DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
PROJECT CONCEPT REPORT

Project Type:	Roundabout	P.I. Number:	0009975
GDOT District:	3	County:	Troup
Federal Route Number:	I-85	State Route Number:	18

This project will construct roundabouts at the interchange ramp terminals of Interstate 85 and State Route 18.

Submitted for approval:

_____ _____
District Engineer, District 3 Date

_____ _____
State Program Delivery Engineer Date

_____ _____
GDOT Project Manager Date

Recommended for approval:

_____ _____
State Environmental Administrator Date

_____ _____
State Traffic Engineer Date

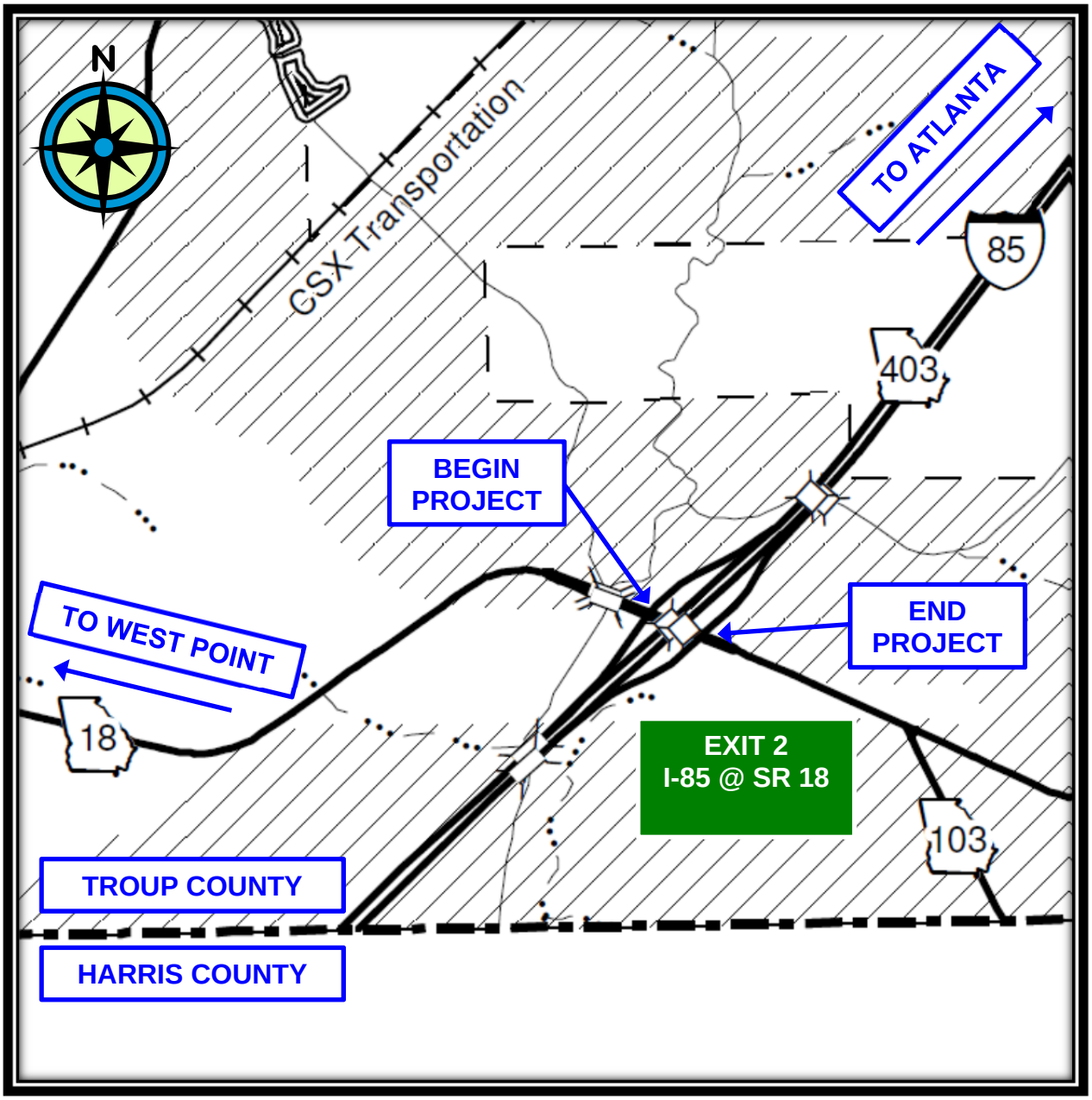
_____ _____
Project Review Engineer Date

_____ _____
State Utilities Engineer Date

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

_____ _____
State Transportation Planning Administrator Date

PROJECT LOCATION MAP



PLANNING AND BACKGROUND

Project Justification Statement (by GDOT Office of Traffic Operations: The proposed project will reduce crash frequency and severity at the intersection of I-85 and SR18. In Georgia, nearly a third of fatal crashes occur at intersections. Intersection safety is a focus area for the Georgia Department of Transportation. Nationally, intersection crashes account for 40% of all reported crashes and approximately 20% of traffic fatalities. Of those crashes, almost half are the result of angle collisions. Angle collisions are often high speed, high impact crashes which often result in serious injuries or fatalities. Crash data from 2004-2009 was analyzed resulting in 38 total crashes with 23 injuries and 0 fatalities. Of those crashes, 11 were angle collisions, 1 was head-on collisions, and 14 were rear-end collisions.

Existing conditions: The existing diamond interchange of I-85 and SR 18 consists of four ramps with two-way stop control. The ramps exiting I-85 onto SR 18 each have two lanes, one for left turns and one for right turns. The entrance ramps to I-85 from SR 18 each have one lane. SR 18 is a four-lane divided highway with left-turn lanes onto the entrance ramps. There are no sidewalks. There are four existing bridges in the project area. I-85 crosses SR 18 with two bridges, and SR 18 crosses Long Cane Creek with two bridges. There are no major utilities in the area, but there are distribution lines for power, water, gas, and communications.

Other projects in the area: The following maintenance projects may require minor coordination as this project advances to construction.

PI Number	Description
M004521	I-85 Sign Upgrades
M004921	I-85 Resurfacing
M005025	SR 18 Resurfacing
M005103	SR 18 Resurfacing

MPO: None

TIP #: None

TIA Regional Commission: Three Rivers Regional Commission

Congressional District(s): 3

Federal Oversight: Exempt

Projected Traffic (by GDOT Office of Planning): ADT

	Current Year (2013)	Open Year (2018)	Design Year (2038)	24 HR T
SR18	16,000	17,600	26,000	10%

Functional Classification (SR18): Urban Minor Arterial

Complete Streets - Bicycle, Pedestrian, and/or Transit Standard Warrants met: No

The project is not on a state or local bicycle route. There are no bicycle or pedestrian generators in the vicinity. There is no evidence of pedestrian or bicycle traffic. There are no existing or planned transit facilities in the area. Therefore, this project does not warrant incorporating bicycle, pedestrian or transit accommodations.

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

Pavement Evaluation and Recommendations:

Initial Pavement Evaluation Summary Report Required? No
Initial Pavement Type Selection Report Required? No
Feasible Pavement Alternatives: HMA & PCC

DESIGN AND STRUCTURAL

Description of the proposed project:

This project will replace the existing two-way, stop-controlled ramp terminals with roundabouts at the interchange of I-85 and SR 18. The project is located the City of West Point in southern Troup County. The project length is approximately 0.25 miles.

Major Structures: No impacts are anticipated to the four bridges below:

Structure ID	Description
285-0022-0	SR18 EB over Long Cane Creek
285-0023-0	SR18 WB over Long Cane Creek
285-0051-0	I-85 NB over SR18
285-0052-0	I-85 SB over SR18

Design Features: SR18, Urban Minor Arterial

Feature	Existing	Standard*	Proposed
Typical Section			
- **Number of Lanes**	4	2	N/A
- **Lane Width(s)**	12'	10'-12'	N/A
- **Median Width & Type**	0'-20' Grass	4'-6'	N/A
- **Outside Shoulder or Border Area Width**	5'-12'	N/A	N/A
- **Outside Shoulder Slope**	6.25%	2%	N/A
- **Inside Shoulder Width**	2'	N/A	N/A
- **Sidewalks**	N/A	N/A	N/A
- **Auxiliary Lanes**	2	N/A	N/A
- **Bike Lanes**	N/A	N/A	N/A
Posted Speed	45		
Design Speed	50	50	N/A
Min Horizontal Curve Radius	22896.4	758	22896.4
Maximum Superelevation Rate	8%	4%-6%	N/A
Maximum Grade	3%	7%	N/A
Access Control	By permit	N/A	By permit
Design Vehicle	Unknown	WB-67	WB-67
Pavement Type	PCC & Asphalt	PCC	N/A

Design Features: I-85 Ramps, Urban Interstate/Freeway Ramp (Entrance/Exit)

Feature	Existing	Standard*	Proposed
Typical Section			
- **Number of Lanes**	2	1-2	N/A
- **Lane Width(s)**	12	12-16	N/A
- **Median Width & Type**	N/A	N/A	N/A
- **Outside Shoulder or Border Area Width**	14	8'-10'	N/A
- **Outside Shoulder Slope**	2%	6%	N/A
- **Inside Shoulder Width**	4'-8'	2'-4'	N/A
- **Sidewalks**	N/A	N/A	N/A
- **Auxiliary Lanes**	N/A	N/A	N/A
- **Bike Lanes**	N/A	N/A	N/A
Posted Speed	N/A		
Design Speed	35 & 60	35 & 60	N/A

Min Horizontal Curve Radius	730 & 1505	314 & 1200	≥314 &1200
Maximum Superelevation Rate	8%	5%-8%	N/A
Maximum Grade	3%	7	N/A
Access Control	By permit	N/A	By permit
Design Vehicle	WB-67	WB-67	N/A
Pavement Type	PCC/ Asphalt	PCC	N/A

*According to current GDOT design policy if applicable

Major Interchanges/Intersections: I-85 at SR18

Lighting required: Yes – See Roundabouts section

Off-site Detours Anticipated: No

Transportation Management Plan [TMP] Required: Yes

Project classified as: Non-Significant
TMP Components Anticipated: Temporary Traffic Control (TTC) & Public Involvement (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/Median Openings	DP&S	☒	☐	☐	
2. Intersection Sight Distance	DP&S	☒	☐	☐	
3. Intersection Skew Angle	DP&S	☒	☐	☐	
4. Lateral Offset to Obstruction	DP&S	☒	☐	☐	
5. Rumble Strips	DP&S	☒	☐	☐	
6. Safety Edge	DP&S	☒	☐	☐	
7. Median Usage	DP&S	☒	☐	☐	
8. Roundabout Illumination Levels	DP&S	☒	☐	☐	
9. Complete Streets	DP&S	☒	☐	☐	
10. ADA & PROWAG	DP&S	☒	☐	☐	
11. GDOT Construction Standards	DP&S	☒	☐	☐	

12. GDOT Drainage Manual	DP&S	☒	☐	☐	
13. GDOT Bridge & Structural Manual	Bridges	☒	☐	☐	

VE Study anticipated: No

UTILITY AND PROPERTY

Temporary State Route needed: No

Railroad Involvement: No

Utility Involvements:

Company	Service
City of West Point	Electric Distribution, Water, Gas
Charter Communications	Cable TV
Interstate Telephone d/b/a Wide Open West	Telecommunications and Cable TV

SUE Required: Yes

Public Interest Determination Policy and Procedure recommended? No

Right-of-Way (ROW):

Existing width: 140-200 feet
Proposed width: 140-200 feet (only small strips and miters expected)
Required Right-of-Way anticipated: Yes
Easements anticipated: Temporary, Permanent w/ right to place utilities
Anticipated total number of impacted parcels: 7
Displacements anticipated: None

Location and Design approval: Required

Impacts to USACE property anticipated? No

ROUNDABOUTS

Roundabout Lighting Agreement/Commitment Letter received: Yes – In August 2011, the City of West Point issued a letter of support (appended to Feasibility Study – see attached) for the roundabout and subsequent costs for landscaping and lighting.

Roundabout Planning Level Assessment: A roundabout evaluation was prepared in January 2011 (appended to Feasibility Study – see attached), recommending roundabouts be constructed at both ramp terminals.

Roundabout Feasibility Study: A roundabout feasibility (see attached) was prepared in April 2015 and recommended roundabouts as the preferred intersection control alternative over signals and stop-signs.

Roundabout Peer Review Required: Yes – The attached feasibility study was completed in April 2015.

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern: None

Context Sensitive Solutions Proposed: None

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document: NEPA – Categorical Exclusion (CE)

MS4 Permit Compliance – Is the project located in an MS4 area? No

Environmental Permits/Variances/Commitments/Coordination anticipated:

Permit/ Variance/ Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	☒	☐	
2. Forest Service/Corps Land	☒	☐	
3. CWA Section 404 Permit	☒	☐	
4. 33 USC 408 Decision	☒	☐	
5. Tennessee Valley Authority Permit	☒	☐	
6. Buffer Variance	☒	☐	
7. Coastal Zone Management Coordination	☒	☐	
8. NPDES	☐	☒	
9. FEMA	☒	☐	
10. Cemetery Permit	☒	☐	
11. FAA	☒	☐	Lanett Municipal Airport >6 miles away
12. Other Permits	☒	☐	
13. Other Commitments	☒	☐	
14. Other Coordination	☒	☐	

Is a PAR required? No

Environmental Comments and Information:

NEPA: The categorical exclusion (CE) is not approved. There are no significant issues anticipated.

Ecology: There are two buffered streams: Long Cane Creek and an unnamed tributary to Long Cane Creek. X If replaced, the culvert conveying the unnamed tributary will be buried 20% to accommodate fish passage. Several tributaries to Long Cane Creek are designated as Bio F impaired. Additional protective practices will be implemented in the Erosion, Sedimentation, and Pollution Control Plan if further investigation concludes impairment within one mile of the project.

History: A Finding of No Historic Properties Affected document was completed on January 28, 2015.

Archeology: x

Air Quality:
Is the project located in a PM 2.5 Non-attainment area? No
Is the project located in an Ozone Non-attainment area? No
Is a Carbon Monoxide hotspot analysis required? No

Noise Effects: x

Public Involvement: A Public Information Open House was held on TBD. See attached synopsis.

Major stakeholders:

Traveling public

KIA
Troup County
City of West Point
Emergency Services
Board of Education

CONSTRUCTION

Issues potentially affecting constructability/construction schedule: No

Early Completion Incentives recommended for consideration: No

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Project Team Initiation Process (PTIP): October 16, 2013

Initial Concept Meeting: N/A

Concept Meeting: TBD

Other coordination to date: None

Project Activity	Party Responsible for Performing Task(s)
Concept Development	GDOT – District 3 Design
Design	Consultant (To Be Determined)
Right-of-Way Acquisition	GDOT – District 3 Right-Of-Wa
Utility Coordination (Preconstruction)	GDOT – District 3 Utilities
Utility Relocation (Construction)	Utility Owners
Letting to Contract	GDOT – Office of Bidding Administration
Construction Supervision	GDOT – District 3 Construction
Providing Material Pits	Contractor
Providing Detours	N/A
Environmental Studies, Documents, & Permits	GDOT – Office of Environmental Services
Environmental Mitigation	GDOT – Office of Environmental Services
Construction Inspection & Materials Testing	GDOT – District 3 Construction & Office of Materials

Project Cost Estimate Summary and Funding Responsibilities:

	Breakdown of PE	ROW	Reimbursable Utility	CST*	Environmental Mitigation	Total Cost
Funded By	GDOT	GDOT	GDOT	GDOT	GDOT	
$ Amount	$250,000.00	x	x	x	x	x
Date of Estimate	6/28/2012	x	x	x	x	

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

ALTERNATIVES DISCUSSION

Alternative selection:

Preferred Alternative: Roundabouts – Construct roundabouts at each ramp terminal.

Estimated Property Impacts:	Minor	**Estimated Total Cost:**	x
Estimated ROW Cost:	x	**Estimated CST Time:**	24 months
Rationale: Roundabouts will reduce crashes and crash severity. They will satisfy traffic needs well beyond the 2038 design-year, operating at a higher level-of-service than traffic signals (which are not warranted), all-way stops, and the existing two-way stop condition.			

No-Build Alternative: Two-way Stops – Maintain existing operations with two-way stop control.			
Estimated Property Impacts:	None	**Estimated Total Cost:**	$0
Estimated ROW Cost:	$0	**Estimated CST Time:**	0 months
Rationale: Analysis of the open year traffic indicated the northbound ramp terminal intersection would be congested with a low LOS (F) in the AM peak period. These results suggest that the current intersection control is adequate only part of the time under existing traffic and will likely degrade over time. Also, maintaining existing operations does not satisfy the safety goals of the project.			

Comments:

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Typical Sections
3. Detailed Cost Estimates:
    a. Construction including Engineering and Inspection
    b. Completed Liquid AC Cost Adjustment forms
    c. Right-of-Way
    d. Utilities
    e. Environmental Mitigation
4. Roundabout Feasibility Study (also includes)
    a. TE Study w/ Signal Warrant Analysis
    b. Roundabout Evaluation
    c. Local Indication of Roundabout Support (w/ Lighting)
    d. Crash Analysis
    e. Traffic Data
    f. Operational Analysis
5. Pavement Design
6. Meeting Minutes/Summaries
    a. Project Team Initiation Process (PTIP)
    b. Concept Meeting
    c. Public Information Open House (PIOH)

APPROVALS

Concur:

_____ _____
Director of Engineering Date

Approve:

_____ _____
Chief Engineer Date

Georgia Department of Transportation

I-85 at SR-18 Interchange, PI 0009975

Roundabout Feasibility Study

April 2015

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Executive summary

The proposed project is intended to improve the operational efficiency and safety of the I-85/SR-18 interchange intersections in Troup County, Georgia. The purpose of this study is to determine the feasibility of a roundabout traffic control conversion for both ramp intersections with SR-18. The ramp terminal intersections exhibit crash patterns and signs of congestion.

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 has resulted in a reduction in crash frequency and in many instances superior operational efficiency. Roundabouts are generally navigated at slower speeds which correlate with fewer and less severe crashes. Roundabouts also present fewer conflict points than traditional intersections, generally resulting in fewer collisions.

The ramp terminal intersections do not satisfy the warrants for signalization. The northbound ramp terminal is congested during one of the peak periods. As traffic volumes grow in the future, increasing the probability of crashes and congestion, the need for a different intersection control will become more urgent. It is then only a question of timing as to when roundabouts would be implemented as the optimal safety countermeasure.

Based on the results of previous engineering studies, several traffic control alternatives were eliminated from further analysis. Previous analyses revealed that traffic signals were not warranted and conversion to all-way stop controlled intersections would not correct the safety and efficiency issues the project was initiated to correct. Therefore the recommended intersection controls for these ramp termini are roundabouts. The preliminary cost-benefit ratio estimate is 1.6.

GHD generated and refined several roundabout concepts accounting for oversize and overweight permitted trucks, for review by District 3 staff. After receiving comments from the District, GHD explored variations of the original concepts as necessary to address the comments. The revised concept designs considered in this report include the following:

- Multilane roundabouts with full and partial right-turn bypasses
- Analysis of the corridor as to the needs of over-sized/over-weight vehicle needs in the corridor

The selected improvements must operate at a level of service (LOS) C during the 2038 design year in accordance with GDOT policy for the intersection context and roadway classifications. The quantitative and qualitative criteria used to compare the various alternatives included:

- Construction (cost and complexity)
- Mobility (LOS)
- Safety
- Truck accommodation
- Property access & business impacts
- Pedestrian accessibility
- Environmental factors

Through a deliberative evaluation process, the design team has determined that roundabout traffic control meets or exceeds the needs of the I-85/SR-18 interchange. Based on the pros and cons of staging a build-out, continuing with an ultimate-only design is preferred.

1. Introduction

1.1 Background

At the request of the Georgia Department of Transportation (GDOT), GHD has completed a feasibility study to compare the operational and safety performance of roundabouts for the I-85/SR-18 diamond interchange in Troup County. It builds on the findings of a previous Traffic Engineering (TE) Study dated August 2006 and a Roundabout Evaluation dated January 12, 2011. According to the TE Study, a signal is not warranted at this location. Initially, GHD considered the following alternatives:

- The no-build scenario (e.g. retain existing stop control operations at the ramp termini);
- Installation of all-way stop control of the ramp termini;
- Installation of traffic signal controls; and
- The installation of roundabouts at the ramp termini.

In addition to analyzing the intersection operations for the 2018 and 2038 design years, GHD also investigated the potential for interim roundabout configurations that would operate acceptably through 2028 or beyond, but it was recognized early in the analysis that multilane roundabouts would be required to serve traffic demand in the first ten years.

The proposed project is intended to enhance safety and improve operational efficiency at the I-85 interchange with SR-18 in Troup County. 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 has resulted in a reduction in crash frequency and in many instances superior 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 generally resulting in fewer collisions.

1.2 Location & context

The project is located in Troup County in the City of West Point, Georgia approximately 1.22 miles from the eastern city limits and 0.61 miles north of the Harris County line, as seen in Figure 1. This is the first interchange that northbound I-85 traffic encounters entering Georgia from Alabama. It is an efficient route for most northbound commuters to access West Point and the Kia manufacturing plant. A more direct connection to the Kia plant is via Kia Boulevard at the next interchange to the north.

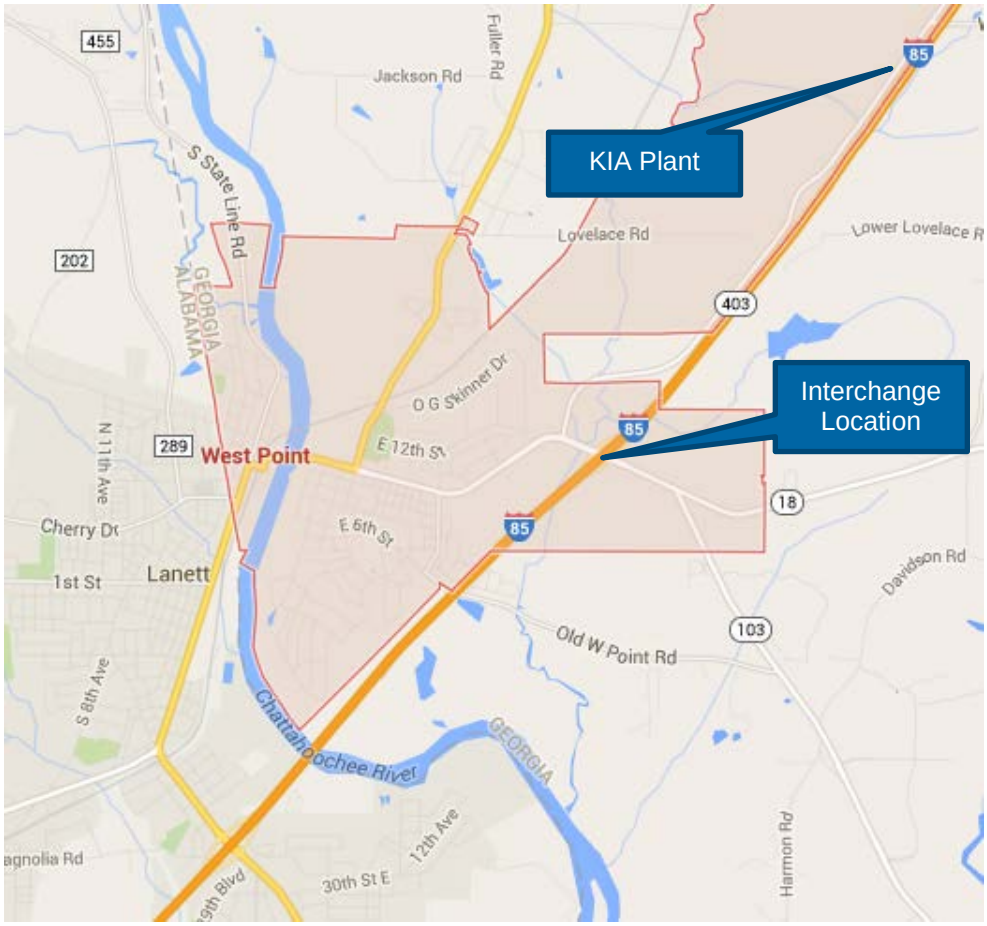


Figure 1 Interchange location

Source: Google

Topography

Within the project area, I-85 is an Interstate principal arterial, with an AADT of 33,790 (2012). SR-18 is a rural minor arterial and is a significant east-west corridor for Troup County with an AADT of 7,680 vehicles per day (2013). An aerial depiction of the site context is shown in Figure 2. Currently, the ramp intersections are stop-controlled with separate turn lanes. SR-18 is free-flowing, with separate left–turn lanes and right-turn bypasses onto the ramps. The typical cross-section through the project area consists of four 12-ft wide travel lanes, a 12-ft wide median, and 2-ft wide curb and gutter on both sides of the roadway. SR-18 passes under I-85 at this interchange. In addition, there are left turn lanes from SR-18 onto the I-85 entrance ramps. The speed limit at this location is 45 mph. Apart from the grade separation the landscape is generally level; however there is a major watercourse, Long Cane Creek, crossing SR-18, approximately 750-ft. west of the southbound ramp terminal.

The I-85 ramps (northbound and southbound) consists of two 12-ft lane exit ramps and one 16-ft lane entrance ramps with 6-ft paved shoulders and 2-ft unpaved shoulders. The mainline is a four lane rural interstate principal arterial. Its lane widths are 12-ft and its shoulder widths vary. The median width is 64-ft. The speed limit along the ramps is not posted; while, the speed limit along I-85 is 70 mph.

Figure 2 Interchange overview

1.3 Project need

The proposed project is intended to reduce crash frequency and severity at the interchange ramp termini of I-85 and SR-18. The preliminary cost-benefit ratio estimate is 1.6. See Appendix H.

In Georgia, nearly a third of fatal crashes occur at intersections. Intersection safety is a focus area for the GDOT. Nationally, intersection crashes account for 40% of all reported crashes and approximately 20% of traffic fatalities. Of those crashes, almost half are the result of angle collisions. Angle collisions are often high speed, high impact crashes which often result in serious injuries or fatalities. At this location we have incidents of those crash types, which roundabouts have proven to reduce.

The TE Study noted congestion on the I-85 northbound off-ramp. However, the ramp intersection traffic volumes do not satisfy the warrants for a traffic signal.

1.4 Purpose of this report

The purpose of this study is to provide an evidence-based analysis of the need and feasibility for roundabouts as the preferred traffic control upgrade for the I-85/SR-18 interchange. The quantitative criteria used to justify a roundabout include:

- Safety performance for all users
- Operational performance for motor vehicle operators
- Estimated capital costs

Vehicle noise, fuel consumption, maintenance/operations, emissions; effects on pedestrians, bicyclists, maintenance and emergency services; and, speed control and aesthetics are not quantified, however it is widely recognized that roundabouts are superior in these categories.

1.5 Scope and limitations

This report has been prepared by GHD for Georgia Department of Transportation and may only be used and relied on by Georgia Department of Transportation for the purpose agreed between GHD and the Georgia Department of Transportation.

The services undertaken by GHD in connection with preparing this report are limited to those specifically detailed in the report and are subject to the scope limitations set out in the Task Order.

GHD has prepared this report on the basis of information provided by Georgia Department of Transportation and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Cursory option analysis

A TE Study was completed for this interchange in 2006 at the request of GDOT District 3 (see Appendix A). Based on recommendations from that report, several alternatives, which are explained below, were not considered for further analysis as part of this feasibility study.

2.1 All-way stop conversion

An all-way stop conversion was not conducted, due to GDOT policy which does not support all-way stop controls on interchange ramp termini and multilane facilities such as SR-18, particularly at interchanges.

2.2 Traffic signal conversion

A signal warrant analysis was completed as part of the 2006 TE Study. The analysis determined that signals were not warranted for this intersection. Based on GDOT policy of not installing unwarranted signals, this option was eliminated from further consideration.

2.3 Do nothing

An updated traffic control LOS analysis was completed of the existing two-way stop control (TWSC) as documented in Appendix A. The TE Study completed in 2006 included a TWSC analysis, however, traffic volumes have increased in 9-years since that study was completed. The 2006 study also only included the northbound ramp terminal intersection. Results of the latest TWSC study, which includes both ramp terminal intersections, are shown in Table 1 and Table 2.

Table 1: 2018 SB ramps TWSC analysis

	SB I-85 Off-ramp		WB SR-18	
Peak	AM	PM	AM	PM
LOS	C	C	A	A
Average Delay	16.2	16.0	9.6	8.7
v/c	0.29	0.37	0.20	0.21
Max. 95th% Queue (ft)	50	50	25	25

LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

Table 2: 2018 NB ramps TWSC analysis

	NB I-85 Off-ramp		EB SR-18	
Peak	AM	PM	AM	PM
LOS	F	C	A	A
Average Delay	234.3	18.9	8.9	9.1
v/c	1.64	0.61	0.18	0.18
Max. 95th% Queue (ft)	675	100	25	25

LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

As the TWSC analysis shows, the northbound ramp terminal intersection is congested with a low LOS (F) in the AM peak period. These results suggest that the current intersection control is adequate only part of the time under existing traffic and will likely degrade over time. Based on the established need of the project, the TWSC option was eliminated due to it not satisfying the goals of the project, nor solving the existing safety deficiencies.

2.4 Roundabout conversion

A cursory roundabout evaluation, as detailed in Appendix B, was completed in January 2011, which supported the further evaluation of a roundabout for both ramp terminals due to the safety benefits that come from such a conversion. Further, an Indication of Roundabout Support, as shown in Appendix C, was signed by the City of West Point in August of 2011. Based on the above results, a roundabout was analyzed further herein.

3. Safety assessment

3.1 Crash history

GDOT assembled crash data for this interchange from 2003 to 2013. We chose to examine the most recent five years, 2009-2013, inclusive. Tabulated collision records can be found in Appendix D. Within that period, 62 crashes were analyzed. The following incidents were excluded from the

safety evidence for this roundabout study: wildlife related collisions; incidents that occurred exclusively on the interstate; incidents on the approach curves to the west of the interchange; ramp related crashes that would not be solved by an intersection control change, e.g. single vehicle run-offs; and, collisions that were located at another interchange (e.g., the I-185 and SR-18 interchange). A total of 29 crashes were identified for both interchange ramp terminals combined. Of those records, 4 were angle collisions, 6 were side-swipes, and 18 were rear-end collisions. Ten crashes involved injuries, and none involved fatalities. Collisions diagrams are shown in Figure 3 and Figure 4. Table 3 divides the crashes and injuries by year for both ramp terminal intersections combined. The preliminary collision reduction benefit cost ratio estimate is 1.6.

Table 3: Collision history

	2009	2010	2011	2012	2013
Total crashes	10	2	9	8	0
Total injuries	5	1	0	4	0

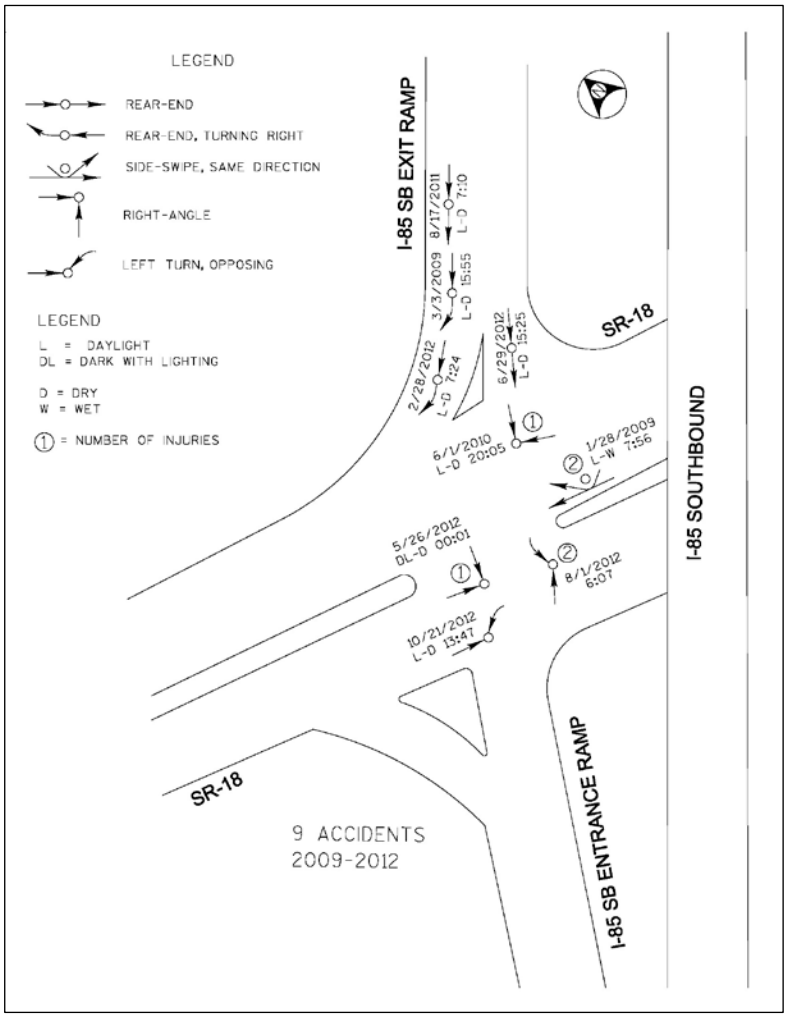


Figure 3 Collision diagram for I-85 SB ramps

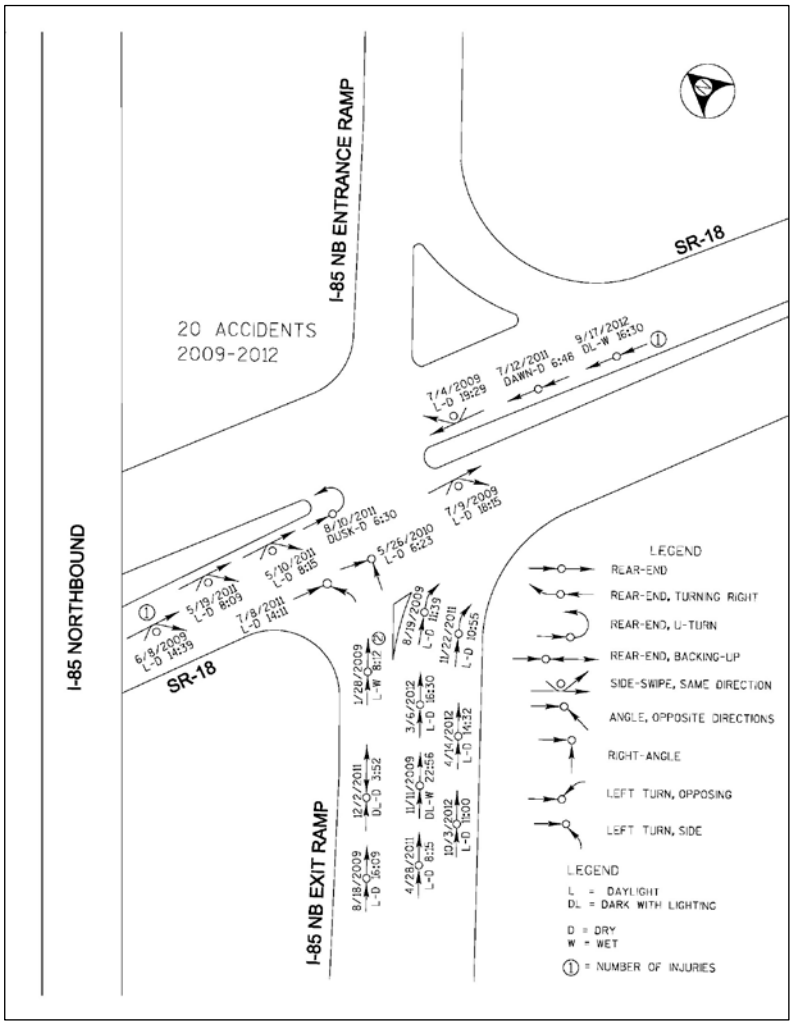


Figure 4 Collision diagram for I-85 NB ramps

GHD reviewed the Crash Modification Factors Clearinghouse website to obtain the most current and applicable crash modification factors (CMFs) for the various alternatives and the site characteristics. The clearinghouse is a Web-based database providing CMFs and supporting documentation to assist transportation engineers in identifying the most appropriate counter-measures for safety needs. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. A summary of the CMF's for each countermeasure is provided in Table 4 below. Details for each CMF ID are included in Appendix D.

Table 4: Crash modification factors

CMF ID (Year)	Description	CMF (CRF)	Crash Type	Crash Severity
4930 (2013)	Convert two-way stop control into a roundabout	0.751 (24.89)	All	All
4931 (2013)		0.65 (35.03)	All	Fatal, serious injury, minor injury

The CMFs provided above suggest a positive safety expectation when converting a two-way stop controlled intersection to a roundabout. Crashes could be expected to decrease by 24-35%. It

should be noted that these CMFs are for generic intersection conversions and not specifically for interchange ramp intersection conversions. That said, as of the writing of this report, no direct CMFs for interchange ramp conversions exist, however, we have no reason to believe similar results would not occur in this situation.

4. Operational analysis

4.1 Analysis inputs

Utilizing traffic forecasts provided by GDOT, as shown in Appendix E, GHD performed roundabout analyses in accordance with Chapter 8, Section 8.2.2 of the GDOT Design Policy Manual (DPM). The roundabouts were analyzed with GDOT's Roundabout Analysis Tool v. 2.1 and ARCADY. The approach LOS, volume-to-capacity (v/c) ratio, 95th percentile queue length (back-of-queue, in feet), and average delay per vehicle (in seconds) is reported for each leg of the roundabout. A v/c ratio of 0.85 is generally considered to be the threshold for acceptable roundabout operations. In order to account for lower capacities experienced in the U.S. compared to international experience, the ARCADY analyses included a capacity reduction of 15% for the 2018 peak hour volumes and 10% for the 2038 peak hour volumes. The results of these analyses can be found in section 4.2 and 4.3, with detailed results shown in Appendix F.

4.2 Southbound ramps intersection

4.2.1 2018 Build year

Table 5: 2018 SB ramps analysis – interim configuration

Peak Hour	Analysis Condition	Intersection		Approach											
				SB I-85 Off Ramp				EB SR-18				WB SR-18			
		Level of Service	Average Delay	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)
AM	ARCADY	A	9.3	A	8.0	0.31	25	A	6.1	0.59	25	B	13.1	0.74	175
	GDOT	B	10.4	B	11.3	0.38	47	A	7.7	0.59	108	B	13.0	0.69	160
PM	ARCADY	A	5.1	A	6.9	0.31	25	A	2.2	0.34	25	A	8.2	0.59	25
	GDOT	A	6.0	A	8.6	0.34	41	A	2.8	0.53	86	A	9.0	0.55	93

LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

For the build year traffic forecasts, a single lane roundabout (interim lane configuration) with a partial right-turn bypass lane for the southbound off ramp and free-flow bypass lane for the southbound on ramp has a LOS A/B. The interim lane configuration was also analyzed for the 2028 forecasts and the westbound movement has LOS E and will require an additional westbound lane.

4.2.2 2038 Design year

Table 6: 2038 SB ramps analysis – ultimate configuration

Peak Hour	Analysis Condition	Intersection		Approach											
				SB I-85 Off Ramp				EB SR-18				WB SR-18			
		Level of Service	Average Delay	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)
AM	ARCADY	B	12.7	B	13.9	0.54	75	C	20.5	0.89	625	A	3.8	0.55	25
	GDOT	B	10.2	C	15.5	0.55	89	B	11.7	0.78	224	A	6.9	0.47	67
PM	ARCADY	A	4.4	B	11.0	0.55	50	A	3.2	0.53	25	A	2.9	0.42	25
	GDOT	A	5.7	B	12.4	0.55	89	A	3.3	0.69	155	A	5.7	0.35	43

LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

A roundabout with multilane entries westbound and a bypass lane plus single lane entries on the other three approaches will satisfy the design year traffic demands.

4.3 Northbound ramps intersection

4.3.1 2018 Build year

Table 7: 2018 NB ramps analysis – interim configuration

Peak Hour	Analysis Condition	Intersection		Approach											
				EB SR-18				NB I-85 Off Ramp				WB SR-18			
		Level of Service	Average Delay	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)
AM	ARCADY	A	9.0	A	7.7	0.56	25	A	9.9	0.57	25	A	9.4	0.53	25
	GDOT	B	11.4	A	9.0	0.53	85	B	13.1	0.61	111	B	12.1	0.57	96
PM	ARCADY	A	6.6	A	5.2	0.36	25	A	6.1	0.35	25	A	8.2	0.52	25
	GDOT	A	8.1	A	6.0	0.34	40	A	7.4	0.36	44	B	10.3	0.54	87

LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

For the build year traffic forecasts a single lane roundabout (interim lane configuration) with a partial right-turn bypass lane for the northbound off ramp and westbound has a LOS A/B. The interim lane configuration was also analyzed for the 2028 forecasts and has a LOS C, with minimal residual capacity.

4.3.2 2038 Design year

Table 8: NB ramps analysis – ultimate configuration

Peak Hour	Analysis Condition	Intersection		Approach											
				EB SR-18				NB I-85 Off Ramp				WB SR-18			
		Level of Service	Average Delay	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)	Level of Service	Average Delay	v/c	Max 95th % Queue (ft)
AM	ARCADY	A	9.7	C	15.8	0.80	300	A	7.5	0.51	50	A	4.8	0.38	25
	GDOT	B	11.8	A	8.9	0.61	116	C	16.1	0.58	97	B	10.2	0.46	65
PM	ARCADY	A	5.5	A	6.2	0.49	25	A	7.0	0.54	25	A	3.5	0.10	25
	GDOT	A	8.7	A	5.5	0.37	46	B	12.3	0.58	99	A	7.5	0.37	45

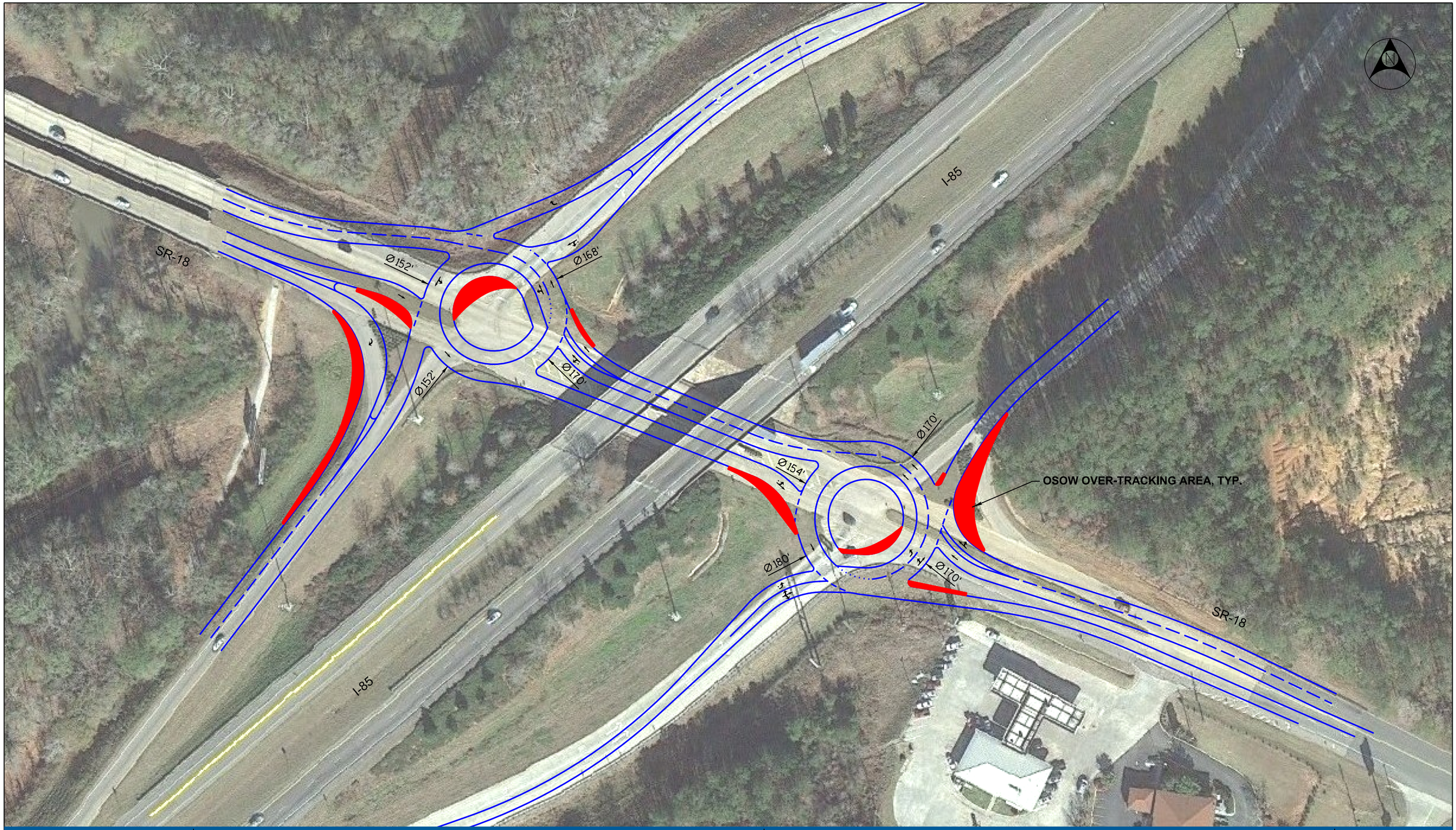
LOS Source: 2010 Highway Capacity Manual – Unsignalized Intersections *Delay in Seconds*

A roundabout with multilane entries westbound and northbound, plus single-lane entries on the eastbound approach will satisfy the design year traffic demands. As shown in the preceding tables, both ramp intersections will operate with satisfactory levels of service in the build year and in the design year. We recommend building the ultimate two lane entries on the northbound off ramp and the westbound entry to avoid throw-away costs, given the single lane entries perform marginally acceptable 10 years into operation.

5. Concept development

With heavy emphasis on the traffic counts, in addition to the analysis results in Sections 4.2 and 4.3, and Appendix F, conceptual roundabout layouts were developed (see Figure 5). The roundabouts were sized and located to balance competing objectives. First, offset left approach geometry was implemented to reinforce speed reduction on the approaches to enhance pedestrian safety. Second, the approaches were adjusted as necessary to accommodate WB-67 turning movements. Based on discussion with GDOT engineers, it was determined that truck volumes did not warrant requiring that trucks be able to travel within lane while negotiating the roundabout (otherwise known as a Case 3 design as defined in a multi-state, MN and WI, pooled fund study). And third, the roundabouts were shifted to minimize impacts to the parcels in the southeast quadrant, as well as avoiding a bridge structure (Long Cane Creek) to the west of I-85, and to avoid the I-85 bridge piers between the roundabouts.

Related to this project need, the interchange roundabouts were analyzed for basic OSOW vehicle accommodations, based from routing data provided by GDOT. Details on this analysis can be found in Appendix G. Because of the additional pavement needs for OSOW vehicle accommodation and lack of LOS B or better operations in 2028, an interim/ultimate design configuration was not pursued further, as over-tracking areas would only need to be enlarged to accommodate the OSOW vehicles for a single-lane configuration. The recommended conceptual layout is shown in Figure 5.



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I-85 at SR-18

TROUP COUNTY, GEORGIA

CONCEPT DESIGN WITH OSOW ACCOMMODATIONS

SCALE
0 50 100

Plot Date: 4/14/2015 File Name: G:\86\8616566 PI 0009975 - I-85 @ SR 18, McGee 22\CADD\Display.dgn

Figure 5 Roundabout conceptual design

To accommodate OSOW vehicles, over-tracking pads sometimes called 'truck blisters' are required behind curb lines in several areas around the roundabout. Figure 6 shows a typical curb and cross-section for a truck over-tracking pad. These pads would be constructed in a similar fashion to the regular roadway surface, except placed behind the curb, for the trailer wheels to over-track onto. Over-tracking pads were developed based on vehicle routes supplied by GDOT and our analysis of swept path requirements of three key oversize trucks. If the roundabouts move forward as the preferred intersection control, more detailed analysis will need to be executed as profiles are created, to ensure adequate vertical clearances are maintained for trailers and loads that travel close to the roadway surface.

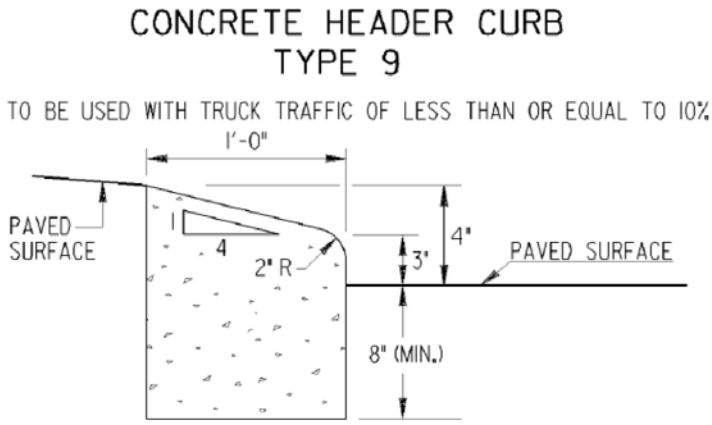

Figure 6 Truck over-tracking curb and pad

6. Cost estimate

A concept-level cost estimate was prepared by GDOT District 3 Preconstruction. The construction cost estimate of $5.9 M plus Preliminary Engineering = $6,423,359. Refer to Appendix H for the construction cost estimate.

7. Environment

The GDOT Project Manager has shared environmental documentation obtained to date. It includes typical environmental documentation for:

- Three structures more than 50 years old located on the south side of SR-18 east of I-85.
- A listing of threatened plant and animal species within a few miles of the project
- A water course and several intermittent streams within the project limits

Each of these can be addressed by the project environmental document and permit.

8. Conclusions and recommendations

Based on the preceding analysis, converting the I-85 ramp terminals at SR-18 to roundabout intersections is feasible and is the preferred intersection control alternative. Roundabouts are superior to both traffic signals, which are not warranted, and to the existing two-way stop control.

The northbound ramp terminal currently incurs congestion during one of the peak periods. Operationally, roundabouts at the ramp termini would satisfy traffic needs well-beyond the 2038 design year, while only requiring minor modifications to accommodate OSOW vehicle passage. Since traffic signals are not warranted, the roundabout can address the current and forecasted congestion.

If roundabouts are selected to be constructed, an interim/ultimate staging of additional lanes is not recommended, as the extra costs associated with the additional construction, both for interim OSOW accommodations and for the ultimate traffic forecasts, outweigh the benefits of a slightly reduced initial construction cost.

Appendix A – TE Study

Appendix B – Roundabout evaluation

Appendix C – Indication of roundabout support

Appendix D – Crash analysis & CMF

Appendix E – Traffic data

Appendix F – ARCADY & GDOT roundabout analysis

Appendix G – OSOW accommodation analysis

Appendix H – Cost estimate and Benefit cost ratio

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
	Eric Frailing, David Low, Mark Lenters	Mark Lenters				

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Appendix A – TE Study

Traffic Signal Warrant Analysis
TE Study Level 2
SR 18 at
I-85 Northbound Ramps
Troup County
MP 1.54
Work Order #76

Department of Transportation
State of Georgia
August 2006

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STUDY LOCATION

The intersection of State Route (SR) 18 at I-85 Northbound Ramps in Troup County has been examined for signalization needs. This intersection is located along SR 18 within the city limits of West Point, Georgia. For purposes of this report, SR 18 has an east-west orientation and the I-85 Northbound Ramps have a north-south orientation. (Please refer to the site location map in Appendix A.)

REASON FOR INVESTIGATION

The Georgia Department of Transportation (GDOT) District 3 Traffic Engineer has requested that the intersection of SR 18 at I-85 Northbound Ramps be investigated to determine if signalization, safety, or other operational improvements are warranted.

TOPOGRAPHY

At the study location, SR 18 is a four-lane roadway with all lanes being 12-feet in width. At the study intersection, the westbound approach has two through lanes and a channelized right-turn lane onto the I-85 Northbound On-Ramp. The eastbound approach has an exclusive left-turn lane onto the I-85 Northbound On-Ramp and two through lanes. The westbound left-turn lane has 50-feet of storage and 85-feet of taper.

The I-85 Northbound Off-Ramp is a one-lane roadway 16-feet in width. The I-85 Northbound Off-Ramp forms the northbound approach with SR 18 and has a shared left-turn/through/right-turn lane.

Intersection sight distance was measured using a driver's eye height of 42" and a vehicle height of 42" per AASHTO guidelines. Sight distance measurements are shown on the existing conditions drawing in Appendix C.

The northwest, northeast, and southwest intersection quadrants are vacant of developed land. A Shell Gas Station is located on the southeast quadrant and has a driveway along SR 18 just east of the study intersection. The overpass for I-85 is located just west of the study intersection.

(Please see the photos of the study area in Appendix B and the existing conditions diagram in Appendix C.)

EXISTING TRAFFIC CONTROL

State Route 18 carries free-flow traffic at the intersection with I-85 Northbound Ramps. The northbound movement of the I-85 Northbound Off-Ramp is controlled by a stop sign and a stop bar. It should be noted that vehicles stopped behind the existing stop bar location on the northbound approach will have their sight distance in the westbound direction obscured by the existing bridge columns for the I-85 overpass.

VEHICLE VOLUME HISTORY

The most current vehicle volumes for SR 18 are reflected in Table 1. These annual average daily traffic (AADT) volumes were recorded along SR 18 by GDOT Count Station 0123, located approximately 0.45 miles west of the study intersection, and GDOT Count Station 0125, located approximately 0.21 miles east of the study intersection.

Table 1
AADT for SR 18

YEAR	SR 18 (TC #0123)	SR 18 (TC #0125)
2004	6,749	4,265
2003	7,047	5,279
2002	7,420	4,640

Twenty-four hour approach tube counts were also collected at the intersection for the purpose of conducting the signal warrant analysis. The following table shows the approach volumes recorded in October 2005. (Please see the traffic volume summary in Appendix I.)

Table 2
Daily Intersection Approach Volumes by Direction
Year 2005

Approach Direction	Daily Approach Volumes
Eastbound on SR 18	3,142
Westbound on SR 18	3,535
Northbound on I-85 NB Off-Ramp	3,363

QUEUE DELAY

A delay study was performed for the I-85 Northbound Off-Ramp northbound approach. The total approach stop delay was calculated for the AM, Midday, and PM peaks. The AM peak recorded an average vehicle delay of 21.89 sec/veh and the highest total stopped approach delay of 2.12 vehicle hours. (A 15-second queue delay sheet from peak hour observations may be found in Appendix I.)

VEHICULAR SPEEDS

The posted speed limit along SR 18 is 45 MPH. The speed limit is not posted along the I-85 Northbound Off-Ramp approach.

PEDESTRIAN MOVEMENTS

Crosswalks or sidewalks are not present at the study intersection. During the peak hour traffic counts, one pedestrian was recorded crossing the SR 18 westbound approach during the Midday peak indicating minor pedestrian activity.

PARKING

On-street parking is not permitted along SR 18 and the I-85 Northbound Ramps in the vicinity of the intersection.

COLLISION HISTORY

Collision data was available for the study intersection between the time periods of January 2003 to December 2004. A total of 2 collisions were reported in 2003 and 1 was considered correctable by the installation of a traffic signal. A total of 2 collisions were reported in 2004 and none were considered correctable by the installation of a traffic signal.

(Collision diagrams for 2003 and 2004 are provided in Appendix F.)

ADJACENT SIGNALIZED INTERSECTIONS

The signalized intersection of SR 18 at MLK Jr. Drive is located approximately 1.0 mile west of the study intersection.

MUTCD SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was performed for the intersection of SR 18 at I-85 Northbound Ramps using the criteria provided in the Manual on Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA), 2003. According to MUTCD, the investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the following traffic signal warrants and other factors related to existing operation and safety at the study location:

Warrant 1, Eight-Hour Peak Volume
Warrant 2, Four-Hour Vehicular Volume
Warrant 3, Peak Hour
Warrant 4, Pedestrian Volume
Warrant 5, School Crossing
Warrant 6, Coordinated Signal System
Warrant 7, Crash Experience
Warrant 8, Roadway Network

A traffic control signal should not be installed unless one or more of the above warrants are met. However, the satisfaction of a traffic signal warrant or warrants should not in itself require the installation of a traffic control signal.

This traffic signal warrant analysis evaluated actual traffic conditions to determine if they satisfy the minimum warrants established by the MUTCD. Additionally, it should be noted that Warrants 1, 2, and 3 are the vehicular volume warrants and are based on mainline traffic volumes, side street traffic volumes, number of travel lanes, and mainline traffic speed.

Due to the presence of speeds being greater than 40 mph and its location near an isolated population of less than 10,000 people, the 70% volume reduction was applicable. The results of the warrant analysis are shown in Table 3 and Appendix G.

In terms of the proper allocation or reduction for right turning volumes during warrant analysis, the procedure outlined in *NCHRP Report 457*, specifically Figure 2-11 (Minor-road right-turn volume reduction warrant check), was used as a guideline. Reductions made to the right-turn volumes are summarized in Appendix G.

Table 3
Signal Warrant Analysis Results

Warrant	Criteria Satisfied	Hrs Met/ Required
1A	Not Met	4 / 8
1B	Not Met	0 / 8
1C	Not Met	N/A
2	Not Met	1 / 4
3	Not Met	N/A
3A	Not Met	N/A
3B	Not Met	0 / 1
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	Not Met	N/A (1 crash correctable by a signal over 12-month period)
8	N/A	N/A

As Table 3 shows, none of the MUTCD signal warrants were satisfied.

INTERSECTION CAPACITY ANALYSIS

The capacity and level of service (LOS) for the intersection of SR 18 at I-85 Northbound Ramps was based on analysis procedures provided in the Highway Capacity Manual, Special Report 209, published by the Transportation Research Board, 2000. The capacity was examined for unsignalized conditions. In the evaluation of this unsignalized intersection, the critical movement is the operation of the I-85 Northbound Off-Ramp's northbound approach. The results of the intersection capacity analysis are summarized in Table 4. Peak hour movement counts used in the analysis are shown in Appendix E.

Table 4
LOS for SR 18 at I-85 Northbound Off-Ramp
Unsignalized Intersection

Minor Street Approach	Approach LOS (Approach Delay in Seconds)		
	AM Peak	Midday Peak	PM Peak
Northbound	F (145.4)	B (12.8)	C (21.6)

From Table 4, the unsignalized Northbound Off-Ramp northbound approach operates at LOS F during the AM peak, LOS B during the Midday peak hour, and LOS C during the PM peak hour. The output of the unsignalized intersection analysis is shown in Appendix H.

OTHER INFORMATION

In conjunction with this study, a traffic signal warrant analysis was also conducted at the intersection of SR 18 at I-85 Southbound Ramps, which is located approximately 0.9 miles west of the study location. Georgia Department of Transportation's office of Urban Design has completed a project concept report (STP-0003-00(787), PI No. 0003787) that would lengthen and install right-turn lanes on both the Southbound and Northbound Off-Ramps at SR 18. In addition, based on design year (2025) traffic volumes, installation of a traffic signal was proposed at the intersection SR 18 and I-85 Northbound Off-Ramps.

(A copy of the concept report can be found in Appendix J.)

CONCLUSIONS

The following conclusions are based on the collected data, signal warrant and intersection capacity analyses, and field observations:

- An examination of traffic volumes and collision experience indicates that none of the MUTCD signal warrants are satisfied at this intersection.
- 1 of the 2 collisions reported between January 2003 and December 2003 was considered correctable by a traffic signal. Additionally, none of the 2 collisions reported between January 2002 and December 2002 are considered correctable by a traffic signal.
- The unsignalized intersection LOS for the Northbound Off-Ramp northbound approach is acceptable (LOS C or better) during the Midday and PM peak hours and unacceptable during the AM peak hour.

RECOMMENDATIONS

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

- Installation of a traffic signal is not recommended at this location, as none of the MUTCD signal warrant criteria were satisfied under existing traffic conditions.
- A northbound right-turn lane should be installed along the I-85 Northbound Off-Ramp as recommended in GDOT's concept study (please see concept study for sketch).
- The existing stop bar along the I-85 Northbound Off-Ramp should be shifted north towards SR 18 so sight distance to the west will not be obscured by the I-85 overpass bridge columns.

GEORGIA REGISTERED No. 028775 PROFESSIONAL ENGINEER CHRISTOPHER R. MROCZKA

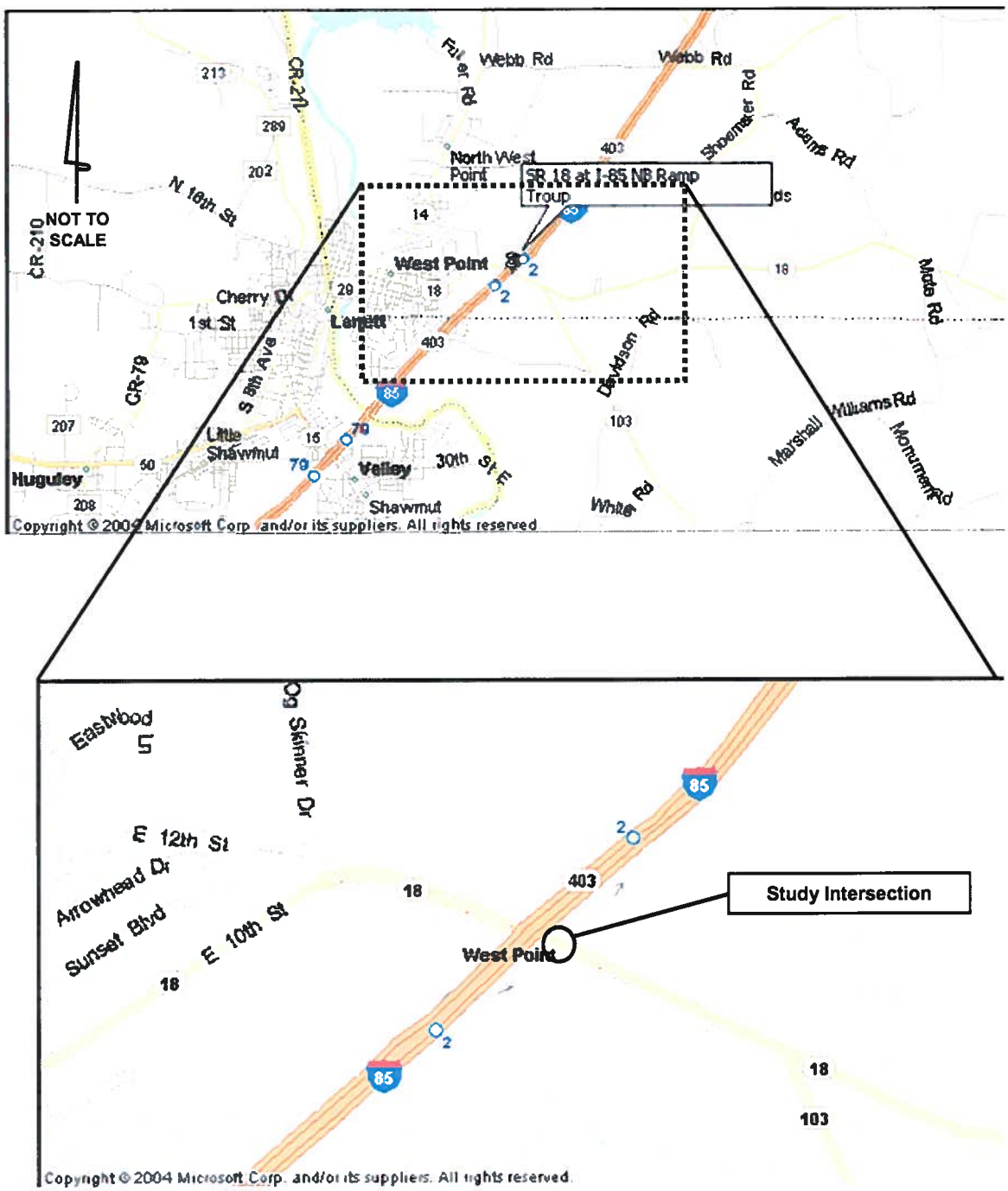
PREPARED BY: _____ DATE 8/14/06
Kimley-Horn and Associates, Inc.

RECOMMENDED BY: _____ DATE _____
District Traffic Engineer

RECOMMENDED BY: _____ DATE _____
State Traffic Safety and Design Engineer

APPROVED BY: _____ DATE _____
Director of Operations

Appendix A
Location Map – Figure 1



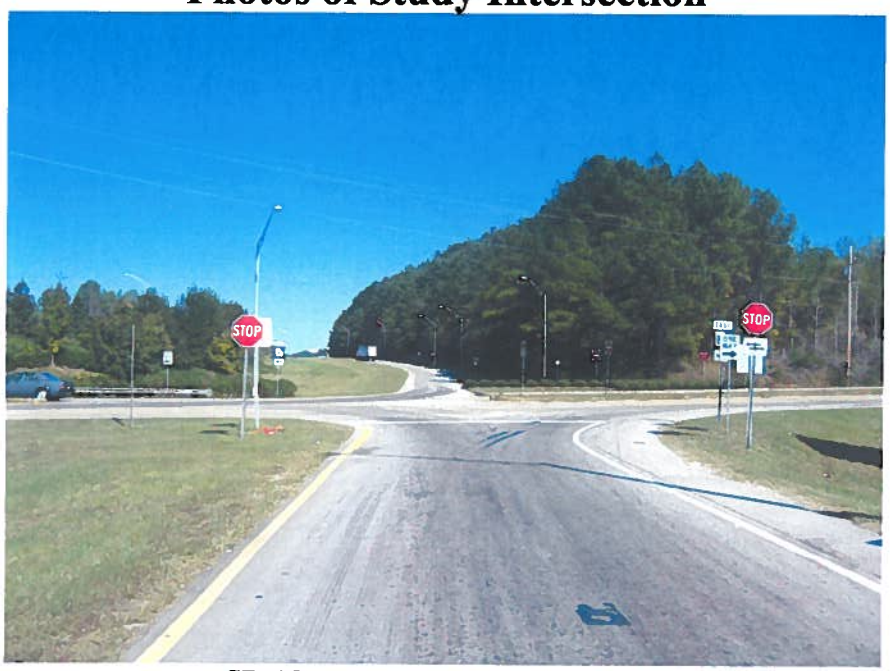
Kimley-Horn and Associates, Inc.
Day Wilburn Associates, Inc.

Appendix B
Photos of Study Intersection

SR 18 at I-85 Northbound Ramps
Westbound Approach

SR 18 at I-85 Northbound Ramps
Eastbound Approach

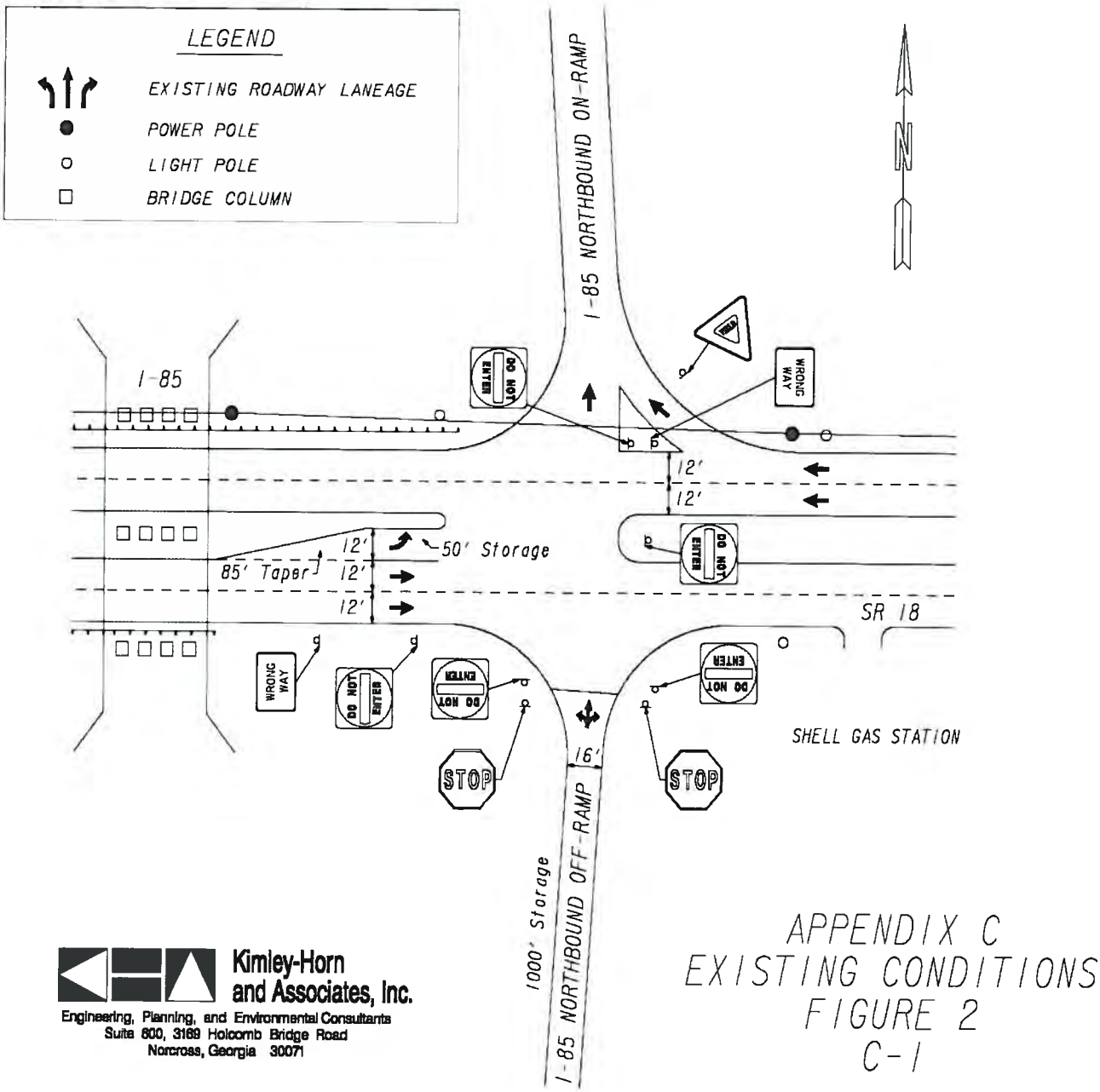
Appendix B
Photos of Study Intersection



SR 18 at I-85 Northbound Ramps
Northbound Exit Ramp Approach

SR 18 at I-85 Northbound Ramps
Northbound Entrance Ramp

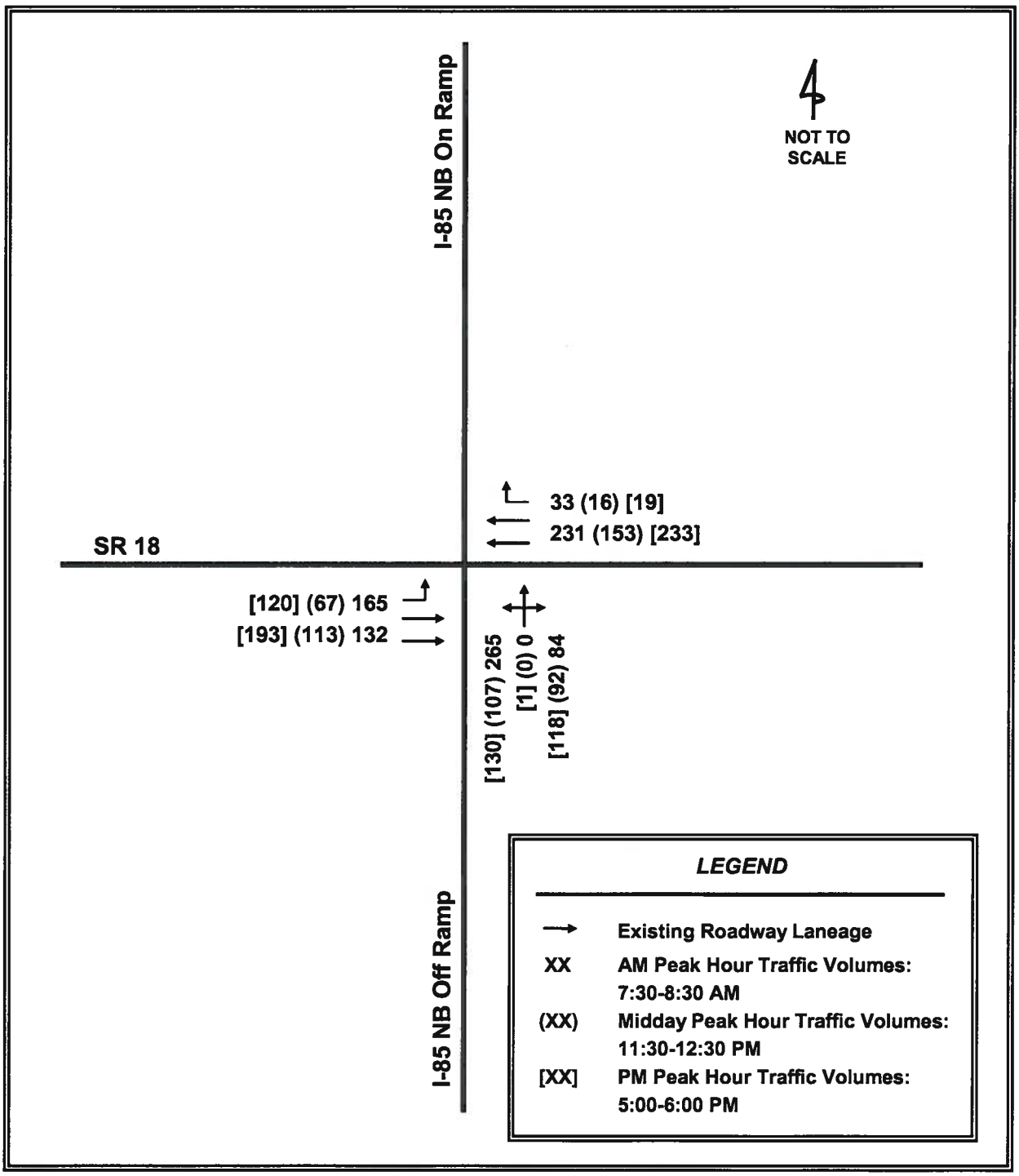
Appendix C
Existing Conditions Diagram – Figure 2



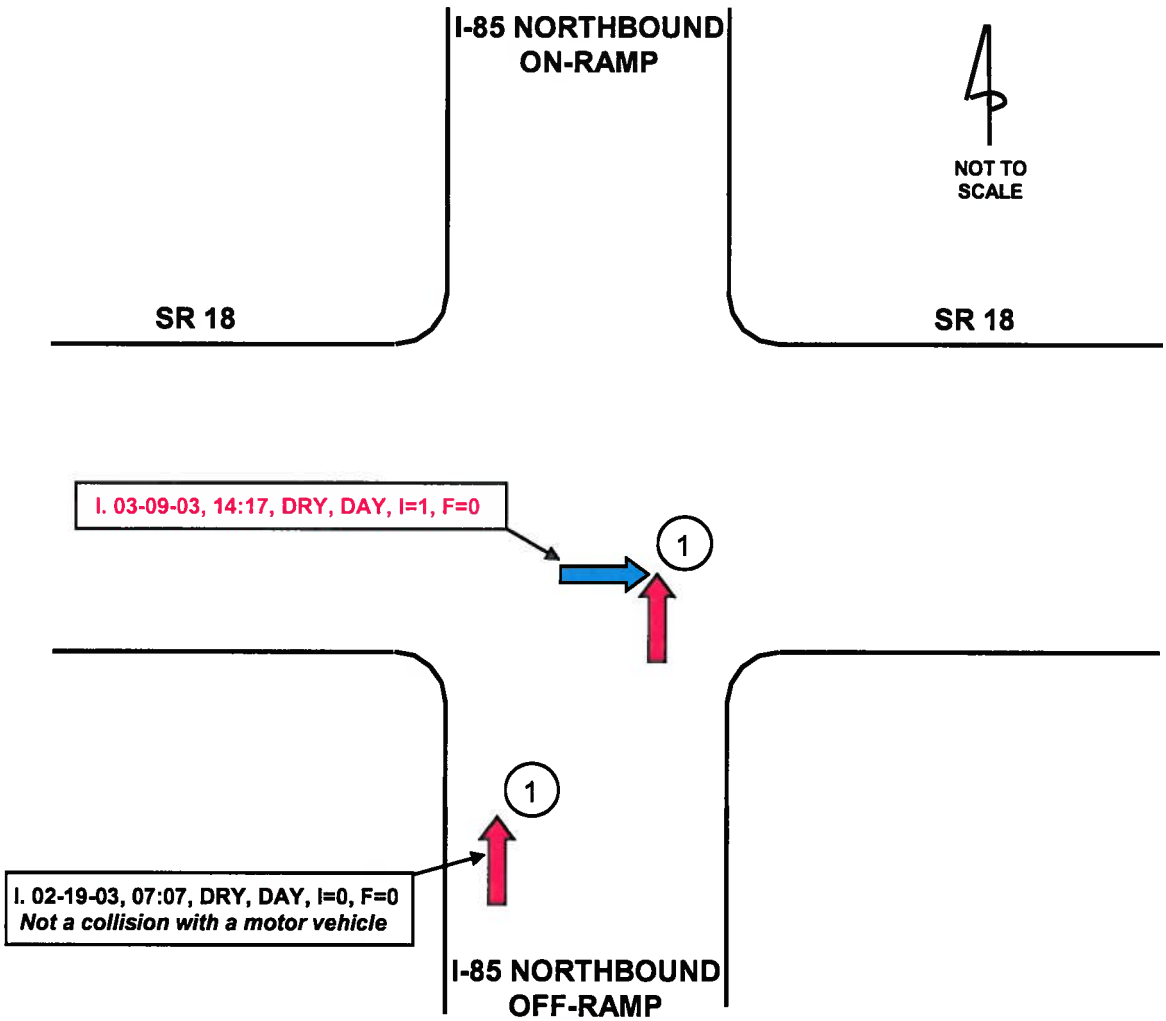
Appendix D
Proposed Improvements Diagram

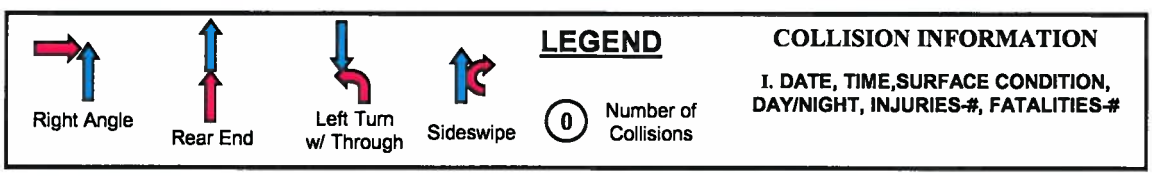
See Recommendations for Proposed Improvements

Appendix E
Peak Hour Turning Movement Counts – Figure 3

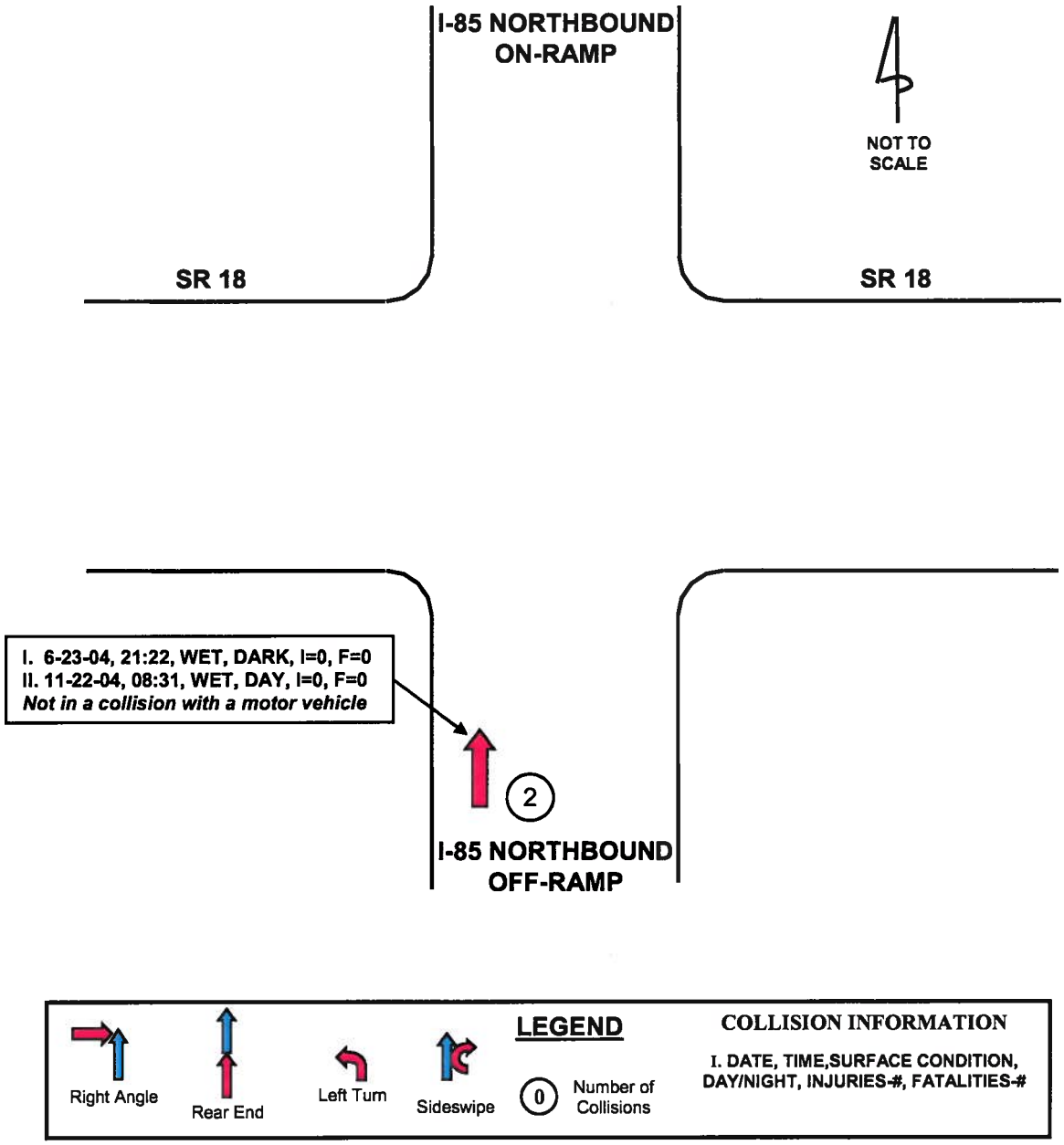


Appendix F
Collision Diagram – Figure 4
January 1, 2003 – December 31, 2003 (1 year)





Appendix F
Collision Diagram – Figure 5
January 1, 2004 – December 31, 2004 (1 year)



Appendix G
Signal Warrant Summary

(See Attached)

Signal Warrant Analysis
SR 18 at I-85 Northbound Off-Ramp
Level 2, Troup County

01/25/06
09:29:37

WARRANTS/TEAPAC[Ver 2.61.12] - MUTCD Warrant Analysis

Conditions Used for Warrant Analysis	2003 MUTCD
Intersection # 1	
Major Street Direction	EastWest
Number of Lanes in North-South direction	1
Number of Lanes in East-West direction	2
Approach speed on major street is greater than 40 mph	Yes
Isolated community has population less than 10,000	Yes
Signal will not seriously disrupt progressive traffic flow	Yes
Trials of other remedies have failed to improve conditions	Yes
Number of accidents correctable by a signal	1
Peak hour stop sign delay for worst minor approach (veh-hours)	2
Number of accidents correctable by a multi-way stop	0
Peak hour average delay for all minor approaches (sec/veh)	0

WARRANTS/TEAPAC[Ver 2.61.12] - Warrant Analysis for Traffic Signal

Warrant 1A Analysis - 8-Hour Minimum Vehicular Volume

Start Time	700	1700	1400	1600	800	1200	600	1300	Req.
Minor Volume	213	133	132	125	203	116	110	110	105
Major Volume	547	571	476	478	406	316	277	389	420
Warrant Met?	Yes	Yes	Yes	Yes	No	No	No	No	8

Number of 1-hour periods meeting the warrant 4
Signal will not seriously disrupt progressive traffic flow Yes

>> WARRANT 1A IS NOT MET <<

Warrant 1B Analysis - 8-Hour Interruption of Continuous Traffic

Start Time	700	800	1700	1400	1600	1200	600	1300	Req.
Minor Volume	213	203	133	132	125	116	110	110	53
Major Volume	547	406	571	476	478	316	277	389	630
Warrant Met?	No	No	No	No	No	No	No	No	8

Number of 1-hour periods meeting the warrant 0
Signal will not seriously disrupt progressive traffic flow Yes

>> WARRANT 1B IS NOT MET <<

Signal Warrant Analysis
SR 18 at I-85 Northbound Off-Ramp
Level 2, Troup County

01/25/06
09:29:37

WARRANTS/TEAPAC[Ver 2.61.12] - Warrant Analysis for Traffic Signal

Warrant 1A Analysis (80%) - 8-Hour Minimum Vehicular Volume

Start Time	700	1700	800	1400	1600	1200	600	1300	Req.
Minor Volume	213	133	203	132	125	116	110	110	120
Major Volume	547	571	406	476	478	316	277	389	480
Warrant Met?	Yes	Yes	No	No	No	No	No	No	8

Number of 1-hour periods meeting the warrant (56% not allowed) 2

Warrant 1B Analysis (80%) - 8-Hour Interruption of Continuous Traf

Start Time	700	800	1700	1400	1600	1200	600	1300	Req.
Minor Volume	213	203	133	132	125	116	110	110	60
Major Volume	547	406	571	476	478	316	277	389	720
Warrant Met?	No	No	No	No	No	No	No	No	8

Number of 1-hour periods meeting the warrant (56% not allowed) 0

Warrant 1C Analysis - 8-Hour Combination of Warrants

80% of Warrants 1A and 1B are met (56% not allowed)	No
Signal will not seriously disrupt progressive traffic flow	Yes
Trials of other remedies have failed to reduce delays	Yes

>> WARRANT 1C IS NOT MET <<

Warrant 2 Analysis - 4-Hour Vehicular Volume

Start Time	700	800	1700	1400	1600	1200	600	1300	Req.
Minor Volume	213	203	133	132	125	116	110	110	-
Minor Reqrmt	151	208	142	180	179	252	272	216	<--
Warrant Met?	Yes	No	No	No	No	No	No	No	4

Number of 1-hour periods meeting the warrant	1
Signal will not seriously disrupt progressive traffic flow	Yes

>> WARRANT 2 IS NOT MET <<

Signal Warrant Analysis
SR 18 at I-85 Northbound Off-Ramp
Level 2, Troup County

01/25/06
09:29:37

WARRANTS/TEAPAC[Ver 2.61.12] - Warrant Analysis for Traffic Signal

Warrant 3A Analysis - Peak Hour Delay

Start Time	700	1700	800	1400	1600	1200	600	1300	Req.
Minor Volume	213	133	203	132	125	116	110	110	100
Total Volume	760	704	609	608	603	432	387	499	650
Warrant Met?	Yes	Yes	No	No	No	No	No	No	1

Number of 1-hour periods meeting the warrant	2
Signal will not seriously disrupt progressive traffic flow	Yes
Delay for worst minor approach (must be at least 4 veh-hours)	2

>> WARRANT 3A IS NOT MET <<

Warrant 3B Analysis - Peak Hour Volume

Start Time	700	800	1700	1400	1600	1200	600	1300	Req.
Minor Volume	213	203	133	132	125	116	110	110	-
Minor Reqrmt	264	332	253	297	296	377	397	341	<--
Warrant Met?	No	No	No	No	No	No	No	No	1

Number of 1-hour periods meeting the warrant	0
Signal will not seriously disrupt progressive traffic flow	Yes

>> WARRANT 3B IS NOT MET <<

Warrant 7 Analysis - Crash Experience

80% of Warrant 1A or 1B is met	No
Signal will not seriously disrupt progressive traffic flow	Yes
Trials of other remedies have failed to reduce accidents	Yes
Number of correctable accidents (must be 5 or more per year)	1

>> WARRANT 7 IS NOT MET <<

Summary of MUTCD Traffic Signal Warrant Analysis

Warrant 1A 8-Hour Minimum Vehicular Volume	NOT MET
Warrant 1B 8-Hour Interruption of Continuous Traffic	NOT MET
Warrant 1C 8-Hour Combination of Warrants	NOT MET
Warrant 2 4-Hour Vehicular Volume	NOT MET
Warrant 3A Peak Hour Delay	NOT MET
Warrant 3B Peak Hour Volume	NOT MET
Warrant 7 Crash Experience	NOT MET

>> Traffic Signal Warrant is NOT MET <<

Signal Warrant Analysis
SR 18 at I-85 Northbound Off-Ramp
Level 2, Troup County

01/25/06
09:30:02

WARRANTS/TEAPAC[Ver 2.61.12] - Summary of Parameter Values

Intersection # 1
Type of Count REDUCED

ADT Factor 0.00
Trucks INCLUDED

Count Periods:	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop
60 min intrvls	0	2300	0	0	0	0	0	0	0	0

Vehicle Counts:

Time	N RT	N TH	N LT	E RT	E TH	E LT	S RT	S TH	S LT	W RT	W TH	W LT
0	0	19	0	0	31	0	0	0	0	0	32	0
100	0	15	0	0	16	0	0	0	0	0	24	0
200	0	7	0	0	14	0	0	0	0	0	23	0
300	0	4	0	0	7	0	0	0	0	0	14	0
400	0	9	0	0	33	0	0	0	0	0	13	0
500	0	26	0	0	56	0	0	0	0	0	54	0
600	0	110	0	0	145	0	0	0	0	0	132	0
700	0	213	0	0	276	0	0	0	0	0	271	0
800	0	203	0	0	213	0	0	0	0	0	193	0
900	0	95	0	0	119	0	0	0	0	0	211	0
1000	0	103	0	0	143	0	0	0	0	0	231	0
1100	0	97	0	0	173	0	0	0	0	0	187	0
1200	0	116	0	0	167	0	0	0	0	0	149	0
1300	0	110	0	0	194	0	0	0	0	0	195	0
1400	0	132	0	0	209	0	0	0	0	0	267	0
1500	0	101	0	0	239	0	0	0	0	0	231	0
1600	0	125	0	0	219	0	0	0	0	0	259	0
1700	0	133	0	0	316	0	0	0	0	0	255	0
1800	0	92	0	0	157	0	0	0	0	0	220	0
1900	0	93	0	0	148	0	0	0	0	0	192	0
2000	0	78	0	0	102	0	0	0	0	0	155	0
2100	0	47	0	0	63	0	0	0	0	0	91	0

Signal Warrant Analysis
SR 18 at I-85 Northbound Off-Ramp
Level 2, Troup County

01/25/06
09:30:03

WARRANTS/TEAPAC[Ver 2.61.12] - Summary of Parameter Values

2200	0	36	0	0	53	0	0	0	0	0	78	0
2300	0	39	0	0	49	0	0	0	0	0	58	0

Appendix H
Capacity Analysis Results

(See Attached)

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	CRM
Agency/Co.	Kimley-Horn
Date Performed	1/20/2006
Analysis Time Period	AM Peak

Site Information

Intersection	SR 18 at I-85 NB Ramps
Jurisdiction	Troup County
Analysis Year	2005
Project ID	015891050

East/West Street: SR 18	North/South Street: I-85 Northbound Ramp
Intersection Orientation: East-West	Study Period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	165	132	0	0	231	33
Peak-Hour Factor, PHF	0.94	0.94	1.00	1.00	0.77	0.77
Hourly Flow Rate, HFR	175	140	0	0	300	42
Percent Heavy Vehicles	0	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	265	0	84	0	0	0
Peak-Hour Factor, PHF	0.83	1.00	0.83	1.00	1.00	1.00
Hourly Flow Rate, HFR	319	0	101	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LR				
v (vph)	175			420				
C (m) (vph)	1228			417				
v/c	0.14			1.01				
95% queue length	0.50			25.86				
Control Delay	8.4			145.4				
LOS	A			F				
Approach Delay	–	–	145.4					
Approach LOS	–	–	F					

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Version 4.1

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	CRM	Intersection	SR 18 at I-85 NB Ramps
Agency/Co.	Kimley-Horn	Jurisdiction	Troup County
Date Performed	1/20/2006	Analysis Year	2005
Analysis Time Period	Midday Peak	Project ID	015891050

East/West Street: SR 18	North/South Street: I-85 Northbound Ramp
Intersection Orientation: East-West	Study Period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	67	113	0	0	153	16
Peak-Hour Factor, PHF	0.74	0.74	1.00	1.00	0.90	0.90
Hourly Flow Rate, HFR	90	152	0	0	170	17
Percent Heavy Vehicles	0	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	107	0	92	0	0	0
Peak-Hour Factor, PHF	0.94	1.00	0.94	1.00	1.00	1.00
Hourly Flow Rate, HFR	113	0	97	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LR				
v (vph)	90			210				
C (m) (vph)	1399			674				
v/c	0.06			0.31				
95% queue length	0.21			1.35				
Control Delay	7.8			12.8				
LOS	A			B				
Approach Delay	–	–	12.8					
Approach LOS	–	–	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	CRM
Agency/Co.	Kimley-Horn
Date Performed	1/20/2006
Analysis Time Period	PM Peak

Site Information

Intersection	SR 18 at I-85 NB Ramps
Jurisdiction	Troup County
Analysis Year	2005
Project ID	015891050

East/West Street: SR 18
North/South Street: I-85 Northbound Ramp
Intersection Orientation: East-West
Study Period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	120	193	0	0	233	19
Peak-Hour Factor, PHF	0.78	0.78	1.00	1.00	0.89	0.89
Hourly Flow Rate, HFR	153	247	0	0	261	21
Percent Heavy Vehicles	0	–	–	0	–	–
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	130	0	118	0	0	0
Peak-Hour Factor, PHF	0.92	1.00	0.92	1.00	1.00	1.00
Hourly Flow Rate, HFR	141	0	128	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L			LR				
v (vph)	153			269				
C (m) (vph)	1292			485				
v/c	0.12			0.55				
95% queue length	0.40			3.62				
Control Delay	8.2			21.6				
LOS	A			C				
Approach Delay	–	–	21.6					
Approach LOS	–	–	C					

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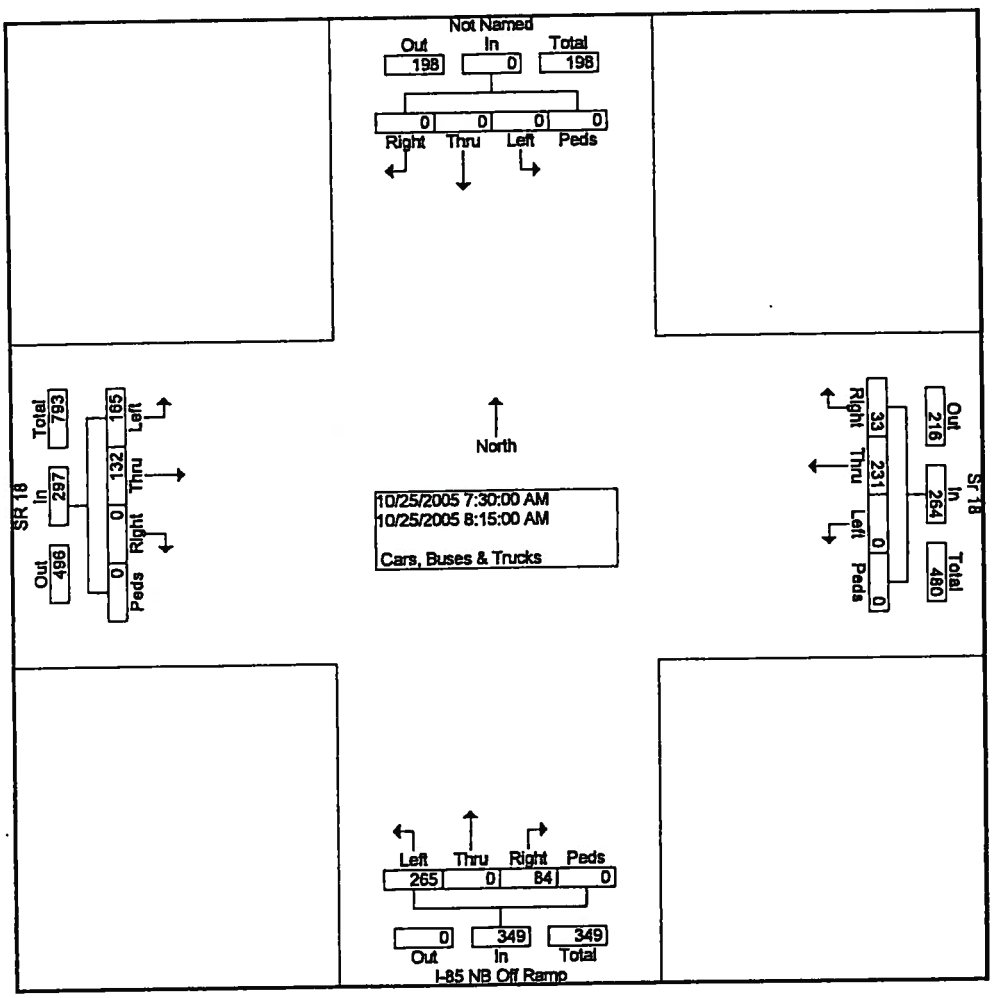
Appendix I
Traffic Volume Summary

(See Attached)

Georgia Traffic, Inc.
Professional Traffic Studies
www.Georgia-Traffic.com
Tel: 770-926-5949, Fax: 1-484-423-2499

File Name : 23660007-TMC
Site Code : 23660007
Start Date : 10/25/2005

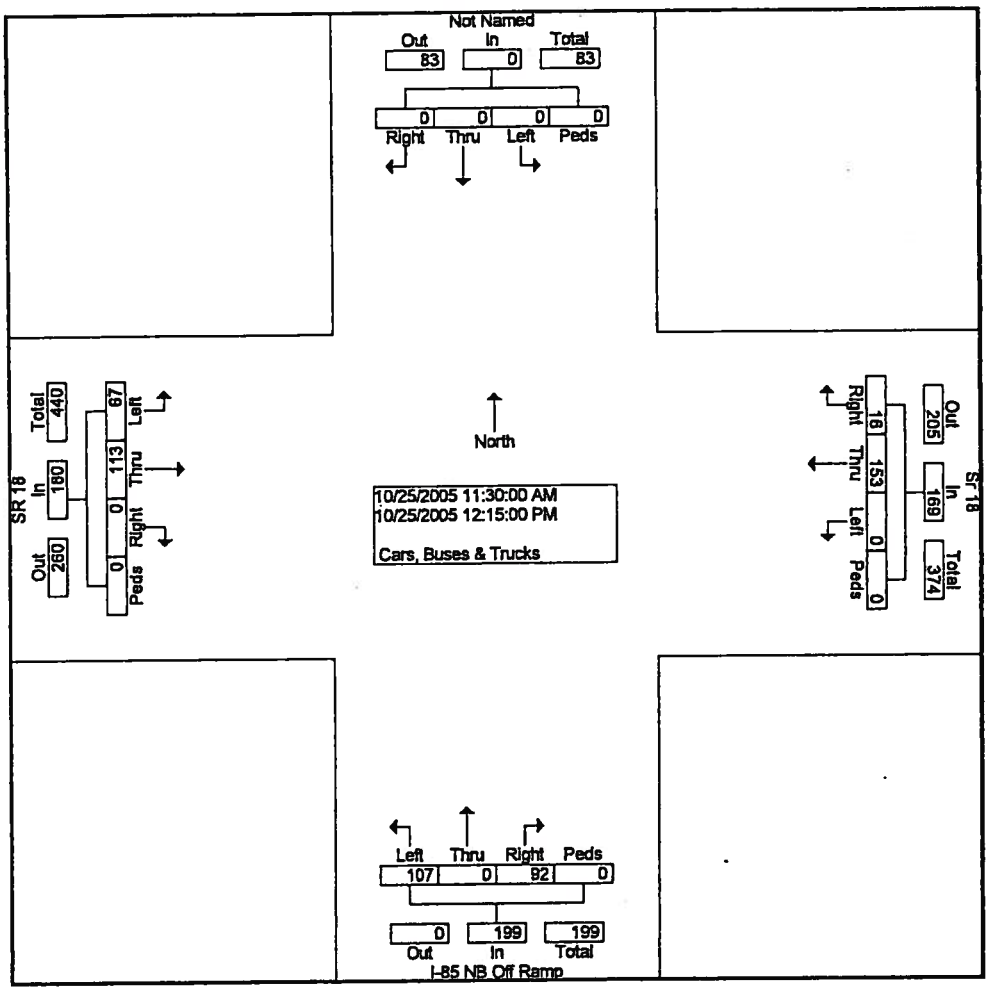
	I-85 NB Off Ramp North Bound					South Bound					SR 18 East Bound					Sr 18 West Bound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Intersection	07:30 AM																				
Volume	265	0	84	0	349	0	0	0	0	0	165	132	0	0	297	0	231	33	0	264	910
Percent	75.9	0.0	24.1	0.0		0.0	0.0	0.0	0.0		55.6	44.4	0.0	0.0		0.0	87.5	12.5	0.0		
07:45																					
Volume	74	0	27	0	101	0	0	0	0	0	45	34	0	0	79	0	67	6	0	73	253
Peak Factor																					0.899
High Int.	08:00 AM					6:45:00 AM					07:45 AM					07:30 AM					
Volume	81	0	24	0	105	0	0	0	0	0	45	34	0	0	79	0	76	10	0	86	
Peak Factor					0.831										0.940					0.767	



Georgia Traffic, Inc.
Professional Traffic Studies
www.Georgia-Traffic.com
Tel: 770-926-5949, Fax: 1-484-423-2499

File Name : 23660007-TMC
Site Code : 23660007
Start Date : 10/25/2005

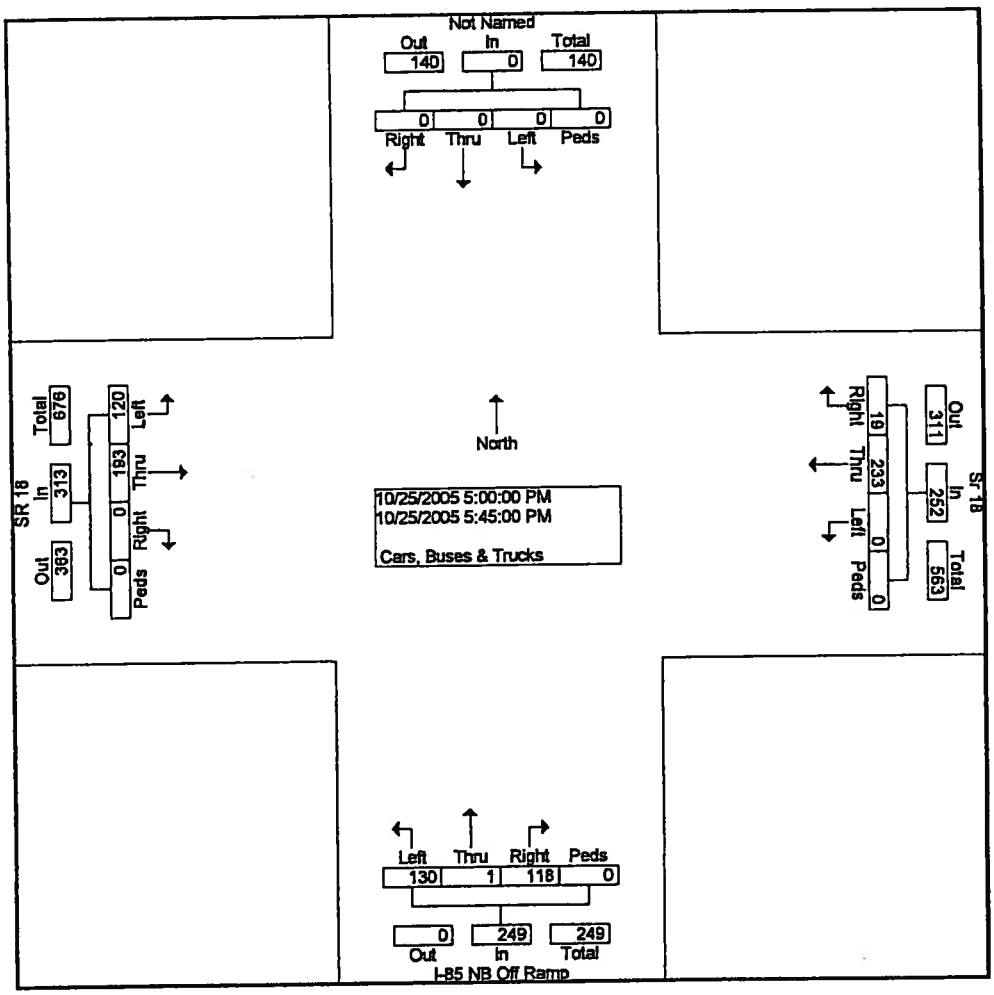
	I-85 NB Off Ramp North Bound					South Bound					SR 18 East Bound					Sr 18 West Bound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Intersection	11:30 AM																				
Volume	107	0	92	0	199	0	0	0	0	0	67	113	0	0	180	0	153	16	0	169	548
Percent	53.8	0.0	46.2	0.0		0.0	0.0	0.0	0.0		37.2	62.8	0.0	0.0		0.0	90.5	9.5	0.0		
12:00 Volume	32	0	18	0	50	0	0	0	0	0	27	34	0	0	61	0	26	4	0	30	141
Peak Factor																					0.972
High Int.	12:15 PM										12:00 PM					11:45 AM					
Volume	29	0	24	0	53	0	0	0	0	0	27	34	0	0	61	0	42	5	0	47	
Peak Factor					0.939										0.738					0.899	



Georgia Traffic, Inc.
Professional Traffic Studies
www.Georgia-Traffic.com
Tel: 770-926-5949, Fax: 1-484-423-2499

File Name : 23660007-TMC
Site Code : 23660007
Start Date : 10/25/2005

	I-85 NB Off Ramp North Bound					South Bound					SR 18 East Bound					Sr 18 West Bound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				
Volume	130	1	118	0	249	0	0	0	0	0	120	193	0	0	313	0	233	19	0	252	814
Percent	52.2	0.4	47.4	0.0		0.0	0.0	0.0	0.0		38.3	61.7	0.0	0.0		0.0	92.5	7.5	0.0		
05:00 Volume	32	1	31	0	64	0	0	0	0	0	41	60	0	0	101	0	49	8	0	57	222
Peak Factor																					0.917
High Int.	05:15 PM										05:00 PM					05:30 PM					
Volume	33	0	35	0	68	0	0	0	0	0	41	60	0	0	101	0	69	2	0	71	
Peak Factor					0.915										0.775					0.887	



Appendix J
Project Concept Report

(See Attached)

ORIGINAL TO GENERAL FILES

D.O.T. 65

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P. I. No. 0003787, Troup County
STP-0003-00(787)
I-85 Exit Ramps at SR 18

OFFICE Preconstruction

DATE May 12, 2005

FROM Margaret B. Pirkle, P.E., Assistant Director of Preconstruction

for

TO SEE DISTRIBUTION

SUBJECT REVISED PROJECT CONCEPT REPORT APPROVAL

Attached for your files is the approval for subject project.

MBP/cj

Attachment

DISTRIBUTION:

David Mulling
Harvey Keepler
Ken Thompson
Jamie Simpson
Michael Henry
Keith Golden
Joe Palladi (file copy)
Babs Abubakari
Ben Buchan
Thomas Howell
BOARD MEMBER
FHWA

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

RECEIVED
MAR 07 2005
BY:

INTERDEPARTMENTAL CORRESPONDENCE

FILE: STP-0003-00(787), Troup County
I-85 Exit Ramps @ SR 18
P.I. No. 0003787

OFFICE: Urban Design

DATE: March 2, 2005

FROM: James B. Buchan, P.E., State Urban Design Engineer

TO: Margaret B. Pirkle, P.E., Assistant Director of Preconstruction

SUBJECT: Revised Project Concept Report

Attached is the original copy of the Revised Concept Report for your further handling and approval in accordance with the Plan Development Process (PDP).

This concept revision is required to adequately correct existing deficiencies in the operation of the I-85 northbound and southbound exit ramps at SR 18. It changes the project termini by relocating the I-85 northbound and southbound exit ramp diverges and lengthening the ramps. It revises the I-85 northbound exit ramp alignment from a tapered exit to a parallel exit and revises the paved shoulder widths of both ramps in the currently proposed typical section. It also modifies the currently proposed traffic control at the ramp intersections with SR 18.

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

3/9/05
Date

State Transportation Planning Administrator

JBB:MLG

cc: Honorable Mr. David Doss
GDOT Board Chairman, 11th U.S. Congressional District
Buddy Grafton
David Mulling
Harvey Keepler
Keith Golden
Joe Palladi
Jamie Simpson
Kenneth D. Crabtree, Jr. District 3, Area 6 Engineer
Thomas Howell
David Graham
David Millen
Kerry Gore
Keith Rohling
Don Brown
Georgene Geary
David Painter

REVISED PROJECT CONCEPT REPORT

Need and Purpose: The proposed project addresses operational and safety issues on the I-85 exit ramps and improves mobility through the I-85/ SR 18 Interchange. Daily traffic volumes do not indicate severe congestion on SR 18 therefore improvements are not proposed.

Background

Planned safety improvements for the I-85 exit ramps at SR 18 entered the Department's construction work program in December of 2001 upon request of the State Traffic Safety and Design Engineer. Improvements have been proposed primarily to address operational and safety issues, including traffic queues backing up onto the interstate and accidents on I-85. It will also serve to relieve congestion along the ramps and prevent back-up onto the interstate.

SR 18 within the proposed project limits is a significant east-west corridor for Troup County. The roadway is functionally classified as a rural minor arterial. The typical section consists of four 12 ft travel lanes with a 12 ft raised median and 2 ft curb and gutter on both sides of the roadway. In addition, there are left turn lanes from SR 18 onto the I-85 entrance ramps. The speed limit at this location is 45 mph. The landscape is "level". The section of roadway is along a local school bus route. It is not a state bicycle route.

The I-85 ramps (northbound and southbound) consist of one 16 ft travel lane with 6 ft paved shoulders and 2 ft unpaved shoulders. The mainline is a four lane rural interstate principal arterial. Its lane widths are 12 ft and its shoulder widths vary. The median width is 64 ft. The speed limit along the ramp is 45 mph. The speed limit along the mainline is 70 mph. It is a school bus route. It is not a state bicycle route.

Proposed Improvements

There are no other planned projects in the vicinity of this proposed project.
The typical section on SR 18 or I-85 is not scheduled for reconstruction or modification.
In the 2000 census, Troup County was identified as a slow growing area having a population increase from 1990 to 2000 of 5.8%, while the state of Georgia as a whole increased by 26.4%. There are no apparent environmental justice issues.

Travel Demand and Operational Characteristics

The 2005 AADT for SR 18 within the proposed project limits is 10,300 vehicles per day (vpd). With this volume, the roadway operates at LOS C. The 2025 AADT for SR 18 is 15,600 vpd. With this volume, the roadway will operate at LOS D in 2025 without improvements.

The 2005 AADT for the I-85 southbound exit ramp is 1900 vpd. The 2025 AADT for this ramp is 2850 vpd. Without improvements, the southbound exit ramp will operate at LOS E in the 2025 peak period.

The 2005 AADT for the I-85 northbound exit ramp is 3950 vpd. The 2025 AADT for this ramp is 6000 vpd. Without improvements, the northbound exit ramp will operate at LOS F in 2025 AM & PM.

The 2005 AADT for I-85 in the vicinity of the project is 36,100 vpd. With this volume, the roadway operates at LOS C. The 2025 AADT for the interstate is 53,900 vpd. With this volume, the roadway will operate at LOS E in 2025 without improvements. Truck percentage along the roadway is 15%.

Safety

There were very few accidents and/or injuries along SR 18 within the proposed project limits from 2000 to 2002. In 2000, there was only one accident with no injuries. In 2001, there were 2 accidents with 2 injuries. In 2002, 0 accidents were reported.

Along I-85 however, there has been a steady increase in the number of accidents reported near the proposed project. In 2000, there were 18 accidents with 14 injuries. In 2001, there were 22 accidents with 6 injuries. In 2002, there were 29 accidents with 15 injuries. During these years, the majority of accidents occurred at M.P. 0.60. This is the precise mile point at which I-85 intersects with the northbound off ramp to SR 18.

Below is a chart of comparable statewide averages:

Accidents from M.P. 0.0 to 1.04

Year	2000		2001		2002	
	I-85	Statewide	I-85	Statewide	I-85	Statewide
Crashes	18		22		29	
Crashes Per 100 MVMT	200	61	244	63	282	73
Injuries	14		6		15	
Injuries Per 100 MVMT	156	20	66	19	146	21
Fatalities	0		0		0	
Fatalities Per 100 MVMT	0	1.15	0	1.20	0	1.02

(MVMT: Million Vehicle Miles Traveled)

The chart reveals that accident and injury rates along I-85 near the proposed project limits are substantially higher than comparable statewide averages. The high accident rates are the result of queued traffic along the ramps backing up onto the interstate. The widening of the ramps should provide additional storage capacity and improved operations, and thereby relieve congestion resulting in traffic accidents.

Project location: The project is located approximately 0.88 miles west of the City Limits of West Point and 0.76 miles north of the Harris County Line. The project proposes improvements to the I-85 northbound exit ramp beginning at I-85 milepost 0.67 and the I-85 southbound exit ramp beginning at I-85 milepost 1.02.

Description of the approved concept: The currently approved concept widens the I-85 northbound and southbound exit ramps at SR 18, to provide two 12-foot travel lanes with a 2-foot paved inside shoulder and a 6-foot paved outside shoulder. The widening is required to provide exclusive left turn lanes at the ramp intersections with SR 18. No work on SR 18 or I-85 is proposed in the currently approved concept.

PDP Classification: Major ____ Minor X

Federal Oversight: Full Oversight (X), Exempt ( ), SF ( ), Other ( )

Functional Classification: SR 18 ———— Rural Minor Arterial
I-85 ———— Rural Interstate

U.S. Route Number: I-85 (Interstate 85); F153-1 (SR 18)
State Route Number: SR 403 (Interstate 85); SR 18

Traffic (ADT) as shown in the approved concept:
SR 18 ———— 4,800 (1998 ADT)
I-85 Mainline ———— 25,300 (1998 ADT)

Proposed features to be revised:

Project Termini & Ramp Alignments

In this revised concept, the I-85 northbound and southbound exit ramps are proposed to be lengthened to provide adequate vehicle storage for the highest volume movement for each ramp. A parallel ramp alignment is proposed for the northbound exit ramp to accommodate the queue developing on the ramp without causing traffic to spill back onto the Interstate through lanes. Lengthening the ramps necessitates shifting the northbound exit ramp diverge to the south and shifting the southbound exit ramp diverge to the north. *See the attached 1" =400' layout.*

Typical Sections

The revised typical section changes the inside shoulder width to 8-feet with 4-feet paved and the outside shoulder width to 12-feet with 10-feet paved. The paved outside shoulder will facilitate disabled vehicles to completely pull out of the ramp through lane. In the design year, the ramps will experience 13% truck traffic. The 24-hour truck traffic is 15 %. *See the attached typical section.*

Traffic Control

In the existing condition and the currently approved concept, both ramp intersections with SR 18 are stop controlled. This concept revision recommends to signalize the northbound ramp intersection with SR 18 and to retain stop control at the southbound ramp intersection with SR 18.

HCS analysis of the currently approved concept indicates that maintaining stop control at both intersections does not improve the operation of the northbound exit ramp at SR 18. Even with an added left turn lane from the ramp to SR 18, the northbound exit ramp operates at a.m. LOS F and p.m. LOS E in the design year, with stop control. The southbound exit ramp operates at LOS C in the design year with an added left turn lane under stop control.

Installing a traffic signal at the northbound ramp intersection with SR 18 makes the northbound exit ramp operate at a.m. LOS D and p.m. LOS C in the design year. The southbound exit ramp operates at a.m. LOS C and improves to p.m. LOS B. *See the attached Intersection Capacity Analysis Summary.*

A Traffic Engineering Study was conducted prior to approval of the currently approved concept. It was concluded that seven of the eleven traffic signal warrants were not satisfied for the southbound ramp intersection, and nine of the eleven traffic signal warrants were not satisfied for the northbound ramp intersection; therefore signalized intersections were not proposed. During the development of this Revised Concept Report, it was determined that adding a traffic signal at the northbound ramp intersection with SR 18 significantly improves operation of both the northbound and southbound ramp intersections. District 3 Traffic Operations is currently updating the Traffic Engineering Study. *See the attached May 12, 2000 Traffic Engineering Study.*

Describe the revised feature(s) to be approved: This revised concept changes the project termini as a result of lengthening the ramps to provide sufficient vehicle storage without causing traffic to spill back onto I-85. The beginning and ending mileposts along I-85 are approximately 0.47 to 1.04 respectively. It modifies the currently proposed northbound and southbound exit ramp typical sections to increase the widths of the paved inside and outside shoulders. This concept revision also proposes to install a traffic signal at the northbound ramp intersection with SR 18, and replaces damaged guardrail at both entrance ramp intersections.

Design Exceptions anticipated: A Design Exception may be required for the proposed shoulder widths. AASHTO's 2001 edition of "A Policy on Geometric Design of Highways and Streets", page 842 states that:

> *For one-way operation, the sum of the right and left shoulder widths should not exceed 3.0 to 3.6 m [10 to 12 ft]. A paved shoulder width of 0.67 to 1.2 m [2 to 4 ft] is desirable on the left with the remaining width of 2.4 to 3.0 m [8 to 10 ft] used for the paved right shoulder.*

The sum of the proposed left and right paved shoulder widths is 14-feet under this concept revision in anticipation of changes to the current Entrance and Exit Ramp Construction Details. The Department is currently working with FHWA to revise the Entrance and Exit Ramp Construction Details to show the sum of the inside and outside paved shoulder widths as 14-feet. The revised Construction Details are currently not approved. If they are approved, the Design Exception will not be necessary.

Updated traffic data (ADT):

Base Year: (2005) 3950 vpd Design Year: (2025) 6000 vpd

Programmed/Schedule:

P.E. 2003 R/W: None Construction: FY 2005

Revised/Schedule: R/W: FY 2006 Construction: FY 2006

Revised cost estimates:

1. Construction Cost – $1,215,000.00
   (includes 10% E&C, inflation not included as per TOPPS 3A-9)

2. R/W Cost – $ 67,750.00
   Small amounts of *Easement for Construction & Maintenance of Slopes* and *Drainage Easement* may be required.

3. Utility relocations are not anticipated.

Is the project located in a Non-attainment area? ___ Yes X No

Recommendation: This Office recommends that the proposed revision to the concept be approved for implementation.

Attachments:

1. Location Sketch
2. Cost Estimate
3. Typical Section
4. 1"=400' Layout
5. Intersection Sketches (Existing and Proposed)
6. Traffic Volume Sheets
7. Intersection Capacity Analyses Summary
8. 2000-2002 Crash Data (I-85 & S.R. 18)
9. Traffic Engineering Study

Concur: Bobby Watts
Director of Preconstruction

Approve: Shawn Shamlne
For: Division Administrator, FHWA

Approve: O. L. Fitchett Jr.
Chief Engineer

LOCATION SKETCH

STP-0003-00(787), Troup County

PI # 0003787

Estimate Report for file "0003787"

Section Roadway items

Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1010	1.00	LS	100000.00	TRAFFIC CONTROL	100000.0
153-1300	1.00	EA	49465.29	FIELD ENGINEERS OFFICE TP 3	49465.29
210-0100	1.00	LS	352704.41	GRADING COMPLETE	352704.41
310-5120	1213.00	SY	13.90	GR AGGR BASE CRS, 12 INCH, INCL MATL	16860.7
400-3101	479.00	TN	50.00	ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL	23950.0
400-3605	1539.00	TN	45.35	ASPH CONC 19MM SUPERPAVE, GP 1 OR 2, INCL POLYMER MODIFIED	69793.65
402-3121	649.00	TN	35.71	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	23175.79
413-1000	696.00	GL	0.94	BITUM TACK COAT	654.24
439-0026	8165.00	SY	41.46	PLAIN PC CONC PVMT, CL 3 CONC, 12 INCH THK	338520.9
610-0209	760.00	LF	2.15	REM CHAIN LINK FENCE, 4 FT	1634.0
641-1200	1200.00	LF	11.27	GUARDRAIL, TP W	13524.0
641-5001	6.00	EA	429.03	GUARDRAIL ANCHORAGE, TP 1	2574.18
641-5012	2.00	EA	1383.53	GUARDRAIL ANCHORAGE, TP 12	2767.06
643-1132	760.00	LF	6.19	CH LK FENCE, ZC COAT, 4 FT, 9 GA	4704.40
				Section Sub Total:	**$1,000,328.62**

Section Drainage Items

Item Number	Quantity	Units	Unit Price	Item Description	Cost
441-0600	1.00	CY	604.00	CONC HEADWALLS	604.0
500-3101	40.00	CY	413.62	CLASS A CONCRETE	16544.8
511-1000	3000.00	LB	0.61	BAR REINF STEEL	1830.0
550-1360	30.00	LF	50.56	STORM DRAIN PIPE, 36 IN, H 1-10	1516.80
603-2182	20.00	SY	42.74	STN DUMPED RIP RAP, TP 3, 24 IN	854.80
				Section Sub Total:	**$21,350.40**

Section Erosion Control Items

Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0230	282.00	LB	1.66	TEMPORARY GRASSING	468.12
163-0240	43.00	TN	193.05	MULCH	8301.15
165-0010	450.00	LF	1.01	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	454.5
165-0020	2270.00	LF	1.05	MAINTENANCE OF TEMPORARY SILT FENCE, TP B	2383.5
171-0010	900.00	LF	1.69	TEMPORARY SILT FENCE, TYPE A	1521.0
171-0020	4540.00	LF	1.67	TEMPORARY SILT FENCE, TYPE B	7581.79
700-7010	47.00	GL	20.71	LIQUID LIME	973.37
700-8000	1.88	TN	234.18	FERTILIZER MIXED GRADE	440.25
700-8100	527.00	LB	1.43	FERTILIZER NITROGEN CONTENT	753.61
716-2000	88.00	SY	1.12	EROSION CONTROL MATS, SLOPES	98.56
				Section Sub Total:	**$22,975.87**

Section Signing and Marking Items

Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-0009	2.00	EA	9000.00	REMOVE AND RESET EXIST SPCL GUIDE SIGNS, OVERHEAD	18000.0
647-1000	1.00	LS	39349.41	TRAFFIC SIGNAL INSTALLATION NO	39349.41
653-0120	4.00	EA	56.18	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	224.72
653-1501	7060.00	LF	0.25	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	1765.0
653-3501	270.00	GLF	0.13	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	35.1
				Section Sub Total:	**$59,374.23**

Total Estimated Cost: $1,104,029.12

Subtotal Construction Cost	**$1,104,029.12**
E&C Rate 10.0 %	$110,402.91
Inflation Rate 0.0 % @ 0.0 Years	$0.00
Total Construction Cost	**$1,214,432.03**
Right Of Way	$67,750.00
ReImb. Utilities	$0.00
Grand Total Project Cost	**$1,282,182.03**

Preliminary Right of Way Cost Estimate

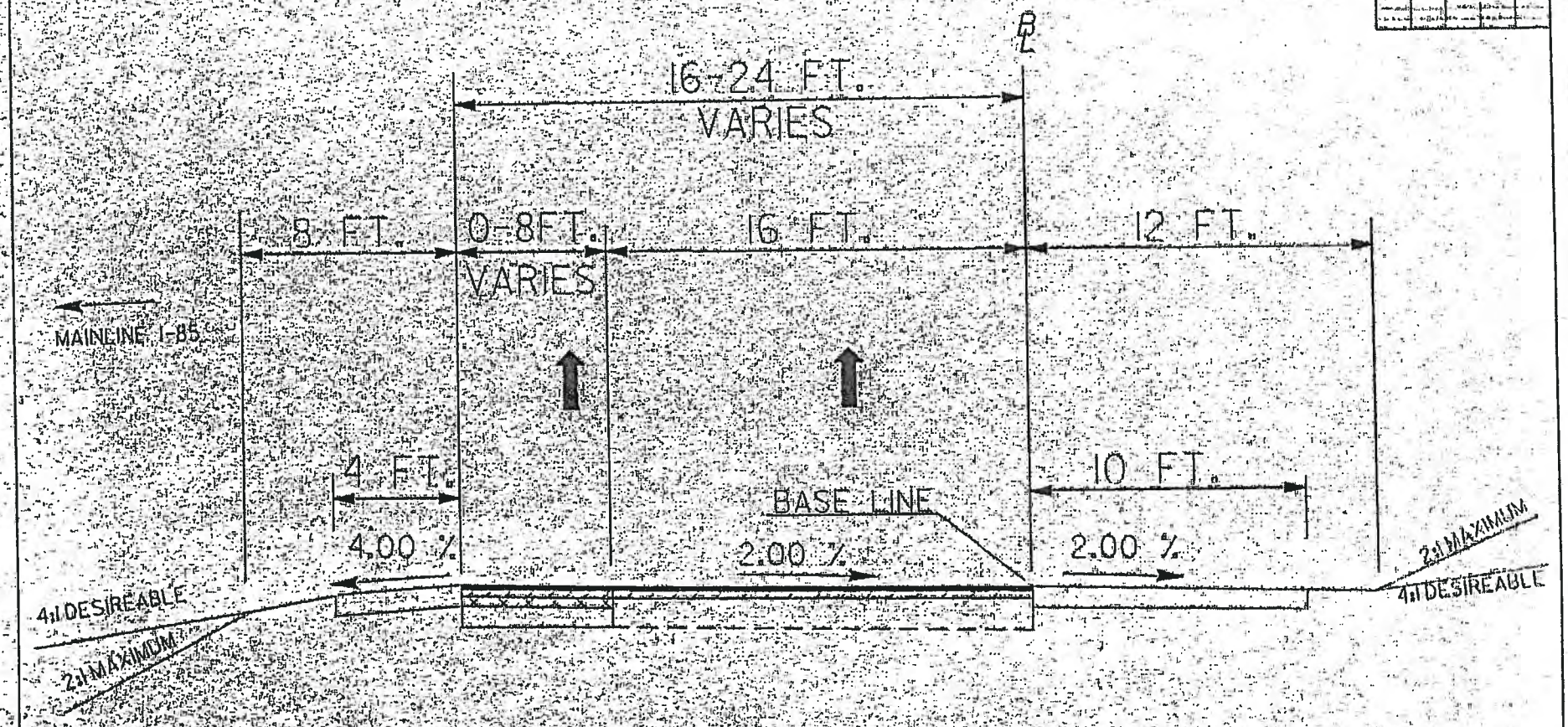
Don Brown
Right of Way Administrator
By: Jerry Milligan

Date: January 14, 2005
Project: STP-0003-00(787)Troup
Existing/Required R/W: Varies/Varies
Project Termini: I-85 / SR 18 Exit Ramp Improvements
Project Description: I-85 / SR 18 Exit Ramp Improvements

P.I. Number: 0003787
No. Parcels: 2

Land: Commercial : .39 acres @ $ 50,000 / acre		$ 19,500
Improvements : none		0
Relocation: Residential (0)		
Commercial (0)		0
Damage : Proximity (0) parcel		0
Net Cost		$ 19,500
Net Cost		$ 19,500
Scheduling Contingency	55 %	10,725
Adm/Court Cost	60 %	18,135
Inflation Factor	40 %	19,344
		$ 67,704

Total Cost $ 67,750



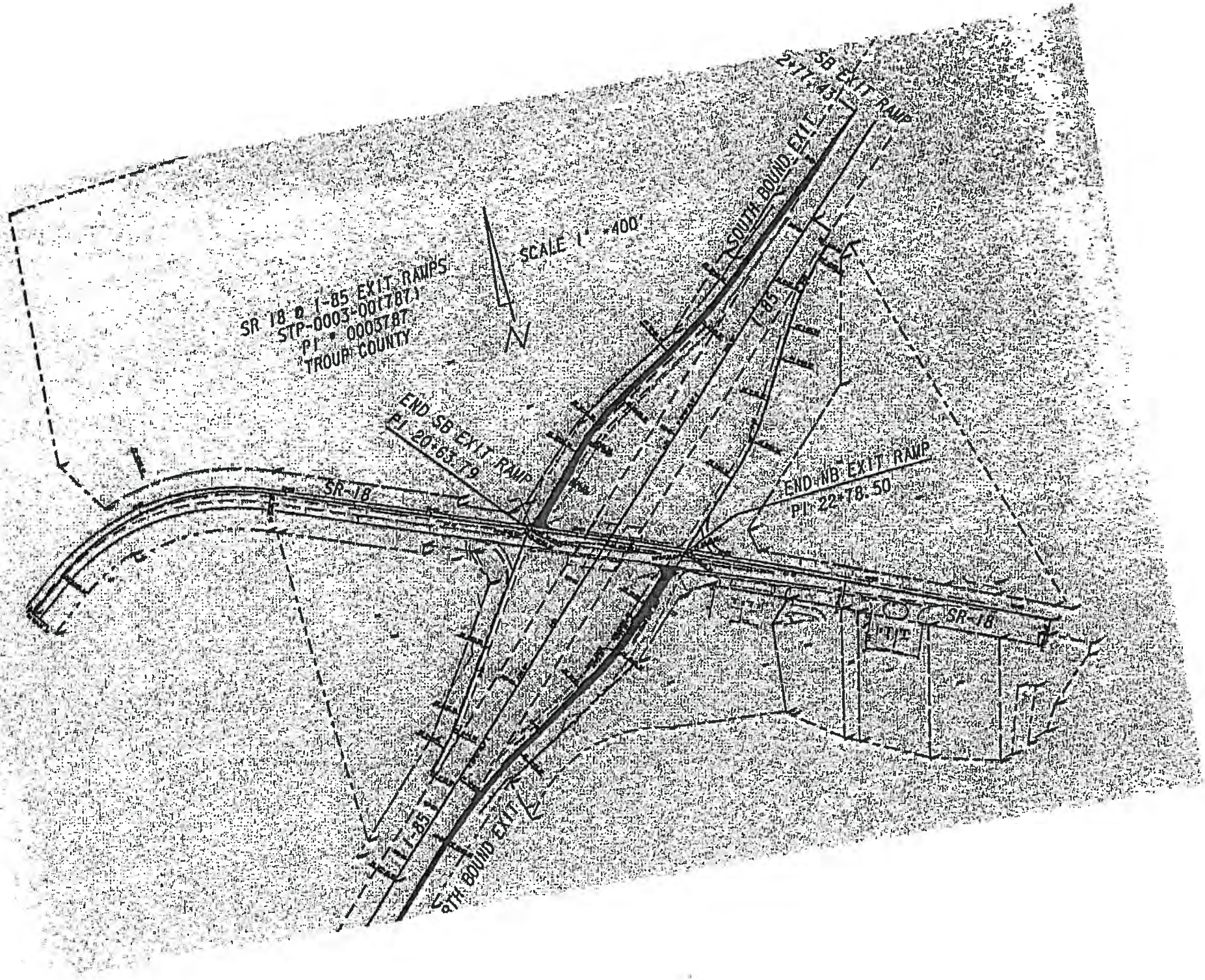
North and South Bound Exit Ramps

NOT TO SCALE

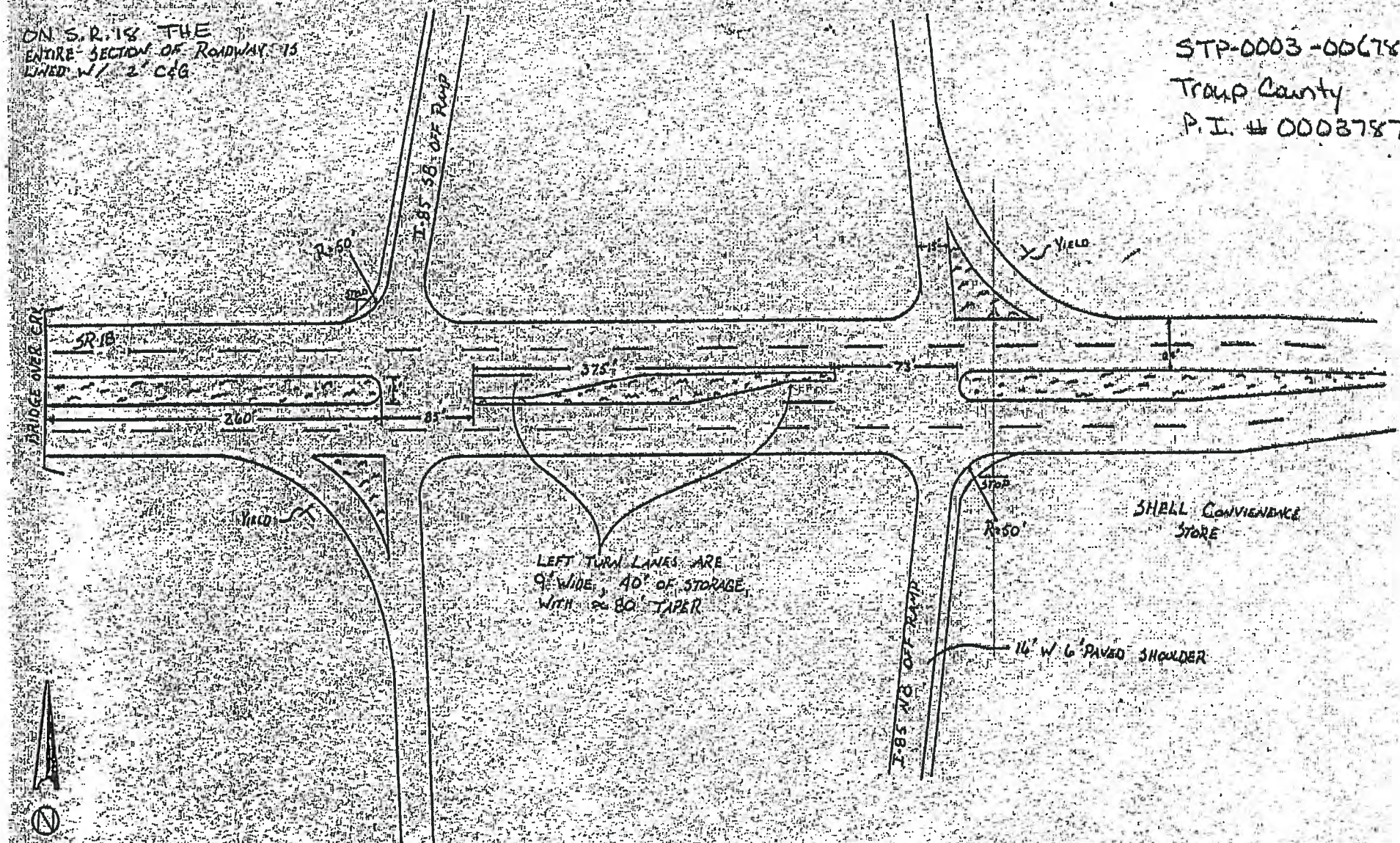
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE OF URBAN DESIGN

I-85 EXIT RAMP TYPICAL SECTION

5-1


SR 18 @ I-85 EXIT RAMPS
STP-0003-00(787)
PI # 0000787
TROUP COUNTY
SCALE 1" = 400'
N
SB EXIT RAMP
2+77.43
SOUTH BOUND EXIT
I-85
END SB EXIT RAMP
PI 20+63.79
SR-18
END NB EXIT RAMP
PI 22+78.50
SR-18
I-85
NTH BOUND EXIT

STP-0003-00(787)
Troup County
P.I. # 0003787



I-85 Exit Ramps @ S.R. 18 (Existing)

Not to Scale

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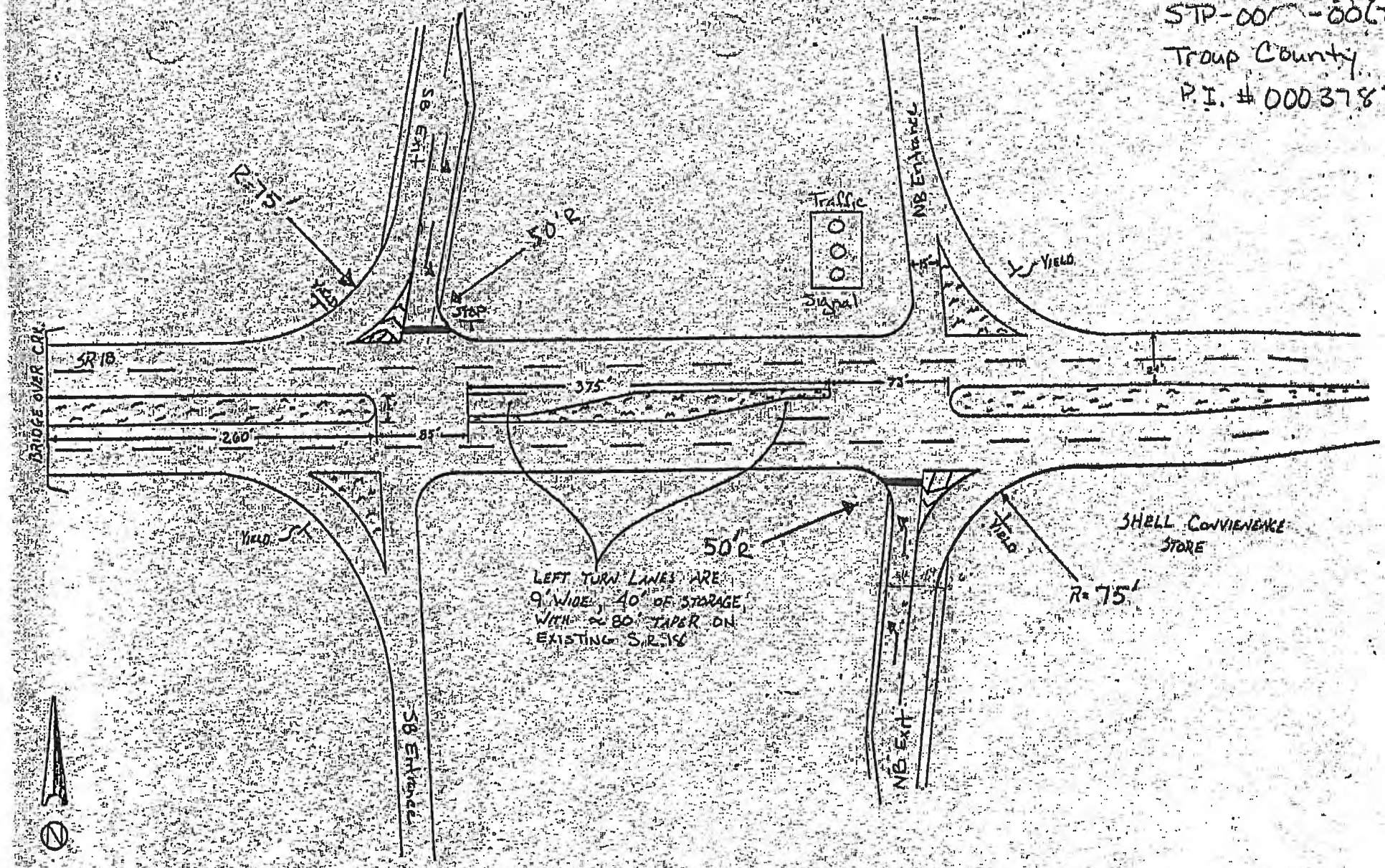
Troup County
P.I. # 0003787

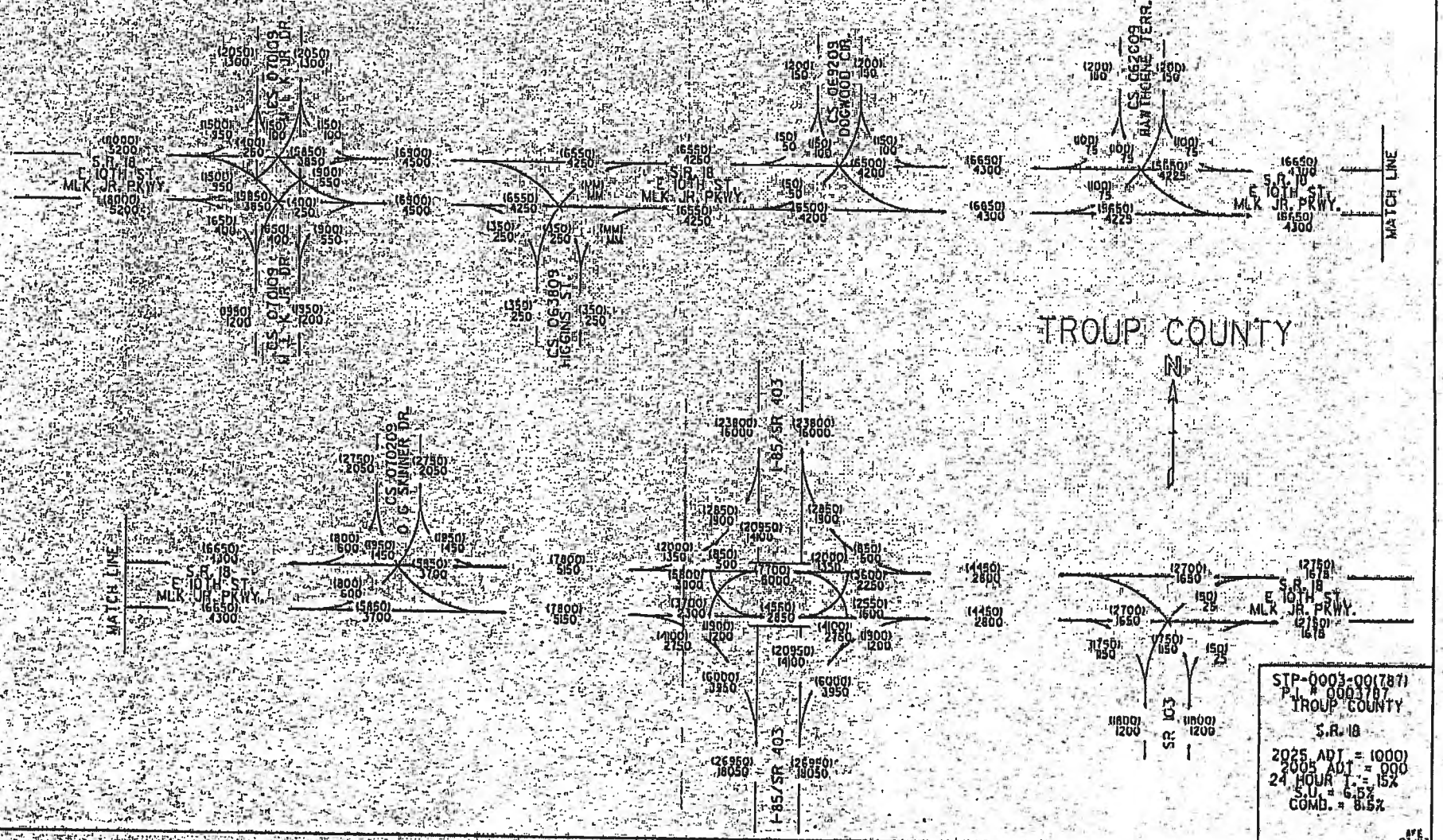


I-85 Exit Ramps @ S.R. 18 (Proposed)

Not to Scale

SHEET 1 OF 2

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENT/LOCATION



STP-0003-00(787)
P.I. # 0003787
TROUP COUNTY
S.R. 18
2025 ADT = (000)
2005 ADT = 000
24 HOUR T. = 15%
S.U. = 6.5%
COMB. = 8.5%

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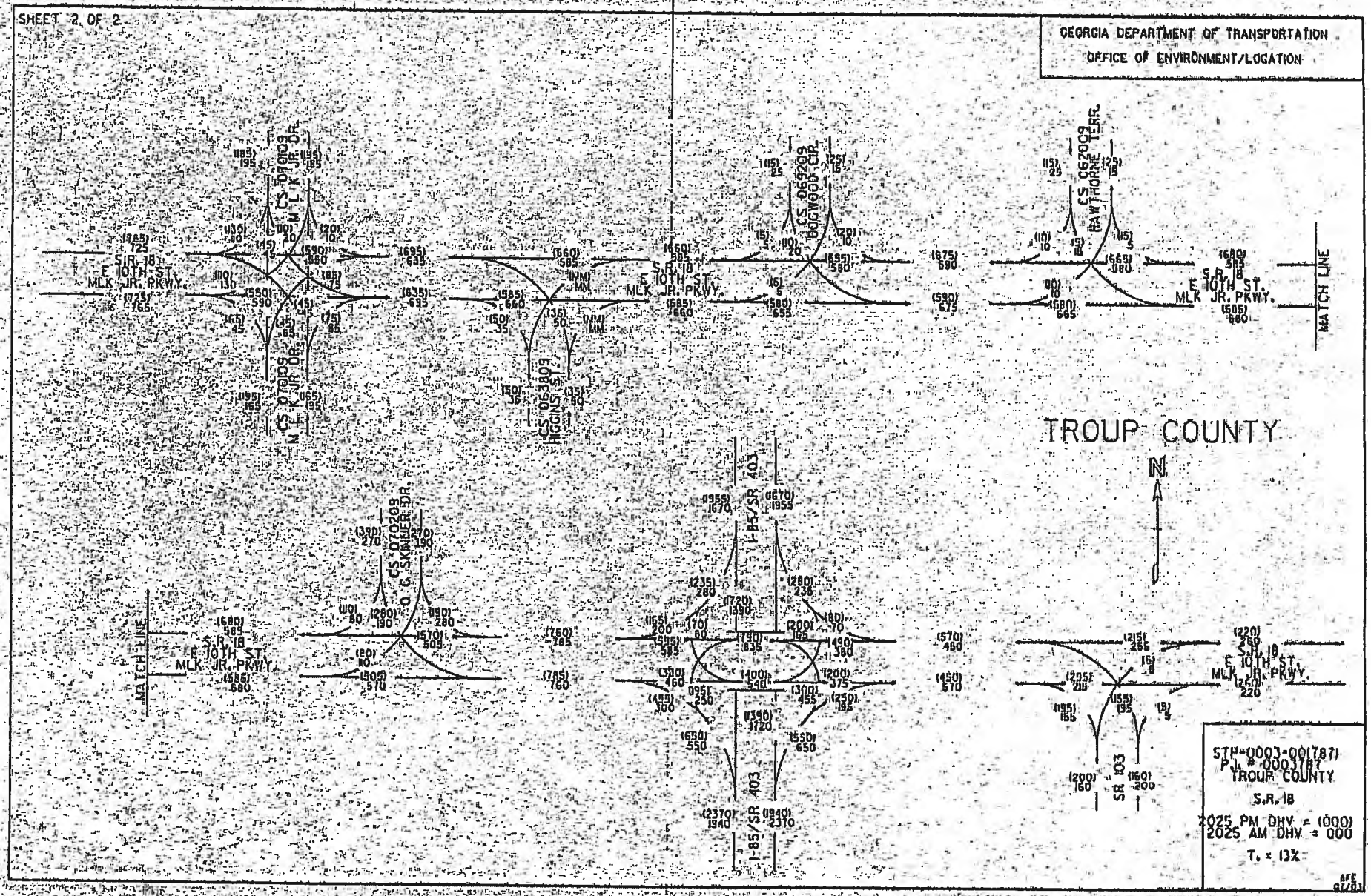
SHEET 2 OF 2

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENT/LOCATION



STP-0003-00(787)
P.I. # 0003787
TROUP COUNTY
S.R. 18
2025 PM DHV = (000)
2025 AM DHV = 000
T = 13%

AFE 01/03

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INTERSECTION CAPACITY ANALYSIS SUMMARY

STP-0003-00(787), Troup County

PI # 0003787

Approved Concept (Ramp Widening w/Stop Controlled NB & SB Intersections)

	Control Delay (s)		Approach Delay (s)		Level of Service		Approach Level of Service	
NB RAMPS @ SR 18	AM	PM	AM	PM	AM	PM	AM	PM
EB SR 18	9.1	9.4	na	na	A	A	na	na
WB SR 18	0	0	na	na	A	A	na	na
NB LT	296.8	68.1	211.1	41.8	F	F	F	E
NB RT	11.1	10.2	211.1	41.8	B	B	F	E
SB RAMPS @ SR 18	AM	PM	AM	PM	AM	PM	AM	PM
EB SR 18	0	0	na	na	A	A	na	na
WB SR 18	10.9	10.6	na	na	B	B	na	na
SB LT	42.9	33.5	20.9	18.5	E	D	C	C
SB RT	12.0	12.2	20.9	18.5	B	B	C	C

Ramp Widening w/Signalized NB Intersection & Stop Controlled SB Intersection

	Approach Delay		Intersection Delay		Approach Level of Service		Intersection Level of Service	
	AM	PM	AM	PM	AM	PM	AM	PM
NB RAMPS @ SR 18	na	na	41.1	24.5	na	na	D	C
EB SR 18	36.2	36.7	na	na	D	D	na	na
WB SR 18	47.1	21.0	na	na	D	C	na	na
NB EXIT	41.1	20.1	na	na	D	C	na	na
	Control Delay (s)		Approach Delay (s)		Level of Service		Approach Level of Service	
SB RAMPS @ SR 18	AM	PM	AM	PM	AM	PM	AM	PM
EB SR 18	0	0	na	na	A	A	na	na
WB SR 18	10.9	10.6	na	na	B	B	na	na
SB LT	32.1	22.2	16.1	13.3	D	C	C	B
SB RT	9.7	9.6	16.1	13.3	A	A	C	B

Ramp Widening w/Signalized NB Intersection & Signalized SB Intersection

	Approach Delay		Intersection Delay		Approach Level of Service		Intersection Level of Service	
	AM	PM	AM	PM	AM	PM	AM	PM
NB RAMPS @ SR 18	na	na	41.1	24.5	na	na	D	C
EB SR 18	36.2	36.7	na	na	D	D	na	na
WB SR 18	47.1	21.0	na	na	D	C	na	na
NB EXIT	41.1	20.1	na	na	D	C	na	na
	AM	PM	AM	PM	AM	PM	AM	PM
SB RAMPS @ SR 18	na	na	34.7	25.9	na	na	C	C
EB SR 18	39.6	17.8	na	na	D	B	na	na
WB SR 18	38.7	39.2	na	na	D	D	na	na
SB EXIT	9.1	8.3	na	na	A	A	na	na

S.R. 18 CRASH DATA 2000-2002

STP-0003-00(787), TROUP COUNTY

P.I. # 0003787

Accident No	Date	Time	County	Route Type	Route	Mileag	Intersecting Rt Type	Intersecting Rt	Ramp Section	Injuries	Fatalities	Collision	Location of Impact	Harmful Event	Light	Surface	DirVeh1	DirVeh2	MovrVeh1	MovrVeh2
01E90404	5/12/2000	4:00 PM	Troup	State Route	001800	1.45				0	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	N	E	12	9
14070559	9/19/2001	10:53 AM	Troup	State Route	001800	1.43				1	0	Not A Collision With A Motor Vehicle	On Shoulder	Guardrail Face	Daylight	Wet	W		1	
12000285	10/11/2001	2:46 PM	Troup	State Route	001800	1.47				0	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	N	E	5	5
13220134	8/24/2001	11:29 AM	Troup	State Route	001800	1.48				1	0	Not A Collision With A Motor Vehicle	Off Roadway	Culvert	Daylight	Dry	N		1	
23270346	10/1/2002	9:52 PM	Troup	State Route	001800	1.50				2	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	N	W	1	5

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*JTD*	Intersection	*I-85 SB Ramp @ SR 18*
Agency/Co.	*GHD Inc.*	Jurisdiction	*GDOT*
Date Performed	*5/6/2014*	Analysis Year	*2018*
Analysis Time Period	*AM*		

Project Description

East/West Street: *SR 18* | North/South Street: *I-85 SB Ramps*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*500*	*275*	*175*	*550*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*568*	*312*	*198*	*625*	*0*
Percent Heavy Vehicles	*0*	--	--	*6*	--	--
Median Type	*Raised curb*					
RT Channelized			*1*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*50*		*175*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.88*	*1.00*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*56*	*0*	*198*
Percent Heavy Vehicles	*0*	*0*	*0*	*6*	*0*	*6*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*				*L*		*R*
v (veh/h)		*198*				*56*		*198*
C (m) (veh/h)		*973*				*193*		*714*
v/c		*0.20*				*0.29*		*0.28*
95% queue length		*0.76*				*1.15*		*1.13*
Control Delay (s/veh)		*9.6*				*31.1*		*12.0*
LOS		*A*				*D*		*B*
Approach Delay (s/veh)	--	--				*16.2*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*JTD*	Intersection	*I-85 SB Ramp @ SR 18*
Agency/Co.	*GHD Inc.*	Jurisdiction	*GDOT*
Date Performed	*5/6/2014*	Analysis Year	*2018*
Analysis Time Period	*PM*		

Project Description

East/West Street: *SR 18* | North/South Street: *I-85 SB Ramps*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*275*	*500*	*225*	*350*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*312*	*568*	*255*	*397*	*0*
Percent Heavy Vehicles	*0*	--	--	*6*	--	--
Median Type	*Raised curb*					
RT Channelized			*1*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*75*		*200*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.88*	*1.00*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*85*	*0*	*227*
Percent Heavy Vehicles	*0*	*0*	*0*	*6*	*0*	*6*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*				*L*		*R*
v (veh/h)		*255*				*85*		*227*
C (m) (veh/h)		*1217*				*230*		*829*
v/c		*0.21*				*0.37*		*0.27*
95% queue length		*0.79*				*1.61*		*1.11*
Control Delay (s/veh)		*8.7*				*29.5*		*11.0*
LOS		*A*				*D*		*B*
Approach Delay (s/veh)	--	--				*16.0*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*JTD*	Intersection	*I-85 NB Ramp @ SR 18*
Agency/Co.	*GHD Inc.*	Jurisdiction	*GDOT*
Date Performed	*5/6/2014*	Analysis Year	*2018*
Analysis Time Period	*AM*		

Project Description

East/West Street: *SR 18*	North/South Street: *I-85 NB Ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*175*	*375*			*350*	*100*
Peak-Hour Factor, PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*198*	*426*	*0*	*0*	*397*	*113*
Percent Heavy Vehicles	*6*	--	--	*6*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*1*
Lanes	*1*	*2*	*0*	*0*	*2*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*375*		*175*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*0.88*	*1.00*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*426*	*0*	*198*	*0*	*0*	*0*
Percent Heavy Vehicles	*6*	*0*	*6*	*6*	*0*	*6*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*		*L*		*R*			
v (veh/h)	*198*		*426*		*198*			
C (m) (veh/h)	*1130*		*260*		*813*			
v/c	*0.18*		*1.64*		*0.24*			
95% queue length	*0.63*		*26.73*		*0.95*			
Control Delay (s/veh)	*8.9*		*338.1*		*10.8*			
LOS	*A*		*F*		*B*			
Approach Delay (s/veh)	--	--	*234.3*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*JTD*	Intersection	*I-85 NB Ramp @ SR 18*
Agency/Co.	*GHD Inc.*	Jurisdiction	*GDOT*
Date Performed	*5/6/2014*	Analysis Year	*2018*
Analysis Time Period	*PM*		

Project Description

East/West Street: *SR 18*	North/South Street: *I-85 NB Ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*175*	*175*			*400*	*50*
Peak-Hour Factor, PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*198*	*198*	*0*	*0*	*454*	*56*
Percent Heavy Vehicles	*6*	--	--	*6*	--	--
Median Type	*Raised curb*					
RT Channelized			*0*			*1*
Lanes	*1*	*2*	*0*	*0*	*2*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*175*		*275*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*0.88*	*1.00*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*198*	*0*	*312*	*0*	*0*	*0*
Percent Heavy Vehicles	*6*	*0*	*6*	*6*	*0*	*6*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*		*L*		*R*			
v (veh/h)	*198*		*198*		*312*			
C (m) (veh/h)	*1075*		*326*		*943*			
v/c	*0.18*		*0.61*		*0.33*			
95% queue length	*0.67*		*3.76*		*1.46*			
Control Delay (s/veh)	*9.1*		*31.7*		*10.7*			
LOS	*A*		*D*		*B*			
Approach Delay (s/veh)	--	--	*18.9*					
Approach LOS	--	--	*C*					

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Appendix B – Roundabout evaluation

FILE COPY

Department of Transpc
State of Georgia
Thomaston District Office

Roundabout Evaluation

January 12, 2011

LOCATION: State Route 18 @ I-85 NB and SB Ramps, M.P. 1.39 and 1.48

CITY/COUNTY: Troup County

REQUESTED BY: State Traffic Engineer

REASON FOR INVESTIGATION: To determine the need for a roundabout.

F I N D I N G S

This interchange is located just within the east city limits of West Point. This is the first interchange entering Georgia from Alabama and the chosen route for most northbound commuters to access West Point and the Kia manufacturing plant. Past studies have concluded that signals are not warranted at the ramps due to the mainline volumes. The side street (ramp) volumes surpassed the necessary volumes for all volume warrants and major queues were observed. The ramps have right and left turn lanes at the intersections and State Route 18 is multilane through both intersections.

A multi-way stop evaluation was not conducted at the interchange due to State Route 18 being a multilane facility.

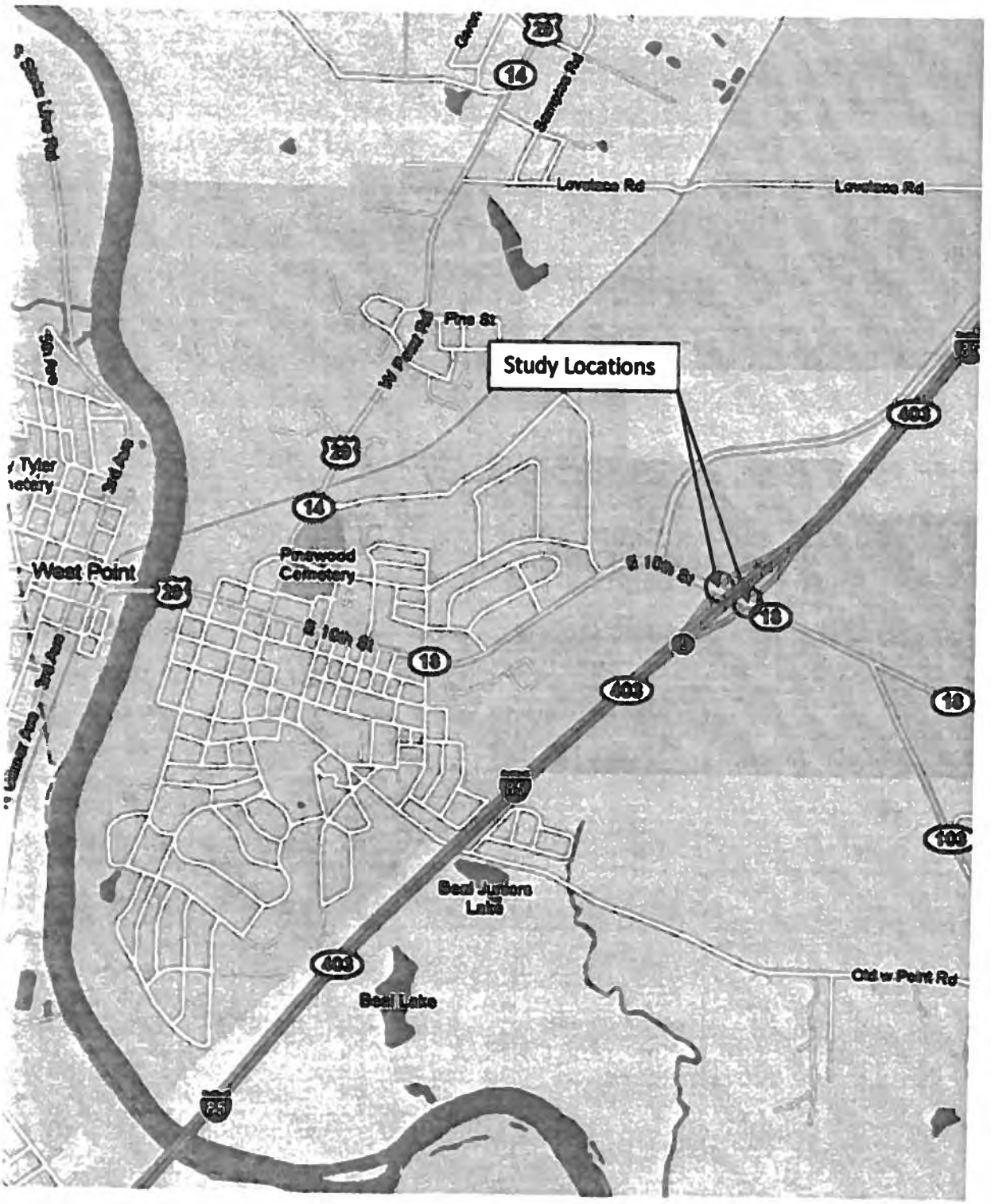
Recommendations:
Due to the observed queues and operation of these intersections, the construction of roundabouts at both ramps would be beneficial. It is recommended that a project to construct roundabouts at both ramps be initiated.

Prepared by:

Scott Pinkston
Traffic Operations Manager

1-14-11
Date

I-85 @ State Route 18 Ramps (Troup County)



Appendix C – Indication of roundabout support

file copy

RECEIVED
SEP 07 2011
BY: MC

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INDICATION OF ROUNDABOUT SUPPORT

To the Georgia Department of Transportation:

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

Location

The City of West Point in Troup County supports the consideration of a roundabout at the location specified below.

Local Street Names: Hwy 18 at I 85 Exit 2

State/County Route Numbers: _____ at _____

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 (if needed)
- Any maintenance costs associated with the landscaping (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 29 day of August 2011

Attest: [signature]
Clerk

By: [signature]

Title: Mayor

Vance C. Smith, Jr., Commissioner

GEORGIA DEPARTMENT OF TRANSPORTATION
One Georgia Center, 600 West Peachtree Street, NW
Atlanta, Georgia 30308
Telephone: (404) 631-1000

August 8, 2011

RECEIVED
SEP 06 2011
BY

Mr. Ed Moon
City Manager
City of West Point
P.O. Box 487
730 First Avenue
West Point, Georgia 31833-0487

RE State Route 18 at I-85 Ramps: Roundabout Intersection Improvement-Lighting requirements

Dear Mr. Moon:

The intersection of State Route 18 and the I-85 entrance and exit ramps is entering the concept planning stage. These intersections have roundabout designs for traffic control proposed as improvements. For this project, lighting is both a necessary component and a requirement. Lighting requirements for this project are based on the Illuminating Engineering Society of North America (IESNA) and American Association of State Highway and Transportation Officials (AASHTO).

As a part of this project, the Department is requesting a written commitment from the City of West Point. This commitment should state that the city is willing to share in the costs of the lighting by funding the energy operation and maintenance of the installed system. The Department's responsibility shall be the design and construction of the project, including all materials. Currently, the Department estimates the monthly energy costs to be approximately $200.00 per month.

If the City of West Point agrees to responsibility for energy and maintenance costs for the lighting installed as part of this project, please sign the attached agreement form and return to our office. If the Department does not receive a written response, it will be assumed that the city cannot fund or participate in the lighting and maintenance costs. In the event the city does not commit to funding the Department may elect to change the scope of the project and or suspend further development of the Project Concept Report.

If you have any questions or would like to discuss lighting requirements for this project, contact Scott MacLean at 404-631-1551, our office at 706-646-6676 or write or office at 115 Transportation Boulevard, Thomaston, Georgia 30286.

Sincerely,

Mike England
District Traffic Engineer

ME:
attachment
cc: Scott MacLean, Office of Design Policy and Support
Scott Zehngraff, Atlanta TMC

Appendix D – Crash analysis & CMF

AccidentNo	AccidentNumber	Date	Time	County	RouteType	Route	IntersectingRoute	Distance From	Injuries	Fatalities	MannerOfCollision	LocationOfImpact	FirstHarmfulEvent	Light	Surface	DirVeh1	MnvrVeh1	LatDecimal	LongDecimal	IntersectRouteType	DirVeh2	MnvrVeh2
252827	252827	5/1/2009	18:35:00	TROUP	Interstate	I 85	HWY 18	0	2	0	Not A Collision with Motor Vehicle	Off Roadway	Over Turn	Daylight	Dry	Northeast	Straight	33.165595	-84.867062			
343818	343818	8/19/2009	11:39:00	TROUP	Interstate	I 85	SR 18	0	0	0	Rear End	Ramp	Motor Vehicle In Motion	Daylight	Dry	Northeast	Turning Right	32.87816	-85.151344	State Route	Northeast	Turning Right
391622	391622	11/29/2009	15:47:00	TROUP	Interstate	I 185	I 185	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	-1	-1	Interstate	North	Straight
1767223	1767223	11/11/2009	22:56:00	TROUP	Interstate	I 85	HWY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Dark-Lighted	Wet	Northeast	Straight	-1	-1		Northeast	Turning Right
3388319	3388319	11/29/2009	16:35:00	TROUP	Interstate	I 85	I 185	0	6	1	Rear End	On Roadway	Other Object (Not Fixed)	Daylight	Dry	North	Straight	32.98882	-85.02958	Interstate	North	Stopped
3390182	3390182	2/12/2010	23:00:00	TROUP		185	85	0	0	0	Rear End	On Shoulder	Other - Fixed Object	Daylight	Wet	North	Negotiating A Curve	0	0			
3408938	3408938	10/27/2009	13:02:00	TROUP	Interstate	I 85	I 185	0	2	0	Head On	On Shoulder	Impact Attenuate	Daylight	Wet	North	Straight	32.98784	-85.00057	Interstate		
3480044	3480044	6/19/2010	8:00:00	TROUP	State Route	SR 18	I 85	0	0	0	Not A Collision with Motor Vehicle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	32.87816	-85.151344	Interstate	East	Straight
3521844	3521844	5/26/2010	6:23:00	TROUP		HWY 18	I 85	0	0	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	32.869484	-85.035141	Interstate	East	Straight
3547380	3547380	11/12/2010	5:50:00	TROUP		I185 ON FROM I85 RP	I 85	0	2	0	Sideswipe-Same Direction	On Roadway	Other Object (Not Fixed)	Dark-Lighted	Dry	South	Changing Lanes	33.07401	-84.92702	Interstate	South	Straight
3596964	3596964	6/1/2010	20:05:00	TROUP	State Route	SR 18	I 85	0	1	0	Angle	On Roadway	Other Object (Not Fixed)	Daylight	Dry	South	Straight	32.87672	-85.1611	Interstate	West	Straight
3687920	3687920	1/28/2009	7:56:00	TROUP		HIGHWAY 18	I 85	0	2	0	Sideswipe-Same Direction	On Roadway	Motor Vehicle In Motion	Daylight	Wet	West	Turning Left	-1	-1	Interstate	West	Straight
3687924	3687924	1/28/2009	8:12:00	TROUP	Interstate	I 85	HIGHWAY 18	0	2	0	Rear End	Off Roadway	Motor Vehicle In Motion	Daylight	Wet	North	Straight	-1	-1		North	Stopped
3687940	3687940	2/25/2009	7:40:00	TROUP	Interstate	I 85	HIGHWAY 18	0	1	0	Not A Collision with Motor Vehicle		Other Non-Collision	Daylight	Dry	North	Straight	-1	-1			
3687981	3687981	5/1/2009	18:35:00	TROUP	Interstate	I 85	HIGHWAY 18	0	1	0	Not A Collision with Motor Vehicle	Off Roadway	Over Turn	Daylight	Dry	South	Straight	-1	-1			
3725910	3725910	4/28/2011	8:15:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	32.8772	-85.174019		North	Stopped
3759201	3759201	5/11/2011	6:06:00	TROUP		HIGHWAY 18	I 85	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Dark-Lighted	Dry	East	Straight	32.869484	-85.035141	Interstate	East	Turning Left
3765279	3765279	5/10/2011	8:15:00	TROUP		HIGHWAY 18	I 85	0	0	0	Sideswipe-Same Direction	On Roadway	Motor Vehicle In Motion	Daylight	Dry	East	Turning Left	32.869484	-85.035141	Interstate	East	Straight
3772129	3772129	5/19/2011	8:09:00	TROUP		HIGHWAY 18	I 85	300	0	0	Sideswipe-Same Direction	On Roadway	Motor Vehicle In Motion	Daylight	Dry	East	Turning Left	32.869484	-85.035141	Interstate	East	Straight
3788528	3788528	5/28/2011	4:59:00	TROUP	Interstate	I 185	I 185	0	0	0	Rear End	On Roadway	Other Object (Not Fixed)	Dark-Not Lighted	Dry	North	Straight	32.96126	-84.95399	Interstate	North	Straight
3801219	3801219	6/16/2011	8:50:00	TROUP	Interstate	I 85	HWY 18	528	0	0	Angle	On Shoulder	Guard Rail Face	Daylight	Dry	South	Straight	32.8772	-85.174019			
3806983	3806983	6/30/2011	23:25:00	TROUP	Interstate	I 85	I 185	0	0	0	Not A Collision with Motor Vehicle	On Roadway	Other Object (Not Fixed)	Dark-Not Lighted	Dry	South	Straight	33.0579	-84.95109	Interstate	South	Straight
3813001	3813001	7/8/2011	14:40:00	TROUP		HIGHWAY 18	I 85	75	0	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Turning Left	32.869484	-85.035141	Interstate	East	Straight
3815069	3815069	7/14/2011	7:05:00	TROUP	Interstate	I 85	HIGHWAY 18	2640	1	0	Not A Collision with Motor Vehicle	On Shoulder	Bridge/Pier Abutment	Daylight	Wet	South	Straight	32.8772	-85.174019			
3815083	3815083	7/12/2011	6:48:00	TROUP		HIGHWAY 18	I 85	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Dawn	Dry	West	Straight	32.869484	-85.035141	Interstate	West	Stopped
3829028	3829028	8/2/2011	0:40:00	TROUP	Interstate	I 85	HWY 18	500	1	0	Not A Collision with Motor Vehicle	Median	Over Turn	Dark-Not Lighted	Dry	South	Straight	32.8772	-85.174019			
3832854	3832854	8/10/2011	6:30:00	TROUP		HIGHWAY 18	I 85	231	0	0	Rear End	On Roadway	Motor Vehicle In Motion - In Other Roadway	Dusk	Dry	East	Making U-turn	32.8772	-85.174019	Interstate	East	Straight
3842900	3842900	8/17/2011	7:10:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	Ramp	Motor Vehicle In Motion	Daylight	Dry	South	Straight	32.8772	-85.174019		South	Straight
3907230	3907230	10/26/2011	8:47:00	TROUP		HIGHWAY 18	I 85	1320	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	East	Straight	32.869484	-85.035141	Interstate	East	Straight
3928832	3928832	11/22/2011	10:55:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Turning Right	32.8772	-85.174019		North	Stopped
3930775	3930775	11/23/2011	0:00:00	TROUP	Interstate	I 85	HIGHWAY 18	0	1	0	Not A Collision with Motor Vehicle	On Roadway	Guard Rail End	Daylight	Dry	North	Changing Lanes	32.8772	-85.174019		North	Straight
3933680	3933680	12/2/2011	3:52:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Dark-Lighted	Dry	North	Backing	32.8772	-85.174019		None	Stopped
3984095	3984095	1/25/2012	14:40:00	TROUP	Interstate	I 85	HIGHWAY 18	5280	1	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	32.877803	-85.151582		North	Straight
4018876	4018876	2/28/2012	7:24:00	TROUP	Interstate	I 85	HWY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	South	Turning Right	32.854351	-85.17865		South	Stopped
4022409	4022409	3/6/2012	16:30:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	Ramp	Motor Vehicle In Motion	Daylight	Dry	North	Turning Right	32.877949	-85.151727		North	Stopped
4057035	4057035	4/14/2012	14:32:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Turning Right	32.877949	-85.151727		North	Turning Right
4109981	4109981	5/26/2012	0:01:00	TROUP		HWY 18	I 85	0	1	0	Angle	On Roadway	Motor Vehicle In Motion	Dark-Lighted	Dry	South	Straight	32.869481	-85.035141	Interstate	East	Straight
4133145	4133145	6/29/2012	15:25:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	Ramp	Motor Vehicle In Motion	Daylight	Dry	South	Turning Right	32.877949	-85.151727		South	Turning Right
4142747	4142747	6/29/2012	14:55:00	TROUP	Interstate	I 85	HIGHWAY 18	5280	1	0	Angle	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Changing Lanes	32.877949	-85.151727		North	Straight
4165142	4165142	8/1/2012	6:07:00	TROUP		HIGHWAY 18	I 85	0	2	0						South	Turning Left	32.987	-84.538176	Interstate	North	Straight
4172360	4172360	8/8/2012	19:00:00	TROUP	Interstate	I 85	HIGHWAY 18	1000	0	0	Not A Collision with Motor Vehicle	On Roadway	Guard Rail Face	Daylight	Dry	North	Straight	32.877949	-85.151727			
4172361	4172361	8/11/2012	6:50:00	TROUP		HWY 18	I 85	-1	0	0	Sideswipe-Same Direction	On Roadway	Motor Vehicle In Motion	Dawn	Dry	West	Changing Lanes	32.987	-84.538176	Interstate	West	Straight
4207310	4207310	9/17/2012	16:30:00	TROUP		HIGHWAY 18	I 85	100	1	0	Rear End	On Roadway	Motor Vehicle In Motion	Dark-Lighted	Wet	West	Straight	33.06478	-84.222084	Interstate	West	Stopped
4222862	4222862	10/3/2012	11:00:00	TROUP	Interstate	I 85	HIGHWAY 18	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	North	Straight	33.046019	-84.966042		North	Stopped
4224204	4224204	10/1/2012	10:50:00	TROUP	Interstate	I 85	I 185	0	0	0	Not A Collision with Motor Vehicle	On Shoulder	Median Barrier	Daylight	Wet	North	Negotiating A Curve	33.06697	-84.93651	Interstate		
4233898	4233898	10/19/2012	18:58:00	TROUP		HIGHWAY 18	I 85	500	1	0	Angle	On Roadway	Motor Vehicle In Motion	Dawn	Dry	North	Entering/Leaving Driveway	32.869481	-85.035141	Interstate	East	Straight
4233899	4233899	10/21/2012	13:47:00	TROUP		HIGHWAY 18	I 85	0	0	0	Rear End	On Roadway	Motor Vehicle In Motion	Daylight	Dry	East	Straight	32.869481	-85.035141	Interstate	West	Turning Left
4352588	4352588	2/11/2013	16:09:00	TROUP	Interstate	I 185	I 85	0	2	0		On Shoulder	Median Barrier	Daylight	Wet	North	Straight	33.06606	-84.93793	Interstate		
4357531	4357531	2/10/2013	19:00:00	TROUP	Interstate	I 185	I 85	0	0	0	Not A Collision with Motor Vehicle	On Shoulder	Median Barrier	Dark-Not Lighted	Wet	North	Straight	33.06732	-84.93597	Interstate		
4424984	4424984	4/25/2013	20:54:00	TROUP	Interstate	I 85	I 185	0	0	0	Not A Collision with Motor Vehicle	On Roadway	Animal	Dark-Not Lighted	Dry	North	Negotiating A Curve	33.04905	-84.94978	Interstate		
4495915	4495915	7/3/2013	11:53:00	TROUP	Interstate	I 85	I 185	0	0	0	Not A Collision with Motor Vehicle	Median	Ditch	Daylight	Wet	North	Changing Lanes	33.06712	-84.93664	Interstate		
4503537	4503537	7/13/2013	16:55:00	TROUP	Interstate	I 185	I 85	0	0	0	Not A Collision with Motor Vehicle	On Roadway	Median Barrier	Daylight	Wet	North	Straight	33.05629	-84.94972	Interstate		
4540965	4540965	8/14/2013	15:49:00	TROUP	Interstate	I 185	I 85	0	1	0		On Shoulder	Median Barrier	Daylight	Wet	North	Straight	33.06671	-84.93688	Interstate		
4632711	4632711	10/30/2013	23:10:00	TROUP	Interstate	I 185	I 85	-1	0	0	Not A Collision with Motor Vehicle	On Shoulder	Embankment	Dark-Not Lighted	Dry	North	Negotiating A Curve	33.06047	-84.94358	Interstate		
4653199	4653199	11/22/2013	18:20:00	TROUP	Interstate	I 185	FROM I85	0	0	0	Not A Collision with Motor Vehicle	On Roadway	Animal	Dark-Not Lighted	Dry	South	Straight	33.04829	-84.96299			
4679988	4679988	12/14/2013	12:56:00	TROUP	Interstate	I 85	I 185	0	0	0	Angle	Median	Ditch	Daylight	Wet	North	Negotiating A Curve	33.07002	-84.93217	Interstate		

Rows in RED were removed from the crash analysis
Rows in GREEN were included in the crash analysis

Vehicle Analysis 1																				
Accident No	**Date**	**Time**	**County**	**Route Type**	**Route**	**Milelog**	**Intersecting Rt Type**	**Intersecting Rt**	**Ramp Section**	**Injuries**	**Fatalities**	**Collision**	**Location of Impact**	**Harmful Event**	**Light**	**Surface**	**DirVeh1**	**DirVeh2**	**MnvrVeh1**	**MnvrVeh2**
'91400062	3/3/2009	3:55 PM	Troup	State Route	'001800	1.05	3	'070209		0	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Dry	S	S	Turning Right	Turning Right
'93230395	7/9/2009	6:15 PM	Troup	State Route	'001800	1.45		'	3	0	0	Sideswipe - Same Direction	On Roadway	Motor Vehicle in Motion	Daylight	Dry	E	N	Straight	Changing Lanes
'93230398	7/4/2009	7:29 PM	Troup	State Route	'001800	1.46		'	1	0	0	Sideswipe - Same Direction	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	W	Changing Lanes	Straight
'92690153	6/8/2009	2:39 PM	Troup	State Route	'001800	1.5		'		1	0	Sideswipe - Same Direction	On Roadway	Motor Vehicle in Motion	Daylight	Dry	E	E	Changing Lanes	Straight
'93710308	8/18/2009	4:09 PM	Troup	State Route	'001800	1.86	1	'010300		0	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Dry	N	N	Straight	Turning Left

Rows in RED were removed from the crash analysis
Rows in GREEN were included in the crash analysis

CMF / CRF Details

CMF ID: 4930

Conversion of two-way stop-controlled intersection into single- or multi-lane roundabout

Description: Conversion of two-way stop-controlled intersection into single- or multi-lane roundabout.

Prior Condition: The intersection was operating under TWSC control.

Category: Intersection geometry

Study: *Evaluation of Roundabout Safety*, Qin et al., 2013

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.751
Adjusted Standard Error:	
Unadjusted Standard Error:	0.105

Crash Reduction Factor (CRF)

Value:	24.89 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	
Unadjusted Standard Error:	10.5

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not specified
Number of Lanes:	2,4
Road Division Type:	All
Speed Limit:	
Area Type:	All
Traffic Volume:	
Time of Day:	All

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	3-leg,4-leg
Traffic Control:	Stop-controlled
Major Road Traffic Volume:	4100 (total entering) to 48100 (total entering) Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	

Development Details	
Date Range of Data Used:	1994 to 2010
Municipality:	Statewide
State:	WI
Country:	USA
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	Crashes
Before Sample Size Used:	122 Crashes
After Sample Size Used:	93 Crashes

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	08-01-2013
Comments:	- Study included three-year before and after crash data for each site. - Reported traffic volume is total entering volume.

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in

CMF / CRF Details

CMF ID: 4931

Conversion of two-way stop-controlled intersection into single- or multi-lane roundabout

Description: Conversion of two-way stop-controlled intersection into single- or multi-lane roundabout.

Prior Condition: The intersection was operating under TWSC control.

Category: Intersection geometry

Study: *Evaluation of Roundabout Safety*, Qin et al., 2013

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.65
Adjusted Standard Error:	
Unadjusted Standard Error:	0.104

Crash Reduction Factor (CRF)

Value:	35.03 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	
Unadjusted Standard Error:	10.4

Applicability

Crash Type:	All
Crash Severity:	Fatal,Serious injury,Minor injury
Roadway Types:	Not specified
Number of Lanes:	2,4
Road Division Type:	All
Speed Limit:	
Area Type:	All
Traffic Volume:	
Time of Day:	All

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	3-leg,4-leg
Traffic Control:	Stop-controlled
Major Road Traffic Volume:	4100 (total entering) to 48100 (total entering) Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	

Development Details	
Date Range of Data Used:	1994 to 2010
Municipality:	Statewide
State:	WI
Country:	USA
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	Crashes
Before Sample Size Used:	48 Crashes
After Sample Size Used:	18 Crashes

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	08-01-2013
Comments:	- Study included three-year before and after crash data for each site. - Reported traffic volume is total entering volume.

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

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Appendix E – Traffic data

Department of Transportation
State of Georgia

INTERDEPARTMENT CORRESPONDENCE

FILE Troup County
P.I. # 0009975

OFFICE Planning

DATE April 24, 2013

FROM Cynthia L. VanDyke, State Transportation Planning Administrator

TO Genetha Rice-Singleton, State Program Delivery Engineer
Attention: Derrick Cameron

SUBJECT **Design** Traffic for SR 18 at I-85

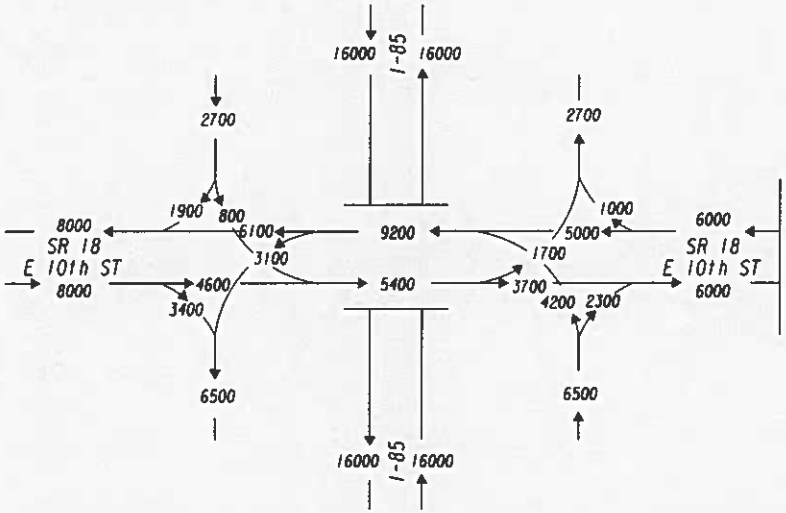
The Design Traffic for the above project is attached in pdf and dgn format.

If you have any questions concerning this information please contact Dan Funk at (404) 631-1959.

CLV/drf

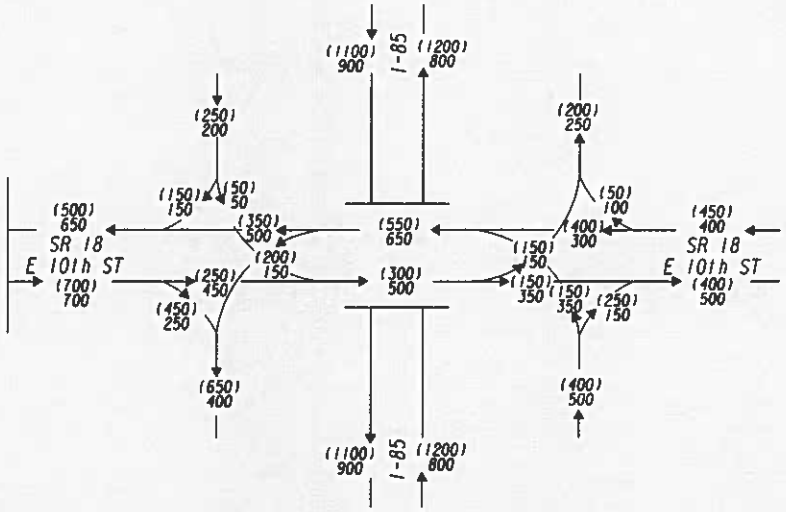
STATE GA | PROJECT NUMBER | SHEET NO. 1 | TOTAL SHEETS 1

2013 ADT



2013 DHV
(000) = PM DHV
000 = AM DHV

TROUP COUNTY



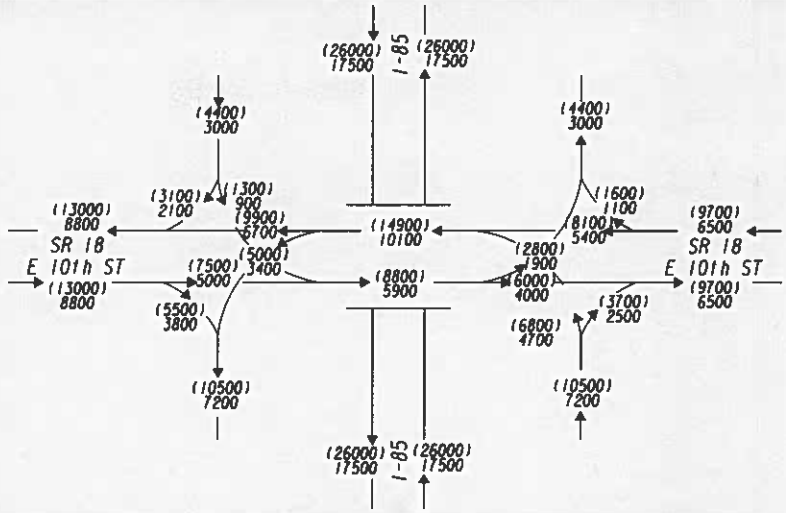
PI# 0009975 TROUP COUNTY I-85 @ SR 18	2013 ADT/ DHV	24 HOUR T= 10% SU= 4% COMB= 6%	T= 6% SU= 3% COMB= 3%	REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

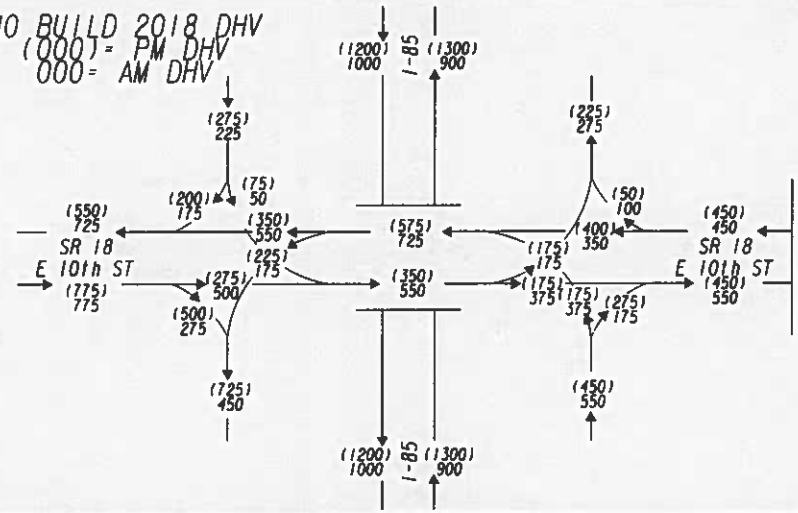
DRAWING No. 10-1

NO BUILD
2018/ 2038 ADT

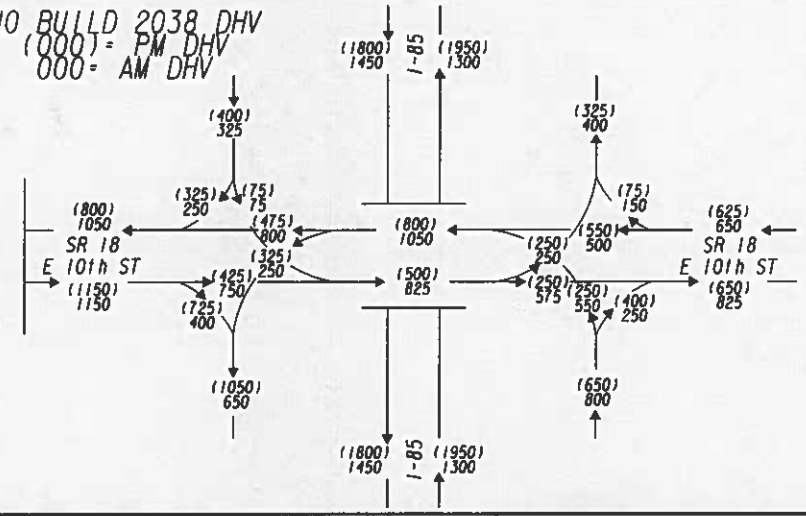
TROUP COUNTY



NO BUILD 2018 DHV
(000)= PM DHV
000= AM DHV



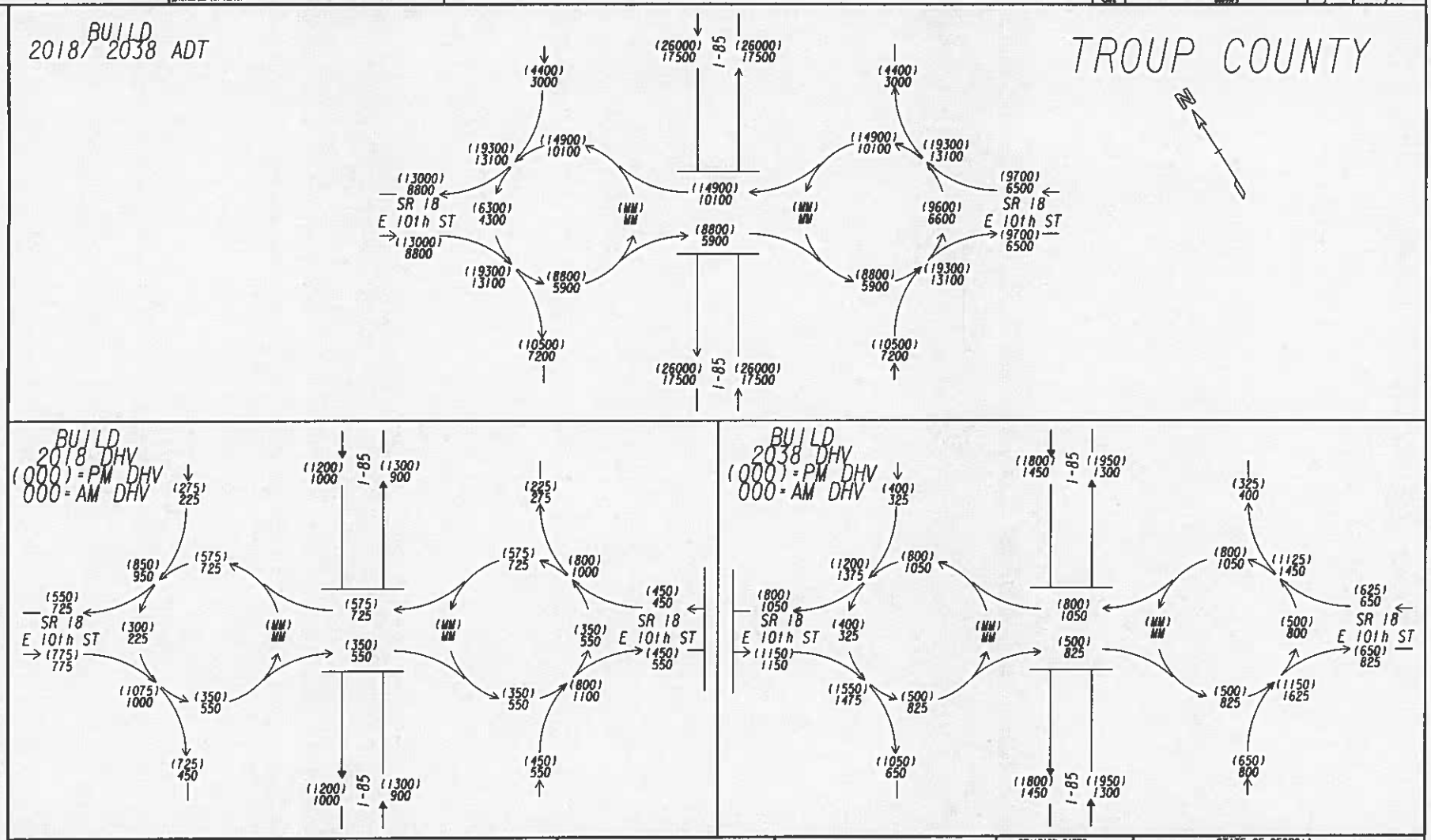
NO BUILD 2038 DHV
(000)= PM DHV
000= AM DHV



PI# 0009975 TROUP COUNTY I-85 @ SR 18	NO BUILD 2018/ 2038 ADT 2018/ 2038 DHV	24 HOUR T= 10% SU= 4% COMB= 6%	T= 6% SU= 3% COMB= 3%	REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No. 10-2



PI# 0009975 TROUP COUNTY I-85 @ SR 18	BUILD 2018/ 2038 ADT 2018/ 2038 DHV	24 HOUR T= 10% SU= 4% COMB= 6%	T= 6% SU= 3% COMB= 3%	REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

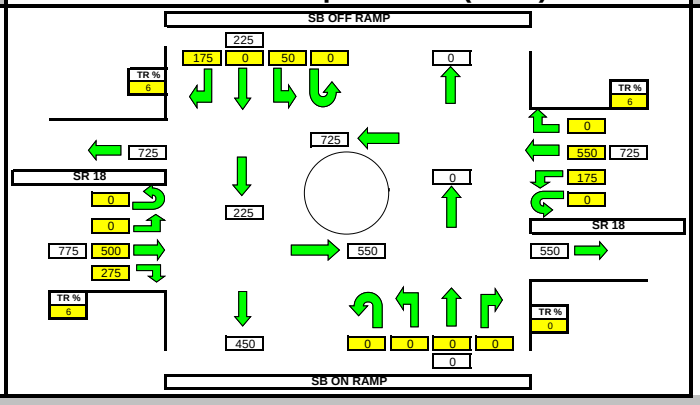
DRAWING No. 10-3

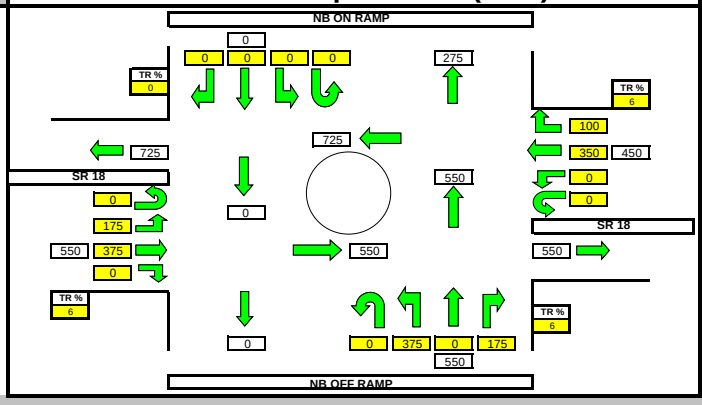
Appendix F – ARCADY & GDOT roundabout analysis

I -85 SB Ramp & SR 18 (West)

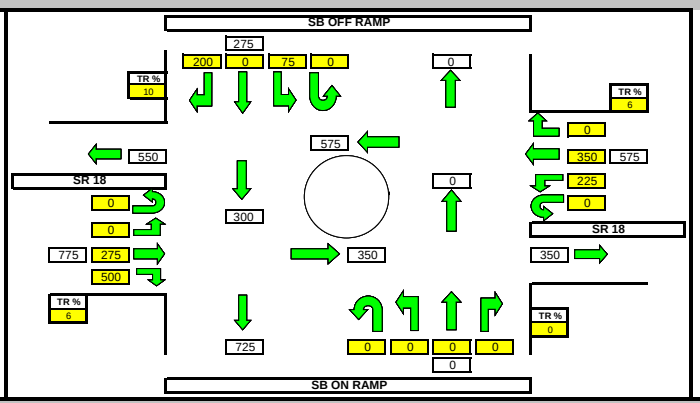
I -85 NB Ramp & SR 18 (East)

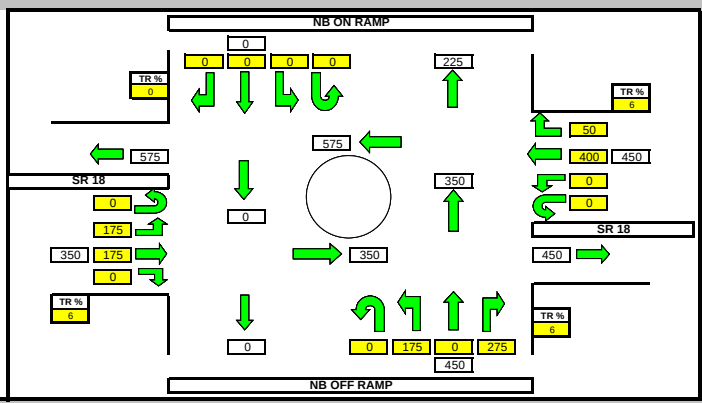
2018 AM PEAK HOUR TRAFFIC





2018 PM PEAK HOUR TRAFFIC





CONCEPTUAL LANE CONFIGURATION

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.06	175	0	50	0
SR 18	1.06	275	500	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	550	175	0

PM Peak Period Rodel Inputs

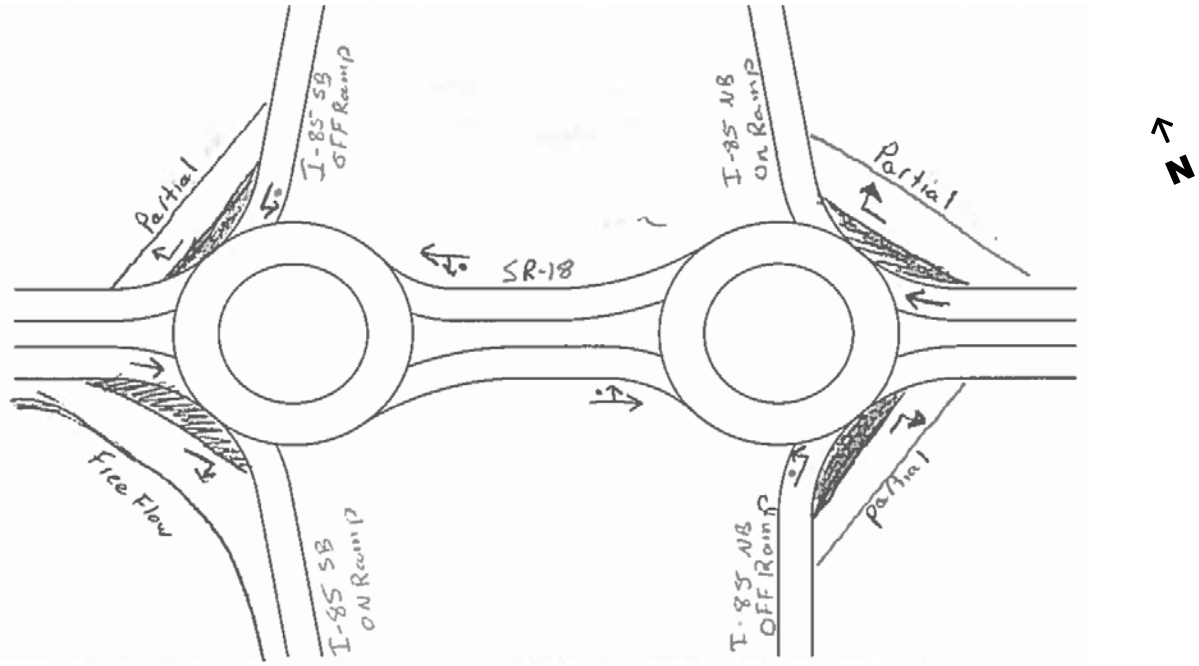
Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.10	200	0	75	0
SR 18	1.06	500	275	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	350	225	0

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	375	175	0
NB OFF RAMP	1.06	175	0	375	0
SR 18	1.06	100	350	0	0

PM Peak Period Rodel Inputs

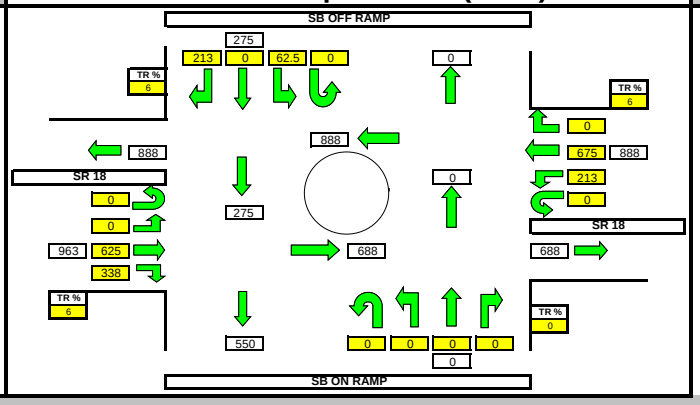
Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	175	175	0
NB OFF RAMP	1.06	275	0	175	0
SR 18	1.06	50	400	0	0



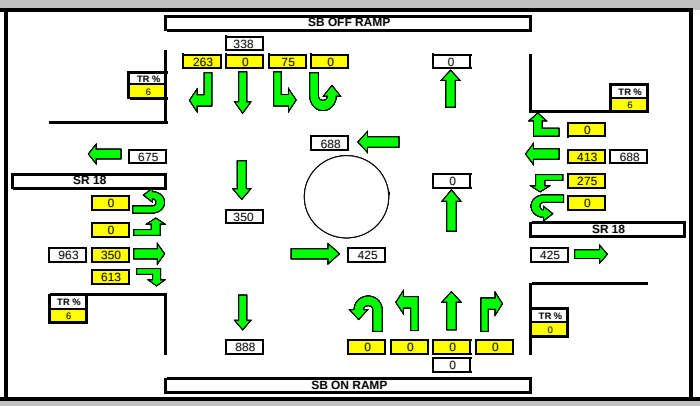
I-85 & SR 18 Interchange
Troup County, GA
INTERIM LANE CONFIGURATION

I -85 SB Ramp & SR 18 (West)

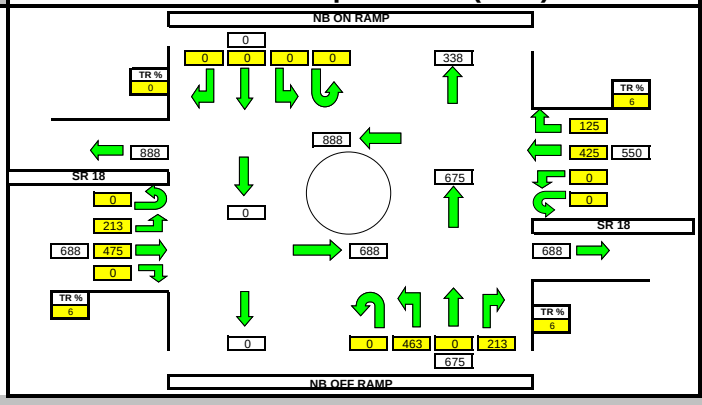
2028 AM PEAK HOUR TRAFFIC

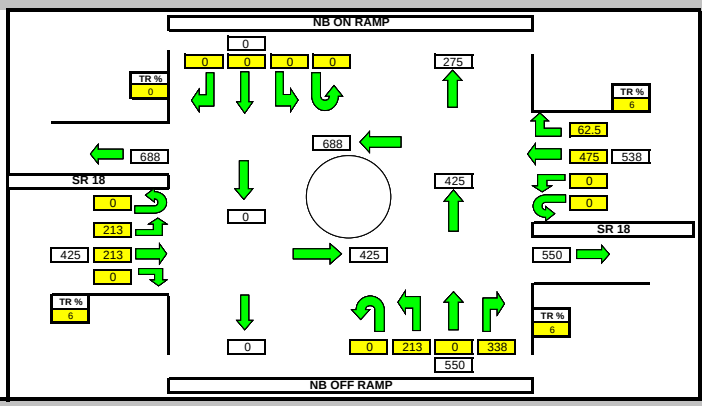


2028 PM PEAK HOUR TRAFFIC



I -85 NB Ramp & SR 18 (East)





CONCEPTUAL LANE CONFIGURATION

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.06	212.5	0	62.5	0
SR 18	1.06	337.5	625	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	675	212.5	0

PM Peak Period Rodel Inputs

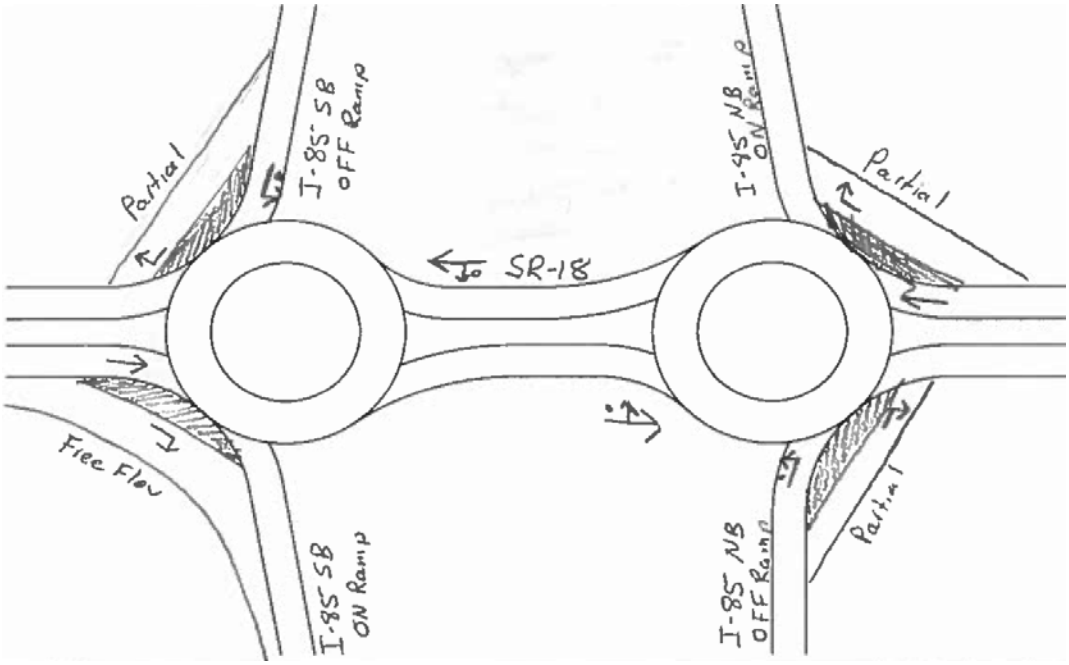
Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.06	262.5	0	75	0
SR 18	1.06	612.5	350	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	412.5	275	0

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	475	212.5	0
NB OFF RAMP	1.06	212.5	0	462.5	0
SR 18	1.06	125	425	0	0

PM Peak Period Rodel Inputs

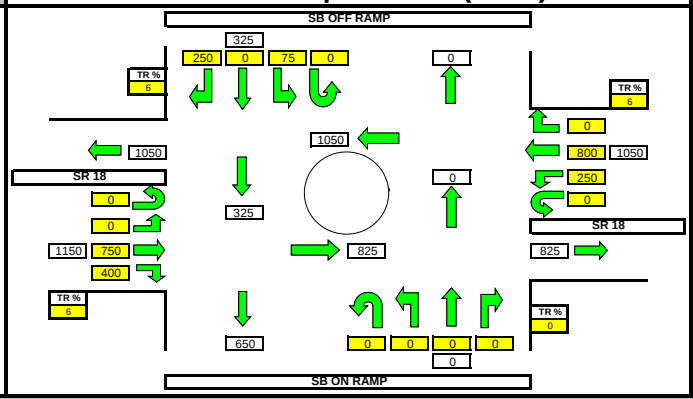
Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	212.5	212.5	0
NB OFF RAMP	1.06	337.5	0	212.5	0
SR 18	1.06	62.5	475	0	0



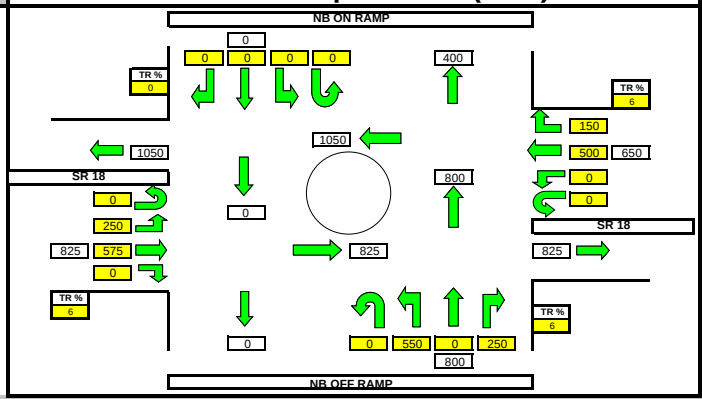
I-85 & SR 18 Interchange
Troup County, GA
INTERIM LANE CONFIGURATION

I -85 SB Ramp & SR 18 (West)

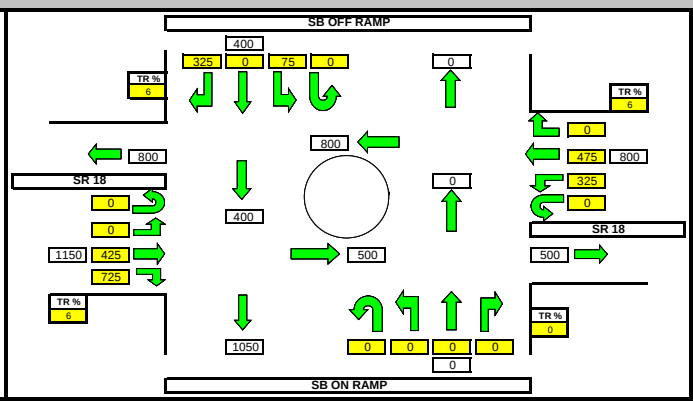
2038 AM PEAK HOUR TRAFFIC

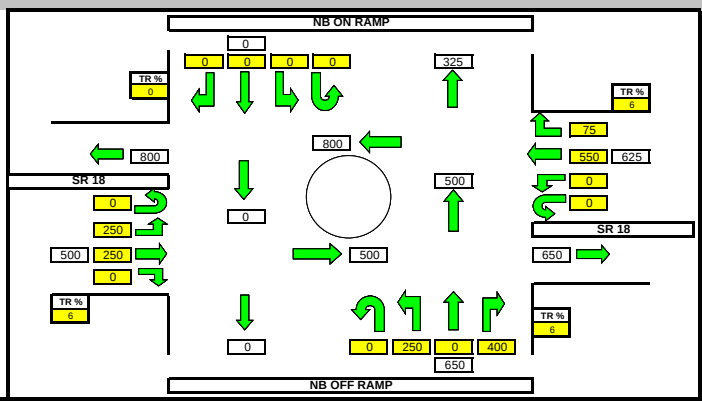


I -85 NB Ramp & SR 18 (East)



2038 PM PEAK HOUR TRAFFIC





CONCEPTUAL LANE CONFIGURATION

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.06	250	0	75	0
SR 18	1.06	400	750	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	800	250	0

PM Peak Period Rodel Inputs

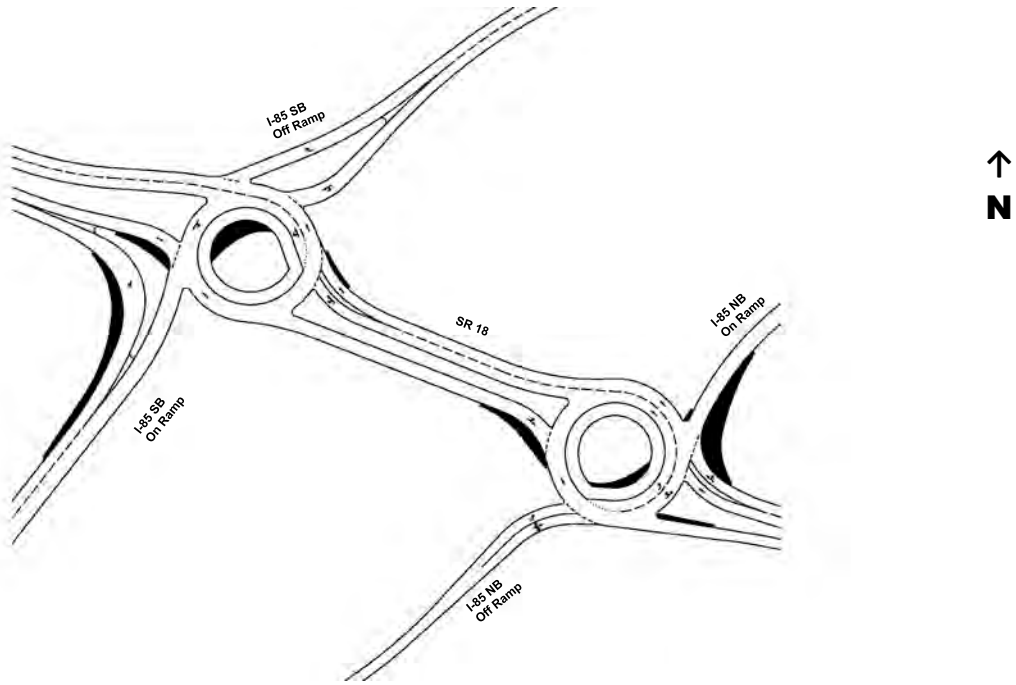
Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
SB OFF RAMP	1.06	325	0	75	0
SR 18	1.06	725	425	0	0
SB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	475	325	0

AM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	575	250	0
NB OFF RAMP	1.06	250	0	550	0
SR 18	1.06	150	500	0	0

PM Peak Period Rodel Inputs

Leg	PCU	1st Exit	2nd Exit	3rd Exit	U-turn
NB ON RAMP	1.00	0	0	0	0
SR 18	1.06	0	250	250	0
NB OFF RAMP	1.06	400	0	250	0
SR 18	1.06	75	550	0	0



I-85 & SR 18 Interchange
Troup County, GA
ULTIMATE LANE CONFIGURATION

I-85 SB & NB Ramp at SR 18

OPERATIONAL ANALYSIS DOCUMENTATION

F.1 2018 – GDOT Spreadsheet Operational Analysis ..... F.1.1 – F.1.8

F.2 2028 – GDOT Spreadsheet Operational Analysis ..... F.2.1 – F.2.8

F.3 2038 – GDOT Spreadsheet Operational Analysis ..... F.3.1 – F.3.8

F.4 2018 - ARCADY Operational Analysis ..... F.4.1 – F.4.6

F.5 2028 - ARCADY Operational Analysis ..... F.5.1 – F.5.6

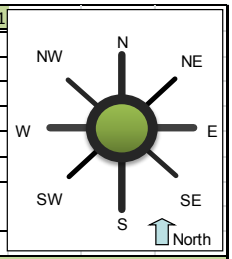
F.6 2038 - ARCADY Operational Analysis ..... F.6.1 – F.6.6

F.7 2018 - ARCADY Operational Analysis (PHF=0.80) ..... F.7.1 – F.7.6

GDOT Spread sheet Operational Analysis

2018 - AM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2018, AM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	**50**						**500**	
(TO)	SE (4), vph								
	S (5), vph			**175**					
	SW (6), vph								
	W (7), vph			**550**					
	NW (8), vph								
Output	Total Vehicles	50	0	725	0	0	0	500	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	**6%**	0%	**6%**	0%	0%	0%	**6%**	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	60	0	0	0	0	0	602	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	211	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	663	0	0	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	60	0	873	0	0	0	602	0
Conflicting flow, pcu/h	873	0	0	0	0	0	271	0

Roundabout Type	**Standard Single Lane or Urban Compact**
Enter type here…	Standard Single Lane

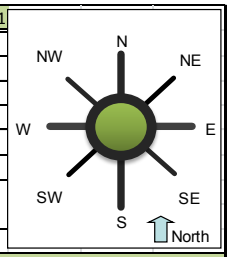
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	445	NA	1066	NA	NA	NA	813	NA
Entry Flow Rates, vph	57	NA	824	NA	NA	NA	568	NA
V/C ratio	**0.13**		**0.77**				**0.70**	
Control Delay, s/veh	**10**		**18**				**18**	
LOS	A		C				C	
95th % Queue (ft)	**12**		**214**				**155**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	625	NA	1258	NA	NA	NA	1012	NA
Entry Flow Rates, vph	57	NA	824	NA	NA	NA	568	NA
V/C ratio	**0.10**		**0.69**				**0.59**	
Control Delay, sec/pcu	**7**		**13**				**12**	
LOS	A		B				B	
95th % Queue (ft)	**8**		**160**				**108**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**275**	**175**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	331	211				
Conflicting Flow, pcu/hr	0	663				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	1066	550				
Flow Rates of Exiting Traffic, vph	313	199				
V/C ratio	**0.29**	**0.38**				
Control Delay, s/veh	**0.0**	**12.5**				
LOS	A	B				
95th % Queue (ft)	**33**	**47**				
Approach w/Bypass Delay, s/veh	***11.3***	***11.9***				
Approach w/Bypass LOS	*B*	*B*				

GDOT Spread sheet Operational Analysis

2018 - AM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2018, AM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 NB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph							175	
Exit	NE (2), vph								
Legs	E (3), vph							375	
(TO)	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph			350		375			
	NW (8), vph								
Output	Total Vehicles	0	0	350	0	375	0	550	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	211	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	452	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	0	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	422	0	452	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	422	0	452	0	663	0
Conflicting flow, pcu/h	0	0	663	0	663	0	0	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

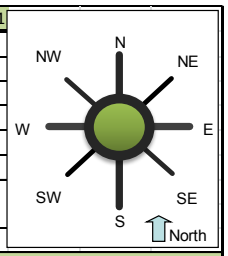
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	550	NA	550	NA	1066	NA
Entry Flow Rates, vph	NA	NA	398	NA	426	NA	625	NA
V/C ratio			**0.72**		**0.78**		**0.59**	
Control Delay, s/veh			**25**		**29**		**11**	
LOS			D		D		B	
95th % Queue (ft)			**158**		**188**		**105**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	740	NA	740	NA	1258	NA
Entry Flow Rates, vph	NA	NA	398	NA	426	NA	625	NA
V/C ratio			**0.57**		**0.61**		**0.53**	
Control Delay, sec/pcu			**14**		**15**		**9**	
LOS			B		C		A	
95th % Queue (ft)			**96**		**111**		**85**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**175**	**100**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	211	120				
Conflicting Flow, pcu/hr	452	211				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	679	863				
Flow Rates of Exiting Traffic, vph	199	114				
V/C ratio	**0.29**	**0.14**				
Control Delay, s/veh	**9.0**	**5.5**				
LOS	A	A				
95th % Queue (ft)	**32**	**13**				
Approach w/Bypass Delay, s/veh	***22.9***	***21.0***				
Approach w/Bypass LOS	*C*	*C*				

GDOT Spread sheet Operational Analysis

2018- PM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2018, PM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	**75**						**275**	
(TO)	SE (4), vph								
	S (5), vph			**225**					
	SW (6), vph								
	W (7), vph			**350**					
	NW (8), vph								
Output	Total Vehicles	75	0	575	0	0	0	275	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	**6%**	0%	**6%**	0%	0%	0%	**6%**	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	90	0	0	0	0	0	331	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	271	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	422	0	0	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	90	0	693	0	0	0	331	0
Conflicting flow, pcu/h	693	0	0	0	0	0	361	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

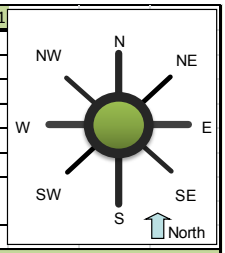
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	533	NA	1066	NA	NA	NA	743	NA
Entry Flow Rates, vph	85	NA	653	NA	NA	NA	313	NA
V/C ratio	**0.16**		**0.61**				**0.42**	
Control Delay, s/veh	**9**		**12**				**10**	
LOS	A		B				B	
95th % Queue (ft)	**15**		**116**				**56**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	723	NA	1258	NA	NA	NA	942	NA
Entry Flow Rates, vph	85	NA	653	NA	NA	NA	313	NA
V/C ratio	**0.13**		**0.55**				**0.35**	
Control Delay, sec/pcu	**6**		**9**				**8**	
LOS	A		A				A	
95th % Queue (ft)	**11**		**93**				**42**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**500**	**200**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	602	241				
Conflicting Flow, pcu/hr	0	422				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	1066	699				
Flow Rates of Exiting Traffic, vph	568	227				
V/C ratio	**0.53**	**0.34**				
Control Delay, s/veh	**0.0**	**9.6**				
LOS	A	A				
95th % Queue (ft)	**86**	**41**				
Approach w/Bypass Delay, s/veh	***3.7***	***9.4***				
Approach w/Bypass LOS	*A*	*A*				

GDOT Spread sheet Operational Analysis

2018 - PM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2018, PM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 NB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph							175	
Exit	NE (2), vph								
Legs	E (3), vph							175	
(TO)	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph			400		175			
	NW (8), vph								
Output	Total Vehicles	0	0	400	0	175	0	350	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	211	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	211	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	0	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	482	0	211	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	482	0	211	0	422	0
Conflicting flow, pcu/h	0	0	422	0	422	0	0	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

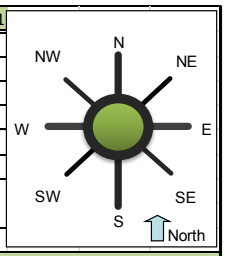
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	699	NA	699	NA	1066	NA
Entry Flow Rates, vph	NA	NA	455	NA	199	NA	398	NA
V/C ratio			**0.65**		**0.28**		**0.37**	
Control Delay, s/veh			**17**		**9**		**7**	
LOS			C		A		A	
95th % Queue (ft)			**128**		**31**		**46**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	898	NA	898	NA	1258	NA
Entry Flow Rates, vph	NA	NA	455	NA	199	NA	398	NA
V/C ratio			**0.54**		**0.23**		**0.34**	
Control Delay, sec/pcu			**11**		**6**		**6**	
LOS			B		A		A	
95th % Queue (ft)			**87**		**24**		**40**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**275**	**50**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	331	60				
Conflicting Flow, pcu/hr	211	211				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	863	863				
Flow Rates of Exiting Traffic, vph	313	57				
V/C ratio	**0.36**	**0.07**				
Control Delay, s/veh	**8.3**	**4.8**				
LOS	A	A				
95th % Queue (ft)	**44**	**6**				
Approach w/Bypass Delay, s/veh	***8.4***	***16.0***				
Approach w/Bypass LOS	*A*	*C*				

GDOT Spread sheet Operational Analysis

2028 - AM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2028, AM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	**63**						**625**	
(TO)	SE (4), vph								
	S (5), vph			**213**					
	SW (6), vph								
	W (7), vph			**675**					
	NW (8), vph								
Output	Total Vehicles	63	0	888	0	0	0	625	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	**6%**	0%	**6%**	0%	0%	0%	**6%**	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	76	0	0	0	0	0	753	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	257	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	813	0	0	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	76	0	1070	0	0	0	753	0
Conflicting flow, pcu/h	1070	0	0	0	0	0	332	0

Roundabout Type	**Standard Single Lane or Urban Compact**
Enter type here…	Standard Single Lane

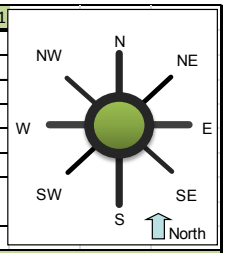
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	366	NA	1066	NA	NA	NA	765	NA
Entry Flow Rates, vph	72	NA	1009	NA	NA	NA	710	NA
V/C ratio	**0.20**		**0.95**				**0.93**	
Control Delay, s/veh	**13**		**36**				**41**	
LOS	B		E				E	
95th % Queue (ft)	**19**		**430**				**352**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	534	NA	1258	NA	NA	NA	964	NA
Entry Flow Rates, vph	72	NA	1009	NA	NA	NA	710	NA
V/C ratio	**0.14**		**0.85**				**0.78**	
Control Delay, sec/pcu	**9**		**21**				**20**	
LOS	A		C				C	
95th % Queue (ft)	**13**		**304**				**217**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**338**	**213**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	407	257				
Conflicting Flow, pcu/hr	0	813				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	1066	473				
Flow Rates of Exiting Traffic, vph	384	242				
V/C ratio	**0.36**	**0.54**				
Control Delay, s/veh	**0.0**	**19.0**				
LOS	A	C				
95th % Queue (ft)	**44**	**84**				
Approach w/Bypass Delay, s/veh	***26.3***	***17.7***				
Approach w/Bypass LOS	*D*	*C*				

GDOT Spread sheet Operational Analysis

2028 - AM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2028, AM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 NB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph							213	
Exit	NE (2), vph								
Legs	E (3), vph							475	
(TO)	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph			425		463			
	NW (8), vph								
Output	Total Vehicles	0	0	425	0	463	0	688	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	257	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	572	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	0	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	512	0	558	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	512	0	558	0	829	0
Conflicting flow, pcu/h	0	0	814	0	829	0	0	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

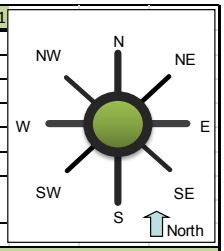
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	472	NA	465	NA	1066	NA
Entry Flow Rates, vph	NA	NA	483	NA	526	NA	782	NA
V/C ratio			**1.02**		**1.13**		**0.73**	
Control Delay, s/veh			**77**		**111**		**16**	
LOS			F		F		C	
95th % Queue (ft)			**375**		**486**		**183**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	656	NA	648	NA	1258	NA
Entry Flow Rates, vph	NA	NA	483	NA	526	NA	782	NA
V/C ratio			**0.78**		**0.86**		**0.66**	
Control Delay, sec/pcu			**26**		**34**		**12**	
LOS			D		D		B	
95th % Queue (ft)			**200**		**262**		**140**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**213**	**125**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	257	151				
Conflicting Flow, pcu/hr	572	257				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	602	825				
Flow Rates of Exiting Traffic, vph	242	142				
V/C ratio	**0.40**	**0.18**				
Control Delay, s/veh	**12.0**	**6.2**				
LOS	B	A				
95th % Queue (ft)	**51**	**18**				
Approach w/Bypass Delay, s/veh	***80.0***	***61.1***				
Approach w/Bypass LOS	*F*	*F*				

GDOT Spread sheet Operational Analysis

2028 - PM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2028, PM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	**75**						**338**	
(TO)	SE (4), vph								
	S (5), vph			**275**					
	SW (6), vph								
	W (7), vph			**413**					
	NW (8), vph								
Output	Total Vehicles	75	0	688	0	0	0	338	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	**6%**	0%	**6%**	0%	0%	0%	**6%**	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	90	0	0	0	0	0	407	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	331	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	497	0	0	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	90	0	829	0	0	0	407	0
Conflicting flow, pcu/h	829	0	0	0	0	0	422	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

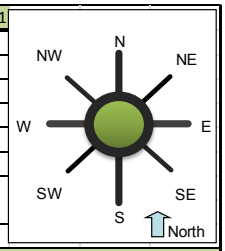
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	465	NA	1066	NA	NA	NA	699	NA
Entry Flow Rates, vph	85	NA	782	NA	NA	NA	384	NA
V/C ratio	**0.18**		**0.73**				**0.55**	
Control Delay, s/veh	**10**		**16**				**14**	
LOS	B		C				B	
95th % Queue (ft)	**18**		**183**				**89**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	648	NA	1258	NA	NA	NA	898	NA
Entry Flow Rates, vph	85	NA	782	NA	NA	NA	384	NA
V/C ratio	**0.14**		**0.66**				**0.45**	
Control Delay, sec/pcu	**7**		**12**				**10**	
LOS	A		B				A	
95th % Queue (ft)	**13**		**140**				**64**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**613**	**263**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	738	317				
Conflicting Flow, pcu/hr	0	497				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	1066	648				
Flow Rates of Exiting Traffic, vph	697	299				
V/C ratio	**0.65**	**0.49**				
Control Delay, s/veh	**0.0**	**13.2**				
LOS	A	B				
95th % Queue (ft)	**135**	**71**				
Approach w/Bypass Delay, s/veh	***5.0***	***12.6***				
Approach w/Bypass LOS	*A*	*B*				

GDOT Spread sheet Operational Analysis

2028 - PM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2028, PM Peak Period	
County/District:	Troup County, GA	
Intersection Name:	I-85 NB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph							213	
Exit	NE (2), vph								
Legs	E (3), vph							213	
(TO)	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph			475		213			
	NW (8), vph								
Output	Total Vehicles	0	0	475	0	213	0	426	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{HV}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	257	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	257	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	0	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	572	0	257	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	572	0	257	0	513	0
Conflicting flow, pcu/h	0	0	513	0	513	0	0	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

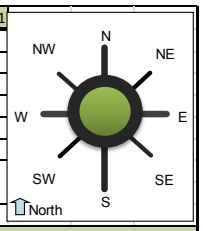
Results: Approach Measures of Effectiveness								
HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	638	NA	638	NA	1066	NA
Entry Flow Rates, vph	NA	NA	540	NA	242	NA	484	NA
V/C ratio			**0.85**		**0.38**		**0.45**	
Control Delay, s/veh			**33**		**11**		**8**	
LOS			D		B		A	
95th % Queue (ft)			**248**		**47**		**64**	
Calibrated Model (future)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	834	NA	834	NA	1258	NA
Entry Flow Rates, vph	NA	NA	540	NA	242	NA	484	NA
V/C ratio			**0.69**		**0.31**		**0.41**	
Control Delay, sec/pcu			**17**		**8**		**7**	
LOS			C		A		A	
95th % Queue (ft)			**148**		**35**		**54**	
Notes:								v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**338**	**63**				
Volume Characteristics (for entry leg)						
PHF	0.88	0.88				
F_{HV}	0.94	0.94				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	407	76				
Conflicting Flow, pcu/hr	257	257				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	825	825				
Flow Rates of Exiting Traffic, vph	384	72				
V/C ratio	**0.47**	**0.09**				
Control Delay, s/veh	**10.4**	**5.3**				
LOS	B	A				
95th % Queue (ft)	**66**	**8**				
Approach w/Bypass Delay, s/veh	***10.6***	***29.8***				
Approach w/Bypass LOS	*B*	*D*				

GDOT Spread sheet Operational Analysis

2038 - AM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2038, AM Peak Period	
County/District:	Troup County, GA	
Intersection:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		Left Only	SELECT	SELECT	SELECT	Left-Thru	Thru	SELECT	SELECT
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	75							
(TO)	SE (4), vph								
	S (5), vph					250			
	SW (6), vph								
	W (7), vph					244	557		
	NW (8), vph								
	Entry Volume, vph	75	0	0	0	494	557	0	0

	S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation	SELECT	SELECT	SELECT	SELECT	Thru	SELECT	SELECT	SELECT
N (1), vph								
NE (2), vph								
E (3), vph					750			
SE (4), vph								
S (5), vph								
SW (6), vph								
W (7), vph								
NW (8), vph								
Entry Volume, vph	0	0	0	0	750	0	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	1	0	2	0	0	0	1	0
# of Conflict Flow Lanes	2	1	1	1	1	1	1	1

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	6%	0%	6%	0%	0%	0%	6%	0%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{hv}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Results: Approach Measures of Effectiveness

HCM 2010 Model	N		E		S		W	
Lane Designations	*Left Only*	*Lane 2*	*Left-Thru*	*Thru*	*Lane 1*	*Lane 2*	*Thru*	*Lane 2*
Entry Capacity, veh/h	440	NA	1066	1066	NA	NA	811	NA
Entry Flow Rates, veh/h	85	NA	561	632	NA	NA	852	NA
V/C ratio	**0.19**	#VALUE!	**0.53**	**0.59**	#VALUE!	#VALUE!	**1.05**	
Control Delay, s/veh	**11.1**	#VALUE!	**9.7**	**11.1**	#VALUE!	#VALUE!	**68.3**	
LOS	B	#VALUE!	A	B	#VALUE!	#VALUE!	F	
95th % Queue (ft)	**19**	#VALUE!	**84**	**108**	#VALUE!	#VALUE!	**548**	
Approach Delay, LOS	15.9 sec, LOS C		10.5 sec, LOS B		#VALUE!		44.6 sec, LOS E	

Calibrated Model	N		E		S		W	
Lane Designations	*Left Only*	*Lane 2*	*Left-Thru*	*Thru*	*Lane 1*	*Lane 2*	*Thru*	*Lane 2*
Entry Capacity, veh/h	496	NA	1358	1358	NA	NA	1088	NA
Entry Flow Rates, veh/h	85	NA	561	632	NA	NA	852	NA
V/C ratio	**0.17**	#VALUE!	**0.41**	**0.47**	#VALUE!	#VALUE!	**0.78**	
Control Delay, s/veh	**9.6**	#VALUE!	**6.6**	**7.3**	#VALUE!	#VALUE!	**18.0**	
LOS	A	#VALUE!	A	A	#VALUE!	#VALUE!	C	
95th % Queue (ft)	**16**	#VALUE!	**55**	**67**	#VALUE!	#VALUE!	**224**	
Approach Delay, LOS	15.6 sec, LOS C		6.9 sec, LOS A		#VALUE!		11.7 sec, LOS B	

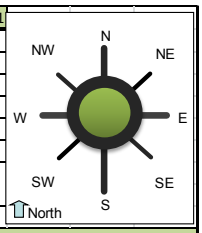
v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
# of Conflicting Exit Flow Lanes	**1**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume	400	250				
Exit Leg: ***(Select Input Method)***	HCM	HCM				
*Lane Flow in Exit Leg****	301	964				
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)	0.88	0.88				
F_{HV} (Entry Leg)	0.94	0.94				
F_{ped}	1.00	1.00				
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow	482	301				
Conflicting Critical Flow	301	964				
Bypass Lane Results						
Entry Capacity of Bypass, veh/h	1200	543				
Flow Rates of Exiting Traffic, veh/h	455	284				
V/C ratio	0.38	0.55				
Control Delay, sec/pcu	0.0	17.3				
LOS	A	C				
95th % Queue (ft)	**48**	**89**				

GDOT Spread sheet Operational Analysis

2038 - AM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2038, AM Peak Period	
County/District:	Troup County, GA	
Intersection:	I-85 NB Ramp Terminal & SR 18	



Volumes	Entry Legs (FROM)							
	N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation	SELECT	SELECT	SELECT	SELECT	Thru	Thru	SELECT	SELECT
N (1), vph								
Exit NE (2), vph								
Legs E (3), vph								
(TO) SE (4), vph								
S (5), vph								
SW (6), vph								
W (7), vph					235	265		
NW (8), vph								
Entry Volume, vph	0	0	0	0	235	265	0	0
	S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation	Left Only	Left Only	SELECT	SELECT	Left-Thru	SELECT	SELECT	SELECT
N (1), vph					250			
NE (2), vph								
E (3), vph					575			
SE (4), vph								
S (5), vph								
SW (6), vph								
W (7), vph	292	259						
NW (8), vph								
Entry Volume, vph	292	259	0	0	825	0	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	1	0
# of Conflict Flow Lanes	2	1	2	1	2	1	1	1

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{hv}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Results: Approach Measures of Effectiveness

HCM 2010 Model	N		E		S		W	
Lane Designations	*Lane 1*	*Lane 2*	*Thru*	*Thru*	*Left Only*	*Left Only*	*Left-Thru*	*Lane 2*
Entry Capacity, veh/h	NA	NA	517	543	506	532	1066	NA
Entry Flow Rates, veh/h	NA	NA	267	301	331	294	938	NA
V/C ratio	#VALUE!	#VALUE!	**0.52**	**0.55**	**0.65**	**0.55**	**0.88**	
Control Delay, s/veh	#VALUE!	#VALUE!	**16.7**	**17.3**	**22.9**	**17.6**	**26.2**	
LOS	#VALUE!	#VALUE!	C	C	C	C	D	
95th % Queue (ft)	#VALUE!	#VALUE!	**78**	**89**	**124**	**88**	**328**	
Approach Delay, LOS	#VALUE!		14.6 sec, LOS B		19.3 sec, LOS C		26.2 sec, LOS D	

Calibrated Model	N		E		S		W	
Lane Designations	*Lane 1*	*Lane 2*	*Thru*	*Thru*	*Left Only*	*Left Only*	*Left-Thru*	*Lane 2*
Entry Capacity, veh/h	NA	NA	590	650	573	633	1547	NA
Entry Flow Rates, veh/h	NA	NA	267	301	331	294	938	NA
V/C ratio	#VALUE!	#VALUE!	**0.45**	**0.46**	**0.58**	**0.46**	**0.61**	
Control Delay, s/veh	#VALUE!	#VALUE!	**13.3**	**12.5**	**17.4**	**12.8**	**8.9**	
LOS	#VALUE!	#VALUE!	B	B	C	B	A	
95th % Queue (ft)	#VALUE!	#VALUE!	**62**	**65**	**97**	**65**	**116**	
Approach Delay, LOS	#VALUE!		11.4 sec, LOS B		15.8 sec, LOS C		8.9 sec, LOS A	

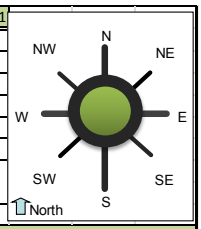
v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
# of Conflicting Exit Flow Lanes	**1**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume	250	150				
Exit Leg: ***(Select Input Method)***	HCM	HCM				
*Lane Flow in Exit Leg****	693	301				
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)	0.88	0.88				
F_{HV} (Entry Leg)	0.94	0.94				
F_{ped}	1.00	1.00				
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow	301	181				
Conflicting Critical Flow	693	301				
Bypass Lane Results						
Entry Capacity of Bypass, veh/h	533	863				
Flow Rates of Exiting Traffic, veh/h	284	170				
V/C ratio	0.53	0.21				
Control Delay, sec/pcu	16.8	6.3				
LOS	C	A				
95th % Queue (ft)	**82**	**21**				

GDOT Spread sheet Operational Analysis

2038 - PM Peak Period (*I-85 SB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2038, PM Peak Period	
County/District:	Troup County, GA	
Intersection:	I-85 SB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		Left Only	SELECT	SELECT	SELECT	Left-Thru	Thru	SELECT	SELECT
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph	75							
(TO)	SE (4), vph								
	S (5), vph					325			
	SW (6), vph								
	W (7), vph					51	424		
	NW (8), vph								
	Entry Volume, vph	75	0	0	0	376	424	0	0
		S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation		SELECT	SELECT	SELECT	SELECT	Thru	SELECT	SELECT	SELECT
	N (1), vph								
	NE (2), vph								
	E (3), vph					400			
	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph								
	NW (8), vph								
	Entry Volume, vph	0	0	0	0	400	0	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	1	0	2	0	0	0	1	0
# of Conflict Flow Lanes	2	1	1	1	1	1	1	1

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	94%	100%	94%	100%	100%	100%	94%	100%
% Heavy Vehicles	6%	0%	6%	0%	0%	0%	6%	0%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{hv}	0.943	1.000	0.943	1.000	1.000	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Results: Approach Measures of Effectiveness

HCM 2010 Model	N		E		S		W	
Lane Designations	*Left Only*	*Lane 2*	*Left-Thru*	*Thru*	*Lane 1*	*Lane 2*	*Thru*	*Lane 2*
Entry Capacity, veh/h	543	NA	1066	1066	NA	NA	761	NA
Entry Flow Rates, veh/h	85	NA	427	482	NA	NA	455	NA
V/C ratio	**0.16**	#VALUE!	**0.40**	**0.45**	#VALUE!	#VALUE!	**0.60**	
Control Delay, s/veh	**8.6**	#VALUE!	**7.6**	**8.4**	#VALUE!	#VALUE!	**14.5**	
LOS	A	#VALUE!	A	A	#VALUE!	#VALUE!	B	
95th % Queue (ft)	**15**	#VALUE!	**52**	**63**	#VALUE!	#VALUE!	**107**	
Approach Delay, LOS	12.8 sec, LOS B		8 sec, LOS A		#VALUE!		5.2 sec, LOS A	

Calibrated Model	N		E		S		W	
Lane Designations	*Left Only*	*Lane 2*	*Left-Thru*	*Thru*	*Lane 1*	*Lane 2*	*Thru*	*Lane 2*
Entry Capacity, veh/h	650	NA	1358	1358	NA	NA	1003	NA
Entry Flow Rates, veh/h	85	NA	427	482	NA	NA	455	NA
V/C ratio	**0.13**	#VALUE!	**0.31**	**0.35**	#VALUE!	#VALUE!	**0.45**	
Control Delay, s/veh	**7.0**	#VALUE!	**5.4**	**5.9**	#VALUE!	#VALUE!	**8.8**	
LOS	A	#VALUE!	A	A	#VALUE!	#VALUE!	A	
95th % Queue (ft)	**12**	#VALUE!	**36**	**43**	#VALUE!	#VALUE!	**64**	
Approach Delay, LOS	12.5 sec, LOS B		5.7 sec, LOS A		#VALUE!		3.1 sec, LOS A	

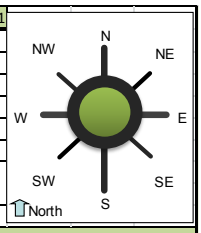
v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**W (7)**	**N (1)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**W (7)**				
Does the bypass have a dedicated receiving lane?	**Yes**	**No**				
# of Conflicting Exit Flow Lanes	**1**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume	725	325				
Exit Leg: ***(Select Input Method)***	HCM	HCM				
*Lane Flow in Exit Leg****	391	572				
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)	0.88	0.88				
F_{HV} (Entry Leg)	0.94	0.94				
F_{ped}	1.00	1.00				
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow	873	391				
Conflicting Critical Flow	391	572				
Bypass Lane Results						
Entry Capacity of Bypass, veh/h	1200	714				
Flow Rates of Exiting Traffic, veh/h	824	369				
V/C ratio	0.69	0.55				
Control Delay, sec/pcu	0.0	13.7				
LOS	A	B				
95th % Queue (ft)	**155**	**89**				

GDOT Spread sheet Operational Analysis

2038 - PM Peak Period (*I-85 NB Ramp*)

General & Site Information		v2.1
Analyst:	JTD	
Agency/Co:	GHD	
Date:	5/6/2014	
Project or PI#:	I-85 SR 18 Interchange	
Year, Peak Hour:	2038, PM Peak Period	
County/District:	Troup County, GA	
Intersection:	I-85 NB Ramp Terminal & SR 18	



Volumes		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		SELECT	SELECT	SELECT	SELECT	Thru	Thru	SELECT	SELECT
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph					259	292		
	NW (8), vph								
	Entry Volume, vph	0	0	0	0	259	292	0	0
		S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation		Left Only	Left Only	SELECT	SELECT	Left-Thru	SELECT	SELECT	SELECT
	N (1), vph					250			
	NE (2), vph								
	E (3), vph					250			
	SE (4), vph								
	S (5), vph								
	SW (6), vph								
	W (7), vph	133	118						
	NW (8), vph								
	Entry Volume, vph	133	118	0	0	500	0	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	1	0
# of Conflict Flow Lanes	2	1	2	1	2	1	1	1

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100%	100%	94%	100%	94%	100%	94%	100%
% Heavy Vehicles	0%	0%	6%	0%	6%	0%	6%	0%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians (ped/hr)	0	0	0	0	0	0	0	0
PHF	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*	*0.88*
F_{hv}	1.000	1.000	0.943	1.000	0.943	1.000	0.943	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Results: Approach Measures of Effectiveness

HCM 2010 Model	N		E		S		W	
Lane Designations	*Lane 1*	*Lane 2*	*Thru*	*Thru*	*Left Only*	*Left Only*	*Left-Thru*	*Lane 2*
Entry Capacity, veh/h	NA	NA	679	699	679	699	1066	NA
Entry Flow Rates, veh/h	NA	NA	294	331	151	134	568	NA
V/C ratio	#VALUE!	#VALUE!	**0.43**	**0.47**	**0.22**	**0.19**	**0.53**	
Control Delay, s/veh	#VALUE!	#VALUE!	**11.5**	**12.1**	**7.9**	**7.3**	**9.8**	
LOS	#VALUE!	#VALUE!	B	B	A	A	A	
95th % Queue (ft)	#VALUE!	#VALUE!	**58**	**68**	**22**	**19**	**86**	
Approach Delay, LOS	#VALUE!		11 sec, LOS B		11.2 sec, LOS B		9.8 sec, LOS A	

Calibrated Model	N		E		S		W	
Lane Designations	*Lane 1*	*Lane 2*	*Thru*	*Thru*	*Left Only*	*Left Only*	*Left-Thru*	*Lane 2*
Entry Capacity, veh/h	NA	NA	847	900	847	900	1547	NA
Entry Flow Rates, veh/h	NA	NA	294	331	151	134	568	NA
V/C ratio	#VALUE!	#VALUE!	**0.35**	**0.37**	**0.18**	**0.15**	**0.37**	
Control Delay, s/veh	#VALUE!	#VALUE!	**8.2**	**8.2**	**6.1**	**5.4**	**5.5**	
LOS	#VALUE!	#VALUE!	A	A	A	A	A	
95th % Queue (ft)	#VALUE!	#VALUE!	**41**	**45**	**17**	**14**	**46**	
Approach Delay, LOS	#VALUE!		7.8 sec, LOS A		10.5 sec, LOS B		5.5 sec, LOS A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)						
Bypass Characteristics	**Bypass #1**	**Bypass #2**	**Bypass #3**	**Bypass #4**	**Bypass #5**	**Bypass #6**
Select Entry Leg from Bypass (FROM)	**S (5)**	**E (3)**				
Select Exit Leg for Bypass (TO)	**E (3)**	**N (1)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
# of Conflicting Exit Flow Lanes	**1**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume	400	75				
Exit Leg: ***(Select Input Method)***	HCM	HCM				
*Lane Flow in Exit Leg****	301	301				
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)	0.88	0.88				
F_{HV} (Entry Leg)	0.94	0.94				
F_{ped}	1.00	1.00				
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow	482	90				
Conflicting Critical Flow	301	301				
Bypass Lane Results						
Entry Capacity of Bypass, veh/h	789	863				
Flow Rates of Exiting Traffic, veh/h	455	85				
V/C ratio	0.58	0.10				
Control Delay, sec/pcu	13.5	5.2				
LOS	B	A				
95th % Queue (ft)	**99**	**9**				

ARCADY Operational Analysis

2018 - AM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	175.000	0.000	50.000	0.000	225.00
EB SR 18	275.000	500.000	0.000	0.000	775.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	550.000	175.000	0.000	725.00
Total	450.00	1050.00	225.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	375.000	175.000	0.000	550.00
I-85 NB Off Ramp	175.000	0.000	375.000	0.000	550.00
WB SR 18	100.000	350.000	0.000	0.000	450.00
Total	275.00	725.00	550.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	450.00
Max V/C Ratio	0.09	0.59	Exit-only	0.74	Exit-only	0.56	0.57	0.53
Max Delay (s)	6.37	9.44	Exit-only	13.11	Exit-only	7.72	11.39	10.48
Max LOS	A	A	Exit-only	B	Exit-only	A	B	B
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	7.00	Exit-only	1.00	1.00	?

ARCADY Operational Analysis

2018 - AM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	175.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	450.00
Max V/C Ratio	0.31	0.57	Exit-only	0.74	Exit-only	0.56	0.57	0.53
Max Delay (s)	8.43	8.73	Exit-only	13.11	Exit-only	7.72	11.39	10.48
Max LOS	A	A	Exit-only	B	Exit-only	A	B	B
Max 95th percentile Queue (Veh)	1.00	1.00	Exit-only	7.00	Exit-only	1.00	1.00	?

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	175.00	450.00
Max V/C Ratio	0.09	0.59	Exit-only	0.74	Exit-only	0.56	0.26	0.40
Max Delay (s)	6.37	9.44	Exit-only	13.11	Exit-only	7.72	6.71	6.23
Max LOS	A	A	Exit-only	B	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	7.00	Exit-only	1.00	~1	1.00

ARCADY Operational Analysis

2018 - AM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	100.00
Max V/C Ratio	0.09	0.59	Exit-only	0.74	Exit-only	0.56	0.57	0.15
Max Delay (s)	6.37	9.44	Exit-only	13.11	Exit-only	7.72	11.39	5.82
Max LOS	A	A	Exit-only	B	Exit-only	A	B	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	7.00	Exit-only	1.00	1.00	~1

ARCADY Operational Analysis

2018 - PM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	200.000	0.000	50.000	0.000	250.00
EB SR 18	500.000	275.000	0.000	0.000	775.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	350.000	225.000	0.000	575.00
Total	700.00	625.00	275.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	175.000	175.000	0.000	350.00
I-85 NB Off Ramp	275.000	0.000	175.000	0.000	450.00
WB SR 18	50.000	400.000	0.000	0.000	450.00
Total	325.00	575.00	350.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	450.00
Max V/C Ratio	0.12	0.34	Exit-only	0.59	Exit-only	0.36	0.23	0.52
Max Delay (s)	5.71	6.19	Exit-only	8.20	Exit-only	5.24	5.45	8.71
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	1.00	Exit-only	1.00	~1	?

ARCADY Operational Analysis

2018 - PM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	200.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	450.00
Max V/C Ratio	0.31	0.33	Exit-only	0.59	Exit-only	0.36	0.23	0.52
Max Delay (s)	7.30	5.72	Exit-only	8.20	Exit-only	5.24	5.45	8.71
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	1.00	1.00	Exit-only	1.00	Exit-only	1.00	~1	?

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	275.00	450.00
Max V/C Ratio	0.12	0.34	Exit-only	0.59	Exit-only	0.36	0.35	0.46
Max Delay (s)	5.71	6.19	Exit-only	8.20	Exit-only	5.24	6.54	6.89
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	1.00	Exit-only	1.00	1.00	200.00

ARCADY Operational Analysis

2018 – PM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	50.00
Max V/C Ratio	0.12	0.34	Exit-only	0.59	Exit-only	0.36	0.23	0.06
Max Delay (s)	5.71	6.19	Exit-only	8.20	Exit-only	5.24	5.45	4.51
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	1.00	Exit-only	1.00	~1	~1

ARCADY Operational Analysis

2028 - AM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
I-85 SB Off Ramp	213.000	0.000	63.000	0.000	276.00
EB SR 18	338.000	625.000	0.000	0.000	963.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	675.000	213.000	0.000	888.00
Total	551.00	1300.00	276.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	475.000	213.000	0.000	688.00
I-85 NB Off Ramp	213.000	0.000	463.000	0.000	676.00
WB SR 18	125.000	425.000	0.000	0.000	550.00
Total	338.00	900.00	676.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	276.00	963.00	Exit-only	888.00	Exit-only	688.00	676.00	550.00
Max V/C Ratio	0.14	0.80	Exit-only	0.95	Exit-only	0.73	0.77	0.73
Max Delay (s)	8.69	20.41	Exit-only	47.58	Exit-only	13.03	22.98	20.98
Max LOS	A	C	Exit-only	E	Exit-only	B	C	C
Max 95th percentile Queue (Veh)	~1	12.00	Exit-only	49.00	Exit-only	6.00	10.00	8.00

ARCADY Operational Analysis

2028 - AM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	213.00	963.00	Exit-only	888.00	Exit-only	688.00	676.00	550.00
Max V/C Ratio	0.49	0.76	Exit-only	0.95	Exit-only	0.73	0.77	0.73
Max Delay (s)	14.43	16.77	Exit-only	47.58	Exit-only	13.03	22.98	20.98
Max LOS	B	C	Exit-only	E	Exit-only	B	C	C
Max 95th percentile Queue (Veh)	2.00	9.00	Exit-only	49.00	Exit-only	6.00	10.00	8.00

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	276.00	963.00	Exit-only	888.00	Exit-only	688.00	213.00	550.00
Max V/C Ratio	0.14	0.80	Exit-only	0.95	Exit-only	0.73	0.35	0.52
Max Delay (s)	8.69	20.41	Exit-only	47.58	Exit-only	13.03	8.38	8.33
Max LOS	A	C	Exit-only	E	Exit-only	B	A	A
Max 95th percentile Queue (Veh)	~1	12.00	Exit-only	49.00	Exit-only	6.00	1.00	?

ARCADY Operational Analysis

2028 – AM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	276.00	963.00	Exit-only	888.00	Exit-only	688.00	676.00	125.00
Max V/C Ratio	0.14	0.80	Exit-only	0.95	Exit-only	0.73	0.77	0.22
Max Delay (s)	8.69	20.41	Exit-only	47.58	Exit-only	13.03	22.98	7.20
Max LOS	A	C	Exit-only	E	Exit-only	B	C	A
Max 95th percentile Queue (Veh)	~1	12.00	Exit-only	49.00	Exit-only	6.00	10.00	~1

ARCADY Operational Analysis

2028 - PM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
I-85 SB Off Ramp	263.000	0.000	75.000	0.000	338.00
EB SR 18	613.000	350.000	0.000	0.000	963.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	413.000	275.000	0.000	688.00
Total	876.00	763.00	350.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st exit	2nd exit	3rd exit	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	213.000	213.000	0.000	426.00
I-85 NB Off Ramp	338.000	0.000	213.000	0.000	551.00
WB SR 18	63.000	475.000	0.000	0.000	538.00
Total	401.00	688.00	426.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	338.00	963.00	Exit-only	688.00	Exit-only	426.00	551.00	538.00
Max V/C Ratio	0.12	0.44	Exit-only	0.69	Exit-only	0.43	0.26	0.62
Max Delay (s)	6.19	7.35	Exit-only	10.69	Exit-only	5.76	5.32	11.34
Max LOS	A	A	Exit-only	B	Exit-only	A	A	B
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	3.00	Exit-only	1.00	~1	1.00

ARCADY Operational Analysis

2028 - PM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	263.00	963.00	Exit-only	688.00	Exit-only	426.00	551.00	538.00
Max V/C Ratio	0.48	0.45	Exit-only	0.73	Exit-only	0.45	0.28	0.67
Max Delay (s)	11.45	7.56	Exit-only	13.03	Exit-only	6.38	5.91	14.01
Max LOS	B	A	Exit-only	B	Exit-only	A	A	B
Max 95th percentile Queue (Veh)	2.00	1.00	Exit-only	6.00	Exit-only	1.00	~1	4.00

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	338.00	963.00	Exit-only	688.00	Exit-only	426.00	338.00	538.00
Max V/C Ratio	0.14	0.47	Exit-only	0.73	Exit-only	0.45	0.44	0.58
Max Delay (s)	6.91	8.38	Exit-only	13.03	Exit-only	6.38	7.63	9.54
Max LOS	A	A	Exit-only	B	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	200.00	Exit-only	6.00	Exit-only	1.00	1.00	1.00

ARCADY Operational Analysis

2028 – PM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	338.00	963.00	Exit-only	688.00	Exit-only	426.00	551.00	63.00
Max V/C Ratio	0.14	0.47	Exit-only	0.73	Exit-only	0.45	0.28	0.09
Max Delay (s)	6.91	8.38	Exit-only	13.03	Exit-only	6.38	5.91	5.07
Max LOS	A	A	Exit-only	B	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	200.00	Exit-only	6.00	Exit-only	1.00	~1	~1

ARCADY Operational Analysis

2038 - AM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	250.000	0.000	75.000	0.000	325.00
EB SR 18	400.000	750.000	0.000	0.000	1150.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	800.000	250.000	0.000	1050.00
Total	650.00	1550.00	325.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	575.000	250.000	0.000	825.00
I-85 NB Off Ramp	250.000	0.000	550.000	0.000	800.00
WB SR 18	150.000	500.000	0.000	0.000	650.00
Total	400.00	1075.00	800.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 10% to all legs was applied.

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	325.00	1150.00	Exit-only	1050.00	Exit-only	825.00	800.00	650.00
Max V/C Ratio	0.16	0.89	Exit-only	0.55	Exit-only	0.80	0.51	0.38
Max Delay (s)	8.50	31.48	Exit-only	3.76	Exit-only	15.75	6.12	4.02
Max LOS	A	D	Exit-only	A	Exit-only	C	A	A
Max 95th percentile Queue (Veh)	~1	25.00	Exit-only	1.00	Exit-only	12.00	?	1.00

ARCADY Operational Analysis

2038 - AM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	250.00	1150.00	Exit-only	1050.00	Exit-only	825.00	800.00	650.00
Max V/C Ratio	0.54	0.84	Exit-only	0.55	Exit-only	0.80	0.51	0.38
Max Delay (s)	15.57	22.89	Exit-only	3.76	Exit-only	15.75	6.12	4.02
Max LOS	C	C	Exit-only	A	Exit-only	C	A	A
Max 95th percentile Queue (Veh)	3.00	17.00	Exit-only	1.00	Exit-only	12.00	?	1.00

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	14.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	325.00	1150.00	Exit-only	1050.00	Exit-only	825.00	250.00	650.00
Max V/C Ratio	0.16	0.89	Exit-only	0.55	Exit-only	0.80	0.44	0.29
Max Delay (s)	8.50	31.48	Exit-only	3.76	Exit-only	15.75	10.42	2.66
Max LOS	A	D	Exit-only	A	Exit-only	C	B	A
Max 95th percentile Queue (Veh)	~1	25.00	Exit-only	1.00	Exit-only	12.00	2.00	~1

ARCADY Operational Analysis

2038 - AM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	325.00	1150.00	Exit-only	1050.00	Exit-only	825.00	800.00	150.00
Max V/C Ratio	0.16	0.89	Exit-only	0.55	Exit-only	0.80	0.51	0.25
Max Delay (s)	8.50	31.48	Exit-only	3.76	Exit-only	15.75	6.12	7.33
Max LOS	A	D	Exit-only	A	Exit-only	C	A	A
Max 95th percentile Queue (Veh)	~1	25.00	Exit-only	1.00	Exit-only	12.00	?	~1

ARCADY Operational Analysis

2038 - PM Peak Period

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	325.000	0.000	75.000	0.000	400.00
EB SR 18	725.000	425.000	0.000	0.000	1150.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	475.000	325.000	0.000	800.00
Total	1050.00	900.00	400.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	250.000	250.000	0.000	500.00
I-85 NB Off Ramp	400.000	0.000	250.000	0.000	650.00
WB SR 18	75.000	550.000	0.000	0.000	625.00
Total	475.00	800.00	500.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 10% to all legs was applied.

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	400.00	1150.00	Exit-only	800.00	Exit-only	500.00	650.00	625.00
Max V/C Ratio	0.13	0.53	Exit-only	0.42	Exit-only	0.49	0.19	0.36
Max Delay (s)	6.28	8.62	Exit-only	2.92	Exit-only	6.16	3.05	3.30
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	?	Exit-only	1.00	Exit-only	~1	~1	1.00

ARCADY Operational Analysis

2038 - PM Peak Period

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	325.00	1150.00	Exit-only	800.00	Exit-only	500.00	650.00	625.00
Max V/C Ratio	0.55	0.50	Exit-only	0.42	Exit-only	0.49	0.19	0.36
Max Delay (s)	12.07	7.75	Exit-only	2.92	Exit-only	6.16	3.05	3.30
Max LOS	B	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	2.00	1.00	Exit-only	1.00	Exit-only	~1	~1	1.00

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	24.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	14.00	26.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	400.00	1150.00	Exit-only	800.00	Exit-only	500.00	400.00	625.00
Max V/C Ratio	0.13	0.53	Exit-only	0.42	Exit-only	0.49	0.54	0.32
Max Delay (s)	6.28	8.62	Exit-only	2.92	Exit-only	6.16	9.41	2.77
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	?	Exit-only	1.00	Exit-only	~1	?	1.00

ARCADY Operational Analysis

2038 - PM Peak Period

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 SB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...	I-85 NB Ra...
Leg	I-85 SB Off...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On...	EB SR 18	I-85 NB Off...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	24.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	26.00	Exit-only	14.00	26.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	150.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	170.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	170.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Average Demand (Veh/hr)	400.00	1150.00	Exit-only	800.00	Exit-only	500.00	650.00	75.00
Max V/C Ratio	0.13	0.53	Exit-only	0.42	Exit-only	0.49	0.19	0.10
Max Delay (s)	6.28	8.62	Exit-only	2.92	Exit-only	6.16	3.05	4.78
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	?	Exit-only	1.00	Exit-only	~1	~1	~1

ARCADY Operational Analysis

2018 - AM Peak Period – PHF = 0.80

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	175.000	0.000	50.000	0.000	225.00
EB SR 18	275.000	500.000	0.000	0.000	775.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	550.000	175.000	0.000	725.00
Total	450.00	1050.00	225.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	375.000	175.000	0.000	550.00
I-85 NB Off Ramp	175.000	0.000	375.000	0.000	550.00
WB SR 18	100.000	350.000	0.000	0.000	450.00
Total	275.00	725.00	550.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	450.00
Max V/C Ratio	0.11	0.68	Exit-only	0.85	Exit-only	0.64	0.68	0.64
Max Delay (s)	7.14	12.00	Exit-only	18.74	Exit-only	9.18	15.86	13.97
Max LOS	A	B	Exit-only	C	Exit-only	A	C	B
Max 95th percentile Queue (Veh)	~1	4.00	Exit-only	18.00	Exit-only	1.00	5.00	3.00

ARCADY Operational Analysis

2018 - AM Peak Period – PHF = 0.80

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	175.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	450.00
Max V/C Ratio	0.39	0.66	Exit-only	0.85	Exit-only	0.64	0.68	0.64
Max Delay (s)	10.27	10.78	Exit-only	18.74	Exit-only	9.18	15.86	13.97
Max LOS	B	B	Exit-only	C	Exit-only	A	C	B
Max 95th percentile Queue (Veh)	1.00	3.00	Exit-only	18.00	Exit-only	1.00	5.00	3.00

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	175.00	450.00
Max V/C Ratio	0.11	0.68	Exit-only	0.85	Exit-only	0.64	0.32	0.46
Max Delay (s)	7.14	12.00	Exit-only	18.74	Exit-only	9.18	7.70	6.99
Max LOS	A	B	Exit-only	C	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	4.00	Exit-only	18.00	Exit-only	1.00	~1	1.00

ARCADY Operational Analysis

2018 - AM Peak Period – PHF = 0.80

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	225.00	775.00	Exit-only	725.00	Exit-only	550.00	550.00	100.00
Max V/C Ratio	0.11	0.68	Exit-only	0.85	Exit-only	0.64	0.68	0.18
Max Delay (s)	7.14	12.00	Exit-only	18.74	Exit-only	9.18	15.86	6.41
Max LOS	A	B	Exit-only	C	Exit-only	A	C	A
Max 95th percentile Queue (Veh)	~1	4.00	Exit-only	18.00	Exit-only	1.00	5.00	~1

ARCADY Operational Analysis

2018 - PM Peak Period – PHF = 0.80

Turning Volumes for I-85 SB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 SB Off Ramp	200.000	0.000	50.000	0.000	250.00
EB SR 18	500.000	275.000	0.000	0.000	775.00
I-85 SB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
WB SR 18	0.000	350.000	225.000	0.000	575.00
Total	700.00	625.00	275.00	0.00	-

Truck Percentages: 6% on All Legs

Turning Volumes for I-85 NB Ramp

From \ To	1st	2nd	3rd	U-Turn	Total
I-85 NB On Ramp	Exit-only	Exit-only	Exit-only	Exit-only	0.00
EB SR 18	0.000	175.000	175.000	0.000	350.00
I-85 NB Off Ramp	275.000	0.000	175.000	0.000	450.00
WB SR 18	50.000	400.000	0.000	0.000	450.00
Total	325.00	575.00	350.00	0.00	-

Truck Percentages: 6% on All Legs

Geometry and Results – All Legs
Capacity Reduction of 15% to all legs was applied.

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	450.00
Max V/C Ratio	0.14	0.40	Exit-only	0.67	Exit-only	0.41	0.27	0.61
Max Delay (s)	6.27	6.93	Exit-only	9.93	Exit-only	5.65	5.93	10.84
Max LOS	A	A	Exit-only	A	Exit-only	A	A	B
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	3.00	Exit-only	1.00	~1	?

ARCADY Operational Analysis

2018 - PM Peak Period – PHF = 0.80

I-85 SB Ramp Roundabout

SB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☐	☑	☐	☐	☐	☐	☑	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	200.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	450.00
Max V/C Ratio	0.37	0.38	Exit-only	0.67	Exit-only	0.41	0.27	0.61
Max Delay (s)	8.57	6.29	Exit-only	9.93	Exit-only	5.65	5.93	10.84
Max LOS	A	A	Exit-only	A	Exit-only	A	A	B
Max 95th percentile Queue (Veh)	1.00	1.00	Exit-only	3.00	Exit-only	1.00	~1	?

I-85 NB Ramp Roundabout

NB Off Ramp Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☐	☑
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	275.00	450.00
Max V/C Ratio	0.14	0.40	Exit-only	0.67	Exit-only	0.41	0.42	0.53
Max Delay (s)	6.27	6.93	Exit-only	9.93	Exit-only	5.65	7.44	7.95
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	3.00	Exit-only	1.00	1.00	?

ARCADY Operational Analysis

2018 – PM Peak Period – PHF = 0.80

I-85 NB Ramp Roundabout

WB SR 18 Partial Single Lane Right Turn-bypass

Intersection	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 SB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp	I-85 NB Ramp
Leg	I-85 SB Off ...	EB SR 18	I-85 SB On ...	WB SR 18	I-85 NB On ...	EB SR 18	I-85 NB Off ...	WB SR 18
V - Approach road half-width (ft)	12.00	12.00	Exit-only	12.00	Exit-only	12.00	12.00	12.00
E - Entry width (ft)	14.00	14.00	Exit-only	14.00	Exit-only	14.00	14.00	14.00
l' - Effective flare length (ft)	130.00	130.00	Exit-only	130.00	Exit-only	130.00	130.00	130.00
R - Entry radius (ft)	75.00	75.00	Exit-only	75.00	Exit-only	75.00	75.00	75.00
D - Inscribed circle diameter (ft)	150.00	150.00	Exit-only	150.00	Exit-only	150.00	150.00	150.00
PHI - Conflict (entry) angle (deg)	20.00	20.00	Exit-only	20.00	Exit-only	20.00	20.00	20.00
Exit Only	☐	☐	☑	☐	☑	☐	☐	☐
Leg Has Bypass	☑	☑	☐	☐	☐	☐	☑	☐
Percentage Intercept Adjustment (%)	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Average Demand (Veh/hr)	275.00	775.00	Exit-only	575.00	Exit-only	350.00	450.00	50.00
Max V/C Ratio	0.14	0.40	Exit-only	0.67	Exit-only	0.41	0.27	0.08
Max Delay (s)	6.27	6.93	Exit-only	9.93	Exit-only	5.65	5.93	4.72
Max LOS	A	A	Exit-only	A	Exit-only	A	A	A
Max 95th percentile Queue (Veh)	~1	1.00	Exit-only	3.00	Exit-only	1.00	~1	~1

Appendix G – OSOW accommodation analysis

Memorandum

March 27, 2015

To	Daniel Pass, PE, District 3 Preconstruction Engineer Kevin VanHouten, Project Manager		
Copies to	Scott Zehngraff, PE, Assistant State Traffic Engineer Jason Mobley, PE, District 3 Preconstruction Tommy Crochet, PE – McGee Partners		
From	David Low, PE, PTOE Mark Lenters, PE Peter Lynch, SFS Andy Duerr, PE – QA/QC	Tel	678-280-2105
Subject	PI#: 0009975 I-85 at SR 18, Troup County **Oversize Overweight (OSOW) Analysis**	Job no.	8618323

Overview

The purpose of this task order is to provide Georgia DOT with defined requirements for accommodating oversize overweight (OSOW) vehicles through proposed roundabouts at the I-85/SR 18 interchange currently under development for a roundabout feasibility study. The project involves the construction of roundabouts at the ramp terminals on each side of the underpass. The findings of this study will be incorporated into the concepts for the feasibility study as directed by GDOT.

There is a difference between the terms ‘design vehicle’ versus ‘check vehicle’. A ‘design vehicle’ may be accommodated within the roadway and possibly within its own lane or adjacent lanes. A ‘check vehicle’ is a predominant OSOW vehicle that has been checked to see that it can get through the intersection (which may involve off-tracking and features required to accommodate off-tracking).

Every truck route has to be designed for a WB-67 vehicle. On the OSOW portions of the freight network “check” vehicles must be accommodated or “checked”, i.e. creating vehicle swept paths to see how they need to be mitigated.

Check vehicle definition: A vehicle that is accommodated either in the roadway or outside the travel lane, such as when truck trailers track over the curb. In these cases the roundabout designer should accommodate them by providing paved truck aprons

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and off-tracking pads, sometimes called 'truck blisters', in which wheels stay on pavement.

It would be excessive to add travel way pavement for OSOW to be used as a design vehicle, as in most cases their need to be accommodated is infrequent. However, a roundabout designer should know the size, turning characteristics, and frequency of OSOW allowed on the route. This could be routine if all states had an OSOW freight network and check vehicles.

Review of Permit Records

GHD and Specialized Freight Solutions (SFS), with assistance from the GDOT Permits Office, reviewed the OSOW permit history to determine the size and weight of the OSOW vehicles that have historically used or moved through the interchange. Permits prior to the opening of the Kia plant in April 2009 were disregarded as requested by GDOT. It was also decided to disregard permits associated with the tornado in April 2011 as some of the moves may have been emergency shipments for relief efforts.

Loads associated with the tornado are noted in the permit data, and vehicles can be inferred: track hoes, back hoes, mobile lifts, excavators, grinders, tank, scrapers, and dump trucks most of which would be transported on a DST Lowboy. The key findings from looking at records during the tornado period are that no new vehicles emerged during this time. This is to be expected since clean-up is not expected to require a custom vehicle. There is nothing custom or unusual in configuration regarding damaged property that is mostly waste or recyclable.

There were two different permitting systems in place at GDOT during the review period between April 2009 and the present. From April 2009 through June 2014, GDOT utilized a Bentley system. From July 2014 forward, they are using a ProMiles system. GHD and SFS requested data from both systems from GDOT Permit staff. This was done to determine which permits may have used the interchange and the direction, frequency, size and weight of the permitted loads. The key was to investigate and determine if there were unique vehicles that could not be represented by at least one of the vehicle configurations in the existing truck library.

The truck library referred to are the most commonly manufactured trucks that carry oversize loads nationally. Peter Lynch of Specialized Freight Solutions is involved with FHWA and OSOW on a national scene and sources this information from databases and interviews with freight carriers and other DOTs.

Ninety-three (93) permits were issued using Bentley's software. This permit data is provided in Appendix A.

GHD received information recently indicating that there were permits issued since July 2014 for this interchange in the ProMiles database. These records were not readily apparent until mid-February 2015, but were consistent with permit records summarized from the previous Bentley database.

GHD obtained permit data for vehicles using this interchange from ProMiles from July 1, 2014 through February 17, 2015. Eighty-seven (87) permits were obtained using ProMiles' software. This permit data is provided in Appendix B. GHD will do further checking on this data between now and Preliminary Design.

Multi-Trip Permits Routing

GDOT issues a multi-trip permit, which means there may be permit holders that are not required to report actual routing by standard semi tractor-trailers. These loads may range from 13'6" high, 8'6" wide, 65 to 70' long, and 80,000 pounds up to 14' high, and/or up to 12' wide, and/or up to 75' long, and/or up to 100,000 pounds and the loads may access the interchange from every direction. The WB-92 design vehicle, with a 1'9" buffer on both sides, was used to model the likely multi-trip permit movements not identified from the single trip permit data.

Check Vehicles

In reviewing the permit data, information on vehicle classes and types is limited from the data set. Although oversize vehicles vary in size and width around the state and the country the study team is making the assumption that there are several common types that can be assumed for the purpose of conceptual design. The assumptions regarding vehicle lengths and widths were validated by the Traffic Operations staff at the TMC. The OSOW vehicle types that were used for the swept path modeling include: the DST Lowboy, WB-92 and Mobile Home. Including the buffers, the overall widths are: 14-ft. for the DST Lowboy; 12-ft. for the WB-92, and 16-ft. for the Mobile Home, respectively.

<u>DST Lowboy Defined</u>

DST Lowboy is an often used oversize overweight truck that has very low ground clearance. The vehicle dimensions of length, width, and height are shown in Exhibit 3 in the back of this report.

'DST' stands for Dawes Specialized Transport, a division of Dawes Crane and Rigging Inc., a company that is well known for hauling oversize overweight loads. DST utilizes a fleet of heavy specialized equipment, including their 100- and 200-ton capacity lowboy trailer combinations. Hence a DST Lowboy is a truck that is the equivalent of a lowboy owned and utilized by DST.

As to the DST Lowboy, we can define it for the purposes of a tool we used. OSOW trucks are like legos in that, one can have several different combinations, hence the word specialized. Then based on commodity we are confident that longer loads would have a similar set up to the DST Lowboy. We could just drop the DST because Lowboy by itself can be equivalent in size to a standard 53' foot Van or flatbed trailer. We need to say specialized or articulated lowboy to cover the jeep (essentially the extra 5th wheel and extra articulation) and stingers or 5 axle groupings in the back.

The DST Lowboy vehicle we have assumed is the jeep, the mule and the trailer. This is the three-part vehicle we modeled. They might not need all three parts to carry a specific load.

Vehicle Checks of Horizontal Layout

OSOW check vehicles from GHD's vehicle library were utilized to identify necessary modifications. The WB-92 and DST Lowboy were generally the controlling vehicles for determining the necessary horizontal geometric modifications at both roundabouts. The predominate movements from the majority of the single vehicle permits are eastbound and westbound SR 18 traffic to northbound I-85.

The following table shows which vehicles and directions should be mitigated to accommodate movements based solely on known permit history. These are depicted in blue on the attached swept path diagrams.

Direction	DST Lowboy	Mobile Home	WB-92
E 18 to S 85	No	No	Yes
W 18 to N 85	Yes	No	Yes
E 18 to N 85	Yes	Yes	Yes
W 18 to S 85	Yes	Yes	Yes
N 85 to E or W 18	Yes*		
S 85 to E 18	Yes*		
S 85 to W 18	To be determined		
From E 18 to W 18	Yes	No	No
From W 18 to E 18	No	No	No

* Check vehicles to be determined prior to Preliminary Design

Trucks are likely delivering loads in one direction and either on a linked trip to another destination or may be returning empty to the same destination. The Lowboy can be shortened once it delivers the load.

In addition to the vehicles and directions checked based on the permit data, GHD also checked the eastbound and westbound through movements on SR 18 through the interchange. These are shown in orange on the attached swept path diagrams.

The following movements were analyzed:

1. eastbound (SR 18) to southbound (I-85) right turn
2. eastbound (SR 18) to northbound (I-85) left turn
3. westbound (SR 18) to southbound (I-85) left turn
4. westbound (SR 18) to northbound (I-85) right turn
5. eastbound (SR 18) through movement
6. westbound (SR 18) through movement

Eastbound to Southbound Right Turn (SR 18 to I-85)

Horizontal modifications are necessary to accommodate the eastbound to southbound right turn. Because of the WB-92 movement, a concrete pad, or truck blister, behind the mountable curb will be required. See Exhibits 1-4 for analysis results.

Eastbound to Northbound Left Turn (SR 18 to I-85)

Horizontal modifications are necessary to accommodate the eastbound to northbound left turn through the interchange. A truck pad should be added to the right side of the entry at both roundabouts due to all three design vehicles off-tracking behind the curb. The southeast side of the eastern roundabout requires horizontal adjustment due to the DST Lowboy. See Exhibits 1-4 for analysis results.

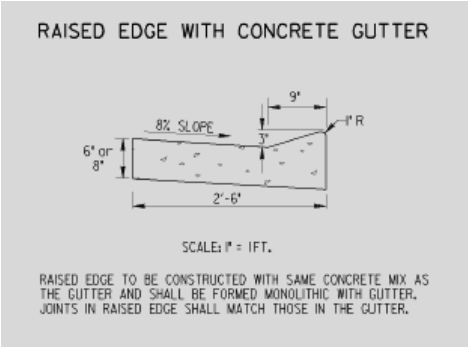
Westbound to Southbound Left Turn (SR 18 to I-85)
Horizontal modifications are necessary to accommodate the westbound to southbound left turn through the interchange. A truck pad should to be added to the right side of the entry at the western roundabout due to the WB-92. The northwest side of the western roundabout requires horizontal adjustment in the form of a widened truck apron due to the DST Lowboy and WB-92. See Exhibits 1-3 for analysis results.

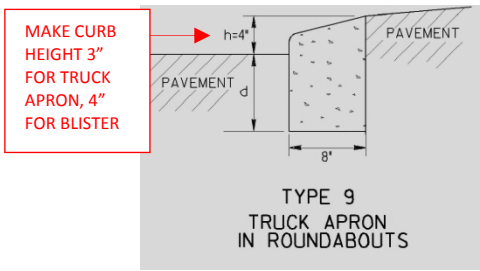
Westbound to Northbound Right Turn (SR 18 to I-85)
Horizontal modifications are necessary to accommodate the westbound to northbound right turn for the DST Lowboy and WB-92 design vehicles. A truck pad behind the mountable curb should be provided during design. See Exhibits 1-3 for analysis results.

Eastbound Through (SR 18)
Horizontal modifications on the eastern departure from the east roundabout are necessary to accommodate the eastbound through movement for the DST Lowboy and WB-92. A truck pad behind the inside edge of the mountable splitter island curb should be provided during design. See Exhibits 1-3 for analysis results.

Curb Type for Alternative Truck Apron or Outside Truck Blister

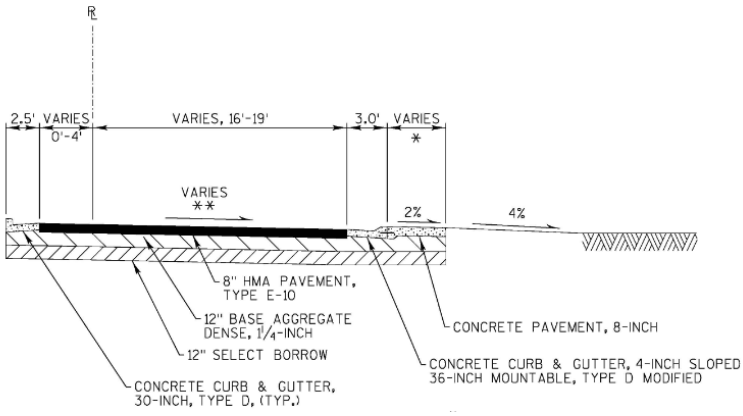
The study team recommends that either a 3-inch raised edge with concrete gutter or a Type 9 curb with a 3-inch curb height be used for the truck apron and outside truck blisters. Details of the 3-inch curb alternatives are shown below.



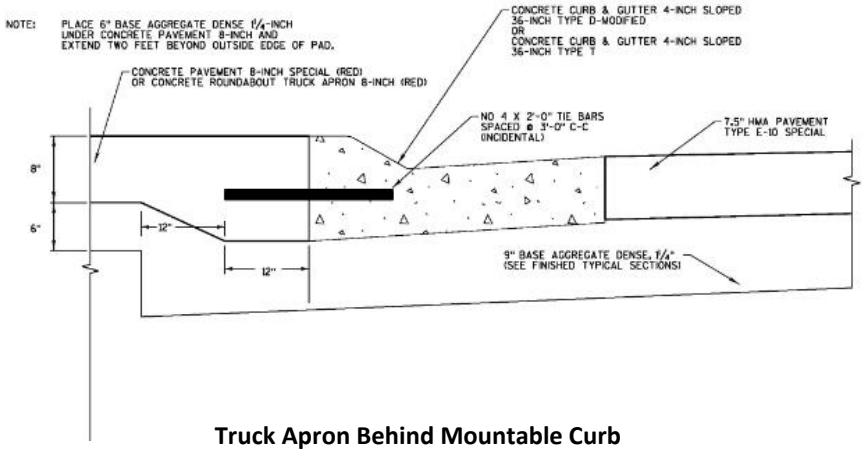


Truck Blisters

Additional concrete pavement, 8 inches thick, should be installed behind the mountable curb as a truck over-tracking area or 'truck blister' in the areas identified in Exhibits 1-4. The truck blister pavement shall be attached to the mountable curb with tie bars. See illustrations below.



Truck Blister Behind Mountable Curb



Truck Apron Behind Mountable Curb

Future Vertical Analysis

The DST Lowboy design vehicle is recommended as the controlling check vehicle for analyzing ground clearance in AutoTurn Pro. During Preliminary Design, vertical analyses should be performed using a minimum ground clearance of 5 inches; while the actual ground clearance of the DST Lowboy is 6 inches. Several swept paths in each direction analyzed should be developed to document various scenarios.

Limitations

GHD will do further investigation of the ProMiles permit data prior to Preliminary Design.

To ensure that multi trip permit holders are not impeded at this interchange it is recommended that the WB 92 with the recommended buffers be checked in all directions and necessary mitigations preformed accordingly.

Conclusion

This analysis shows that it is feasible for OSOW trucks to use the I-85/SR 18 interchange if several accommodations are made to the proposed roundabouts. Exhibit

1 illustrates the additional over-tracking areas that are necessary to accommodate typical OSOW vehicles. A vertical analysis should be conducted during Preliminary Design, and a final check should be performed when completing Final Design details.

Lessons Learned

From a review of the permit data received it was determined that no new OSOW vehicles need to be created or added to GHD's existing OSOW vehicle library. Instead existing vehicles could be used with a buffer added for width. Specifically the DST Lowboy, WB 92 and Mobile Home from GHD library can be used and the buffer should be 16' wide for the Mobile Home, 14' wide for the DST Lowboy, and 12' wide for the WB 92 respectively. With these buffers, modeling these known OSOW vehicles through the proposed design is the only reasonable alternative to verifying the vehicles with industry. These buffers would be in addition to any shy distance that may be added around the vehicle's existing dimensions within the GHD OSOW library of vehicles. Further the presence of any Lowboy configuration will give some indication of the vertical clearance issues that may be presented at these intersections once the project gets into Preliminary Design. The key is to avoid creating features that will cause low clearance vehicles to get hung up or bottom out as the vehicles move through the interchange.

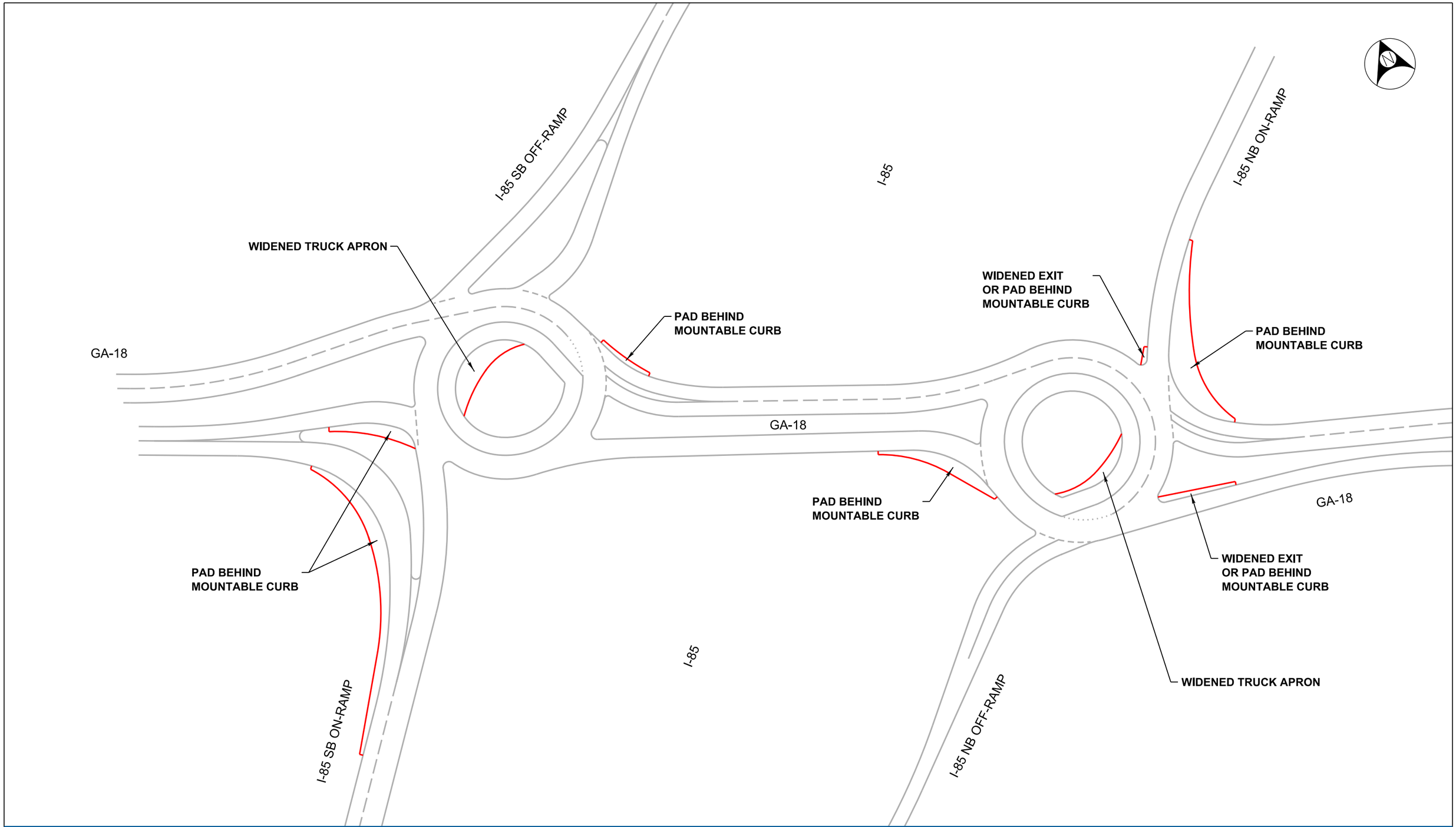
Statewide OSOW Network Needed

The study team recommends that GDOT develop a statewide OSOW roadway freight network to accommodate OSOW vehicles and facilitate the flow of freight. An OSOW network offers several benefits. First, trucks can be channeled to the best, most accommodating routes. Second, a set of check vehicles can be developed proactively and applied during design for projects across the state as needed. GDOT should avoid simultaneous construction on two parallel OSOW routes.

A statewide study to determine OSOW check vehicles for intersection designs is more economical than performing individual project investigations. Some OSOW vehicle types may be limited to certain regions of the state, while others should be checked statewide. The statewide study should develop a recommended process and procedure for when and where to use the various check vehicles.

Vertical clearance analysis is also a crucial element in the proposed statewide OSOW network development and evaluation process. Sometimes roadway construction modifications are made to accommodate drainage that later become an impediment for freight. We are presently working with Glen Williams and his colleagues to enable GDOT designers to manipulate In-Roads software and AutoTurn to model OSOW vehicles.

Overall, the development of a statewide OSOW network will save the state a significant amount of time and money in program delivery, help to ensure that the state is creating a uniform system, and avoid creating impediments to trucks and OSOW vehicles. In the long run, the network will boost Georgia's economy by effectively providing for the efficient movement of goods and creating a competitive advantage for Georgia compared to states without a similar network.



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I-85 at GA-18

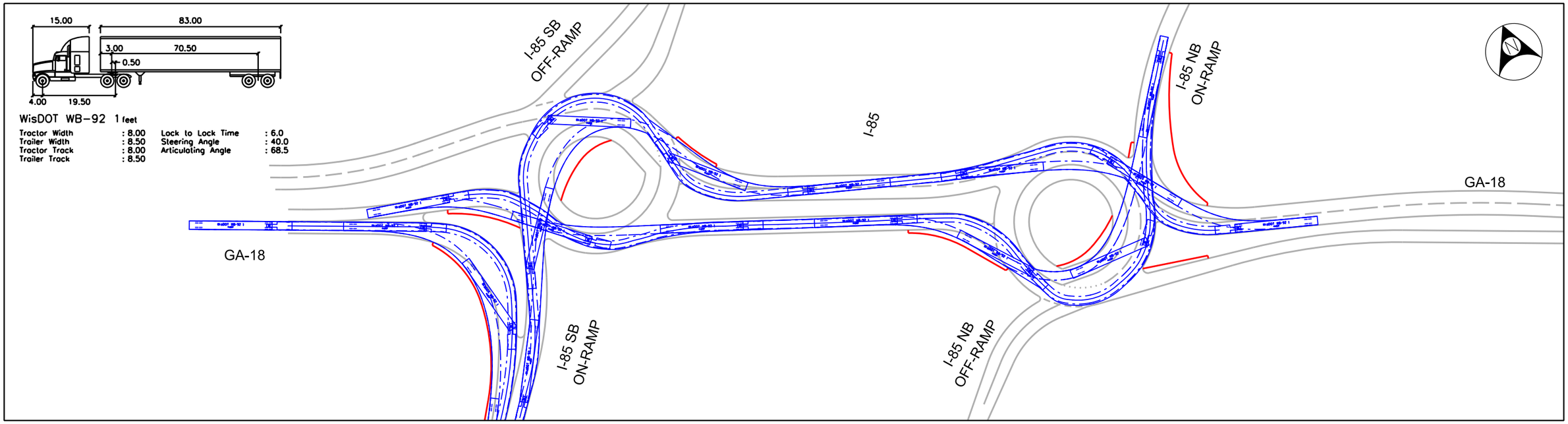
West Point, Georgia

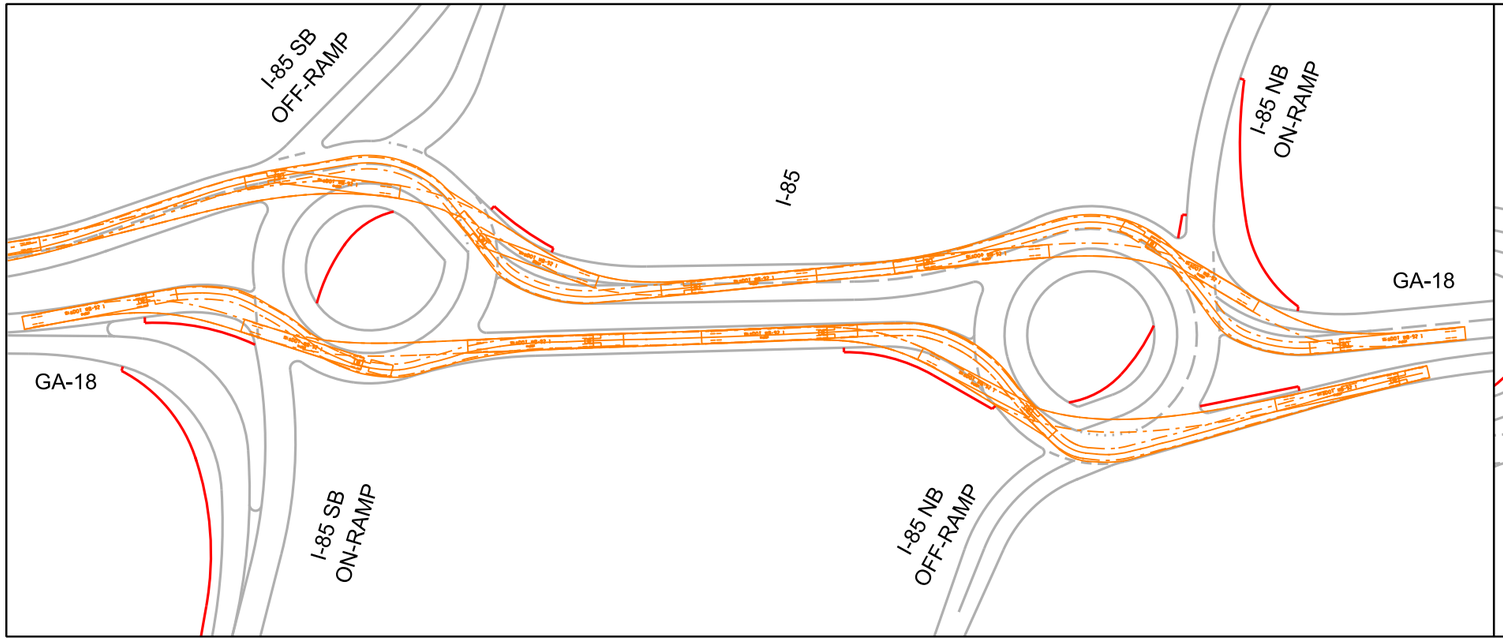
OSOW HORIZONTAL GEOMETRY MODIFICATIONS

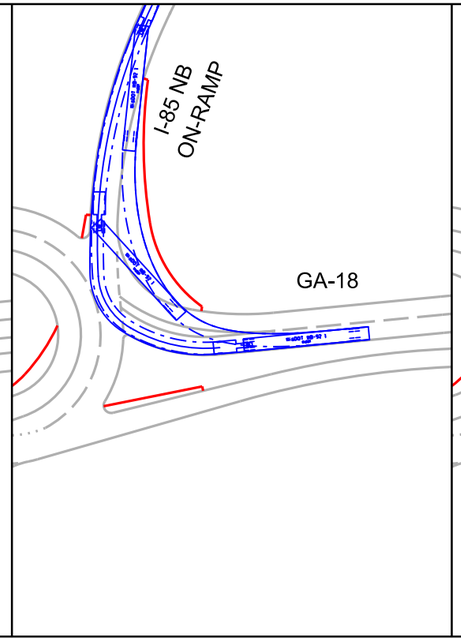
SCALE
0 25 50

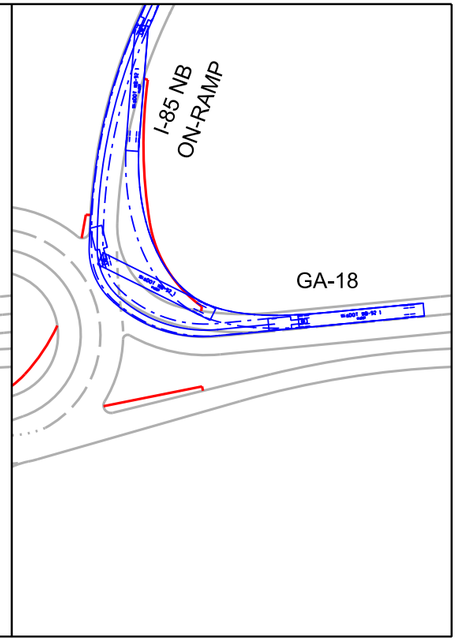
EXHIBIT: 1

Plot Date: 1/20/2015 File Name: G:\86\8618323 McGee I-85 OSOW\CADD\OSOW Exhibits\GHD_ex1_Accommodations.dgn









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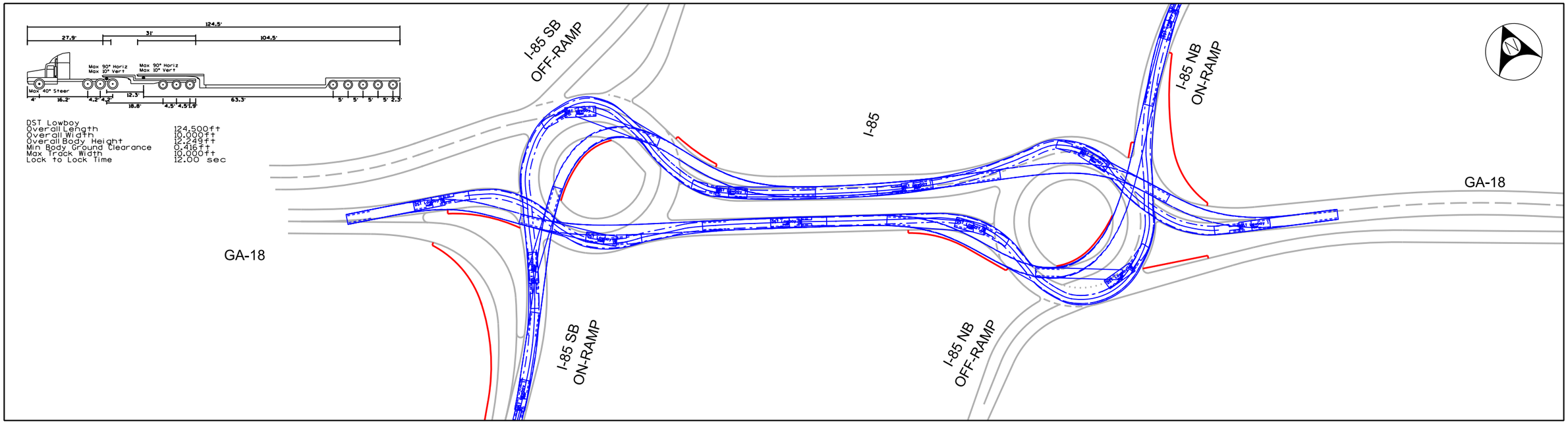
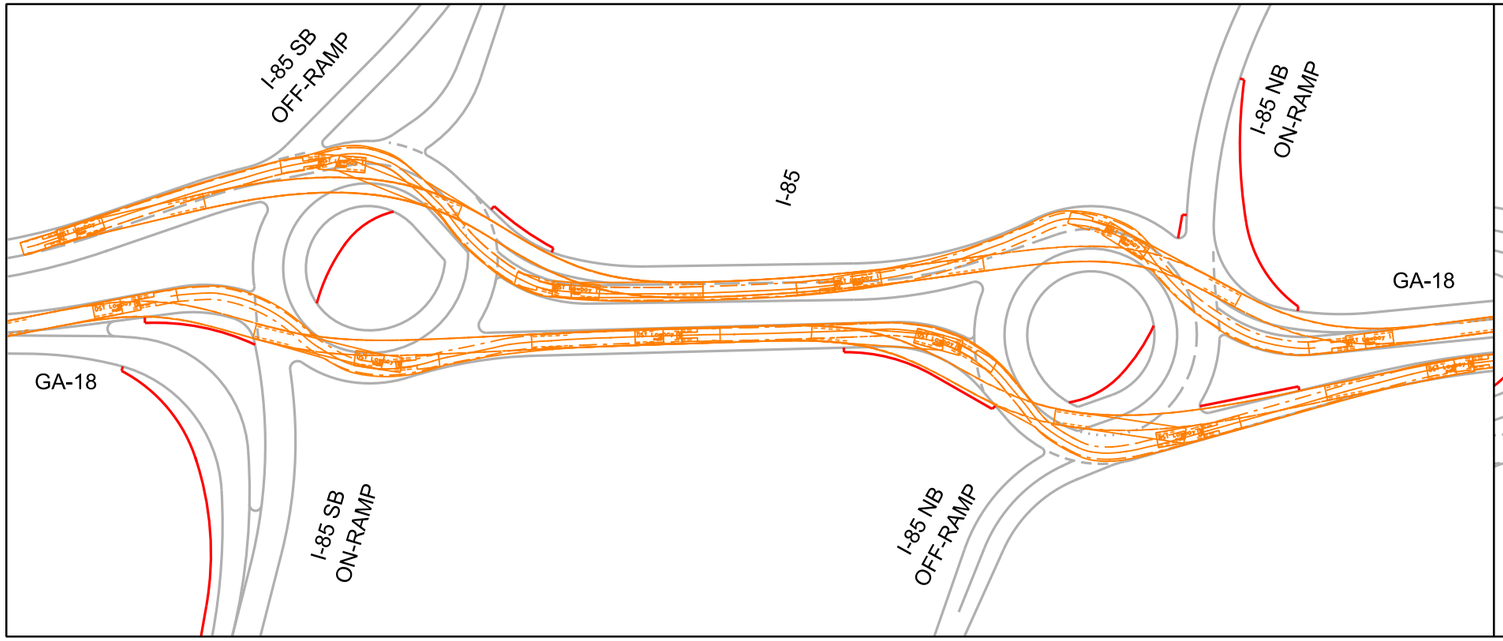
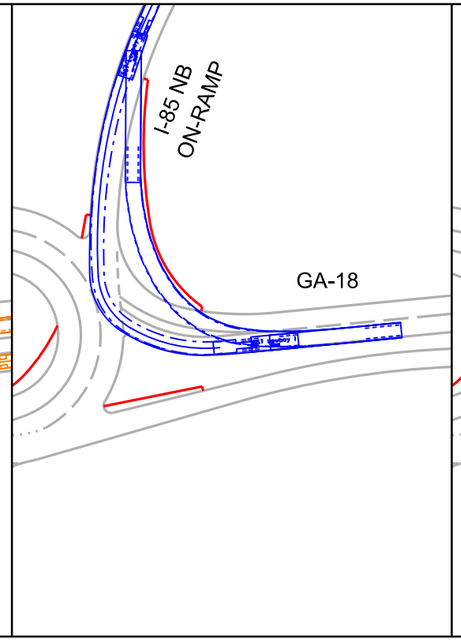
DESIGN VEHICLE - WB 92

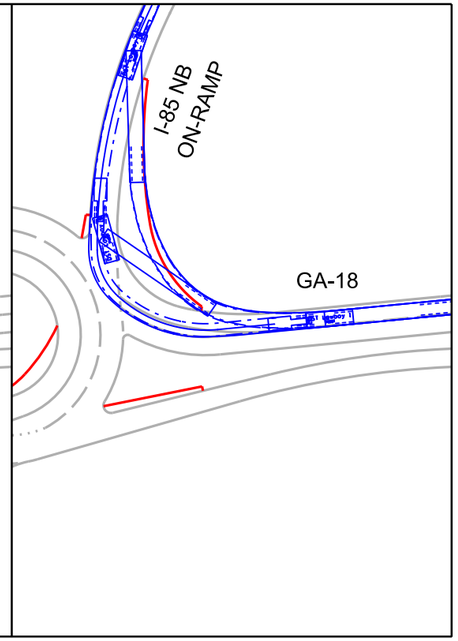
SCALE
0 50 100

EXHIBIT: 2









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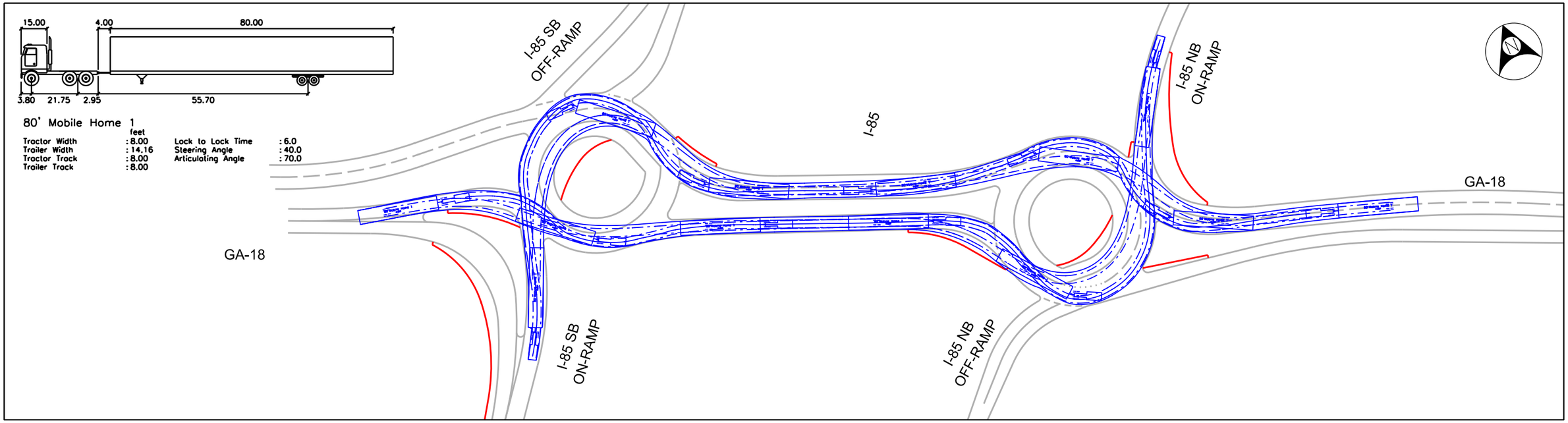
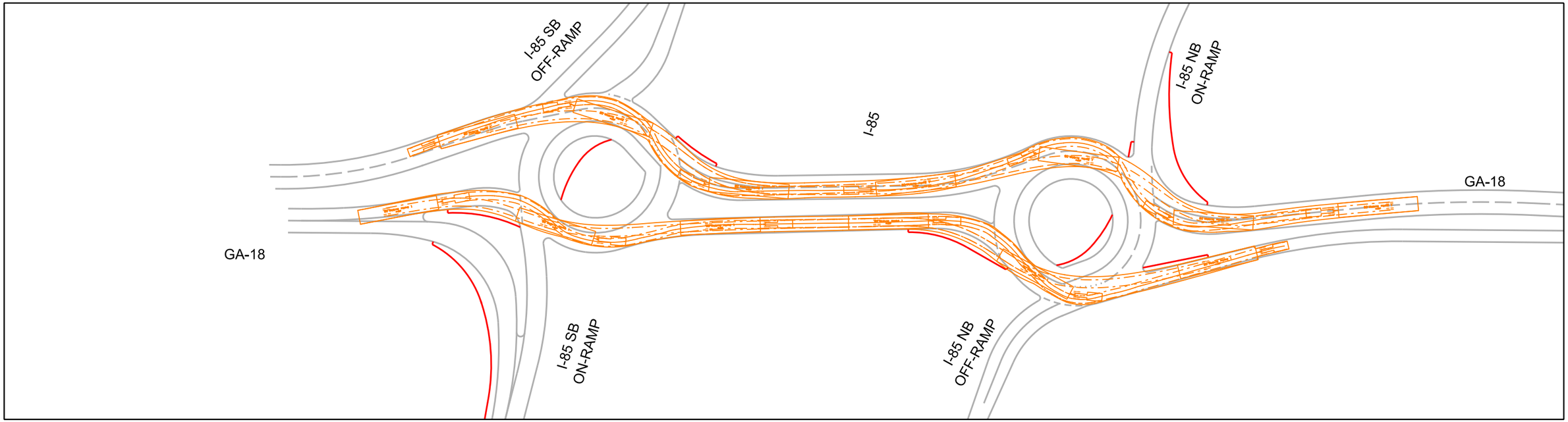
DESIGN VEHICLE - DST LOWBOY

SCALE
0 50 100

EXHIBIT: 3





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I-85 at GA-18

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DESIGN VEHICLE - MOBILE HOME

SCALE
0 50 100

EXHIBIT: 4

APPENDIX A

WEST POINT, GEORGIA

I-85 at SR 18 (10th Street)

BENTLEY PERMIT DATA

APRIL 2009 THROUGH JUNE 2014

ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Georgia Department of Transportation

Parameters: Route From, Route To, Height, Path, App No, Permit No, US DOT #

Processed Date: 5/27/14

	App No	Permit No	Route Start	Route End	Width	Length	Height	GVW (lbs)	Start Date	End Date	Path
1	690896	I0379701	WEST POINT	AL LINE	12ft 0in	70ft 0in	15ft 0in	148000	04/15/2009	04/25/2009	GA-18, I-85 BEG: GA-18 & US-29 (1)(5) Excavator BHB
2	691621	I0387371	WEST POINT	FOREST PARK	12ft 0in	100ft 0in	14ft 0in	125000	04/15/2009	04/25/2009	GA-103, GA-18, I-85, US-27 ALT, GA-16, OLD GA-16, GA-154, GA-34, GA-54, GA-74 EXIT #61 I-85, I-285, I-75, FRONTAGE RD. BEG: GA-103 @ HARRIS COUNTY BUSINESS Trackhoe END: FRONTAGE RD @ TRACTOR & EQUIPMENT (8)(11) BLM
3	691698	I0387691	WEST POINT	AL LINE	11ft 6in	80ft 0in	14ft 0in	135000	04/15/2009	04/25/2009	GA-18, I-85 Excavator BEG: GA-18 AND US-29 (1)(5) BHB
4	700560	I0474351	WEST POINT	FAIRBURN	9ft 10in	100ft 0in	13ft 6in	149000	05/08/2009	05/19/2009	GEORGIAN TERRACE, BRIARCLIFF RD, SUMMERFIELD RD, OLD WELLS RD, AVENUE E, 10TH ST/GA-18, GA-18, I-85, GA-154, GA14/US-29, BISHOP RD. Crane BEG: 1 GEORGIAN TERRACE (1)(11) END: 7735 BISHOP RD BLM
5	701213	I0480391	WEST POINT	CONYERS	12ft 0in	75ft 0in	14ft 0in	130000	05/12/2009	05/22/2009	GA-103, GA-18, I-85, I-285, I-20, SIGMAN RD, OLD COVINGTON HWY, PLUNKETT RD BEG; GA-103 & GA-18 END; YARD (8)(11) SP
6	701271	I0480392	WEST POINT	CONYERS	11ft 0in	75ft 0in	14ft 0in	130000	05/12/2009	05/22/2009	GA-103, GA-18, I-85, I-285, I-20, SIGMAN RD, OLD COVINGTON HWY, PLUNKETT RD Backhoe BEG; GA-103 & GA-18 END; YARD (8)(11) SP

File Location: Public Folders/Operational Documents/ Overdimensional Permitting

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Daehan solution Johnson controls?

Georgia Department of Transportation

Parameters: Route From, Route To, Height, Path, App No, Permit No, US DOT #

Processed Date: 5/27/14

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7	711414	I0580771	WEST POINT	FLOWERY BRANCH	12ft 0in	100ft 0in	14ft 6in	125000	06/09/2009	06/19/2009	PROGRESS PKWY, GA-103, GA-18, I-85, US-27 ALT, GA-16, GA-54, GA-74, I-85, I-285, I-85, I-985, FRIENDSHIP RD Excavator BEG: 791 PROGRESS PKWY (8) (11) END: THOMPSON MILL RD & NEW FRIENDSHIP RD BHB
8	712340	I0589351	WEST POINT	FAYETTEVILLE	11ft 0in	75ft 0in	14ft 0in	125000	06/11/2009	06/22/2009	GA-103, GA-18, I-85, GA-74, MILAM RD, RIVERS RD, GA-92, GA-85, GA-54 Excavator BEG: GA-103 & GA-18 (8) (11) END: GA-54 & CALLOWAY RD BLM
9	713232	I0598161	WEST POINT	ACWORTH	16ft 0in	100ft 0in	14ft 6in	0	06/16/2009	06/26/2009	ANN MURPHY RD, US-29, GA-18, I-85, US-27 ALT, GA-16, OLD GA-16, GA-154, GA-34, GA-54, GA-74, I-85, I-285, I-75, GLADE RD, TANYARD CREEK RD Mobile Home BEG: 173 ANN MURPHY RD (1) (11) END: LOT 115E TANYARD CREEK RD BLM
10	713233	I0598171	WEST POINT	ACWORTH	16ft 0in	100ft 0in	14ft 6in	0	06/16/2009	06/26/2009	ANN MURPHY RD, US-29, GA-18, I-85, US-27 ALT, GA-16, OLD GA-16, GA-154, GA-34, GA-54, GA-74, I-85, I-285, I-75, GLADE RD, TANYARD CREEK RD Mobile Home BEG: 173 ANN MURPHY RD (1) (11) END: LOT 115E TANYARD CREEK RD BLM
11	718421	I0649551	WEST POINT	DOULGASVILLE	12ft 0in	70ft 0in	15ft 0in	148000	06/29/2009	07/09/2009	GA-18, I-85, GA-219, US-27, GA-166BP, GA-166, GA-61, I-20, GA-92, JARITA WAY (1) (11) BEG: GA-18 & US-29 Excavator END; JARITA WAY & GA-92 CMM

File Location: Public Folders/Operational Documents/ Overdimensional Permitting

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Georgia Department of Transportation

Parameters: Route From, Route To, Height, Path, App No, Permit No, US DOT #

Processed Date: 5/27/14

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12	718422	I0649621	WEST POINT	DOULGASVILLE	12ft 0in	70ft 0in	15ft 0in	148000	06/29/2009	07/09/2009	GA-18, I-85, GA-219, US-27, GA-166BP, GA-166, GA-61, I-20, GA-92, JARITA WAY BEG: GA-18 & US-29 END; JARITA WAY & GA-92 CMM Excavator I II
13	718423	I0649511	WEST POINT	DOULGASVILLE	12ft 0in	70ft 0in	15ft 0in	148000	06/29/2009	07/09/2009	GA-18, I-85, GA-219, US-27, GA-166BP, GA-166, GA-61, I-20, GA-92, JARITA WAY BEG: GA-18 & US-29 END; JARITA WAY & GA-92 CMM Excavator I II
14	718935	I0653791	WEST POINT	FAIRBURN	12ft 0in	80ft 0in	14ft 8in	142000	06/29/2009	07/09/2009	GA-18, I-85, US-27 ALT, GA-16. OLD GA-16, GA-154, GA-34, GA-54, GA-74, HOWELL AVENUE BEG: GA-18 @ JCT OF AVE E END: 107 HOWELL AVE BLM Crane I II
15	722232	I0686311	WEST POINT	FAIRBURN	12ft 0in	70ft 0in	15ft 0in	148000	07/08/2009	07/18/2009	GA-18, I-85, US-27 ALT, GA-16 E, OLD GA-16, GA-154, GA-34, GA-54, GA-74, LASER IND CT BEG: US-29 & GA-18 END: GA-74 & LASER IND CT REP Excavator I II
16	722242	I0686431	WEST POINT	DOUGLASVILLE	12ft 0in	70ft 0in	15ft 0in	148000	07/09/2009	07/20/2009	GA-18, I-85, GA-219, US-27, GA-166 BP, GA-166, GA-61, I-20, GA-92 BEG: GA-18 & US-29 END: JARITA WAY & GA-92 REP Excavator I II

File Location: Public Folders/Operational Documents/ Overdimensional Permitting

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Georgia Department of Transportation

Parameters: Route From, Route To, Height, Path, App No, Permit No, US DOT #

Processed Date: 5/27/14

	App No	Permit No	Route Start	Route End	Width	Length	Height	GVW (lbs)	Start Date	End Date	Path
17	722244	I0686501	WEST POINT	DOUGLASVILLE	12ft 0in	70ft 0in	15ft 0in	148000	07/09/2009	07/20/2009	GA-18, I-85, GA-219, US-27, GA-166BP, GA-166, GA-61, I-20, GA-92 BEG: GA-18 & US-29 END: JARITA WAY & GA-92 REP Excavator (1) (11)
											GA-18, I-85, US-27 ALT (EXIT #41), GA-16 E, OLD GA-16, GA-154, GA-34, GA-54, GA-74, LASER INDUSTRIAL CT BEG: US-29, GA-18 BEG: GA-74, LASER IND CT Excavator (1) (11)
18	722322	I0687891	WEST POINT	FAIRBURN	12ft 0in	70ft 0in	15ft 0in	148000	07/08/2009	07/18/2009	SP
19	727954	I0740831	WEST POINT	AL LINE	14ft 0in	112ft 0in	15ft 0in	180000	07/24/2009	08/04/2009	GA-103, GA-18, I-85 (8) (5) Excavator
											GA-103, GA-18, I-85, GA-109, GA-74, I-75, I-16, US-129, GA-49, GA-24, GA-88, US-17 BEG: GA-103, GA-18 Motor Scaper (8) (11)
20	738230	I0838691	WEST POINT	WRENS	11ft 0in	73ft 0in	13ft 6in	112000	08/25/2009	09/04/2009	CMM
21	747823	I0931201	WEST POINT	AL LINE	12ft 0in	80ft 0in	13ft 6in	40000	09/22/2009	10/02/2009	GA-18, I-85 Office Trailer in Tow ?
22	747827	I0931231	WEST POINT	AL LINE	12ft 0in	80ft 0in	13ft 6in	40000	09/22/2009	10/02/2009	GA-18, I-85 " " " " ?
23	758572	I1035031	WEST POINT	TN LINE	10ft 8in	70ft 0in	13ft 6in	80000	10/19/2009	10/29/2009	STATE LINE RD, US-29, GA-18, I-85, I-285, I-75, I-24 (1) (11) Paper Conveyor
											GA-103, GA-18, I-85, GA-219, ORCHARD HILL RD, LUKKEN IND DR, US-29, GA-109 ~~Paper Conveyor~~ BEG-DAVIDSON RD & GA-103 BL M (8) (5) Excavator
24	779725	I1243551	WEST POINT	AL LINE	10ft 0in	73ft 0in	13ft 6in	132000	12/16/2009	12/26/2009	
											DAVIDSON DR, GA-103, GA-18, I-85, WHITESVILLE RD, ORCHARD HILL RD, LUKKEN INDUSTRIAL DR, US-29, GA-109. (8) (5)
25	779816	I1243031	WEST POINT	AL LINE	13ft 4in	73ft 0in	13ft 6in	92000	12/16/2009	12/26/2009	BHB Dozer

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Georgia Department of Transportation

Parameters: Route From, Route To, Height, Path, App No, Permit No, US DOT #

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	App No	Permit No	Route Start	Route End	Width	Length	Height	GVW (lbs)	Start Date	End Date	Path
26	784181	J0001381	WEST POINT	AL LINE	11ft 9in	73ft 0in	12ft 8in	148000	01/04/2010	01/14/2010	DAVIDSON RD, GA-103, GA-18, I-85 Excavator BEG: DAVIDSON RD, GA-103 (8) (5) REP
27	808210	J0235851	WEST POINT	MABELTON	12ft 0in	100ft 0in	14ft 0in	125000	03/09/2010	03/19/2010	US-29, GA-18, I-85, GA-54, US-27 ALT, GA-16, OLD GA-16, GA-154, GA-34, GA-54, GA-74, I-85, I-285, HOLLOWELL PKY, RIVERVIEW RD Excavator BEGIN ADDRESS: US29, GA18 (1) (11) END ADDRESS: 6079 RIVERVIEW RD BLM BLM
28	817698	J0329241	WEST POINT	ACWORTH	12ft 0in	100ft 0in	14ft 0in	125000	04/01/2010	04/12/2010	GA-18, I-85, GA-54, GA-74, I-85, I-285, HOLLOWELL PKWY, RIVERVIEW RD, S COBB DR, I-285, I-75, CHASTAIN RD, US-41, CEDAR CREST RD, GOLF LINK DRIVE BEGIN ADDRESS: HWY-18 & I-85 — (11) ? END ADDRESS: CEDAR CREST RD & GOLF LINK DRIVE VIA: YARD Excavator BLM
29	818143	J0332031	WEST POINT	AL LINE	11ft 9in	73ft 0in	13ft 6in	132000	04/05/2010	04/15/2010	GA-103, GA-18, I-85 (8) (5) Excavator BEG: GA-103 & GA-18
30	824012	J0390701	WEST POINT	MABLETON	12ft 0in	100ft 0in	14ft 0in	135000	04/19/2010	04/29/2010	GA-18, I-85, I-285, HOLLOWELL PKWY, RIVERVIEW RD, BEG: HWY-18, I-85 END: 6079 RIVERVIEW RD — (11) ? SP

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ARPS Route Information

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Directions: %GA-18, I-85%

Georgia Department of Transportation

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	App No	Permit No	Route Start	Route End	Width	Length	Height	GVW (lbs)	Start Date	End Date	Path
											GA-18, I-85, GA 109 (EX # 18), US-27 ALT, GA-16 E, OLD GA-16, GA-154, GA-34, GA-54, GA-74, I-85, I-285, HOLLOWELL PKWY, RIVERVIEW RD BEG: HWY-18, I-85 END: 6079 RIVERVIEW RD — (11) ?
31	824419	J0390702	WEST POINT	MABLETON	12ft 0in	100ft 0in	14ft 0in	135000	04/19/2010	04/29/2010	SP Excavator
32	830397	J0452591	WEST POINT	AL LINE	16ft 0in	100ft 0in	13ft 6in	-1	05/04/2010	05/14/2010	JARRELL HOGG RD, ADAMS RD, GA-18, I-85 BEGIN ADDRESS: 549 JARRELL HOGG RD BHB (10) (5) Mobile Home
33	830398	J0452611	WEST POINT	AL LINE	16ft 0in	100ft 0in	13ft 6in	-1	05/04/2010	05/14/2010	JARRELL HOGG RD, ADAMS RD, GA-18, I-85 BEGIN ADDRESS: 549 JARRELL HOGG RD BHB (10) (5) Mobile Home
34	851736	J0658721	WEST POINT	TN LINE	10ft 0in	70ft 0in	13ft 6in	84000	06/28/2010	07/09/2010	FORTE DR, GA-18, I-85, I-285, I-75, I-24 Kia Plant (3) (11) Shuttle Wagon
35	858153	J0721951	WEST POINT	AUSTELL	11ft 0in	100ft 0in	13ft 6in	125000	07/16/2010	07/27/2010	STATE LINE RD, 3RD AVE, 10 TH AVE/US 29, GA-18, I-85, I-285, I-20, RIVERSIDE PKWY Crane BEGIN ADDRESS: 20201 STATE LINE RD END ADDRESS: 485 RIVERSIDE PKWY (1) (11) SP
36	937303	K0160651	WEST POINT	ELLENWOOD	12ft 6in	72ft 0in	13ft 8in	148000	02/18/2011	03/01/2011	GA-103, GA-18, I-85, I-285, I-675, ANVIL BLOCK RD, TANNERS CHURCH RD BHB BEGIN ADDRESS: GA-103 & GA-18 (8) (11) Dozer END ADDRESS: ANVIL BLOCK RD & TANNERS CHURCH RD
37	937891	K0167621	WEST POINT	JENKINSBURG	14ft 0in	100ft 0in	14ft 6in	125000	02/21/2011	03/03/2011	GA-103, GA-18, I-85, US-27 ALT/US-29, GA-16, HIGH FALLS RD, ENGLAND CHAPEL RD, US-23, HOLLY ST, MAIN ST/GA-42. Off Road BHB BEGIN ADDRESS: HWY-103, WHITEN RD (8) (11) Dump Truck END ADDRESS: GA-42, STONEY BROOK DR

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Directions: %GA-18, I-85%

Georgia Department of Transportation

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38	938560	K0173331	WEST POINT	ELLENWOOD	12ft 0in	72ft 0in	13ft 8in	148000	02/23/2011	03/05/2011	GA-103, GA-18, I-85, I-285, I-675, ANVIL BLOCK RD, TANNERS CHURCH RD BEG: GA-103 AND GA-18 Backhoe (8) (11) END: ANVIL BLOCK RD AND TANNERS CHURCH RD BLM
39	940060	K0187581	WEST POINT	AUSTELL	11ft 0in	85ft 0in	13ft 6in	148000	02/24/2011	03/07/2011	MANAGEMENT RD, US-29, GA-18, I-85, I-285, I-20, SIX FLAGS PKWY, RIVERSIDE PKWY Crane BEGIN ADDRESS: WEST POINT DAM/MANAGEMENT RD. & US-29 END ADDRESS: 485 RIVERSIDE PKWY (1) (11) BLM
40	941771	K0203751	WEST POINT	EATONTON	14ft 0in	100ft 0in	14ft 6in	125000	03/01/2011	03/11/2011	GA-103, GA-18, I-85, I-285, I-20, US-441 (8) (11) BEGIN ADDRESS: GA- 103 & WHITTEN RD END ADDRESS: MILLEDGEVILLE HWY & DENNIS STATION RD Trackhoe BLM
41	942996	K0216121	WEST POINT	ATLANTA	12ft 0in	72ft 0in	13ft 8in	125000	03/03/2011	03/14/2011	GA-103, GA-18, I-85, I-285, PEACHTREE IND BLVD, JOHNSON FERRY RD Scraper BEG: GA-103 AND GA-18 END: JOHNSON FERRY RD AND DURDEN RD (8) (11) BLM
42	944589	K0231071	WEST POINT	ELLENWOOD	12ft 0in	72ft 0in	13ft 8in	148000	03/08/2011	03/15/2011	GA-103, GA-18, I-85, I-285, I-675, ANVIL BLOCK RD, TANNERS CHURCH RD Backhoe BEG; GA-103 & GA-18 END; ANVIL BLOCK & TANNERS CHURCH RD REP (8) (11)

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43	962581	K0406611	WEST POINT	BOWDEN	14ft 0in	100ft 0in	14ft 6in	148000	04/20/2011	04/30/2011	GA-103, GA-18, I-85, US-27, GA-100, GA-166, KUGLAR ST, LIPHAM ST, SANDY FLAT RD BHB BEG: GA-103 AND WHITTEN RD END: SANDY FLAT RD AND LIPHAM ST. Trackhoe 8 11
44	964010	K0419381	WEST POINT	ELLENWOOD	12ft 0in	72ft 0in	13ft 8in	148000	04/25/2011	05/05/2011	GA-103, GA-18, I-85, I-285, I-675, ANVIL BLOCK RD, TANNERS CHURCH RD, Backhoe 8 11 BEGIN ADDRESS: GA-103 & GA-18 END ADDRESS: ANVIL BLOCK RD & TANNERS CHURCH RD BLM
45	964572	K0423411	WEST POINT	AL LN	8ft 6in	68ft 0in	13ft 6in	96000	04/26/2011	05/06/2011	GA-18, I-85 Kia Plant Mobil Lift 3 5 BEG: GA-18 & KIA PKWY
46	973183	K0508251	WEST POINT	AL LINE	8ft 6in	68ft 0in	13ft 6in	96000	05/17/2011	05/27/2011	GA-18, I-85 BEG: GA-18 & KIA PKWY Kia Plant 3 5
47	974432	K0522111	WEST POINT	LUTHERSVILLE	12ft 0in	70ft 0in	14ft 6in	148000	05/19/2011	05/30/2011	THIRD AVE , E. 10TH ST, GA-14, GA-18, I-85, GA-109, GA-41 / US-27 ALT BEGIN ADDRESS: THIRD AVE & 15TH STREET END ADDRESS: CORNER OF COLEMAN CREEK CIRCLE & US-27 ALT. BLM Excavator 1 11 NOTE: WHEN CROSSING BRIDGE OVER GEORGIA RAILROAD ON GA-109 IN MERIWETHER CO. 1.) SPEED LESS THAN 5MPH. 2.) STRADDLE CENTERLINE OF BRIDGE. 3.) ONLY VEHICLE ON BRIDGE WHEN CROSSING.
48	974611	K0522451	WEST POINT	TN LN	8ft 6in	68ft 0in	13ft 6in	96000	05/20/2011	05/31/2011	KIA PKWY, GA-18, I-85, I-285, I-75 Mobile Lift : Kia Plant 3 11

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	App No	Permit No	Route Start	Route End	Width	Length	Height	GVW (lbs)	Start Date	End Date	Path
49	978451	K0560811	WEST POINT	LUTHERSVILLE	12ft 0in	70ft 0in	13ft 6in	148000	05/31/2011	06/10/2011	3RD AVE, E 10TH ST, US-29, GA-18, I-85, GA-109, TERRELL ST, GA-41/US-27 ALT. Excavator 1 11 BHB BEG: 3RD AVE AND 15TH ST END: US-27 ALT AND COLEMAN CREEK BRIDGE NOTE: DO NOT TRAVEL ACROSS CREEK BRIDGE
50	978580	K0561881	WEST POINT	NEWNAN	12ft 0in	100ft 0in	13ft 0in	148000	05/31/2011	06/10/2011	WEBB RD, GA-14/US29 S, GA-18, I-85, GA-34, PKWY NORTH. Kia Plant Grinder 1 11 BHB BEGIN ADDRESS: WEBB RD & GA-14/US29. ND ADDRESS: PKWY NORTH AND GA-34
51	981732	K0593511	WEST POINT	VILLA RICA	12ft 0in	66ft 0in	13ft 6in	125000	06/08/2011	06/18/2011	OLD WEST POINT RD, US-29, GA-18, I-85, US27, GA166, GA61, I-20, LIBERTY RD, EDGE RD Excavator 1 11 BEGIN ADDRESS: 2560 OLD WEST POINT RD END ADDRESS: 459 EDGE RD SP
52	981922	K0594191	WEST POINT	LA GRANGE	14ft 0in	100ft 0in	14ft 6in	148000	06/08/2011	06/18/2011	GA-18, I-85, GA-109, GA-14 SPUR Kia Plant Grinder 3 11 ? BEG GA-18 & KIA PKWY END GA-14 SPUR, & US-29 CMM
53	989010	K0663561	WEST POINT	CARROLLTON	10ft 0in	100ft 0in	14ft 6in	160000	06/29/2011	07/09/2011	DAVIDSON RD, GA-18, I-85, US-27 N, GA-166 W, BURWELL RD N, LAMBERT LN N, LOVVORN RD E. 8 or 10 11 Tank BEG: DAVIDSON RD & GA-18 END: 2550 LOVVORN RD.
54	989154	K0664961	WEST POINT	PALMETTO	14ft 0in	100ft 0in	14ft 9in	135000	06/27/2011	07/07/2011	GA-18, I-85, GA-154, US-29. Backhoe 11 ? BHB

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

Georgia Department of Transportation

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59	1001793	K0793351	WEST POINT	MILTON	12ft 0in	71ft 0in	13ft 8in	148000	07/29/2011	08/09/2011	GA-103, GA-18, I-85, I-285, GA-400, MCFARLAND RD, GA-9 BEG: GA-103 & GA-18 END: GA-9 & MCFARLAND RD (8) (11) Scraper SP
60	1006941	K0844371	WEST POINT	WOODSTOCK	12ft 0in	80ft 0in	14ft 6in	125000	08/10/2011	08/20/2011	WEBB RD, US-29, GA-18, I-85, I-285, I-75, I-575, GA-92, SOUTH CHEROKEE LN Kia Plant Dump Truck BEG: WEBB RD & US-29 END: SOUTH CHEROKEE LN & GA-92 (1) (11) CMM
61	1007556	K0848691	WEST POINT	GRIFFIN	12ft 0in	80ft 0in	14ft 6in	125000	08/11/2011	08/22/2011	WEBB RD, US-29, GA-18, I-85, GA-27 ALT, GA-16, US-19/41, BIRDIE RD, BAPTIST CAMP RD, JORDAN HILL RD Kia Plant BEG: WEBB RD AND US-29 END: BAPTIST CAMP RD AND JORDAN HILL RD Dump Truck (1) (11) SP
62	1007557	K0848731	WEST POINT	WOODSTOCK	12ft 0in	80ft 0in	14ft 6in	125000	08/11/2011	08/22/2011	WEBB RD, US-29, GA-18, I-85, I-285, I-75, I-575, SIXES RD, BELLS FERRY RD, STEEL BRIDGE RD Kia Plant BEG: WEBB RD & US-29 END: BELLS FERRY RD & STEEL BRIDGE RD Dump Truck (1) (11) SP
63	1007558	K0848741	WEST POINT	WOODSTOCK	12ft 0in	80ft 0in	14ft 6in	125000	08/11/2011	08/22/2011	WEBB RD, US-29, GA-18, I-85, I-285, I-75, I-575, SIXES RD, BELLS FERRY RD, STEEL BRIDGE RD Kia Plant BEG: WEBB RD & US-29 END: BELLS FERRY RD & STEEL BRIDGE RD Dump Truck (1) (11) SP

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ARPS Route Information

Route Start: WEST POINT

Directions: %GA-18, I-85%

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64	1007560	K0848771	WEST POINT	WOODSTOCK	12ft 0in	80ft 0in	14ft 6in	125000	08/11/2011	08/22/2011	WEBB RD, US-29, GA-18, I-85, I-285, I-75, I-575, SIXES RD, BELLS FERRY RD, STEELS BRIDGE RD Kia Plant BEG: WEBB RD & US-29 END: BELLS FERRY RD & STEELS BRIDGE RD 1 11 Dump Truck SP
65	1008368	K0860681	WEST POINT	PEACHTREE CITY	12ft 0in	83ft 0in	14ft 6in	160000	08/15/2011	08/25/2011	WEBB RD, US-29, GA-18, I-85 N, GA-154 S (EX #51), GA-34 E, GA-54 E, GA-74 S, TDK BLVD, DIVIDEND DR. Kia Plant BEG: WEBB RD & US-29 END: 411 DIVIDEND DR. 1 11 Excavator
66	1008774	K0859981	WEST POINT	PEACHTREE CITY	12ft 0in	80ft 0in	14ft 6in	135000	08/15/2011	08/25/2011	WEBB RD, US-29, GA-18, I-85, GA-34, GA-54, GA-74, TDK BLVD, DIVIDEND DR Kia Plant BEG: WEBB RD & US-29 END: 411 DIVIDEND DR 1 11 Excavator SP
67	1009637	K0870991	WEST POINT	DOUGLAS	12ft 0in	83ft 0in	14ft 6in	160000	08/17/2011	08/27/2011	WEBB RD, US-29, GA-18, I-85, I-185 S, US-80 E (EX #10), GA-96 E, I-75 S, US-82 E (EX #62), US-441 N, GA-32, BOWENS MILL RD, LANDFILL RD. Kia Plant → landfill BEG: WEBB RD & US-29 END: 1219 LANDFILL RD. 1 11 Excavator
68	1015662	K0928261	WEST POINT	ELLENWOOD	12ft 0in	71ft 0in	13ft 8in	148000	08/31/2011	09/10/2011	GA-103, GA-18, I-85, I-285, I-675, ANVIL BLOCK RD, TANNER CHURCH RD. BHB BEGIN ADDRESS: GA-103 & GA-18. 8 11 Backhoe END ADDRESS: TANNER CHURCH RD & ANVIL BLOCK RD.

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Directions: %GA-18, I-85%

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75	1104012	L0395951	WEST POINT	NEWNAN	12ft 0in	100ft 0in	14ft 6in	148000	04/09/2012	04/19/2012	GA-103, GA-18, I-85, GA-34, NEWNAN CROSSING BYPASS BEGIN ADDRESS: 2631 GA-103 END ADDRESS: NEWNAN CROSSING BYPASS & LOWER FAYETTEVILLE BHB 8 11 Rock Crusher
76	1107499	L0428341	WEST POINT	SMYRNA	12ft 0in	80ft 0in	13ft 0in	135000	04/17/2012	04/27/2012	DAVIDSON RD, GA-103, GA-18, I-85, I-285, S. COBB DR, GA-280, POWDER SPRINGS ST, WARD ST BEG: 791 NORTH PROGRESS PKWY END: 2525 WARD ST BLM 8 or 10 11 Off Road Dump Truck
77	1109526	L0448611	WEST POINT	FOREST PARK	12ft 0in	75ft 0in	14ft 6in	125000	04/23/2012	05/03/2012	NORTH PROGESS PKWY, GA-103, GA-18, I-85, I-285, I-75, GA-85 BEGIN ADDRESS: 791 NORTH PROGESS PKWY END ADDRESS: 5035 GA-85 BLM 8 11 Excavator
78	1110416	L0459041	WEST POINT	CHAMBLEE	12ft 0in	80ft 0in	13ft 0in	148000	04/25/2012	05/05/2012	DAVIDSON RD, GA-103, GA-18, I-85, I-285, GA-141, PIERCE DR BEG: 791 N PROGRESS PKWY END: 3652 PIERCE DR SP 8 or 10 11 Excavator
79	1120420	L0555381	WEST POINT	TOCCOA	12ft 0in	95ft 0in	13ft 6in	132000	05/17/2012	05/28/2012	N. PROGRESS PKWY, DAVIDSON RD, GA-103, GA-18, I-85, I-285, I-85, GA-17, ARROWHEAD DRIVE BEG: 791 N. PROGRESS PKWY END: 203 ARROWHEAD DRIVE BLM 8 or 10 11 Crane House
80	1127835	L0627051	WEST POINT	MCDONOUGH	8ft 6in	68ft 0in	13ft 6in	135000	06/06/2012	06/16/2012	NORTH PROGRESS PKWY, GA-103, GA-18, I-85, I-285, I-75, GA-155, MACON ST. BHB BEG: 791 NORTH PROGRESS PKWY. END: 535 MACON ST. 8 11 Fork Lift

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88	128520 2	M0721151	WEST POINT	AL LN	8ft 6in	84ft 0in	13ft 6in	106000	07/08/2013	07/18/2013	N PROGRESS PKWY, DAVIDSON RD, GA 103 N, GA-18, I-85 BEG: 291 N PROGRESS PKWY CMM 8 5 Fork Lift
89	128520 7	M0721141	WEST POINT	AL LN	8ft 6in	84ft 0in	13ft 6in	106000	07/08/2013	07/18/2013	N PROGRESS PKWY, DAVIDSON RD, GA 103 N, GA-18, I-85 BEG: 291 N PROGRESS PKWY CMM 8 5 Fork Lift
90	128672 7	M0735831	WEST POINT	AL LN	13ft 0in	92ft 0in	13ft 6in	150000	07/09/2013	07/19/2013	N PROGRESS PKWY, GA-103, GA-18, I-85 BEG: 291 NORTH PROGRESS PKWY SP 8 5 Crane House
91	136106 1	N0057441	WEST POINT	MORELAND	14ft 0in	100ft 0in	14ft 6in	135000	01/17/2014	01/28/2014	GA-103, GA-18, I-85, US-29, BEXTON RD, HAYNIE RD BEG: GA-103 & GA-18 END: HAYNIE RD & BEXTON RD BLM 8 11
92	137075 3	N0152601	WEST POINT	WILLIAMSON	12ft 0in	75ft 0in	13ft 6in	127000	02/17/2014	02/27/2014	GA-18, I-85, GA-109, US-27, GA-18, BOTTOMS RD, W RD, WRIGHT RD BEGIN ADDRESS: GA-103 & GA-18 END ADDRESS: 336 WRIGHT RD SP 8 11
93	138725 0	N0307831	WEST POINT	GROVETOWN	10ft 11in	70ft 0in	13ft 6in	80000	03/26/2014	04/05/2014	STATE LINE RD, US-29, GA-18, I-85, I-285, GA-47, GA-223, WRIGHTSBORO RD 1 11 Pump Hall

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APPENDIX B

WEST POINT, GEORGIA

I-85 at SR 18 (10th Street)

PROMILES PERMIT DATA

JULY 1, 2014 THROUGH FEBRUARY 17, 2015

The road segment numbers in this image correspond to the list of permits in the Excel file attached. For example, there were permits traveling over road segment 1208242. This would correspond to the permits that started from the west on SR 18 and headed south on I-85. Road segment 1208243 would correspond to permits starting from the east on SR 15 and turning south on I-85. Note: there were no permits for a couple of the turns. The last list in the spreadsheet is for permits traveling on SR 18 through the intersection either way.

The spreadsheet includes permit number, height, length, width, GVW, company name, permit contact name, and permit contact email. Many of these permits were ordered by permit services and would not be the actual company contact. All dimensions are in inches. If you need more information please let us know.

Michael A. Webb
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Vice President Government Sales
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mike@promiles.com
www.promiles.com

Permit Nbr	Height (inches)	Length (inches)	Width (inches)	GVW (lbs)	Company	Contact Name	Contact Email	Load Description	Origin	Destination
1123328 - I-85 SB Exit Ramp										
N1054531	162	900	129	80,000	RTS & SON INC	Jeanne Hahn	permits@axyspermits.com	EMPTY STEEL STORAGE BOX	I-85;SC;Lavonia	3735 KIA PARKWAY WEST POINT 31833
N1163941	168	888	144	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment D8N Caterpiller Dozier	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833
N1164081	168	888	144	122,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment CAT 330 Excavator	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833
N1168541	168	888	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment 621 JD Pan	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833
N1183021	168	900	132	97,500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood
N1192461	168	864	131	84,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood
N1227341	162	900	108	80,000	AMERICAN OUTDOOR TRANSPORTATIO	David Patterson	permits@fleetone.com	PORTABLE BUILDING	I-24W;TN;Wildwood	3735 KIA PKWY WEST POINT 0
N1232411	167	888	111	80,000	ADMIRAL MERCHANTS MOTOR FREIGHT	Laura Selvog	permits@ammf.com	Guard Shack	I-24W;TN;Wildwood	3735 Kia Parkway west point 0
N1251201	162	900	102	110,000	CHANCEYS WRECKER SERVICE INC	Carl	cser@bellsouth.net	forklift	4695 Aviation Parkway Atlanta 0	6500 Kia Parkway West Point 0
N1277651	156	852	144	135,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment PC-400	336 Wright Rd Williamson 30292	PEARL ST, 1.1mi E of West Point, GA
N1366321	168	864	132	88,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.com	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood
N1475291	168	888	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment Cat 330 Excavator	Intersection of OLD ATLANTA and BERTHA	100 Pear Street West Point 0
N1501981	168	888	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment 621 JD Pan	Intersection of BOTTOMS and WEST	100 Pear Street West Point 0
N1562721	168	888	144	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment D8N Caterpiller Dozier	Intersection of OAK and OAK	100 Pear St West Point 0
N1647221	168	888	144	130,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	Intersection of OLD ATLANTA and BERTHA	100 Pear Street West Point 0
N1682281	162	840	140	80,000	STRONG TRUCKING LLC	Vicky Strong	strongtrucking2010@hotmail.com	Make-Tri State, Model-Conveyer, Serial-140061549	I-75;TN;Ringgold	Intersection of US-29 and GA-18
N1683331	162	840	138	80,000	LANDSTAR INWAY INC	elizabeth phillips	comdatapmts@comdata.com	CONVEYOR	I-75;TN;Ringgold	GA-103 in HARRIS
N1769191	162	900	139	125,000	DEEP WOODS TRANSPORT LLC	PATTY DOLLAR	dwt.trucks@gmail.com	329 Cat Excavator	300 LEE INDUSTRIAL BLVD AUSTELL 30168	GA-14;AL;West Point
P1041521	156	852	144	124,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment Terex 300 Off Road Truck	5710 Riverview Rd Mableton 0	100 Pear Street West Point 0
P1094711	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	excavator	LEE INDUSTRIAL BLVD in MABLETON	KIA PKWY in WEST POINT
P1106471	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	excavator	GA-124 in JACKSON	GA-103 in WEST POINT
P1106461	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	off road truck	MCGINNIS FERRY RD, 2.9mi W of MCGINNIS FERRY & US	GA-103 in WEST POINT
P1117521	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	scraper	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT
P1123361	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	dozer	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT
P1133311	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	dozer	LEE INDUSTRIAL BLVD in MABLETON	GA-103 in WEST POINT
1208242 - From the West on SR 18 headed South on I-85										
N1164531	174	1200	144	145,000	CRAWFORD GRADING & PIPELINE INC	SCOTT BOWDEN	cgp@crawfordgrading.com	EXCAVATOR	Intersection of 10TH and KIA	I-85;AL;West Point
N1190641	162	900	144	132,000	D H GRIFFIN WRECKING COM INC	Danny Smith		EXCAVATOR	GA-109, 4.6mi W of La Grange, GA	I-85;AL;West Point
N1426631	167	1032	131	149,000	CONSOLIDATED LUMBER TRANSPORT IN	Matthew Bick	ginnyb@jrctransportation.com	rock crusher	Intersection of GA34 and US27	I-85;AL;West Point
N1720171	162	840	144	132,000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	4864 West Point Lagrange 0	I-85;AL;West Point
1207243 - From the East on SR 18 headed South on I-85										
NONE										
1117402 - From the West on SR 18 headed North on I-85										
N1072221	162	900	120	150,000	PHOENIX CRANE RENTAL CO INC	LARRY O'DONALD	lodonald@phoenixcrane.com	Self Propelled Crane	3735 kia Parkway West Point 31833	1855 Dickerson Dr Mableton 30126
N1183021	168	900	132	97,500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood
N1192461	168	864	131	84,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood
N1366321	168	864	132	88,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.com	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood
N1372971	168	888	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment Cat 330 Excavator	100 Pear St West Point 0	Intersection of BERTHA and OLD ATLANTA
N1513041	168	888	144	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment D8N Caterpiller Dozier	100 Pear Street West Point 0	Intersection of OAK RIDGE and OAK RIDGE
N1647231	168	888	144	130,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear West Point 0	Intersection of BERTHA and OLD ATLANTA
N1653591	168	888	144	134,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1654351	168	888	151	134,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1678051	168	888	151	130,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1704121	168	888	151	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0
N1707321	168	888	151	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0
N1761061	168	888	151	125,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment CAT 330 Excavator	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1119241	168	888	151	110,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1119211	168	888	151	11,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1166781	168	900	135	125,000	INLAND TRANSPORTATION LLC	Samuel Matherson	sam@holmanfreight.com	Cat 330C L	US-29;AL;West Point	I-75;FL;Lake Park
1117415 - From the East on SR 18 headed North on I-85										
NONE										
1122598 - I-85 NB Exit Ramp										
N1055751	162	912	136	130,000	KEEN TRANSPORT INC	Kathy Sharp	kathy.sharp@keentransport.com	Excavator	I-85;AL;West Point	GA-234, 2.8mi W of Four Points
N1056241	168	1020	137	132,000	BENGAL TRANSPORTATION SERVICES IN	Dusty Barbay		CAT EXCAVATOR	I-85;AL;West Point	WOOLDRIDGE RD, 0.8mi SW of Fortson
N1058931	162	840	102	92,000	CRST MALONE INC	Eric Walters	comdatapmts@comdata.com	crated machinery	I-85;AL;West Point	7777 Kia Pkwy WEST POINT 0

Permit Nbr	Height (inches)	Length (inches)	Width (inches)	GVW (lbs)	Company	Contact Name	Contact Email	Load Description	Origin	Destination
N1075331	162	936	140	130,000	KEEN TRANSPORT INC	Kathy Sharp	kathy.sharp@keentransport.com	EXCAVATOR	I-85;AL;West Point	LOWE RD, 2.7mi W of Four Points
N1181171	162	912	138	136,000	KEEN TRANSPORT INC	Tammy Failor	tammy.failor@keentransport.com	EXCAVATOR	I-85;AL;West Point	SMITH RD, 1.1mi W of Fortson, GA
N1526171	168	876	114	150,000	THE MILLER GROUP INC	Kevin Gamble	kevin.gamble@millergroup.ca	milling machine	I-85;AL;West Point	WHITTLESEY BLVD, 0.9mi NE of WHITTLESEY & US27 N
N1549281	162	840	144	132,000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	I-85;AL;West Point	4864 West Point Lagrange 0
N1591411	162	924	140	80,000	AMERICAN TRANSPORT INC	kay shimitz	kay@wcspermits.com	MACHINE SECTION	I-85;AL;West Point	GA-103 in WEST POINT
N1629031	162	888	156	80,000	JBF INC	BENTLEY FARR	JBFINC@HIWAAY.NET	stacked wood trusses	I-85;AL;West Point	708 Pear St West Point 31833
N1698931	162	876	129	142,200	CONN EQUIPMENT RENTAL CO, INC	JEFF		SELF PROPELLED CRANE	I-85;AL;West Point	5875 CHIPLEY WARM SPRINGS 0
P1116091	162	816	120	80,000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM	CAMSTREETMAN@GMAIL.COM	MULCHER	I-85;AL;West Point	Intersection of PINE LAKE and GA103
1208244 - SR 18 EB; 1117396 - SR 18 WB										
N1058931	162	840	102	92,000	CRST MALONE INC	Eric Walters	comdatapmts@comdata.com	crated machinery	I-85;AL;West Point	7777 Kia Pkwy WEST POINT 0
N1064951	162	840	132	142,000	ALEXANDER CONTRACTING CO INC	Tammy Britton	tbritton@alexandercontractionco.com	Excavator	GA-18, 2.4mi NE of Lanett	Intersection of TECHNOLOGY and US-80
N1072221	162	900	120	150,000	PHOENIX CRANE RENTAL CO INC	LARRY O'DONALD	lodonald@phoenixcrane.com	Self Propelled Crane	3735 kia Parkway West Point 31833	1855 Dickerson Dr Mableton 30126
N1180411	162	720	120	75,000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM STREETMAN	camstreetman@gmail.com	MULCHER	Intersection of GA-208 and US-27	I-85;AL;West Point
N1183021	168	900	132	97,500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood
N1192461	168	864	131	84,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood
N1276901	162	960	131	103,000	DIAMOND EXPRESS LLC	ALTHA	DISPATCHER104@ATLANTICBB.NET	MILITARY TANK	MARINE CORPS LOGISTICS BASE – MAIN GATE (FLEMING	I-85;AL;West Point
N1277881	168	852	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment Cat 330 Excavator	700 Custer Road Fort Benning 0	100 Hatchett St West Point 0
N1366321	168	864	132	88,000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.com	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood
N1372971	168	888	144	124,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment Cat 330 Excavator	100 Pear St West Point 0	Intersection of BERTHA and OLD ATLANTA
N1513041	168	888	144	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construciton Equipment D8N Caterpiller Dozier	100 Pear Street West Point 0	Intersection of OAK RIDGE and OAK RIDGE
N1549281	162	840	144	132,000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	I-85;AL;West Point	4864 West Point Lagrange 0
N1629031	162	888	156	80,000	JBF INC	BENTLEY FARR	JBFINC@HIWAAY.NET	stacked wood trusses	I-85;AL;West Point	708 Pear St West Point 31833
N1647231	168	888	144	130,800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear West Point 0	Intersection of BERTHA and OLD ATLANTA
N1653591	168	888	144	134,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1654351	168	888	151	134,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1678051	168	888	151	130,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
N1683331	162	840	138	80,000	LANDSTAR INWAY INC	elizabeth phillips	comdatapmts@comdata.com	CONVEYOR	I-75;TN;Ringgold	GA-103 in HARRIS
N1698961	162	876	129	142,200	CONN EQUIPMENT RENTAL CO, INC	JEFF		SELF PROPELLED CRANE	5875 CHIPLEY WARM SPRINGS 0	I-85;AL;West Point
N1704121	168	888	151	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0
N1707321	168	888	151	132,600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0
N1761061	168	888	151	125,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment CAT 330 Excavator	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1106461	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	off road truck	MCGINNIS FERRY RD, 2.9mi W of MCGINNIS FERRY & US	GA-103 in WEST POINT
P1106471	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	excavator	GA-124 in JACKSON	GA-103 in WEST POINT
P1117521	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	scraper	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT
P1119241	168	888	151	110,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1119211	168	888	151	11,000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING.COM	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA
P1123361	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	dozer	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT
P1128341	162	780	120	75,000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM		MULCHER	PINE LAKE RD in HARRIS	I-85;AL;West Point
P1133311	168	900	168	148,000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavation.com	dozer	LEE INDUSTRIAL BLVD in MABLETON	GA-103 in WEST POINT
P1166781	168	900	135	125,000	INLAND TRANSPORTATION LLC	Samuel Matherson	sam@holmanfreight.com	Cat 330C L	US-29;AL;West Point	I-75;FL;Lake Park

	Permit Nbr	Height (inches)	Length (inches)	Width (inches)	GVW (lbs)	Company	Contact Name	Contact Email	Load Description	Origin	Destination	
	1123328	→ I-85 SB Exit Ramp										
1	N1054531	162	900	129	80000	RTS & SON INC	Jeanne Hahn	permits@axyspermits.com	EMPTY STEEL STORAGE BOX	I-85;SC;Lavonia	3735 KIA PARKWAY WEST POINT 31833	12 to 4
2	N1163941	168	888	144	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment D8N Caterpiller Dozier	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833	12 to 2
3	N1164081	168	888	144	122600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment CAT 330 Excavator	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833	" " "
4	N1168541	168	888	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment 621 JD Pan	100 Rehoboth Rd Griffin 30223	100 Pear Street West Point 31833	" " "
5	N1183021	168	900	132	97500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood	?
6	N1192461	168	864	131	84000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood	?
7	N1227341	162	900	108	80000	AMERICAN OUTDOOR TRANSPORTATIO	David Patterson	permits@fleetone.com	PORTABLE BUILDING	I-24W;TN;Wildwood	3735 KIA PKWY WEST POINT 0	12 to 4
8	N1232411	167	888	111	80000	ADMIRAL MERCHANTS MOTOR FREIGH	Laura Selvog	permits@ammf.com	Guard Shack	I-24W;TN;Wildwood	3735 Kia Parkway west point 0	12 to 4
9	N1251201	162	900	102	110000	CHANCEYS WRECKER SERVICE INC	Carl	cser@bellsouth.net	forklift	4695 Aviation Parkway Atlanta 0	6500 Kia Parkway West Point 0	12 to 4
10	N1277651	156	852	144	135000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment PC-400	336 Wright Rd Williamson 30292	PEARL ST, 1.1mi E of West Point, GA	12 to 2
11	N1366321	168	864	132	88000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.c	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood	?
12	N1475291	168	888	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment Cat 330 Excavator	Intersection of OLD ATLANTA and BERTHA	100 Pear Street West Point 0	?
13	N1501981	168	888	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment 621 JD Pan	Intersection of BOTTOMS and WEST	100 Pear Street West Point 0	?
14	N1562721	168	888	144	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment D8N Caterpiller Dozier	Intersection of OAK and OAK	100 Pear St West Point 0	?
15	N1647221	168	888	144	130800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment JD 621 Pan	Intersection of OLD ATLANTA and BERTHA	100 Pear Street West Point 0	?
16	N1682281	162	840	140	80000	STRONG TRUCKING LLC	Vicky Strong	strongtrucking2010@hotm	Make-Tri State, Model-Conveyer, Serial-140061549	I-75;TN;Ringgold	Intersection of US-29 and GA-18	12 to 2
17	N1683331	162	840	138	80000	LANDSTAR INWAY INC	elizabeth phillips	comdatapmts@comdata.c	CONVEYOR	I-75;TN;Ringgold	GA-103 in HARRIS County	12 to 1
18	N1769191	162	900	139	125000	DEEP WOODS TRANSPORT LLC	PATTY DOLLAR	dwt.trucks@gmail.com	329 Cat Excavator	300 LEE INDUSTRIAL BLVD AUSTELL 30168	GA-14;AL;West Point US 29	12 to 2
19	P1041521	156	852	144	124000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment Terex 300 Off Road Truck	5710 Riverview Rd Mableton 0	100 Pear Street West Point 0	12 to 2
20	P1094711	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	excavator	LEE INDUSTRIAL BLVD in MABLETON	KIA PKWY in WEST POINT	12 to 4
21	P1106471	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	excavator	GA-124 in JACKSON	GA-103 in WEST POINT	12 to 1
22	P1106461	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	off road truck	MCGINNIS FERRY RD, 2.9mi W of MCGINNIS FE	GA-103 in WEST POINT	" " "
23	P1117521	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	scraper	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT	" " "
24	P1123361	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	dozer	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT	" " "
25	P1133311	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	dozer	LEE INDUSTRIAL BLVD in MABLETON	GA-103 in WEST POINT	" " "
	1208242	– I-85 SB Entrance Ramp				From the west on SR 18 and headed south on I-85						
26	N1164531	174	1200	144	145000	CRAWFORD GRADING & PIPELINE INC	SCOTT BOWDEN	cgp@crawfordgrading.com	EXCAVATOR	Intersection of 10TH and KIA	I-85;AL;West Point	6 to 4
27	N1190641	162	900	144	132000	D H GRIFFIN WRECKING COM INC	Danny Smith		EXCAVATOR	GA-109, 4.6mi W of La Grange, GA	I-85;AL;West Point	?
28	N1426631	167	1032	131	149000	CONSOLIDATED LUMBER TRANSPORT IN	Matthew Bick	ginnyb@jrctransportation.	rock crusher	Intersection of GA34 and US27	I-85;AL;West Point	?
29	N1720171	162	840	144	132000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	4864 West Point Lagrange 0	I-85;AL;West Point	?
	1207243		From the east on SR 18 and headed south on I-85.									
	NONE											
	1117402		From the west on SR 18 and headed north on I-85									
30	N1072221	162	900	120	150000	PHOENIX CRANE RENTAL CO INC	LARRY O'DONALD	lodonald@phoenixcrane.c	Self Propelled Crane	3735 kia Parkway West Point 31833	1855 Dickerson Dr Mableton 30126	3 to 11
31	N1183021	168	900	132	97500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood	?
32	N1192461	168	864	131	84000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood	1 to 11
33	N1366321	168	864	132	88000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.c	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood	1 to 11
34	N1372971	168	888	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment Cat 330 Excavator	100 Pear St West Point 0	Intersection of BERTHA and OLD ATLANTA	?
35	N1513041	168	888	144	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construciton Equipment D8N Caterpiller Dozier	100 Pear Street West Point 0	Intersection of OAK RIDGE and OAK RIDGE	?
36	N1647231	168	888	144	130800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment JD 621 Pan	100 Pear West Point 0	Intersection of BERTHA and OLD ATLANTA	?
37	N1653591	168	888	144	134600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
38	N1654351	168	888	151	134600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
39	N1678051	168	888	151	130600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
40	N1704121	168	888	151	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0	?
41	N1707321	168	888	151	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0	?
42	N1761061	168	888	151	125000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment CAT 330 Excavator	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
43	P1119241	168	888	151	110000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
44	P1119211	168	888	151	11000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADIN(	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
45	P1166781	168	900	135	125000	INLAND TRANSPORTATION LLC	Samuel Matherson	sam@holmanfreight.com	Cat 330C L	US-29;AL;West Point	I-75;FL;Lake Park	1 to 11
	1117415		From the east on SR 18 and headed north on I-85									
	NONE											

	Permit Nbr	Height (inches)	Length (inches)	Width (inches)	GVW (lbs)	Company	Contact Name	Contact Email	Load Description	Origin	Destination	
	1122598		I-85	NB Exit	Ramp							
46	N1055751	162	912	136	130000	KEEN TRANSPORT INC	Kathy Sharp	kathy.sharp@keentranspo	Excavator	I-85;AL;West Point	GA-234, 2.8mi W of Four Points	?
47	N1056241	168	1020	137	132000	BENGAL TRANSPORTATION SERVICES IN	Dusty Barbay		CAT EXCAVATOR	I-85;AL;West Point	WOOLDRIDGE RD, 0.8mi SW of Fortson	?
48	N1058931	162	840	102	92000	CRST MALONE INC	Eric Walters	comdatapmts@comdata.c	crated machinery	I-85;AL;West Point	7777 Kia Pkwy WEST POINT 0	6 to 4
49	N1075331	162	936	140	130000	KEEN TRANSPORT INC	Kathy Sharp	kathy.sharp@keentranspo	EXCAVATOR	I-85;AL;West Point	LOWE RD, 2.7mi W of Four Points	?
50	N1181171	162	912	138	136000	KEEN TRANSPORT INC	Tammy Failor	tammy.failor@keentrans	EXCAVATOR	I-85;AL;West Point	SMITH RD, 1.1mi W of Fortson, GA	6 to 7
51	N1526171	168	876	114	150000	THE MILLER GROUP INC	Kevin Gamble	kevin.gamble@millergrou	milling machine	I-85;AL;West Point	WHITTLESEY BLVD, 0.9mi NE of WHITTLESEY & US27 N	6 to 7
52	N1549281	162	840	144	132000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	I-85;AL;West Point	4864 West Point Lagrange 0	6 to 2
53	N1591411	162	924	140	80000	AMERICAN TRANSPORT INC	kay shimitz	kay@wcspermits.com	MACHINE SECTION	I-85;AL;West Point	GA-103 in WEST POINT	6 to 7
54	N1629031	162	888	156	80000	JBF INC	BENTLEY FARR	JBFINC@HIWAAY.NET	stacked wood trusses	I-85;AL;West Point	708 Pear St West Point 31833	6 to 1
55	N1698931	162	876	129	142200	CONN EQUIPMENT RENTAL CO, INC	JEFF		SELF PROPELLED CRANE	I-85;AL;West Point	5875 CHIPLEY WARM SPRINGS 0	6 to 10
56	P1116091	162	816	120	80000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM	CAMSTREETMAN@GMAIL	MULCHER	I-85;AL;West Point	Intersection of PINE LAKE and GA103	6 to 7
	SR18EB SR18WB		going under I-85									
	1208244, 1117396											
57	N1058931	162	840	102	92000	CRST MALONE INC	Eric Walters	comdatapmts@comdata.c	crated machinery	I-85;AL;West Point	7777 Kia Pkwy WEST POINT 0	10 to 4
58	N1064951	162	840	132	142000	ALEXANDER CONTRACTING CO INC	Tammy Britton	tbritton@alexandercontra	Excavator	GA-18, 2.4mi NE of Lanett	Intersection of TECHNOLOGY and US-80 1 to 7 westbound SR 18	
59	N1072221	162	900	120	150000	PHOENIX CRANE RENTAL CO INC	LARRY O'DONALD	lodonald@phoenixcrane.c	Self Propelled Crane	3735 kia Parkway West Point 31833	1855 Dickerson Dr Mableton 30126 3 to 11 eastbound s	
60	N1180411	162	720	120	75000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM STREETMAN	camstreetman@gmail.com	MULCHER	Intersection of GA-208 and US-27	I-85;AL;West Point	1 to 7
61	N1183021	168	900	132	97500	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	TRACKMOBILE	Intersection of I85 and GA219	I-24W;TN;Wildwood	?
62	N1192461	168	864	131	84000	RENOLDS TRANSPORT LTD	Kayla Ackerson	jdschall@aol.com	CN RAIL TRACKMOBILE	I-85, 3.7mi S of La Grange, GA	I-24W;TN;Wildwood	1 to 11
63	N1276901	162	960	131	103000	DIAMOND EXPRESS LLC	ALTHA	DISPATCHER104@ATLANT	MILITARY TANK	MARINE CORPS LOGISTICS BASE – MAIN GATE (	I-85;AL;West Point	8 to 2
64	N1277881	168	852	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment Cat 330 Excavator	700 Custer Road Fort Benning 0	100 Hatchett St West Point 0	8 to 2
65	N1366321	168	864	132	88000	RENOLDS TRANSPORT LTD	Kayla Ackerson	KAYLA@transportpermit.c	TRACKMOBILE	I-85, 3.5mi S of La Grange, GA	I-24W;TN;Wildwood	1 to 11
66	N1372971	168	888	144	124800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment Cat 330 Excavator	100 Pear St West Point 0	Intersection of BERTHA and OLD ATLANTA	?
67	N1513041	168	888	144	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construciton Equipment D8N Caterpiller Dozier	100 Pear Street West Point 0	Intersection of OAK RIDGE and OAK RIDGE	?
68	N1549281	162	840	144	132000	D H GRIFFIN WRECKING COM INC	DANNY		EXCAVATOR	I-85;AL;West Point	4864 West Point Lagrange 0	1 to 11
69	N1629031	162	888	156	80000	JBF INC	BENTLEY FARR	JBFINC@HIWAAY.NET	stacked wood trusses	I-85;AL;West Point	708 Pear St West Point 31833	10 to 2
70	N1647231	168	888	144	130800	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment JD 621 Pan	100 Pear West Point 0	Intersection of BERTHA and OLD ATLANTA	?
71	N1653591	168	888	144	134600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
72	N1654351	168	888	151	134600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment D8R Caterpiller Dozier	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
73	N1678051	168	888	151	130600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
74	N1683331	162	840	138	80000	LANDSTAR INWAY INC	elizabeth phillips	comdatapmts@comdata.c	CONVEYOR	I-75;TN;Ringgold	GA-103 in HARRIS	12 to 7
75	N1698961	162	876	129	142200	CONN EQUIPMENT RENTAL CO, INC	JEFF		SELF PROPELLED CRANE	5875 CHIPLEY WARM SPRINGS 0	I-85;AL;West Point	8 to 2
76 8	N1704121	168	888	151	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0	1 to 11
77	N1707321	168	888	151	132600	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment JD 621 Pan	100 Pear Street West Point 0	6977 Nashville St Ringgold 0	1 to 11
78	N1761061	168	888	151	125000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment CAT 330 Excavator	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
79	P1106461	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	off road truck	MCGINNIS FERRY RD, 2.9mi W of MCGINNIS FE	GA-103 in WEST POINT	12 to 7
80	P1106471	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	excavator	GA-124 in JACKSON	GA-103 in WEST POINT	12 to 7
81	P1117521	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	scraper	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT	12 to 7
82	P1119241	168	888	151	110000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
83	P1119211	168	888	151	11000	UNITED CONSOLIDATED GROUP INC	Leigh Ann Green	LGREEN@UNITEDGRADING	Construction Equipment TEREX TA 300 Off Rd Truck	100 Pear Street West Point 0	Intersection of BERTHA and OLD ATLANTA	?
84	P1123361	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	dozer	WHITLEY RD, 0.1mi NE of WHITLEY & US41 N	GA-103 in WEST POINT	12 to 7
85	P1128341	162	780	120	75000	BACH & DEVOS FORESTRY & WILDLIFE S	CAM		MULCHER	PINE LAKE RD in HARRIS County	I-85;AL;West Point	8 to 2
86	P1133311	168	900	168	148000	PLATEAU EXCAVATION INC	Robert Milam	rmilam@plateauexcavatio	dozer	LEE INDUSTRIAL BLVD in MABLETON	GA-103 in WEST POINT	12 to 7
87	P1166781	168	900	135	125000	INLAND TRANSPORTATION LLC	Samuel Matherson	sam@holmanfreight.com	Cat 330C L	US-29;AL;West Point	I-75;FL;Lake Park	1 to 11

APPENDIX C

WEST POINT, GEORGIA

I-85 at SR 18 (10th Street)

ROUTING DIAGRAM AND SUMMARY

OF BENTLEY DATA AND PROMILES DATA

10th Street
SR 18
Kia Parkway
SR 18
SR 18
SR 103
I-85
1208242
1208243
1208244
1117396
1117402
1117415
1122598
1123328
N

Bentley Data 4/09 - 4/14		ProMiles Data 7/1/2014 - 2/17/2015	
1 to 5	2		
8 to 11	35		
1 to 11	33	𝍸 IIII	9
8 to 5	9		
10 to 5	2		
3 to 11	3	II	2
3 to 5	2		
unknown	7		
	93 records		
12 to 4		𝍸	5
12 to 2		𝍸 II	7
12 to 7		𝍸 𝍸 II	12
6 to 4		I	I
6 to 7		IIII	4
6 to 2		II	~~I~~ 2
~~6 to 1~~		~~I~~	~~I~~
6 to ~~10~~ 9		I	I
10 to 4		I	I
1 to 7		I	I
8 to 2		IIII	4
10 to 2		I	I
~~12 to 7~~		~~II~~	
			50 records

APPENDIX D

GDOT COMMENTS ON OSOW REPORT

GDOT Comments to I-85/SR 18 OSOW Analysis – Final - 2/12/2015 and GHD Response

GHD issued a "Draft" version of the OSOW Report on 1/29/2015 and "Final" version on 2/12/2015. Below are comments from Dan Pass and Ken Werho to the "Final" version.

Dan Pass's Comments:

This was no easy effort, as a first study of this type in Georgia. I expect this will form a useful reference for others, but the goal here is to meet the project need and no more.

Many questions are posed below, don't be alarmed or think that I am asking a great deal more that I actually am. GDOT does not have much history with this type of study. Clarity should be the emphasis of revisions, rather than any significant additions. As Mark mentioned in an e-mail, we do want to move forward to complete the feasibility study.

You may want to prepare brief responses, before making any corrections. There have been many involved in this effort and some of my questions may have already been answered.

1. ***Overview:*** The WB-67 is the standard "design vehicle" for roundabouts on state routes and is allowed to partially encroach on an adjacent circulatory lane, and to use the truck apron. Thus, this design vehicle *does* not stay in lane. A bus and single unit truck should maintain lane discipline, though I am unsure whether they should be classified as "design" or "check" vehicles.

   GHD Response:

   Every truck route has to be designed for a WB-67 vehicle. On the OSOW portions of the freight network "check" vehicles must be accommodated or "checked", i.e. creating vehicle swept paths to see how they need to be mitigated.

   Check vehicle definition: (Check vehicles may need some overtracking areas.) A vehicle that is accommodated either in the roadway or outside the travel lane, such as when truck trailers track over the curb. In these cases the roundabout designer should accommodate them by providing paved truck aprons and truck blisters in which wheels stay on pavement.

   Design vehicle definition: A vehicle that is accommodated within the roadway and possibly within its own lane or adjacent lanes.

   It would be excessive to add travel way pavement for OSOW to be used as a design vehicle, as in most cases their need to be accommodated is infrequent. However, a roundabout designer should know the size, turning characteristics, and frequency of OSOW allowed on the route. This could be routine if all states had an OSOW freight network and check vehicles.

2. ***Review of Permit Records:*** I would have included vehicles prior to the opening of the KIA plant that were going to other destinations – but I suggest not going back for this. I would have also at least described the vehicles associated with the tornado, as tornados are not uncommon to

Georgia. We would like to know that we were not (or how much we are) restricting access during such emergencies. That being said, the KIA interchange is nearby so access for such rare event is provided. [Scott/Ken - what were the design vehicles for the KIA interchange? This may provide a useful comparison to vehicles for selected for this study.]

GHD Response:

Loads associated with the tornado are noted in the permit data and vehicles can be inferred: track hoes, back hoes, mobile lifts, excavators, grinders, tank, scrapers, and dump trucks most of which would be transported on a DST Lowboy. The key findings from looking at records during the tornado period are that no new vehicles emerged during this time. This is to be expected since clean-up is not expected to require a custom vehicle. There's nothing custom or unusual in configuration regarding damaged property that is mostly waste or recyclable.

3. At the end of the second paragraph, what "existing truck library" is being referred to?

   GHD Response:

   The truck library referred to are the most commonly manufactured trucks that carry oversize loads nationally. Peter Lynch is involved with FHWA and OSOW on a national scene and sources this information from databases and interviews with freight carriers and other DOTs.

4. Agreed, it is odd that no permits have been issued since July 2014 for this interchange. Is this also the case for the KIA interchange? If this were the case, it may suggest the problem is with querying the database – others will know better than I.

   With the above limitations, a regional or vicinity map (or schematic) show sources of oversize vehicles and access to the interchange would be very appropriate. This type of information might also be useful in deciding the likelihood of OSOWs moving along SR 18 but not accessing I-85. [The limitation of not contacting local industry/locals is unfortunate, though I will not second guess the reasoning in this case. Normal design practice is to do this very thing, where non-standard vehicles must be accommodated - refer to Section 3.2.2 of the GDOT DPM.]

   GHD Response:

   GHD received information recently indicating that there were permits issued since July 2014 for this interchange in the ProMiles database. These records were not readily apparent until mid-February 2015, but were consistent with permit records summarized from the previous Bentley database.

5. Permit information collected should be provided in attachments. It can be largely as received, but should be as complete as possible. Even, what has not been included in decision-making is worth documenting.

   GHD Response:

   This data will be provided in an appendix.

6. ***Multi-Trip Permits Routing:*** Not sure what is being meant by "actual routing between standard semi-tractor trailers". Are there significant movements which might apply to multi-trip permits routing which would not be captured by the single trip permit data? In other words, are the numbers likely to be larger and sources more diverse?

   GHD Response:

   Multi-Trip Permits Routing
   GDOT issues a multi-trip permit, which means there may be permit holders that are not required to report actual routing "by" standard semi tractor-trailers. These loads may range from 13'6" high, 8'6" wide, 65 to 70' long, and 80,000 pounds up to 14' high, and/or up to 12' wide, and/or up to 75' long, and/or up to 100,000 pounds and the loads may access the interchange from every direction. The WB-92 design vehicle, with a 1'9" buffer on both sides, was used to model the likely multi-trip permit movements not identified from the single trip permit data.

7. ***Check Vehicles:*** I recognize that without making local contacts and by using permit data alone, assumptions are necessary. Nevertheless, this report should include essential information and decisions sufficient for "detailed design" tasks.

   AutoTurn templates need to be included in the report. Diagrams of the vehicles would be helpful. In general, this report seems incomplete as far as attachments.

   GHD Response:

   AutoTurn swept paths for check vehicles are included in the report. Permit data will be included in an Appendix.

8. ***Vehicle Checks of Horizontal Alignment*** ("layout" may be a better term):

   GHD Response:

   We will change the heading to "Vehicle Checks of Horizontal Layout".

9. What is a "DST Lowboy"? Be sure to define acronyms.

   GHD Response:

   DST Lowboy is an often used oversize overweight truck that has very low ground clearance. The vehicle dimensions of length, width, and height are shown on a diagram in the report.

   DST stands for Dawes Specialized Transport, a division of Dawes Crane and Rigging Inc., well known for hauling oversize overweight loads. DST utilizes a fleet of heavy specialized equipment, including their 100- and 200-ton capacity lowboy trailer combinations. Hence a DST Lowboy is a truck that is the equivalent of a lowboy owned and utilized by DST.

   As to the DST Lowboy, we can define it for the purposes of a tool we used. OSOW trucks are like legos in that, one can have several different combinations, hence the word specialized. Then based on commodity we are confident that longer loads would have a similar set up to the DST Lowboy. We should just drop the DST because Lowboy by itself can be equivalent in size to a standard 53' foot Van or flatbed trailer. We need to say specialized or articulated lowboy to cover the jeep (essentially the extra 5th wheel and extra articulation) and stingers or 5 axle groupings in the back.

The DST Lowboy vehicle we have assumed is the jeep, the mule and the trailer. This is the three-part vehicle we modeled. They might not need all three parts to carry a specific load.

10. It is odd that there are SR 18 movements to I-85 NB & SB, but no corresponding movements in the other direction. Are they likely taking other routes on return trips? In a Dec 23, 2014 e-mail from David Low, he writes, "At any time we have no data or zero trips for SB I-85 and NB I-85 that exit to SR 18 and travel either way suggests that the query may be off." I suggest that any further efforts needed along these lines be largely handled by District coordination with our Permits unit.

    Considering the above, and with the known limitation on the data, it seems unreasonable to confine combinations of turning movements and OSOW to "known permit history". Appropriate extrapolations, based on knowledge of the area and freight, should be made where necessary to support a robust design.

    GHD Response:

    Trucks are likely delivering loads in one direction and either on a linked trip to another destination or may be returning empty to the same destination. At the time we wrote the report we made extrapolations regarding east-west trips on SR 18 that had not been identified in the records. Thus we added checks for SR 18 east and west. In February we received additional records that covered the ProMiles permits from July 1, 2014 through February 17, 2015.

    The Lowboy can be shortened once it delivers the load.

11. Some description of proposed treatments, or reference to descriptions, would be helpful.

    Future Vertical Analysis: OK, this was included in the scope and can be documented separately.

    GHD Response:

    Proposed treatments are illustrated and described in the report as "truck blisters". We have typical cross-sections showing what a truck blister should look like.

12. ***Conclusions:***

    Please add a bulleted list to summarize findings and limitations – perhaps 5 or 6 items. Is further investigation/data required for detailed design?

    GHD Response:

    Findings and Limitations:

    During Preliminary Design, vertical analyses should be performed using a minimum ground clearance of 5 inches. Several swept paths in each direction analyzed should be developed to document various scenarios.

    GHD will do further investigation of the ProMiles permit data prior to Preliminary Design.

13. Suggest another set of bullets could be provided to document lessons learned. What improvements can be made to the process of preparing future studies – for other projects? What steps can GDOT take to streamline the process?

GHD Response:

Lessons Learned:
From a review of the permit data received it was determined that no new OSOW vehicles need to be created or added to GHD's existing OSOW vehicle library. Instead existing vehicles could be used with a buffer added for width. Specifically the DST Lowboy, WB 92 and Mobile Home from GHD library can be used and the buffer should be 16' wide for the Mobile Home, 14' wide for the DST Lowboy, and 12' wide for the WB 92 respectively. With these buffers, modeling these known OSOW vehicles through the proposed design is the only reasonable alternative to verifying the vehicles with industry. These buffers would be in addition to any shy distance that may be added around the vehicle's existing dimensions within the GHD OSOW library of vehicles. Further the presence of any Lowboy configuration will give some indication of the vertical clearance issues that may be presented at these intersections once the project gets into Preliminary Design. The key is to avoid creating features that will cause low clearance vehicles to get hung up or bottom out as the vehicles move through the interchange.

To ensure that multi trip permit holders are not impeded at this interchange it is recommended that the WB 92 with the recommended buffers be checked in all directions and necessary mitigations preformed accordingly.

Statewide OSOW Network Needed
The study team recommends that GDOT develop a statewide OSOW roadway freight network to accommodate OSOW vehicles and facilitate the flow of freight. An OSOW network offers several benefits. First, trucks can be channeled to the best, most accommodating routes. Second, a set of check vehicles can be developed proactively and applied during design for projects across the state as needed. GDOT should avoid simultaneous construction on two parallel OSOW routes.

A statewide study to determine OSOW check vehicles for intersection designs is more economical than performing individual project investigations. Some OSOW vehicle types may be limited to certain regions of the state, while others should be checked statewide. The statewide study should develop a recommended process and procedure for when and where to use the various check vehicles.

Vertical clearance analysis is also a crucial element in the proposed statewide OSOW network development and evaluation process. Sometimes roadway construction modifications are made to accommodate drainage that later become an impediment for freight. We are presently working with Glen Williams and his colleagues to enable GDOT designers to manipulate In-Roads software and AutoTurn to model OSOW vehicles.

Overall, the development of a statewide OSOW network will save the state a significant amount of time and money in program delivery, help to ensure that the state is creating a uniform system, and avoid creating impediments to trucks and OSOW vehicles. In the long run, the network will boost Georgia's economy by effectively providing for the efficient movement of goods and creating a competitive advantage for Georgia compared to states without a similar network.

Ken Werho's Comments:

14. Are we trying to get OSOW from I-85 to KIA Parkway, 0.18 mile from ramp? If so, KIA interchange would be the best option since it has been constructed for these loads.

    GHD Response:
    We are trying to accommodate OSOW vehicles passing through the I-85/SR 18 intersections since the opening of the Kia Plant. Most (two thirds) of these vehicles are in two different patterns: (1) from the west in West Point headed east on SR 18 turning left onto I-85 north, and (2) from the southeast near Columbus on SR 103 northwest bound, turning left onto SR 18 west and right onto I-85 north.

    The I-85/Kia Blvd. interchange is the best option for Kia plant related loads.

15. Are we trying to get OSOW from I-85 to SR 14/US 29 (2-lane roadway), 1.39 miles west from ramp? With the use of Gabbettville Road (a County Road that was rehabbed after completion of interchange), all of the heavy equipment was brought in on this route for both the interchange & KIA.

    GHD Response:
    Several of the OSOW permits come from West Point and part of their route includes US 29. We expect any trips involving Gabbettville Road to access I-85 via the Kia Blvd./I-85 interchange.

16. Are we trying to get OSOW from I-85 to downtown West Point, 1.83 miles west from ramp, in which they would have to negotiate two 90 degree turns and a R/R crossing with cantilevers lights and gates.

    GHD Response:
    Several of the OSOW permits come through downtown West Point.

17. On the SB/west side roundabout, additional width shoulders will be required to ensure placement of guardrail does not affect tail sweep of loads or negotiating space.

    GHD Response:
    Additional shoulder width would be desirable, but, per discussion at the March 4, 2015 project meeting, this was considered out of scope. Scott Zehngraff said that we should not include this in the Concept, but that if necessary we can adjust the design between Concept and PFPR.

We will revise the report to blend this content into the text and add this Q&A as an appendix too.

Appendix H – Cost estimate and Benefit cost ratio

DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0009975

JOB NUMBER *0009975* **FED/STATE PROJECT NUMBER**

SPEC YEAR: *13*

DESCRIPTION: *I-85 @ SR 18*

ITEMS FOR JOB 0009975

0010 - ROADWAY

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0010	150-1000	1.000	LS	$350,000.00000	TRAFFIC CONTROL - 0009975	$350,000.00
0015	153-1300	1.000	EA	$125,000.00000	FIELD ENGINEERS OFFICE TP 3	$125,000.00
0115	210-0100	1.000	LS	$1,500,000.00000	GRADING COMPLETE - 0009975	$1,500,000.00
0125	310-1101	15000.000	TN	$18.05272	GR AGGR BASE CRS, INCL MATL	$270,790.80
0130	318-3000	1000.000	TN	$16.27537	AGGR SURF CRS	$16,275.37
0555	402-1812	1000.000	TN	$85.01260	RECYL AC LEVELING,INC BM&HL	$85,012.60
0835	402-3121	1000.000	TN	$80.00000	RECYL AC 25MM SP,GP1/2,BM&HL	$80,000.00
0760	402-3129	1300.000	TN	$82.00000	RECYL AC 12.5 MM MIX,GP2,BM&HL	$106,600.00
0535	402-3190	5200.000	TN	$78.00000	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	$405,600.00
0565	413-1000	1000.000	GL	$5.06415	BITUM TACK COAT	$5,064.15
0150	432-5010	1000.000	SY	$10.00000	MILL ASPH CONC PVMT,VARB DEPTH	$10,000.00
0765	439-0026	20000.000	SY	$65.00000	PLN PC CONC PVMT CL3 12 THK	$1,300,000.00
0770	441-0006	450.000	SY	$45.00000	CONC SLOPE PAV, 6 IN	$20,250.00
0775	441-0016	100.000	SY	$37.19415	DRIVEWAY CONCRETE, 6 IN TK	$3,719.42
0175	441-0018	200.000	SY	$43.51144	DRIVEWAY CONCRETE, 8 IN TK	$8,702.29
0180	441-0104	2000.000	SY	$29.58000	CONC SIDEWALK, 4 IN	$59,160.00
0185	441-0108	700.000	SY	$46.55268	CONC SIDEWALK, 8 IN	$32,586.88
0190	441-0204	700.000	SY	$27.53916	PLAIN CONC DITCH PAVING, 4 IN	$19,277.41
0570	441-0748	500.000	SY	$38.56407	CONC MEDIAN, 6 IN	$19,282.04
0210	441-4030	50.000	SY	$47.24553	CONC VALLEY GUTTER, 8 IN	$2,362.28
0780	441-5002	1100.000	LF	$11.66668	CONC HEADER CURB, 6, TP 2	$12,833.35
0785	441-5025	600.000	LF	$18.00000	CONC HEADER CURB, 4, TP 9	$10,800.00
0590	441-6222	4000.000	LF	$15.34310	CONC CURB & GUTTER/ 8X30TP2	$61,372.40
0220	444-1000	300.000	LF	$4.28939	SAWED JTS IN EXIST PVMTS - PCC	$1,286.82
0230	446-1100	200.000	LF	$7.96123	PVMT REF FAB STRIPS, TP2,18 INCH WIDTH	$1,592.25
0245	500-3101	500.000	CY	$650.00000	CLASS A CONCRETE	$325,000.00
0790	500-3107	30.000	CY	$600.00000	CL A CONC, RET WALL	$18,000.00
0795	500-3200	30.000	CY	$391.95068	CL B CONC	$11,758.52
0800	500-9999	50.000	CY	$175.16924	CL B CONC,BASE OR PVMT WIDEN	$8,758.46
0250	511-1000	20000.000	LB	$1.00000	BAR REINF STEEL	$20,000.00
0805	515-2020	20.000	LF	$91.13759	GALV STEEL PIPE HDRAIL,2,ROUD	$1,822.75
0255	550-1180	3500.000	LF	$31.64491	STM DR PIPE 18,H 1-10	$110,757.19
0260	550-1240	2000.000	LF	$40.73172	STM DR PIPE 24,H 1-10	$81,463.44
0540	550-1301	500.000	LF	$51.02198	STM DR PIPE 30,H 10-15	$25,510.99
0265	550-2180	60.000	LF	$34.93356	SIDE DR PIPE 18,H 1-10	$2,096.01
0290	550-3418	2.000	EA	$462.82117	SAFETY END SECTION 18,SD,4:1	$925.64
0310	550-4218	2.000	EA	$481.31218	FLARED END SECT 18 IN, ST DR	$962.62
0315	550-4224	2.000	EA	$570.91082	FLARED END SECT 24 IN, ST DR	$1,141.82
0545	550-4230	8.000	EA	$658.80633	FLARED END SECT 30 IN, ST DR	$5,270.45
0820	615-1000	200.000	LF	$468.30182	JACK OR BORE PIPE - 0009975	$93,660.36
0380	620-0100	1000.000	LF	$27.01038	TEMP BARRIER, METHOD NO. 1	$27,010.38

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DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0009975

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0385	634-1200	10.000	EA	$124.36415	RIGHT OF WAY MARKERS	$1,243.64
0415	641-1200	2000.000	LF	$17.19658	GUARDRAIL, TP W	$34,393.16
0420	641-5001	5.000	EA	$748.83814	GUARDRAIL ANCHORAGE, TP 1	$3,744.19
0430	643-0010	1500.000	LF	$6.05932	FIELD FENCE WOVEN WIRE	$9,088.98
0440	648-1350	2.000	EA	$17,554.61250	IMPACT ATT UNIT, TP-P- 0009975	$35,109.23
0500	668-1100	20.000	EA	$2,038.52110	CATCH BASIN, GP 1	$40,770.42
0670	668-2100	1.000	EA	$1,635.36349	DROP INLET, GP 1	$1,635.36
0675	681-4220	20.000	EA	$5,500.00000	LT STD, 40' MH, POST TOP	$110,000.00
0680	681-6366	20.000	EA	$5,500.00000	LUMINAIRE,TP 3, 400W,HP SODIUM	$110,000.00
0685	682-1405	5000.000	LF	$1.13867	CABLE, TP XHHW, AWG NO 8	$5,693.35
0690	682-1406	2500.000	LF	$1.23605	CABLE, TP XHHW, AWG NO 6	$3,090.13
0695	682-1505	3000.000	LF	$1.12084	CABLE, TP RHH/RHW, AWG NO 8	$3,362.52
0700	682-1506	2500.000	LF	$1.32012	CABLE, TP RHH/RHW, AWG NO 6	$3,300.30
0705	682-6110	500.000	LF	$9.11016	CONDUIT, RIGID, 1 IN	$4,555.08
0710	682-6219	2500.000	LF	$5.72514	CONDUIT, NONMETL, TP 2, 1 IN	$14,312.85
0715	682-9000	1.000	LS	$10,000.00000	MAIN SVC PICK UP POINT	$10,000.00
0720	682-9022	5.000	EA	$500.00000	ELEC JCT BX,REF PLASTIC MORTAR	$2,500.00
					SUBTOTAL FOR ROADWAY:	**$5,634,505.90**

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DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0009975

0020 - EROSION CONTROL

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0025	163-0232	5.000	AC	$500.00000	TEMPORARY GRASSING	$2,500.00
0030	163-0240	75.000	TN	$224.23497	MULCH	$16,817.62
0035	163-0300	4.000	EA	$1,284.92526	CONSTRUCTION EXIT	$5,139.70
0045	163-0520	500.000	LF	$13.52836	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN	$6,764.18
0050	163-0527	30.000	EA	$234.15561	CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG	$7,024.67
0740	163-0528	1200.000	LF	$3.56937	CONSTR AND REM FAB CK DAM -TP C SLT FN	$4,283.24
0730	163-0539	10.000	EA	$1,300.00000	CONST AND REM RETROFIT-SL BD DM/W STN FL	$13,000.00
0055	163-0541	2.000	EA	$374.26570	CONSTR & REM ROCK FILTER DAMS	$748.53
0550	163-0550	20.000	EA	$120.35204	CONS & REM INLET SEDIMENT TRAP	$2,407.04
0060	165-0010	250.000	LF	$1.00000	MAINT OF TEMP SILT FENCE, TP A	$250.00
0065	165-0030	3000.000	LF	$1.00000	MAINT OF TEMP SILT FENCE, TP C	$3,000.00
0070	165-0041	900.000	LF	$1.00000	MAINT OF CHECK DAMS - ALL TYPES	$900.00
0735	165-0096	10.000	EA	$1,300.00000	MAINT OF RETROFIT-SLOT BD DAM/W ST FLT	$13,000.00
0830	165-0101	4.000	EA	$1,000.00000	MAINT OF CONST EXIT	$4,000.00
0750	165-0105	20.000	EA	$37.51388	MAINT OF INLET SEDIMENT TRAP	$750.28
0755	165-0110	2.000	EA	$28.82865	MAINT OF ROCK FILTER DAM	$57.66
0080	167-1000	2.000	EA	$500.00000	WATER QUALITY MONITORING AND SAMPLING	$1,000.00
0085	167-1500	18.000	MO	$500.00000	WATER QUALITY INSPECTIONS	$9,000.00
0090	171-0010	500.000	LF	$1.96892	TEMPORARY SILT FENCE, TYPE A	$984.46
0095	171-0030	6000.000	LF	$3.08924	TEMPORARY SILT FENCE, TYPE C	$18,535.44
0810	603-2024	500.000	SY	$42.82074	STN DUMPED RIP RAP, TP 1, 24	$21,410.37
0815	603-2182	500.000	SY	$40.41379	STN DUMPED RIP RAP, TP 3, 24	$20,206.90
0345	603-7000	1000.000	SY	$3.43583	PLASTIC FILTER FABRIC	$3,435.83
0620	643-8200	600.000	LF	$1.71422	BARRIER FENCE (ORANGE), 4 FT	$1,028.53
0505	700-6910	10.000	AC	$962.15405	PERMANENT GRASSING	$9,621.54
0510	700-7000	30.000	TN	$102.20484	AGRICULTURAL LIME	$3,066.15
0515	700-8000	7.000	TN	$464.84558	FERTILIZER MIXED GRADE	$3,253.92
0520	700-8100	500.000	LB	$2.06355	FERTILIZER NITROGEN CONTENT	$1,031.78
0725	700-9300	600.000	SY	$6.12078	SOD	$3,672.47
0525	716-1000	5000.000	SY	$1.44753	EROSION CONTROL MATS,WATERWAYS	$7,237.65
0530	716-2000	2500.000	SY	$1.16043	EROSION CONTROL MATS, SLOPES	$2,901.08
					SUBTOTAL FOR EROSION CONTROL:	**$187,029.04**

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DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0009975

0040 - SIGNING AND MARKING

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0595	500-3104	10.000	CY	$866.15138	CL A CONC, SIGNS	$8,661.51
0825	632-0003	2.000	EA	$5,878.60934	CHANGEABLE MESS SIGN,PORT,TP 3	$11,757.22
0445	636-1020	150.000	SF	$13.57028	HWY SGN,TP1MAT,REFL SH TP3	$2,035.54
0390	636-1029	100.000	SF	$16.03053	HWY SGN,TP2 MATL,REFL SH TP 3	$1,603.05
0450	636-1033	150.000	SF	$19.17503	HWY SIGNS, TP1MAT,REFL SH TP 9	$2,876.25
0600	636-1072	500.000	SF	$16.59144	HWY SIGNS,ALUM EXTRD PNLS, RS TP 3	$8,295.72
0395	636-2070	500.000	LF	$8.21758	GALV STEEL POSTS, TP 7	$4,108.79
0400	636-2080	200.000	LF	$9.59339	GALV STEEL POSTS, TP 8	$1,918.68
0605	636-2090	200.000	LF	$7.39760	GALV STEEL POSTS, TP 9	$1,479.52
0610	636-3000	3000.000	LB	$5.80783	GALV STEEL STR SHAPE POST	$17,423.49
0405	636-5010	12.000	EA	$30.45232	DELINEATOR, TP 1	$365.43
0625	653-1502	100.000	LF	$1.07056	THERMO SOLID TRAF ST, 5 IN YEL	$107.06
0630	653-1804	500.000	LF	$2.65330	THERM SOLID TRAF STRIPE, 8,WH	$1,326.65
0460	654-1001	150.000	EA	$4.38854	RAISED PVMT MARKERS TP 1	$658.28
0465	654-1003	40.000	EA	$4.36281	RAISED PVMT MARKERS TP 3	$174.51
0470	654-1010	40.000	EA	$29.57385	RAISED PVMT MARKERS TP 10	$1,182.95
0635	657-1084	1500.000	LF	$5.18016	PRF PL SD PVMT MKG,8,WH,TP PB	$7,770.24
0640	657-1085	3500.000	LF	$5.51750	PRF PL SD PVT MKG,8,B/W,TP PB	$19,311.25
0645	657-3085	120.000	GLF	$3.52535	PRF PL SK PVMT MKG,8,B/W,TPPB	$423.04
0650	657-5001	30.000	SY	$18.99579	PREFORMED PLASTIC PVMT MKG, WHITE, TP PB	$569.87
0655	657-5002	600.000	SY	$13.42311	PREFORMED PLASTIC PVMT MKG, YE, TP PB	$8,053.87
0660	657-5014	8.000	EA	$100.00000	PRF PL PVT MKG,WD/SYM,WH,TP PB	$800.00
0485	657-5016	8.000	EA	$100.00000	PRF PL PVT MKG,ARW TP1,WH,TPPB	$800.00
0480	657-5017	4.000	EA	$488.34635	PRF PL PVT MKG,ARW TP2,WH,TPPB	$1,953.39
0665	657-6085	5000.000	LF	$5.83355	PRF PL SD PVMT MKG,8,B/Y,TPPB	$29,167.75
					SUBTOTAL FOR SIGNING AND MARKING:	**$132,824.06**

TOTALS FOR JOB 0009975

ITEMS COST:	**$5,954,359.00**
COST GROUP COST:	**$0.00**
ESTIMATED COST:	**$5,954,359.00**
CONTINGENCY PERCENT:	**0.00**
ENGINEERING AND INSPECTION:	**0.00**
ESTIMATED COST WITH CONTINGENCY AND E&I:	**$5,954,359.00**

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Lakeshia Osborn
3/27/2015

BENEFIT COST ANALYSIS WORKSHEET

SR 18 @ I-85 Exit Ramp
Troup County
PI 0009975

ACCIDENT DATA

Description	Symbol	Value
Property Damage Accidents (no fatality or injury)	P	4.8
Fatalities	F	0
Injuries	I	1.4

FIXED VALUES

Description	Symbol	Value
Fatality Cost	Fc	$9,100,000
Injury Cost	Ic	$955,500
Property Damage Cost	Pc	$27,300
Maintenance/Operating Cost	Cm	$20,000

TABLE VALUES

Description	Symbol	Value
Reduction Factor (fatalities and injuries) (Appendix E)	R	0.65
Reduction Factor (property damage) (Appendix E)	Rp	0.42
Capital Recovery Factor (Appendix E)	Ek	0.087
Initial Improvement Cost (Itemized Cost Estimate)	Ci	$6,423,359.00

Q = Weighted cost of fatal and injury collisions

$$Q = \frac{(Fc \times F) + (Ic \times I)}{F + I}$$

Q = 955500

B = Benefit

B = Q (F + I) (R) + Pc (P) (Rp)

B = 924541.8

C = Cost

C = Ek (Ci) + Cm

C = 578832.233

B/C = Benefit/Cost Ratio

B/C = 1.597253483

BENEFIT/COST RATIO: 1.60

Lakeshia Osborn
3/27/2015

BENEFIT COST ANALYSIS FACTOR DEFINITIONS

F: annual number of collisions involving fatatlities during study period

I: average annual number of collisions involving injured people for the period of the study

P: average annual number of collisions involoving only property damage for the period of the study

R: reduction of fatal and injury collisions by type (from Table A - Appendix E)

R_p: reduction of property damage only collisions by type (from Table A - Appendix E)

P_c: average cost, in thousands of $, per property damage only collision

Q: weighted cost, in thousands of $, of fatal and injury collisions

I_c: average cost per injury in thousands of $

F_c: average cost per fatality in thousands of $

E_k: capital recovery factor based on countermeasure life (from Table B - Appendix E)

C_i: estimated intial cost of the countermeasure (cost of the improvement including r/w) in thousands of $

C_m: estimated annual maintenance and operating cost of the countermeasure in thousands of $

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
	Eric Frailing, David Low, Mark Lenters	Mark Lenters				

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