ORIGINAL TO GENERAL FILES

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA

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

**FILE** P.I. # 0009887 **OFFICE** Design Policy & Support

Cherokee County
GDOT District 6 - Cartersville **DATE** July 25, 2013
Roundabout: SR 372 @ SR 369

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

**TO** SEE DISTRIBUTION

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

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

Attachment

DISTRIBUTION:

Bobby Hilliard, Program Control Administrator
Genetha Rice-Singleton, State Program Delivery Engineer
Glenn Bowman, State Environmental Administrator
Cindy VanDyke, State Transportation Planning Administrator
Kathy Zahul, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Charles "Chuck" Hasty, State Materials Engineer
Mike Bolden, State Utilities Engineer
Ken Thompson, Statewide Location Bureau Chief
Andy Casey, State Roadway Design Engineer
Attn: Sam Woods, Design Group Manager
DeWayne Comer, District Engineer
Michael Haithcock, District Preconstruction Engineer
Kerry Bonner, District Utilities Engineer
Ryan Fernandez, Project Manager
BOARD MEMBER - 11th Congressional District

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

| | | | |
|---|---|---|---|
| Project Type: | Roundabout | P.I. Number: | 0009887 |
| GDOT District: | 6 | County: | Cherokee |
| Federal Route Number: | N/A | State Route Number: | 369 and 372 |
| | Project Number: | N/A | |

The proposed project will construct a Roundabout at the intersection of State Route 369 (Hightower Road) and State Route 372 (Ball Ground Road) in Cherokee County, Georgia, which is expected to reduce crash frequency and severity, as well as provide improved operational efficiency.

**Submitted for approval:**

C. Andy Carey — State Roadway Design Engineer — DATE 4/29/13

Genetta Lee — State Program Delivery Engineer — DATE 5/21/2013

[signature] — GDOT Project Manager — DATE 5/17/13

**Recommendation for approval:**

Program Control Administrator — DATE

* Glenn Bowman /MMOA — State Environmental Administrator — DATE 5/30/13

* Kathy Zahul /MMOA — State Traffic Engineer — DATE 5/29/13

* Lisa Myers /MMOA — Project Review Engineer — DATE 5/28/13

* Patrick Allen /MMOA — for State Utilities Engineer — DATE 5/22/13

District Engineer — DATE

State Transportation Financial Management Administrator — DATE

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

* Cynthia VanDyke — State Transportation Planning Administrator *(recommendation required)* — DATE 5/23/13

* Recommendation on file - MMOA.

## PROJECT LOCATION


**State Route 369 (Hightower Road) at State Route 372 (Ball Ground Road) Cherokee County, Georgia**

## PLANNING & BACKGROUND DATA

**Project Justification Statement:** prepared by Dee Corson, District Traffic Operations Manager, District 6 Traffic Operations.

This project will be fulfilled by Federal Highway Safety Funds. A request was made November 30, 2004 for operational improvements along with signalization to be included in the TIP but was never realized due to funding.

This request originated within District 6 Traffic Operations. Over the years there have been several requests from the local government, businesses and citizens for improvements.

This is the intersection of two moderate volume state routes in a metro county with a LOS of F. The roads come together at a steep skew with both horizontal and vertical curves.

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

Performance goals include congestion reduction, mobility improvements, reduction of potential crashes, and correction of geometric and/or structural deficiencies. Secondary benefits may include reduction of greenhouse emissions and fuel savings for drivers.

**Description of the proposed project:** The proposed project will construct a Roundabout at the intersection of State Route 369 (Hightower Road) and State Route 372 (Ball Ground Road) in Cherokee County, Georgia, which is expected to reduce crash frequency and severity, as well as provide improved operational efficiency.

SR 369 is a two lane rural major collector with a posted speed limit of 55 mph and an AADT of 10,310 vehicles per day. SR 372 is a two lane rural major collector with a posted speed limit of 55 mph and an AADT of 6,050 vehicles per day. Currently, the intersection is all way stop controlled with no turn lanes on any of the approaches.

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

**MPO:** Atlanta Regional Commission (ARC) MPO Project ID: N/A

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

**Congressional District(s):** 11

**Projected Traffic:** ADT
**SR 369**
Current Year (2011): 7,700 Open Year (2016): 8,950 Design Year (2036): 14,100
**SR 372**
Current Year (2011): 7,000 Open Year (2016): 8,150 Design Year (2036): 12,850
Traffic Projections Performed by: GDOT Office of Planning

**Functional Classification (SR 369 & SR 372):** Rural Major Collector

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

## CONTEXT SENSITIVE SOLUTIONS

**Issues of Concern:** Public acceptance/perception of the roundabout.

**Context Sensitive Solutions:** Public meeting(s) to ensure support and develop buy in from local government.

## DESIGN AND STRUCTURAL DATA

**Mainline Design Features:** State Route 369 & State Route 372

| Feature | Existing | Standard* | Proposed |
|---|---|---|---|
| **Typical Section** | | | |
| - **Number of Lanes** | **2** | **N/A** | **2** |
| - **Lane Width(s)** | **12 ft.** | **12 ft.** | **12-18 ft.** |
| - **Median Width & Type** | **N/A** | **N/A** | **N/A** |
| - **Outside Shoulder or Border Area Width** | **TBD** | **10 ft.** | **10 ft.-12 ft.** |
| - **Outside Shoulder Slope** | **6 % (assumed)** | **6 %** | **6 %** |
| - **Inside Shoulder Width** | **N/A** | **N/A** | **N/A** |
| - **Sidewalks** | **N/A** | **5 ft.** | **5 ft.** |
| - **Auxiliary Lanes** | **N/A** | **N/A** | **N/A** |
| - **Bike Lanes** | **N/A** | **N/A** | **N/A** |
| **Posted Speed** | **55 mph** | | **55 mph** |
| **Design Speed** | **55 mph** | **55 mph** | **55 mph** |
| **Min Horizontal Curve Radius** | **TBD** | **960 ft.** | **960 ft.** |
| **Superelevation Rate** | **TBD** | **8 %** | **TBD** |
| **Grade** | **TBD** | **8 %** | **TBD** |
| **Access Control** | **Permit** | **Permit** | **Permit** |
| **Right-of-Way Width** | **≈ 80 ft.** | **N/A** | **TBD** |
| **Maximum Grade – Crossroad** | **TBD** | **7 %** | **TBD** |
| **Design Vehicle** | **unknown** | **WB-67** | **WB-67** |

*According to current GDOT design policy if applicable

**Major Structures:** N/A

**Major Interchanges/Intersections:** There are no interchanges in the immediate vicinity of the project site. The closest major intersection is State Route 372 (Ball Ground Road) at State Route 20 (Cumming Highway), which is three miles to the South.

**Utility Involvements:** TBD

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

**SUE Required:** ☒ No ☐ Yes

**Railroad Involvement:** No involvement.

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

Warrants met: ☒ None ☐ Bicycle ☐ Pedestrian ☐ Transit

**Right-of-Way:**

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

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

| | | |
|---|---|---|
| Anticipated number of impacted parcels: | | 12 |
| Displacements anticipated: | Total: | 0 |
| | Businesses: | 0 |
| | Residences: | 0 |
| | Other: | 0 |

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

**Off-site Detours Anticipated:** ☒ No ☐ Undetermined ☐ Yes

**Transportation Management Plan [TMP] Required:** ☐ No ☒ Yes

If Yes: Project classified as: ☒ Non-Significant ☐ Significant

TMP Components Anticipated: ☒ TTC ☐ TO ☐ PI

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

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

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

| GDOT Standard Criteria | Reviewing Office | No | Undeter-mined | Yes | Appvl Date (if applicable) |
|---|---|---|---|---|---|
| 1. Access Control<br>- *Median Opening Spacing* | DP&S | ☒ | ☐ | ☐ | |
| 2. Median Usage & Width | DP&S | ☒ | ☐ | ☐ | |
| 3. Intersection Skew Angle | DP&S | ☒ | ☐ | ☐ | |
| 4. Lateral Offset to Obstruction | DP&S | ☒ | ☐ | ☐ | |
| 5. Intersection Sight Distance | DP&S | ☒ | ☐ | ☐ | |
| 6. Bike, Pedestrian & Transit Accommodations | DP&S | ☒ | ☐ | ☐ | |
| 7. GDOT Drainage Manual | DP&S | ☒ | ☐ | ☐ | |
| 8. Georgia Standard Drawings | DP&S | ☒ | ☐ | ☐ | |
| 9. GDOT Bridge & Structural Manual | Bridge Design | ☒ | ☐ | ☐ | |
| 10. Roundabout Illumination | DP&S | ☒ | ☐ | ☐ | |
| 11. Rumble Strips | DP&S | ☒ | ☐ | ☐ | |
| 12. Safety Edge | DP&S | ☒ | ☐ | ☐ | |

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

## ENVIRONMENTAL DATA

**Anticipated Environmental Document:**

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

**Project Air Quality:**

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

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

A concept level preliminary hydrology study for MS4 compliance was considered during the development of the drainage system and water treatment for the project. The Concept for post BMP treatment would be to use several Dry Swales located strategically in several locations around the project. Without actual limits for the project it is not possible at this time to determine the actual locations and sizes of the Dry Swales but the described concept is expected to address all concerns regarding MS4 compliance, including considerations of the project footprint and ROW requirements.

The drainage delineations for the project basically divide the total 3.1 acres of curb and gutter paved areas into four areas the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant of the intersection. Each quadrant had basically the same drainage basin of approximately 0.7 to 0.9 acres. These quadrants each have curb and gutter channelization of the storm flows which would outfall into concrete flumes and then flow into Dry Swales. For the northeast, southwest, and southeast quadrants, the treated water would then mix with offsite water (that was carried through a series of diversion ditches) to cross drains and then outfall to the northwest quadrant to maintain the current flow conditions of the site. By delineating the areas into four distinct outfalls the designers feel the footprint required to accommodate the dry swales will not be a problem.

**Environmental Permits/Variances/Commitments/Coordination anticipated:** Undetermined – Special study underway

| Permit/ Variance/ Commitment/ Coordination Anticipated | No | Yes | Remarks |
|---|---|---|---|
| 1. U.S. Coast Guard Permit | ☒ | ☐ | |
| 2. Forest Service/Corps Land | ☒ | ☐ | |
| 3. CWA Section 404 Permit | ☐ | ☒ | There are 5 non-relatively permanent waters within the project corridor. These systems may be considered jurisdictional depending on USACE verification. |

| | | | |
|---|---|---|---|
| 4. Tennessee Valley Authority Permit | ☒ | ☐ | |
| 5. Buffer Variance | ☒ | ☐ | There are 5 ephemeral drainage systems within the project corridor. Because these systems are not intermittent or perennial, they would not require buffers. However, final designation is subject to Georgia EPD verification. |
| 6. Coastal Zone Management Coordination | ☒ | ☐ | |
| 7. NPDES | ☐ | ☒ | If over 1 acre disturbed area |
| 8. FEMA | ☒ | ☐ | |
| 9. Cemetery Permit | ☒ | ☐ | |
| 10. Other Permits | ☒ | ☐ | |
| 11. Other Commitments | ☐ | ☒ | The ecological field survey has been completed and there is a Draft Ecology Resource Survey Report. It is likely a type of project that would generate environmental commitments. |
| 12. Other Coordination | ☐ | ☒ | Coordination with GA DNR has occurred and is documented in the Ecology Resource Survey Report. It is likely a type of project that could require coordination with other agencies such as SHPO, USFWS, etc… |

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

**NEPA/GEPA:** Special studies have been requested but project has not been field checked yet. Project will likely be a Categorical Exclusion. CDMSMITH leading environmental; history and arch to be completed in house (SS requested on 09.24.12); ecology survey has been completed - on schedule (Cox 09.24.12)

**Ecology:** A USGS Blue Line Stream near the proposed roundabout location has been identified. Design adjustments will be made during preliminary design to minimize impacts to the stream. 1/13/12: Ecology included in District TO (rjw)

**History:** NHPA sent 1/14/13, no concurrence req'd; HISTORY CLEAR

**Archeology:** SSR rec'vd 9/27/12, notification sent 10/9/12, needs survey…

**Air & Noise:** Site Visit on 6-21-2011 for this round-a-bout, pictures taken and posted on server, project appears to be a type 3 however off Hightower Road there are residences so it would depend on how the round-a-bout is moving.

**Public Involvement:** Project is not anticipated to have public controversy but will require public involvement.

**Major stakeholders:** Users.

## ROUNDABOUTS

**Roundabout Lighting agreement/commitment letter received:** ☐ No ☒ Yes
The Chairman of the Cherokee County Board of Commissioners signed a Local Government Lighting Project Agreement on September 22, 2010.

**Planning Level assessment:** The PLA recommended that a modern roundabout be constructed at this location. The purpose of this project is to improve the operations of the intersection of SR 369 and SR 372.

**Feasibility Study:** Completed, see attachment 8b.

**Peer Review required:** ☐ No ☐ Yes ☒ Completed – Date: 3/12-2013

## CONSTRUCTION

**Issues potentially affecting constructability/construction schedule:** No known issues which could affect construction, this will be investigated further during PIOH's and future meeting with local officials.

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

## PROJECT RESPONSIBILITIES

**Project Activities:**

| Project Activity | Party Responsible for Performing Task(s) |
|---|---|
| Concept Development | GDOT Office of Roadway Design |
| Design | GDOT Office of Roadway Design |
| Right-of-Way Acquisition | GDOT |
| Utility Relocation | Utility Owners |
| Letting to Contract | GDOT |
| Construction Supervision | GDOT |

| | |
|---|---|
| Providing Material Pits | Contractor |
| Providing Detours | N/A |
| Environmental Studies, Documents, and Permits | GDOT |
| Environmental Mitigation | GDOT |
| Construction Inspection & Materials Testing | GDOT |

**Lighting required:** ☐ No ☒ Yes

**Initial Concept Meeting:** 9-21-11, see attached minutes.

**Concept Meeting:** 4-3-13, see attached minutes.

**Other projects in the area:**

- **CSSTP-0005-00(970), PI# 0005970** (Genetha Rice-Singleton) – SR 372/ Ballground Road from Canton Hwy to Cumming Hwy – Ties to our project. Scheduled Let Date: LR2.
- **STP00-0001-00(337), PI# 0001337** (Mike Haithcock/GDOT) – SR 369 Truck Climbing Lanes – Ties to our project. Scheduled Let Date: LR.

**Other coordination to date:** Peer review with Ourston Roundabout Engineering, Inc. was performed during the Concept development process, see attached minutes.

**Project Cost Estimate and Funding Responsibilities:**

| | Breakdown of PE | ROW | Reimbursable Utility | CST* | Environmental Mitigation | Total Cost |
|---|---|---|---|---|---|---|
| By Whom | GDOT | GDOT | GDOT | GDOT | GDOT | |
| $ Amount | 238k | 669k | 94,700 | 1,732,560 | Non-expected | 2,734,260 |
| Date of Estimate | 2/25/2010 | 6/10/2013 | 5/14/2013 | 4/23/2013 | 5/17/2013 | |

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

## ALTERNATIVES DISCUSSION

**Alternative selection:**

| | | | |
|---|---|---|---|
| **Preferred Alternative:** Hybrid Roundabout (2 Lanes NB/SB and 1 Lane EB/WB) | | | |
| **Estimated Property Impacts:** | **12 parcels** | **Estimated Total Cost:** | **$1,732,560** |
| **Estimated ROW Cost:** | **$669k** | **Estimated CST Time:** | **18 months** |
| **Rationale:** See Feasibility Study, attachment 8b. | | | |

| **No-Build Alternative:** | | | |
|---|---|---|---|
| **Estimated Property Impacts:** | **0** | **Estimated Total Cost:** | **0** |
| **Estimated ROW Cost:** | **0** | **Estimated CST Time:** | **0** |
| **Rationale:** Alternate does not satisfy project justification. | | | |

*See Feasibility Study for discussion of all other alternates.

**Comments:**

**Attachments:**

1. Concept Layout
2. Typical sections
3. Detailed Cost Estimates:
    a. Construction including Engineering and Inspection
    b. Completed Fuel & Asphalt Price Adjustment forms
    c. Right-of-Way
    d. Utilities
4. Crash summaries
5. Traffic diagrams
6. Capacity analysis summary *(tabular format)*
7. Summary of TE Study and/or Signal Warrant Analysis
8. Roundabout Data
    a. Planning level assessment
    b. Roundabout feasibility study
    c. Lighting agreement or commitment letter
    d. Peer Review and responses
9. Highway Safety Manual Crash Reduction Factor Calculations
10. Minutes of Concept meetings

## APPROVALS

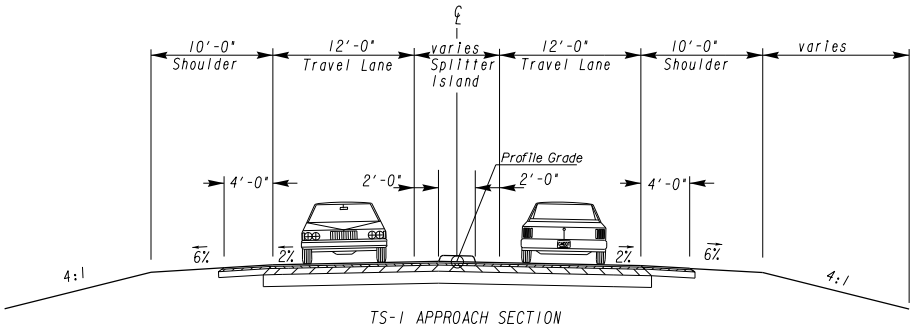
Concur: _____ 7/19/2013
Director of Engineering

Approve: _____ 7/22/13
Chief Engineer Date

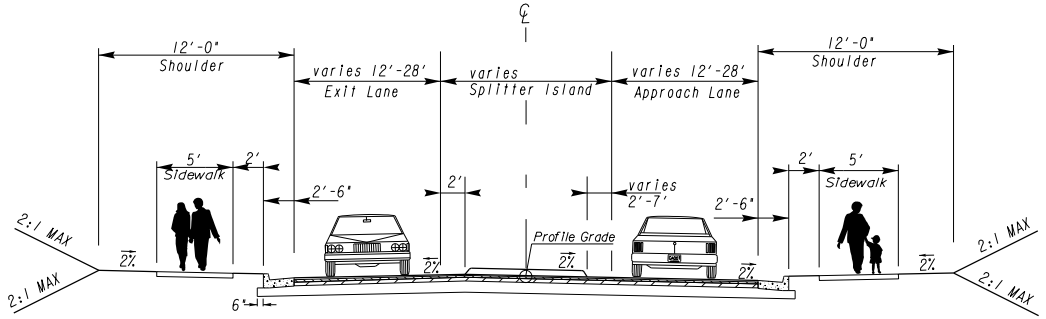
ATTACHMENT 1

# ATTACHMENT 2

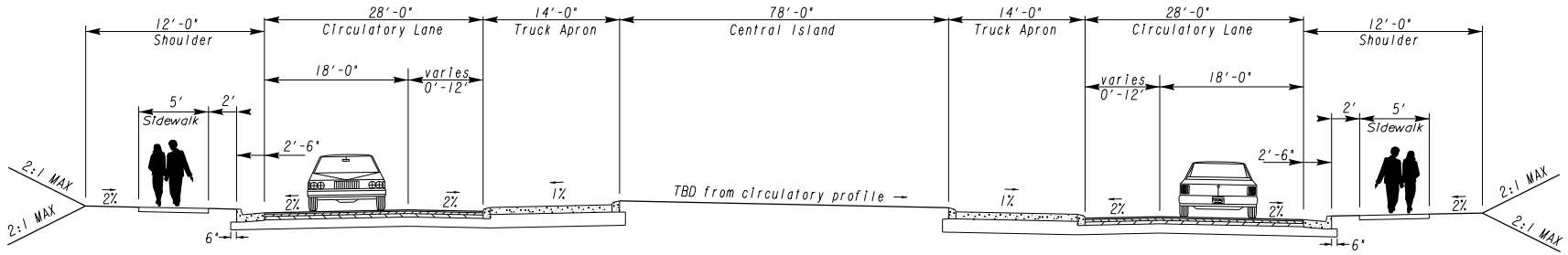
| 4/19/2013 2:06:37 PM USER:rolam | GPLOT-V8 gplotborder-V81-PO.tbl | M:\0009887 Cherokee County\2.03 DGNs\Concept\0009887 TypIcals.dgn | STATE GA | PROJECT NUMBER 0009938 | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|




TS-1 APPROACH SECTION




TS-2 ENTRANCE AND EXIT SECTION




TS-3 CIRCULATORY SECTION

| | | | | REVISION DATES | |
|---|---|---|---|---|---|
| | | **GEORGIA** DEPARTMENT OF TRANSPORTATION | NOT TO SCALE | | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION<br>OFFICE: ROADWAY DESIGN<br>**TYPICAL SECTIONS**<br>SR 369 @ SR 372 CHEROKEE COUNTY ROUNDABOUT<br>DRAWING No. 05-001 |

12/14/202 GPLN

ATTACHMENT 3

PI 0009887 Cherokee County

| | | |
|---|---|---|
| **Subtotal Construction Cost** | | **$1,527,495.93** |
| Engineering & Inspection | 5% | $76,374.80 |
| Total Liquid AC Adjustment | | $128,689.33 |
| **Total Construction Cost** | | **$1,732,560.06** |
| Right of Way | | $669,000.00 |
| Reimbursable Utilities | | $94,700.00 |
| Environmental Mitigation | | $0.00 |
| **Total Project Cost** | | **$2,496,260.06** |

# DETAILED COST ESTIMATE

Georgia Department of Transportation

## Job: 0009887

**JOB NUMBER** *0009887* **FED/STATE PROJECT NUMBER** *0009887*

**SPEC YEAR:** *01*

**DESCRIPTION:** *SR 372 @ SR 369*

**ITEMS FOR JOB 0009887**

### *0010 - ROADWAY*

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0010 | 150-1000 | 1.000 | LS | $50,000.00000 | TRAFFIC CONTROL - TO BE DETERMINED | $50,000.00 |
| 0290 | 153-1300 | 1.000 | EA | $35,000.00000 | FIELD ENGINEERS OFFICE TP 3 18 MONTH PROJECT | $35,000.00 |
| 0015 | 210-0100 | 1.000 | LS | $100,000.00000 | GRADING COMPLETE - TO BE DETERMINED | $100,000.00 |
| 0020 | 310-1101 | 10778.230 | TN | $17.19365 | GR AGGR BASE CRS, INCL MATL | $185,317.11 |
| 0009 | 318-3000 | 135.000 | TN | $18.28234 | AGGR SURF CRS | $2,468.12 |
| 0445 | 402-1812 | 200.000 | TN | $75.32233 | RECYL AC LEVELING,INC BM&HL | $15,064.47 |
| 0030 | 402-3121 | 4798.020 | TN | $58.10222 | RECYL AC 25MM SP,GP1/2,BM&HL | $278,775.61 |
| 0310 | 402-3130 | 1263.000 | TN | $76.72923 | RECYL AC 12.5MM SP,GP2,BM&HL TEMPORARY, PERMANENT AND DRIVEWAYS | $96,909.02 |
| 0035 | 402-3190 | 1687.000 | TN | $63.70696 | RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL | $107,473.64 |
| 0040 | 413-1000 | 872.400 | GL | $2.48106 | BITUM TACK COAT | $2,164.48 |
| 0475 | 429-1000 | 12.000 | EA | $536.00575 | RUMBLE STRIPS | $6,432.07 |
| 0315 | 430-0200 | 450.000 | SY | $58.20000 | PLN PC CONC PVMT/CL1C/ 10" TK | $26,190.00 |
| 0480 | 432-0206 | 1069.920 | SY | $5.45161 | MILL ASPH CONC PVMT/ 1.50" DEP | $5,832.79 |
| 0410 | 439-0022 | 450.000 | SY | $85.34203 | PLN PC CONC PVMT CL3 10" THK | $38,403.91 |
| 0029 | 441-0016 | 185.600 | SY | $32.78764 | DRIVEWAY CONCRETE, 6 IN TK | $6,085.39 |
| 0050 | 441-0104 | 1244.200 | SY | $33.54004 | CONC SIDEWALK, 4 IN | $41,730.52 |
| 0305 | 441-0754 | 2155.000 | SY | $39.08985 | CONC MEDIAN, 7 1/2 IN | $84,238.63 |
| 0060 | 441-5008 | 245.000 | LF | $11.83959 | CONC HEADER CURB, 6 IN, TP 7 | $2,900.70 |
| 0065 | 441-5025 | 333.000 | LF | $16.10000 | CONC HEADER CURB, 4", TP 9 | $5,361.30 |
| 0070 | 441-6222 | 2639.000 | LF | $12.16537 | CONC CURB & GUTTER/ 8"X30"TP2 | $32,104.41 |
| 0420 | 446-1100 | 99.000 | LF | $9.49482 | PVMT REF FAB STRIPS, TP2,18 INCH WIDTH | $939.99 |
| 0565 | 620-0100 | 200.000 | LF | $37.61899 | TEMP BARRIER, METHOD NO. 1 | $7,523.80 |
| 0350 | 632-0003 | 4.000 | EA | $3,907.91667 | CHANGEABLE MESS SIGN,PORT,TP 3 | $15,631.67 |
| 0345 | 634-1200 | 30.000 | EA | $110.82670 | RIGHT OF WAY MARKERS | $3,324.80 |
| 0355 | 643-8200 | 1000.000 | LF | $1.46190 | BARRIER FENCE (ORANGE), 4 FT | $1,461.90 |
| | | | | | ***SUBTOTAL FOR ROADWAY:*** | **$1,151,334.33** |



File Location: Div of Preconstruction > CES

# DETAILED COST ESTIMATE

Georgia Department of Transportation

**Job: 0009887**

## 0020 - DRAINAGE

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0485 | 550-1180 | 305.000 | LF | $36.54633 | STM DR PIPE 18",H 1-10 | $11,146.63 |
| 0460 | 550-1360 | 225.000 | LF | $62.46846 | STM DR PIPE 36",H 1-10 | $14,055.40 |
| 0085 | 550-2180 | 305.000 | LF | $25.44191 | SIDE DR PIPE 18",H 1-10 | $7,759.78 |
| 0570 | 550-2240 | 145.000 | LF | $31.08279 | SIDE DR PIPE 24",H 1-10 | $4,507.00 |
| 0090 | 550-4218 | 7.000 | EA | $495.58929 | FLARED END SECT 18 IN, ST DR | $3,469.13 |
| 0435 | 550-4224 | 1.000 | EA | $580.81918 | FLARED END SECT 24 IN, ST DR | $580.82 |
| 0465 | 550-4436 | 1.000 | EA | $841.00000 | FLARED END SECT 36 IN, SLP DR | $841.00 |
| 0089 | 668-2100 | 6.000 | EA | $1,744.86177 | DROP INLET, GP 1 | $10,469.17 |
| 0095 | 668-2100 | 6.000 | EA | $1,744.86177 | DROP INLET, GP 1 | $10,469.17 |
| 0094 | 999-3155 | 500.000 | LF | $48.41187 | DRY SWALE EDGE DRAIN | $24,205.94 |
| | | | | | ***SUBTOTAL FOR DRAINAGE:*** | **$87,504.04** |

## 0030 - EROSION CONTROL PERMANENT

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0100 | 603-2182 | 107.000 | SY | $46.97879 | STN DUMPED RIP RAP, TP 3, 24" FOR 5 FLUMES AND 3 CROSSDRAINS | $5,026.73 |
| 0105 | 603-7000 | 125.000 | SY | $4.56006 | PLASTIC FILTER FABRIC | $570.01 |
| 0110 | 700-6910 | 5.000 | AC | $439.81118 | PERMANENT GRASSING | $2,199.06 |
| 0115 | 700-7000 | 15.000 | TN | $20.45367 | AGRICULTURAL LIME | $306.81 |
| 0120 | 700-8000 | 10.000 | TN | $393.26570 | FERTILIZER MIXED GRADE | $3,932.66 |
| 0125 | 700-8100 | 500.000 | LB | $1.81328 | FERTILIZER NITROGEN CONTENT | $906.64 |
| 0130 | 716-2000 | 6353.400 | SY | $0.88998 | EROSION CONTROL MATS, SLOPES | $5,654.40 |
| | | | | | ***SUBTOTAL FOR EROSION CONTROL PERMANENT:*** | **$18,596.31** |

## 0040 - EROSION CONTROL TEMPORARY

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0135 | 163-0232 | 3.000 | AC | $21.31329 | TEMPORARY GRASSING | $63.94 |
| 0140 | 163-0240 | 104.000 | TN | $207.63186 | MULCH | $21,593.71 |
| 0145 | 163-0300 | 3.000 | EA | $1,065.77873 | CONSTRUCTION EXIT | $3,197.34 |
| 0150 | 163-0503 | 3.000 | EA | $365.88623 | CONSTR AND REMOVE SILT CONTROL GATE,TP 3 | $1,097.66 |
| 0155 | 163-0527 | 35.000 | EA | $246.67975 | CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG | $8,633.79 |
| 0160 | 163-0528 | 70.000 | LF | $3.53259 | CONSTR AND REM FAB CK DAM -TP C SLT FN | $247.28 |
| 0165 | 163-0529 | 150.000 | LF | $3.94324 | CNST/REM TEMP SED BAR OR BLD STRW CK DM | $591.49 |
| 0170 | 163-0550 | 1.000 | EA | $139.35888 | CONS & REM INLET SEDIMENT TRAP | $139.36 |
| 0175 | 165-0030 | 2330.000 | LF | $0.71587 | MAINT OF TEMP SILT FENCE, TP C | $1,667.98 |
| 0180 | 165-0041 | 70.000 | LF | $2.15750 | MAINT OF CHECK DAMS - ALL TYPES | $151.03 |
| 0185 | 165-0071 | 75.000 | LF | $1.28425 | MAINT OF SEDIMENT BARRIER - BALED STRAW | $96.32 |
| 0190 | 165-0087 | 3.000 | EA | $104.13672 | MAINT OF SILT CONTROL GATE, TP 3 | $312.41 |
| 0195 | 165-0101 | 3.000 | EA | $461.97556 | MAINT OF CONST EXIT | $1,385.93 |
| 0200 | 165-0105 | 1.000 | EA | $61.00849 | MAINT OF INLET SEDIMENT TRAP | $61.01 |
| 0205 | 167-1000 | 2.000 | EA | $296.50548 | WATER QUALITY MONITORING AND SAMPLING | $593.01 |
| 0210 | 167-1500 | 18.000 | MO | $630.85871 | WATER QUALITY INSPECTIONS | $11,355.46 |
| 0215 | 171-0030 | 4661.000 | LF | $2.67960 | TEMPORARY SILT FENCE, TYPE C | $12,489.62 |
| 0490 | 576-1018 | 80.000 | LF | $42.11692 | SLOPE DRAIN PIPE, 18 IN | $3,369.35 |
| | | | | | ***SUBTOTAL FOR EROSION CONTROL TEMPORARY:*** | **$67,046.69** |

# DETAILED COST ESTIMATE

Georgia Department of Transportation

**Job: 0009887**

## 0050 - LANDSCAPE

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0220 | 700-9300 | 531.000 | SY | $3.99937 | SOD | $2,123.67 |
| 0550 | 702-0105 | 3.000 | EA | $9.80000 | BETULA NIGRA - TO BE DETERMINED | $29.40 |
| 0555 | 702-0330 | 215.000 | EA | $9.20000 | HEMEROCALLIS SPECIES - TO BE DETERMINED | $1,978.00 |
| 0230 | 702-0469 | 72.000 | EA | $80.00000 | ILEX VOMITORIA SCHILLINGS - TO BE DETERMINED | $5,760.00 |
| 0560 | 702-0542 | 9.000 | EA | $395.00000 | LAGERSTROEMIA INDICA - TO BE DETERMINED | $3,555.00 |
| 0240 | 702-9025 | 200.000 | SY | $30.27410 | LANDSCAPE MULCH | $6,054.82 |
| | | | | | ***SUBTOTAL FOR LANDSCAPE:*** | **$19,500.89** |

## 0060 - SIGNING & MARKING

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0245 | 636-1020 | 78.000 | SF | $14.19907 | HWY SGN,TP1MAT,REFL SH TP3 | $1,107.53 |
| 0500 | 636-1029 | 423.000 | SF | $13.59697 | HWY SGN,TP2 MATL,REFL SH TP 3 | $5,751.52 |
| 0250 | 636-1033 | 209.000 | SF | $19.40254 | HWY SIGNS, TP1MAT,REFL SH TP 9 | $4,055.13 |
| 0255 | 636-2070 | 632.000 | LF | $6.75975 | GALV STEEL POSTS, TP 7 | $4,272.16 |
| 0360 | 636-2090 | 148.000 | LF | $7.75164 | GALV STEEL POSTS, TP 9 | $1,147.24 |
| 0365 | 653-0120 | 4.000 | EA | $73.42620 | THERM PVMT MARK, ARROW, TP 2 | $293.70 |
| 0370 | 653-0296 | 5.000 | EA | $106.86842 | THERMO PVMT MARKING,WORD,TP 15 | $534.34 |
| 0265 | 653-1501 | 2723.000 | LF | $0.48996 | THERMO SOLID TRAF ST 5 IN, WHI | $1,334.16 |
| 0270 | 653-1502 | 2267.000 | LF | $0.48187 | THERMO SOLID TRAF ST, 5 IN YEL | $1,092.40 |
| 0275 | 653-1704 | 1.000 | LF | $4.78162 | THERM SOLID TRAF STRIPE,24",WH | $4.78 |
| 0280 | 653-1804 | 902.000 | LF | $1.74295 | THERM SOLID TRAF STRIPE, 8",WH | $1,572.14 |
| 0375 | 653-3501 | 291.000 | GLF | $0.32389 | THERMO SKIP TRAF ST, 5 IN, WHI | $94.25 |
| 0380 | 653-4830 | 159.000 | GLF | $8.20000 | THERMO SKIP TRAF STR, 18", WHITE | $1,303.80 |
| 0385 | 653-6004 | 283.000 | SY | $3.01766 | THERM TRAF STRIPING, WHITE | $854.00 |
| 0390 | 653-6006 | 168.000 | SY | $3.12088 | THERM TRAF STRIPING, YELLOW | $524.31 |
| 0395 | 654-1001 | 28.000 | EA | $4.46287 | RAISED PVMT MARKERS TP 1 | $124.96 |
| 0400 | 654-1003 | 5.000 | EA | $3.96000 | RAISED PVMT MARKERS TP 3 | $19.80 |
| | | | | | ***SUBTOTAL FOR SIGNING & MARKING:*** | **$24,086.22** |

## 0070 - LIGHTING

| Line Number | ITEM | QUANTITY | UNITS | PRICE | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|---|
| 0505 | 615-1200 | 660.000 | LF | $11.04179 | DIRECTIONAL BORE - TO BE DETERMINED | $7,287.58 |
| 0510 | 647-2120 | 24.000 | EA | $217.30667 | PULL BOX, PB-2 | $5,215.36 |
| 0515 | 681-4230 | 12.000 | EA | $4,840.00000 | LT STD, 50' MH, POST TOP | $58,080.00 |
| 0520 | 681-6446 | 48.000 | EA | $727.52500 | LUMINAIRE,TP 4, 250W,HP SODIUM | $34,921.20 |
| 0525 | 682-1505 | 6000.000 | LF | $1.30000 | CABLE, TP RHH/RHW, AWG NO 8 | $7,800.00 |
| 0530 | 682-6222 | 720.000 | LF | $6.60701 | CONDUIT, NONMETL, TP 2, 2 IN | $4,757.05 |
| 0535 | 682-6233 | 1320.000 | LF | $2.19815 | CONDUIT, NONMETL, TP 3, 2 IN | $2,901.56 |
| 0540 | 682-9000 | 1.000 | LS | $17,000.00000 | MAIN SVC PICK UP POINT | $17,000.00 |
| 0545 | 682-9010 | 12.000 | EA | $1,788.72522 | SVC POLE RISER | $21,464.70 |
| | | | | | ***SUBTOTAL FOR LIGHTING:*** | **$159,427.45** |

**TOTALS FOR JOB 0009887**



File Location: Div of Preconstruction > CES

# DETAILED COST ESTIMATE

Georgia Department of Transportation

**Job: 0009887**

| | |
|---|---|
| ITEMS COST: | $1,527,495.93 |
| COST GROUP COST: | $0.00 |
| ESTIMATED COST: | $1,527,495.93 |
| CONTINGENCY PERCENT: | 0.00 |
| ENGINEERING AND INSPECTION: | 0.00 |
| ESTIMATED COST WITH CONTINGENCY AND E&I: | $1,527,495.93 |



File Location: Div of Preconstruction > CES

# ATTACHMENT 3

| | | |
|---|---|---|
| **PROJ. NO.** | N/A | CALL NO. |
| P.I. NO. | 0009887 | |
| DATE | 4/17/2013 | |

| INDEX (TYPE) | DATE | INDEX |
|---|---|---|
| REG. UNLEADED | Apr-13 | $ 3.498 |
| DIESEL | | $ 3.970 |
| LIQUID AC | | $ 565.00 |

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) | | | **127419.0825** | **$ 127,419.08** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 904.00 | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 565.00 | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | 375.8675 | |

| ASPHALT | Tons | %AC | AC ton |
|---|---|---|---|
| Leveling | | 5.0% | 0 |
| 12.5 OGFC | | 5.0% | 0 |
| 12.5 mm | 1165.35 | 5.0% | 58.2675 |
| 9.5 mm SP | | 5.0% | 0 |
| 25 mm SP | 4798 | 5.0% | 239.9 |
| 19 mm SP | 1554 | 5.0% | 77.7 |
| | **7517.35** | | **375.8675** |

**BITUMINOUS TACK COAT**

| | | | | |
|---|---|---|---|---|
| Price Adjustment (PA) | | | **$ 1,270.25** | **$ 1,270.25** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 904.00 | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 565.00 | |
| Total Monthly Tonnage of asphalt cement (TMT) | | | 3.747046044 | |

| Bitum Tack Gals | gals/ton | tons |
|---|---|---|
| 872.4 | 232.8234 | 3.74704604 |

**BITUMINOUS TACK COAT (surface treatment)**

| | | | | |
|---|---|---|---|---|
| Price Adjustment (PA) | | | **0** | **$ -** |
| Monthly Asphalt Cement Price month placed (APM) | Max. Cap | 60% | $ 904.00 | |
| Monthly Asphalt Cement Price month project let (APL) | | | $ 565.00 | |
| 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** **$ 128,689.33**

ATTACHMENT 3

# Department of Transportation

State of Georgia

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Interdepartmental Correspondence

| | | | |
|---|---|---|---|
| **FILE** | R/W Cost Estimate | **OFFICE** | Atlanta |
| | | **DATE** | June 10, 2013 |
| **FROM** | Phil Copeland, Right of Way Administrator<br>LaShone Alexander, Right of Way Cost Estimator | | |
| **TO** | Robert Elam, P.E. | | |

**SUBJECT** **Preliminary Right of Way Cost Estimate**
**Project: Cherokee County**
**P.I. No.: 0009887**
**Description: SR 372 @ SR 369**

As per your request, attached is a copy of the approved Preliminary Right of Way Cost Estimates on the above referenced projects.

If you have any questions, please contact LaShone Alexander at One Georgia Center 600 West Parkway Street, NW Atlanta, GA 30308, Right of Way Office at (478) 553-1569 or (478) 232-4045.

`

PC:LA
Attachments
c: file

ATTACHMENT 3 GEORGIA DEPARTMENT OF TRANSPORTATION
PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 6/10/2013
Revised:

Project: 0009887
County: Cherokee
PI: 0009887

Description: SR 372 @ SR 369
Project Termini: SR 372 @ SR 369

Existing ROW: Varies
Parcels: 12
Required ROW: Varies

| | | |
|---|---|---|
| Land and Improvements | | $434,550.00 |
| *Proximity Damage* | *$0.00* | |
| *Consequential Damage* | *$0.00* | |
| *Cost to Cures* | *$0.00* | |
| *Trade Fixtures* | *$0.00* | |
| *Improvements* | *$50,000.00* | |
| Valuation Services | | $22,500.00 |
| Legal Services | | $83,100.00 |
| Relocation | | $24,000.00 |
| Demolition | | $0.00 |
| Administrative | | $104,000.00 |
| TOTAL ESTIMATED COSTS | | $668,150.00 |
| ***TOTAL ESTIMATED COSTS (ROUNDED)*** | | ***$669,000.00*** |

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

Prepared By: LaShonne Alexander CG#: 28699 06/10/2013 (DATE)
Approved By: LaShonne Alexander CG#: 28699 06/10/2013 (DATE)

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

ATTACHMENT 3

# DEPARTMENT OF TRANSPORTATION
# STATE OF GEORGIA

## INTERDEPARTMENT CORRESPONDENCE

FILE: Cherokee County
P.I. No. 0009887

OFFICE: Cartersville

DATE: May 14, 2013

FROM: Kerry D. Bonner, District Utilities Engineer

TO: Genetha Rice-Singleton, State Program Delivery Engineer
**Attn: Ryan Fernandez**

SUBJECT: CONCEPT UTILITY COST ESTIMATE

We are furnishing you with a Concept Utility Cost estimate for each utility with facilities potentially located within the project limits.

| FACILITY OWNER | NON-REIMBURSABLE | REIMBURSABLE |
|---|---|---|
| Atlanta Gas Light Company | $ 240,000.00 | |
| BellSouth Telecommunication | $ 50,000.00 | |
| Cherokee County Water & Sewer* | $ 225,000.00 | |
| Comcast Communications | $ 28,500.00 | |
| Windstream Communications | $ 25,000.00 | |
| TDS Telecom | $ 15,000.00 | |
| Sawnee EMC | | $ 94,700.00 |
| Totals | $ 583,500.00 | $ 94,700.00 |

Total Preliminary Utility Cost Estimate: $ 678,200.00

* The reimbursable amount could increase to $319,700.00 if the Cherokee County Water & Sewer were to apply for utility assistance for the relocation of their facilities.

If you have any questions, please contact Stan McCarley at 770-387-3751.

KDB/sm

C: Mike Bolden, State Utilities Engineer
Angie Robinson, Administrator Financial Management
File/Estimating Book

## CRASH HISTORY

| Year | Total Crashes | State Crash Average | Total Injuries ** | State Injury Average |
|---|---|---|---|---|
| 2004 | 11 | 6.48 | 4 (6) | 1.48 |
| 2005 | 5 | 4.82 | 1 (1) | 1.27 |
| 2006 | 9 | 7.27 | 0 (0) | 1.91 |
| 2007 | 8 | 7.48 | 2 (2) | 1.81 |
| 2008 | 9 | 5.38 | 4 (7) | 0.91 |

** A (B) – A is the number of injury crashes, whereas B is the number of injuries resulting from those crashes.

## CRASH HISTORY

| Crash Type | Total | % | Injuries | % |
|---|---|---|---|---|
| Angle | 22 | 52.4% | 10 | 62.5% |
| Rear-end | 16 | 38.0% | 2 | 12.5% |
| Head-on | 2 | 4.8% | 4 | 25.0% |
| Sideswipe | 2 | 4.8% | 0 | 0.0% |
| Non vehicle collision | 0 | 0.0% | 0 | 0.0% |
| Total | 42 | 100.0% | 16 | 100.0% |

ATTACHMENT 4

**District:** Six
**County:** Cherokee
**Location:** SR 369 @ SR 372

| | |
|---|---|
| Functional Class | 07-Rural-Major Collector |
| AADT Range | 10-15 |

| Type Collision | Total Crashes | Total Intersections | Avg. Total Crashes per Intersection | Avg. Fatal Crashes per Intersection | Avg. Injury Crashes per Intersection | Avg. PDO Crashes per Intersection |
|---|---|---|---|---|---|---|
| **2004** | **382** | **59** | **6.475** | **0.000** | **1.475** | **5.000** |
| Angle | 116 | 59 | 1.966 | 0.000 | 0.542 | 1.424 |
| Head On | 19 | 59 | 0.322 | 0.000 | 0.220 | 0.102 |
| Not A Collision With A Motor Vehicle | 8 | 59 | 0.136 | 0.000 | 0.000 | 0.136 |
| Rear End | 205 | 59 | 3.475 | 0.000 | 0.627 | 2.847 |
| Sideswipe - Opposite Direction | 5 | 59 | 0.085 | 0.000 | 0.051 | 0.034 |
| Sideswipe - Same Direction | 29 | 59 | 0.492 | 0.000 | 0.034 | 0.458 |
| **2005** | **53** | **11** | **4.818** | **0.000** | **1.273** | **3.545** |
| Angle | 11 | 11 | 1.000 | 0.000 | 0.364 | 0.636 |
| Head On | 1 | 11 | 0.091 | 0.000 | 0.000 | 0.091 |
| Not A Collision With A Motor Vehicle | 4 | 11 | 0.364 | 0.000 | 0.091 | 0.273 |
| Rear End | 30 | 11 | 2.727 | 0.000 | 0.636 | 2.091 |
| Sideswipe - Opposite Direction | 3 | 11 | 0.273 | 0.000 | 0.091 | 0.182 |
| Sideswipe - Same Direction | 4 | 11 | 0.364 | 0.000 | 0.091 | 0.273 |
| **2006** | **80** | **11** | **7.273** | **0.000** | **1.909** | **5.364** |
| Angle | 39 | 11 | 3.545 | 0.000 | 1.091 | 2.455 |
| Head On | 2 | 11 | 0.182 | 0.000 | 0.182 | 0.000 |
| Not A Collision With A Motor Vehicle | 3 | 11 | 0.273 | 0.000 | 0.091 | 0.182 |
| Rear End | 30 | 11 | 2.727 | 0.000 | 0.455 | 2.273 |
| Sideswipe - Opposite Direction | 2 | 11 | 0.182 | 0.000 | 0.091 | 0.091 |
| Sideswipe - Same Direction | 4 | 11 | 0.364 | 0.000 | 0.000 | 0.364 |
| **2007** | **157** | **21** | **7.476** | **0.048** | **1.810** | **5.619** |
| Angle | 45 | 21 | 2.143 | 0.000 | 0.952 | 1.190 |
| Head On | 2 | 21 | 0.095 | 0.000 | 0.048 | 0.048 |
| Not A Collision With A Motor Vehicle | 3 | 21 | 0.143 | 0.000 | 0.048 | 0.095 |
| Rear End | 94 | 21 | 4.476 | 0.048 | 0.667 | 3.762 |
| Sideswipe - Opposite Direction | 2 | 21 | 0.095 | 0.000 | 0.048 | 0.048 |
| Sideswipe - Same Direction | 11 | 21 | 0.524 | 0.000 | 0.048 | 0.476 |
| **2008** | **113** | **21** | **5.381** | **0.000** | **0.905** | **4.476** |
| Angle | 37 | 21 | 1.762 | 0.000 | 0.524 | 1.238 |
| Head On | 4 | 21 | 0.190 | 0.000 | 0.000 | 0.190 |
| Not A Collision With A Motor Vehicle | 4 | 21 | 0.190 | 0.000 | 0.048 | 0.143 |
| Rear End | 62 | 21 | 2.952 | 0.000 | 0.286 | 2.667 |
| Sideswipe - Same Direction | 6 | 21 | 0.286 | 0.000 | 0.048 | 0.238 |
| **Total** | **785** | **24.724** | **31.423** | **0.048** | **7.371** | **24.004** |
| 5-Year Average (2004-2008) | 157.000 | 24.724 | 6.285 | 0.010 | 1.474 | 4.801 |

| | Avg. Crashes | Value | Crash Reduction | Total |
|---|---|---|---|---|
| **Fatal:** | 0.010 | $ 5,800,000.00 | 0.800 | $ 44,190.48 |
| **Injury:** | 1.474 | $ 333,500.00 | 0.800 | $ 393,299.49 |
| **PDO:** | 4.801 | $ 4,800.00 | 0.420 | $ 9,678.55 |
| | | | **Benefit per Year** | **$ 447,168.52** |
| | | | **5 Year Benefit** | $ 2,235,842.58 |

ATTACHMENT 5

# Department of Transportation
# State of Georgia

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INTERDEPARTMENT CORRESPONDENCE

**FILE** Cherokee County
P.I. # 0009887

**OFFICE** Planning

**DATE** August 5, 2011

**FROM** Cindy VanDyke, State Transportation Planning Administrator

**TO** Bobby Hilliard, PE, State Program Delivery Engineer
Attention: Charles Robinson

**SUBJECT** Design Traffic for SR 372 @ SR 369

The Design Traffic for the above mentioned project is furnished on the attached document in 0009887.pdf

If you have any questions concerning this information please contact Leslie Woods at (404) 631-1773

CLV/LRW

ATTACHMENT 5

# Traffic Projections/Forecasting Summary Sheet

P.I. # 0009887

Cherokee County

**Year the counts** were taken in 2011

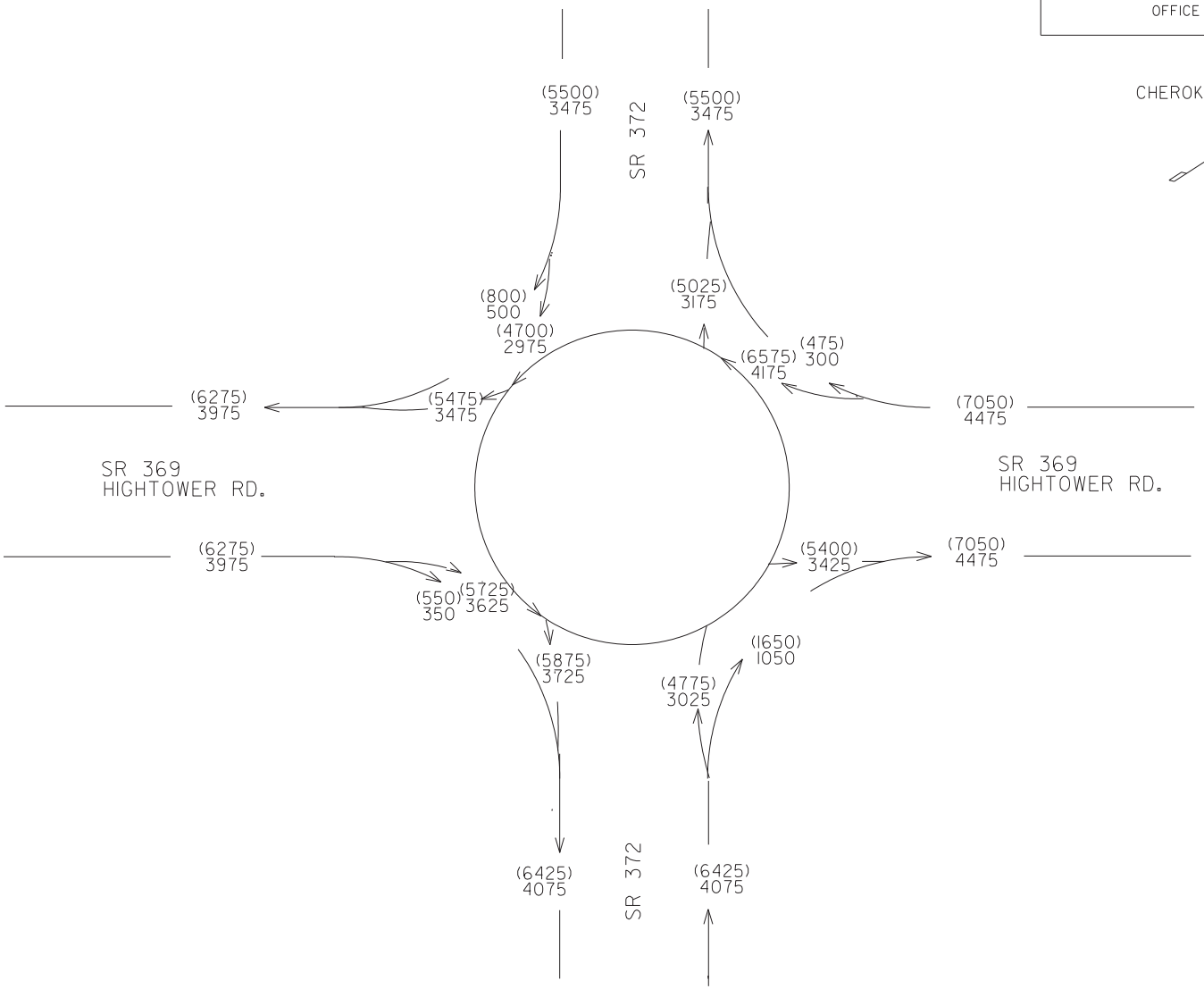
## Growth Factors

| *Growth for Build* | *Growth for No Build* |
|---|---|
| Existing Year to Base Year 3.0% | Existing to Base Year 3.0% |
| Base Year to Design Year 2.5% | Base to Design Year 2.5% |
| K = 9% | K = 9% |
| D = 60% | D = 60% |

## Assumptions

- Looked at 5-year trend.
- Considered ARC projections for Cherokee County as additional tool (3.1%).

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

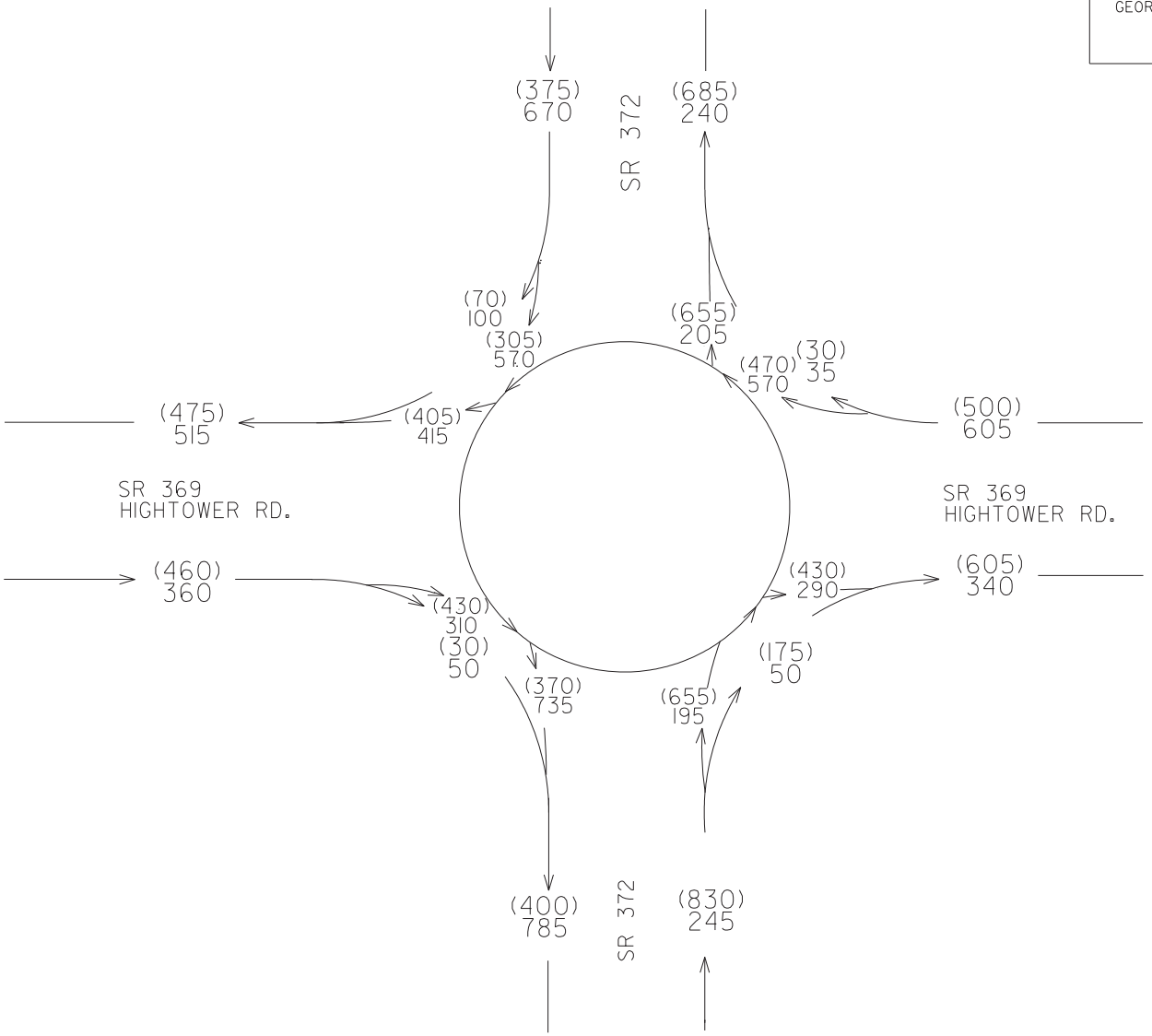
BUILD
2036 ADT = (000)
2016 ADT = 000
24-HR. T = 11%
S.U. = 6%
COMB. = 5%

LRW
8/2011

ATTACHMENT 5

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

ATTACHMENT 5




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

BUILD
2036 DHV PM = (000)
2036 DHV AM = 000

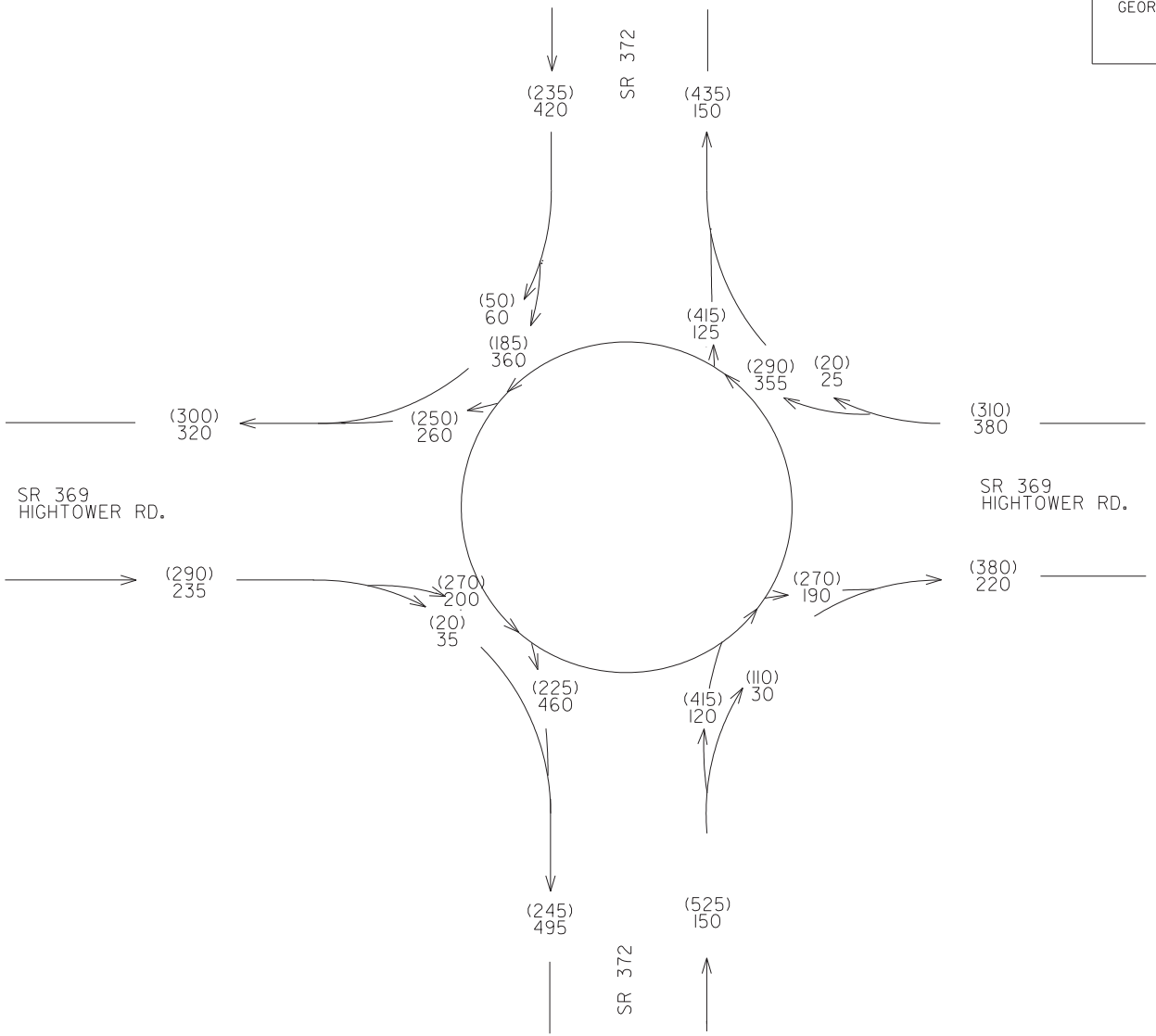
T-PEAK = 12.5%
S.U. = 7%
COMB.= 5.5%

LRW
8/2011

ATTACHMENT 5

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

CHEROKEE COUNTY




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

BUILD
2016 DHV PM = (000)
2016 DHV AM = 000

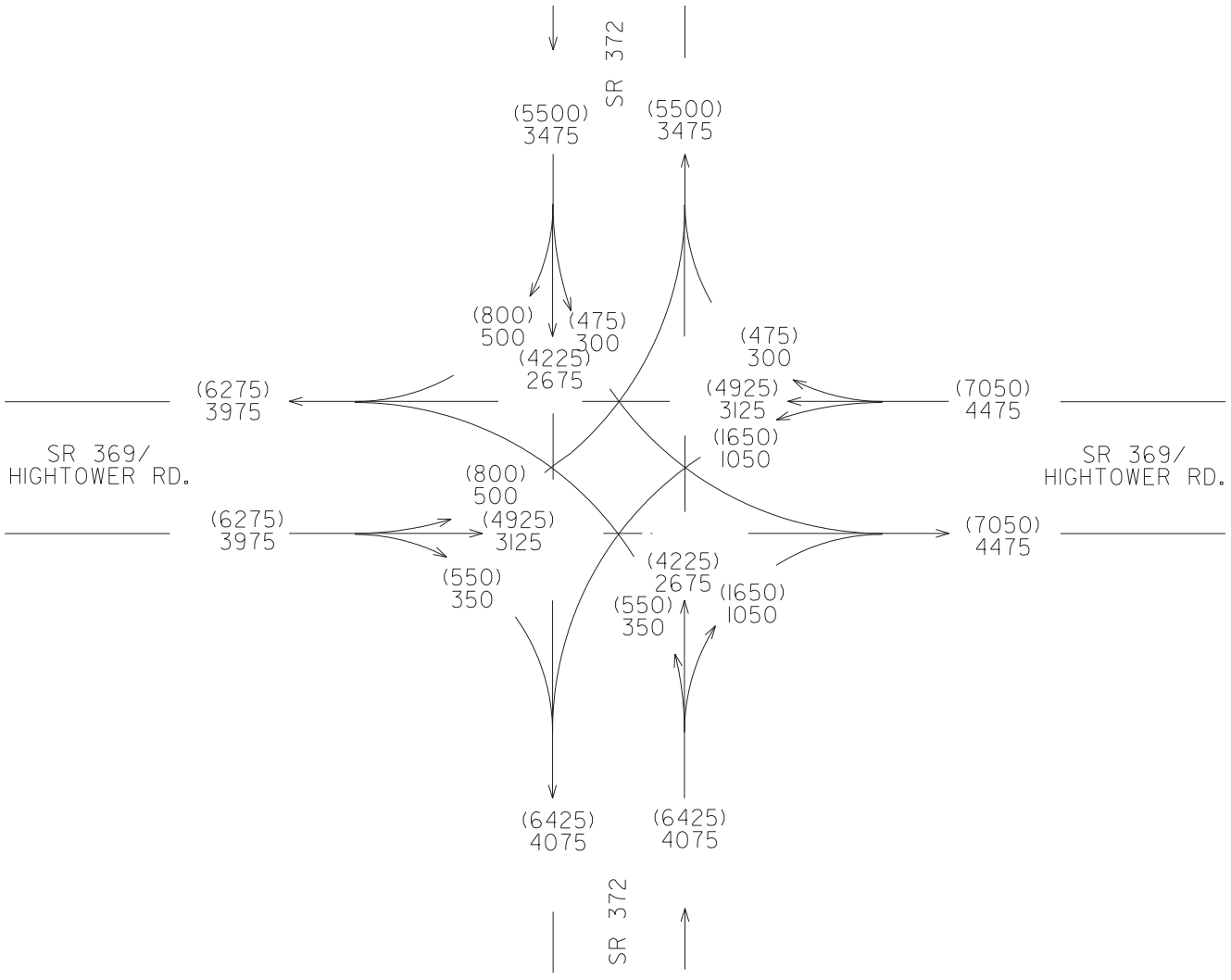
T-PEAK = 12.5%
S.U. = 7%
COMB.= 5.5%

LRW
8/2011

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

ATTACHMENT 5

CHEROKEE COUNTY




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

NO-BUILD
2036 ADT = (000)
2016 ADT = 000

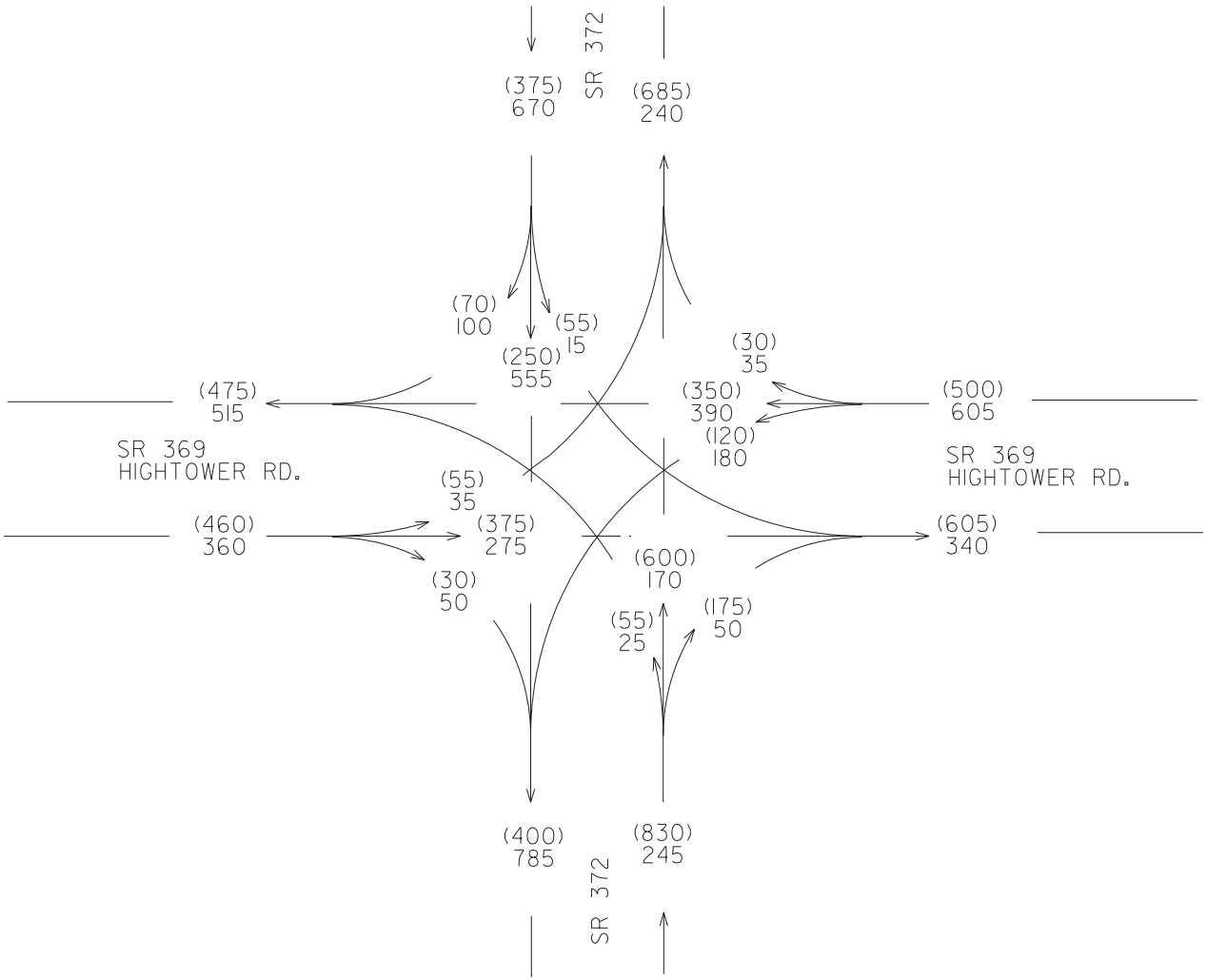
24-HR. T = 11%
S.U. = 6%
COMB. = 5%

LRW
8/2011

ATTACHMENT 5

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

CHEROKEE COUNTY




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

NO-BUILD
2036 PM DHV = (000)
2036 AM DHV = 000

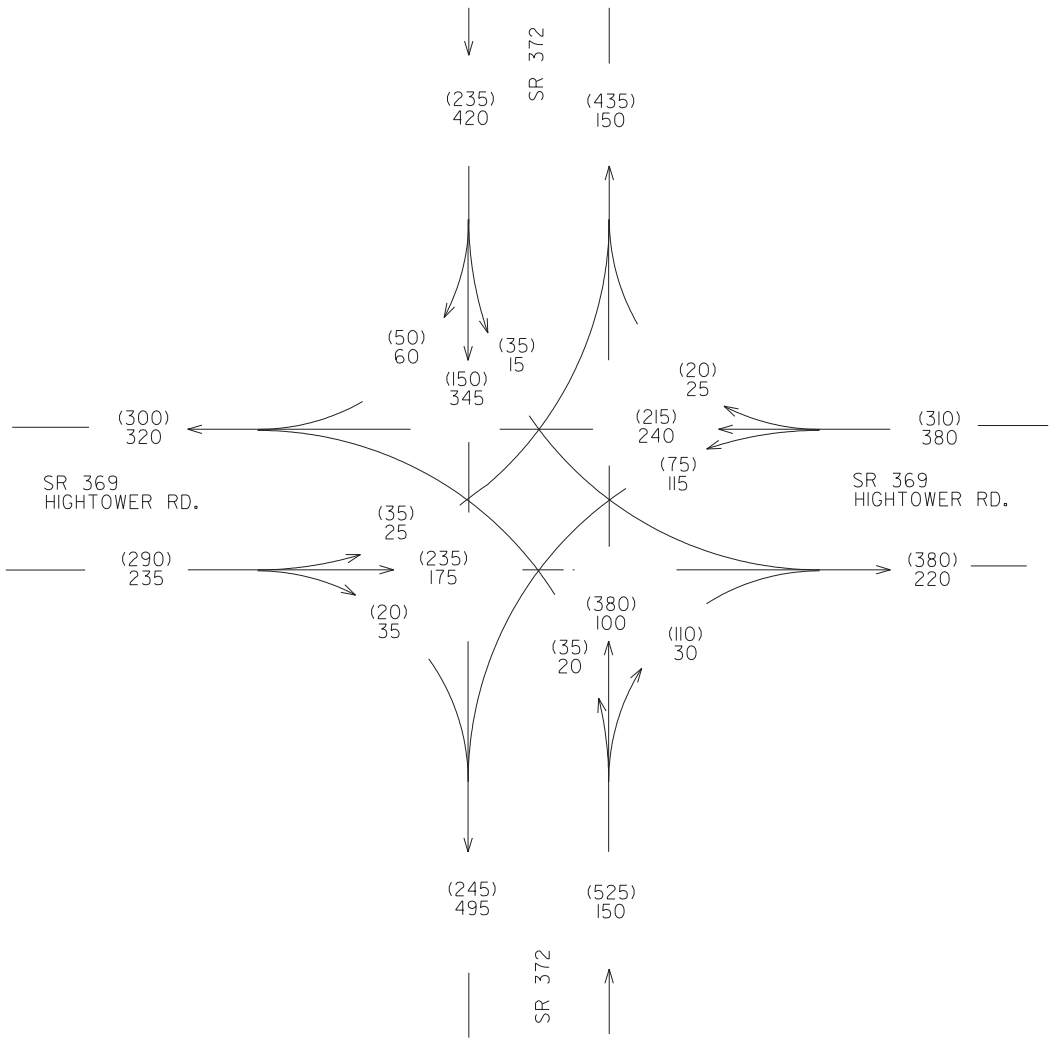
T-PEAK = 12.5%
S.U. = 7%
COMB. = 5.5%

LRW
8/2011

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

ATTACHMENT 5

CHEROKEE COUNTY




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

NO-BUILD
2016 PM DHV = (000)
2016 AM DHV = 000

T-PEAK = 12.5%
S.U. = 7%
COMB. = 5.5%

LRW
7/2012

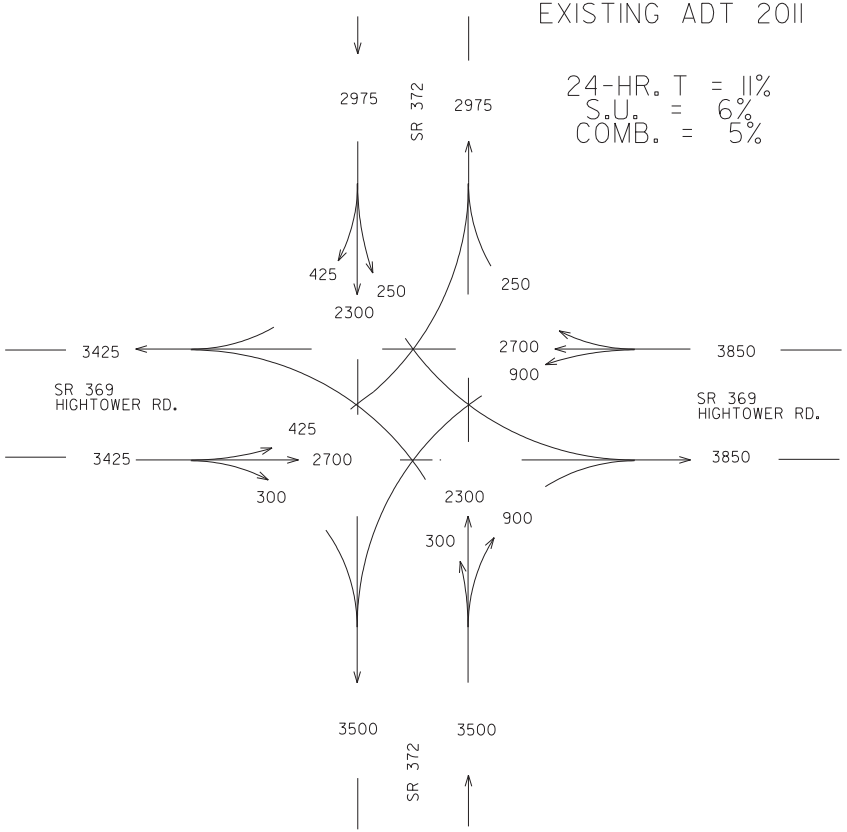
ATTACHMENT 5

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING

CHEROKEE COUNTY

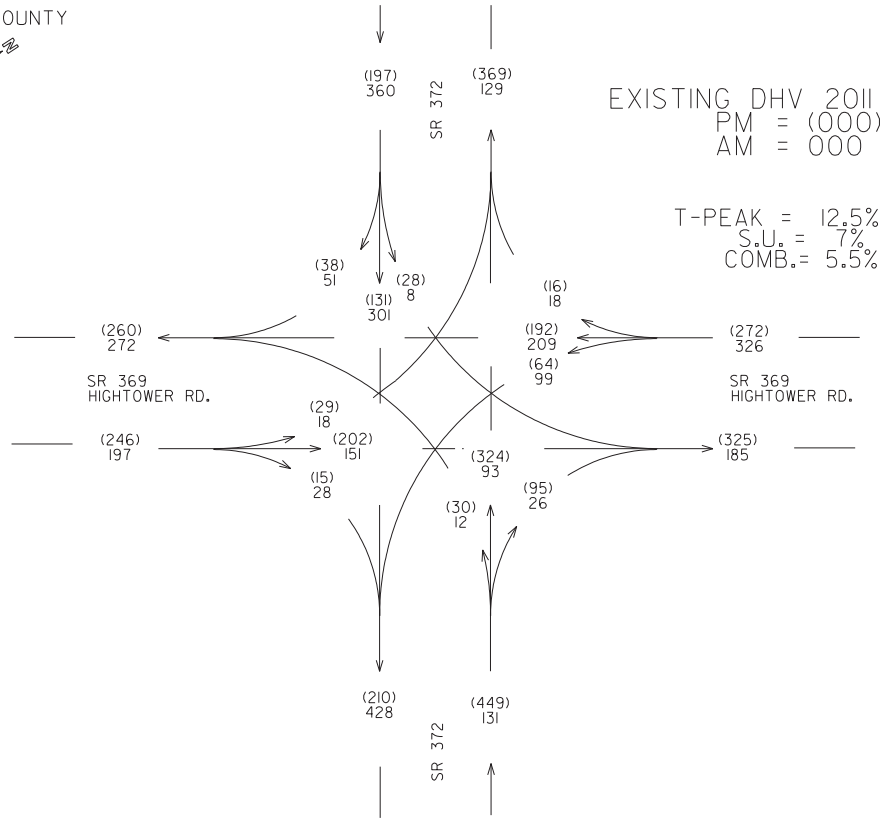
## EXISTING ADT 2011

24-HR. T = 11%
S.U. = 6%
COMB. = 5%




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

T-PEAK = 12.5%
S.U. = 7%
COMB.= 5.5%




P.I. 0009887
CHEROKEE COUNTY

SR 372 @ SR 369

LRW
8/2011

**Operational Analysis**

As shown in tables 3 through 6, the operational delay and level of service (LOS) are better at a Roundabout than at a Signalized Intersection. A Roundabout will provide a LOS C from base year through design year whereas a signalized intersection will drop down to a LOS F by the year 2036. In a No-Build scenario as shown in tables 7 and 8, LOS is a LOS E/F by base year.

| Analysis Tool | Approach | Movement | 2016 – Base Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM | | | | PM | | | |
| | | | V/C | Delay (s/veh) | LOS | 95th % Queue (ft) | V/C | Delay (s/veh) | LOS | 95th % Queue (ft) |
| **Roundabout** | | | | | | | | | | |
| Sidra | Northbound | L | 0.644 | 18.0 | C | 6.4 | 0.351 | 14.5 | B | 2.3 |
| | | T | | | | | | | | |
| | | R | | | | | | | | |
| | Southbound | L | 0.194 | 12.9 | B | 1.1 | 0.732 | 18.8 | C | 9.0 |
| | | T | | | | | | | | |
| | | R | | | | | | | | |
| | Eastbound | L | 0.332 | 13.2 | B | 2.2 | 0.409 | 15.4 | C | 3.0 |
| | | T | | | | | | | | |
| | | R | 0.026 | 15.4 | C | 0.1 | 0.027 | 17.2 | C | 0.2 |
| | Westbound | L | 0.281 | 14.3 | B | 1.9 | 0.292 | 12.6 | B | 1.9 |
| | | T | | | | | | | | |
| | | R | 0.048 | 17.6 | C | 0.4 | 0.021 | 15.9 | C | 0.1 |
| HCS | Northbound | L | 0.23 | 7.3 | A | 0.9 | 0.88 | 36.3 | E | 10.8 |
| | | T | | | | | | | | |
| | | R | | | | | | | | |
| | Southbound | L | 0.77 | 26.6 | D | 7.2 | 0.41 | 11.2 | B | 2.0 |
| | | T | | | | | | | | |
| | | R | | | | | | | | |
| | Eastbound | L | 0.42 | 13.4 | B | 2.1 | 0.43 | 10.9 | B | 2.2 |
| | | T | | | | | | | | |
| | | R | 0.07 | 7.4 | | 0.2 | 0.03 | 5.1 | | 0.1 |
| | Westbound | L | 0.46 | 9.8 | A | 2.5 | 0.59 | 18.1 | C | 3.8 |
| | | T | | | | | | | | |
| | | R | 0.03 | 4.5 | | 0.1 | 0.04 | 6.6 | | 0.1 |

Table 3 - Single Lane Roundabout Capacity Analysis – 2016

| Analysis Tool | Approach | Movement | 2036 – Design Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM | | | | PM | | | |
| | | | V/C | Delay (s/veh) | LOS | 95th % Queue (ft) | V/C | Delay (s/veh) | LOS | 95th % Queue (ft) |
| **Roundabout** | | | | | | | | | | |
| Sidra | Northbound | L, T | 0.618 | 22.2 | C | 5.8 | 0.329 | 17.5 | C | 2.2 |
| | | R, T | 0.618 | 20.0 | C | 6.4 | 0.329 | 14.5 | B | 2.4 |
| | Southbound | L, T | 0.158 | 14.1 | B | 0.9 | 0.653 | 20.9 | C | 6.7 |
| | | R, T | 0.158 | 12.4 | B | 1.1 | 0.653 | 18.5 | C | 7.2 |
| | Eastbound | L, T | 0.639 | 15.0 | B | 5.3 | 0.855 | 24.4 | C | 9.1 |
| | | R | 0.040 | 15.7 | C | 0.2 | 0.052 | 17.3 | C | 0.2 |
| | Westbound | L, T | 0.577 | 17.0 | C | 3.9 | 0.593 | 15.1 | C | 4.3 |
| | | R | 0.092 | 17.9 | C | 0.4 | 0.039 | 16.4 | C | 0.2 |
| HCS | Northbound | L, T | 0.20 | 7.8 | A | 0.7 | 0.83 | 35.5 | E | 8.4 |
| | | R, T | 0.22 | 8.1 | A | 0.8 | 0.93 | 51.9 | F | 11.7 |
| | Southbound | L, T | 0.77 | 33.0 | D | 6.7 | 0.39 | 13.5 | B | 1.9 |
| | | R, T | 0.87 | 44.9 | E | 9.0 | 0.44 | 14.8 | B | 2.2 |
| | Eastbound | L, T | 0.69 | 24.8 | C | 5.3 | 0.72 | 21.1 | C | 6.1 |
| | | R | 0.15 | 11.6 | | 0.5 | 0.06 | 6.4 | | 0.2 |
| | Westbound | L, T | 0.80 | 23.3 | C | 8.4 | 1.01 | 70.0 | F | 14.5 |
| | | R | 0.05 | 5.2 | | 0.2 | 0.08 | 9.5 | | 0.3 |

Table 4 – 2 x 1 Lane Roundabout Capacity Analysis – 2036

| Approach | Movement | 2016 – Base Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | AM | | | PM | | |
| | | V/C | Delay (s/veh) | LOS | V/C | Delay (s/veh) | LOS |
| Signalized Intersection | | | | | | | |
| Northbound | L, T, R | 0.337 | 20.7 | C | 0.940 | 52.5 | D |
| Southbound | L, T, R | 0.826 | 37.0 | D | 0.604 | 26.7 | C |
| Eastbound | L, T, R | 0.880 | 34.2 | C | 0.917 | 41.2 | D |
| Westbound | L, T, R | 0.954 | 33.0 | C | 1.010 | 54.7 | F |

Table 5 – Signalized Intersection Capacity Analysis – 2016

| Approach | Movement | 2036 – Design Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | AM | | | PM | | |
| | | V/C | Delay (s/veh) | LOS | V/C | Delay (s/veh) | LOS |
| Signalized Intersection | | | | | | | |
| Northbound | L, T, R | 0.689 | 39.6 | D | 1.668 | 333.2 | F |
| Southbound | L, T, R | 1.331 | 200.2 | F | 0.957 | 56.2 | E |
| Eastbound | L, T, R | 1.362 | 230.9 | F | 1.618 | 323.7 | F |
| Westbound | L, T, R | 1.307 | 191.1 | F | 1.551 | 291.4 | F |

Table 6 – Signalized Intersection Capacity Analysis – 2036

| Approach | Movement | 2016 – Base Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | AM | | | PM | | |
| | | V/C | Delay (s/veh) | LOS | V/C | Delay (s/veh) | LOS |
| All Way Stop Control | | | | | | | |
| Northbound | L, T, R | 0.41 | 17.42 | C | 1.36 | 200.40 | F |
| Southbound | L, T, R | 0.99 | 65.66 | F | 0.66 | 28.01 | D |
| Eastbound | L, T, R | 0.60 | 22.88 | C | 0.80 | 38.81 | E |
| Westbound | L, T, R | 0.92 | 51.91 | F | 0.85 | 44.58 | E |

Table 7 – No Build Capacity Analysis – 2016

| Approach | Movement | 2036 – Design Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | AM | | | PM | | |
| | | V/C | Delay (s/veh) | LOS | V/C | Delay (s/veh) | LOS |
| All Way Stop Control | | | | | | | |
| Northbound | L, T, R | 0.76 | 38.90 | E | 2.59 | 746.47 | F |
| Southbound | L, T, R | 1.97 | 466.26 | F | 1.18 | 135.20 | F |
| Eastbound | L, T, R | 1.06 | 92.95 | F | 1.45 | 245.74 | F |
| Westbound | L, T, R | 1.80 | 391.98 | F | 1.58 | 300.94 | F |

Table 8 – No Build Capacity Analysis – 2036

ATTACHMENT 7

# Georgia Department of Transportation

District Six Traffic Operations

369 @ 372 2016 8th Highest 100%

Study Name : **369@372 20168thXRT100**
Study Date : **01/05/12**
Page No. : **1**

## *Signal Warrants - Summary*

### Major Street Approaches

***Eastbound:*** SR 369
Number of Lanes: **1**
Approach Speed: **45**
Total Approach Volume: **1,624**

***Westbound:*** SR 369
Number of Lanes: **1**
Approach Speed: **45**
Total Approach Volume: **1,872**

### Minor Street Approaches

***Northbound:*** SR 372
Number of Lanes: **1**
Total Approach Volume: **1,360**

***Southbound:*** SR 372
Number of Lanes: **1**
Total Approach Volume: **1,336**

### Warrant Summary (Urban values apply.)

**Warrant 1 - Eight Hour Vehicular Volumes** ..... Not Satisfied

**Warrant 1A - Minimum Vehicular Volume** ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

**Warrant 1B - Interruption of Continuous Traffic** ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

**Warrant 1 A&B - Combination of Warrants** ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

**Warrant 2 - Four Hour Volumes** ..... Not Satisfied
Number of hours (0) volumes exceed minimum < minimum required (4).

**Warrant 3 - Peak Hour** ..... Not Satisfied

**Warrant 3A - Peak Hour Volumes** ..... Not Satisfied
Volumes do not exceed minimums for any hour.

**Warrant 3B - Peak Hour Delay** ..... Not Satisfied
Total approach volumes and delays on minor street do not exceed minimums for any hour.

**Warrant 4 - Pedestrian Volumes** ..... Not Satisfied
Required 4 Hr pedestrian volume reached for 0 hour(s) and the single hour volume for 0 hour(s)

**Warrant 5 - School Crossing** ..... Not Satisfied
Number of gaps > .0 seconds (0) exceeds the number of minutes in the crossing period (0).

**Warrant 6 - Coordinated Signal System** ..... Not Satisfied
No adjacent coordinated signals are present

**Warrant 7 - Crash Experience** ..... Not Satisfied
Number of accidents (-1) is less than minimum (5). Volume minimums are met.

**Warrant 8 - Roadway Network** ..... Not Satisfied
Major Route conditions not met. No volume requirement met.

ATTACHMENT 7

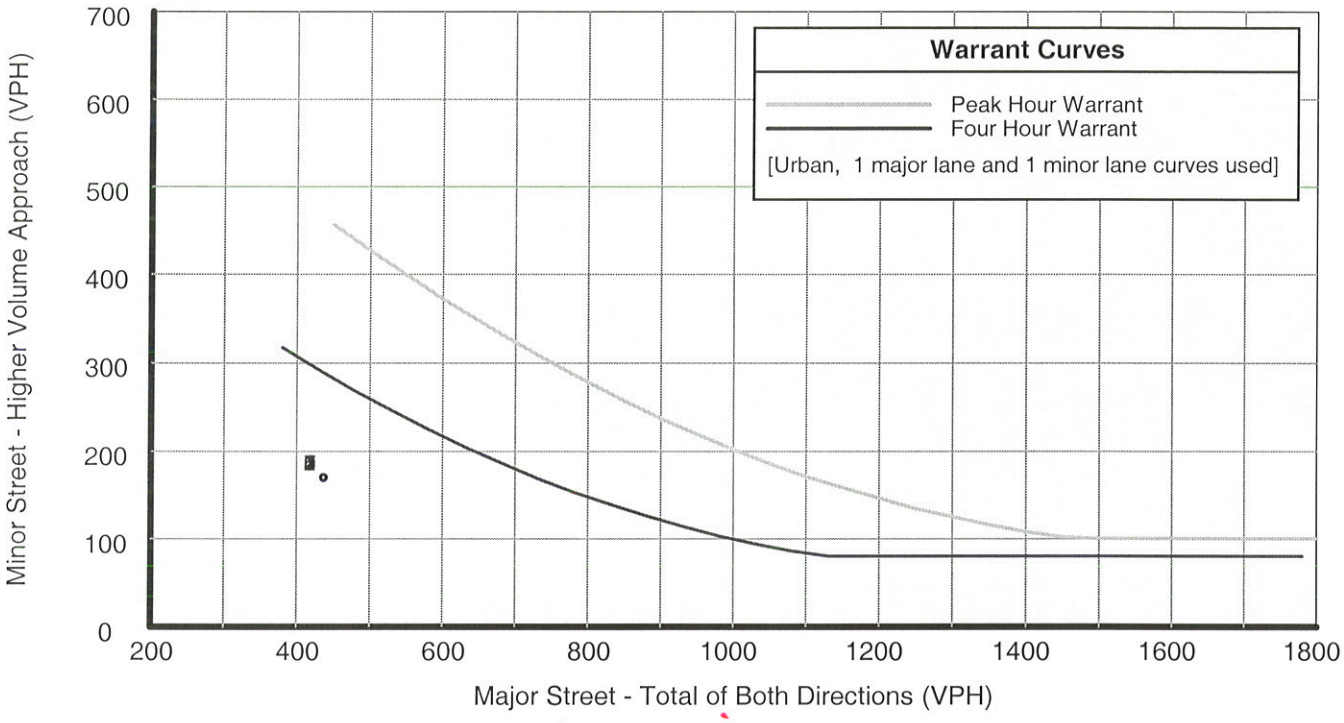
# Georgia Department of Transportation

District Six Traffic Operations

369 @ 372 2016 8th Highest 100%

Study Name : **369@372 20168thXRT100**
Study Date : **01/05/12**
Page No. : **2**

## *Signal Warrants - Summary*




70% = 350 Single lane major / 105 minor

525 53

**Analysis of 8-Hour Volume Warrants:**

| Hour Begin | Major Total | Higher Minor Vol | Higher Minor Dir | War-1A Major Crit | War-1A Minor Crit | War-1A Meets? | War-1B Major Crit | War-1B Minor Crit | War-1B Meets? | War-1A&B Major Crit | War-1A&B Minor Crit | War-1A&B Meets? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 01:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 02:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 03:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 04:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 05:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 06:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 07:00 | 437 | 170 | NB | 500-No | 150-Yes | Minor | 750-No | 75-Yes | Minor | 600-No | 120-Yes | Minor |
| 08:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 09:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 10:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 11:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 12:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 13:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 14:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 15:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 16:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 17:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 18:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 19:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 20:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 21:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 22:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |
| 23:00 | 0 | 0 | NB | 500-No | 150-No | --- | 750-No | 75-No | --- | 600-No | 120-No | --- |

ATTACHMENT 8A

# DEPARTMENT OF TRANSPORTATION

# STATE OF GEORGIA

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## INTERDEPARTMENT CORRESPONDENCE

**FILE** **Cherokee County**

**OFFICE** Traffic Operations
Cartersville, Georgia

**DATE** December 17, 2010

**FROM:** Harry A. Maddox, District Traffic Engineer

**TO:** Kathy Zahul, P.E., State Traffic Engineer
Attention: Scott Zehngraff

**SUBJECT:** **Traffic Engineering Study for proposed roundabout at SR 369 @ SR 372**

Submitted for your further processing is the Traffic Engineering Study for the proposed intersection of State Route 369 @ State Route 372.

The proposed roundabout is an existing all way stop intersection in Cherokee County. Using actual counts from 2003 in HCS, it was operating at LOS D. Adding a conservative 2% per year, currently the intersection LOS is F. It has a single lane approach on all four legs with slip ramps for right turns on SR 369. It forms a narrow roughly 45 degree skew to the north and south.

There are no other traffic control devices within a mile of this location.

This office recommends that the subject intersection be added to the list of proposed intersection improvement projects for roundabouts.

If you have further questions regarding this matter please contact our office.

HAM/DC/s
Attachments: TE Report
Location Map

ATTACHMENT 8A


# DEPARTMENT OF TRANSPORTATION
## STATE OF GEORGIA

# TRAFFIC ENGINEERING INVESTIGATION
# CARTERSVILLE, GEORGIA
# DISTRICT SIX

| | |
|---|---|
| **COUNTY** | Cherokee |
| **PRIMARY ROUTE** | State Route 369 |
| **SECONDARY ROUTE** | State Route 372 |
| **MILE POST** | 2.06 |
| **PREPARED BY** | Dee Corson<br>District Traffic Operations Engineer |

ATTACHMENT 8A

## REASON FOR INVESTIGATION:

To make a determination of the need for operational improvements at the intersection of State Route 369 and State Route 372.

## TOPOGRAPHY:

The adjacent land use is rural and sparse residential with several single family residential subdivisions in the area.

## GEOMETRICS:

The existing roadway consists of two twelve foot lanes 1-2 foot paved shoulder and 6 foot earth shoulders. The intersection is currently operating as an all way stop control. There are right turn slip ramps for State Route 369. Southbound State Route 372 is in a horizontal curve of approximately -31' coming into the intersection, -36' northbound, -43' westbound on State Route 369, and -13' eastbound.

## VEHICULAR VOLUMES:

2007 Average Annual Daily Traffic on State Route 1 is 10,310 vehicles per day.

## ADJACENT SIGNALIZED LOCATIONS:

There are no adjacent signalized or other controlled intersections nearby.

## HISTORY:

| Type | 2007 | 2008 | 2009 |
|---|---|---|---|
| Angle | 4 | 3 | 3 |
| Rear End | 3 | 3 | 1 |
| Left Turn | 0 | 3 | 2 |

## LOS ANALYSIS:

Using actual counts from 2003, this intersection operated at a LOS of D, it now operates at a LOS F.

## CONCLUSIONS:

This intersection is currently operating at a LOS F. This intersection should be included in a project to construct a modern roundabout.

## RECOMMENDATIONS:

Based upon the findings, it is recommended that modern roundabout be constructed at this intersection.

**PREPARED BY:** _____ **DATE** 12/17/10
**Dee Corson-District Traffic Operations Engineer**

**RECOMMENDED BY:** _____ **DATE** 12-17-10
**Harry A. Maddox-District Traffic Engineer**

**APPROVED BY:** _____ **DATE** _____
**Kathy Zahul, P.E.-State Traffic Engineer**

ATTACHMENT 8B

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

INTERDEPARTMENTAL CORRESPONDENCE

**FILE:** P.I. 0009887, SR 369 at SR 372 Roundabout
Cherokee County

**OFFICE:** Roadway Design
**DATE:** November 21, 2012

**FROM:** C. Andy Casey, P.E., State Roadway Design

**To:** Kathy Zahul, P.E., State Traffic Engineer
**Attn: Scott Zehngraff**

**Subject:** Roundabout Feasibility Study – S.R. 369 at S.R. 372

## Introduction

The purpose of this study is to identify alternatives and evaluate their feasibility to improve the operational and safety functions of the intersection between State Route 369 (SR 369) and State Route 372 (SR 372) in Cherokee County. A signalized intersection and five roundabout alternatives were analyzed during this study. This feasibility study summarizes the findings and recommendations of the analysis.

## 1. Project Background and Site Conditions

This project proposes to improve the safety and operation of the existing intersection between S.R. 369 and S.R. 372. The proposed project length is approximately 0.5 miles including approaches. The intersection is skewed, approximately forty-five degrees, with S.R. 372 aligned North and South, and S.R. 369 aligned East and West. See Figure 1 and Figure 2 (Page 2) for existing conditions of the intersection.

SR 369 is a two lane rural major collector with a posted speed limit of 55 mph and an AADT of 10,310 vehicles per day. SR 372 is a two lane rural major collector with a posted speed limit of 55 mph and an AADT of 6,050 vehicles per day. Presently, the intersection is stop controlled. The existing right of way is 100 feet.

The intersection, an all-way stop control, is located in Ball Ground, Georgia. The area is rural and the topography is rolling. The surrounding area is a mix of undeveloped, residential and commercial properties. There are no railroads, bridges, fire, police or school facilities within two miles of the intersection. The area to the East of the intersection includes commercial and undeveloped properties. There are two fuel stations, Citgo and Rite Way, Cherokee Seed & Feed and Amos' BBQ. The area to the South includes a mix of undeveloped, residential and commercial properties. The lone commercial property is Bramble Motorcare. The area to the West includes residential and undeveloped property. The area to the North includes undeveloped, residential and commercial property. The lone commercial property is unnamed. All surrounding undeveloped properties have grassed roadside vegetation and are wooded.

District Traffic Operations performed analysis to determine if the intersection would meet signal warrants. The findings were that the intersection will meet Warrants 1A and 1B at build year volume projections with a single lane approach assumption using 70% volumes. In addition to the signal warrant investigation, district traffic operations noted that approach rumble strips were added a few years ago during a maintenance project to help mitigate site distance issues coupled with the high speed approaches for the intersection. No results were noted for the mitigation of the rumble strips effectiveness.

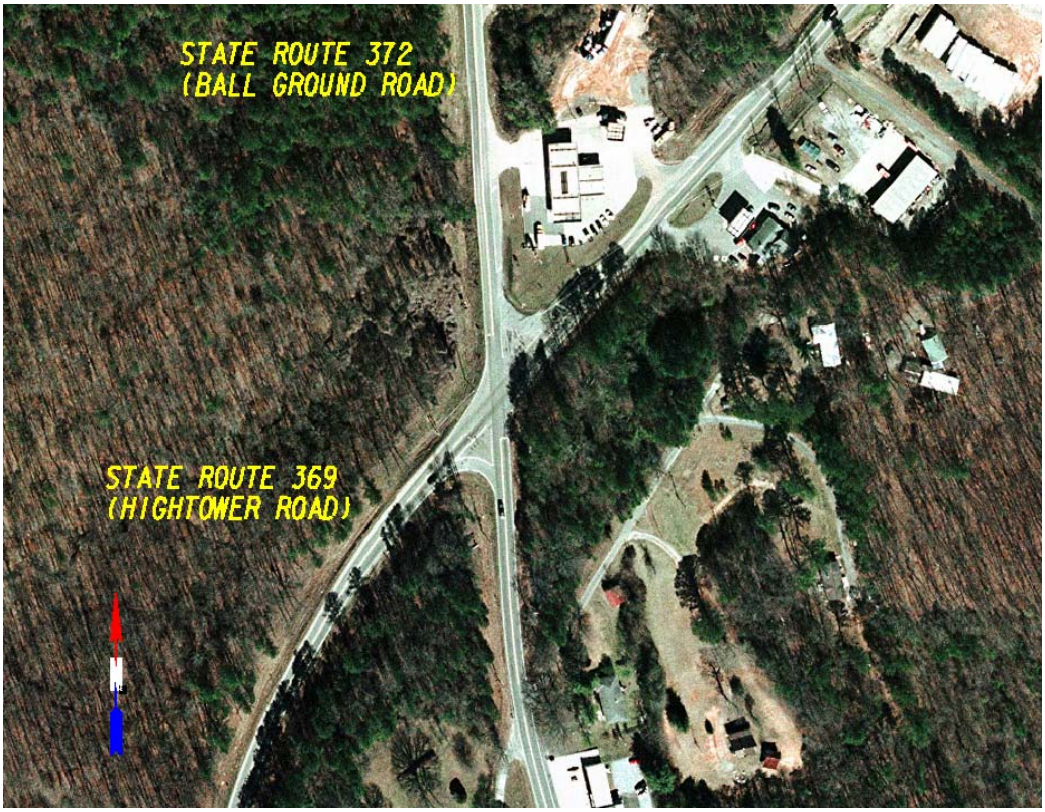


Figure 1 - Existing Conditions: SR 369 at SR 372 Ball Ground, Cherokee County, GA


Figure 2 - Existing Conditions: SR 369 at SR 372

## 2. SAFETY ASSESSMENT

Historical crash data was obtained from Office of Traffic Operations for the available most recent five years (2004 to 2008) for the intersection of State Route 369/Hightower Road and State Route 372/Ball Ground Round. There were forty-two total accidents, sixteen injuries and zero fatalities.

| Year | Total Crashes | Crash Types | | | | | Crash Severity | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Angle | Rear End | Head On | Sideswipe | Other | PDO* | Injury** | Fatal |
| 2004 | 11 | 9 | 2 | 0 | 0 | 0 | 7 | 4 (6) | 0 |
| 2005 | 5 | 1 | 4 | 0 | 0 | 0 | 4 | 1 (1) | 0 |
| 2006 | 9 | 3 | 6 | 0 | 0 | 0 | 9 | 0 (0) | 0 |
| 2007 | 8 | 6 | 2 | 0 | 0 | 0 | 6 | 2 (2) | 0 |
| 2008 | 9 | 4 | 3 | 2 | 0 | 0 | 5 | 4 (7) | 0 |
| **TOTAL** | **42** | **23** | **17** | **2** | **0** | **0** | **31** | **11 (16)** | **0** |

**Table 1 Crash History – S.R. 369 at S.R 372**
**PDO – Property Damage Only*
***A (B) – A is the number of injury crashes, whereas B is the number of injuries resulting from those crashes*

An analysis of the data shows that Angle Crashes accounted for 55% percent of all crashes and 63% of all injuries. The leading cause of these accidents is failure to stop and yield right of way at the All Way Stop Control intersection. The angle collision frequency is correctable by installing either a traffic signal control or a roundabout, provided the intersection skew can be mitigated. By implementing a roundabout, there would be an expected 82% reduction in severe injuries by eliminating angular crashes and a 44% reduction in total crashes.

## 3. Alternate Sketches

Six design alternates were developed for the improvement of State Route 372/Ball Ground Road and State Route 369/Hightower Road.

**Alternate 1** – *Single Lane Roundabout*
Alternate 1 proposes a single lane roundabout with right turn bypasses on the Westbound to Northbound and Eastbound to Southbound legs. The Inscribed Circle Diameter (ICD) is 180 feet. An analysis of this configuration resulted in a Level of Service (LOS) A in the Build Year and LOS F in the Design Year. The single lane roundabout reaches LOS F in the eleventh year of operation.


Figure 4 – Alternate 1: Single Lane Roundabout

**Alternate 2** – *Multilane Roundabout*
Alternate 2 proposes a multilane roundabout with two through lanes at each approach and exit. The right turn bypasses on the Westbound to Northbound and Eastbound to Southbound legs are only one lane. The Inscribed Circle Diameter (ICD) is 200 feet. An analysis of this configuration resulted in a Level of Service (LOS) A in the Build Year and LOS B in the Design Year. The multilane alternate provides more capacity than is necessary for the first ten years after opening and in the design year.


Figure 5 – Alternate 2: Multilane Roundabout

**Alternate 3** – *Hybrid Roundabout*
Alternate 3 proposes a roundabout with two through and exit lanes Northbound and Southbound. The Eastbound and Southbound approach and exit would have one lane. The right turn bypasses on the Westbound to Northbound and Eastbound to Southbound legs are one lane. The Inscribed Circle Diameter (ICD) is 190 feet. An analysis of this configuration resulted in a Level of Service (LOS) A in the Build Year and LOS C in the Design Year. The hybrid alternate addresses the specific Northbound/Southbound traffic movement while maintaining a smaller footprint than the multilane roundabout (Alternate 2).


Figure 6 – Alternate 3: Hybrid Roundabout

**Alternate 4** – *Linked Roundabout (North to South)*
Alternate 4 proposes two single lane roundabouts that are interconnected. The roundabouts both have an ICD of 150 feet. An analysis of this configuration resulted in a LOS F in the Design Year. The failure results from inadequate queue storage between the roundabouts. The dominant patterns of traffic are not well served by a pair of roundabouts.

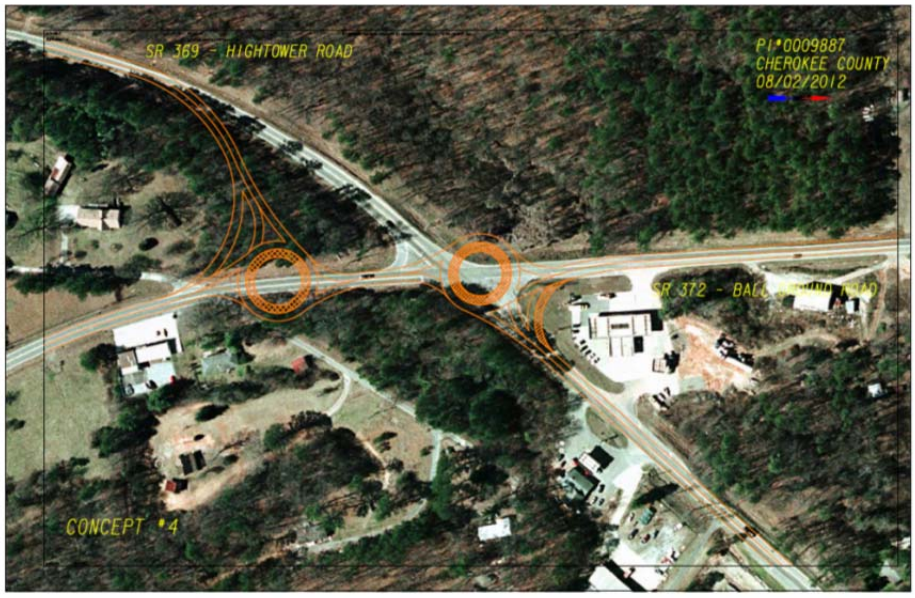


Figure 7 – Alternate 4: Linked Roundabout (North to South Link)

**Alternate 5** – *Linked Roundabout (North to West)*
Alternate 5 proposes two single lane roundabouts that are interconnected. The roundabouts both have an ICD of 150 feet. An analysis of this configuration resulted in a LOS F in the Design Year. The failure results from inadequate queue storage between the roundabouts. The dominant patterns of traffic are not well served by a pair of roundabouts.


Figure 8 – Alternate 5: Linked Roundabout (North to West Link)

**Alternate 6** – *Signal Alignment*
Alternate 6 proposes an alignment that would correct the intersection geometry. The existing intersection has a skew angle 45 degrees. An alignment was created that provided a 90 degree intersection. This alternate has one lane approaches and exits with no dedicated turn lanes. Variations of the approach alignment are feasible depending on the acceptability of an intersection skew angle less than 90 degrees. An analysis of this configuration resulted in a LOS E in the Design Year. The signal alternative could perform better with the addition of turn lanes. According to the Transportation Research Board NCHRP 672 intersection safety performance report and the Federal Highway FHWA-SA-12-005 documentation, a signalized intersection does not provide the level of safety that a roundabout would provide. By converting from a signalized intersection to a roundabout, a location can experience an expected 78% reduction in severe (injury/fatal) crashes and a 48% reduction in overall crashes.


Figure 9 – Alternate 6: Signal Alignment

## 4. Operational Analysis

Detailed operational analyses were performed for the six alternates for the Base Year (2016) and Design Year (2036). The Base Year analyses were all improvements over the existing LOS, so the Design Year LOS is summarized below to effectively judge the performances of each alternate long term.

| Concept | | Traffic Analysis (LOS) 2036 | | | | |
|---|---|---|---|---|---|---|
| | | Sidra | GDOT | HCS | ARCADY | Synchro |
| | | AM/PM | AM/PM | AM/PM | AM/PM | AM/PM |
| 1 | Single Lane Roundabout | F/F | F/F | F/F | | |
| 2 | Multilane Roundabout | B/B | A/B | B/C | | |
| 3 | Hybrid 2 Lane Roundabout (2 Lanes N/S and 1 Lane E/W) | C/C | C/C | D/E | | |
| 4 | Linked Roundabout (North to South Link) | | D/E | | F/B | |
| 5 | Linked Roundabout (North to West) | | D/E | | | |
| 6 | Signal Alignment | | | E/E | | E/E |

*Alternate 1* – The single lane roundabout was analyzed within SIDRA, the GDOT Roundabout Tool and HCS 2010. This alternate failed to maintain a minimum LOS C in the Design Year.

*Alternate 2* – The multilane roundabout was analyzed within SIDRA, the GDOT Roundabout Tool and HCS 2010. The results show that this alternate will have the highest LOS of all the alternates in the Design Year.

*Alternate 3* – The hybrid roundabout was analyzed within SIDRA, the GDOT Roundabout Tool and HCS 2010. This alternate meets the minimum LOS C in the Design Year.

*Alternate 4* – The North to South Linked roundabout was analyzed in the GDOT Roundabout Tool and ARCADY. This alternate failed to maintain a minimum LOS C in the Design Year.

*Alternate 5* – The North to West Linked roundabout was analyzed in the GDOT Roundabout Tool. Analysis of Alternate 4 indicates that this configuration did not warrant another Arcady study. This alternate failed to maintain a minimum LOS C in the Design Year.

*Alternate 6* – The signal alignment was analyzed within HCS 2010 and SYNCHRO. This alternate failed to maintain a minimum LOS C in the Design Year.

**5. Cost Comparison**

All of the alternates would require a larger footprint than the existing condition. The size of the footprint is directly proportional to the total cost for each alternate. As the size of the footprint increases, so does the construction and right of way costs. A significant portion of the cost will be acquisition of right of way.

| Concept | Construction Cost ($) |
|---|---|
| **1 - Single Lane Roundabout** | **$ 725,088.22** |
| **2 - Multilane Roundabout** | **$ 1,084,163.64** |
| **3 - Hybrid Roundabout** | **$ 982,298.42** |
| **4 - Linked Roundabout** | **$ 874,463.91** |
| **5 - Linked Roundabout** | **$ 991,279.04** |
| **6 - Signal Alignment** | **$ 1,228,703.01** |

*Alternate 1* – The single lane roundabout has the smallest right of way footprint of the alternates and has the lowest estimated construction cost overall.

*Alternate 2* – The multilane roundabout has the second largest estimated construction cost due to its large footprint and the increased amount of pavement required for this alternate.

*Alternate 3* – The hybrid roundabout's estimated construction cost is the third least expensive. The footprint of this alternate is larger than the single lane roundabout, but requires less pavement than the multilane roundabout.

*Alternate 4 & 5* – the linked roundabouts have large footprints and large pavement requirements.

*Alternate 6* – The signal alignment is the most expensive estimated construction cost estimate. This is due to the large amount of right of way required to provide minimum geometric corrections. The footprint of the alignment crosses a deep valley that would require a large amount of fill material, or a bridge depending on the location of the origin of a blue line stream.

**6. Alternate Selection**

Based on results of the analyses, Alternate 3 has been selected as the recommended alternate. This alternate was determined to be the most feasible for the following reasons:

*Improved Operations*

- The hybrid alternate specifically addresses the heavy Northbound and Southbound movements, while providing adequate capacity to the Eastbound and Westbound traffic without overdesigning the intersection.

*Reduced Property Impacts*

- This alternate is large enough to address future traffic needs while maintaining a smaller footprint than the multilane roundabout. The right turn bypass lanes can be realigned to further reduce impacts to the surrounding property owners.

*Safety*

- A contributing factor to the crashes at this intersection is the large intersection skew. The current skew angle is 45 degrees, whereas the desirable range is 70 to 90 degrees, A roundabout configuration removes many of the issues presented by a large skew angle in the intersection.

- This alternate will reduce the number of conflict points that exist within the current all way stop control configuration. It is expected that the hybrid roundabout will reduce the number of head-on and angle collisions at this intersection.

- The NCHRP 672 says, “Recent research of roundabouts in the United States identified crash reductions of approximately 35.4% for all crashes and 75.8% for injury crashes when converted from a signal or stop control to a roundabout.”

Please see the attached Decision Matrix for further alternate analysis.

**7. Conceptual Roundabout Design**

The design of the Hybrid Roundabout at a concept level includes the following dimensional data:

Inscribed Circle Diameter – 190 feet

Circulatory Width – 16.5 to 33 feet

Entry Lane Widths – 13 to 16 feet

Exit Lane Width - 13 to 16 feet

Challenges associated with the layout include: reducing entry path speeds and minimizing the alignment changes for the north and south approaches while attempting to reduce the conflict areas in the northwest and southeast quadrants. This is a very challenging design to develop a functional layout in spite of the large intersection skew. Several iterations will be necessary to optimize the layout given these constraints.

**8. Recommendations**

The results of this study indicate that a hybrid roundabout will be the most feasible solution to provide both safety and functional capacity at this intersection in Base and Design Years based on the projected traffic volumes.

*Staging*

It is recommended that the Hybrid roundabout be incrementally implemented. A four-way, single lane approach roundabout should be constructed in the footprint of a Hybrid roundabout. The extra storage at the Northbound and Southbound entrances and exits, as well as within the roundabout will be striped. This configuration will function as a single lane roundabout until an increase in traffic demand. As the traffic demand increases, drivers will utilize the striped portions of the roundabout. As

drivers begin to utilize this additional area at the roundabout, the striping will need to be updated to define the Northbound and Southbound lanes.

By implementing the Hybrid Roundabout incrementally, the public will have time to acclimate to a new type of intersection. The single lane roundabout configuration will maintain a LOS C or better for 10 years. By the time that the traffic demands require the Hybrid roundabout configuration, the travelling public should be acclimated to roundabout navigation. Once the Hybrid roundabout configuration is implemented, a LOS C or better should be expected through the Design Year (2036).

In summary, a Hybrid Roundabout is the most feasible of the alternates, but its implementation should be staged as traffic demand warrants.

ATTACHMENT 8C

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

# INDICATION OF ROUNDABOUT SUPPORT

To the Georgia Department of Transportation:

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

CHEROKEE

**Location**

The Commissioner of Pickens County supports the consideration of a roundabout at the location specified below.

Local Street Names: _____ at

State/County Route Numbers: **State Route 369 at State Route 372**

**Associated Conditions**

The undersigned agrees to participate in the following maintenance of the intersection in the event that the roundabout is selected as the preferred concept alternative:

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

We agree to participate in a formal Local Government Lighting Project Agreement during the preliminary design phase. This indication of support is submitted and all of the conditions are hereby agreed to. The undersigned are duly authorized to execute this agreement.

This is the 22nd day of Sept, 2010

Attest: Sheila R. Berkin
Clerk

By: _____

Title: CHAIRMAN
CHEROKEE COUNTY
Bd of Commissioners

CHEROKEE COUNTY BOARD OF COMMISSIONERS

ATTACHMENT 8d

**PI#0009887 Cherokee County Roundabout Peer Review Summary**

Date: **09/21/2011**
Location: 26th Floor Conference Room
Time: 3:00 PM

*Attendees*
Mark Lenters, Scott Zehngraff, David Acree, Sam Woods, Drew Martin, Charles Robinson (PM), and Derrick Cameron

- It will be difficult to get a functional design with this layout, because the approaches are skewed and one is curved.
- An ellipse may work, or a larger inscribed circular diameter.
- This project will involve more hours and will require more direction.
- We will need to think outside the box.
- If a signal were to be placed here, the intersection would have to be realigned. The intersection skew angle would need to be at least 70 degrees.
- Another option to consider is the "Peanut". This is two linked roundabouts. Mark says he will run this through Arcady. There is no visual output, but this is the best model for analyzing multiple roundabouts.
- We will need to develop multiple alternates pretty far and explain the faults of each. More details will reveal more problems.
- Mark will send GDOT aerial examples of the ideas he is proposing.

General
- Early and frequent coordination is key to the peer review.
- We will be using a Matrix Evaluation covering: safety, impacts, operation, etc.
- Vissim is not a great tool for operational analysis. The program is very hard to calibrate. Also, the program is not a design tool. The user specified calibrations do not replicate real world observations. However, the simulation output from this program is good for public meetings.

---

Date: **02/14/2012**
Location: Email Response
Time: 4:41 PM

*Attendees*
Mark Lenters, Charles Robinson, Dan Pass, Sunita Nadella, David Acree, and Drew Martin

Concept Team Meeting: February 14, 2012

- Consider several other options;
- A pair of compact roundabouts with alternative intersection location
- Develop each option to a level of detail similar to the first two layouts to determine feasibility, i.e. lane configuration, (these three for speed control: circle size, circle location and alignment of arms) and approximate swept paths for trucks.
- Once each option is developed an evaluation exercise will ensue with these evaluation criteria:

- Sight distance and visibility of the intersection from approaches
- Complexity and human factors (navigation, intuitiveness)
- Capacity single lane roundabout versus two lane entries
- Space for trucks
- Transitional speed control for high speed approaches
- Access impacts
- Property takes
- Cost
- Degree to which it solves the safety problems as compared to existing conditions.
- Other factors that the evaluation team may deem pertinent

---

Date: **02/14/2012**
Location: Phone conversation/Web Conference
Time: 8:00 AM

*Attendees*
Mark Lenters and Drew Martin

Concept Team Meeting: June 29, 2012

Topics Discussed

1. Traffic origin and destination, driver type and roadway classification.
2. A symmetrical two lane roundabout is not warranted.
3. "Intersection Safety Prediction" spreadsheet
4. Layout #1 and #2
    a. #1: This layout will require larger medians.
    b. #1 and #2 : 200' diameter is too large. It was suggested that it be reduced to 180'-195'.
    c. #1 and #2: It is too soon to be concerned with entry and exit radii.
5. Hybrid Roundabout, 2 (North/South) x 1 (East/West), is more feasible.
6. Offset alignment method and Radial method was discussed. Offset method is strongly preferred /recommended.
7. Explore locating the center of the hybrid roundabout in between the location of Layout #1 and #2.
8. Frequent discussions between the designers and Mark was encouraged.
9. Other concept ideas presented for investigation.

Tasks

*Ourston*

1. Provide "Intersection Safety Prediction" spreadsheet. *Complete*

*GDOT*

1. Explore traffic origin and destination; verify driver type and roadway classification (FFS).
2. Verify the traffic volume and schedule a site visit for Peak Hour observation.
3. Check the Stopping Sight Distance on North leg approaching the intersection.
4. Layout #1 and #2: Run truck turning movements.
5. Develop Hybrid 2x1 Roundabout Provide a traffic turning movement diagram for the two roundabout option(s). Show how the turns redistribute when the intersection is split into two tees.
6. Develop four concepts presented in the meeting.

7. Use the "Intersection Safety Prediction" spreadsheet to analyze the existing intersection.

---

Date: **03/28/2012**
Location: Phone conversation/Web Conference
Time: 3:30 PM

*Attendees*
Mark Lenters and Drew Martin

Topics Discussed
1. Concepts under development:
    a. Concept #1 – Multilane Roundabout
    b. Concept #2 – Multilane Roundabout (Smaller R/W footprint)
    c. Concept #3 – Hybrid 2 Lane Roundabout (2 Lanes N/S and 1 Lane E/W)
    d. Concept #4 – Linked Roundabout (North to West Link)
    e. Concept #5 – Linked Roundabout (North to South Link)
    f. Concept #6 – Linked Roundabout (Diagonal Link)
    g. Concept #7 – Right Turn Bypass
    h. Concept #8 – New Location West Leg with Bypass
    i. Concept #9 – Signal Alignment
2. Develop matrix for grading concepts. Possible criteria:
    a. Traffic Analysis
    b. Sight Distance
    c. Navigation
    d. Length of Turning Paths
    e. Principle Truck Movement Impedance
    f. Low Level Cost Estimate
    g. Turning Movements
    h. Route Continuity
3. Discussed triangular shapes created by Entry/Exit radii overlap. These areas should not be an issue if the perpendicular length from the roundabout is less than five feet.
4. Once basic geometry is established, create a pdf of layouts for review.

**Tasks**

***Ourston***
1. Provide Arcady capacity results for linked roundabout concepts.
2. Comment on Scoring Matrix.

***GDOT***
1. Provide Mark with linked roundabout turning movements.
2. Develop and provide a Scoring Matrix for concepts.

Develop and provide a pdf layout of developed concepts.

---

Date: **02/14/2013**
Location: Phone conversation/Web Conference

ATTACHMENT 8d

*Attendees*
David Acree (GDOT), Robert Elam (GDOT), Drew Martin (GDOT), Mark Lenters (Ourston), and Troy Pankratz (Ourston)

PI 0009887 - Roundabout -SR 369 @ SR 372
A concept report and roundabout layout was provided for review and discussion prior to today's meeting. There was some initial discussion on looking at a 2x2 alternate but it was decided this was previously evaluated and we were going to focus on the 2x1 (previously referred to as hybrid design) that was provided for this meeting. It was also decided that changes to improve the conceptual layout will be made after the report and current layout are submitted for the concept team meeting (CTM) request. Below are the recommendations made to improve the conceptual design:

- Consider adjusting the alignment to reduce the skew. This primarily applies to the east / west direction approaches.
- It was further discussed that this may need to wait until the survey is complete so the boundaries could be better defined. Some concept work will be done to try and improve the existing approaches after the CTM has been requested. Ourston will supply an example layout that addresses a skewed intersection.
- Consider reducing the diameter of the roundabout and consider a using Spiral design slight rotated to improve the path of a circulating vehicle.
- Consider an elliptical design (stretched toward the narrow corners)
- A concern of the difficulty of vehicles riding side by side was discussed. It's was mentioned that it is not desirable for traffic to ride side by side. Pavement marking the roundabout promotes side-by-side travel; therefore additional discussion at the time of preliminary design will be necessary to determine if striping the circle will benefit operations.
- Consider removing the two lane approach and use a flared entry instead. The flare should be even on both sides of the approach, not like adding an auxiliary lane.
- This was discussed further after the meeting (by GDOT designers). Clarification is requested to determine if the flared entry is appropriate for the ultimate build out (20 year design to be implemented in year 10+-). If the capacity analysis indicates the need for a two lane approach, will a flared approach provide the necessary capacity in the design year? Is additional analysis needed? Furthermore if the two lane approach is to be striped out in the design year it is expected that drivers would be able to negotiate a roundabout easier thus allowing a multi-lane configuration. In 20 years when drivers better understand how to enter and cross a multilane stream of traffic, perhaps then the lane lines will be of greater benefit, but for this skewed design that still remains to be demonstrated due to the conflict areas. This next comment expands on the concern that ORE has.
- Concern with the large conflict areas was discussed. These areas are located at the north and south bound approaches where two through lanes pass in front of the approach lane from the north or southbound drivers. The driver entering the roundabout may assume the inside lane circulating driver will continue through the roundabout and thus fail to yield if the circulating driver decides to exit to the adjacent roadway. This issue is inherent with a multi-lane roundabout and the skewed intersection exacerbates the problem and some of the above mentioned recommendations are meant to minimize this conflict area. This will also be evaluated with the preliminary design when impacts to the environment and businesses can be more accurately defined to compare with changes being made to improve the possible conflict.

- This should not be an issue with the open year single lane design.
- It was mentioned that the roundabout was part of the solution to the existing skewed intersection. Significant alignment modification would reduce the potential benefit of the roundabout alternative in comparison with other options.
- Consider removing the tanget lengths on the approaches and allow the inside entry curve to reach the edge of the circulatory roadway.
- This should provide a more desirable deflection as the driver enters the roundabout helping to slow the vehicle speeds
- In addition, the removal of the tangents help prevent the drivers from accelerating into the roundabout through the long tangent sections.

Action Items:

- Roadway Design to provide the updated concept report and available attachment to Ourston for review by COB Friday February 15, 2013.
- Ourston to provide any previously marked comments of feasibility study to design ASAP or with concept package review. (sent Dec. 3, 2012; attached to this email)
- Ourston to provide a review of concept report package by Wednesday February 20th.
- Roadway Design to submit package and request the CTM by Friday February 22, 2013.
- Roadway Design to improve the concept layout based on the above recommendations and coordinate with Ourston Engineering on the final concept layout to be presented at the CTM.

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Date: **03/12/2013**
Location: Phone conversation/Web Conference

*Attendees*
David Acree (GDOT), Sam Woods (GDOT), Robert Elam (GDOT), Ryan Fernandez (GDOT), Mark Lenters (Ourston), and Troy Pankratz (Ourston)

PI 0009887 - Roundabout -SR 369 @ SR 372
The rough draft concept report and an elliptical roundabout layout were provided for review and discussion prior to today's meeting. The purpose of the meeting was for Ourston to provide incremental review level comments to help keep the project on task and to hopefully prevent any major rework from being required by the design team. The importance of documenting the design process (including the various iterations) was discussed. Mark suggested we keep a log as we try various layouts and include changes to the design (such as ICD, approach alignment, entry radius, etc...) as well as our own comments as to results of the various changes. This process should help ensure that as the designer goes through the iteration process they do not end up in a "circular" design pattern of re-implementing design changes previously analyzed.

The initial discussion focused on the elliptical roundabout layout. Below are the recommendations (by Ourston) to improve the conceptual design:

Suggested changes to current layout

- Rotate the ellipse around the center approximately 15°-20° clockwise, this should help increase the deflection of the north/ south approaches.

- Try a reduction in the ICD of the ellipse. Currently the size is primary 230' and secondary 200', try a primary 190' secondary 170' and a primary 150' secondary 130'. The reduction of the ICD will help entry deflection and provide a reduced entry speed. (Ourston mentioned that variations between the primary and secondary radii greater than 20' should be discouraged)
- The eastbound SR 372 approach appears to have sufficient entry deflection but may be limited on the approach sight distance, consider an alignment shift to the north to reduce the skew and help with sight distance as well as provide needed entry curvature for speed reduction. This alignment change will also help the exit alignment and minimize the reverse curvature from SR 369 to SR 372.
- The westbound SR 372 approach appears to have sufficient entry deflection but has too much reverse curvature in the approach curves, consider using a straight in but left offset alignment.
- The northbound and southbound SR 369 approaches appear to not have sufficient deflection for entry speed reduction, consider more left offset for the approaches, this will help with the deflection of the entry radius.
- The flared entries for the northbound and southbound SR 369 approaches have too large of entry radii currently 150', consider a 80'-100' radius to help maintain sufficient deflection and reduce entry speeds.
- The right turn bypass lanes for the SR 372 approaches need to maintain the 70° minimum skew to SR 369 at intersect.
- The right turn bypass lanes for the SR 372 approaches need to have the "throat" developed. This will allow for approaching right turn vehicles sufficient decision/reaction distance to enter and negotiate the bypass safely. (it was suggested to use a 3 second minimum for length)
- As another option, it was suggested to try shifting the center of the ellipse to the north west. This will be another iteration and should include some or all if the suggestions included above for the layout.

Next, the feasibility study and the rough draft concept report were discussed.

Feasibility Study

- It was noted that even though the crash data does not show fatalities (high severity) for the intersection, the angular crashes accounted for a large percentage of injuries suggesting possible sight distance issues. More clarification of the expected reductions in crashes (percent reduction) should be determined and included in the report.
- It was discussed that Roundabout crash modification factors and safety performance functions should be reviewed to help clarify the safety benefits of the roundabout versus a signalized intersection.

Concept Report

- The comments under the project description section could/should be moved to the feasibility study. A request to the district traffic operations should be sent to check if any additional mitigation measures were implemented and the findings from the implementation.
- The accommodation requirement of pedestrians and bicyclists needs to be determined. When looking at Google earth it appears that there could be accommodations outside the limits of this project to handle the needs of the pedestrians and bicyclists through connectivity of the outlying surface streets. These may already be in use and would potentially eliminate the need for sidewalks and bike lanes within the project limits.

Action Items:

- Roadway Design to contact Ourston (Troy) Thursday morning to work through some layout options in real time using CAD.
- Implement iteration suggestions listed above and provide another iteration layout for peer review.
- GDOT to email District Traffic Operations to check on mitigation measures that were implemented and the findings from the implementation.

ATTACHMENT 9

**PI 0009887 Cherokee County**

**Proposed Concept Report for a Rural Roundabout.**

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

ATTACHMENT 10

**Office of Roadway Design Meeting Minutes: PI#0009887, 0009898, 0009938**
Location: 26th Floor Conference Room
Date: 09/21/2011
Time: 3:00 PM

*Attendees*
Mark Lenters
Scott Zehngraff
David Acree
Sam Woods
Drew Martin
Charles Robinson
Derrick Cameron

PI#0009898 – Bartow County (PM Charles Robinson)

- Charles is to provide the Traffic Impact Study for David.
- The I-75 ramps were converted to concrete as result of a maintenance project four to six years ago. If there are plans, Roadway Design is to provide them to Mark.
- According to Mark, at concept level we want to be 75-85% on the horizontal alignment. At the feasibility study level we will want to have the horizontal alignment developed to 30%.
- The general consensus is that existing traffic (provided by the District) wouldn't be helpful. The design traffic will change drastically in design year due to the proposed sports complex.
- We will need future traffic volumes before the feasibility study can be initiated. We will need to wait on Abby to provide both sets of numbers before proceeding.
- It was asked if there has been an instance of just one roundabout being built at a set of ramp terminals and neglecting the other set. Mark said it has been done before but didn't think that would apply in our situation.
- GDOT is to provide Mark with example and templates of concept reports.
- We need to figure out what the cleared area adjoining the project is going to be in the future. Access management is the main concern. The county (Bartow) may be able to help with this issue.

PI#0009938 – Dawson County (PM Derrick Cameron)

- This intersection is a good candidate for a "Y" shaped roundabout. While FHWA does not recommend this design, if it is designed correctly, it will perform well.
- This design yields a high capacity because you can have two circulating lanes and only one exit lane.
- The problem with this design is crashes.
- Mark suggested an Inscribed Circle Diameter of 140'.
- Mark will provide aerial of St. George Airport where this design was utilized.
- Mark also suggested a bypass lane for a grade climb.
- The starting point should be a T-shaped roundabout moving towards a Y-shape and others.
- Smaller curves will be key to this design because larger curves will incur right of way costs.
- Current driveways will function well with the roundabout intersection. The slower speeds within the roundabout will increase the acceptable gaps for entering the roadway.

ATTACHMENT 10

PI#0009887 – Cherokee County (PM Charles Robinson)

- It will be difficult to get a functional design with this layout, because the approaches are skewed and one is curved.
- An ellipse may work, or a larger inscribed circular diameter.
- This project will involve more hours and will require more direction.
- We will need to think outside the box.
- If a signal were to be placed here, the intersection would have to be realigned. The intersection skew angle would need to be at least 70 degrees.
- Another option to consider is the “Peanut”. This is two linked roundabouts. Mark says he will run this through Arcady. There is no visual output, but this is the best model for analyzing multiple roundabouts.
- We will need to develop multiple alternates pretty far and explain the faults of each. More details will reveal more problems.
- Mark will send GDOT aerial examples of the ideas he is proposing.

General

- Early and frequent coordination is key to the peer review.
- We will be using a Matrix Evaluation covering: safety, impacts, operation, etc.
- Vissim is not a great tool for operational analysis. The program is very hard to calibrate. Also, the program is not a design tool. The user specified calibrations do not replicate real world observations. However, the simulation output from this program is good for public meetings.

ATTACHMENT 10

# Concept Team Meeting Minutes

**BY:** Ryan Fernandez, GDOT Project Manager

**DATE:** April 3, 2013, 10:00 am, District 6 Office, Cartersville, GA

**SUBJECT:** Roundabout SR 372 @ SR 369, Cherokee County

**ATTENDEES:**

| | | | |
|---|---|---|---|
| Ryan Fernandez | Project Mgr | 404-631-1162 | rfernandez@dot.ga.gov |
| Robert Elam | Roadway Design | 404-631-1621 | relam@dot.ga.gov |
| Sam Woods | Roadway Design | 404-631-1628 | swoods@dot.ga.gov |
| Michael Haithcock | Asst. District Engineer | 678-227-2454 | mhaithcock@dot.ga.gov |
| Dee Corson | D6 Traffic Ops | 770-387-3637 | dcorson@dot.ga.gov |
| Kerry Bonner | D6 Utilities | 770-387-3614 | kbonner@dot.ga.gov |
| Daniel Monteith | D6 Utilities | 770-387-3615 | dmonteith@dot.ga.gov |
| David Acree | Roadway Design | 404-631-1627 | dacree@dot.ga.gov |
| David Ray | D6 Design | 770-387-3622 | dray@dot.ga.gov |
| Sophie O'Neal | CDM Smith | 404-720-1336 | soneill@cdmsmith.com |
| Iris Vargas | Roadway Design | 404-631-1621 | ivargas@dot.ga.gov |
| Chris Bates | Comcast | 404-449-0547 | christopher_bates@comcast.com |
| Lorie Short | AT&T | 706-581-6630 | lorie.short@att.com |
| Bill Graham | CCWSA | 706-259-3394 | bgraham@ccwsa.com |

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The rough draft concept report and roundabout layout were provided for review and discussion prior to today's meeting. The purpose of the meeting was for the design team (GDOT) to provide present the concept details to the Concept Team and to receive comments and input from the Team as well as local officials. The meeting was scheduled and kicked off by Ryan the PM on the project. He provided an agenda for the meeting (*see attached*) which he moderated discussion throughout and Roadway Design provided a Powerpoint presentation which covered the specific details regarding the Concept design and the design approach and decision matrices.

Below are the comments or discussion from the meeting:

- Introductions were made.
- Ryan discussed the project schedule
  - R/W December 2013, Let to construction December 2014
- Ryan noted the project assignments
  - Designed in GDOT Roadway Design
  - Environmental Document by Task Order (CDM Smith)
- Ryan discussed the Project Justification for the project:
  - This is the intersection of two moderate volume state routes in a metro county with LOS of F. The roads come together at a steep skew with both horizontal and vertical curves.
  - Roundabouts compared to traffic signals have resulted in a greater reduction in crash frequency and in many instances better operational efficiency.
  - Performance goals include congestion reduction, mobility improvements, reduction of crashes, and correction of geometric deficiencies.

  - Robert discussed the failure of the current intersection under a no build condition with existing and projected traffic.
  - Robert presented 6 alternates that were reviewed, (Peer Review by Ourston Roundabout Engineering) a Single Lane Roundabout, Multilane Roundabout, 2 x 1 Roundabout, two Linked Roundabout options, and the Signalized Intersection
  - Robert discussed the Capacity analysis performed and the various software used. Sidra was the preferred software for the Roundabout analysis and the GDOT Roundabout Tool was used as a check. HCS 2010 was also used along with Archady and Synchro.
  - Robert presented a filtered approach to the Preferred Concept by a series of Matrices covering Sight Distance, Navigation, Primary Truck Impedence, Cost Estimate, Truck Turning Movements, Route Continuity, Bike & Ped Access, LOS, Safety, Constructability, and Complexity to help narrow the options and ultimately decide the preferred design which was the 2 x 1 Roundabout.
  - Robert discussed the details of the 2 x 1 design, dimensional data, design considerations, truck paths, and fastest path calculations.
- Ryan turned the meeting over to Robert with the Office of Roadway Design to present the Powerpoint presentation:
  - Robert discussed the location of the intersection and existing conditions of the intersection showing approaches and current deficiencies.
  - Robert presented the crash history data for years 2004-2008, angle crashes and rear-ends being the most frequent at over 90% of the time. The existing crash data showed that the intersection is above the state averages for crashes and injuries.
- Ryan discussed the other projects in the area
  - PI: 0005970, SR 372/Ballground Road from Canton Hwy to Cumming Hwy, managed by Genetha Rice-Singleton, Anticipated Let Date: LR2
  - PI: 0001337, SR 369 Truck Climbing Lanes, managed by Mike Haithcock, Anticipated Let Date: LR
- Ryan questioned the type of environmental document required
  - CE is assumed (CDM Smith was present but no comments added regarding project)
  - He questioned if project is in an I-Bat area?
  - Mike Haithcock mentioned there may be an exception for projects under 2 acres disturbed
- Ryan mentioned the need to identify the location of environmental resources such as:
  - Wetlands
  - Endangered Species
  - Park lands
  - Potential historic properties and archaeological sites
  - Cemeteries
  - Location of potential hazardous waste sites
- Ryan mentioned that there has been no Public input to date, need to hold PIOH
- Ryan questioned Utility issues
  - ATT, Cherokee Water, and Comcast had no comments.
  - PID is not recommended
  - SUE is not required
- Ryan noted Right of Way estimations (although limits still to be confirmed once survey is evaluated)
  - Potential number of parcels – 18

  - Temporary and permanent easements.
- Ryan opened floor for General Discussion
  - No Maintenance problems existing along project
  - Mike questioned if Cherokee County has looked at the project and it was noted that the Local Government Planning Assessment was completed 9-22-2010 and signed off for the lighting and maintenance agreement by the Cherokee County Board of Commissioners. It was also discussed that Geoff Morton be approached as a local champion for the project before a PIOH is scheduled.
  - Mike questioned if there are other options if Public does not agree with Roundabout proposed. Robert and David responded that it would be difficult to justify any other option for safety reasons other than a Roundabout for this location. Robert discussed the need for the project team to find a champion(s) local official or stakeholder for the project and that education of the public to the workings of a modern day roundabout will be critical to the success of the project with the public buy in. Robert said this will require several meetings in order to build a consensus. He noted that research shows initial responses to Roundabouts to be 70-80% negative and then once a roundabout is installed 70-80% positive, education will be critical early on with the public.
  - Robert discussed that simply placing a Roundabout in a location will not necessarily correct the problems with the intersection. It requires many iterations and there are many design criteria that should be considered for a roundabout to operate and function as intended. If not designed properly the Roundabout may not perform as intended.
  - Robert discussed other benefits gained by Roundabouts like off peak more free flow operation, a roundabout provides free flow 24 hours a day.
  - Robert questioned if the locals use Hightower Trail as a bike and ped access for movement. Dee said she was not sure. David said this would need to be confirmed and could be discussed with the County.
  - There was some additional discussion regarding other Roundabouts in Cherokee County or District 6 which could be looked at prior to a PIOH due to the fact that some believe they do not perform as intended (Dee noted some in Canton have issues). This fact finding mission would be to head off any potential negative comments that could come from the PIOH and better prepare for public response and interaction.
  - Mike and Dee both agreed that this looks like a good location for a Roundabout.
  - Dee noted that Bikes are present on the project and she was not sure if they use paths.
  - Dee noted that there is a Rock Quarry nearby that contribute to heavy truck traffic in area.

cc: All Attendees

# PI 0009887 CHEROKEE COUNTY SR 372 AT SR 369 ROUNDABOUT CONCEPT TEAM MEETING

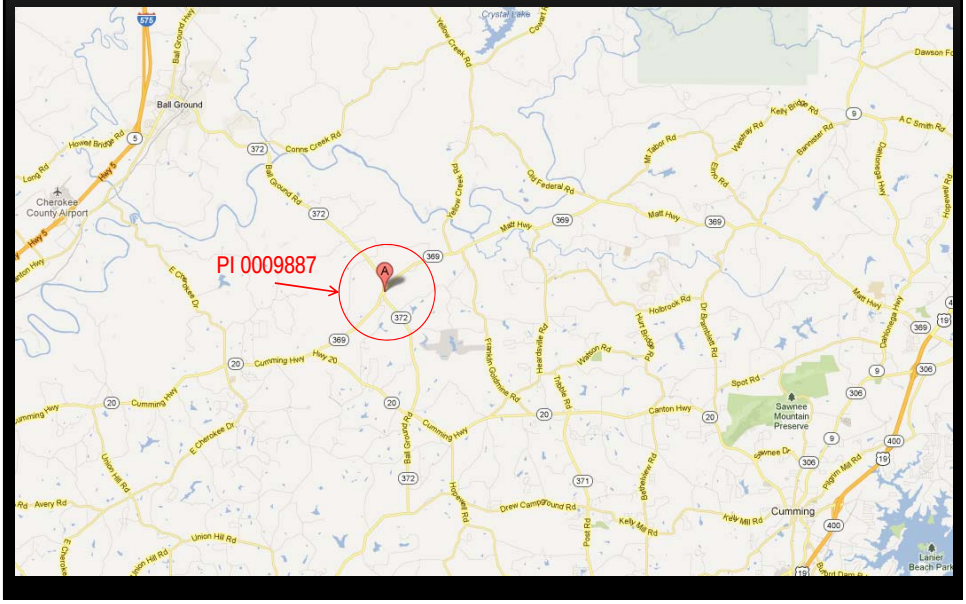
4/3/13

Roadway Design, GDOT

## AGENDA

- Existing Conditions/Background
- Crash History
- Projected Volumes
- Alternates
- Scoring Matrix and other considerations
- Preferred Design
- Fastest Paths/Truck Paths
- Comments and Questions
- Discuss Concept Report

## LOCATION MAP
## SR 372 AT SR 369

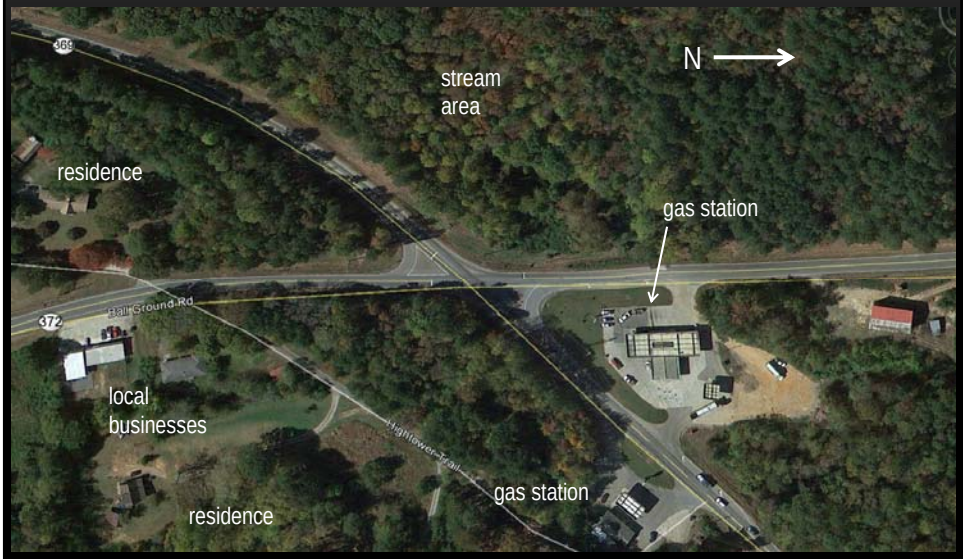



## EXISTING CONDITIONS


SR 372
2 Lanes Rural
V = 55 mph
AADT = 6,050

SR 369
2 Lanes Rural
V = 55 mph
AADT = 10,310

## EXISTING CONDITIONS




## CRASH HISTORY

| Year | Total Crashes | State Crash Average | Total Injuries ** | State Injury Average |
|---|---|---|---|---|
| 2004 | 11 | 6.48 | 4 (6) | 1.48 |
| 2005 | 5 | 4.82 | 1 (1) | 1.27 |
| 2006 | 9 | 7.27 | 0 (0) | 1.91 |
| 2007 | 8 | 7.48 | 2 (2) | 1.81 |
| 2008 | 9 | 5.38 | 4 (7) | 0.91 |

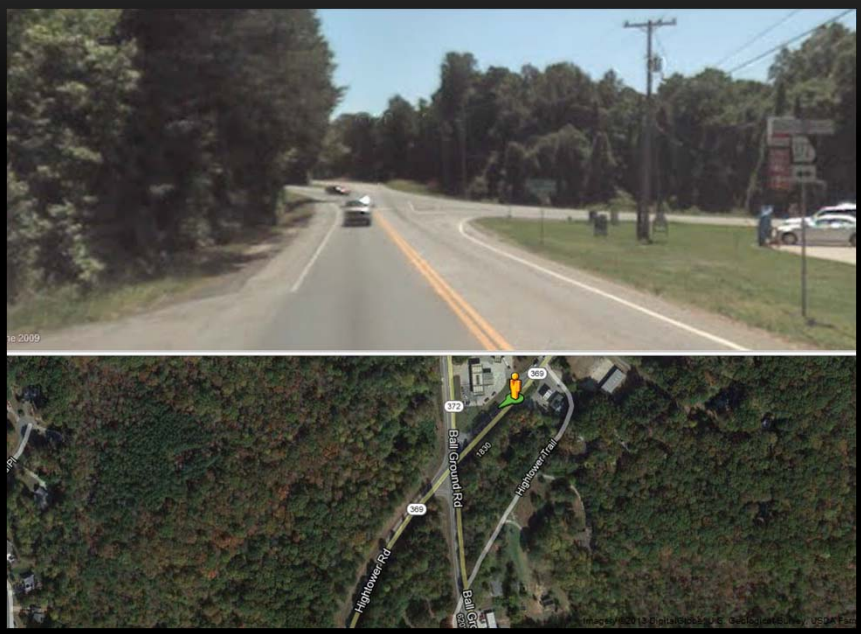
** A (B) – A is the number of injury crashes, whereas B is the number of injuries resulting from those crashes.

## CRASH HISTORY

| Crash Type | Total | % | Injuries | % |
|---|---|---|---|---|
| Angle | 22 | 52.4% | 10 | 62.5% |
| Rear-end | 16 | 38.0% | 2 | 12.5% |
| Head-on | 2 | 4.8% | 4 | 25.0% |
| Sideswipe | 2 | 4.8% | 0 | 0.0% |
| Non vehicle collision | 0 | 0.0% | 0 | 0.0% |
| Total | 42 | 100.0% | 16 | 100.0% |

## SOUTHBOUND ON SR 372

## WESTBOUND ON SR 369




## NORTHBOUND ON SR 372

## EASTBOUND ON SR 369


## PROJECTED VOLUMES (NO-BUILD)

| Leg | 2011 ADT | 2016 ADT | 2036 ADT | 2011 LOS | 2016 LOS | 2036 LOS |
|---|---|---|---|---|---|---|
| SR 369 (W) | 3850 | 3975 | 6275 | C | E | F |
| SR 369 (E) | 3425 | 4475 | 7050 | D | F | F |
| SR 372 (N) | 3500 | 4075 | 6425 | F | F | F |
| SR 372 (S) | 2975 | 3475 | 5500 | D | F | F |
| Intersection | | | | E | F | F |

## ALTERNATE 1 – SINGLE LANE ROUNDABOUT


- SINGLE LANE APPROACHES
- SINGLE LANE CIRCULATORY
- CIRCLE LOCATED AT SR369 & SR 372
- ICD – 180 FT.
- SR 369 RIGHT TURN BYPASS LANES
- BUILD YEAR LOS A
- DESIGN YEAR LOS F
- LOS F REACHED IN 11TH YEAR

## ALTERNATE 2 – MULTI-LANE ROUNDABOUT


- MULTI-LANE APPROACHES
- MULTI-LANE CIRCULATORY
- CIRCLE LOCATED AT SR369 & SR 372
- ICD – 200 FT.
- SR 369 RIGHT TURN BYPASS LANES
- BUILD YEAR LOS A
- DESIGN YEAR LOS B
- DIFFICULT FOR NEW USERS TO NAVIGATE AND MORE CAPACITY THAN NEEDED

## ALTERNATE 3 – 2 X 1 ROUNDABOUT


- SINGLE LANE APPROACHES
- 2 X 1 LANE CIRCULATORY
- SR 369 RE-ALIGNED
- CIRCLE LOCATED AT SR369 & SR 372
- ICD – 178 FT.
- SPIRAL SHIFT
- SR 369 RIGHT TURN BYPASS LANES
- BUILD YEAR LOS A
- DESIGN YEAR LOS C
- INCREASED ROW IMPACT

## ALTERNATE 4 – LINKED ROUNDABOUTS


- SINGLE LANE APPROACHES
- SINGLE LANE CIRCULATORY
- CIRCLES LOCATED AT SR369 & SR 372 & ON NB SR 369
- ICD(S) – 150 FT.
- SR 369 RIGHT TURN BYPASS LANES
- DESIGN YEAR LOS F
- INADEQUATE QUEUE STORAGE BETWEEN ROUNDABOUTS

## ALTERNATE 5 – LINKED ROUNDABOUTS


- SINGLE LANE APPROACHES
- SINGLE LANE CIRCULATORY
- CIRCLES LOCATED AT SR369 & SR 372 & ON NB SR 369
- ICD(S) – 150 FT.
- SR 369 RIGHT TURN BYPASS LANES
- DESIGN YEAR LOS F
- INADEQUATE QUEUE STORAGE BETWEEN ROUNDABOUTS

## ALTERNATE 6 – SIGNALIZED INTERSECTION


- MEETS SIGNAL WARRANTS 1A & 1B AT BUILD YEAR 70% TRAFFIC PROJECTIONS
- SKEW CORRECTED BY SR 369 RE-ALIGNMENT
- DESIGN YEAR LOS E
- ADDITIONAL TURNING LANES WOULD HELP PERFORMANCE
- INCREASED ROW IMPACTS

## LOS ANALYSIS FOR DESIGN YEAR 2036

| Concept | | Traffic Analysis (LOS) 2036 | | | | |
|---|---|---|---|---|---|---|
| | | Sidra | GDOT | HCS | Archady | Synchro |
| | | AM/PM | AM/PM | AM/PM | AM/PM | AM/PM |
| 1 | Single Lane Roundabout | F/F | F/F | F/F | | |
| 2 | Multilane Roundabout | B/B | A/B | B/C | | |
| 3 | 2 x 1 Roundabout (2 Lanes N/S & 1 Lane E/W) | C/C | C/C | D/E | | |
| 4 | Linked Roundabout (North to South Link) | | D/E | | F/B | |
| 5 | Linked Roundabout (North to West Link) | | D/E | | N/A | |
| 6 | Signal Alignment | | | E/E | | E/E |

## SCORING MATRIX

| Concept | | Concept Scoring Criteria | | | |
|---|---|---|---|---|---|
| | | Sight Distance | Navigation | Truck Impedance | Cost Estimate |
| 1 | Single Lane Roundabout | (3) Similar to current | (1) Intuitive | (3) EB to NB WB to SB | **(1)** $584,491 |
| 2 | Multilane Roundabout | (2) Similar to current | (3) Less Intuitive | (1) EB to NB WB to SB | (3) $910,761 |
| 3 | 2 x 1 Roundabout (2 Lanes N/S & 1 Lane E/W) | (1) Improvement to current | (2) Less Intuitive | (2) EB to NB WB to SB | (2) $806,334 |
| 4 | Linked Roundabout (North to South Link) | (4) Limited from West approach | (4) Challenging | (4) N to S and S to N | (2) $735,404 |
| 5 | Linked Roundabout (North to West Link) | (4) Limited from West approach | (4) Challenging | (4) E to W and W to E | (2) $794,026 |
| 6 | Signal Alignment | (1) Improvement to current | (1) Intuitive | (4) Left turns oppose traffic | (4) $1,494,215 |

## SCORING MATRIX CONTINUED…

| Concept | | Concept Scoring Criteria | | |
|---|---|---|---|---|
| | | Turning Movements | Route Continuity | Ped & Bike Access |
| 1 | Single Lane Roundabout | (2) Less Complicated | (1) Preserved | (1) Less Difficult, Wayfinding Intuitive |
| 2 | Multilane Roundabout | (3) Less Complicated | (1) Preserved | (3) More Difficult, Wayfinding less Intuitive |
| 3 | 2 x 1 Roundabout (2 Lanes N/S & 1 Lane E/W) | (3) More Complicated | (1) Preserved | (2) More Difficult, Wayfinding Intuitive |
| 4 | Linked Roundabout (North to South Link) | (4) Most Complicated | (4) Not Preserved | (4) Most Difficult, Wayfinding less Intuitive |
| 5 | Linked Roundabout (North to West Link) | (4) Most Complicated | (4) Not Preserved | (4) Most Difficult, Wayfinding less Intuitive |
| 6 | Signal Alignment | (1) Least Complicated | (1) Preserved | (1) Less Difficult, Wayfinding Intuitive |

## SCORING MATRIX TOTALS

| Concept | | Concept Scoring Criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Sight Distance | Navigation | Primary Truck Impedance | Cost Estimate | Turning Movement Issues | Route Continuity | Ped & Bike Access | TOTAL |
| 1 | Single Lane Roundabout | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 12 |
| 2 | Multilane Roundabout | 2 | 3 | 1 | 3 | 3 | 1 | 3 | 16 |
| 3 | 2 x 1 Roundabout (2 Lanes N/S & 1 Lane E/W) | 1 | 2 | 2 | 2 | 3 | 1 | 2 | 13 |
| 4 | Linked Roundabout (North to South Link) | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 26 |
| 5 | Linked Roundabout (North to West Link) | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 26 |
| 6 | Signal Alignment | 1 | 1 | 4 | 4 | 1 | 1 | 1 | 13 |

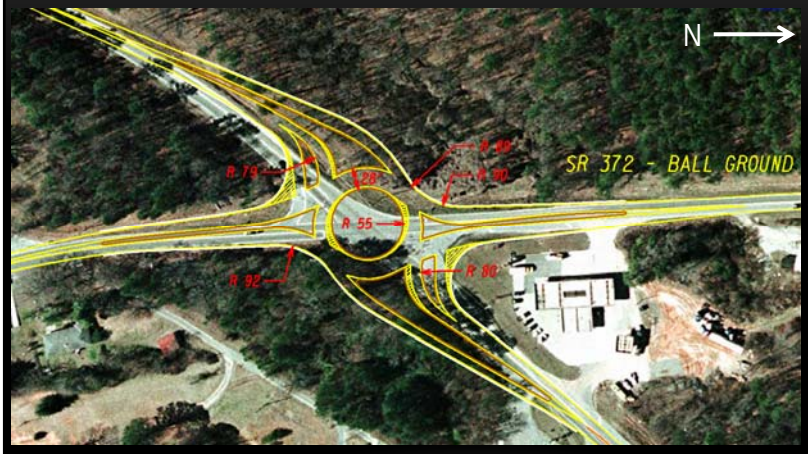
## SECONDARY SCORING MATRIX EVALUATION

| Concept | | Other Concept Considerations | | | | | |
|---|---|---|---|---|---|---|---|
| | | LOS | Scoring Matrix Total | Safety | Constructability | Complexity | TOTAL |
| 1 | Single Lane Roundabout | Fails | 1 | 1 | 1 | 1 | Fails |
| 3 | 2 x 1 Roundabout (2 Lanes N/S & 1 Lane E/W) | 1 | 2 | 2 | 2 | 2 | 9 |
| 6 | Signal Alignment | 2 | 2 | 3 | 3 | 3 | 13 |

## PREFERRED ALTERNATIVE – LAYOUT 3

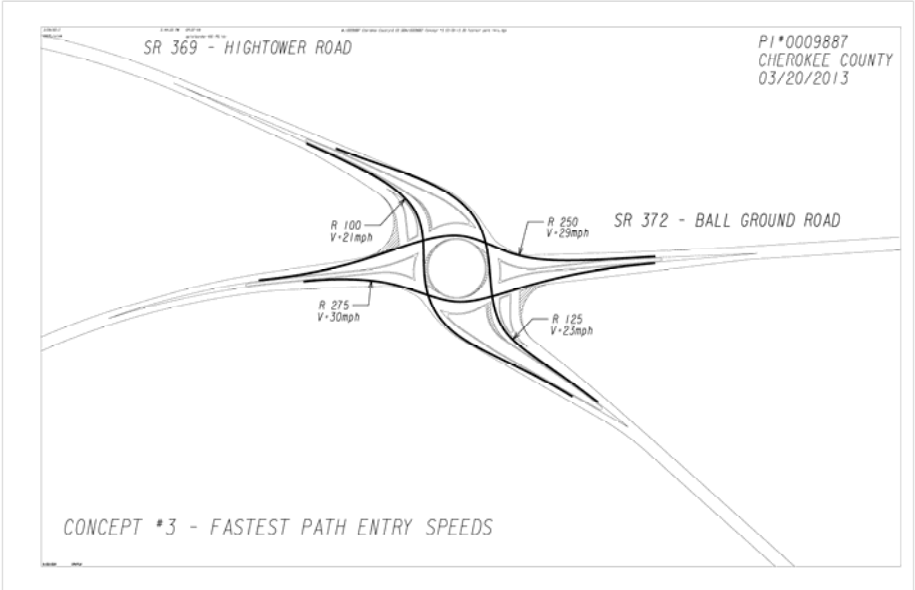

- DESIGN DONE ON AERIAL PHOTOGRAPHY
- RECEIVED PEER REVIEW
- TIE IN LOCATIONS UNDETERMINED UNTIL SURVEY EVALUATED
- WILL NEED TO ACCOMMODATE AT LEAST THE 350FT SPLITTER ISLANDS AND SHIFTING TAPERS
- HOPE TO STAY WITHIN THE 1000 FEET IN EACH DIRECTION
- DESIGNED AS 2X1 WILL OPEN AS SINGLE LANE

## PREFERRED ALTERNATIVE – LAYOUT 3

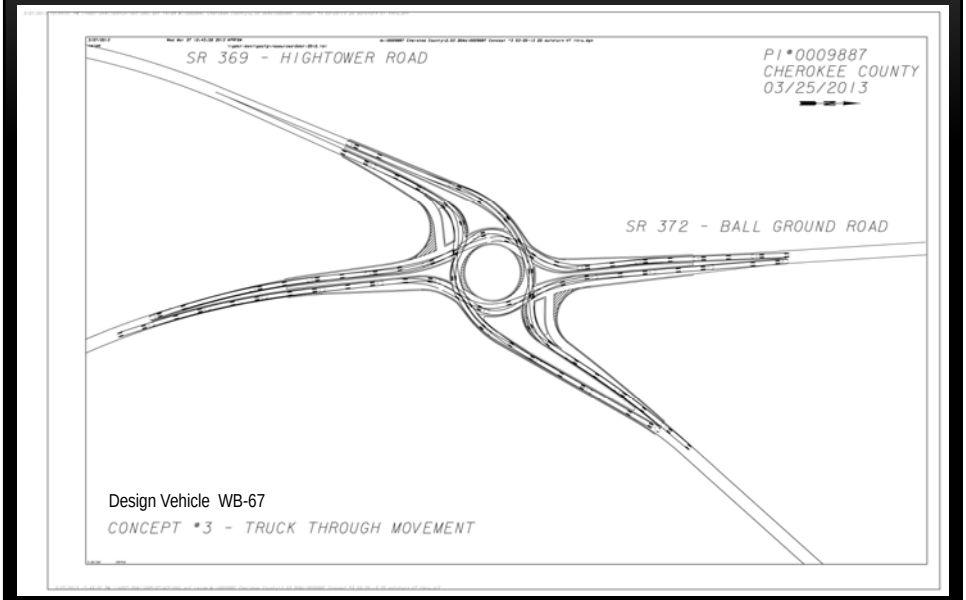



- 12 FT APPROACH LANES
- 28 FT WIDE & 18 FT WIDE CIRCULATORY ROADWAY
- SR 372 APPROACHES MULTI-LANE FLARED ENTRIES 24 FT WIDE
- SR 372 FLARE ACCOMMODATES TRUCKS
- SR 369 SINGLE LANE ENTRY 15-20 FT WIDE
- SR 369 BYPASS LANES TO ACCOMMODATE TRUCKS
- DEPARTURE ALIGNMENT TO HELP ENSURE PROPER PHI ANGLE TO REDUCE CONFLICT ZONES

## FASTEST PATHS



## TRUCK PATHS

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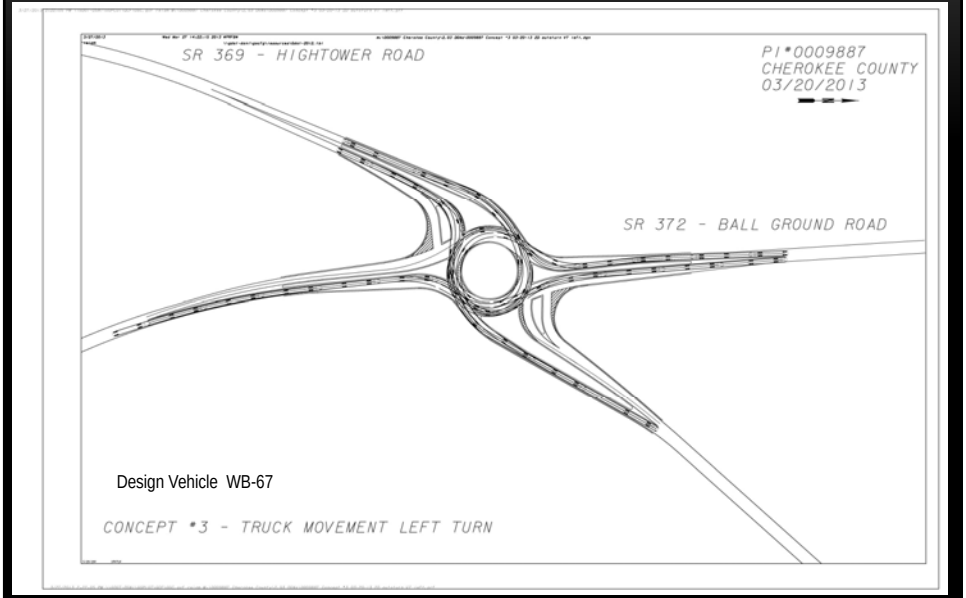

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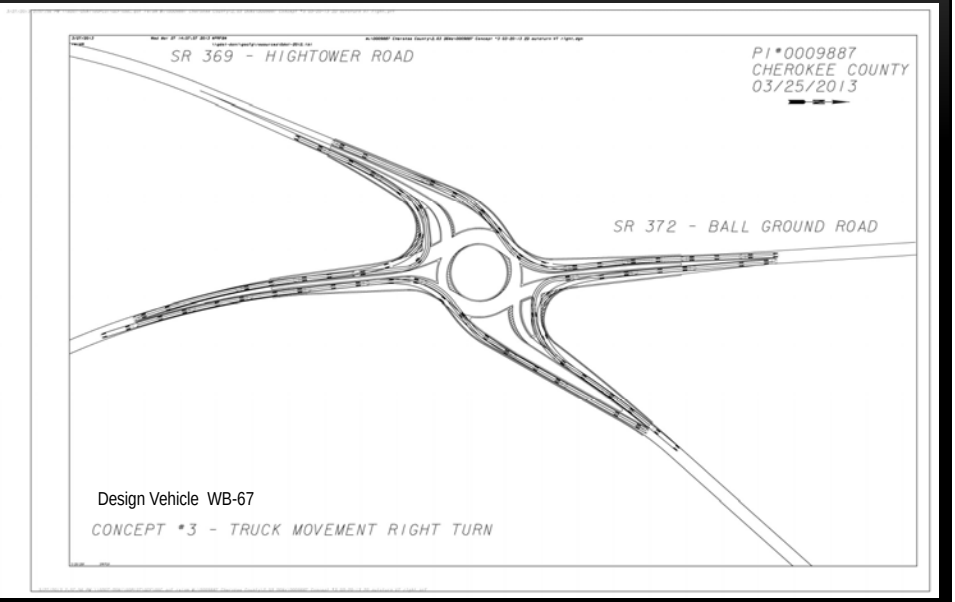


# Comments and Questions?