ORIGINAL TO GENERAL FILES

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA

## OFFICE OF DESIGN POLICY & SUPPORT
## INTERDEPARTMENTAL CORRESPONDENCE

**FILE** P.I. # 0009870

Effingham County
GDOT District 5 - Jesup
Roundabout - SR 17 @ SR 119

**OFFICE** Design Policy & Support

**DATE** June 20, 2013

**FROM** for Brent Story, State Design Policy Engineer

**TO** SEE DISTRIBUTION

**SUBJECT** **APPROVED CONCEPT REPORT**

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

Attachment

DISTRIBUTION:

Bobby Hilliard, Program Control Administrator
Genetha Rice-Singleton, State Program Delivery Engineer
Glenn Bowman, State Environmental Administrator
Cindy VanDyke, State Transportation Planning Administrator
Kathy Zahul, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Charles "Chuck" Hasty, State Materials Engineer
Mike Bolden, State Utilities Engineer
Ken Thompson, Statewide Location Bureau Chief
Andy Casey, State Roadway Design Engineer
Attn: Joshua Taylor, Design Group Manager
Karon Ivery, District Engineer
Brad Saxon, District Preconstruction Engineer
Stephen Thomas, District Utilities Engineer
Perry Black, Project Manager
BOARD MEMBER - 12th Congressional District

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA
# PROJECT CONCEPT REPORT

| | | | |
|---|---|---|---|
| Project Type: | Safety | P.I. Number: | 0009870 |
| GDOT District: | 5 | County: | Effingham |
| Federal Route Number: | N/A | State Route Number: | SR 17 at SR 119 |
| Project Number: | N/A | | |

A four-legged, all-way stop controlled intersection redesigned into a 140' diameter roundabout. The project length is approximately 0.5 mile in length and is located at MP 4.24 on SR 119 and MP 14.14 on SR 17.

**Submitted for approval:**

C. Andy Carry — 4/8/13
State Roadway Design Engineer — DATE

Benedict Nwi-Ashi — 4/18/2013
State Program Delivery Engineer — DATE

Perry Blash — 4/9/13
GDOT Project Manager — DATE

**Recommendation for approval:**

Program Control Administrator — DATE

GLENN BOWMAN*/EKP — 5/5/2013
State Environmental Administrator — DATE

KATHY ZAHUL*/EKP — 5/17/2013
State Traffic Engineer — DATE

LISA MYERS*/EKP — 5/2/2013
Project Review Engineer — DATE

PATRICK ALLEN*/EKP — 4/30/2013
for State Utilities Engineer — DATE

KARON IVERY*/EKP — 5/8/2013
District Engineer — DATE

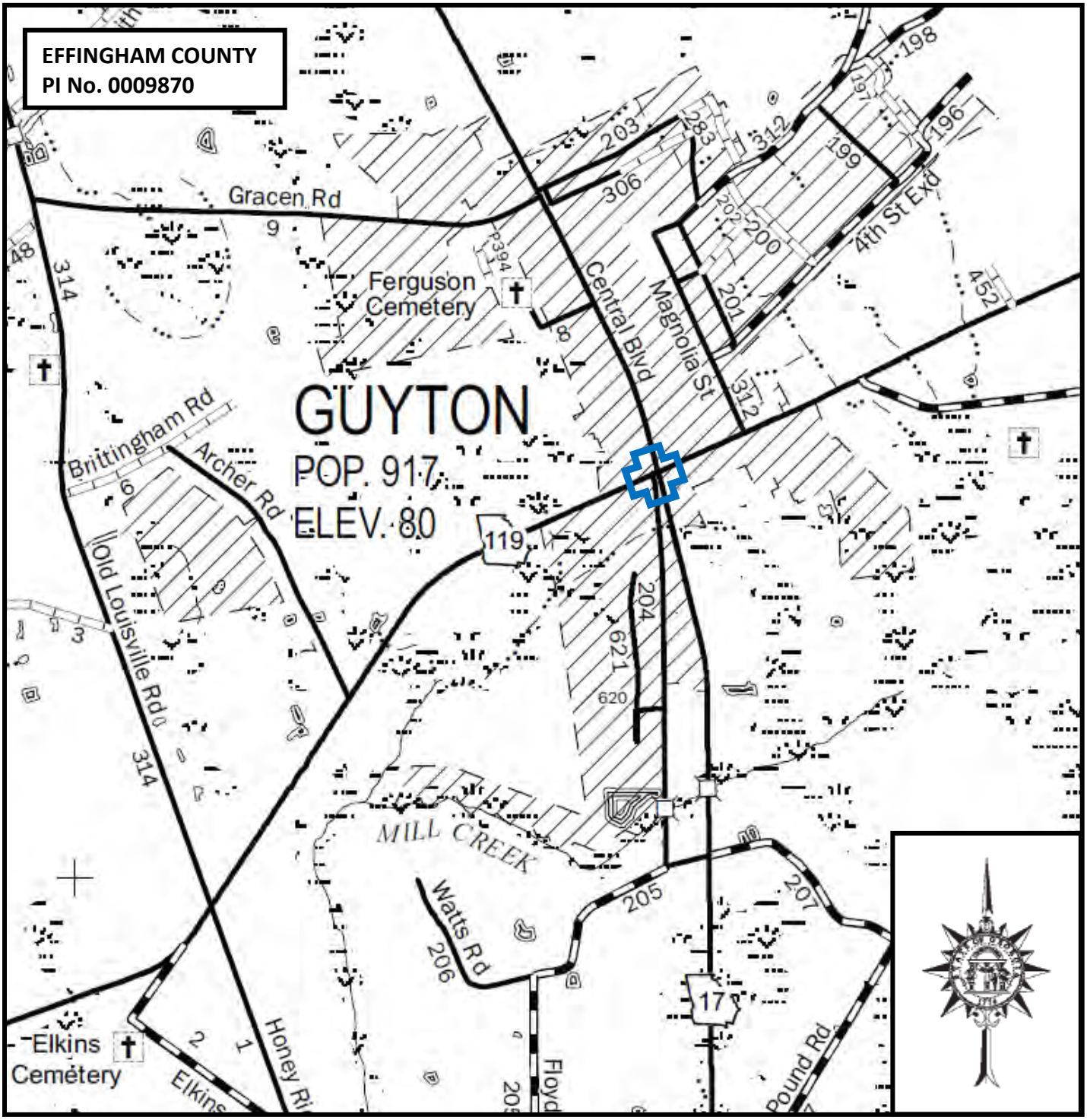
State Transportation Financial Management Administrator — DATE

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Plan (RTP) and/or the State Transportation Improvement Program (STIP).

CINDY VANDYKE*/EKP — 5/1/2013
State Transportation Planning Administrator — DATE

* - RECOMMENDATION ON FILE

## PROJECT LOCATION



## PLANNING & BACKGROUND DATA

**Project Justification Statement:**

The proposed project will enhance safety and improve operational efficiency at the intersection of SR 17/Central Boulevard and SR 119/Springfield Avenue in Guyton, GA. In Georgia, nearly a third of fatal crashes occur at intersections making intersection safety a focus area for the Georgia Department of Transportation. Nationally intersection crashes account for 40% of all reported crashes and approximately 20% of traffic fatalities. Of those fatalities, nearly 50% are the result of angle collisions. Angle collisions are often high speed, high impact crashes which often result in serious injuries or fatalities.

Roundabouts have been identified as one of nine proven countermeasures by the Federal Highway Administration (FHWA). The installation of roundabouts in comparison to traditional safety countermeasures such as traffic signals have resulted in a greater reduction in crash frequency and in many instances better operational efficiency. Roundabouts are generally navigated at slower speeds which correlate with lower impact, less severe crashes. A roundabout also presents fewer conflict points than a traditional intersections resulting in fewer collisions.

Crash data from 2005-2009 indicated that 17 crashes occurred at this intersection resulting in 5 total injuries. Of those crashes 58% were angle collisions accounting for 100% of the injuries. Studies have shown that the installation of a roundabout results in nearly 80% reduction in fatal and serious injury crashes and nearly 40% reduction in property damage crashes.

**Description of the proposed project:**

The project is located in Effingham County in the City of Guyton at the intersection of SR 119/Springfield Avenue and SR 17/Central Boulevard. The project proposes to convert the existing 4-leg intersection of SR 119 and SR 17 into a single-lane modern roundabout configuration. The intersection of W. Central Boulevard and SR 119, which is located approximately 100' west of the 4-leg intersection of SR 119 and SR 17, will be removed to facilitate the roundabout. A cul-de-sac will be placed on the existing northbound approach of W. Central Boulevard, while the southbound approach will be removed. The project is located at MP 14.11 on SR 17 and includes approximately 0.5 miles of improvements on SR 17 and SR 119.

**Federal Oversight:** ☐ Full Oversight ☒ Exempt ☐ State Funded ☐ Other

**MPO:** N/A MPO Project ID: N/A

**Regional Commission:** Coastal Regional Commission RC Project ID: N/A

**Congressional District(s):** 12

**Projected Traffic SR 119:** ADT

Current Year (2011): 7,800 Open Year (2015): 8,450 Design Year (2035): 11,150
Traffic Projections Performed by: GDOT Office of Planning

**Projected Traffic SR 17:** ADT

Current Year (2011): 5,600 Open Year (2015): 6,050 Design Year (2035): 8,000
Traffic Projections Performed by: GDOT Office of Planning

**Functional Classification (Mainline):**

SR 119 – Rural Minor Arterial
SR 17 – Rural Major Collector

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

**Is this project on a designated Bike Route, Pedestrian Plan, or Transit Network?**
☐ None ☒ Bike Route ☐ Pedestrian Plan ☐ Transit Network

Both SR 17 and SR 119 are included in State Bike Routes 85 and 95.

## CONTEXT SENSITIVE SOLUTIONS

**Issues of Concern:**

The intersection SR 17 and SR 119 lies within the historic Effingham-Ebenezer Scenic Byway. The 60 mile byway travels through the communities of Ebenezer, Guyton, Springfield and Rincon. The following excerpt is from the Historic Effingham-Ebenezer Scenic Byway Corridor Management Plan and explains the significance of the byway.

*"The Historic Effingham-Ebenezer Scenic Byway celebrates the history of Ebenezer, as the second settlement in the early province, and Effingham County – one of the original eight counties in fledgling Georgia. Ebenezer was settled by German Lutherans fleeing from religious persecution in Salzburg. The Salzburgers emphasized family, community, and strong religious faith. As such, their impact on the culture of Effingham County is evident through numerous beautiful and historic churches. Effingham County also tells a story of struggle and strife as the early settlement of Ebenezer had to be moved due to undesirable environmental conditions. New Ebenezer, which was ravaged during the American Revolution, also suffered from the fire and destruction that accompanied Sherman on his March to the Sea during the Civil War."*

*"The Scenic Byway retraces these and other historic events and significant places throughout the county, attesting to times of both prosperity and struggle. Visitors along the Byway will experience beautiful oak-lined streets, expanses of rolling grasslands, and scenic river vistas."*

SR 17 is also designated on the Oversize Truck Route Network, which will require verification of the appropriate design vehicle with the Oversize Permit Unit with the Office of Traffic Operations.

**Context Sensitive Solutions:**

The proposed roundabout at the intersection of SR 17 and SR 119, within the Historic Effingham-Ebenezer Scenic Byway, shall have appropriate signing for the corridor. In addition, members of the scenic byway committee will be consulted concerning any other considerations that may need to occur.

The roundabout has been analyzed for left, right and U-turn maneuvers using a WB-67 design vehicle, which the Oversize Permit Unit has verified as being adequate.

## DESIGN AND STRUCTURAL DATA

**Mainline Design Features:**

**Roadway Name/Identification: SR 119**

| Feature | Existing | Standard* | Proposed |
|---|---|---|---|
| **Typical Section** | | | |
| - **Number of Lanes** | **2** | **n/a** | **2** |
| - **Lane Width(s)** | **20'/12'** | **11'-12'** | **12'** |
| - **Median Width & Type** | **n/a** | **n/a** | **n/a** |
| - **Outside Shoulder Width & Slope** | **7' Unpaved Shoulder Grass, earth sod Left & Right MP 4.24 – 4.6 curb and gutter** | **2:1/4:1 8'/rural** | **2:1 Curb and Gutter-Right & Left** |
| - **Inside Shoulder Width** | **n/a** | **n/a** | **n/a** |
| - **Sidewalks** | **Left & Right** | **n/a** | **Left & Right** |
| - **Auxiliary Lanes** | **n/a** | **n/a** | **n/a** |
| - **Bike Lanes** | **n/a** | **4'** | ****** |
| **Posted Speed** | **35 mph** | | **35 mph** |
| **Design Speed** | **35 mph** | **45/55 mph** | **35 mph** |
| **Min Horizontal Curve Radius** | **-** | **371'** | **154'** |

| | | | |
|---|---|---|---|
| **Superelevation Rate** | **-** | **6%** | **2%** |
| **Grade** | **-** | **5% (45 mph)** | **5% (max)** |
| **Access Control** | **Permitted** | **Permitted** | **Permitted** |
| **Right-of-Way Width** | **60'** | **n/a** | **60'** |
| **Maximum Grade – Crossroad** | **-** | **7% (45 mph)** | **7% (max)** |
| **Design Vehicle** | **WB-67** | **WB-67** | **WB-67** |

* According to current GDOT design policy if applicable

** Bike route continuity has been considered. A 10 ft. wide multi-use trail will connect the cul-de-sac on W. Central Boulevard to the pedestrian crossing on the northbound approach of SR 17. Westbound cyclists on SR 19 can make a left-turn through the roundabout and exit the roundabout heading southbound on SR 17. Immediately south of the intersection, they can then use the multi-use path to access W. Central Boulevard.

**Roadway Name/Identification: SR 17**

| Feature | Existing | Standard* | Proposed |
|---|---|---|---|
| **Typical Section** | **2** | **n/a** | **2** |
| **- Number of Lanes** | **12'** | **12'** | **12'** |
| **- Lane Width(s)** | **n/a** | **n/a** | **n/a** |
| **- Median Width & Type** | **-** | **-** | **-** |
| **- Outside Shoulder Width & Slope** | **5-7' unpaved grass earth sod-Right & Left.**<br><br>**MP 13.95 – 14.75: 5-12' curb and gutter – Right & Left.** | **2:1/4:1 8'/rural** | **2:1 Curb and Gutter-Right & Left** |
| **- Inside Shoulder Width** | **Right** | **n/a** | **Right & Left** |
| **- Sidewalks** | **-** | **5'** | **5'** |
| **- Auxiliary Lanes** | **Right turn lane NB.**<br><br>**Parking Right and Left (7-11').** | **n/a** | **n/a** |
| **- Bike Lanes** | **n/a** | **4'** | ****** |
| **Posted Speed** | **35 mph** | | **35 mph** |
| **Design Speed** | **35 mph** | **45/55 mph** | **35 mph** |
| **Min Horizontal Curve Radius** | **-** | **371'** | **154'** |
| **Superelevation Rate** | **-** | **6%** | **2%** |
| **Grade** | **-** | **7% (45 mph)** | **7% (max)** |

| | | | |
|---|---|---|---|
| **Access Control** | **Permitted** | **Permitted** | **Permitted** |
| **Right-of-Way Width** | **60'** | **n/a** | **151'** |
| **Maximum Grade – Crossroad** | **-** | **5%** | **5%** |
| **Design Vehicle** | **WB-67** | **WB-67** | **WB-67** |

* According to current GDOT design policy if applicable

** Bike route continuity has been considered. A 10 ft. wide multi-use trail will connect the cul-de-sac on W. Central Boulevard to the pedestrian crossing on the northbound approach of SR 17. Northbound cyclist on W. Central Boulevard will use the multiuse path to navigate to the northbound approach of SR 17 to enter the roundabout. Cyclist will use the marked crossing to enter the SR 17 northbound approach and would then make a right-turn through the roundabout to continue westbound on SR 119.

**Major Structures:** N/A

**Major Interchanges/Intersections:**

This project proposes a new roundabout configuration at the intersection of SR 119 and SR 17 to improve operations and enhance safety at the intersection. The project will also include modifications to the intersection of SR 119 at West Central Blvd.

**Utility Involvements:**

Atlanta Gas Light
Comcast
City of Guyton – Water
City of Guyton – Sewer
Georgia Power Distribution
Planters Rural Telephone

**Public Interest Determination Policy and Procedure recommended (Utilities)?** ☒ No ☐ Yes

**SUE Required:** ☒ No ☐ Yes

**Railroad Involvement: N/A**

**Complete Streets - Bicycle, Pedestrian, and/or Transit Warrants:**

Warrants met: ☐ None ☒ Bicycle ☒ Pedestrian ☐ Transit

Both SR 17 and SR 119 are included in State Bike Routes 85 and 95.

**Right-of-Way:**
Required Right-of-Way anticipated: ☐ No ☒ Yes ☐ Undetermined
Easements anticipated: ☐ None ☐ Temporary ☒ Permanent ☐ Utility ☐ Other
*Check all easement types that apply.*

| | | |
|---|---|---|
| Anticipated number of impacted parcels: | | 6 |
| Displacements anticipated: | Total: | 0 |
| | Businesses: | 0 |
| | Residences: | 0 |
| | Other: | 0 |

**Location and Design approval:** ☐ Not Required ☒ Required

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

A Transportation Management Plan shall be handled via Special Provision 150.

**Design Exceptions to FHWA/AASHTO controlling criteria anticipated:**

| FHWA/AASHTO Controlling Criteria | No | Undeter -mined | Yes | Appvl Date (if applicable) |
|---|---|---|---|---|
| 1. Design Speed | ☒ | ☐ | ☐ | |
| 2. Lane Width | ☒ | ☐ | ☐ | |
| 3. Shoulder Width | ☒ | ☐ | ☐ | |
| 4. Bridge Width | ☒ | ☐ | ☐ | |
| 5. Horizontal Alignment | ☒ | ☐ | ☐ | |
| 6. Superelevation | ☒ | ☐ | ☐ | |
| 7. Vertical Alignment | ☒ | ☐ | ☐ | |
| 8. Grade | ☒ | ☐ | ☐ | |
| 9. Stopping Sight Distance | ☒ | ☐ | ☐ | |
| 10. Cross Slope | ☒ | ☐ | ☐ | |
| 11. Vertical Clearance | ☒ | ☐ | ☐ | |
| 12. Lateral Offset to Obstruction | ☒ | ☐ | ☐ | |
| 13. Bridge Structural Capacity | ☒ | ☐ | ☐ | |

**Design Variances to GDOT Standard Criteria anticipated:**

| GDOT Standard Criteria | Reviewing Office | No | Undeter- -mined | Yes | Appvl Date (if applicable) |
|---|---|---|---|---|---|
| 1. Access Control<br>- *Median Opening Spacing* | DP&S | ☒ | ☐ | ☐ | |
| 2. Median Usage & Width | DP&S | ☒ | ☐ | ☐ | |

| | | | | | |
|---|---|---|---|---|---|
| 3. Intersection Skew Angle | DP&S | ☒ | ☐ | ☐ | |
| 4. Lateral Offset to Obstruction | DP&S | ☒ | ☐ | ☐ | |
| 5. Intersection Sight Distance | DP&S | ☒ | ☐ | ☐ | |
| 6. Bike, Pedestrian & Transit Accommodations | DP&S | ☒ | ☐ | ☐ | |
| 7. GDOT Drainage Manual | DP&S | ☒ | ☐ | ☐ | |
| 8. Georgia Standard Drawings | DP&S | ☒ | ☐ | ☐ | |
| 9. GDOT Bridge & Structural Manual | Bridge Design | ☒ | ☐ | ☐ | |
| 10. Roundabout Illumination | DP&S | ☒ | ☐ | ☐ | |
| 11. Rumble Strips | DP&S | ☒ | ☐ | ☐ | |
| 12. Safety Edge | DP&S | ☒ | ☐ | ☐ | |

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

## ENVIRONMENTAL DATA

**Anticipated Environmental Document:**

**GEPA:** ☐ **NEPA:** ☒ CE ☐ EA/FONSI ☐ EIS

**Project Air Quality:**

Is the project located in a PM 2.5 Non-attainment area? ☒ No ☐ Yes
Is the project located in an Ozone Non-attainment area? ☒ No ☐ Yes
Is a Carbon Monoxide hotspot analysis required? ☐ No ☒ Yes

**MS4 Compliance – Is the project located in an MS4 area?** ☒ No ☐ Yes

**Environmental Permits/Variances/Commitments/Coordination anticipated:** *List all anticipated permits, variances, commitments, and coordination needed –Section 404, TVA, Water Quality, etc.*

| Permit/ Variance/ Commitment/ Coordination Anticipated | No | Yes | Remarks |
|---|---|---|---|
| 1. U.S. Coast Guard Permit | ☒ | ☐ | |
| 2. Forest Service/Corps Land | ☒ | ☐ | |
| 3. CWA Section 404 Permit | ☐ | ☒ | May be required for impacts to Waters of US |
| 4. Tennessee Valley Authority Permit | ☒ | ☐ | |
| 5. Buffer Variance | ☐ | ☒ | Will need EPD to verify |
| 6. Coastal Zone Management Coordination | ☒ | ☐ | |
| 7. NPDES | ☐ | ☒ | Notice of Intent |
| 8. FEMA | ☒ | ☐ | |
| 9. Cemetery Permit | ☒ | ☐ | |
| 10. Other Permits | ☒ | ☐ | |
| 11. Other Commitments | ☒ | ☐ | |
| 12. Other Coordination | ☒ | ☐ | |

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

**NEPA/GEPA:** A NEPA Categorical Exclusion is anticipated for this project. A *de minimis* determination for Section 4(f) impacts is anticipated.

**Ecology:** An Ecology Resource Survey and Assessment of Effects Report will be required.

**History:** The project is partially located within the Guyton Historic District. Several contributing resources are located adjacent to the proposed roundabout. A *de minimis* determination is anticipated for Section 4(f). Section 106 notification was sent out March 12, 2013. A Historic Resources Survey Report and Assessment of Effects Report will be required.

**Archeology:** An archaeology survey has not been conducted at this time. Archaeology field work will begin once the Section 106 Notification has been out for 30 days.

**Air & Noise:** The project is located within an attainment area for $PM_{2.5}$ and Ozone. The proposed roundabout will require a CO hotspot analysis and full Air Assessment Report. The project will be modeled for traffic-related noise impacts using Traffic Noise Model 2.5 and a Type I Noise Impact Assessment will be completed.

**Public Involvement:** A Public Information Open House will be required.

**Major stakeholders:** City of Guyton
Effingham-Ebenezer Scenic Byway Committee

## ROUNDABOUTS

**Roundabout Lighting agreement/commitment letter received:** ☐ No ☒ Yes

Refer to the Indication of Roundabout Support letter included as an attachment.

**Planning Level assessment:** *N/A*

**Feasibility Study:**

Kittelson & Associates, Inc. (KAI) evaluated the operational and geometric feasibility of a roundabout at the intersection of SR 17 (Central Boulevard) with SR 119 (Springfield Avenue) in Guyton, Effingham County, Georgia. Their report documents the development of the conceptual roundabout design for the system of closely spaced intersections between SR 17/SR 119 and West Central Boulevard/SR 119.

Based upon KAI's evaluation, a roundabout is a feasible alternative for implementation at the intersection of SR 17 with SR 119. A single-lane roundabout is sufficient to serve estimated traffic volumes through the design year 2035.

A roundabout is estimated to provide safety benefits over the current two closely spaced stop controlled intersections by reducing the likelihood for injury crashes. This is due to reduced intersection speeds with a roundabout as well as removal of severe crash types such as right-angle and head-on crashes. A reduction in total vehicle crashes is also expected with roundabout implementation.

For the roundabout alternative, KAI developed several design options at a sketch level to identify the anticipated footprint, potential impacts, and potential constructability associated with each option. The concept designs present options for four and six-leg configurations. The six-leg configurations were prepared to evaluate the feasibility of also connecting West Central Boulevard into the roundabout due to its proximity to the intersection of SR 17 with SR 119. Based upon coordination with the GDOT staff including the project manager and representatives from the Office of Roadway Design and Office of Environmental Services, a single-lane roundabout with four approach legs was selected as the preferred alternative.

The operations review, feasibility evaluation, and conceptual design development included each of the components outlined in the Georgia DOT's Roundabout Design Checklist for Concept Development.

Please see the attached Roundabout Feasibility Report summary.

**Peer Review required:** ☐ No ☒ Yes ☐ Completed – Date:

## CONSTRUCTION

**Issues potentially affecting constructability/construction schedule:** N/A

**Early Completion Incentives recommended for consideration:** ☒ No ☐ Yes

## PROJECT RESPONSIBILITIES

**Project Activities:**

| Project Activity | Party Responsible for Performing Task(s) |
|---|---|
| Concept Development | GDOT – Office of Roadway Design |
| Design | GDOT – Office of Roadway Design |
| Right-of-Way Acquisition | GDOT – Office of Right-of-Way |
| Utility Relocation | Utility Owners |
| Letting to Contract | GDOT – Office of Bidding Administration |
| Construction Supervision | GDOT – Office of Construction |
| Providing Material Pits | Contractor |
| Providing Detours | N/A |
| Environmental Studies, Documents, and Permits | GDOT (McGee Partners) |
| Environmental Mitigation | GDOT – Office of Environmental Services |
| Construction Inspection & Materials Testing | GDOT – Office of Materials |

**Lighting required:** ☐ No ☒ Yes

**Initial Concept Meeting:** N/A

**Concept Meeting:** The Concept Team Meeting was held February 13, 2013 at the District 5, Area 6 office in Statesboro. Please see the attached concept team meeting minutes.

**Other projects in the area:**

- **PI M004397 –** SR 119 from Bulloch County Line to SR 21BU in Effingham. Resurface & maintenance project.

**Other coordination to date:** N/A

**Project Cost Estimate and Funding Responsibilities:**

| | Breakdown of PE | ROW | Reimbursable Utility | CST* | Environmental Mitigation | Total Cost |
|---|---|---|---|---|---|---|
| By Whom | GDOT | GDOT | GDOT | GDOT | TBD | |
| $ Amount | $250,000.00 | $242,000.00 | $75,000.00 | $1,746,000.00 | Not Known | $2,313,000.00 |
| Date of Estimate | 6/3/2011 | 9/15/2012 | 9/7/2012 | 3/29/2013 | | |

*CST Cost includes: Construction, Engineering and Inspection, and Liquid AC Cost Adjustment.

## ALTERNATIVES DISCUSSION

**Alternative selection:**

| | | | |
|---|---|---|---|
| **Preferred Alternative:** A single-lane, 140 foot inscribed diameter, four-leg roundabout is proposed for the intersection of SR 119 and SR 17. | | | |
| **Estimated Property Impacts:** | 6 | **Estimated Total Cost:** | $2,313,000.00 |
| **Estimated ROW Cost:** | $242,000.00 | **Estimated CST Time:** | 18 months |
| **Rationale:** The proposed design adequately handles design volumes within the smallest footprint and right-of-way requirements. The proposed design was checked for the truck path of a WB-67 and found to be adequate for right turns, left turns, and u-turns as well as for the through movements on all approaches. The roundabout will reduce the likelihood for injury crashes due to low intersection operating speeds and removal of severe crash types such as right-angle and head-on crashes. | | | |

| **No-Build Alternative:** Maintain the existing all-way stop controlled intersection between SR 17 and SR 119. | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | 0 | **Estimated Total Cost:** | $0.00 |
| **Estimated ROW Cost:** | $0.00 | **Estimated CST Time:** | 0 months |
| **Rationale:** The existing all-way stop controlled intersection at SR 17 and SR 119 is estimated to operate over-capacity by the design year 2035 with a Level of Service F for some of the approaches if no improvements are made to this intersection. | | | |

| **Alternative 1:** A single-lane, 150 foot inscribed diameter, four-leg roundabout was considered for the intersection of SR 119 and SR 17. | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | 6 | **Estimated Total Cost:** | $2,104,000.00 * |
| **Estimated ROW Cost:** | Not Available | **Estimated CST Time:** | 18 months |
| **Rationale:** The 150' diameter roundabout alternative has a larger footprint than the proposed 140' diameter roundabout. The larger inscribed diameter increases the required right-of-way, the project cost, and also the potential impacts on the surrounding properties. | | | |

*Price excludes ROW Costs.

| **Alternative 2:** A single-lane, 170 ft by 200 ft elliptical, five-leg roundabout was considered for the intersection of SR 119 and SR 17. | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | Not Available | **Estimated Total Cost:** | Not Available |
| **Estimated ROW Cost:** | Not Available | **Estimated CST Time:** | Not Available |
| **Rationale:** The 170 ft by 200 ft elliptical, five-leg roundabout alternative has a larger footprint and requires more right of way than the proposed 140' diameter roundabout. This configuration would pose additional encroachments on the parcel in the northwest quadrant and would affect traffic circulation within the site. WB-50 or larger vehicles would not be to complete right turn movements onto W Central Boulevard from southbound SR 17 or right turn movements from W Central Boulevard onto westbound SR 119. | | | |

| **Alternative 3:** A single-lane, 170 ft by 200 ft elliptical, six-leg roundabout was considered for the intersection of SR 119 and SR 17. | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | Not Available | **Estimated Total Cost:** | Not Available |
| **Estimated ROW Cost:** | Not Available | **Estimated CST Time:** | Not Available |
| **Rationale:** The 170 ft by 200 ft elliptical, six-leg roundabout alternative has a larger footprint and requires more right of way than the proposed 140' diameter roundabout. This configuration would pose additional encroachments on the parcel in the northwest quadrant. WB-50 or larger vehicles could not navigate out of the W Central Boulevard approaches. The SR 119 northbound approach would lack positive channelization for the northbound entry. | | | |

| **Alternative 4:** A single-lane, 200 ft inscribed diameter, six-leg roundabout was considered for the intersection of SR 119 and SR 17. | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | Not Available | **Estimated Total Cost:** | Not Available |
| **Estimated ROW Cost:** | Not Available | **Estimated CST Time:** | Not Available |
| **Rationale:** The 200' diameter roundabout alternative has the largest footprint considered among all alternatives. This configuration would pose additional encroachments on the parcel in the northwest quadrant. WB-50 or larger vehicles could not navigate out of the W Central Boulevard approaches. The SR 119 northbound approach would lack positive channelization for the northbound entry. | | | |

## APPROVALS

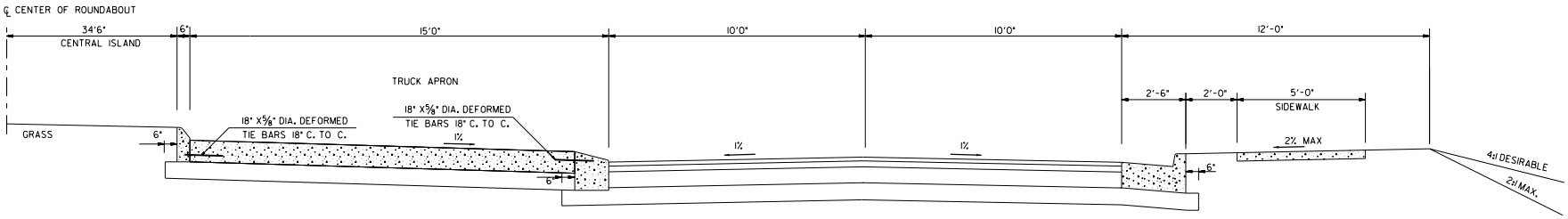
Concur: _____ 6-11-13
Director of Engineering

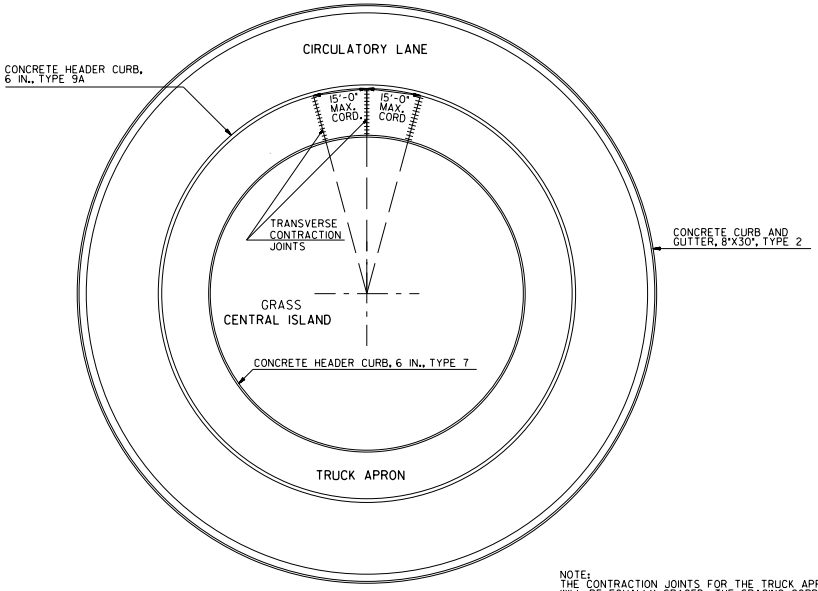
Approve: _____ 6/17/13
Chief Engineer Date

**List of Attachments**

| Attachment | Description | Number of Sheets |
|---|---|---|
| 1 | Preferred Alternate Typical Sections | 2 |
| 2 | Preferred Alternate Layout | 1 |
| 3a | Construction Cost Estimate | 2 |
| 3b | Asphalt Fuel Index Adjustment | 4 |
| 3c | Right Of Way Cost Estimate | 7 |
| 3d | Utilities Cost Estimate | 1 |
| 4 | Crash Summaries | 2 |
| 5 | Traffic Diagrams | 5 |
| 6 | TE Study / Signal Warrant Analysis | 24 |
| 7 | Capacity Analysis Summary | 1 |
| 8 | Indication of Roundabout Support Letter | 1 |
| 9 | Highway Safety Manual Crash Reduction Factor Calculations | 1 |
| 10 | Concept Meeting Minutes | 2 |
| 11 | Roundabout Feasibility Report | 32 |

| 5/17/2013 12:52:05 PM | GPLOT-V8 | M:\0009870 SR 17 @ SR 119\DGN\0009887TYPS.dgn | STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|
| USER=sbaockhold1 | gplotborder-v81-PO.tbl | | GA | 0009870 | | |




PLAN

NOTE:
THE CONTRACTION JOINTS FOR THE TRUCK APRON WILL BE EQUALLY SPACED. THE SPACING CORD WILL BE LESS THAN OR EQUAL TO 15'-0" MAXIMUM.

**GEORGIA**
**DEPARTMENT OF TRANSPORTATION**

NOT TO SCALE

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: ROADWAY DESIGN

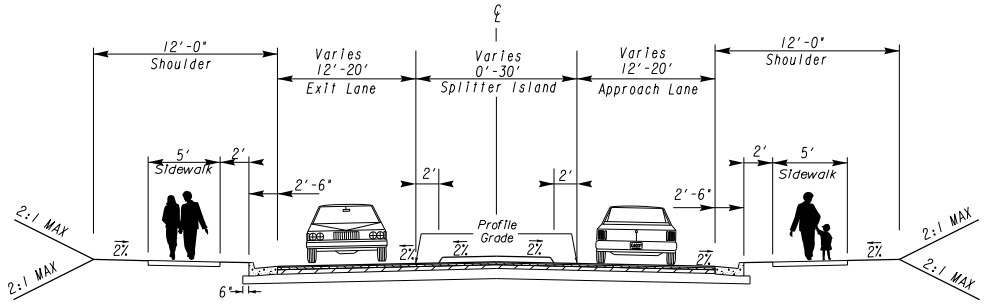
**TYPICAL SECTIONS**

0009870
EFFINGHAM COUNTY

DRAWING No. 05-0001

4/27/2012 GPLN

# SR 17 & SR 119




**GEORGIA**
**DEPARTMENT OF TRANSPORTATION**

NOT TO SCALE

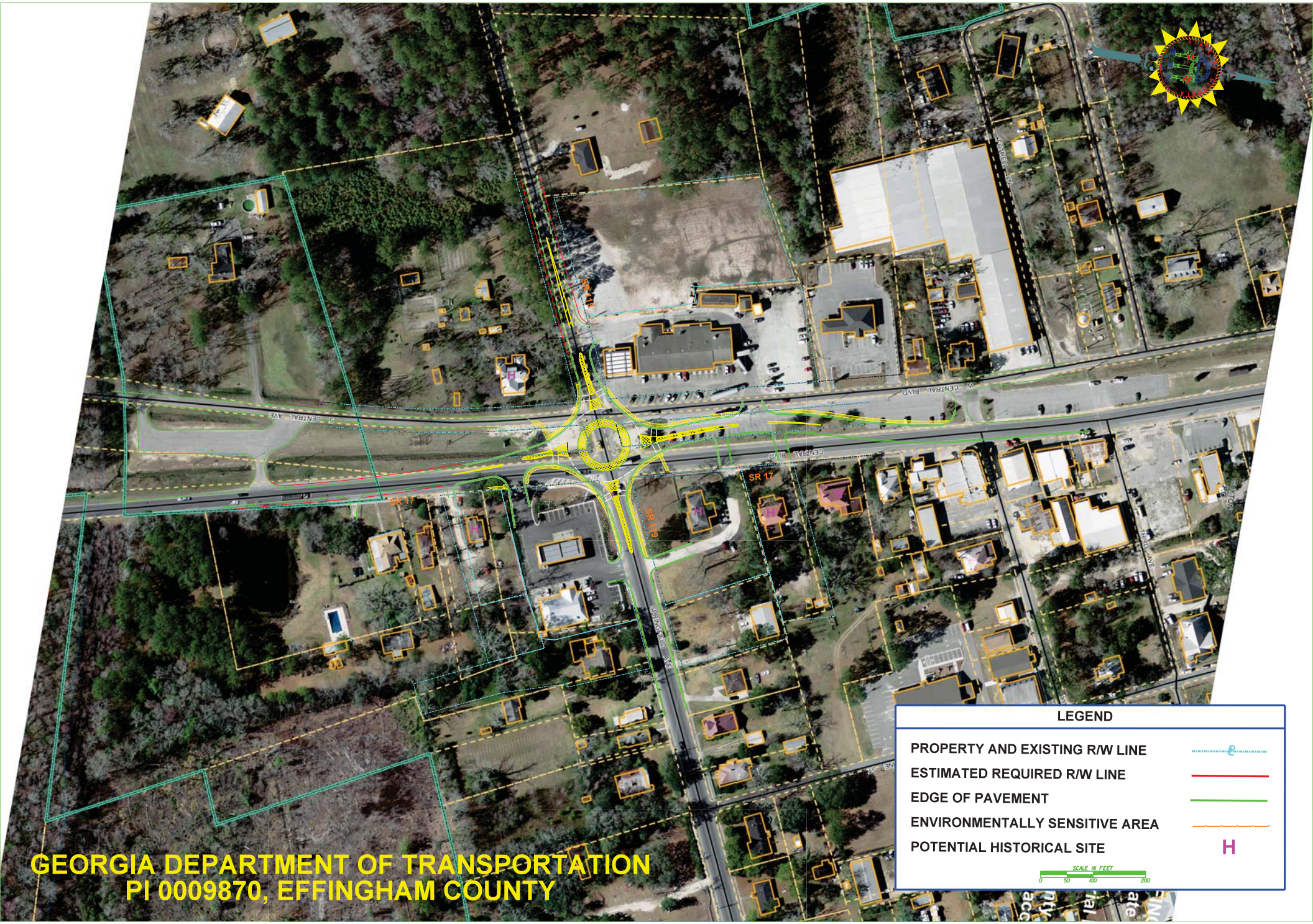
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: ROADWAY DESIGN

**TYPICAL SECTIONS**

0009870
EFFINGHAM COUNTY

DRAWING No. 05-0002




# GEORGIA DEPARTMENT OF TRANSPORTATION
## PI 0009870, EFFINGHAM COUNTY

# DETAILED COST ESTIMATE

Georgia Department of Transportation

## Job: 0009870

**JOB NUMBER** *0009870* **FED/STATE PROJECT NUMBER**

**SPEC YEAR:** *01*

**DESCRIPTION:** *SR 17 @ SR 119*

**ITEMS FOR JOB 0009870**

### *0010 - ROADWAY*

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0005 | 150-1000 | 1.000 | LS | $75,000.00000 | TRAFFIC CONTROL - 0009870 | $75,000.00 |
| 0085 | 210-0100 | 1.000 | LS | $150,000.00000 | GRADING COMPLETE - 0009870 | $150,000.00 |
| 0090 | 310-1101 | 7004.000 | TN | $19.71597 | GR AGGR BASE CRS, INCL MATL | $138,090.65 |
| 0095 | 402-1812 | 1380.000 | TN | $89.78737 | RECYL AC LEVELING,INC BM&HL | $123,906.57 |
| 0104 | 402-3100 | 981.000 | TN | $90.00955 | REC AC 9.5 MM SP,TPI,GP1ORBL1,INCL BM&HL | $88,299.37 |
| 0100 | 402-3121 | 2613.000 | TN | $90.22257 | RECYL AC 25MM SP,GP1/2,BM&HL | $235,751.58 |
| 0110 | 402-3190 | 1140.000 | TN | $94.51076 | RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL | $107,742.27 |
| 0115 | 413-1000 | 1337.000 | GL | $2.81842 | BITUM TACK COAT | $3,768.23 |
| 0135 | 430-0200 | 422.000 | SY | $55.00000 | PLN PC CONC PVMT/CL1C/ 10" TK | $23,210.00 |
| 0120 | 432-5010 | 3851.000 | SY | $3.60046 | MILL ASPH CONC PVMT,VARB DEPTH | $13,865.37 |
| 0125 | 441-0104 | 833.000 | SY | $31.27808 | CONC SIDEWALK, 4 IN | $26,054.64 |
| 0130 | 441-0748 | 728.000 | SY | $38.86179 | CONC MEDIAN, 6 IN | $28,291.38 |
| 0139 | 441-5008 | 220.000 | LF | $11.83000 | CONC HEADER CURB, 6 IN, TP 7 | $2,602.60 |
| 0145 | 441-5025 | 315.000 | LF | $25.00000 | CONC HEADER CURB, 4", TP 9 | $7,875.00 |
| 0150 | 441-6222 | 3861.000 | LF | $14.23195 | CONC CURB & GUTTER/ 8"X30"TP2 | $54,949.56 |
| 0155 | 446-1100 | 850.000 | LF | $4.20927 | PVMT REF FAB STRIPS, TP2,18 INCH WIDTH | $3,577.88 |
| 0160 | 550-1180 | 2550.000 | LF | $34.78030 | STM DR PIPE 18",H 1-10 | $88,689.77 |
| 0165 | 550-1240 | 650.000 | LF | $38.65978 | STM DR PIPE 24",H 1-10 | $25,128.86 |
| 0170 | 550-4218 | 2.000 | EA | $508.28184 | FLARED END SECT 18 IN, ST DR | $1,016.56 |
| 0175 | 550-4224 | 1.000 | EA | $647.08819 | FLARED END SECT 24 IN, ST DR | $647.09 |
| 0180 | 573-2006 | 500.000 | LF | $15.58388 | UNDDR PIPE INCL DRAIN AGGR 6" | $7,791.94 |
| 0185 | 603-2181 | 50.000 | SY | $61.14694 | STN DUMPED RIP RAP, TP 3, 18" | $3,057.35 |
| 0190 | 603-7000 | 50.000 | SY | $3.33397 | PLASTIC FILTER FABRIC | $166.70 |
| 0195 | 634-1200 | 41.000 | EA | $122.40440 | RIGHT OF WAY MARKERS | $5,018.58 |
| 0225 | 668-1100 | 4.000 | EA | $2,244.46188 | CATCH BASIN, GP 1 | $8,977.85 |
| 0230 | 668-2100 | 12.000 | EA | $1,778.65208 | DROP INLET, GP 1 | $21,343.82 |
| | | | | | ***SUBTOTAL FOR ROADWAY:*** | **$1,244,823.62** |





**CONFIDENTIALITY NOTICE: This document may contain confidential and/or privileged information. Any unauthorized duplication, disclosure, distribution/ retransmission or taking of any action in reliance upon the material in this document is strictly forbidden.**

# DETAILED COST ESTIMATE

Georgia Department of Transportation

**Job: 0009870**

## 0020 - EROSION CONTROL

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0010 | 163-0232 | 1.000 | AC | $77.46168 | TEMPORARY GRASSING | $77.46 |
| 0015 | 163-0240 | 20.000 | TN | $272.02836 | MULCH | $5,440.57 |
| 0020 | 163-0300 | 2.000 | EA | $1,388.68137 | CONSTRUCTION EXIT | $2,777.36 |
| 0025 | 163-0527 | 5.000 | EA | $367.04665 | CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG | $1,835.23 |
| 0030 | 163-0528 | 500.000 | LF | $5.05408 | CONSTR AND REM FAB CK DAM -TP C SLT FN | $2,527.04 |
| 0035 | 163-0529 | 400.000 | LF | $3.87531 | CNST/REM TEMP SED BAR OR BLD STRW CK DM | $1,550.12 |
| 0040 | 165-0010 | 8888.000 | LF | $0.78088 | MAINT OF TEMP SILT FENCE, TP A | $6,940.46 |
| 0045 | 165-0030 | 4352.000 | LF | $0.95552 | MAINT OF TEMP SILT FENCE, TP C | $4,158.42 |
| 0050 | 165-0041 | 550.000 | LF | $1.92899 | MAINT OF CHECK DAMS - ALL TYPES | $1,060.94 |
| 0055 | 165-0071 | 400.000 | LF | $1.27394 | MAINT OF SEDIMENT BARRIER - BALED STRAW | $509.58 |
| 0060 | 165-0101 | 2.000 | EA | $449.80088 | MAINT OF CONST EXIT | $899.60 |
| 0065 | 167-1000 | 2.000 | EA | $242.45701 | WATER QUALITY MONITORING AND SAMPLING | $484.91 |
| 0070 | 167-1500 | 12.000 | MO | $657.05190 | WATER QUALITY INSPECTIONS | $7,884.62 |
| 0075 | 171-0010 | 8888.000 | LF | $2.03533 | TEMPORARY SILT FENCE, TYPE A | $18,090.01 |
| 0080 | 171-0030 | 4352.000 | LF | $3.10220 | TEMPORARY SILT FENCE, TYPE C | $13,500.77 |
| 0240 | 700-6910 | 1.000 | AC | $931.11318 | PERMANENT GRASSING | $931.11 |
| 0245 | 700-7000 | 3.000 | TN | $50.61463 | AGRICULTURAL LIME | $151.84 |
| 0250 | 700-8000 | 1.000 | TN | $449.99588 | FERTILIZER MIXED GRADE | $450.00 |
| 0255 | 700-8100 | 50.000 | LB | $3.54161 | FERTILIZER NITROGEN CONTENT | $177.08 |
| 0260 | 700-9300 | 4700.000 | SY | $7.12490 | SOD | $33,487.03 |
| 0265 | 716-2000 | 1280.000 | SY | $1.59448 | EROSION CONTROL MATS, SLOPES | $2,040.93 |
| | | | | | ***SUBTOTAL FOR EROSION CONTROL:*** | **$104,975.08** |

## 0030 - SIGNS AND MARKING

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0200 | 636-1033 | 100.000 | SF | $18.35567 | HWY SIGNS, TP1MAT,REFL SH TP 9 | $1,835.57 |
| 0205 | 636-2070 | 250.000 | LF | $6.52395 | GALV STEEL POSTS, TP 7 | $1,630.99 |
| 0210 | 653-1501 | 7914.000 | LF | $0.52020 | THERMO SOLID TRAF ST 5 IN, WHI | $4,116.86 |
| 0215 | 653-1502 | 8700.000 | LF | $0.47806 | THERMO SOLID TRAF ST, 5 IN YEL | $4,159.12 |
| 0220 | 654-1001 | 108.000 | EA | $3.59782 | RAISED PVMT MARKERS TP 1 | $388.56 |
| | | | | | ***SUBTOTAL FOR SIGNS AND MARKING:*** | **$12,131.10** |

## 0040 - LIGHTING

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0235 | 682-9030 | 1.000 | LS | $200,000.00000 | LIGHTING SYSTEM | $200,000.00 |
| | | | | | ***SUBTOTAL FOR LIGHTING:*** | **$200,000.00** |

### TOTALS FOR JOB 0009870

| | |
|---|---|
| **ITEMS COST:** | **$1,561,929.80** |
| **COST GROUP COST:** | **$0.00** |
| **ESTIMATED COST:** | **$1,561,929.80** |
| **CONTINGENCY PERCENT:** | **0.00** |
| **ENGINEERING AND INSPECTION:** | **0.05** |
| **ESTIMATED COST WITH CONTINGENCY AND E&I:** | **$1,640,026.29** |





**CONFIDENTIALITY NOTICE: This document may contain confidential and/or privileged information. Any unauthorized duplication, disclosure, distribution/ retransmission or taking of any action in reliance upon the material in this document is strictly forbidden.**

| | |
|---|---|
| **PROJ. NO.** | N/A |
| P.I. NO. | 0009870 |
| DATE | 12/14/2012 |

CALL NO.

| **INDEX (TYPE)** | **DATE** | **INDEX** |
|---|---|---|
| REG. UNLEADED | Mar-13 | $ 3.683 |
| DIESEL | | $ 4.092 |
| LIQUID AC | | $567 |

Link to Fuel and AC Index:
http://www.dot.ga.gov/doingbusiness/Materials/Pages/asphaltcementindex.aspx

## LIQUID AC ADJUSTMENTS

**PA=[((APM-APL)/APL)]xTMTxAPL**

**Asphalt**

| | | | | | | |
|---|---|---|---|---|---|---|
| Price Adjustment (PA) | | | | **103999.14** | **$** | **103,999.14** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ | 907.20 | | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ | 567.00 | | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | | 305.7 | | |

| **ASPHALT** | **Tons** | **%AC** | **AC ton** |
|---|---|---|---|
| Leveling | 1380 | 5.0% | 69 |
| 12.5 OGFC | | 5.0% | 0 |
| 12.5 mm | | 5.0% | 0 |
| 9.5 mm SP | 981 | 5.0% | 49.05 |
| 25 mm SP | 2613 | 5.0% | 130.65 |
| 19 mm SP | 1140 | 5.0% | 57 |
| | **6114** | | **305.7** |

**BITUMINOUS TACK COAT**

| | | | | | | |
|---|---|---|---|---|---|---|
| Price Adjustment (PA) | | | **$** | **1,953.62** | **$** | **1,953.62** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ | 907.20 | | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ | 567.00 | | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | | 5.742549933 | | |

| Bitum Tack Gals | gals/ton | tons |
|---|---|---|
| 1337 | 232.8234 | 5.74254993 |

| | | | |
|---|---|---|---|
| **PROJ. NO.** | N/A | | CALL NO. |
| P.I. NO. | 0009870 | | |
| DATE | 12/14/2012 | | |

**BITUMINOUS TACK COAT (surface treatment)**

| | | | | | |
|---|---|---|---|---|---|
| Price Adjustment (PA) | | | | **0** | **$ -** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ | 907.20 | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ | 567.00 | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | | 0 | |

| Bitum Tack | SY | Gals/SY | Gals | gals/ton | tons |
|---|---|---|---|---|---|
| Single Surf. Trmt. | | 0.20 | 0 | 232.8234 | 0 |
| Double Surf.Trmt. | | 0.44 | 0 | 232.8234 | 0 |
| Triple Surf. Trmt | | 0.71 | 0 | 232.8234 | 0 |
| | | | | | 0 |

| | | |
|---|---|---|
| **TOTAL LIQUID AC ADJUSTMENT** | **$** | **105,952.76** |

GEORGIA DEPARTMENT OF TRANSPORTATION
PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 9/15/2012 Project: Effingham County Roundabout
Revised: County: Effingham
PI: 0009870

Description: Roundabout SR 17 @ SR 119
Project Termini: Widening/Reconstruction of SR 119

Existing ROW: Varies
Parcels: 6 Required ROW: Varies

| | | |
|---|---|---|
| Land and Improvements | | $120,000.00 |
| *Proximity Damage* | *$0.00* | |
| *Consequential Damage* | *$0.00* | |
| *Cost to Cures* | *$0.00* | |
| *Trade Fixtures* | *$0.00* | |
| *Improvements* | *$50,000.00* | |
| Valuation Services | | $6,000.00 |
| Legal Services | | $41,550.00 |
| Relocation | | $12,000.00 |
| Demolition | | $0.00 |
| Administrative | | $62,000.00 |
| TOTAL ESTIMATED COSTS | | $241,550.00 |
| ***TOTAL ESTIMATED COSTS (ROUNDED)*** | | ***$242,000.00*** |

| Preparation Credits | Hours | Signature |
|---|---|---|
| | | |
| | | |
| | | |

Prepared By: LaShone Alexander CG#: 2856999 9/15/2012 DATE
Approved By: LaShone Alexander CG#: 2856999 9/15/2012 DATE

**NOTE: No Market Appreciation is included in this Preliminary Cost Estimate**

allsop

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA

## INTERDEPARTMENT CORRESPONDENCE

FILE P.I. # 0009870 Effingham County

OFFICE Jesup

DATE 9-7-2012

FROM Stephen Thomas, District Utilities Engineer

TO Perry Black, Project Manager

SUBJECT PRELIMINARY UTILITY COST ESTIMATE

As requested by your office, we are furnishing you with a Preliminary Utility Cost Estimate of each Utility with facilities potentially located within the above referenced project limits.

| Facility Owner | Non-Reimbursable | Reimbursable | Comments |
|---|---|---|---|
| Atlanta Gas Light | $ 105,600.00 | $ 0.00 | |
| ComCast | $ 63,360.00 | $ 0.00 | |
| City of Guyton - Water | $ 92,400.00 | $ 0.00 | |
| City of Guyton - Sewer | $ 33,000.00 | $ 0.00 | |
| Georgia Power Distribution | $ 270,000.00 | $ 75,000.00 | |
| Planters Rural Telephone | $ 79,200.00 | $ 0.00 | |
| **Totals** | **$ 643,560.00** | **$ 75,000.00** | |
| **Total Reimbursement** | | **$ 75,000.00** | |

CC; Angie Robinson, Office of Financial Management;
Terry Brigman, Assistant State Utilities Engineer
District Office File
Utilities Office File

## Crash Summaries

| | |
|---|---|
| **PI Number:** | 0009870 |
| **Project Number:** | N/A |
| **Description:** | Roundabout at SR 17 and SR 119 |
| **Designer:** | Joshua Taylor |
| **Date:** | 10/30/2012 |
| **Notes:** | The accident query was confined to a quarter mile along each approach from the intersection of SR 17 and SR 119. |

**Roadway Mileage Information:**

| Roadway | Begin Milelog | End Milelog |
|---|---|---|
| SR 17 | 13.89 | 14.39 |
| SR 119 | 3.99 | 4.49 |
| | | |
| | | |

**Note**: The following information is compiled using the Georgia Department of Transportation's Accident Data Information System version 1.1. Refer to the following link:

http://tomcat1/GDOT_Ver1.1/GDOT_IntroPage.cfm

**Collision Types, Weather Conditions & Pavement Surface Considtions:**

| | 2006 | | 2007 | | 2008 | | 2009 | | **Total** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual Number of Crashes | Percentage of Total Crashes | Actual Number of Crashes | Percentage of Total Crashes | Actual Number of Crashes | Percentage of Total Crashes | Actual Number of Crashes | Percentage of Total Crashes | Actual Number of Crashes | Percentage of Total Crashes |
| Number of Collisions | 3 | 100.0% | 11 | 100.0% | 7 | 100.0% | 5 | 100.0% | 26 | 100.0% |
| **Severity of Collision** | | | | | | | | | | |
| Property | 2 | 66.7% | 8 | 72.7% | 5 | 71.4% | 4 | 80.0% | 19 | 73.1% |
| Fatality | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Injury | 1 | 33.3% | 3 | 27.3% | 2 | 28.6% | 1 | 20.0% | 7 | 26.9% |
| **Type of Collision** | | | | | | | | | | |
| Angle | 2 | 66.7% | 1 | 9.1% | 5 | 71.4% | 1 | 20.0% | 9 | 34.6% |
| Head On | 0 | 0.0% | 1 | 9.1% | 1 | 14.3% | 2 | 40.0% | 4 | 15.4% |
| Not A Collision With A Motor Vehicle | 0 | 0.0% | 4 | 36.4% | 0 | 0.0% | 0 | 0.0% | 4 | 15.4% |
| Rear End | 1 | 33.3% | 4 | 36.4% | 1 | 14.3% | 2 | 40.0% | 8 | 30.8% |
| Sideswipe - Opposite Direction | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Sideswipe - Same Direction | 0 | 0.0% | 1 | 9.1% | 0 | 0.0% | 0 | 0.0% | 1 | 3.8% |
| **Harmful Event** | | | | | | | | | | |
| Animal | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Bridge Parapet End | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Bridge Pier/Abutment | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Bridge Rail | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Culvert | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Curb | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Deer | 0 | 0.0% | 3 | 27.3% | 0 | 0.0% | 0 | 0.0% | 3 | 11.5% |
| Ditch | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Embankment | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Fence | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Fire/Explosion | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Guardrail End | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Guardrail Face | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Highway Traffic Sign Post | 0 | 0.0% | 1 | 9.1% | 0 | 0.0% | 0 | 0.0% | 1 | 3.8% |
| Immersion | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Impact Attenuate | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Jackknife | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Luminaire Light Support | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Mailbox | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Median Barrier | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Motor Vehicle in Motion | 3 | 100.0% | 6 | 54.5% | 5 | 71.4% | 5 | 100.0% | 19 | 73.1% |
| Motor Vehicle in Motion - In Other Roadway | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Other Fixed Object | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Other Non-Collision | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Other Object (Not Fixed) | 0 | 0.0% | 0 | 0.0% | 1 | 14.3% | 0 | 0.0% | 1 | 3.8% |
| Other Post | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Overhead Sign Support | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Overturn | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Parked Motor Vehicle | 0 | 0.0% | 0 | 0.0% | 1 | 14.3% | 0 | 0.0% | 1 | 3.8% |
| Pedalcycle | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Pedestrian | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Railway Train | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Tree | 0 | 0.0% | 1 | 9.1% | 0 | 0.0% | 0 | 0.0% | 1 | 3.8% |
| Utility Pole | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| **Direction of Travel** | | | | | | | | | | |
| N | 1 | 33.3% | 1 | 9.1% | 2 | 28.6% | 2 | 40.0% | 6 | 23.1% |
| S | 2 | 66.7% | 7 | 63.6% | 4 | 57.1% | 2 | 40.0% | 15 | 57.7% |
| E | 0 | 0.0% | 1 | 9.1% | 1 | 14.3% | 1 | 20.0% | 3 | 11.5% |
| W | 0 | 0.0% | 2 | 18.2% | 0 | 0.0% | 0 | 0.0% | 2 | 7.7% |
| **Light Condition** | | | | | | | | | | |
| Dark-Lighted | 0 | 0.0% | 1 | 9.1% | 2 | 28.6% | 0 | 0.0% | 3 | 11.5% |
| Dark-Not Lighted | 0 | 0.0% | 3 | 27.3% | 0 | 0.0% | 0 | 0.0% | 3 | 11.5% |
| Dawn | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Daylight | 3 | 100.0% | 7 | 63.6% | 5 | 71.4% | 5 | 100.0% | 20 | 76.9% |
| Dusk | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| **Surface Condition** | | | | | | | | | | |
| Wet | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 2 | 40.0% | 2 | 7.7% |
| Dry | 3 | 100.0% | 11 | 100.0% | 7 | 100.0% | 3 | 60.0% | 24 | 92.3% |
| Snowy | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Other | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

## Crash Summaries

| | |
|---|---|
| **PI Number:** | 0009870 |
| **Project Number:** | N/A |
| **Description:** | Roundabout at SR 17 and SR 119 |
| **Designer:** | Joshua Taylor |
| **Date:** | 10/30/2012 |
| **Notes:** | The accident query was confined to a quarter mile along each approach from the intersection of SR 17 and SR 119. |

**Accident Rates:**

| Year | County | Rt Type | Route Num | Low Milelog | High Milelog | ADT | Distance | Vehicle Miles | Segment Length |
|---|---|---|---|---|---|---|---|---|---|
| 2006 | Effingham | 1 | 1700 | 13.89 | 14.11 | 6830 | 0.22 | 1503 | 0.22 |
| 2006 | Effingham | 1 | 1700 | 14.11 | 14.39 | 5640 | 0.28 | 1579 | 0.28 |
| 2006 | Effingham | 1 | 11900 | 3.99 | 4.37 | 3100 | 0.38 | 1178 | 0.38 |
| 2006 | Effingham | 1 | 11900 | 4.37 | 4.49 | 6790 | 0.12 | 815 | 0.12 |

| | |
|---|---|
| Total Vehicle Miles = | 5075 vehicle-miles |
| Average ADT = | 5075 vehicle/day |
| Total Length in Miles = | 1 mile(s) |
| Total Accidents = | 3 accident(s) |
| Total Injuries = | 1 accident(s) |
| Total Fatalities = | 0 accident(s) |
| Accident Rate * = [3 accidents / (5075 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 162 |
| Injury Rate * = [1 accidents / (5075 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 54 |
| Fatality Rate * = [0 accidents / (5075 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 0 |

**** Rates are per 100 million vehicle-miles***

---

| Year | County | Rt Type | Route Num | Low Milelog | High Milelog | ADT | Distance | Vehicle Miles | Segment Length |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | Effingham | 1 | 1700 | 13.89 | 14.11 | 6470 | 0.22 | 1423 | 0.22 |
| 2007 | Effingham | 1 | 1700 | 14.11 | 14.39 | 5100 | 0.28 | 1428 | 0.28 |
| 2007 | Effingham | 1 | 11900 | 3.99 | 4.37 | 3550 | 0.38 | 1349 | 0.38 |
| 2007 | Effingham | 1 | 11900 | 4.37 | 4.49 | 7040 | 0.12 | 845 | 0.12 |

| | |
|---|---|
| Total Vehicle Miles = | 5045 vehicle-miles |
| Average ADT = | 5045 vehicle/day |
| Total Length in Miles = | 1 mile(s) |
| Total Accidents = | 11 accident(s) |
| Total Injuries = | 3 accident(s) |
| Total Fatalities = | 0 accident(s) |
| Accident Rate = [11 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 597 |
| Injury Rate = [3 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 163 |
| Fatality Rate = [0 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 0 |

**** Rates are per 100 million vehicle-miles***

---

| Year | County | Rt Type | Route Num | Low Milelog | High Milelog | ADT | Distance | Vehicle Miles | Segment Length |
|---|---|---|---|---|---|---|---|---|---|
| 2008 | Effingham | 1 | 1700 | 13.89 | 14.11 | 6470 | 0.22 | 1423 | 0.22 |
| 2008 | Effingham | 1 | 1700 | 14.11 | 14.39 | 5100 | 0.28 | 1428 | 0.28 |
| 2008 | Effingham | 1 | 11900 | 3.99 | 4.37 | 3550 | 0.38 | 1349 | 0.38 |
| 2008 | Effingham | 1 | 11900 | 4.37 | 4.49 | 7040 | 0.12 | 845 | 0.12 |

| | |
|---|---|
| Total Vehicle Miles = | 5045 vehicle-miles |
| Average ADT = | 5045 vehicle/day |
| Total Length in Miles = | 1 mile(s) |
| Total Accidents = | 7 accident(s) |
| Total Injuries = | 2 accident(s) |
| Total Fatalities = | 0 accident(s) |
| Accident Rate = [7 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 380 |
| Injury Rate = [2 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 109 |
| Fatality Rate = [0 accidents / (5045 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 0 |

**** Rates are per 100 million vehicle-miles***

---

| Year | County | Rt Type | Route Num | Low Milelog | High Milelog | ADT | Distance | Vehicle Miles | Segment Length |
|---|---|---|---|---|---|---|---|---|---|
| 2009 | Effingham | 1 | 1700 | 13.89 | 14.11 | 6276 | 0.22 | 1381 | 0.22 |
| 2009 | Effingham | 1 | 1700 | 14.11 | 14.39 | 4947 | 0.28 | 1385 | 0.28 |
| 2009 | Effingham | 1 | 11900 | 3.99 | 4.37 | 3444 | 0.38 | 1309 | 0.38 |
| 2009 | Effingham | 1 | 11900 | 4.37 | 4.49 | 6829 | 0.12 | 819 | 0.12 |

| | |
|---|---|
| Total Vehicle Miles = | 4894 vehicle-miles |
| Average ADT = | 4894 vehicle/day |
| Total Length in Miles = | 1 mile(s) |
| Total Accidents = | 5 accident(s) |
| Total Injuries = | 1 accident(s) |
| Total Fatalities = | 0 accident(s) |
| Accident Rate = [5 accidents / (4894 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 280 |
| Injury Rate = [1 accidents / (4894 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 56 |
| Fatality Rate = [0 accidents / (4894 vehicle-miles x 365 days)] x 100000000 vehicle-miles = | 0 |

**** Rates are per 100 million vehicle-miles***

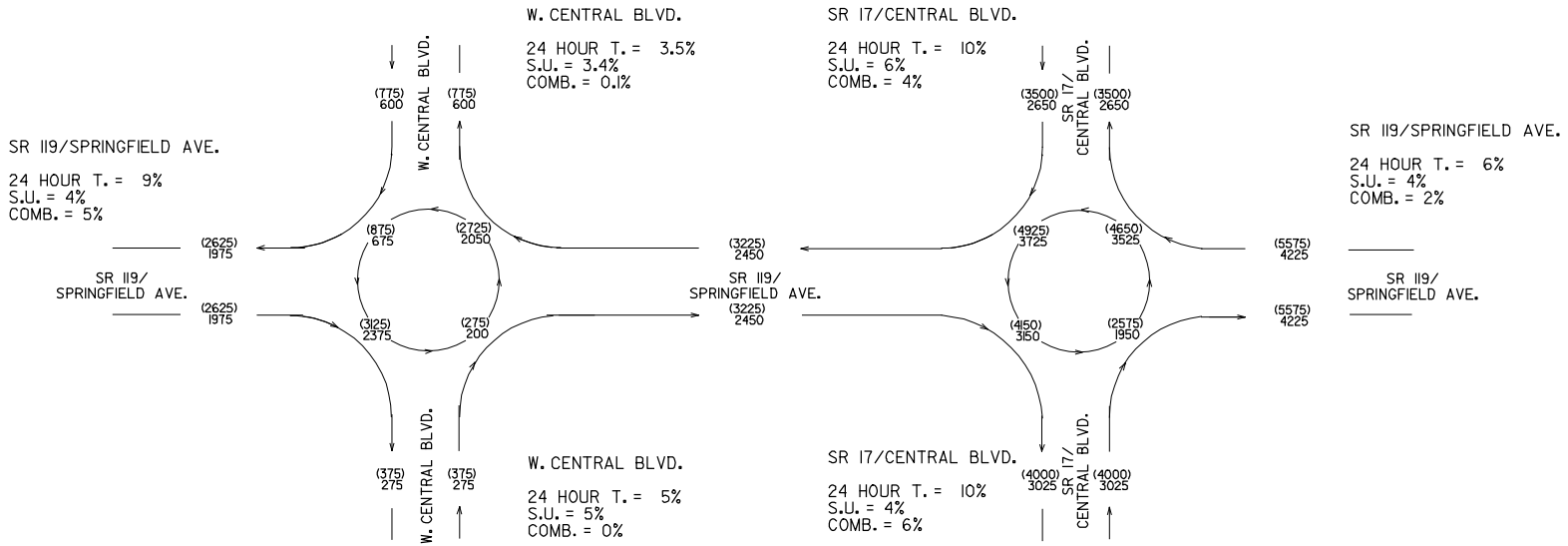
GEORGIA DEPARTMENT OF TRANSPORTATION

OFFICE OF PLANNING

SHEET 1 OF 5

EFFINGHAM COUNTY

# 2035 ADT = (000)
# 2015 ADT = 000




BUILD

P.I. # 0009870
EFFINGHAM COUNTY
SR 17/CENTRAL AVE.
SR 119/SPRINGFIELD AVE.

2035 ADT = (000)
2015 ADT = 000

NOT TO SCALE

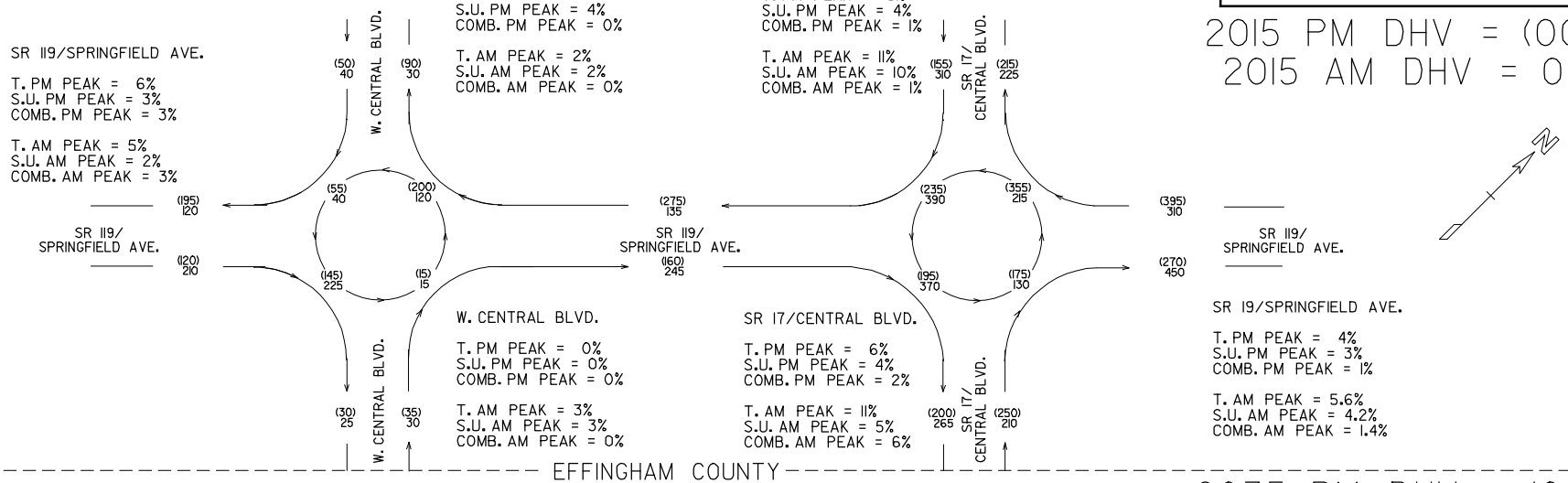
MTW
09/11

...\EFFINGHAM\0009870Diagrams.dgn 9/20/2011 3:15:02 PM micword

SHEET 2 OF 5

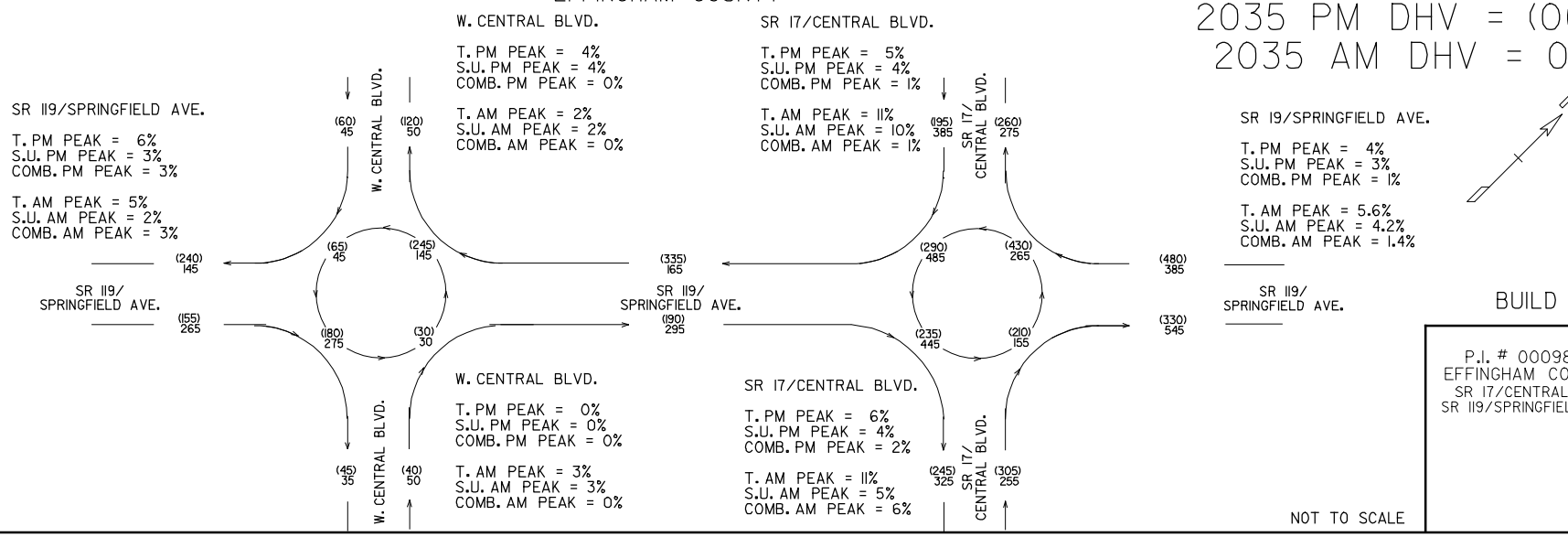
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

# 2015 PM DHV = (000)
# 2015 AM DHV = 000




EFFINGHAM COUNTY

# 2035 PM DHV = (000)
# 2035 AM DHV = 000




BUILD

P.I. # 0009870
EFFINGHAM COUNTY
SR 17/CENTRAL AVE.
SR 119/SPRINGFIELD AVE.

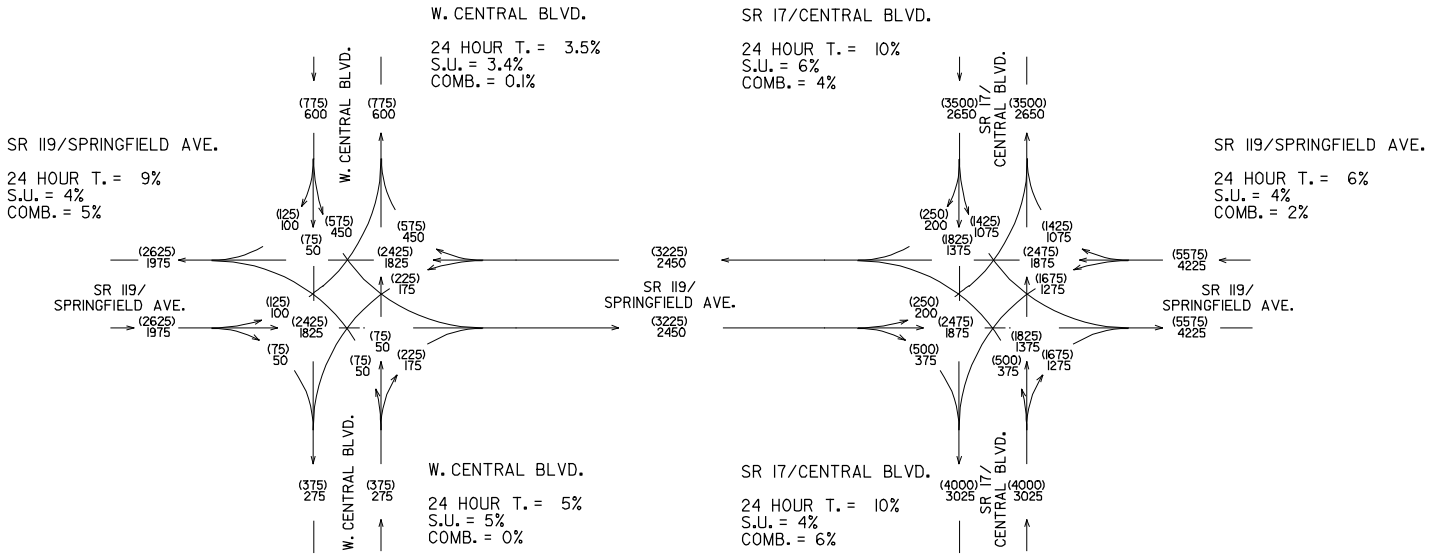
NOT TO SCALE

MTW
09/11

...\EFFINGHAM\0009870Diagrams.dgn 9/20/2011 3:15:32 PM micword

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

# 2035 ADT = (000)
# 2015 ADT = 000




NO BUILD

P.I. # 0009870
EFFINGHAM COUNTY
SR 17/CENTRAL AVE.
SR 119/SPRINGFIELD AVE.

2035 ADT = (000)
2015 ADT = 000

NOT TO SCALE

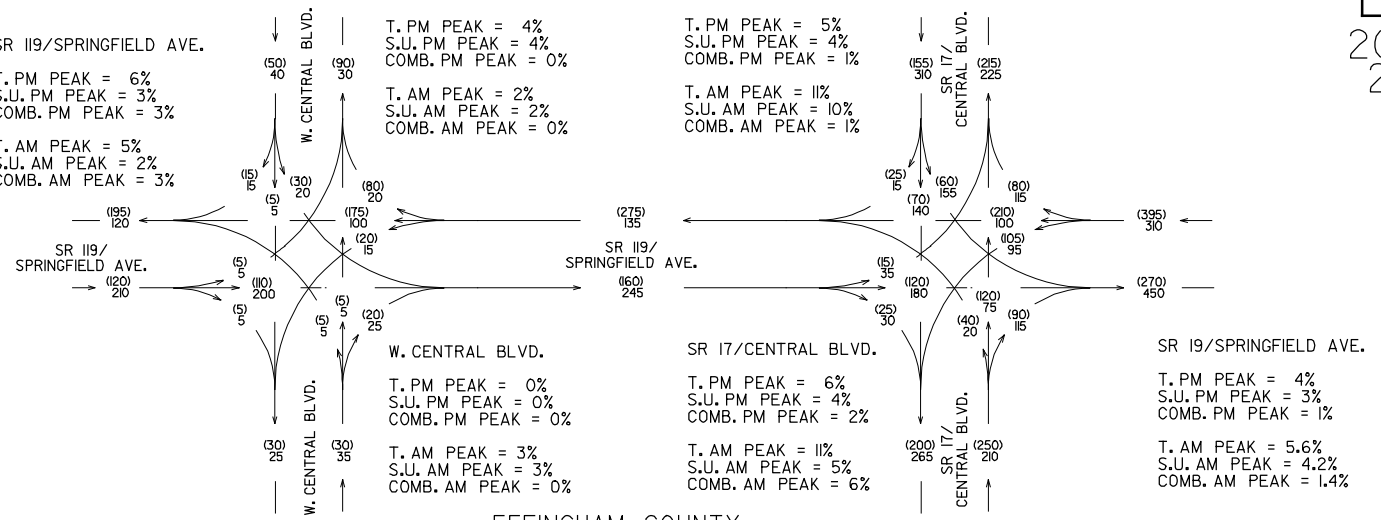
MTW
09/11

GEORGIA DEPARTMENT OF TRANSPORTATION

OFFICE OF PLANNING

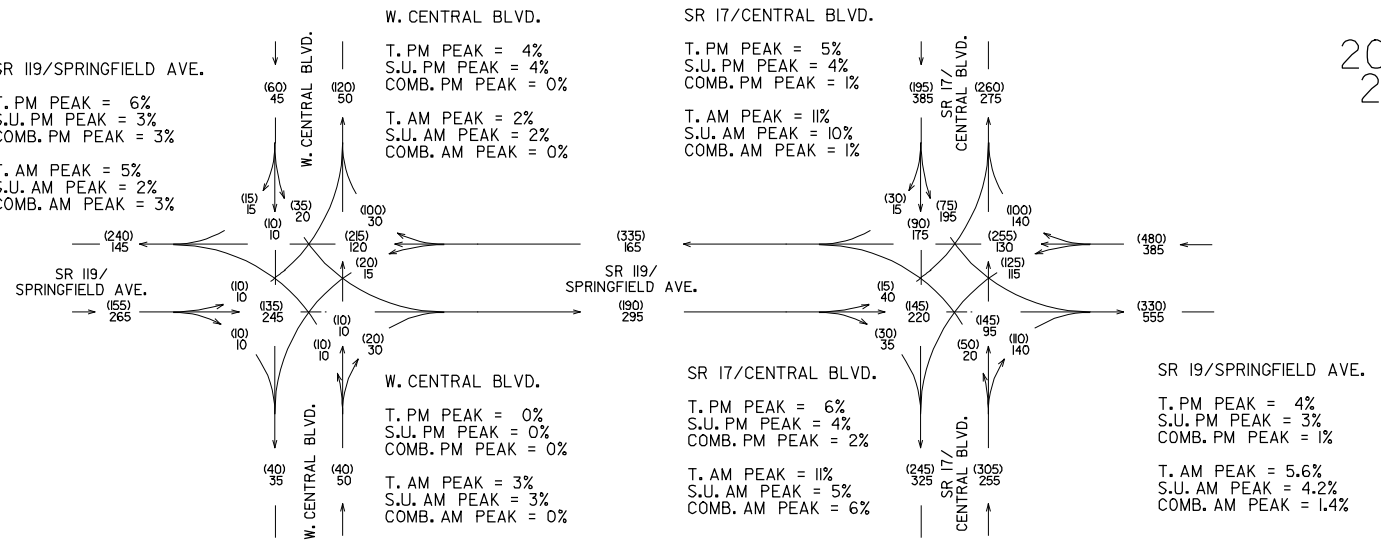
SHEET 4 OF 5

# 2015 PM DHV = (000)
# 2015 AM DHV = 000




EFFINGHAM COUNTY

# 2035 PM DHV = (000)
# 2035 AM DHV = 000




NO BUILD

NOT TO SCALE

P.I. # 0009870
EFFINGHAM COUNTY
SR 17/CENTRAL AVE.
SR 119/SPRINGFIELD AVE.

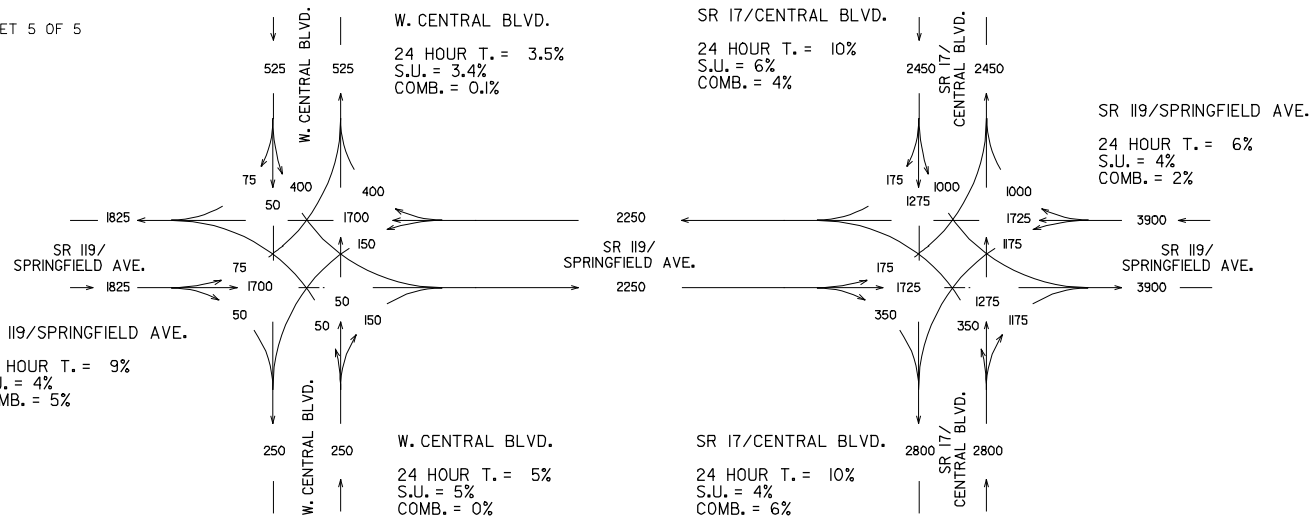
MTW
09/11

...\EFFINGHAM\0009870Diagrams.dgn 9/20/2011 3:15:56 PM micword

SHEET 5 OF 5

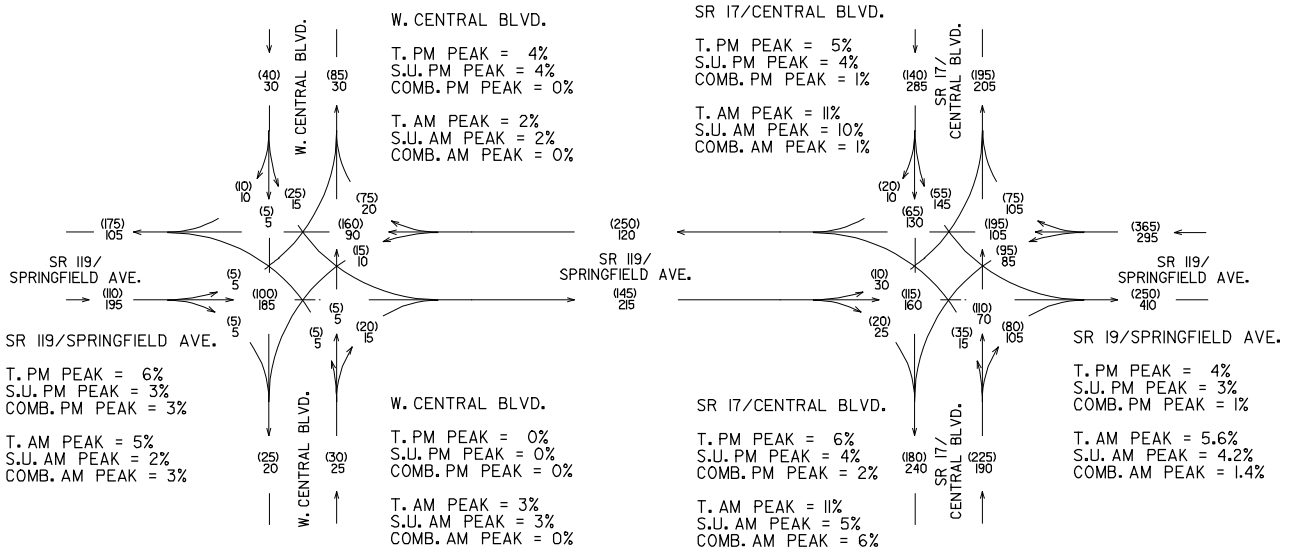
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

# EXISTING 2011 ADT




EFFINGHAM COUNTY

# 2011 PM DHV = (000)
# 2011 AM DHV = 000




NO BUILD

P.I. # 0009870
EFFINGHAM COUNTY
SR 17/CENTRAL AVE.
SR 119/SPRINGFIELD AVE.

NOT TO SCALE

MTW
09/11

...\EFFINGHAM\0009870Diagrams.dgn 9/20/2011 3:16:08 PM micword

# INTERSECTION OPERATIONAL ANALYSIS
# ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

**DEPARTMENT OF TRANSPORTATION**
**STATE OF GEORGIA**
**February 20, 2009**
**M.P. 14.11**

**Prepared by**

**District 5**
**Traffic Operations**

# INTERSECTION OPERATIONAL ANALYSIS/ ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

## STUDY LOCATION

The intersection of State Route (SR) 17 at SR 119 in Effingham County has been examined for Operational Improvement needs. This intersection is located along SR119 inside the City limits of Guyton. For the purposes of this report, SR17 has a North/South orientation and SR119 has an East/West orientation. (See attached site map and adjacent signalized intersection map).

## REASON FOR INVESTIGATION

The City of Guyton has officially requested that the Department investigate this location to determine if Signalization or other operational improvements can be implemented due to Safety Concerns and existing delay experienced during Peak Hours.

### TOPOGRAPHY

At the study location, SR17 is a two-lane roadway with both lanes being 12-feet in width. SR17 Northbound approach has a 100 foot right turn/deceleration lane.

SR119 is a two-lane roadway. The Eastbound approach lanes are 12-feet in width. The Westbound approach lanes are 20 feet in width.

Intersection sight distance was measured using a driver's eye height of 42" and a vehicle height of 42" per ASHTO guidelines. Sight distance measurements are shown below.

| | |
|---|---|
| SR119 East approach looking North onto SR17 | 800ft. |
| SR119 East approach looking South onto SR17 | 2000ft. |
| SR119 West approach looking North onto SR17 | 800ft. |
| SR119 West approach looking South onto SR17 | 2000ft. |

The Northeast quadrant of the study intersection is developed with a real estate office. The Southeast quadrant is developed by a convenience store. There is a 75 foot grassed buffer between SR17 and Central Ave. that runs parallel to SR17 on its west side.

# INTERSECTION OPERATIONAL ANALYSIS/ ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

## EXISTING TRAFFIC CONTROL

**The intersection of SR 17 and SR 119 currently operates as a Four Way Stop. An Overhead flashing beacon controls all four approaches along with stop ahead signs, stop signs and stop bars. Edge lines, center lines and RPM's are present and in good condition.**

## VEHICLE VOLUME HISTORY

| Table 1- AADT for SR17 AT SR119 | | |
|---|---|---|
| YEAR | SR17 (TC#0119) | SR119(TC#0171) |
| 2007 | 5100 | 3550 |
| 2006 | 5630 | 3100 |
| 2005 | 5000 | 3180 |

## VEHICLUAR SPEEDS

**The posted speed limit for SR17 Northbound approach at SR119 is 45 MPH. The posted speed limit for SR17 Southbound approach at SR119 is 35 MPH. The posted speed limit for SR119 eastbound approach at SR17 is 45 MPH. The posted speed limit for SR119 westbound approach at SR17 is 35 MPH.**

# INTERSECTION OPERATIONAL ANALYSIS/ ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

## PEDESTRIAN MOVEMENTS

**During the peak hour traffic counts, no pedestrians were recorded crossing any approach of the intersection. Sidewalks are present on the East side of the intersection.**

## PARKING

**On-street parking is not permitted along SR17 or SR119 in the vicinity of the intersection.**

## COLLISION HISTORY

**Collision data was available for the study intersection between the time period of March 2005 to May 2008. A total of 16 collisions were reported. Below see the accidents per year.**

| CRASHES | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| *RIGHT ANGLE* | 4 | 1 | 1 | |
| *LEFT TURN* | 2 | | | 2 |
| *REAR END* | 1 | 1 | 4 | |
| *HEAD ON* | | | | |
| *SIDESWIPE* | | | | |
| *OTHER* | | | | |
| | | | | |

**( See attached collision diagram )**

# INTERSECTION OPERATIONAL ANALYSIS/ ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

## MUTCD SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was performed for the intersection of SR17 at SR119 using the criteria provided in the Manual on Uniform Traffic Control Devices MUTCD, 2003 Edition. The data for the study was imported into the PC WARRANTS program for analysis and justification.
(See attached PC Warrants Analysis )

## OTHER INFORMATION

At build out Project CSML-0006-00(700) Effingham Pkwy will intersect SR119 approx. 1.8 miles east of the study intersection.

An intersection level of service analysis was performed for the study intersection in its current configuration and with possible improvements. (See results below)

| Configuration | LOS |
|---|---|
| Four Way Stop (Existing) | C (See Attached All Way Stop Control Analysis) |
| Roundabout (Proposed) | A (See Attached Roundabout Worksheet) |

## CONCLUSIONS

An examination of traffic volumes and collision experience indicates that Warrant 2 (Four Hour Volumes) of the MUTCD signal warrants is satisfied at this intersection.

Of the 16 collisions reported between March 2005 and May 2008 10 are considered correctable by the installation of a roundabout.

Using Peak Hour Volumes it is concluded that a Roundabout at the study intersection will function at a Level of Service "A".

Existing speed limits on all four approaches will need to be reduced to meet entry speed requirements for a single lane Urban Roundabout.

# INTERSECTION OPERATIONAL ANALYSIS/ ROUNDABOUT ANALYSIS
# TE STUDY
# SR17 AT SR119
# EFFINGHAM COUNTY

## RECOMMENDATIONS

**Based on an analysis of traffic data, collision experience, intersection operations, and potential signalization needs, the following action is recommended.**

- **It is recommended that a Single Lane Urban Roundabout be constructed at the study intersection.**
- **It is recommended that the speed limit on all four approaches at the study intersection be reduced to 25 MPH.**
- **It is recommended that the Construction of the Single Lane Urban Roundabout at the study intersection be accomplished through an operational improvement project.**
- **It is recommended that the Single Lane Urban Roundabout be designed to accommodate design vehicle (WB-67).**

*RECOMMENDED BY:* Robert F. McCall *DATE:* 2-25-09
*District Traffic Engineer*

*RECOMMENDED BY:*_____ *DATE:*_____
*State Traffic Engineer*

*RECOMMENDED BY:*_____ *DATE:*_____
*Director of Operations*

**Attachment 7 - Capacity Analysis Summary**

**Intersection Analysis**

| Approach | 2011 Existing Conditions | | | | 2015 No Build Condition[1] | | | | 2015 Build Condition[2] | | | | 2035 No Build Condition[1] | | | | 2035 Build Condition[2] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Southbound | 18.54 | C | 11.44 | B | 24.22 | C | 12.6 | B | 11 | B | 8 | A | 103.7 | F | 17.9 | C | 17 | C | 11 | B |
| Westbound | 17.46 | C | 17.25 | C | 21.77 | C | 22.07 | C | 11 | B | 7 | A | 89.49 | F | 69.07 | F | 17 | C | 8 | A |
| Northbound | 13.51 | B | 12.81 | B | 15.98 | C | 14.79 | B | 11 | B | 8 | A | 34.63 | D | 25.29 | D | 16 | C | 10 | B |
| Eastbound | 14.62 | B | 11.14 | B | 18.09 | C | 12.28 | B | 9 | A | 11 | B | 46.57 | E | 16.99 | C | 11 | B | 16 | C |

***NOTES:*** 1. No Build Conditions reflect AWSC at the intersection of SR 119 and SR 17

2. Build Conditions reflect a single-lane, four leg roundabout at the intersection of SR 119 and SR 17

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

# INDICATION OF ROUNDABOUT SUPPORT

To the Georgia Department of Transportation:

Attn: State Traffic Engineer
935 E. Confederate Ave, Building 24
Atlanta, GA 30316

**Location**

The CITY of GUYTON in EFFINGHAM County supports the consideration of a roundabout at the location specified below.

Local Street Names: VETERANS MEMORIAL PKWY. at SPRINGFIELD AVE.

State/County Route Numbers: SR 17 at SR 119

**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 of the electric energy used for any lighting installed and the maintenance thereof (if needed)
- Any maintenance costs associated with the landscaping as approved by the local government and the Georgia Department of Transportation (after construction is complete)

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 of the conditions are hereby agreed to. The undersigned are duly authorized to execute this agreement.

This is the 24th day of Jan., 2011

By: Michael A. Sam

Title: Mayor

Attest: Delia M. Kemp
Clerk

**PI 0009870 Effingham County**

**Proposed Concept Report for a Rural Roundabout**

The Highway Safety Manual (HSM) has been referenced for the availability of a Predictive Method analysis using a Safety Performance Function (SPF) with associated Crash Modification Factors (CMF) to provide a predicted average crash frequency. The proposed intersection work on this project includes a roundabout to replace an existing four-leg intersection with stop control at each leg. There is no HSM SPF available for this intersection type thus a HSM Predictive Method analysis is not available.

**Concept Team Meeting**

**PI No.: 0009870**

**SR 17/Central Blvd. @ SR 119/Springfield Ave.**
**Effingham County**

---

| | |
|---|---|
| Date/Time: | February 13, 2013 11:00AM |
| Place: | Statesboro Area 6 Office Statesboro, Georgia |
| Attendees: | Perry Black (GDOT), Tommy Crochet (McGee Partners), Drew Pitman (Edwards-Pitman Environmental), Brad Saxon (GDOT), Rob Mikell (Comcast), Michael Johnson (City of Guyton), Debra Scruggs (City of Guyton), Mike O'Neal (City of Guyton), Ron Nelson (GDOT), Paul Williams (GDOT), Rick Long (GA. Power), Robert Farmer (Planters Telephone), Dessie Carter (Planters Telephone), Paul Teague (Atlanta Gas Light), Joshua Taylor (GDOT), Christina Berry (GDOT), Melvin Johnson (GDOT) |

---

- Discussion started with the Environmental phase of the project:
    - It was noted that the historic resources date back to the 1870's in the National Register.
    - It was brought to the attention of the project manager that introductions were not done. Introductions were done at that time.
    - Coordination between the State Historic Preservation Office (SHPO) and GDOT Office of Environmental Services (OES) will need to take place before a specific design alternative is selected because of the significant historic resources.
    - It was noted that SHPO may view a roundabout as an adverse effect.
    - Ecology-there may be 2 outfalls within the project limits.
    - It was noted that there is a good chance that an Arborist may be needed to evaluate impacts to trees.
    - A Categorical Exclusion type of environmental document will most likely be required along with a Public Information Open House.
    - No residential or business relocates are expected.
    - It was noted that the environmental phase of the project may require 18 months to complete.
    - It was noted that the park benches located in the median may need to be relocated
    - The green space will be replaced if possible

- The discussion moved to Utilities:
    - It was stated that severe impacts are anticipated with reimbursable utilities.
    - It was noted Georgia Power will be affected by this project.
    - It was noted that staged relocation will probably need to be utilized.

    - It was stated that prior rights has not been determined at this time and will need to be researched.
    - After discussion with District Utility it was determined that the Public Interest Determination is not applicable to this project.
    - It was noted that Georgia Power would like to avoid the need to acquire private easements.
    - It was noted that at this time SUE is not needed on this project.
    - The City of Guyton stated that they should have the deed to the railroad property in their records
    - It was stated that the railroad track was probably removed in the mid 1960's

- The Design of the the project was then discussed:
    - It was noted that the 140' inscribed circle roundabout is the preferred alternative.
    - It was stated that on SR 17 the curve could be reduced on the north side of the roundabout.
    - The City of Guyton noted that it may be difficult for trucks entering and exiting the gas station off of SR 17.
    - It was noted that a soil survey would not be needed as this project is classified as a minor project.
    - It was noted that timber trucks use this route and are longer than the WB-67 trucks used as a design vehicle.
    - It was stated that on SR 19 bike traffic is significant
    - It was noted that a detour will not be needed.

- Right of Way was discussed:
    - The location of the gas station tanks were pointed out on the layout. No R/W impacts to the tanks are anticipated
    - It was noted that temporary easement can be condemned if it is related to an Environmental issue.

The meeting adjourned at 12:00pm

# GEORGIA DEPARTMENT OF TRANSPORTATION
## MEETING / CONFERENCE RECORD OF ATTENDEES

**PURPOSE:** P.I.# 0009870 SR 17/Central Blvd. @ SR 119/Springfield Ave. Effingham County-Concept Team Meeting

**LOCATION:** Statesboro Area 6 Office Statesboro Georgia

**DATE:** 2/13/2013 **TIME:** 11:00 A.M.

**MODERATOR:** Perry Black

| | NAME | ORGANIZATION | PHONE NO. | GDOT suffix: @dot.ga.gov<br>E-MAIL ADDRESS |
|---|---|---|---|---|
| 1 | PERRY BLACK | GDOT-OPD | 404-631-1224 | PeBlack@dot.ga.gov |
| 2 | Tommy Crochet | McGee Partners | 770-938-6400 | tcrochet@mcgeepartners.com |
| 3 | Drew Pitman | Edwards-Pitman Environmental | 770-333-9484 | dpitman@edwards-pitman.com |
| 4 | BRAD SAXON | GDOT | 912-427-5715 | bsaxon@dot.ga.gov |
| 5 | Rob Mikell | Comcast | 912-658-7262 | Rob_Mikell@cable.comcast.com |
| 6 | Michael Johnson | City of Guyton | 912-772-3353 | mbJohnsonsr70@yahoo.com |
| 7 | Debra Scruggs | City of Guyton | 912-772-3353 | debra.scruggs@cityofguyton.com |
| | Michael O'Neal | City of Guyton | 912 772 3353 | mike.oneal@cityofguyton.com |
| 9 | Ron Nelson | GDOT | 912871 1103 | ronelson@dot.ga.gov |
| 10 | Paul Williams | GDOT - District 5 | 912-427-5779 | pwilliams@dot.ga.gov |
| 11 | Rick Long | Ga. Power | 912897 3822 | rdlong@southernco.com |
| 12 | ROBERT FARMER | PLANTERS TELEPHONE | 912 857-4415 | ROBERT.FARMER@PLANTERS.NET |
| 13 | DESSIE CARTER | PLANTERS TELEPHONE | 912 857-4415 | PRTCCO@PLANTERS.NET |
| 14 | Paul Teague | Atlanta Gas Light | 404-613-5986 | pteague@aglresources.com |
| 15 | JOSHUA TAYLOR | GDOT - ROADWAY | 404-681-1659 | jotaylor@dot.ga.gov |
| 16 | Christina Barry | GDOT-Roadway | 404-631-1676 | cbarry@dot.ga.gov |
| 17 | MELVIN JOHNSON | GDOT MAINT. | 912 424 9915 | mejohnson@dot.ga.gov |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |

Roundabout Feasibility Report

# SR 17/Central Boulevard at SR 119/Springfield Avenue

Effingham County, Georgia

August 2012

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Roundabout Feasibility Report

# SR 17/Central Boulevard at SR 119/Springfield Avenue

Effingham County, Georgia

Prepared For:
**Georgia Department of Transportation**

Prepared By:
**Kittelson & Associates, Inc.**
225 E. Robinson Street, Suite 450
Orlando, FL 32801
(407) 540-0555

Project Manager: Justin Bansen, P.E.

Project No. 10956.11

August 2012

# TABLE OF CONTENTS

Introduction and Executive Summary ..... 1
Background ..... 2
Intersection Operations Analysis ..... 5
Existing stop control and Geometry (No Build) ..... 6
Roundabout Control ..... 7
Safety Analysis ..... 9
Conceptual Geometric Design ..... 10
Design Considerations ..... 10
Alternatives Comparison ..... 18
Concept Refinement ..... 19
Conceptual Construction Staging ..... 23
Cost Considerations ..... 24
Summary and Conclusions ..... 25
References ..... 26

# LIST OF FIGURES

Figure 1 Site Vicinity Map ..... 3
Figure 2 Intersection Layout ..... 4
Figure 3 Four-Leg 150-Foot Inscribed Diameter Roundabout Concept ..... 13
Figure 4 Four-Leg 140-Foot Inscribed Diameter Roundabout Concept ..... 14
Figure 5 Five-Leg Elliptical Roundabout Concept ..... 15
Figure 6 Six-Leg Elliptical Roundabout Concept ..... 16
Figure 7 Six-Leg 200-foot Inscribed Diameter Roundabout Concept ..... 17
Figure 8 Refined Four-Leg 140-Foot Inscribed Diameter Concept Design ..... 21

# LIST OF TABLES

Table 1 Traffic Volumes at SR 17 and SR 119 for Operations Analysis ..... 5
Table 2 Traffic Volumes at W. Central Boulevard and SR 119 for Operations Analysis ..... 5
Table 3 SR 17 & SR 119 AWSC Intersection Operations ..... 6
Table 4 W. Central Boulevard & SR 119 TWSC Intersection Operations ..... 6
Table 5 Intersection Operations with Single Lane Four-legged Roundabout ..... 7
Table 6 Intersection Operations with Single Lane Six-legged Roundabout ..... 8
Table 7 Safety Analysis Results ..... 9
Table 8 Roundabout Designs Comparison ..... 18

# APPENDICES

Appendix 1 Traffic Volumes ..... 1
Appendix 2 Stop Controlled Intersection Operations Analysis ..... 2
Appendix 3 Roundabout Operations Analysis ..... 3
Appendix 4 Safety Analysis ..... 4
Appendix 5 Design Vehicle Swept Paths ..... 5
Appendix 6 Fastest Paths ..... 6
Appendix 7 Sight Distance Overlay ..... 7
Appendix 8 Conceptual Cross-Section ..... 8
Appendix 9 Conceptual Construction Staging ..... 9
Appendix 10 Cost Estimates ..... 10

# INTRODUCTION AND EXECUTIVE SUMMARY

Kittelson & Associates, Inc. (KAI) evaluated the operational and geometric feasibility of a roundabout at the intersection of SR 17 (Central Boulevard) with SR 119 (Springfield Avenue) in Guyton, Effingham County, Georgia. This report documents the development of the conceptual roundabout design for the system of closely spaced intersections between SR 17/SR 119 and West Central Boulevard/SR 119.

Based upon KAI's evaluation, a roundabout is a feasible alternative for implementation at the intersection of SR 17 with SR 119. A single-lane roundabout is sufficient to serve estimated traffic volumes through the design year 2035.

A roundabout is estimated to provide safety benefits over the current two closely spaced stop-controlled intersections by reducing the likelihood for injury crashes. This is due to reduced intersection speeds with a roundabout as well as removal of severe crash types such as right-angle and head-on crashes. A reduction in total vehicle crashes is also expected with roundabout implementation.

For the roundabout alternative, KAI developed several design options at a sketch level to identify the anticipated footprint, potential impacts, and potential constructability associated with each option. The concept designs present options for four and six-lane configurations. The six-leg configurations were prepared to evaluate the feasibility of also connecting West Central Boulevard into the roundabout due to its proximity to the intersection of SR 17 with SR 119. Based upon coordination with GDOT staff, a single-lane roundabout with four approach legs was selected as the preferred alternative.

The operations review, feasibility evaluation, and conceptual design development included each of the components outlined in the Georgia DOT's Roundabout Design Checklist for Concept Development.

# BACKGROUND

The intersection of SR 17 and SR 119 is located in Effingham County, Georgia, in the City of Guyton. A site vicinity map of the project location is provided in Figure 1 and an aerial of the intersection is shown in Figure 2. The intersection is stop-controlled on all four approaches. The adjacent intersection of West Central Boulevard with SR 119 is located approximately 130 feet west of the study intersection. SR 119 has ground-mounted advance stop-ahead warning signs. SR 17 has traffic calming pavement markings on both the northbound and southbound approaches.

**SR 17** is a two-lane lane facility to the north and south of the study intersection. It features wide shoulders to the north and approximately quarter mile south of the study intersection. At the intersection with SR 119, there is a short channelized yield-controlled right-turn lane provided on the northbound approach with no storage. SR 17 is classified as a rural major collector. The town of Guyton is established along SR 17. The 2011 two-way ADT on SR 17 is approximately 4900 north of the intersection and 5600 south of the intersection. SR 17 has a posted speed of 35 mph in the vicinity of the study intersection.

**SR 119** is a two-lane facility both east and west of the intersection. It features wide lanes, approximately 20-foot wide on the westbound approach. SR 119 is classified as an urban minor arterial street. Private residences access SR 119 east of the study intersection. SR 119 is also designated as a state bike route to the east of the study intersection. SR 119 to the west is mostly undeveloped with approximately 12-foot wide lanes and no shoulders. The 2011 two-way ADT on SR 119 is approximately 3650 west of the intersection and 7800 east of the intersection. SR 119 has a posted speed limit of 35 miles in the vicinity of the study intersection.

**West Central Boulevard** is a two lane business access road paralleling SR 17 north of the SR 119. South of SR 119, W. Central Boulevard diverts away from SR 17 and is physically separated by a drainage ditch. Both approaches of this local connection serve relatively small daily traffic volumes. The 2011 two-way ADT on the northern approach is approximately 1050. The two-way ADT on the southern approach is approximately 500.

The following list highlights a brief summary of key site conditions and constraints:

- **Vertical Road Geometry** – The intersection is located in a relatively flat area with very slight grades. A drainage ditch separates SR 17 and West Central Boulevard south of SR 119.
- **Adjacent Properties** – All quadrants of the intersection are occupied. Gas stations are built on the southeast and northwest corners. A private residence occupies the southwest corner. A new Subway restaurant was built on the northeast quadrant. All buildings are set back enough not to require relocation; however, right-of-way impacts may apply.
- **Multimodal Facilities** – No bike lanes are present on any approaches; however SR 119 east of SR 17 is a state bike route. Five-foot wide sidewalks are present on the east side of SR 17 north and south of SR 119. There are no bus stops or lines in the near vicinity of the intersection.

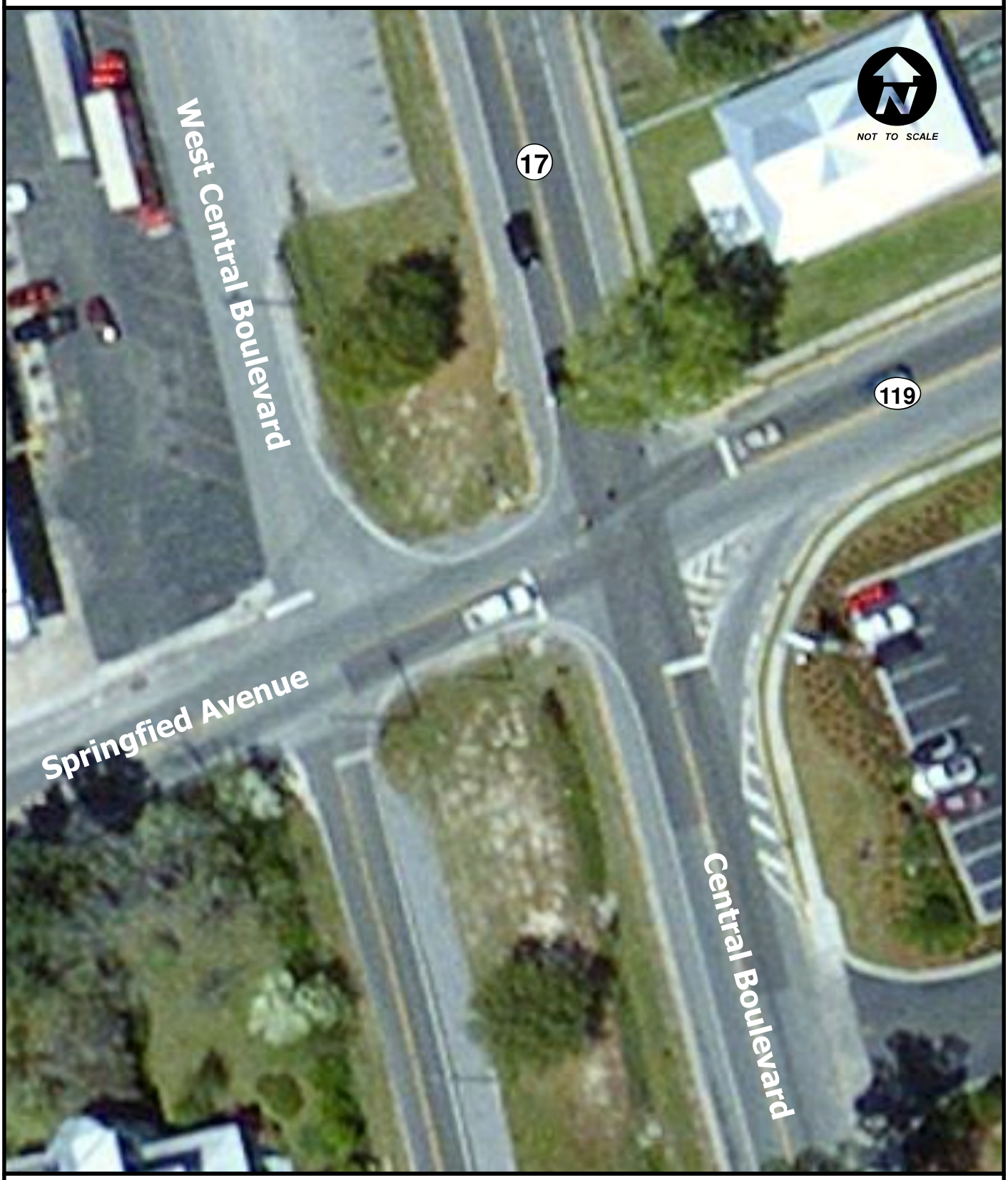
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Site Vicinity

Guyton, Effingham County, Georgia

Figure

1




KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Intersection Layout

Guyton, Effingham County, Georgia

Figure
2

# INTERSECTION OPERATIONS ANALYSIS

KAI evaluated operations at the study intersections using Highway Capacity Manual (HCM) methodologies (Reference 2). KAI evaluated the operations for the existing conditions (2011), the build year (2015), and the design year (2035) during both the AM and PM peak hour time periods. The intersections were analyzed with the following alternatives:

1. Existing stop control and intersection lane configurations;
2. Four-leg roundabout configuration at SR 17/SR 119; and
3. Six-leg roundabout configuration incorporating SR 17, SR 119, and West Central Blvd.

Peak hour traffic volumes utilized for the analyses were sourced from information provided by GDOT staff. This included existing turning movement counts for 2011, design hour volumes (DHV) for 2015 and 2035, and average daily traffic (ADT) for 2015 and 2035. The traffic forecasts also included heavy vehicle percentages (%HV) for 2011, 2015 and 2035. Volume data is provided in Appendix 1. The turning movement volumes used in the analyses is shown in Table 1 and Table 2, for SR 17 & SR 119 and W. Central Boulevard & SR 119, respectively.

Table 1 Traffic Volumes at SR 17 and SR 119 for Operations Analysis

| Year | Time Period | EB – SR 119 | | | WB – SR 119 | | | NB – SR 17 | | | SB – SR 17 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L | Th | R | L | Th | R | L | Th | R | L | Th | R |
| 2011 | AM Peak | 30 | 160 | 25 | 85 | 105 | 105 | 15 | 70 | 105 | 145 | 130 | 10 |
| | PM Peak | 10 | 115 | 20 | 95 | 195 | 75 | 35 | 110 | 80 | 55 | 65 | 20 |
| 2015 | AM Peak | 35 | 180 | 30 | 95 | 100 | 115 | 20 | 75 | 115 | 155 | 140 | 15 |
| | PM Peak | 15 | 120 | 25 | 105 | 210 | 80 | 40 | 120 | 90 | 60 | 70 | 15 |
| 2035 | AM Peak | 40 | 220 | 35 | 115 | 130 | 140 | 20 | 95 | 140 | 195 | 175 | 15 |
| | PM Peak | 15 | 145 | 30 | 125 | 255 | 100 | 50 | 145 | 110 | 75 | 90 | 30 |

Notes: L – left turn, Th – through movement, R – right turn

Table 2 Traffic Volumes at W. Central Boulevard and SR 119 for Operations Analysis

| Year | Time Period | EB – SR 119 | | | WB – SR 119 | | | NB – W. Central Blvd. | | | SB – W. Central Blvd. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L | Th | R | L | Th | R | L | Th | R | L | Th | R |
| 2011 | AM Peak | 5 | 185 | 5 | 10 | 90 | 20 | 5 | 5 | 15 | 15 | 5 | 10 |
| | PM Peak | 5 | 100 | 5 | 15 | 160 | 75 | 5 | 5 | 20 | 25 | 5 | 10 |
| 2015 | AM Peak | 5 | 200 | 5 | 15 | 100 | 20 | 5 | 5 | 25 | 20 | 5 | 15 |
| | PM Peak | 5 | 110 | 5 | 20 | 175 | 80 | 5 | 5 | 20 | 30 | 5 | 15 |
| 2035 | AM Peak | 10 | 245 | 10 | 15 | 120 | 30 | 10 | 10 | 30 | 20 | 10 | 15 |
| | PM Peak | 10 | 135 | 10 | 20 | 215 | 100 | 10 | 10 | 20 | 35 | 10 | 15 |

Notes: L – left turn, Th – through movement, R – right turn

## EXISTING STOP CONTROL AND GEOMETRY (NO BUILD)

The primary study intersection of SR 17 and SR 119 is currently operated under all way stop control. Additionally, the study analyzed the closely spaced, two-way stop controlled intersection at SR 119 and W. Central Boulevard, located approximately 130 feet west of SR 17. The results of this analysis are summarized in Table 3 and Table 4, respectively. While the SR 17 at SR 119 intersection was found to provide sufficient capacity for 2015, by 2035 two approaches are estimated to have a volume-to-capacity ratio greater than 1. Specifically, the westbound movement on SR 119 will operate at a level-of-service F during both AM and PM peak hours. Additionally, the southbound movement will operate at LOS F during the AM peak hour.

The intersection of W. Central Blvd at SR 119 was found to provide level-of-service "B" or better for both 2015 and 2035 analysis years. The analysis output sheets are provided in Appendix 2.

Table 3 SR 17 & SR 119 AWSC Intersection Operations

| SR 17 & SR 119 | | SB | | | WB | | | NB | | | EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Time Period | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS |
| 2011 | AM Peak | 0.63 | 18.54 | C | 0.62 | 17.46 | C | 0.46 | 13.51 | B | 0.49 | 14.62 | B |
| | PM Peak | 0.39 | 11.44 | B | 0.65 | 17.25 | C | 0.5 | 12.81 | B | 0.39 | 11.14 | B |
| 2015 | AM Peak | 0.73 | 24.22 | C | 0.71 | 21.77 | C | 0.54 | 15.98 | C | 0.6 | 18.09 | C |
| | PM Peak | 0.41 | 12.6 | B | 0.74 | 22.07 | C | 0.53 | 14.79 | B | 0.42 | 12.28 | B |
| 2035 | AM Peak | **>1.0** | **103.7** | **F** | **>1.0** | **89.49** | **F** | **0.75** | 34.63 | D | 0.86 | 46.57 | E |
| | PM Peak | 0.51 | 17.9 | C | **>1.0** | **69.07** | **F** | **0.71** | 25.29 | D | 0.49 | 16.99 | C |

v/c = volume-to-capacity ratio, LOS = Level of Service

Table 4 W. Central Boulevard & SR 119 TWSC Intersection Operations

| W. Central Blvd & SR 119 | | SB | | | WB | | | NB | | | EB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Time Period | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS | v/c | Control Delay (sec/v) | LOS |
| 2011 | AM Peak | **0.05** | **10.8** | **B** | 0.01 | 7.7 | A | 0.04 | 10.3 | B | 0 | 7.5 | A |
| | PM Peak | **0.08** | **11.7** | **B** | 0.01 | 7.5 | A | 0.04 | 10 | A | 0 | 7.8 | A |
| 2015 | AM Peak | **0.07** | **11.3** | **B** | 0.01 | 7.8 | A | 0.05 | 10.4 | B | 0 | 7.5 | A |
| | PM Peak | **0.1** | **12.1** | **B** | 0.02 | 7.5 | A | 0.04 | 10.2 | B | 0 | 7.9 | A |
| 2035 | AM Peak | **0.09** | **12.6** | **B** | 0.01 | 7.9 | A | 0.09 | 11.7 | B | 0.01 | 7.6 | A |
| | PM Peak | **0.14** | **13.8** | **B** | 0.02 | 7.6 | A | 0.08 | 11.8 | B | 0.01 | 8.1 | A |

v/c = volume-to-capacity ratio, LOS = Level of Service

## ROUNDABOUT CONTROL

KAI evaluated the SR 17/SR 119 intersection under roundabout control using the Highway Capacity Manual 2010 methodologies, as applied by the GDOT "Roundabout Analysis Tool" (Reference 3). Operational performance measures used for the intersection analysis are volume-to-capacity (v/c) ratio, control delay, and vehicle queues for each intersection approach. For planning purposes, an approach v/c ratio below 0.85 is generally targeted for the design year operations for the roundabout alternatives. For approaches where the operational results show a v/c ratio exceeding 0.85, additional consideration of delay and queue lengths contributes to the determination of whether the approach operations may be acceptable.

KAI evaluated a single-lane roundabout configuration for the study intersection. The roundabout was initially evaluated as a four-legged configuration for the study intersection only. However, due to the close proximity of West Central Blvd, a larger 6-legged alternative configuration was also evaluated that incorporated the two West Central Blvd approaches into the roundabout. Analysis was performed for the 2015 build year and for design year 2035 conditions. Analysis output reports for all roundabout scenarios are provided in Appendix 3.

Roundabout analysis results for the years 2015 and 2035 are summarized for both scenarios in Table 5, for a four–legged roundabout configuration, and Table 6, for a six-legged roundabout configuration. Under the 4-legged configuration, the West Central Blvd/SR 119 intersection is assumed to be closed and traffic along West Central Blvd is routed to SR 17 and then through the SR 17/SR 119 intersection. The volume-to-capacity ratio, delay, LOS, and 95$^{th}$ percentile queue length for each approach are provided. The north approach is the critical movement in the AM, while the east approach is critical in the PM.

Table 5 Intersection Operations with Single Lane Four-legged Roundabout

| Four-legged | | South Approach | | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Time Period | v/c | Control Delay (sec/v) | LOS | 95th % Queue (ft) | v/c | Control Delay (sec/v) | LOS | 95th % Queue (ft) |
| 2015 | AM Peak | 0.42 | 11 | B | 58 | 0.38 | 11 | B | 46 |
| | PM Peak | 0.37 | 8 | A | 46 | 0.18 | 7 | A | 17 |
| 2035 | AM Peak | 0.58 | 17 | C | 103 | 0.54 | 17 | C | 85 |
| | PM Peak | 0.48 | 11 | B | 70 | 0.25 | 8 | A | 26 |
| **Four-legged** | | **North Approach** | | | | **East Approach** | | | |
| **Year** | **Time Period** | **v/c** | **Control Delay (sec/v)** | **LOS** | **95th % Queue (ft)** | **v/c** | **Control Delay (sec/v)** | **LOS** | **95th % Queue (ft)** |
| 2015 | AM Peak | 0.5 | 11 | B | 78 | 0.39 | 9 | A | 50 |
| | PM Peak | 0.30 | 8 | A | 33 | 0.52 | 11 | B | 80 |
| 2035 | AM Peak | 0.65 | 16 | C | 133 | 0.51 | 11 | B | 79 |
| | PM Peak | 0.40 | 10 | B | 51 | 0.67 | 16 | C | 137 |

v/c = volume-to-capacity ratio, LOS = Level of Service

As summarized in Table 5, a four-legged roundabout at the SR 17/SR 119 intersection provides adequate capacity to achieve a v/c ratio less than 0.85 for all approaches for the forecast 2035 AM and PM peak conditions. A four-legged roundabout with closure of the adjacent West Central Blvd/SR 119 intersection is feasible due to the low volumes from the secondary intersection of W. Central Boulevard and SR 119 can be diverted to SR 17 to access the roundabout.

While the analysis indicates that a four-legged roundabout is sufficient to serve the opening and design-year traffic volumes, KAI also evaluated the expected operations for a larger six-legged configuration with incorporation of W Central Boulevard (northwest and southwest approaches) into the roundabout. Analysis results for a six-legged roundabout are summarized in **Error! Reference source not found.**, hich shows the roundabout to operate with a maximum estimated v/c ratio of 0.67 through year 2035.

Table 6 Intersection Operations with Single Lane Six-legged Roundabout

| Six-legged Roundabout | | South Approach | | | | West Approach | | | | North Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Time Period | v/c | Control Delay (sec/v) | LOS | 95th % Queue (ft) | v/c | Control Delay (sec/v) | LOS | 95th % Queue (ft) | v/c | Control Delay (sec/v) | LOS | 95th % Queue (ft) |
| 2015 | AM Peak | 0.37 | 11 | B | 48 | 0.39 | 11 | B | 48 | 0.47 | 11 | B | 70 |
| | PM Peak | 0.34 | 8 | A | 40 | 0.17 | 6 | A | 17 | 0.25 | 8 | A | 25 |
| 2035 | AM Peak | 0.51 | 15 | C | 81 | 0.56 | 17 | C | 89 | 0.63 | 17 | C | 125 |
| | PM Peak | 0.44 | 10 | B | 61 | 0.24 | 8 | A | 25 | 0.34 | 10 | B | 40 |
| **Six-legged Roundabout** | | **East Approach** | | | | **Southwest Approach** | | | | **Northwest Approach** | | | |
| **Year** | **Time Period** | **v/c** | **Control Delay (sec/v)** | **LOS** | **95th % Queue (ft)** | **v/c** | **Control Delay (sec/v)** | **LOS** | **95th % Queue (ft)** | **v/c** | **Control Delay (sec/v)** | **LOS** | **95th % Queue (ft)** |
| 2015 | AM Peak | 0.39 | 9 | A | 50 | 0.08 | 8 | A | 6 | 0.08 | 7 | A | 6 |
| | PM Peak | 0.52 | 11 | B | 79 | 0.05 | 5 | A | 4 | 0.08 | 6 | A | 7 |
| 2035 | AM Peak | 0.51 | 11 | B | 79 | 0.13 | 10 | B | 11 | 0.1 | 8 | A | 8 |
| | PM Peak | 0.67 | 16 | C | 137 | 0.07 | 6 | A | 5 | 0.11 | 7 | A | 9 |

v/c = volume-to-capacity ratio, LOS = Level of Service

# SAFETY ANALYSIS

In addition to the traffic operations, safety is an important consideration in evaluating the appropriate intersection treatment. Roundabouts have proven to be an effective intersection treatment for improving safety - particularly for reducing severe and fatal crashes. Roundabouts reduce the number of intersection conflict points and provide slower speed operating conditions that increases time for drivers to react and reduces the likelihood of an injury should a crash occur.

A total of 22 crashes were reported at the intersection during the years 2007 through 2009. Six injury crashes were reported but none were fatal. Of the 22 total crashes reported, seven were angle collisions. A safety evaluation was performed for the intersection based upon the analysis procedure documented in *NCHRP Report 672 Roundabouts: An Informational Guide – 2nd Edition (Reference 4)*. The procedure utilizes Safety Performance Functions (SPF) documented in the National Cooperative Highway Research Program (NCHRP) *Report 572: Roundabouts in the United States (Reference 5). NCHRP Report 572* assessed the number of recorded crashes at fifty-five sites before and after roundabout installation. Ten of those sites were all-way stop control (AWSC) prior to a roundabout being installed. Given the fact that all vehicles must stop at an AWSC intersection, crash rates for the AWSC intersections were relatively low in the "before" condition and therefore the research identified insignificant differences in crashes when converting from AWSC to a roundabout for the intersections that were evaluated as part of the study.

At the study intersection, the SPFs documented in NCHRP Report 572 were used to estimate the expected number of crashes for the existing AWSC condition. Using an Empirical Bayes methodology, the results of the AWSC crash estimate were refined to better reflect the three years of available historical crash data. Based upon the Empirical Bayes procedure, the estimated annual crashes for the AWSC condition was increased from 2.59 crash per year (the raw estimate based upon the AWSC SPF) to a refined estimate of 6.36 crashes per year (accounting for historical crash data). This was then compared against predicted crashes for a single-lane roundabout which were calculated using the SPF reported in NCHRP Report 572.

The observed, expected, and predicted crashes for the AWSC and roundabout are listed in Table 7. The safety analysis is included in Appendix 4.

Table 7 Safety Analysis Results

| Observed Crashes (2007 to 2009) | Expected AWSC Crashes | Expected Roundabout Crashes | Anticipated Crash Reduction |
|---|---|---|---|
| 22 total crashes | 6.36 total crashes/year | 2.84 total crashes/year | 55% |
| 6 injury Crashes | 1.5 injury crashes/year | 0.36 injury crashes/year | 76% |

Based upon the historical crash data and refined estimate of expected annual crashes at the existing AWSC intersection, a single-lane roundabout (4-leg configuration) is estimated to result in a 55% reduction in total crashes and 76% reduction in injury crashes at the intersection of SR 17 with SR 119.

# CONCEPTUAL GEOMETRIC DESIGN

KAI developed several conceptual roundabout designs for the intersection. Concepts were initially developed in Microstation to a level that would allow initial screening and discussion of potential impacts. One alternative was later selected and further refined as discussed in the next section of this report. KAI utilized concepts previously developed by GDOT as a starting point and prepared additional alternatives for consideration. Concepts were developed in accordance with the design principles outlined in the *NCHRP Report 672 Roundabouts: An Informational Guide – 2nd Edition.*

The concepts presented in this section represent one set of possible options for the roundabout horizontal geometry. Roundabout design is based upon a set of fundamental principles which guide the design process. These principles include: (1) achieving speed control at entry, (2) providing appropriate lane numbers and arrangements, (3) appropriately aligning the natural path of vehicles, (4) accommodating the design vehicle, (5) accommodating non-motorized users, and (6) providing adequate sight distance and visibility. Alternative sizes, shapes, placement, and approach alignments may also be acceptable provided that they result in a design that meets these fundamental principles.

As discussed in the operational analysis, a single-lane roundabout with four approaches or legs is sufficient to accommodate the projected 2035 traffic volumes. While traffic volumes on W. Central Boulevard are relatively low (between 500 and 1050 daily vehicles), KAI developed several alternative concepts that incorporated one or both approaches of W. Central Boulevard into the roundabout, resulting in five and six legged configurations. The following options were developed at a planning level in Microstation to illustrate the relative roundabout sizes, locations, and lane configurations. Note that these concepts are developed to a level for initial screening and discussion of potential impacts only. Additional refinement of each option is needed prior to further design consideration.

- Design 1: Four-leg 150-foot inscribed diameter roundabout, shown in Figure 3.
- Design 2: Four-leg 140-foot inscribed diameter roundabout, shown in Figure 4.
- Design 3: Five-leg elliptical roundabout with a major 200-foot major diameter and 170-foot minor diameter, shown in Figure 5.
- Design 4: Six-leg elliptical roundabout with a major 200-foot major diameter and 170-foot minor diameter, shown in Figure 6.
- Design 5: Six-leg 200-foot inscribed diameter roundabout, shown in Figure 7.

## DESIGN CONSIDERATIONS

The following bullet-point discussion summarizes the key considerations in the development of the conceptual designs. The features shown in the concept designs, and discussed below, were developed based upon an iterative process to balance vehicle fastest path speeds, vehicle alignment, and truck accommodations. Additional refinements may be needed during the design process based upon updated surveyed conditions.

## Design Environment

- Closely spaced intersections at the edge of a rural town. Relatively large spacing between intersections provides drivers with expectation of uninterrupted travel conditions from the south and west. These approaches are likely to experience higher travel speeds than the reciprocal movements.
- Emphasis on truck navigation due to intersection of two state routes. WB-67 or equivalent size vehicles are expected along both SR 17 and SR 119.
- Emphasis on improving intersection safety performance. Objective is to further enhance safety performance, particularly with respect to injury crashes.
- No existing bicycle amenities along SR 17 or SR 119 in the intersection vicinity.
- Five-foot wide sidewalks along the eastern side of SR 17 north and south of the intersection vicinity.
- Business uses occupy three of interaction quadrants in the southeast, northeast, and northwest. A private residence occupies the southwest quadrant. Trees and landscaped buffers align both roadways.
- Right-of-way information was provided to KAI by GDOT for use on the project. ROW is expected to be required for any of the roundabout alternatives; however, the amount of ROW and potential impacts vary by alternative.

## Lane Configurations

- Based upon the KAI's operational analysis, a single-lane roundabout is estimated to provide adequate operations through the design year 2035. Both roundabout options with four or six approaches are expected to operate acceptably; therefore, the number of approaches does not affect the ultimate configuration selection.

## Truck Navigation

- The design concepts were developed with the intent to accommodate a WB-67 tractor-trailer for all movements. For the six-legged configurations, the intersection spacing restricted the ability to accommodate a WB-67 to or from West Central Boulevard for some alternatives. Based on design traffic volumes provided by GDOT, truck traffic is moderately high through the intersection. However, a WB-67 was accommodated for the SR 17 and SR 119 approaches for all alternatives. The 24-hour T-factor is 9% for the eastbound approach, 10% for the northbound approach, 6% for the westbound approach, and 10% for the southbound approach.

## Speed Control

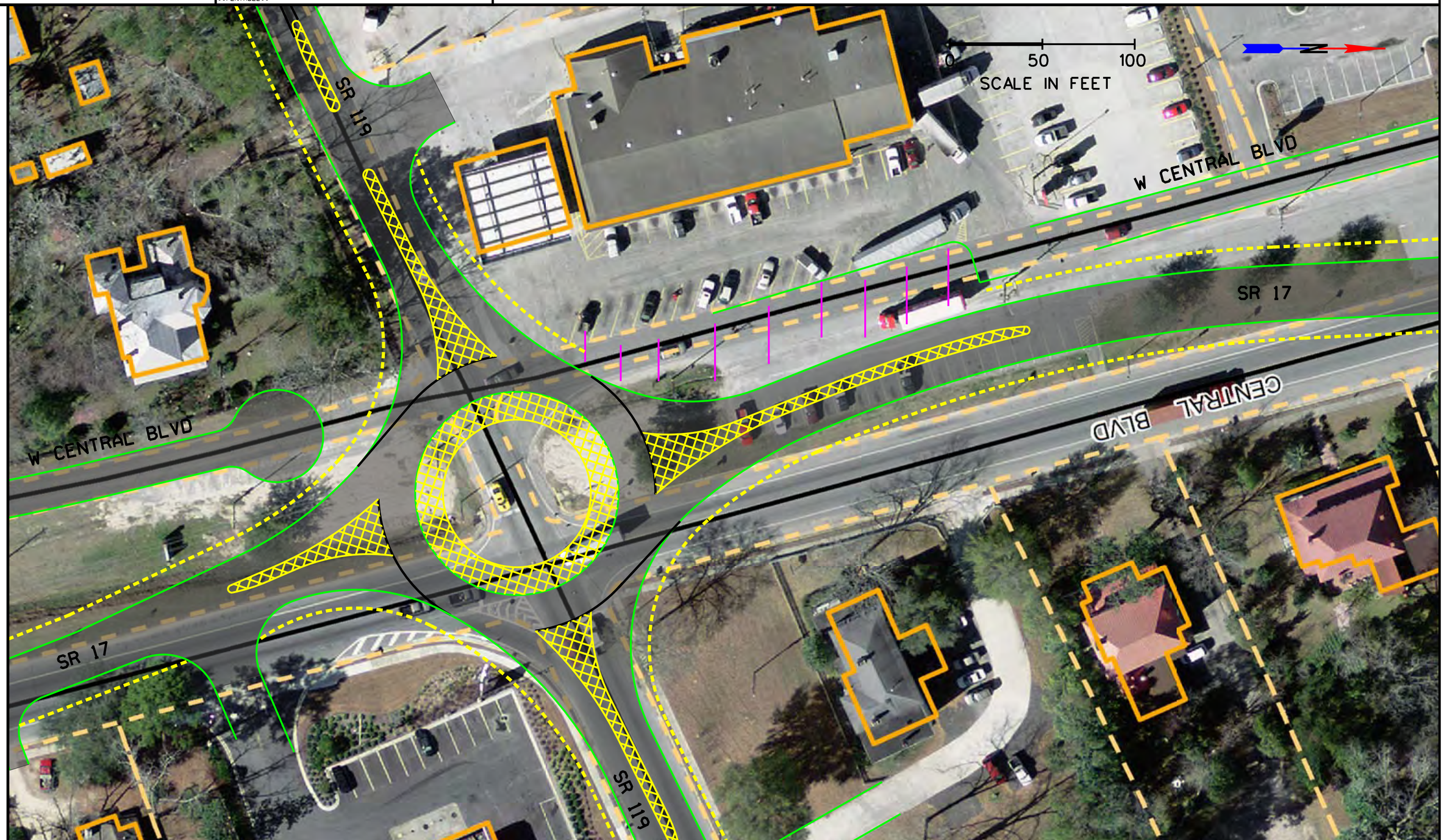
- Existing approach speeds on both SR 17 and SR 119 are 35 mph in the vicinity of the study intersection.

- Reduced vehicle speeds entering the intersection is one of the fundamental design criteria for roundabouts. The designs were developed based upon the fastest path criteria from *NCHRP Report 672*. The procedure estimates the fastest path that would be achieved by a vehicle ignoring all lane lines approaching and traveling through the roundabout. The design concepts were developed to maintain fastest path speeds entering the roundabout of less than 25 mph.

## Non-Motorized Users

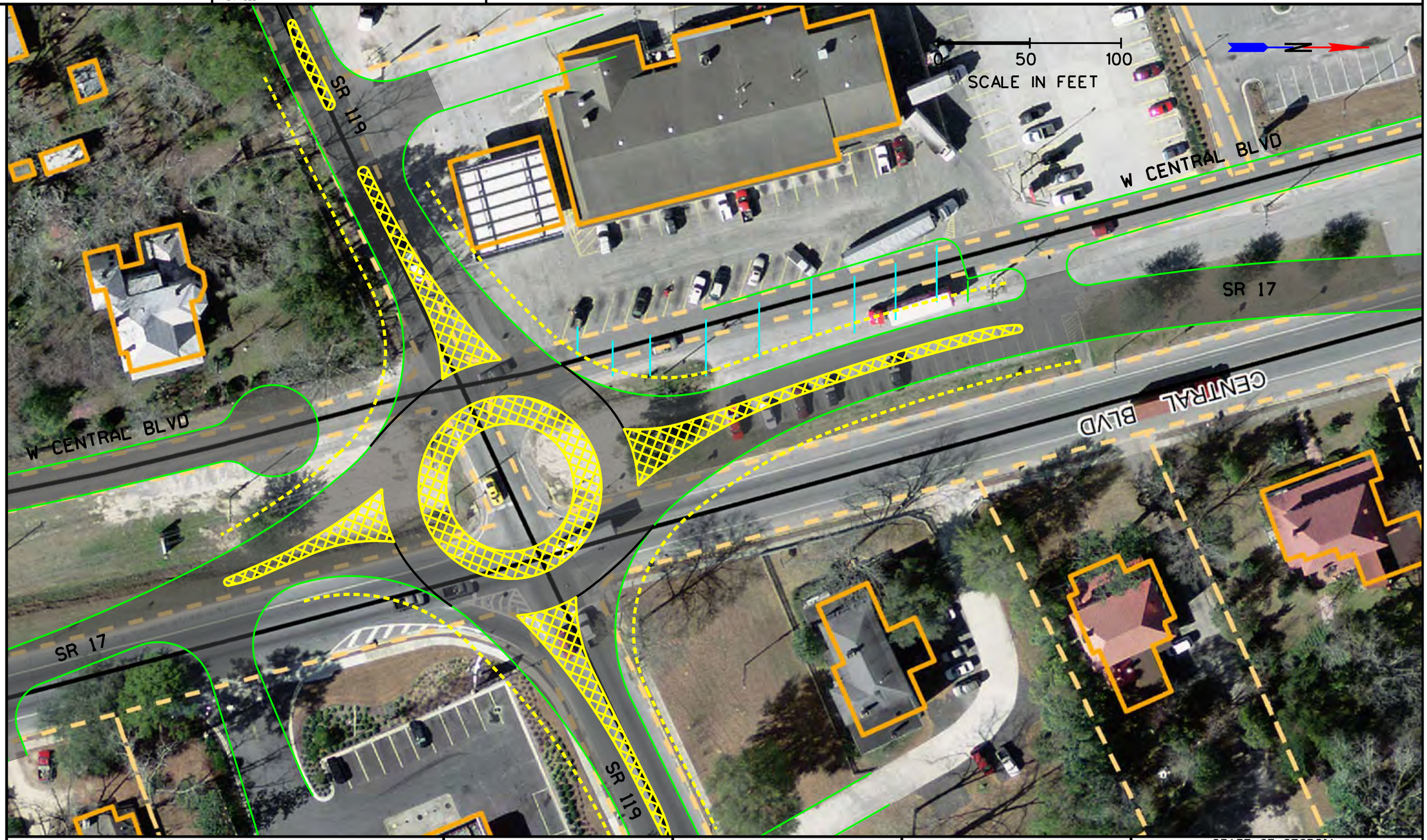
- Limited pedestrian activity is assumed based upon the environment. However, SR 119 is designated as a state bike route east of the study intersection. The designated bike route makes a 90 degree turn through the intersection and continues down West Central Boulevard to the south of SR 119.
- SR 119 features wide lanes, approximately 20-foot wide, east of SR 17; however, bike lanes are not designated by pavement markings. SR 17 features paved shoulders north and south of the study intersection; however, this area is presumed to be used for on-street parking. Based upon guidance in NCHRP Report 672, no provisions for bike ramps were provided on any of the approaches. However, existing driveway curb cuts are present on each of the approaches to the roundabout that would allow a cyclist to transition onto the sidewalk if they are uncomfortable navigating through the roundabout as a vehicle.
- Splitter island lengths and widths were designed to incorporate pedestrian crossings with appropriately sized pedestrian refuges.
- Pedestrian crossings are positioned one car length (20 feet) behind the yield line on the single lane approaches. This allows for at least one vehicle waiting to enter the roundabout while not impeding the pedestrians. Similarly, one vehicle can stop on the exit yielding to pedestrians, while not impeding the circulating roundabout traffic.
- Five-foot wide sidewalks are provided on all quadrants of the intersection with a two-foot buffer strip where right-of-way permitted. The sidewalk width and buffer distance was minimized to avoid potential right-of-way impacts. However, consideration may be given by GDOT to increasing these dimensions during design. NCHRP Report 672 identifies a minimum desired setback (buffer) of two feet with five feet the recommended setback. The recommended sidewalk width is 6 feet or larger, with 5 feet being the minimum width.

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$



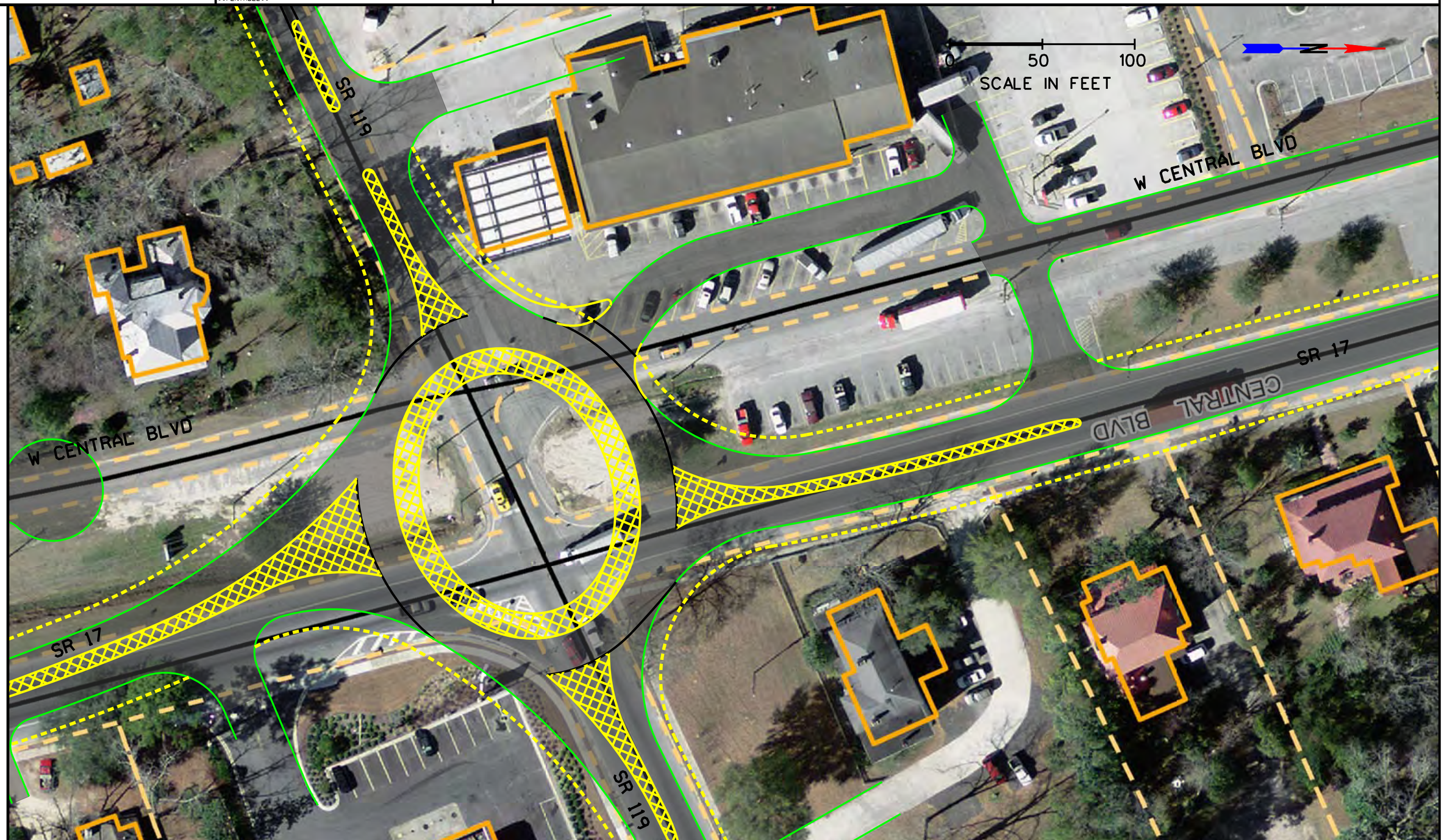

| | | | | |
|---|---|---|---|---|
| CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | FOUR-LEG 150 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 1 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY | FIGURE 3 |

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$



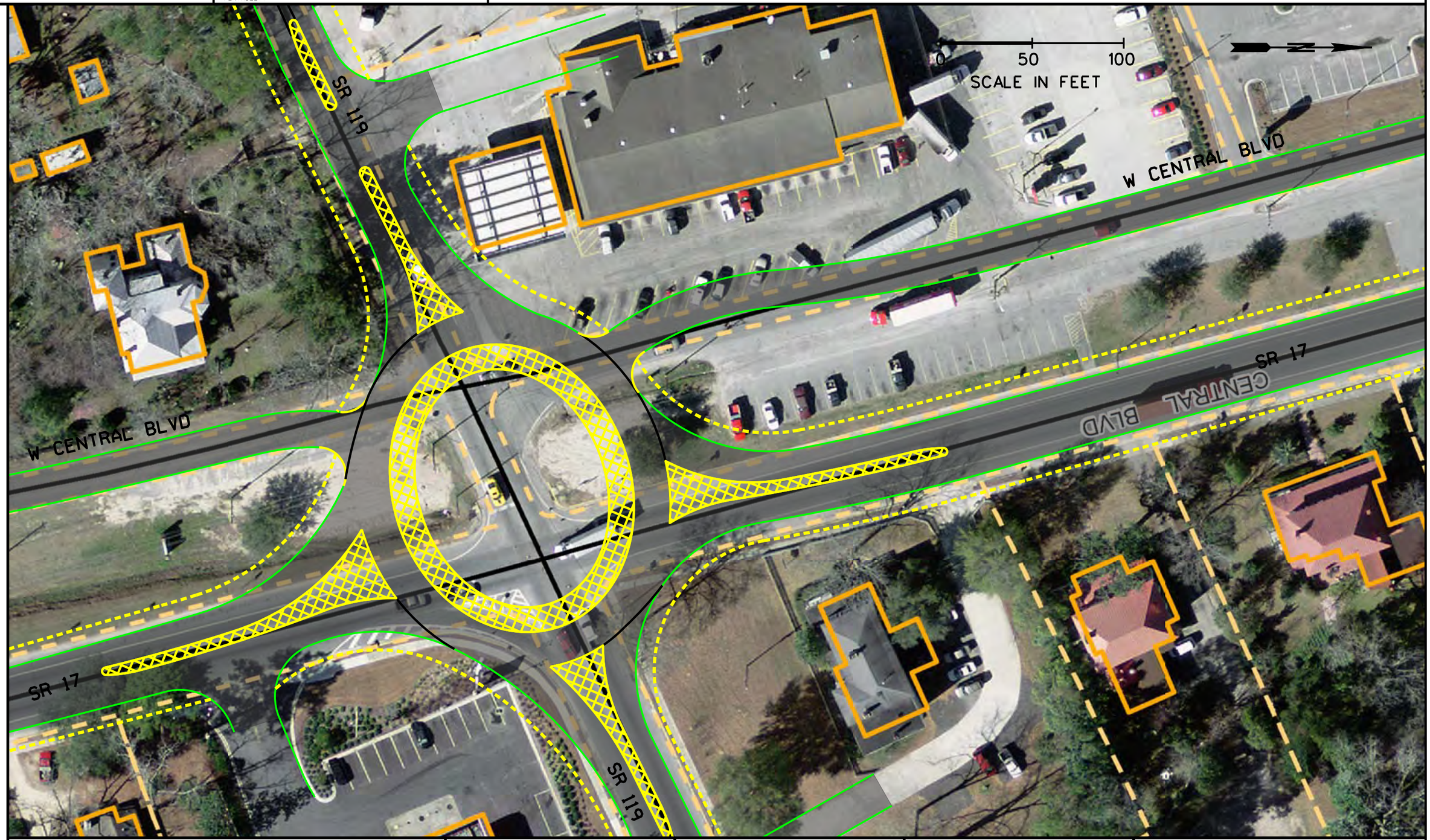

| | | | | |
|---|---|---|---|---|
| | CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | FOUR-LEG 140 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 2 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY<br>FIGURE 4 |

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$



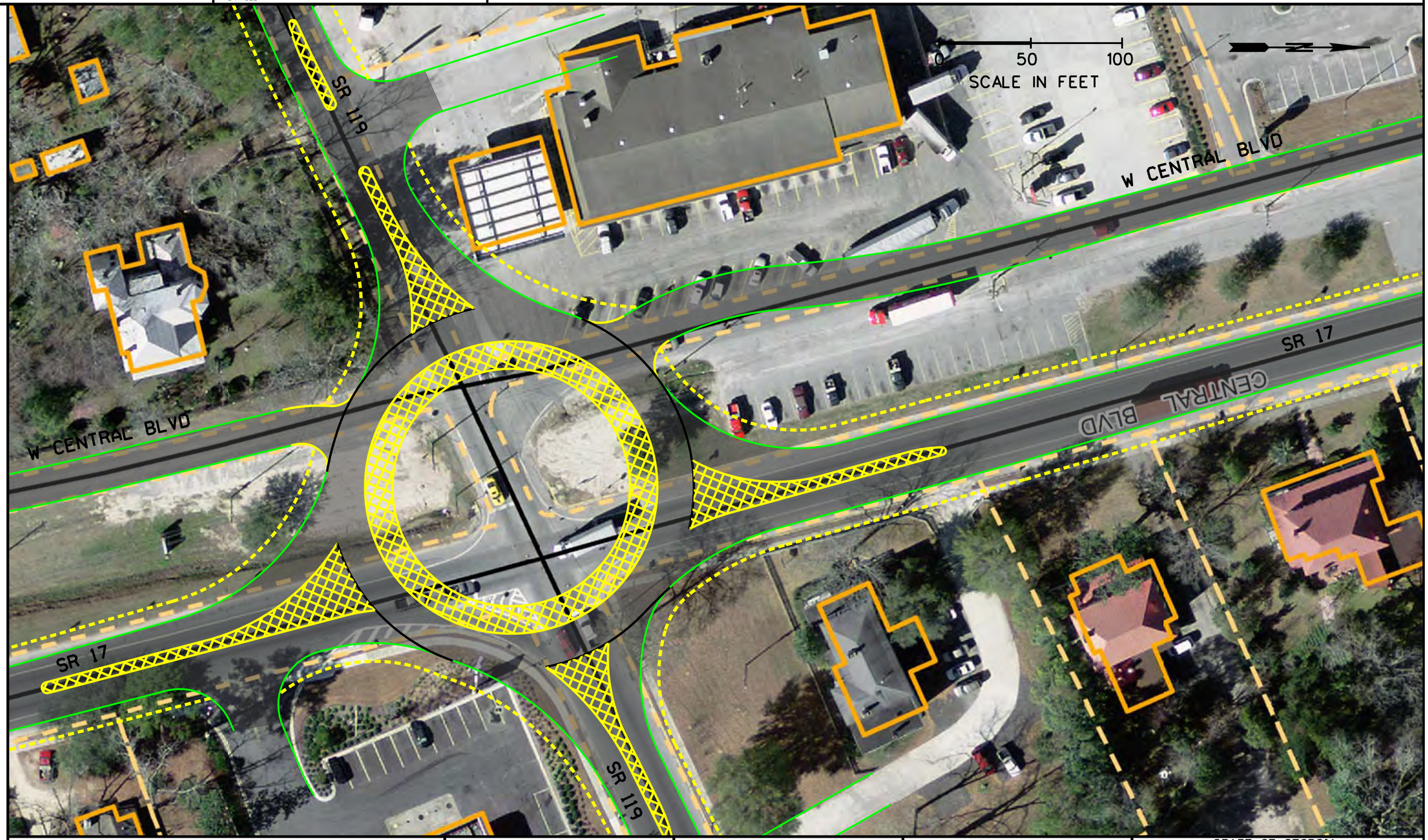

| | | | | |
|---|---|---|---|---|
| CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | FIVE-LEG 170X200 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 3 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY | FIGURE 5 |

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$




| | | | | |
|---|---|---|---|---|
| | CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | SIX-LEG 170X200 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 4 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY<br>FIGURE 6 |

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$




| | | | | |
|---|---|---|---|---|
| | CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | SIX-LEG 200 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 5 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY<br>FIGURE 7 |

# ALTERNATIVES COMPARISON

After creating initial concepts for each option, the opportunities and constraints of each option were weighed to select one concept for further refinement. Table 8 presents the comparison.

Table 8 Roundabout Designs Comparison

| | Alternative 1<br>Four-leg 150-foot ICD<br>(Figure 3) | Alternative 2<br>Four-leg 140-foot ICD<br>(Figure 4) | Alternative 3<br>Five-leg ellipse<br>(Figure 5) | Alternative 4<br>Six-leg ellipse<br>(Figure 6) | Alternative 5<br>Six-leg 200-foot ICD<br>(Figure 7) |
|---|---|---|---|---|---|
| **Description** | Single-lane, 150-foot inscribed diameter roundabout with four approaches (on SR 17 and SR 119) | Single-lane, 140-foot inscribed diameter roundabout with four approaches (on SR 17 and SR 119) | Single-lane, 170- by 200-foot elliptical roundabout with five approaches (W Central Blvd north access in addition to SR 17 and SR 119) | Single-lane, 170- by 200-foot elliptical roundabout with six approaches (connects all three roads in the study vicinity) | Single-lane, 200-foot inscribed diameter roundabout with six approaches (connects all three roads in the study vicinity) |
| **Design Vehicle** | WB-67 | WB-67 | WB-67 | WB-67 | WB-67 |
| **Inscribed Circle Diameter (ICD)** | 150’ | 140’ | 170’ by 200’ | 170’ by 200’ | 200’ |
| **Opportunities** | • Sized appropriately for design volumes<br>• Larger diameter provides slight advantage for truck navigation over 140 ft alternative.<br>• Fewer impacts to adjacent properties than 5 and 6-legged configurations.<br>• Meets all performance objectives | • Sized appropriately for design volumes<br>• Smallest footprint and right-of-way requirements<br>• Fewer impacts to adjacent properties than 5 and 6-legged configurations.<br>• Meets all performance objectives | • Larger diameter potentially more visible as vehicles approach<br>• Direct access to W Central Blvd northern roadway approach<br>• Best of the three scenarios with more than 4-legs from a roundabout geometry perspective | • Larger diameter more visible as vehicles approach<br>• Direct access to both W Central Blvd roadway approaches | • Larger diameter more visible as vehicles approach<br>• Direct access to both W Central Blvd roadway approaches |
| **Constraints** | • Larger footprint increases potential impact over comparable 140 ft alternative<br>• No direct access to W Central Blvd south or north approaches | • Smaller turning radii, wider entry may lead to higher entry speeds<br>• No direct access to W Central Blvd south or north approaches | • Larger footprint and right-of-way requirements<br>• Encroachment on gas station in NW quadrant<br>• Impacts to site circulation in NW quadrant of intersection<br>• No direct access to the southern W Central Blvd roadway leg<br>• WB-50 or larger vehicles cannot right-turn onto W Central Blvd from SR 17 southbound or right-turn out of W Central Blvd onto SR 119 westbound | • Larger footprint and right-of-way requirements<br>• Encroachment on gas station in NW quadrant<br>• WB-50 or larger vehicles cannot navigate in and out of the W Central Blvd approaches<br>• SR 119 northbound approach alignment results in lack of positive channelization of the northbound entry. | • Largest footprint and right-of-way requirements<br>• Encroachment on gas station in NW quadrant<br>• WB-50 or larger vehicles cannot navigate in and out of the W Central Blvd approaches<br>• SR 119 northbound approach alignment results in lack of positive channelization of the northbound entry |

# CONCEPT REFINEMENT

Based upon coordination with GDOT Staff, the 140-foot diameter 4-legged roundabout configuration was selected as the preferred alternative for further refinement. Potential impacts to adjacent properties and limitations on truck accommodation to and from West Central Boulevard from the roundabout were key factors in removing the six-legged configurations from further consideration. The 140-foot diameter roundabout meets all of the roundabout performance objectives identified in NCHRP Report 672 while providing a slightly smaller footprint than the 150-foot option.

The following bullet points provide additional discussion related to the geometric characteristics of the design concept that was further refined in Microstation. The refined concept is presented in Figure 8.

## Geometric Characteristics

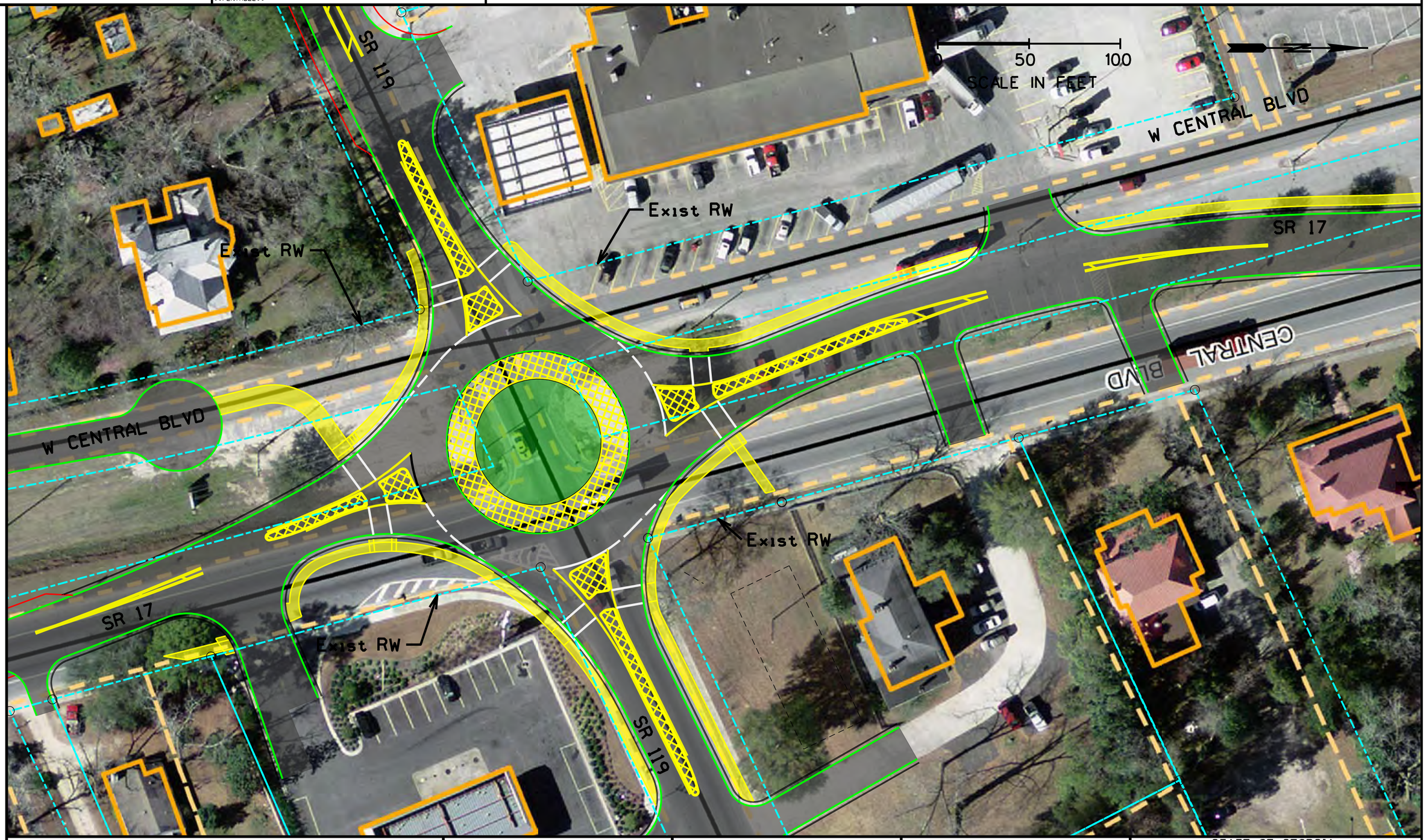
- **Inscribed Circle Diameter:** the design utilizes an inscribed circle diameter of 140 feet. The typical range of inscribed circle diameter for a single-lane roundabout accommodating a WB-67 design vehicle is approximately 130 to 180 feet, according to *NCHRP Report 672*. A 140-foot diameter was selected to minimize the overall intersection footprint and impacts to adjacent properties while still meeting the roundabout performance objectives for speed control, truck accommodation, vehicle alignment, and intersection visibility.
- **Roundabout Position:** The positioning of the roundabout considered property impacts and constructability while meeting the roundabout performance objectives for accommodating trucks, speed control, and natural vehicle path alignments. The center of the roundabout inscribed circle was offset approximately 6 feet to the north of the existing SR 119 centerline. SR 17 was realigned to provide a more central east-west location for the roundabout between the two existing roadway right-of-way limits for SR 17 and W. Central Boulevard. The center of the roundabout is approximately 38 feet west of the existing SR 17 centerline.
- **Approach Alignment:** The alignment of the approaches was established to meet the performance objectives of the intersection (including speed control and heavy vehicle accommodation) while balancing impacts to adjacent properties. In general, any approach alignment that allows for these objectives to be met is considered acceptable. Additional discussion is provided in Section 6.3.2 of NCHRP Report 672 that outlines advantages and trade-offs of a left-offset, centered, or right-offset alignment.

  For the SR 17 at SR 119 intersection, all approach alignments are offset to the left of center to emphasize vehicle channelization and slow approach speeds. The offset alignment is also helpful for accommodating large trucks by allowing for a larger entry radius while maintaining deflection and speed control. Due to the slight skew angle of the intersection, the offset left alignments helps to improve the accommodation of WB-67 trucks making the right-turns from SR 119 to SR 17.

  To maintain appropriate speed control and provide appropriate truck accommodation, the north leg of the intersection is relocated to the west of its current alignment.

- **Entry Curves:** Entry radii of between 85 and 95 feet were used for the approaches. Entry radii typically range from approximately 65 to 100 feet. As noted above, SR 17 also features a series of reverse curves, which aid to decrease approach speeds in advance of the intersection and increase entry deflection to align vehicles towards the circulating lanes.
- **Exit Curves:** For the exit curves, radii of approximately 150, 200, and 240 feet were used for the southbound approach, east- and westbound approach; and northbound approach, respectively. The exit radii were selected based upon the swept path of the design vehicles to minimize the entry and exit widths to the extent practical. Larger radii are encouraged on the exit from the roundabout to avoid capacity constraints and better facilitate heavy vehicle movements. The potential speed of vehicles through the exit is limited by the acceleration characteristics of the vehicles.
- **Lane Widths:** The concept design utilizes a circulatory roadway width of 20 feet. Entry and exit widths flare to match the circulatory roadway width at the yield line.
- **Splitter Islands:** The splitter islands are designed to provide sufficient length and width to be visible to drivers, provide adequate pedestrian refuge, channelize vehicles, and provide vehicle speed control. Splitter island lengths are approximately 100-foot long on the south and west approaches and approximately 140-foot long on the east and north approaches. Fifty feet is the minimum length, with 100 feet or more desirable. Splitter islands are designed based upon the guidance in *NCHRP Report 672* to provide appropriate nose radii and offsetting of curb lines at the approach ends.
- **Bike Route Continuity:** SR 119 east of SR 17 is designated as a state bike route. The route extends south along W Central Boulevard and parallel to SR 17. While bike ramps and multiuse paths around the roundabout are not provided, consideration was given to providing bike route continuity through the roundabout as part of the design concept. Additional consideration for route guidance signing will be needed during the design phase.
    - A 10-foot wide multi-use path is provided from West Central Boulevard that connects to the pedestrian crossing on the southern leg of the roundabout. Cyclists riding westbound on SR 119 would make a left-turn through the roundabout and exit the roundabout heading southbound on SR 17. Immediately south of the intersection, they would use the multiuse path to access West Central Boulevard.
    - Cyclists arriving from West Central Boulevard would use the multiuse path to navigate to the south leg of the roundabout. Cyclists would use the marked crossing to navigate across the southbound exit leg, then they would claim the lane on the northbound roundabout entry and make the right-turn onto SR 119.
    - Driveway curb cuts upstream of the roundabout and pedestrian ramps at the marked crossing locations provide bicyclists the opportunity to exit the roadway, dismount, and use the sidewalks to traverse around the intersection as a pedestrian.

DATE$$$ TIME$$$ $PRF8$ $DGN$
$USER$ $$PENTABLE$$




| | | | | |
|---|---|---|---|---|
| | CONCEPTUAL DESIGN FOR DISCUSSION PURPOSE ONLY | FOUR-LEG 140 FT INSCRIBED DIAMETER | SR 17 AT SR 119 ROUNADBOUT ALTERNATIVE 2 | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: EFFINGHAM COUNTY<br>FIGURE 8 |

## Performance Checks

The following performance checks were performed for the single and multilane concept designs in accordance with *NCHRP Report 672*:

- **Truck Paths:** Design checks illustrating the swept path for WB-67 vehicles are provided in Appendix 5.
- **Fastest Path:** The fastest path is the smoothest, flattest path possible for a single vehicle in the absence of other traffic and ignoring lane markings into, through, and exiting the roundabout. The speed of the roundabout is determined from the smallest radius along the fastest allowable path. The estimated entering speeds achieved in the design concepts range from 21 to 24 mph for vehicles entering the roundabout or making a right-turn.

  Fastest path vehicle speeds reflect an aggressive driver in a low volume condition that is trying to go as fast as possible by running over lane lines. For most drivers, typical entering speeds will be less than the predicted fastest path speeds, particularly during time periods where other vehicles are present. Fastest path vehicle speed design checks are provided in Appendix 6.
- **Sight Distance:** Stopping sight distance is the distance along a roadway required for a driver to perceive and react to an object in the roadway and to brake to a complete stop before reaching that object. Stopping sight distance should be provided at every point within a roundabout and on each entering and exiting approach. Intersection sight distance is the distance required for a driver without the right-of-way to perceive and react to the presence of conflicting vehicles. Sight distance checks are included in Appendix 7. The provided sight-distance checks overlay the sight triangles for both stopping and intersection sight distance onto one map to establish areas where clear sight lines should be provided.

## Preliminary Design Considerations

- **Conceptual Cross-Sections:** Typical sections through the roundabout circulatory roadway are provided in Appendix 8. Typical sections are provided for both the single-lane and multilane portions of the conceptual roundabout design.
- **Lighting**: Lighting should be provided at the intersection to increase intersection visibility for users approaching the roundabout at night.
- **Landscaping:** Within the central island and along the approaches, landscaping should be provided to provide a “terminal vista” to increase the visibility of the roundabout. Sight-distance triangles provided in Appendix 7 identify areas of the roundabout where high-growth landscaping is appropriate and areas where sight-distance must be preserved.
- **Pavement Type:** Pavement surfaces used for the roundabout are generally consistent with the pavement on the approach roadways and/or the type of pavement that GDOT would typically use for facilities of similar type and location. Asphalt paving is recommended to match the existing pavement along SR 17 and SR 119. A geotechnical evaluation and

pavement analysis should be completed as part of the design process. Asphalt paving can reduce the traffic management plan complexity during construction and could even reduce the amount of temporary pavement areas needed.

Portland concrete cement pavement could also be considered and could be more durable in the long term. However, special attention is required in designing and constructing the various joints between the driving surface and splitter and center islands. The most common reliability problem reported in the *NCHRP Report 672* is *"…cracking around the outside of the circulatory roadway in the vicinity of the outside curbs and splitter islands"* (page 6-88, Reference 6). Due to cement curing time requirements, construction staging is generally more complex than for asphalt paving and could result in additional temporary intersection pavement or intersection closures. Pavement markings are also less visible on concrete pavement surfaces.

## CONCEPTUAL CONSTRUCTION STAGING

Staging for the construction of the roundabout could be accomplished through a variety of options including full closure, partial diversion, or under full traffic. As outlined in the GDOT roundabout checklist (Concept Phase), KAI prepared a planning-level concept for the construction staging of the roundabout, assuming that construction under full traffic would be desired. The information below presents one potential staging option; however, actual staging will require additional development during the design phase. Additional considerations that may impact the construction staging include final vertical profiles along the approach roadways, any potential utility relocations, and pavement material choice. KAI assumed asphalt pavement would be used in the construction of the intersection.

Construction under full traffic creates conflicts that will need to be managed through signing, markings, and flagging. Construction of the central island requires additional temporary width around the periphery of the ultimate inscribed circle diameter to allow for truck and trailer to stay off of the central island curb and truck apron during construction. One potential option for construction sequencing for the study intersection is provided below (illustrations of the stages are provided in Appendix 9):

1. Construct outside widening in all quadrants of the intersection for roundabout and approach footprint. Construct the new SR 17 roadway alignment within the area between the existing roadway and W Central Boulevard. Use temporary pavement along the future intersection sidewalks to create additional space for truck movements around the center island during future construction stages. Rebuild W Central Boulevard to close access to SR 119 and provide new connections with SR 17 along the newly constructed alignment.
2. Install roundabout signing. Use cones to designate shape of central island. Divert SR 17 traffic onto the new roadway alignment and begin operating intersection using roundabout circulation patterns. Vehicles will use the temporary widening around the perimeter of the inscribed circle to provide a buffer from the central island construction such that truck trailers do not track over the truck apron during construction of the apron. Construct central island curb and truck apron.

3. Relocate traffic onto roundabout circulatory roadway when the truck apron concrete curbing and travel surface has cured enough to carry vehicle loading. Along the outside periphery of the intersection traffic continues to use the temporary widening to provide a buffer for splitter island construction. Construct splitter islands on each of the approaches.
4. Relocate all traffic to use the actual roundabout entry and exit lanes. Remove all temporary widening and construct outside curb and gutter. Construct sidewalks and access ramps on all approaches.
5. Construct final paving course and final pavement markings. Install remaining signing.

## COST CONSIDERATIONS

Conceptual level construction costs were developed by URS staff for the proposed roundabout layout shown. As presented in Appendix 10, a planning level estimate of $1.28 million was identified for the project. This can be used for planning and programming a new project and for comparative purposes. The costs were developed based upon the planning-level conceptual layout and therefore should be recognized as approximate in nature. The construction cost estimate was developed in the CES (Cost Estimating Software) as is standard for GDOT projects. No additional contingencies were added since this project is not currently programmed. Inflation and other contingencies can be added at a later date once more information about scheduling is known.

# SUMMARY AND CONCLUSIONS

The following bullet-points summarize the findings of the feasibility study:

- The existing all-way stop controlled intersection at SR 17 and SR 119 is estimated to operate over-capacity by the design year 2035 with an LOS "F" for some approaches.
- Implementation of a single-lane roundabout is expected to provide adequate intersection operations through the design year 2035.
- A roundabout is estimated to provide safety benefits over the existing all-way stop control configuration based upon the historical crash experience. A roundabout reduces the likelihood for injury crashes due to low intersection operating speeds and removal of severe crash types such as right-angle and head-on crashes.
- Four and six-legged roundabout configurations were evaluated. The six-legged configurations incorporate the adjacent West Central Boulevard approaches into the roundabout. Potential impacts to adjacent properties and limitations on truck accommodation to and from West Central Boulevard from the roundabout were key factors that prevented the six-legged configurations from being advanced for further consideration.
- The conceptual geometric designs illustrate that roundabouts are spatially feasible at the study intersection. However, each of the alternatives considered are anticipated to require additional right-of-way.
- The preferred roundabout concept is a 140 foot diameter four-leg configuration. This concept provides the least amount to new right-of-way impacts on the surrounding business and residence and allows for a roundabout geometry that meets the performance objectives outlined in *Roundabouts: An Informational Guide – 2nd Edition.*
- Additional investigation of vertical geometry and utility impacts will be needed as the project proceeds into the design phase.

# REFERENCES

1. Department of Transportation State of Georgia, *Traffic Engineering Study*, February 20, 2009.
2. Transportation Research Board, *Highway Capacity Manual*, 2000.
3. Department of Transportation State of Georgia*, Roundabout Analysis Tool*.
4. National Cooperative Highway Research Program, Report 672 Roundabouts: An Informational Guide, 2nd Edition, 2010.
5. National Cooperative Highway Research Program, *Report 572 Roundabouts in the United States*, 2007.