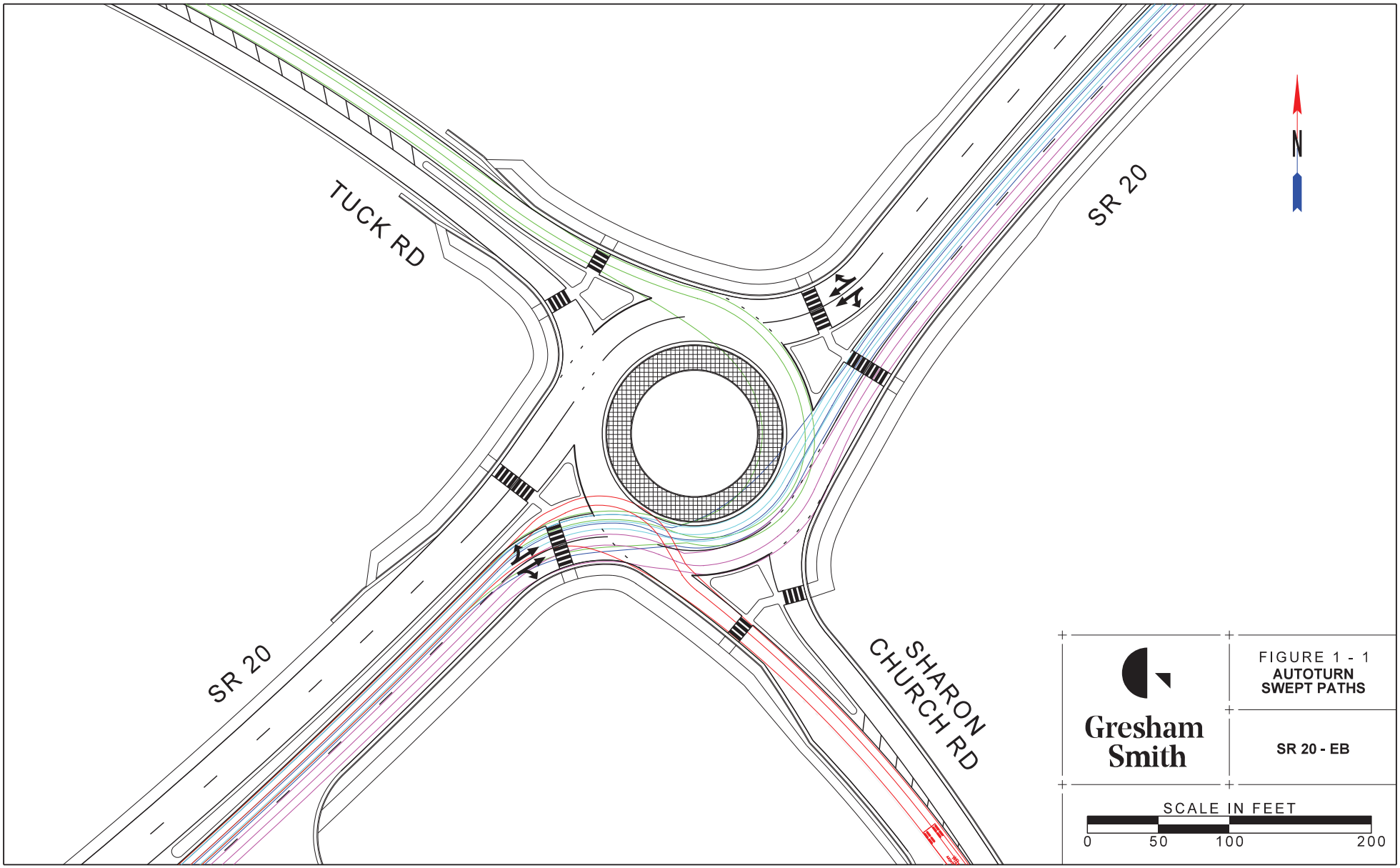


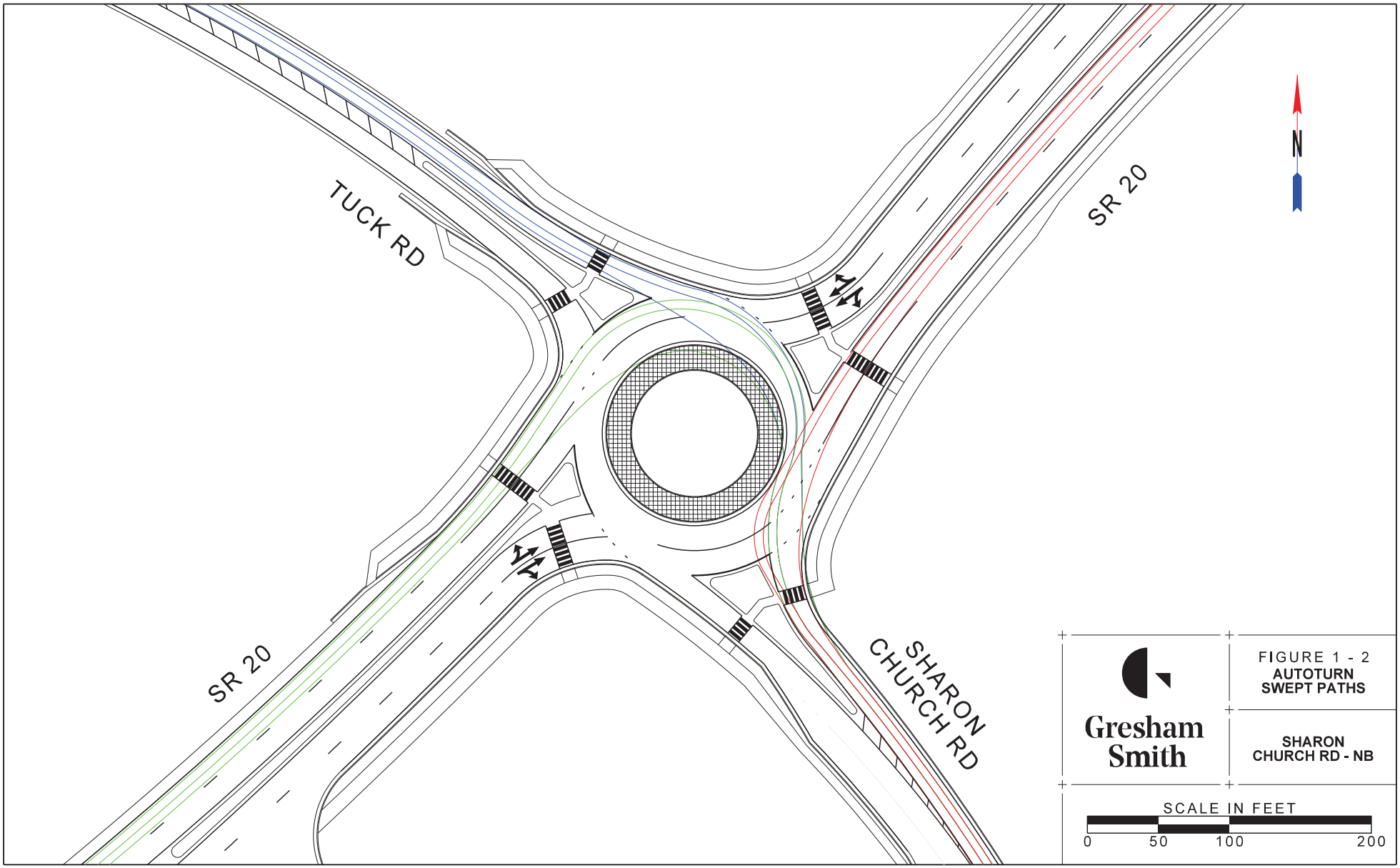
ROUNDABOUT #	From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
1	Tuck Road SB	SR 20 WB	R5		76	18
		Sharon Church Road SB	R1		128	23
			R2		125	22
			R3	108	361	35
		SR 20 EB	R4		54	16

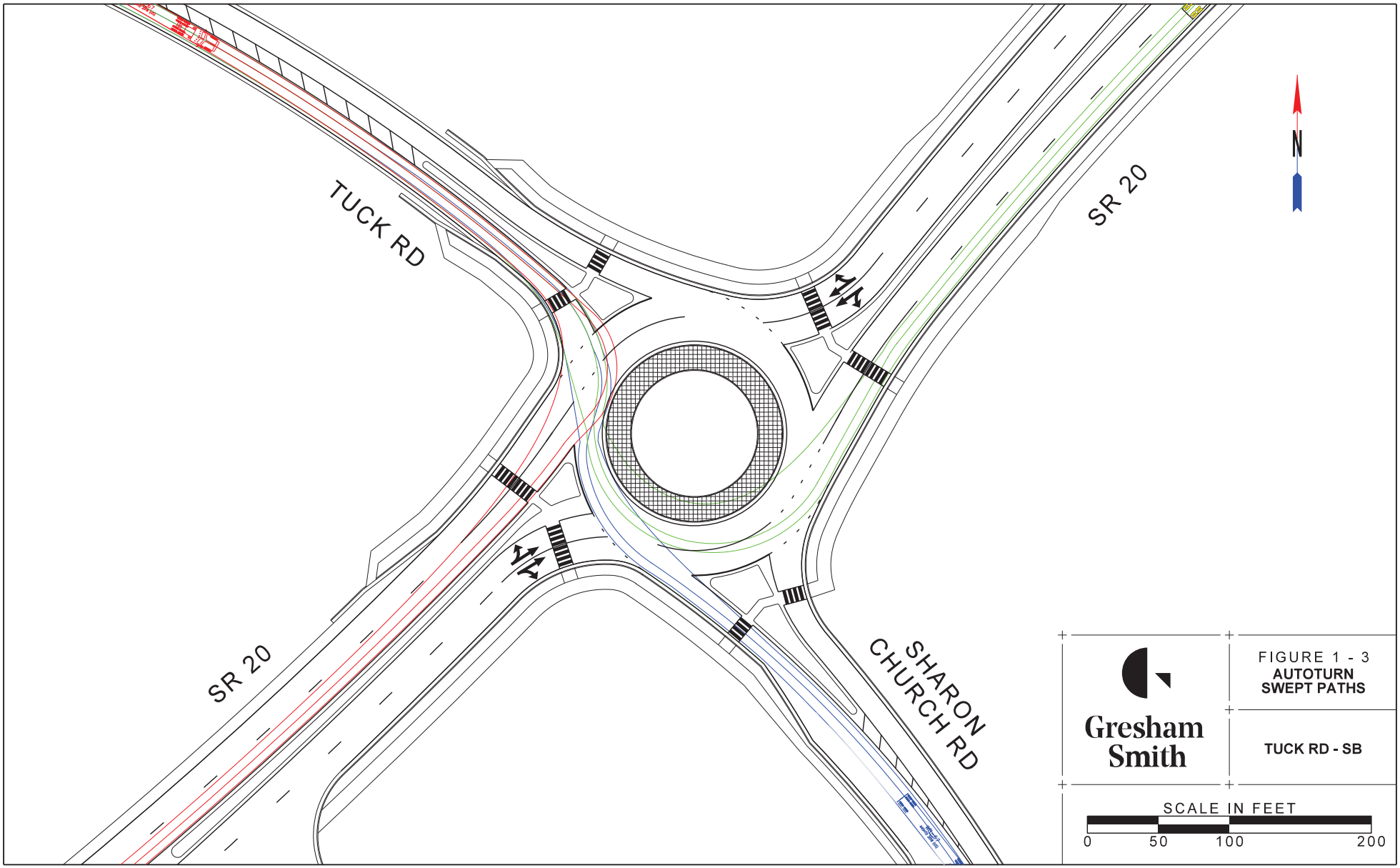


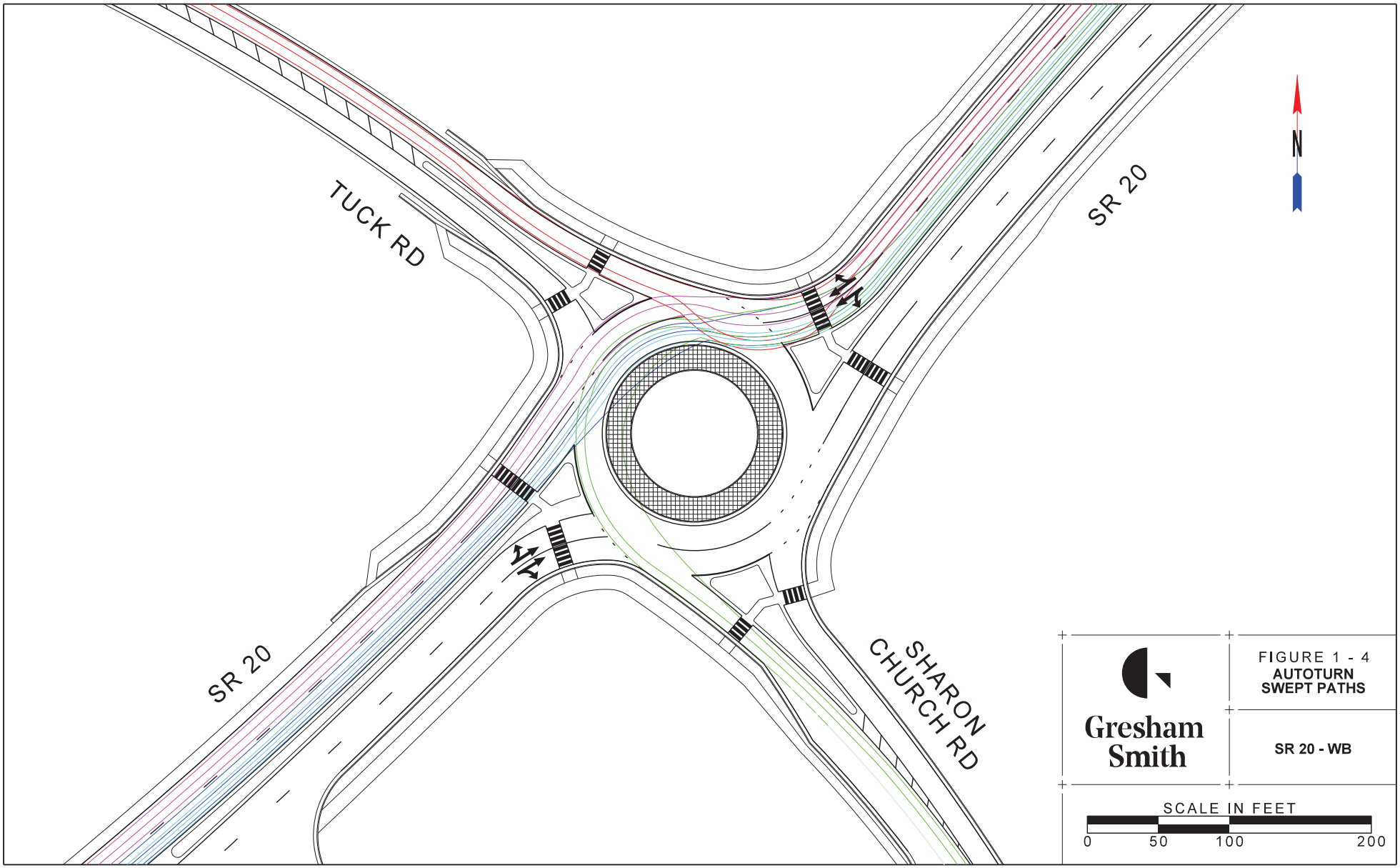
ROUNDABOUT #	From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
1	SR 20 WB	Tuck Road NB	R5		99	20
		SR 20 WB	R1		166	25
			R2		156	24
			R3	109	462	36
		Sharon Church Road SB	R4		55	16

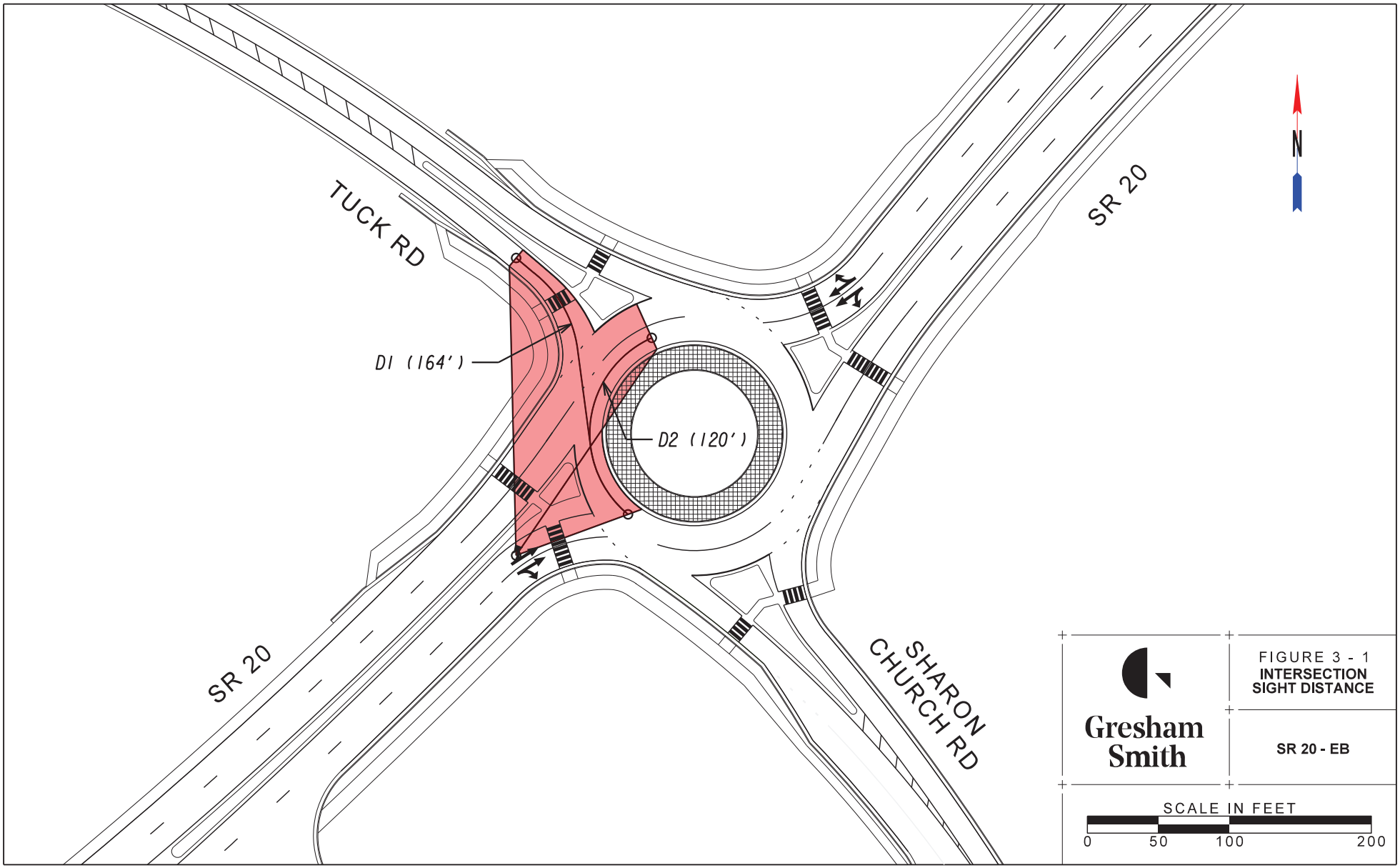


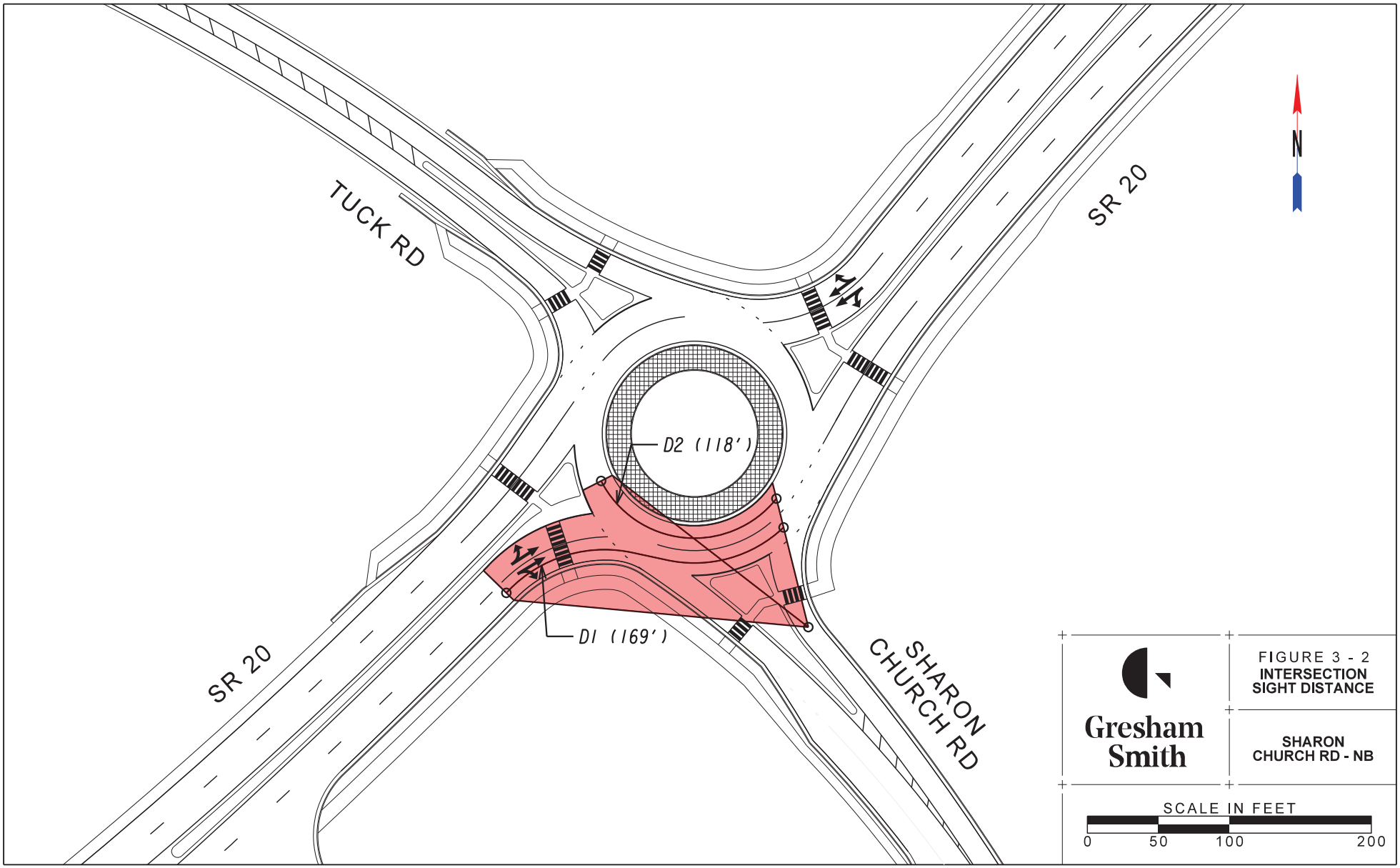

TUCK RD
SR 20
SR 20
SHARON CHURCH RD
N
Gresham Smith
FIGURE 1 - 1
AUTOTURN SWEPT PATHS
SR 20 - EB
SCALE IN FEET
0
50
100
200

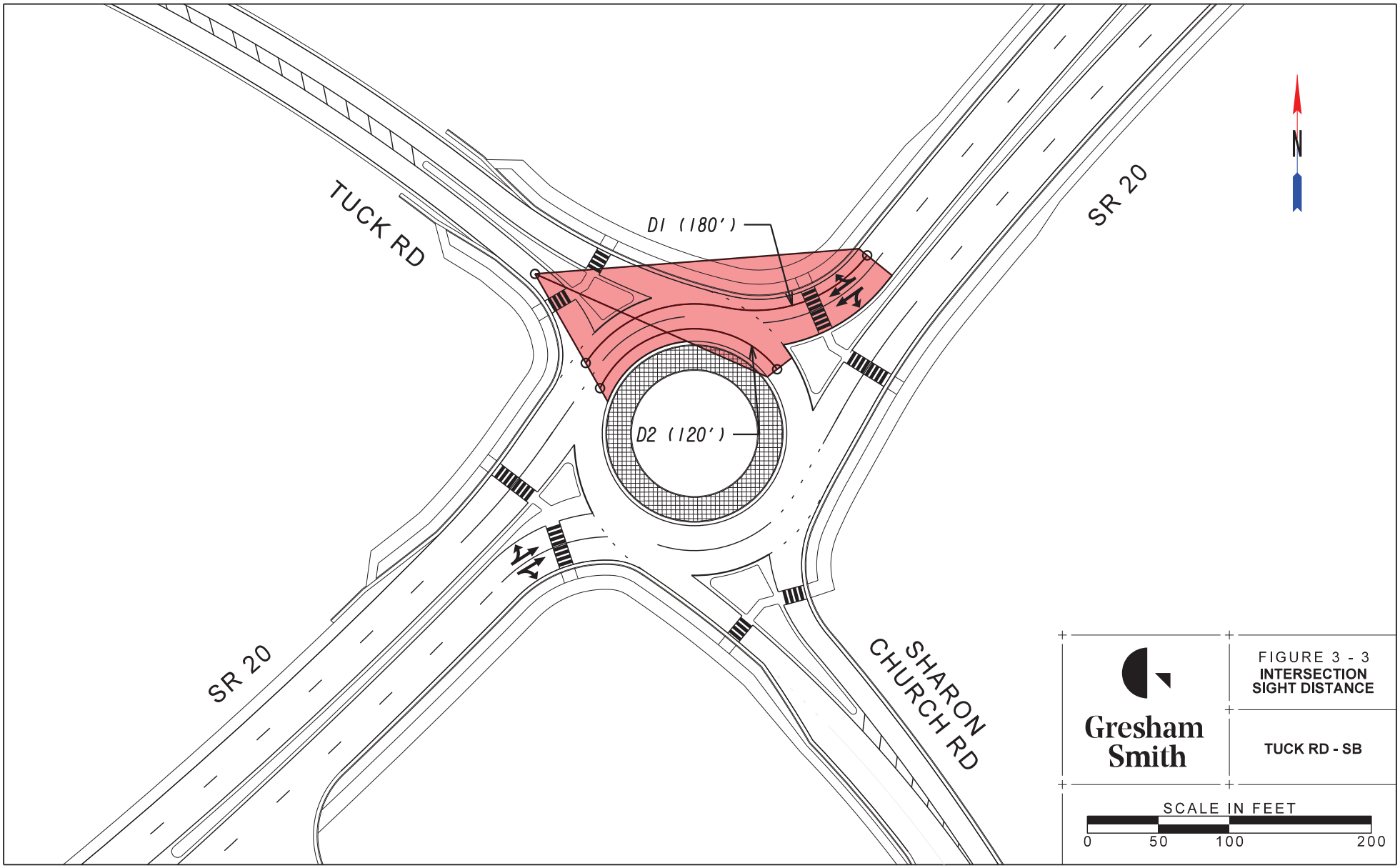

TUCK RD
SR 20
SR 20
SHARON CHURCH RD
N
Gresham Smith
FIGURE 1 - 2
AUTOTURN SWEPT PATHS
SHARON CHURCH RD - NB
SCALE IN FEET
0
50
100
200

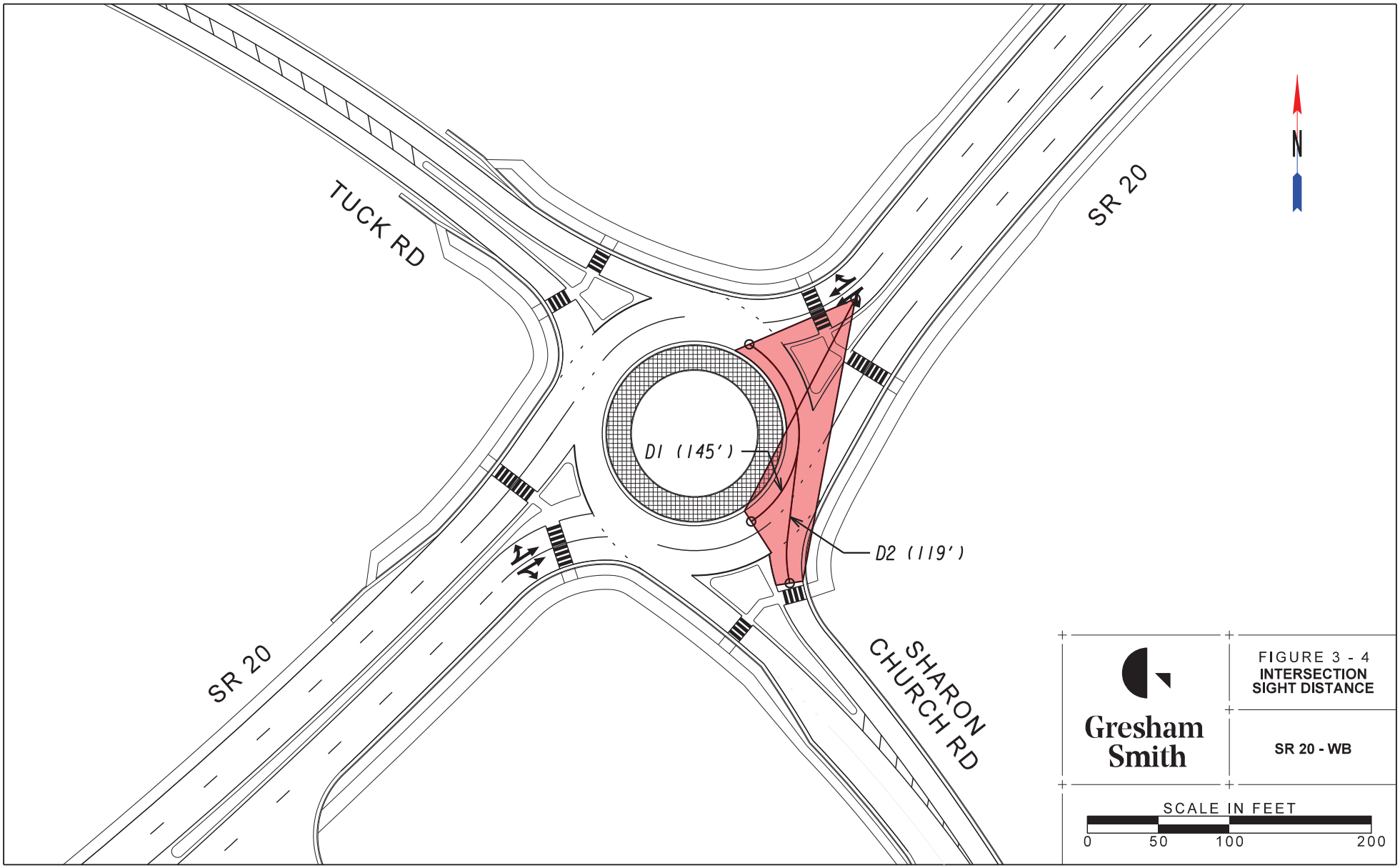

TUCK RD
SR 20
SR 20
SHARON CHURCH RD
N
Gresham Smith
FIGURE 1 - 3
AUTOTURN SWEPT PATHS
TUCK RD - SB
SCALE IN FEET
0
50
100
200


TUCK RD
SR 20
SR 20
SHARON CHURCH RD
N
Gresham Smith
FIGURE 1 - 4
AUTOTURN SWEPT PATHS
SR 20 - WB
SCALE IN FEET
0
50
100
200


TUCK RD
SR 20
SR 20
SHARON CHURCH RD
D1 (164')
D2 (120')
N
Gresham Smith
FIGURE 3 - 1
INTERSECTION SIGHT DISTANCE
SR 20 - EB
SCALE IN FEET
0
50
100
200


TUCK RD
SR 20
SR 20
SHARON CHURCH RD
D2 (118')
D1 (169')
N
Gresham Smith
FIGURE 3 - 2
INTERSECTION SIGHT DISTANCE
SHARON CHURCH RD - NB
SCALE IN FEET
0
50
100
200


TUCK RD
SR 20
D1 (180')
D2 (120')
N
SR 20
SHARON CHURCH RD
Gresham Smith
FIGURE 3 - 3
INTERSECTION SIGHT DISTANCE
TUCK RD - SB
SCALE IN FEET
0
50
100
200


TUCK RD
SR 20
SR 20
SHARON CHURCH RD
D1 (145')
D2 (119')
N
Gresham Smith
FIGURE 3 - 4
INTERSECTION SIGHT DISTANCE
SR 20 - WB
SCALE IN FEET
0
50
100
200

Gresham Smith

Genuine Ingenuity

ATTACHMENT 9

MS4 Concept Report Summary

MS4 Concept Report Summary

Attach the following checklist information to the Concept Report Template:

Is there a Project Level Exclusion that applies to this project: ☒ No ☐ Yes

If yes, please indicate which of the following exclusions apply:

- ☐ Roadways that are not owned or operated (maintained) by GDOT may not require post-construction BMPs. Coordinate with the appropriate local government or entity to determine stormwater management requirements.
- ☐ The project location is not within a designated MS4 area.
- ☐ Maintenance and safety improvement projects whereby the sites are not connected and disturbs less than one acre at each individual site. This includes projects such as repaving, shoulder building, fiber optic line installation, sign addition, and sound barrier installation.
- ☐ Projects that have their environmental documents approved or right-of-way plans submitted for approval on or before June 30th, 2012.
- ☐ Road projects that disturb less than 1 acre or for site development projects that add less than 5,000 ft^2 of impervious area.

If the project has a Project Level Exclusion nothing further is needed.

If the project does not have a Project Level Exclusion use the MS4 Concept Level Design Spreadsheet to estimate the treatment volumes and flow rates, size the BMP's, complete the tables below, and include as an attachment to the Concept Report. Add additional rows, if necessary. It is understood that this information will be approximate based on available information at the time of the concept.

In MS4 designated areas, water quantity requirements may be waived for drainage areas that flow directly into surface waters that have a drainage area greater than 5 square miles.
In addition to the above charts, attach the Drainage Area Map, drainage basin summary spreadsheets, and cost estimates (if required) to the Concept Report. For outfall areas considering an infiltration BMP, attach Worksheet J-1. See Appendix J of the GDOT Drainage Design for Highways Manual (Drainage Manual).

Project Scope

The project is for roadway improvements to SR 20 in Walton County, Georgia. Walton County is a MS4 designated county within the state of Georgia, and will require a MS4 report per GDOT guidance.

The project begins 1000 ft south of the existing intersection of CR 118/Tuck Road and SR 20 (MP 2.1) and ends at the intersection of SR 20 and Covington Street (MP 0.8) for a total project length of approximately 1.3 miles. The project lies completely within Walton County and completely within the City of Loganville. Along SR 20, the existing two lane section will be widened to a four lane section with a 20 ft raised median. CR 118/ Tuck Road and CS 660/ Sharon Church Road be realigned to intersect SR 20 at the same location. The realigned CR 118/ Tuck Road and CS 660/ Sharon Church Road will intersect SR 20 approximately 80 ft south of the existing intersection of CS 660/ Sharron Church Road and SR 20. Turn lanes will be added and access will be restricted along the project to improve traffic flow along the corridor. The entire project area has been delineated into drainage basins and calculations have been made in each basin to determine the necessary water quality volumes, required storage volumes and peak flows. Each basin was then examined at the outfalls to determine feasibility of implementing BMPs to treat the required runoff. The following is a concept level report for location, size and type of BMPs placed to meet the MS4 requirements.

Drainage Areas

Drainage Area 1 consists of approximately 1.85 acres, with 0.67 acres of onsite area located between the western limits of the project site east to a residential driveway. Runoff from the south side of SR20 is directed into a roadside ditch.

Drainage Area 2 consists of approximately 4.66 acres, with 1.50 acres of onsite area located on the south side of SR 20 between a residential driveway and a high point near the existing intersection with Tuck Rd. Runoff from the south side of SR20 is directed into a roadside ditch. A Bioslope is proposed to treat additional runoff resulting from widening of the roadway.

Drainage Area 3 consists of approximately 1.33 acres, all onsite, located on the north side of SR 20 between the western project limits and a high point at the existing intersection with Tuck Rd. Runoff from the north side of SR20 is directed into a roadside ditch. A Bioslope is proposed to treat additional runoff resulting from widening of the roadway.

Drainage Area 4 consists of approximately 27.32 acres, with 2.58 acres of onsite area located west of Tuck Rd. This area includes wooded areas behind a few industrial properties. Runoff discharges the right of way as sheet flow and enters an existing detention pond west of the industrial sites.

Drainage Area 5 consists of approximately 10.00 acres of residential properties all located off site, south the project area.

Drainage Area 6 consists of approximately 9.67 acres, with 3.32 acres of onsite area distributed between two sub-basins. Sub basin 6.1 is located at the southwest portion of the intersection of SR20 and N Sharon Church Rd. Sub basin 6.2 extends along the west side of N Sharon Church Rd. The runoff from sub basin 6.1enters a proposed stormsewer system which outfalls east of N Sharon Church Rd, and the runoff from sub basin 6.2 exists the roadway through a stormsewer system before outfalling into a detention pond to the south.

Drainage Area 7 consists of approximately 14.49 acres, with 4.96 acres of onsite area distributed between two sub-basins. Sub basin 7.1 is located to the west of Tuck Rd, and includes Tuck Rd in super elevation, and sub-basin 7.2 is located to the east of the proposed realignment of Tuck Rd. In existing conditions, the basin is almost entirely open pasture, but will include the new realignment of Tuck Rd in proposed conditions. Both sub basins will employ bioretention basins to capture and outfall runoff to the east along SR 20.

Drainage Area 8 consists of approximately 10.71 acres, with 0.68 acres of onsite area located on N Sharon Church Rd. This area is primarily residential. Runoff discharges the roadways into a stormsewer system which outfalls east towards Little Haynes Creek Tributary.

Drainage Area 9 consists of approximately 36.45 acres of residential properties and the wooded area surrounding Little Haynes Creek Tributary. The entire basin is located off site, south the project area.

Drainage Area 10 consists of approximately 4.01 acres, all onsite, located on the south side of SR 20 between the N Sharon Church Rd and Overlook Dr. project limits and a high point at the existing intersection with Tuck Rd. Runoff from the south side of SR20 is directed into a roadside ditch. Two Bioretention basins are proposed at the eastern and western edges of the basin before outfalling towards Little Haynes Creek Tributary. The Bioretention basin adjacent to Overlook Dr will also treat runoff directed from basins to the east.

Drainage Area 11 consists of approximately 197.81 acres of wooded areas and pastures to the north of SR 20. Basin 11 is the main basin for Little Haynes Creek Tributary, as it flowing into the 6'x6' box culvert under SR20. There are two sub basins within basin 11 which constitute 2.66 acres of onsite areas. Sub basin 11.1 is located to the N of SR 20 and conveys runoff through a stormsewer system before discharging into Little Haynes Creek Tributary. Sub basin 11.2 is located at the north limits of the project, where the proposed realignment of Tuck Rd intersects with the existing Tuck Rd. This sub basin will employ a Bioslope to convey runoff.

Drainage Area 12 consists of approximately 28.04 acres of residential properties all located off site, south the project area.

Drainage Area 13 consists of approximately 7.36 acres, with 2.75 acres onsite, located south of SR 20 between Overlook Dr and Huntington Dr. Runoff from the south side of SR20 is directed into a stormsewer system which outfalls west into a proposed enhanced swale before outfalling west through a culvert under Overlook Dr.

Drainage Area 14 consists of approximately 4.33 acres, all onsite, located north of SR 20 between Overlook Dr and Publix Dr. Runoff from the north side of SR20 is conveyed through a stormsewer system which outfalls west as it combines with the runoff from basin 13.

Drainage Area 15 consists of approximately 349.27 acres of mixed land use. The entire basin is located off site, surrounding Little Haynes Creek, north of the project area.

Drainage Area 16 consists of approximately 21.22 acres of mixed residential properties all located off site, south the project area.

Drainage Area 17 consists of approximately 4.16 acres, all onsite, located south of SR 20 between Huntington Dr and Tommy Lee Fuller Dr. Runoff from the south side of SR20 is conveyed through a stormsewer system which outfalls west as it combines with the stormsewer system in basin 13.

Drainage Area 18 consists of approximately 14.74 acres, with 4.28 acres of onsite area distributed between three sub-basins. Sub basin 18.1 is located east of Publix Drive and north of SR20. Sub basin 18.2 extends along the west side of US 78 from the intersection with SR 20 and Logan Dr. Sub-basin 18.3 is located north of sub-basin 18.2, extending from Logan Dr. to the norther limits of the project site. All three sub-basins convey stormwater through closed systems before outfalling to a 54" CMP under Publix Drive.

Drainage Area 19 consists of approximately 14.74 acres, with 4.98 acres of onsite area distributed between two sub-basins. Sub basin 19.1 is located south of SR 20, between Magnolia Street and US78. Sub basin 19.2 extends along the west side of US 78 from the intersection with SR 20 and the limits of the project near Bobby Boss Dr. All sub-basins convey stormwater through closed systems before combining with the closed systems north of SR 20 in basin 18.

Drainage Area 20 consists of approximately 12.81 acres, with 3.40 acres of onsite area. Sub basin 20. extends along the east side of US 78 from the intersection with SR 20 and the limits of the project near Bobby Boss Dr. Stormwater from basin 20 is conveyed through closed systems before outfalling east of the project area through a 48" CMP.

Drainage Area 21 consists of approximately 3.87 acres, with 1.97 acres onsite, located east of US 78 between SR 20 and Broad St in downtown Loganville. All runoff is maintained within a closed stormsewer system.

Drainage Area 22 consists of approximately 4.73 acres, all offsite, located east of basin 21, between SR 20 and Broad St in downtown Loganville. All runoff is maintained within a closed stormsewer system.

Drainage Area 23 consists of approximately 7.69 acres, with 0.75 acres onsite, located east of US 78 between Broad St and CS Floyd Rd, in downtown Loganville. All runoff is maintained within a closed stormsewer system.

Drainage Area 24 consists of approximately 2.42 acres, with 0.91 acres onsite, located east of US 78. The majority of basin 24 consists of a cemetery in downtown Loganville. All runoff is maintained within a closed stormsewer system which outfalls west into the closed system within basin 18.

Drainage Area 25 consists of approximately 35.73 acres, all offsite. This basin is commercial development in downtown Loganville, located north of the project site, north of CS Floyd Rd.

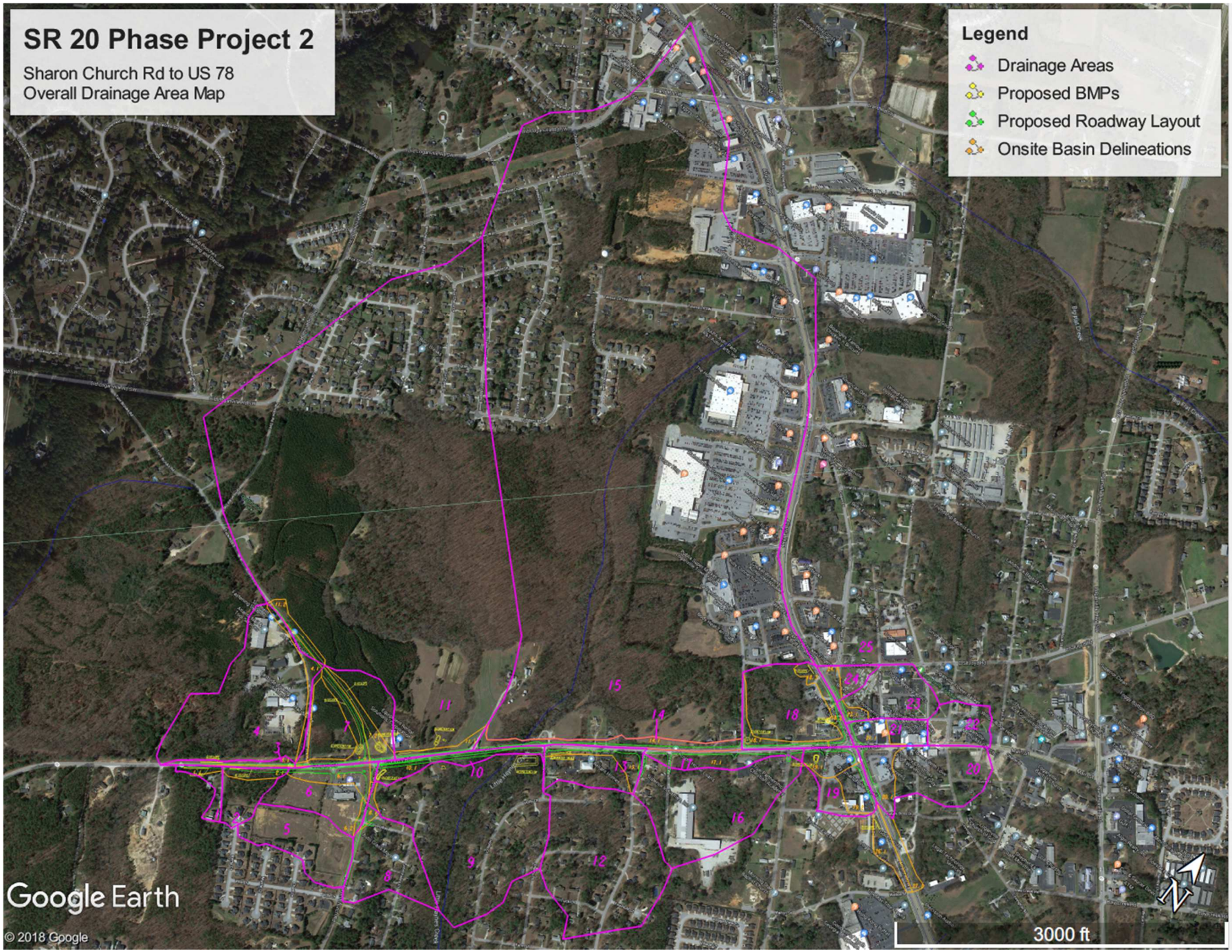
Drainage Area 26 consists of approximately 2.02 acres, all onsite. Located at the southern limits of the project site, along the west side of US 78 from Bobby Boss Dr to Walton St. All runoff is maintained within a closed stormsewer system which outfalls to the south.

Drainage Area 27 consists of approximately 1.54 acres, all onsite. Located at the southern limits of the project site, along the east side of US 78 from Bobby Boss Dr to Walton St. All runoff is maintained within a closed stormsewer system which outfalls to the south.

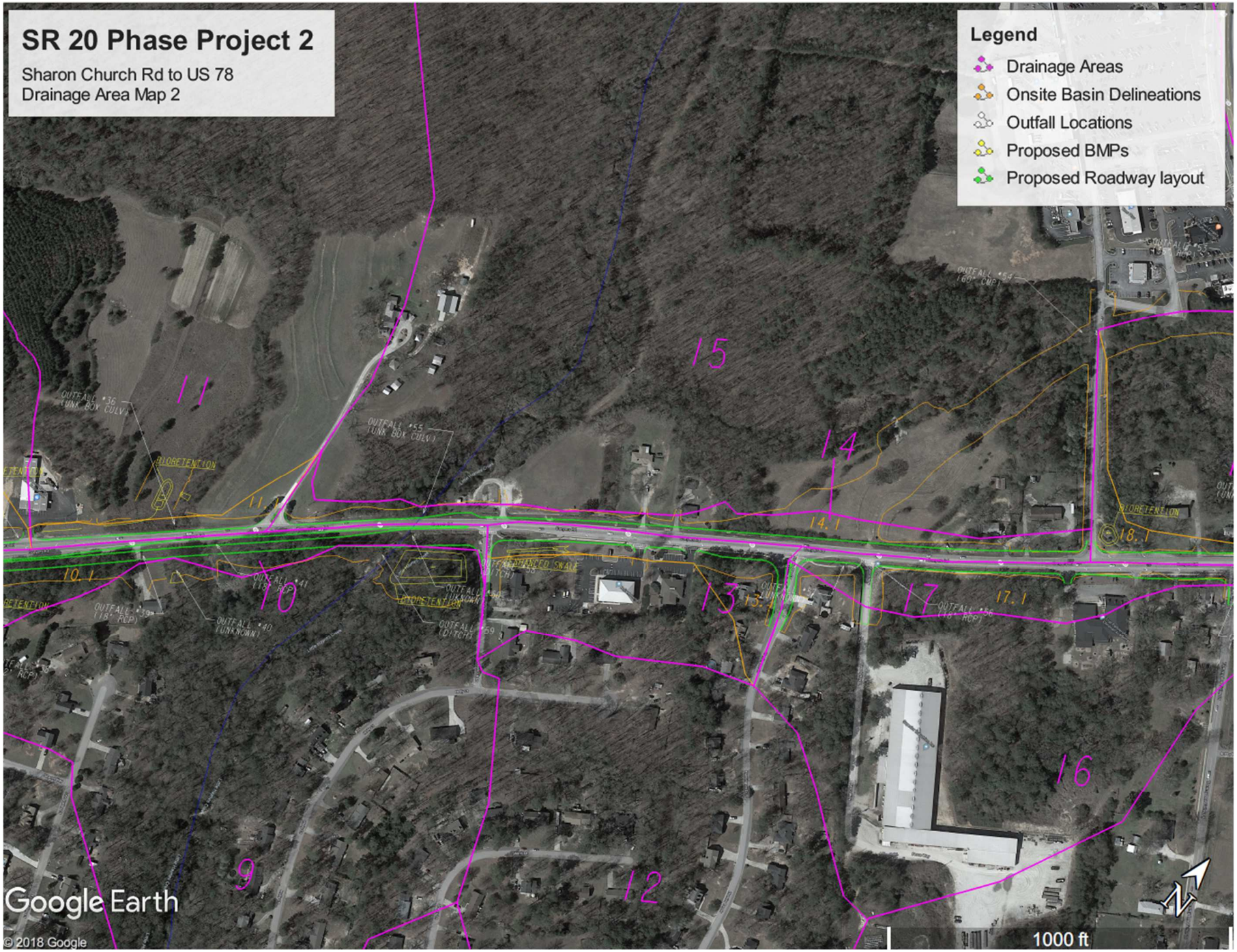
BMP Selection and Feasibility Summary					
	Outfall Level Exclusion?			Is the BMP Feasible?	
Outfall Area	Y/N	Exclusion No.	BMP Selected	Y/N	Infeasibility Criteria No.
1.1	N	N/A	Bioslope	Y	-
2.1	N	N/A	Bioslope	Y	-
3.1	N	N/A	Bioslope	Y	-
4.1	N	N/A	Grassed Channel	Y	-
5	Y	#5	N/A	-	-
6.1	N	N/A	Bioretention	Y	-
6.2	N	N/A	Bioslope	Y	-
7.1	N	N/A	Bioretention/Bioslope	Y	-
7.2	N	N/A	Bioretention/Bioslope	Y	-
8.1	N	N/A	Bioretention	N	#5
9	Y	#6	N/A	-	-
10.1	N	N/A	Bioretention	Y	-
11.1	N	N/A	Bioretention	Y	-
11.2	N	N/A	Bioslope	Y	-
12	Y	#6	N/A	-	-
13.1	N	N/A	Bioretention	Y	-
14.1	N	N/A	Enhanced Swale	N	#1
15	Y	#5	N/A	-	-
16	Y	#5	N/A	-	-
17.1	N	N/A	Enhanced Swale	N	#1
18.1	N	N/A	Bioretention	N	#5
18.2	N	N/A	Enhanced Swale	N	#1
18.3	N	N/A	Enhanced Swale	N	#1
19.1	N	N/A	Bioretention	Y	-
19.2	N	N/A	Bioretention	N	#5
20.1	N	N/A	Bioretention	N	#5
21.1	N	N/A	Bioretention	N	#5
22	Y	#6	N/A	-	-
23.1	N	N/A	Bioretention	N	#5
24	Y	#6	N/A	-	-
25	Y	#6	N/A	-	-
26.1	N	N/A	Bioslope	N	#1
27.1	N	N/A	Bioslope	N	#1

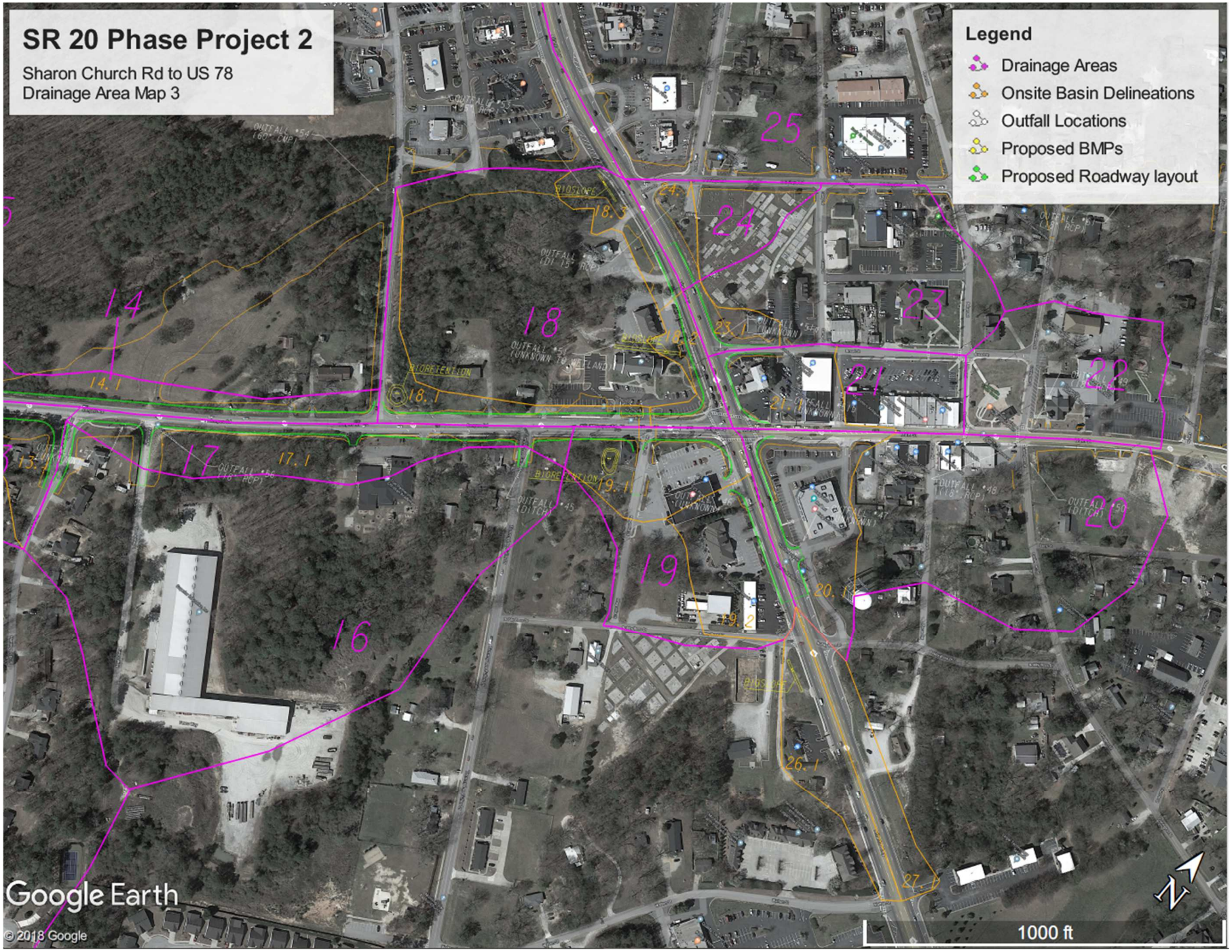
Drainage Area Summary								
	Pre-Development			Post-Development				Water Quality Volume
Outfall Area	Tc	Weighted CN	Area (Acres)	Tc	Weighted CN	Area (Acres)	% Impervious	(Cubic Feet)
1.1	5.0	46	0.68	5.0	47	0.68	22.63%	28
2.1	11.7	49	1.50	11.7	50	1.50	16.00%	102
3.1	17.1	62	1.33	17.1	66	1.33	33.83%	392
4.1	14.0	61	2.59	14.0	63	2.59	27.80%	431
6.1	8.9	62	2.95	8.9	70	2.95	42.37%	1725
6.2	5.1	60	0.37	5.1	64	0.37	29.73%	118
7.1	11.4	61	2.80	11.4	71	2.80	31.43%	2823
7.2	11.7	65	2.16	11.7	68	2.16	19.91%	980
8.1	5.9	77	0.68	5.9	79	0.68	35.29%	196
10.1	5.0	68	4.01	5.0	74	4.01	35.91%	2823
11.1	5.0	76	1.35	5.0	82	1.35	43.70%	1019
11.2	12.3	63	1.31	12.3	68	1.31	17.56%	745
13.1	11.4	80	2.75	11.4	84	2.75	53.82%	1529
14.1	15.7	80	4.33	15.7	90	4.33	76.91%	5841
17.1	9.5	72	4.16	9.5	75	4.16	34.38%	1294
18.1	18.0	77	1.99	18.0	80	1.99	44.22%	784
18.2	5.0	90	1.05	5.0	92	1.05	80.00%	353
18.3	8.3	75	1.24	8.3	76	1.24	33.06%	39
19.1	5.0	86	2.49	5.0	89	2.49	67.47%	1019
19.2	5.0	84	2.48	5.0	86	2.48	58.87%	784
20.1	5.0	87	3.40	5.0	88	3.40	65.29%	353
21.1	5.0	97	1.97	5.0	97	1.97	96.45%	118
23.1	5.0	84	0.75	5.0	85	0.75	54.67%	39
26.1	5.0	83	2.01	5.0	86	2.01	49.25%	745
27.1	5.0	83	1.54	5.0	85	1.54	53.90%	274

Drainage Area Maps




SR 20 Phase Project 2
Sharon Church Rd to US 78
Drainage Area Map 1
Legend
Drainage Areas
Onsite Basin Delineations
Outfall Locations
Proposed BMPs
Proposed Roadway layout
Google Earth
© 2018 Google
1000 ft
N


SR 20 Phase Project 2
Sharon Church Rd to US 78
Drainage Area Map 2
Legend
Drainage Areas
Onsite Basin Delineations
Outfall Locations
Proposed BMPs
Proposed Roadway layout
15
11
14
14.1
18.1
10.1
10
13
13.1
17
17.1
16
9
12
Google Earth
© 2018 Google
1000 ft


SR 20 Phase Project 2
Sharon Church Rd to US 78
Drainage Area Map 3
Legend
Drainage Areas
Onsite Basin Delineations
Outfall Locations
Proposed BMPs
Proposed Roadway layout
Google Earth
© 2018 Google
1000 ft

Gresham Smith

Genuine Ingenuity

ATTACHMENT 10

Initial Pavement Evaluation Summary

Georgia Department of Transportation

Interoffice Memo

DATE: November 1, 2019 Monica L. Flournoy 2019.11.06 14:46:17-05'00'

FROM: Monica L. Flournoy, P.E., State Materials Engineer
Office of Materials and Testing

TO: Kimberly Nesbitt, State Program Delivery Administrator
Attn: Kimberly Kimbrough, Project Manager

PROJECT DESCRIPTION:

PI No. 0016387, Walton County
SR 20 from CS 660/Sharon Church Road to SR 10/US 78

WE ARE SENDING THE FOLLOWING ITEMS:

☒ Attached ☐ Under Separate Cover

REPORT TYPE:

☐ Pavement Evaluation Summary
☒ Initial Pavement Evaluation Summary
☐ Pavement Type Selection
☐ OTHER
☐ Pavement Design

PAGES	DESCRIPTION
5	Initial Pavement Evaluation Summary
2	Project Location Map
30	Field Distress Photos
1	Typical Sections
3	Traffic Data
3	COPACES Data
18	Historic Projects
4	Pavement Designs

THESE ARE TRANSMITTED AS CHECKED BELOW:

☒ As Requested ☐ For Your Use ☐ For Approval

☐ For Revision ☐ For Review and Comm.

cc: MLF: JTR: IDR: EUU: CD

Initial Pavement Evaluation Summary
PI No. 0016387 Walton County
SR 20 from CS 660/Sharon Church Road to SR 10/US 78
November 1, 2019

1 Project Location and Description

Project Identification (PI) Number (No.) 0016387 is located in Walton County and is a widening/realignment project (see Appendix A for Location Map). This project originated from PI 142000-, a larger project planned for SR 20 at Centerville Rosebud Road, SR 20 at SR 10/US 78, and SR 20 at SR 81, which was divided into 3 projects (PI 0016386, 0016387, 0016388).

The project proposes asymmetric widening of SR 20 from a 2 lane rural section to a 4 lane urban section divided by a concrete median. The project begins at SR 20 mile point (MP) 0.90 in Walton County and ends at MP 2.17 in Walton County. The project also proposes realigning "Tuck Road" and resurfacing the intersection of SR 20 and SR 10 (US-78). SR 20 is functionally classified as a minor arterial and SR 10 as a principle arterial within the project limits. SR 10/US 78 is a high priority route and SR 20 is a medium priority route according to GDOT's state route categorization. The total project length is approximately 1.27 miles on SR 20. Based on the concept layout provided by the project manager, the ratio of potential overlay area to total pavement area of the project is approximately 36,500 yd^2 over 74,200 yd^2 or 49%.

At the request of the Office of Program Delivery, the pavement management branch of the Office of Materials and Testing (OMAT) reviewed the suitability of the existing pavement to be retained for the proposed project with the design traffic loading. This Initial Pavement Evaluation Summary (IPES) report includes a pavement design recommendation in response to this request.

2 Existing Conditions

2.1 Soil Survey Summary

A Soil Survey Summary was not available for this project. Therefore, the historic default Soil Support Value (SSV) of 3.0 and Regional Factor (RF) of 1.6 for Walton County was used in development of the pavement designs. Graded Aggregate Base (GAB) is the base type typically allowed in this area. If a Soil Survey Summary is completed at a later date, these designs should be re-evaluated.

2.2 Traffic

Traffic diagrams, prepared by Gresham Smith and approved by the GDOT Office of Planning on February 21, 2019, were provided by the project manager from the GDOT Office of Program Delivery. The data used in the pavement designs are summarized in Table 1.

Table 1: Traffic

Road	No. of Lanes Each Direction	One-way AADT 2023 (2043)	One-Way AADT 2025 (2045)	24 HR Truck %	Single Unit Truck %	Multi-Unit Truck %
SR 20	2	10575 (15725)	10925 (16400)	5.0	4.0	1.0
SR 10/US 78	2	20525 (30525)	21150 (31450)	4.0	3.5	0.5
Side Roads	1	3450 (5125)	3575 (5350)	5.0	4.0	1.0

Note ( ) denotes design year traffic

2.3 Field Investigation

A field investigation was performed on July 3, 2019. The investigators noted and photographed visible pavement surface distresses within the project limits. Example pavement surface condition photographs are included in this report (see Appendix B). Cores will be needed to identify the full extent of distresses observed on the surface.

2.3.1 SR 20

The most common distress observed on SR 20 within the project limits was level 1 block cracking. Level 1 load cracking was also observed in both directions scattered throughout the project but was worst around MP 1.6. Crack sealing was found throughout the project area: the assumption is made that areas where sealant is found marks the presence of a crack. Severe rutting was observed around the intersection with SR 10/US 78 along with a few pop outs. Several patches and potholes exist around MP 1.52.

2.3.2 SR 10/US 78

SR 10/US 78 exhibited light rutting at the intersection with SR 20 and minimal block cracking. No significant distresses were found on SR 10/US 78 within the project limits.

2.3.3 CR 118/Tuck Road

CR 118/Tuck Rd appeared to be recently resurfaced, and as a result, no distresses could be readily observed.

2.3.4 CS 660/N Sharon Church Road

CR 660/N Sharon Church Rd appeared to be recently resurfaced up to the radius of return at the intersection with SR 20, and as a result, no distresses could be readily observed.

2.4 COPACES (Computerized Pavement Condition Evaluation System)

The GDOT Maintenance Office conducts surveys of GDOT maintained routes. The COPACES ratings from these surveys are based on a visual survey of surface distresses of the pavement. In 2017, the average rating for SR 20 between MP 1.0 and MP 2.0 in Walton

County was 42. This rating can be described as poor. This COPACES survey was performed by the Area 2 Maintenance Office of District 1. The 2017 rating showed 50% level 1 load cracking, 50% level 3 load cracking, 20% level 1 load cracking, and 1/8 inch rutting within MP 1.0 - 2.0. Visual inspection of SR 10 showed that level 3 load cracking was confined to a limited area about 500 ft north and south of MP 1.62. A graphical overview of historic COPACES ratings from 1994 to 2017 is shown on the attached COPACES rating chart (see Appendix E). A COPACES rating of 100 typically denotes recent construction or resurfacing.

2.5 Existing Pavement Structure

IPES reports do not include recovering pavement cores or conducting testing to determine pavement and base thicknesses or subgrade layer types. Therefore, no analysis of the existing structure for the anticipated traffic loads was performed.

2.6 Previous Projects

2.6.1 PI H002127 Year: 1953

This project included the original paving of SR 20 within the project area and was composed of two 10 ft wide lanes of single surface treatment on top of 8 inches of "Class A Topsoil Base" from MP 2.17 to MP 1.05. MP 1.05 – MP 1.17 (SR 10/US 78 intersection) had the same typical section, except with four 10 ft wide lanes and curb/gutter (see Appendix F). "Topsoil Base" is comparable to Sand Clay Base.

2.6.2 PI H013967 Year: 1976

This project consisted of symmetric widening of SR 20 within the project area of PI 0016387 with the exception of SR 10/US 78. Both lanes of SR 20 were widened from 10 ft to 12 ft using 4 inches of B-modified Asphaltic Concrete (see Appendix F) on an unknown base type. Note that this mix type is prone to stripping due to low Asphaltic Cement (AC) content.

2.6.3 PI H018350 Year: 1982

This project consisted of overlay within the project area of PI 0016387 with leveling, where required, and 1 inch of Asphaltic Concrete "H" Group 2 only (see Appendix F)

2.6.4 PI 780550- Year: 1989

This project consisted of rehabilitation of the SR 20 within the project area of PI 0016387 South of SR 78. No plans could be found. See Appendix F for the preconstruction status report (PSR) on this project.

2.6.5 PI 132905- Year: 1999

This project consisted of shoulder work on SR 20 along the entire area of PI 0016387. No plans could be found (see Appendix F for the PSR)

2.6.6 PI M002876 Year: 2005

This project consisted of milling and inlaying 1.5 inches of 12.5 mm Superpave Asphaltic Concrete within the project limits of PI 0016387. No plans could be found, but the work type was classified as maintenance (see Appendix F for the PSR).

2.6.7 PI S009788 Year: 2008

No definite description or plans could be found for this project, but it likely consisted of widening SR 20 at N Sharon Church Road in Walton county to add a left turn lane from SR 20 South and a right turn lane from SR 20 North (MP 1.72 to MP 1.89). See Appendix F for the PSR on this project.

3 Summary and Recommendations

Since cores were not taken, crack depths could not be determined, and in-place base material could not be examined. Therefore, no structural analysis of the existing pavement was performed. For these reasons, no overlay design recommendations can be made in this report. However, the initial investigation indicates that most of the travel lane area is likely built on top soil base and otherwise on top of B-modified asphaltic concrete. Note that areas widened with B-modified asphaltic concrete may require full depth replacement due to its susceptibility to stripping. The low COPACES rating and its rapid decline after 2007 also suggests the existing pavement is structurally deficient. Furthermore, since only a small part of the existing pavement is part of the prospective travel way, full depth construction is recommended throughout the travel lanes for this project. If the decision is made to retain the pavement in the travel lanes, a full pavement evaluation summary will be needed to form an inlay/overlay strategy.

The following full-depth flexible pavement structure found in Table 2 is recommended for the proposed reconstruction and widening of SR 20. Table 3 shows the recommended full depth pavement design structure for side roads. Pavement design analyses may be found at the end of this document.

Table 2 : Full-Depth Flexible Pavement Section SR 20

Pay Item Number	Material	Course	Thickness	Spread Rate
402-4510	12.5 mm Superpave Polymer Modified	Surface	1.5 inches	165 lbs/yd^2
402-3190	19 mm Superpave	Binder	2 inches	220 lbs/yd^2
402-3121	25 mm Superpave	Asphalt Base	4 inches	440 lbs/yd^2
310-1101	Graded Aggregate Base	Base	10 inches	N/A

Table 3 : Full-Depth Flexible Pavement Section SR 20 Side Roads

Pay Item Number	Material	Course	Thickness	Spread Rate
402-3130	12.5 mm Superpave	Surface	1.5 inches	165 lbs/yd^2
402-3190	19 mm Superpave	Binder	2 inches	220 lbs/yd^2
402-3121	25 mm Superpave	Asphalt Base	3 inches	330 lbs/yd^2
310-1101	Graded Aggregate Base	Base	8 inches	N/A

4 Other Information

- The use of asphalt mixes recommended in this report meet the "Criteria for Use of Asphaltic Concrete Layer and Mix Types" established on January 19th, 2018.
- The design recommendation in this IPES is subject to change if a final pavement evaluation is completed at a later date. Also, additional recommendations may be provided based on the findings of the final pavement evaluation.

Author: Ciprian Donisa

Reviewer: Ian Rish

2019.10.30 07:27:02-04'00'

Gresham Smith

Genuine Ingenuity

ATTACHMENT 11

Minutes of Concept Meetings

a. Initial Concept Team Meeting (12-12-18)

b. Concept Team Meeting (6-27-19)

Gresham Smith

December 20, 2018

Meeting Minutes

PROJECTS:
PI 0016386 – SR 20, PHASE PROJECT 1, THREE INTERSECTIONS
PI 0016387 – SR 20, PHASE PROJECT 2, N SHARON CHURCH RD TO US 78
PI 0016388 – SR 20, PHASE PROJECT 3, SR 81 TO BRAND RD

WALTON COUNTY, GA
Gresham Smith Project No. 24306.01, 24306.02, 24306.03

Meeting Date:	December 12th, 2018
Participants:	See Attached
Discussion:	INITIAL CONCEPT TEAM MEETING FOR PI 0016386, 0016387, 0016388

Meeting Notes:

1. Project Background
    a. History of project was discussed. Project was a part of PI 142000 (STP00-2584-00(009) which originally focused on improvements along SR 20 including proposing two one-way pair through the city of Loganville. After push back from the city and the public It was determined that PI 142000 should to be split into three separate projects; PI 0016386, 0016387, 0016388.
        i. PI 0016386 – Project limits and scope are to improvements of three separate intersections along SR 20 West of Loganville. These intersections are SR 20 & Centerhill Church Rd, SR 20 & Centerville Rosebud Rd, and SR 20 & McCullers Rd
        ii. PI 0016387 – Project limits and scope are focused on operational improvements along SR 20 from N. Sharron Church to US 78 / US 10.
        iii. PI 0016388 – Project limits and scope are focused on SR 20 from Brand Rd to SR 81. Additionally, SR 81 improvements to US 78 / US 10 are to be determined.
2. Review of Initial Concepts, Concept Report, & General Discussion
    a. PI 0016386 – SR 20, Phase Project 1, Three Intersections
        i. Gresham Smith developed an initial concept for each of the three intersections:
            1. The concept for the Intersection of SR 20 & Centerhill Church Rd included converting this intersection into a signalized intersection. Adding right and left turn lanes to SR 20 & Centerhill Church Rd. The concept also realigns Moon Rd to intersect with Centerhill Church Rd and remove access to SR 20 due to intersection spacing.

2. The concept for the Intersection of SR 20 & Centerville Rosebud Rd included converting this intersection into a signalize intersection, adding additional left & right turn lanes, and realigning Centerville Rosebud Rd to correct a substandard intersection skew angle.
3. The concept for the intersection of SR 20 & McCullers aims to eliminate the offset intersection of McCullers by realigning it. In addition, left and right turn lanes are added along SR 20 & McCullers Rd.

ii. Concept Comments & Discussion

1. GDOT District 1 indicated that they would like to remove any indication traffic signals on all intersections until the ICE analysis has been completed. In addition, they would like Gresham Smith to develop other intersection alternatives such as Roundabouts.

iii. Concept Report

1. Need and purpose statement is need for this project. GDOT Office of Planning to provide
2. Gresham Smith to finish the continue to develop the concept report and have a draft completed for the concept meeting.

iv. ICE Analysis

1. The initial ICE analysis has been submitted. However, based on the ICE analysis certain intersections types will need to be considered.

v. Environmental & Special Studies

1. Environmental AOI has been developed and submitted
2. GDOT to reference old documents of PI 142000 and update accordingly. Since this project is now State funded a CE will be allowed. No noise will be needed. However, air will be dependent on traffic.

vi. Survey

1. No additional coverage is anticipated.

vii. Utilities

1. District 1 Utilities noted that there are no special circumstances anticipated.

b. PI 0016387 – SR 20, Phase Project 2, N Sharron Church Rd to US 78

i. Gresham Smith developed an initial concept for this corridor which is summarized as the following:

1. SR 20 to be widened to an urban four lane sections starting just west of N Sharon Church Rd to the intersection of US 78 / US 10. A proposed raised median was proposed between N Sharon Church Rd to Overlook Drive and a flush median was proposed from Overlook drive to US 78 / US 10.
2. Tuck Rd would be realigned with N Sharon Church Rd to remove the offset intersection issue.
3. A U-turn would be allowed at Overlook Drive

ii. Concept Comments & Discussion

1. It was determined that a raised median should be conserved throughout the entirety of the corridor of SR 20 and access control should be the priority though outs the corridor.
2. It was determined that the raised eyebrow U-Turn should be relocated at Hunginton Dr. Huntington Dr should also be allowed full access. R-Cut should be investigated at Overlook Dr and Publix Dr.
3. GDOT District 1 would also like Gresham to investigate intersection alternatives such as roundabouts if ICE analysis warrants.

iii. Concept Report

1. Need and purpose statement is need for this project. GDOT Office of Planning to provide
2. Gresham Smith to finish the continue to develop the concept report and have a draft completed for the concept meeting.

iv. ICE Analysis

1. Initial ICE analysis submitted. However, based on ICE analysis additional intersection types will need to be considered.

v. Environmental & Special Studies

1. Environmental AOI has been developed and submitted
2. GDOT to reference old documents of PI 142000 and update accordingly. Since this project is now State funded a CE will be allowed. No noise will be needed. However, air will be dependent on traffic.

vi. Survey

1. No additional coverage is anticipated.

vii. Utilities

1. District 1 Utilities noted that there are no special circumstances anticipated.

c. PI 0016388 – SR 20, Phase Project 3, SR 81 to Brand Rd

i. Initial Scoping Discussion

1. Scoping of this project has not been fully developed so a brief discussion of the scoping took place between Gresham Smith & GDOT to determine the overall limits of the project. The following scope and limits were determined.

a. Initial Scope of project is to widen SR 20 to four lane section from Brand Rd to the intersection of SR 20 & SR 81

b. Additional discussion took place about also to include operational and corridor improvements along SR 81 (Lawrenceville Rd) to US 78 / US 10. Improvements should identify substandard intersections, access control issues, and safety concerns.

c. District indicated that there is a proposed Multi-Use trail being proposed in this area. GDOT indicated they would provide the report.

d. Additional survey, traffic, and utilities need to be obtained in this area.

3. **PIOH Discussion**

a. It was determined that a PIOH for PI 0016386 & PI 0016387 should be conducted together and a separate PIOH for PI 0016388 should be considered

4. Schedule

a. An approved P6 Schedule has been developed for all three project with the following key milestones:

PROJECT	Concept Report	PFPR	LET
PI 0016386	June 2019	May 2020	April 2022
PI 0016387	August 2019	July 2020	June 2022
PI 0016388	January 2020	TBD	TBD

Action Items:

PI 0016386 – SR 20, Phase Project 1, Three Intersections

Item	Action Required	Assigned To	Due Date
1	Remove traffic signals at SR 20 & Centerhill Church Rd and SR 20 & Centerville Rosebud Rd	Gresham Smith	
2	Develop Additional intersection concepts throughout project. (Roundabouts)	Gresham Smith	
3	Finish Draft Concept Report for Concept Meeting	Gresham Smith	
4	GDOT to provided "Need and Purpose" Statement for project	GDOT	

PI 0016387 – SR 20, Phase Project 2, N Sharon Church Rd to US 78

Item	Action Required	Assigned To	Due Date
1	Revise initial concept to show raised median throughout corridor and develope access control management through R-Cuts.	Gresham Smith	
2	Develop additional intersection concepts throughout the project (Roundabouts)	Gresham Smith	
3	Finish Draft Concept Report for Concept Meeting	Gresham Smith	
4	GDOT to Provide "Need and Purpose" State for project	GDOT	

PI 0016388 – SR 20, Phase Project 3, Brand Rd to SR 81

Item	Action Required	Assigned To	Due Date
1	GDOT to provide Mutli-Use concept / Report to Gresham Smith	GDOT	
2	Initial Concept need to be developed now that scope has been identified	Gresham Smith	

This represents our understanding of the items discussed at this meeting. If you have any questions or comments concerning any of the information contained herein, please contact me.

Prepared by: Joel Jones, PE
Project Engineer

Attachments
Attachment 1 – Sign In Sheet

Copy: Participants
Bryan Lott - GDOT

0016386

PI NOS. 0016387, 0016388

Kim Coley,	GDOT Planning	Kcoley@dot.ga.gov
Viveca Cooper	GDOT DI R/W	vcooper@dot.ga.gov
SueAnne Decker	GDOT DI TO	sdecker@dot.ga.gov
Hunter Boyle	GDOT DI TO	hboyle@dot.ga.gov
ADAM SHELTON	KECK & WOOD CITY OF LOGANVILLE	ASHELTON@KECKWOOD.COM
ROBBY OLIVER	GDOT UTILITIES	roliver@dot.ga.gov
Terri Holbrook	GDOT Utilities	teholbrook@dot.ga.gov
JAMES PARR	City of Lawrenceville GA	JAMES.parr@Lawrencevillega.org
MIKE BRANDENBURG	City of Lawrenceville GA	Mike.brandenburg@lawrencevillega.org
Chris Boggs	Georgia Power Company	X2Cjboggs@southernco.com
Derrick Kemp	GCDWR	derrick.Kemp@GwinnettCounty.com
Chris YANCEY	City of Loganville	CYANCEY@loganvillega.gov
Brandon Phillips	City of Loganville	bphillips@loganville-ga.gov

Gresham Smith

CONCEPT TEAM MEETING FOR:
SR 20 AT THREE INTERSECTIONS (PI 0016386)
WALTON COUNTY

MEETING DATE: April 23th, 2019, 1PM

LOCATION: GDOT District 1 Conference Room/Teleconference

MEETING MINUTES

1. Introductions – See attached list of meeting attendees

2. Project Schedule – Shawn Reese reviewed the project schedule
    - Concept Approval Date: 8/15/2019
    - Right of Way Approval Date:7/17/2020
    - Management Let Date: 4/15/2022

3. Project Background & Descriptions
    - Background – Andrew Farmer gave a brief overview of the history of the project.
        - This project was originally under PI 142000, but this project was separated in 2018 due to project justification change and updates to the traffic counts
        - ICTM was held 12-12-2018
    - Project Justification
        - Chelsea Lincoln provided an overview of the Project Justification Statement (PJS) and discussed differences between the traffic and crash rates in the PJS and the traffic and crash analysis within rest of the Concept Report.
    - Three Intersections Along SR 20 – Joel Jones reviewed the existing issues at the three intersection locations and what the preferred design alternatives would include:
        1. SR 20 & Centerhill Church Rd (Moon Rd & Old Moon Rd)
            - The existing intersections of Moon Rd and Centerhill Church Rd are closely spaced and have substandard skew angles with SR 20.
            - The proposed design would realign Moon Rd to intersect with Centerhill Church Rd to remove the closely spaced intersections. There would be a minor realignment of Centerhill Church Rd to improve the skew angle with SR 20 the meet GDOT standards. Turn lanes would be provided at the intersection.
        2. SR 20 & Centerville Rosebud Road
            - Centerville Rosebud Rd intersects SR 20 at a very sharp skew angle. The proposed design would realign Centerville Rosebud Rd and provide turn lanes.
        3. SR 20 & McCullers Road

- McCullers Rd is currently an offset intersection. The proposed design would realign McCullers into a four way intersection with turn lanes.

- Environmental Resources – Joel Jones reviewed the locations of the known environmental resources.

4. Traffic
   - Crash History – Chelsea Lincoln provided an overview of the crash history
   - ICE Analysis/ Alternatives Considered – Chelsea Lincoln provided an update on the Stage 1 and 2 ICE analysis and the results from the reports:
   - Stage 1 ICE was approved by GDOT on 3/19/2019. The Stage 1 ICE recommended analyzing stop controlled and signalized intersections, as well as roundabouts.
   - Stage 2 ICE analysis has been completed and will be submitted to GDOT sometime after the Concept Team meeting. The Stage 2 ICE analysis results were discussed.
     - SR 20 & Centerhill Church Rd
       1. Signalized intersections with turn lanes. The signal would meet warrants within the first 10 years after opening (Signal Warrant 1)
       2. A single lane roundabout would also work at this location, but would need to be upgraded to a multi-lane prior to the design year. GDOT District 1 Traffic Ops prefers roundabouts.
       3. A 2-Way stop controlled intersection does not meet capacity requirements for the design year.
       4. A larger roundabout that included Moon Road was investigated, but was ruled out due to the increased cost of realigning SR 20 to incorporate the Moon Road leg of the roundabout.
       5. The Stage 2 ICE scores the roundabout and signalized intersections similarly. The signalized intersection was chosen as the preferred alternative due to reduced construction cost as compared to the multi-lane roundabout.
     - SR 20 & Centerville Rosebud Rd
       1. Signalized intersections with turn lanes. The signal would meet warrants within the first 10 years after opening (Signal Warrant 1)
       2. A single lane roundabout would also work at this location, but would need to be upgraded to a multi-lane prior to the design year. GDOT District 1 Traffic Ops prefers roundabouts.
       3. A 2-Way stop controlled intersection does not meet capacity requirements for the design year.
       4. The Stage 2 ICE scores the roundabout and signalized intersections similarly. The signalized intersection was chosen as

the preferred alternative due to reduced construction cost as compared to the multi-lane roundabout.

- SR 20 & McCullers Rd
    1. This intersection did not meet signal warrants, so the signalized intersection was not further investigated.
    2. The 2-way stop controlled intersection did not meet minimum operational performance.
    3. A single lane roundabout would works at this location, but would need to be upgraded to a multi-lane prior to the design year. This is the preferred alternative for this location.
- Roundabout Peer Review
    1. Andrew Farmer stated that peer reviews for any proposed roundabouts would be completed after approval of Stage 2 ICE

5. Roadway Design – Joel Jones reviewed the following:
    - Design Criteria
        - No Comments regarding Design Criteria
    - Horizontal/Vertical Alignments
        - Symmetrical widening with mill and overlay along SR 20 anticipated.
        - No design variances or exceptions are expected.
    - Typical Sections
        - No comments regarding typical sections
    - Access Control – by permit
        - D1 traffic Ops would prefer right in right out access for driveway from cemetery adjacent to Centerhill Church Rd
        - D1 Traffic Ops stated that they prefer that Copart shouldn't have any additional driveway access points to SR 20 (at Centerville Rosebud Rd intersection). Any additional driveways should be located to Centerville Rosebud Rd. Further coordination will need to occur with Copart to determine what parcels they have purchased and work with them to provide access to the remaining parcels within the vicinity to the intersection.
    - Traffic Control/ Constructability
        - No major constructability issues anticipated. District 1 Construction commented that temporary pavement may be needed to construct tie ins with sideroads that will be realigned.
        - No off site detours during construction. Short term onsite detours utilizing temporary pavement may be required, but staging will be further investigated during preliminary design phase.
        - Based on previous soil survey from 2008, no unusual soil conditions are anticipated.

- District 1 Maintenance was not at the meeting, but no known maintenance issues were presented. Amy pipes proposed to be retained during preliminary design will be video scoped. Any existing CMP pipes will be replaced.

6. Environmental – Keisha Jackson reviews
    - Environmental Document – State funded under $100 million so no document is required
    - Required Permits/ Special Studies – NPDES, Section 7 for Federally Protected Species/MS4
    - MS4 – Andrew Farmer stated that MS4 is required. Bioretention, bio-slopes, enhanced swales are anticipated.
    - Public involvement Plan – PIOH Scheduled for January 2020 and is planned to be held concurrently with PI 00016387 (SR 20 from N. Sharon Church to SR10/ US78).

7. Utilities
    - Utility Owners are listed in concept. No major transmission facilities.
    - SUE – not required for this project.
    - No railroads
    - Private Airfield just within 5 miles of McCullers Intersection. FAA coordination most likely not required (Spring Valley Farm).

8. Right of Way
    - Number of parcels 65
    - Displacements 0
    - Utility accommodation – utilities may be placed in right off way or easements

9. Risks
    - Andrew Farmer reviewed risks from ICTM. The only concern was adding a roundabout to the corridor as there are no other roundabouts along this section of SR 20.
    - No additional project risks were identified.

10. Project Cost Estimates
    - No comments regarding project cost estimates.

11. Project Assignments
    - Andrew Farmer reviewed project assignments

12. Additional Discussion
    - TE report approval is required prior to showing proposed signals on the concept layouts. It was noted that attaching the TE report to the Concept report does not mean that the TE report will be approved.

- The McCullers Rd roundabout will be submitted for peer review after the design is altered to provide for a multilane roundabout conversion prior to the design year.

This represents our understanding of the items discussed at this meeting. If you have any questions or comments concerning any of the information contained herein, please contact us.

Prepared by: Andrew Farmer, P.E.

Copy Participants

MEETING SIGN-IN SHEET

Project: 0016386	**Meeting Date:** 4.23.19
Facilitator: Bryan Lott	**Place/Room:** D1 Rm 114

Name	Company	Phone	E-Mail
Bryan Lott	GDOT - CPD	4-631-1569	bLott@dot.ga.gov
Sharon Hall	GDOT - DPO	(4)631-1606	SHALL@dot.ga.gov
KEISHA JACKSON	GDOT/OES	6.247.2470	keijackson@dot.ga.gov
Harold D. Mull	GDOT - Dist Const.	770.533-8963	hmulle dot.ga.gov
Jonathan Peevy	GDOT D1 T.O.	770 533-8276	jpeevy@dot-ga.gov
Kim Coley	GDOT - D1	770-533-8273	KColey@dot.ga.gov
KELLY HAIRSTON	GDOT - D1 CONST.	706-224-9645	khairston@dot.ga.gov
Judy Prince	GPOT - D1	770.533.7243	jprince@dot.ga.gov
Shannon Giles	GDOT - D1 Const.	7065832644	sgiles@dot.ga.gov
Johnathan Mayd	GDOT - Planning	404-631-1774	Jmayd@dot.GA.gov
ANDREW FARMER	GRESHAM SMITH	678-518-3899	andrew.farmer@greshamsmith.com
Joel Jones	Gresham Smith	7) 545-0041	joel.jones@greshamsmith.com
Shawn Reese	Gresham Smith	8) 518-3939	shawn.reese@greshamsmith.com
Chelsea Lincoln	Gresham Smith	6) 518-3890	chelsea.lincoln@greshamsmith.com

Gresham Smith

CONCEPT TEAM MEETING MINUTES:
SR 20 FROM SHARON CHURCH RD TO US 78/ SR10 (PI 0016387)
WALTON COUNTY

MEETING DATE: June 27th, 2019, 1PM

LOCATION: GDOT District 1 Conference Room/Teleconference

ATTENDEES: See Attached

AGENDA

1. Introductions
    a. Roundtable introductions and those who attended via teleconference made introductions

2. Project Schedule:
    a. Gresham Smith gave a brief overview of the project schedule and key milestone dates:
        i. Concept Approval: 10/15/2019
        ii. Right of Way Approval Date: 9/15/2020
        iii. Management Let Date: 6/15/2022

3. Project Background & Description
    a. Background
        i. Gresham Smith gave a brief background of the project. The project was originally apart of the PI 142000. The project was separated into (3) parts. This project is along SR 20 from just west of N Sharon Church Rd/Tuck Rd and extend east towards US 78/ SR 10 intersection.
        ii. Initial Concept Team Meeting was held on 12-12-2018
    b. Project Justification
        i. Gresham Smith went over the PJS that was given by GDOT and described that the PJS will need to be updated to reflect more accurate crash data that was pulled from the GDOT GEARS data and AADT volumes per the approved design traffic.
    c. Alternatives
        i. Preferred Alternative
            1. The preferred alternative proposes widening along SR 20 with a 20-ft raised concrete median. This alternative proposes realigning Tuck Rd with N Sharon Church Rd with a roundabout. The raised median throughout the corridor is being proposed for access management and ICE recommendations. There are U-turn movements allowed at certain locations.
                a. The preferred alternative has two options at the intersection of SR 20 & US 78/SR 10. The first is providing 2 left turn lanes on SR 20 and 2 left turn lanes

along US 78/SR 10. The second option is to provide a displaced left along US 78/SR 10. Currently the first option only meets the traffic projects for 15 years. However, this option is being presented due to the second option being more than the programmed cost for construction in addition to commercial displacements in the downtown Loganville area.

b. District Construction mentioned they would prefer the median be all concrete unless locals are to maintain the grass.

ii. Alternative 1
    1. Alternative 1 is similar to the preferred alignment except that it proposes realigning SR 20 with CS Floyd and upgrading the pavement along CS Floyd to meet state route standards
        a. This alternative was not selected based on adverse impacts to environmental and historical resources and does not fully address the congestion issues at the intersection of SR 20 & US 78/SR 10.

iii. Alterative 2
    1. Alternative 2 is similar to the preferred alignment except that it proposes a set of one-way pairs where the EB traffic continues to along the existing path of SR 20 and the WB traffic is realigned to the intersection to CS Floyd.
        a. This alternative was not selected based on the adverse impacts to environmental and historical resources and public pushback that was received during the original project PI 142000 that proposed a similar alignment.

iv. GDOT made a comment regarding the by lane drop/by pass lane being proposed at the roundabout and driver expectancy.
    1. Gresham Smith indicated that Stage II ICE is still outstanding and will provide a clearer direction on this. It was also noted that additional signing could be utilized otherwise the project limits may increase to prove proper merge lengths.

v. GDOT wanted to know the cost difference on the displaced left option and if it could be combined with alternative options
    1. Gresham Smith indicated the displaced left option would increase construction cost by approximately $4 Million without the considerations of the additional right of way cost. The displaced left with other alternatives were not considered base on alternative being not selected based on impacts and the displaced creates more impacts.

4. Environmental Resources
    a. (2) Wetlands & (2) Streams that pass-through box culverts along SR 20
    b. There are historical resources that include Tuck Farm, Harrison House (impacted), & Loganville Historical District.
    c. There is no known archeology
    d. There are (2) cemeteries.
    e. There are (5) UST sites located within the project limits

5. Traffic
    a. Crash data
        i. It was noted that the crash data for SR 20 exceeded the statewide average.
    b. ICE Analysis / Intersection Options Considered
        i. Stage I ICE is approved
        ii. Stage II ICE is in preliminary development
        iii. Intersection Options
            1. SR 20 & N Sharon Church Rd – ICE scored the roundabout as the best option.
                a. GDOT asked if the Roundabout was designed for a truck.
                    i. The RB was designed to accommodate a WB-67 and P simultaneously with the WB-67 over tracking into the P lane without conflicting, and two BUS-40s could pass through simultaneously without over tracking lanes or using truck apron. Truck blisters are provided for WB-67 right turn movements.
                b. GDOT asked Gresham Smith to reach out to district opts for comments regarding roundabout configuration.
                c. GDOT commented that a lighting agreement needs to be obtained
            2. SR 20 & US 78/SR 10
                a. The most cost-effective solution was providing two left turn lanes along SR 20 and US 78/SR 10 over a displaced left. Gresham Smith asked GDOT if they preferred two left turn lanes over displaced left based on impacts and cost savings. GDOT did not indicate they would want to implement a displaced left in this location.
                    i. GDOT requested that the two way left turn lane along US 78/SR 10 to be proposed with striping that allows for storage into the two left turn lanes onto SR 20 and make Bobby Boss Dr as right-in/right-out. GDOT emphasized that que lengths

need to be accommodated based on current congestion.

3. SR 20 & Overlook.
    a. Median break provided at this location for left-in movements. Overlook being proposed as a right-in/right-out movement.
        i. GDOT commented to ensure that median breaks are not wide enough to allow left turn movements from Overlook.
4. SR 20 & Huntington Dr
    a. Median break provided with U-Turn accommodations for WB-67 design vehicles. Huntington drive has no restricted movements.

5. SR 20 & Publix Drive
    a. Median break provided with U-Turn accommodations for WB-67 design vehicles. This is for an industrial facility located at Fesco Way.
        i. GDOT commented to ensure that median breaks are not wide enough to allow left turn movements from Publix Dr.

6. Roadway Design
    a. Design Criteria
        i. Gresham Smith went over the design criteria that was described in the concept report.
        ii. A question was raised if raised medians should be grass or concrete
            1. Keck & Wood would reach out to City of Loganville to see if they want the maintenance of grass medians.
    b. Design Variances
        i. One design variance is anticipated for intersection skew angle at SR 20 & US 78/SR 10
    c. Typical Sections
        i. Gresham Smith went over the typical sections that were presented in the concept report.
    d. Traffic Control / Constructability
        i. There are no detours expected during construction. There are no known constructability issues known at this time.
        ii. District Construction recommended the existing deficient sag curve at Magnolia Street be corrected with leveling instead of full depth construction.
    e. Maintenance Issues
        i. There are no know maintenance issues at this time.

7. Environmental
    a. Environmental Document – 404 Permit
    b. Required Permits – NPDES, Section 7 for Federally Protected Species/MS4
    c. MS4 – MS4 Required. Bioretention, bio-slopes, enhanced swales anticipated.
    d. Public Involvement Plan – PIOH Scheduled for Jan 2020 combined with PI 0016386

8. Utilities
    a. There a pump station and slick that need to be avoided near Overlook Dr
    b. GDOT stated that SUE quality level A will be needed especially as the project approaches Loganville.

9. Right-of-Way
    a. 60 impacted parcels. 2 known displacements.
    b. Utility accommodation – GDOT requested that 10-ft from back of shoulder break should be right-of-way for utility accommodation/placement.

10. Risks
    a. Risks were discussed such as roundabout construction, staging, and utilities conflicts.

11. Project Cost Estimates
    a. The cost estimate was discussed, and it was mentioned that the construction cost exceeds the programmed cost.

12. Project Assignments
    a. Project Assignments were reviewed.
    b. City of Monroe, City of Lawrenceville, and Walton County will need to be added to the concept report project activities table.

13. Additional Discussion
    a. GDOT Requested 1 to 2 days from this meeting to receive all comments from the district and have them recorded.
    b. Gresham Smith requested GDOT to provide more up to date aerial
    c. GDOT instructed Gresham Smith to proceed with option A as the preferred alternative, list Option B as another alternative.

This represents our understanding of the items discussed at this meeting. If you have any questions or comments concerning any of the information contained herein, please contact us.

Prepared By: Joel Jones, P.E

Attachments

1. GDOT Comments & Responses – Preferred Alternative Concept Layout
2. Sign In Sheet

PI No. 0016387

Concept Team Meeting, June 27, 2019 2:00 PM, District One Office.

Sign In Sheet

NAME	ORGANIZATION	PHONE NUMBER	E-MAIL
Terri Holbrook	DIVT	770-533-8316	teholbrook@dot.ga.gov
Joel Jones	GS	770-545-0041	JOEL.JONES@GRESHAMSMITH.com
ANDREW FARMER	GS	678-518-3899	andrew.farmer@greshamsmith
Shawn Reese	GS	678-518-3939	shawn.reese@greshamsmith.com
Zack Lammers	GS	678.518.3664	zack.lammers@gspret.com
Chelsea Lincoln	GS	678-518-3890	chelsea.lincoln@greshamsmith.com
Nithin Gomez	GS	678.518.3886	nithin.gomez@greshamsmith.com
Sharon Hall	GDOT	404-631-1606	SHALL@dot.ga.gov
HAROLD D. MULL	GDOT	770-533-8763	hmull@dot.ga.gov
JONATHON DILLS	GDOT R/W	770 533 8288	jdills@dot.ga.gov
Kim R. Coley	GDOT	770 533-8273	Kcoley@dot.ga.gov
Keisha Jackson	GDOT/OES	678.247.2470	Keijackson@dot.ga.gov
Johnathan mcloyd	GDOT/Planning		Jomcloyd@dot.GA.gov
Bryan Sartin	Keck & Wood (City of Loganville)	678-417-4019	bsartin@keckwood.com
Bryan Gotf (via Phone)	GDOT/OPD		
Sue Anne Decker	GDOT D1 (for part of the meeting)		
Shane Giles	GDOT Traffic Ops	770-533-8491	Shgiles@dot.ga.gov
NAME	ORGANIZATION	PHONE NUMBER	E-MAIL

July 26, 2019

Gresham Smith

PI 0016387

GDOT DISTRICT 1 COMMENTS REGARDING THE PREFERRED LAYOUT FOR
SR 20 FROM CS 660/SHARON CHURCH RD TO SR 10/US 78
WALTON COUNTY

Comment Received: 7/8/2019

Summary of Comments

General:

1. Ensure clear zone requirements are met for all fixed objects.
    - Clear Zone requirements will be satisfied, and any fixed objects that do not meet clear zone requirements will be protected and documented during the preliminary design stage.

Roundabout (SR 20 @ Sharon Church Rd & Tuck Rd):

2. Is extra R/W required for construction of roundabout? (How will staging be addressed?)
    - Yes. Additional ROW will be needed to construct a roundabout. Concept Layout will be reviewed to ensure the proper amount of ROW impacts are accounted for this layout.
    - Construction barrels and temporary pavement markings will be used to delineate traffic movements during construction. This same method will be used to transition the traffic pattern over to the roundabout movements.

3. Consider adding bypass lanes in NE and SW quadrants of roundabout so Right-turning vehicles don't have to enter roundabout. (This could help with driver expectations as current design shows two through lanes entering roundabout, and becoming a LT/through-right inside the roundabout.)
    - A traffic analysis was performed investigating adding bypass lanes to the NE and the SW quadrants of the roundabout and reducing the roundabout to a single lane roundabout. Adding a bypass lane on the NE quadrant of the roundabout increases the LOS for right turn movements onto truck Rd from a LOS B to LOS A. However, combining the through movements and left turn movements through the roundabout reduces the LOS from an A to a C. Adding a bypass lane on the SW quadrand and reducing the roundabout to a single lane causes the the SR 20 EB traffic to fail by reducing the LOS from a LOS A to LOS F. Therefore, adding a bypass lane on the SW or the NE reduces the overall operational efficiency of the roundabout and the primary movements. However, the driver expectancy conerns can and will be mitigated through advanced warning signs.
        - *Based on further discussion with the District a second lane was provided for the SR 20 WB traffic through the roundabout.*

4. Is WB approach to roundabout designed correctly considering entry speed?
    - Yes. The westbound approach was designed per GDOT standards with a design speed of less than or equal to 30-mph.

5. Will trucks track in both lanes of roundabout?
    - The roundabout has been designed so that a WB-67 and passenger vehicle can go through the roundabout at the same time. The WB-67 does slightly overtrack however, the two vehicles movements are not in conflict.

6. Demo roadway past limits of construction to SR 20, and install cul-de-sac
    - The layout will be updated to show the removal of pavement passed the limits of construction to SR 20. Also, a hammerhead style turnaround will be implemented in this location to reduce right-of-way impacts.

7. Joint use drive for parcels 7 & 11 – how are combination trucks supposed to enter gas station? Should exiting drive there be full access?
    - The concept layout will be revised to allow for full access of this shared use drive. In addition, a left turn lane will be investigated for this drive in order to not impede traffic flow entering the Roundabout.

8. Consider narrowing median and striping off excess pvm't on south leg of roundabout to assist in truck tracking.
    - Based on pedestrian requirements, narrowing the raised median on the South leg of the roundabout will not be feasible. The roundabout design currently has truck blister to assist with the over-tracking concerns of this movement. In addition, a roundabout peer review will be conducted during the preliminary design stage to ensure all roundabout requirements and concerns have been satisfied.

9. District recommends a single Eastbound through lane on west leg approach, opening to two lanes on east side of roundabout, with excess pavement hatched out in SE quadrant
    - The two SR 20 EB lanes were provided based on traffic projections and need to be maintained through the roundabout.

10. Are ped. accommodations req'd for roundabout?
    - Yes. Pedestrian accommodation will be added to the concept layout at the Roundabout.

SR 20:

11. Decrease width of driveway in parcel 20.
    - The concept layout matches the existing driveway width.

12. Add raised concrete median instead of striping at ½ RCUT @Overlook Drive, extend median east ~20' down LT lane along 5" white line, and create channelized RO-only from Overlook using wider radius and a concrete island
    - A narrow raised concrete median will be extended at the R-Cut location at Overlook Dr. A raised concrete island will be added to Overlook Dr to create right-out traffic channelization.

13. Extend LT lane(s) at parcel 27/28.
    - The left turn lanes will be extended to provide a symmetrically raised median.

(These Comments Provided On The Exhibit) SR 20 @ Overlook Dr.:

Replace hatching on SR 20 with raised median & extend ~20' down LT lane along 5" white striping.
- Raised median will be provided at R-CUT to disallow left turns onto SR-20 from Overlook Dr.

Add raised island & increase RT turning radius on Overlook Dr
- A raised island will be added at Overlook Dr.

Huntington Dr @ SR 20:

14. Offset left turn lanes at Huntington Dr for better sight distance.
    - Left turn lanes will be provided with an offset layout and modified type B raised median opening will be implemented.

15. Pull back nose of Huntington Dr island/median and hatch nose point.
    - The raised island at Huntington Dr will be revised to match the stop bar location.

16. Extend LT lane(s) in front of parcel 36
    - Left turn lanes will be extended at this location.

17. Remove striping and replace with concrete in partial RCUT @ Publix Drive and extend concrete ~20' west along white line in LT lane
    - A raised narrow median will be provided at the R-Cut located at Publix Dr.

Publix Dr @ SR 20:

18. On Publix drive, create channelized RO-only by large radius and raised island
    - Will investigate the use of a raised island at Publix Dr and implemented if the raised median is not in conflict with the U-Turn movement allowed at this location. However, as mentioned in the previous comment the raised island will be extended to ensure vehicles cannot make a left exiting Publix Dr.

    (This Comment Provided On The Exhibit)

    Replace hatching on SR 20 with raised median & extend ~20' down LT lane along 5" white striping
    - Raised median will be provided at R-CUT to disallow left turns on to SR-20 from Publix Dr.

19. Do EB LT lanes on 20 need to be extended for 95% queue?
    - The left turn lanes will be revised to account for the 95% queue length.

US 78/SR 10 @ SR 20:

20. Consider adding a narrow-raised median on SR 20, between the WB through lanes & EB left turn lanes
    - Narrow raised median will be added to the concept layout.

US 78/SR 10

21. Bobby Ross Dr on east and west side of 78/10 should be RI/Ro
    - Raised island will be added to provide right-in/right-out access from Bobby Boss Dr

22. Consider removing gore striping at end of NB LT lanes on 78/10 turning west onto 20 so 95% queue can store in center turn lane
    - Hatching will be revised

23. Raised island req'd in SE corner of 20+78/10 intersection where crosswalks change direction
    - A raised island will be added to this location.

24. RI/RO drive at 78/10 & Broad Street
    - Raised island will be added to provide right-in/right-out access from Broad St

25. Does second WB through lane on east side of 78/10 on 20 need to be extended due to AASHTO req's?
    - No. This is an additional lane that allows right turn movement.

    (This Comment Provided On The Exhibit)

    Remove the white striping/hatching past the crosswalk of the SR 20 RT lane onto US 78/SR 10 and add a stop bar
    - A stop bar will be added to the RT turn lane from SR 20 to US 78

Pecan St @ SR 20:

26. Correct the approach taper on SR 20
    - Approach taper is based on a 25-mph design speed.
27. Need to address vehicles attempting to turn left both EW & WB onto SR 20 from Pecan St
    - Hatching will be revised to allow left turns movement from Pecan St.

Broad St @ US 78/SR 10:

28. RI/RO @ Broad Street
    - Raised island will be added to provide right-in/right-out access from Broad St

Preferred Alt. 3B

1. D1 Traffic Ops is in support of the displaced left alternative
    a. Additional direction from GDOT on the having the displaced left as the concept report perfered alternative

Responses Prepared by: Joel Jones, P.E.