Georgia Department of Transportation

Interoffice Memo
Office of Design Policy & Support

DATE: 4/4/2020

FILE: P.I.# 00016386
Walton County / GDOT District 1 - Gainesville
Roundabouts - SR 20 @ 3 LOCS IN WALTON COUNTY

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
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SueAnne Decker, District Preconstruction Engineer
Yulonda Pride-Foster, District Utilities Manager
Kimberly Kimbrough, Project Manager
BOARD MEMBER - 10th Congressional District

GDOT
Georgia Department of Transportation

Project Concept Report

Project Type:	Intersection Improvements	P.I. Number:	0016386
GDOT District:	1	County:	Walton
Federal Route Number:	N/A	State Route Number:	20
Project Number:	N/A		

Reconstruction and intersection improvements at three intersection locations along SR 20 in Walton County, GA. The intersections are SR 20 & Center Hill Church Rd, Centerville Rosebud Rd, & McCullers Rd.

Submitted for approval: * Concept Report 3rd submittal on 02/26/2020

Joel M. Jones, ~~P.E. Gresham Smith~~ — Date: 10-29-19

Kimberly W. Nesbitt
State Program Delivery Administrator — Date: 2/25/2020

Kimberly J. Kimbrough CF KE8D
GDOT Project Manager — Date: 11-1-19

Recommendation for approval: * Recommendations are on file ~ OB

* Eric Duff
State Environmental Administrator — Date: 07/19/2019

* Chris Raymond
for State Traffic Engineer — Date: 03/10/2020

* Erik Rohde
Project Review Engineer — Date: 11/17/2019

* Stevonn Dilligard
for State Utilities Engineer — Date: 07/19/2019

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

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

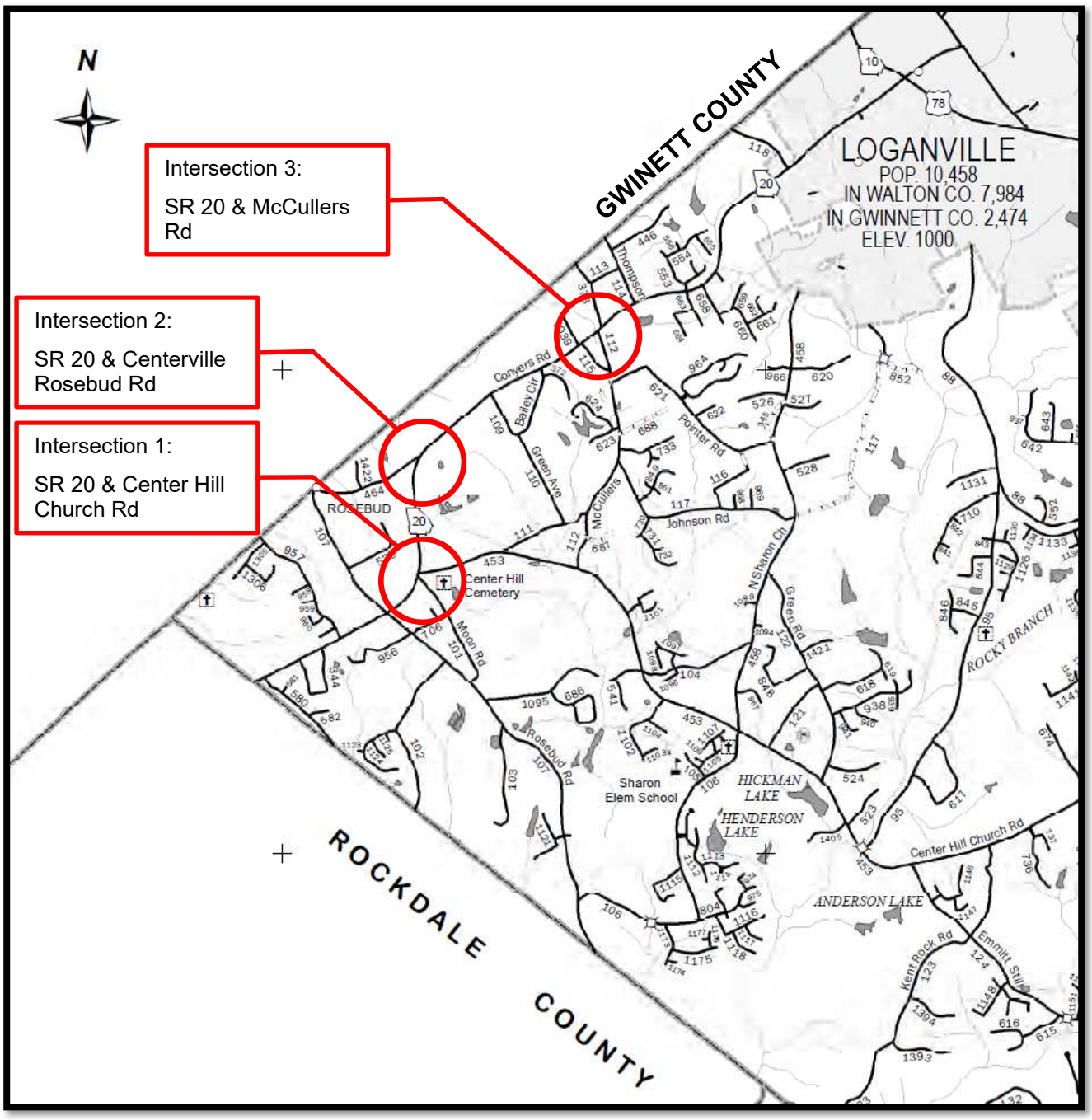
☐ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

R. Paul Tanner
State Transportation Planning Administrator — Date: 11-19-19

**** Recommendations also received from:***

Office of Intermodal: Alan Hood - 07/16/2019
Office of Materials: Monica Flournoy - 08/02/2019

PROJECT LOCATION MAP



PROJECT: PI 0016386
SR 20 at Three Locations
Walton County, GA

PLANNING AND BACKGROUND

Project Justification Statement (Prepared by GDOT Office of Planning – January 15, 2019):
GDOT Project Identification (P.I.) No. 0016386 is located within the Atlanta Metropolitan Organization boundary on State Route (SR) 20. This project originated from P.I. No. 142000- SR 20 FM Sharon Church RD to Brand RD; inc 3 Locs – PE only. P.I. No. 142000-originated from a study conducted by District 1. SR 20 is an urban minor arterial that provides north-south access in Walton County. SR 20 is a two-lane facility, one lane 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 purpose of the project is to reduce congestion and crash severity.

According to GDOT's 2017 traffic data, the Annual Average Daily Traffic (AADT) on this segment of SR 20 is 12,250 vehicles per day with 7% truck traffic. 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 16,343 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 lower compared to the statewide averages for an urban minor arterial. The statewide average crash rates are 601, 637, and 655 per 100 million vehicle miles (MVM) for years 2014, 2015, and 2016 respectively. The crash rates for this segment of SR 20 are 152, 277, and 313 per 100 MVM for years 2014, 2015, and 2016 respectively. There was zero fatalities.

SR 20	2014	2014 Statewide Average	2015	2015 Statewide Average	2016	2016 Statewide Average
# of Crashes	17		31		35	
Crash Rate	152	601	277	637	313	655
# of Injuries	7		14		12	
Injury Rate	63	145	125	156	107	156
# of Fatalities	0		0		0	
Fatality Rate	0	1.21	0	1.68	0	1.53

On this segment of SR 20, 43% of the crashes were rear end which are associated with congestion and frequent stops. 26% of the crashes were angle movements which are associated with turning movements.

Existing conditions: Project PI 0016386 is located at three separate intersection along SR 20 approximately 2-1/2 to 4-1/2 miles southwest of Loganville in Walton County Georgia. These three existing intersections are SR 20 at Moon Rd / Center Hill Church Rd, SR 20 at Centerville Rosebud Rd, and SR 20 at McCullers Rd. SR 20 is currently classified as a minor arterial with a posted speed of 45-mph to 55-mph through the limits of the project. SR 20 is comprised of a rural section with two 12-foot lanes (one in each direction) with 2-foot paved shoulders. There are several visible overhead and underground utilities that are present though the entirety of the project.

Other projects in the area:
PI 0000416 – SR 20 from Sharon Church Rd to Pleasant Hill Rd/Rockdale (Long Range)
PI 0012674 – SR 10; SR 10BU; SR 11; SR 20; SR 81; SR 138 @ 13 Locations in Walton County (8/2019 Let)
PI 0016387 - SR 20 from CS 660/North Sharon Church Rd to SR 10/US 78 (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

SR-20 Projected Traffic: AADT 24 HR T: 7.0 %
Current Year (2017): 12,250 Open Year (2023): 13,250 Design Year (2043): 19,750

Centerhill Church Rd Project Traffic: AADT 24 HR T: 5.0 %
Current Year (2017): 4,650 Open Year (2023): 5,350 Design Year (2043): 8,000

Centerville Rosebud Rd Project Traffic: AADT 24 HR T: 5.5 %
Current Year (2017): 4,300 Open Year (2023): 4,750 Design Year (2043): 7,150

McCullers Rd Projected Traffic: AADT 24 HR T: 2.0 %
Current Year (2017): 1,200 Open Year (2023): 2,500 Design Year (2043): 3,550

Moon Rd Projected Traffic: AADT 24 HR T: 2.0 %
Current Year (2017): 250 Open Year (2023): 250 Design Year (2043): 400

Traffic Projections Performed by: Gresham Smith
Date approved by the GDOT Office of Planning: 2/27/2019

AASHTO Functional Classification (SR 20): *Minor Arterial*
AASHTO Functional Classification (Centerhill Church Rd/ Centerville Rosebud Rd): *Major Collector*
AASHTO Functional Classification (Moon Rd/ McCullers Rd): *Local Road and Street*

AASHTO Context Classification (SR 20): *Rural*

AASHTO Project Type (SR 20): *Reconstruction*

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

State Bicycle Route 35 (March to the Sea Corridor) follows SR 20 from the beginning of the project and turns east onto Center Hill Church Rd. Bikeable rural shoulders will be utilized along these road segments along the bicycle route. SR 20 at Centerville Rosebud Road and SR 20 at McCullers Rd do not meet any Bicycle Warrants or Guidelines.

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 proposed project begins approximately 1400-ft west of the existing intersection of SR 20 and Center Hill Church Rd and ends approximately 500-ft past the existing intersection of McCullers Rd for a total project length of 2.61 miles including 1.20 miles of exceptions between the three intersection locations. The project is completely within Walton County with a design speed of 55 mph. SR 20 will remain 2 through lanes throughout the project corridor with the addition of turn lanes.

Intersection 1: At the intersection of SR 20 and Center Hill Church Road, a multi-lane roundabout is proposed. Center Hill Church Road will be realigned with SR 20 to correct the existing 70° skew to 90°. Additionally, Moon Road will be realigned with Center Hill Church Road instead of SR 20 to remove the closely spaced intersections. The proposed project length at this intersection is 0.43 miles

Intersection 2: At the intersection of SR 20 and Centerville Rosebud Road, the project proposes a multi-lane roundabout is proposed. Centerville Rosebud Road is being proposed to be realigned with SR 20 by approximately 700-ft to the south, correcting the intersection skew angle from 60° to 90°. The proposed project length at this intersection is 0.46 miles

Intersection 3: At the intersection of SR 20 and McCullers Road, a multi-lane roundabout is proposed. McCullers Road would be realigned to eliminate the existing Offset T-intersection. The proposed project length at this intersection is 0.52 miles

Major Structures: N/A

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

Is the project located on a Special Roadway or Network? ☒ No ☐ Yes STRAHNET Connectors

Mainline Design Features: SR 20 (Minor Arterial)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12-ft**	**11-ft Min/ 12-ft Desirable**	**12-ft**
- **Median Width & Type**	**N/A**	**N/A**	**N/A**
- **Outside Shoulder Width**	**2-ft paved**	**10-ft Total (4-ft to 6.5-ft Paved)**	**10-ft Total (6.5-ft Paved)**
- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**N/A**	**N/A**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**None**	**4-ft**	**4-ft (incorporated into 6.5-ft paved shoulder)**
Posted Speed	45 mph /55 mph		55 mph
Design Speed	**55 mph**	**55 mph**	**55 mph**
Minimum Horizontal Curve Radius	**1060-ft**	**1060-ft**	**1350-ft**
Maximum Superelevation Rate	**6%**	**6% or 8%**	**6%**
Maximum Grade	**5%**	**5%**	**5%**
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*

Side Road Design Features: Centerhill Church Rd (Major Collector)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12-ft**	**11-ft Min/ 12-ft Desirable**	**12-ft**
- **Median Width & Type**	**N/A**	**N/A**	**N/A**
- **Outside Shoulder Width**	**2-ft paved**	**10-ft Total (4-ft to 6.5-ft Paved)**	**10-ft Total (6.5-ft Paved)**
- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**N/A**	**N/A**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**None**	**4-ft**	**4-ft (incorporated into 6.5-ft paved shoulder)**
Posted Speed	55 mph		55 mph
Design Speed	**55 mph**	**55 mph**	**55 mph**
Minimum Horizontal Curve Radius	**1060-ft**	**1060-ft**	**1955-ft**
Maximum Superelevation Rate	**6%**	**6% or 8%**	**6%**
Maximum Grade	**5%**	**5%**	**5%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-40
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

**According to current GDOT design policy if applicable*

Side Road Design Features: Centerville Rosebud Rd (Major Collector)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12-ft**	**11-ft Min/ 12-ft Desirable**	**12-ft**
- **Median Width & Type**	**N/A**	**N/A**	**N/A**
- **Outside Shoulder Width**	**2-ft paved**	**6-ft/8-ft**	**8-ft Total (4-ft Paved)**
- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**N/A**	**N/A**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**N/A**	**N/A**
Posted Speed	45 mph		45 mph
Design Speed	**45 mph**	**45 mph**	**45 mph**
Minimum Horizontal Curve Radius	**643-ft**	**643-ft**	**2500-ft**
Maximum Superelevation Rate	**6%**	**6% or 8%**	**6%**
Maximum Grade	**8%**	**8%**	**8%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-40
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

**According to current GDOT design policy if applicable*

Side Road Design Features: Moon Rd/ McCullers Rd (Local Road)

Feature	Existing	*Policy	Proposed
Typical Section:			
- Number of Lanes	2		2
- **Lane Width(s)**	**12-ft**	**11-ft Min/ 12-ft Desirable**	**12-ft**
- **Median Width & Type**	**N/A**	**N/A**	**N/A**
- **Outside Shoulder Width**	**2-ft paved**	**6-ft/8-ft**	**6-ft Total (2-ft Paved) Moon Rd 8-ft Total (2-ft Paved) McCullers Rd**
- **Outside Shoulder Slope**	**6%**	**6%**	**6%**
- **Sidewalks**	**N/A**	**N/A**	**N/A**
- Auxiliary Lanes	N/A		N/A
- **Bike Accommodation**	**N/A**	**N/A**	**N/A**
Posted Speed**	35 mph/ 45 mph		35 mph/ 45 mph
Design Speed**	**35 mph/ 45 mph**	**35 mph/ 45 mph**	**35 mph/ 45 mph**
Minimum Horizontal Curve Radius	**1665-ft**	**340-ft/ 643-ft**	**500-ft / 650-ft**
Maximum Superelevation Rate	**6%**	**6% or 8%**	**6%**
Maximum Grade	**8%**	**10%/ 9%**	**8%**
Access Control	By Permit	**By Permit**	By Permit
Design Vehicle	N/A		WB-40
Check Vehicle	N/A		WB-67
Pavement Type	HMA		HMA

**According to current GDOT design policy if applicable*

***Moon Rd and McCullers Rd (North of SR 20) Design/Posted Speed is 35 mph. McCullers Rd (South of SR 20) Design/Posted Speed is 45 mph.*

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. Stopping Sight Distance	☒	☐	☐		
3. Horizontal Curve Radius	☒	☐	☐		
4. Maximum Grade	☒	☐	☐		
5. Vertical Clearance	☒	☐	☐		
6. Superelevation Rate	☒	☐	☐		
7. Lane Width	☒	☐	☐		
8. Cross Slope	☒	☐	☐		
9. 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. Roundabout Illumination Levels	DP&S	☒	☐	☐	
10. Complete Streets Warrants	DP&S	☒	☐	☐	
11. ADA Requirements in PROWAG	DP&S	☒	☐	☐	
12. GDOT Construction Standards	DP&S	☒	☐	☐	
13. GDOT Drainage Manual	DP&S	☒	☐	☐	

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

Lighting Required: ☐ No ☒ Yes
Lighting is required for roundabouts at SR 20 and Centerhill Church Rd, Centerville Rosebud Rd, & McCullers Rd per GDOT policy.

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/Intersections:
SR 20 at Center Hill Church Road – Proposed Roundabout
SR 20 at Centerville Rosebud Road – Proposed Roundabout
SR 20 at McCullers Road – Proposed Roundabout

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

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

UTILITY AND PROPERTY

Railroad Involvement: N/A

Utility Involvements:
- AT&T (Telephone – Local)
- Atlanta Gas Light (Gas)
- City of Lawrenceville (Gas)
- City of Loganville (Sanitary Sewer)
- City of Loganville (Water)
- City of Monroe (Fiber)
- Georgia Power (Electric – Distribution)
- Gwinnett County Public Utilities (Water/ Sanitary Sewer)
- Walton County Water Authority (Water)
- Walton EMC (Electric – Distribution)
- Zayo Fiber Solutions (Fiber)

SUE Required: ☐ No ☒ Yes ☐ Undetermined

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

Right-of-Way (ROW): Existing width: 100ft. Proposed width: 100-140ft.

.

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:		51
	Businesses:	0
Displacements anticipated:	Residences:	0
	Other:	0
	Total Displacements:	0

Location and Design approval: ☐ Not Required ☒ Required

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

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern: Impacts to local businesses, churches, and a cemetery.

Context Sensitive Solutions Proposed: Shift alignment of improvements to avoid property impacts.

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 project area.

Waters of the United States (WOTUS): Waters of the United States are located within the project corridor. A perennial stream and an open water are located in the area of the Center Hill Church Rd and SR 20 intersection. No WOTUS waters were identified at the Centerville Rosebud Rd at SR 20 intersection. One wetland, one ephemeral stream and an open water were identified in the vicinity of the of the SR 20 and McCullers Rd intersection.

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 the 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.

z				
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 one eligible historic resource in the project corridor, Resource #2/Moon Barn (Hayden 2006). The resource is located in the immediate vicinity of the Center Hill Church Road at SR 20 intersection. The Historic Resource Survey Report describes the Moon Barn as a transverse crib barn located approximately 0.2 mile north of Center Hill Church Road. 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 resource and its boundary.

Archeology:
The proposed project is located within the limits of 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.

The Center Hill Baptist Church cemetery is located just east of SR 20 between existing Moon Road and Center Hill Church Road.

Air Quality:
Is the project located in a PM 2.5 Non-attainment area? ☐ No ☐ Yes ☒ NA

Is the project located in an Ozone Non-attainment area? ☐ No ☒ Yes
Carbon Monoxide hotspot analysis: ☐ Required ☐ Not Required ☒ TBD
The proposed project proposes realigning 3 intersections with roundabout configurations and traffic volumes in the project corridor exceeding 10,000 vpd with the level of service of D, E or F.

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 resource's assessment of effect analysis.

Public Involvement:
A public information meeting is targeted for early January 2020 and is needed to solicit public input on the current project in the corridor. Additionally, roundabout support letters have been received for this project.

Major stakeholders:
Anticipated major stakeholders include Walton County, City of Loganville, area residents, business owners, and the traveling public. Cycling enthusiasts may also have interest in the proposed project.

CONSTRUCTION

Issues potentially affecting constructability/construction schedule: N/A

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: December 12, 2018 – See attached minutes

Concept Team Meeting: April 23, 2019 – see attached minutes.

Other coordination to date: Meeting with Copart regarding intersection of SR 20 at Centerville Rosebud Rd (See alternative discussion for more information)

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 Owner
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:	$1,100,000		$3,549,000	$5,483,980	$9,237,149	$18,270,129
Funded By:	HB 170	HB 170	HB 170	HB 170	HB 170	
Estimated Amount:	$1,100,000	$18,000	$3,836,655**	$3,445,013	$10,974,226	$18,255,894
Date of Estimate:	3/2018	6/2019	10/2019	2/2019	02/2020	
Cost Difference:	$0		($287,655)	$2,038,967	($1,737,077)	$14,235

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.
** ROW Cost Estimated by Engineer using Walton County Tax Assessor information. This information is to be updated upon the receipt of an updated ROW Cost Estimate.

ALTERNATIVES DISCUSSION

Alternative selection:

Preferred Alternative: This alternative proposes realigning the intersection of SR 20 and Centerhill Church Rd, Centerville Rosebud Rd, and McCullers Rd with multi-lane roundabouts.

The first intersection, SR 20 & Centerhill Church Rd, also proposes removing direct access to SR 20 by realigning Moon Rd with Centerhill Church Rd approximately 450-ft east of the proposed roundabout of SR 20 and Centerhill Church Rd. The existing alignment of Moon Rd is being proposed to remain in place with the addition of a cul-de-sac to maintain access to Center Hill Baptist Church & Cemetery. The realignment of Moon Rd has been proposed to reduce additional realignment and construction work that would be required along SR 20 to provide adequate roundabout entry angle and speed design.

The second intersection, SR 20 & Centerville Rosebud Rd, proposes the realignment of Centerville Rosebud Rd approximately 650-ft south of the exiting intersection. The roundabout has been proposed in this location based on coordination with adjacent parcel owners and limiting the risk that maybe associated with a displacement of proposing a roundabout closer to the existing intersection.

The third intersection, SR 20 & Centerville Rosebud Rd, proposes removing the offset intersection of McCullers Rd by primarily realigning McCullers Rd located to the northwestern side of SR 20. The existing alignment of McCullers Rd is being proposed to remain in place with the addition of a cul-de-sac to maintain access to two parcels.

Stage II ICE & traffic analysis has determined that a single-lane roundabout would perform operationally for 10 years past the “build year” at which time an additional through by-pass lane would be required along SR 20 for all three intersection locations. Per NCHRP Report 672 and GDOT Policy, it is recommended the roundabouts be constructed and striped as a single-lane roundabout on a footprint that will be required for the ultimate configuration of the multi-lane roundabout. This will provide the most cost-effective method of retrofitting the roundabout to a multi-lane roundabout.

Estimated Property Impacts:	**51 Parcels**	**Estimated Total Cost:**	**$18,255,894**
Estimated ROW Cost:	**$3,836,655***	**Estimated CST Time:**	**18 months**

Rationale: The proposed project aims to reduce congestion while improving the by improving three intersections along the SR 20 corridor. Intersection control evaluation (ICE) analysis has determined that multi-lane roundabouts score the best in addressing congestion associated with intersection delay and overall level of service (LOS). This alternative has proposed adding capacity by providing additional turn lanes & by-pass lanes to help improve traffic flow. These roundabout configurations are projected to reduce intersection delay by up to 95% during peak hour conditions. Traffic projections also show at least one approach at all three intersections having a failing LOS in the design year. This preferred alternative solution improves the LOS for all routes associated with these intersections to not below a LOS B.

In addition to this preferred alternative improving congestion issues associated with intersection delay, proposing multi-lane roundabouts have added benefits of improving existing substandard geometric conditions and reduce crash severity where possible. A multi-lane roundabout will address existing substandard geometric conditions such as intersection spacing, intersection skew angles, and undesirable offset intersections. Roundabouts can also reduce crash severity due to speed reduction along intersection approaches that are associated by roundabout design. This is achieved through geometric design and signing of the roundabouts.

It should also be noted that through the ICE analysis it has been determined that all three of these intersections do not meet signal warrants for 7 to 8 years. Therefore, this alternative provides and immediate solutions this project’s needs.

No-Build Alternative: Make no improvements			
Estimated Property Impacts:	**0 Parcels**	**Estimated Total Cost:**	**$0**
Estimated ROW Cost:	**$0**	**Estimated CST Time:**	**0 months**
Rationale: The three existing intersections along SR 20 suffer from lack of turn lanes along the mainline and substandard intersection skew angles resulting in an increase in crash severity and frequency above average as well as increased congestion for the design year. The closely spaced intersections of Moon Road and Center Hill Church Road as well as SR 20 as well as the offset T-intersection of McCullers and SR 20 also may contribute to the crash history and lead to operational issues. This alternative was not chosen because it does not address the operational or reducing crash severity issues associated with the existing intersections.			

Alternative 1: This alternative proposes the realignment of the intersections along of SR 20 at Centerhill Church Rd, Centerville Rosebud Rd, and McCullers Rd. The realigned intersections of SR 20 / Centerhill Church Rd & SR 20 / Centerville Rosebud are being proposed as signalized intersections with added left & right turn lanes. The intersection of SR 20 and McCullers Rd is being proposed as a single-lane roundabout on a footprint that can be easily retrofitted to a multi-lane roundabout. The roadway realignments of Centerhill Church Rd, Centerville Rosebud Rd, and McCullers Rd are similar in nature to the realignments proposed in the preferred alternative.			
Estimated Property Impacts:	**49 Parcels**	**Estimated Total Cost:**	**$16,514,011**
Estimated ROW Cost:	**$3,320,500***	**Estimated CST Time:**	**18 months**
Rationale: Although these alternative addresses capacity & crash frequency/severity concerns, Stage II ICE determined that the intersection of SR 20 / Centerhill Church Rd & SR 20 / Centerville Rosebud Rd do not meet signal warrants for approximately 7 to 8 years past the build year. Therefore, these proposed signals would have to be left as unsignalized stop controlled intersections that would have to retrofitted to signals for a period of time until which signal warrants are met. This alternative would significantly reduce the capacity of the corridor as well as do little to reduce crash frequency/severity during the 7 to 8-year period. It is for these reasons that this alternative was no selected as the preferred option.			

Alternative 2: Same as the Preferred Alternative, but with a two-way stop-controlled intersection with SR 20 and McCullers Road (realigned to a “plus intersection”).			
Estimated Property Impacts:	**48 Parcels**	**Estimated Total Cost:**	**$16,050,000**
Estimated ROW Cost:	**$3,250,000***	**Estimated CST Time:**	**18 months**
Rationale: This alternative was included as part of the approved concept for PI 142000. The traffic was updated in 2017 and the intersection analysis at SR 20 at McCullers Road shows that a two-way stop-controlled intersection would have a failing level of service, thus not completely satisfying the project justification.			

**Estimated ROW Cost by Designer for all Alternatives*

Comments:

Intersection #1: SR 20 & Center Hill Church Rd

- A retaining wall has been added along Moon Rd to eliminate any impacts to the adjacent cemetery that has since been further developed since the time the aerial photos shown in the concept layouts. In addition, the eroded soils & hazardous waste consideration in this area will be determined after a Soil Report and Phase 1 UST has been obtained.

Intersection #2: SR 20 & Centerville Rosebud Rd

- The previous project (PI 142000) proposed a cul-de-sac along Old Centerville Rosebud Rd. However, there has been extensive coordination with Copart of Connecticut (Parcel #17), who has purchased adjacent parcels along existing alignment of Centerville Rosebud Rd, regarding access. Through this coordination it was determined that this parcel owner does not wish to have access along the existing alignment and why the existing alignment has been demolished and removed.

Intersection #3: SR 20 & McCullers Rd

- After extensive analysis the placement of the roundabout at SR 20 & McCullers was determined to reduce impacts to the greatest number of parcels.

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 Estimate
4. Crash summaries
5. Design Traffic diagrams
6. ICE Reports
    a. Stage 1 Screening Decision Record
    b. Concurrence Memo
    c. Stage 2 Alternative Selection Decision Record
    d. Approved Waiver Request
7. Roundabout Data
    a. Lighting Agreement
    b. Roundabout Performance Checks
    c. Peer Review and Responses
8. MS4 Concept Report Summary
9. Minutes of Concept meetings

APPROVALS

Concur: _____ 4/2/2020
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: 2020.04.04 19:45:02 -04'00' 4/4/2020
Chief Engineer — Date

Gresham Smith

Genuine Ingenuity

ATTACHMENT 1

Concept Layouts

CHARLES L. WHEELER
EXIST R/W
EXIST R/W
JEANNE W. EUBANKS AKA JEANNE W. JONES
2
BEGIN PROJECT
JEANNE W. EUBANKS AKA JEANNE W. JONES
JAMES E. VOWELL
1
ROY R. DAVIS
3
WILLIAM J. & TERESA Y. QUINTON
4
SHARON K. PARIS
5
BENNIE TREECE
6
KERRY H. & REGINA W. ROE
EXIST R/W
EXIST R/W
ESA BOUNDARY
END PROJECT
DWANYE C. & TRICIA T. MOON
ESA BOUNDARY
RED'D R/W
RED'D R/W
EXIST R/W
ESA BOUNDARY
JAMES E. VOWELL
2
EXIST R/W
RED'D R/W
9
CENTER HILL BAPTIST CHURCH. INC.
GLOEAM L. & PATRICIA MOON
CENTER HILL BAPTIST CHURCH. INC.
7
LIMIT OF CONSTRUCTION
OPEN WATER 1aa
RED'D R/W
OLD MOON ROAD
RED'D R/W
8
CENTER HILL BAPTIST CHURCH. INC.
10
ESA BOUNDARY
ESA BOUNDARY
RED'D R/W
RED'D R/W
EXIST R/W
CAROLYN MILLIGAN MOON
11
CENTER HILL BAPTIST CHURCH. INC.
BIOSLOPE
CENTERHILL CHURCH ROAD
MOON ROAD
STIG A.T. & KETHLEEN M. AHLENIUS
48" PIPE
RED'D R/W
JAMES DOUGLAS & REBECCA W. GOWAN
RETAINING WALL
GREGORY J. WARD
LIMIT OF CONSTRUCTION
RED'D R/W
RANDALL ALAN MOON
13
PERENNIAL STREAM 01bb
EXIST R/W
LIMIT OF CONSTRUCTION
BIOSLOPE
LOUIE WAYNE MOON
14
ESA BOUNDARY
EXIST R/W
EXIST R/W
ANTHONY K. MOON
12
EXIST R/W
MOON ROAD

GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY

SR 20 @ 3 INTERSECTIONS

PI# 0016386

CONCEPT DISPLAY LAYOUT
(SHEET 1 OF 3)

Gresham Smith

GDOT
Georgia Department of Transportation

DATE: OCTOBER ,2019

SCALE IN FEET

0 100 200

LEGEND

- PAVED ROADWAY
- DRIVEWAY
- RETAINING WALL
- REQUIRED R/W (RED'D R/W)
- EXISTING R/W LINE AND PROPERTY LINE
- ENVIRONMENTALLY SENSITIVE AREAS
- OBLITERATE AND GRASS
- DRIVEWAY EASEMENT
- REQUIRED EASEMENT
- SIGNAL

VIRGINIA E. DOSS ESTATE

DONALD W. KING ESTATE
27

LIMIT OF CONSTRUCTION

HANNAH G. MITCHELL
26

EXIST R/W

COPART OF CONNECTICUT, INC

EXISTING CENTERVILLE ROSEBUD RD TO BE OBLITERATED AND REMOVED

BOBBY J. MCCARTHY
25

JEREMY A. & KIMBERLY HARTZOG
24

23
HANNAH G. MITCHELL

COPART OF CONNECTICUT, INC

COPART OF CONNECTICUT, INC

COPART OF CONNECTICUT, INC.
17

CENTERVILLE ROSEBUD ROAD

REQ'D R/W

EXIST R/W

16
HANNAH G. MITCHELL

50
DIDIER A. MADISON & ANDREA WILLIETTE MADISON

15
CLYDE & SARA B. MIDDLEBROOKS

51
FIZCO LIMITED

REQ'D R/W

EXIST R/W

19
JEFFREY SCOTT MITCHELL

MICHAEL H. TURNER

45
MICHAEL H. TURNER

18

47
MICHAEL S. TURNER

EXIST R/W

BEGIN PROJECT

48
MICHAEL H. TURNER

49
JOHN W. & TONI R. STRAUT

EXIST 60' DRIVEWAY EASEMENT

SOUTHEASTERN PAVING & GRADING, INC.
20

21
SOUTHEASTERN PAVING & GRADING, INC.

REQ'D R/W

EXIST R/W

END PROJECT

22
FIREWATER LLC

GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY

SR 20 @ 3 INTERSECTIONS

PI# 0016386

CONCEPT DISPLAY LAYOUT
(SHEET 2 OF 3)

Gresham Smith

GDOT
Georgia Department of Transportation

DATE: October 2019

SCALE IN FEET
0 100 200

LEGEND

PAVED ROADWAY	
DRIVEWAY	
RETAINING WALL	
REQUIRED R/W	REQ'D R/W
EXISTING R/W LINE AND PROPERTY LINE	
ENVIRONMENTALLY SENSITIVE AREAS	
OBLITERATE AND GRASS	
DRIVEWAY EASEMENT	
REQUIRED EASEMENT	
SIGNAL	

BEGIN PROJECT

ALAN BENTLEY

WYERS BROTHERS

29 YOUSEF SEHA

LANGE COURT

27 C&G CARE WHISPERS

ROE BUSINESS PARK

WIRIAN SUE BIGGERS

30 JAN SMITH ROE

POINTER ROAD

31 RANDY A. & VICKIE A. COOPER

46 ALAN BENTLEY

DETENTION POND

36 EVELYN E. BENTLEY

35 EVELYN E. BENTLEY

REQ'D R/W

REQ'D R/W

REQ'D R/W

REQ'D R/W

REQ'D R/W

REQ'D R/W

37 GROVER F. & BETTY J. DAY

LIMIT OF CONSTRUCTION

McCULLERS ROAD

44 KENNETH H. SMITH

EXISTING McCULLERS RD TO BE OBLITERATED AND REMOVED

43 OLIVER E. AVARITT

EVELYN E. BENTLEY

38 SUSAN W. ATHA

DETENTION POND

32 MARILYN JOHNSON MCNAIR

LIMIT OF CONSTRUCTION

34 SIASIM LOGANVILLE LLC

39 MYRINA ENTERPRISES

40 SARAH L. TOWNSEND

ASOUD ALI POHLEL

41

END PROJECT

KEITH E. CLAY

33 LISA L. MCNAIR HARGROVE

McCULLERS ROAD

CATHY G. & BRYAN C. NORRIS

42 EBC PROPERTIES

LOUISE S. BRYAN

JAMES MATTHEEW WAZZAWI

20

20

GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY

SR 20 @ 3 INTERSECTIONS

PI# 0016386

CONCEPT DISPLAY LAYOUT
(SHEET 3 OF 3)

Gresham Smith

DATE: JULY 10,2019

SCALE IN FEET

0 100 200

LEGEND

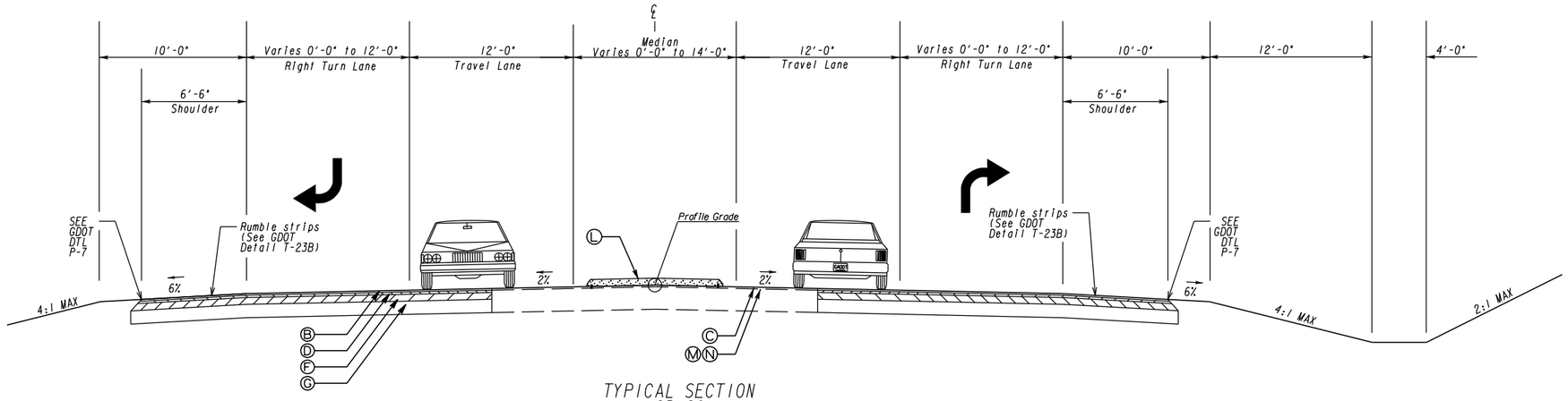
- PAVED ROADWAY
- DRIVEWAY
- RETAINING WALL
- REQUIRED R/W — REQ'D R/W
- EXISTING R/W LINE AND PROPERTY LINE
- ENVIRONMENTALLY SENSITIVE AREAS
- OBLITERATE AND GRASS
- DRIVEWAY EASEMENT
- REQUIRED EASEMENT
- SIGNAL

Gresham Smith

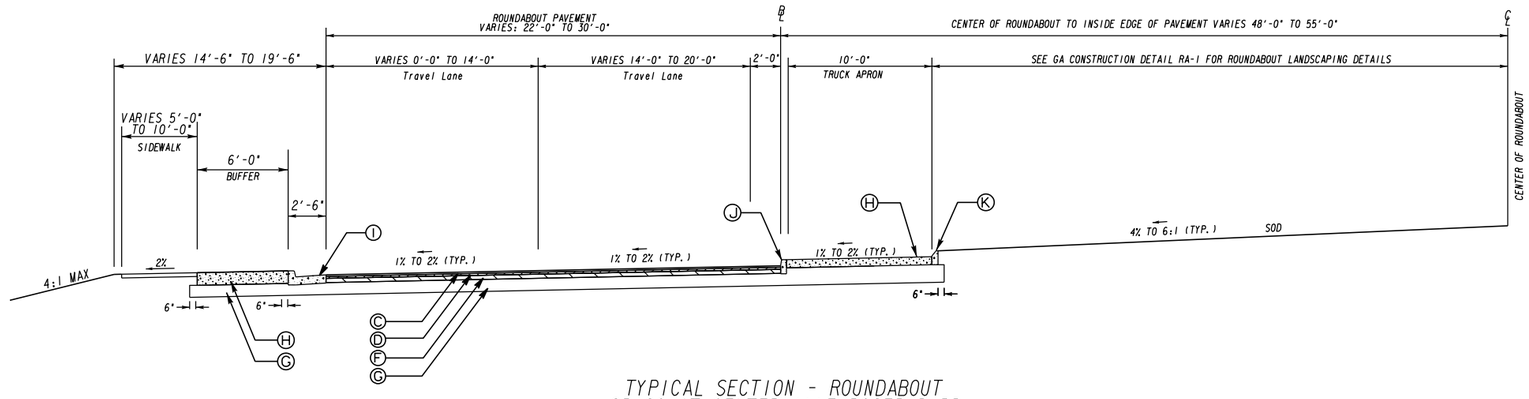
Genuine Ingenuity

ATTACHMENT 2

Typical Sections



TYPICAL SECTION
SR-20
DS = 55 MPH (POSTED 45 TO 55 MPH)



TYPICAL SECTION - ROUNDABOUT
SR-20 AT CENTERVILLE ROSEBUD RD
SR-20 AT CENTERHILL CHURCH RD
DS - 30 MPH

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ. YD.)

Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)

Ⓒ RECYCLED ASPH CONC 12.5 MM SUPERPAVE W/ POLYMER MODIFIED AC, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)

Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)

Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)

Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ. YD.)

Ⓖ GR AGGR BASE CRS, 10 INCH, INCL MATL

Ⓗ PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK

Ⓘ CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2

Ⓙ CONCRETE HEADER CURB, 4 IN, TP 9

Ⓚ CONCRETE HEADER CURB, 6 IN, TP 7

Ⓛ CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE

Ⓜ RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)

Ⓝ MILL ASPH CONC PVMT (VARIABLE DEPTH)

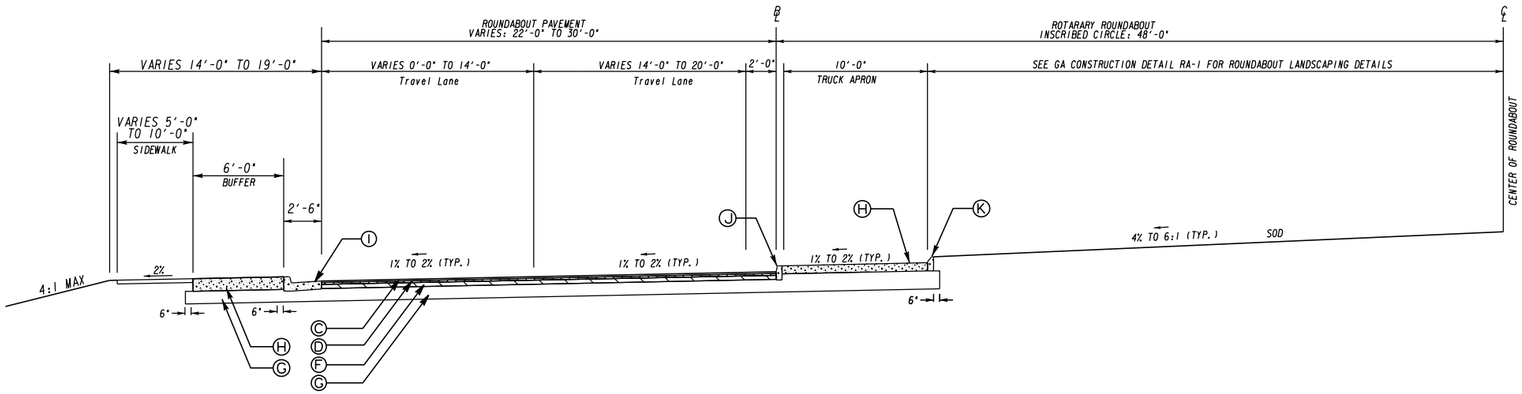
N. T. S

REVISION DATES

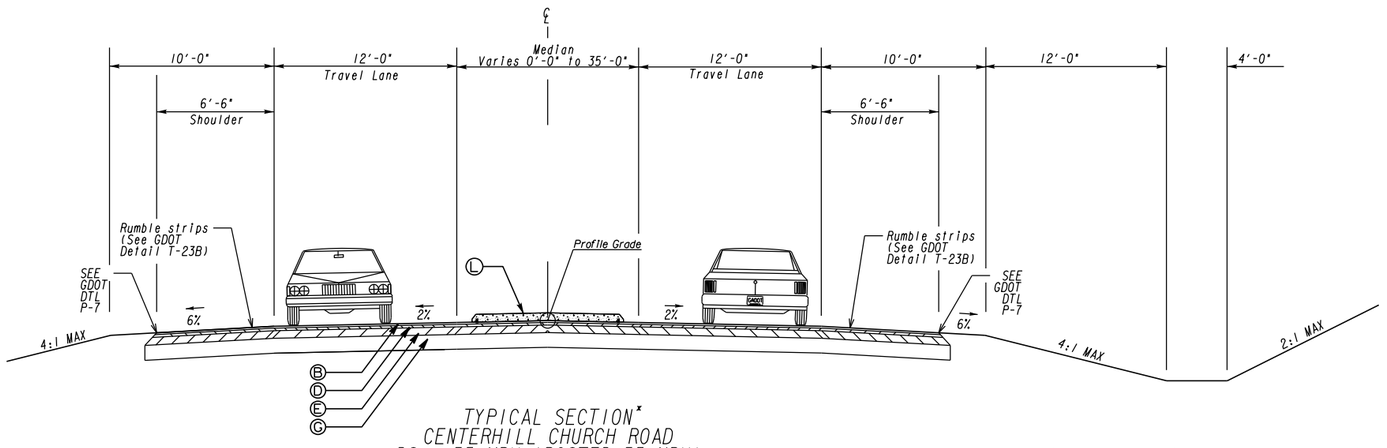
TYPICAL SECTIONS
SR 20 @ 3 LOCATIONS
PREFERRED ALTERNATIVE

		DATE:	
CHECKED:			
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

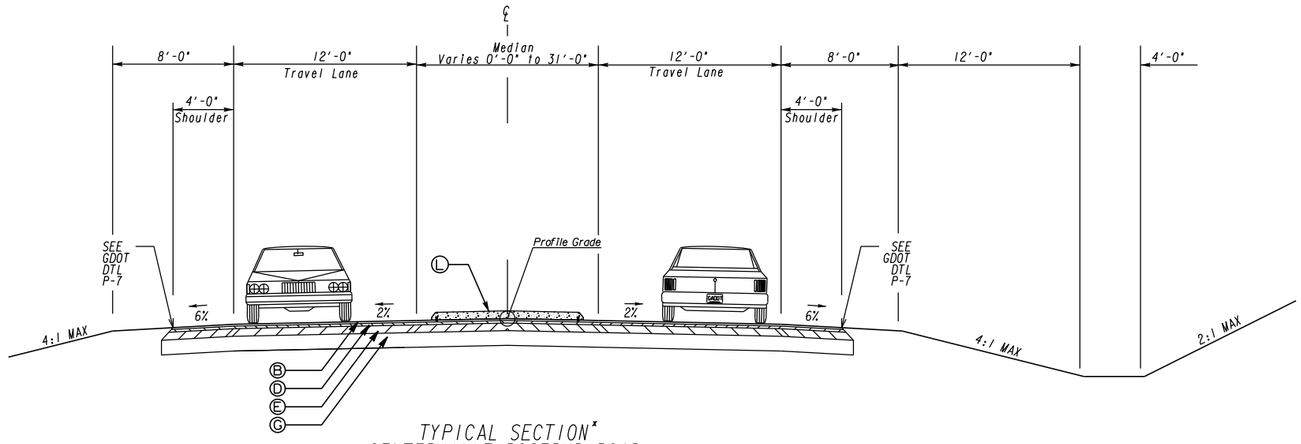
DRAWING No. 05-0001



TYPICAL SECTION - ROUNDABOUT
SR-20 AT MCCULLERS ROAD
DS - 30 MPH



TYPICAL SECTION[x]
CENTERHILL CHURCH ROAD
DS = 55 MPH (POSTED 55 MPH)



TYPICAL SECTION[x]
CENTERVILLE ROSEBUD ROAD
(DS=45 MPH)

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ. YD.)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- Ⓒ RECYCLED ASPH CONC 12.5 MM SUPERPAVE W/ POLYMER MODIFIED AC, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ. YD.)
- Ⓖ GR AGGR BASE CRS, 10 INCH, INCL MATL
- Ⓗ PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK
- Ⓘ CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2
- Ⓙ CONCRETE HEADER CURB, 4 IN, TP 9
- Ⓚ CONCRETE HEADER CURB, 6 IN, TP 7
- Ⓛ CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE
- Ⓜ RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)
- Ⓝ MILL ASPH CONC PVMT (VARIABLE DEPTH)

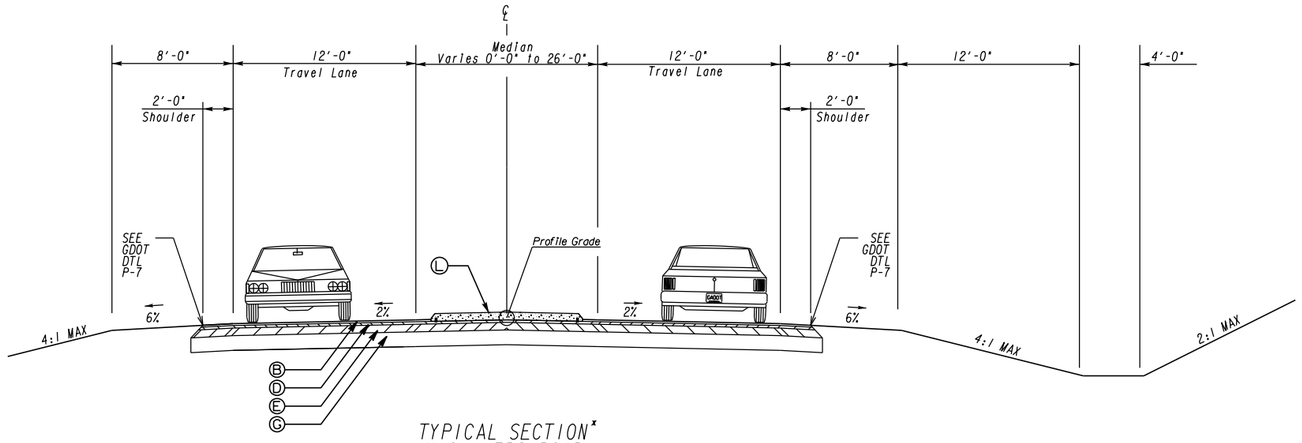
[x] TYPICAL SECTION SHOWN ARE INTENDED TO SHOW LANE CONFIGURATION & FULL DEPTH PAVEMENT TYPE SELECTION ONLY. MILL & LEVELING WILL BE IMPLEMENTED IN AREAS WHERE THE PROPOSED ALIGNMENT FOLLOWS OR TIES BACK INTO THE EXISTING ALIGNMENT.

N. T. S

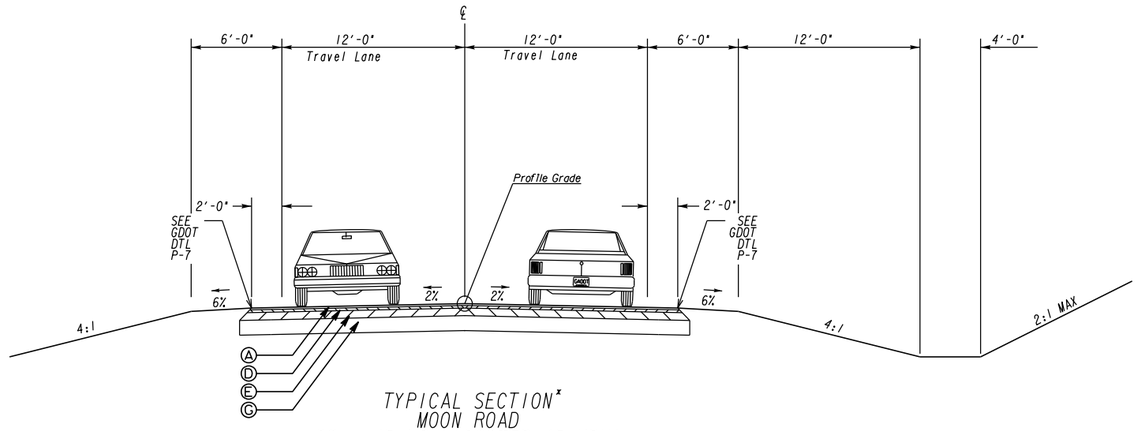
REVISION DATES

TYPICAL SECTIONS
SR 20 @ 3 LOCATIONS
PREFERRED ALTERNATIVE

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



TYPICAL SECTION[x]
McCULLERS ROAD
(DS=35 MPH TO 45 MPH)



TYPICAL SECTION[x]
MOON ROAD
DS = 45 MPH (POSTED 45 MPH)

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE 11.BLEND 1, INCL BITUM MATL & H LIME (135 LB/SQ. YD.)

Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)

Ⓒ RECYCLED ASPH CONC 12.5 MM SUPERPAVE W/ POLYMER MODIFIED AC, INCL BITUM MATL & H LIME (165 LB/SQ. YD.)

Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ. YD.)

Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/ SQ. YD.)

Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ. YD.)

Ⓖ GR AGGR BASE CRS, 10 INCH, INCL MATL

Ⓗ PLAIN PC CONC PVMT (STAMPED), CL 3 CONC, 10 IN THK

Ⓘ CONCRETE CURB & GUTTER - 8 IN X 30 IN, TP 2

Ⓙ CONCRETE HEADER CURB, 4 IN, TP 9

Ⓚ CONCRETE HEADER CURB, 6 IN, TP 7

Ⓛ CONCRETE MEDIAN (INTEGRAL) WITH TIE BARS, 6 IN, TP 7 CURB FACE

Ⓜ RECYCLED ASPH CONC LEVELING, INC BITUM MATL & H LIME (VARIABLE DEPTH)

Ⓝ MILL ASPH CONC PVMT (VARIABLE DEPTH)

[x] TYPICAL SECTION SHOWN ARE INTENDED TO SHOW LANE CONFIGURATION & FULL DEPTH PAVEMENT TYPE SELECTION ONLY. MILL & LEVELING WILL BE IMPLEMENTED IN AREAS WHERE THE PROPOSED ALIGNMENT FOLLOWS OR TIES BACK INTO THE EXISTING ALIGNMENT.

N.T.S

REVISION DATES

TYPICAL SECTIONS

SR 20 @ 3 LOCATIONS

PREFERRED ALTERNATIVE

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

Gresham Smith
Genuine Ingenuity

ATTACHMENT 3

Detailed Cost Estimate

a. Construction including Engineering and Inspection Contingencies

b. Revisions to Programmed Cost forms, & Liquid AC Cost Adjustment Forms

c. Right-of-Way
(This attachment is currently being updated by GDOT Office of ROW and will be provided upon receipt of updated ROW Cost Estimate)

d. Utilities

e. Utility Concept Report

f. Environmental Mitigation Cost Estimate

Georgia Department of Transportation

Interoffice Memo

FILE

PI NUMBER	0016386	PROJECT DESCRIPTION	SR 20 @ 3 Locs in Walton County
OFFICE	Program Delivery		
DATE	Thursday, February 20, 2020		

From: Kimberly W. Nesbitt, State Program Delivery Administrator

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:	4/15/2022
Management Right of Way Date:	7/15/2020

Cost Estimate Review Iteration

Date of Submittal #1	
Date of Submittal #2	
Date of Submittal #3	

Summary of Programmed Costs and Proposed Revised Costs:

Estimate Type	Cost Estimate Amounts (T-Pro Without Inflation)	Last Estimate Date	Revised Cost Estimate
CONSTRUCTION			$10,974,226.01
RIGHT OF WAY			$3,549,000.00
UTILITIES			$3,445,013.25

Explanation for Cost Change and Contingency Justification:

20% Contingency is appropriate for intersection reconstruction during concept phase. Original programmed cost assumed signalized and stop controlled intersection configurations. The increased construction cost of approximately 20% arose from Stage II ICE analysis that indicated roundabout be used in lieu of signalized intersections.

Attachments:

CST, ROW, and UTL cost estimates

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, P.E.
Title:	Designer
Signature:	
Date:	20-Feb-20

FOR PROJECTS WITH A LOCAL SPONSOR	
If the project has a local sponsor, the project manager should ensure that the local authority completes the following validation indicating that it has reviewed the construction cost estimate and whether it is in concurrence with the construction costs presented.	
Please select the appropriate validation below upon review of the cost estimate: ☐ I acknowledge that I have reviewed the project construction cost estimate and concur with the costs presented. ☐ I acknowledge that I have reviewed the project construction cost estimate but do not concur with the costs presented.	
Please provide an explanation for non-concurrence.	
Local Authority Name and Title:	
Local Authority Signature:	
Date:	

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**	$ 8,416,562.74
ENGINEERING AND INSPECTION (The default E&I percentage is 5.0%, but may be adjusted per project scope.) →	**D**	$ 420,828.14

Construction Cost	E&I Percentage	E&I Cost
B	C	D = B x C
$ 8,416,562.74	5%	$ 420,828.14

CONTINGENCY (Refer to the Risk and Contingencies Table included in GDOT Policy 3A-9 Cost Estimating Purpose) →	**I**	$ 1,767,478.18

Construction Cost	E&I Cost	Construction + E&I	Contingency Percentage	Contingency Cost
E	F	G = E + F	H	I = G x H
$ 8,416,562.74	$ 420,828.14	$ 8,837,390.88	20%	$ 1,767,478.18

ASPHALT FUEL PRICE ADJUSTMENT (Leave blank if not applicable) →	**Q**	$ 369,356.95

Date	Feb 2020
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		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)
	Description	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	316.00 TN	5.00%	15.80 TN	1231.19 TN	$500.00/ TON	60%	$ 800.00	$ 369,356.95
	Patching	835.00 TN	5.00%	41.75 TN					
	9.5 mm SP								
	12.5 OGFC								
	12.5 PEM								
	12.5 mm SP	4283.00 TN	5.00%	214.15 TN					
	19 mm SP	6805.00 TN	5.00%	340.25 TN					
	25 mm SP	11288.00 TN	5.00%	564.40 TN					

Bituminous Tack Coat		Tack Coat	GL/TN	Tons
	Description	R	S	T = R/S
	Tack Coat	12768.00 GL	232.8234 GL/TN	54.84 TN

Bituminous Tack Coat (Surface Treatment)		SY	GL/SY	TN
	Description	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**	$ 10,974,226.01
RIGHT OF WAY COST →	**Y**	$ 3,549,000.00
UTILITIES COST (Provided by Utility Office) →	**Z = Sum of Reimbursable Costs**	$ 3,445,013.25

Utility Owner	Reimbursable Cost	Utility Owner	Reimbursable Cost
AT&T Telephone (Local)	$ 1,679,359.50		
City of Lawrenceville Gas	$ 1,653.75		
Walton EMC	$ 1,764,000.00		

Detailed Cost Estimate

Job ID: 0016386

Detailed Cost Estimate

Time Processed: Feb-21-2020 12:44:43 PM

JOB NUMBER: 0016386
FED/STATE PROJECT NUMBER:
SPEC YEAR: 13
ITEM HISTORY: ALL_2018Q3_24MO
DESCRIPTION: SR 20 @ THREE INTERSECTIONS
ASSIGNED CONTROL GROUP: GRESHAM SMITH AND PARTNERS CONSULTANTS

ITEMS FOR JOB 0016386

-

Line Number	Item	Quantity	Units	Price	Description	Amount
0005	150-1000	1.00	LS	$650,000.00000	TRAFFIC CONTROL - PI 0016386 - PH 1	$650,000.00
0009	632-0003	10.00	EA	$8,728.96052	CHANGEABLE MESS SIGN,PORT,TP 3	$87,289.61
0010	153-1300	1.00	EA	$90,202.19984	FIELD ENGINEERS OFFICE TP 3	$90,202.20
0015	156-0100	1.00	LS	$97,763.39000	GPS DATA COLLECTION & SUBMITTAL	$97,763.39
0016	210-0100	1.00	LS	$1,300,000.00000	GRADING COMPLETE - PI 0016386 - PH 1	$1,300,000.00
0018	005-0002	1.00	LS	$675,000.00000	INSTALL/LIGHTING FACILITIES (3) LIGHTING FACILITIES @ $225K EA	$675,000.00
0025	402-3102	835.00	TN	$114.43088	REC AC 9.5 MM SP,TPII, BL 1 INCL BM & HL	$95,549.78
0030	402-3130	3125.00	TN	$88.35130	RECYL AC 12.5MM SP,GP2,BM&HL	$276,097.81
0035	402-4510	1158.00	TN	$98.52297	RECYL AC 12.5 MM SP,GP2ONLY,INC P-MBM&HL	$114,089.60
0040	402-3190	6805.00	TN	$76.64308	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	$521,556.16
0045	402-3121	11288.00	TN	$72.77372	RECYL AC 25MM SP,GP1/2,BM&HL	$821,469.75
0050	402-1812	316.00	TN	$107.95963	RECYL AC LEVELING,INC BM&HL	$34,115.24
0055	432-5010	17865.00	SY	$3.18097	MILL ASPH CONC PVMT,VARB DEPTH	$56,828.03
0059	310-1101	25625.00	TN	$26.38483	GR AGGR BASE CRS, INCL MATL	$676,111.27
0063	441-0016	1431.00	SY	$43.93410	DRIVEWAY CONCRETE, 6 IN TK	$62,869.70
0064	318-3000	483.00	TN	$29.41665	AGGR SURF CRS	$14,208.24
0065	413-0750	12768.00	GL	$2.84000	TACK COAT	$36,261.12
0070	430-0200	1010.00	SY	$131.50000	PLN PC CONC PVMT/CL1C/ 10 TK	$132,815.00
0073	430-0180	634.00	SY	$115.00000	PLN PC CONC PVMT/CL1C/ 8 TK	$72,910.00
0074	429-1000	24.00	EA	$820.42407	RUMBLE STRIPS	$19,690.18
0075	441-6222	7415.00	LF	$18.52754	CONC CURB & GUTTER/ 8X30TP2	$137,381.71
0080	441-5008	750.00	LF	$14.35281	CONC HEADER CURB, 6 IN, TP 7	$10,764.61
0085	441-5025	940.00	LF	$18.34000	CONC HEADER CURB, 4, TP 9	$17,239.60
0090	441-0748	3225.00	SY	$44.27966	CONC MEDIAN, 6 IN	$142,801.90
0095	641-1200	1589.00	LF	$21.25713	GUARDRAIL, TP W	$33,777.58
0100	641-5001	8.00	EA	$1,102.57502	GUARDRAIL ANCHORAGE, TP 1	$8,820.60
0105	641-5015	5.00	EACH	$3,535.59000	GUARDRL ANCHOR, TP 12A, 31 IN, TANG, E/A	$17,677.95
0106	621-6210	150.00	LF	$600.00000	CONC SIDE BARRIER, TP 6-S	$90,000.00
0109	621-6211	50.00	LF	$700.00000	CONC SIDE BARRIER, TP 6-SA	$35,000.00
0110	446-1100	10617.54	LF	$4.87383	PVMT REF FAB STRIPS, TP2,18 INCH WIDTH	$51,748.08
0115	456-2015	3.90	GLM	$1,781.07282	INDENT. RUMB. STRIPS - GRND-IN-PL (SKIP)	$6,946.18
0120	653-0120	58.00	EA	$76.60429	THERM PVMT MARK, ARROW, TP 2	$4,443.05
0125	653-0210	6.00	EA	$150.85485	THERM PVMT MARK, WORD , TP 1	$905.13
0130	653-1804	1750.00	LF	$2.26587	THERM SOLID TRAF STRIPE, 8,WH	$3,965.27
0135	653-1704	484.00	LF	$6.87856	THERM SOLID TRAF STRIPE,24,WH	$3,329.22
0140	653-2501	6.00	LM	$2,225.43526	THERMO SOLID TRAF ST, 5 IN, WH	$13,352.61
0145	653-2502	6.00	LM	$2,201.04976	THERMO SOLID TRAF ST, 5 IN YE	$13,206.30
0150	653-3501	2676.00	GLF	$0.36516	THERMO SKIP TRAF ST, 5 IN, WHI	$977.17
0155	653-3502	1816.00	GLF	$0.33527	THERMO SKIP TRAF ST, 5 IN, YEL	$608.85
0160	653-6004	68.00	SY	$5.16123	THERM TRAF STRIPING, WHITE	$350.96
0165	653-6006	1981.00	SY	$4.28653	THERM TRAF STRIPING, YELLOW	$8,491.62
0170	654-1001	792.00	EA	$3.85864	RAISED PVMT MARKERS TP 1	$3,056.04
0175	654-1003	210.00	EA	$4.24615	RAISED PVMT MARKERS TP 3	$891.69
0180	441-0108	1585.00	SY	$62.56014	CONC SIDEWALK, 8 IN	$99,157.82
0185	643-1152	1276.00	LF	$24.98544	CH LK FEN,ZC COAT, 6', 9 GA	$31,881.42
0190	643-8010	1.00	EA	$1,145.25323	GATE, CHAIN LINK ZC COAT - PI 0016386 - PH 1	$1,145.25
0195	441-0303	2.00	EA	$2,299.50200	CONC SPILLWAY, TP 3	$4,599.00
0200	550-1180	2043.00	LF	$46.46769	STM DR PIPE 18,H 1-10	$94,933.49
0205	550-1240	905.00	LF	$56.40023	STM DR PIPE 24,H 1-10	$51,042.21
0210	550-1300	730.00	LF	$68.52089	STM DR PIPE 30,H 1-10	$50,020.25
0215	550-1360	610.00	LF	$80.91576	STM DR PIPE 36,H 1-10	$49,358.61

Line Number	Item	Quantity	Units	Price	Description	Amount
0220	550-2180	1308.00	LF	$34.87246	SIDE DR PIPE 18,H 1-10	$45,613.18
0225	550-2300	33.00	LF	$67.14176	SIDE DR PIPE 30,H 1-10	$2,215.68
0230	550-3518	2.00	EA	$727.15246	SAFETY END SECTION 18,STD,6:1	$1,454.30
0235	550-3524	1.00	EA	$968.02301	SAFETY END SECTION 24,STD,6:1	$968.02
0240	550-3530	1.00	EA	$1,430.00000	SAFETY END SECTION 30,STD,6:1	$1,430.00
0245	550-3618	50.00	EA	$538.16987	SAFETY END SECTION 18,SD,6:1	$26,908.49
0250	550-3630	2.00	EA	$2,366.19000	SAFETY END SECTION 30,SD,6:1	$4,732.38
0255	550-4218	17.00	EA	$637.12938	FLARED END SECT 18 IN, ST DR	$10,831.20
0260	550-4224	6.00	EA	$815.75674	FLARED END SECT 24 IN, ST DR	$4,894.54
0265	550-4230	8.00	EA	$975.84039	FLARED END SECT 30 IN, ST DR	$7,806.72
0270	550-4236	6.00	EA	$1,291.22519	FLARED END SECT 36 IN, ST DR	$7,747.35
0275	603-2181	718.00	SY	$45.91209	STN DUMPED RIP RAP, TP 3, 18	$32,964.88
0280	603-7000	718.00	SY	$4.20338	PLASTIC FILTER FABRIC	$3,018.03
0285	668-2100	20.00	EA	$2,524.00109	DROP INLET, GP 1	$50,480.02
0290	668-2110	6.00	LF	$253.42610	DROP INLET, GP 1, ADDL DEPTH	$1,520.56
0295	668-2105	4.00	EA	$3,856.70000	DROP INLET, GP 1, SPCL DES	$15,426.80
0296	668-1100	24.00	EA	$3,213.14564	CATCH BASIN, GP 1	$77,115.50
0299	668-4300	10.00	EA	$2,331.23157	STORM SEW MANHOLE, TP 1	$23,312.32
0300	634-1200	181.00	EA	$111.02730	RIGHT OF WAY MARKERS	$20,095.94
0305	636-1033	615.00	SF	$15.07723	HWY SIGNS, TP1MAT,REFL SH TP 9	$9,272.50
0310	636-1036	1252.00	SF	$21.99000	HWY SGN,TP1MAT,REFL SH TP 11	$27,531.48
0315	636-2070	1963.00	LF	$7.59088	GALV STEEL POSTS, TP 7	$14,900.90
0320	636-2090	300.00	LF	$7.26578	GALV STEEL POSTS, TP 9	$2,179.73
0330	163-0232	18.00	AC	$417.91719	TEMPORARY GRASSING	$7,522.51
0335	163-0240	622.00	TN	$157.92117	MULCH	$98,226.97
0340	163-0300	6.00	EA	$1,821.15780	CONSTRUCTION EXIT	$10,926.95
0345	163-0501	3.00	EA	$792.25000	CONSTR AND REMOVE SILT CONTROL GATE,TP 1	$2,376.75
0350	163-0503	3.00	EA	$490.74916	CONSTR AND REMOVE SILT CONTROL GATE,TP 3	$1,472.25
0355	163-0520	100.00	LF	$18.69327	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN	$1,869.33
0360	163-0527	25.00	EA	$429.83357	CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG	$10,745.84
0365	163-0528	1200.00	LF	$9.93257	CONSTR AND REM FAB CK DAM -TP C SLT FN	$11,919.08
0370	163-0531	3.00	EA	$18,738.18623	CONSTR & REM SEDIMENT BASIN,TP 1,STA NO- PI 0016386 - PH 1	$56,214.56
0375	163-0539	3.00	EA	$1,528.85000	CONST AND REM RETROFIT-SL BD DM/W STN FL	$4,586.55
0380	163-0541	15.00	EA	$892.38974	CONSTR & REM ROCK FILTER DAMS	$13,385.85
0385	163-0550	6.00	EA	$192.02456	CONS & REM INLET SEDIMENT TRAP	$1,152.15
0390	165-0010	8923.00	LF	$0.56628	MAINT OF TEMP SILT FENCE, TP A	$5,052.92
0395	165-0030	9290.00	LF	$0.62547	MAINT OF TEMP SILT FENCE, TP C	$5,810.62
0400	165-0041	1600.00	LF	$3.59814	MAINT OF CHECK DAMS - ALL TYPES	$5,757.02
0405	165-0060	3.00	EA	$3,691.51821	MAINT OF TEMP SEDIMENT BASIN,STA NO -	$11,074.55
0410	165-0085	3.00	EA	$100.87000	MAINT OF SILT CONTROL GATE, TP 1	$302.61
0415	165-0087	3.00	EA	$137.74972	MAINT OF SILT CONTROL GATE, TP 3	$413.25
0420	165-0096	3.00	EA	$983.28000	MAINT OF RETROFIT-SLOT BD DAM/W ST FLT	$2,949.84
0425	165-0101	6.00	EA	$681.59239	MAINT OF CONST EXIT	$4,089.55
0430	165-0105	6.00	EA	$77.17882	MAINT OF INLET SEDIMENT TRAP	$463.07
0435	165-0110	15.00	EA	$255.83302	MAINT OF ROCK FILTER DAM	$3,837.50
0440	167-1000	6.00	EA	$250.67300	WATER QUALITY MONITORING AND SAMPLING	$1,504.04
0445	167-1500	18.00	MO	$561.74892	WATER QUALITY INSPECTIONS	$10,111.48
0450	171-0010	17845.00	LF	$2.19142	TEMPORARY SILT FENCE, TYPE A	$39,105.89
0455	171-0030	18580.00	LF	$3.23568	TEMPORARY SILT FENCE, TYPE C	$60,118.93
0460	207-0203	17.50	CY	$63.53420	FOUND BKFILL MATL, TP II	$1,111.85
0464	620-0100	1800.00	LF	$32.58806	TEMP BARRIER, METHOD NO. 1	$58,658.51
0465	643-8200	800.00	LF	$2.24961	BARRIER FENCE (ORANGE), 4 FT	$1,799.69
0466	700-9300	262.00	SY	$9.97338	SOD	$2,613.03
0467	702-0212	9.00	EA	$545.75386	CRATAEGUS VIRIDIS - ROUNDABOUT LANDSCAPING	$4,911.78
0468	702-0470	396.00	EA	$25.99015	ILEX VOMITORIA NANA - ROUNDABOUT LANDSCAPING	$10,292.10
0469	702-9005	249.00	LB	$6.10707	SPRING APPLICATION FERTILIZER	$1,520.66
0470	702-9025	530.00	SY	$7.50668	LANDSCAPE MULCH	$3,978.54
0471	700-6910	36.00	AC	$383.82184	PERMANENT GRASSING	$13,817.59
0475	700-7000	108.00	TN	$9.67975	AGRICULTURAL LIME	$1,045.41
0480	700-8000	25.00	TN	$574.71705	FERTILIZER MIXED GRADE	$14,367.93
0485	700-8100	1800.00	LB	$2.32226	FERTILIZER NITROGEN CONTENT	$4,180.07
0490	711-0100	18202.00	SY	$5.48000	TURF REINFORCING MATTING, TP 1	$99,746.96
0495	713-0400	15000.00	SY	$4.18000	COCONUT FIBER BLKT, SLOPES	$62,700.00
0500	716-2000	15000.00	SY	$1.02000	EROSION CONTROL MATS, SLOPES	$15,300.00
0501	169-0010	3.00	EA	$11,162.20000	BIOSLOPE, NO. -	$33,486.60
0502	169-0011	3.00	EA	$693.35000	BIOSLOPE MAINTENANCE	$2,080.05

Line Number	Item	Quantity	Units	Price	Description	Amount
0503	169-0005	2.00	EA	$234,833.07000	BIORETENTION BASIN, NO. -	$469,666.14
0504	169-0006	2.00	EA	$14,587.00000	BIORETENTION BASIN MAINTENANCE	$29,174.00
Total						**$8,416,562.74**

TOTALS FOR JOB 0016386

ITEMS COST:	$8,416,562.74
COST GROUP COST:	$0.00
ESTIMATED COST:	$8,416,562.74
CONTINGENCY PERCENT:	0.00%
ENGINEERING AND INSPECTION:	0.00%
ESTIMATED COST WITH CONTINGENCY AND E&I:	$8,416,562.74

File Location: Div of Preconstruction > CES

GEORGIA DEPARTMENT OF TRANSPORTATION

** PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 10/29/2019 Project: Operational Improvement

Revised: County: Walton

PI: 0016386

Description: SR 20 @ CenterHill Church Road; SR 20 @ Centerville Rosebud Road and SR 20 @ McCullers Dr.

Project Termini:

Existing ROW: Varies

Parcels: 51 Required ROW: Varies

Land and Improvements		$2,744,960.58
Proximity Damage	$102,000.00	
Consequential Damage	$98,076.92	
Cost to Cures	$215,769.23	
Trade Fixtures	$129,461.54	
Improvements	$19,615.38	
Valuation Services		$333,461.54
Legal Services		$328,655.77
Relocation		$0.00
Demolition		$0.00
Administrative		$429,576.92
TOTAL ESTIMATED COSTS		$3,836,654.81
TOTAL ESTIMATED COSTS (ROUNDED)		$3,836,655.00

Prepared By: Joel Jones CG#: N/A 10/29/2019

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**
County **Walton**
P.I.# **0016386**

Office: **GAINESVILLE**
Date: **February 14, 2019**

Description: ***SR 20 @ 3 LOCS in Walton County***

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-Reimbursable	Estimate Based on
AT & T Telephone (Local)		$1,679,359.50	$1,060,195.50	Site Visit / Available Drawings
Atlanta Gas Light		$0.00	$35,910.00	Site Visit / Available Drawings
City of Lawerceville-Gas	**	$1,653.75	$698,349.75	Site Visit / Available Drawings
City of Loganville-Sewer	**	$0.00	$0.00	Site Visit / Available Drawings
City of Loganville-Water	**	$0.00	$0.00	Site Visit / Available Drawings
City of Monroe (Fiber)	**	$0.00	$0.00	Site Visit / Available Drawings
Geaorgia Power Distribution		$0.00	$0.00	Site Visit / Available Drawings
Gwinnett County Public Utilities	**	$0.00	$0.00	Site Visit / Available Drawings
Walton County Water Authority	**	$0.00	$1,055,722.50	Site Visit / Available Drawings
Walton EMC		$1,764,000.00	$0.00	Site Visit / Available Drawings
Zayo Fiber Solutions		$0.00	$11,340.00	
Total	100.00%	$3,445,013.25	$2,861,517.75	
Department Responsibility	100.00%	$3,445,013.25		
Local Sponsor Responsibility	0.00%	$0.00		PFA Dated N/A with N/A

** Indicates Potential Utility Aid Request from Local Gov't

Estimate is based on the best available information at the current stage, unforeseen prior rights information may be provided by the Utility Company at a later date that could cause some non-reimbursable costs to shift to the reimbursable cost column.

If additional information is needed, please contact Robby Oliver at 770-533-8320.

cc: Patrick Allen, State Utilities Administrator
Yulonda Pride-Foster, State Utilities Preconstruction Manager
Brandon Kirby, District Preconstruction Engineer
Shannon Giles, Area Manager
File

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

Concept Utility Report

Project Number: Click here to enter text.

District: 1-Gainesville

County: Walton

Prepared by: Terri Holbrook

P.I. # 0016386

Date: 06/05/2019

Project Description: SR 20 @ 3 Locations

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? No

Level: ☐A ☐B ☐C ☐D

Public Interest Determination (PID):

~OB

☐Automatic ☐Mandatory ☐Consideration ☒No Use ☐Exempt

Is a separate utility funding phase recommended? No

Potential Project (Schedule/Budget) Impacts: On locations 2 & 3 there are slick sites that need to be avoided.

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

Project Specific Recommendations for Avoidance/Mitigation: On locations 2 & 3 there are slick sites that need to be avoided

Right of Way Coordination: N/A

Environmental Coordination: N/A

Additional Remarks: On Location 1 the project seems to encroach on a cemetary.

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					
City of Lawernceville Gas	Mike Hutchins Mike.hutchins@lawrencevillegaweb.org					
Walton County Water	Morris Jordan morris.jordan@co.walton.ga.us					
Walton EMC	Ron Marshall rmarshall@waltonemc.com					
Gwinnett County Water	Derrick Kemp derrick.kemp@gwinnettcounty.com					
Gwinnett County Sewer	Derrick Kemp derrick.kemp@gwinnettcounty.com					
AGL	Ginny Mauldin-Kinney vmauldin@southernco.com					
City of Loganville sewer	Chris Taylor ctaylor@loganville-ga.gov					
City of Loganville water	Chris Taylor ctaylor@loganville-ga.gov					
City of Monroe Fiber	Brian Thompson bkr@monroega.gov					
Georgia Power Distribution	Galen Davis gdavis@southernco.com					
Zayo	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.

Jones, Joel

From: Westberry, Lisa <lwestberry@dot.ga.gov>
Sent: Tuesday, June 18, 2019 12:27 PM
To: Jones, Joel; Hall, Sharon R
Cc: Jackson, Keisha
Subject: PI 0016386, Walton County - Estimated Mitigation Cost for Concept Report

As requested, the estimated mitigation costs for the subject project is **$18,000.00**. 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

Crash Summary

CRASH SUMMARY

Crash data along SR 20, from west of Center Hill Church Road to east of McCullers Road, was obtained from the Georgia Electronic Accident Reporting System (GEARS) for the period between January 1, 2014 and December 31, 2018. The crash data summarized by severity and by manner of collision is provided in Table 1 and Table 2. The crash rates for this section of SR 20 were calculated and compared to statewide crash averages for urban minor arterials and are shown in Table 1 as well.

A detailed analysis of the crashes was completed to determine the types of crashes along this section of roadway. The number of crashes of each type was summarized to determine crash patterns. As shown in Table 2, there were 164 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" type, which accounted for 43% of the total number of crashes. Approximately 26% of the total number of crashes were "Angle" crashes, 21% were "Single Vehicle" crashes, 6% were "Head-On" crashes, and the remaining 4% were "Sideswipe" crashes.

Table 1. Summary of Traffic Crash History by Severity along SR 20[1]

Year	Crashes			Crashes Per 100 Million Vehicle Miles[2]		
	Total	Injury	Fatal	Total	Injury	Fatal
2014	17	7	0	152 (601)	63 (145)	0.00 (1.21)
2015	31	14	0	277 (637)	125 (156)	0.00 (1.68)
2016	35	12	0	313 (655)	107 (156)	0.00 (1.53)
2017	38	18	0	340 (623)	161 (153)	0.00 (1.35)
2018	43	21	0	385 (--[3])	188 (--[3])	0.00 (--[3])
Total	164	72	0			

Note: 1. The crash data provided is for the section of SR 20 between MP 3.6 to MP 6.1.
2. The number in parentheses represents the statewide average crash rates for urban minor arterials.
3. Statewide average crash rates for 2018 are not yet available.

Table 2. Summary of Traffic Crash History by Manner of Collision along SR 20

Year	Manner of Collision						Total
	Angle	Head On	Rear End	Sideswipe - Same Direction	Sideswipe - Opposite Direction	Not A Collision With Motor Vehicle	
2014	4	1	8	0	0	4	17
2015	13	0	14	0	0	4	31
2016	8	2	13	2	1	9	35
2017	9	4	14	2	1	8	38
2018	9	3	21	1	0	9	43
Total	43	10	70	5	2	34	164
% of Total	26%	6%	43%	3%	1%	21%	

The crash data along this section of SR 20 was also reviewed to determine the number of crashes at each of the three (3) project intersections: SR 20 at Center Hill Church Road, Centerville Rosebud Road, and McCullers Road (North and South). A detailed analysis of the crashes was completed to determine the type of crashes at each intersection.

The crash data for the SR 20 at Center Hill Church Road intersection, summarized by severity and by manner of collision, is provided in Table 3 and Table 4. As shown in Table 3, there were 22 crashes at this intersection over the five year period (2014 - 2018), twelve (12) of which were injury crashes. As shown in Table 4, the majority of these crashes, by manner of collision, were "Single Vehicle" type crashes, accounting for 59% of all crashes reported at the intersection. Approximately 32% of the total number of crashes were "Angle" crashes, 4.5% were "Head-On" crashes, and the remaining 4.5% were "Rear End" crashes. There were no "Sideswipe" crashes reported at this intersection.

Table 3. Summary of Traffic Crash History by Severity at SR 20 and Center Hill Church Road

Year	Severity			Total
	PDO	Injury	Fatal	
2014	2	2	0	4
2015	1	2	0	3
2016	5	1	0	6
2017	2	4	0	6
2018	0	3	0	3
Total	10	12	0	22

Table 4. Summary of Traffic Crash History by Manner of Collision at SR 20 and Center Hill Church Road

	Manner of Collision						
Year	Angle	Head On	Rear End	Sideswipe - Same Direction	Sideswipe - Opposite Direction	Not A Collision With Motor Vehicle	Total
2014	1	1	0	0	0	2	4
2015	3	0	0	0	0	0	3
2016	1	0	0	0	0	5	6
2017	1	0	1	0	0	4	6
2018	1	0	0	0	0	2	3
Total	7	1	1	0	0	13	22
% of Total	32%	4.5%	4.5%	0%	0%	59%	

The crash data for the SR 20 at Center Rosebud Road intersection, summarized by severity and by manner of collision, is provided in Table 5 and Table 6. As shown in Table 5, there were 32 crashes at this intersection over the five year period (2014 - 2018), eleven (11) of which were injury crashes. As shown in Table 6, the majority of these crashes, by manner of collision, were "Angle" type crashes, accounting for 40.5% of all crashes reported at the intersection. Approximately 37.5% of the total number of crashes were "Rear End" crashes, 12.5% were "Single Vehicle" crashes, and the remaining 9.5% were "Head On" crashes. There were no "Sideswipe" crashes reported at this intersection.

Table 5. Summary of Traffic Crash History by Severity at SR 20 and Centerville Rosebud Road

Year	Severity			Total
	PDO	Injury	Fatal	
2014	3	1	0	4
2015	6	4	0	10
2016	4	2	0	6
2017	4	3	0	7
2018	4	1	0	5
Total	21	11	0	32

Table 6. Summary of Traffic Crash History by Manner of Collision at SR 20 and Centerville Rosebud Road

	Manner of Collision						
Year	Angle	Head On	Rear End	Sideswipe - Same Direction	Sideswipe - Opposite Direction	Not A Collision With Motor Vehicle	Total
2014	1	1	2	0	0	0	4
2015	5	0	4	0	0	1	10
2016	2	1	2	0	0	1	6
2017	3	1	3	0	0	0	7
2018	2	0	1	0	0	2	5
Total	13	3	12	0	0	4	32
% of Total	40.5%	9.5%	37.5%	0%	0%	12.5%	

The crash data for the SR 20 at McCullers Road (North and South) intersections, summarized by severity and by manner of collision, is provided in Table 7 and Table 8. As shown in Table 7, there were 53 crashes at this intersection over the five year period (2014 - 2018), 22 of which were injury crashes. As shown in Table 8, the majority of these crashes, by manner of collision, were “Rear End” type crashes, accounting for 60.5% of all crashes reported at the intersection. Approximately 22.5% of the total number of crashes were “Angle” crashes, 7.5% were “Head-On” crashes, 5.5% were “Single Vehicle” crashes, and the remaining 4.5% were “Sideswipe” crashes.

Table 7. Summary of Traffic Crash History by Severity at SR 20 and McCullers Road

Year	Severity			Total
	PDO	Injury	Fatal	
2014	3	1	0	4
2015	5	3	0	8
2016	4	4	0	8
2017	7	3	0	10
2018	12	11	0	23
Total	31	22	0	53

Table 8. Summary of Traffic Crash History by Manner of Collision at SR 20 and McCullers Road

Year	Manner of Collision						Total
	Angle	Head On	Rear End	Sideswipe - Same Direction	Sideswipe - Opposite Direction	Not A Collision With Motor Vehicle	
2014	1	0	2	0	0	1	4
2015	2	0	5	0	0	1	8
2016	2	0	6	0	0	0	8
2017	2	1	6	1	0	0	10
2018	5	3	13	1	0	1	23
Total	12	4	32	2	0	3	53
% of Total	22.5%	7.5%	60.5%	4%	0%	5.5%	

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ATTACHMENT 5

Design Traffic Diagrams

Georgia Department of Transportation

Interoffice Memo

FILE: Walton County
P.I. # 0016386

DATE: February 27, 2019

FROM: Paul Tanner, State Transportation Planning Administrator

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

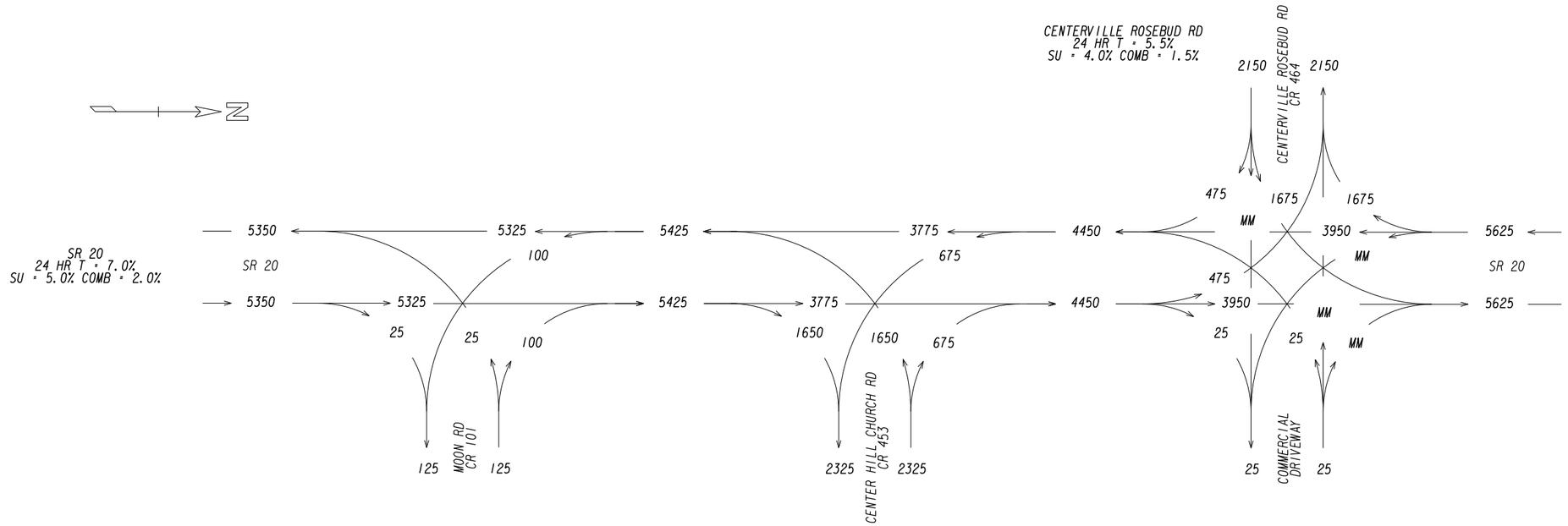
SUBJECT: **Design Traffic Forecasts** for SR 20 @ 3 Locs in Walton County.

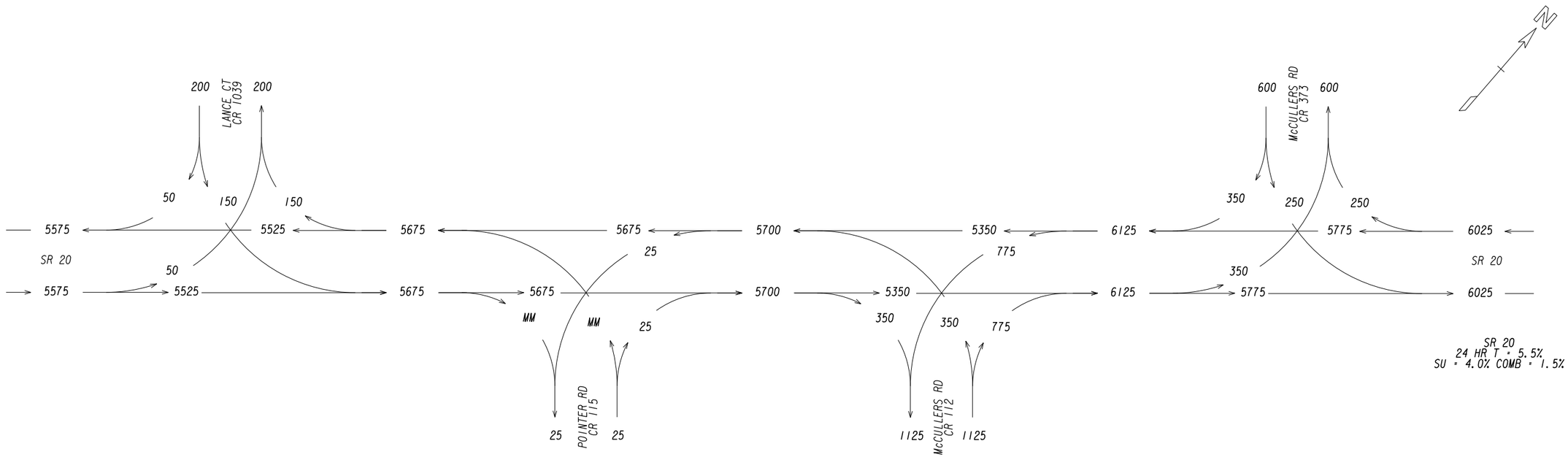
Per request, we have reviewed the consultant's design traffic forecasts for the above project. Based on the information furnished, we find the design traffic forecasts to be satisfactory, and the design traffic forecasting task to be complete for the above project. The reviewed and approved design traffic forecasts for the above project is attached in 0016386_10.pdf and 0016386_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





PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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EXISTING

PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

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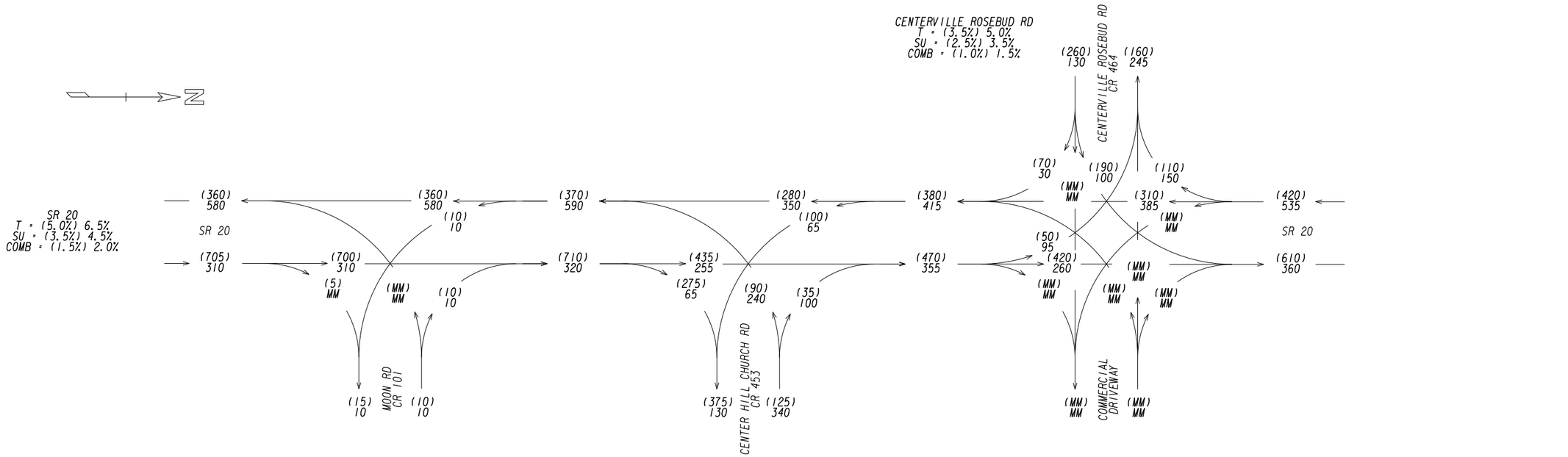

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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

PROGRAM DELIVERY

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REVISION DATES		

TRAFFIC DIAGRAM

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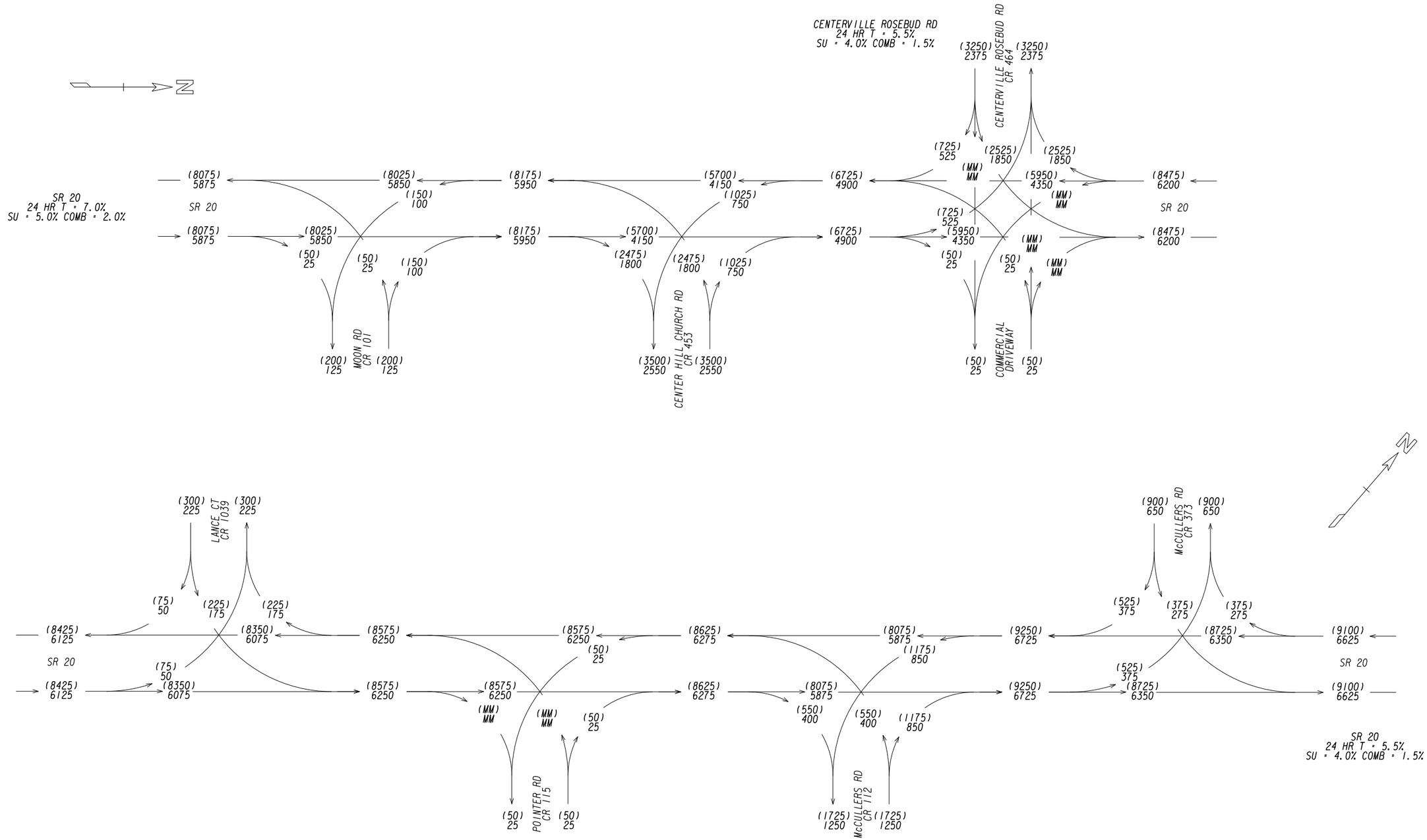
10/23/2015 GPLN



PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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2023 AADT = 000
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PROGRAM DELIVERY

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REVISION DATES		

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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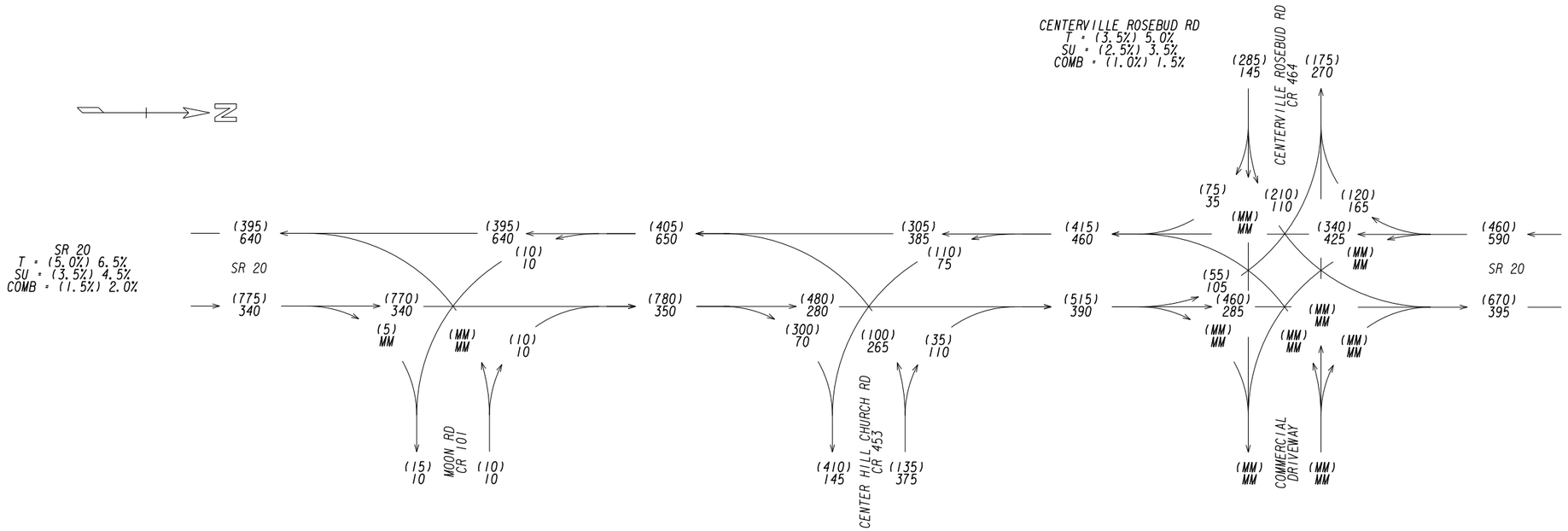

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WALTON COUNTY
SR 20 @ 3 LOCATIONS

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NO BUILD

PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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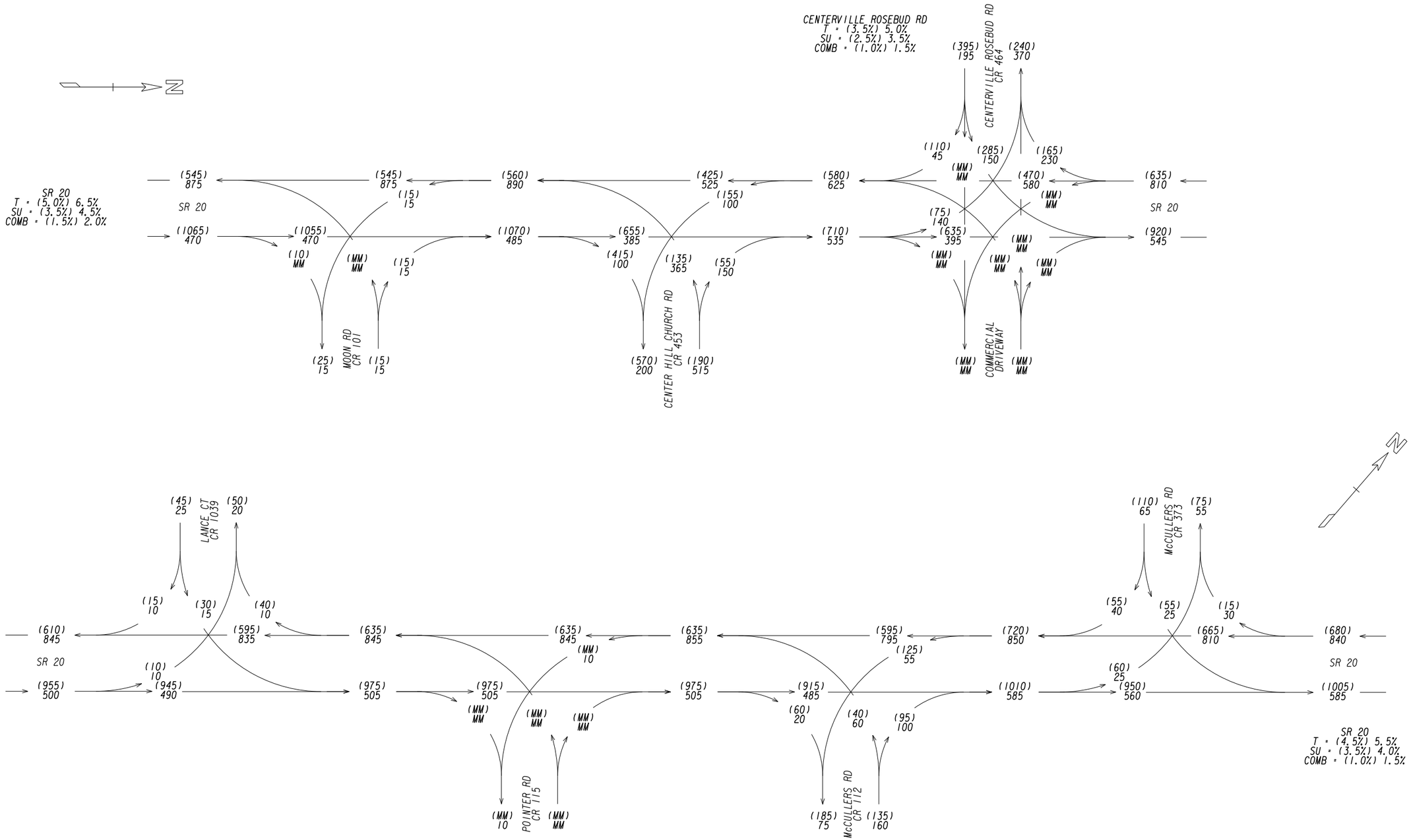

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WALTON COUNTY
SR 20 @ 3 LOCATIONS

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REVISION DATES

TRAFFIC DIAGRAM

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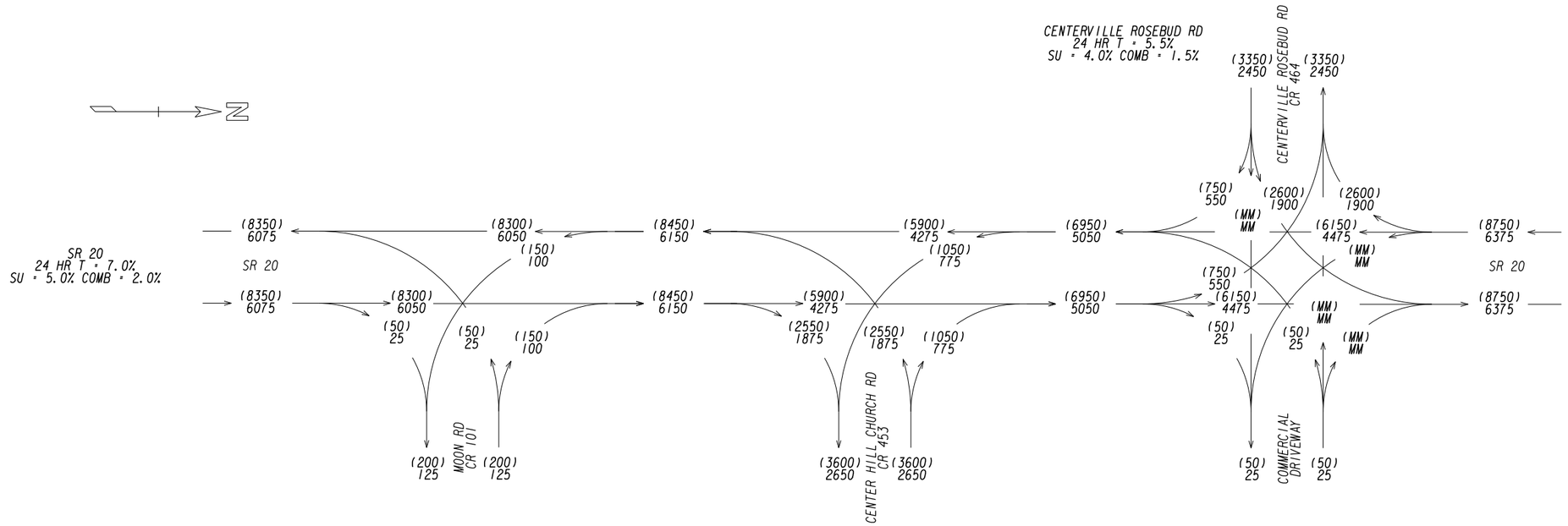

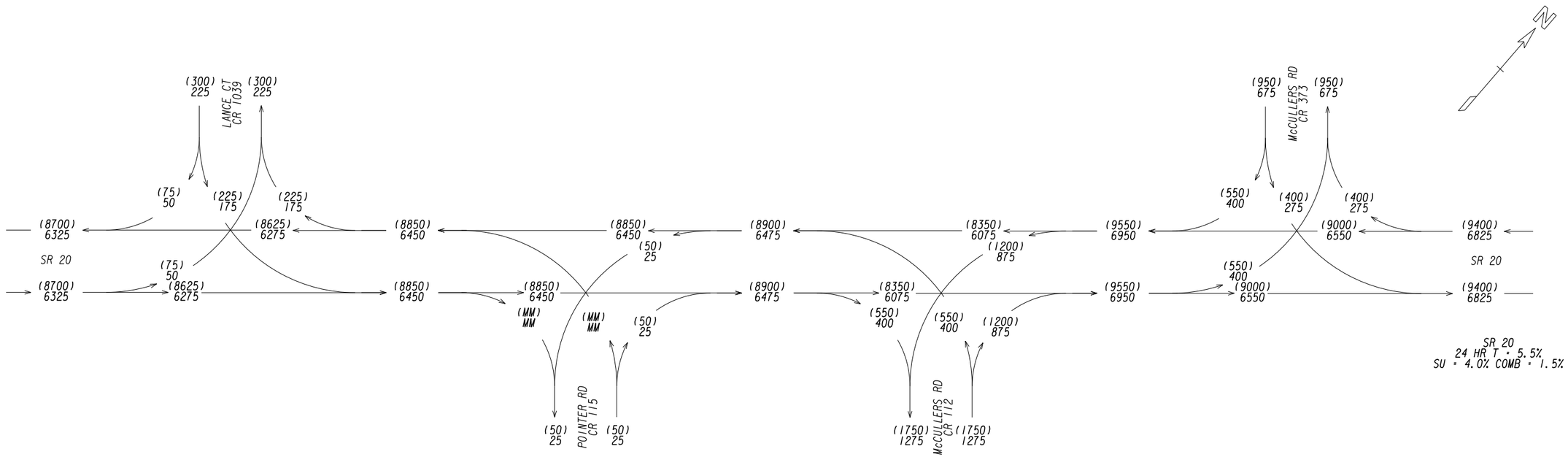

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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PROGRAM DELIVERY

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REVISION DATES		

TRAFFIC DIAGRAM

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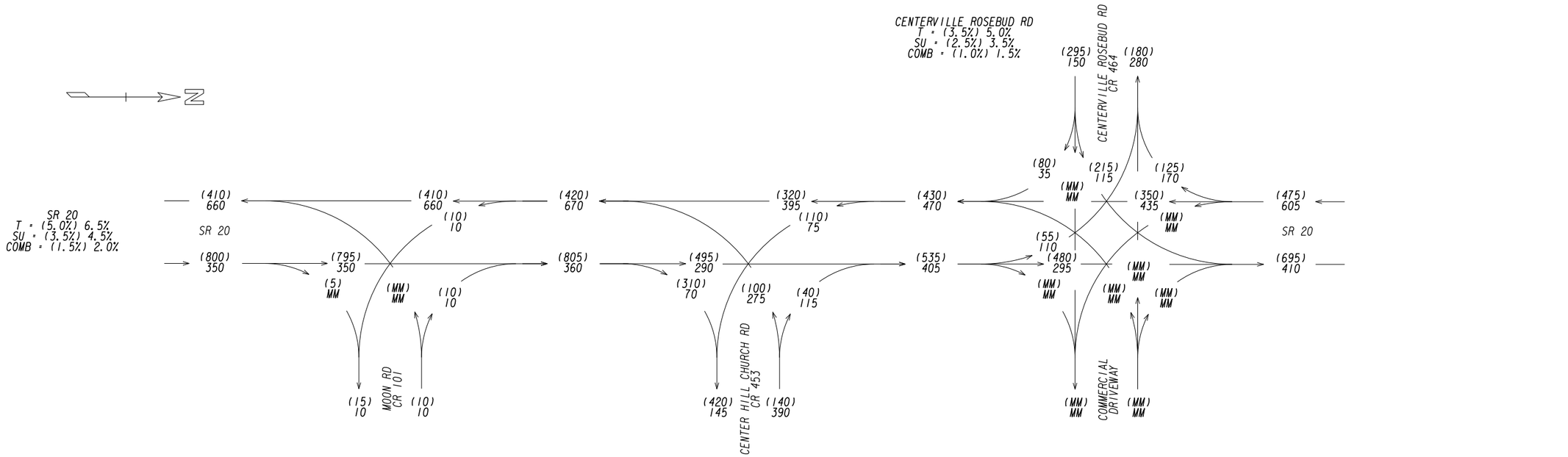

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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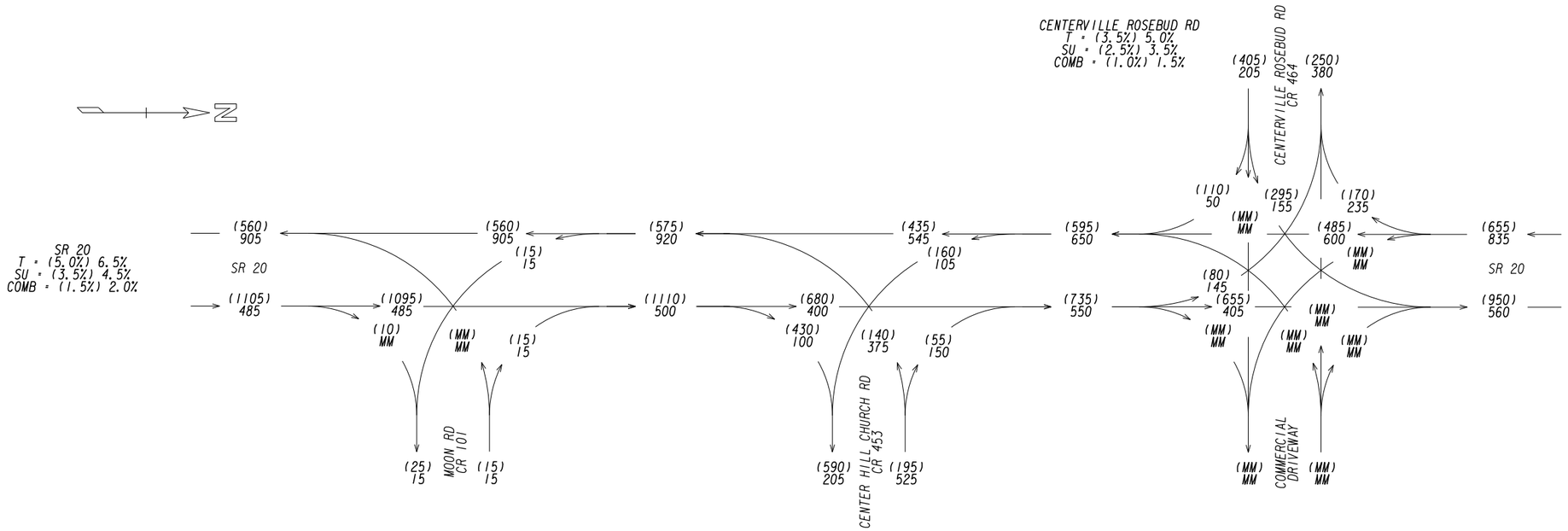

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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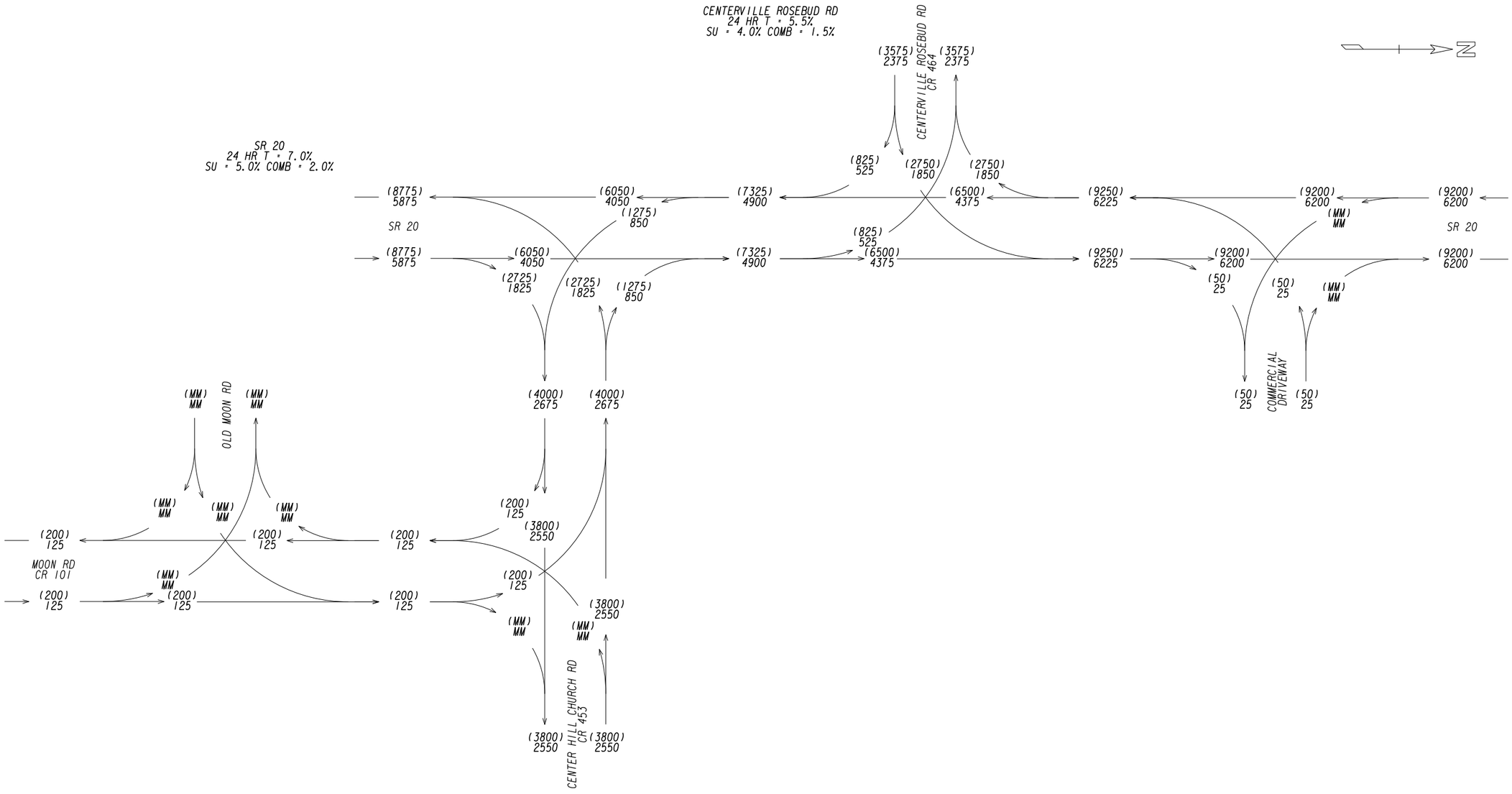

SHEET 1 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

2043 AADT = (000)
2023 AADT = 000
BUILD

PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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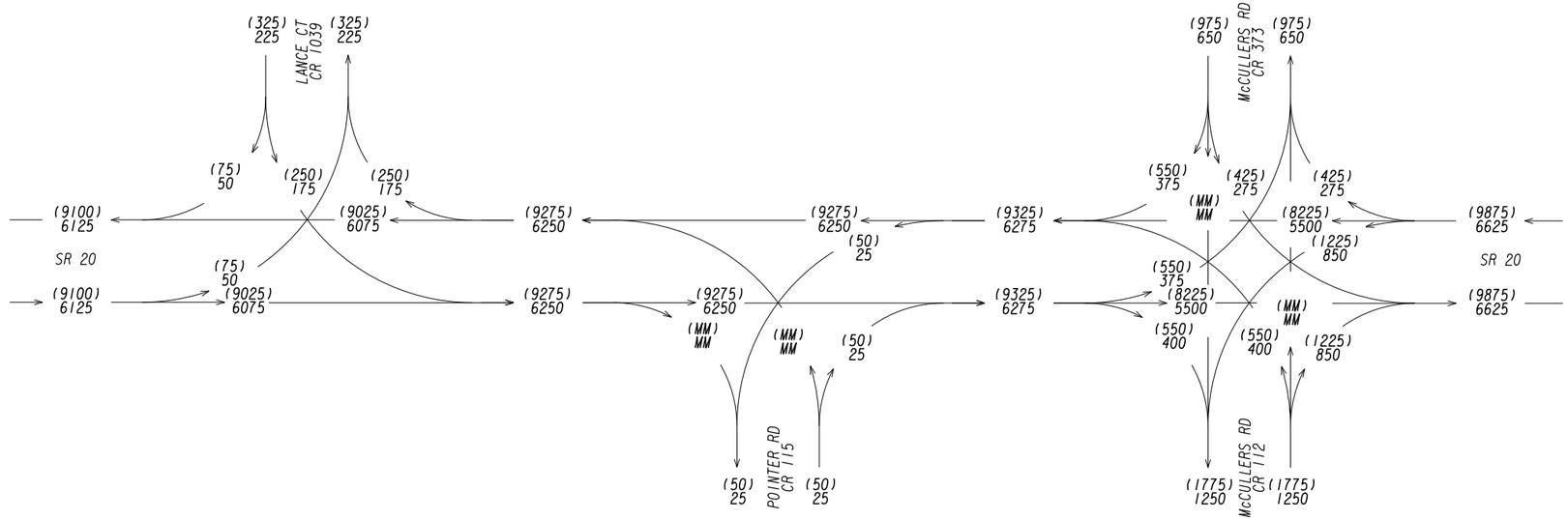

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SU = 4.0% COMB = 1.5%

SHEET 2 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

2043 AADT = (000)
2023 AADT = 000
BUILD

PROGRAM DELIVERY

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REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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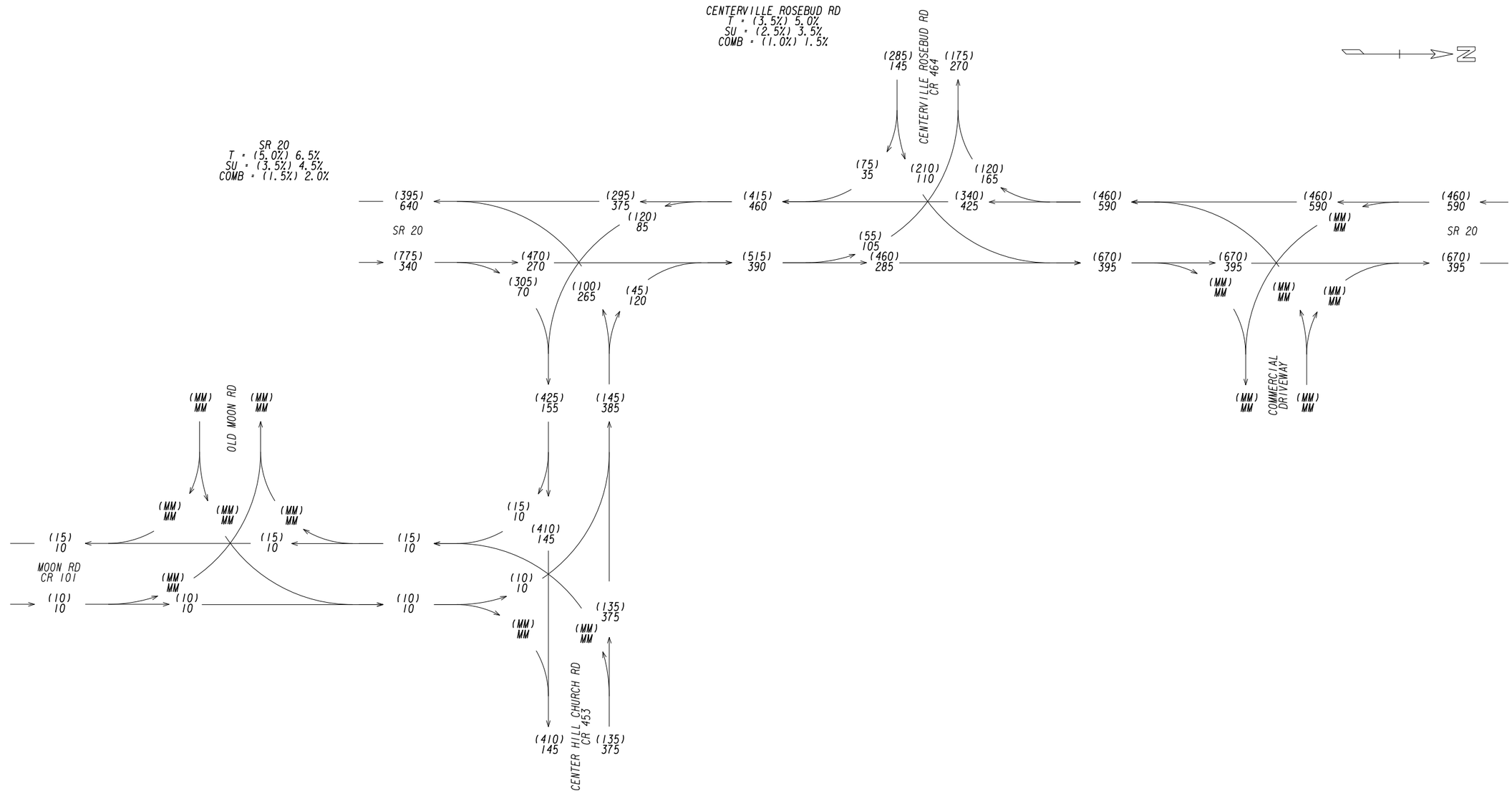

SHEET 1 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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

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REVISION DATES		

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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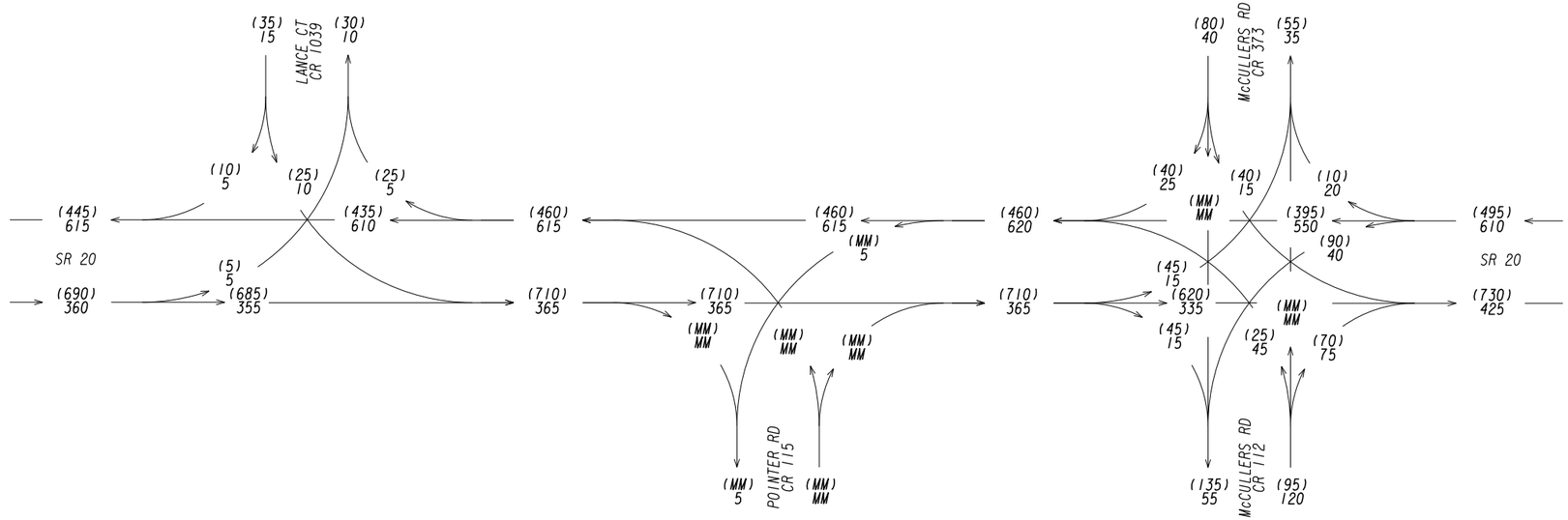

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SU = (3.5%) 4.0%
COMB = (1.0%) 1.5%

SHEET 2 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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

GDOT
PROGRAM DELIVERY

Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM
SR 20 @ 3 LOCS IN WALTON COUNTY

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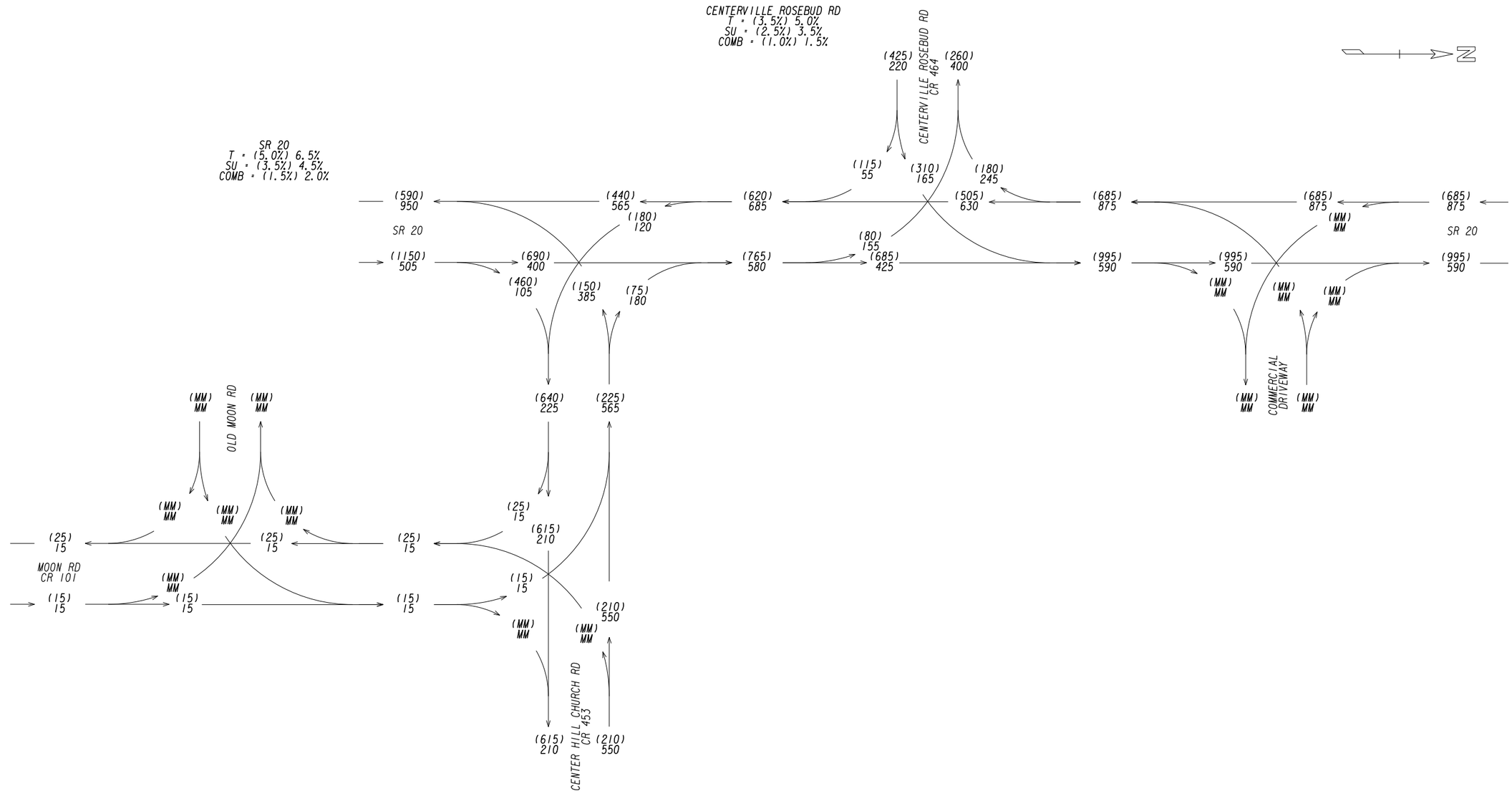

SHEET 1 OF 2

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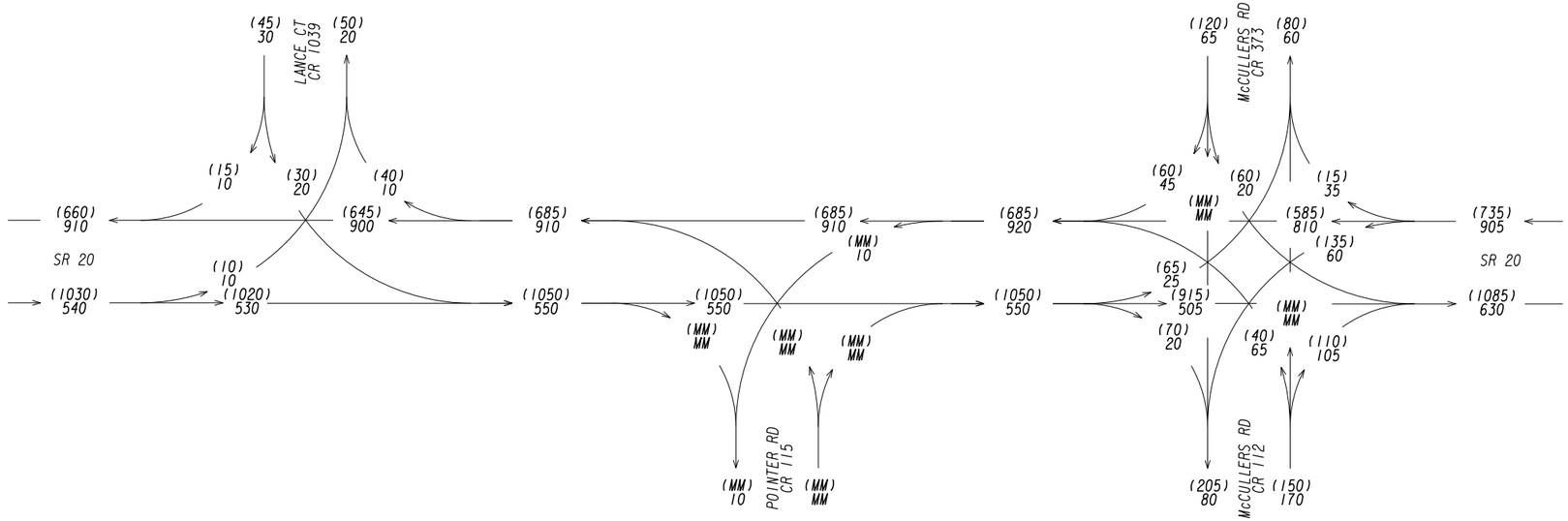

SR 20
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SU = (3.5%) 4.0%
COMB = (1.0%) 1.5%

SHEET 2 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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

GDOT
PROGRAM DELIVERY

Gresham Smith

REVISION DATES		

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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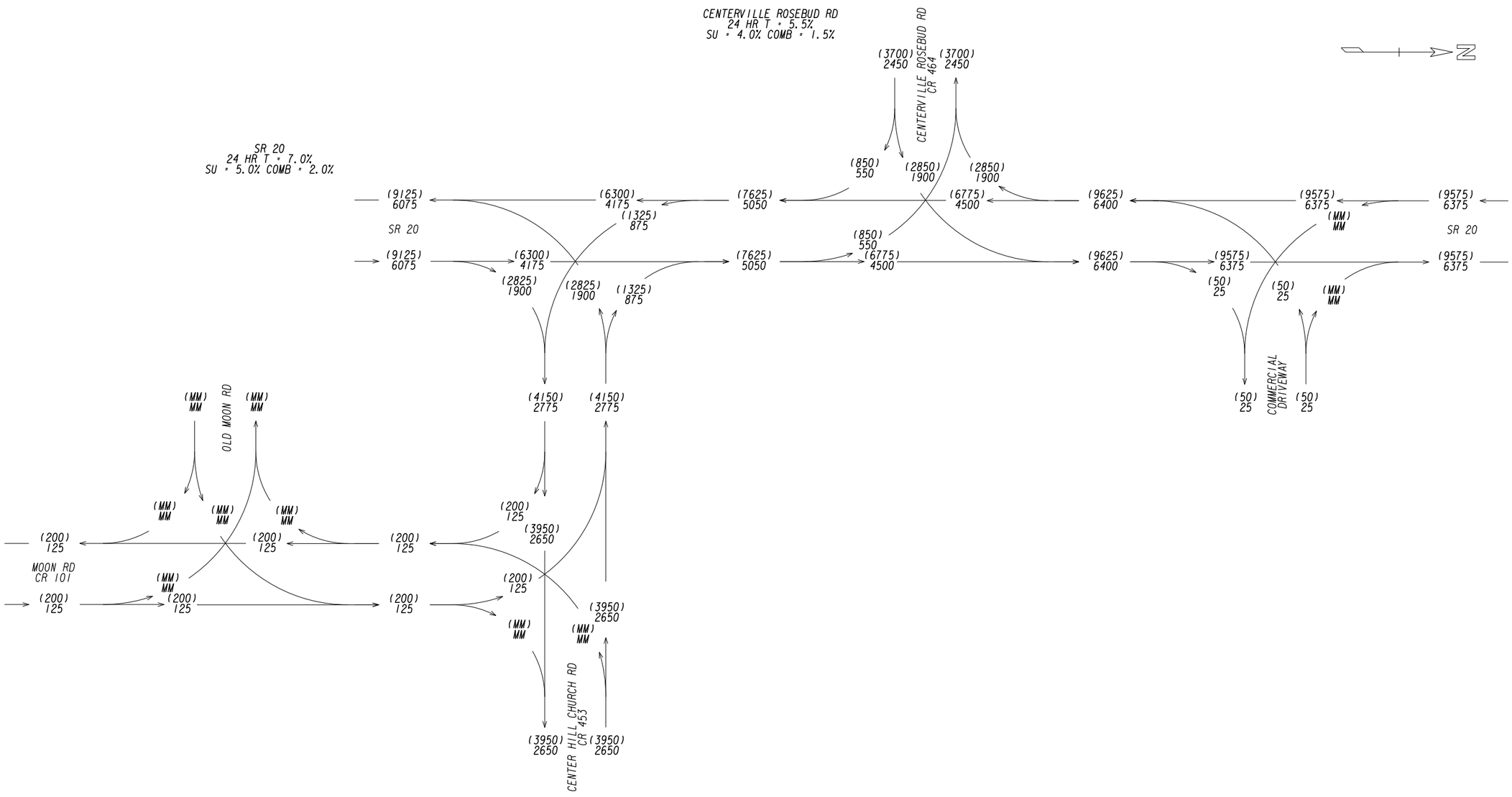

SHEET 1 OF 2

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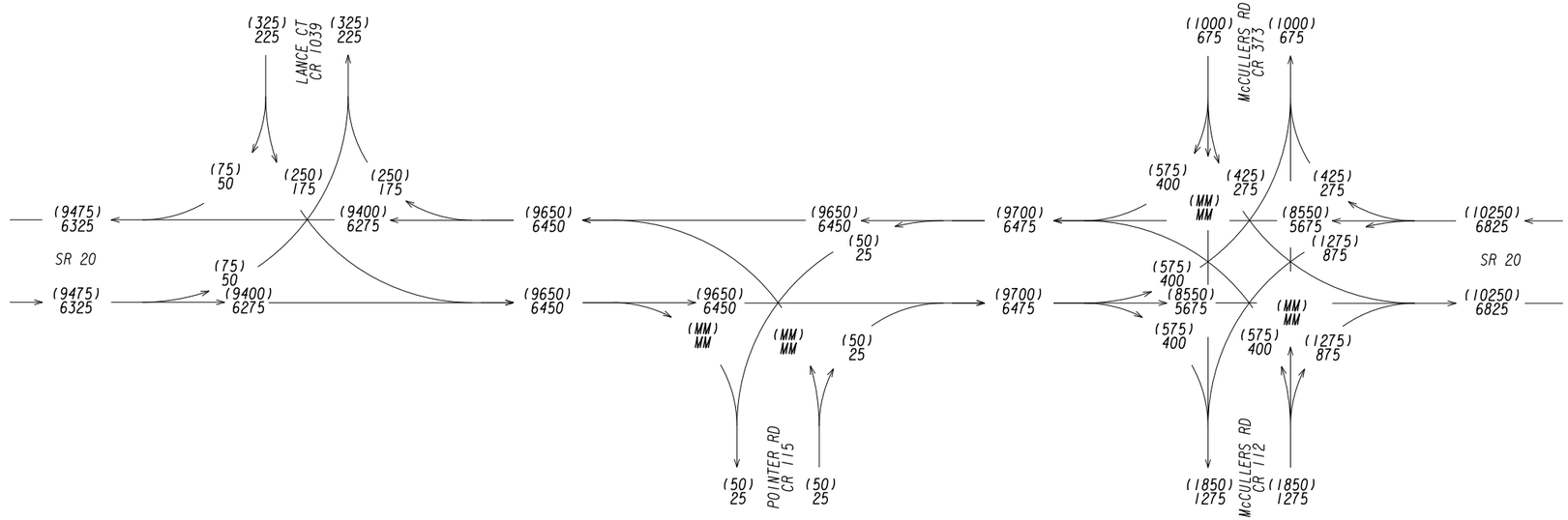
10/23/2015 GPLN



SR 20
24 HR T = 5.5%
SU = 4.0% COMB = 1.5%

SHEET 2 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

2045 AADT = (000)
2025 AADT = 000
BUILD

PROGRAM DELIVERY

Gresham Smith

REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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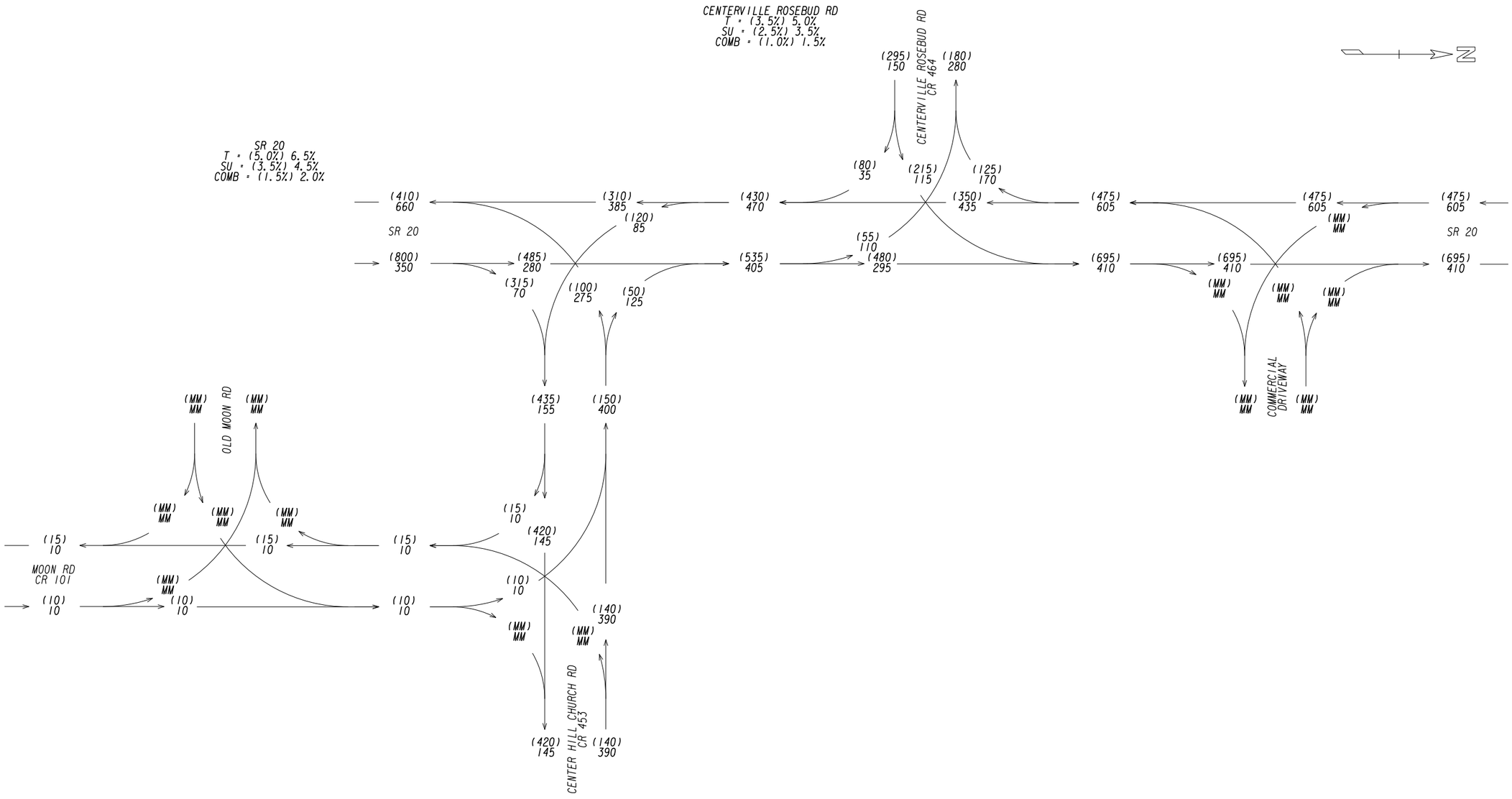

SHEET 1 OF 2

PI# 0016386 WALTON COUNTY SR 20 @ 3 LOCATIONS	2025 PM DHV = (000) 2025 AM DHV = 000 BUILD	PROGRAM DELIVERY	Gresham Smith	REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

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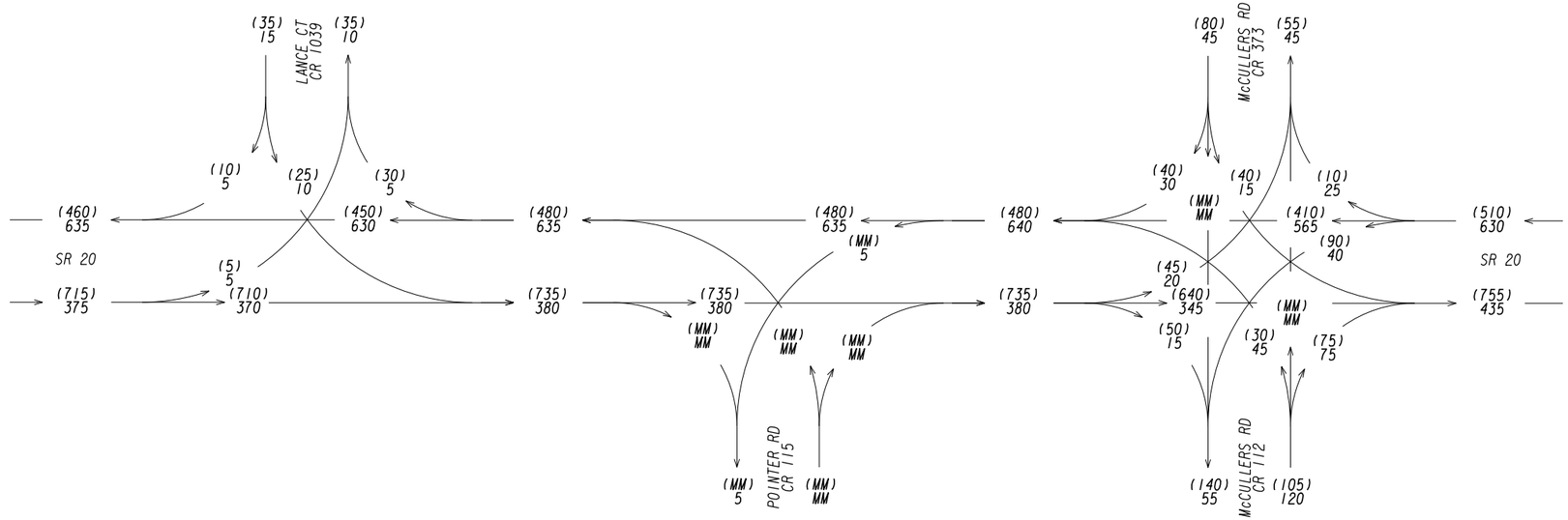
10/23/2015 GPLN



SR 20
T = (4.5%) 5.5%
SU = (3.5%) 4.0%
COMB = (1.0%) 1.5%

SHEET 2 OF 2

PI# 0016386
WALTON COUNTY
SR 20 @ 3 LOCATIONS

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

PROGRAM DELIVERY

Gresham Smith

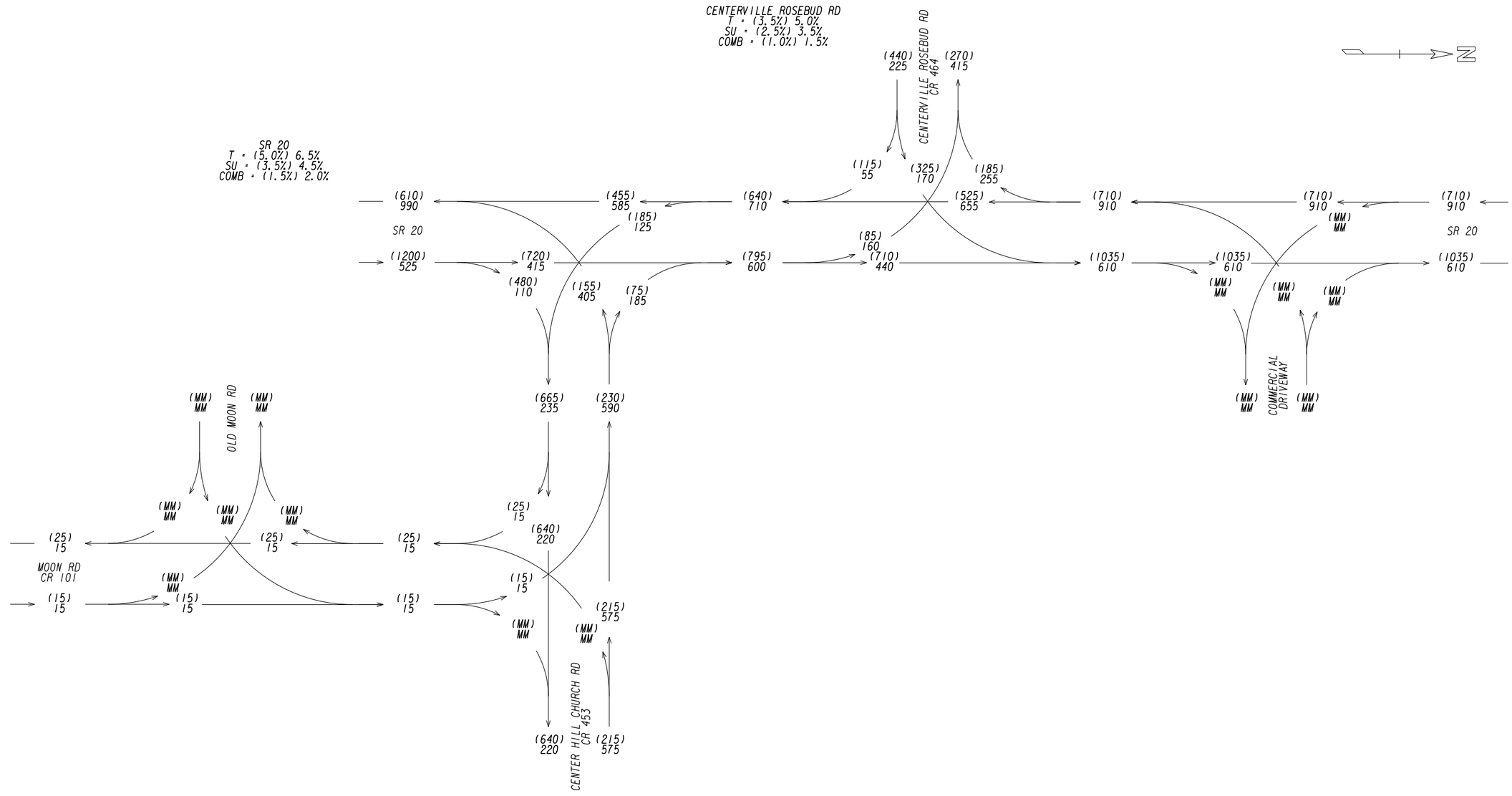
REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

CHECKED:	CBL	DATE:	02/22/19
BACKCHECKED:	AWC	DATE:	02/22/19
CORRECTED:	CBL	DATE:	02/22/19
VERIFIED:	AWC	DATE:	02/22/19

DRAWING No.
10-0018



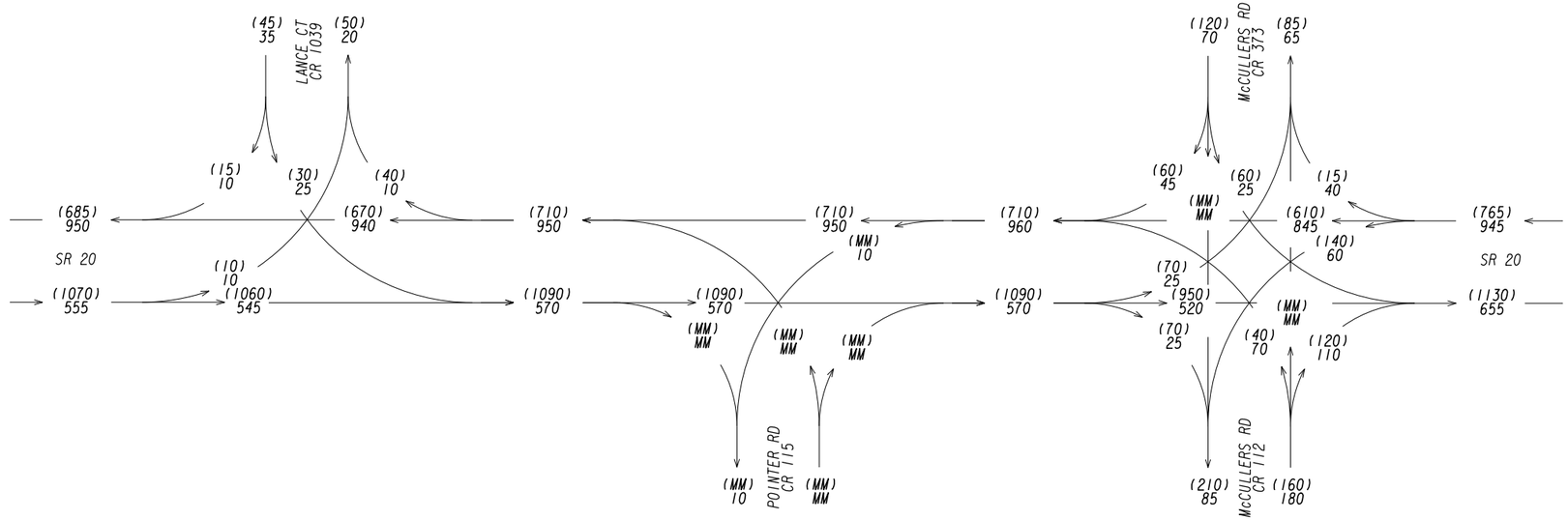
SHEET 1 OF 2

PI# 0016386 WALTON COUNTY SR 20 @ 3 LOCATIONS	2045 PM DHV = (000) 2045 AM DHV = 000 BUILD	PROGRAM DELIVERY	Gresham Smith	REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

CHECKED:	CBL	DATE:	02/22/19	DRAWING No.
BACKCHECKED:	AWC	DATE:	02/22/19	10-0019
CORRECTED:	CBL	DATE:	02/22/19	
VERIFIED:	AWC	DATE:	02/22/19	



SR 20
T = (4.5%) 5.5%
SU = (3.5%) 4.0%
COMB = (1.0%) 1.5%

SHEET 2 OF 2

PI# 0016386 WALTON COUNTY SR 20 @ 3 LOCATIONS	2045 PM DHV = (000) 2045 AM DHV = 000 BUILD	PROGRAM DELIVERY	Gresham Smith

REVISION DATES

TRAFFIC DIAGRAM

SR 20 @ 3 LOCS IN WALTON COUNTY

CHECKED:	CBL	DATE:	02/22/19
BACKCHECKED:	AWC	DATE:	02/22/19
CORRECTED:	CBL	DATE:	02/22/19
VERIFIED:	AWC	DATE:	02/22/19

DRAWING No.
10-0020

Gresham Smith
Genuine Ingenuity

ATTACHMENT 6

ICE Reports

a. Stage 1 Screening Decision Record

b. Concurrence Memo

c. Stage 2 Alternative Selection Decision Record

   i. SR 20 @ Center Hill Church Rd

   ii. SR 20 @ Centerville Rosebud Rd

   iii. SR 20 @ McCullers Rd

d. Approved Waiver Request

   i. Center Hill Church Rd @ Moon Rd

   ii. Moon Rd @ Old Moon Rd

   iii. SR 20 @ Pointer Rd

GDOT ICE Tool: Summary Report for Multiple Locations

ICE Version 2.14 | Revised 08/22/2018

Stage 1 Decision Document PI# 0016386

			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 @ Center Hill	Conventional (Minor Stop)	N/A					x							x		x										
SR 20 @ Center. Rose.	Conventional (Minor Stop)	N/A					x							x		x										
SR 20 @ McCullers Rd	Conventional (Minor Stop)	N/A				x								x		x										

Concurred by: _____ **Date:** 3/19/19 **Name:** ANDREW HEATH

Chief Engineer or (Approved Delegate)

GDOT ICE Tool: Summary Report for Multiple Locations

ICE Version 2.14 | Revised 08/22/2018

Stage 2 Decision Document PI# 0016386

			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 @ Center Hill	Conventional (Minor Stop)	N/A					6.2							1.2		-										
SR 20 @ Center. Rose.	Conventional (Minor Stop)	N/A					6.2							2.6		-										
SR 20 @ McCullers Rd	Conventional (Minor Stop)	N/A					6.1							3.0		-										

Approved by: _____ **Date:** 7/24/19 **Name:** Andrew Heath, P.E.

Chief Engineer or (Approved Delegate)

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 Request By: GDOT Project Manager

County: Walton GDOT District: 1 - Gainesville

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

Minor (Crossing) ST: Center Hill Speed Limit: 55 mph

Major ST Direction: North/South Area Type: Urban

Intersection Control: Conventional (Minor Stop)

Prepared By: Gresham Smith Analyst: C. Lincoln

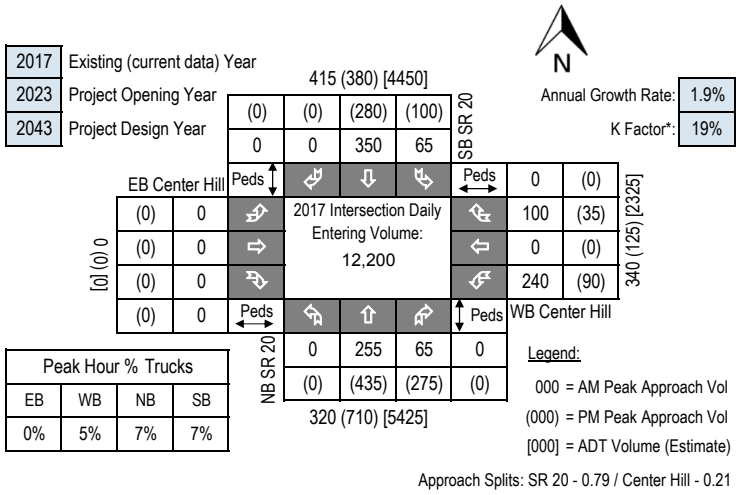
Date: 7/16/2019 Project ID:

Project Purpose: Intersection Improvements

2017	Existing (current data) Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 19%



Peak Hour % Trucks			
EB	WB	NB	SB
0%	5%	7%	7%

Legend:

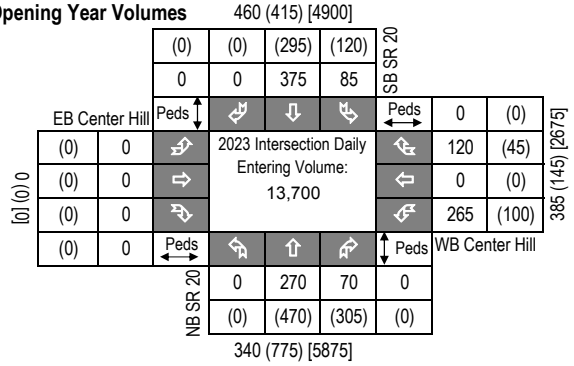
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

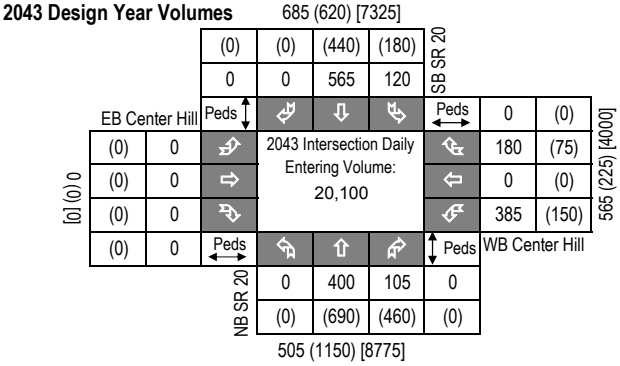
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.79 / Center Hill - 0.21

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 2.14 | Revised 08/03/2018

GDOT PI #	0016386
Project Location:	SR 20 @ Center Hill
Prepared by:	Gresham Smith
Analyst:	C. Lincoln
Date:	7/16/2019

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	**Yes**	No	No	Design Year AADT > 15,000
	Single Lane Roundabout	**Yes**	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 18,750
	Multilane Roundabout	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RCUT (stop control)	**Yes**	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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 LT Lanes on Both Roads Add RT Lanes on Both Roads	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unignalized (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	No	No	No	No	No	No	Not applicable; 3-legged intersection
	RCUT (signalized)	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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	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	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 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 | GDOT District: 1 - Gainesville | Date: 7/16/2019
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ Center Hill | 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	71.5 sec	8.6 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	1.38	0.81
2043 Design Yr No-Build Peak Hr Intersection Delay	333.3 sec	93.5 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	3.22	2.72

Complete Streets Warrants Met?
- ☐ PEDESTRIANS
- ☑ BICYCLES
- ☐ TRANSIT

Crash Data: Enter 5 most recent years of intersection crash data (Crash Type)	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	3	4	0	32%
Head-On	1	0	0	5%
Rear End	0	1	0	5%
Sideswipe - same	0	0	0	0%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	6	7	0	59%
TOTALS:	10	12	0	22

* 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	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Convert to Multilane by Design Yr*		*Add LT & RT lanes all approaches*		
Construction Cost	$2,212,000	$845,000	$795,000		
ROW Cost	$273,000	$0	$0		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$66,000	$30,000	$39,000		
Design & Contingency Cost	$618,000	$211,000	$278,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$3,169,000	$1,086,000	$1,112,000		
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	13.7 sec / 8.4 sec	228.8 sec / 53.3 sec	18.3 sec / 15.6 sec		
2043 Design Yr Build Intersection V/C	0.76 / 0.59	3.15 / 2.24	0.83 / 0.87		
Safety Analysis:					
Predefined CRF: PDO	32%	40%	39%		
Predefined CRF: Fatal/Inj	71%	33%	40%		
Predefined CRF Source:	FHWA Clearinghouse #s 236 / 237	FHWA Clearinghouse #s 270&285 / 274&288	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:					
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	6.2	1.2	-		
Rank of Control Type Alternatives:	1	2	-		

*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 2.14 | Revised 08/03/2018

Project Information

Location: SR 20 @ Center Hill
County: Walton
Date: 7/16/2019
GDOT PI # (or N/A): 0016386
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: North/South

Table 1: Existing Conditions

	NB SR 20			SB SR 20			EB Center Hill			WB Center Hill		
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	0	0	0	1	0
Lane Widths*	0'	12'	0'	0'	12'	0'	0'	0'	0'	0'	11'	0'
Bay Length**	0'		0'	0'		0'	0'		0'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	100'						100'					

Table 2: Proposed Conditions

	Multilane Roundabout	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	None	None
Reimbursable Utility:	Moderate	Moderate	Moderate	Moderate	Moderate
# of Driveway(s) Impacted	14	14	14	0	0
Modify/Replace Traffic Signal	0	0	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:	Single Intersection

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	5%
Traffic Control:	20%
Project Size:	0%
Prelim Engineering:	15%
Project Contingency:	20%

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

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		Add LT and RT 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	62,186	$783,220	33,600	$318,182	33,600	$318,182				
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0				
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	2400	$60,903	3,800	$72,504	4,000	$76,320				
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0				
Concrete Island (sqyd)	n/a	$51.58/syd	450	$30,871	0	$0	0	$0				
Median Landscaping	$100K/LM	$1.89/LF	3600	$9,068	0	$0	0	$0				
Typical Driveways Impacted (ea)	n/a	$7,500 ea	14	$139,650	14	$105,000	14	$105,000				
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1200	$54,409	1,900	$64,773	2,000	$68,182				
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	3707	$50,540	0	$0	0	$0				
Signing & Marking	$0	$22.73/LF	1,200	$36,277	1,900	$43,187	2,000	$45,460				
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0				
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	1	$182,575				
Lighting (per pole)	n/a	$5,607 ea	22	$164,061	0	$0	0	$0				
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0				
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0				
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0				
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0				
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0				
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0				
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0				
Grading Complete - 20%	n/a	n/a		$530,271		$120,729		$0				
Traffic Control - 20%	n/a	n/a		$353,514		$120,729		$0				
Reimbrusable Utility	n/a	n/a		$66,450		$30,182		$39,786				
Preliminary Engineering - 15%	n/a	n/a		$265,135		$90,547		$119,358				
Contigency - 20%	n/a	n/a		$353,514		$120,729		$159,144				
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$171,146		$0		$0				
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0				
ROW Multiplier - 1.6	n/a	n/a		$102,687		$0		$0				
Project Scale Reduction - 0.0%	n/a	n/a		$0		$0		$0				
Grand Total Costs				**$3,172,000**		**$1,087,000**		**$1,114,000**				

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*
Multilane Roundabout	High Speed Roundabout	F.D. Asphalt	1.33	0.0	62,186	0.0	600	0.0	600	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
Traffic Signal	Pave/Overlay Intersection	F.D. Asphalt	0.00	0.0	16,000	33,600.0	1,000	0.0	1,000	0.0
N/A	#N/A	None	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	None	#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 1-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.

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 @ Center Hill Church Rd	102	603	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 @ Center Hill Church Rd	153	902	Yes	Yes	Yes	Yes	Yes	Yes	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	71.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	265	110	280	70	75	385
Future Vol, veh/h	265	110	280	70	75	385
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	301	125	318	80	85	438

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	966	358	0	0	398	0
Stage 1	358	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	~ 279	680	-	-	1134	-
Stage 1	701	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 251	680	-	-	1134	-
Mov Cap-2 Maneuver	~ 251	-	-	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	485	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	224.3	0	1.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	1134	-
HCM Lane V/C Ratio	-	-	1.384	0.075	-
HCM Control Delay (s)	-	-	224.3	8.4	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	22	0.2	-

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

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	100	35	480	300	110	305
Future Vol, veh/h	100	35	480	300	110	305
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	109	38	522	326	120	332

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1256	685	0	0	848	0
Stage 1	685	-	-	-	-	-
Stage 2	571	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	186	443	-	-	777	-
Stage 1	495	-	-	-	-	-
Stage 2	559	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	151	443	-	-	777	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	495	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	76.5	0	2.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	182	777	-
HCM Lane V/C Ratio	-	-	0.806	0.154	-
HCM Control Delay (s)	-	-	76.5	10.5	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	5.5	0.5	-

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	333.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	365	150	385	100	100	525
Future Vol, veh/h	365	150	385	100	100	525
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	415	170	438	114	114	597

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1318	494	0	0	551	0
Stage 1	494	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	~ 171	569	-	-	994	-
Stage 1	607	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 142	569	-	-	994	-
Mov Cap-2 Maneuver	~ 142	-	-	-	-	-
Stage 1	607	-	-	-	-	-
Stage 2	~ 353	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, $	1049.7	0	1.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	182	994	-
HCM Lane V/C Ratio	-	-	3.216	0.114	-
HCM Control Delay (s)	-	-	$ 1049.7	9.1	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	54.4	0.4	-

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

Intersection	
Int Delay, s/veh	93.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	135	55	655	415	155	425
Future Vol, veh/h	135	55	655	415	155	425
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	147	60	712	451	168	462

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1737	938	0	0	1163	0
Stage 1	938	-	-	-	-	-
Stage 2	799	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	~ 94	316	-	-	590	-
Stage 1	376	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 58	316	-	-	590	-
Mov Cap-2 Maneuver	~ 58	-	-	-	-	-
Stage 1	376	-	-	-	-	-
Stage 2	270	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 894	0	3.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	76	590	-
HCM Lane V/C Ratio	-	-	2.717	0.286	-
HCM Control Delay (s)	-	-	$ 894	13.5	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	20.2	1.2	-

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

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

2023 Opening Year Single Lane Analysis

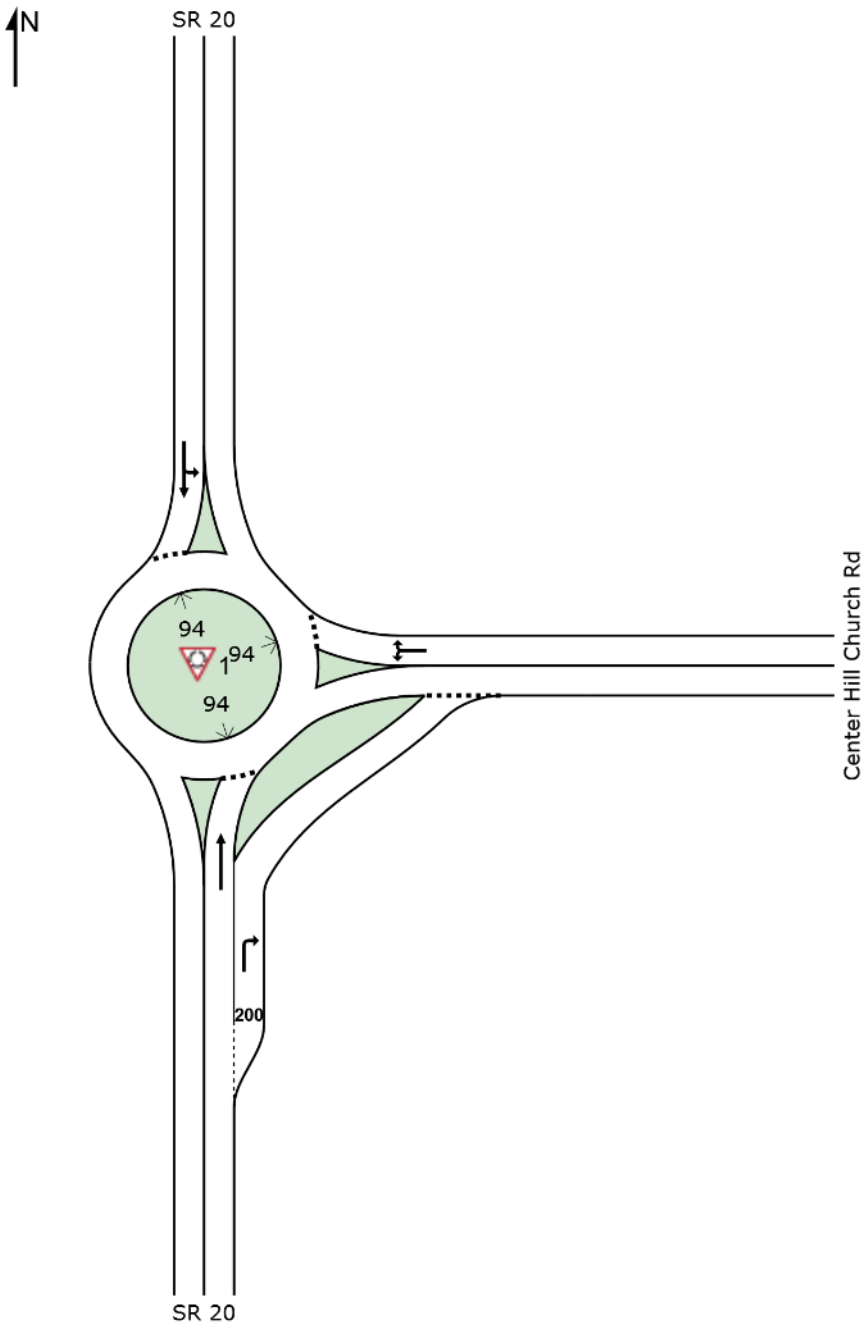
Single Lane Design Life Analysis

2043 Design Year Multi-Lane Analysis

SITE LAYOUT

Site: 1 [2023 AM - Single Lane]

SR 20 @ Center Hill Church Rd
Roundabout



LANE SUMMARY

Site: 1 [2023 AM - Single Lane]

SR 20 @ Center Hill Church Rd
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: SR 20													
Lane 1[d]	303	6.5	1287	0.236	100	4.8	LOS A	1.7	44.0	Full	1600	0.0	0.0
Lane 2	79	6.5	1228	0.064	100	3.5	LOS A	0.4	10.2	Short	200	0.0	NA
Approach	382	6.5		0.236		4.6	LOS A	1.7	44.0				
East: Center Hill Church Rd													
Lane 1[d]	433	5.0	910	0.475	100	9.9	LOS A	3.5	90.4	Full	1600	0.0	0.0
Approach	433	5.0		0.475		9.9	LOS A	3.5	90.4				
North: SR 20													
Lane 1[d]	517	6.5	855	0.605	100	13.5	LOS B	7.0	185.1	Full	1600	0.0	0.0
Approach	517	6.5		0.605		13.5	LOS B	7.0	185.1				
Intersection	1331	6.0		0.605		9.7	LOS A	7.0	185.1				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 1 [2023 PM - Single Lane]

SR 20 @ Center Hill Church Rd
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: SR 20													
Lane 1[d]	511	5.0	1290	0.396	100	6.6	LOS A	3.0	78.9	Full	1600	0.0	0.0
Lane 2	332	5.0	1265	0.262	100	5.2	LOS A	1.7	45.3	Short	200	0.0	NA
Approach	842	5.0		0.396		6.0	LOS A	3.0	78.9				
East: Center Hill Church Rd													
Lane 1[d]	158	5.0	730	0.216	100	7.4	LOS A	1.3	34.0	Full	1600	0.0	0.0
Approach	158	5.0		0.216		7.4	LOS A	1.3	34.0				
North: SR 20													
Lane 1[d]	451	5.0	1143	0.395	100	7.2	LOS A	3.1	81.9	Full	1600	0.0	0.0
Approach	451	5.0		0.395		7.2	LOS A	3.1	81.9				
Intersection	1451	5.0		0.396		6.5	LOS A	3.1	81.9				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

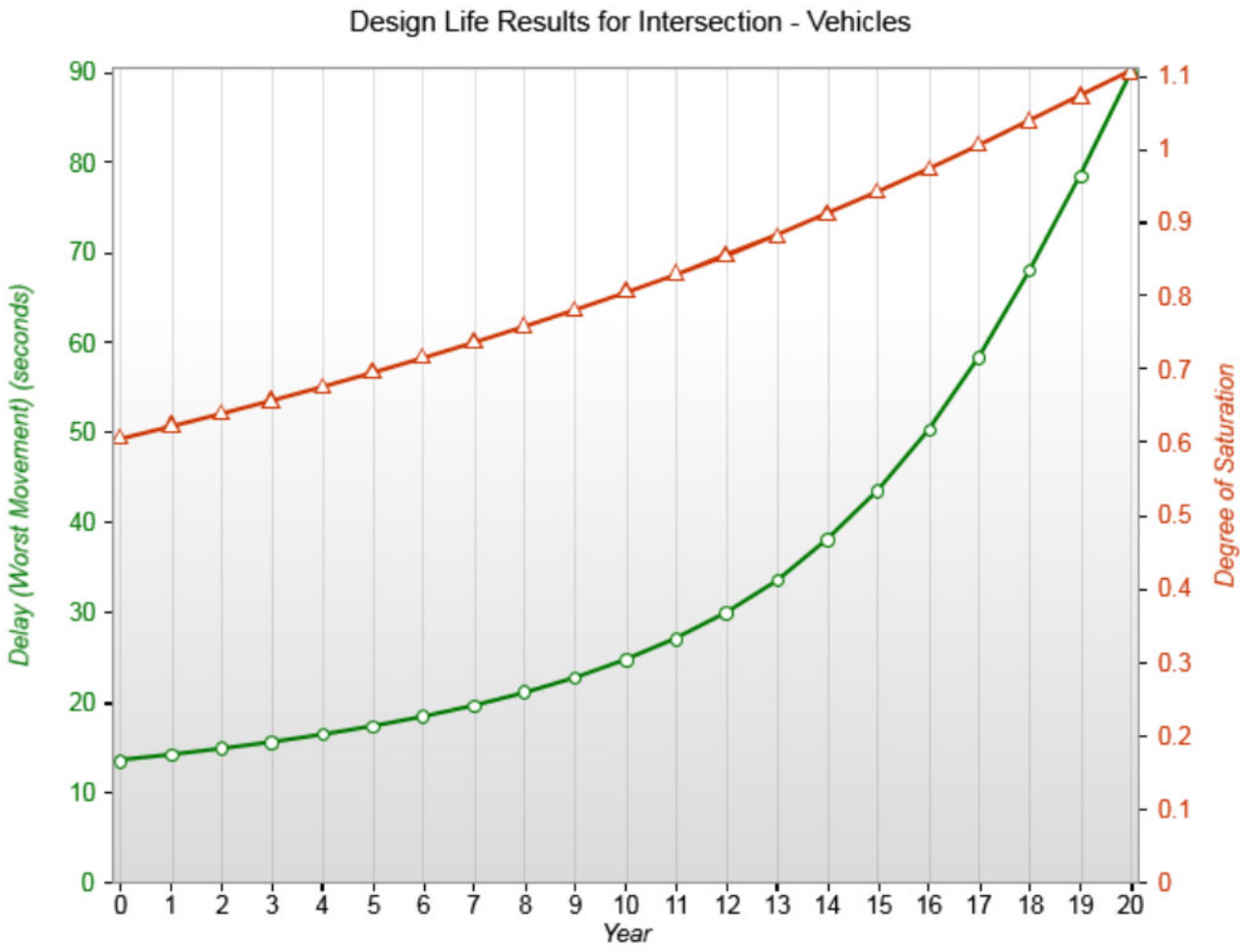
d Dominant lane on roundabout approach

GRAPHS - Design Life Analysis

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

Site: 1 [2023 AM - Single Lane - DL]

SR 20 @ Center Hill Church Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 11 years

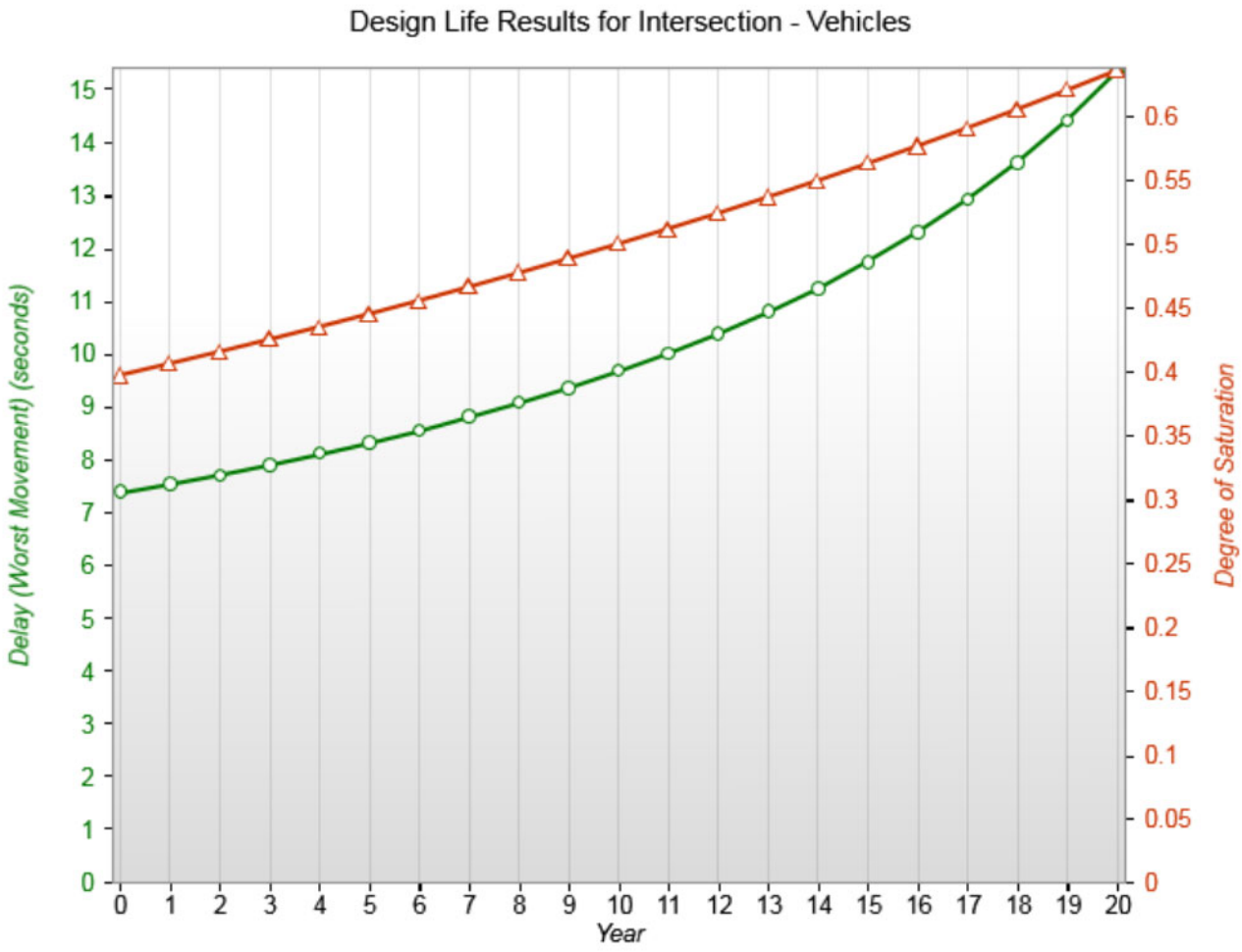


GRAPHS - Design Life Analysis

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

Site: 1 [2023 PM - Single Lane - DL]

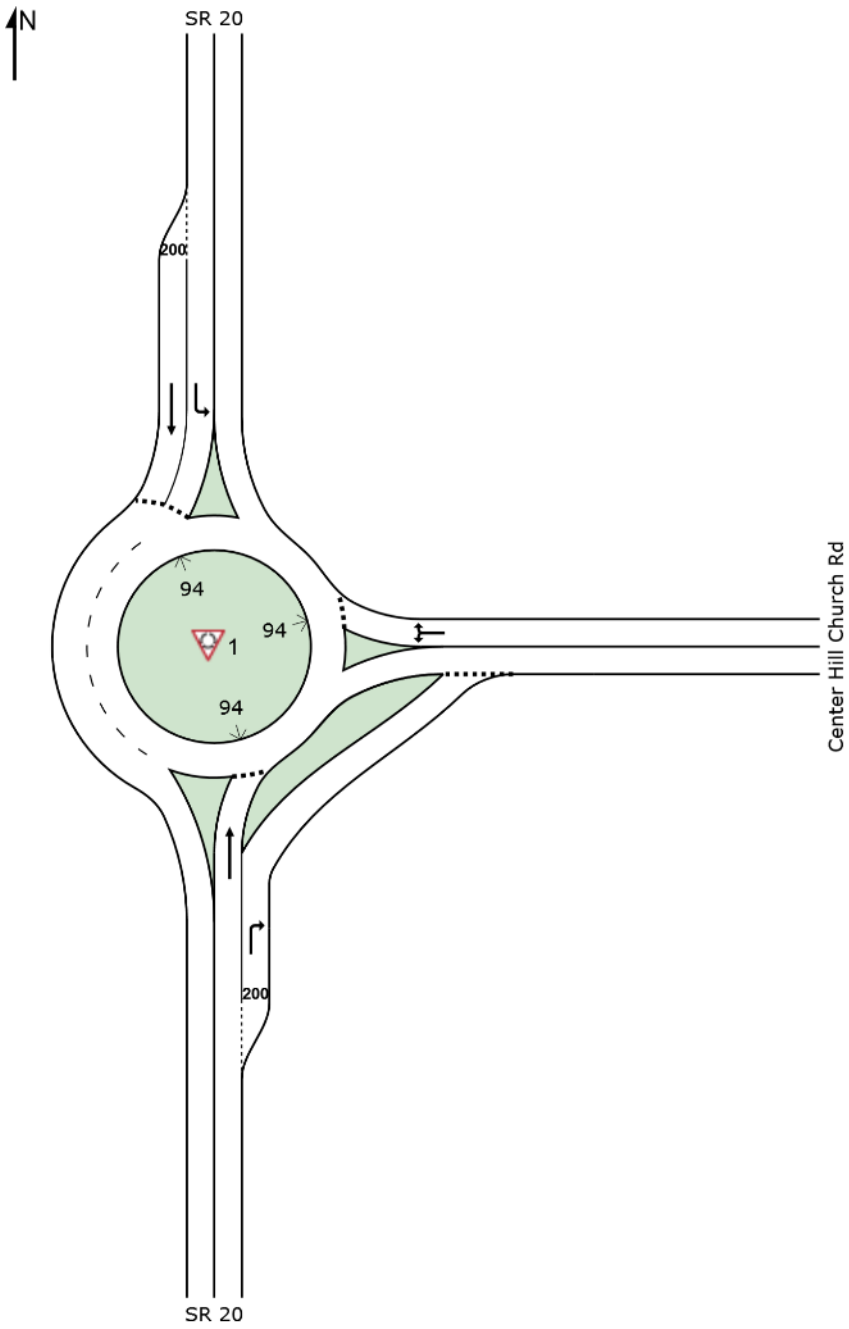
SR 20 @ Center Hill Church Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years



SITE LAYOUT

Site: 1 [2043 AM - Multi Lane]

SR 20 @ Center Hill Church Rd
Roundabout



LANE SUMMARY

Site: 1 [2043 AM - Multi Lane]

SR 20 @ Center Hill Church Rd
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: SR 20													
Lane 1[d]	449	6.5	1297	0.347	100	6.0	LOS A	2.7	70.5	Full	1600	0.0	0.0
Lane 2	118	6.5	1245	0.095	100	3.7	LOS A	0.6	15.2	Short	200	0.0	NA
Approach	567	6.5		0.347		5.5	LOS A	2.7	70.5				
East: Center Hill Church Rd													
Lane 1[d]	635	5.0	833	0.762	100	20.6	LOS C	13.5	351.1	Full	1600	0.0	0.0
Approach	635	5.0		0.762		20.6	LOS C	13.5	351.1				
North: SR 20													
Lane 1	135	6.5	570	0.236	100	9.4	LOS A	1.4	38.0	Full	1600	0.0	0.0
Lane 2[d]	635	6.5	934	0.680	100	15.0	LOS C	10.4	272.4	Short	200	0.0	NA
Approach	770	6.5		0.680		14.1	LOS B	10.4	272.4				
Intersection	1972	6.0		0.762		13.7	LOS B	13.5	351.1				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 1 [2043 PM - Multi Lane]

SR 20 @ Center Hill Church Rd
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: SR 20													
Lane 1[d]	750	5.0	1267	0.592	100	9.8	LOS A	5.6	145.8	Full	1600	0.0	0.0
Lane 2	500	5.0	1248	0.401	100	6.8	LOS A	3.0	79.0	Short	200	0.0	NA
Approach	1250	5.0		0.592		8.6	LOS A	5.6	145.8				
East: Center Hill Church Rd													
Lane 1[d]	245	5.0	570	0.429	100	13.1	LOS B	3.4	87.7	Full	1600	0.0	0.0
Approach	245	5.0		0.429		13.1	LOS B	3.4	87.7				
North: SR 20													
Lane 1	196	5.0	950	0.206	100	5.8	LOS A	1.3	34.9	Full	1600	0.0	0.0
Lane 2[d]	478	5.0	1287	0.372	100	6.3	LOS A	3.0	79.0	Short	200	0.0	NA
Approach	674	5.0		0.372		6.2	LOS A	3.0	79.0				
Intersection	2168	5.0		0.592		8.4	LOS A	5.6	145.8				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	228.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	385	180	400	105	120	565
Future Vol, veh/h	385	180	400	105	120	565
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	440	0	-	250	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	438	205	455	119	136	642

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1370	455	0	0	455	0
Stage 1	455	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	~ 159	599	-	-	1080	-
Stage 1	633	-	-	-	-	-
Stage 2	~ 386	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 139	599	-	-	1080	-
Mov Cap-2 Maneuver	~ 139	-	-	-	-	-
Stage 1	633	-	-	-	-	-
Stage 2	~ 337	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 708.9	0	1.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	139	599	1080	-
HCM Lane V/C Ratio	-	-	3.147	0.341	0.126	-
HCM Control Delay (s)	-	-	$ 1033.8	14.1	8.8	-
HCM Lane LOS	-	-	F	B	A	-
HCM 95th %tile Q(veh)	-	-	41.3	1.5	0.4	-

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

Intersection	
Int Delay, s/veh	53.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	150	75	690	460	180	440
Future Vol, veh/h	150	75	690	460	180	440
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	440	0	-	250	190	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	170	85	784	523	205	500

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1693	784	0	0	784	0
Stage 1	784	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	~ 101	389	-	-	813	-
Stage 1	445	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 76	389	-	-	813	-
Mov Cap-2 Maneuver	~ 76	-	-	-	-	-
Stage 1	445	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 463.6	0	3.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	76	389	813	-
HCM Lane V/C Ratio	-	-	2.243	0.219	0.252	-
HCM Control Delay (s)	-	-	$ 687	16.8	10.9	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	15.8	0.8	1	-

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

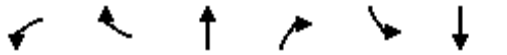
Gresham Smith

Genuine Ingenuity

ALTERNATIVE 3 ANALYSIS

2043 Design Year

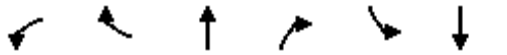
Synchro Output



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	385	180	400	105	120	565
Future Volume (veh/h)	385	180	400	105	120	565
Number	5	12	4	14	3	8
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	1776	1776	1776	1776
Adj Flow Rate, veh/h	438	205	455	119	136	642
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	5	5	7	7	7	7
Cap, veh/h	528	472	574	488	368	909
Arrive On Green	0.31	0.31	0.32	0.32	0.10	0.51
Sat Flow, veh/h	1723	1538	1776	1509	1691	1776
Grp Volume(v), veh/h	438	205	455	119	136	642
Grp Sat Flow(s),veh/h/ln	1723	1538	1776	1509	1691	1776
Q Serve(g_s), s	13.0	5.9	12.8	3.2	2.6	15.2
Cycle Q Clear(g_c), s	13.0	5.9	12.8	3.2	2.6	15.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	528	472	574	488	368	909
V/C Ratio(X)	0.83	0.43	0.79	0.24	0.37	0.71
Avail Cap(c_a), veh/h	626	559	613	521	387	967
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	15.3	17.0	13.7	11.2	10.3
Incr Delay (d2), s/veh	7.9	0.6	6.7	0.3	0.6	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.7	4.6	11.7	2.4	2.3	12.5
LnGrp Delay(d),s/veh	25.7	15.9	23.6	13.9	11.9	12.5
LnGrp LOS	C	B	C	B	B	B
Approach Vol, veh/h	643		574			778
Approach Delay, s/veh	22.6		21.6			12.4
Approach LOS	C		C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.9	10.4	22.8				33.2
Change Period (Y+Rc), s		6.0	6.0	6.0				6.0
Max Green Setting (Gmax), s		19.0	5.0	18.0				29.0
Max Q Clear Time (g_c+I1), s		15.0	4.6	14.8				17.2
Green Ext Time (p_c), s		0.9	0.0	2.0				5.4

Intersection Summary	
HCM 2010 Ctrl Delay	18.3
HCM 2010 LOS	B



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	150	75	690	460	180	440
Future Volume (veh/h)	150	75	690	460	180	440
Number	5	12	4	14	3	8
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	1776	1776	1776	1776
Adj Flow Rate, veh/h	170	85	784	523	205	500
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	5	5	7	7	7	7
Cap, veh/h	256	377	906	770	329	1222
Arrive On Green	0.15	0.15	0.51	0.51	0.10	0.69
Sat Flow, veh/h	1723	1538	1776	1509	1691	1776
Grp Volume(v), veh/h	170	85	784	523	205	500
Grp Sat Flow(s),veh/h/ln	1723	1538	1776	1509	1691	1776
Q Serve(g_s), s	5.7	2.7	23.7	15.9	3.1	7.5
Cycle Q Clear(g_c), s	5.7	2.7	23.7	15.9	3.1	7.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	256	377	906	770	329	1222
V/C Ratio(X)	0.66	0.23	0.87	0.68	0.62	0.41
Avail Cap(c_a), veh/h	450	550	956	813	332	1275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.6	18.5	13.2	11.2	12.7	4.2
Incr Delay (d2), s/veh	2.9	0.3	8.1	2.1	3.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.2	2.1	19.6	11.3	4.0	6.6
LnGrp Delay(d),s/veh	27.6	18.8	21.2	13.4	16.2	4.4
LnGrp LOS	C	B	C	B	B	A
Approach Vol, veh/h	255		1307			705
Approach Delay, s/veh	24.6		18.1			7.8
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		14.1	10.9	36.3				47.2
Change Period (Y+Rc), s		6.0	6.0	6.0				6.0
Max Green Setting (Gmax), s		15.0	5.0	32.0				43.0
Max Q Clear Time (g_c+I1), s		7.7	5.1	25.7				9.5
Green Ext Time (p_c), s		0.4	0.0	4.5				13.3

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 Request By: GDOT Project Manager

County: Walton GDOT District: 1 - Gainesville

Major (State) Road: SR 20 Speed Limit: 55 mph

Minor (Crossing) ST: Center. Rose. Speed Limit: 55 mph

Major ST Direction: North/South Area Type: Urban

Intersection Control: Conventional (Minor Stop)

Prepared By: Gresham Smith Analyst: C. Lincoln

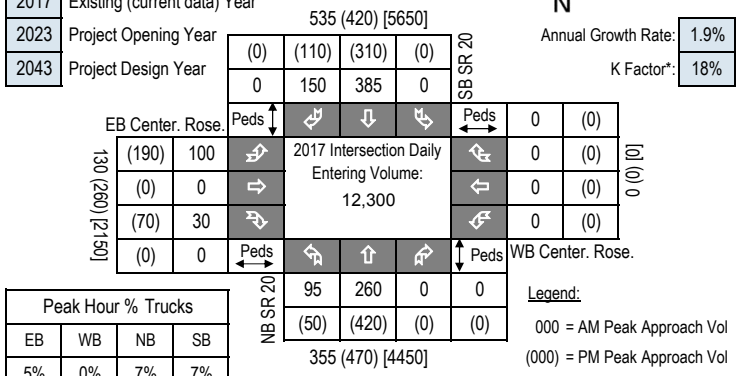
Date: 7/16/2019 Project ID:

Project Purpose: Intersection improvements

2017	Existing (current data) Year
2023	Project Opening Year
2043	Project Design Year

Annual Growth Rate: 1.9%

K Factor*: 18%



Peak Hour % Trucks			
EB	WB	NB	SB
5%	0%	7%	7%

Legend:

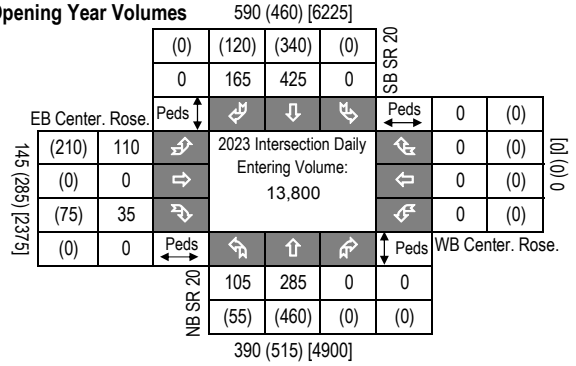
000 = AM Peak Approach Vol

(000) = PM Peak Approach Vol

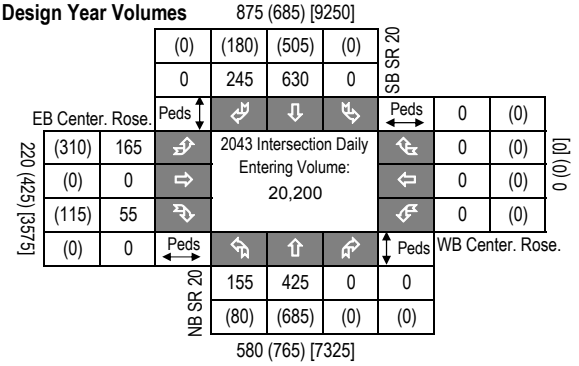
[000] = ADT Volume (Estimate)

Approach Splits: SR 20 - 0.82 / Center. Rose. - 0.18

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 2.14 | Revised 08/03/2018

GDOT PI #	0016386
Project Location:	SR 20 @ Center. Rose.
Prepared by:	Gresham Smith
Analyst:	C. Lincoln
Date:	7/16/2019

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	**Yes**	No	No	Design Year AADT > 15,000
	Single Lane Roundabout	**Yes**	**Yes**	**Yes**	No	**Yes**	No	No	Design Year AADT > 18,750
	Multilane Roundabout	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RCUT (stop control)	**Yes**	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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 LT Lanes on Both Roads Add RT Lanes on Both Roads	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unignalized (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	No	No	No	No	No	No	Not applicable; 3-legged intersection
	RCUT (signalized)	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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	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
	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 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 | GDOT District: 1 - Gainesville | Date: 7/16/2019
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ Center. Rose. | 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	6.6 sec	31.1 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.65	1.14
2043 Design Yr No-Build Peak Hr Intersection Delay	53.9 sec	199.4 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	1.72	2.81

Complete Streets Warrants Met?
- ☐ PEDESTRIANS
- ☐ BICYCLES
- ☐ TRANSIT

Crash Data: *Enter 5 most recent years of intersection crash data*

Crash Type	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	10	3	0	41%
Head-On	2	1	0	9%
Rear End	6	6	0	38%
Sideswipe - same	0	0	0	0%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	3	1	0	13%
TOTALS:	21	11	0	32

* 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	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Convert to Multilane by Design Yr*		*Add LT & RT lanes all approaches*		
Construction Cost	$2,162,000	$813,000	$773,000		
ROW Cost	$273,000	$0	$0		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$64,000	$29,000	$38,000		
Design & Contingency Cost	$604,000	$203,000	$270,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$3,103,000	$1,045,000	$1,081,000		
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	7.3 sec / 10.1 sec	37.1 sec / 130.1 sec	13.4 sec / 15.8 sec		
2043 Design Yr Build Intersection V/C	0.52 / 0.66	1.57 / 2.56	0.83 / 0.79		
Safety Analysis:					
Predefined CRF: PDO	32%	38%	39%		
Predefined CRF: Fatal/Inj	71%	31%	40%		
Predefined CRF Source:	FHWA Clearinghouse #s 236 / 237	FHWA Clearinghouse #s 270&285 / 274&288	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:					
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	6.2	2.6	-		
Rank of Control Type Alternatives:	1	2	-		

*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 2.14 | Revised 08/03/2018

Project Information

Location: SR 20 @ Center. Rose. | County: Walton | Date: 7/16/2019
GDOT PI # (or N/A): 0016386 | 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: North/South

Table 1: Existing Conditions

	NB SR 20			SB SR 20			EB Center. Rose.			WB Center. Rose.		
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	1	0	0	0
Lane Widths*	0'	12'	0'	0'	12'	0'	0'	11'	13'	0'	0'	0'
Bay Length**	0'		0'	0'		0'	0'		40'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	100'						100'					

Table 2: Proposed Conditions

	Multilane Roundabout	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	None	None
Reimbursable Utility:	Moderate	Moderate	Moderate	Moderate	Moderate
# of Driveway(s) Impacted	11	11	11	0	0
Modify/Replace Traffic Signal	0	0	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:	Single Intersection

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	5%
Traffic Control:	20%
Project Size:	0%
Prelim Engineering:	15%
Project Contingency:	20%

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

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		Add LT and RT 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	62,186	$783,220	33,600	$318,182	33,600	$318,182				
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0				
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	2400	$60,903	3,800	$72,504	4,000	$76,320				
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0				
Concrete Island (sqyd)	n/a	$51.58/syd	450	$30,871	0	$0	0	$0				
Median Landscaping	$100K/LM	$1.89/LF	3600	$9,068	0	$0	0	$0				
Typical Driveways Impacted (ea)	n/a	$7,500 ea	11	$109,725	11	$82,500	11	$82,500				
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1200	$54,409	1,900	$64,773	2,000	$68,182				
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	3707	$50,540	0	$0	0	$0				
Signing & Marking	$0	$22.73/LF	1,200	$36,277	1,900	$43,187	2,000	$45,460				
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0				
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	1	$182,575				
Lighting (per pole)	n/a	$5,607 ea	22	$164,061	0	$0	0	$0				
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0				
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0				
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0				
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0				
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0				
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0				
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0				
Grading Complete - 20%	n/a	n/a		$518,331		$116,229		$0				
Traffic Control - 20%	n/a	n/a		$345,554		$116,229		$0				
Reimbrusable Utility	n/a	n/a		$64,954		$29,057		$38,661				
Preliminary Engineering - 15%	n/a	n/a		$259,165		$87,172		$115,983				
Contigency - 20%	n/a	n/a		$345,554		$116,229		$154,644				
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$171,146		$0		$0				
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0				
ROW Multiplier - 1.6	n/a	n/a		$102,687		$0		$0				
Project Scale Reduction - 0.0%	n/a	n/a		$0		$0		$0				
Grand Total Costs				**$3,106,000**		**$1,046,000**		**$1,083,000**				

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*
Multilane Roundabout	High Speed Roundabout	F.D. Asphalt	1.33	0.0	62,186	0.0	600	0.0	600	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
Traffic Signal	Pave/Overlay Intersection	F.D. Asphalt	0.00	0.0	16,000	33,600.0	1,000	0.0	1,000	0.0
N/A	#N/A	None	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	None	#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 1-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.

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 @ Centerville Rosebud Rd	104	623	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 @ Centerville Rosebud Rd	154	928	Yes	Yes	Yes	Yes	Yes	Yes	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	110	35	105	285	425	165
Future Vol, veh/h	110	35	105	285	425	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	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	7	7	7	7
Mvmt Flow	118	38	113	306	457	177

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	546	634	0	-	0
Stage 1	546	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.17	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.263	-	-	-
Pot Cap-1 Maneuver	239	532	925	-	-	-
Stage 1	574	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	204	532	925	-	-	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	574	-	-	-	-	-
Stage 2	497	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	44.1	2.5	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	925	-	240	-	-
HCM Lane V/C Ratio	0.122	-	0.65	-	-
HCM Control Delay (s)	9.4	0	44.1	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.4	-	4	-	-

Intersection	
Int Delay, s/veh	31.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	210	75	55	460	340	120
Future Vol, veh/h	210	75	55	460	340	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	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	5	5	5	5
Mvmt Flow	228	82	60	500	370	130

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1055	435	500	0	-	0
Stage 1	435	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.15	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.245	-	-	-
Pot Cap-1 Maneuver	248	617	1049	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 228	617	1049	-	-	-
Mov Cap-2 Maneuver	~ 228	-	-	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	136	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1049	-	273	-	-
HCM Lane V/C Ratio	0.057	-	1.135	-	-
HCM Control Delay (s)	8.6	0	136	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	13.3	-	-

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

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	53.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	150	45	140	395	580	230
Future Vol, veh/h	150	45	140	395	580	230
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	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	7	7	7	7
Mvmt Flow	161	48	151	425	624	247

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1473	747	871	0	-	0
Stage 1	747	-	-	-	-	-
Stage 2	726	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.17	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.263	-	-	-
Pot Cap-1 Maneuver	~ 137	408	753	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	474	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 101	408	753	-	-	-
Mov Cap-2 Maneuver	~ 101	-	-	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	350	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 417.5	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	753	-	122	-	-
HCM Lane V/C Ratio	0.2	-	1.719	-	-
HCM Control Delay (s)	11	0	$ 417.5	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.7	-	15.9	-	-

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

Intersection	
Int Delay, s/veh	199.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	285	110	75	635	470	165
Future Vol, veh/h	285	110	75	635	470	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	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	5	5	5	5
Mvmt Flow	310	120	82	690	511	179

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1454	601	690	0	-	0
Stage 1	601	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.15	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.245	-	-	-
Pot Cap-1 Maneuver	~ 142	497	891	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	414	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 121	497	891	-	-	-
Mov Cap-2 Maneuver	~ 121	-	-	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	352	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 876.4	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	891	-	153	-	-
HCM Lane V/C Ratio	0.091	-	2.806	-	-
HCM Control Delay (s)	9.4	0	$ 876.4	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	38.7	-	-

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

Gresham Smith

Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

2023 Opening Year Single Lane Analysis

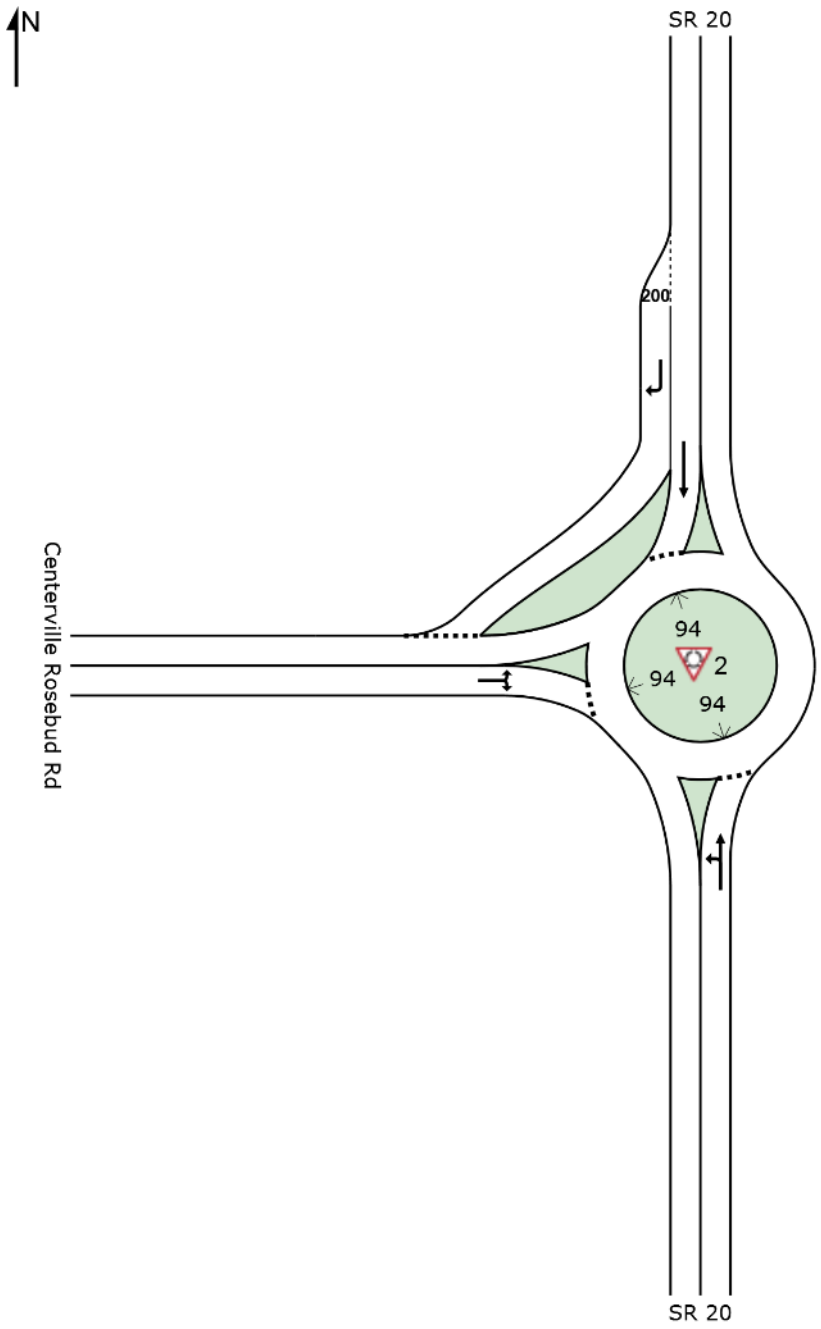
Single Lane Design Life Analysis

2043 Design Year Multi-Lane Analysis

SITE LAYOUT

Site: 2 [2023 AM - Single Lane]

SR 20 @ Centerville Rosebud Rd
Roundabout



LANE SUMMARY

Site: 2 [2023 AM - Single Lane]

SR 20 @ Centerville Rosebud Rd
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: SR 20													
Lane 1[d]	415	6.5	1150	0.361	100	6.7	LOS A	2.7	72.1	Full	1600	0.0	0.0
Approach	415	6.5		0.361		6.7	LOS A	2.7	72.1				
North: SR 20													
Lane 1[d]	452	6.5	1311	0.345	100	5.9	LOS A	2.5	66.2	Full	1600	0.0	0.0
Lane 2	176	6.5	1257	0.140	100	4.0	LOS A	0.8	21.8	Short	200	0.0	NA
Approach	628	6.5		0.345		5.4	LOS A	2.5	66.2				
West: Centerville Rosebud Rd													
Lane 1[d]	154	5.0	756	0.204	100	7.0	LOS A	1.2	31.3	Full	1600	0.0	0.0
Approach	154	5.0		0.204		7.0	LOS A	1.2	31.3				
Intersection	1197	6.3		0.361		6.0	LOS A	2.7	72.1				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 2 [2023 PM - Single Lane]

SR 20 @ Centerville Rosebud Rd
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: SR 20													
Lane 1[d]	560	5.0	1015	0.552	100	10.6	LOS B	4.8	125.0	Full	1600	0.0	0.0
Approach	560	5.0		0.552		10.6	LOS B	4.8	125.0				
North: SR 20													
Lane 1[d]	370	5.0	1425	0.259	100	4.7	LOS A	1.9	49.3	Full	1600	0.0	0.0
Lane 2	130	5.0	1362	0.096	100	3.4	LOS A	0.6	15.4	Short	200	0.0	NA
Approach	500	5.0		0.259		4.4	LOS A	1.9	49.3				
West: Centerville Rosebud Rd													
Lane 1[d]	310	3.5	851	0.364	100	8.4	LOS A	2.4	60.5	Full	1600	0.0	0.0
Approach	310	3.5		0.364		8.4	LOS A	2.4	60.5				
Intersection	1370	4.7		0.552		7.8	LOS A	4.8	125.0				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

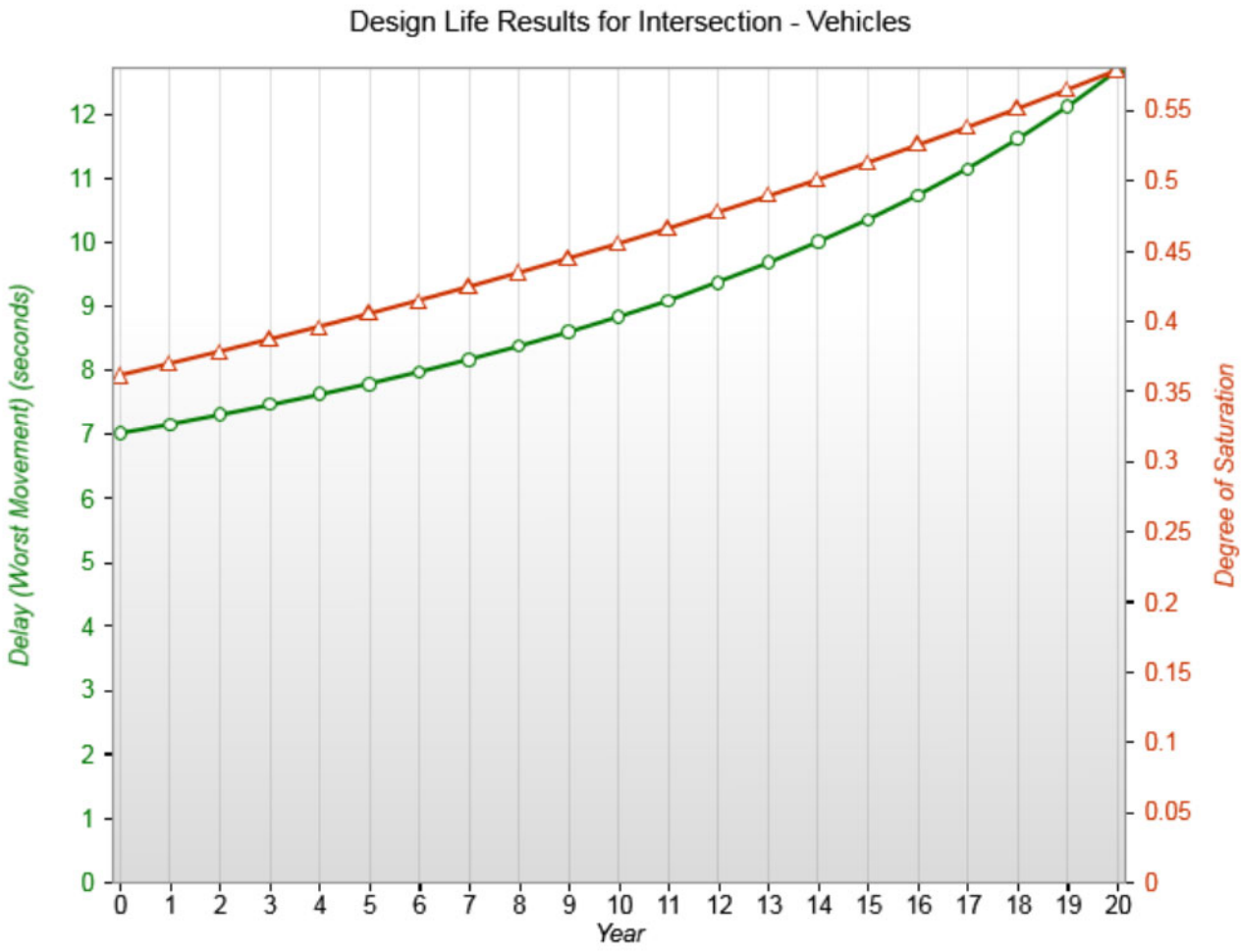
d Dominant lane on roundabout approach

GRAPHS - Design Life Analysis

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

Site: 2 [2023 AM - Single Lane - DL]

SR 20 @ Centerville Rosebud Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years

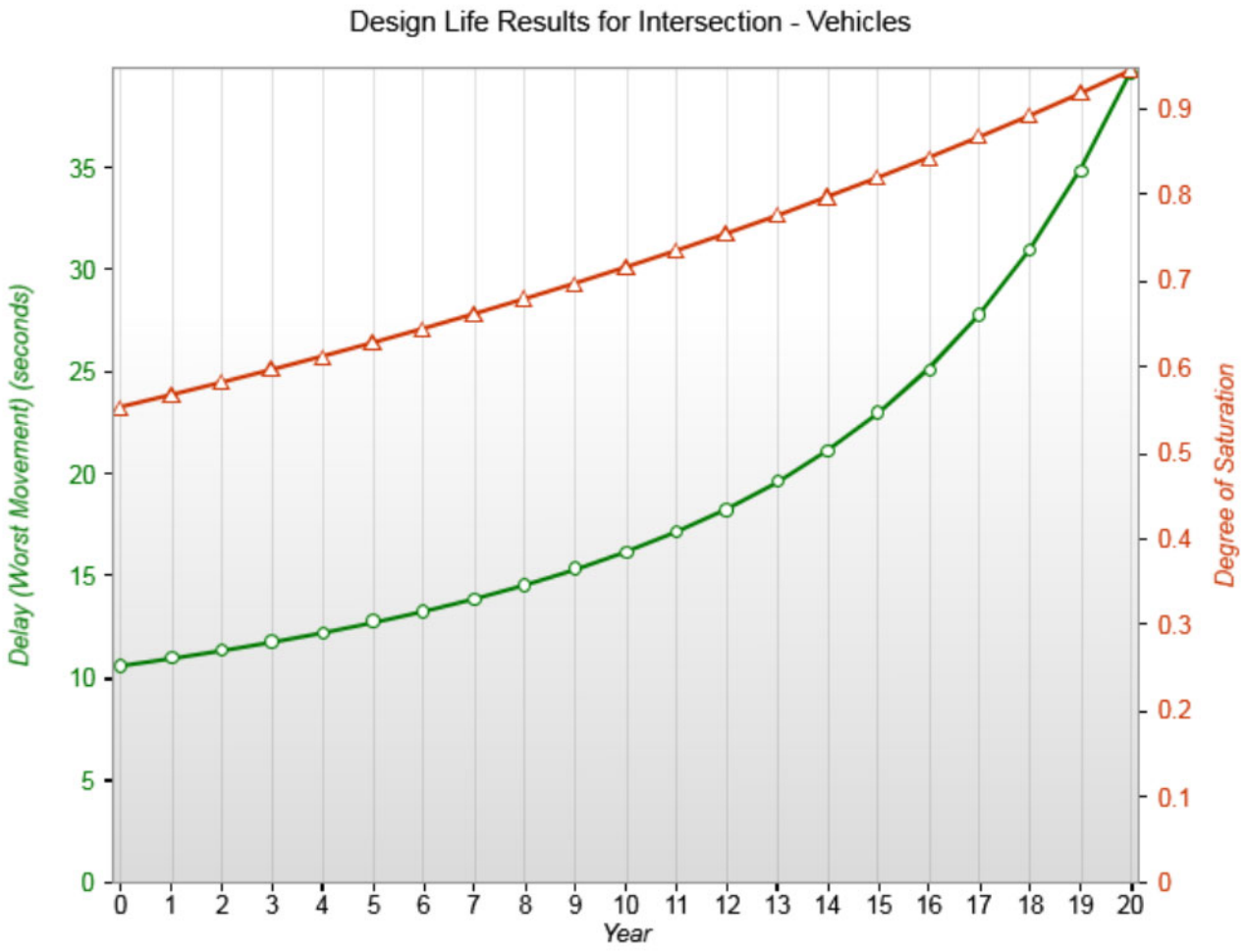


GRAPHS - Design Life Analysis

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

Site: 2 [2023 PM - Single Lane - DL]

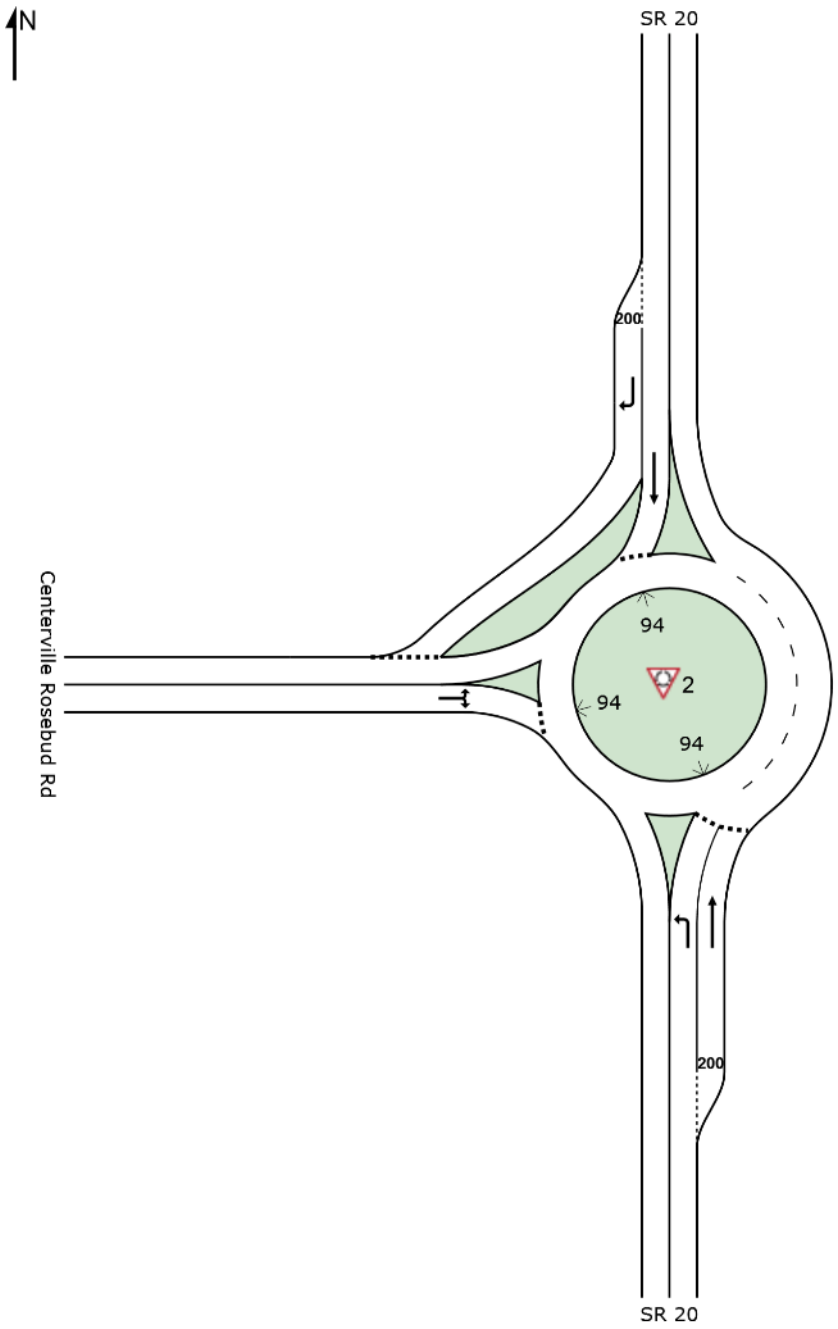
SR 20 @ Centerville Rosebud Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 16 years



SITE LAYOUT

Site: 2 [2043 AM - Multi Lane]

SR 20 @ Centerville Rosebud Rd
Roundabout



Organisation: GRESHAM SMITH AND PARTNERS | Created: Monday, February 18, 2019 10:42:04 AM
Project: \\global.gsp\data\nf\at_nf02\2430601\01Work\03Tech\TR\Traffic\Analysis\SIDRA\SR 20 @ Centerville Rosebud Rd\Centerville Rosebud Rd.sip7

LANE SUMMARY

Site: 2 [2043 AM - Multi Lane]

SR 20 @ Centerville Rosebud Rd
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: SR 20													
Lane 1	165	6.5	940	0.175	100	5.5	LOS A	1.1	28.9	Full	1600	0.0	0.0
Lane 2[d]	452	6.5	1303	0.347	100	6.0	LOS A	2.7	72.0	Short	200	0.0	NA
Approach	617	6.5		0.347		5.8	LOS A	2.7	72.0				
North: SR 20													
Lane 1[d]	670	6.5	1300	0.516	100	8.3	LOS A	4.5	118.8	Full	1600	0.0	0.0
Lane 2	261	6.5	1256	0.207	100	4.7	LOS A	1.3	34.6	Short	200	0.0	NA
Approach	931	6.5		0.516		7.2	LOS A	4.5	118.8				
West: Centerville Rosebud Rd													
Lane 1[d]	234	5.0	621	0.377	100	11.1	LOS B	2.6	67.6	Full	1600	0.0	0.0
Approach	234	5.0		0.377		11.1	LOS B	2.6	67.6				
Intersection	1782	6.3		0.516		7.3	LOS A	4.5	118.8				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 2 [2043 PM - Multi Lane]

SR 20 @ Centerville Rosebud Rd
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: SR 20													
Lane 1	87	5.0	717	0.121	100	6.3	LOS A	0.7	18.3	Full	1600	0.0	0.0
Lane 2[d]	745	5.0	1135	0.656	100	12.3	LOS B	9.3	242.0	Short	200	0.0	NA
Approach	832	5.0		0.656		11.7	LOS B	9.3	242.0				
North: SR 20													
Lane 1[d]	549	5.0	1443	0.380	100	5.9	LOS A	3.1	80.2	Full	1600	0.0	0.0
Lane 2	196	5.0	1391	0.141	100	3.7	LOS A	0.9	23.1	Short	200	0.0	NA
Approach	745	5.0		0.380		5.3	LOS A	3.1	80.2				
West: Centerville Rosebud Rd													
Lane 1[d]	462	3.5	762	0.606	100	14.8	LOS B	6.7	171.8	Full	1600	0.0	0.0
Approach	462	3.5		0.606		14.8	LOS B	6.7	171.8				
Intersection	2038	4.7		0.656		10.1	LOS B	9.3	242.0				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Gresham Smith

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ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	37.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	165	55	155	425	630	245
Future Vol, veh/h	165	55	155	425	630	245
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	175	150	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	177	59	167	457	677	263

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1467	677	677	0	-	0
Stage 1	677	-	-	-	-	-
Stage 2	790	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.17	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.263	-	-	-
Pot Cap-1 Maneuver	~ 139	448	892	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 113	448	892	-	-	-
Mov Cap-2 Maneuver	~ 113	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	359	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	275.5	2.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	892	-	113	448	-	-
HCM Lane V/C Ratio	0.187	-	1.57	0.132	-	-
HCM Control Delay (s)	10	-	$ 362.5	14.3	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.7	-	13.1	0.5	-	-

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

Intersection	
Int Delay, s/veh	130.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	310	115	80	685	505	180
Future Vol, veh/h	310	115	80	685	505	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	175	150	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	5	7	7	7	7
Mvmt Flow	333	124	86	737	543	194

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1452	543	543	0	-	0
Stage 1	543	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.17	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.263	-	-	-
Pot Cap-1 Maneuver	~ 142	534	1001	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 130	534	1001	-	-	-
Mov Cap-2 Maneuver	~ 130	-	-	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	355	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 572.2	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1001	-	130	534	-	-
HCM Lane V/C Ratio	0.086	-	2.564	0.232	-	-
HCM Control Delay (s)	8.9	-	$ 779.3	13.8	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.3	-	29.6	0.9	-	-

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

Gresham Smith

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ALTERNATIVE 3 ANALYSIS

2043 Design Year

Synchro Output

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	165	55	155	425	630	245
Future Volume (veh/h)	165	55	155	425	630	245
Number	1	16	7	4	8	18
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	1776	1776	1776	1776
Adj Flow Rate, veh/h	177	59	167	457	677	263
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	5	5	7	7	7	7
Cap, veh/h	273	403	381	1166	819	696
Arrive On Green	0.16	0.16	0.10	0.66	0.46	0.46
Sat Flow, veh/h	1723	1538	1691	1776	1776	1509
Grp Volume(v), veh/h	177	59	167	457	677	263
Grp Sat Flow(s),veh/h/ln	1723	1538	1691	1776	1776	1509
Q Serve(g_s), s	5.2	1.6	2.4	6.4	18.0	6.2
Cycle Q Clear(g_c), s	5.2	1.6	2.4	6.4	18.0	6.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	273	403	381	1166	819	696
V/C Ratio(X)	0.65	0.15	0.44	0.39	0.83	0.38
Avail Cap(c_a), veh/h	509	613	393	1278	918	780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	15.3	10.0	4.3	12.7	9.5
Incr Delay (d2), s/veh	2.6	0.2	0.8	0.2	5.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.8	2.8	2.4	5.6	15.1	4.7
LnGrp Delay(d),s/veh	23.9	15.5	10.8	4.5	18.5	9.9
LnGrp LOS	C	B	B	A	B	A
Approach Vol, veh/h	236			624	940	
Approach Delay, s/veh	21.8			6.2	16.1	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				40.6		13.6	10.6	30.0
Change Period (Y+Rc), s				6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s				38.0		15.0	5.0	27.0
Max Q Clear Time (g_c+I1), s				8.4		7.2	4.4	20.0
Green Ext Time (p_c), s				8.5		0.4	0.0	4.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.4
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	310	115	80	685	505	180
Future Volume (veh/h)	310	115	80	685	505	180
Number	1	16	7	4	8	18
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	1776	1776	1776	1776
Adj Flow Rate, veh/h	333	124	86	737	543	194
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	5	5	7	7	7	7
Cap, veh/h	423	510	362	1010	693	589
Arrive On Green	0.25	0.25	0.09	0.57	0.39	0.39
Sat Flow, veh/h	1723	1538	1691	1776	1776	1509
Grp Volume(v), veh/h	333	124	86	737	543	194
Grp Sat Flow(s),veh/h/ln	1723	1538	1691	1776	1776	1509
Q Serve(g_s), s	9.7	3.2	1.4	16.5	14.5	4.8
Cycle Q Clear(g_c), s	9.7	3.2	1.4	16.5	14.5	4.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	423	510	362	1010	693	589
V/C Ratio(X)	0.79	0.24	0.24	0.73	0.78	0.33
Avail Cap(c_a), veh/h	512	589	405	1121	758	645
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	13.1	9.6	8.6	14.4	11.5
Incr Delay (d2), s/veh	6.6	0.2	0.3	2.2	5.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.2	5.6	1.2	13.4	12.5	3.7
LnGrp Delay(d),s/veh	25.6	13.3	9.9	10.7	19.4	11.8
LnGrp LOS	C	B	A	B	B	B
Approach Vol, veh/h	457			823	737	
Approach Delay, s/veh	22.3			10.7	17.4	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				35.6		18.2	9.6	26.0
Change Period (Y+Rc), s				6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s				33.0		15.0	5.0	22.0
Max Q Clear Time (g_c+I1), s				18.5		11.7	3.4	16.5
Green Ext Time (p_c), s				7.1		0.5	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

ICE Version 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 Request By: GDOT Project Manager

County: Walton GDOT District: 1 - Gainesville

Major (State) Road: SR 20 Speed Limit: 55 mph

Minor (Crossing) ST: McCullers Rd Speed Limit: 45 mph

Major ST Direction: East/West Area Type: Urban

Intersection Control: Conventional (Minor Stop)

Prepared By: Gresham Smith Analyst: C. Lincoln

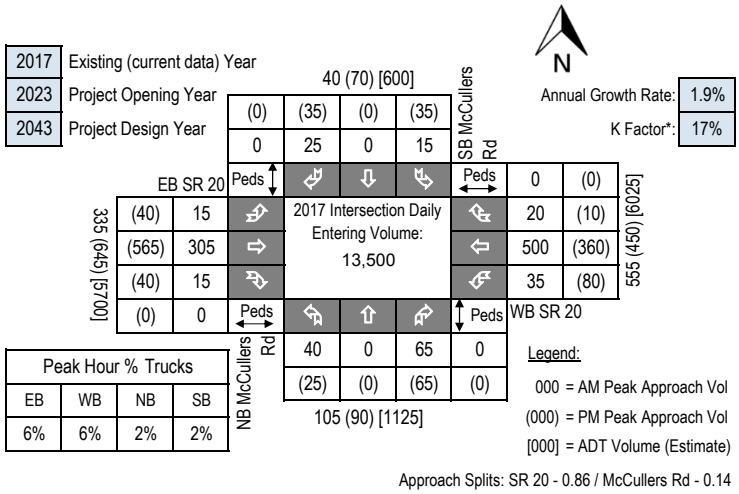
Date: 7/16/2019 Project ID:

Project Purpose: Intersection improvements

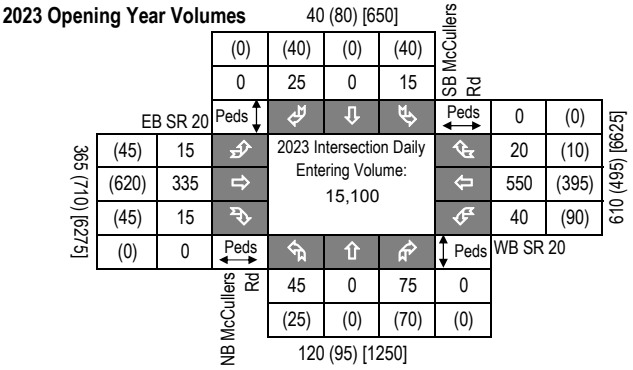
2017	Existing (current data) Year
2023	Project Opening Year
2043	Project Design Year

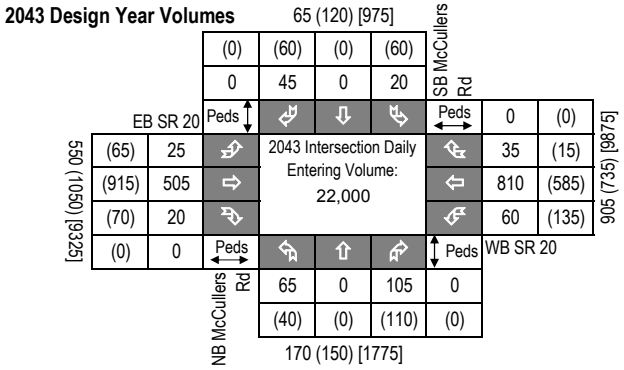
Annual Growth Rate: 1.9%

K Factor*: 17%



Approach Splits: SR 20 - 0.86 / McCullers Rd - 0.14





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 2.14 | Revised 08/03/2018

GDOT PI #	0016386
Project Location:	SR 20 @ McCullers Rd
Prepared by:	Gresham Smith
Analyst:	C. Lincoln
Date:	7/16/2019

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	**Yes**	No	No	Design Year AADT > 15,000
	Single Lane Roundabout	**Yes**	**Yes**	**Yes**	No	**Yes**	No	No	Stage 2 analysis determined multi-lane needed by design yr
	Multilane Roundabout	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RCUT (stop control)	**Yes**	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	RIRO w/down stream U-Turn	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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
	Add LT Lanes on Both Roads Add RT Lanes on SR 20	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unignalized (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	No	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	RCUT (signalized)	No	**Yes**	No	No	No	No	No	Increased minor street left turn delay; additional r/w required for median
	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	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
	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 2.14 | Revised 08/03/2018

GDOT PI # (or N/A): 0016386 | GDOT District: 1 - Gainesville | Date: 7/16/2019
County: Walton | Area Type: Urban | Agency/Firm: Gresham Smith
Project Location: SR 20 @ McCullers Rd | 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	3.0 sec	4.3 sec
2023 Opening Yr No-Build Peak Hr Intersection V/C	0.33	0.37
2043 Design Yr No-Build Peak Hr Intersection Delay	6.9 sec	22.5 sec
2043 Design Yr No-Build Peak Hr Intersection V/C ratio	0.72	1.12

Complete Streets Warrants Met?
- ☐ PEDESTRIANS
- ☐ BICYCLES
- ☐ TRANSIT

Crash Data: *Enter 5 most recent years of intersection crash data*

Crash Type	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Angle	7	5	0	23%
Head-On	3	1	0	8%
Rear End	18	14	0	60%
Sideswipe - same	1	1	0	4%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	2	1	0	6%
TOTALS:	31	22	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:	Multilane Roundabout	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Project Cost: (From CostEst Worksheet)	*Convert to Multilane by Design Yr*		*Add LT bays all approaches*		
Construction Cost	$2,203,000	$752,000	$729,000		
ROW Cost	$85,000	$0	$0		
Environmental Cost	$0	$0	$0		
Reimbursable Utility Cost	$66,000	$26,000	$36,000		
Design & Contingency Cost	$616,000	$188,000	$255,000		
Cost Adjustment (justification req'd)	0%	0%	0%		
Total Cost	$2,970,000	$966,000	$1,020,000		
Traffic Operations:					
Traffic Analysis Software Used	SIDRA 7	Synchro 9	Synchro 9		
Analysis Period	AM / PM Peak Hr	AM / PM Peak Hr	AM / PM Peak Hr		
2043 Design Yr Build Intersection Delay	9.2 sec / 9.7 sec	11.3 sec / 58.8 sec	22.7 sec / 24.2 sec		
2043 Design Yr Build Intersection V/C	0.70 / 0.63	1.02 / 3.43	0.92 / 0.93		
Safety Analysis:					
Predefined CRF: PDO	32%	34%	39%		
Predefined CRF: Fatal/Inj	71%	28%	40%		
Predefined CRF Source:	FHWA Clearinghouse #s 236 / 237	FHWA Clearinghouse #s 270&285 / 274&288	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*				
Local Community Support	Unknown	Unknown	Unknown		
GDOT Support	Unknown	Unknown	Unknown		
Final ICE Stage 2 Score:	6.1	3.0	-		
Rank of Control Type Alternatives:	1	2	-		

[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 2.14 | Revised 08/03/2018

Project Information

Location: SR 20 @ McCullers Rd
GDOT PI # (or N/A): 0016386
Existing Intersection Control: Conventional (Minor Stop)
Type of Analysis: Conventional Non-Safety Funded Project

County: Walton
Area Type: Urban
GDOT District: 1 - Gainesville

Date: 7/16/2019
Agency/Firm: Gresham Smith
Analyst: C. Lincoln
Major Street Direction: East/West

Table 1: Existing Conditions

	EB SR 20			WB SR 20			NB McCullers Rd			SB McCullers Rd		
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	1	0
Lane Widths*	0'	12'	0'	0'	12'	0'	0'	10'	0'	0'	10'	0'
Bay Length**	0'		0'	0'		0'	0'		0'	0'		0'
Median Width		0'			0'			0'			0'	
Right-of-Way	100'						70'					

Table 2: Proposed Conditions

	Single Lane Roundabout	Add LT and RT Lanes	Traffic Signal	N/A	N/A
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	None	None
Reimbursable Utility:	Moderate	Moderate	Moderate	Moderate	Moderate
# of Driveway(s) Impacted	15	15	15	0	0
Modify/Replace Traffic Signal	0	0	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:	Single Intersection

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	5%
Traffic Control:	20%
Project Size:	0%
Prelim Engineering:	15%
Project Contingency:	20%

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

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	Single Lane Roundabout		Add LT and RT 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	34,624	$566,906	25,800	$244,318	25,800	$244,318				
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0				
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	2000	$65,979	3,800	$72,504	4,000	$76,320				
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0	0	$0				
Concrete Island (sqyd)	n/a	$51.58/syd	480	$42,807	0	$0	0	$0				
Median Landscaping	$100K/LM	$1.89/LF	3000	$9,824	0	$0	0	$0				
Typical Driveways Impacted (ea)	n/a	$7,500 ea	15	$149,625	15	$112,500	15	$112,500				
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1000	$45,341	1,900	$64,773	2,000	$68,182				
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	5278	$93,542	0	$0	0	$0				
Signing & Marking	$0	$22.73/LF	1,000	$30,231	1,900	$43,187	2,000	$45,460				
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0				
New Traffic Signal (Mast Arms)	674-1000	$182,575ea	0	$0	0	$0	1	$182,575				
Lighting (per pole)	n/a	$5,607 ea	22	$164,061	0	$0	0	$0				
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0	0	$0				
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	0	$0	0	$0				
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0	0	$0				
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0	0	$0				
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0	0	$0				
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0				
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0	0	$0				
Grading Complete - 20%	n/a	n/a		$466,158		$107,456		$0				
Traffic Control - 20%	n/a	n/a		$310,772		$107,456		$0				
Reimbrusable Utility	n/a	n/a		$58,416		$26,864		$36,468				
Preliminary Engineering - 15%	n/a	n/a		$233,079		$80,592		$109,403				
Contigency - 20%	n/a	n/a		$310,772		$107,456		$145,871				
ROW Cost/Acre: Mixed (Average)	n/a	$128,625ac		$93,120		$0		$0				
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0				
ROW Multiplier - 1.6	n/a	n/a		$55,872		$0		$0				
Project Scale Reduction - 0.0%	n/a	n/a		$0		$0		$0				
Grand Total Costs				**$2,697,000**		**$967,000**		**$1,021,000**				

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*
Single Lane Roundabout	High Speed Roundabout	F.D. Asphalt	0.72	0.0	34,624	0.0	500	0.0	500	0.0
Add LT and RT Lanes	N/A	F.D. Asphalt	0.00	0.0	25,800	0.0	1,000	0.0	900	0.0
Traffic Signal	Pave/Overlay Intersection	F.D. Asphalt	0.00	0.0	16,000	25,800.0	1,000	0.0	1,000	0.0
N/A	#N/A	None	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
N/A	#N/A	None	#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 1-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 @ McCullers Rd	22	722	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 @ McCullers Rd	31	1075	No	No	No	No	No	No	No

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2023 Opening Year

Synchro Output

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	350	15	40	575	45	75
Future Vol, veh/h	350	15	40	575	45	75
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, %	6	6	6	6	2	2
Mvmt Flow	372	16	43	612	48	80

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	388	0	1077	380
Stage 1	-	-	-	-	380	-
Stage 2	-	-	-	-	697	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1149	-	242	667
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1149	-	228	667
Mov Cap-2 Maneuver	-	-	-	-	228	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	466	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	18.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	387	-	-	1149	-
HCM Lane V/C Ratio	0.33	-	-	0.037	-
HCM Control Delay (s)	18.8	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	410	590	20	15	25
Future Vol, veh/h	15	410	590	20	15	25
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	93	93	93	93	93	93
Heavy Vehicles, %	6	6	6	6	2	2
Mvmt Flow	16	441	634	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	656	0	-	0	1118	645
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	473	-
Critical Hdwy	4.16	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.254	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	913	-	-	-	229	472
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	627	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	913	-	-	-	224	472
Mov Cap-2 Maneuver	-	-	-	-	224	-
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	613	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	17.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	913	-	-	-	334
HCM Lane V/C Ratio	0.018	-	-	-	0.129
HCM Control Delay (s)	9	0	-	-	17.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	665	45	90	435	25	70
Future Vol, veh/h	665	45	90	435	25	70
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	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	700	47	95	458	26	74

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	747	0	1371	724
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	647	-
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	-	-	848	-	161	426
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	521	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	848	-	137	426
Mov Cap-2 Maneuver	-	-	-	-	137	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	443	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	25.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	274	-	-	848	-
HCM Lane V/C Ratio	0.365	-	-	0.112	-
HCM Control Delay (s)	25.5	-	-	9.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	1.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	45	690	485	10	40	40
Future Vol, veh/h	45	690	485	10	40	40
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	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	47	726	511	11	42	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	521	0	-	0	1337	516
Stage 1	-	-	-	-	516	-
Stage 2	-	-	-	-	821	-
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	1030	-	-	-	169	559
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	432	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1030	-	-	-	156	559
Mov Cap-2 Maneuver	-	-	-	-	156	-
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	399	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	27.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1030	-	-	-	244
HCM Lane V/C Ratio	0.046	-	-	-	0.345
HCM Control Delay (s)	8.7	0	-	-	27.3
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	1.5

Peak Hour Delays

Based on SYNCHRO Model

2023 AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	15	335	15	40	550	20	45	0	75	15	0	25
Delay (s)	9	0	0	8.3	0	0	18.8	27.8	18.8	17.4	25.7	17.4

	EB	WB	NB	SB	Overall Delay (s)
Volume	365	610	120	40	
Delay (s)	0.4	0.5	18.8	17.4	3.0

Peak Hour Delays

Based on SYNCHRO Model

2023 PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	45	620	45	90	395	10	25	0	70	40	0	40
Delay (s)	8.7	0	0	9.8	0	0	25.5	34.2	25.5	27.3	37.1	27.3

	EB	WB	NB	SB	Overall Delay (s)
Volume	710	495	95	80	
Delay (s)	0.6	1.8	25.5	27.3	4.3

Gresham Smith

Gresham Smith

Genuine Ingenuity

NO BUILD ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	5.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	485	20	55	795	60	100
Future Vol, veh/h	485	20	55	795	60	100
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, %	6	6	6	6	2	2
Mvmt Flow	516	21	59	846	64	106

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	537	0	1490	527
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	963	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1011	-	136	551
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	370	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1011	-	121	551
Mov Cap-2 Maneuver	-	-	-	-	121	-
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	329	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	51.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	236	-	-	1011	-
HCM Lane V/C Ratio	0.721	-	-	0.058	-
HCM Control Delay (s)	51.8	-	-	8.8	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	4.9	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	560	810	30	25	40
Future Vol, veh/h	25	560	810	30	25	40
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	93	93	93	93	93	93
Heavy Vehicles, %	6	6	6	6	2	2
Mvmt Flow	27	602	871	32	27	43

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	903	0	-	0	1543	887
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	656	-
Critical Hdwy	4.16	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.254	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	737	-	-	-	126	343
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	737	-	-	-	119	343
Mov Cap-2 Maneuver	-	-	-	-	119	-
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	488	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	32.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	737	-	-	-	199
HCM Lane V/C Ratio	0.036	-	-	-	0.351
HCM Control Delay (s)	10.1	0	-	-	32.6
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	1.5

Intersection	
Int Delay, s/veh	14.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	915	60	125	595	40	95
Future Vol, veh/h	915	60	125	595	40	95
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	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	963	63	132	626	42	100

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1026	0	1884	995
Stage 1	-	-	-	-	995	-
Stage 2	-	-	-	-	889	-
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	-	-	665	-	78	297
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	402	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	665	-	54	297
Mov Cap-2 Maneuver	-	-	-	-	54	-
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	280	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	182.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	127	-	-	665	-
HCM Lane V/C Ratio	1.119	-	-	0.198	-
HCM Control Delay (s)	182.5	-	-	11.7	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	8.3	-	-	0.7	-

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	950	665	15	55	55
Future Vol, veh/h	60	950	665	15	55	55
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	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	63	1000	700	16	58	58

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	716	0	-	0	1834	708
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	1126	-
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	871	-	-	-	84	435
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	310	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	871	-	-	-	70	435
Mov Cap-2 Maneuver	-	-	-	-	70	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	259	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	138.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	871	-	-	-	121
HCM Lane V/C Ratio	0.073	-	-	-	0.957
HCM Control Delay (s)	9.5	0	-	-	138.7
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	6.3

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	505	20	60	810	35	65	0	105	20	0	45
Delay (s)	10.1	0	0	8.8	0	0	51.8	61.9	51.8	32.6	41.4	32.6

	EB	WB	NB	SB	Overall Delay (s)
Volume	550	905	170	65	
Delay (s)	0.5	0.6	51.8	32.6	6.9

Peak Hour Delays

Based on SYNCHRO Model

2043 PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	65	915	70	135	585	15	40	0	110	60	0	60
Delay (s)	9.5	0	0	11.7	0	0	182.5	192.0	182.5	138.7	150.4	138.7

	EB	WB	NB	SB	Overall Delay (s)
Volume	1050	735	150	120	
Delay (s)	0.6	2.1	182.5	138.7	22.5

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Genuine Ingenuity

ALTERNATIVE 1 ANALYSIS

2023 Opening Year Single Lane Analysis

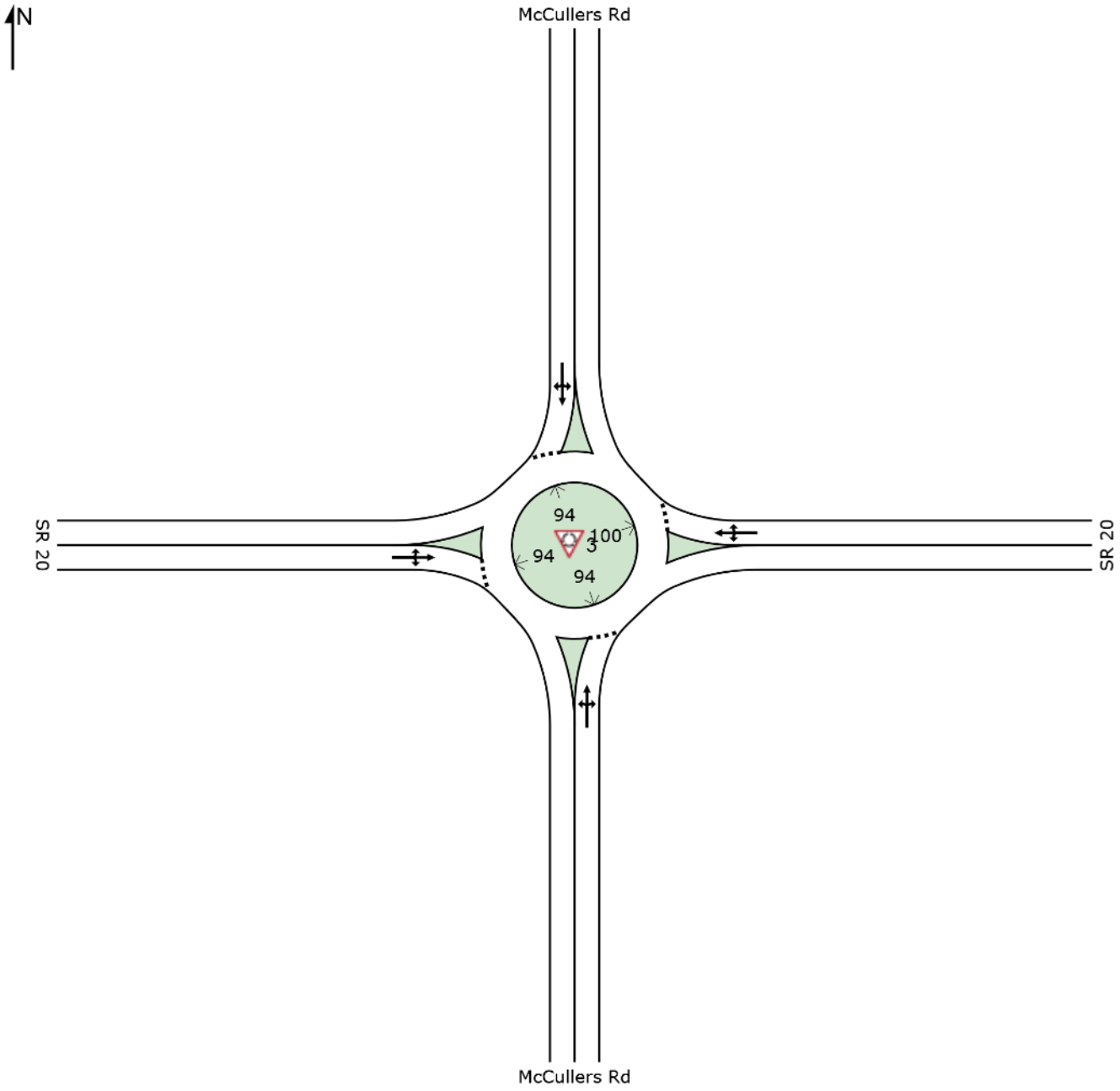
Single Lane Design Life Analysis

2043 Design Year Multi-Lane Analysis

SITE LAYOUT

Site: 3 [2023 AM - Single Lane]

SR 20 @ McCullers Rd
Roundabout



LANE SUMMARY

Site: 3 [2023 AM - Single Lane]

SR 20 @ McCullers Rd
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: McCullers Rd													
Lane 1[d]	127	2.0	878	0.145	100	5.5	LOS A	0.8	20.7	Full	1600	0.0	0.0
Approach	127	2.0		0.145		5.5	LOS A	0.8	20.7				
East: SR 20													
Lane 1[d]	642	5.5	1363	0.471	100	7.3	LOS A	4.1	108.2	Full	1600	0.0	0.0
Approach	642	5.5		0.471		7.3	LOS A	4.1	108.2				
North: McCullers Rd													
Lane 1[d]	43	2.0	594	0.073	100	6.9	LOS A	0.4	10.3	Full	1600	0.0	0.0
Approach	43	2.0		0.073		6.9	LOS A	0.4	10.3				
West: SR 20													
Lane 1[d]	384	5.5	1291	0.298	100	5.5	LOS A	2.0	52.2	Full	1600	0.0	0.0
Approach	384	5.5		0.298		5.5	LOS A	2.0	52.2				
Intersection	1197	5.0		0.471		6.5	LOS A	4.1	108.2				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 3 [2023 PM - Single Lane]

SR 20 @ McCullers Rd
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: McCullers Rd													
Lane 1[d]	101	2.0	573	0.176	100	8.5	LOS A	1.1	28.7	Full	1600	0.0	0.0
Approach	101	2.0		0.176		8.5	LOS A	1.1	28.7				
East: SR 20													
Lane 1[d]	521	4.5	1333	0.391	100	6.4	LOS A	3.0	78.4	Full	1600	0.0	0.0
Approach	521	4.5		0.391		6.4	LOS A	3.0	78.4				
North: McCullers Rd													
Lane 1[d]	85	2.0	685	0.124	100	6.6	LOS A	0.7	17.6	Full	1600	0.0	0.0
Approach	85	2.0		0.124		6.6	LOS A	0.7	17.6				
West: SR 20													
Lane 1[d]	747	4.5	1187	0.630	100	11.2	LOS B	6.2	160.8	Full	1600	0.0	0.0
Approach	747	4.5		0.630		11.2	LOS B	6.2	160.8				
Intersection	1455	4.2		0.630		9.0	LOS A	6.2	160.8				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

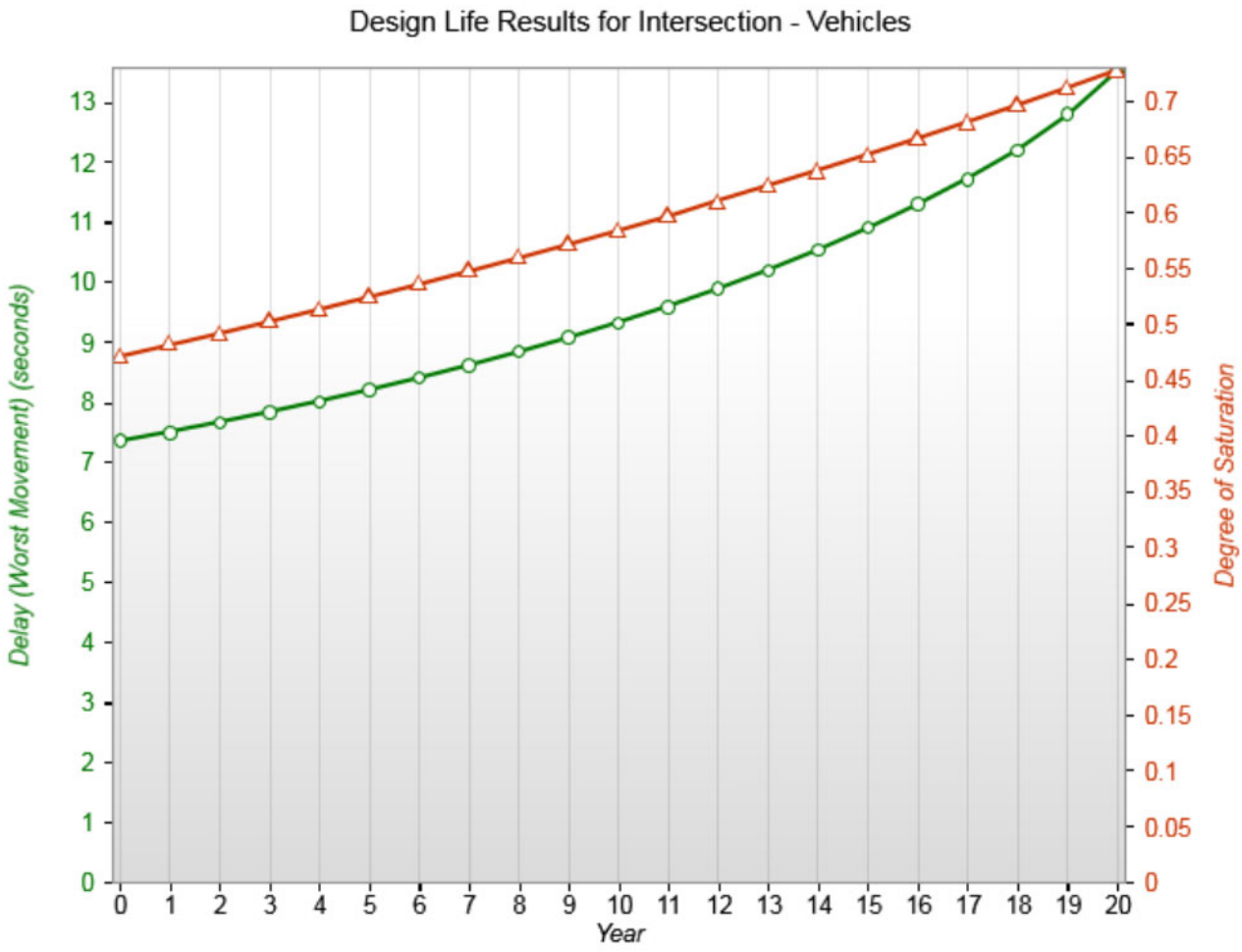
d Dominant lane on roundabout approach

GRAPHS - Design Life Analysis

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

Site: 3 [2023 AM - Single Lane - DL]

SR 20 @ McCullers Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years

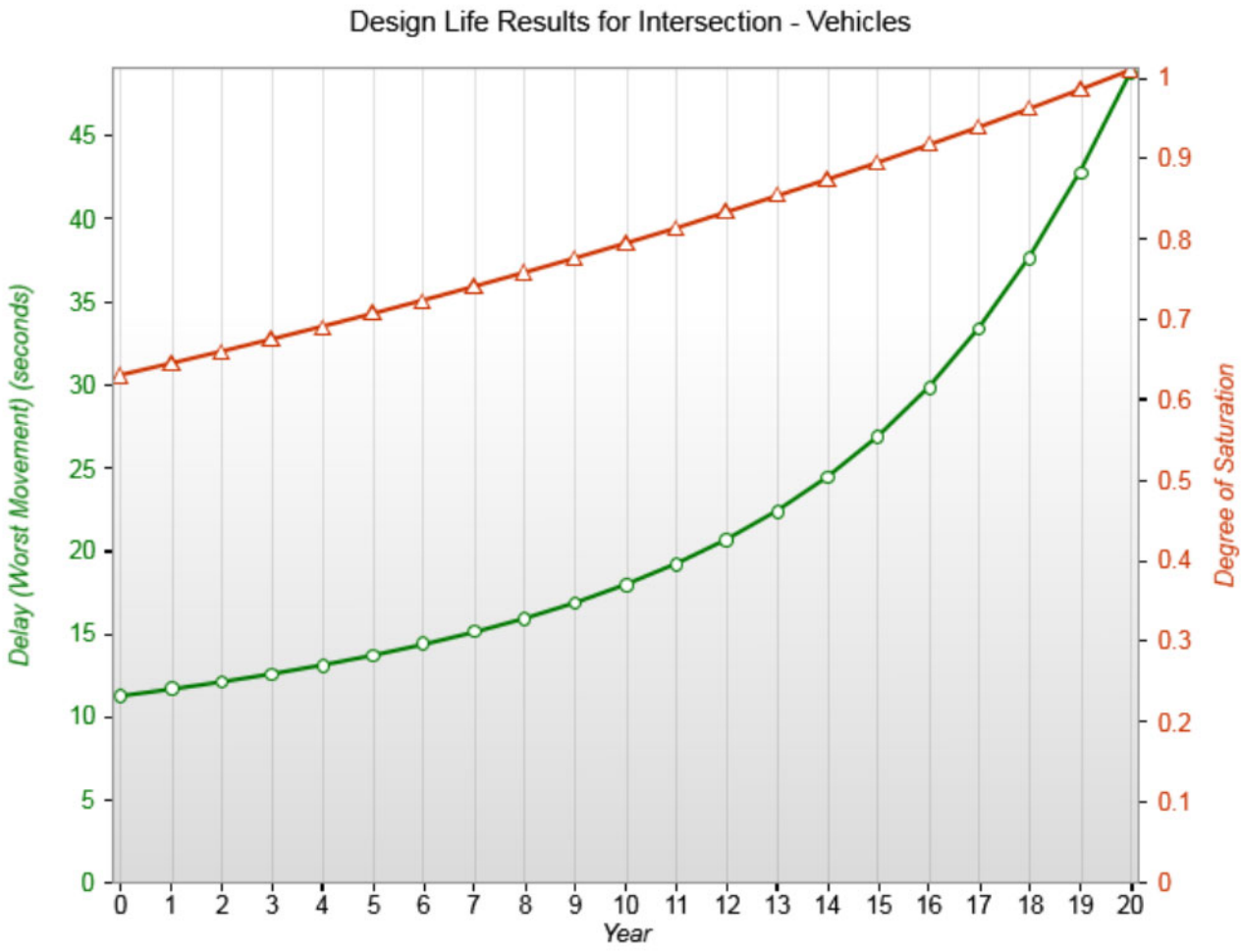


GRAPHS - Design Life Analysis

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

Site: 3 [2023 PM - Single Lane - DL]

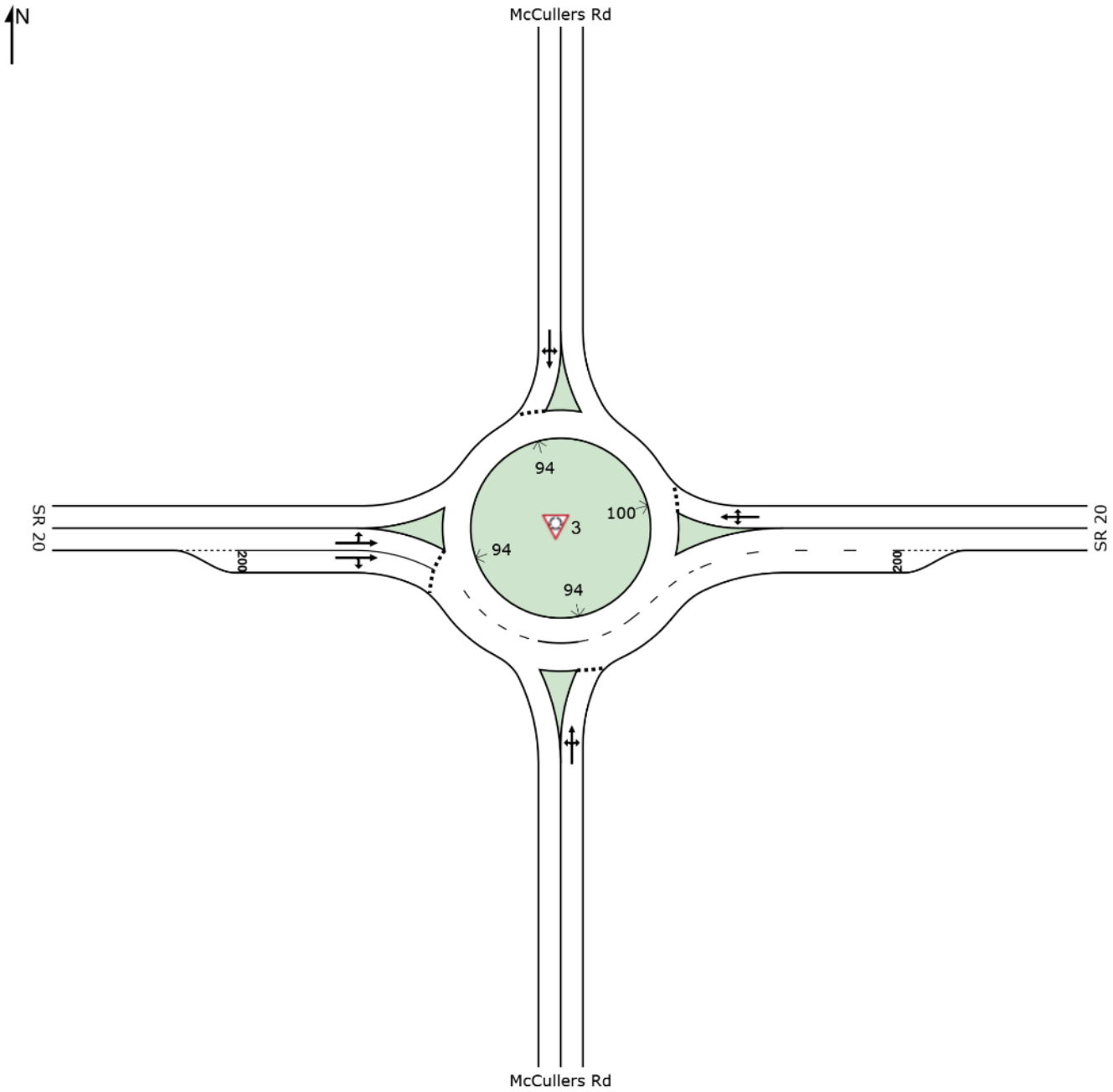
SR 20 @ McCullers Rd
Roundabout
Design Life Analysis (Practical Capacity): Results for 12 years



SITE LAYOUT

Site: 3 [2043 AM - Multi Lane]

SR 20 @ McCullers Rd
Roundabout



LANE SUMMARY

Site: 3 [2043 AM - Multi Lane]

SR 20 @ McCullers Rd
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: McCullers Rd													
Lane 1[d]	180	2.0	744	0.242	100	7.6	LOS A	1.1	28.5	Full	1600	0.0	0.0
Approach	180	2.0		0.242		7.6	LOS A	1.1	28.5				
East: SR 20													
Lane 1[d]	953	5.5	1366	0.697	100	11.9	LOS B	8.7	226.6	Full	1600	0.0	0.0
Approach	953	5.5		0.697		11.9	LOS B	8.7	226.6				
North: McCullers Rd													
Lane 1[d]	69	2.0	398	0.175	100	11.8	LOS B	1.2	29.3	Full	1600	0.0	0.0
Approach	69	2.0		0.175		11.8	LOS B	1.2	29.3				
West: SR 20													
Lane 1[d]	434	5.5	1473	0.295	100	4.9	LOS A	2.1	54.5	Full	1600	0.0	0.0
Lane 2	145	5.5	1047	0.138	47[6]	4.7	LOS A	0.8	20.9	Short	200	0.0	NA
Approach	579	5.5		0.295		4.9	LOS A	2.1	54.5				
Intersection	1781	5.0		0.697		9.2	LOS A	8.7	226.6				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

LANE SUMMARY

Site: 3 [2043 PM - Multi Lane]

SR 20 @ McCullers Rd
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: McCullers Rd													
Lane 1[d]	159	2.0	471	0.338	100	13.2	LOS B	1.8	46.9	Full	1600	0.0	0.0
Approach	159	2.0		0.338		13.2	LOS B	1.8	46.9				
East: SR 20													
Lane 1[d]	774	4.5	1334	0.580	100	9.3	LOS A	5.7	147.8	Full	1600	0.0	0.0
Approach	774	4.5		0.580		9.3	LOS A	5.7	147.8				
North: McCullers Rd													
Lane 1[d]	127	2.0	530	0.240	100	10.1	LOS B	1.5	39.4	Full	1600	0.0	0.0
Approach	127	2.0		0.240		10.1	LOS B	1.5	39.4				
West: SR 20													
Lane 1[d]	837	4.5	1334	0.627	100	10.3	LOS B	6.1	158.2	Full	1600	0.0	0.0
Lane 2	268	4.5	914	0.294	47[6]	7.0	LOS A	1.9	48.0	Short	200	0.0	NA
Approach	1105	4.5		0.627		9.5	LOS A	6.1	158.2				
Intersection	2165	4.2		0.627		9.7	LOS A	6.1	158.2				

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: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

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Genuine Ingenuity

ALTERNATIVE 2 ANALYSIS

2043 Design Year

Synchro Output

Intersection	
Int Delay, s/veh	11.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	505	20	60	810	35	65	0	105	20	0	45
Future Vol, veh/h	25	505	20	60	810	35	65	0	105	20	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	300	-	300	200	-	200	170	-	-	180	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	94	94	94	94	92	94	92	94	92	92	92
Heavy Vehicles, %	2	6	6	6	6	2	2	2	2	2	2	2
Mvmt Flow	27	537	21	64	862	38	69	0	112	22	0	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	862	0	0	537	0	0	1606	1581	537	1636	1581	862
Stage 1	-	-	-	-	-	-	592	592	-	989	989	-
Stage 2	-	-	-	-	-	-	1014	989	-	647	592	-
Critical Hdwy	4.12	-	-	4.16	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.254	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	780	-	-	1011	-	-	85	109	544	81	109	355
Stage 1	-	-	-	-	-	-	493	494	-	297	325	-
Stage 2	-	-	-	-	-	-	288	325	-	460	494	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	780	-	-	1011	-	-	~ 68	99	544	60	99	355
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 68	99	-	60	99	-
Stage 1	-	-	-	-	-	-	476	477	-	287	304	-
Stage 2	-	-	-	-	-	-	233	304	-	353	477	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.6	91.3	41.1
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	68	544	780	-	-	1011	-	-	60	355
HCM Lane V/C Ratio	1.017	0.205	0.035	-	-	0.063	-	-	0.362	0.138
HCM Control Delay (s)	217.4	13.3	9.8	-	-	8.8	-	-	95.8	16.8
HCM Lane LOS	F	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	5.2	0.8	0.1	-	-	0.2	-	-	1.3	0.5

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

Intersection	
Int Delay, s/veh	58.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	915	70	135	585	15	40	0	110	60	0	60
Future Vol, veh/h	65	915	70	135	585	15	40	0	110	60	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	300	-	300	200	-	200	170	-	-	180	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	94	94	94	94	92	94	92	94	92	92	92
Heavy Vehicles, %	2	6	6	6	6	2	2	2	2	2	2	2
Mvmt Flow	71	973	74	144	622	16	43	0	117	65	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	622	0	0	973	0	0	2057	2025	973	2083	2025	622
Stage 1	-	-	-	-	-	-	1115	1115	-	910	910	-
Stage 2	-	-	-	-	-	-	942	910	-	1173	1115	-
Critical Hdwy	4.12	-	-	4.16	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.254	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	959	-	-	693	-	-	~ 41	58	306	~ 39	58	487
Stage 1	-	-	-	-	-	-	252	283	-	329	353	-
Stage 2	-	-	-	-	-	-	316	353	-	234	283	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	959	-	-	693	-	-	~ 28	43	306	~ 19	43	487
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 28	43	-	~ 19	43	-
Stage 1	-	-	-	-	-	-	233	262	-	305	280	-
Stage 2	-	-	-	-	-	-	217	280	-	134	262	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	2.1	169.3	$ 762.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	28	306	959	-	-	693	-	-	19	487
HCM Lane V/C Ratio	1.52	0.382	0.074	-	-	0.207	-	-	3.432	0.134
HCM Control Delay (s)	$ 569.3	23.9	9.1	-	-	11.5	-	-	$ 1511.3	13.5
HCM Lane LOS	F	C	A	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	5	1.7	0.2	-	-	0.8	-	-	8.6	0.5

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

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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	505	20	60	810	35	65	0	105	20	0	45
Future Volume (veh/h)	25	505	20	60	810	35	65	0	105	20	0	45
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1792	1792	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	27	537	21	64	862	38	69	0	112	22	0	49
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.94	0.94	0.94	0.94	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	6	6	6	2	2	2	2	2	2	2
Cap, veh/h	191	895	761	444	933	802	371	0	334	295	0	334
Arrive On Green	0.03	0.50	0.50	0.06	0.52	0.51	0.23	0.00	0.23	0.21	0.00	0.21
Sat Flow, veh/h	1774	1792	1524	1707	1792	1583	1351	0	1583	1276	0	1583
Grp Volume(v), veh/h	27	537	21	64	862	38	69	0	112	22	0	49
Grp Sat Flow(s),veh/h/ln	1774	1792	1524	1707	1792	1583	1351	0	1583	1276	0	1583
Q Serve(g_s), s	0.5	15.2	0.5	1.2	31.6	0.9	3.1	0.0	4.2	1.1	0.0	1.8
Cycle Q Clear(g_c), s	0.5	15.2	0.5	1.2	31.6	0.9	4.9	0.0	4.2	5.3	0.0	1.8
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	191	895	761	444	933	802	371	0	334	295	0	334
V/C Ratio(X)	0.14	0.60	0.03	0.14	0.92	0.05	0.19	0.00	0.34	0.07	0.00	0.15
Avail Cap(c_a), veh/h	265	959	815	478	959	824	371	0	334	295	0	334
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.2	12.7	9.0	8.8	15.7	8.9	24.0	0.0	23.4	26.0	0.0	22.8
Incr Delay (d2), s/veh	0.3	0.9	0.0	0.1	14.0	0.0	1.1	0.0	2.7	0.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	12.2	0.4	1.0	26.1	0.7	2.2	0.0	3.8	0.7	0.0	1.6
LnGrp Delay(d),s/veh	15.5	13.7	9.0	8.9	29.7	8.9	25.1	0.0	26.0	26.5	0.0	23.7
LnGrp LOS	B	B	A	A	C	A	C		C	C		C
Approach Vol, veh/h		585			964			181			71	
Approach Delay, s/veh		13.6			27.5			25.7			24.6	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.6	40.5		21.0	8.1	42.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		15.0	5.0	37.0		15.0	5.0	37.0
Max Q Clear Time (g_c+I1), s		6.9	3.2	17.2		7.3	2.5	33.6
Green Ext Time (p_c), s		0.7	0.0	8.9		0.7	0.0	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	22.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	915	70	135	585	15	40	0	110	60	0	60
Future Volume (veh/h)	65	915	70	135	585	15	40	0	110	60	0	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1792	1792	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	71	973	74	144	622	16	43	0	117	65	0	65
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.94	0.94	0.94	0.94	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	6	6	6	2	2	2	2	2	2	2
Cap, veh/h	449	1043	887	239	1058	917	276	0	269	214	0	269
Arrive On Green	0.05	0.58	0.58	0.07	0.59	0.58	0.18	0.00	0.18	0.17	0.00	0.17
Sat Flow, veh/h	1774	1792	1524	1707	1792	1583	1331	0	1583	1270	0	1583
Grp Volume(v), veh/h	71	973	74	144	622	16	43	0	117	65	0	65
Grp Sat Flow(s),veh/h/ln	1774	1792	1524	1707	1792	1583	1331	0	1583	1270	0	1583
Q Serve(g_s), s	1.4	43.8	1.9	2.9	19.2	0.4	2.5	0.0	5.8	4.3	0.0	3.1
Cycle Q Clear(g_c), s	1.4	43.8	1.9	2.9	19.2	0.4	5.6	0.0	5.8	10.0	0.0	3.1
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	449	1043	887	239	1058	917	276	0	269	214	0	269
V/C Ratio(X)	0.16	0.93	0.08	0.60	0.59	0.02	0.16	0.00	0.43	0.30	0.00	0.24
Avail Cap(c_a), veh/h	467	1077	916	242	1077	934	276	0	269	214	0	269
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.8	16.8	8.1	19.7	11.3	7.9	33.2	0.0	32.3	37.3	0.0	31.7
Incr Delay (d2), s/veh	0.2	13.9	0.0	4.1	0.8	0.0	1.2	0.0	5.0	3.6	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	33.6	1.4	4.2	14.6	0.3	1.8	0.0	5.2	3.1	0.0	2.8
LnGrp Delay(d),s/veh	9.0	30.7	8.1	23.8	12.1	7.9	34.4	0.0	37.3	40.9	0.0	33.8
LnGrp LOS	A	C	A	C	B	A	C		D	D		C
Approach Vol, veh/h		1118			782			160			130	
Approach Delay, s/veh		27.9			14.2			36.6			37.3	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	10.9	56.3		21.0	10.1	57.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		15.0	5.0	52.0		15.0	5.0	52.0
Max Q Clear Time (g_c+I1), s		7.8	4.9	45.8		12.0	3.4	21.2
Green Ext Time (p_c), s		0.8	0.0	4.6		0.4	0.0	13.3

Intersection Summary		
HCM 2010 Ctrl Delay		24.2
HCM 2010 LOS		C

GDOT ICE TOOL: Waiver Form for Multiple TWSC Intersections

ICE Version 2.14 | Revised 08/22/2018

GDOT — Georgia Department of Transportation

Project PI# (or N/A): 0016386

Study Intersection	Existing Intersection Control	Proposed # Lanes on Mainline	Design Year Avg Daily Traffic		Minor Rd Percent	Open Year Warrants Met?		Traffic Operations Data[1]				Safety Data			
								Opening Year		Design Year		Crash Severity			
			Major Rd	Minor Rd		AWSC	Signal	Delay	V/C	Delay	V/C	PDO	Injury	Fatal	Total
Center Hill @ Moon Rd	Conventional (Minor Stop)	2	7,800	200	2.5%	No	No					0	0	0	0
Moon Rd @ Old Moon Rd	Conventional (Minor Stop)	2	400	MM	0.0%	No	No					0	0	0	0
SR 20 @ Pointer Rd	Conventional (Minor Stop)	2	18575	50	0.3%	No	No					1	0	0	1
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
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	--- select one ---				0.0%	No	No					0	0	0	0
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	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0
	--- select one ---				0.0%	No	No					0	0	0	0

Notes:

[1] Traffic Operations data is optional unless needed to justify basis of the waiver request

Study intersections shown in **BOLD** indicate that the below criteria is met and a full ICE should be performed for this location:

- The existing intersection type is anything other than a conventional Two-Way (Minor Street) Stop Control
- AWSC is warranted and potentially feasible for the given cross section
- The minor street ADT is greater than that 10% of the overall intersection total
- Signal Warrants are met

Approved By: ________________ **Date:** 3/19/19 **Name:** Andrew Heath, P.E.

Chief Engineer or (Approved Delegate)

Gresham Smith

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ATTACHMENT 7

Roundabout Data

a. Lighting Agreement
b. Roundabout Performance 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: Sharon Hall, Project Manager

Location

Walton County supports the consideration of a roundabout at the location specified below.

Description: *SR 20 @ McCullers Road- Roundabout*

State/County Route Numbers: (see above)

Project: *P.I. No. 0016386 – 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 27 day of JUNE, 2019

Attest: Leta B. Tallent
County or City Clerk

By: Kevin W. Little

Title: CHAIRMAN

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
SR 20 NB	CENTERHILL CHURCH ROAD	R5		101	20
	SR 20 NB	R1		178	25
		R2		93	20
		R3	113		37
CENTERHILL CHURCH ROAD	SR 20 NB	R5		101	20
	SR 20 SB	R4		43	15
SR 20 SB	SR 20 SB	R1		160	24
		R2		155	24
		R3	133		38
	CENTERHILL CHURCH ROAD	R4		44	15

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK

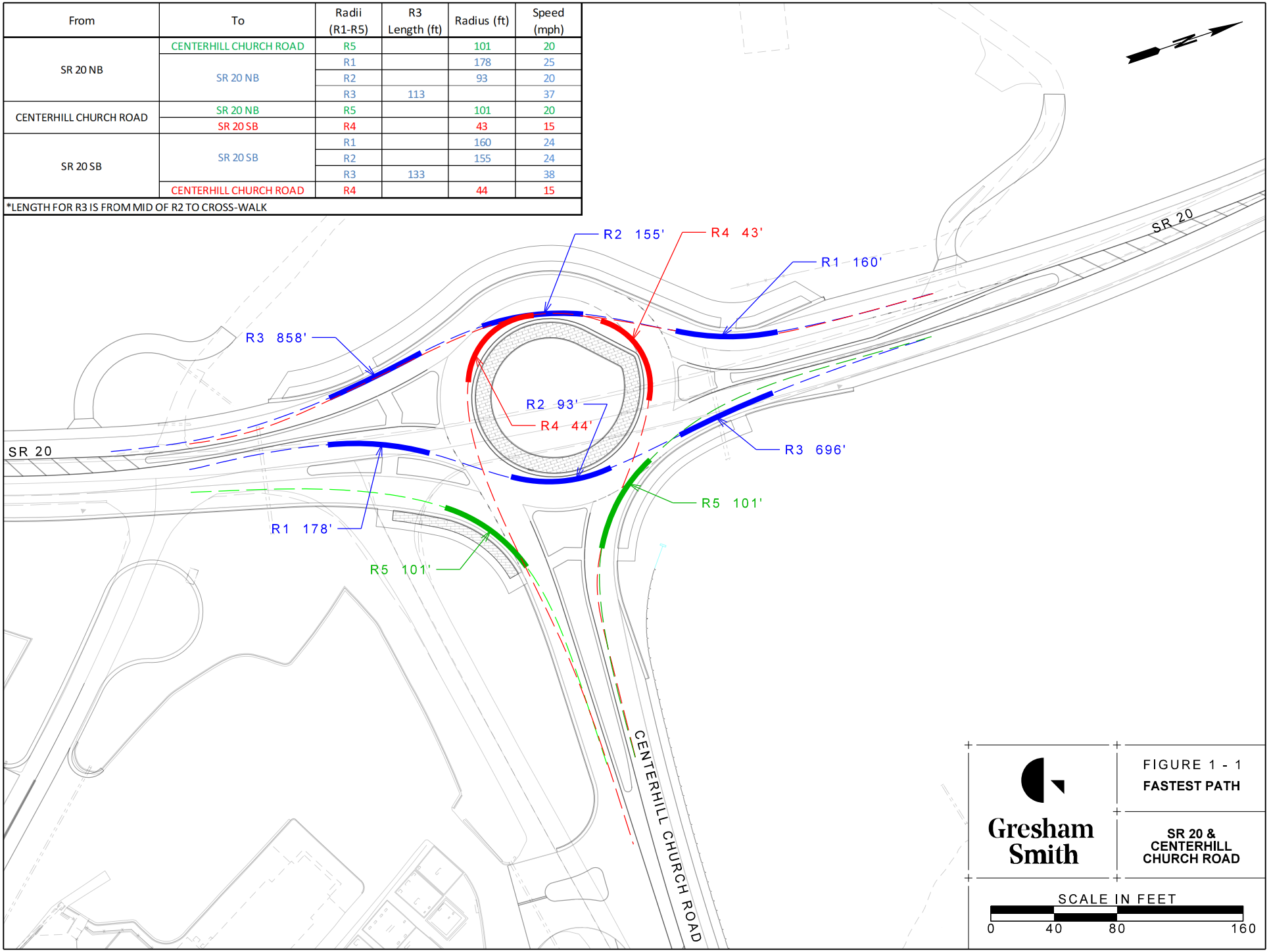

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FIGURE 1 - 1
FASTEST PATH

SR 20 & CENTERHILL CHURCH ROAD

SCALE IN FEET
0 40 80 160

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
SR 20 NB	SR 20 NB	R1		168	25
		R2		132	23
		R3	115		37
	CENTERVILLE ROSEBUD ROAD	R4		71	18
SR 20 SB	SR 20 SB	R1		178	25
		R2		128	22
		R3	116		37
CENTERVILLE ROSEBUD ROAD	SR 20 SB	R5		84	19
	SR 20 NB	R4		47	15

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK

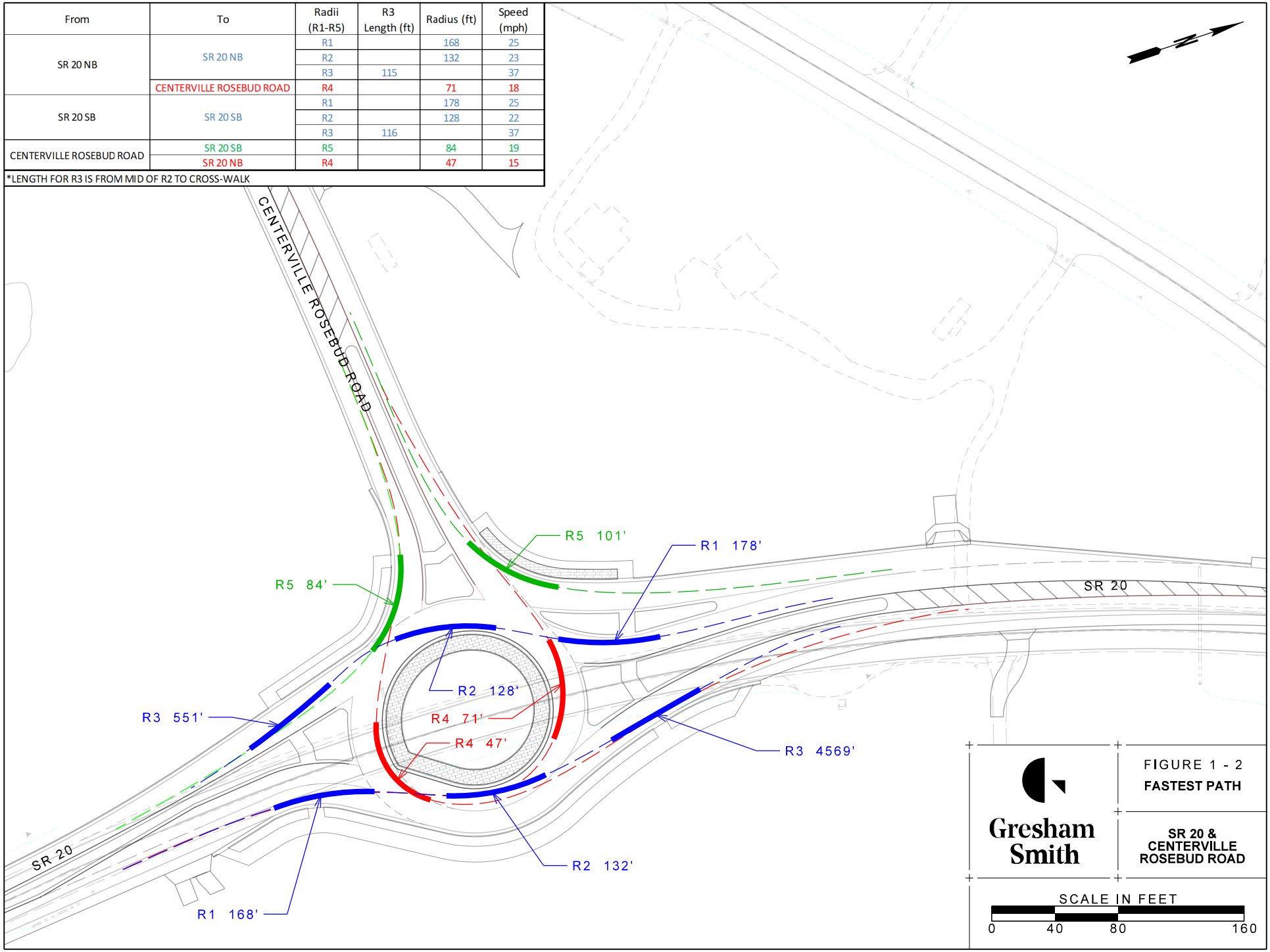

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FIGURE 1 - 2
FASTEST PATH

SR 20 & CENTERVILLE ROSEBUD ROAD

SCALE IN FEET
0 40 80 160

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
SR 20 EB	McCULLERS ROAD SB	R5		101	20
	SR 20 EB	R1		174	25
		R2		80	19
		R3	129		38
	McCULLERS ROAD NB	R4		51	16

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK

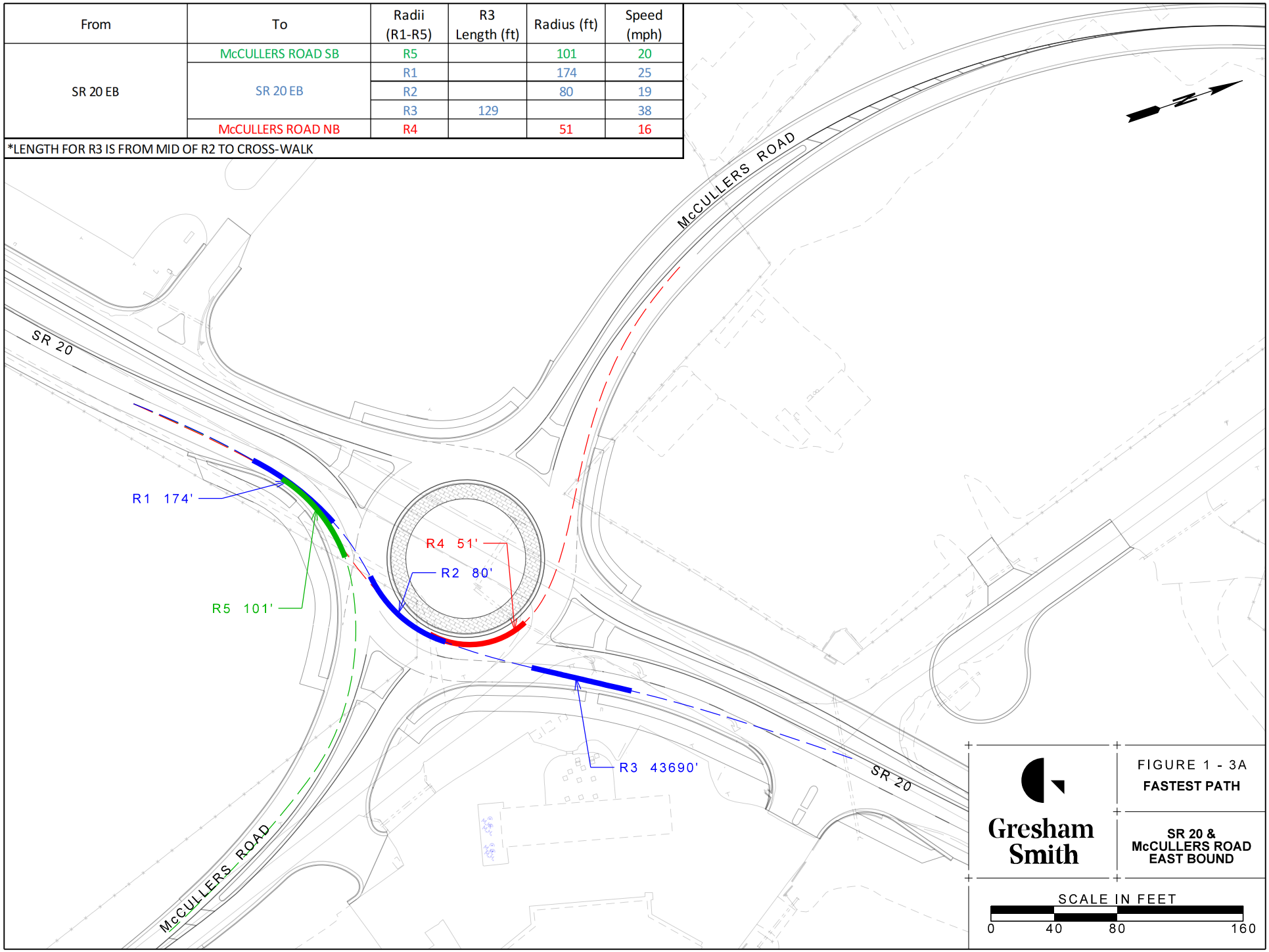

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FIGURE 1 - 3A
FASTEST PATH

SR 20 & McCULLERS ROAD EAST BOUND

SCALE IN FEET
0 40 80 160

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
McCULLERS ROAD SB	SR 20 WB	R5		86	19
	McCULLERS ROAD SB	R1		170	25
		R2		113	21
		R3	113		37
	SR 20 EB	R4		64	17

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK

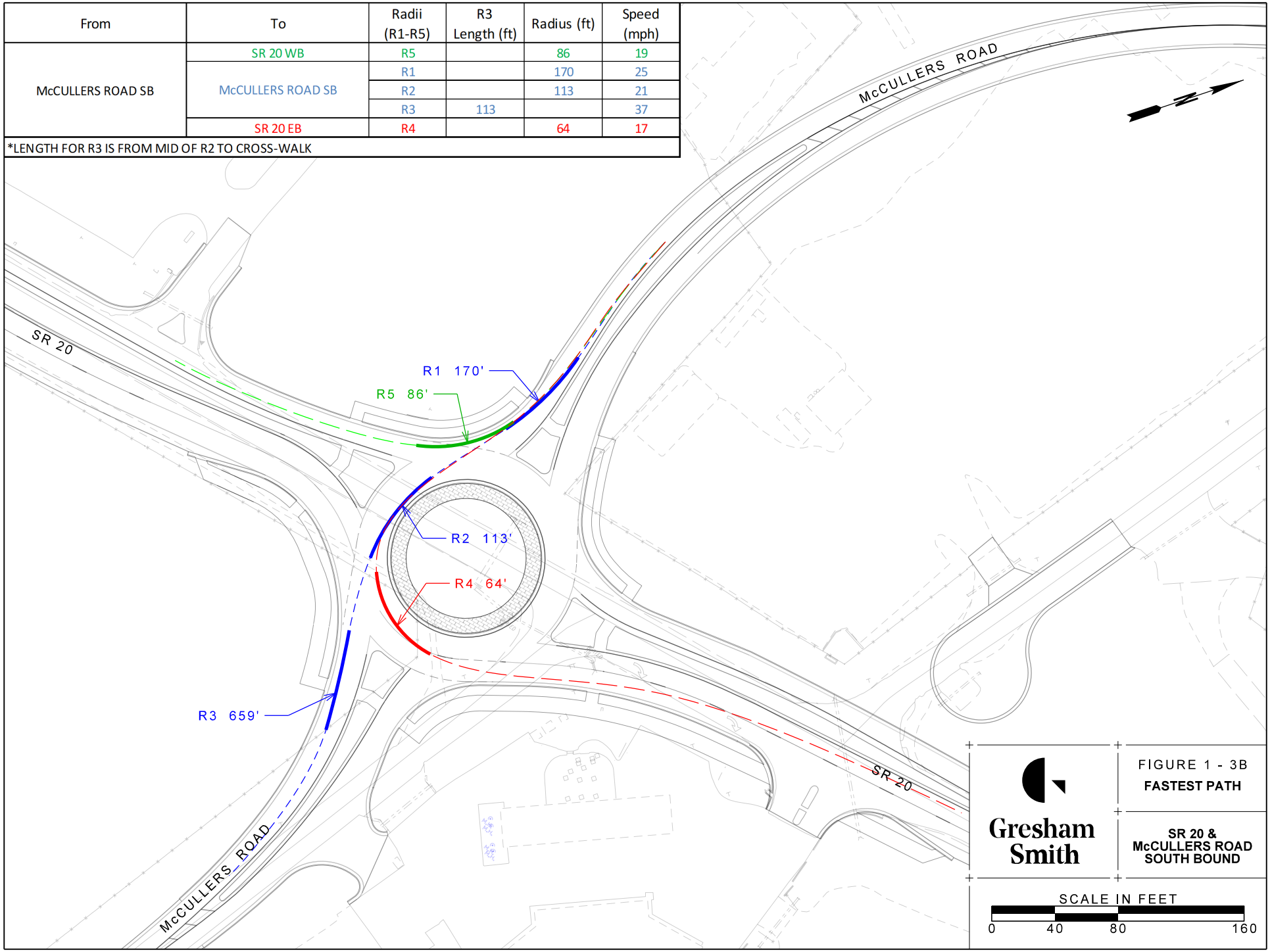

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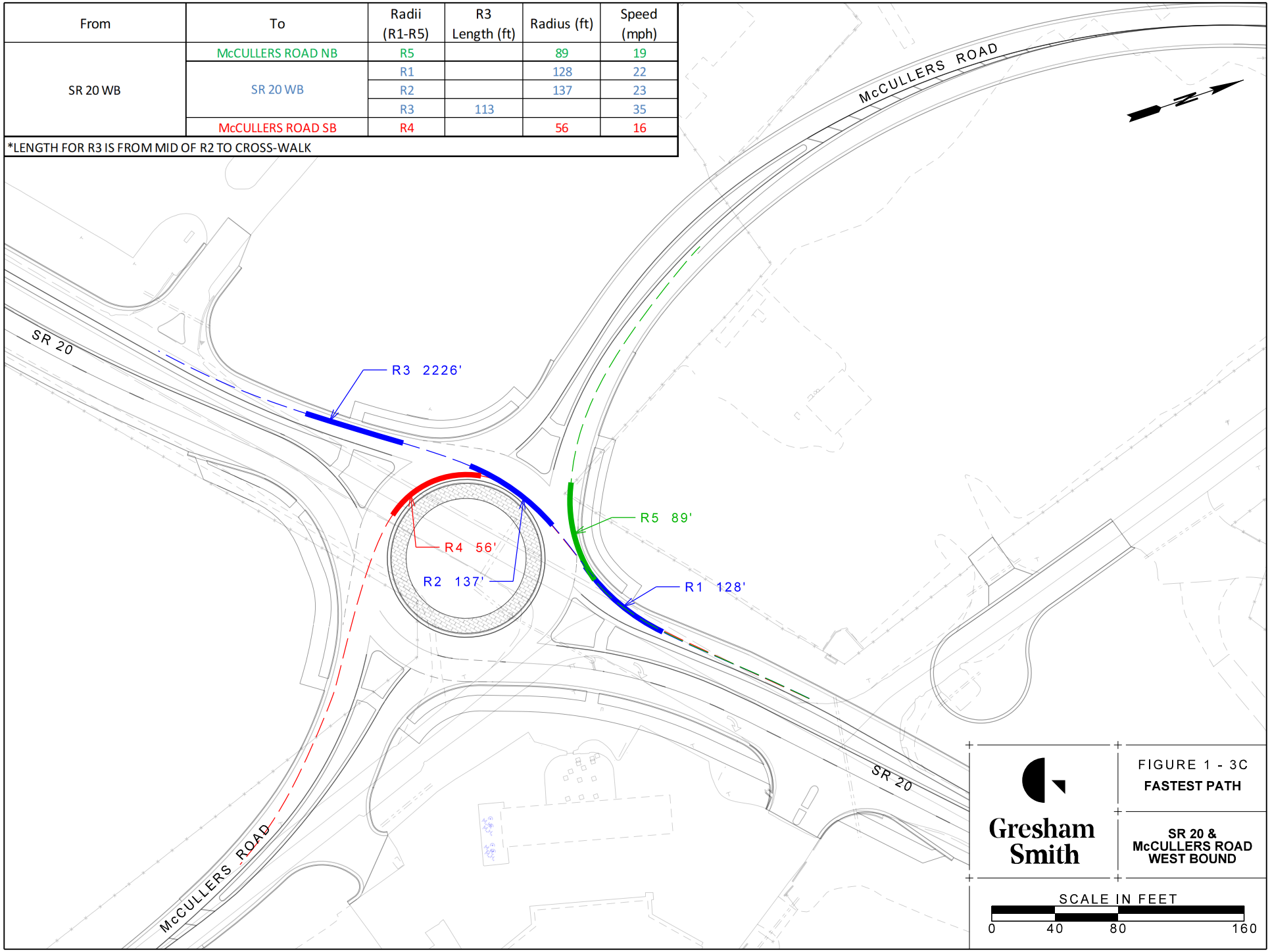
FIGURE 1 - 3B
FASTEST PATH

SR 20 &
McCULLERS ROAD
SOUTH BOUND

SCALE IN FEET
0 40 80 160

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
SR 20 WB	McCULLERS ROAD NB	R5		89	19
	SR 20 WB	R1		128	22
		R2		137	23
		R3	113		35
	McCULLERS ROAD SB	R4		56	16

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK



Gresham Smith

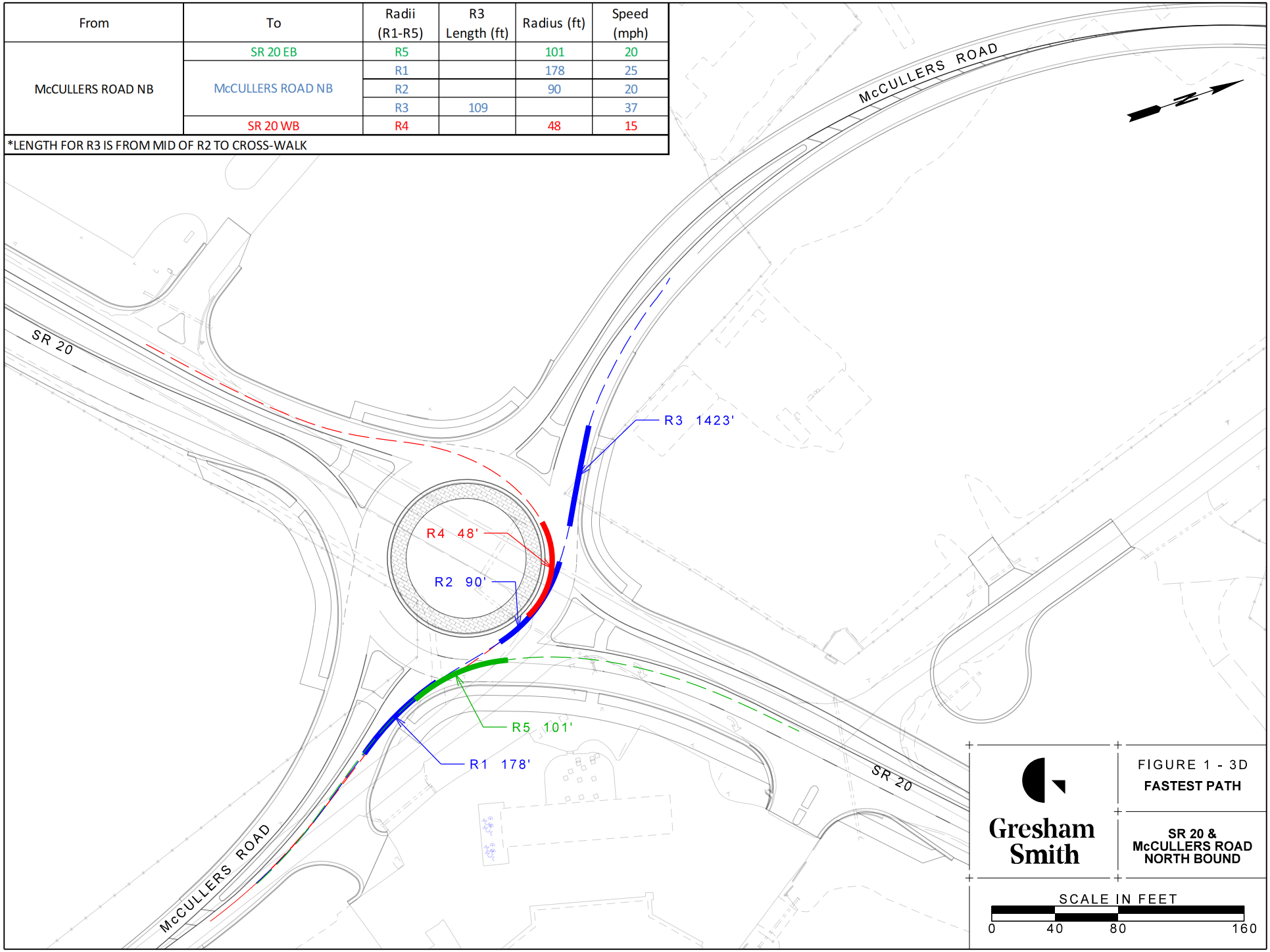
FIGURE 1 - 3C
FASTEST PATH

SR 20 &
McCULLERS ROAD
WEST BOUND

SCALE IN FEET
0 40 80 160

From	To	Radii (R1-R5)	R3 Length (ft)	Radius (ft)	Speed (mph)
McCULLERS ROAD NB	SR 20 EB	R5		101	20
	McCULLERS ROAD NB	R1		178	25
		R2		90	20
		R3	109		37
	SR 20 WB	R4		48	15

*LENGTH FOR R3 IS FROM MID OF R2 TO CROSS-WALK

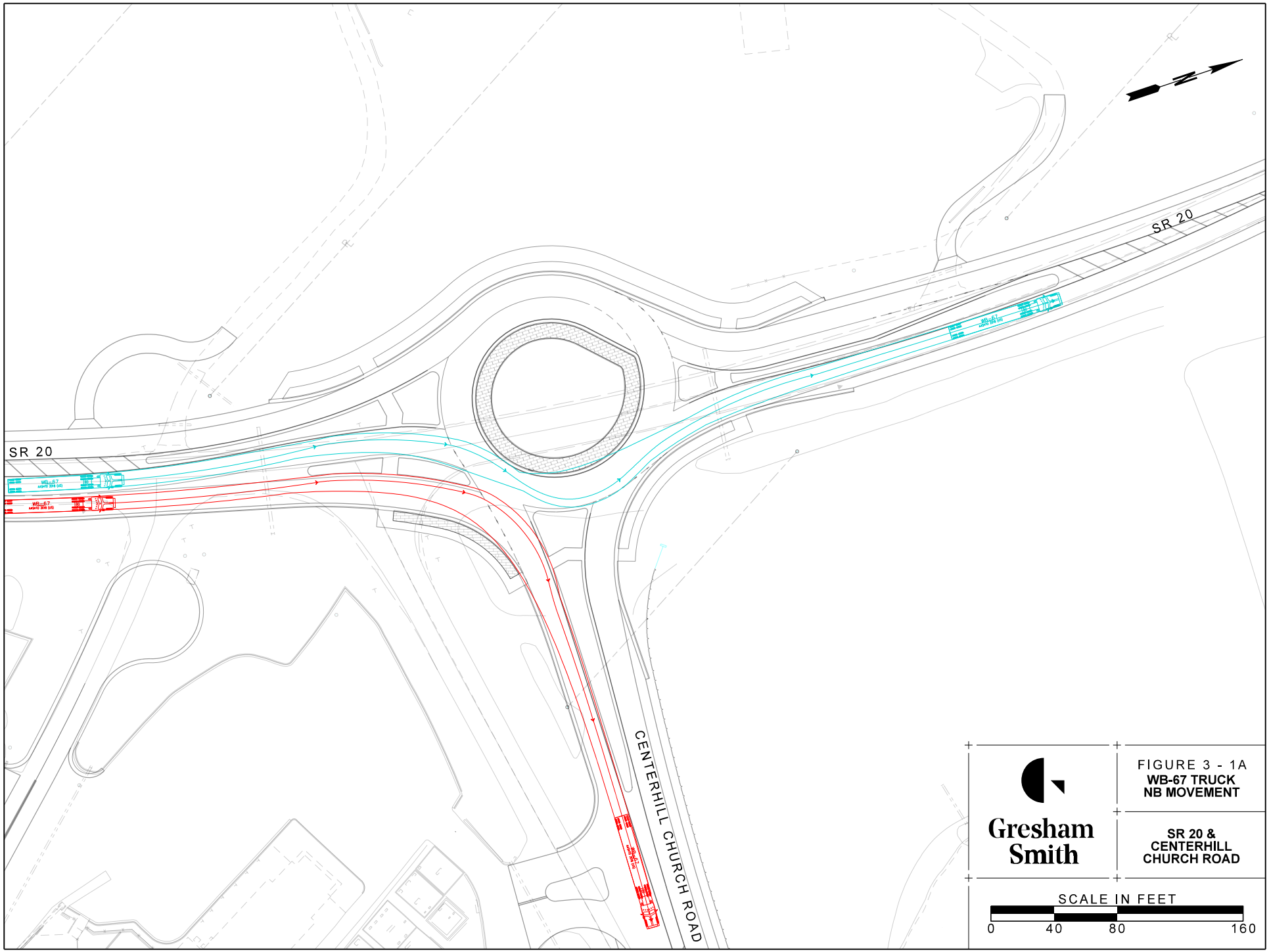


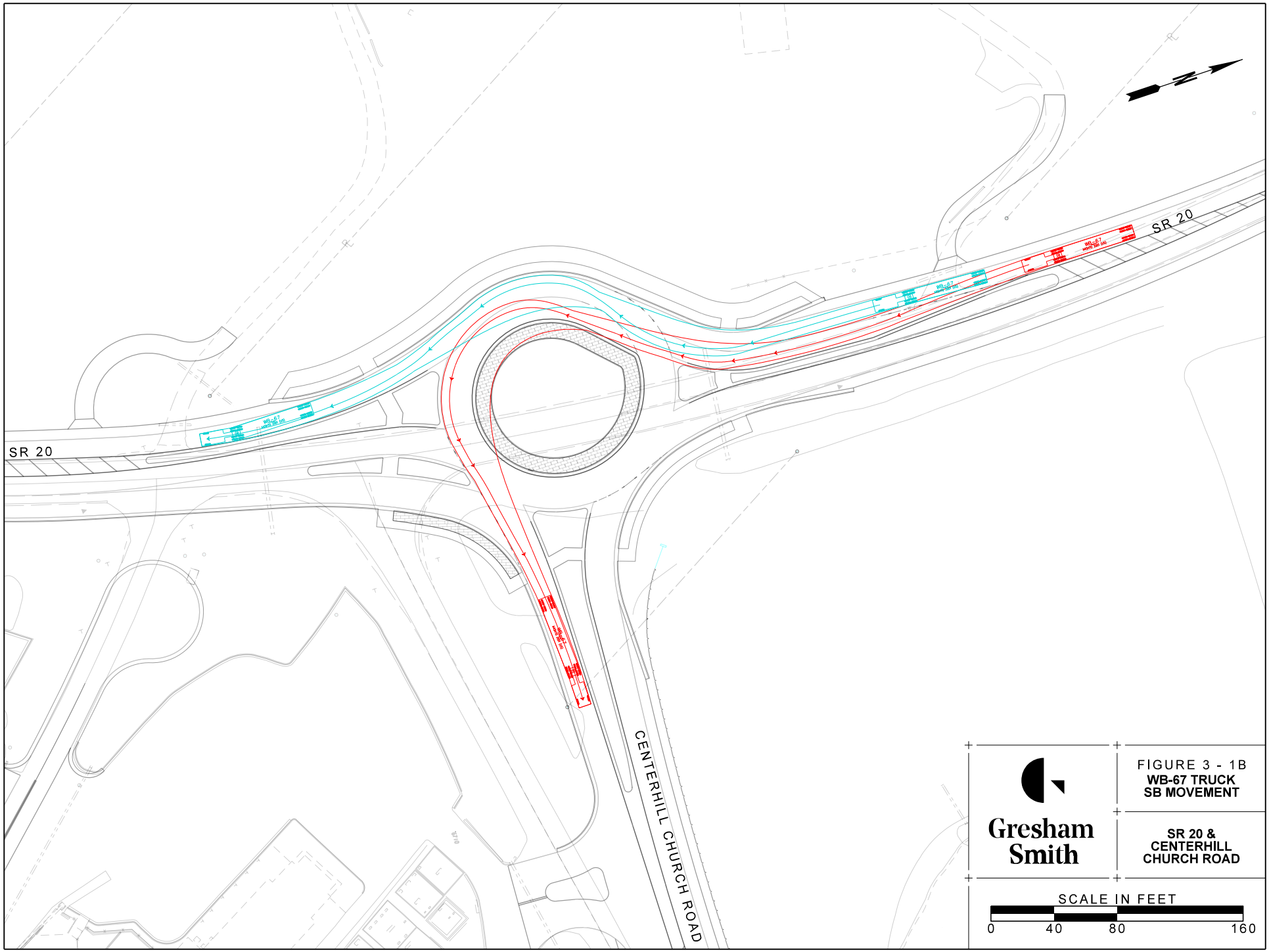
Gresham Smith

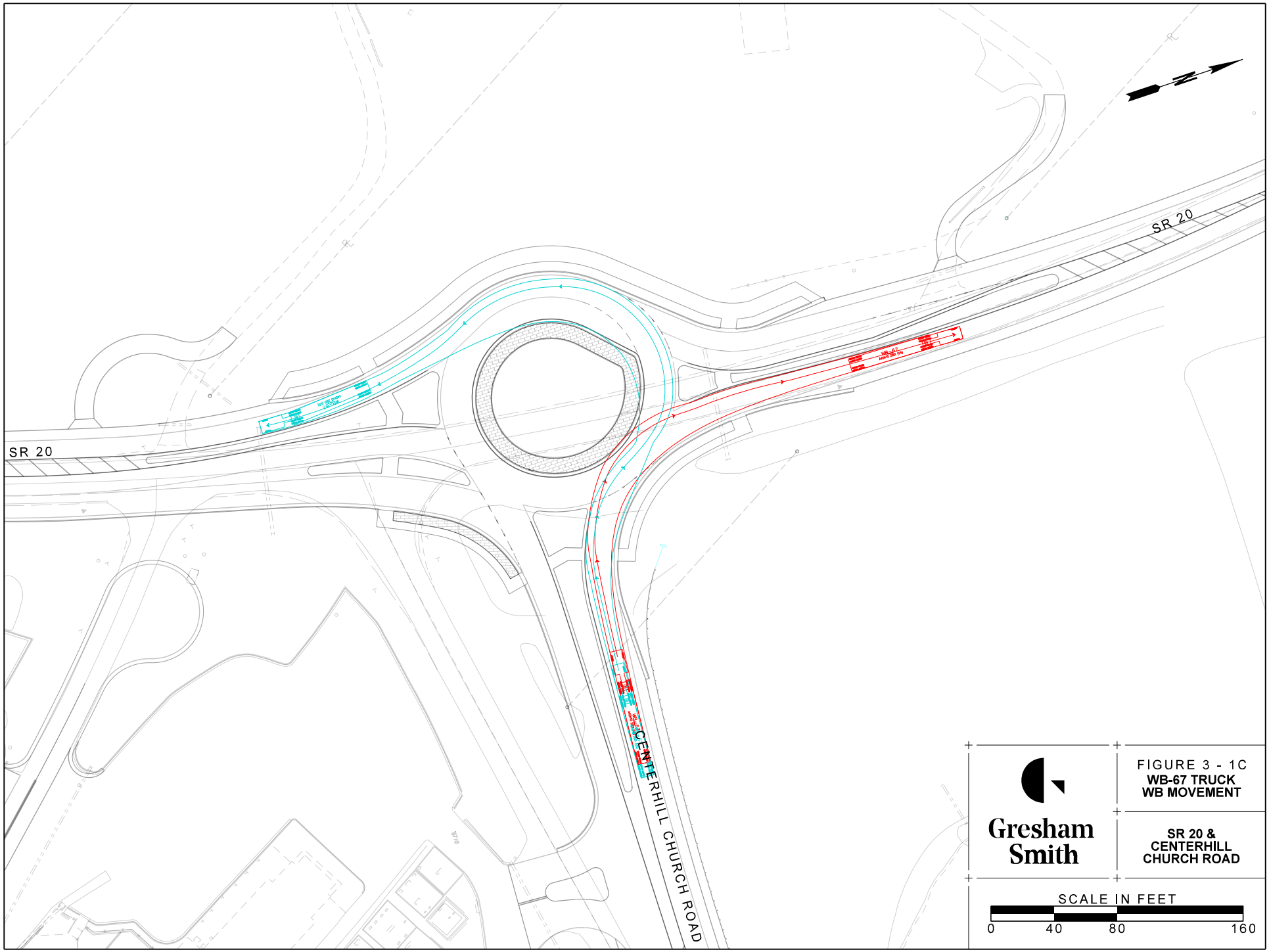
FIGURE 1 - 3D
FASTEST PATH

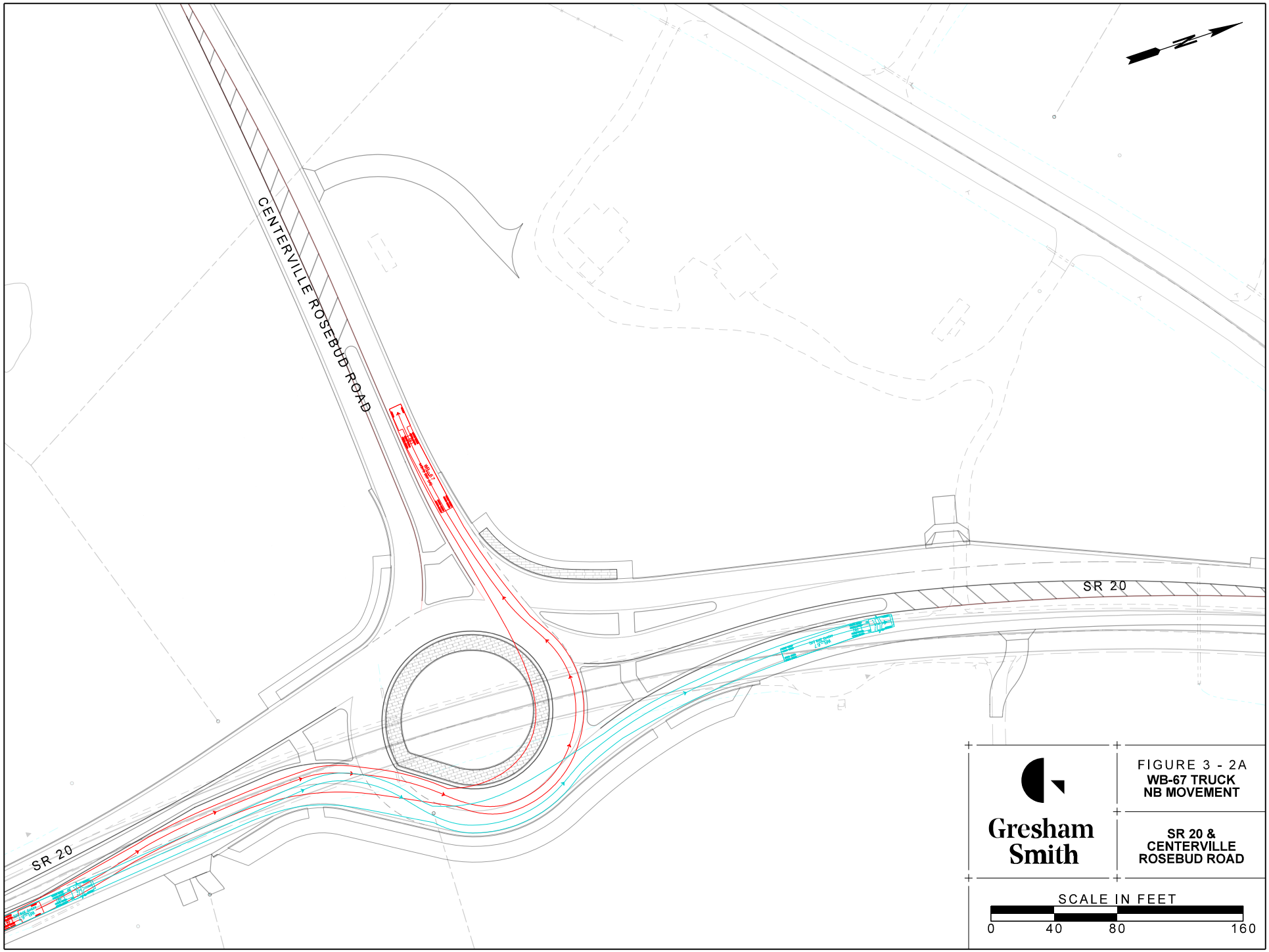
SR 20 &
McCULLERS ROAD
NORTH BOUND

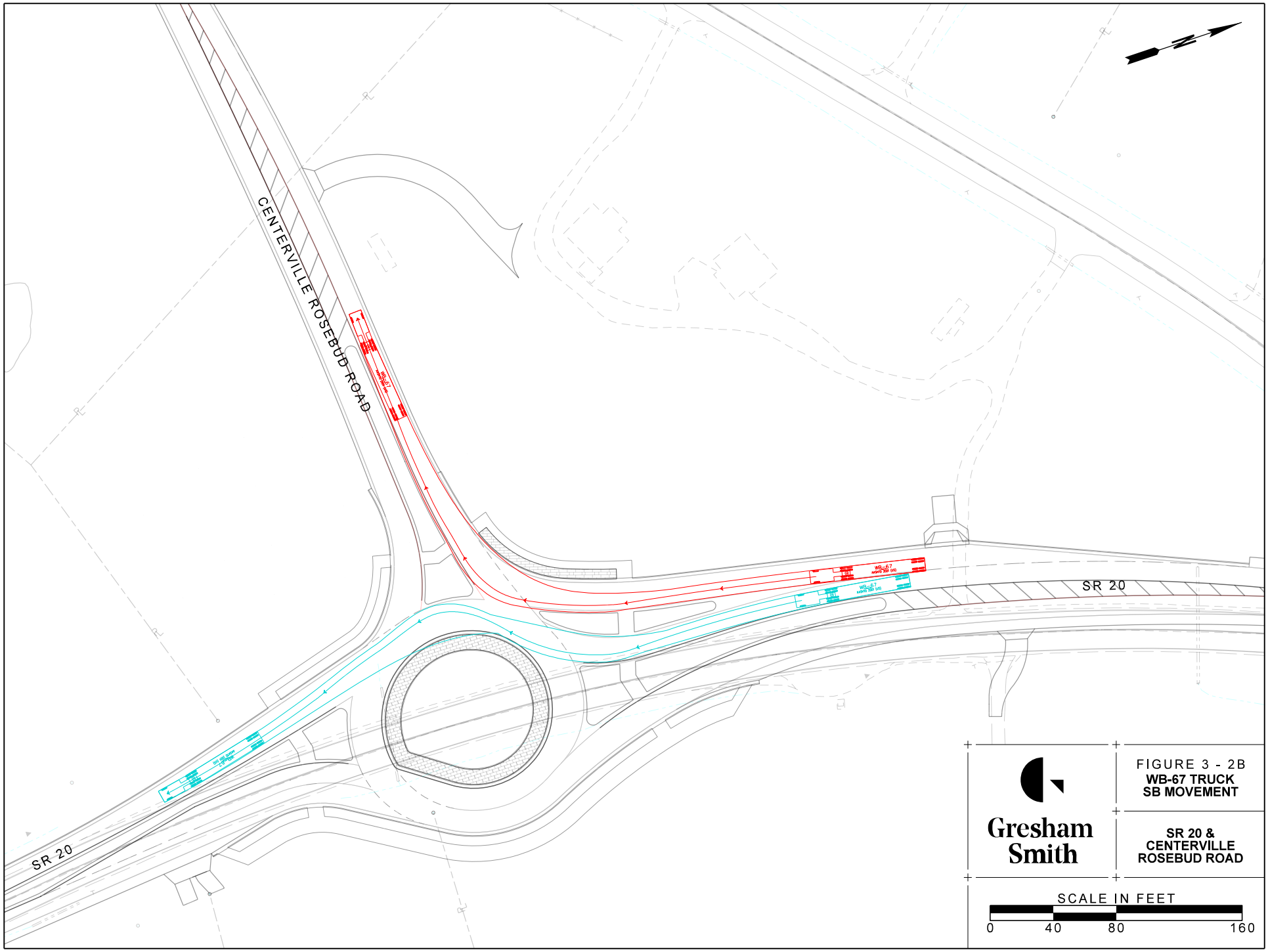
SCALE IN FEET
0 40 80 160


SR 20
SR 20
CENTERHILL CHURCH ROAD
N
Gresham Smith
FIGURE 3 - 1A
WB-67 TRUCK
NB MOVEMENT
SR 20 &
CENTERHILL
CHURCH ROAD
SCALE IN FEET
0
40
80
160


SR 20
SR 20
CENTERHILL CHURCH ROAD
N
Gresham Smith
FIGURE 3 - 1B
WB-67 TRUCK
SB MOVEMENT
SR 20 &
CENTERHILL
CHURCH ROAD
SCALE IN FEET
0
40
80
160


SR 20
SR 20
CENTERHILL CHURCH ROAD
N
Gresham Smith
FIGURE 3 - 1C
WB-67 TRUCK
WB MOVEMENT
SR 20 &
CENTERHILL
CHURCH ROAD
SCALE IN FEET
0
40
80
160


CENTERVILLE ROSEBUD ROAD
SR 20
SR 20
Gresham Smith
FIGURE 3 - 2A
WB-67 TRUCK
NB MOVEMENT
SR 20 &
CENTERVILLE
ROSEBUD ROAD
SCALE IN FEET
0
40
80
160



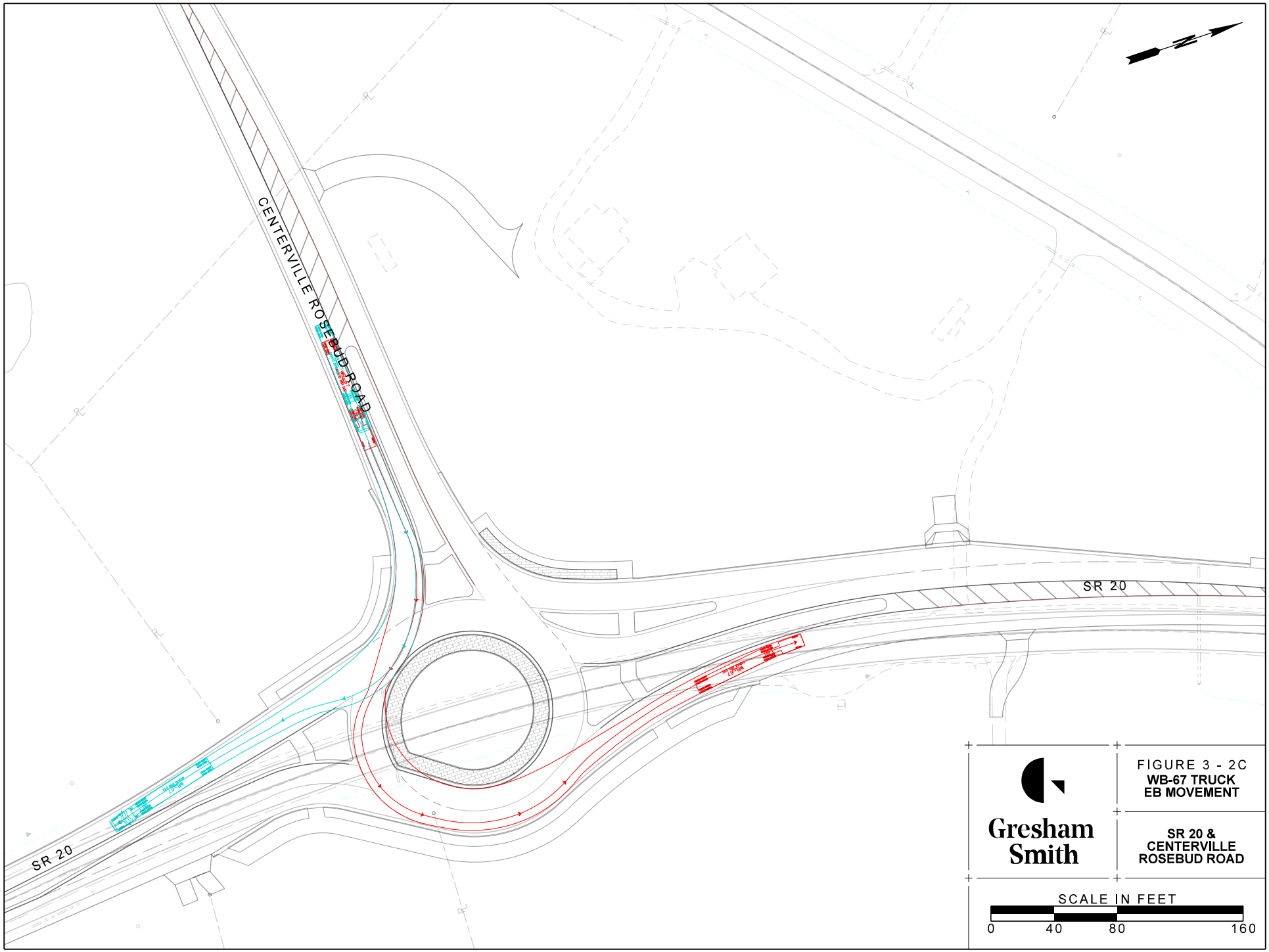
Gresham Smith

FIGURE 3 - 2B
WB-67 TRUCK SB MOVEMENT

SR 20 & CENTERVILLE ROSEBUD ROAD

SCALE IN FEET

0 40 80 160



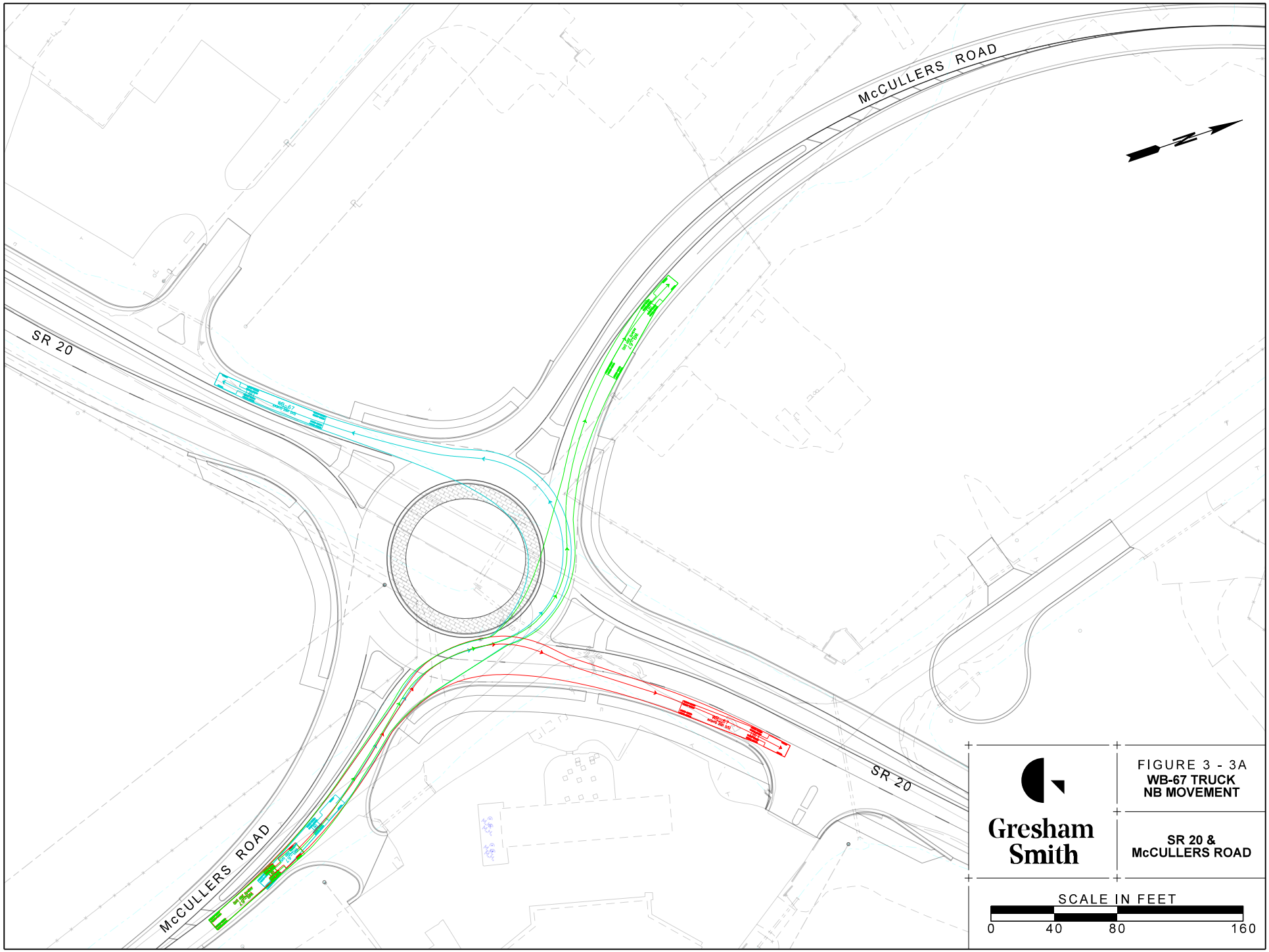
Gresham Smith

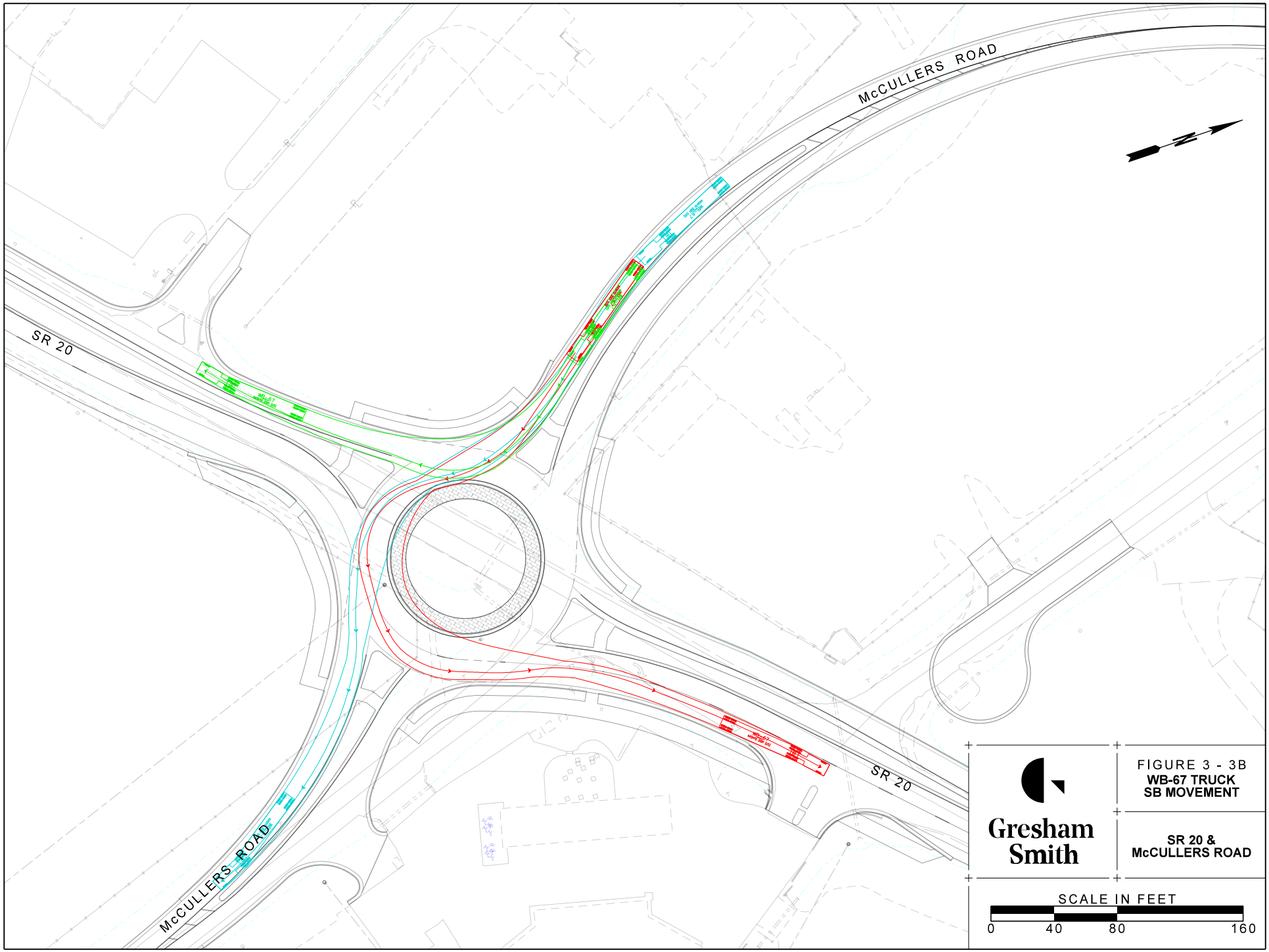
FIGURE 3 - 2C
WB-67 TRUCK
EB MOVEMENT

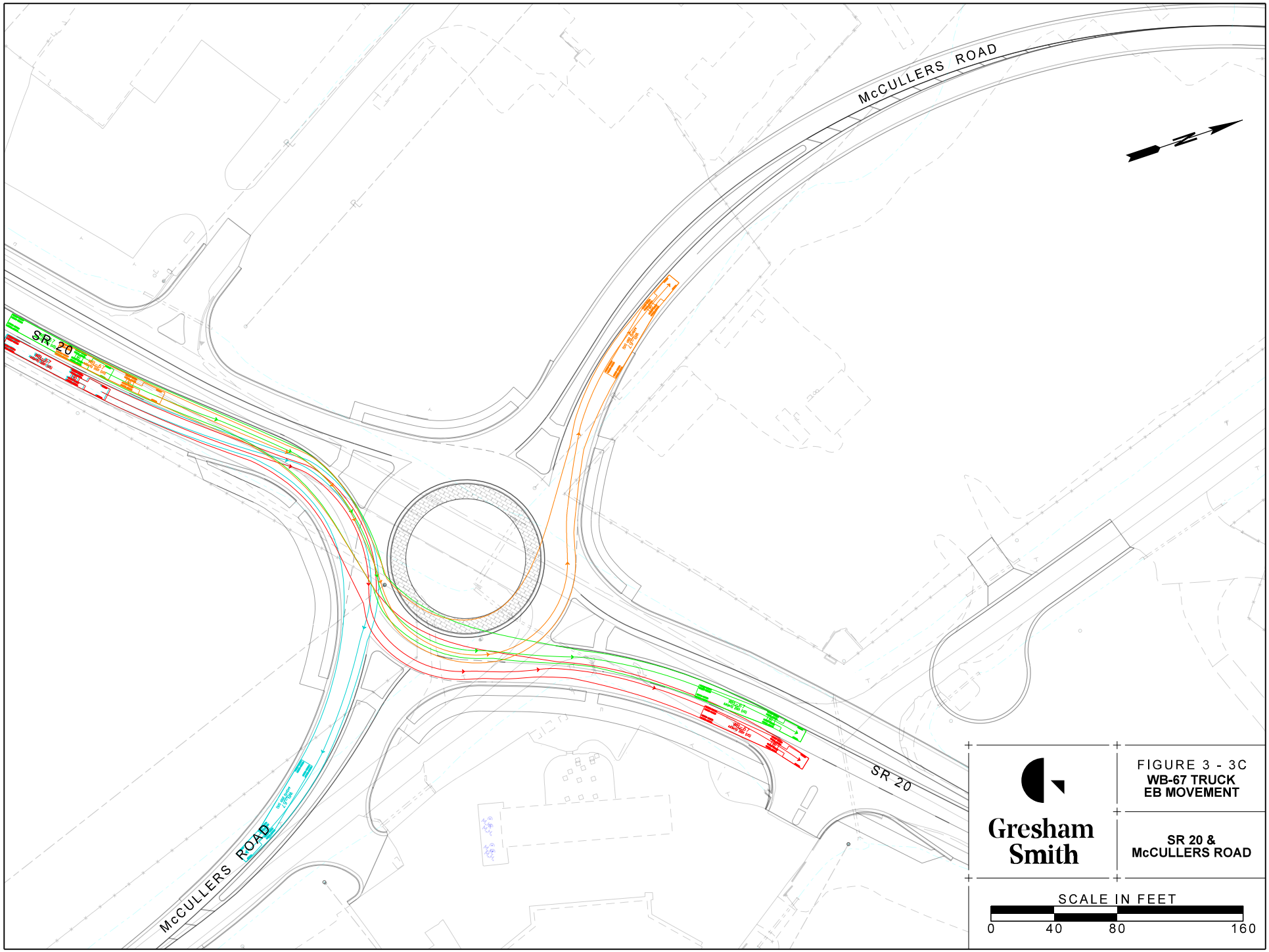
SR 20 &
CENTERVILLE
ROSEBUD ROAD

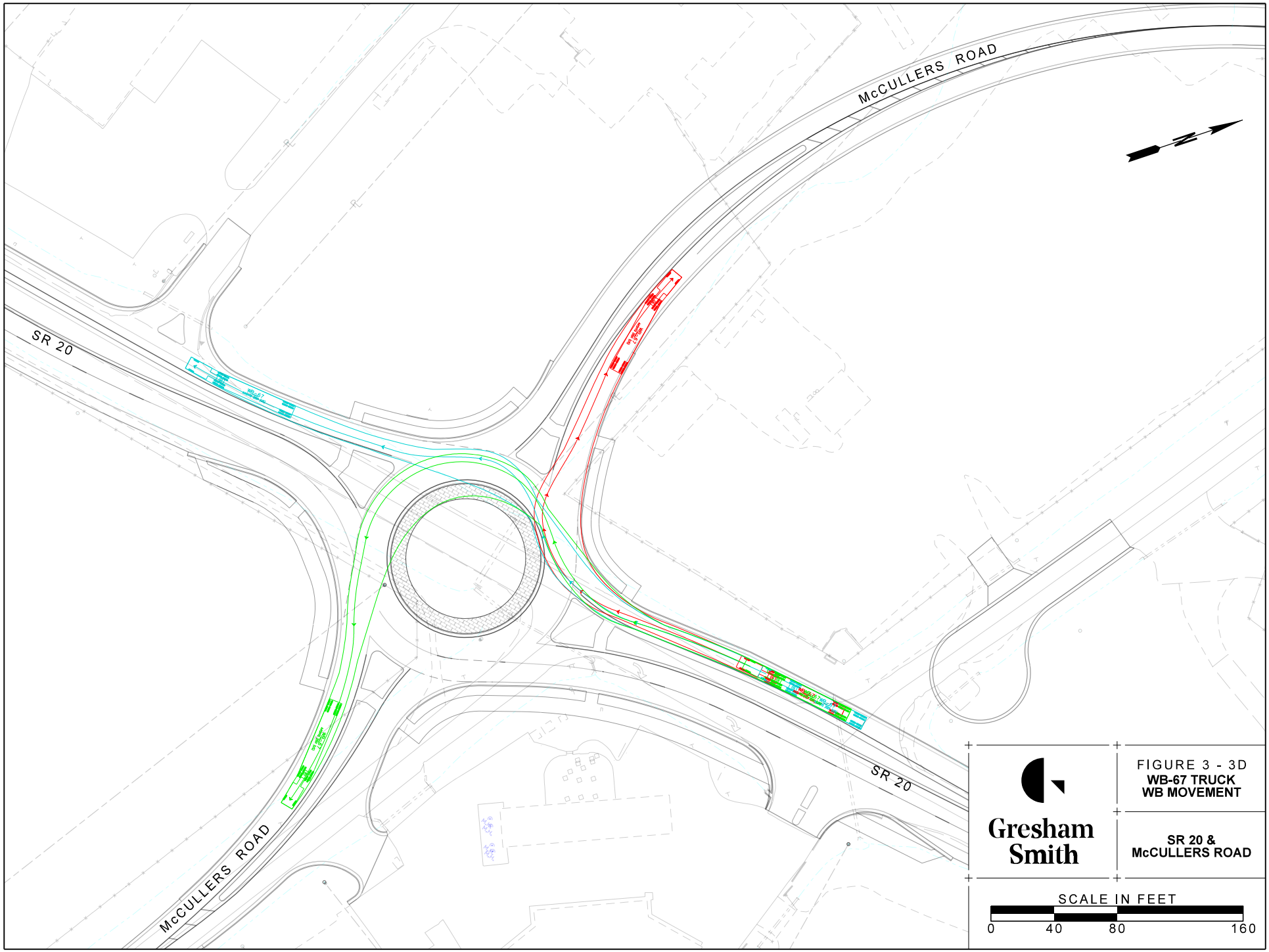
SCALE IN FEET

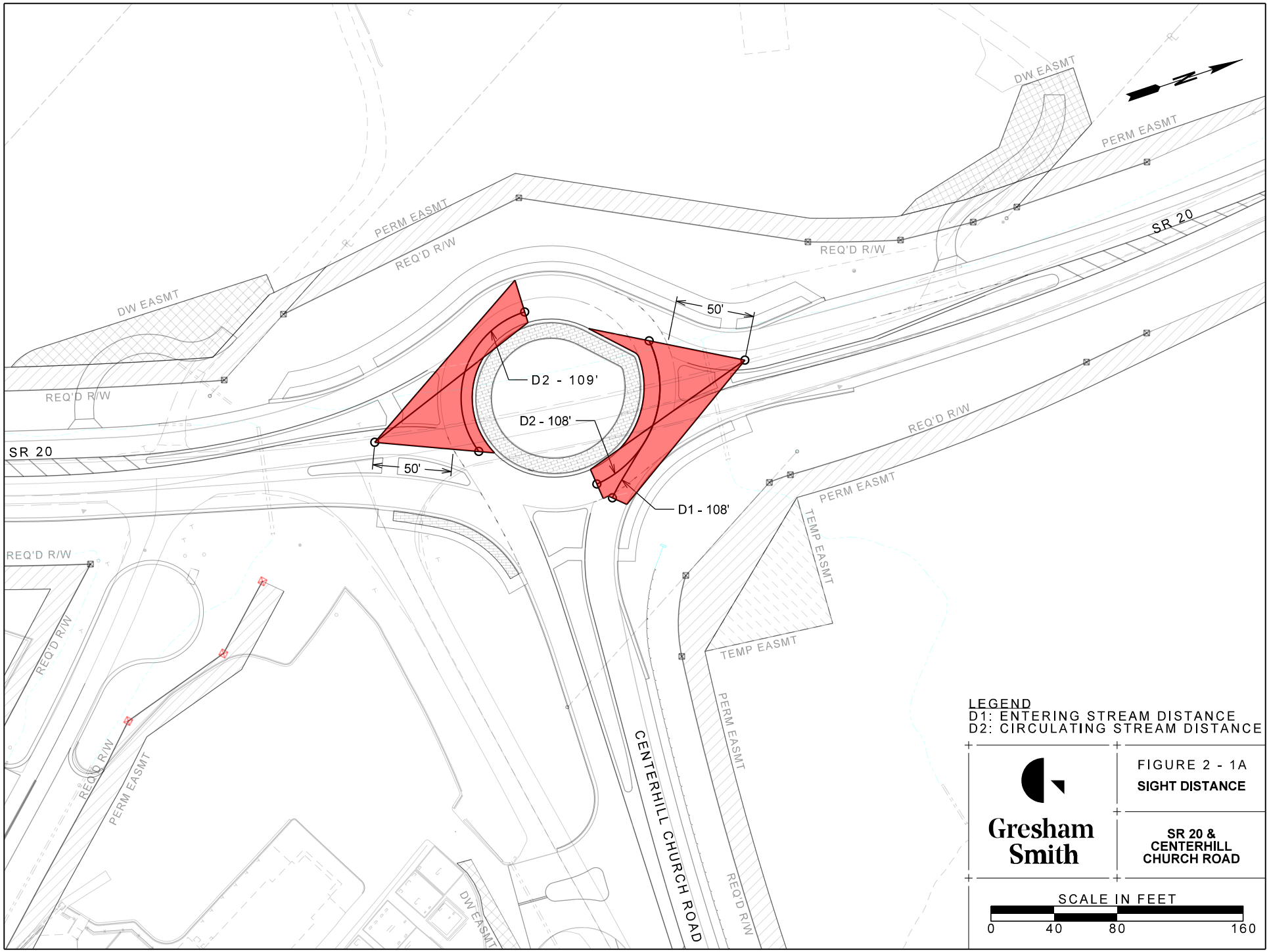
0 40 80 160

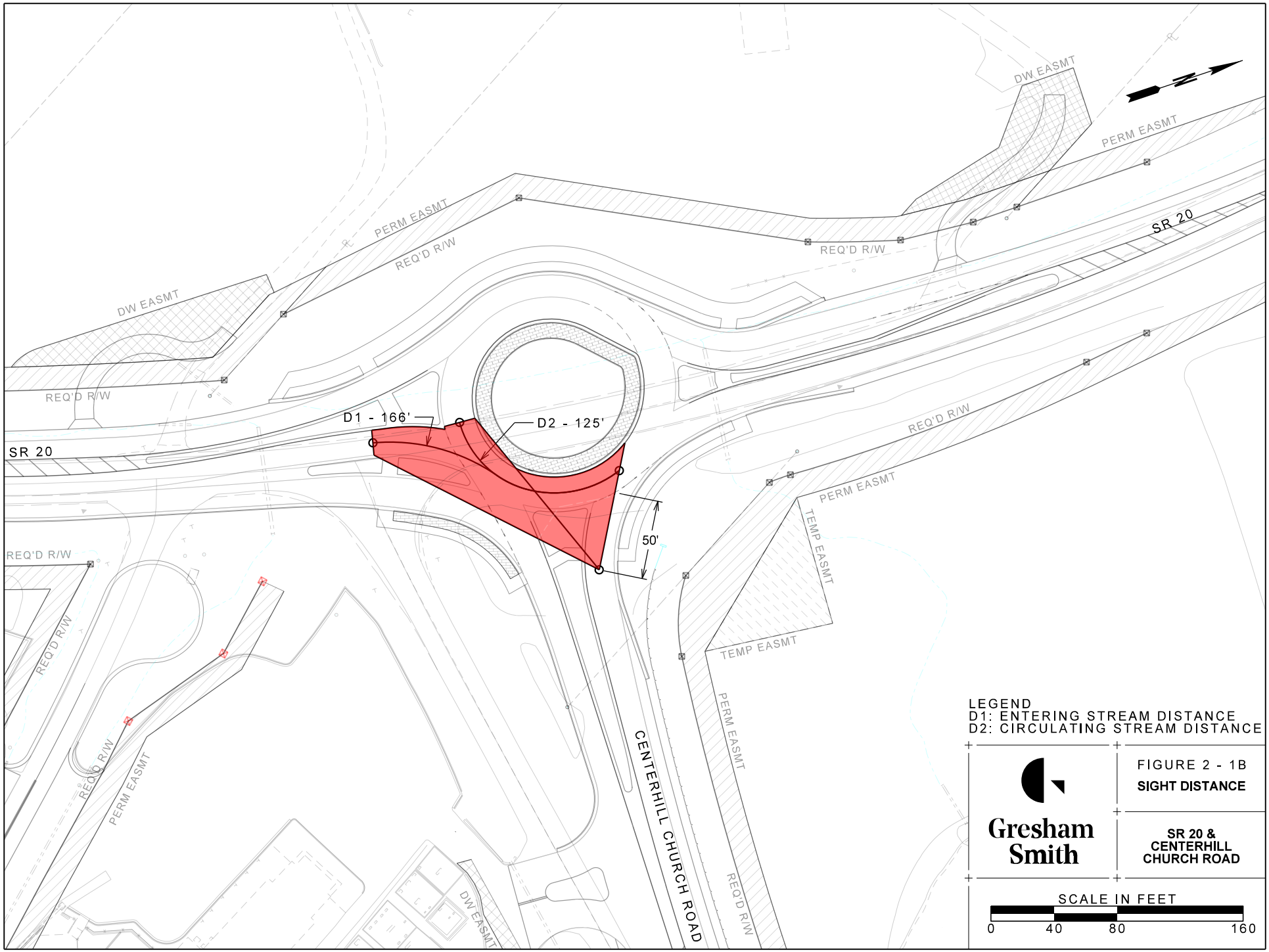

McCULLERS ROAD
SR 20
SR 20
McCULLERS ROAD
N
Gresham Smith
FIGURE 3 - 3A
WB-67 TRUCK
NB MOVEMENT
SR 20 &
McCULLERS ROAD
SCALE IN FEET
0
40
80
160

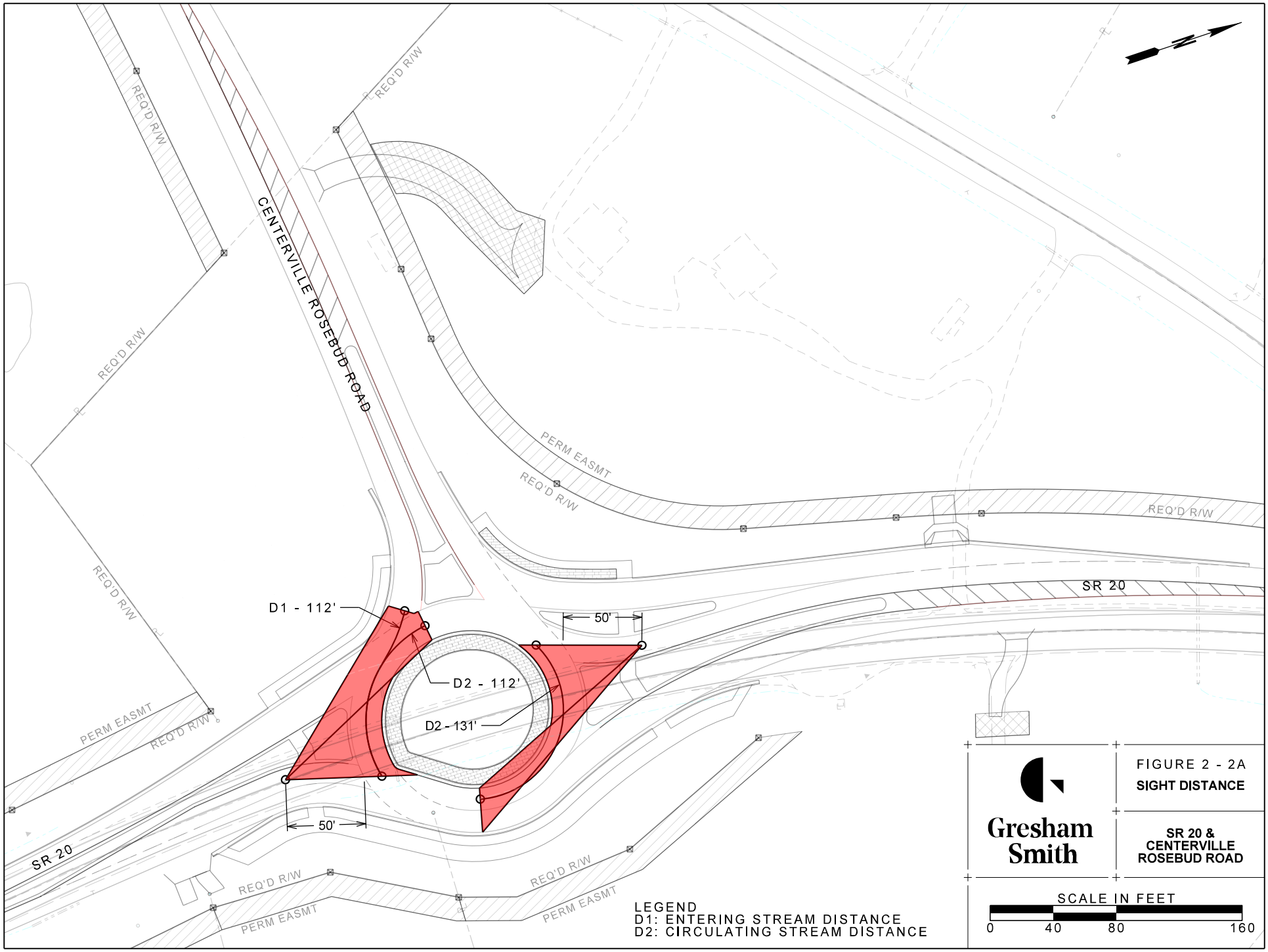

McCULLERS ROAD
SR 20
SR 20
McCULLERS ROAD
N
Gresham Smith
FIGURE 3 - 3B
WB-67 TRUCK
SB MOVEMENT
SR 20 &
McCULLERS ROAD
SCALE IN FEET
0
40
80
160

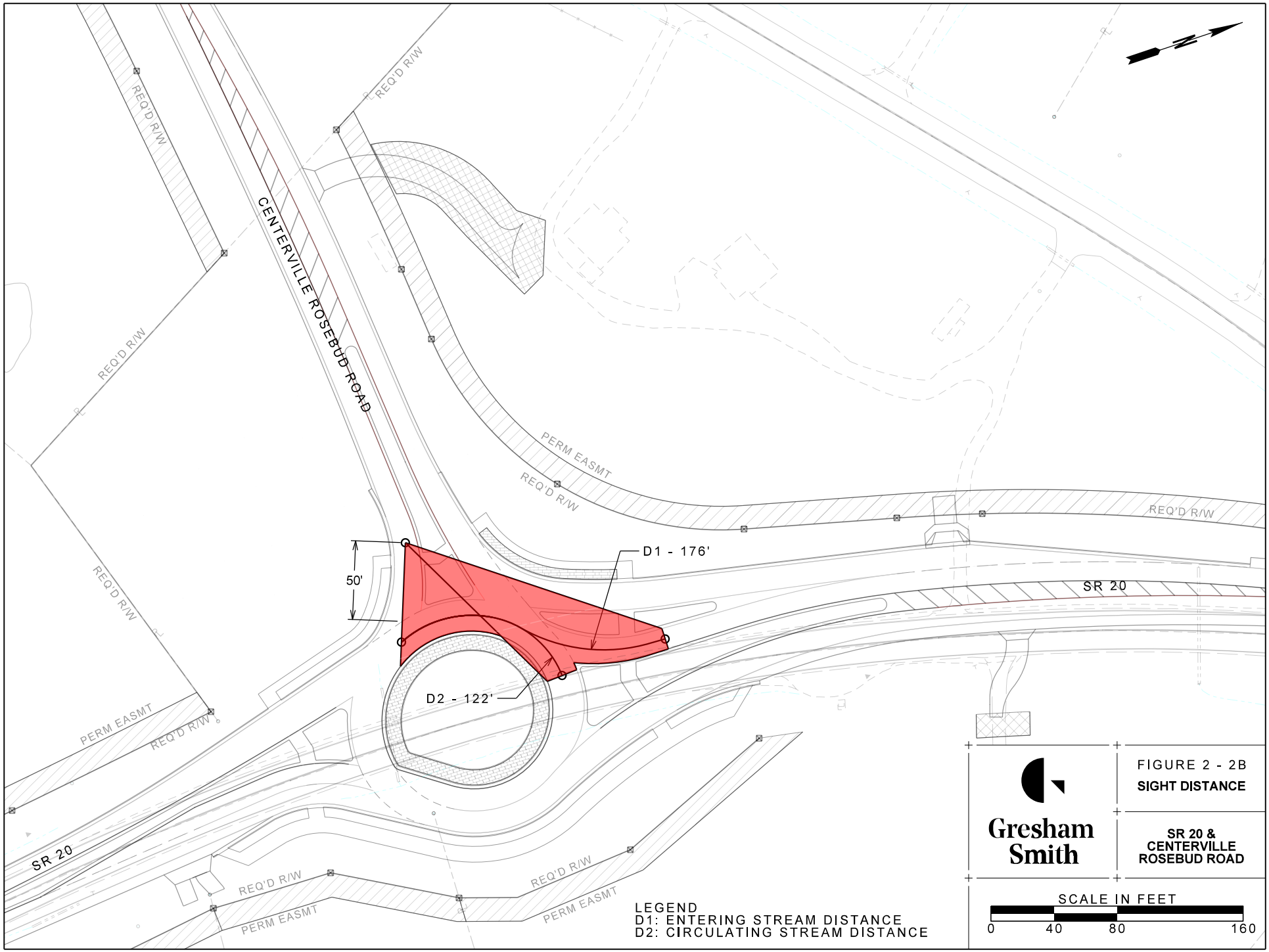

McCULLERS ROAD
SR 20
SR 20
McCULLERS ROAD
N
Gresham Smith
FIGURE 3 - 3C
WB-67 TRUCK
EB MOVEMENT
SR 20 &
McCULLERS ROAD
SCALE IN FEET
0
40
80
160

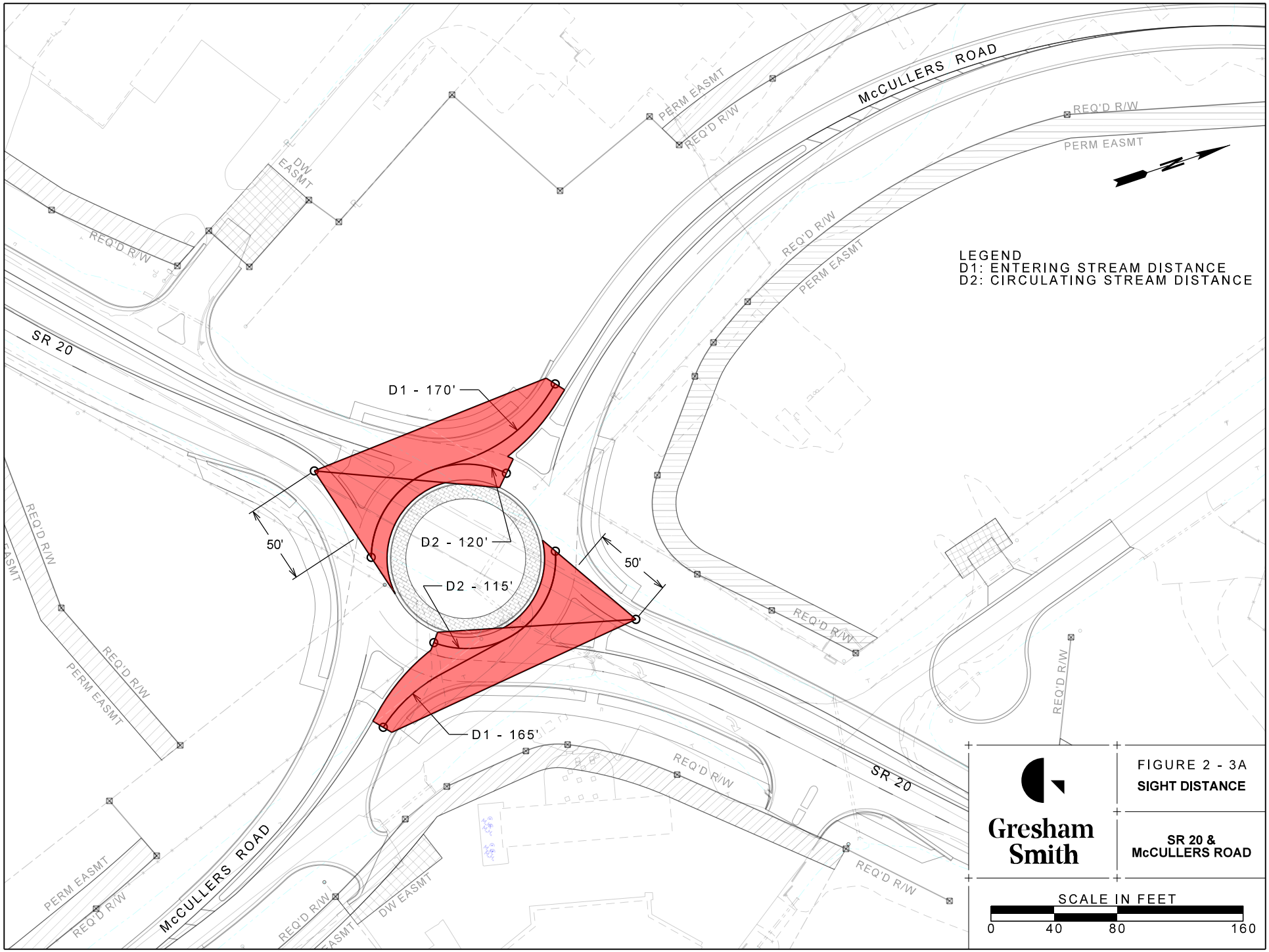

McCULLERS ROAD
SR 20
SR 20
McCULLERS ROAD
N
Gresham Smith
FIGURE 3 - 3D
WB-67 TRUCK
WB MOVEMENT
SR 20 &
McCULLERS ROAD
SCALE IN FEET
0
40
80
160

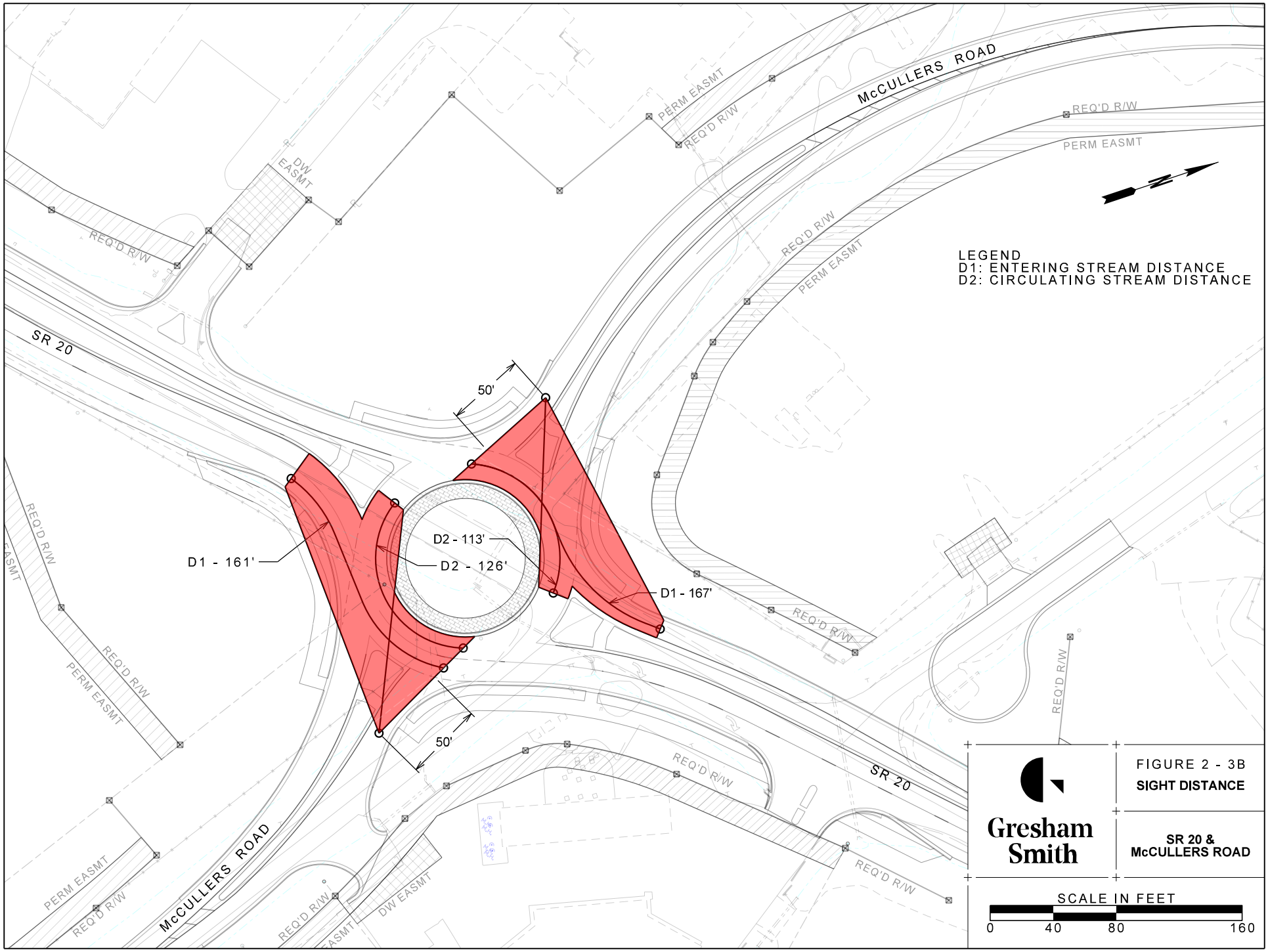

DW EASMT
PERM EASMT
REQ'D R/W
SR 20
50'
D2 - 109'
D2 - 108'
D1 - 108'
TEMP EASMT
CENTERHILL CHURCH ROAD
LEGEND
D1: ENTERING STREAM DISTANCE
D2: CIRCULATING STREAM DISTANCE
Gresham Smith
FIGURE 2 - 1A
SIGHT DISTANCE
SR 20 & CENTERHILL CHURCH ROAD
SCALE IN FEET
0
40
80
160


DW EASMT
PERM EASMT
REQ'D R/W
SR 20
D1 - 166'
D2 - 125'
50'
TEMP EASMT
CENTERHILL CHURCH ROAD
LEGEND
D1: ENTERING STREAM DISTANCE
D2: CIRCULATING STREAM DISTANCE
Gresham Smith
FIGURE 2 - 1B
SIGHT DISTANCE
SR 20 & CENTERHILL CHURCH ROAD
SCALE IN FEET
0
40
80
160


CENTERVILLE ROSEBUD ROAD
REQ'D R/W
PERM EASMT
SR 20
D1 - 112'
D2 - 112'
D2 - 131'
50'
50'
LEGEND
D1: ENTERING STREAM DISTANCE
D2: CIRCULATING STREAM DISTANCE
Gresham Smith
FIGURE 2 - 2A
SIGHT DISTANCE
SR 20 & CENTERVILLE ROSEBUD ROAD
SCALE IN FEET
0
40
80
160


CENTERVILLE ROSEBUD ROAD
REQ'D R/W
PERM EASMT
SR 20
D1 - 176'
D2 - 122'
50'
LEGEND
D1: ENTERING STREAM DISTANCE
D2: CIRCULATING STREAM DISTANCE
Gresham Smith
FIGURE 2 - 2B
SIGHT DISTANCE
SR 20 & CENTERVILLE ROSEBUD ROAD
SCALE IN FEET
0
40
80
160


McCULLERS ROAD
SR 20
REQ'D R/W
PERM EASMT
DW EASMT
LEGEND
D1: ENTERING STREAM DISTANCE
D2: CIRCULATING STREAM DISTANCE
D1 - 170'
D2 - 120'
D2 - 115'
D1 - 165'
50'
50'
McCULLERS ROAD
SR 20
Gresham Smith
FIGURE 2 - 3A
SIGHT DISTANCE
SR 20 & McCULLERS ROAD
SCALE IN FEET
0
40
80
160



Gresham Smith

FIGURE 2 - 3B

SIGHT DISTANCE

SR 20 & McCULLERS ROAD

SCALE IN FEET

0 40 80 160

Gresham Smith

Genuine Ingenuity

ATTACHMENT 8

Concept Level Hydrology for MS4 Permit

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.

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.

There are three intersections encompassed in the project, which will all undergo improvements to update the intersections and the flow of traffic. The three intersections are SR 20 with Center Hill Church Road, SR 20 with Centerville Rosebud Road, and SR 20 with McCullers Road. 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.

Center Hill Church Road

Drainage Area 1 consists of approximately 1.64 acres located outside of the project limits.

Drainage Area 2 consists of approximately 5.79 acres located between Stations 100+00 and 107+95. Drainage Area 2 is located on the west side of SR 20, and is outside of the MS4 area. Runoff from the roadway is conveyed through a roadside ditch.

Drainage Area 3a consists of approximately 5.45 acres located between Stations 107+95 and 111+26. Drainage Area 3a is located on the west side of SR 20, and is outside of the MS4 area. Runoff from the contributing drainage area is conveyed through the ditch before discharging through a 24” RCP cross drain under SR 20, where it outfalls into a Tributary to Sandy Creek.

The drainage area has been split into Sub-Basins 3a and 3b. Each sub-basin exists on opposite sides of the outfall point and include bioretention basins that collect and detain runoff volumes equivalent to the Cpv.

Drainage Area 3b consists of approximately 7.84 acres located between Stations 111+26 and 117+94. Drainage Area 3b is located on the west side of SR 20, and is outside of the MS4 area. Direct runoff from SR 20 is conveyed through a roadside ditch where the runoff enters a proposed cross drain (Station 117+18). The runoff continues downstream to outfall 8, where it ultimately leaves the site (refer to drainage area 8.)

Drainage Area 4 consists of approximately 12.22 acres located between Stations 117+94 and 129+26. Drainage Area 4 is located on the west side of SR 20, and is outside of the MS4 area. Direct runoff from the roadway is conveyed through a roadside ditch before discharging through a 30" RCP cross drain under SR 20, where it outfalls as sheet flow before entering the existing pond.

Drainage Area 5 consists of approximately 0.79 acres on-site located between Stations 900+00 and 901+49. Runoff from the on-site area enters a proposed parallel roadside ditch before draining to outfall 8. The runoff then discharging through a 36" RCP cross drain under Old Moon Road, where it finally outfalls to drainage area 7, where it departs the site to Sandy Creek.

BMPs including enhanced dry swale and bioslope were considered to treat the WQv of runoff from the proposed roadway. Bioslope in this location is infeasible due to the site limitations (Infeasibility Criteria #7) as the side slope of the roadway embankment is 2:1 which exceeds the maximum allowable slope for this BMP per the design criteria in Section 10.4.5 of the GDOT Drainage Manual. Enhanced Dry Swales were found to be infeasible due to the cost of each as compared to the cost of construction the drainage basin. As a result, a grass channel will be used to convey runoff to the basin's outfall.

Drainage Area 6 consists of approximately 0.16 acres on-site located between Stations 901+49 and 902+50. Direct runoff from the roadway is directed into a bioslope (WQ-6) and leaves the project area at the outfall at Sta 904+90.

Drainage Area 7 consists of approximately 13.33 acres (which includes flows from Outfall 3a and 8) and is bounded by Old Moon Road, SR 20 and Moon Road. Runoff from the roadway is treated by bioslopes (WQ-7 and WQ-8.1) on Old Moon Road and runoff from Moon Road is conveyed by a roadside channel. Both flows converge and flow through a 36" RCP cross drain under Old Moon Road, where the outfall leaves the site.

Drainage Area 8 consists of approximately 6.28 acres located between Moon Road and Old Moon Road. Drainage Area 8 is located on the north side of Old Moon Road, and is outside of the MS4 area. Runoff from the contributing drainage area is conveyed through a roadside ditch before discharging through a proposed 36" RCP cross drain under Old Moon Road, where it outfalls to drainage area 7.

Drainage Area 8a consists of approximately 13.26 acres located south of Moon Road. The basin includes the embankment of Moon Road, but is otherwise offsite. There is no impervious area added to basin 8a, and any runoff from the basin travels as sheet flow offsite.

Drainage Area 9 consists of approximately 18.84 acres located between Stations 400+00 and 412+95. Drainage Area 9 is located on the north side of Center Hill Church Road, and is outside of the MS4 area. Direct runoff from SR 20 outfalls to a grassed channel conveying runoff from the intersection with SR 20. Runoff from Stations 401+00 to 407+00 on Center Hill Church Road then outfalls to another roadside ditch. Runoff from Stations 408+50 to 412+50 on Center Hill Church Road are conveyed by a ditch, discharging to a cross drain at Station 408+75 where the runoff proceeds to the site outfall, a perennial stream and tributary to Sandy Creek. Hydraulic analysis of the cross drain suggests that the increase in design storm peak flow resulting from the project will have a negligible impact on the existing 30" RCP culvert.

Drainage Area 10 consists of approximately 2.30 acres located between Stations 400+50 and 408+85. Drainage Area 10 is located on the south side of Center Hill Church Road, and is outside of the MS4 area. Direct runoff from Center Hill Church Road outfalls to a roadside ditch which proceeds through a proposed 18" RCP culvert at Station 612+40 on Moon Road. before proceeding to the site outfall, a perennial stream and tributary to Sandy Creek.

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	Y	5	N/A	N/A	N/A
2	Y	6	N/A	N/A	N/A
3a	Y	5	N/A	N/A	N/A
3b	Y	5	N/A	N/A	N/A
4	Y	5	N/A	N/A	N/A
5	N	N/A	Bioslope	N	1
6	N	N/A	Bioslope	Y	N/A
7	N	N/A	Bioslope	Y	N/A
8	Y	5	N/A	N/A	N/A
8a	Y	6	N/A	N/A	N/A
9	Y	5	N/A	N/A	N/A
10	Y	5	N/A	N/A	N/A

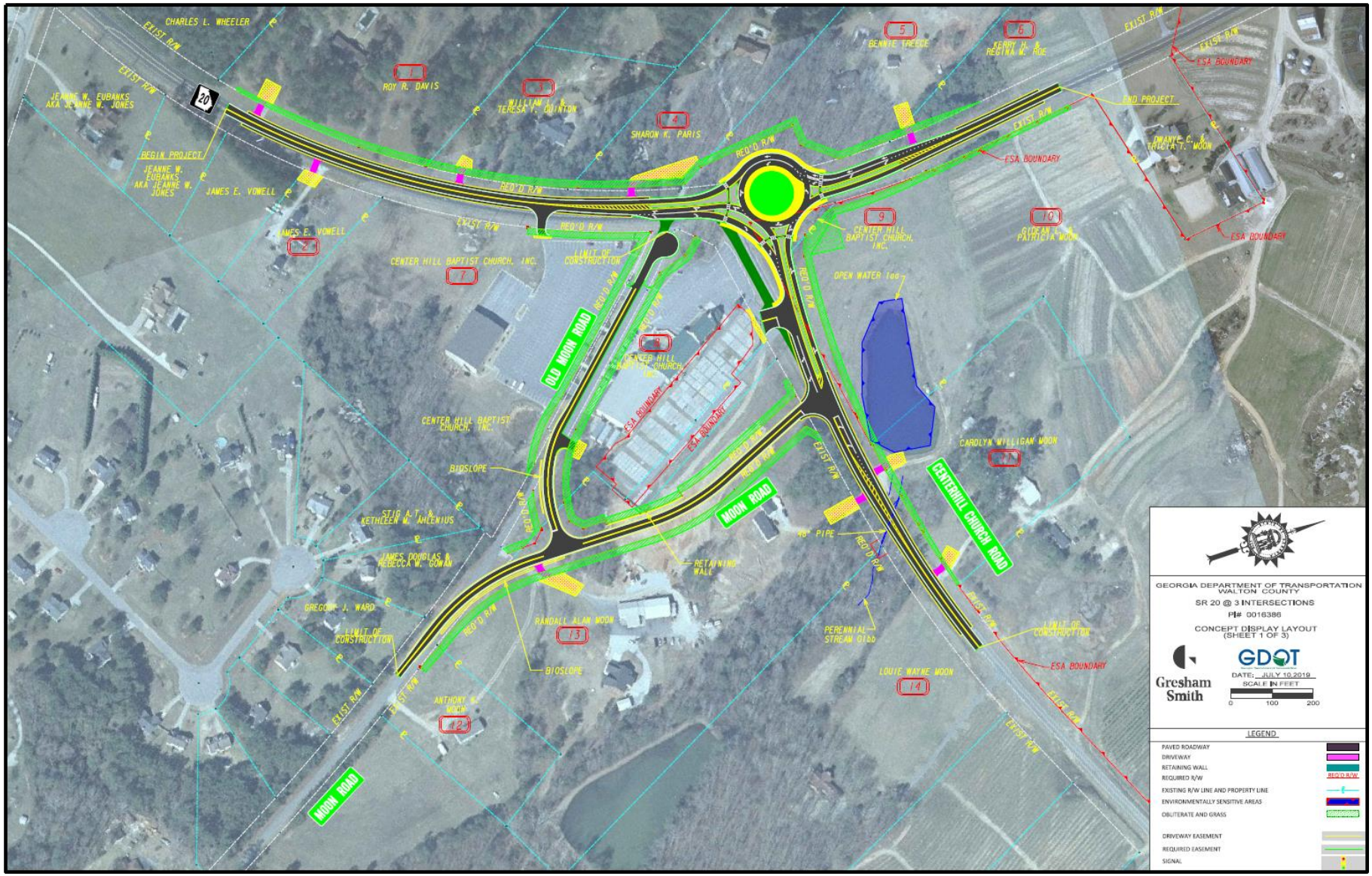
Drainage Area Summary								
	Pre-Development			Post-Development				Water Quality Volume
Outfall Area	Tc	Weighted CN	Area (Acres)	Tc	Weighted CN	Area (Acres)	% Impervious	(Cubic Feet)
Center Hill Church Road								
5	5.0	50	0.79	5.0	51	0.79	-	0
6	5.0	57	0.16	5.0	65	0.16	12	76
7	13.7	56	13.33	13.7	56	13.33	-	0

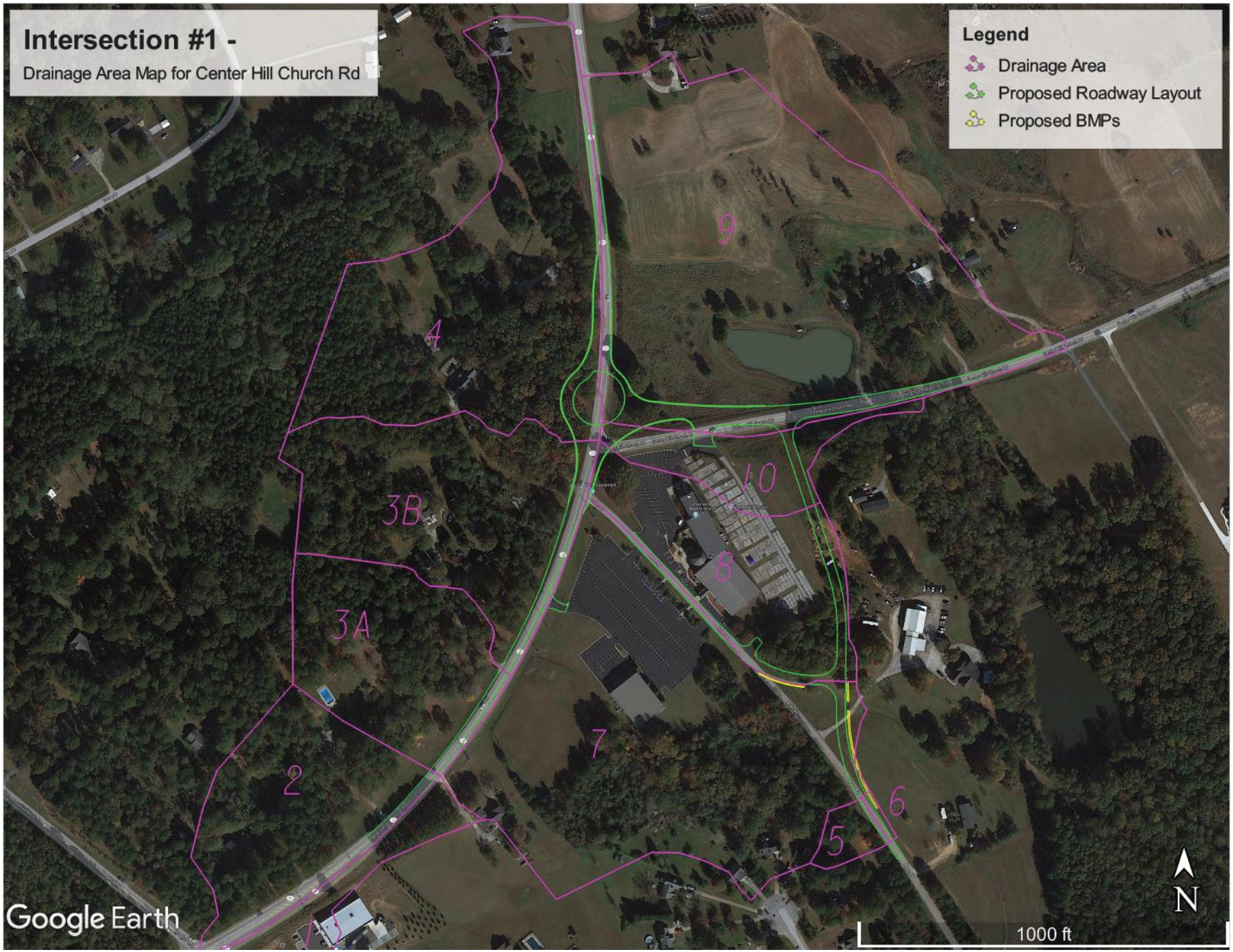
BMPs
WQ-6 (Bioslope) = 50 ft
WQ-7 (Bioslope) = 290 ft
WQ-8.1 (Bioslope) = 130 ft

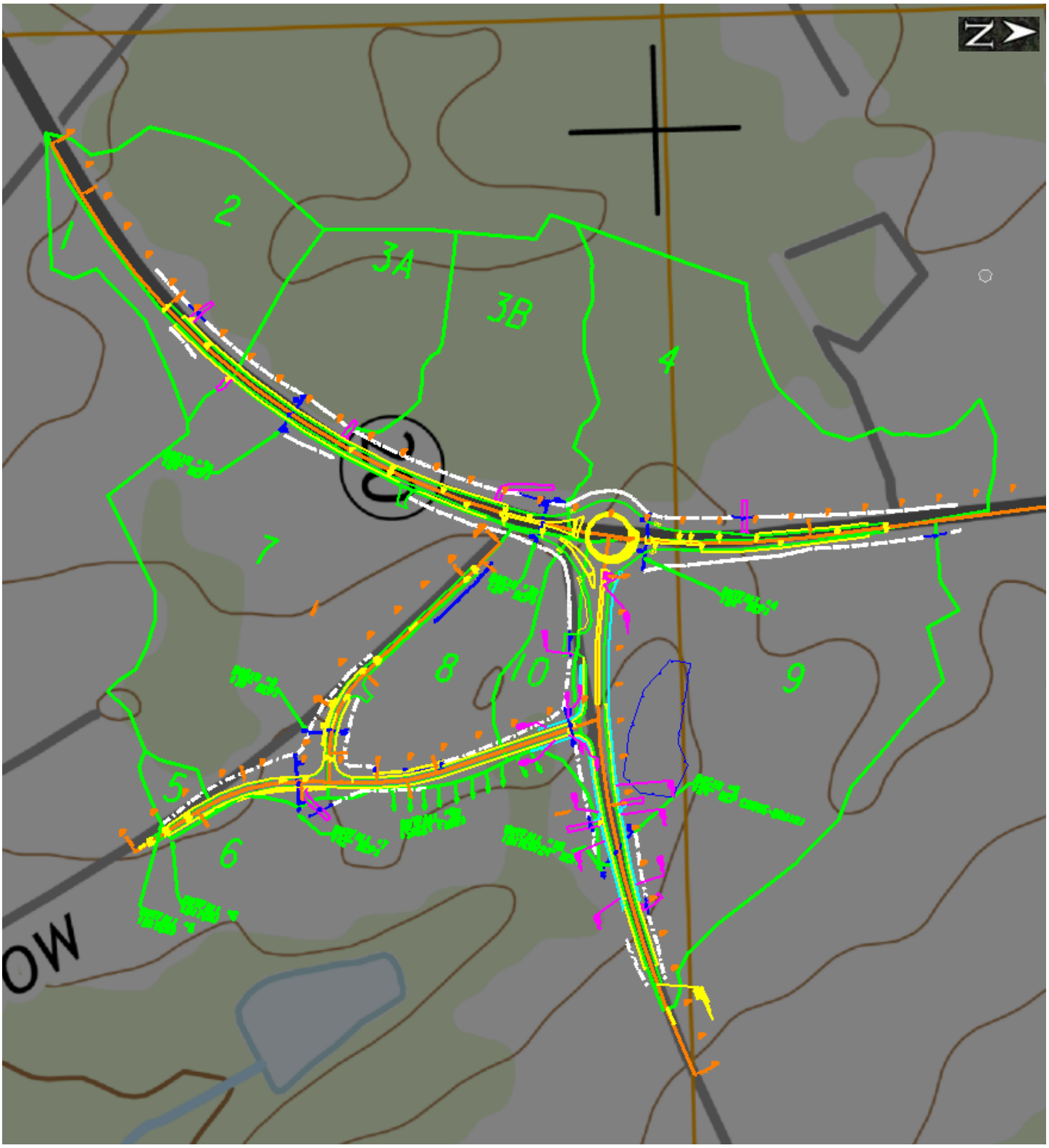
Preliminary cost calculations for all BMPs within intersection #1, Center Hill Church Rd. Costs are included in the Construction Cost Estimate

MS4 BMP Cost

Bioslope	Unit	Unit Cost	Quantity	Cost
573-2006 Unddr Pipe Incl. Drng aggr, 6 in.	LF	$22.65	470	$10,645.50
Plastic Filter Fabric	SY	$4.75	522	$2,480.56
Engineered Media	CY	$30.00	104	$3,133.33
Plant Topsil	CY	$39.90	0	$4,167.33
Outlet Control Structure	EA	$5,000.00	0	$0.00
Riprap	SY	$350.00	0	$0.00
Earthwork	CY	$15.00	104	$1,566.67
Permanent Grassing	AC	$1,227.29	0.0432	$52.97
Right of Way	SF	$15.00	0	$0.00
MS4 BMP Cost Total				**$22,046.36**


CHARLES L. WHEELER
EXIST R/W
JEANNE W. EUBANKS AKA JEANNE W. JONES
BEGIN PROJECT
JAMES E. VOWELL
ROY R. DAVIS
WILLIAM L. & TERESA V. QUINTON
SHARON K. PARIS
BENNIE TREECE
KENNY H. & REGINA W. ROE
END PROJECT
ESA BOUNDARY
DWAYNE C. & TRICIA T. MOON
REQ'D R/W
LIMIT OF CONSTRUCTION
CENTER HILL BAPTIST CHURCH, INC.
OLD MOON ROAD
MOON ROAD
CENTERHILL CHURCH ROAD
OPEN WATER 1ac
GLORIA P. & PATRICIA MOON
CAROLYN WILLIGAN MOON
BIOSLOPE
STIG A.T. & KETHLEEN M. AHLENIUS
JAMES DOUGLAS & REBECCA W. GOWAN
GREGORY J. WARD
RETAINING WALL
48" PIPE
PERENNIAL STREAM Olbb
RANDALL ALAN MOON
LOUIE WAYNE MOON
ANTHONY K. MOON
GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY
SR 20 @ 3 INTERSECTIONS
PI# 0016386
CONCEPT DISPLAY LAYOUT
(SHEET 1 OF 3)
GDOT
DATE: JULY 10,2019
SCALE IN FEET
0 100 200
Gresham Smith
LEGEND
PAVED ROADWAY
DRIVEWAY
RETAINING WALL
REQUIRED R/W
EXISTING R/W LINE AND PROPERTY LINE
ENVIRONMENTALLY SENSITIVE AREAS
OBLITERATE AND GRASS
DRIVEWAY EASEMENT
REQUIRED EASEMENT
SIGNAL


Intersection #1 -
Drainage Area Map for Center Hill Church Rd
Legend
Drainage Area
Proposed Roadway Layout
Proposed BMPs
9
4
10
3B
8
3A
7
2
6
5
N
Google Earth
1000 ft


N
1
2
3A
3B
4
5
6
7
8
9
10
OW

Centerville Rosebud Road

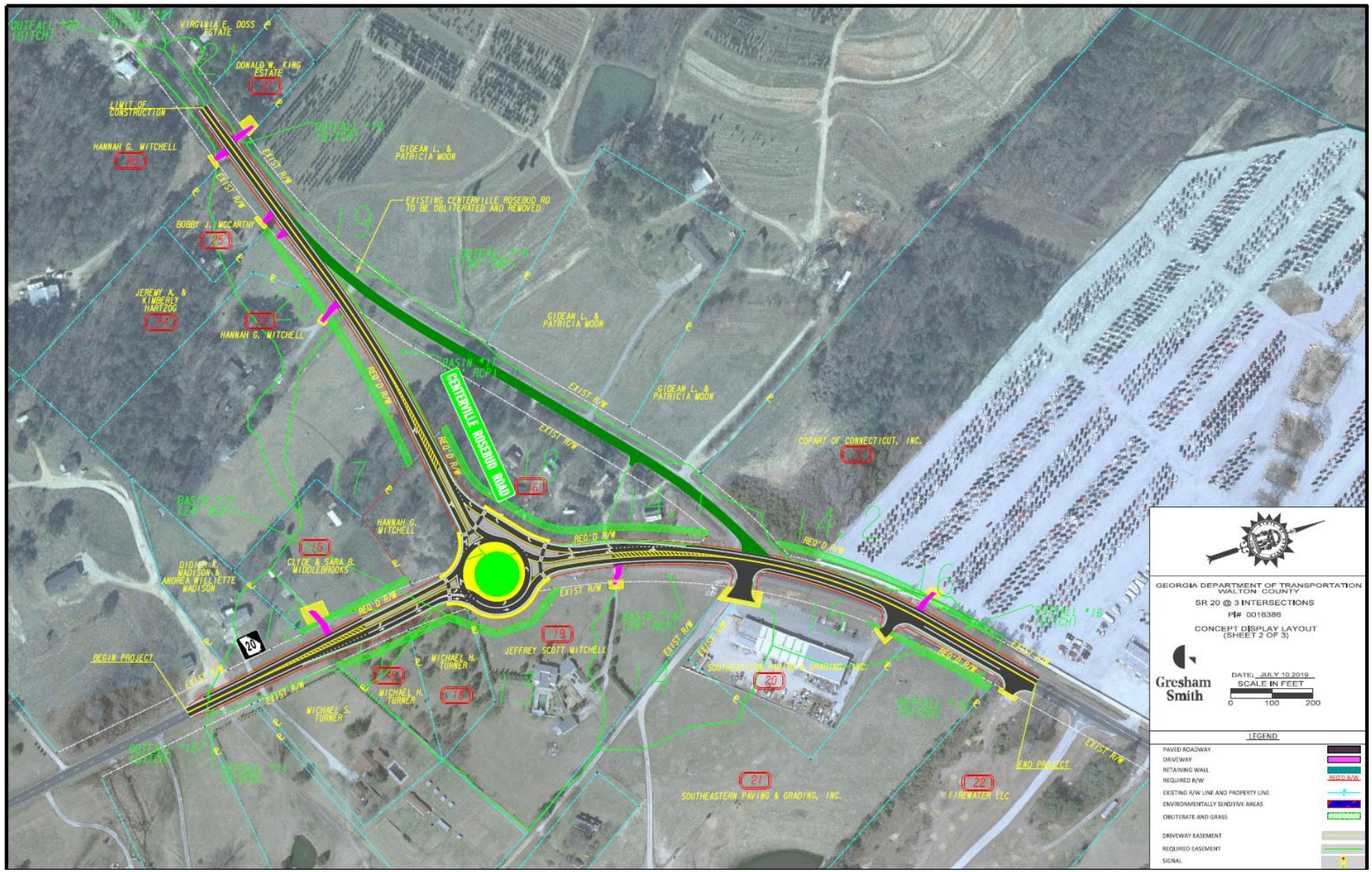
The intersection of Centerville Rosebud Road and SR 20 includes delineated drainage areas 11-21, all of which outfall in Walton County, outside of MS4 areas. Drainage areas 11-21 are excluded from MS4 design due to outfall level exclusion #5.

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.
11	Y	5	N/A	N/A	N/A
12	Y	5	N/A	N/A	N/A
13	Y	5	N/A	N/A	N/A
14	Y	5	N/A	N/A	N/A
15	Y	5	N/A	N/A	N/A
16	Y	5	N/A	N/A	N/A
17	Y	5	N/A	N/A	N/A
18	Y	5	N/A	N/A	N/A
19	Y	5	N/A	N/A	N/A
20	Y	5	N/A	N/A	N/A
21	Y	5	N/A	N/A	N/A

BMPs
None

Cost calculations for all BMPs within intersection #2, Centerville Rosebud Rd. Costs are included in the Construction Cost Estimate

MS4 BMP Cost Total	**$0**



GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY

SR 20 @ 3 INTERSECTIONS

PI# 0016386

CONCEPT DISPLAY LAYOUT
(SHEET 2 OF 3)

Gresham Smith

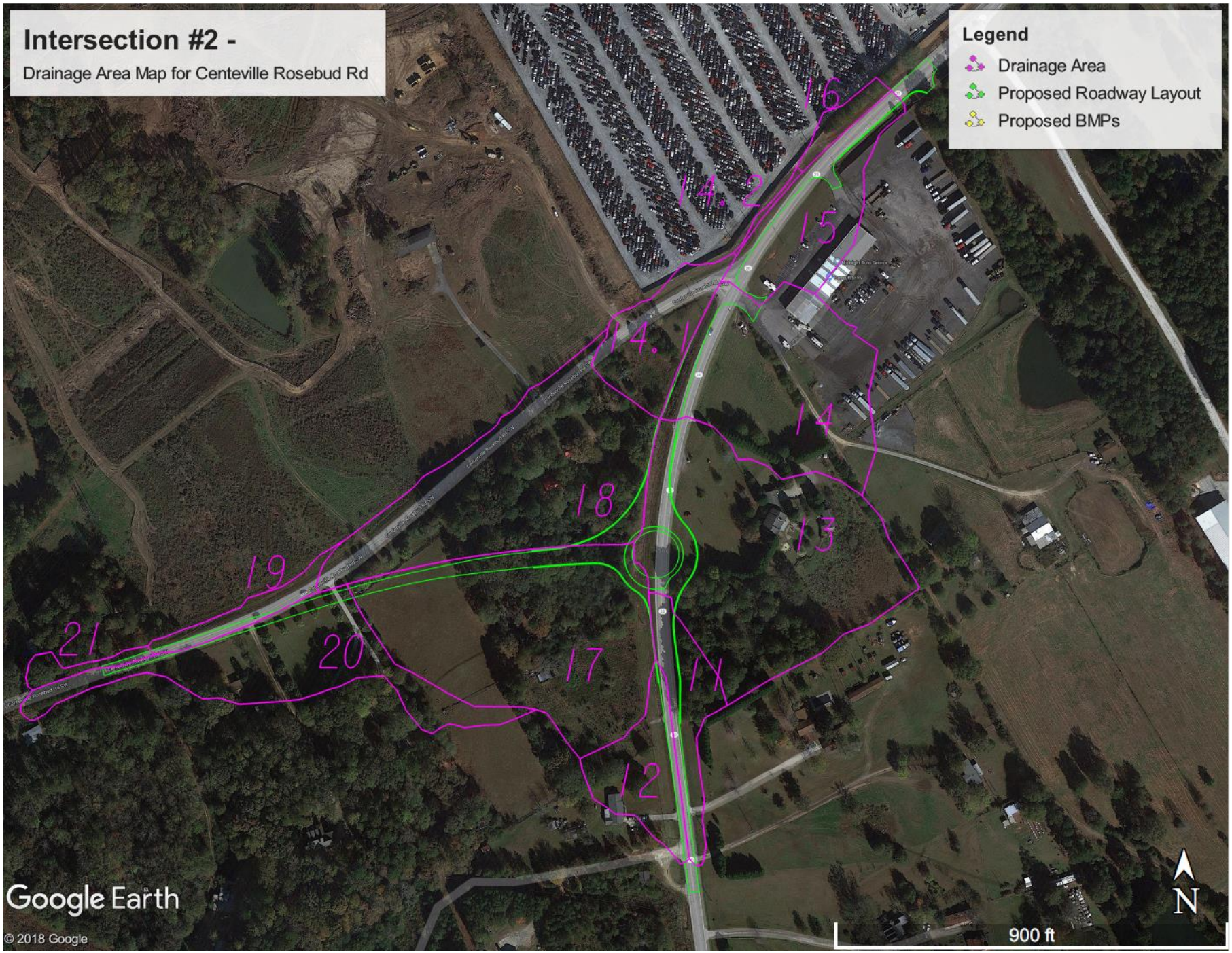
DATE: JULY 10 2019

SCALE IN FEET

0 100 200

LEGEND

- PAVED ROADWAY
- DRIVEWAY
- RETAINING WALL
- REQUIRED R/W
- EXISTING R/W LINE AND PROPERTY LINE
- ENVIRONMENTALLY SENSITIVE AREAS
- OBLITERATE AND GRASS
- DRIVEWAY EASEMENT
- REQUIRED EASEMENT
- SIGNAL


Intersection #2 -
Drainage Area Map for Centeville Rosebud Rd
Legend
Drainage Area
Proposed Roadway Layout
Proposed BMPs
16
14.2
15
14.1
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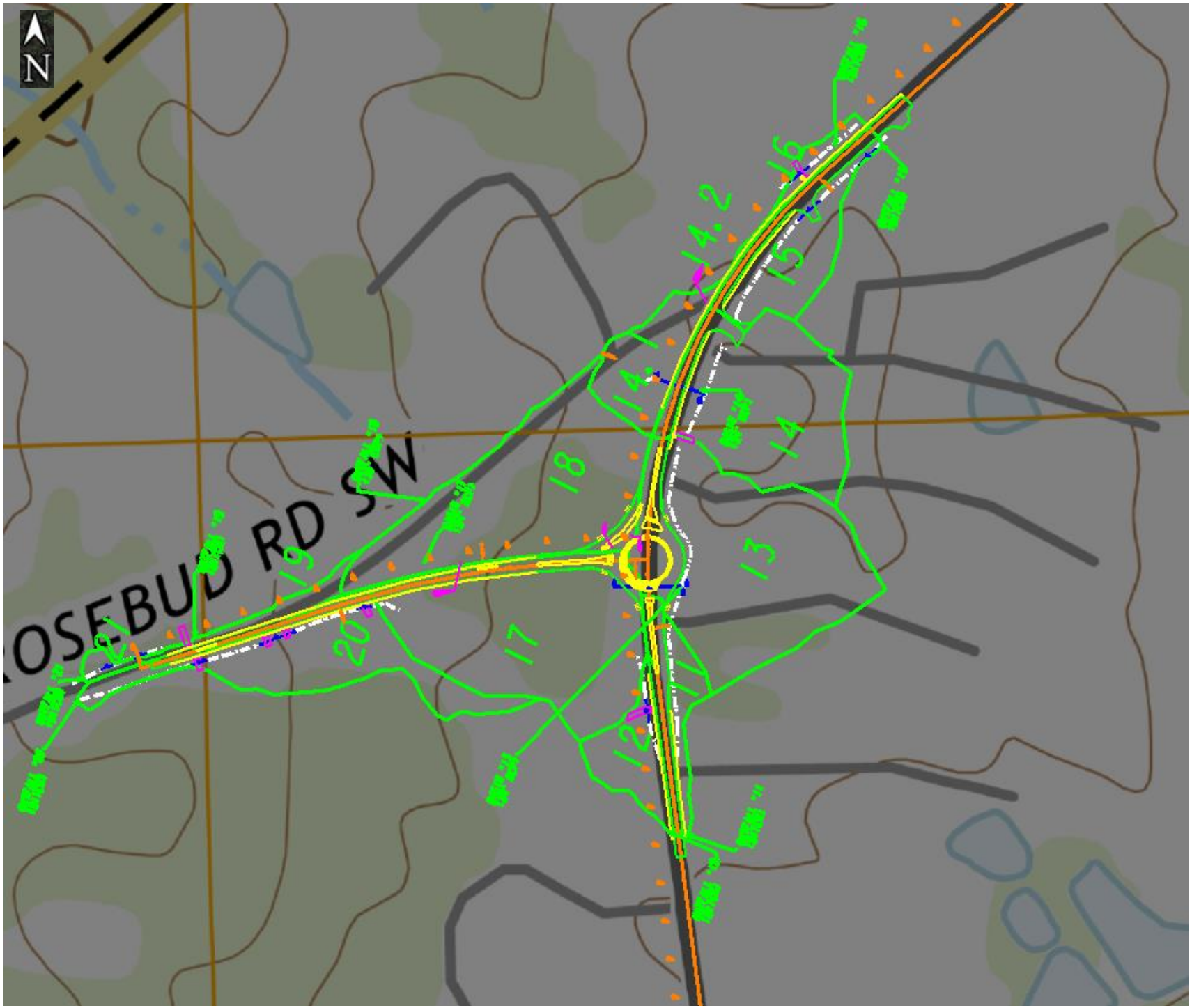
N
ROSEBUD RD SW

McCullers Road

Drainage Area 22 consists of approximately 0.42 acres located between Stations 221+37 and 222+63. Drainage Area 22 is located south of Pointer Road, outside of GDOT MS4 areas. Runoff from the contributing drainage area is conveyed through the ditch before discharging into a proposed 18" RCP under Pointer Road.

Drainage Area 23 consists of approximately 1.38 acres located between Stations 221+37 and 223+40. Drainage Area 23 is located south of Lance Court, outside of GDOT MS4 areas. Runoff from the roadway directly flows to a roadside ditch. Excess from the contributing drainage area is conveyed through the ditch before discharging off site to an existing stream.

Drainage area 24 has been split into two sub-basins (24a and 24b). The sub-basins exist on opposite sides of McCullers Road but share the same drainage area and outfall locations. Outfall 24a flows to a bioretention basin (WQ-24), leading to outfall 25. Outfall 24b flows to a proposed 18" cross drain which leads to the same bioretention pond on outfall 24a (WQ-24). Together, the runoff is transported to a roadside ditch across the intersection of SR 20 and McCullers Road, where it flows to outfall 25 prior to leaving the site.

Drainage Area 24a consists of approximately 13.30 acres located between Stations 222+63 and 231+49. Direct runoff from the roadway is treated by a roadside ditch prior to entering bioretention basin WQ-24. The runoff exists the basin through an outlet control structure and into a 36" pipe to the northwest side of SR 20.

Drainage Area 24b consists of approximately 10.18 acres located between Stations 231+49 and 234+32 . Runoff from the roadway directly enters a parallel roadside ditch separated a driveway, which is then conveyed to a bioretention pond WQ-24. Runoff from the contributing drainage area is conveyed through the bioretention pond before discharging through an outlet control structure leading to another drainage ditch.

The bioretention basin at the end is designed to detain and filtrate the Cpv and allow excess runoff volumes to pass through the OCS before outfalling.

Drainage Area 25 consists of approximately 6.61 acres located between Stations 223+40 and 231+49 to the northwest of SR 20, and is outside of GDOT MS4 areas. Drainage area 25 receives contributing flow from basins 24a, and 24b and conveys flow north to the site outfall.

Drainage Area 26 consists of approximately 5.05 acres located between Stations 231+49 and 239+63. Runoff from the roadway directly enters a parallel roadside ditch which discharges through a 30" RCP cross drain under SR 20. The runoff ultimately outfalls to another bioretention basin (WQ-26) where it travels through an Outlet Control Structure prior to leaving the site. Hydraulic analysis of the cross drain suggests that the increase in design storm peak flow resulting from the project will have a negligible impact on the existing cross drain.

The bioretention basin at the end is designed to detain and filtrate the Cpv and allow excess runoff volumes to pass through the OCS before discharging to receiving waters.

Drainage Area 27 consists of approximately 2.90 acres located between Stations 239+63 and 240+61. Runoff from the basin flows through a cross drain an into the drainage ditch which ties into basin 26 and WQ 26.

BMPs were considered to treat the WQv of runoff from the proposed roadway including enhanced dry swale and bioslope. Bioslope in this location is infeasible due to the site limitations (according to the design criteria in Section 10.4.5 of the GDOT Drainage Manual.) Enhanced swale is infeasible due to size and cost restraints (based on the design criteria in Section 10.4.3 of the GDOT Drainage Manual.) As a result, a grass channel will be used to convey runoff to the basin's receiving waters, which is Little Haynes Creek.

Drainage Area 28 consists of approximately 0.26 acres located between Stations 238+54 and 240+61. Runoff is conveyed through a roadside channel and offsite.

BMPs were considered to treat the WQv of runoff from the proposed roadway including enhanced dry swale and bioslope. Bioslope in this location is infeasible due to the site limitations (according to the design criteria in Section 10.4.5 of the GDOT Drainage Manual.) Enhanced swale is infeasible due to size and cost restraints

(based on the design criteria in Section 10.4.3 of the GDOT Drainage Manual.) As a result, a grass channel will be used to convey runoff to the basin's receiving waters, which is Little Haynes Creek.

Drainage Area 29 consists of approximately 1.09 acres located between Stations 814+16 and 819+78 west of McCullers Road, which is outside of GDOT MS4 areas. Runoff flows through the roadside channel and outfalls into an existing channel at approximate station 529+20.

Drainage Area 30 consists of approximately 3.67 acres located between Stations 807+00 and 814+15. Runoff is conveyed through roadside channels, and routed through a proposed double 30" CMP cross drain under McCullers Rd at outfall 30.

Drainage Area 31 consists of approximately 20.20 acres located between Stations 231+49 and 248+36. Runoff from the roadway is conveyed through roadside channels, and routed through an existing 24" CMP cross drain under McCullers Rd before combining with the outfall from Basin 29.

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.
22	Y	5	N/A	N/A	N/A
23	Y	5	N/A	N/A	N/A
24a	N	N/A	Bioretention	Y	N/A
24b	N	N/A	Bioretention	Y	N/A
25	Y	5	N/A	N/A	N/A
26	N	N/A	Bioretention	Y	N/A
27	N	N/A	Bioslope/Enhanced Swale	N	7
28	N	N/A	Bioslope/Enhanced Swale	N	7
29	Y	5	N/A	N/A	N/A
30	N	N/A	Bioretention	N	N/A
31	N	N/A	Bioretention	N	N/A

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)
McCullers Road								
22	6.0	67	0.42	6.0	74	0.42	35.7	310
23	32.0	68	1.38	30.7	69	1.38	21.5	165
24a	22.1	64	13.30	20.2	65	13.30	11.8	2,078
24b	14.3	73	10.18	13.9	73	10.18	13.0	78
25	9.0	80	6.61	8.1	81	6.61	42.4	823
26	9.9	69	5.05	8.1	69	5.05	24.6	0
27	33.9	69	2.90	32.5	69	2.90	22.1	0
28	5.0	71	0.26	5.0	78	0.26	46.8	212
29	5.0	61	1.09	5.0	68	1.09	28.4	823
30	9.4	83	3.67	9.4	87	3.67	69.2	1,803
31	18.1	64	20.20	16.9	65	20.20	3.9	706

BMPs

WQ-24 (Bioretention) = 10,300sf
WQ-26 (Bioretention) = 7,260sf

Cost calculations for all BMPs within intersection #3, McCullers Rd. Costs are included in the Construction Cost Estimate

MS4 BMP Cost

Bioretention	Unit	Unit Cost	Quantity	Cost
573-2006 Unddr Pipe Incl. Drng aggr, 6 in.	LF	$22.65	780	$17,667.00
Plastic Filter Fabric	SY	$4.75	1058	$5,024.61
Engineered Media	CY	$30.00	417	$12,500.00
Mulch	SY	$4.65	833	$3,875.00
Riprap	SY	$350.00	13	$4,666.67
Outlet Control Structure	EA	$10,000.00	2	$20,000.00
Earthwork	CY	$15.00	1167	$17,500.00
Permanent Grassing	AC	$1,227.29	0.172176309	$211.31
Right of Way	SF	15	0	$0.00
MS4 BMP Cost Total				**$81,444.59**

GEORGIA DEPARTMENT OF TRANSPORTATION
WALTON COUNTY

SR 20 @ 3 INTERSECTIONS

P.I# 0016386

CONCEPT DISPLAY LAYOUT
(SHEET 3 OF 3)

Gresham Smith

DATE: JULY 10 2019

SCALE IN FEET
0 100 200

LEGEND

- PAVED ROADWAY
- DRIVEWAY
- RETAINING WALL
- REQUIRED R/W
- EXISTING R/W LINE AND PROPERTY LINE
- ENVIRONMENTALLY SENSITIVE AREAS
- OBLITERATE AND GRASS
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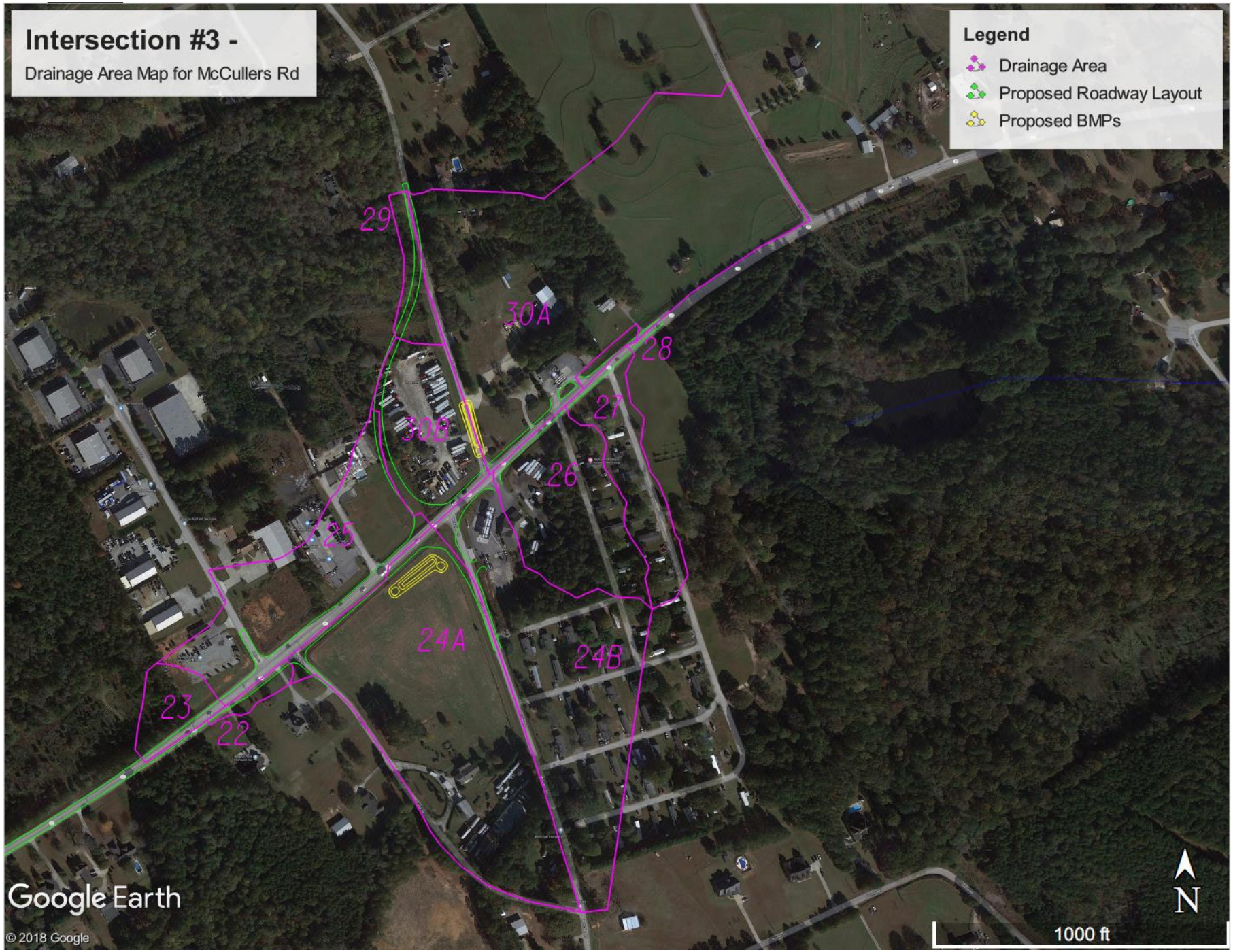
Intersection #3 -
Drainage Area Map for McCullers Rd
Legend
Drainage Area
Proposed Roadway Layout
Proposed BMPs
29
30A
28
30B
27
26
25
24A
24B
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Google Earth
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N
MCCULLERS RD
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24A
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22

Gresham Smith

Genuine Ingenuity

ATTACHMENT 9

Minutes of Concept Meetings

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

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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 23rd, 2019, 1 PM

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 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 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 before 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 before 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 work 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 a 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 might be needed to construct tie ins with the realigned sideroads.
        - No off-site detours during construction. Short term onsite detours utilizing temporary pavement may be required, but staging will be further investigated during the 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 the right of 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 before 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
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