**ORIGINAL TO GENERAL FILES**

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA

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

**FILE** P.I. # 0012625
Fulton County
GDOT District 7 - Metro Atlanta
SR 9 @ Bethany Road Signal Improvements
& Turn Lane Addititons

**OFFICE** Design Policy & Support

**DATE** 4/23/2015

**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:

Glenn Bowman, Director of Engineering
Joe Carpenter, Director of P3/Program Delivery
Genetha Rice-Singleton, Assistant Director of P3/Program Delivery
Albert Shelby, State Program Delivery Engineer
Bobby Hilliard, Program Control Administrator
Cindy VanDyke, State Transportation Planning Administrator
Hiral Patel, State Environmental Administrator
Ben Rabun, State Bridge Engineer
Andrew Heath, 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
Richard Cobb, Statewide Location Bureau Chief
Kathy Zahul, District Engineer
Scott Lee, District Preconstruction Engineer
Patrick Allen, District Utilities Engineer
Vinesha Pegram, Project Manager
BOARD MEMBER - 6th Congressional District

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

Project Type: Signal Improvement
GDOT District: 7
Federal Route Number:
Project Number:
P.I. Number: 0012625
County: Fulton
State Route Number: 9
N/A

*This project consists of the signal improvement at the intersection of Bethany Bend and SR 9; it also adds a right turn lane on the westbound approach of Bethany Bend at the intersection.*

* Signatures/Recommendations on file

**Submitted for approval:**

Pond & Co. — Consultant Designer & Firm *or* GDOT Concept/Design Phase Office Head & Office — 2-19-2015 Date

City of Milton — Local Government *(if applicable)* — 2-19-2015 Date

* Albert V. Shelby III — State Program Delivery Engineer — 11-14-14 Date

* Vinesha C. Pegram — GDOT Project Manager — 11-14-14 Date

**Recommendation for approval:**

* Hiral Patel/KLP — State Environmental Administrator — 11-25-14 Date

* Andrew Heath/KLP — State Traffic Engineer — 3-20-15 Date

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

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

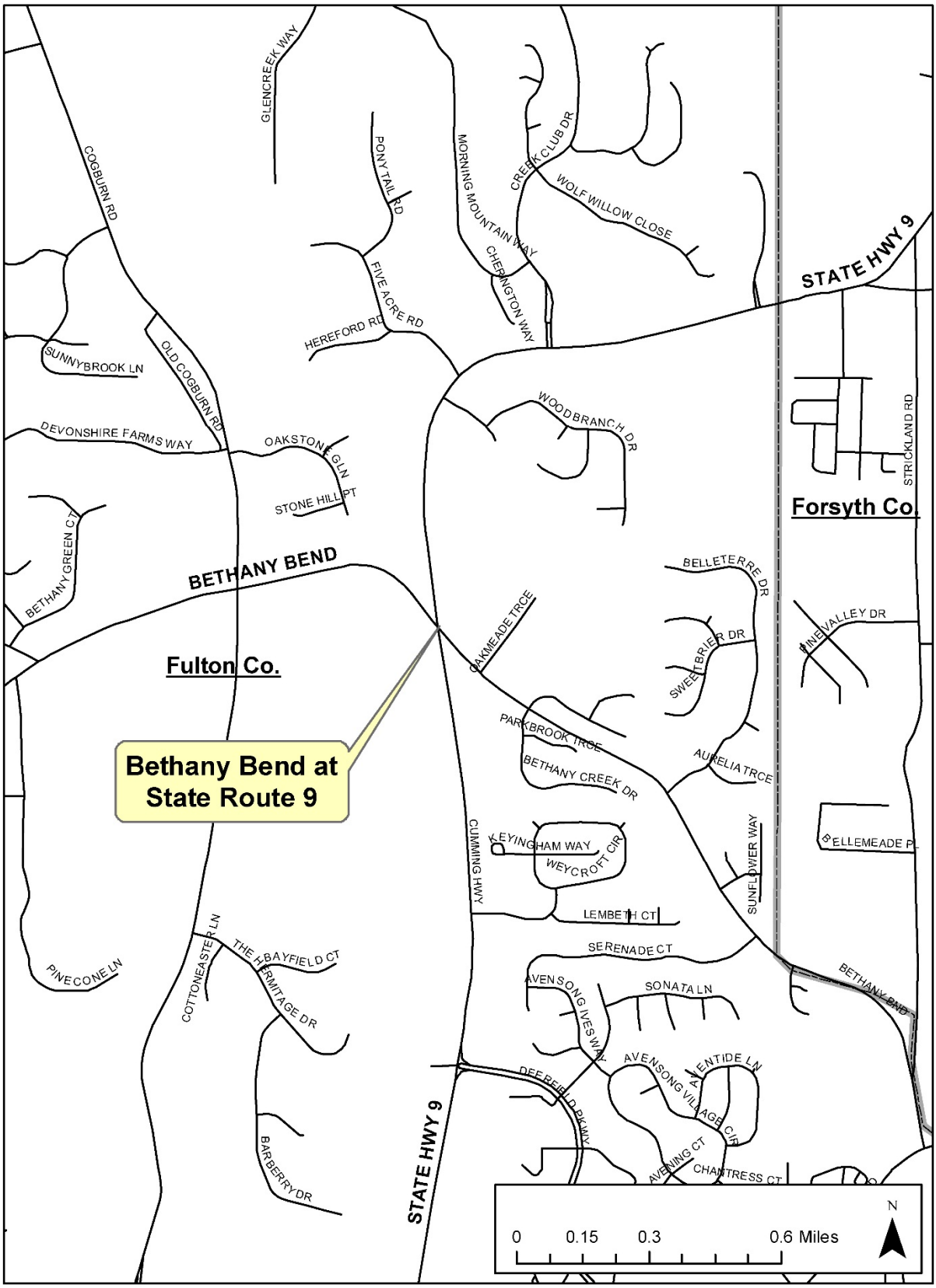
* Cynthia VanDyke — State Transportation Planning Administrator — 11-26-14 Date

**Approval:**

**Concur:** — GDOT Director of Engineering — 4/10/2015 Date

**Approve:** Margaret B. Pikle — GDOT Chief Engineer — 4.20.15 Date

## PROJECT LOCATION



# PLANNING & BACKGROUND DATA

**Project Justification Statement:**

This document is prepared for GDOT Office of Planning by Pond & Company.

This project is located at the intersection of SR 9 and Bethany Bend. The intersection has high rate of accidents which are attributable to many operational issues. Drivers approaching the intersection experience an overload of mixed signals, since signal heads from adjacent approaches are visible. Also, the left turn paths from the north and south approaches of SR 9, which are phased concurrently, are very close to one another. The left turn paths from the east and west approaches of Bethany Bend are excessively acute. There is a potential conflict between the concurrent left turn movements from southbound SR 9 and the right turn from westbound Bethany Bend, since there is little room between these two movements. Refer to figure 4 of the Traffic Study for a graphic of the movements and their proximity with each other.

This intersection was ranked 2nd for most crashes and 3rd for most injuries in Milton for the years 2006-2008 per the City of Milton's Transportation Plan of 2009. Furthermore, the latest crash data for the years 2009- 2013 suggest a growing trend of more crashes occurring year after year as shown in attachment titled Crash Summaries.

The project was identified in the City of Milton's Comprehensive Transportation Plan of 2009, prioritized in the ARC funded Highway 9/GA 400 Area Master Plan Livable Centers Initiative Study (LCI) and later introduced in ARC's Transportation Improvement Program of 2012-2017 with project number FN-280. The City of Milton applied for the concept study funding in mid 2012 and received funding approval late 2012. This project is currently funded up through the concept phase; however, funding is being sought for construction.

The project looks to provide an immediate and short term improvement to the intersection's operations, improve vehicular and pedestrian movements, improve the traffic flow at the intersection, and reduce the high rate of rear end collisions.

**Existing conditions:**

The existing intersection between Bethany Bend and SR 9 is located in Fulton County in the City of Milton. SR 9 and Bethany Bend Rd have one lane in each direction at the intersection, and dedicated left turn lanes at all approaches. There is curb and gutter and sidewalk on either side of both roadways with crosswalks on all legs. There are 3 quadrants of the intersection which are developed; the northeast quadrant is currently undeveloped.

**Other projects in the area:**

PI 0007838 has completed the concept phase and will reconstruct SR 9 from Windward Parkway to the Forsyth county line. This project will reconstruct SR 9 to four lanes with a raised median. PI 0012881– This project will evaluate potential for multi-use connections in the Windward Parkway activity center and surrounding areas; will connect existing facilities on Bethany Bend and State Route 9 to Cogburn Road/Windward Parkway.

**Description of the proposed project:**

**MPO:** Atlanta Regional Commission (ARC) TIP # FN-280

**TIA Regional Commission:** Atlanta Regional Commission RC Project ID: N/A

**MPO Name Congressional District(s):** 6

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

**Projected Traffic:** ADT

| Year | ADT | |
|---|---|---|
| | Bethany Bend | SR 9 |
| Current Year (2013) | 8,190 | 20,130 |
| Expected Open Year (2017) | 8,727 | 21,450 |
| Interim Design Year (2027) | 10,228 | 25,139 |

Traffic Projections Performed by: Pond & Company
Note: 1.6% growth rate per year applied to projections out to 2027 based on City of Milton comments.

**Functional Classification (Mainline):**
SR 9- Urban Minor Arterial Street ;
Bethany Bend - Urban Collector Street

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

**Pavement Evaluation and Recommendations**
Preliminary Pavement Evaluation Summary Report Required? ☒ No ☐Yes
Preliminary Pavement Type Selection Report Required? ☒ No ☐Yes
Feasible Pavement Alternatives: ☒ HMA ☐PCC ☐HMA & PCC

# DESIGN AND STRUCTURAL

**Description of Proposed Project:**

The improvements include minor operational, road design, and signal design improvements to the existing intersection. Currently, as drivers approach the intersection, signal heads for other approaches are visible, which is confusing and creates conflicts between traffic movements. The signal design improvements include the reconfiguring of the signal wires and installing louvers in order to remove this confusion. The road design improvements include the addition of a right turn lane for the northwest bound approach of Bethany Bend. This improvement is expected to result in an average delay reduction of almost 1 minute per vehicle for the northwest bound approach of Bethany Bend. This also provides more space between the concurrent movements of the southbound left turn movements off of SR 9 and the westbound Bethany Bend approach which are turning right. The operational improvements propose the restriction of the right-turn on red for the southeast bound Bethany Bend approach. In addition, this approach has been shown to have frequent rear end collisions. The risk of this right-turn-on-red maneuver is also compounded by the inadequate sight distance to the north and the heavy traffic on SR9, which limits the gaps in the vehicle stream. Signal re-timing is proposed for the northbound and southbound left turns. These left turn approaches would be converted to a protected-only lead-lag operation to be controlled by flashing yellow arrows. The southeast bound right turn should overlap with lagging northbound left turn to offset the delays caused by the restricted right-turn-on-red. These improvements would improve the operational concerns of the intersection.

The improvements outlined above would not preclude future improvements to the SR 9 corridor, including widening the arterial and reconstructing its intersection with Bethany Bend, as outlined in the concept development report for PI #0007838. The project is considered to be a short-term

improvement and the unfavorable skewed geometry of the intersection will be addressed with the implementation of PI #0007838, the widening of SR 9 from Windward Parkway to the Fulton/Forsyth County line.

**Major Structures:** N/A

**Mainline Design Features:**

***SR 9- Urban Minor Arterial***

| Feature | Existing | Standard* | Proposed |
|---|---|---|---|
| **Typical Section** | | | |
| - **Number of Lanes** | **2** | **2** | **2** |
| - **Lane Width(s)** | **12** | **11-12 ft.** | **12** |
| - **Median Width & Type** | **N/A** | **N/A** | **N/A** |
| - **Outside Shoulder or Border Area Width** | **N/A** | **10-16 ft.** | **10 ft.** |
| - **Outside Shoulder Slope** | **N/A** | **2%** | **2%** |
| - **Inside Shoulder Width** | **N/A** | **N/A** | **N/A** |
| - **Sidewalks** | **5 ft.** | **5 ft.** | **5 ft.** |
| - **Auxiliary Lanes** | **12 ft.** | **11-12 ft.** | **12 ft.** |
| - **Bike Lanes** | **N/A** | **N/A** | **N/A** |
| **Posted Speed** | **45** | | **45** |
| **Design Speed** | **45** | **45** | **45** |
| **Min Horizontal Curve Radius** | **N/A** | **711** | **711** |
| **Maximum Superelevation Rate** | **N/A** | **4%** | **4%** |
| **Maximum Grade** | **N/A** | **4%** | **4%** |
| **Access Control** | **Permitted** | **Permitted** | **Permitted** |
| **Design Vehicle** | **N/A** | **WB-55** | **WB-55** |
| **Pavement Type** | **HMA** | **HMA** | **HMA** |

***Bethany Bend – Urban Collector***

| Feature | Existing | Standard* | Proposed |
|---|---|---|---|
| **Typical Section** | | | |
| - **Number of Lanes** | **2** | **2** | **2** |
| - **Lane Width(s)** | **12** | **11-12 ft.** | **12** |
| - **Median Width & Type** | **N/A** | **N/A** | **N/A** |
| - **Outside Shoulder or Border Area Width** | **N/A** | **10-16 ft.** | **10 ft.** |
| - **Outside Shoulder Slope** | **N/A** | **2%** | **2%** |
| - **Inside Shoulder Width** | **N/A** | **N/A** | **N/A** |
| - **Sidewalks** | **5 ft.** | **5 ft.** | **5 ft.** |
| - **Auxiliary Lanes** | **12 ft.** | **11-12 ft.** | **12 ft.** |
| - **Bike Lanes** | **N/A** | **N/A** | **N/A** |
| **Posted Speed** | **40-45** | | **40-45** |
| **Design Speed** | **45** | **45** | **45** |
| **Min Horizontal Curve Radius** | **N/A** | **711** | **711** |
| **Maximum Superelevation Rate** | **N/A** | **4%** | **4%** |
| **Maximum Grade** | **N/A** | **4%** | **4%** |
| **Access Control** | **Permitted** | **Permitted** | **Permitted** |
| **Design Vehicle** | **N/A** | **WB-55** | **WB-55** |
| **Pavement Type** | **HMA** | **HMA** | **HMA** |

*According to current GDOT design policy if applicable

**Major Interchanges/Intersections:** N/A

**Lighting required:** ☒ No ☐ Yes

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

**Will Context Sensitive Solutions procedures be utilized?** ☒ No ☐ Yes

**Design Exceptions to FHWA/AASHTO controlling criteria anticipated:**
None.

**Design Variances to GDOT Standard Criteria anticipated:**
None.

## UTILITY AND PROPERTY

**Temporary State Route Needed:** ☒ No ☐ Yes ☐ Undetermined

**Railroad Involvement:** None

**Utility Involvements:**

| **Utility Company** | **Type** |
|---|---|
| Georgia Power Company | Electrical Distribution |
| Sawnee EMC | Electrical Distribution |
| Comcast | Telecommunications |
| AT&T Telecommunications | Telecommunications |
| Verizon Business | Telecommunications |
| Atlanta Gas Light Resources, Inc. | Natural Gas |
| Fiberlight | Telecommunications |
| Fulton Co. Public Works | Water and Sewer |
| Time Warner Telecom | Telecommunications |
| XO Communications | Telecommunications |

**SUE Required:** ☒ No ☐Yes

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

**Right-of-Way:** Existing width: 80-90 ft. Proposed width: 80-90 ft.
Required Right-of-Way anticipated: ☒ No ☐ Yes ☐ Undetermined

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

Anticipated total number of impacted parcels: None
Displacements anticipated: Businesses: None
Residences: None
Other: None
Total Displacements: None

## ENVIRONMENTAL AND PERMITS

**Anticipated Environmental Document:**

**GEPA:** ☐ **NEPA:** ☐ CE ☒ PCE

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

**Environmental Permits, Variances, Commitments, and Coordination anticipated:**
No permits anticipated

**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
Carbon Monoxide hotspot analysis: ☒ Required ☐ Not Required ☐ TBD

**NEPA/GEPA Comments & Information:**
The project is not expected to have effects on ecology, history, archaeology, noise, or air quality. The project would be expected to qualify as a Type III noise screening. The project is not anticipated to have any potential for public controversy.

## COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

**Project Meetings:**

**Public Involvement:** A PIOH was held on May 21, 2014, at the City of Milton City Hall. This public meeting was held in conjunction with PI0007838's PIOH. See attachments for public comments.

**Concept Meeting:** 10/30/2014 held at GDOT District 7 Office in Chamblee. See attachments for meeting minutes.

| Project Activity | Party Responsible for Performing Task(s) |
|---|---|
| Concept Development | Pond & Company KLP |
| Design | Pond & Company |
| Right-of-Way Acquisition | N/A |
| Utility Relocation | Utility Owner |
| Letting to Contract | City of Milton |
| Construction Supervision | City of Milton |
| Providing Material Pits | N/A |
| Providing Detours | N/A |
| Environmental Studies, Documents, & Permits | GT Hill |
| Environmental Mitigation | N/A |
| Construction Inspection & Materials Testing | N/A |

**Other coordination to date:** Progress meeting on March 20, 2014; see attachments for meeting minutes.

**Project Cost Estimate and Funding Responsibilities:**

| | Breakdown of PE | ROW | Reimbursable Utility | CST* | Environmental Mitigation | Total Cost |
|---|---|---|---|---|---|---|
| Funded By | N/A | N/A | N/A | N/A | N/A | |
| $ Amount | 75,000 | N/A | N/A | $199,909.50 | N/A | $274,909.50 KLP |
| Date of Estimate | ~~N/A~~ 2-1-13 | N/A | N/A | 02/12/2015 | N/A | |

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

## ALTERNATIVES DISCUSSION

| | | | |
|---|---|---|---|
| **Preferred Alternative:** Short term Improvements KLP | | | |
| **Estimated Property Impacts:** | **0** | **Estimated Total Cost:** | **$274,909.50** |
| **Estimated ROW Cost:** | **0** | **Estimated CST Time:** | **3 months** |
| **Rationale:** This alternative was selected to address some of the operational issues without having to wait for the widening of the SR 9 corridor (PI 0007838) to address the intersection's skew angle. This alternative would make the existing intersection less confusing to drivers and reduce the potential of conflicts between left turn movements. | | | |

| | | | |
|---|---|---|---|
| **No-Build Alternative:** This alternative has no improvements and keeps the existing intersection with the substandard skew angle. | | | |
| **Estimated Property Impacts:** | **0 parcels** | **Estimated Total Cost:** | **N/A** |
| **Estimated ROW Cost:** | **N/A** | **Estimated CST Time:** | **N/A** |
| **Rationale:** The increasing trend of accidents and forecasted increase of traffic in this area would make this a non-viable option. | | | |

**Comments/Additional Information:** None

## LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Detailed Cost Estimate
3. Crash summaries
4. City of Milton Transportation Plan of 2009 Appendix E Crash Data
5. PI 0007838 Traffic approval
6. Traffic diagrams
7. Capacity analysis summary
8. Summary of TE Study and/or Signal Warrant Analysis
9. Minutes of Concept meetings
10. Minutes of any meetings that shows support or objection to the concept

Attachment 1
Concept Layouts

# PI No. 0012625 BETHANY BEND AT SR 9 INTERSECTION IMPROVEMENT
## SHORT TERM IMPROVEMENTS - 2015 OPENING YEAR
## PUBLIC INFORMATION OPEN HOUSE MAY 2014

LEGEND

- EXISTING R/W – PROPERTY LINE
- PROPOSED RIGHT OF WAY
- GRASSED AREA
- PROPOSED SIDEWALK
- PROPOSED TRAFFIC SIGNAL

SCALE IN FEET
0 20 40 80

POND
Planners-Engineers-Architects
3500 Parkway Lane
Suite 600
Norcross, Ga. 30092

HOME OF 'THE BEST QUALITY OF LIFE IN GEORGIA'
MILTON
ESTABLISHED 2006

STARBUCKS

KOMI INC

QUANTUM NATIONAL BANK

N

NO TURN ON RED

BETHANY BEND

PUBLIX PARKING LOT

MEPT BETHANY VILLAGE LLC

REPOSITION SIGNALS TO BE INLINE WITH TRAFFIC

MODIFY CONCRETE ISLAND TO IMPROVE TRUCK MANEUVERS

ONLY

ONLY

SR 9 CUMMING HWY

SHELL GAS STATION

INSTALL NEW LEFT TURN SIGNAL WITH FLASHING YELLOW

MODIFY SIGNAL TIMING FOR OPPOSING LEFT TURNS TO BE LEAD-LAG

INSTALL NEW SIGNAL POLES

BETHANY BEND

ADD RIGHT TURN LANE

NO TURN ON RED

CVS PHARMACY

Attachment 2
Detailed Cost Estimates:

a. Construction
b. Liquid AC adjustments

Cost Estimate
2/12/2015
Job Number: 0007838
Description: Signal Improvement at Bethany Bend

| Item | Units | Description | Quantity | Price | Amount |
|---|---|---|---|---|---|
| 210-0100 | LS | GRADING COMPLETE | LS | $ 20,000.00 | $ 20,000.00 |
| 639-4001 | EA | STEEL STRAIN POLE, TP 1 | 2 | $ 8,000.00 | $ 16,000.00 |
| 647-1000 | LS | TRAFFIC SIGNAL INSTALLATION - NO.1 | LS | $ 74,000.00 | $ 74,000.00 |
| 402-3130 | TN | RECYL AC 12.5MM SP, GP2, BM&HL | 32 | $ 60.36 | $ 1,931.52 |
| 402-3190 | TN | RECYL AC 19MM SP, GP 1 OR 2, INC BM&HL | 43 | $ 94.96 | $ 4,083.28 |
| 402-3121 | TN | RECYL AC 25MM SP, GP1/2, BM&HL | 169 | $ 71.20 | $ 12,032.80 |
| 413-1000 | GL | BITUM TACK COAT | 210 | $ 2.78 | $ 583.80 |
| 310-5120 | SY | GR AGGR BASE CRS, 12 INCH, INCL MATL | 384 | $ 19.74 | $ 7,580.16 |
| 441-0104 | SY | CONC SIDEWALK, 4 IN | 312 | $ 27.39 | $ 8,545.68 |
| 653-0120 | EA | THERM PVMT MARK, ARROW, TP 2 | 2 | $ 66.05 | $ 132.10 |
| 653-1704 | LF | THERM SOLID TRAF STRIPE, 24 IN, WHITE | 14 | $ 3.70 | $ 51.80 |
| 653-1501 | LF | THERM SOLID TRAF STRIPE, 5 IN, WHITE | 234 | $ 0.38 | $ 88.92 |
| 653-1804 | LF | THERM SOLID TRAF STRIPE, 8 IN, WHITE | 100 | $ 1.50 | $ 150.00 |
| 653-6004 | SY | THERM TRAF STRIPING, WHITE | 65 | $ 2.77 | $ 180.05 |
| 999-5200 | SF | DETECTABLE WARNING SURFACE | 12 | $ 12.50 | $ 150.00 |
| 636-2070 | LF | GALV STEEL POSTS, TP 7 | 15 | $ 7.07 | $ 106.05 |
| 636-1033 | SF | HWY SIGNS, TP1MATL, REFL SH TP 9 | 28 | $ 18.25 | $ 511.00 |
| 610-0714 | SY | REM CONC MEDIAN | 65 | $ 75.00 | $ 4,875.00 |
| 500-9999 | CY | CLASS B CONC, BASE OR PVMT WIDENING | 11 | $ 215.74 | $ 2,373.14 |
| 700-9300 | SY | SOD | 134 | $ 8.00 | $ 1,072.00 |
| | LS | EROSION CONTROL | LS | $ 15,000.00 | $ 15,000.00 |

| | |
|---|---|
| SUB-TOTAL | $ 169,447.30 |
| CONTIGENCY (10.0 %) | $ 16,944.73 |
| E&I (5.0%) | $ 9,319.60 |
| LIQUID AC ADJUSTMENT | $ 4,197.87 |
| TOTAL | $ 199,909.50 |

| | | | |
|---|---|---|---|
| **PROJ. NO.** | 12625 | CALL NO. | 9/29/2009 |
| P.I. NO. | 0012625 | | |
| DATE | February 12,2015 | | |

| INDEX (TYPE) | DATE | INDEX |
|---|---|---|
| REG. UNLEADED | Feb. 2015 | $ 1.998 |
| DIESEL | | $ 2.777 |
| LIQUID AC | | $ 534.00 |

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) | | | **3908.88** | **$** | **3,908.88** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 854.40 | | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 534.00 | | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | 12.2 | | |

| ASPHALT | Tons | %AC | AC ton |
|---|---|---|---|
| Leveling | | 5.0% | 0 |
| 12.5 OGFC | | 5.0% | 0 |
| 12.5 mm | 32 | 5.0% | 1.6 |
| 9.5 mm SP | | 5.0% | 0 |
| 25 mm SP | 169 | 5.0% | 8.45 |
| 19 mm SP | 43 | 5.0% | 2.15 |
| | **244** | | **12.2** |

**BITUMINOUS TACK COAT**

| | | | | | |
|---|---|---|---|---|---|
| Price Adjustment (PA) | | | **$ 288.99** | **$** | **288.99** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 854.40 | | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 534.00 | | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | 0.901971194 | | |

| Bitum Tack Gals | gals/ton | tons |
|---|---|---|
| 210 | 232.8234 | 0.90197119 |

**BITUMINOUS TACK COAT (surface treatment)**

| | | | | | |
|---|---|---|---|---|---|
| Price Adjustment (PA) | | | **0** | **$** | **-** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 854.40 | | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 534.00 | | |
| 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** | **$** | **4,197.87** |

Attachment 2
Crash summaries

Attachements

**4. Crash Summaries:**

Crash reports from the most recent 5 and a half year period (2009-2014) reveal a total of 135 collisions in the proximity of the intersection, and an average of 22 crashes per year. Table 1 below summarizes the crash type and damage sustained for each year in the reporting period. Note that 2014 crash figures are represented in Table 1 and include all reported incidents through June 30, 2014.

**Table 1: Crash Summary, 2009-2014**

| | Total Number of Incidents | Accident Type | | | | | Damage | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Right Angle | Left Turn | Rear Ending | Single Vehicle | Other | Injuries | Fatalaties | Prop. Damage Only |
| **2014** | 13 | 0 | 0 | 13 | 0 | 0 | 6 | 0 | 7 |
| **2013** | 39 | 0 | 2 | 35 | 2 | 0 | 8 | 0 | 31 |
| **2012** | 39 | 0 | 2 | 29 | 3 | 5 | 12 | 0 | 30 |
| **2011** | 17 | 0 | 1 | 14 | 2 | 0 | 4 | 0 | 13 |
| **2010** | 21 | 2 | 3 | 13 | 1 | 2 | 9 | 0 | 13 |
| **2009** | 6 | 0 | 0 | 5 | 0 | 1 | 1 | 0 | 5 |
| **Total** | 135 | 2 | 8 | 109 | 8 | 8 | 40 | 0 | 99 |

Table 1 also reveals that over the previous 5 and a half year period, injuries occurred at a rate of approximately one injury per every 3.38 crashes. The most frequent type of collision at the intersection is rear-ends by a large margin (>80%). The crash data also suggests that no collision has involved a pedestrian during this timeframe, even though sightlines are poor and pedestrian traffic is high. The safety concerns that justify this project should be addressed as soon as possible to avoid a potential serious injury or fatal crash involving a pedestrian.

A second observed condition at the site is the poor sight distance for right turning vehicles on the south-eastbound approach of Bethany Bend. A potential for high rear-end collisions exists here due to the permitted right turn on red condition paired with poor sight distance. Gaps in traffic on SR 9 during peak hours are limited, and drivers making right turns into traffic flow with infrequent gaps will often hesitate and decide that the gap is not acceptable for the right turn to be completed safely. The following vehicle's driver may see the lead car moving forward as if to complete the right turn and he or she may anticipate pulling up into the lead position at the stop bar, which can result in rear ends if the lead car suddenly stops because the turn cannot be made. Table 2 below illustrates collisions that occurred on either approach of Bethany Bend. Note that rear-end collisions are the dominant type of crash. Of the 27 rear-end crashes that occur on the south-eastbound approach 13 (48%) involved at least one right-turning vehicle. Prohibiting the right-turn-on-red condition should reduce the frequency of rear-end collisions.

**Table 2: Crash Summary, Bethany Bend Approaches, 2009-2014**

| Direction | Total Number of Incidents | Accident Type | | | | | Damage | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Right Angle | Left Turn | Rear Ending | Single Vehicle | Other | Injuries | Fatalaties | Prop. Damage Only |
| **SEB** | 31 | 0 | 0 | 27 | 2 | 2 | 9 | 0 | 24 |
| **NWB** | 17 | 0 | 2 | 11 | 3 | 1 | 5 | 0 | 12 |

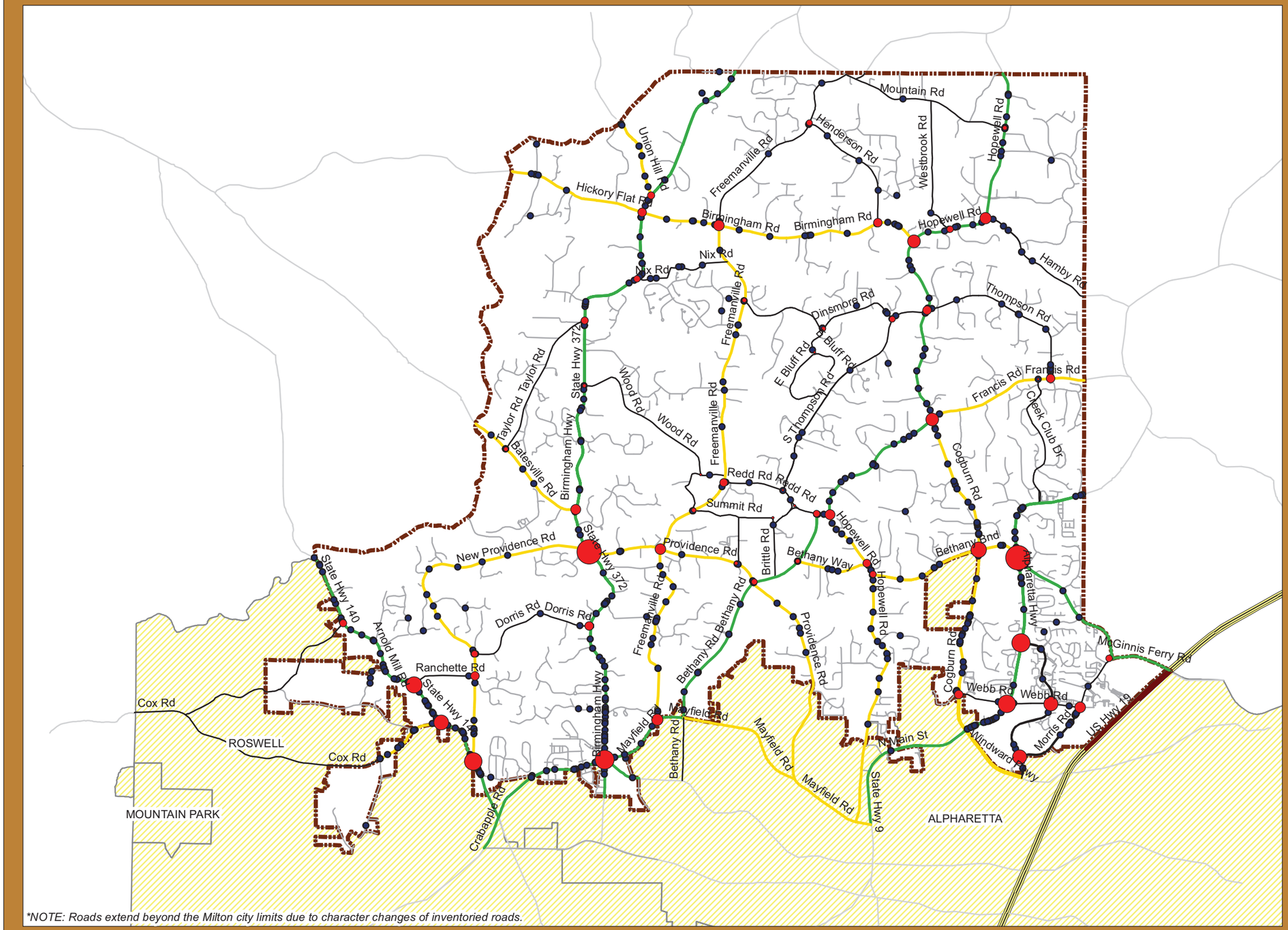
Attachment 4
City of Milton Transportation Plan of 2009 Appendix E Crash Data

# APPENDIX E

## Updated Crash Data

Additional crash data has been obtained from GDOT since the publication of the *Existing Conditions Report*. The crash locations maps has been revised to show crashes for the years 2006 to 2008 (previous map showed 2005 to 2007). Also, data for additional crashes were obtained for 2006 and 2007 that were not included in the crash data from Fulton County.

# City of Milton Transportation Plan




*NOTE: Roads extend beyond the Milton city limits due to character changes of inventoried roads.

## Appendix E
Crash Locations
(2006 - 2008)

**Legend**

**Crashes at Intersections**

- 1
- 10
- 100

Individual Crash Locations

Roadway Functional Classification

- UrbanFreeway
- Minor Arterial
- Collector
- Local Road
- Expressways
- Other Streets
- City of Milton
- Other Fulton County Cities

N
W E
S

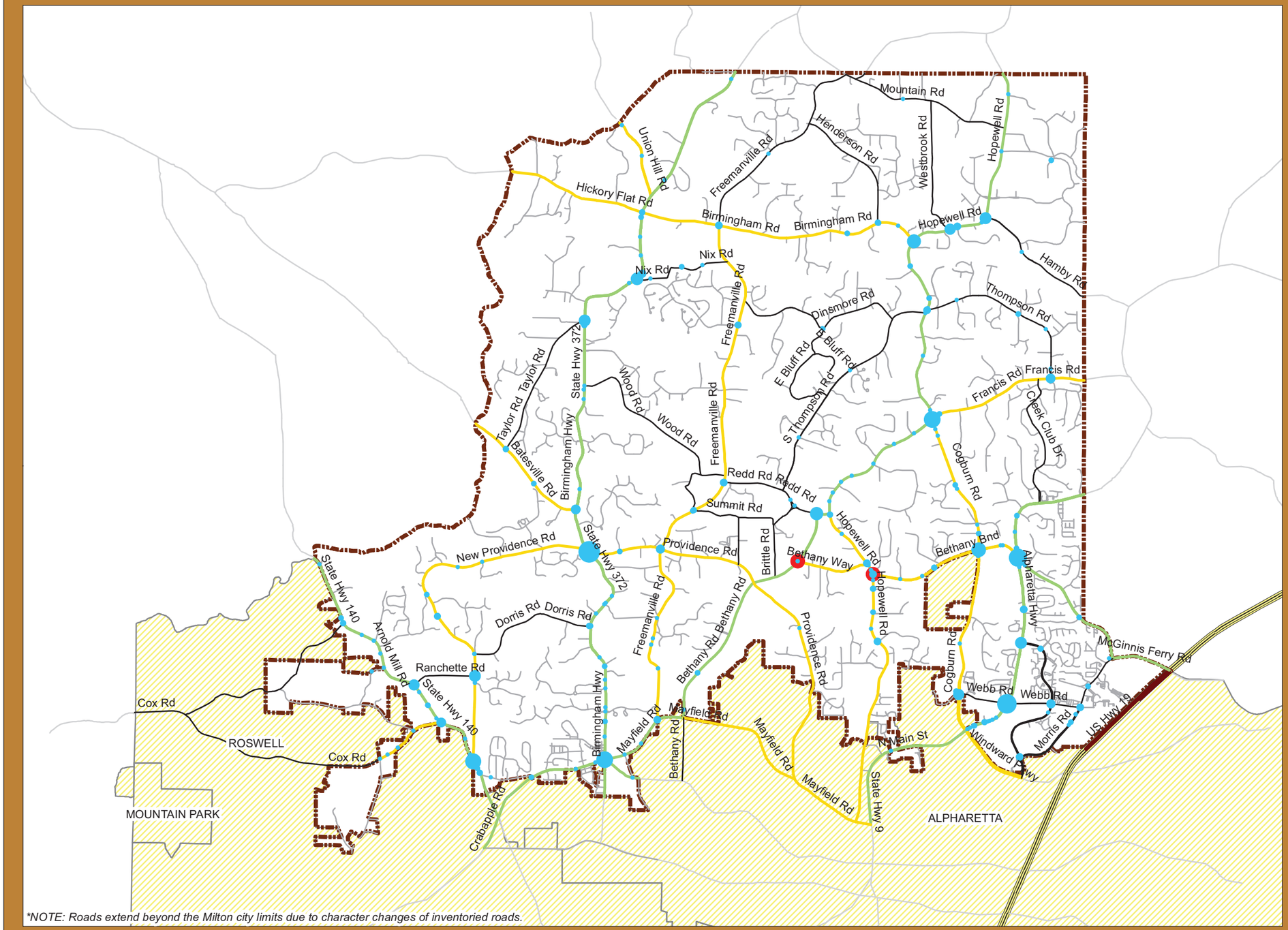
0 0.25 0.5 1 1.5 Miles

Prepared by: Kimley-Horn and Associates, Inc.

Date: November 2, 2009

*Source: City of Milton, GDOT*

# City of Milton Transportation Plan




*NOTE: Roads extend beyond the Milton city limits due to character changes of inventoried roads.

## Appendix E

Injury and Fatality Locations
(2006 - 2008)

**Legend**

**Fatalities**

- 1

**Injury Locations**

- 1
- 5
- 10

Roadway Functional Classification

- UrbanFreeway
- Minor Arterial
- Collector
- Local Road
- Expressways
- City of Milton
- Other Streets
- Other Fulton County Cities

2

0 0.25 0.5 1 1.5 Miles

Prepared by: Kimley-Horn and Associates, Inc.

Date: November 2, 2009

*Source: City of Milton, GDOT*

# APPENDIX E: Crash, Injury, and Fatality Data

| Eleven (11) Intersections with Most Crashes: Years 2006-2008<br>City of Milton | | |
|---|---|---|
| Intersection | Number of Crashes | Improvement In Progress? |
| Birmingham Highway (SR 372) at New Providence Road | 75 | Yes |
| Alpharetta Highway (SR 9) at Bethany Road | 73 | |
| Birmingham Highway (SR 372) at Crabapple Road | 43 | |
| Alpharetta Highway (SR 9) at Deerfield Parkway | 42 | Yes |
| Arnold Mill Road (SR 140) at New Providence Road | 38 | Yes |
| Alpharetta Highway (SR 9) at Webb Road | 37 | |
| Arnold Mill Road (SR 140) at Ranchette Road | 33 | |
| Cogburn Road at Bethany Road | 29 | |
| Arnold Mill Road (SR 140) at Cox Road | 27 | Yes |
| Deerfield Parkway at Morris Road | 25 | |
| Deerfield Parkway at Webb Road | 25 | |

| Ten (10) Intersections with Most Injuries: Years 2006-2008<br>City of Milton | | |
|---|---|---|
| Intersection | Number of Injuries | Improvement In Progress? |
| Birmingham Highway (SR 372) at New Providence Road | 24 | Yes |
| Alpharetta Highway (SR 9) at Webb Road | 20 | |
| Alpharetta Highway (SR 9) at Bethany Road | 17 | |
| Birmingham Highway (SR 372) at Crabapple Road | 15 | |
| Hopewell Road at Cogburn Road/Francis Road | 15 | |
| Arnold Mill Road (SR 140) at New Providence Road | 13 | Yes |
| Cogburn Road at Bethany Road | 11 | |
| Birmingham Road at Hopewell Road | 10 | |
| Redd Road at Haygood Road | 9 | |
| Birmingham Highway (SR 372) at Nix Road | 8 | |

| Intersections with Fatalities: Years 2006-2008<br>City of Milton | | |
|---|---|---|
| Intersection | Number of Injuries | Improvement In Progress? |
| Bethany Road at Haygood Road | 1 | |
| Hopewell Road at Bethany Bend | 1 | |

Source: Georgia Department of Transportation

Attachment 5
PI 0007838 Traffic Approval

# Department of Transportation
# State of Georgia

INTERDEPARTMENT CORRESPONDENCE

**FILE** CSSTP-0007-00(838), Fulton County
P.I.# 0007838

**OFFICE** Planning

**DATE** January 3, 2014

**FROM** Cynthia L. VanDyke, State Transportation Planning Administrator

**TO** Genetha Rice-Singleton, State Program Delivery Engineer
**Attention:** Jeremy Busby, P.E.

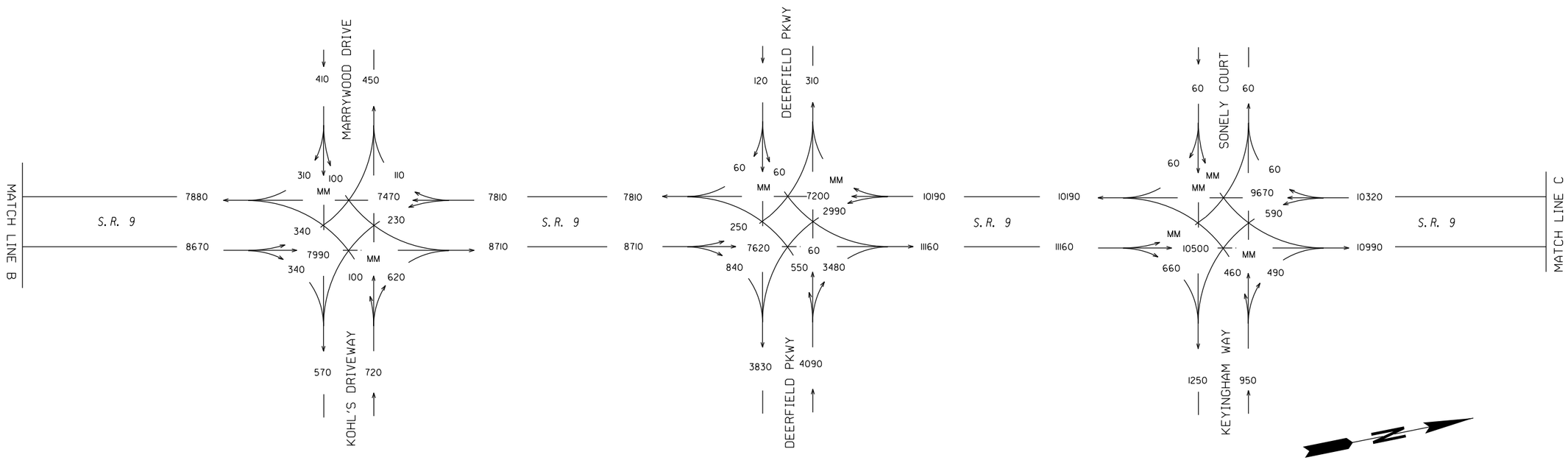
**SUBJECT** **Reviewed** Design Traffic for SR 9 from Winward Parkway to Forsyth County Line.

As per your request, we reviewed the consultant's Design Traffic for the above project.

The Design Traffic is approved based on the information furnished. If you have any questions concerning this information please contact Daniel R. Funk at (404) 631-1959.

CLV/drf

Attachment 6
Traffic Diagrams




DESIGN TRAFFIC
2013 ADT = 000
T(SU)=7% [24HR]
T(MU)=3% [24HR]

POND
Architects-Engineers-Planners
3500 Parkway Lane
Suite 600 •
Norcross, Ga. 30092
Phone 678-336-7740
Fax 678-336-7744
Web www.pondco.com

REVISION DATES

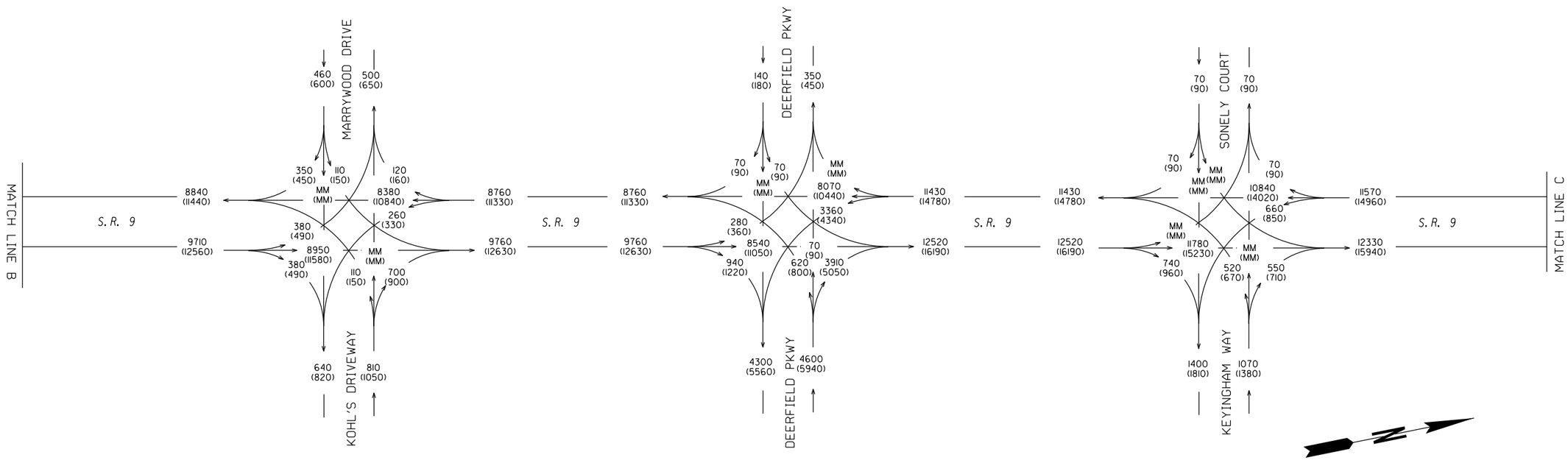
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

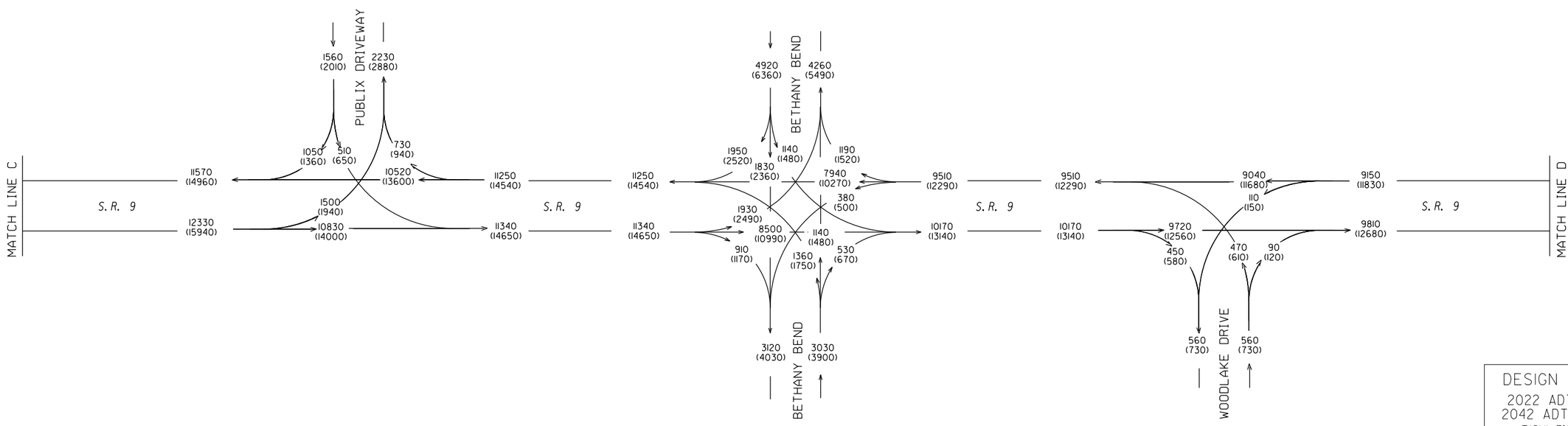
OFFICE:

**TRAFFIC DIAGRAM**
S.R. 9 (EXISTING CONDITIONS)
FULTON COUNTY
2013 AADT
SR9 WIDENING - CITY OF MILTON, GA

DRAWING No. 10- 05

4/27/2012 GPLN




DESIGN TRAFFIC
2022 ADT = 000
2042 ADT = (000)
T(SU)=7% [24HR]
T(MU)=3% [24HR]

POND
Architects-Engineers-Planners
3500 Parkway Lane
Suite 600 •
Norcross, Ga. 30092
Phone 678-336-7740
Fax 678-336-7744
Web www.pondco.com

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

OFFICE:

**TRAFFIC DIAGRAM**
S.R. 9 (NO-BUILD CONDITIONS)
FULTON COUNTY
2022 & 2042 AADT
SR9 WIDENING - CITY OF MILTON, GA

DRAWING No. 10- 08

Attachment 7
Capacity Analysis Summary *(tabular format)*

## Existing Conditions/No-Build Conditions

| Peak Hour Intersection Level-of-Service (LOS) | 2013 Existing Conditions | | | | 2017 No-Build Conditions | | | | 2027 No-Build Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **102.4** | **F** | **92.7** | **F** | **140.4** | **F** | **92.7** | **F** | **238.2** | **F** | **113.7** |
| NB Approach – Through/Right Turn Lane | B | 14.9 | D | 38.9 | B | 15.7 | D | 48.4 | B | 15.1 | **F** | **95.8** |
| NB Approach | D | 39 | D | 46.6 | D | 49.9 | D | 54.8 | E | 76.4 | **F** | **98.3** |
| WB Approach – Left Turn Lane | **F** | **136.3** | **F** | **92.8** | **F** | **153.8** | **F** | **95.5** | **F** | **272.1** | **F** | **96.1** |
| WB Approach – Through/Right Turn Lane | **F** | **116** | **F** | **109.5** | **F** | **115.9** | **F** | **127.6** | **F** | **220.6** | **F** | **191.8** |
| WB Approach | **F** | **122.2** | **F** | **104.2** | **F** | **127.5** | **F** | **117.6** | **F** | **236.4** | **F** | **161.8** |
| SB Approach – Left Turn Lane | **F** | **81.7** | **F** | **96.2** | **F** | **81.7** | **F** | **105.5** | **F** | **82.1** | **F** | **113.2** |
| SB Approach – Through/Right Turn Lane | C | 32.7 | C | 28 | D | 36.1 | C | 30 | D | 43.8 | C | 34.7 |
| SB Approach | C | 34 | C | 32.8 | D | 37.3 | D | 35.5 | D | 44.8 | D | 40.4 |
| EB Approach – Left Turn Lane | **F** | **106.7** | **F** | **113.6** | **F** | **123.6** | **F** | **132.8** | **F** | **202.4** | **F** | **225.7** |
| EB Approach – Through Lane | E | 77.5 | E | 58.5 | E | 79.3 | E | 60.1 | **F** | **139.4** | E | 72.6 |
| EB Approach – Right Turn Lane | **F** | **102.1** | E | 61.1 | **F** | **107.5** | E | 64.2 | **F** | **196.7** | **F** | **91.5** |
| EB Approach | **F** | **136.3** | E | 77.7 | **F** | **101** | **F** | **85.7** | **F** | **176.5** | **F** | **129.9** |
| Intersection | E | 65.2 | E | 57.1 | E | 71.4 | E | 64.7 | **F** | **116.9** | **F** | **99.2** |

## Minor Operational Improvements Scenario

| Peak Hour Intersection Level-of-Service (LOS) | 2017 Minor Operational Improvements | | | | 2027 Minor Operational Improvements | | | | 2042 Minor Operational Improvements | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **99.5** | **F** | **88.8** | **F** | **192.7** | **F** | **132.5** | **F** | **128.9** | **F** | **126.3** |
| NB Approach – Through/Right Turn Lane | B | 14.7 | D | 40.8 | B | 15.1 | **F** | **80.2** | C | 23.9 | D | 54.6 |
| NB Approach | D | 38 | D | 47.6 | E | 63.9 | **F** | **87.7** | D | 46.9 | E | 63.9 |
| WB Approach – Left Turn Lane | **F** | **152.1** | **F** | **95.6** | **F** | **272.1** | **F** | **131.1** | **F** | **118.7** | **F** | **93.5** |
| WB Approach – Through Lane | **F** | **98** | **F** | **130.2** | **F** | **136.8** | **F** | **191.9** | **F** | **145.7** | F | 114.6 |
| WB Approach – Right Turn Lane | E | 61.5 | E | 58.4 | D | 62 | E | 59.1 | E | 60.7 | D | 53.8 |
| WB Approach | **F** | **110.3** | **F** | **113.1** | **F** | **169.6** | **F** | **161.3** | **F** | **126.6** | **F** | **101.1** |
| SB Approach – Left Turn Lane | **F** | **81.4** | **F** | **105.6** | **F** | **82.1** | **F** | **113.2** | **F** | **85.9** | **F** | **132.6** |
| SB Approach – Through/Right Turn Lane | D | 37 | C | 28.9 | D | 48.8 | C | 31.6 | D | 44.7 | D | 42.2 |
| SB Approach | D | 38.2 | C | 34.5 | D | 49.7 | D | 37.5 | D | 46.7 | D | 50.4 |
| EB Approach – Left Turn Lane | **F** | **122.1** | **F** | **133** | **F** | **202.4** | **F** | **225.7** | **F** | **121.8** | **F** | **129** |
| EB Approach – Through Lane | **F** | **94.5** | E | 65.6 | **F** | **139.4** | **F** | **81.1** | E | 76.8 | D | 52.7 |
| EB Approach – Right Turn Lane | D | 39.4 | C | 27.1 | E | 56.6 | D | 29 | C | 31.4 | B | 17.8 |
| EB Approach | **F** | **81.6** | E | 75.3 | **F** | **125.4** | **F** | **111.9** | E | 75.8 | E | 73.3 |
| Intersection | E | 64.4 | E | 58.8 | **F** | **91.6** | **F** | **90.7** | E | 64.6 | E | 67 |

## Offset Intersections Scenario

| Approach | 2017 Offset Intersections | | | | 2027 Offset Intersections | | | | 2042 Offset Intersections | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | | | | | | | | | |
| NB Approach – Left Turn Lane / Dual LT (2042) | B | 13.8 | A | 7.5 | D | 43.9 | B | 17.9 | C | 30 | B | 17.3 |
| NB Approach – Through/Right Turn Lane | A | 3.9 | A | 7.9 | A | 4.6 | B | 14 | B | 10.5 | B | 13.1 |
| NB Approach | A | 7.7 | A | 7.8 | B | 19.7 | B | 14.9 | B | 17.8 | B | 14.1 |
| WB Approach – Left Turn Lane | D | 52.2 | D | 47.7 | D | 52.2 | D | 51.6 | D | 48.6 | D | 49.9 |
| WB Approach – Through/Right Turn Lane | E | 56.1 | E | 55 | E | 55.8 | E | 58.5 | D | 47.2 | D | 50.9 |
| WB Approach | D | 53.8 | E | 52.4 | D | 53.7 | E | 56 | D | 48.1 | D | 50.6 |
| SB Approach – Left Turn Lane | A | 5.6 | B | 11.5 | A | 6.7 | B | 23.3 | B | 13.5 | B | 19.8 |
| SB Approach – Through Lane(s) | B | 13.6 | A | 9.2 | C | 22.1 | B | 12.3 | C | 24.9 | B | 17.1 |
| SB Approach – Right Turn Lane | A | 6.6 | A | 5.9 | A | 8.1 | A | 7.1 | B | 18.1 | B | 14.5 |
| SB Approach | B | 12.4 | A | 8.5 | B | 19.8 | B | 11.4 | C | 23.6 | B | 16.5 |
| EB Approach – Left Turn Lane | E | 58.7 | E | 60.6 | E | 65.6 | E | 67.5 | D | 43.5 | D | 42.9 |
| EB Approach – Through Lane | D | 38.2 | D | 38.1 | D | 37.2 | D | 40 | C | 28.3 | C | 30.8 |
| EB Approach – Right Turn Lane (Yield) / Dual RT (2042) | A | 0 | A | 0 | A | 0 | A | 0 | D | 52.1 | D | 36.9 |
| EB Approach | E | 58.5 | E | 60.1 | E | 65.2 | E | 66.7 | D | 49.3 | D | 39.3 |
| Intersection | B | 16.4 | B | 11.6 | C | 25 | B | 17.3 | C | 29.6 | B | 19.1 |
| **Southern Intersection** | | | | | | | | | | | | |
| NB Approach – Left Turn Lane | C | 20.7 | A | 8.3 | C | 33 | B | 10 | B | 11.6 | B | 11.3 |
| NB Approach – Through Lane(s) | B | 11.5 | D | 41.6 | B | 12 | **F** | **89.7** | B | 10.4 | C | 29.5 |
| NB Approach – Right Turn Lane | A | 8.7 | A | 7.5 | A | 8.6 | A | 7.1 | A | 8.2 | B | 10.8 |
| NB Approach | B | 12 | D | 37.5 | B | 13.3 | E | 79.5 | B | 10.4 | C | 24.2 |
| WB Approach – Left Turn Lane | C | 34.4 | E | 70.6 | **F** | **97.1** | **F** | **180.5** | D | 47.6 | D | 38.9 |
| WB Approach – Through Lane | C | 29.4 | D | 39.8 | D | 39.9 | D | 40.8 | C | 27.1 | C | 30.6 |
| WB Approach – Right Turn Lane | C | 31.6 | D | 46.7 | D | 43.7 | D | 53.9 | D | 52.6 | E | 67.8 |
| WB Approach | C | 32 | D | 52.7 | E | 59.2 | **F** | **90.8** | D | 47.9 | E | 56 |
| SB Approach – Left Turn Lane / Dual LT (2042) | A | 7.9 | **F** | **95.3** | A | 8.8 | **F** | **255.4** | A | 7.1 | C | 33 |
| SB Approach – Through Lane(s) | C | 31.5 | A | 10.6 | **F** | **52.2** | B | 12.3 | B | 13 | B | 13.9 |
| SB Approach – Right Turn Lane | A | 6.8 | A | 7.2 | A | 6.6 | A | 7.4 | A | 6.4 | B | 10.7 |
| SB Approach | C | 26.7 | C | 23.5 | D | 43.4 | D | 50 | B | 11.6 | B | 17.5 |
| EB Approach – Through/Left Turn Lane | | | | | | | | | A | 0 | A | 0 |
| EB Approach – Right Turn Lane | | | | | | | | | D | 42 | D | 46.6 |
| EB Approach | A | 44.2 | E | 60.7 | E | 76.7 | E | 70.8 | C | 23.7 | C | 26.6 |
| Intersection | C | 25.6 | D | 36.6 | D | 41.6 | E | 71.3 | B | 16.8 | C | 26.6 |

Jughandle Intersection Scenario

| Approach | 2017 Jughandle Intersections | | | | 2027 Jughandle Intersections | | | | 2042 Jughandle Intersections | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | | | | | | | | | |
| NB Approach – Left Turn Lane | A | 3 | A | 2.5 | A | 7.7 | A | 4 | A | 5.5 | A | 3.6 |
| NB Approach – Through/Right Turn Lane | A | 1.2 | A | 5.5 | A | 2 | B | 14.1 | A | 1.6 | A | 3.3 |
| NB Approach | A | 1.6 | A | 5.1 | A | 3 | B | 12.9 | A | 2.2 | A | 3.3 |
| WB Approach – Left Turn Lane | E | 76.1 | E | 78.7 | D | 49.4 | E | 66.9 | D | 48.3 | E | 78.8 |
| WB Approach – Through/Right Turn Lane | E | 56.7 | D | 44.3 | D | 35 | D | 37.9 | C | 34.6 | D | 44.5 |
| WB Approach | E | 67.9 | E | 56.8 | D | 43.3 | D | 48.3 | D | 42.9 | D | 54.3 |
| SB Approach – Left Turn Lane | A | 1.5 | A | 5.6 | A | 2.3 | B | 15.2 | A | 2.4 | A | 3.3 |
| SB Approach – Through Lane | A | 4.4 | A | 4.4 | A | 8.8 | A | 5.9 | A | 4.7 | A | 3.7 |
| SB Approach – Right Turn Lane | A | 1.9 | A | 2.6 | A | 3 | A | 3.1 | A | 3.6 | A | 3.2 |
| SB Approach | A | 3.9 | A | 4 | A | 7.8 | A | 5.5 | A | 4.5 | A | 3.6 |
| EB Approach | A | 0 | A | 0 | A | 0 | A | 0 | A | 0 | A | 0 |
| Intersection | A | 3.9 | A | 5 | A | 6.4 | B | 10.4 | A | 4 | A | 3.6 |
| **Central Intersection** | | | | | | | | | | | | |
| NB Approach | B | 16 | E | 55.2 | B | 19.1 | **F** | **117.6** | C | 27.1 | E | 70.3 |
| WB Approach – Through Lane | D | 37.4 | **F** | **106.7** | D | 37.4 | **F** | **163.6** | C | 24.1 | C | 32.5 |
| WB Approach – Right Turn Lane | D | 35 | D | 40.3 | C | 31 | D | 52.8 | B | 19.8 | C | 23.3 |
| WB Approach | C | 30.3 | **F** | **100.5** | D | 36.7 | **F** | **153.2** | C | 23.6 | C | 31.5 |
| SB Approach | C | 27.3 | B | 10.7 | D | 52.2 | B | 14.5 | D | 38.2 | B | 16.9 |
| EB Approach – Through Lane | E | 56.4 | E | 65.3 | **F** | **93.5** | **F** | **100.3** | D | 49 | C | 32.1 |
| EB Approach – Right Turn Lane | D | 37.4 | D | 44.3 | D | 42.5 | E | 59.5 | C | 25.8 | C | 25.9 |
| EB Approach | D | 49.5 | E | 58.3 | E | 74.9 | **F** | **86.9** | D | 41.2 | C | 30.2 |
| Intersection | C | 31.6 | D | 50.4 | D | 48.8 | **F** | **91.3** | C | 34.5 | D | 45.1 |
| **Southern Intersection** | | | | | | | | | | | | |
| NB Approach – Left Turn Lane | A | 7.1 | A | 2.5 | B | 14.8 | A | 3.1 | A | 3.4 | A | 2.5 |
| NB Approach – Through Lane | A | 2.2 | A | 6.4 | A | 1.9 | B | 14 | A | 2.3 | B | 4.3 |
| NB Approach – Right Turn Lane | A | 1.6 | A | 1.8 | A | 1.3 | A | 1.6 | A | 1.8 | A | 2.1 |
| NB Approach | A | 2.5 | A | 5.9 | A | 2.8 | B | 12.5 | A | 2.4 | B | 4.1 |
| WB Approach | A | 0 | A | 0 | A | 0 | A | 0 | A | 0 | A | 0 |
| SB Approach – Left Turn Lane | A | 1.5 | A | 7.5 | A | 1.2 | B | 18.1 | A | 1.5 | A | 5.5 |
| SB Approach – Through Lane | A | 5.9 | A | 3.5 | B | 11.3 | A | 3.7 | A | 3.6 | A | 3.2 |
| SB Approach – Right Turn Lane | A | 1.7. | A | 2.1 | A | 1.4 | A | 1.8 | A | 1.7 | A | 2.2 |
| SB Approach | A | 5.7 | A | 3.6 | B | 10.8 | A | 4.2 | A | 3.5 | A | 3.2 |
| EB Approach | D | 53.1 | D | 54.8 | E | 67.9 | E | 71 | E | 56.4 | E | 57.2 |
| Intersection | A | 5.1 | A | 5.5 | A | 8.9 | A | 9.8 | A | 3.3 | A | 4.2 |

Single Lane Roundabout Scenario

| Approach | 2017 Single Lane RAB | | | | 2027 Single Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | D | 28.2 | **F** | **278** | D | 26.9 | **F** | **280.6** |
| WB Approach | C | 17 | **F** | **218** | C | 15 | **F** | **178.4** |
| SB Approach | **F** | **142.8** | E | 47.9 | **F** | **159.9** | E | 42.6 |
| EB Approach | **F** | **143** | B | 14 | **F** | **147** | B | 11.3 |
| Intersection | **F** | **106.7** | **F** | **166.6** | **F** | **114.4** | **F** | **160.5** |

Combo Single/Multi-Lane Roundabout Scenario

| Approach | 2017 Single/Multi Lane RAB | | | | 2027 Single/Multi Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | B | 11.8 | C | 24.8 | B | 10.6 | C | 20.4 |
| WB Approach | B | 14.6 | **F** | **77.5** | B | 13.9 | **F** | **198.6** |
| SB Approach | C | 16.6 | B | 12.3 | B | 14.8 | B | 11.4 |
| EB Approach | **F** | **304** | C | 22.4 | **F** | **426.1** | C | 23.1 |
| Intersection | **F** | **100.1** | D | 28.2 | **F** | **135.1** | E | 42.2 |

Multi-Lane Roundabout Scenario

| Approach | 2017 Multi-Lane RAB | | | | 2027 Multi-Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | A | 9.3 | C | 18 | A | 8.4 | B | 13.1 |
| WB Approach | A | 9.3 | C | 21.4 | A | 8.9 | E | 39.1 |
| SB Approach | B | 12.8 | A | 9.8 | B | 10.9 | A | 9 |
| EB Approach | E | 37.9 | B | 10.9 | **F** | **71.5** | B | 10.8 |
| Intersection | C | 19.1 | C | 15.1 | D | 28.1 | C | 15.1 |

Realigment Scenario

| Peak Hour Intersection Level-of-Service (LOS) | 2017 Realignment | | | | 2027 Realignment | | | | 2042 Bethany Bend Realignment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | C | 29.7 | B | 13.1 | **F** | **134.8** | B | 17.1 | E | 61.4 | C | 33.1 |
| NB Approach – Through Lane | B | 13.2 | D | 40 | B | 14.5 | **F** | **79.4** | C | 20.4 | D | 46.3 |
| NB Approach – Right Turn Lane | B | 10.1 | A | 9.1 | B | 10.5 | A | 8.5 | B | 16.4 | B | 17.2 |
| NB Approach | B | 17.4 | C | 34.4 | D | 45.8 | E | 66.7 | C | 28.9 | D | 43 |
| WB Approach – Left Turn Lane | E | 55.4 | E | 55 | **F** | **99** | **F** | **85.7** | D | 42.5 | D | 38.5 |
| WB Approach – Through Lane | E | 57 | **F** | **104.7** | E | 62.4 | **F** | **177.3** | D | 51.6 | E | 78.7 |
| WB Approach – Right Turn Lane | D | 49.2 | D | 51.9 | D | 49.8 | D | 53.1 | D | 43.3 | D | 44.3 |
| WB Approach | E | 55.6 | **F** | **84.6** | E | 72.3 | **F** | **138** | D | 47.7 | E | 62.4 |
| SB Approach – Left Turn Lane | B | 11 | C | 33.4 | B | 12 | D | 44.5 | B | 17.6 | D | 44.3 |
| SB Approach – Through Lane | C | 32.2 | B | 17.7 | **F** | **64** | B | 19.6 | D | 39.1 | C | 29.1 |
| SB Approach – Right Turn Lane | B | 13.5 | B | 11.5 | B | 15.2 | B | 11.4 | C | 26.1 | C | 25.2 |
| SB Approach | C | 28.6 | B | 17.3 | D | 54.7 | B | 19.4 | D | 35.9 | C | 29.4 |
| EB Approach – Left Turn Lane | E | 61.1 | **F** | **129.7** | **F** | **104** | **F** | **249.7** | E | 79.1 | E | 78.6 |
| EB Approach – Through Lane | E | 69.7 | E | 59.1 | **F** | **96.9** | E | 73 | E | 69.5 | D | 49.5 |
| EB Approach – Right Turn Lane | E | 58.9 | D | 51.1 | E | 67.7 | E | 56 | D | 50.6 | D | 38.6 |
| EB Approach | E | 63.6 | E | 80 | **F** | **88.1** | **F** | **126.3** | E | 66.2 | E | 58.1 |
| Intersection | D | 39.9 | D | 43.6 | E | 64.9 | E | 72.5 | D | 44.1 | D | 43.7 |

Attachment 8
Summary of TE Study and/or Signal Warrant Analysis

# Bethany Bend at State Route 9

## MILTON, GA

## TRAFFIC STUDY AND DESIGN

## ALTERNATIVES ANALYSIS (GDOT PI #0012625)

September, 2014

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# INTRODUCTION

The city of Milton, GA seeks to study conditions at the intersection of Bethany Bend and State Route 9 for the purpose of identifying safety and operational problems and solutions (***Figure 1***). In anticipation of a major roadway widening effort along the State Route 9 corridor (PI #0007838), the city of Milton looks to investigate a series of alternatives to implement in the interim to improve conditions at this intersection. The anticipated opening date of the reconstructed 4-lane divided highway is 2022.

The intersection of GA State Route 9 and Bethany Bend is currently experiencing congestion along the northern and southern approaches of SR 9, and is accompanied by moderate volumes on the eastern and western approaches of Bethany Bend. The presence of a retail center with a Publix grocery store anchor and the recently-opened Cambridge High School northwest of the intersection is generating pedestrian traffic which must be able to cross the busy intersection in a safe manner.

Geometric elements of the intersection are also impairing vehicular and pedestrian operations. The intersection is severely skewed and a vertical curve limits the sight distance for drivers making a right turn on red from the eastbound approach. Additionally, pedestrian crosswalks are not optimally placed for driver visibility due to the intersection skew.

This traffic study examines the intersection for potential sources of operational and safety problems and also analyzes several alternatives for the intersection to improve conditions in the short-term until SR 9 can be widened. From the examination of the alternatives, four scenarios were then selected to model with the predicted volumes for the 2042 design year of the SR 9 widening project (PI #0007838). The purpose of this secondary analysis was to determine which intersection modification would perform adequately within the long-term scope of the entire SR 9 corridor.

**EXISTING INTERSECTION LOS**

The intersection analysis was performed for the AM and PM peak hour using Trafficware Synchro software, version 8, which is based on the HCM. The capacity of the intersection was determined and the LOS was interpreted for each approach, as shown below in ***Table 3***. Synchro reports for all analyses are included in the appendix of this report.

**Table 3: Peak Hour Intersection Level-of-Service (LOS) and Delay, 2014 Existing Conditions**

| Peak Hour Intersection Level-of-Service (LOS) | 2013 Existing Conditions | | | |
|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **102.4** | **F** | **92.7** |
| NB Approach – Through/Right Turn Lane | B | 14.9 | D | 38.9 |
| NB Approach | D | 39.0 | D | 46.6 |
| WB Approach – Left Turn Lane | **F** | **136.3** | **F** | **92.8** |
| WB Approach – Through/Right Turn Lane | **F** | **116.0** | **F** | **109.5** |
| WB Approach | **F** | **122.2** | **F** | **104.2** |
| SB Approach – Left Turn Lane | **F** | **81.7** | **F** | **96.2** |
| SB Approach – Through/Right Turn Lane | C | 32.7 | C | 28.0 |
| SB Approach | C | 34.0 | C | 32.8 |
| EB Approach – Left Turn Lane | **F** | **106.7** | **F** | **113.6** |
| EB Approach – Through Lane | E | 77.5 | E | 58.5 |
| EB Approach – Right Turn Lane | **F** | **102.1** | E | 61.1 |
| EB Approach | **F** | **136.3** | E | 77.7 |
| Intersection | E | 65.2 | E | 57.1 |

As ***Table 3*** indicates, the westbound approach operates with an overall LOS of "F" in both morning and afternoon peak times, the eastbound approach operates with an overall LOS of "F" in the morning, and several other approaches are operating at an LOS of "E", which indicates that traffic volumes are approaching the capacity of the intersection. The primary movement in the AM peak is the through movement from the southbound approach, which is at an LOS of "C". Conversely, the heaviest PM peak time movement is the through traffic on SR 9 from the northbound approach, which is at an LOS of "D".

**PEDESTRIAN CROSSINGS**

Pedestrian traffic crossing the intersection in an east-west direction across SR 9 appears to be traveling primarily to the retail center on the southwest corner of the crossing and to Cambridge High School located on Bethany Bend to the northwest. Two large pedestrian islands exist between the westbound and northbound approaches and between the eastbound and southbound approaches providing adequate refuge on these corners.

Crosswalks are placed at a right angles to the lanes of travel to minimize the time and distance needed for a pedestrian to cross each leg of the intersection (***Figure 4***). Crosswalk signals and call buttons are located on each corner. Observations have found that the call button on the southwest corner of the intersection is inoperative. Input from the city of Milton indicates that the pedestrian crosswalk that spans the southern leg is particularly problematic, due to the heavy right turning automobile volume crossing this crosswalk. Field observations indicate two primary factors contributing to the pedestrian/vehicle conflicts. The first factor is the large right turn radius at the intersection. Vehicles that are traveling eastbound, making a right turn onto the southern leg can do so at higher speeds than in intersections with a more perpendicular geometry because the turning radius is much larger than a typical 90 degree turn. The second factor is the location of the crosswalk. Right turns from the eastbound approach onto the southern leg must travel 180-190 feet through the intersection before encountering the crosswalk (***Figure 4***). As a result of both factors, right turning vehicles enter the intersection at speeds higher than those of vehicles in more traditional intersections and then travel an excessive distance before encountering the point of conflict with pedestrians. At this point, the driver expectancy to see a crosswalk or pedestrian is low.

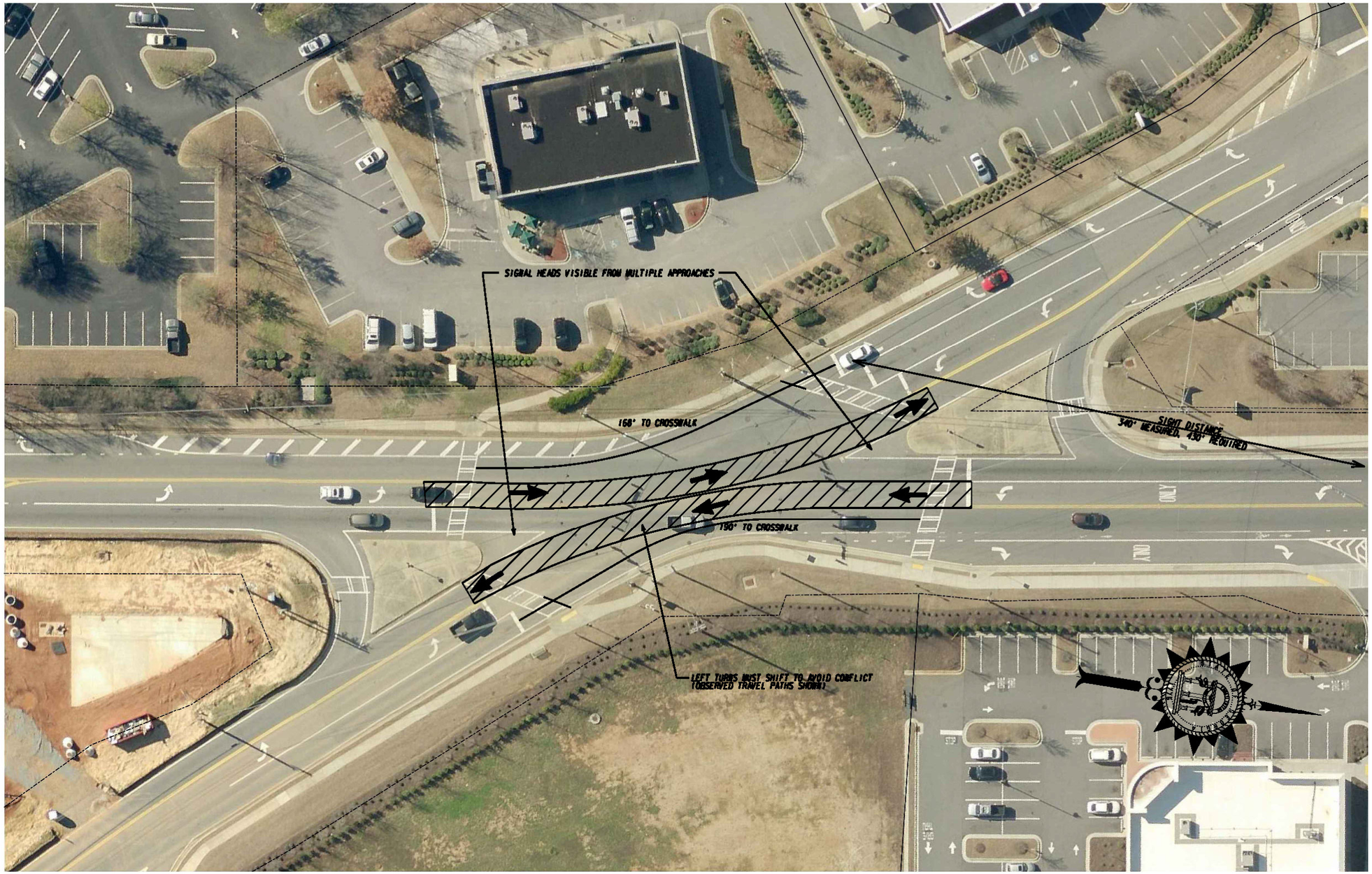
**LANE CONFIGURATION AND SIGNAL PHASING**

SR 9 and Bethany Bend are both 2-lane roads and currently several auxiliary lanes exist at the intersection for left and right turns. Specifically, single left turn lanes exist on all approaches. Channelized right turn lanes exist for the northbound and southbound approaches, and one right turn lane is in place on the eastbound approach. Right turns are permitted on red on all approaches. All left turns are directed by leading protected-only left turn phases.

**SIGHT DISTANCE**

Sight distance is significantly reduced for left turns from the southern leg and for right turns from the western leg due to a low area located approximately 400’ north of the intersection on SR 9. Field observations performed in accordance with AASHTO guidelines indicate that for right turning vehicles on the western leg, sight distance is limited to approximately 340 feet. The minimum recommended length of vision provided by AASHTO for a 45mph major road is 430’, therefore, the sight distance for right turners from the western leg is insufficient (***Figure 4***). The protected-only left turn phase from the southern leg removes the sight distance concern from that direction.

**Figure 4: Existing Conditions**



**RIGHT TURN ON RED OPERATION**

Currently, the intersection operates with an LOS of "E" in the morning and afternoon peak periods. The heaviest volumes of traffic occur in the southbound direction during the AM peak, and the northbound direction in the PM peak. Gaps in this through traffic are limited during the peak hour, but right turns on red are permitted on both eastbound and westbound approaches. Right turns from the eastbound approach are particularly heavy, making up approximately one-third of the total traffic entering the intersection from this direction in both morning and afternoon peaks. It is important to note that this is the same approach with insufficient sight distance for vehicles making a right turn on red. The observed tendency of right turners (on the eastbound approach) is either to not attempt the right turn at all due to lack of gaps and inadequate sight distance, or to move well past the stop bar into the intersection and accelerate quickly into the limited gaps. Even with the limited sight distance and limited gaps available gaps, a review of crash data for the 3-year period between 2010 and 2012 did not show crashes associated with the eastbound right turning movement.

**CONCURRENT NORTHBOUND AND SOUTHBOUND LEFT TURNS AND SIGNAL HEADS**

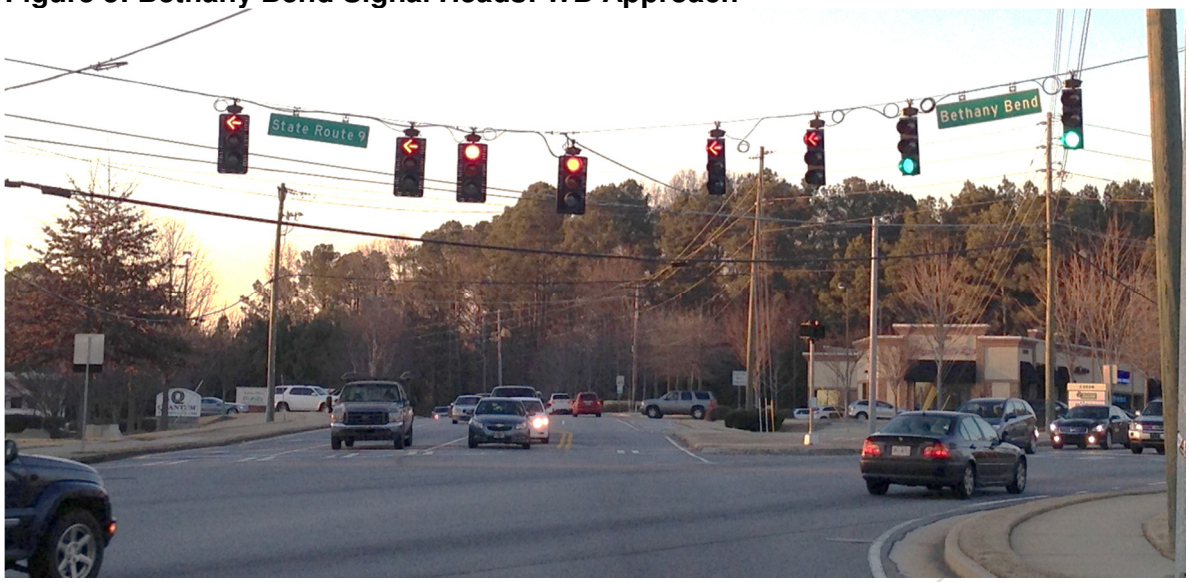
The leading protected left turn phase for the northbound and southbound approaches currently operate at the same time. Vehicles traveling in opposing directions make a left turn at the same time, however observations reveal that left turning vehicles must occupy the same space within the intersection. As a result, the left-turning vehicles must shift to the left and pass each other with a narrow margin (***Figure 4***). This is caused by the skewed angle of Bethany Bend. This shift to the left is not guided by pavement markings and could result in increased risk of collision between left turning vehicles.

Additionally, the traffic signal heads on each approach are positioned so that drivers not only see the signal faces for their own approach, but also for the approach to their immediate left or right. This is particularly pronounced for the eastbound and westbound directions. This could be a confusing situation for a driver who is not familiar with the intersection, as it is possible for up to eight signal heads to be clearly visible at one time (***Figure 5***).

**SOUTHBOUND RIGHT TURN LANE CHANNEL**

The existing southbound right turn lane channel is not wide enough for large trucks to adequately make the turn. This causes significant rubbing between truck tires and the curbing of the lane. In some instances trucks actually mount the curb and traverse the refuge island, which is damaging the concrete and possibly the trucks. A better solution to the existing problem is to install a mountable curb area or a striped, paved area reserved for trucks with wider turning paths.

**Figure 5: Bethany Bend Signal Heads: WB Approach**




# ALTERNATIVES ANALYSIS

Several alternatives were examined to identify feasible interim solutions for the problems identified in the Existing Conditions section. Ideally, these solutions will alleviate some or all of the problems while also anticipating the GDOT project to widen SR 9. These solutions include a no-build alternative, minor improvements to crosswalk placement, signal head placement and signal phasing, and reconstructing the intersection into a pair of offset intersections, a "jughandle" configuration, or a roundabout. An additional design which involves realigning Bethany Bend east of the CVS to create a more perpendicular geometric configuration was developed and studied as well.

This section outlines the methodology used to estimate the background traffic growth along the corridor, and describes each alternative and the respective results from the Synchro or roundabout analysis. Full Synchro reports can be found in the appendix, along with the GDOT Roundabout Analysis tool printouts. A comparison matrix table is provided at the end of this section for reference.

### BACKGROUND TRAFFIC GROWTH

To predict future operations at the intersection, a yearly growth rate was applied to 2013 turning movements. The approved background growth rate for the SR 9 corridor used in the traffic study for PI #0007838 was 1.29% per year, however, for the Milton study, a stronger, up-front growth rate was used to forecast volumes, based on input from city engineers. The resulting yearly rate used was 1.60%.

The assumed open date for any interim improvements analyzed by this study is 2017. A ten-year design life was assumed for the project as well, resulting in projected volumes for 2027. Tables in the appendix show the estimated turning volumes for 2017 and 2027. The expected open date of PI #0007838 is 2022, but to account for any potential delays in design and/or construction of

the major SR 9 project, the alternatives in this study were analyzed using 2027 volumes, thereby allowing for a conservative margin of 5 additional years of service, if needed.

**NO-BUILD**

Retaining the existing intersection configuration means that traffic conditions at the intersection will get worse, and the intersection LOS is expected to reach "F" at some point in 2019. ***Table 4*** displays the LOS results from the expected background growth for 2017 and 2027.

Construction of the major SR 9 widening is expected to be completed in 2022, so the intersection would operate under failing conditions in peak periods for a minimum of three years. Widening the SR 9 corridor would improve conditions in the morning and afternoon to an LOS of "D", but further improvements are needed, as the intersection would fail by 2042, which is the design year for the major roadway project. Also, the intersection's pedestrian crossing and traffic operational challenges would not be addressed until the GDOT widening project.

**Table 4: 2017 and 2027 Peak Hour LOS and Delay Under No-Build Conditions**

| Peak Hour Intersection Level-of-Service (LOS) | 2017 No-Build Conditions | | | | 2027 No-Build Conditions | | | |
|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **140.4** | **F** | **92.7** | **F** | **238.2** | **F** | **113.7** |
| NB Approach – Through/Right Turn Lane | B | 15.7 | D | 48.4 | B | 15.1 | **F** | **95.8** |
| NB Approach | D | 49.9 | D | 54.8 | E | 76.4 | **F** | **98.3** |
| WB Approach – Left Turn Lane | **F** | **153.8** | **F** | **95.5** | **F** | **272.1** | **F** | **96.1** |
| WB Approach – Through/Right Turn Lane | **F** | **115.9** | **F** | **127.6** | **F** | **220.6** | **F** | **191.8** |
| WB Approach | **F** | **127.5** | **F** | **117.6** | **F** | **236.4** | **F** | **161.8** |
| SB Approach – Left Turn Lane | **F** | **81.7** | **F** | **105.5** | **F** | **82.1** | **F** | **113.2** |
| SB Approach – Through/Right Turn Lane | D | 36.1 | C | 30.0 | D | 43.8 | C | 34.7 |
| SB Approach | D | 37.3 | D | 35.5 | D | 44.8 | D | 40.4 |
| EB Approach – Left Turn Lane | **F** | **123.6** | **F** | **132.8** | **F** | **202.4** | **F** | **225.7** |
| EB Approach – Through Lane | E | 79.3 | E | 60.1 | **F** | **139.4** | E | 72.6 |
| EB Approach – Right Turn Lane | **F** | **107.5** | E | 64.2 | **F** | **196.7** | **F** | **91.5** |
| EB Approach | **F** | **101.0** | **F** | **85.7** | **F** | **176.5** | **F** | **129.9** |
| Intersection | E | 71.4 | E | 64.7 | **F** | **116.9** | **F** | **99.2** |

**MINOR OPERATIONAL IMPROVEMENTS**

Some short-term improvements are feasible which would not necessarily require significant reconstruction and which could be performed with limited impacts to adjacent parcels. These improvements are not expected to relieve all of the congestion at this location, but could help to control it until the SR 9 widening is completed. Most importantly, these modifications would improve the operational and safety concerns at the intersection. ***Figure 6*** illustrates many of these recommendations.

- Realign signal faces to a more parallel position with respect to cross-street lanes. This would widen the spacing between the signal faces for each approach and would make each approach's set of signals appear distinct to drivers. Louvers should be installed to limit the number of visible signals on each approach. This would require reconstruction of the intersection's signal span wires.
- The northbound and southbound leading protected-only left turn signals should be converted to a protected-only lead-lag operation. This would separate the phases for left turns in opposing directions and would remove the risk of a head-on collision. The left turns should remain protected-only due to the intersection skew. Synchro models indicate that lagging the northbound left turn and pairing it with the eastbound right turn overlap phase provide better operational results than leading with the northbound left turn phase. Further signal timing studies should be conducted to fine tune the signal timing needs at this intersection.
- The right turn on red on the eastbound approach should be prohibited. As previously mentioned, right turners either conservatively wait until they get a green signal, or attempt to turn into the heavy through traffic with insufficient sight distance to safely make the decision. Prohibiting this right turn on red would eliminate this vehicle conflict. The addition of a right turn signal arrow is recommended to allow the right turn movement to be overlapped with the lagging (or leading) left turn arrow from SR 9 onto Bethany Bend westbound. This solution will increase delay and queues for the EB approach by a small degree, but is recommended due to the lack of sight distance and severe skew.
- A right turn lane should be constructed on the westbound approach. Right turns from this direction are not as significant as from other approaches, but adding an auxiliary lane could improve the overall delay on the approach.
- The city should reduce the size of northern channelizing island to increase the traversable surface area of the southbound right turn lane. This could be accomplished with striping or by installing a truck roll-over apron. The pedestrian crosswalk should be striped through the area, ending at the refuge island ramp.

***Table 5*** shows the LOS results which these minor improvements would induce for years 2017 and 2027. It is important to note that the intersection is expected to begin to fail at some point in 2019, and would continue to operate under failing conditions for a minimum of three years before the widening of SR 9 is completed.

**Figure 6: Minor Operational Improvements**

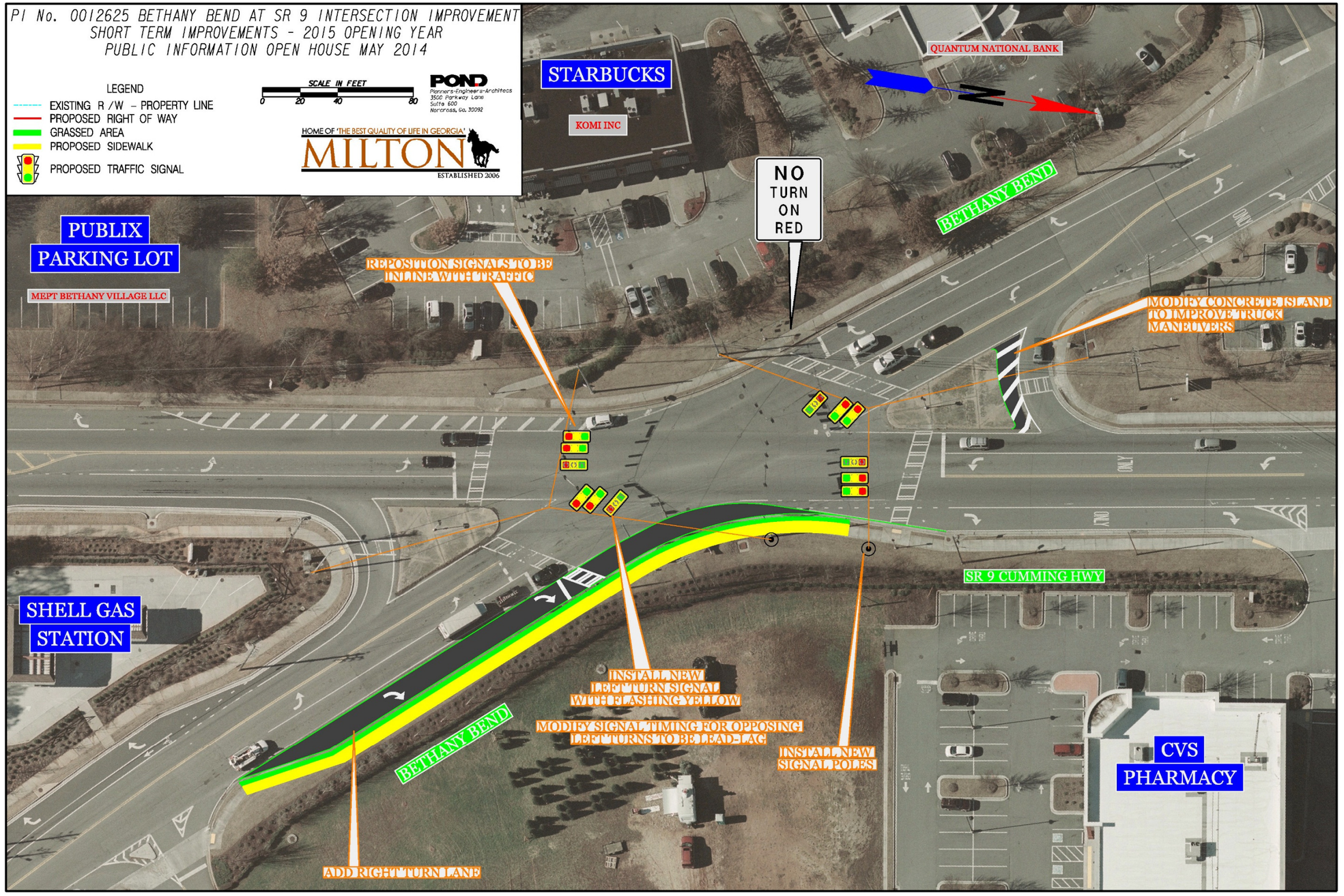


**Table 5: 2017 and 2027 Peak Hour LOS and Delay with Minor Operational Improvements**

| Peak Hour Intersection Level-of-Service (LOS) | 2017 Minor Operational Improvements | | | | 2027 Minor Operational Improvements | | | |
|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **99.5** | **F** | **88.8** | **F** | **192.7** | **F** | **132.5** |
| NB Approach – Through/Right Turn Lane | B | 14.7 | D | 40.8 | B | 15.1 | **F** | **80.2** |
| NB Approach | D | 38.0 | D | 47.6 | E | 63.9 | **F** | **87.7** |
| WB Approach – Left Turn Lane | **F** | **152.1** | **F** | **95.6** | **F** | **272.1** | **F** | **131.1** |
| WB Approach – Through Lane | **F** | **98.0** | **F** | **130.2** | **F** | **136.8** | **F** | **191.9** |
| WB Approach – Right Turn Lane | E | 61.5 | E | 58.4 | D | 62.0 | E | 59.1 |
| WB Approach | **F** | **110.3** | **F** | **113.1** | **F** | **169.6** | **F** | **161.3** |
| SB Approach – Left Turn Lane | **F** | **81.4** | **F** | **105.6** | **F** | **82.1** | **F** | **113.2** |
| SB Approach – Through/Right Turn Lane | D | 37.0 | C | 28.9 | D | 48.8 | C | 31.6 |
| SB Approach | D | 38.2 | C | 34.5 | D | 49.7 | D | 37.5 |
| EB Approach – Left Turn Lane | **F** | **122.1** | **F** | **133.0** | **F** | **202.4** | **F** | **225.7** |
| EB Approach – Through Lane | **F** | **94.5** | E | 65.6 | **F** | **139.4** | **F** | **81.1** |
| EB Approach – Right Turn Lane | D | 39.4 | C | 27.1 | E | 56.6 | D | 29.0 |
| EB Approach | **F** | **81.6** | E | 75.3 | **F** | **125.4** | **F** | **111.9** |
| Intersection | E | 64.4 | E | 58.8 | **F** | **91.6** | **F** | **90.7** |

**OFFSET INTERSECTIONS**

Reconstructing the intersection as shown in ***Figure 7*** would reduce the total entering volume by distributing it between two new intersections while eliminating the skewed geometry. Turning movement volumes were counted at peak times at the driveway to Publix on SR 9 in order to model the southern intersection with a 4-legged configuration. Estimated turning movement volumes for a proposed 86-bed senior living center opposite the proposed Bethany Bend realignment at the northern intersection were used to model a 4-legged configuration. Trip ends were estimated using the *Institute of Transportation Engineers Trip Generation Manual, 9th Edition* using land use code 254 for Senior Living Center. The traffic impact analysis for the Phoenix Senior Living development, prepared by Wilburn Engineering, was the primary source for information regarding trip generation and distribution along SR 9.

Additionally, redistribution of traffic was required since this design removes the ability to travel directly through the intersection on Bethany Bend. Turning movements into and out of the driveways of the Publix shopping center on Bethany Bend and SR 9 were also included in the redistribution. The turning movements at the Bethany Bend driveway were estimated using a 24-hour count along with directional assumptions made by studying traffic distribution at the driveway along Bethany Bend.

***Figure 8*** shows all assumed 2017 traffic patterns prior to reconstruction, while ***Figure 9*** shows assumed 2017 patterns after the reconstruction. The background traffic growth may be applied to these values to determine the 2027 volumes.

This design would also make pedestrians more visible to drivers by placing crosswalks in a standard location, parallel to travel lanes. Access to businesses at the intersection is not expected to be impacted. Current routes or driveways used to access retail properties may change, but overall trip ends at these places of business is not expected to decrease. The parcels required for this design are currently undeveloped which is suitable for right-of-way acquisition. Careful planning could open up the intersection to new businesses as well, particularly adjacent to the CVS and south of the Shell gas station. ***Table 6*** shows the 2017 and 2027 LOS for each intersection, and for each approach.

This scenario is expected to adequately handle demand at most times of the day. A few exceptions could be the forecasted 2027 northbound PM peak hour through traffic and the westbound traffic at the southern intersection. A single through lane on SR 9 is not adequate to handle the volumes moving through the intersection and delays are experienced elsewhere due to the over-capacity conditions. It is expected that by 2027, however, SR 9 will be 4 lanes wide and the added capacity should be sufficient to accommodate this volume.

**Figure 7: Offset Intersections**

**Figure 8: 2017 Turning Movements Prior to Reconstruction**

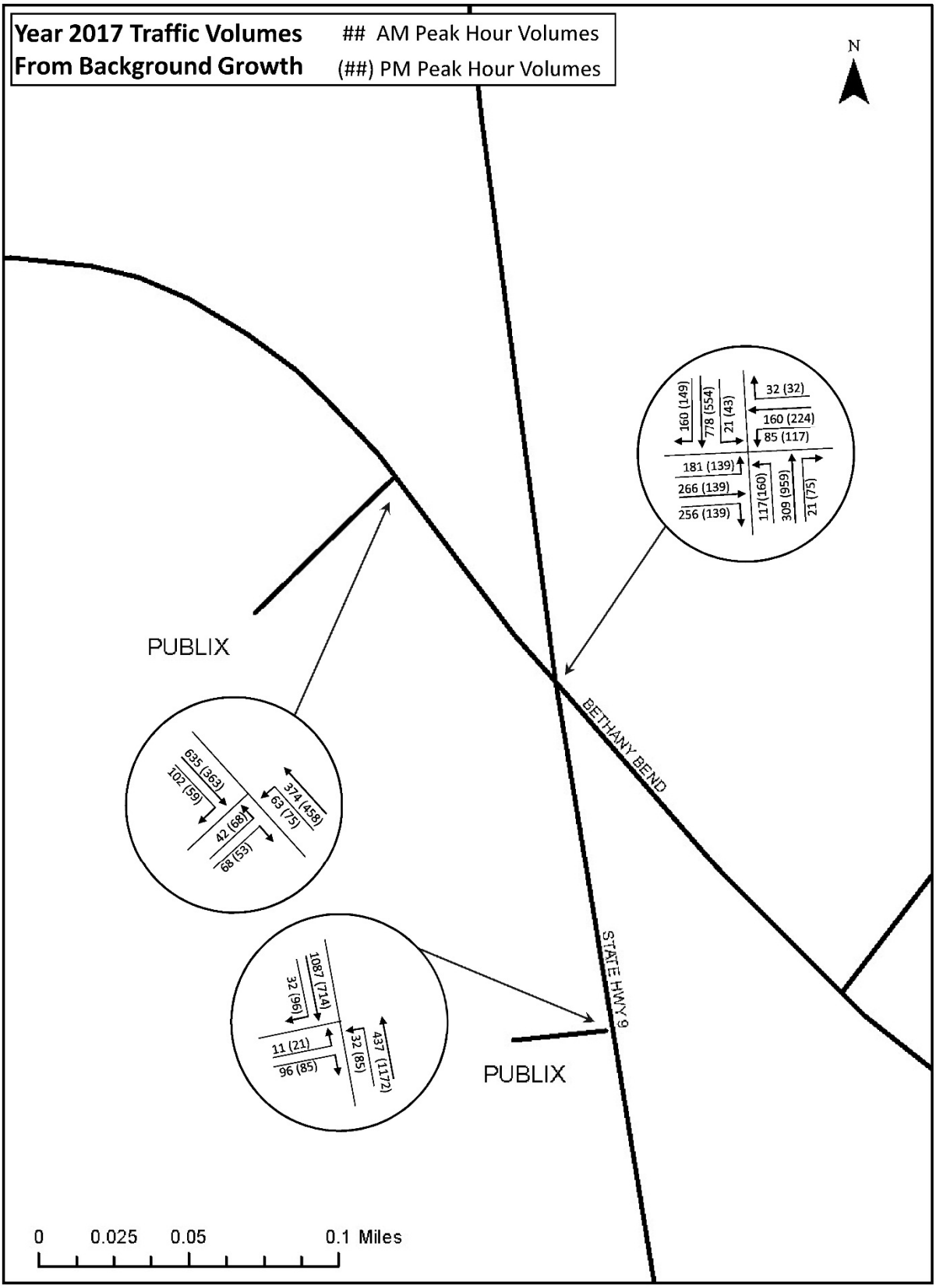


**Figure 9: Redistributed 2017 Turning Movements**

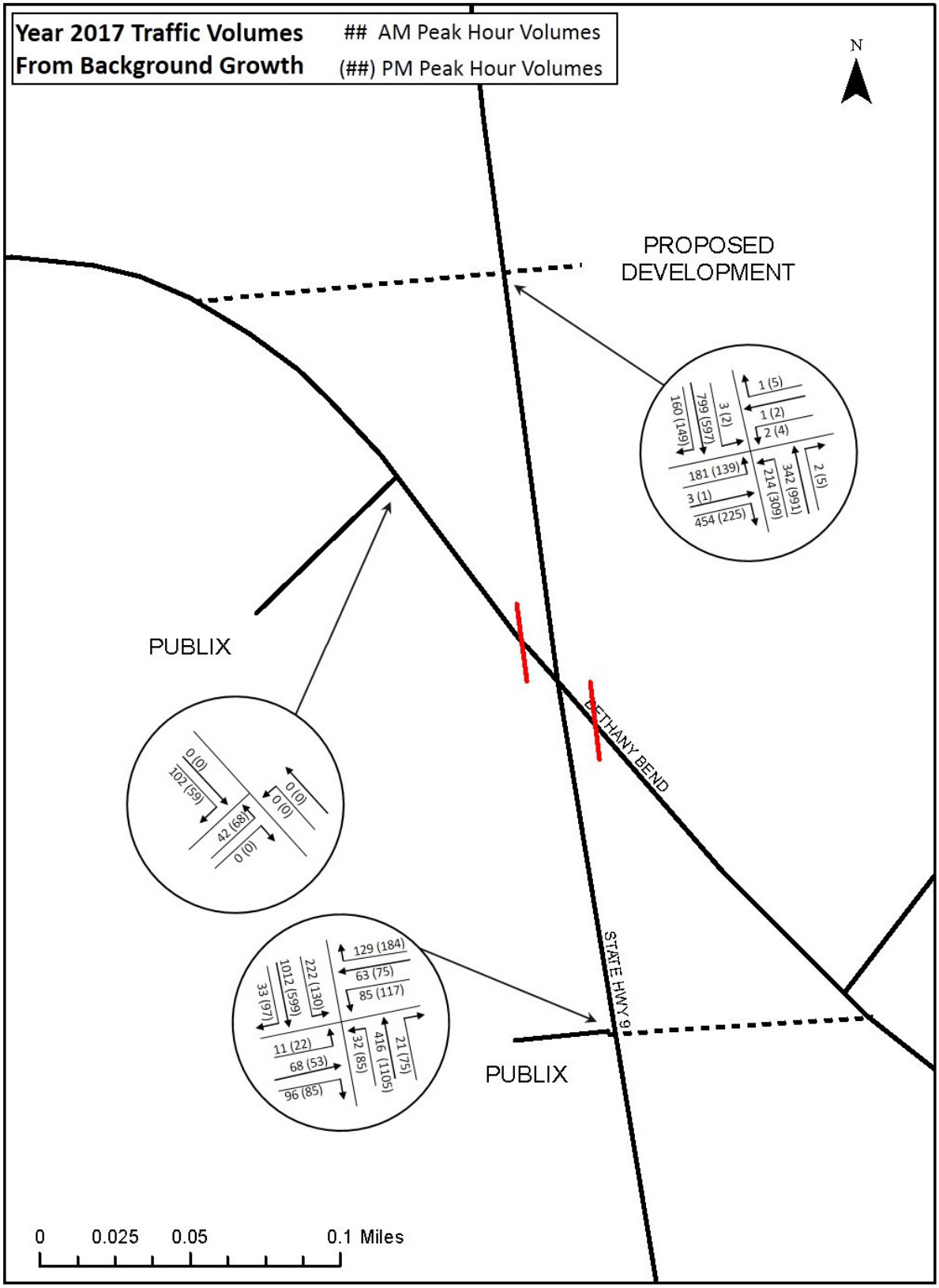


**Table 6: 2017 & 2027 Peak Hour LOS and Delay for Offset Intersections**

| Approach | 2017 Offset Intersections | | | | 2027 Offset Intersections | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | | | | | |
| NB Approach – Left Turn Lane | B | 13.8 | A | 7.5 | D | 43.9 | B | 17.9 |
| NB Approach – Through/Right Turn Lane | A | 3.9 | A | 7.9 | A | 4.6 | B | 14.0 |
| NB Approach | A | 7.7 | A | 7.8 | B | 19.7 | B | 14.9 |
| WB Approach – Left Turn Lane | D | 52.2 | D | 47.7 | D | 52.2 | D | 51.6 |
| WB Approach – Through/Right Turn Lane | E | 56.1 | E | 55.0 | E | 55.8 | E | 58.5 |
| WB Approach | D | 53.8 | E | 52.4 | D | 53.7 | E | 56.0 |
| SB Approach – Left Turn Lane | A | 5.6 | B | 11.5 | A | 6.7 | B | 23.3 |
| SB Approach – Through Lane | B | 13.6 | A | 9.2 | C | 22.1 | B | 12.3 |
| SB Approach – Right Turn Lane | A | 6.6 | A | 5.9 | A | 8.1 | A | 7.1 |
| SB Approach | B | 12.4 | A | 8.5 | B | 19.8 | B | 11.4 |
| EB Approach – Left Turn Lane | E | 58.7 | E | 60.6 | E | 65.6 | E | 67.5 |
| EB Approach – Through Lane | D | 38.2 | D | 38.1 | D | 37.2 | D | 40.0 |
| EB Approach – Right Turn Lane (Yield) | A | 0.0 | A | 0.0 | A | 0.0 | A | 0.0 |
| EB Approach | E | 58.5 | E | 60.1 | E | 65.2 | E | 66.7 |
| Intersection | B | 16.4 | B | 11.6 | C | 25.0 | B | 17.3 |
| **Southern Intersection** | | | | | | | | |
| NB Approach – Left Turn Lane | C | 20.7 | A | 8.3 | C | 33.0 | B | 10.0 |
| NB Approach – Through Lane | B | 11.5 | D | 41.6 | B | 12.0 | **F** | **89.7** |
| NB Approach – Right Turn Lane | A | 8.7 | A | 7.5 | A | 8.6 | A | 7.1 |
| NB Approach | B | 12.0 | D | 37.5 | B | 13.3 | E | 79.5 |
| WB Approach – Left Turn Lane | C | 34.4 | E | 70.6 | **F** | **97.1** | **F** | **180.5** |
| WB Approach – Through Lane | C | 29.4 | D | 39.8 | D | 39.9 | D | 40.8 |
| WB Approach – Right Turn Lane | C | 31.6 | D | 46.7 | D | 43.7 | D | 53.9 |
| WB Approach | C | 32.0 | D | 52.7 | E | 59.2 | **F** | **90.8** |
| SB Approach – Left Turn Lane | A | 7.9 | **F** | **95.3** | A | 8.8 | **F** | **255.4** |
| SB Approach – Through Lane | C | 31.5 | A | 10.6 | **F** | **52.2** | B | 12.3 |
| SB Approach – Right Turn Lane | A | 6.8 | A | 7.2 | A | 6.6 | A | 7.4 |
| SB Approach | C | 26.7 | C | 23.5 | D | 43.4 | D | 50.0 |
| EB Approach | A | 44.2 | E | 60.7 | E | 76.7 | E | 70.8 |
| Intersection | C | 25.6 | D | 36.6 | D | 41.6 | E | 71.3 |

**JUGHANDLE INTERSECTIONS**

***Figure 10*** illustrates a solution known as "jughandles". This design limits the central intersection to a simple two-phase signal by restricting left turns from all approaches. Left and right turns from SR 9 are made at either the northernmost or southernmost intersection depending on the approach direction. Right turns from Bethany Bend would be permitted at the central intersection, but left turns would be directed with signs and markings to cross SR 9, enter the "jughandle" via a right-hand turn lane, and loop around to a signal where a second right turn can be made in the desired direction of travel.

The jughandle design's three intersections all operate effectively except under PM peak conditions in 2027. It should be noted that the PM peak period traffic causes the westbound approach of the central intersection to fail as early as 2017, however, other approaches operate well below failing thresholds. The PM peak period traffic volumes exceed the capacity of the central intersection by 2027 causing significant delays on the northbound, eastbound and westbound approaches. Were SR 9 to be widened by this date, this over-capacity condition would not be experienced. See ***Table 7*** for peak hour LOS values for the open date and design year.

The right-of-way needs for this design are similar to those of the offset intersection design. Construction costs could be expected to be marginally higher than the offset intersections due to the additional pavement required for the jughandle loops, and the installation and maintenance of a third traffic signal. As with the offset intersection design, trips with destinations among the retail surrounding the intersection may be required to adjust their routes, but are not expected to decrease. Pedestrian crossings would likely remain at the central intersection. With this assumption, it is recommended that the crosswalks be restriped as described in the Minor Operational Improvements section to improve pedestrian visibility, and reduce the distance that a vehicle must travel before encountering the crosswalk when making a right turn from Bethany Bend onto SR 9. The crosswalks would need to be approximately 85'-100' in length, compared to the existing 50'-60'.

This design is uncommon and would require public education on how to traverse the intersection safely, leading to added implementation costs. One important safety concern is related to the prohibition of left turns at the central intersection. If a driver on either the northbound or southbound approach attempts to make a left turn at the central intersection onto Bethany Bend, the risk of rear-end collisions is increased. There is no way to physically impede drivers from making a left turn from SR 9 onto Bethany Bend, therefore, education and proper signage should be incorporated to clearly inform and indicate that the left turn maneuver is prohibited here.

**Figure 10: Jughandle Intersections**

**Table 7: 2017 & 2027 Peak Hour LOS and Delay for Jughandle Configuration**

| Approach | 2017 Offset Intersections | | | | 2027 Offset Intersections | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | | | | | |
| NB Approach – Left Turn Lane | A | 3.0 | A | 2.5 | A | 7.7 | A | 4.0 |
| NB Approach – Through/Right Turn Lane | A | 1.2 | A | 5.5 | A | 2.0 | B | 14.1 |
| NB Approach | A | 1.6 | A | 5.1 | A | 3.0 | B | 12.9 |
| WB Approach – Left Turn Lane | E | 76.1 | E | 78.7 | D | 49.4 | E | 66.9 |
| WB Approach – Through/Right Turn Lane | E | 56.7 | D | 44.3 | D | 35.0 | D | 37.9 |
| WB Approach | E | 67.9 | E | 56.8 | D | 43.3 | D | 48.3 |
| SB Approach – Left Turn Lane | A | 1.5 | A | 5.6 | A | 2.3 | B | 15.2 |
| SB Approach – Through Lane | A | 4.4 | A | 4.4 | A | 8.8 | A | 5.9 |
| SB Approach – Right Turn Lane | A | 1.9 | A | 2.6 | A | 3.0 | A | 3.1 |
| SB Approach | A | 3.9 | A | 4.0 | A | 7.8 | A | 5.5 |
| EB Approach | A | 0.0 | A | 0.0 | A | 0.0 | A | 0.0 |
| Intersection | A | 3.9 | A | 5.0 | A | 6.4 | B | 10.4 |
| **Central Intersection** | | | | | | | | |
| NB Approach | B | 16.0 | E | 55.2 | B | 19.1 | **F** | **117.6** |
| WB Approach – Through Lane | D | 37.4 | **F** | **106.7** | D | 37.4 | **F** | **163.6** |
| WB Approach – Right Turn Lane | D | 35.0 | D | 40.3 | C | 31.0 | D | 52.8 |
| WB Approach | C | 30.3 | **F** | **100.5** | D | 36.7 | **F** | **153.2** |
| SB Approach | C | 27.3 | B | 10.7 | D | 52.2 | B | 14.5 |
| EB Approach – Through Lane | E | 56.4 | E | 65.3 | **F** | **93.5** | **F** | **100.3** |
| EB Approach – Right Turn Lane | D | 37.4 | D | 44.3 | D | 42.5 | E | 59.5 |
| EB Approach | D | 49.5 | E | 58.3 | E | 74.9 | **F** | **86.9** |
| Intersection | C | 31.6 | D | 50.4 | D | 48.8 | **F** | **91.3** |

**Table 7 cont: 2017 & 2027 Peak Hour LOS and Delay for Jughandle Configuration**

| Approach | 2017 Offset Intersections | | | | 2027 Offset Intersections | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| **Southern Intersection** | | | | | | | | |
| NB Approach – Left Turn Lane | A | 7.1 | A | 2.5 | B | 14.8 | A | 3.1 |
| NB Approach – Through Lane | A | 2.2 | A | 6.4 | A | 1.9 | B | 14.0 |
| NB Approach – Right Turn Lane | A | 1.6 | A | 1.8 | A | 1.3 | A | 1.6 |
| NB Approach | A | 2.5 | A | 5.9 | A | 2.8 | B | 12.5 |
| WB Approach | A | 0.0 | A | 0.0 | A | 0.0 | A | 0.0 |
| SB Approach – Left Turn Lane | A | 1.5 | A | 7.5 | A | 1.2 | B | 18.1 |
| SB Approach – Through Lane | A | 5.9 | A | 3.5 | B | 11.3 | A | 3.7 |
| SB Approach – Right Turn Lane | A | 1.7. | A | 2.1 | A | 1.4 | A | 1.8 |
| SB Approach | A | 5.7 | A | 3.6 | B | 10.8 | A | 4.2 |
| EB Approach | D | 53.1 | D | 54.8 | E | 67.9 | E | 71.0 |
| Intersection | A | 5.1 | A | 5.5 | A | 8.9 | A | 9.8 |

**ROUNDABOUT**

Several roundabout configurations were analyzed for operational performance. Those roundabouts were:

- Single-lane roundabout
- Multi-lane approaches on SR 9 with single-lane approaches on Bethany Bend
- Multi-lane roundabout

In certain cases, roundabouts can offer an efficient alternative to signalizing an intersection. Generally, ADT thresholds (total entering volume) for single- and multi-lane roundabouts are 25,000 vpd and 45,000 vpd respectively. The entering ADT forecasted for 2017 is approximately 27,300 vpd. This preliminary investigation suggests that the demand on the intersection will exceed capacity of a single-lane roundabout, but that a multi-lane roundabout could be a feasible solution.

The roundabout analyses were conducted using the Georgia Department of Transportation's Roundabout Analysis Tool v2.1. The methodology used by this tool is detailed in the *2010 Highway Capacity Manual* and is applicable for various types of roundabouts, including those with bypass lanes, and single- and multi-lane approaches of different combinations. GDOT's tool also provides two different calibrations of the HCM model based on observations at roundabouts where driver familiarity is low as well as where it is more common for drivers to encounter roundabouts. The tool recommends using the "less familiar" calibration to analyze operations in the opening year, and then using the "more familiar" calibration for operations at the design year. A full documentation of each analysis can be found in the appendix of this document.

Single Lane Roundabout

The first scenario which was studied was a roundabout with single lanes on all four approaches. It is assumed that a right-turn bypass lane would exist for all four approaches. This is a common design for roundabouts and can be constructed with wide shoulders to accommodate the widening of the SR 9 corridor at a later date. ***Table 8*** shows the 2017 and 2027 delay and LOS for each approach in this scenario. It should be noted that major failure occurs on multiple approaches under these conditions, and therefore, further analysis of this configuration was not examined.

**Table 8: 2017 & 2027 Peak Hour LOS and Delay for Single-Lane Roundabout**

| Approach | 2017 Single Lane RAB | | | | 2027 Single Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | D | 28.2 | **F** | **278.0** | D | 26.9 | **F** | **280.6** |
| WB Approach | C | 17.0 | **F** | **218.0** | C | 15.0 | **F** | **178.4** |
| SB Approach | **F** | **142.8** | E | 47.9 | **F** | **159.9** | E | 42.6 |
| EB Approach | **F** | **143** | B | 14.0 | **F** | **147.0** | B | 11.3 |
| Intersection | **F** | **106.7** | **F** | **166.6** | **F** | **114.4** | **F** | **160.5** |

Single/Multi-Lane Roundabout

With the opening of the 4-lane corridor, the roundabout would have multi-lane approaches on at least the north- and southbound legs, so this became the second roundabout configuration that was analyzed. A right-turn bypass lane for the northern and southern legs was included in the analysis. The inside lanes on the north- and southbound approaches would be used for the through and left turn movement, while the outside lanes would be used for the through movement only. The modeled scenario required traffic on the east- and westbound approaches to cross both lanes of circulating traffic and use only the inside lane once within the roundabout. A right turn, left turn or through movement would be possible from this inside lane for the minor street. ***Table 9*** details the LOS and delay for each approach in this scenario.

**Table 9: 2017 & 2027 Peak Hour LOS and Delay for Single/Multi-Lane Roundabout**

| Approach | 2017 Single/Multi Lane RAB | | | | 2027 Single/Multi Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | B | 11.8 | C | 24.8 | B | 10.6 | C | 20.4 |
| WB Approach | B | 14.6 | **F** | **77.5** | B | 13.9 | **F** | **198.6** |
| SB Approach | C | 16.6 | B | 12.3 | B | 14.8 | B | 11.4 |
| EB Approach | **F** | **304** | C | 22.4 | **F** | **426.1** | C | 23.1 |
| Intersection | **F** | **100.1** | D | 28.2 | **F** | **135.1** | E | 42.2 |

The combination of single- and multi-lane approaches is expected to fail in the AM peak period by 2017, however, use of a bypass lane on the eastbound approach would reduce overall

intersection delay to an LOS of "D". The delay for the eastbound approach would be reduced to 54.8 seconds, but would remain at an LOS of "F" in 2017. In 2027, the same eastbound bypass lane would reduce overall intersection delay from 135.1 seconds to 38.4 seconds, which translates to an LOS of "E". The delay for the eastbound approach would go down to 98 seconds, but would again remain at an LOS of "F". In both the opening year of 2017 and the design year of 2027, the westbound approach fails during the PM peak, and a bypass lane would not improve the delay for this approach. This failure is due to the heavy through volumes in the northbound direction which act as a conflicting flow for the through and left turning traffic on the westbound approach. It should also be noted that adding a bypass lane to either the east- or westbound approach would require a larger roundabout footprint and therefore will have impacts to adjacent parcels such as the Starbucks and Salon V9.

Multi-Lane Roundabout

The multi-lane design which was considered at this location incorporated right-turn bypass lanes for the northbound and southbound approaches. The inside lanes for all approaches were for the left turn and through movements, while the outside lane was reserved for the through and right turn movements. A roundabout with two lanes on each approach performed well, with the only approach failure occurring in the 2027 AM peak on the eastbound approach. Heavy right turns paired with heavy conflicting southbound through traffic leads to this operational failure. See ***Table 10*** for LOS and delay results.

**Table 10: 2017 & 2027 Peak Hour LOS and Delay for Multi-Lane Roundabout**

| Approach | 2017 Multi-Lane RAB | | | | 2027 Multi-Lane RAB | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach | A | 9.3 | C | 18.0 | A | 8.4 | B | 13.1 |
| WB Approach | A | 9.3 | C | 21.4 | A | 8.9 | E | 39.1 |
| SB Approach | B | 12.8 | A | 9.8 | B | 10.9 | A | 9.0 |
| EB Approach | E | 37.9 | B | 10.9 | **F** | **71.5** | B | 10.8 |
| Intersection | C | 19.1 | C | 15.1 | D | 28.1 | C | 15.1 |

A right turn bypass lane would reduce approach delay from 71.5 seconds (LOS of "F") to 27.5 seconds (LOS of "D") on the eastbound approach but would impact the adjacent businesses in the Publix shopping center.

Two variations of the multi-lane roundabout were studied to determine the optimal lane configuration. Those variations included:

- Outside lanes on the east- and westbound approaches were used as a right-turn only lane
- Bypass lanes in place on all four approaches

The first variation resulted with a similar failure during the morning peak travel time in 2027 for the eastbound approach as well as an additional failure in the 2027 westbound afternoon peak travel time. The second variation which includes two-lane approaches on all four legs with an

additional right turn bypass for each approach yielded the most effective operational configuration. Preliminary attempts to design the roundabout with this approach lane configuration suggest that a significant reconstruction of the site would be required, and would involve major acquisition of additional right of way near businesses such as Starbucks and Salon V9.

**REALIGNMENT OF BETHANY BEND**

A fifth alternative involving the reconstruction of Bethany Bend has been examined as well. ***Figure 11*** illustrates this alternative alignment. The benefit to this design is that the intersection retains the standard intersection design with a more perpendicular skew. However, it requires significant additional right-of-way.

***Table 11*** provides the LOS for each lane and approach under 2017 and 2027 conditions. This configuration does experience extensive side street delays, especially by 2027, due to the fact that the volumes on the corridor are exceeding the capacity of a 2-lane road. Operationally, the intersection performs relatively well when compared to the offset intersection design and the jughandle design. It should be noted that the levels of service found in ***Table 11*** were achieved through the use of permitted-protected left turn phasing paired with an eastbound right turn overlap phase.

This design simplifies the intersection and accommodates pedestrian crossings well. The skewed intersection would be replaced by a traditional perpendicular crossing and would remove the hazardous sight distance condition for eastbound right turners.

**Figure 11: Bethany Bend Realignment**

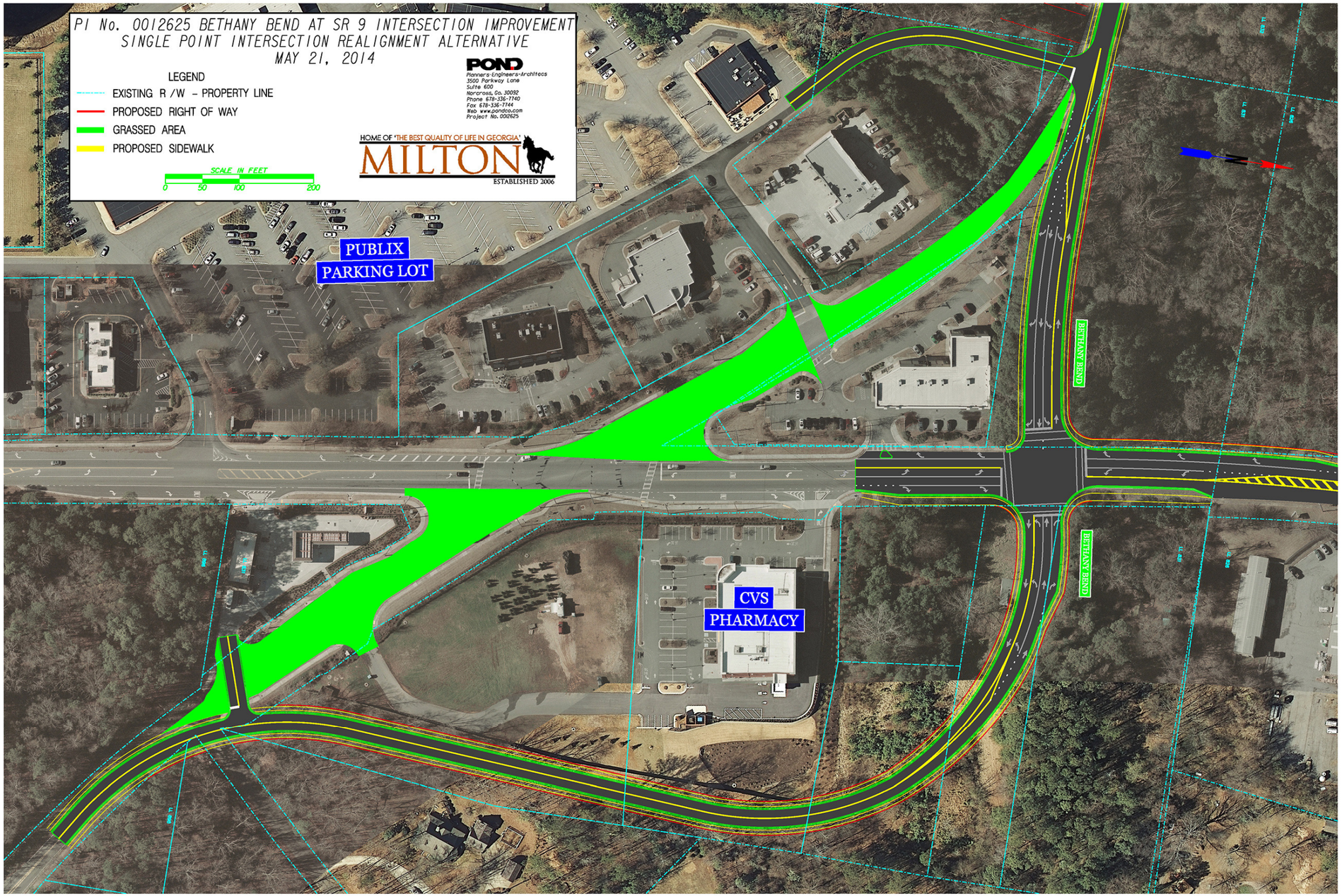


**Table 11: 2017 and 2027 Peak Hour LOS and Delay with Realignment**

| Peak Hour Intersection Level-of-Service (LOS) | 2017 Realignment | | | | 2017 Realignment | | | |
|---|---|---|---|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | C | 29.7 | B | 13.1 | **F** | **134.8** | B | 17.1 |
| NB Approach – Through Lane | B | 13.2 | D | 40.0 | B | 14.5 | **F** | **79.4** |
| NB Approach – Right Turn Lane | B | 10.1 | A | 9.1 | B | 10.5 | A | 8.5 |
| NB Approach | B | 17.4 | C | 34.4 | D | 45.8 | E | 66.7 |
| WB Approach – Left Turn Lane | E | 55.4 | E | 55.0 | **F** | **99.0** | **F** | **85.7** |
| WB Approach – Through Lane | E | 57.0 | **F** | **104.7** | E | 62.4 | **F** | **177.3** |
| WB Approach – Right Turn Lane | D | 49.2 | D | 51.9 | D | 49.8 | D | 53.1 |
| WB Approach | E | 55.6 | **F** | **84.6** | E | 72.3 | **F** | **138.0** |
| SB Approach – Left Turn Lane | B | 11.0 | C | 33.4 | B | 12.0 | D | 44.5 |
| SB Approach – Through Lane | C | 32.2 | B | 17.7 | **F** | **64.0** | B | 19.6 |
| SB Approach – Right Turn Lane | B | 13.5 | B | 11.5 | B | 15.2 | B | 11.4 |
| SB Approach | C | 28.6 | B | 17.3 | D | 54.7 | B | 19.4 |
| EB Approach – Left Turn Lane | E | 61.1 | **F** | **129.7** | **F** | **104.0** | **F** | **249.7** |
| EB Approach – Through Lane | E | 69.7 | E | 59.1 | **F** | **96.9** | E | 73.0 |
| EB Approach – Right Turn Lane | E | 58.9 | D | 51.1 | E | 67.7 | E | 56.0 |
| EB Approach | E | 63.6 | E | 80.0 | **F** | **88.1** | **F** | **126.3** |
| Intersection | D | 39.9 | D | 43.6 | E | 64.9 | E | 72.5 |

**COMPARISON OF ALTERNATIVES**

***Table 12*** below is an illustrative comparison of the 8 alternatives for the treatment of the Bethany Bend and SR 9 intersection. Note that the while the no-build, the minor improvements and the jughandle configuration all fail by 2027, this does not consider impacts to intersection capacity caused by the SR 9 widening, which is expected to add capacity. The two alternatives which successfully removes the skew completely are the offset intersections and the realignment of Bethany Bend. All improvements would make pedestrians more visible to drivers. The constructability column is a relative ranking of whether construction would impact daily traffic and whether property owners in the area would require right-of-way compensation. Education would be recommended for the more uncommon designs of the jughandles and the roundabouts. The relative cost column is determined based on the likelihood of additional right-of-way needs, potential design costs, and construction costs.

**Table 12: Alternative Comparison Matrix**

| Alternative | Operations & Geometry | | | Pedestrian Safety | | Implementation | | |
|---|---|---|---|---|---|---|---|---|
| | 2027 LOS (AM/PM) | 2042 LOS | Removes Skew | Visibility | Crossing Distance | Constructability | Driver Expectancy | Cost |
| No-Build | F/F | N/A* | No, insufficient sight distance | not visible from stop bar | 50'-65' | No impacts | Common Configuration | $ |
| Minor Improvements | F/F | E/E | No | visible from stop bar | 85'-100' | Minimal impacts to traffic | Common Configuration | $$ |
| Offset Intersections | D/E | C/B | Yes | visible from stop bar | 55'-65' | Moderate impacts to traffic and property owners | Common Configuration | $$$ |
| Jughandles | D/F | B/D | No, but minimizes effects | visible from stop bar | 85'-100' | Moderate impacts to traffic and property owners | Uncommon Configuration | $$$ |
| Roundabout - Single Lane | F/F | N/A* | No | visible from approaches | 55'-65' | Moderate impacts to traffic and property owners | Common Configuration | $$$ |
| Roundabout - Single/Multi Lane | F/E | N/A* | No | visible from approaches | 55'-65' | Moderate impacts to traffic and property owners | Uncommon Configuration | $$$ |
| Roundabout - Multi-lane | D/C | N/A* | No | visible from approaches | 55'-65' | Heavy impacts to traffic and property owners | Uncommon Configuration | $$$ |
| Realignment | E/E | D/D | Yes | Visible from approaches | 55-65' | Heavy impacts to traffic and property owners | Common Configuration | $$$ |

***** *Scenario not analyzed for 2042 due to significant operational failure, major impacts, or lack of safety improvements*

From ***Table 12***, four alternatives were chosen for further study to determine the capacity and LOS at 2042, which is the design year of the GDOT project to widen the SR 9 corridor (PI #0007838**)**. Those alternatives are:

- Minor Improvements
- Offset Intersections
- Jughandles
- Realignment

The no-build scenario was not selected for 2042 analysis since it does not improve pedestrian conditions, and therefore is not an ideal solution. The roundabout variations were not determined to be feasible. The single lane roundabout's capacity is not sufficient to meet existing demands. The combination of a single/multi-lane roundabout is not feasible since the intersection fails by 2027. The multi-lane roundabout would be a feasible solution if not for the heavy AM right turns made from Bethany Bend onto SR 9 southbound. The available space at the site is constrained due to parking lots and businesses, and adding bypass lanes would have significant impacts. Therefore, at this time, the multi-lane roundabout was determined not to be a feasible alternative.

# 2042 TRAFFIC ANALYSIS

This section documents the results from the intersection capacity analyses of the three feasible alternatives using 2042 build volumes and lane configurations for the SR 9 widening project. Lane configurations for the SR 9 widening project consist of an additional through lane in each direction along the SR 9 corridor. Left turn and right turn treatments, such as dual turn lanes, are assumptions based on vehicle volumes and Synchro model results. The volumes are taken from the approved balanced flow diagrams for PI #0007838, which can be found in the appendix of this document.

### MINOR OPERATIONAL IMPROVEMENTS

***Table 13*** shows the LOS and delay for each approach with the previously described minor improvements under the build conditions at 2042. Notably, the left turn lanes fail on each approach in these conditions. One potential solution to the limited capacity condition is to add dual left turn lanes on each approach. Dual left turns from the northbound and southbound directions would require at least two receiving lanes on the east- and westbound approaches to make the maneuver possible. Dual left turns from the east- and westbound directions may not be possible due to limited space caused by the sharp angle of the turn. Therefore, improving the intersection with the minor modifications outlined in the “Alternatives Analysis” would most likely only be sufficient as a short term solution. The severe skew limits the use of necessary long-range auxiliary lanes, and preliminary estimates shows that these dual left turn lanes are needed in this configuration to improve throughput. Reconstruction of the intersection into either the offset intersections or jughandles would likely be required as part of the SR 9 corridor project to accommodate demands at the design year.

**Table 13: 2042 Peak Hour LOS and Delay for Minor Operational Improvements**

| Peak Hour Intersection Level-of-Service (LOS) | 2042 Minor Operational Improvements | | | |
|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | **F** | **128.9** | **F** | **126.3** |
| NB Approach – Through/Right Turn Lane | C | 23.9 | D | 54.6 |
| NB Approach | D | 46.9 | E | 63.9 |
| WB Approach – Left Turn Lane | **F** | **118.7** | **F** | **93.5** |
| WB Approach – Through Lane | **F** | **145.7** | F | 114.6 |
| WB Approach – Right Turn Lane | E | 60.7 | D | 53.8 |
| WB Approach | **F** | **126.6** | **F** | **101.1** |
| SB Approach – Left Turn Lane | **F** | **85.9** | **F** | **132.6** |
| SB Approach – Through/Right Turn Lane | D | 44.7 | D | 42.2 |
| SB Approach | D | 46.7 | D | 50.4 |
| EB Approach – Left Turn Lane | **F** | **121.8** | **F** | **129.0** |
| EB Approach – Through Lane | E | 76.8 | D | 52.7 |
| EB Approach – Right Turn Lane | C | 31.4 | B | 17.8 |
| EB Approach | E | 75.8 | E | 73.3 |
| Intersection | E | 64.6 | E | 67.0 |

**OFFSET INTERSECTIONS**

The offset intersection design performs well even as far into the future as the 2042 design year of SR 9. The land need to construct this design is relatively undeveloped at this time, and it is recommended that right-of-way be acquired now before development can occur. The design successfully removes the sharp skew of the intersection, and makes pedestrian crossings more practical and visible. Traffic would be required to travel through two signalized intersections instead of the existing one, therefore, signal coordination should be investigated to mitigate delays. Also, this analysis makes use of dual left turn lanes at the northern intersection's northbound approach and at the southern intersection's southbound approach. Dual right turn lanes are used to accommodate heavy right turns at the northern intersection's eastbound approach. The results of the 2042 analysis are shown in ***Table 14***.

**Table 14: 2042 Peak Hour LOS and Delay for Offset Intersections**

| Approach | 2042 Offset Intersections | | | |
|---|---|---|---|---|
| | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | |
| NB Approach – Dual Left Turn Lanes | C | 30.0 | B | 17.3 |
| NB Approach – Through/Right Turn Lanes | B | 10.5 | B | 13.1 |
| NB Approach | B | 17.8 | B | 14.1 |
| WB Approach – Left Turn Lane | D | 48.6 | D | 49.9 |
| WB Approach – Through/Right Turn Lane | D | 47.2 | D | 50.9 |
| WB Approach | D | 48.1 | D | 50.6 |
| SB Approach – Left Turn Lane | B | 13.5 | B | 19.8 |
| SB Approach – Through Lanes | C | 24.9 | B | 17.1 |
| SB Approach – Right Turn Lane | B | 18.1 | B | 14.5 |
| SB Approach | C | 23.6 | B | 16.5 |
| EB Approach – Left Turn Lane | D | 43.5 | D | 42.9 |
| EB Approach – Through Lane | C | 28.3 | C | 30.8 |
| EB Approach – Dual Right Turn Lanes | D | 52.1 | D | 36.9 |
| EB Approach | D | 49.3 | D | 39.3 |
| Intersection | C | 29.6 | B | 19.1 |
| **Southern Intersection** | | | | |
| NB Approach – Left Turn Lane | B | 11.6 | B | 11.3 |
| NB Approach – Through Lanes | B | 10.4 | C | 29.5 |
| NB Approach – Right Turn Lane | A | 8.2 | B | 10.8 |
| NB Approach | B | 10.4 | C | 24.2 |
| WB Approach – Left Turn Lane | D | 47.6 | D | 38.9 |
| WB Approach – Through Lane | C | 27.1 | C | 30.6 |
| WB Approach – Right Turn Lane | D | 52.6 | E | 67.8 |
| WB Approach | D | 47.9 | E | 56.0 |
| SB Approach – Dual Left Turn Lanes | A | 7.1 | C | 33.0 |
| SB Approach – Through Lanes | B | 13.0 | B | 13.9 |
| SB Approach – Right Turn Lane | A | 6.4 | B | 10.7 |
| SB Approach | B | 11.6 | B | 17.5 |
| EB Approach – Through/Left Turn Lane | A | 0.0 | A | 0.0 |
| EB Approach – Right Turn Lane | D | 42.0 | D | 46.6 |
| EB Approach | C | 23.7 | C | 26.6 |
| Intersection | B | 16.8 | C | 26.6 |

**JUGHANDLE INTERSECTIONS**

The jughandle configuration also performs well at the 2042 design year. The results from the analysis are shown in ***Table 15.*** Dual left turn lanes are not necessary with the jughandle configuration.

**Table 15: 2042 Peak Hour LOS and Delay for Jughandle Intersections**

| Approach | 2042 Jughandle Intersections | | | |
|---|---|---|---|---|
| | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| **Northern Intersection** | | | | |
| NB Approach – Left Turn Lane | A | 5.5 | A | 3.6 |
| NB Approach – Through/Right Turn Lane | A | 1.6 | A | 3.3 |
| NB Approach | A | 2.2 | A | 3.3 |
| WB Approach – Left Turn Lane | D | 48.3 | E | 78.8 |
| WB Approach – Through/Right Turn Lane | C | 34.6 | D | 44.5 |
| WB Approach | D | 42.9 | D | 54.3 |
| SB Approach – Left Turn Lane | A | 2.4 | A | 3.3 |
| SB Approach – Through Lane | A | 4.7 | A | 3.7 |
| SB Approach – Right Turn Lane | A | 3.6 | A | 3.2 |
| SB Approach | A | 4.5 | A | 3.6 |
| EB Approach – Right Turn Lane | A | 0.0 | A | 0.0 |
| Intersection | A | 4.0 | A | 3.6 |
| **Central Intersection** | | | | |
| NB Approach | C | 27.1 | E | 70.3 |
| WB Approach – Through Lane | C | 24.1 | C | 32.5 |
| WB Approach – Right Turn Lane | B | 19.8 | C | 23.3 |
| WB Approach | C | 23.6 | C | 31.5 |
| SB Approach | D | 38.2 | B | 16.9 |
| EB Approach – Through Lane | D | 49.0 | C | 32.1 |
| EB Approach – Right Turn Lane | C | 25.8 | C | 25.9 |
| EB Approach | D | 41.2 | C | 30.2 |
| Intersection | C | 34.5 | D | 45.1 |
| **Southern Intersection** | | | | |
| NB Approach – Left Turn Lane | A | 3.4 | A | 2.5 |
| NB Approach – Through Lane | A | 2.3 | B | 4.3 |
| NB Approach – Right Turn Lane | A | 1.8 | A | 2.1 |
| NB Approach | A | 2.4 | B | 4.1 |
| WB Approach | A | 0.0 | A | 0.0 |
| SB Approach – Left Turn Lane | A | 1.5 | A | 5.5 |
| SB Approach – Through Lane | A | 3.6 | A | 3.2 |
| SB Approach – Right Turn Lane | A | 1.7 | A | 2.2 |
| SB Approach | A | 3.5 | A | 3.2 |
| EB Approach | E | 56.4 | E | 57.2 |
| Intersection | A | 3.3 | A | 4.2 |

**BETHANY BEND REALIGNMENT**

The realignment of Bethany Bend also performs well at the 2042 design year. The results from the analysis are shown in ***Table 16.*** The realignment design requires dual left turn lanes on the eastbound approach of Bethany Bend.

**Table 16: 2042 Peak Hour LOS and Delay with Realignment**

| Peak Hour Intersection Level-of-Service (LOS) | 2042 Bethany Bend Realignment | | | |
|---|---|---|---|---|
| Approach | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| NB Approach – Left Turn Lane | E | 61.4 | C | 33.1 |
| NB Approach – Through Lane | C | 20.4 | D | 46.3 |
| NB Approach – Right Turn Lane | B | 16.4 | B | 17.2 |
| NB Approach | C | 28.9 | D | 43.0 |
| WB Approach – Left Turn Lane | D | 42.5 | D | 38.5 |
| WB Approach – Through Lane | D | 51.6 | E | 78.7 |
| WB Approach – Right Turn Lane | D | 43.3 | D | 44.3 |
| WB Approach | D | 47.7 | E | 62.4 |
| SB Approach – Left Turn Lane | B | 17.6 | D | 44.3 |
| SB Approach – Through Lane | D | 39.1 | C | 29.1 |
| SB Approach – Right Turn Lane | C | 26.1 | C | 25.2 |
| SB Approach | D | 35.9 | C | 29.4 |
| EB Approach – Left Turn Lane | E | 79.1 | E | 78.6 |
| EB Approach – Through Lane | E | 69.5 | D | 49.5 |
| EB Approach – Right Turn Lane | D | 50.6 | D | 38.6 |
| EB Approach | E | 66.2 | E | 58.1 |
| Intersection | D | 44.1 | D | 43.7 |

**MCGINNIS FERRY ROAD INTERCHANGE WITH SR 400**

In preparation for a potential interchange at McGinnis Ferry Road and SR 400, this study investigated possible impacts to the alternatives put forth in this document. The Interchange Justification Report (IJR) prepared for GDOT by Moreland Altobelli Associates in 2013 forecasted that an additional 8,800 vehicles per day would use Bethany Bend near the southern terminus of the road as a result of the new interchange with SR 400. Using general assumptions regarding directional volumes at peak times based on derived k-factors along Bethany Bend, additional demand caused by the interchange was estimated to be 655 vph in the AM and 745 vph in the PM peak at the intersection of Bethany Bend and SR 9. This additional demand would likely require the use of right turn overlap phases on Bethany Bend to clear the through traffic effectively under the proposed offset intersection concept. The westbound approach of Bethany Bend would also require a dual right turn lane. Intersection LOS with the additional traffic for both intersections (north and south) is not expected to exceed a “D”. See the traffic report related to PI #0007838 for greater detail regarding this added traffic.

# CONCLUSIONS AND RECOMMENDATIONS

## CONCLUSIONS

The intersection of Bethany Bend and State Route 9 is approaching an over-capacity condition at peak times and also possesses potentially hazardous elements for drivers and pedestrians. The SR 9 corridor is currently under preliminary engineering design to be widened from a 2-lane road to a 4-lane divided road with access management design elements and is expected to open to the public in 2022. This study examines several alternatives which the city of Milton can implement in the short-term to relieve some of the congestion at the intersection, and improve pedestrian conditions. Each alternative was reviewed and three were selected for further analysis using 2042 volumes in an attempt to estimate their operational level of service at the design year of the SR 9 corridor. A brief summary of each alternative is found below, as well as recommendations on each treatment.

- No-Build Alternative: The intersection is expected to fail at some time in 2019. Without improvements at the intersection, pedestrian safety will still be a concern, as drivers will not expect to encounter pedestrians due to the skew of the intersection. Therefore, this scenario was not investigated further.
- Minor Improvements: The minor improvements consist of (***see Figure 6***):
    - Add a westbound right turn lane
    - Prohibit right turns on red on eastbound approaches
    - Re-time the north- and southbound left turn phases to a lead-lag configuration
    - Re-hang the span wires which hold traffic signals to improve spacing
    - Install louvers on all signal faces
    - Over-lap the right turn phase from the eastbound approach with the leading left turn phase from the northbound approach to accommodate heavy right turn volumes
    - Install truck apron within southbound channelized right turn lane to improve turning radius for large vehicles

  The minor improvements do not significantly relieve congestion at the intersection, and the level of service is expected to drop to an "F" at some point in 2019, which is three years prior to the opening of the 4-lane SR 9. This scenario was analyzed under 2042 build conditions as well. The intersection was found to fail on many approaches by 2042. Adding dual auxiliary lanes would likely improve conditions, but the skewed geometry limits the location of these lanes. This scenario offers a cost effective means to improve safety for pedestrians in the short-term, however a full reconstruction of the intersection is recommended as part of the GDOT project PI #0007838.
- Offset Intersections: Offset intersections perform very well and are one of the only alternatives that don't fail before the open date of the SR 9 corridor. Acquisition of necessary right-of-way is recommended now before the land is developed. This alternative would require roadway sections on new alignment, resulting in significant costs. However, it is less expensive than the jughandle intersections, due to the fact that less pavement is needed, and only two signals would need to be installed and maintained. Dual auxiliary lanes are expected on certain approaches, and further study should be conducted to determine turn bay lengths and locations. Signal coordination is recommended to avoid frequent stops for through traffic.

- Jughandle Intersections: The jughandle intersections also perform very well, even at the 2042 design year for SR 9. However, this is estimated to be a more costly design than the offset intersections because the jughandles require additional right-of-way and pavement. The design also requires three signals that need to be installed and maintained. In addition, this design is uncommon, and driver education is recommended. As previously mentioned, prohibiting left turns at the central intersection is a challenge that would need to be accomplished with proper signage and enforcement.
- Roundabout: The roundabouts with single lane approaches on at least the minor street do not provide sufficient capacity to accommodate the expected traffic volumes on the busy corridor. The one configuration which did operate well at 2027 was the multi-lane roundabout with two lanes on each approach. It is anticipated that significant reconstruction of the site would be required to align the entry points at a safe location on the roundabout. This reconstruction would impact businesses on either side of the intersection, and therefore this design was not considered to be a feasible solution.
- Realignment of Bethany Bend: The realignment of Bethany Bend performs very well prior to the SR 9 widening, as well as after the corridor is widened. It is estimated to be the most costly design due to the prerequisite right of way needs. The alignment would run through undeveloped property where plans are currently being made to rezone and develop. It does offer the most simplistic design of the three feasible alternatives, as it is a simple 4-legged intersection.

**RECOMMENDATIONS**

- Realign Bethany Bend to intersect SR 9 at right angles (offset intersections). The southern realignment should intersect opposite the Publix driveway on SR 9. The northern realignment should intersect at a location north of the businesses in the northwest corner of the site.
- Remove pavement and skewed crossing on Bethany Bend northwest and southeast of the intersection.
- Retain access to Publix driveway on Bethany Bend.
- Investigate signal coordination to provide consecutive green signals for vehicles traveling through the intersections on Bethany Bend and SR 9.
- Consider developing a backage road that extends behind the CVS on the east side of SR 9. This would be in anticipation of redevelopment of the unused parcel south of CVS.
- Consider creating greenspace in areas where existing pavement is removed to enhance pedestrian experience.

Attachment 9
Minutes of Concept Meetings

POND

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# MEETING MINUTES

**Project:** PI 0012625 – SR 9 @CS 1326/Bethany Bend Road
**Pond Project No:** 1140138
**Meeting:** Concept Team Meeting
**Meeting Location:** GDOT – District 7 Office, Chamblee
**Meeting date:** October 30,2014

Minutes prepared by: Arwin Lopez
Prepared on: November 5, 2014

**Attendees:**

| Name | Company/Dept./ Branch | Phone | E-mail |
|---|---|---|---|
| Vinesha Pegram | GDOT-OPD | 404-631-1587 | vpegram@dot.ga.gov |
| Scott Lee | GDOT-D7-Preconst. | 770-986-1261 | slee@dot.ga.gov |
| Julia Billings | GDOT - Planning | 404-631-1774 | jbillings@dot.ga.gov |
| Mike Lobdell | GDOT-D7-Traffic | 770-986-1765 | mlobdell@dot.ga.gov |
| Sara Leaders | City of Milton | 678-242-2626 | sara.leaders@cityofmiltonga.us |
| Kevin Skinner | Pond & Company | 678-336-7740 | skinnerk@pondco.com |
| Graham Malone | Pond & Company | 678-336-7740 | maloneg@pondco.com |
| Arwin Lopez | Pond & Company | 678-336-7740 | lopeza@pondco.com |
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| Ashley Ikpelve | GDOT- D7 | 770-986-1765 | aikepeve@dot.ga.gov |
| Persephone C. Goodwin | GDOT-D7-Construction | 770-986-1360 | pgoodwin@dot.ga.gov |
| Joel Cantoran | GDOT - Engineering | 678-2099603 | jcantoran@dot.ga.gov |
| Kaycee Mertz | GDOT - Planning | 404-349-0245 | kmertz@dot.ga.gov |
| Shun Pringle | GDOT - D7- Construction | 707-986-1414 | springle@dot.ga.gov |

**Meeting Minutes:**

Vinesha Pegram began the meeting by stating that this project is currently funded to concept phase. Arwin Lopez stated that this project concept was developed in conjunction with PI 0007838 SR 9 Widening and Operational Improvements from Windward Pkwy to Forsyth Co. line.

Arwin Lopez described the location of the project and the existing conditions of the intersection of SR 9 and Bethany Bend. He explained the substandard intersection skew and its effect on sight distance. He described that the horizontal sight distance problem is compounded by a vertical sag curve along SR9 just north of the intersection. He also stated that there is an increasing trend in vehicular accidents as shown in the crash reports of the last 5 years. He also mentioned that fortunately there have been no recent reports of accidents involving pedestrians; however, due to the sight distance problem pedestrian safety is a concern.

Arwin proceeded to explain the environmental features identified by GT Hill's screening. GT Hill identified an intermittent stream 900 feet west of the intersection and south of Bethany Bend road. He stated the estimated improvements at the location of the stream would be the extension of the culvert at Bethany Bend which would require a 404 permit.

Kevin Skinner gave a status update of PI 007838 SR 9 Widening and Operational Improvements from Windward Pkwy to Forsyth Co. line. He informed that the Concept Report and Traffic Study has been approved. Also, the environmental document for this project is being prepared by Kimley-Horn. The environmental document will cover multiple projects

along the SR 9 corridor. Richard O'Hara asked if this environmental document would cover this project (PI 0012625 SR9 @ CS 1326 Bethany Bend). Kevin confirmed that it would cover the project.

Sara Leaders with the City of Milton proceeded by giving an update on another project within the vicinity, PI 0012881. She informed that the project consists of the concept study of a multi-use trail connectivity between a Windward Park Activity Center located west of the intersection of SR 9 and Bethany Bend to the Big Creek Greenway Trail system east of SR 400. The project is currently evaluating the potential of a pedestrian underpass at the intersection of SR9 and Bethany Bend. However, Sara mentioned the potential underpass could be constructed once Bethany Bend is realigned, and the old Bethany Bend right-of-way could be repurposed for the location of the trail and underpass.

Graham Malone informed that the SR9 @ Bethany Bend traffic study included a "what-if" scenario in the event that a planned new interchange on SR 400 at McGinnis Ferry Road was to be built.

Arwin Lopez proceed to go over the design alternatives developed which included a short term alternative, a long term alternative (Offset "T" intersection), Single point intersection Realignment, Roundabout, and Jug-handle. The reasoning for having two preferred alternatives (Short and long term) was due to the effort of addressing some of the intersection issues in the short term in response to the increasing accident rates. Additionally, the long term alternative was included in order to have an executable plan in the event the widening of SR 9 under PI0007838 were delayed.

Sara Leaders added that the environmental document for PI 0007838 is scheduled for approval for early 2017 and the commencement of construction is programmed for February 2020. She explained that there is a short span of time between the environmental document approval and construction of PI0007838 for the implementation of the long term preferred alternative. However, as stated earlier, the City would like to have their options open if PI0007838 were to be delayed.

Arwin Lopez informed that the project used the approved traffic from PI007838 and that it is expected to be constructed under traffic and without offsite detours. He also mentioned that a PIOH was held on May 21, 2014. Sara added that the public favored, in the long term, the Offset "T" alternative.

Sara stated that the City is planning on applying for a funding call through ARC and would like to use the approved concept report as part of the application.

Vinesha Pegram commented that the concept report should include the documentation for the approved traffic from PI0007838. She also recommended the concept report be modified to only show one preferred alternative. She suggested the "long term alternative" be referred to as "long term plan".

Richard O'Hara asked if the GT Hill environmental screening identified the need for the northern long-eared bat. Arwin replied that yes they did and more studies are required to determine project impacts on the northern long-eared bat for any alternative that would require construction activities within the nearby woodlands. Arwin added that the environmental studies lead by Kimley-Horn will be assessing that impact. Richard also commented that the project justification should state a clear need and purpose and that removing the second long term alternative would be clearer.

## Action Items:

It was agreed that the concept report should be revised to show one preferred alternative to clearly convey the need and purpose. Also the concept report should be revised soon so Department staff may have adequate time for review in order to meet the expected January approval.

Attachment 10
Minutes of Any Meetings that shows support or objection to the concept *(e.g. PIOH, PHOH, Detour Meeting, Town Hall Meeting, etc.)*

Project: State Route 9 at Bethany Bend Intersection Concept Study
Meeting Location: Milton City Hall
Meeting Date: November 20, 2013
Minutes Prepared By: Graham Malone
Minutes Prepared On: December 3, 2013

Attendees:

| Name: | Organization: | Email Address: |
|---|---|---|
| Sara Leaders | City of Milton | Sara.leaders@cityofmiltonga.us |
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| Kevin Skinner | Pond & Company | skinnerk@pondco.com |
| Richard Fangmann | Pond & Company | fangmannr@pondco.com |
| Arwin Lopez | Pond & Company | lopeza@pondco.com |
| Graham Malone | Pond & Company | maloneg@pondco.com |

Meeting Agenda

The purpose of this meeting was to discuss the project's progress, schedule and coordination. Pond & Company provided three design alternatives to be considered for inclusion in a January public information open house meeting. These alternatives are:

- Roundabout
- Offset "T" intersections
- Jughandles

Discussion Topics

- The traffic volumes to be used in the alternatives analysis are currently being reviewed and approved by GDOT's Office of Planning, in conjunction with the volumes used in the State Route 9 widening project. A growth rate of 1.29% per year has been approved by GDOT. Pond & Company will investigate using a stronger up-front growth rate for this shorter-term intersection improvement project.
- A major concern which has been brought up by the public is the difficulty that pedestrians experience when crossing the intersection. The southern leg is particularly difficult to cross due to the angle of approach for eastbound right-turning vehicles. Current intersection geometry does not allow for a refuge island on the western corner, and vehicles approach this right turn at higher than average speeds due to the intersection's skewed nature. Numerous students from Cambridge High School walk to campus, and are required to cross here as well.
- Roundabout alternative
    - This alternative requires a moderate footprint, and would require some right of way acquisition.
    - Impacts to the Shell gas station parcel may be extensive.
    - The open spaces of a roundabout design would improve pedestrian crossings.
    - A roundabout in this location may be able to handle existing demand, but should be analyzed for the future, 4-lane scenario, since roundabouts can experience unacceptable queuing if volumes are too heavy (as in peak times).

- Offset "T" intersections
  - This alternative could allow for redevelopment in the area around the existing intersection, particularly on the east side of SR 9.
  - Consideration would need to be made to continue to provide the Shell gas station access for tanker trucks into and out of the facility. This could be done with a backage road that could extend behind the CVS and tie in just east of the southern "T" intersection of the realigned Bethany Bend. This backage road would also facilitate back access to adjacent parcels.
  - The southern "T" intersection would actually be a 4-leg intersection because of the Publix driveway. This could significantly decrease operational levels, depending on volumes using the driveway. Further traffic analysis is required before a recommendation can be made.
  - Right of way acquisition is minimal.
  - Pedestrian crossing would be improved, since crossings would be made at perpendicular intersecting roads rather than at the existing skew.
  - Through traffic on Bethany Bend would be required to make a right turn followed by a left turn which may be unfavorable to residents along Bethany Bend.
- Jughandles
  - Operates similarly to the offset "T" intersection, except the through traffic on Bethany Bend would continue to move through the main intersection, which would be controlled by a 2-phase signal.
  - Left turns from all approaches would be prohibited at the intersection. Drivers on Bethany Bend wishing to make a left turn would move through the intersection, and loop back around to make a right at one of two other signals. This design is similar to a freeway cloverleaf interchange. Drivers on SR 9 wishing to make a left turn would move through the intersection and make the left turn at one of two other signals.
  - Once concern which was brought up was pedestrian safety. This design does not necessarily improve pedestrian crossing, although it would provide a longer green time to cross than what is currently in place. The idea to prohibit right turns at the major intersection and pull those away to one of the minor intersections was brought up. This alternative can be analyzed further.
  - This option may be confusing to drivers, and the prohibition of left and right turns, even with signage, may not be observed by drivers.
- A continuous flow intersection was also discussed as a possible option. This design could impact adjacent parcels due to the large footprint that is required for this type of intersection. Access to parcels at the intersection may also be cut off from through traffic because of the displaced left turn lanes. Further analysis will be conducted to determine if this design is feasible.

Next Steps

- The city will host a public information open house meeting in late January to follow the city council meeting the week of January 20th.
- The three alternatives that were presented were all determined to be feasible at this time, and will be provided to the public during the open house as viable options with further traffic analysis to support the concepts.
- Pond & Company will continue to work with GDOT to finalize approved volumes along the corridor, and will begin to model each alternative for level of service. A "what-if" scenario will also be conducted to account for the possible increase in traffic along Bethany Bend which would be created by a new GA 400 interchange at McGinnis Ferry Road.

Project: State Route 9 at Bethany Bend Intersection Concept Study
Meeting Location: Milton City Hall
Meeting Date: March 20, 2014
Minutes Prepared By: Graham Malone
Minutes Prepared On: March 20, 2014

Attendees:

| Name: | Organization: | Email Address: |
|---|---|---|
| Sara Leaders | City of Milton | Sara.leaders@cityofmiltonga.us |
| Carter Lucas | City of Milton | carter.lucas@cityofmiltonga.us |
| Roddy Motes | City of Milton | roddy.motes@cityofmiltonga.us |
| Jeremy Busby | GDOT | jbusby@dot.ga.gov |
| Richard Fangmann | Pond & Company | fangmannr@pondco.com |
| Arwin Lopez | Pond & Company | lopeza@pondco.com |
| Graham Malone | Pond & Company | maloneg@pondco.com |

Meeting Agenda

The purpose of this meeting was to discuss the project's progress, the draft alternatives analyses, and how to prepare for the upcoming PIOH scheduled for May 21, 2014.

Discussion Topics

- The meeting began with an outline of observed problems at the intersection. These issues all currently affect the overall driver and pedestrian safety at the intersection. These challenges that were presented are:
    - Protected left turns from SR 9 in both northbound and southbound approaches pass by very close to one another.
    - Sight distance for right turners attempting to make a right-turn-on-red from the eastbound approach on Bethany Bend is less than required due to a low depression area north of the intersection.
    - Signal faces on several approaches are spaced such that when drivers arrive at the intersection, signal heads that direct the other approaches are partially visible. This can be confusing to drivers when conflicting signals are observed.
    - Crosswalks for the east-west pedestrian traffic (across the southern leg) are positioned such that when right turns are made from the eastbound right-turn lane drivers must travel over 150' before encountering the crosswalk. This can lead to lower driver expectancy to encounter pedestrians at this point in the turning movement.
- The group then discussed Pond & Company's ideas for improving conditions at the site. Certain immediate improvements were presented as an alternative to help improve safety for minimal costs. Immediate solutions presented for these issues are as follows:
    - Lead-lag the northbound and southbound protected left turns. This idea was seen by the group as an improvement with no negative impacts to the overall intersection.
    - Restrict right-turns-on-red for the eastbound approach. This would prevent right-turners from turning into traffic when sight distance is less than what is required by AASHTO guidelines. It was noted that AM right-turns here are particularly heavy and restricting the turns may have an adverse effect on queues. Also, in the afternoon when school is released, cars are directed by a police officer in platoons of vehicles and the inability to make a right turn on red here may cause unwanted queues. Additionally, it was decided

that crash data at the intersection should be studied to determine if a significant amount of rear-end collisions or right-angle collisions are occurring because of eastbound right turns. Pond & Company decided that further investigation of right-turn-on-red volumes and crash rates should be conducted before a recommendation is made at the upcoming PIOH.

- Change the configuration of the signal span wires over the intersection to pull signal faces back to a position that is more parallel to travel lanes. This will increase the spacing between signal heads for each adjacent approach, and should provide a clearer distinction as to which set of signals are to be followed by drivers. Also install louvers on each signal head to limit visibility from other approaches. Again, the group did not identify any negative impacts to this recommendation and was in favor of it.
- Restripe crosswalks to position them so they are in a more parallel position to lanes of travel. This would require lengthening them, but would put pedestrians at a much closer location to drivers (particularly the eastbound right-turns). Pedestrians would be more visible for right-turners. One concern that was noted is that by lengthening the crosswalks, the walk time is increased and may not be adequate from an ADA perspective. It was also noted that with the proposed alignments, pedestrians would be asked to walk a long distance in the crosswalk, then double back on their path to access the sidewalk down to the Starbucks and other retail. Some options such as a rectangular rapid flashing beacon (RRFB), overhead black-out signs, or embedded flashing yellow lights that would indicate when pedestrians are present were discussed as well. These options will be investigated, however due to the arterial classification, embedded flashing yellow lights are not preferred. RRFBs are reserved for mid-block crossings and are not feasible here.
- The group discussed the possibility of channelizing the eastbound right turn which would require construction within the intersection's right-of-way. This design would offer pedestrian refuge in a raised island. Pond & Company will provide a sketch-up of possible configurations to determine feasibility of this concept and to offer a visual for the PIOH.

- The PIOH is scheduled for May 21st. It will be a joint open house for both the Bethany Bend at SR 9 intersection project and the SR 9 corridor project. The layout for the meeting will be a focus on the corridor project in the main floor area, with a section off to the side reserved for exhibits and information relating to potential Bethany Bend intersection concept. The Bethany Bend concepts will be displayed in groups by timeframe.
  - Immediate solutions will focus on improving safety and will consist of an exhibit with a channelized right turn lane on the eastbound approach. Other information will be provided regarding studied alternatives such as an advanced ped-walk signal timing, an exclusive ped-walk phase, etc.
  - Short term solutions will be presented as a means to improve safety and operations. The offset intersection exhibit will be presented, with SR 9 shown as a 2-lane road. The jughandles will be shown as well as another concept. This idea will be presented as feasible, but more difficult to implement than the offset intersections.
  - The final build diagram will be presented as a single exhibit to show the ultimate build-out configuration of the intersection at 2042. This exhibit will show SR 9 as a divided 4-lane road and will show all dual turn lanes. The LOS of the intersections with added volume from the proposed McGinnis Ferry Road interchange will be available if questions arise.

Next Steps

- Pond will create a sketch-up of a concept for a channelized eastbound right turn lane for the PIOH.
- Pond will work to provide preliminary cost estimates for the intermediate offset intersection design and construction.
- Steps will be taken to move the concept forward to have it ready to implement should funding be awarded. This includes selecting a preferred alternative, setting up an implementation timeframe, allocating funding based on cost estimate and potentially conducting an environmental assessment if funds from any source other than the local level are used. If funds are sought through ARC, projects that are ready to move forward are generally given a higher priority in the Atlanta Regional Commission's selection process.
- Sara will provide Graham with crash data for the intersection.
- Pond & Company will further investigate the number of right turns on red being made at the intersection from the eastbound approach's right turn lane. This will give a better understanding of the effects of restricting the RTOR.

# PI0012625 Public Information Open House Comments Meeting held on May 21, 2014 at the City Hall of Milton.

| Q: Short term improvements you would suggest for the intersection of SR 9 at Bethany Bend: |
|---|
| A huge improvement must be made in the timing of the lights at the intersection of 9 and Bethany Bend. I repeatedly sit for 3 or more lights in the mornings waiting to turn north. Likewise the timing of the lights at Windward and 9 must be made. I have sat for as many of 4 lights waiting to get through that intersection on Saturdays. |
| A roundabout, or, an alternate pass through to Cogburn road/Bethany bend. Since this is single lane right now, best to give FIRST-PREFERENCE alternatives to those that have to turn at the intersection. No, I take Rt 9 more often than the turn to Cogburn. Yes, I do have children at Hopewell. |
| A turn lane coming Southbound on SR9 to turn right (West) on Bethany Bend would be extremely helpful. Travelling Southbound in the mornings (workdays and weekends) are especially painful because people who need to turn onto Bethany Bend have to wait until they reach the light to turn. |
| Agree with immediate improvements proposed |
| Ban right on red from Bethany Bend onto Hwy 9 South. Most drivers from Bethany Bend will make the right on red with or without the right of way, and I have witnessed many narrow misses there. |
| Bethany bend at McGinnis ferry needs a light. Always backed up. |
| better timing of the traffic lights |
| Change timing at signal and lengthen left turn lane on Bethany bend and highway 9 |
| Cops at intersection during rush hour |
| Do it all at once...don't band aid the situation. |
| Extend the traffic light times. |
| extending the turn lanes |
| Good crossing well marked out |
| I didn't know there was a problem |
| I like the proposed short term improvements |
| If this project will take several years to occur, I think something may need to be done for the exit of the Publix shopping center onto Bethany Bend. To turn left out of the shopping center onto Bethany Bend, it is pretty much a blind turn. You can't see traffic coming from Cambridge high direction until it's almost too late. It's also very hard to see traffic coming from Hwy 9/Bethany Bend intersection at the signal. It's so dangerous to turn from the shopping center. |
| Implement smart, linked, traffic lights including those at Deerfield Pkwy / SR 9, that sense the traffic volume and adjust their phasing automatically, so traffic is not bunched up and also would not kept there sitting on a red light, waiting for nothing. |
| Improve the turn from Bethany Bend into Hwy9 . It is currently too sharp. |
| Improve timing of lights or any other intervention available to allow more cars to turn left (north) onto 9 from Bethany bend. |
| Include a way to walk to cross the hwy 9 from the CVS to Starbucks |
| Keep people from cutting thru the nail salon lot. So dangerous |
| Lengthen the light on south bound highway 9 in the morning and northbound in the evening. Hwy 9 backs up a lot but traffic on Bethany empties at each light and the light still doesn't change for a while. |
| Lengthen the right hand turn lane. Things only get backed up because people are turning to get to the school |
| Light - better definition of turn lights, placement and timing |
| Longer turn lane from Bethany Bend to left turn to 9. |
| Longer lights, turn lanes |
| Love love love stop light at sunfish bend. Intersection is currently unsafe. Love love love sidewalks all the way on both sides |
| Make a separate right turn only lane for southbound for Cambridge traffic |
| Make dotted lines clearly to left turners |
| MODIFY TURN SIGNAL AND LONGER TIME FOR RUSH HOUR |
| No left turns during peak hour |
| No right turn from Bethany to SR 9 south |
| No turn on red by Starbucks |
| On the green area (grassed area) next to Gas station and CVS ( Bethany bend) can you build a "passive park". You can put some bench and trees and a water fountain. |

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| Right turn lane on 9 at Bethany Bend East towards Forsyth |
| Sidewalks |
| Stop right turns on red as people traveling east and turning south onto hwy 9 pull out in front of west facing traffic turning south who have a green light every day. |
| The light needs to be the same on the weekend as during the week. Hwy 9 is backed up because only 4-5 cars can get through the light on the weekend. |
| This cannot happen quick enough!! |
| Use woods across from high school to cut through to 9 ? Clear some of the angle and woods on either side of Lake Laurel community so we can see to make a left on to 9. |
| Widen everything |
| Yes!! property owners should clean up of all the vacant lands. Also demolish all the old vacant homes on those properties. |
| Yes, implement a long term moratorium on new businesses opening in that intersection. Or make it into further greenspace... |

| Q: Other suggested improvement alternatives for SR 9 at Bethany Bend: |
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| Add 4 lanes with 3 open in the mornings southbound and 3 open in the afternoon northbound...similar to what Roswell has done...very efficient movement of traffic. |
| All of 9 needs to be widened, especially intersection at McFarland and 9. |
| Correct the angle of the intersection for best lines of vision for drivers/pedestrians' safety. |
| I would prefer waiting until the entire project is ready to remedy Bethany Bend |
| It is difficult to see how to access CVS in both the models. It appears impossible to turn left from CVS onto 9. Need to be able to get out of there easily and still get to it. Hard to see how to turn into it. But if I had to choose, offset T would be preferred. |
| Leave traffic signal where it is and just widen the road way |
| New alignment with signals results in a road running right next to our property with little to no benefit |
| No access through my 2 ac lot on corner of five acre rd. and sr 9. I am 100% against it. Please leave my property alone. |
| Other (please specify) |
| Run off Drainage system beneath Hwy# 9 is really bad |
| Since SR 9 separates 2 schools and numerous employers (of teenagers) from multiple neighborhoods, the pedestrian crossing ability should be given great consideration |
| The State DOT should widen Hwy 9 not just in Fulton County but Forsyth County. Road construction should be done at the same time. Highway in Forsyth County all the way to exit 14. In the next 3-5 years there will be massive growth in the area. |
| Too bad this intersection wasn't aligned properly the first time it was widened. |
| Widen Bethany for new 400 entrance with this project vs having to tear up rd. and repo in future |

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| Q: Are there any specific issues that the city should be alerted to in regards to improvements at SR 9 and Bethany Bend? |
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| 1. Issue 1: Putting the Median and stop lights at Crooked creek and Wyndham-This is an extremely short sighted approach because when this was conceived at that time Milton Preserve did not exist. Even in their plan draft put out there yesterday there were no MP home sites built. Hence the median did not take into consideration the 70+ cars that go in and out of MP everyday. Putting the median will cause tremendous hardship for residents to get in and out of the community. Residents will have to travel around and make U turn from both directions. 2. Issue 2: Removing the left turn lane to MP- If this lane is removed, this is a safety issue as the school bus would not have a dedicated lane to stop for kids to get in and out. Also if is there is a backup we will get stuck as there are is no dedicated left turn lane any longer. 3. Issue 3: Removing the walkways and converting that into a Multi use lane- It seems a total waste of money that the existing walkways would be done with to develop the multi use lane specifically for cycling. Have they studied if there really are so many cyclists to justify this. On the other hand a lot of people do use the walkways currently. 4. Issue 4: Converting the existing 2 lane highway to 4 lanes- Again when this was conceived, MP was not in existence. This shall result in higher noise pollution levels especially for residents closer to the road. The city needs to address the impact of the noise pollution levels, Dust pollution and standing traffic between the two lights before finalizing this plan. I stay very next to the road in Milton preserve and I see a greater impact for me. |
| A huge improvement must be made in the timing of the lights at the intersection of 9 and Bethany Bend. I repeatedly sit for 3 or more lights in the mornings waiting to turn north. Likewise the timing of the lights at Windward and 9 must be made. I have sat for as many of 4 lights waiting to get through that intersection on Saturdays. |
| a) Left turn into Publix when northbound if "New Alignment with Signal" is selected. b) Use some of reclaimed land for mini park. c) Ensure pedestrian and bicycle traffic is prioritized. |
| Address Deerfield Rd and Hwy 9 backup during evening rush. Will the widening project help the flow at this intersection? |
| As a Lake Laurel resident we are concerned with the zoning of the lots at 5 acre road |
| Be mindful of those communities on SR 9 that have to get out of their community onto SR 9. Traffic no can get extremely busy. Construction will make it a nightmare. |
| Build new project accurate for this project |
| Combined sidewalk and bike trail dangerous to pedestrians. |
| Commuters have already been disrupted by the mess of the intersection changes on Hopewell. Making changes to Hwy 9 will be a giant mess. Instead, develop alternate paths that commuters can take. Also, stop approving new construction without first making the infrastructure changes necessary to support the increased traffic. I am considering moving out of the area because of the giant screw ups in traffic planning. |
| Create 40 ft. landscape setback for undeveloped parcels now. Buy land now to prepare for widening. |
| Dangerous blind curve on SR 9 and Woodlake Dr |
| Dirt and debris that will cover the homes in the area near and close to Hwy #9. Will the City be responsible for the cleaning of the outside shell and windows of the homes that will be affected? |
| Do not make Bethany a major cross street any more than present. |
| Emails are great and public information signs |
| Expense to tax payers for too elaborate proposed improvements for a couple of miles of expanded road; traffic will still back up due to reduced lanes going into Forsyth County... |
| Extra caution because of High school students that walk on that road |
| Getting out of Lake Laurel community. Also need to extend parking lot of Rispa shopping center to open at north end of lot and share a light with Crooked Creek. |
| How much private land will the State take from property owners? |
| I am president of the Milton Preserve HOA Board, and we are vehemently against the proposed two stop lights at Crooked Creek and again just 100 yards north of us. Further, a median, and other proposed changes clearly indicate that no one living here. And who will be forced to deal with the mess it will create, is involved in the planning. Please respect we taxpayers that invested in Milton but whose neighborhood isn't even shown on your maps. We matter and we are appalled that these newer homeowners have been largely bypassed in planning. Why, when the city knew each home was lighting up as a taxpaying resource were NO letters of information sent to us, not one? |

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| I do not think the entire road needs to be widened; just enough to alleviate the back-up that occurs on Saturday's. DO NOT SPEND MONEY UNTIL SUBJECT MATTER EXPERTS HAVE WEIGHED IN ON SOLUTIONS. Look at timing of lights, adding turn lanes, etc. Do not have a decision and then only produce back up that supports it. Let the information guide you to a solution. We are smart people....at least that is why we wanted to form our own city. Let's live up to that expectation. |
| I have endless amounts of wildlife within my area, please watch for them |
| I have seen may accident of people turning left on 9 from Publix |
| I suggest linking 400 to SR 9 from McGinnis Ferry Rd to Bethany Bend with one straight Rd rather than many turns and twists |
| I want it sooner. Love the streetlight at Stonecreek! (I live in Fairmont) |
| If this project will take several years to occur, something more immediate needs to be done with the exit from the Publix shopping center onto Bethany Bend. With Cambridge High now exiting on that road, there is so much more traffic. It is very hard to see to turn left onto Bethany Bend when exiting the shopping center. You can't see traffic until it comes from around the bend and it's also so hard to see traffic coming from 9. I've thought this intersection is very dangerous and I support anything being done to make it safer! We fully support the widening of any of the roads in Milton. We support the widening of SR 9 as well as a new alignment of Bethany Bend and 9 with a signal. Great options! Great work! Buy up whatever land you need to make this intersection safer as well as widen the roads in Milton. There's so much traffic. The roads are congested. What are the odds that Milton can work with Forsyth county to get them to widen SR 9 into Forsyth county also? McFarland and SR 9 has serious congestion at all times of the day. |
| Just keep in mind how you will deal with the high school traffic when doing this project. |
| Keep pedestrian traffic in mind |
| Many people walk ad bike through this intersection. Sidewalks and bike paths would improve overall safety |
| My townhouse backs up to this proposed project. Very concerned about noise levels and the aesthetics of finished project. |
| No issues, but it would be great to make sure sidewalks and bicycle lanes are included in this project. |
| None of this decrease traffic....in fact, studies show that usually when a city decides to widen roads, it increases traffic; making it counterintuitive. |
| Offset T option will make it safer to exit the Publix lot. |
| On the green area (grassed area) next to Gas station and CVS ( Bethany bend) can you build a "passive park". You can put some bench and trees and a water fountain. |
| Please add more bike lanes/wider shoulders and sidewalks |
| Please allow a cross over on hwy 9 at Milton preserve or we will not be able to turn left |
| Please do not increase the amount of traffic lights on Hwy 9. Adding traffic lights will slow the flow of traffic on Hwy 9. |
| Please put traffic light at Stonecreek Church and Fairmont |
| Preserve as much green space as possible! |
| Pressure on council members / lobbying from commercial interests (such as the gas station) needs to be resisted. They are only concerned with their own commercial interests (and to be brutally honest, the gas station should never have been permitted to be built there in the first place). |
| Protect existing Milton residents. |
| Sidewalks please. |
| The proposed changes to include the 2 stop lights (First one near Crooked Creek and the second one near wyndham) is counter productive. There will be unwanted traffic back up especially for residents of Milton Preserve with potential for accidents. We strongly object to the stop lights at these locations. Additionally the road widening is not welcome since it will disturb the peace and tranquility of the area as neighbors will be unable to take the kids out for a walk. It poses a hazard to people living in these neighborhoods. |
| The proposed widening of SR 9 will affect our subdivision (Milton Preserve) will cause hardship to our residents. |
| There is a lot of traffic that goes in and out of Publix/Starbucks/Zaxby etc. etc. A light there will immensely help regulating traffic. |
| There is just going to be a back up at Forsyth co line, will need to be opened up all the way to Cumming or at least to McFarland to effect a traffic improvement |

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| There is no reason to move 5 acre road. Without a traffic light at that intersection it will be More dangerous than it is now. Also changing the speed limit to 35 I feel is unnecessary |
| This is a once in a lifetime opportunity.....we are designers....the street scape can make or break this project.....wide sidewalks both northbound and southbound.....bicycle lane.....lampposts that are extraordinarily beautiful combined with small pocket gardens.....we will help for free as Milton residents to help you develop this important game changing streetscape. |
| This is a residential and schools area with many young adults walking from and to schools. We don't need more infrastructure that might allow more cars driving faster. Thousand of students will be at risk. What we need is more speed control! We don't have traffic issues in this intersection different to high speed drivers . Getting out of the neighborhood is already a nightmare that will only get worse with this project. |
| Traffic light at Kennewick connectivity |
| What is Forsyth county doing at the county line- will the road be 4-laned and then bottleneck at the line? |
| Would like to see sidewalks and a bike lane since traffic may move faster and need safer pedestrian and bicycling pathway. |
| Would you make Crabapple Road four lanes? Probably not. It would detract from the charm of the area. If development goes the route of a Crabapple-like charm as we've discussed in previous meetings for redevelopment of the area, then it really would be for naught. I live in Milton Preserve right across from Crooked Creek along Hwy 9. I commute to Sandy Springs for work each day and I honestly do not have issues getting in and out of our neighborhood (and I'm leaving around 7:30am and getting home around 6:30pm), so from my standpoint I feel zero need to widen Hwy 9 from Bethany Bend to the Forsyth County line. Can it be bad sometimes, like on a Saturday morning heading south? Absolutely but I know we live in a major metro area so I'm going to expect some of that. The worst part for me is weekday morning southbound backup and that is due to Cambridge traffic. Do we feel the need to add two lanes to the county border to alleviate that backup? I would hope not...I'd hope when the Bethany Bend intersection is redone that a turn lane towards Cambridge will be added. When Hwy 9 goes back to two lanes at the Forsyth County line, how will that affect traffic? I guess I don't see outrageous amounts of traffic on Hwy 9 from Bethany Bend to Forsyth to feel the need to make a major change like this. Does Crooked Creek need a traffic light? From what I see, the reason why they have a longer wait time is because the neighborhood is large. I pass by there every day multiple times a day and I never see a huge backup of residents needing to get out of their subdivision. I'm worried/wondering as to what catering to them will do to the rest of the smaller subdivisions along Hwy 9. We all just need a little patience! Thank you. |