



**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA  
REVISED PROJECT CONCEPT REPORT**

Project Type: <u>Widening</u>	P.I. Number: <u>110630</u>
GDOT District: <u>1</u>	County: <u>Jackson</u>
Federal Route Number: <u>I-85</u>	State Route Number: <u>403</u>

*A Revised Project Concept Report is required based on revisions to the design criteria that include the roadway typical sections and bridge typical sections. These changes are due to the necessity to shift traffic temporarily to the outside shoulders during construction and to match the roadway barrier width across the bridges. In addition, six lanes will suffice across the bridges for the design period.*

**Submitted for approval:**

David Estes, PE Ayres Associates  State Program Delivery Engineer	09/26/2012 DATE
 GDOT Project Manager	10/10/2012 DATE
	9/27/2012 DATE

*\* Recommendation on file*

**Recommendation for approval:**

* Glenn Bowman / KUP State Environmental Administrator	10/23/2012 DATE
* Ben Rabun / KUP State Bridge Design Engineer	11/16/2012 DATE

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

Cynthia D. Naegele State Transportation Planning Administrator	10-16-12 DATE
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*This project (PI: 110630) has a program preconstruction date of 2018 and is outside of the STIP (2012-2015) and the next STIP (2013-2016).*

## **PLANNING, APPROVED CONCEPT, & BACKGROUND DATA**

### **Project Justification Statement:**

Also known as State Route 403, I-85 is a primary interstate corridor in northeastern Georgia connecting the Metro Atlanta region with Greenville, South Carolina. Between north of SR 53/Green Street (exit 129) and north of SR 11/US 129/Lee Street (exit 137) in Jackson County, I-85 is currently two lanes in each direction and is functionally classified as a Rural Interstate Principal Arterial. As an interstate, it is not listed as a designated bike route in the Statewide Bicycle Plan. For this section of I-85, an improvement project was proposed and approved by the SHIP committee to be added to the Department's Construction Work Program. The construction phase for this project is not listed in the approved FY 2012-2015 STIP.

Based on design traffic information approved by the Office of Planning, current year (2012) traffic volumes on this corridor range from 46,300 AADT to 50,700 AADT. These volumes correspond to a Level of Service "B". Projected traffic volumes indicate a volume that ranges from 76,400 ADT to 83,800 ADT by the design year 2040, which corresponds to Level of Service "D". Level of Service "D" is considered unacceptable in accordance with performance measures set in the Georgia 2005-2035 Statewide Transportation Plan. These traffic counts also indicate that trucks will account for up to 29 percent of the total volume on this section of I-85. Analysis of the last three years of available crash data in this area show that the crash rates for this section of I-85/SR 403 were above the statewide average for similar classified facilities for two out of the three years. This analysis was performed by GDOT Office of Planning in March 2012.

Future traffic conditions and high truck volumes on I-85/SR 403 through this area demonstrate a need to provide capacity improvements as illustrated through the future year deficient level of service. This project, known as GDOT P.I. # 110630, is one of several linked projects along the corridor designed to improve the entirety of the I-85/SR 403 corridor through Northeast Georgia. The southern terminus of PI # 110630 is located just south of the existing SR 53 interchange. At this location, the project is proposed to tie into PI # 110620 which proposes to widen I-85/SR 403 to a total of six lanes from that point and proceeding south. PI # 110620 is moving forward on a similar schedule with CST not listed in the 2012-2015 STIP. The northern terminus is located just north of the existing SR 11/ US 129 interchange. At this location, this project is proposed to tie into PI # 110640 which proposes to widen I-85/SR 403 to a total of six lanes further north; the CST phase of this project is also outside of the 2012-2015 STIP. The environmental documents for both PI 110620 and 110630 have been approved.

Based on this information, the proposed limits accommodate the primary purpose of this project, which is to address future congestion and improve traffic conditions on the I-85/SR 403 corridor within Jackson County in Georgia.

**Description of the approved concept:**

The approved report proposed the widening and reconstruction of I-85 from four lanes to six lanes beginning just north of SR 53 and ending just north of US 129/SR 11 for a total project length of 8.0 miles. The existing roadway consists of two lanes in each direction separated by a 64'-0" depressed grass median on 7 miles of the project, with the remaining 1 mile (bifurcated section) having a 176'-0" depressed grass median. The proposed section narrows the typical 64'-0" median with the addition of a new lane in each direction with paved shoulders and a barrier wall as separation. In the bifurcated section of roadway, the additional lane and shoulder are added in each direction without the need for the barrier wall. The approved Revised Concept Report also showed typical sections for the bridges over Walnut Creek, The CSX Railroad, and the Little Oconee River to be a total width of eight lanes (four in each direction). The profile grade for the approved Revised Concept Report indicated lowering the Interstate pavement rather than raising the SR 332 bridge due to an inadequate K- Factor on the original mainline pavement.

**PDP Classification:**     Major                       Minor

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

**Projected Traffic as shown in the approved Concept Report:** Choose

Open Year (2005): 51,600

Design Year (2025): 87,700

**Updated Traffic: ADT**

Open Year (2020): 57,200

Design Year (2040): 83,800

**Functional Classification (Mainline):** Rural Interstate Principal Arterial

**VE Study anticipated:**     No                       Yes                       Completed – Date: 6/1/2007

**PROPOSED REVISIONS**

This Revised Concept Report still utilizes the same general typical sections as the previously approved documents. The main difference being the widening proposed on the outside edges of the pavement and the bridges are now shown at six lanes total width. In addition, the center median travel lanes' pavement is shown on the typical section as 13'-0" of CRC. The striped lane is shown as 12'-0". The total striped widths of the lanes and the median have not changed – only the actual CRC pavement width and the bituminous shoulder paving width.

A Pavement Evaluation Review was accepted by the State Materials and Research Engineer on February 03, 2012. The outside shoulder as it exists is underdesigned by 22 to 26 percent and consequently, the recommendation is to mill the existing pavement to a depth of approximately 4.5 inches and overlay with new pavement prior to utilizing the outside edges of pavement for traffic diversion, consistent with the Pavement Evaluation Report which is summarily included with this Revised Concept Report as Attachment #7. This concept is consistent with the last approval letter from FHWA dated February 19, 2008 which is attached to this revised report (Attachment 6).

High mast lighting is proposed on the interchange at Exit 129 per the Lighting Agreement between GDOT and the City of Braselton, Georgia (Attachment 8). The District Utility Engineer has discussed the lighting

issue with the Jackson EMC regarding power availability. The power service is already within the interchange so they do not anticipate any reimbursement costs associated with serving the project lighting system.

Approved Features:	Proposed Features:
<p><b>1. Typical Sections</b></p> <ul style="list-style-type: none"> <li>a. Outside Grassed Shoulder – Proposed width of 2’-0”.</li> <li>b. Lanes Adjacent to Median – Proposed Continuously Reinforced Concrete pavement width of 12’-0”.</li> </ul> <p><b>2. Structures</b></p> <ul style="list-style-type: none"> <li>a. Bridges over Walnut Creek proposed to be replaced with an eight-lane bridge.</li> <li>b. Bridges over CSXT Railroad proposed to be replaced with an eight-lane bridge.</li> <li>c. Bridges over Middle Oconee River proposed to be replaced with an eight-lane bridge.</li> </ul> <p><b>3. Bridge Inside Shoulders</b></p> <ul style="list-style-type: none"> <li>a. 3’-1” special designed median barrier.</li> <li>b. 11’-7 1/2” inside shoulder</li> </ul> <p><b>4. Interchange Lighting</b></p> <ul style="list-style-type: none"> <li>a. Previously approved Concept and Revised Concept Reports did not discuss interchange lighting.</li> </ul>	<p><b>1. Typical Sections</b></p> <ul style="list-style-type: none"> <li>a. Outside Grassed Shoulder – Proposed width of 14’-0” in order to facilitate staging temporary paving and avoid unnecessary grading.</li> <li>b. Lanes Adjacent to Median – Proposed Continuously Reinforced Concrete pavement width of 13’-0” in order to avoid edge shear inside the driving lane.</li> </ul> <p><b>2. Structures</b></p> <ul style="list-style-type: none"> <li>a. Bridges over Walnut Creek proposed to be replaced with a six-lane bridge.</li> <li>b. Bridges over CSXT Railroad proposed to be replaced with a six-lane bridge.</li> <li>c. Bridges over Middle Oconee River proposed to be replaced with a six-lane bridge.</li> </ul> <p><b>3. Bridge Inside Shoulders</b></p> <ul style="list-style-type: none"> <li>a. 2’-4” median barrier</li> <li>b. 12’-0” inside shoulder</li> </ul> <p><b>4. Interchange Lighting</b></p> <ul style="list-style-type: none"> <li>a. High mast lighting is proposed to be constructed at the interchange at Exit 129 (I-85 at SR 53) as per the attached agreement between GDOT and the City of Braselton, Georgia dated June 05, 2006.</li> </ul>
<p><b>Reason(s) for change:</b></p> <p><b>1. Typical Section</b> – In order to stage the traffic and maintain traffic during construction it is necessary to shift the traffic to the outside shoulders temporarily. In order to shift the traffic to the outside shoulders the existing shoulders require widening and temporary paving. After construction is complete the temporary paving will be removed but the grading will remain. The result of this widening will be an outside grassed shoulder width of 14’-0”. The 14’-0” wide grassed shoulder will be left in place in order to reduce grading, reduce construction costs and reduce soil erosion. (See Attachment #3)</p>	

To alleviate edge shear cracking within the driving lane, the width of the CRC pavement closest to the center median is increased to 13'-0". The lane edge stripe will be constructed to allow for a 12'-0" travel lane. The total widths of the lanes and shoulders will not change – only specific pavement widths.

2. **Structures** – An eight-lane bridge will not be used for any time in the near future, so maintenance costs will accrue with no return on the investment. Future widening is easy and un-obtrusive. Six-lane bridges are proposed to meet the needs of this project and reduce construction costs and future maintenance costs.
3. **Bridge Inside Shoulders** – A 2'-4" median barrier is proposed across the bridges in order to match the width of the roadway barrier that's proposed on the rest of project.
4. **Interchange Lighting** – The City of Braselton enacted a resolution on May 08, 2006 authorizing the Mayor to execute lighting agreements to provide high mast lighting of the interchange at I-85 and SR 53. An agreement between the Georgia DOT and the City of Braselton, Georgia was entered into on June 05, 2006. The City agrees to provide energy and the operation and maintenance of the requested lighting system for the interchange. The design of the lighting system will be performed during the Final Plan Development Process as per PDP.

## ENVIRONMENTAL

### Air Quality:

Is the project located in a PM 2.5 Non-attainment area?

No

Yes

Is the project located in an Ozone Non-attainment area?

No

Yes

**Potential environmental impacts of proposed revision:** Minor additional stream impacts are anticipated due to the extending of culverts under I-85. There are no anticipated effects to the environmental/project schedule. The amount of stream buffer impacts are less than the 300 linear feet of stream impacts that require a PAR. These minor impacts to the streams at these locations will not have adverse impact to the jurisdictional waters of the US.

**Have proposed revisions been reviewed by environmental staff?**

No

Yes

**Environmental responsibilities (Studies/Documents/Permits):** GDOT prepared one CE document that combined this project NHIMO-0085-02(167) with the adjacent project NHIMO-0085-02(166).

### Environmental impacts by section:

**NEPA:** *An environmental reevaluation is required due to the additional stream impacts.*

**Ecology:** *The extension of existing culverts has increased the impacts to the streams. Most of the culvert extension impacts are less than 50' and does not warrant a stream buffer variance or mitigation. One exception to this is at Station 575+20 to Station 577+70 left where there are 250 feet of stream buffer impacts that will require a stream buffer variance.*

**Archeology:** *No additional surveys are required.*

**History:** *No effects to historic resources. No additional surveys required.*

**Air & Noise:** *There are no effects to air/noise analysis. Additional modeling will not be required.*

**Public Involvement:** *No additional public involvement required.*

## PROJECT COST & ADDITIONAL INFORMATION

Updated Cost Estimate		Date of Estimate
Base Construction Cost:	\$67,237,700.83	11/13/2012
Engineering and Inspection:	\$3,361,885.04	11/13/2012
Liquid AC Adjustment:	\$3,124,251.36	11/13/2012
<u>Total Construction Cost:</u>	\$73,723,837.23	
Right-of-Way:	\$0	11/13/2012
Utilities (reimbursable costs):	\$0	11/13/2012
Environmental Mitigation:	\$0	11/13/2012
<b>TOTAL PROJECT COST:</b>	\$73,723,837.23	

**Recommendation:** Recommend that the proposed revision to the concept be approved for implementation.

**Comments:**

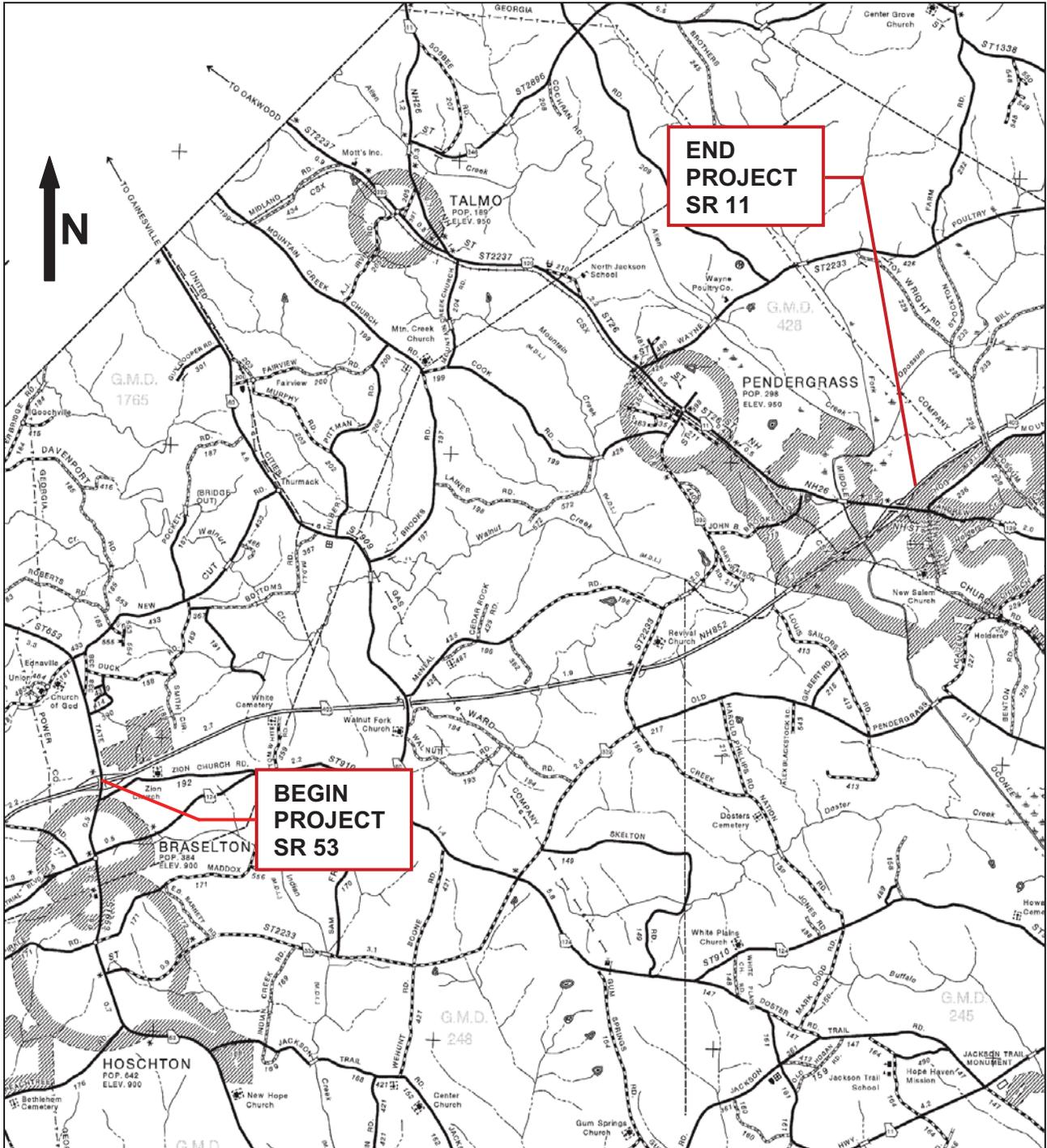
**Attachments:**

1. Sketch map and Layout Sheet
2. Cost Estimate(s)
3. Typical Sections
4. Original Implementation of VE Study
5. Updated Traffic Analysis
6. FHWA letter of approval of February 19, 2008
7. Pavement Evaluation Review excerpts
8. Lighting Agreement



**ATTACHMENT #1**

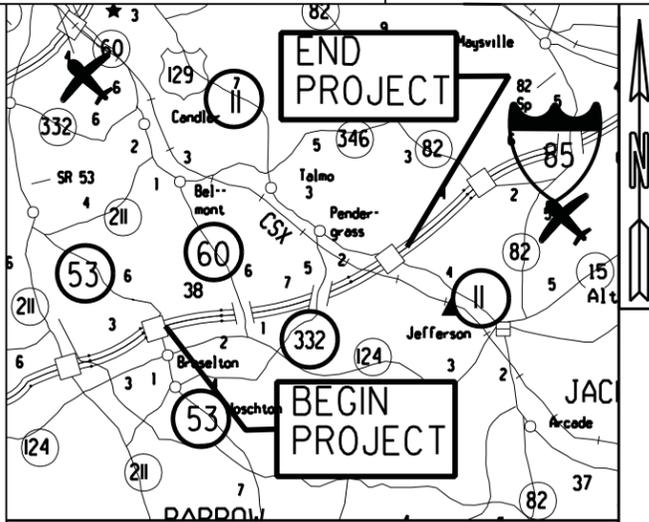
# PROJECT MAP



**Project No: NHIMO-0085-02(167), Jackson County**  
**P.I. No: 110630**  
**Description: I-85 From North of SR 53/Green Street to**  
**North of SR 11/US 129/Lee Street**

# DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

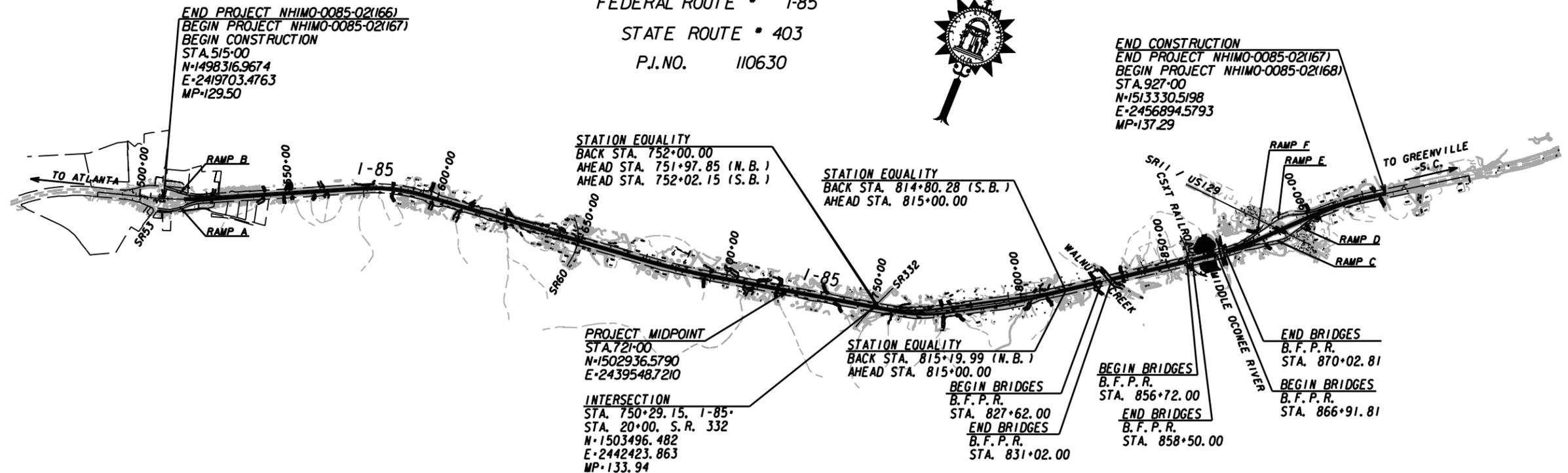
## PROJECT LAYOUT I-85 WIDENING AND IMPROVEMENTS FROM NORTH OF SR 53 TO NORTH OF SR 11



LOCATION SKETCH

FEDERAL AID PROJECT  
NHIMO-0085-02(167)  
JACKSON COUNTY

FEDERAL ROUTE \* I-85  
STATE ROUTE \* 403  
P.J.NO. 110630



LENGTH OF PROJECT	COUNTY No.137
	Project No. NHIMO-0085-02(167)
COUNTY: JACKSON	MILES
NET LENGTH OF ROADWAY	7.803
NET LENGTH OF BRIDGES	0.157
NET LENGTH OF PROJECT	7.646
NET LENGTH OF EXCEPTIONS	0.0000
GROSS LENGTH OF PROJECT	7.803

**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400  
ATLANTA, GA 30303

8/22/2012 11:13:17 AM C:\GDOT\GDOTROAD\tables\Gplotborder-half.tbl 110630\New Contract 08-09-10\ROADWAY\Gm\concept\110630Project Layout.dgn(08-1-56.59-63) GRWCOV

**ATTACHMENT #2**

# DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

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INTERDEPARTMENT CORRESPONDENCE

**FILE PROJECT No.**  ,  **OFFICE**   
 **DATE**

**P.I. No.**

**FROM**

**TO** Lisa L. Myers, State Project Review Engineer

**SUBJECT REVISIONS TO PROGRAMMED COSTS**

**PROJECT MANAGER**

**MNGT LET DATE**

**MNGT R/W DATE**

**PROGRAMMED COST (TPro W/OUT INFLATION)**

**LAST ESTIMATE UPDATE**

**CONSTRUCTION** \$

**DATE**

**RIGHT OF WAY** \$

**DATE**

**UTILITIES** \$

**DATE**

**REVISED COST ESTIMATES**

**CONSTRUCTION\*** \$

**RIGHT OF WAY** \$

**UTILITIES** \$

\* Costs contain  % Engineering and Inspection

**REASON FOR COST INCREASE**

This is an annual cost estimate submitted as required by the GDOT Plan Development Process and addition to interchange 129 lighting. The lighting cost is preliminary and a detailed cost estimate will be prepared with the Final Plans as per PDP. The total cost estimate has decreased due to a change in unit costs and quantity changes.

**CONTINGENCY SUMMARY**

Construction Cost Estimate:	\$ 67,237,700.83	(Base Estimate)
Engineering and Inspection:	\$ 3,361,885.04	(Base Estimate x 5 %)
Total Liquid AC Adjustment	\$ 3,124,251.36	(From attached worksheet)
<b>Construction Total:</b>	<b>\$ 73,723,837.23</b>	

**REIMBURSABLE UTILITY COST**

Utility Owner

Reimbursable Cost

N/A

Attachments

PROJ. NO.

NHIMO-0085-02(167)

CALL NO.

P.I. NO.

110630

DATE

11/13/2012

INDEX (TYPE)

REG. UNLEADED

Nov-12

\$ 3.337

DIESEL

\$ 3.961

LIQUID AC

\$ 569.00

Link to Fuel and AC Index:

<http://www.dot.ga.gov/doingbusiness/Materials/Pages/asphaltcementindex.aspx>

LIQUID AC ADJUSTMENTS

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

Asphalt

Price Adjustment (PA)

3047268.12

\$ 3,047,268.12

Monthly Asphalt Cement Price month placed (APM)

Max. Cap

60%

\$ 910.40

Monthly Asphalt Cement Price month project let (APL)

\$ 569.00

Total Monthly Tonnage of asphalt cement (TMT)

8925.8

ASPHALT	Tons	%AC	AC ton
Leveling	1020	5.0%	51
12.5 OGFC		5.0%	0
12.5 mm	13310	5.0%	665.5
9.5 mm SP		5.0%	0
25 mm SP	75420	5.0%	3771
19 mm SP	88766	5.0%	4438.3
	<b>178516</b>		<b>8925.8</b>

BITUMINOUS TACK COAT

Price Adjustment (PA)

\$ 76,983.24

\$ 76,983.24

Monthly Asphalt Cement Price month placed (APM)

Max. Cap

60%

\$ 910.40

Monthly Asphalt Cement Price month project let (APL)

\$ 569.00

Total Monthly Tonnage of asphalt cement (TMT)

225.4927984

Bitum Tack

Gals	gals/ton	tons
52500	232.8234	225.492798

PROJ. NO.

NHIMO-0085-02(167)

CALL NO.

P.I. NO.

110630

DATE

11/13/2012

**BITUMINOUS TACK COAT (surface treatment)**

Price Adjustment (PA)						<b>0</b>	\$	-
Monthly Asphalt Cement Price month placed (APM)		Max. Cap	60%	\$	910.40			
Monthly Asphalt Cement Price month project let (APL)				\$	569.00			
Total Monthly Tonnage of asphalt cement (TMT)					0			

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

<b>TOTAL LIQUID AC ADJUSTMENT</b>							\$	<b>3,124,251.36</b>
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STATE HIGHWAY AGENCY

DATE : 11/13/2012  
PAGE : 1

JOB ESTIMATE REPORT

JOB NUMBER : 110630\_AYRES                      SPEC YEAR: 01  
DESCRIPTION: I-85 FM NORTH OF SR 53/GREEN ST TO NORTH OF SR 11/US 129/LEE  
ROAD WIDENING

COST GROUPS FOR JOB 110630\_AYRES

COST GROUP	DESCRIPTION	QUANTITY	PRICE	AMOUNT	ACTIVE?
STRO	STRUCTURES, OTHER (SF)				N
ERTHCY	EARTHWORK (CY)				N
DRNGLF	DRAINAGE (LF)				N
DRNGEA	DRAINAGE (EA)				N
CONC	CONCRETE (SY)				N
BASE	BASE/AGGREGATE (TN)				N
ASPH	ASPHALT (TN)				N
TRFT	TRAFFIC CONTROL-TEMPORARY (LS)				Y
ERTHLS	EARTHWORK (LS)				Y
EROC	EROSION CONTROL (SY)				Y
LSGN	LARGE OVERHEAD AND COSTLY SIGNS				Y
THSY	THERMO PLASTIC MARKING SQUARE YARDS				Y
PFPL	PREFORMED PLASTIC STRIPES				Y
PLYU	POLY UREA TRAFFIC STRIPE				Y
SSGN	SMALL ROADSIDE SIGNS				Y
GDRL	GUARDRAIL/BARRIER (LF)				Y
MISC	MISCELLANEOUS (LS)				Y
RMVL	REMOVALS (LS)				Y
LTNG	LIGHTING (EA)				Y
ACTIVE COST GROUP TOTAL				0.00	
INFLATED COST GROUP TOTAL				0.00	

ITEMS FOR JOB 110630\_AYRES

LINE	ITEM	ALT	UNITS	DESCRIPTION	QUANTITY	PRICE	AMOUNT
0005	500-0100		SY	GROOVED CONCRETE	12100.000	2.21	26766.77
0010	500-1006		LS	SUPERSTR CONCRETE, CL AA, BR NO - BRIDGE I.D. 157-0039-0,40,41,42,43,44	1.000	6113478.00	6113478.00
0015	500-2100		LF	CONCRETE BARRIER	2030.000	36.12	73342.54
0020	500-3101		CY	CLASS A CONCRETE	1580.000	392.82	620663.53
0025	501-3000		LS	STR STEEL, BR NO - BRIDGE I.D. 157-0039-0,40,41,42,43,44	1.000	343460.00	343460.00
0030	511-1000		LB	BAR REINF STEEL	253700.000	0.64	163238.19
0035	511-3000		LS	SUPERSTR REINF STEEL, BR NO - BRIDGE I. D. 157-0039-0,40,41,42,43,44	1.000	966500.00	966500.00
0040	514-1000		LS	EPOXY COAT/SUP REINF ST BR NO- BRIDGE I. D. 157-0039-0,40,41,42,43,44	1.000	320465.00	320465.00
0050	520-1104		LF	PIL-IN-PL,STEEL H,HP 10 X 42	360.000	43.04	15494.85
0055	520-2214		LF	PILING, PSC, 14 IN SQ	690.000	49.39	34082.52
0060	520-2216		LF	PILING, PSC, 16 IN SQ	1830.000	48.46	88691.83
0065	205-0001		CY	UNCLASS EXCAV	215776.000	3.24	699187.60

## STATE HIGHWAY AGENCY

DATE : 11/13/2012

PAGE : 2

## JOB ESTIMATE REPORT

0070	550-1180	LF	STM DR PIPE 18",H 1-10	15000.000	27.44	411747.60
0075	550-1181	LF	STM DR PIPE 18",H 10-15	210.000	30.19	6341.30
0080	668-2110	LF	DROP INLET, GP 1, ADDL DEPTH	73.000	167.02	12192.78
0085	550-4218	EA	FLARED END SECT 18 IN, ST DR	57.000	453.40	25844.29
0090	611-4001	EA	RECONSTR MINOR DRAINAGE STR	4.000	1531.11	6124.44
0095	668-2100	EA	DROP INLET, GP 1	124.000	1847.59	229102.10
0100	668-2200	EA	DROP INLET, GP 2	46.000	2452.41	112811.16
0105	441-0301	EA	CONC SPILLWAY, TP 1	2.000	1753.49	3506.99
0110	441-0303	EA	CONC SPILLWAY, TP 3	1.000	1693.37	1693.38
0115	310-1101	TN	GR AGGR BASE CRS, INCL MATL	408280.000	11.70	4777941.61
0120	402-1812	TN	RECYL AC LEVELING,INC BM&HL	1020.000	67.53	68884.97
0125	402-3113	TN	RECYL AC 12.5MM SP,GP1/2,BM&HL	13310.000	65.98	878193.80
0130	402-3121	TN	RECYL AC 25MM SP,GP1/2,BM&HL	75420.000	54.95	4144462.49
0135	402-3190	TN	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	88766.000	53.47	4747091.17
0140	413-1000	GL	BITUM TACK COAT	52500.000	2.21	116354.18
0150	430-1220	SY	C REF CONC PVMT/HES/ 12" TK	430380.000	63.08	27148370.40
0155	433-1200	SY	REF CONC APPR SL/I SLOPED EDGE	3300.000	141.89	468258.98
0164	456-2012	GLM	INTENT. RUMB. STRIPS - GRND-IN-PL (CONT)	32.000	1419.18	45413.83
0165	500-3200	CY	CL B CONC	56.000	380.99	21335.65
0170	150-1000	LS	TRAFFIC CONTROL - NHIMO-0085-02(167)	1.000	160000.00	160000.00
0175	201-1500	LS	CLEARING & GRUBBING - NHIMO-0085-02(167)	1.000	416600.00	416600.00
0180	163-0232	AC	TEMPORARY GRASSING	210.000	24.27	5097.81
0185	163-0240	TN	MULCH	120.000	195.59	23471.91
0190	163-0300	EA	CONSTRUCTION EXIT	6.000	1314.35	7886.14
0195	163-0501	EA	CONSTR AND REMOVE SILT CONTROL GATE,TP 1	10.000	442.92	4429.28
0200	163-0502	EA	CONSTR AND REMOVE SILT CONTROL GATE,TP 2	15.000	545.22	8178.42
0205	163-0520	LF	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN	11600.000	11.01	127830.61
0210	163-0531	EA	CONSTR & REM SEDIMENT BASIN,TP 1,STA NO- NHIMO-0085-02(167)	14.000	9127.45	127784.41
0215	163-0550	EA	CONS & REM INLET SEDIMENT TRAP	124.000	137.63	17067.19
0220	165-0010	LF	MAINT OF TEMP SILT FENCE, TP A	29700.000	0.41	12366.49
0225	165-0020	LF	MAINT OF TEMP SILT FENCE, TP B	34700.000	0.45	15818.69
0230	165-0030	LF	MAINT OF TEMP SILT FENCE, TP C	4800.000	0.67	3261.02
0235	165-0041	LF	MAINT OF CHECK DAMS - ALL TYPES	30000.000	0.83	25013.40
0240	165-0060	EA	MAINT OF TEMP SEDIMENT BASIN,STA NO - NHIMO-0085-02(167)	14.000	2456.11	34385.57
0245	165-0085	EA	MAINT OF SILT CONTROL GATE, TP 1	10.000	86.21	862.15
0250	165-0086	EA	MAINT OF SILT CONTROL GATE, TP 2	15.000	122.57	1838.56
0255	165-0101	EA	MAINT OF CONST EXIT	6.000	471.46	2828.82
0260	165-0105	EA	MAINT OF INLET SEDIMENT TRAP	124.000	40.13	4976.52
0265	167-1000	EA	WATER QUALITY MONITORING AND SAMPLING	2.000	236.18	472.37
0270	167-1500	MO	WATER QUALITY INSPECTIONS	24.000	772.11	18530.68
0275	171-0010	LF	TEMPORARY SILT FENCE, TYPE A	29700.000	1.17	34920.37
0280	171-0020	LF	TEMPORARY SILT FENCE, TYPE B	34700.000	1.16	40374.14
0285	171-0030	LF	TEMPORARY SILT FENCE, TYPE C	4800.000	2.69	12918.14
0290	603-2018	SY	STN DUMPED RIP RAP, TP 1, 18"	2640.000	50.99	134614.95
0295	700-6910	AC	PERMANENT GRASSING	84.000	617.69	51886.61

## STATE HIGHWAY AGENCY

DATE : 11/13/2012

PAGE : 3

## JOB ESTIMATE REPORT

LINE NO	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE	
0300	700-7000	TN	AGRICULTURAL LIME	6.000	22.18	133.13
0305	700-8000	TN	FERTILIZER MIXED GRADE	50.000	385.38	19269.49
0310	700-8100	LB	FERTILIZER NITROGEN CONTENT	4300.000	1.54	6633.18
0315	716-2000	SY	EROSION CONTROL MATS, SLOPES	52400.000	0.76	40168.79
0320	636-1072	SF	HWY SIGNS,ALUM EXTRD PNLS, RS TP 3	54486.000	14.97	815914.23
0325	638-1001	LS	STR SUPPORT OVHD SIGN,TP I,STA SB # 101	1.000	80750.00	80750.00
0330	638-1001	LS	STR SUPPORT OVHD SIGN,TP I,STA NB # 103	1.000	80750.00	80750.00
0335	638-1001	LS	STR SUPPORT OVHD SIGN,TP I,STA SB #104	1.000	80750.00	80750.00
0340	638-1003	LS	STR SUPPORT OVHD,SIGN,TP IIIISTA NB # 101	1.000	56000.00	56000.00
0345	638-1003	LS	STR SUPPORT OVHD,SIGN,TP IIIISTA NB # 102	1.000	56000.00	56000.00
0350	638-1003	LS	STR SUPPORT OVHD,SIGN,TP IIIISTA SB # 102	1.000	56000.00	56000.00
0355	638-1003	LS	STR SUPPORT OVHD,SIGN,TP IIIISTA SB # 103	1.000	56000.00	56000.00
0360	653-6004	SY	THERM TRAF STRIPING, WHITE	7800.000	2.77	21664.97
0365	653-6006	SY	THERM TRAF STRIPING, YELLOW	2700.000	2.83	7642.08
0370	653-1501	LF	THERMO SOLID TRAF ST 5 IN, WHI	89760.000	0.35	31418.69
0375	653-1502	LF	THERMO SOLID TRAF ST, 5 IN YEL	89760.000	0.36	33177.09
0380	653-3501	GLF	THERMO SKIP TRAF ST, 5 IN, WHI	174240.000	0.21	38108.03
0385	658-1210	LF	SOLID POLYUREA TRAF STRIPE,10IN, WHITE	11100.000	2.75	30525.00
0390	636-1020	SF	HWY SGN,TP1MAT,REFL SH TP3	10.000	15.65	156.55
0395	636-1029	SF	HWY SGN,TP2 MATL,REFL SH TP 3	540.000	13.84	7476.41
0400	636-2070	LF	GALV STEEL POSTS, TP 7	550.000	7.33	4036.22
0405	636-2080	LF	GALV STEEL POSTS, TP 8	240.000	9.56	2294.88
0410	636-2090	LF	GALV STEEL POSTS, TP 9	70.000	8.30	581.63
0415	636-3000	LB	GALV STEEL STR SHAPE POST	6800.000	4.13	28090.73
0420	636-5010	EA	DELINEATOR, TP 1	200.000	43.79	8759.03
0425	636-5020	EA	DELINEATOR, TP 2	86.000	47.02	4043.84
0430	636-5100	EA	MILEPOST SIGNS	16.000	169.16	2706.58
0435	641-1100	LF	GUARDRAIL, TP T	260.000	48.53	12617.93
0440	641-1200	LF	GUARDRAIL, TP W	29900.000	14.44	431799.65
0445	641-5001	EA	GUARDRAIL ANCHORAGE, TP 1	43.000	596.53	25651.04
0450	641-5012	EA	GUARDRAIL ANCHORAGE, TP 12	43.000	1827.88	78598.86
0455	620-0100	LF	TEMP BARRIER, METHOD NO. 1	126720.000	13.49	1710221.99
0460	620-0200	LF	TEMP BARRIER, METHOD NO. 2	1020.000	54.82	55919.90
0465	621-3125	LF	CONC BARRIER, TP 25S, MODIFIED	840.000	192.12	161383.71
0470	621-3126	LF	CONCRETE BARRIER, TP 26S	180.000	348.00	62640.00
0475	621-6001	LF	CONC BARRIER, TP S-1	21800.000	63.00	1373400.00
0480	621-6002	LF	CONC BARRIER, TP S-2	7900.000	74.00	584600.00
0485	621-6003	LF	CONC BARRIER, TP S-3	4600.000	188.00	864800.00
0490	621-6050	LF	CONC BARRIER, TP TS	80.000	250.00	20000.00
0495	649-0018	LF	CONCRETE GLARE SCREEN, 18 INCH	12500.000	15.00	187500.00
0500	540-1202	LS	REM OF PARTS OF EX BR, BR NO - BRIDGE I. D. 157-0040-0	1.000	112000.00	112000.00
0505	540-1202	LS	REM OF PARTS OF EX BR, BR NO - BRIDGE I. D. 157-0039-0	1.000	112000.00	112000.00
0510	540-1202	LS	REM OF PARTS OF EX BR, BR NO - BRIDGE I. D. 157-0042-0	1.000	112000.00	112000.00
0515	540-1202	LS	REM OF PARTS OF EX BR, BR NO - BRIDGE I.	1.000	112000.00	112000.00

STATE HIGHWAY AGENCY

DATE : 11/13/2012  
 PAGE : 4

JOB ESTIMATE REPORT

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=====
0520  540-1202      LS      D. 157-0041-0
      REM OF PARTS OF EX BR, BR NO - BRIDGE I.          1.000      112000.00      112000.00
      D. 157-0044-0
0525  540-1202      LS      REM OF PARTS OF EX BR, BR NO - BRIDGE I.          1.000      112000.00      112000.00
      D. 157-0043-0
0530  163-0528      LF      CONSTR AND REM FAB CK DAM -TP C SLT FN          5400.000           3.16      17079.28
0535  683-1101      EA      LIGHT TOW/STEL/100'MH/LW EQUIP          16.000      14786.35      236581.72
    
```

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ITEM TOTAL                                     67237700.84
INFLATED ITEM TOTAL                           67237700.84
    
```

TOTALS FOR JOB 110630\_AYRES

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ESTIMATED COST:                                     67237700.83
CONTINGENCY PERCENT ( 0.0 ):                          0.00
ESTIMATED TOTAL:                                     67237700.83
    
```

NOTE: The item totals include all alternate items. The estimated totals include only the low cost alternate items.

**ATTACHMENT #3**

**ALLOWABLE RANGES TABLE**

FOR THIS PROJECT, CROSS SLOPES THAT ARE ADJUSTED TO "BEST FIT" EXISTING PAVEMENT SLOPES ARE SUBJECT TO THE FOLLOWING LIMITS:

**A. NORMAL CROWN**

SECTION WITH GRADES 0.5% OR GREATER	SECTION WITH GRADES LESS THAN 0.5%
0.0150 FT/FT - MINIMUM	0.0156 FT/FT - MINIMUM
0.0200 FT/FT - DESIRABLE	0.0200 FT/FT - DESIRABLE
0.0250 FT/FT - MAXIMUM	0.0300 FT/FT - MAXIMUM

**B. SUPERELEVATION RATE**

S.E. RATE SHOWN ON PLANS OR SE RATE EXISTING IN FIELD, WHICHEVER IS GREATER.

**C. SUPERELEVATION TRANSITION LENGTH (LENGTH FROM FLAT POINT TO FULL SE)**

	RATE OF CHANGE	CORRESPONDING DIFFERENCE IN GRADE BETWEEN PIVOT POINT AND EDGE OF PAVEMENT
MINIMUM	1:150	0.67%
DESIRABLE	1:200	0.50%
MAXIMUM	1:300	0.33%

LENGTH SHALL BE SET TO AVOID CREATING A FLAT GUTTER GRADE ON LOW SIDE AND TO AVOID FLAT CROSS SLOPES AT OR NEAR THE LOW POINT OF VERTICAL CURVES.

**D. POSITIONING OF SUPERELEVATION TRANSITION LENGTH ON SIMPLE CURVES**

- 50% OF TRANSITION INSIDE CURVE - MAXIMUM
- 33% OF TRANSITION INSIDE CURVE - DESIRABLE
- 20% OF TRANSITION INSIDE CURVE - MINIMUM

NOTE: CROWN WIPE-OUT SHALL BE AT THE SAME RATE AS THE SE TRANSITION.

**E. SMOOTHING OF BREAKS IN EDGE PROFILE AT BEGIN AND END OF TRANSITION SHALL BE ACCOMPLISHED BY VERTICAL CURVE WITH A MINIMUM LENGTH (IN FEET) EQUAL TO THE SPEED DESIGN (IN MPH).**

**NOTES:**

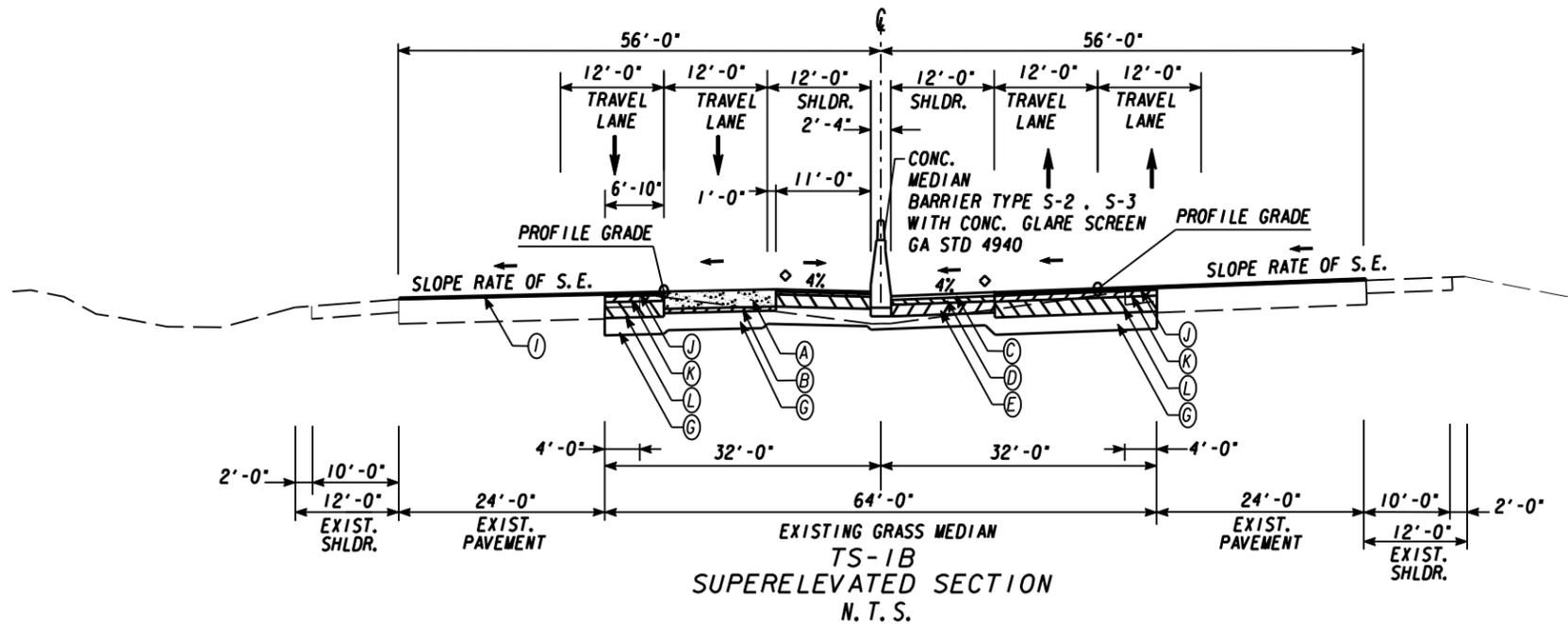
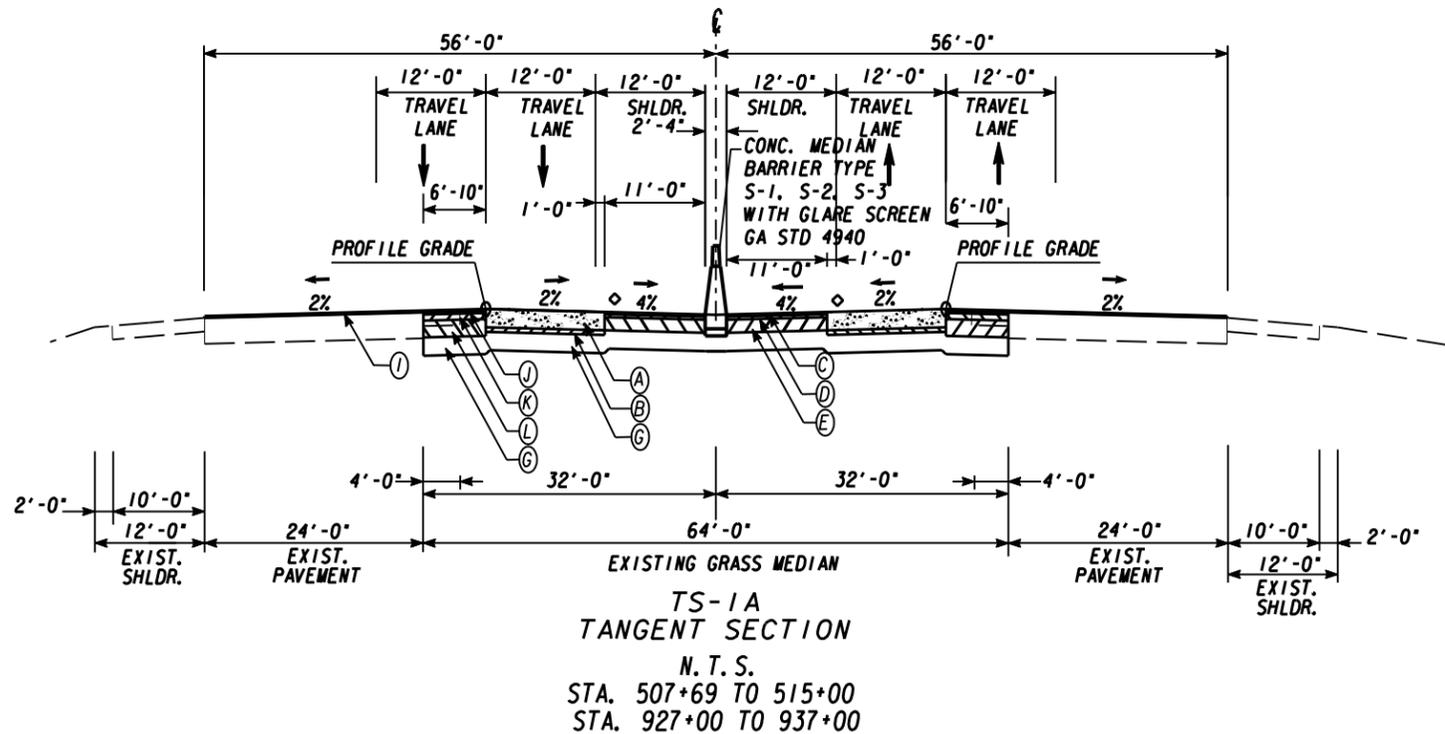
- EXISTING CONC. AND ASPH PAVEMENT SHALL BE REMOVED.
- SEE ROADWAY PLANS FOR SUPERELEVATION RATES AND TRANSITIONS.
- SEE ROADWAY PLANS FOR LOCATION OF GUARDRAIL.
- SHOULDER MAY BE GRADED AWAY FROM ROADWAY TO FACILITATE THE SLOPE TIE TO EXISTING GROUND.

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	—	0-10'
2:1	ALL	OVER 10'

◇ CONTINUOUS INDENTATION RUMBLE STRIPS- GROUND-IN PLACE.

**PAVEMENT MATERIAL SCHEDULE**

Ⓐ CONT. REINF., CONC. PAVEMENT, CL 1, CONC., 12 INCH
Ⓑ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
Ⓒ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1OR 2, INCL BITUM MATL & H LIME, 220 LBS./SY
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1OR 2, INCL BITUM MATL & H LIME, 935 LBS./SY
Ⓕ ROLLER COMPACTED CONCRETE PAVEMENT, 12 INCH.
Ⓖ GRADED AGGREGATE BASE, 12 INCH
Ⓗ ASPH CONC 12.5 MM PEM, GP 2 ONLY, INCL POLYMER-MODIFIED, 135 LBS./SY
Ⓘ RECYCLED ASPH CONC 12.5 MM SMA, GP 2 ONLY, 220 LBS./SY
Ⓚ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1OR 2, INCL BITUM MATL & H LIME, 440 LBS./SY
Ⓛ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1OR 2, INCL BITUM MATL & H LIME, 1210 LBS./SY



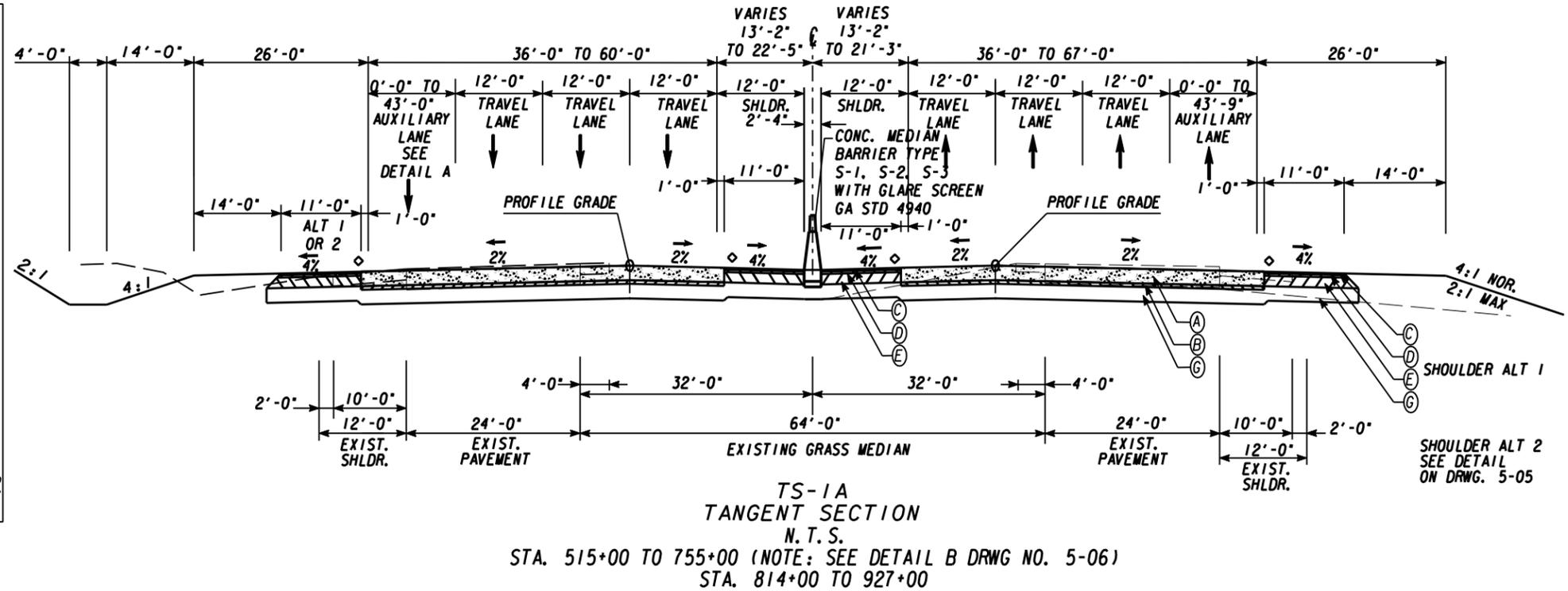
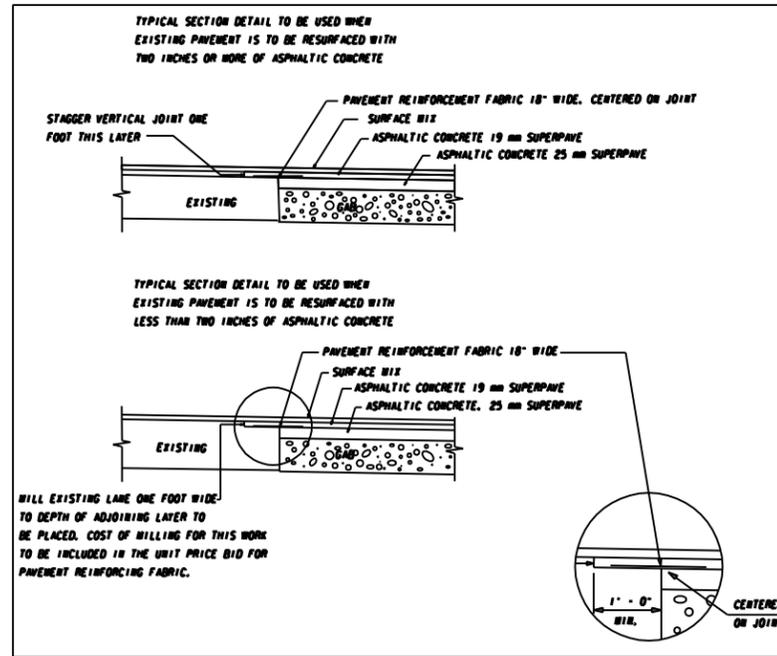
**REVISION DATES**

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

ALTERNATE 1 & 3  
1-85

DRAWING No.  
5-01

**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303



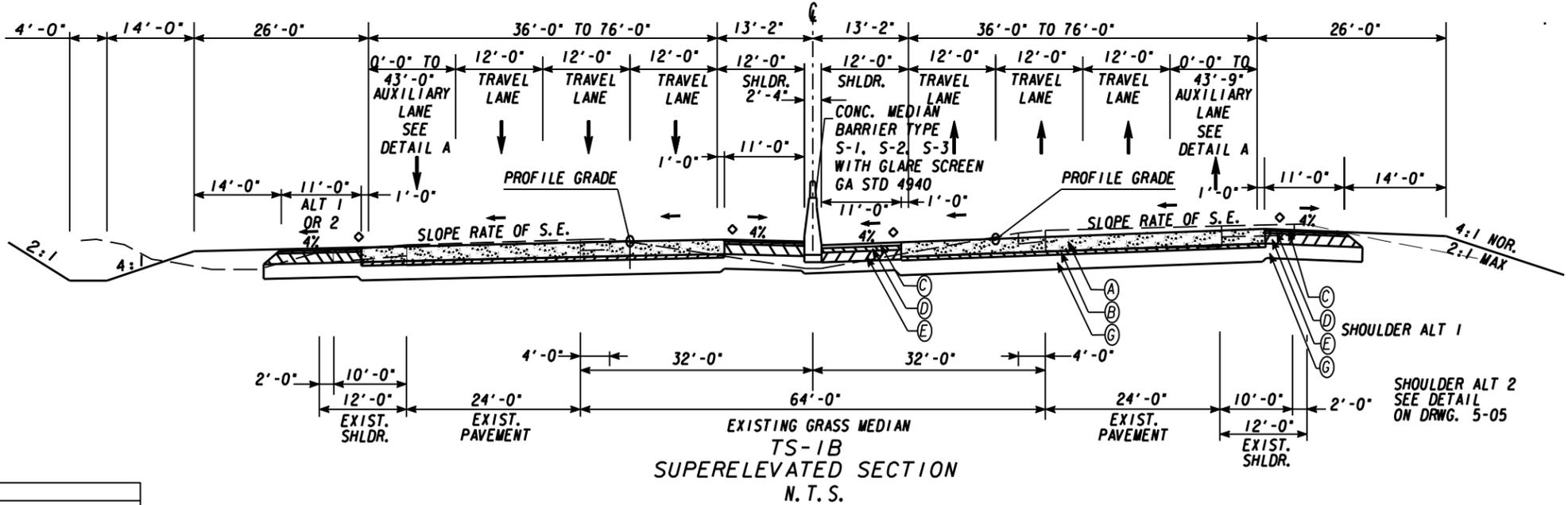
NOTES:

1. EXISTING CONC. AND ASPH PAVEMENT SHALL BE REMOVED.
2. SEE ROADWAY PLANS FOR SUPERELEVATION RATES AND TRANSITIONS.
3. SEE ROADWAY PLANS FOR LOCATION OF GUARDRAIL.
4. SHOULDER MAY BE GRADED AWAY FROM ROADWAY TO FACILITATE THE SLOPE TIE TO EXISTING GROUND.

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	—	0-10'
2:1	ALL	OVER 10'

◇ CONTINUOUS INDENTATION RUMBLE STRIPS- GROUND-IN PLACE.

PAVEMENT MATERIAL SCHEDULE	
Ⓐ	CONT. REINF., CONC. PAVEMENT, CL 1, CONC., 12 INCH
Ⓑ	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
Ⓒ	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
Ⓓ	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 220 LBS./SY
Ⓔ	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 935 LBS./SY
Ⓕ	ROLLER COMPACTED CONCRETE PAVEMENT, 12 INCH.
Ⓖ	GRADED AGGREGATE BASE, 12 INCH



**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

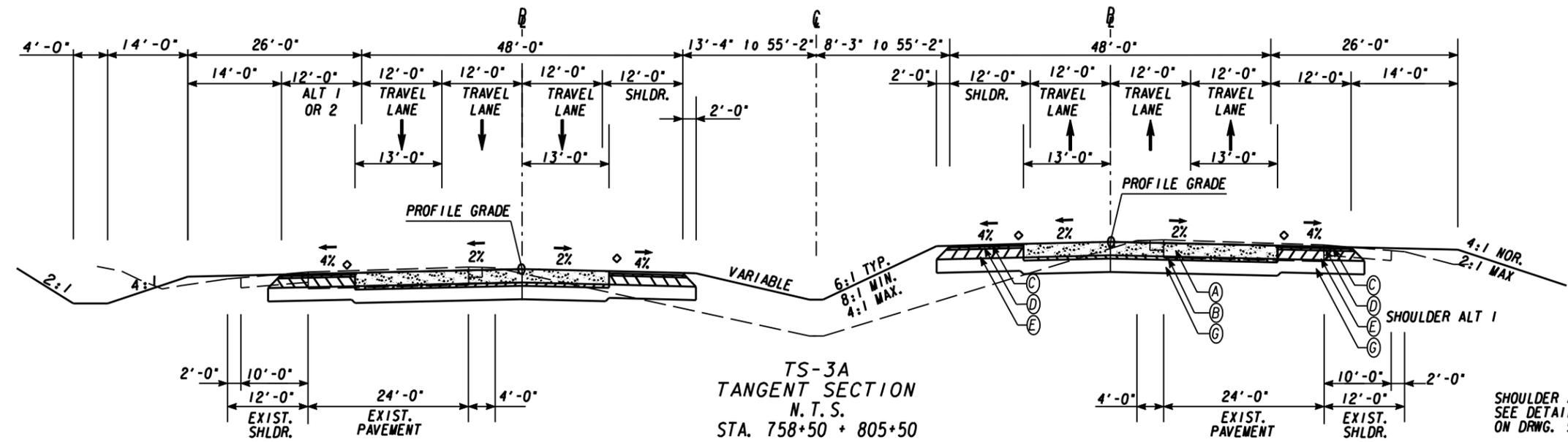
REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

ALTERNATE \*2 & 4  
1-85

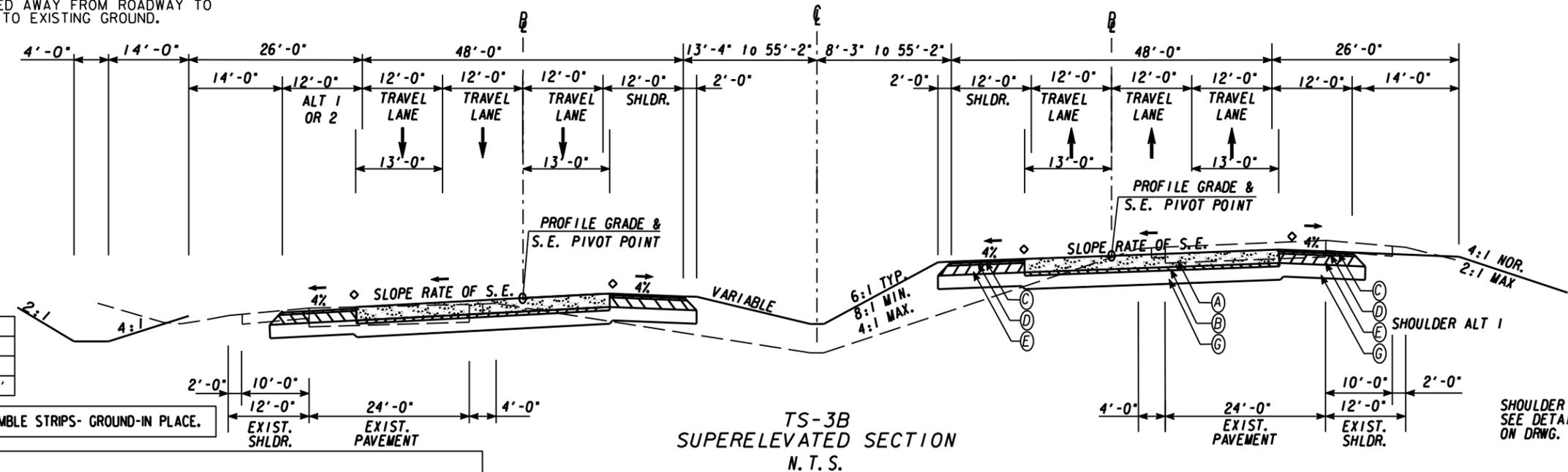
DRAWING No.  
5-02





**NOTES:**

1. EXISTING CONC. AND ASPH PAVEMENT SHALL BE REMOVED.
2. SEE ROADWAY PLANS FOR SUPERELEVATION RATES AND TRANSITIONS.
3. SEE ROADWAY PLANS FOR LOCATION OF GUARDRAIL.
4. SHOULDER MAY BE GRADED AWAY FROM ROADWAY TO FACILITATE THE SLOPE TIE TO EXISTING GROUND.



SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1		0-10'
2:1	ALL	OVER 10'

CONTINUOUS INDENTATION RUMBLE STRIPS- GROUND-IN PLACE.

PAVEMENT MATERIAL SCHEDULE	
(A)	CONT. REINF., CONC. PAVEMENT, CL 1, CONC., 12 INCH
(B)	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
(C)	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
(D)	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 220 LBS./SY
(E)	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 935 LBS./SY
(F)	ROLLER COMPACTED CONCRETE PAVEMENT, 12 INCH.
(G)	GRADED AGGREGATE BASE, 12 INCH

**AYRES  
ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

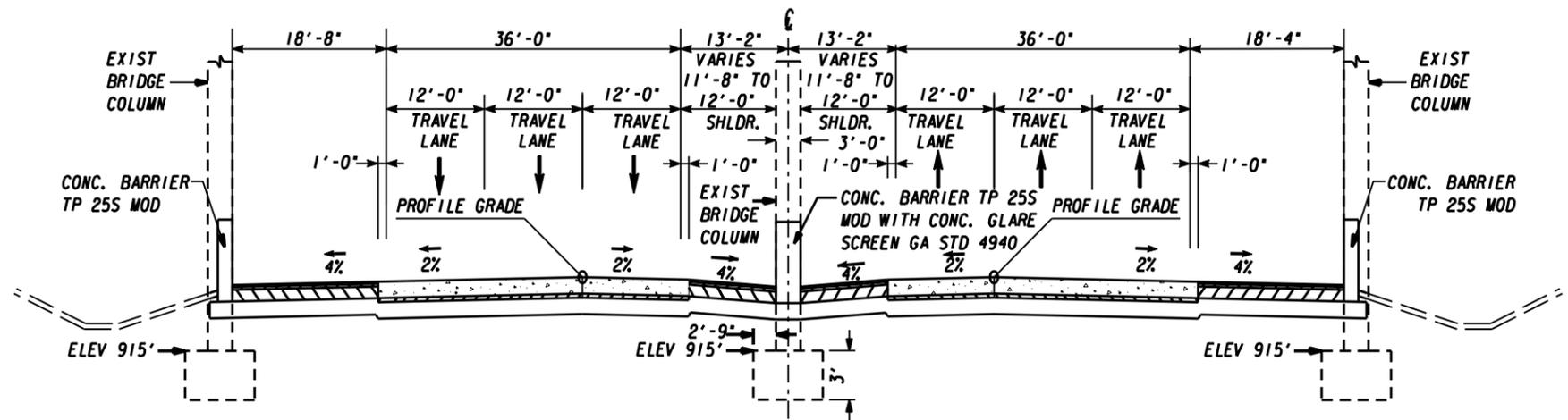
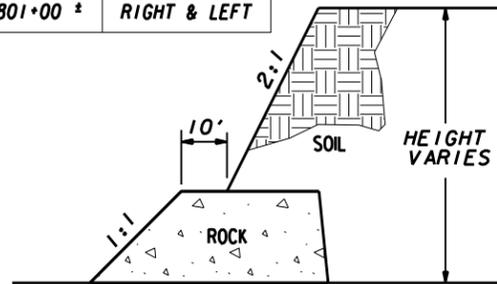
**REVISION DATES**


STATE OF GEORGIA  
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TYPICAL SECTIONS

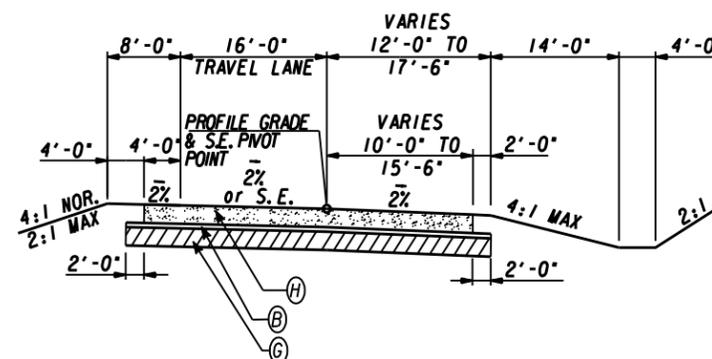


**NOTE:**  
SLOPES CUT AT 1:1 IN INTACT ROCK MAY BE APPLICABLE AT THE FOLLOWING LOCATIONS, AT THE DISCRETION OF THE ENGINEER:

STATION	LOCATION
740+00 ± TO 742+00 ±	LEFT & RIGHT
760+00 ± TO 768+00 ±	LEFT & RIGHT
784+00 ± TO 788+00 ±	LEFT
795+00 ± TO 801+00 ±	RIGHT & LEFT

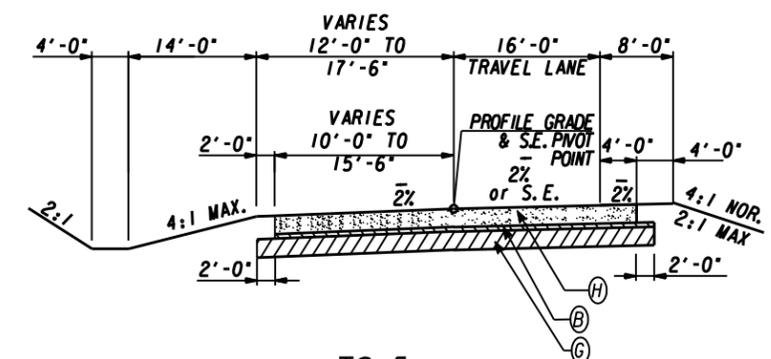


DETAIL B  
N. T. S.  
STA. 648+63 TO 649+09



TS-4  
N. T. S.

- RAMP A STA. 514+50 TO STA. 515+00 (RT SHOULDER CONST)
- RAMP A STA. 515+00 TO STA. 519+66
- RAMP C STA. 877+02 TO STA. 881+82
- RAMP C STA. 881+82 TO STA. 883+24 (RT SHOULDER CONST)
- RAMP D STA. 895+00 TO STA. 896+50 (RT SHOULDER CONST)
- RAMP D STA. 896+50 TO STA. 903+63



TS-5  
N. T. S.

- RAMP B STA. 512+50 TO STA. 521+35
- RAMP E STA. 893+80 TO STA. 895+00 (LT SHOULDER CONST)
- RAMP E STA. 895+00 TO STA. 904+66
- RAMP F STA. 874+43 TO STA. 880+96
- RAMP F STA. 880+96 TO STA. 882+47 (LT SHOULDER CONST)

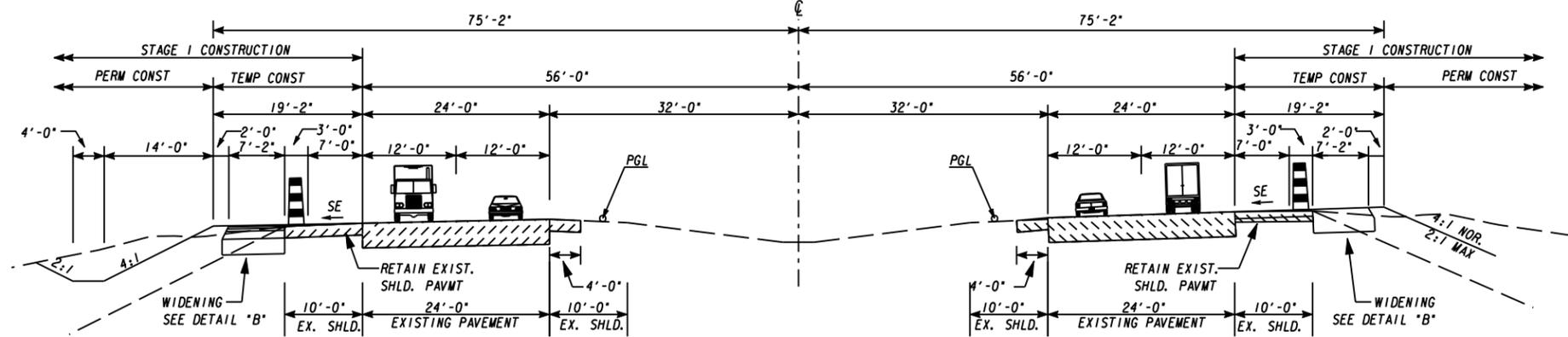
PAVEMENT MATERIAL SCHEDULE	
(A)	CONT. REINF., CONC. PAVEMENT, CL1, CONC., 12 INCH
(B)	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
(C)	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
(D)	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 220 LBS./SY
(E)	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 935 LBS./SY
(F)	ROLLER COMPACTED CONCRETE PAVEMENT, 12 INCH.
(G)	GRADED AGGREGATE BASE, 12 INCH
(H)	PLAIN PC CONC. PVMT, CL 1, 12 INCH

**AYRES**  
ASSOCIATES  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

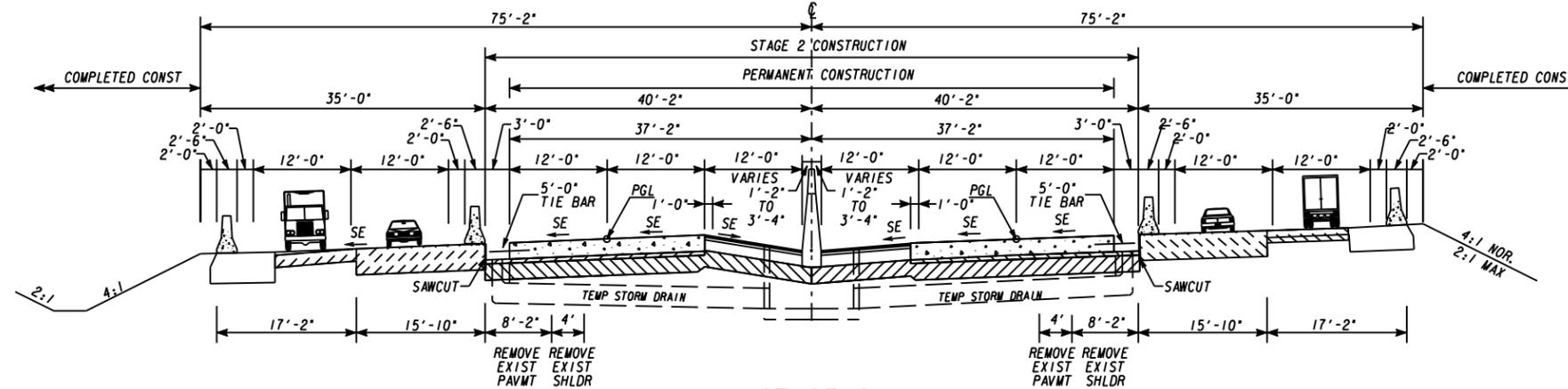
REVISION DATES

STATE OF GEORGIA  
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TYPICAL SECTIONS

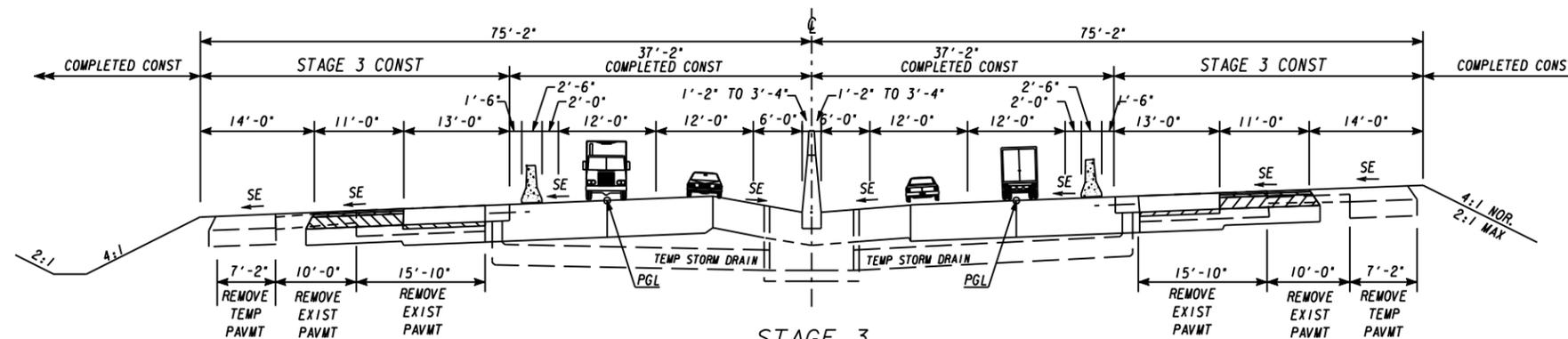




STAGE 1  
SUPERELEVATED SECTION  
TS-1B  
N. T. S.



STAGE 2  
SUPERELEVATED SECTION  
TS-1B  
N. T. S.



STAGE 3  
SUPERELEVATED SECTION  
TS-1B  
N. T. S.

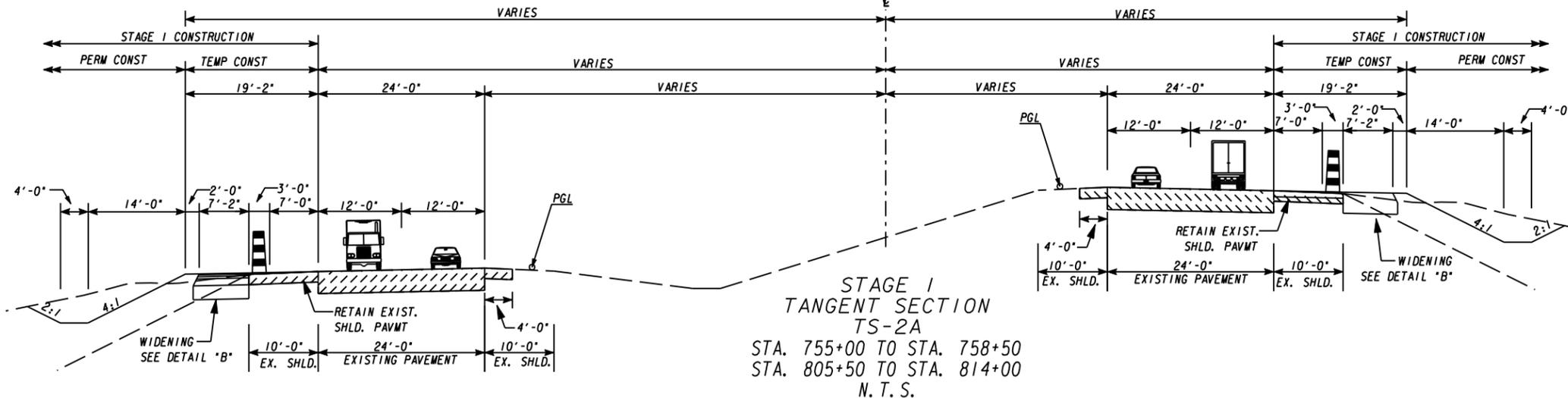
**AYRES ASSOCIATES**  
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SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

REVISION DATES

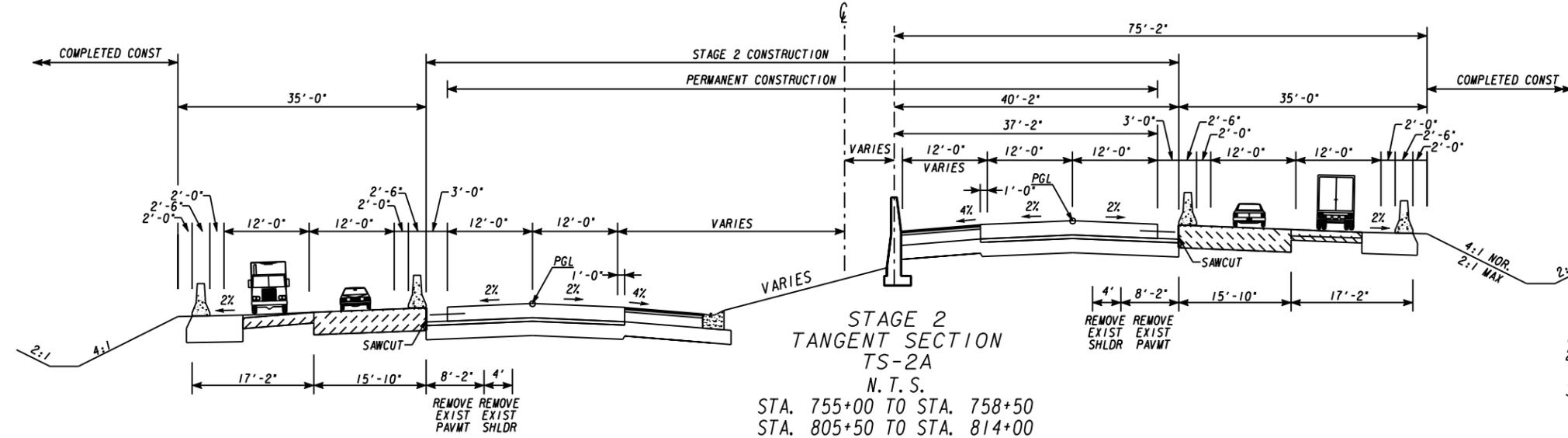
STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

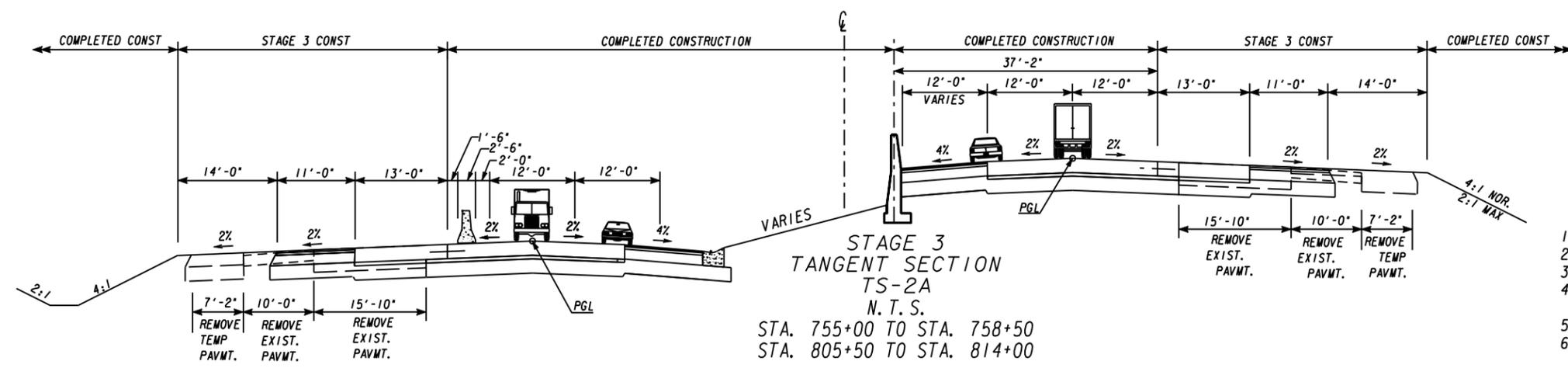
DRAWING No.  
19-02



- MAINTENANCE OF TRAFFIC STAGE 1**
1. INSTALL DRUMS.
  2. MAINTAIN TRAFFIC ON EXISTING LANES.
  3. CONSTRUCT OUTSIDE WIDENING AND EXIST OUTSIDE SHOULDER OVERLAY.
  4. SHIFT TRAFFIC AS NECESSARY TO INSIDE LANE TEMPORARILY TO MAINTAIN ONE LANE DURING SHOULDER OVERLAY OPERATIONS.
  5. PLACE TEMPORARY STRIPING FOR STAGE 2.



- MAINTENANCE OF TRAFFIC STAGE 2**
1. INSTALL TEMP OUTSIDE CONCRETE BARRIER.
  2. INSTALL TEMP INSIDE BARRIER & SHIFT TRAFFIC TO EXISTING OUTSIDE LANE AND PAVED SHOULDER.
  3. CONSTRUCT MEDIAN BARRIER, DRAINAGE STRUCTURES, INSIDE SHOULDERS, INSIDE LANES AND TEMPORARY STRIPING FOR STAGE 3.
  4. INSTALL TEMP STORM DRAINS.



- MAINTENANCE OF TRAFFIC STAGE 3**
1. INSTALL TEMP INSIDE CONCRETE BARRIER.
  2. SHIFT TRAFFIC TO INSIDE LANE AND SHOULDER.
  3. REMOVE OUTSIDE TEMP BARRIER.
  4. REMOVE EXIST OUTSIDE SHOULDER, TEMP PAVING AND EXIST OUTSIDE LANE.
  5. CONSTRUCT OUTSIDE LANE AND PAVED SHOULDER.
  6. BACKFILL TEMP STORM DRAIN.

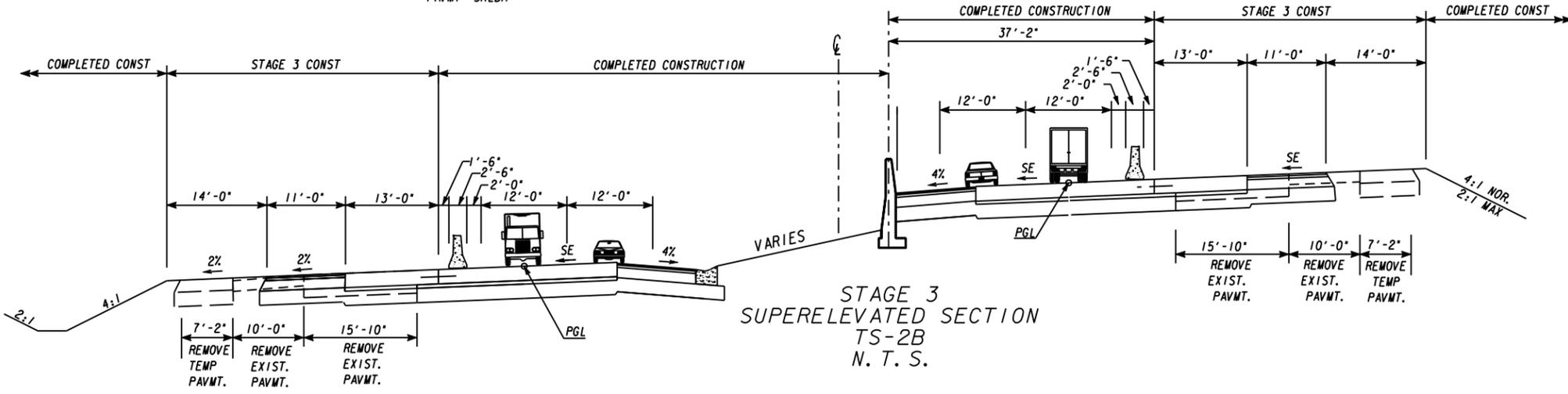
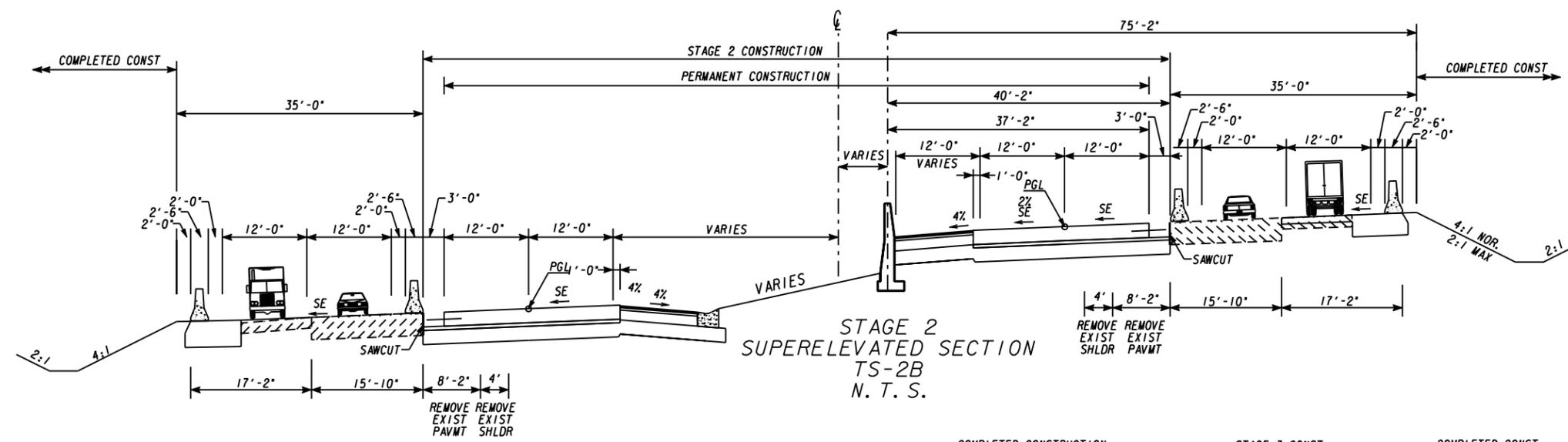
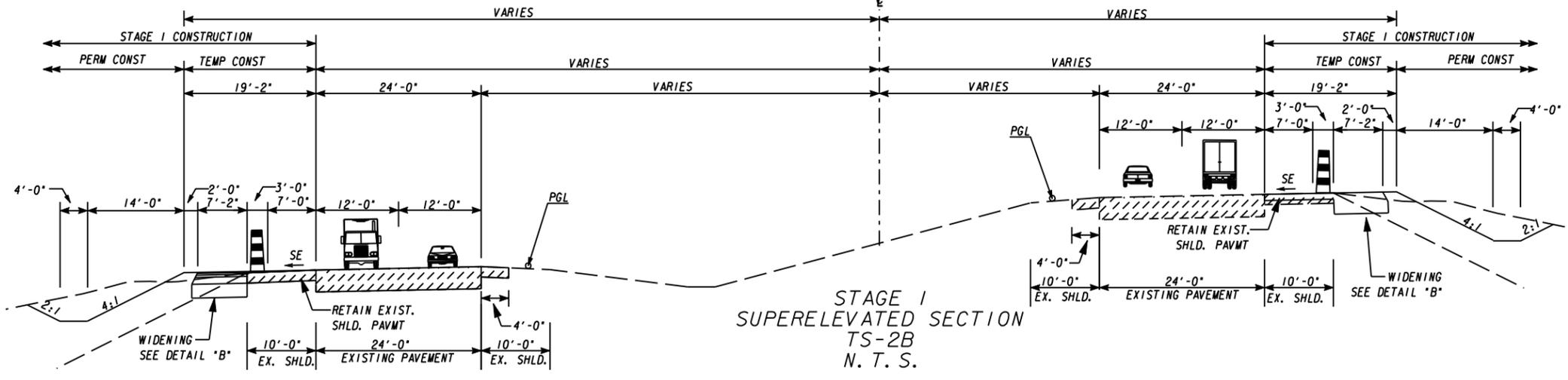
**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

DRAWING No.  
19-03



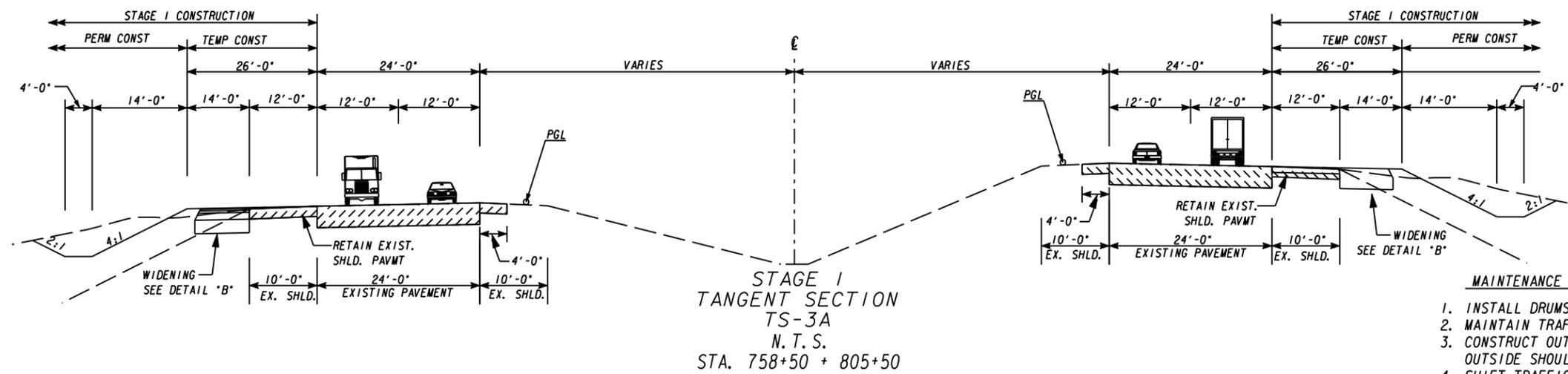
**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

REVISION DATES	

STATE OF GEORGIA  
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TYPICAL SECTIONS

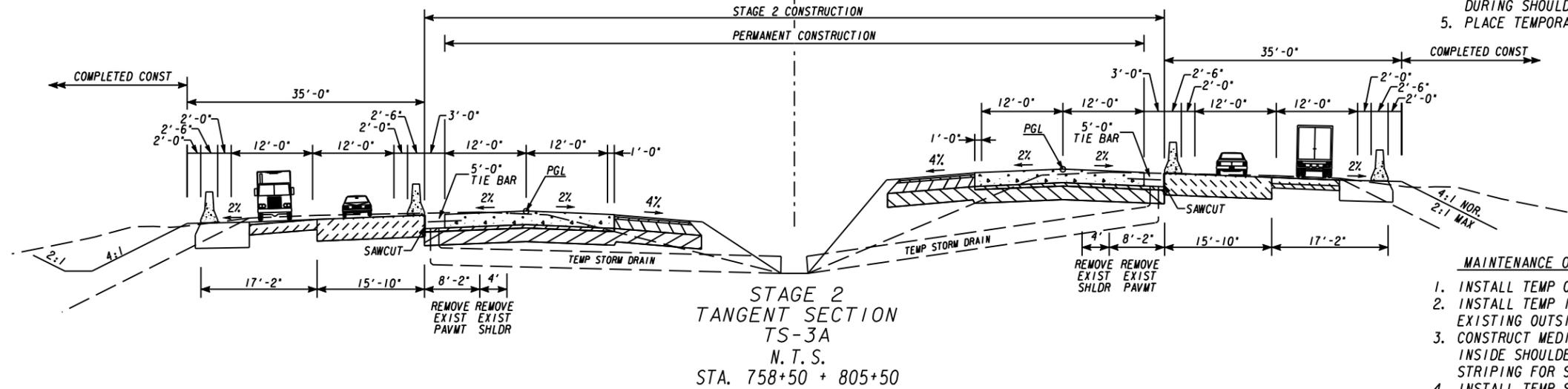
CONSTRUCTION STAGING  
1-85

DRAWING No.  
19-04



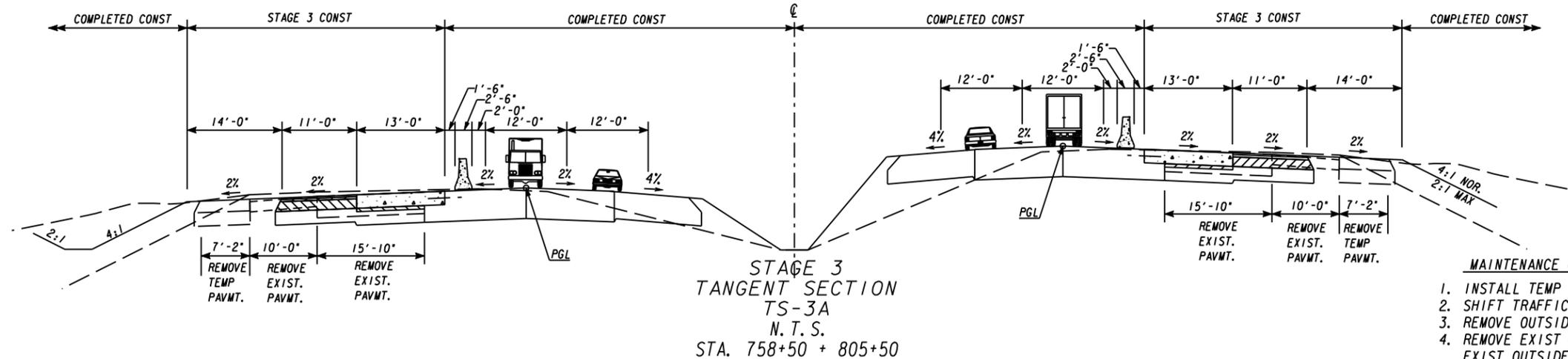
**MAINTENANCE OF TRAFFIC STAGE 1**

1. INSTALL DRUMS.
2. MAINTAIN TRAFFIC ON EXISTING LANES.
3. CONSTRUCT OUTSIDE WIDENING AND EXIST OUTSIDE SHOULDER OVERLAY.
4. SHIFT TRAFFIC AS NECESSARY TO INSIDE LANE TEMPORARILY TO MAINTAIN ONE LANE DURING SHOULDER OVERLAY OPERATIONS.
5. PLACE TEMPORARY STRIPING FOR STAGE 2.



**MAINTENANCE OF TRAFFIC STAGE 2**

1. INSTALL TEMP OUTSIDE CONCRETE BARRIER.
2. INSTALL TEMP INSIDE BARRIER & SHIFT TRAFFIC TO EXISTING OUTSIDE LANE AND PAVED SHOULDER.
3. CONSTRUCT MEDIAN BARRIER, DRAINAGE STRUCTURES, INSIDE SHOULDERS, INSIDE LANES AND TEMPORARY STRIPING FOR STAGE 3.
4. INSTALL TEMP STORM DRAINS.



**MAINTENANCE OF TRAFFIC STAGE 3**

1. INSTALL TEMP INSIDE CONCRETE BARRIER.
2. SHIFT TRAFFIC TO INSIDE LANE AND SHOULDER.
3. REMOVE OUTSIDE TEMP BARRIER.
4. REMOVE EXIST OUTSIDE SHOULDER, TEMP PAVING AND EXIST OUTSIDE LANE.
5. CONSTRUCT OUTSIDE LANE AND PAVED SHOULDER.
6. BACKFILL TEMP STORM DRAIN.

**REVISION DATES**

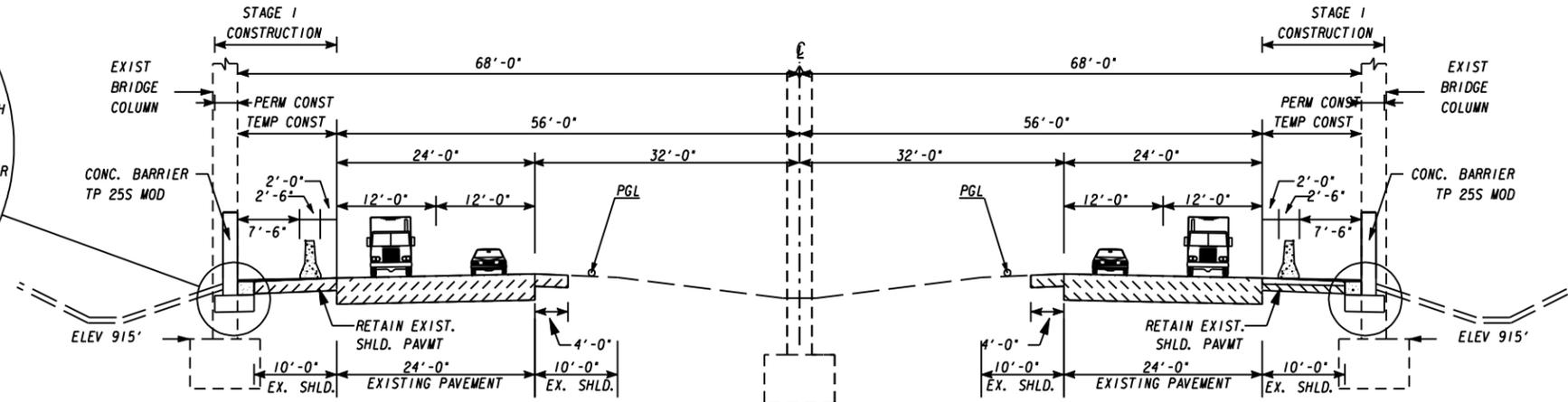
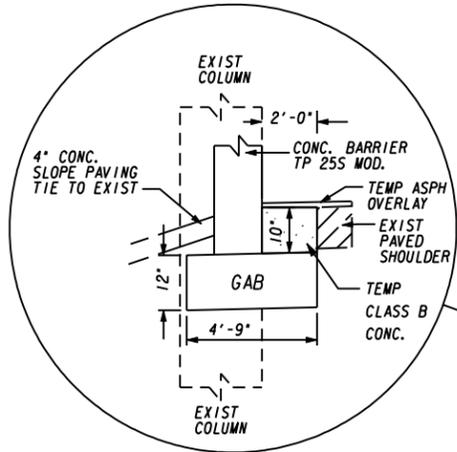

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

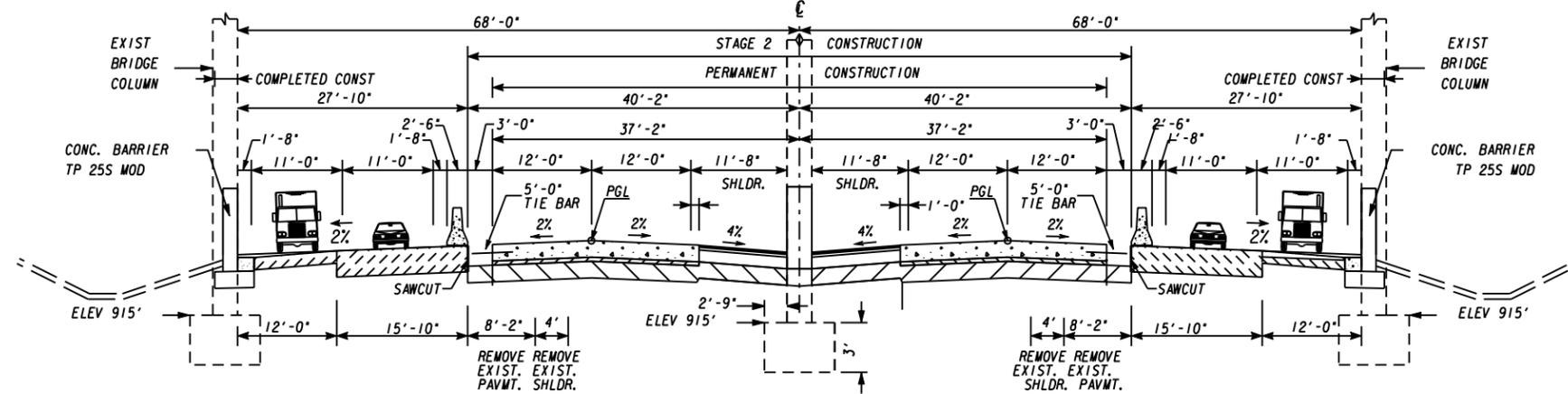
DRAWING No.  
19-05

**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

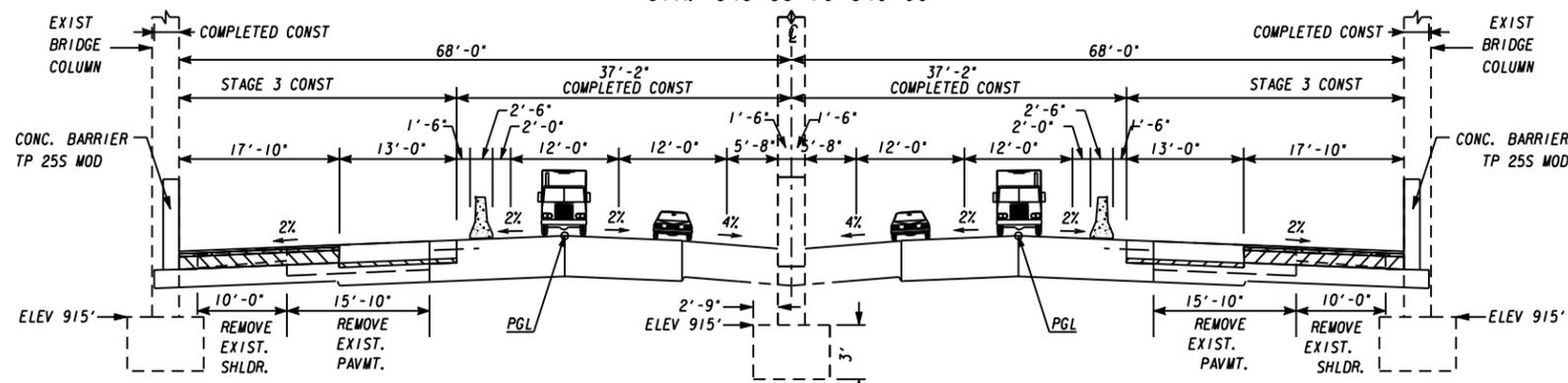
C:\110630\new contract 08-09-10\roadway\dgn\110630st05.dgn(0N:5, 45-49, 60-62)



STAGE 1 DETAIL A  
N. T. S.  
STA. 648+63 TO 649+09



STAGE 2 DETAIL A  
N. T. S.  
STA. 648+63 TO 649+09



STAGE 3 DETAIL A  
N. T. S.  
STA. 648+63 TO 649+09

**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

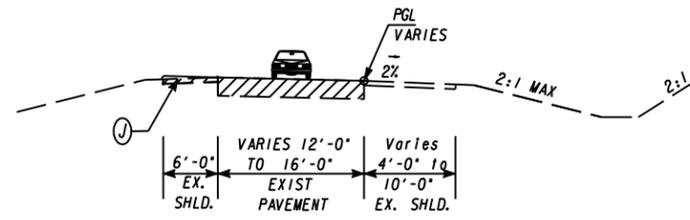
REVISION DATES

NO.	DATE	DESCRIPTION

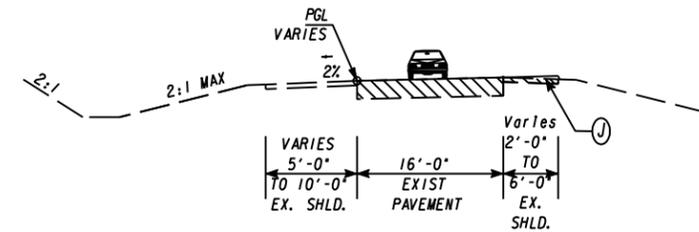
STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

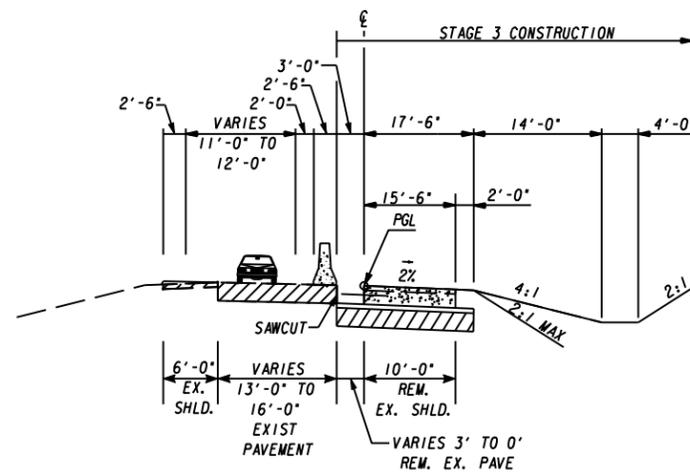
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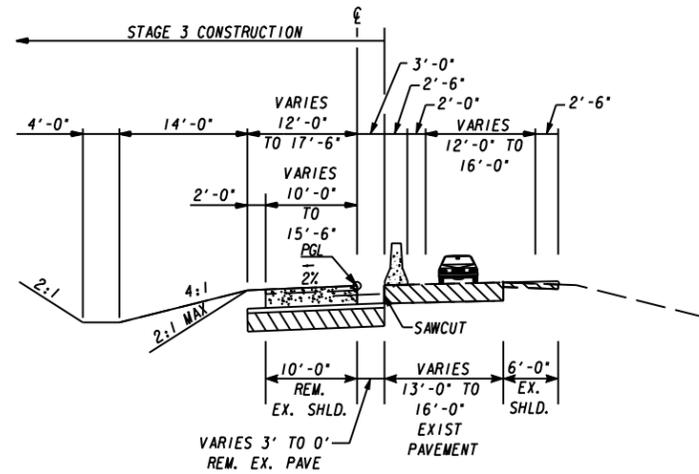
STAGE 1 & 2  
TS-4  
N. T. S.  
RAMP A, C, & D



STAGE 1 & 2  
TS-5  
N. T. S.  
RAMP B, E, & F



STAGE 3  
TS-4  
N. T. S.  
RAMP A, C, & D



STAGE 3  
TS-5  
N. T. S.  
RAMP B, E, & F

PAVEMENT MATERIAL SCHEDULE	
①	ASPH CONC 12.5 MM OGFC, GP 2 ONLY, INCL POLYMER-MODIFIED, 90 LBS./SY
②	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
③	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
④	RECYCLED ASPH CONC, 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
⑤	GRADED AGGREGATE BASE, 10 INCH
⑥	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME

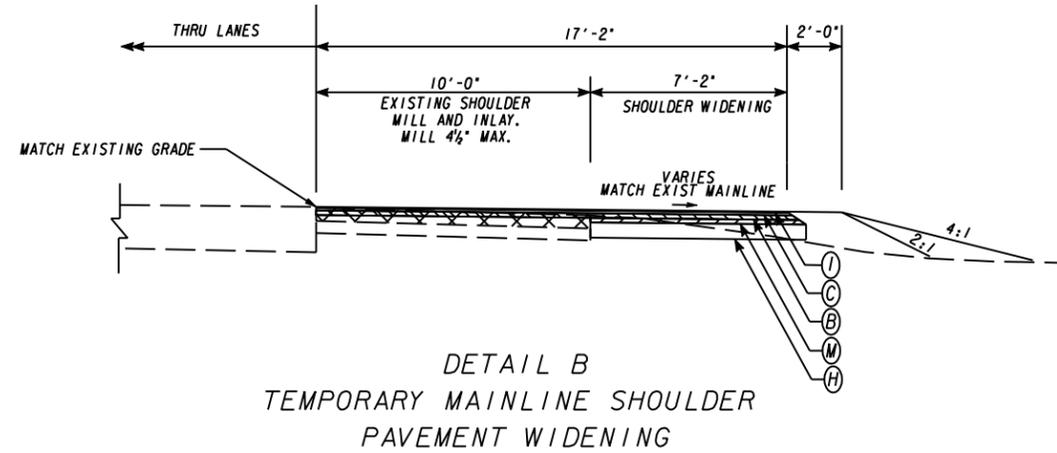
**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

REVISION DATES

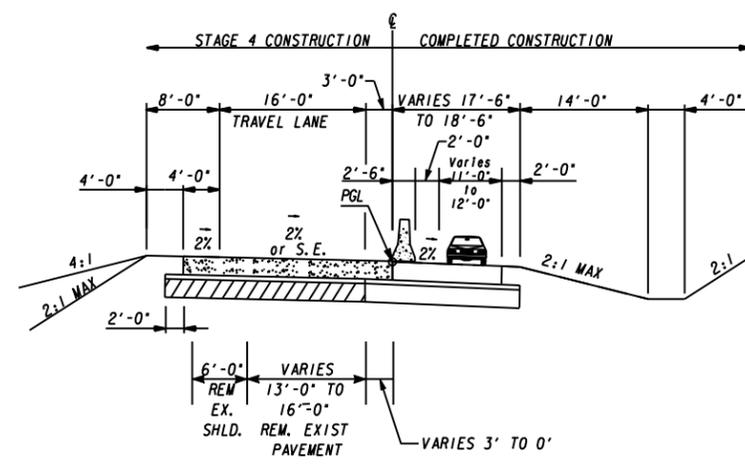
STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

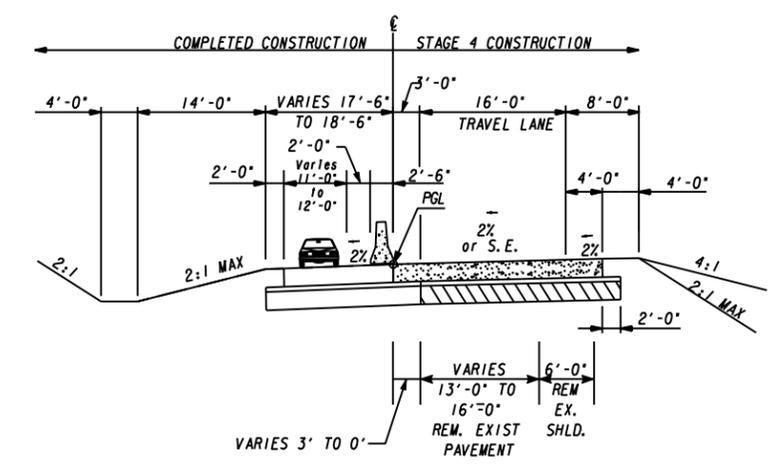
DRAWING No.  
19-07



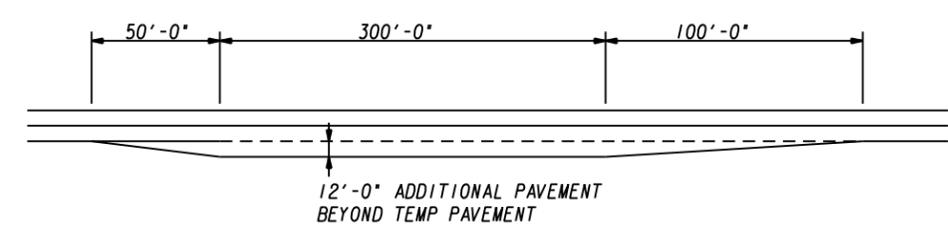
DETAIL B  
TEMPORARY MAINLINE SHOULDER  
PAVEMENT WIDENING



STAGE 4  
TS-4  
N. T. S.  
RAMP A, C, & D



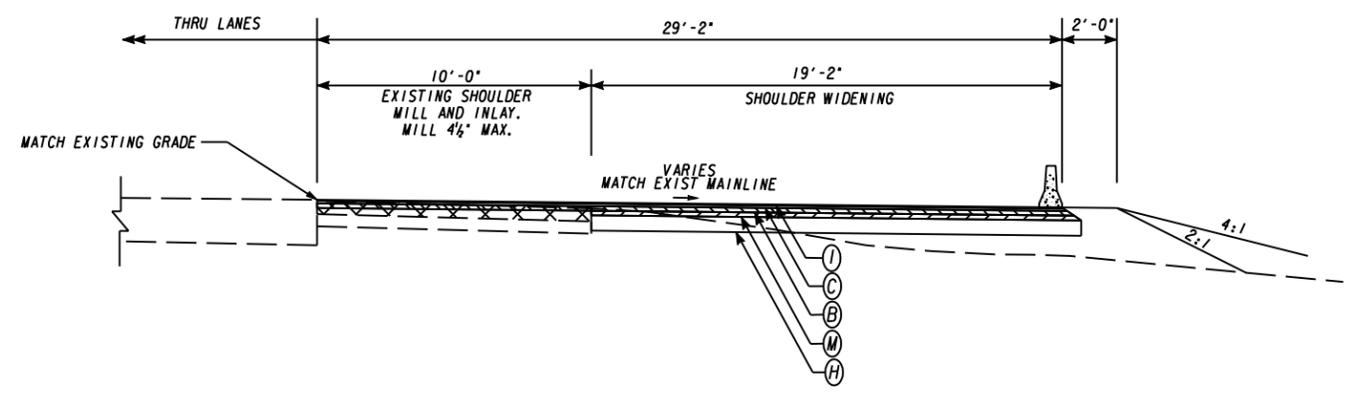
STAGE 4  
TS-5  
N. T. S.  
RAMP B, E, & F



STAGING REFUGE AREAS  
(APPROX 1 MILE SPACING)  
CONSTRUCT IN STAGES 2 AND 3

TO BE CONSTRUCTED AT THE  
FOLLOWING LOCATIONS:

LEFT	RIGHT
570+75	571+25
639+75	628+75
689+75	684+75
737+75	744+75
821+75	805+75



TYPICAL SHOULDER  
DETAIL FOR REFUGE AREAS

STAGING GENERAL NOTES:

TEMPERARY BARRIER IS TO BE PLACED IN STAGES 2 & 3 ALONG  
THE OUTSIDE WHERE THE SLOPES ARE STEEPER THAN 3:1

PAVEMENT MATERIAL SCHEDULE	
①	ASPH CONC 12.5 MM OGFC, GP 2 ONLY, INCL POLYMER-MODIFIED, 90 LBS./SY
②	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME, 165 LBS./SY
③	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
④	RECYCLED ASPH CONC, 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME, 330 LBS./SY
⑤	GRADED AGGREGATE BASE, 10 INCH
⑥	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME

**AYRES ASSOCIATES**  
225 PEACHTREE STREET, NE.  
SOUTH TOWER - SUITE 1400.  
ATLANTA, GA 30303

REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: PROGRAM DELIVERY  
TYPICAL SECTIONS

CONSTRUCTION STAGING  
1-85

DRAWING No.  
19-08

**ATTACHMENT #4**

**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA**

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**INTERDEPARTMENT CORRESPONDENCE**

**FILE:** NH-IM-85-2(165), (166), (167), (168), **OFFICE:** Engineering Services  
NH-IM-85-2(169), (170), (171), (172), (173), (174) & (175)  
Gwinnett, Barrow, Jackson, Banks, Franklin and Hart  
P.I. Nos. 110610, 110620, 110630, 110640, 110650, 110660, 110670, 110680,  
110690, 110700, & 110710  
I-85 Widening/Reconstruction

**DATE:** May 15, 2007

**FROM:** Brian K. Summers, PE, Project Review Engineer

**TO:** Babs Abubakari, PE, State Program Delivery and Consultant Design Engineer

**SUBJECT: IMPLEMENTATION OF VALUE ENGINEERING STUDY ALTERNATIVES**

Recommendations for implementation of Value Engineering Study Alternatives are indicated in the table below. Incorporate the VE alternatives recommended for implementation to the extent reasonable in the design of the project.

ALT #	Description	Potential Savings/LCC	Implement	Comments
<b>PAVEMENT</b>				
A-1	Revise Typical Section and use asphalt widening and overlay	Note: See attached revised Life Cycle Cost Analysis which includes more current Asphalt prices.	No	A Life Cycle Cost Analysis has been done to reflect current material costs and the Pavement Design Committee has recommended a CRC Pavement typical section on these projects.
A-2	Mill asphalt down to existing concrete and use a bonded concrete overlay	Note: See attached revised Life Cycle Cost Analysis which includes more current Asphalt prices.	No	A Life Cycle Cost Analysis has been done to reflect current material costs and the Pavement Design Committee has recommended a CRC Pavement typical section on these projects.

ALT #	Description	Potential Savings/LCC	Implement	Comments
<b>MULBERRY RIVER BRIDGE – P.I. No. 110620</b>				
B-1	Jack the existing deck and widen the existing bridge	\$7900 (revised costs submitted by PBS & J which takes into account the bridge rehabilitation work)	No	The Bridge Maintenance Office has determined that the existing bridges will require extensive corrective/rehabilitative work and has recommended that the existing bridges be replaced.
<b>BRIDGE JACKING</b>				
C-1	Revise the profile grades by milling the existing asphalt	\$2,670,642	No	A Life Cycle Cost Analysis has been done to reflect current material costs and the Pavement Design Committee has recommended a CRC Pavement typical section on these projects.
<b>MEDIAN BARRIER</b>				
D-1	Use Double Face Guardrail with swale in the median	\$67,485,729	No	The staging on these projects requires the median to be closed out in order to accommodate traffic flow while the existing pavement is being removed and replaced with a CRC Pavement Section.
D-2	Use Cable Median Barrier with a swale in the median	\$73,838,220	No	The staging on these projects requires the median to be closed out in order to accommodate traffic flow while the existing pavement is being removed and replaced with a CRC Pavement Section.

ALT #	Description	Potential Savings/LCC	Implement	Comments
<b>FENCING</b>				
E-1	Utilize and repair the existing fence	\$2,680,818	No	This does not apply any more. The scope of the project does not include replacement of fencing which would require easements.
<b>PROFILE</b>				
F-1	Mill the existing pavement to achieve the corrected "K" value	\$475,365	No	A Life Cycle Cost Analysis has been done to reflect current material costs and the Pavement Design Committee has recommended a CRC Pavement typical section on these projects.

A meeting was held on March 28, 2007 to discuss the above recommendations. George Merritt with FHWA, Ron Morris and Mickey Michalski with PBS & J, Joe Wheeler and Stanley Hill of Consultant Design, and Brian Summers, Lisa Myers, and Ron Wishon of Engineering Services were in attendance.

Additional information was provided by the Office of Consultant Design on April 4, 2007.

The results above reflect the consensus of those in attendance and those who provided input.

Approved: signed by David E. Studstill, Jr. Date: May 18, 2007  
 David E. Studstill, Jr., P. E., Chief Engineer

Approved: signed by Gus Shanine Date: November 14, 2007  
 for Rodney Barry, P.E., FHWA Division Administrator

**NH-IM-85-2(165), (166), (167), (168), (169), (170), (171), (172), (173), (174) & (175)**

**Gwinnett, Barrow, Jackson, Banks, Franklin and Hart**

**P.I. Nos. 110610, 110620, 110630, 110640, 110650, 110660, 110670, 110680, 110690, 110700 & 110710**

**Implementation of Value Engineering Study Alternatives**

**Page 4.**

BKS/REW

Attachments

c: Gus Shanine, FHWA  
George Merritt, FHWA  
Brent Story  
Jason McCook  
Sandy Moore  
Stanley Hill  
Brad McManus  
Tim Matthews  
Joe Wheeler  
Randy Hart  
Gail D'Avino  
Ken Werho  
Lisa Myers

**ATTACHMENT #5**

**OFFICE OF PLANNING**  
**Design Traffic Projections/Traffic Review Request Form**

Date of Request: 06-21-2012

Traffic Request

Traffic Review

**Requestor Information**

Requestor Name: Steve Adewale

Requestor Phone Number: (404)631-1578

Requestor Office: Program Delivery

Requestor Office Head: Bobby E. Hilliard

**Project Information**

P.I. Number: 110630

County: Jackson

Project Type Work: Interstate Widening

Construction Start Year: 2018

Base Year 2020

Design Year 2040

Check all that are applicable:

Base year  Existing DHV

Design Year  Build base year ADT  Build design year ADT

Existing ADT  Build base year DHV  Build design year DHV

No Build Base year ADT  No Build Design Year ADT

No Build Base year DHV  No Build Design Year DHV

Attachments:

1. See attached cover sheet showing the project limits and layout.



# Department of Transportation State of Georgia

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## INTERDEPARTMENT CORRESPONDENCE

**FILE** NHIM0-0085-02(167), Jackson County                      **OFFICE** Planning  
P.I. # 110630  
**DATE** July 27, 2012

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

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

**SUBJECT** **Updated** Design Traffic for I-85 FM of SR 53/Green Street to N of SR 11/US  
129/Lee Street.

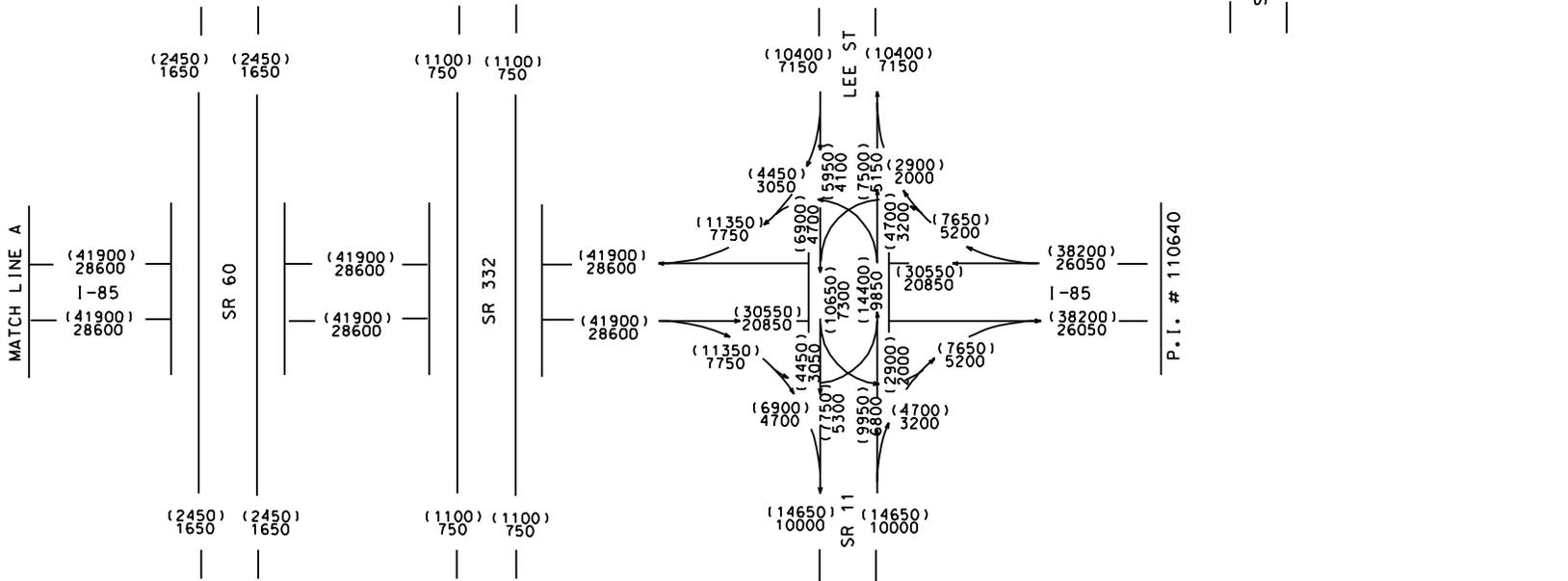
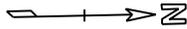
The Updated Design Traffic for the above project is attached in pdf and dgn format.

If you have any questions concerning this information please contact Abby Ebodaghe at (404) 631-1923.

CLV/AFE

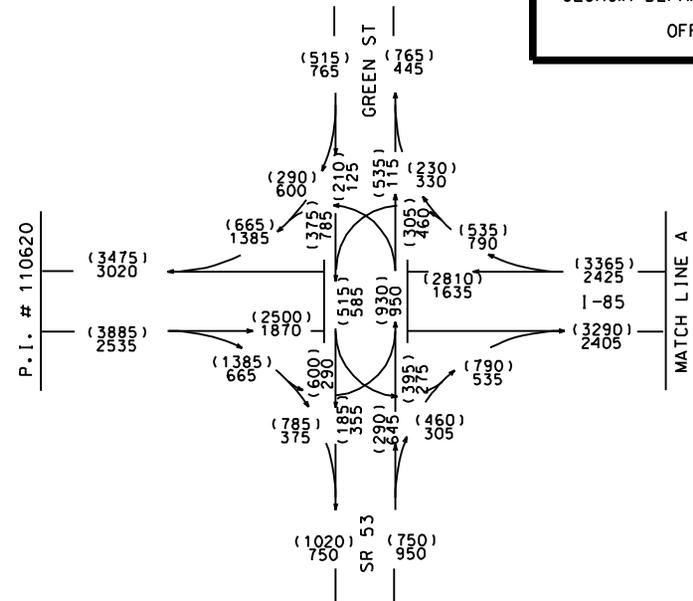
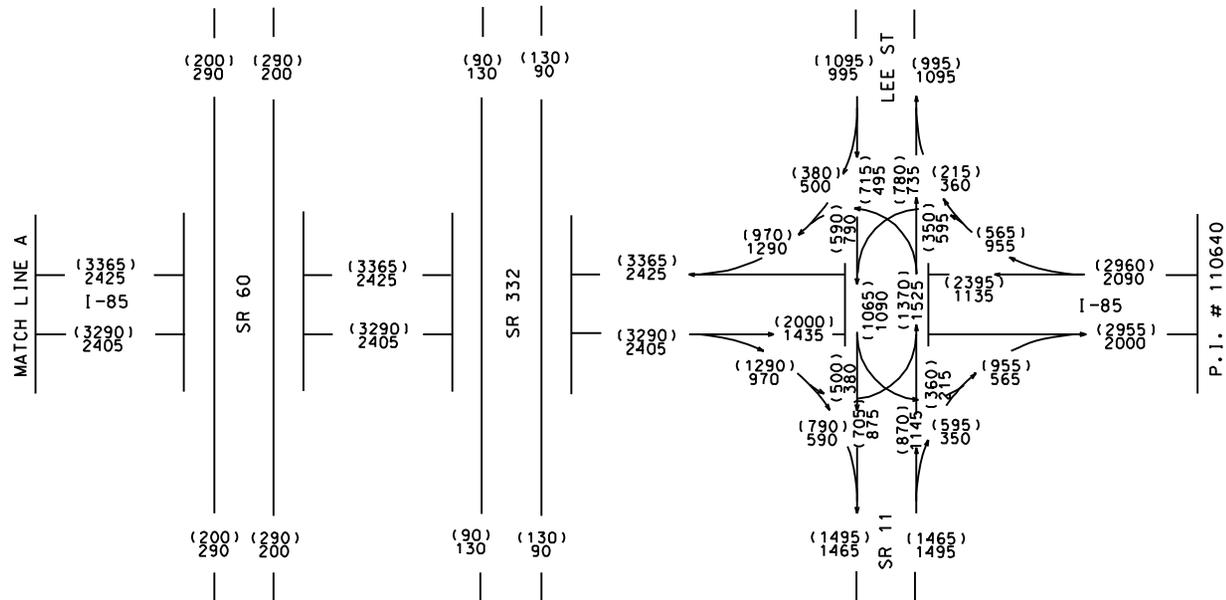
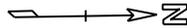
# NO BUILD ADT = 58000

## JACKSON COUNTY



NHIMO-0085-02(167)  
 P. I. # 110630  
 JACKSON COUNTY  
 I-85 FM SR 53/  
 GREEN ST. TO N  
 OF SR 11/US 129/  
 LEE ST.  
 2040 ADT = (000)  
 2020 ADT = 000  
 24 HR T = 29%  
 S. U. = 5%  
 COMB. = 24%

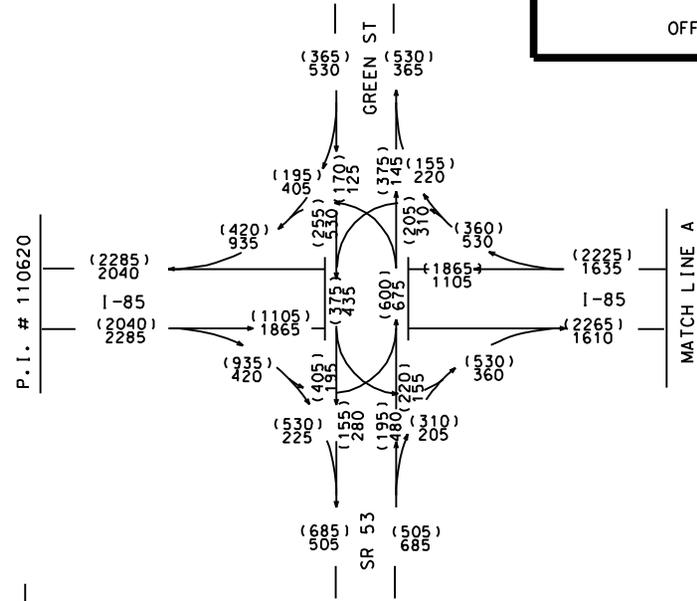
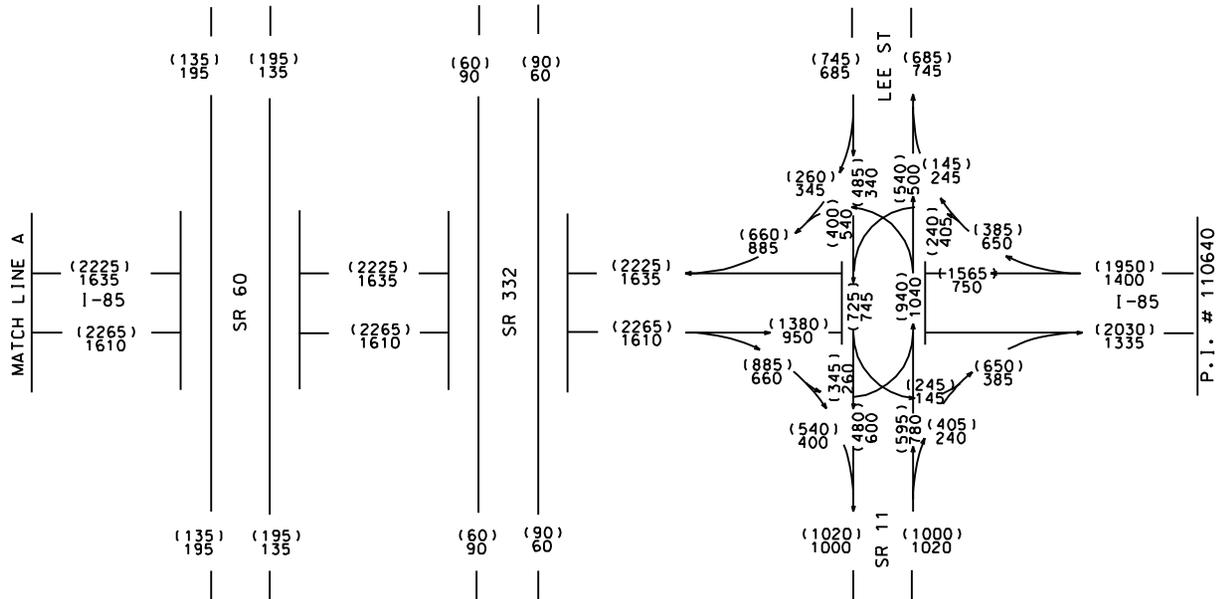
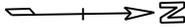
JACKSON COUNTY



NH1MO-0085-02(167)  
P.I. # 110630  
JACKSON COUNTY  
I-85 FM SR 53/  
GREEN ST. TO N  
OF SR 11/US 129/  
LEE ST.  
2040 PM DHV = (000)  
2040 AM DHV = 000

T = 17.5%  
S.U. = 3.5%  
COMB. = 14%

JACKSON COUNTY

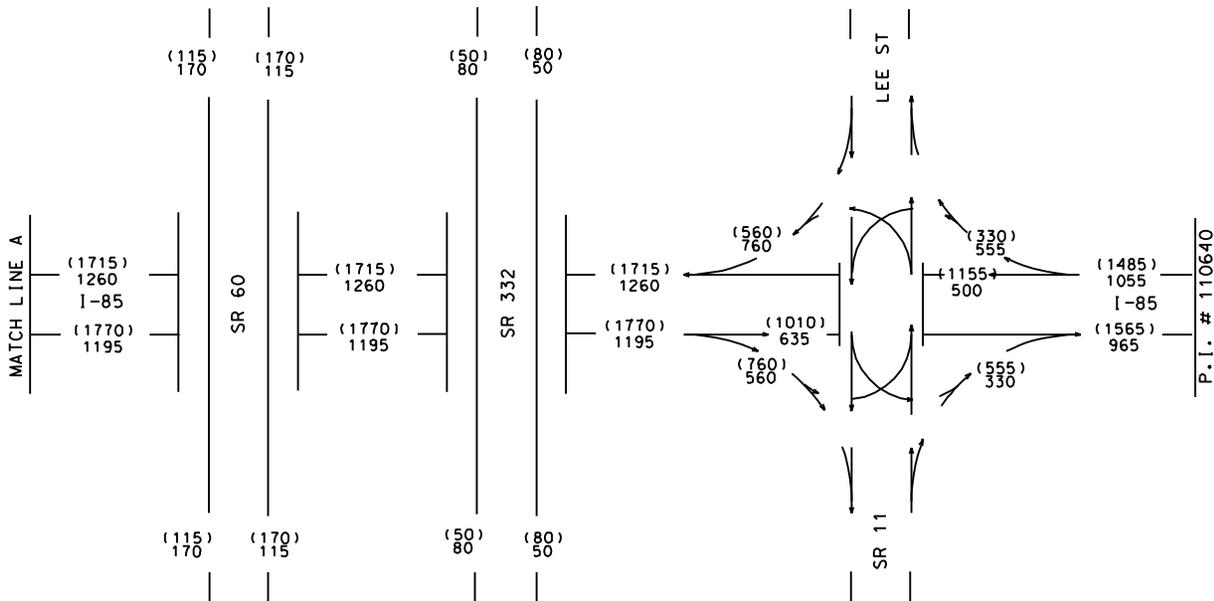
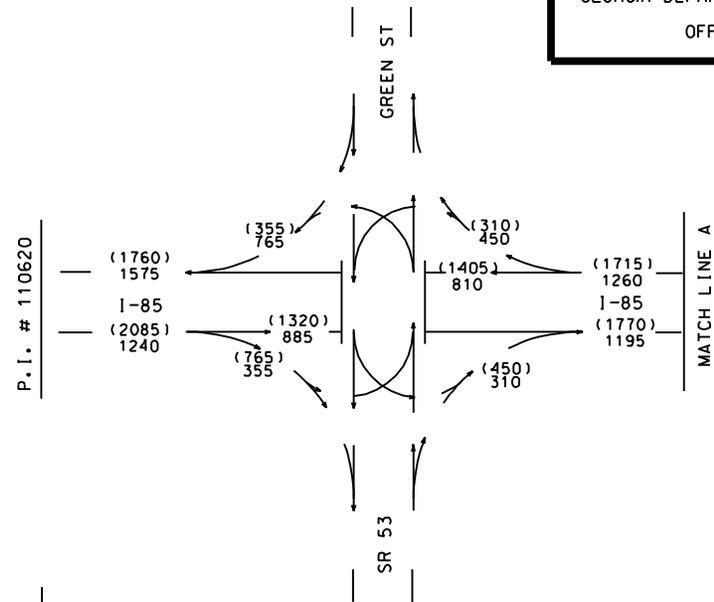
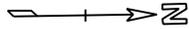


T = 17%  
S.U. = 3.5%  
COMB. = 14%

NH1M0-0085-02(167)  
P.I. # 110630  
JACKSON COUNTY  
I-85 FM SR 53/  
GREEN ST. TO N  
OF SR 11/US 129/  
LEE ST.

2020 PM DHV = 1000  
2020 AM DHV = 000

JACKSON COUNTY



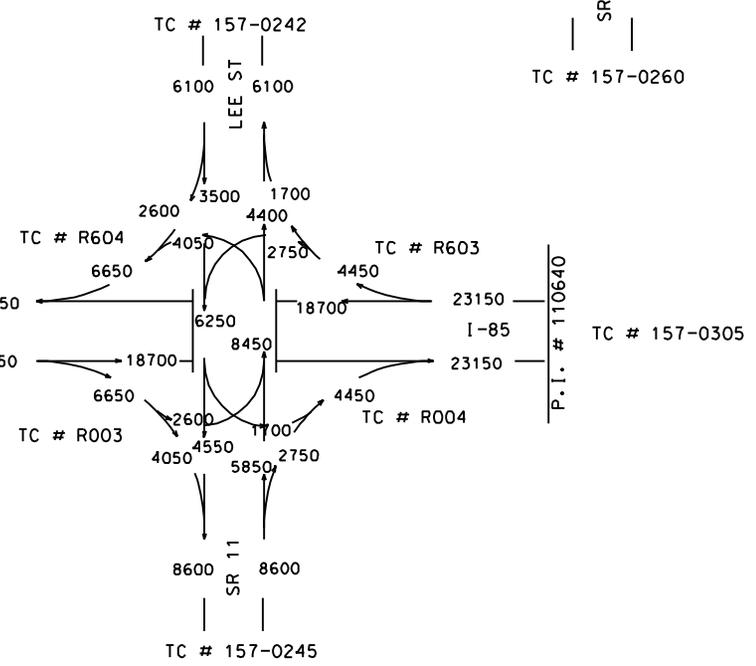
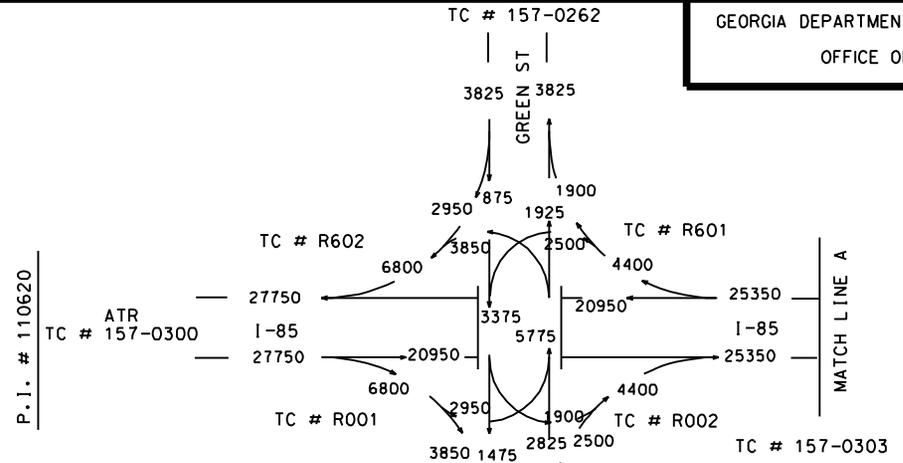
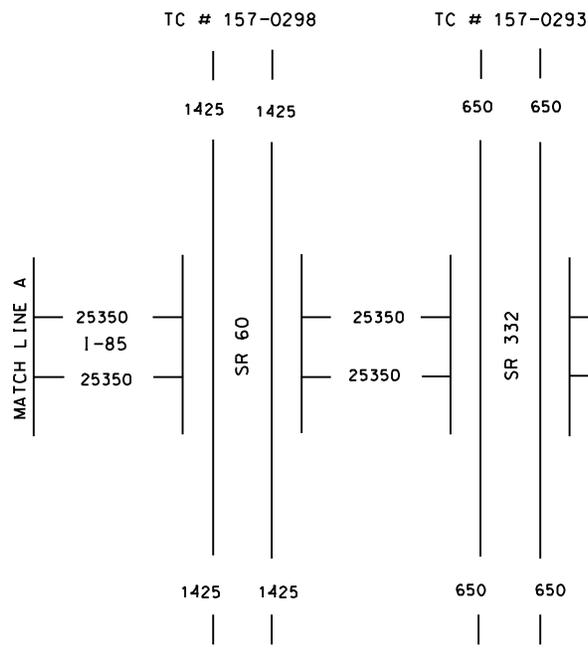
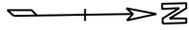
TC # 157-0245

T = 17.5%  
S.U. = 3.5%  
COMB. = 14%

NHIMO-0085-02(167)  
P.I. # 110630  
JACKSON COUNTY  
I-85 FM SR 53/  
GREEN ST. TO N  
OF SR 11/US 129/  
LEE ST.

2010 PM DHV = (000)  
2010 AM DHV = 000

JACKSON COUNTY



NH[MO-0085-02(167)  
P.I. # 110630  
JACKSON COUNTY  
I-85 FM SR 53/  
GREEN ST. TO N  
OF SR 11/US 129/  
LEE ST.  
2010 EXISTING ADT  
24 HR T = 29%  
S. U. = 5%  
COMB. = 24%

**MEMORANDUM**

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To: David Estes, P.E.

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From: John Davis, P.E., PTOE / Joshua Hoffmann

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Date: August 8, 2012

Project No.: 66-0160.01

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Re: Traffic Analysis I-85 Project Concept Report

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This technical memorandum provides an update to the prior capacity analysis results (for 2009 and 2029) to a design year of 2040. The update also includes analysis for the existing condition in the year 2010. This update is prompted by a revised traffic forecast from Georgia DOT (GDOT) for the design year. In summary, the forecasted volumes are reduced in the new design year as compared to the volumes used in the prior analysis. The previous analysis at year 2029 showed the need for three and four lanes in each direction due to these higher volumes. The analysis based on the new forecasted volumes revealed that two and three lanes at year 2040 are only necessary in each direction. The analyzed segments are:

- I-85 between SR 53 and SR 11 freeway segment (Northbound and Southbound).
- SR 11 merge and diverge ramp junctions (Northbound and Southbound).
- SR 53 merge and diverge ramp junctions (Northbound and Southbound).

The analysis used AM volume Southbound (SB) movements and PM volumes for Northbound (NB) movements. The analysis was completed using the following modules of the 2010 Highway Capacity Software (HCS2010):

- Freeway module for design analysis of the basic freeway segment
- Ramps and Ramps Junction Merge module for merging analysis
- Ramps and Ramps Junction Diverge module for diverging analysis

**Results****Measure of Effectiveness**

Level of service (LOS) on a freeway segment is defined by density. The unit of measure for density is passenger cars per mile per lane (pc/mi/ln). All Level of Service (LOS) have been obtained by comparing the results to the 2010 Highway Capacity Manual, Exhibit 11-5, which is represented below.

**Table 1: Level of Service**

LOS	Density (pc/mi/ln)
A	<= 11
B	> 11 - 18
C	> 18 - 26
D	> 26 - 35
E	> 35 - 45
F	> 45 Demand exceeds capacity

According to GDOT Design Policy Manual, a highway classified as 'Rural' needs to operate at LOS 'C' or better. The basis freeway segment of I-85 from SR 53 to SR 11 would be considered in the 'Rural' classification.

### Basic Freeway Segment Analysis

The following table shows the results from the HCM2010 basic freeway segment analysis of I-85 from SR 53 to SR 11 for 2010 and 2040 traffic. For detailed results please refer to the attached software output sheets.

**Table 2: Capacity Analysis Results I-85 from SR 53 to SR 11**

Analysis Type	Direction	Measure of Effectives	Year		
			2010	2040	2040
			Existing Conditions	Two Lanes	Three Lanes
I-85 between SR 53 and SR 11 freeway segment	NB	LOS	B	D	B
		Density (pc/mi/ln)	13.2	27.7	17.3
	SB	LOS	A	C	B
		Density (pc/mi/ln)	9.7	18.6	12.4

In the existing year I-85 between SR 53 and SR 11 operates at an acceptable LOS in both the northbound and southbound directions. For the design year 2040 with two travel lanes, the northbound direction operates at a LOS 'D', which is below the acceptable LOS service. The southbound direction operates at an acceptable LOS with two travel lanes. The analysis for three travel lanes on both northbound and southbound shows the operation of the segment is LOS 'B', which is an acceptable LOS.

### Diverge Analysis (Exit Ramps)

The following table shows the results from the HCM2010 diverge segment analysis of I-85 at junctions SR 53 and SR 11 for 2010 and 2040 traffic. For detailed results please refer to the attached software output sheets.

**Table 3: Diverge Analysis Results**

Analysis Type	Direction	Measure of Effectives	Year		
			2010	2040	2040
			Existing Conditions	Two Lane	Three Lanes
Ramp Diverge Analysis at SR 53	SB	LOS	B	C	B
		Density (pc/mi/ln)	19.7	24.9	19.0
Ramp Diverge Analysis at SR 11	NB	LOS	B	D	C
		Density (pc/mi/ln)	19.5	31.8	23.5
	SB	LOS	B	B	B
		Density (pc/mi/ln)	11.1	19.6	15.5

The existing year 2010 both SR 53 and SR 11 junctions operate at an acceptable LOS in both northbound and southbound directions. In the analysis for design year 2040, both two lanes and three lanes at SR 53 junction in the southbound direction operate at an acceptable LOS. The analysis for design year 2040 at SR 11 junction with two travel lanes in the northbound direction shows an unacceptable LOS 'D' while the southbound direction shows an acceptable LOS. The analysis for design year 2040 with three travel lanes in both northbound and southbound directions shows an acceptable LOS.

### Merge Analysis (Entrance Ramps)

The following table shows the results from the HCM2010 merge segment analysis of I-85 at junctions SR 53 and SR 11 for 2010 and 2040 traffic. For detailed results, please refer to the attached software output sheets.

**Table 4: Merge Analysis Results**

Analysis Type	Direction	Measure of Effectives	Year		
			2010	2040	2040
			Existing Conditions	Two Lane	Three Lanes
Ramp Merge Analysis at SR 53	NB	LOS	B	C	B
		Density (pc/mi/ln)	15.9	24.2	18.8
Ramp Merge Analysis at SR 11	NB	LOS	B	C	C
		Density (pc/mi/ln)	15.2	27.9	20.4
	SB	LOS	B	C	B
		Density (pc/mi/ln)	12.3	25.3	18.6

The existing year 2010 both SR 53 and SR 11 junctions operate at an acceptable LOS in both northbound and southbound directions. The analysis for design year 2040 shows that both two lanes and three lanes on I-85 at SR 53 junction in the northbound direction operate at an acceptable LOS. The analysis with two travel lanes in the northbound and

southbound for design year 2040 at SR 11 junction shows an acceptable LOS. The analysis for design year 2040 with three travel lanes in both northbound and southbound directions shows an acceptable LOS.

### **Recommendations**

From the traffic analysis for design year 2040, the following recommendations are made:

#### **I-85 from SR 53 to SR 11 - Basic Freeway Segment**

Three travel lanes on I-85 in both northbound and southbound directions are recommended for the design year 2040.

#### **SR 53 and SR 11 Junctions Diverge and Merge**

With the recommendation of three travel lanes on I-85 the junctions at SR 53 and SR 11 will operate at an acceptable LOS.

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 SB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 11</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>AM Peak Hour</i>	Analysis Year	<i>2010</i>
Project Description <i>Existing Conditions</i>			
<input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>1260</i>	veh/h	Peak-Hour Factor, PHF <i>0.95</i>
AADT		veh/day	%Trucks and Buses, P <sub>T</sub> <i>5</i>
Peak-Hr Prop. of AADT, K			%RVs, P <sub>R</sub> <i>0</i>
Peak-Hr Direction Prop, D			General Terrain: <i>Grade</i>
DDHV = AADT x K x D		veh/h	Grade <i>3.00%</i> Length <i>0.76mi</i>
			Up/Down % <i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>3.0</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>2</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )	<i>680</i>	Design LOS	
x f <sub>p</sub> )		v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )	pc/h/ln
S	<i>70.0</i>	x f <sub>p</sub> )	
D = v <sub>p</sub> / S	<i>9.7</i>	S	mph
LOS	<i>A</i>	D = v <sub>p</sub> / S	pc/mi/ln
		Required Number of Lanes, N	
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 SB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 60</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>AM Peak Hour</i>	Analysis Year	<i>2040</i>
Project Description <i>Two Lane Analysis</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>2405</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	<i>0.95</i>
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P <sub>T</sub>
Peak-Hr Direction Prop, D			<i>5</i>
DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub>
			<i>0</i>
			General Terrain:
			<i>Grade</i>
			Grade
			<i>3.00%</i>
			Length
			<i>0.76mi</i>
			Up/Down %
			<i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>3.0</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>2</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )		Design LOS	
<i>1297</i>	pc/h/ln	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	
S	<i>69.9</i>	S	mph
D = v <sub>p</sub> / S	<i>18.6</i>	D = v <sub>p</sub> / S	pc/mi/ln
LOS	<i>C</i>	Required Number of Lanes, N	
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 SB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 11</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>AM Peak Hour</i>	Analysis Year	<i>2040</i>
Project Description <i>Three Lane Analysis</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>2405</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	<i>0.95</i>
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P <sub>T</sub>
Peak-Hr Direction Prop, D			<i>5</i>
DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub>
			<i>0</i>
			General Terrain:
			<i>Grade</i>
			Grade
			<i>3.00%</i>
			Length
			<i>0.76mi</i>
			Up/Down %
			<i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>3.0</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>3</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )		Design LOS	
<i>865</i>	pc/h/ln	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )	pc/h/ln
x f <sub>p</sub> )		x f <sub>p</sub> )	
S	<i>70.0</i>	S	mph
D = v <sub>p</sub> / S	<i>12.4</i>	D = v <sub>p</sub> / S	pc/mi/ln
LOS	<i>B</i>	Required Number of Lanes, N	
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 NB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 11</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>PM Peak Hour</i>	Analysis Year	
Project Description <i>Existing Conditions</i>			
<input checked="" type="checkbox"/> Oper.(LOS) <input type="checkbox"/> Des.(N) <input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>1715</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	<i>0.95</i>
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P <sub>T</sub>
Peak-Hr Direction Prop, D			<i>5</i>
DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub>
			<i>0</i>
			General Terrain:
			<i>Grade</i>
			Grade
			<i>3.00%</i>
			Length
			<i>0.28mi</i>
			Up/Down %
			<i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>1.2</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>2</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )		Design LOS	
<i>925</i>	pc/h/ln	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> x f <sub>p</sub> )	
S	<i>70.0</i>	S	mph
D = v <sub>p</sub> / S	<i>13.2</i>	D = v <sub>p</sub> / S	pc/mi/ln
LOS	<i>B</i>	Required Number of Lanes, N	
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 NB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 11</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>PM Peak Hour</i>	Analysis Year	<i>2040</i>
Project Description <i>Two Lane Analysis</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>3365</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	<i>0.95</i>
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P <sub>T</sub>
Peak-Hr Direction Prop, D			<i>5</i>
DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub>
			<i>0</i>
			General Terrain:
			<i>Grade</i>
			Grade
			<i>3.00%</i>
			Length
			<i>0.28mi</i>
			Up/Down %
			<i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>1.2</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>2</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )		Design LOS	
<i>1815</i>	pc/h/ln	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )	
x f <sub>p</sub> )		pc/h/ln	
S	<i>65.6</i>	x f <sub>p</sub> )	
S	mph	S	mph
D = v <sub>p</sub> / S	<i>27.7</i>	D = v <sub>p</sub> / S	pc/mi/ln
D	pc/mi/ln	Required Number of Lanes, N	
LOS	<i>D</i>		
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

<b>BASIC FREEWAY SEGMENTS WORKSHEET</b>			
<b>General Information</b>		<b>Site Information</b>	
Analyst	<i>Joshua Hoffmann</i>	Highway/Direction of Travel	<i>I-85 NB</i>
Agency or Company	<i>Ayres Associates</i>	From/To	<i>SR 53 to SR 11</i>
Date Performed	<i>8/6/2012</i>	Jurisdiction	<i>Jackson County</i>
Analysis Time Period	<i>PM Peak Hour</i>	Analysis Year	<i>2040</i>
Project Description <i>Three Lane Analysis</i>			
<input checked="" type="checkbox"/> Oper.(LOS)		<input type="checkbox"/> Des.(N)	
<input type="checkbox"/> Planning Data			
<b>Flow Inputs</b>			
Volume, V	<i>3365</i>	veh/h	Peak-Hour Factor, PHF
AADT		veh/day	<i>0.95</i>
Peak-Hr Prop. of AADT, K			%Trucks and Buses, P <sub>T</sub>
Peak-Hr Direction Prop, D			<i>5</i>
DDHV = AADT x K x D		veh/h	%RVs, P <sub>R</sub>
			<i>0</i>
			General Terrain:
			<i>Grade</i>
			Grade
			<i>3.00%</i>
			Length
			<i>0.28mi</i>
			Up/Down %
			<i>3.00</i>
<b>Calculate Flow Adjustments</b>			
f <sub>p</sub>	<i>1.00</i>	E <sub>R</sub>	<i>1.2</i>
E <sub>T</sub>	<i>1.5</i>	f <sub>HV</sub> = 1/[1+P <sub>T</sub> (E <sub>T</sub> - 1) + P <sub>R</sub> (E <sub>R</sub> - 1)]	<i>0.976</i>
<b>Speed Inputs</b>		<b>Calc Speed Adj and FFS</b>	
Lane Width	ft		
Rt-Side Lat. Clearance	ft	f <sub>LW</sub>	mph
Number of Lanes, N	<i>3</i>	f <sub>LC</sub>	mph
Total Ramp Density, TRD	ramps/mi	TRD Adjustment	mph
FFS (measured)	<i>70.0</i>	FFS	<i>70.0</i>
Base free-flow Speed, BFFS	mph		mph
<b>LOS and Performance Measures</b>		<b>Design (N)</b>	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )		Design LOS	
<i>1210</i>	pc/h/ln	v <sub>p</sub> = (V or DDHV) / (PHF x N x f <sub>HV</sub> )	pc/h/ln
x f <sub>p</sub> )		x f <sub>p</sub> )	
S	<i>70.0</i>	S	mph
D = v <sub>p</sub> / S	<i>17.3</i>	D = v <sub>p</sub> / S	pc/mi/ln
LOS	<i>B</i>	Required Number of Lanes, N	
<b>Glossary</b>		<b>Factor Location</b>	
N - Number of lanes	S - Speed	E <sub>R</sub> - Exhibits 11-10, 11-12	f <sub>LW</sub> - Exhibit 11-8
V - Hourly volume	D - Density	E <sub>T</sub> - Exhibits 11-10, 11-11, 11-13	f <sub>LC</sub> - Exhibit 11-9
v <sub>p</sub> - Flow rate	FFS - Free-flow speed	f <sub>p</sub> - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v <sub>p</sub> - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	AM Peak Hour			Analysis Year	2010				
Project Description Existing Conditions									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 1260 Ramp Volume, V <sub>R</sub> 450 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0				Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h			
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	1260	0.95	Level	25	0	0.889	1.00	1492	
Ramp	450	0.95	Level	25	0	0.889	1.00	533	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 1492 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	1492	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	959	Exhibit 13-8	4800	No
					V <sub>R</sub>	533	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	1492	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 11.1 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.216 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 64.0 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 64.0 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	AM Peak Hour			Analysis Year	2040				
Project Description Two Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 2090 Ramp Volume, V <sub>R</sub> 955 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0				Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h			
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2090	0.95	Level	25	0	0.889	1.00	2475	
Ramp	955	0.95	Level	25	0	0.889	1.00	1131	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 2475 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	2475	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1344	Exhibit 13-8	4800	No
					V <sub>R</sub>	1131	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2475	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 19.6 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.270 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 62.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 62.4 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	AM Peak Hour			Analysis Year	2040				
Project Description Three Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 3 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 2090 Ramp Volume, V <sub>R</sub> 955 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2090	0.95	Level	25	0	0.889	1.00	2475	
Ramp	955	0.95	Level	25	0	0.889	1.00	1131	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 0.646 using Equation (Exhibit 13-7) V <sub>12</sub> = 1999 pc/h V <sub>3</sub> or V <sub>av34</sub> 476 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	2475	Exhibit 13-8	7200	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1344	Exhibit 13-8	7200	No
					V <sub>R</sub>	1131	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	1999	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 15.5 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.270 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 62.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = 76.8 mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 64.8 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2040				
Project Description Two Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 3290 Ramp Volume, V <sub>R</sub> 1290 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	3290	0.95	Level	25	0	0.889	1.00	3896	
Ramp	1290	0.95	Level	25	0	0.889	1.00	1528	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 3896 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	3896	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	2368	Exhibit 13-8	4800	No
					V <sub>R</sub>	1528	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	3896	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 31.8 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = D (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.306 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 61.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 61.4 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2010				
Project Description Existing Conditions									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 2085 Ramp Volume, V <sub>R</sub> 765 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0				Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h			
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2085	0.95	Level	25	0	0.889	1.00	2469	
Ramp	765	0.95	Level	25	0	0.889	1.00	906	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 2469 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	2469	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1563	Exhibit 13-8	4800	No
					V <sub>R</sub>	906	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2469	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 19.5 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.250 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 63.0 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 63.0 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 SB				
Agency or Company	Ayres Associates			Junction	SR 53				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	AM Peak Hour			Analysis Year	2040				
Project Description Three Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 3 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 450 Freeway Volume, V <sub>F</sub> 2425 Ramp Volume, V <sub>R</sub> 790 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 35.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2425	0.95	Level	25	0	0.889	1.00	2872	
Ramp	790	0.95	Level	25	0	0.889	1.00	936	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 0.645 using Equation (Exhibit 13-7) V <sub>12</sub> = 2185 pc/h V <sub>3</sub> or V <sub>av34</sub> 687 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	2872	Exhibit 13-8	7200	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1936	Exhibit 13-8	7200	No
					V <sub>R</sub>	936	Exhibit 13-10	2000	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2185	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 19.0 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.512 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 55.7 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = 76.8 mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 59.6 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2010				
Project Description Existing Conditions									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 2085 Ramp Volume, V <sub>R</sub> 765 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	2085	0.95	Level	25	0	0.889	1.00	2469	
Ramp	765	0.95	Level	25	0	0.889	1.00	906	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 2469 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	2469	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1563	Exhibit 13-8	4800	No
					V <sub>R</sub>	906	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2469	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 19.5 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = B (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.250 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 63.0 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 63.0 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2040				
Project Description Two Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 3290 Ramp Volume, V <sub>R</sub> 1290 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	3290	0.95	Level	25	0	0.889	1.00	3896	
Ramp	1290	0.95	Level	25	0	0.889	1.00	1528	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 3896 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	3896	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	2368	Exhibit 13-8	4800	No
					V <sub>R</sub>	1528	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	3896	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 31.8 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = D (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.306 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 61.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 61.4 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2040				
Project Description Three Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 3 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 3290 Ramp Volume, V <sub>R</sub> 1290 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0			Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h				
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	3290	0.95	Level	25	0	0.889	1.00	3896	
Ramp	1290	0.95	Level	25	0	0.889	1.00	1528	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 0.592 using Equation (Exhibit 13-7) V <sub>12</sub> = 2931 pc/h V <sub>3</sub> or V <sub>av34</sub> 965 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	3896	Exhibit 13-8	7200	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	2368	Exhibit 13-8	7200	No
					V <sub>R</sub>	1528	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	2931	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 23.5 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = C (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.306 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 61.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = 76.8 mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 64.6 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst	Joshua Hoffmann				Freeway/Dir of Travel	I-85 SB			
Agency or Company	Ayres Associates				Junction	SR 11			
Date Performed	8/6/2012				Jurisdiction	Jackson County			
Analysis Time Period	AM Peak Hour				Analysis Year	2010			
Project Description Existing Conditions									
Inputs									
Upstream Adj Ramp		Number of Lanes, N				2		Downstream Adj Ramp	
<input type="checkbox"/> Yes	<input type="checkbox"/> On	Acceleration Lane Length, L <sub>A</sub>				700		<input type="checkbox"/> Yes	<input type="checkbox"/> On
<input checked="" type="checkbox"/> No	<input type="checkbox"/> Off	Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No	<input type="checkbox"/> Off
L <sub>up</sub> =	ft	Freeway Volume, V <sub>F</sub>				500		L <sub>down</sub> =	ft
V <sub>u</sub> =	veh/h	Ramp Volume, V <sub>R</sub>				760		V <sub>D</sub> =	veh/h
		Freeway Free-Flow Speed, S <sub>FF</sub>				70.0			
		Ramp Free-Flow Speed, S <sub>FR</sub>				55.0			
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	500	0.95	Level	25	0	0.889	1.00	592	
Ramp	760	0.95	Level	25	0	0.889	1.00	900	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6) V <sub>12</sub> = 592 pc/h V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	1492	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	1492	Exhibit 13-8		No	V <sub>12</sub>		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 12.3 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> =	0.261 (Exhibit 13-11)				D <sub>S</sub> =	(Exhibit 13-12)			
S <sub>R</sub> =	62.7 mph (Exhibit 13-11)				S <sub>R</sub> =	mph (Exhibit 13-12)			
S <sub>0</sub> =	N/A mph (Exhibit 13-11)				S <sub>0</sub> =	mph (Exhibit 13-12)			
S =	62.7 mph (Exhibit 13-13)				S =	mph (Exhibit 13-13)			

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Joshua Hoffmann			Freeway/Dir of Travel		I-85 SB		
Agency or Company		Ayres Associates			Junction		SR 11		
Date Performed		8/6/2012			Jurisdiction		Jackson County		
Analysis Time Period		AM Peak Hour			Analysis Year		2040		
Project Description Two Lane Analysis									
Inputs									
Upstream Adj Ramp		Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			700			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			1135			L <sub>down</sub> = ft	
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			1290			V <sub>D</sub> = veh/h	
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0				
		Ramp Free-Flow Speed, S <sub>FR</sub>			55.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	1135	0.95	Level	25	0	0.889	1.00	1344	
Ramp	1290	0.95	Level	25	0	0.727	1.00	1867	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6) V <sub>12</sub> = 1344 pc/h V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	3211	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	3211	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 25.3 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> =	0.341 (Exhibit 13-11)				D <sub>S</sub> =	(Exhibit 13-12)			
S <sub>R</sub> =	60.5 mph (Exhibit 13-11)				S <sub>R</sub> =	mph (Exhibit 13-12)			
S <sub>0</sub> =	N/A mph (Exhibit 13-11)				S <sub>0</sub> =	mph (Exhibit 13-12)			
S =	60.5 mph (Exhibit 13-13)				S =	mph (Exhibit 13-13)			

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 SB					
Agency or Company	Ayres Associates			Junction	SR 11					
Date Performed	8/6/2012			Jurisdiction	Jackson County					
Analysis Time Period	AM Peak Hour			Analysis Year	2040					
Project Description Three Lane Analysis										
Inputs										
Upstream Adj Ramp		Number of Lanes, N			3			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			700			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			1135			L <sub>down</sub> = ft		
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			1290			V <sub>D</sub> = veh/h		
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>			55.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	1135	0.95	Level	25	0	0.889	1.00	1344		
Ramp	1290	0.95	Level	25	0	0.889	1.00	1528		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L <sub>EQ</sub> = P <sub>FM</sub> = 0.597 using Equation (Exhibit 13-6) V <sub>12</sub> = 803 pc/h V <sub>3</sub> or V <sub>av34</sub> = 541 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L <sub>EQ</sub> = P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V <sub>FO</sub>	2872	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8			
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8			
					V <sub>R</sub>		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V <sub>R12</sub>	2331	Exhibit 13-8		No	V <sub>12</sub>		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 18.6 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M <sub>S</sub> = 0.284 (Exhibit 13-11) S <sub>R</sub> = 62.0 mph (Exhibit 13-11) S <sub>0</sub> = 69.9 mph (Exhibit 13-11) S = 63.4 mph (Exhibit 13-13)					D <sub>S</sub> = (Exhibit 13-12) S <sub>R</sub> = mph (Exhibit 13-12) S <sub>0</sub> = mph (Exhibit 13-12) S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	Joshua Hoffmann		Freeway/Dir of Travel	I-85 NB						
Agency or Company	Ayres Associates		Junction	SR 11						
Date Performed	8/6/2012		Jurisdiction	Jackson County						
Analysis Time Period	PM Peak Hour		Analysis Year	2010						
Project Description Existing Conditions										
Inputs										
Upstream Adj Ramp		Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			700			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			1010			L <sub>down</sub> = ft		
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			555			V <sub>D</sub> = veh/h		
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>			55.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	1010	0.95	Level	25	0	0.889	1.00	1196		
Ramp	555	0.95	Level	25	0	0.889	1.00	657		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6) V <sub>12</sub> = 1196 pc/h V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V <sub>FO</sub>	1853	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8			
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8			
					V <sub>R</sub>		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V <sub>R12</sub>	1853	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 15.2 (pc/mi/ln) LOS = B (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M <sub>S</sub> =	0.269 (Exhibit 13-11)				D <sub>S</sub> =	(Exhibit 13-12)				
S <sub>R</sub> =	62.5 mph (Exhibit 13-11)				S <sub>R</sub> =	mph (Exhibit 13-12)				
S <sub>0</sub> =	N/A mph (Exhibit 13-11)				S <sub>0</sub> =	mph (Exhibit 13-12)				
S =	62.5 mph (Exhibit 13-13)				S =	mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB					
Agency or Company	Ayres Associates			Junction	SR 11					
Date Performed	8/6/2012			Jurisdiction	Jackson County					
Analysis Time Period	PM Peak Hour			Analysis Year	2040					
Project Description Two Lane Analysis										
Inputs										
Upstream Adj Ramp		Number of Lanes, N			2			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			700			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			2000			L <sub>down</sub> = ft		
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			955			V <sub>D</sub> = veh/h		
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>			55.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	2000	0.95	Level	25	0	0.889	1.00	2368		
Ramp	955	0.95	Level	25	0	0.889	1.00	1131		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6) V <sub>12</sub> = 2368 pc/h V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V <sub>FO</sub>	3499	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8			
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8			
					V <sub>R</sub>		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V <sub>R12</sub>	3499	Exhibit 13-8		No	V <sub>12</sub>		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 27.9 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M <sub>S</sub> = 0.373 (Exhibit 13-11) S <sub>R</sub> = 59.6 mph (Exhibit 13-11) S <sub>0</sub> = N/A mph (Exhibit 13-11) S = 59.6 mph (Exhibit 13-13)					D <sub>S</sub> = (Exhibit 13-12) S <sub>R</sub> = mph (Exhibit 13-12) S <sub>0</sub> = mph (Exhibit 13-12) S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB					
Agency or Company	Ayres Associates			Junction	SR 11					
Date Performed	8/6/2012			Jurisdiction	Jackson County					
Analysis Time Period	PM Peak Hour			Analysis Year	2040					
Project Description Three Lane Analysis										
Inputs										
Upstream Adj Ramp		Number of Lanes, N			3			Downstream Adj Ramp		
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			700			<input type="checkbox"/> Yes <input type="checkbox"/> On		
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			2000			L <sub>down</sub> = ft		
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			955			V <sub>D</sub> = veh/h		
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0					
		Ramp Free-Flow Speed, S <sub>FR</sub>			55.0					
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	2000	0.95	Level	25	0	0.889	1.00	2368		
Ramp	955	0.95	Level	25	0	0.889	1.00	1131		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ (Equation 13-6 or 13-7) L <sub>EQ</sub> = P <sub>FM</sub> = 0.597 using Equation (Exhibit 13-6) V <sub>12</sub> = 1414 pc/h V <sub>3</sub> or V <sub>av34</sub> = 954 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ (Equation 13-12 or 13-13) L <sub>EQ</sub> = P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?	
V <sub>FO</sub>	3499	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8			
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8			
					V <sub>R</sub>		Exhibit 13-10			
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?	
V <sub>R12</sub>	2545	Exhibit 13-8 4600:All		No	V <sub>12</sub>		Exhibit 13-8			
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 20.4 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					
Speed Determination					Speed Determination					
M <sub>S</sub> = 0.294 (Exhibit 13-11)					D <sub>S</sub> = (Exhibit 13-12)					
S <sub>R</sub> = 61.8 mph (Exhibit 13-11)					S <sub>R</sub> = mph (Exhibit 13-12)					
S <sub>0</sub> = 68.4 mph (Exhibit 13-11)					S <sub>0</sub> = mph (Exhibit 13-12)					
S = 63.4 mph (Exhibit 13-13)					S = mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET										
General Information					Site Information					
Analyst		Joshua Hoffmann			Freeway/Dir of Travel		I-85 NB			
Agency or Company		Associates			Junction		SR 11			
Date Performed		8/6/2012			Jurisdiction		Jackson County			
Analysis Time Period		PM Peak Hour			Analysis Year		2010			
Project Description Existing Conditions										
Inputs										
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> Freeway Volume, V <sub>F</sub> Ramp Volume, V <sub>R</sub> Freeway Free-Flow Speed, S <sub>FF</sub> Ramp Free-Flow Speed, S <sub>FR</sub>			2  660 2085 765 70.0 55.0		Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h			
Conversion to pc/h Under Base Conditions										
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>		
Freeway	2085	0.95	Level	25	0	0.889	1.00	2469		
Ramp	765	0.95	Level	25	0	0.889	1.00	906		
UpStream										
DownStream										
Merge Areas					Diverge Areas					
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>					
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 2469 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					
Capacity Checks					Capacity Checks					
		Actual	Capacity	LOS F?			Actual	Capacity	LOS F?	
V <sub>FO</sub>			Exhibit 13-8		V <sub>F</sub>	2469	Exhibit 13-8	4800	No	
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	1563	Exhibit 13-8	4800	No	
					V <sub>R</sub>	906	Exhibit 13-10	2200	No	
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area					
		Actual	Max Desirable	Violation?			Actual	Max Desirable	Violation?	
V <sub>R12</sub>			Exhibit 13-8		V <sub>12</sub>		2469	Exhibit 13-8	4400:All	No
Level of Service Determination (if not F)					Level of Service Determination (if not F)					
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = 19.5 (pc/mi/ln) LOS = B (Exhibit 13-2)					
Speed Determination					Speed Determination					
M <sub>S</sub> = (Exhibit 13-11) S <sub>R</sub> = mph (Exhibit 13-11) S <sub>0</sub> = mph (Exhibit 13-11) S = mph (Exhibit 13-13)					D <sub>S</sub> = 0.250 (Exhibit 13-12) S <sub>R</sub> = 63.0 mph (Exhibit 13-12) S <sub>0</sub> = N/A mph (Exhibit 13-12) S = 63.0 mph (Exhibit 13-13)					

RAMPS AND RAMP JUNCTIONS WORKSHEET									
<b>General Information</b>					<b>Site Information</b>				
Analyst	Joshua Hoffmann			Freeway/Dir of Travel	I-85 NB				
Agency or Company	Associates			Junction	SR 11				
Date Performed	8/6/2012			Jurisdiction	Jackson County				
Analysis Time Period	PM Peak Hour			Analysis Year	2040				
Project Description Two Lane Analysis									
<b>Inputs</b>									
Upstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>up</sub> = ft V <sub>u</sub> = veh/h		Number of Lanes, N 2 Acceleration Lane Length, L <sub>A</sub> Deceleration Lane Length L <sub>D</sub> 660 Freeway Volume, V <sub>F</sub> 3290 Ramp Volume, V <sub>R</sub> 1290 Freeway Free-Flow Speed, S <sub>FF</sub> 70.0 Ramp Free-Flow Speed, S <sub>FR</sub> 55.0				Downstream Adj Ramp <input type="checkbox"/> Yes <input type="checkbox"/> On <input checked="" type="checkbox"/> No <input type="checkbox"/> Off L <sub>down</sub> = ft V <sub>D</sub> = veh/h			
<b>Conversion to pc/h Under Base Conditions</b>									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	3290	0.95	Level	25	0	0.889	1.00	3896	
Ramp	1290	0.95	Level	25	0	0.889	1.00	1528	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
<b>Estimation of v<sub>12</sub></b>					<b>Estimation of v<sub>12</sub></b>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = using Equation (Exhibit 13-6) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = 1.000 using Equation (Exhibit 13-7) V <sub>12</sub> = 3896 pc/h V <sub>3</sub> or V <sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
<b>Capacity Checks</b>					<b>Capacity Checks</b>				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>		Exhibit 13-8			V <sub>F</sub>	3896	Exhibit 13-8	4800	No
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>	2368	Exhibit 13-8	4800	No
					V <sub>R</sub>	1528	Exhibit 13-10	2200	No
<b>Flow Entering Merge Influence Area</b>					<b>Flow Entering Diverge Influence Area</b>				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>		Exhibit 13-8			V <sub>12</sub>	3896	Exhibit 13-8	4400:All	No
<b>Level of Service Determination (if not F)</b>					<b>Level of Service Determination (if not F)</b>				
D <sub>R</sub> = 5.475 + 0.00734 v <sub>R</sub> + 0.0078 V <sub>12</sub> - 0.00627 L <sub>A</sub>					D <sub>R</sub> = 4.252 + 0.0086 V <sub>12</sub> - 0.009 L <sub>D</sub>				
D <sub>R</sub> = (pc/mi/ln)					D <sub>R</sub> = 31.8 (pc/mi/ln)				
LOS = (Exhibit 13-2)					LOS = D (Exhibit 13-2)				
<b>Speed Determination</b>					<b>Speed Determination</b>				
M <sub>S</sub> = (Exhibit 13-11)					D <sub>S</sub> = 0.306 (Exhibit 13-12)				
S <sub>R</sub> = mph (Exhibit 13-11)					S <sub>R</sub> = 61.4 mph (Exhibit 13-12)				
S <sub>0</sub> = mph (Exhibit 13-11)					S <sub>0</sub> = N/A mph (Exhibit 13-12)				
S = mph (Exhibit 13-13)					S = 61.4 mph (Exhibit 13-13)				

RAMPS AND RAMP JUNCTIONS WORKSHEET									
General Information					Site Information				
Analyst		Joshua Hoffmann			Freeway/Dir of Travel		I-85 NB		
Agency or Company		Ayres Associates			Junction		SR 53		
Date Performed		8/6/2012			Jurisdiction		Jackson County		
Analysis Time Period		PM Peak Hour			Analysis Year		2040		
Project Description Three Lane Analysis									
Inputs									
Upstream Adj Ramp		Number of Lanes, N			2			Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L <sub>A</sub>			450			<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L <sub>D</sub>						<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
L <sub>up</sub> = ft		Freeway Volume, V <sub>F</sub>			1435			L <sub>down</sub> = ft	
V <sub>u</sub> = veh/h		Ramp Volume, V <sub>R</sub>			955			V <sub>D</sub> = veh/h	
		Freeway Free-Flow Speed, S <sub>FF</sub>			70.0				
		Ramp Free-Flow Speed, S <sub>FR</sub>			35.0				
Conversion to pc/h Under Base Conditions									
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f <sub>HV</sub>	f <sub>p</sub>	v = V/PHF x f <sub>HV</sub> x f <sub>p</sub>	
Freeway	1435	0.95	Level	25	0	0.889	1.00	1699	
Ramp	955	0.95	Level	25	0	0.889	1.00	1131	
UpStream									
DownStream									
Merge Areas					Diverge Areas				
Estimation of v <sub>12</sub>					Estimation of v <sub>12</sub>				
$V_{12} = V_F (P_{FM})$ L <sub>EQ</sub> = (Equation 13-6 or 13-7) P <sub>FM</sub> = 1.000 using Equation (Exhibit 13-6) V <sub>12</sub> = 1699 pc/h V <sub>3</sub> or V <sub>av34</sub> = 0 pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)					$V_{12} = V_R + (V_F - V_R)P_{FD}$ L <sub>EQ</sub> = (Equation 13-12 or 13-13) P <sub>FD</sub> = using Equation (Exhibit 13-7) V <sub>12</sub> = pc/h V <sub>3</sub> or V <sub>av34</sub> = pc/h (Equation 13-14 or 13-17) Is V <sub>3</sub> or V <sub>av34</sub> > 2,700 pc/h? <input type="checkbox"/> Yes <input type="checkbox"/> No Is V <sub>3</sub> or V <sub>av34</sub> > 1.5 * V <sub>12</sub> /2 <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, V <sub>12a</sub> = pc/h (Equation 13-16, 13-18, or 13-19)				
Capacity Checks					Capacity Checks				
	Actual	Capacity		LOS F?		Actual	Capacity		LOS F?
V <sub>FO</sub>	2830	Exhibit 13-8		No	V <sub>F</sub>		Exhibit 13-8		
					V <sub>FO</sub> = V <sub>F</sub> - V <sub>R</sub>		Exhibit 13-8		
					V <sub>R</sub>		Exhibit 13-10		
Flow Entering Merge Influence Area					Flow Entering Diverge Influence Area				
	Actual	Max Desirable		Violation?		Actual	Max Desirable		Violation?
V <sub>R12</sub>	2830	Exhibit 13-8	4600:All	No	V <sub>12</sub>		Exhibit 13-8		
Level of Service Determination (if not F)					Level of Service Determination (if not F)				
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$ D <sub>R</sub> = 24.2 (pc/mi/ln) LOS = C (Exhibit 13-2)					$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$ D <sub>R</sub> = (pc/mi/ln) LOS = (Exhibit 13-2)				
Speed Determination					Speed Determination				
M <sub>S</sub> =	0.356 (Exhibit 13-11)				D <sub>S</sub> =	(Exhibit 13-12)			
S <sub>R</sub> =	60.0 mph (Exhibit 13-11)				S <sub>R</sub> =	mph (Exhibit 13-12)			
S <sub>0</sub> =	N/A mph (Exhibit 13-11)				S <sub>0</sub> =	mph (Exhibit 13-12)			
S =	60.0 mph (Exhibit 13-13)				S =	mph (Exhibit 13-13)			

**ATTACHMENT #6**



U.S. Department  
of Transportation  
Federal Highway  
Administration

Georgia Division

61 Forsyth St. SW 17T100.  
Atlanta, GA 30303

February 19, 2008

In Reply Refer To:  
HTM-GA

Ms. Gena L. Abraham, Commissioner  
Department of Transportation  
No. 2 Capitol Square  
Atlanta, Georgia 30334

*TODD LONG - DIRECTOR OF PRECONSTRUCTION*  
Attention: ~~Mike Thomas, Director, Division of Transportation Planning, Data and Intermodal  
Development~~

Dear Ms. Abraham:

Our office has reviewed and approved the revised Concept Reports NH-IM-85-2 (165, 166, 167, 168, 169, 170, 171, 172, 173, 174) conditioned upon the following comments being satisfied:

- For project NH-IM-85-2(167), please evaluate the option of raising SR 332 in the design phase (as opposed to lowering the Interstate profile).
- Several of the reports indicate the reconstruction of Interstate bridges to accommodate 8 lanes total width. After discussion with your staff, we have agreed that all bridges will only be widened to accommodate six lanes.
- Approval of these Concept Reports does not constitute approval of design decisions (sequence of construction/staging etc.).

Please contact George Merritt if you have any questions at 404-562-3655 or [george.merritt@fhwa.dot.gov](mailto:george.merritt@fhwa.dot.gov).

Sincerely,

Fol: Rodney Barry, P.E.  
Division Administrator

**MOVING THE**  
**AMERICAN**  
**ECONOMY**

**ATTACHMENT #7**

# DEPARTMENT OF TRANSPORTATION

## STATE OF GEORGIA

### INTERDEPARTMENTAL CORRESPONDENCE

**FILE** NHIM0-0085-02(167)  
Jackson County

**OFFICE** Materials and Research  
Forest Park, GA

PI No. 110630-

**DATE** February 3, 2012

**FROM**  Georgene M. Geary, P. E., State Materials and Research Engineer

**TO** Bobby Hilliard, P. E., Office of Program Delivery  
Attention: Steve Adewale

**SUBJECT** Pavement Evaluation Review (Shoulders and Ramps) - **ACCEPTANCE**  
I-85 from North of SR 53/Green St to North of SR 11/US 29/Lee St

As requested, the submitted pavement evaluation summary has been reviewed for this project. The report was prepared by MC Squared, Inc, on December 5, 2011 and revised on January 13, 2012. The comments from our Office are as follows:

This report is acceptable for use in the design and construction of this project.

If additional information is needed, please contact Eugene Utsalo of the Geotechnical Engineering Bureau at 404-608-4475.

GMG: EUU

Copy: Amanda S. Pereira, PE  
MC Squared Inc,  
1275 Shiloh Road NW  
Suite 2620  
Kennesaw, GA 30144

File



January 13, 2012

Mr. Mario Macrina, P.E.  
**Wolverton & Associates, Inc.**  
6745 Sugarloaf Parkway  
Suite 100  
Duluth, GA 30097

**Final Pavement Evaluation Summary Report  
I-85 Shoulders and Ramps  
from North of SR 53 to North of SR 11  
NHIMO-0085-021(167) P.I. # 110630  
Jackson County, GA  
MC<sup>2</sup> Inc. Project No. A071101.027**

**MC Squared, Inc. (MC<sup>2</sup>)** is pleased to resubmit this attached Pavement Evaluation Summary Report for the above referenced project. The Pavement Evaluation was performed in general accordance with **MC<sup>2</sup>** Proposal No. A071101.027, dated August 29, 2011. The report was prepared in general accordance with Georgia Department of Transportation (**GDOT**) reference documents for pavement evaluation.

Based on the comments received from the **Georgia Department of Transportation (GDOT)** review, a revised report is attached which incorporates the requested changes.

We appreciate the opportunity to be of service on this project and look forward to continuing to work with you. Should you have any questions or require additional information, please do not hesitate to contact us at your convenience.

Respectfully submitted,  
**MC<sup>2</sup>**

Amanda S. Pereira, PE  
Project Manager  
Georgia License No. PE034548

Kermit Schmidt, PE  
Vice President/Chief Engineer  
Georgia License No. PE031391

Sameer Moussly  
CEO/Project Manager

**23. Flexible  
Pavement  
Design**

Based on our analysis and review of our field reconnaissance, the PACES survey data, the existing pavement conditions, the pavement core data, the base material and the subgrade soils, an overlay design is recommended for the outside shoulders of northbound and southbound I-85 between SR 53 and SR 11.

This design is based on traffic data provided to **MC<sup>2</sup>** by **Ayres Associates**, the average existing pavement and base course, subgrade conditions (based on the field work performed), laboratory testing, and the **GDOT** Pavement Design Manual and other **GDOT** guidance documents. The **GDOT** asphalt pavement design computer program (APD) was utilized as part of the analysis. The design output summarizing the data and input values is included in **Appendix IV**.

The pavement is underdesign by approximately 10 to 15%. The project is classified as a rural highway with rural shoulders with no curb and gutter sections. **GDOT** Pavement Design Manual recommends an underdesign between 10 and 15%. A summary of the recommended inlay/overlay section from this project is presented below:

A. Mill and Inlay Recommendations

Pay Item Number	Material	Course	Thickness	Spread Rate
400-3206	12.5 mm OGFC	Drainage	---	90 lbs./yd <sup>2</sup>
402-4510	12.5 mm Superpave w/polymer Modified AC	Surface	1.5 inches	165 lbs./yd <sup>2</sup>
402-3190	19 mm Superpave	Binder	3.0 inches	330 lbs./yd <sup>2</sup>

A mill depth of ±4.5 inches is recommended. After milling and immediately prior to inlaying, the surface cracks shall be sealed with hot-poured joint sealer, such as Type M crack sealant/joint filler.

Extra depth milling (2 inches) should be provided as needed and used at the discretion of the engineer. An additional 10% of the original milling quantities should be adequate for the extra depth milling.

It should be noted that overall final grading plan for the proposed project may require field adjustments of the above recommended depths.

Since the use of the shoulders as an auxiliary lane during the construction activities is temporary and the shoulders appeared to be in good condition, an analysis of the pavement as is was performed. Based on the output from the **GDOT** asphalt pavement design computer program (APD), as is, the pavement is underdesigned approximately 22 to 26 percent. Although this may be considered acceptable for a temporary condition, based on the rut susceptibility testing which indicated rutting of different layers ranging from 5.5 mm to 14.0 mm, the mill and overlay of the existing asphaltic concrete pavement to a depth of approximately 4.5 inches, as indicated in the overlay design above is recommended. The output data for the existing conditions of the north and southbound lanes are included in **Appendix IV**.

**ATTACHMENT #8**

**AGREEMENT**

**BETWEEN**

**DEPARTMENT OF TRANSPORTATION**

**STATE OF GEORGIA**

**AND**

**THE CITY OF BRASELTON, GEORGIA**

This Agreement is made and entered into this 5<sup>th</sup> day of June, 2006, by and between the DEPARTMENT OF TRANSPORTATION, an agency of the State of Georgia, hereinafter called the **DEPARTMENT**, and BRASELTON, GEORGIA, acting by and through its City Counsel, hereinafter called the **CITY**.

WHEREAS, the CITY has represented to the DEPARTMENT a desire to obtain Highmast Roadway Lighting at the I-85@SR 53 Interchange - Exit 129 in the City of BRASELTON, Georgia; and

WHEREAS, the CITY has represented to the DEPARTMENT a desire to participate in: 1.) Providing the Energy, and 2.) The Operation and Maintenance of said lighting systems at the aforesaid locations, and the DEPARTMENT has relied upon such representation; and

WHEREAS, the DEPARTMENT has indicated a willingness to fund the materials for the said lighting systems at the aforesaid locations, with funds of the DEPARTMENT, funds apportioned to the DEPARTMENT by the Federal Highway Administration under Title 23, United States Code, Section 104, or a combination of funds from any of the above sources.

NOW, THEREFORE, in consideration of the mutual promises made and of the benefits to flow from one to the other, the DEPARTMENT and the CITY hereby agree each with the other as follows:

1. The DEPARTMENT or its assigns shall cause the installation of all materials and equipment necessary for the Highmast Roadway Lighting System at the I-85@SR 53 Interchange - Exit 129, as shown on Attachment "A" attached hereto, and made a part hereof.

2. Upon completion of said lighting system, and acceptance by the DEPARTMENT, the CITY shall assume full responsibility for the operation and maintenance of the entire lighting system, including but not limited to replacement of lamps, ballasts, luminaries, lighting structures, associated equipment, conduit, wiring and service equipment. The CITY further agrees to pay for all energy required for the operation of said lighting system.

3. The DEPARTMENT shall retain ownership of all materials and various components of the entire lighting system. The CITY, in its operation and maintenance of the lighting system, shall not in any way alter the type or location of any of the various components which make up the entire lighting system without prior written approval from the DEPARTMENT.

4. This Agreement is considered as continuing for a period of fifty (50) years from the date of execution of this Agreement. The DEPARTMENT reserves the right to terminate this Agreement, at any time for just cause, upon thirty (30) days written notice to the CITY.

5. It is understood by the CITY that the DEPARTMENT has relied upon the CITY'S representation of providing for the energy, maintenance, and operation of the lights represented by this Agreement, therefore, if the CITY elects to de-energize or fails to properly maintain the lighting system during the term of this Agreement, the CITY must reimburse the DEPARTMENT the materials cost for the lighting system. If the CITY elects to de-energize or fails to properly maintain any individual unit within the lighting system, the CITY must reimburse the DEPARTMENT for the material cost for the individual unit which will include all costs for the pole, luminaires, foundations, and associated wiring. The DEPARTMENT will provide the CITY with a statement of material costs upon completion of the installation.

The covenants herein contained shall, except as otherwise provided accrue to the benefit of and be binding upon the successors and assigns of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have made and executed this Agreement the day and year first above written.

RECOMMENDED:

Brent A. Story  
Brent A. Story, P.E.  
State Road & Airport Design Engineer

Buddy Gratton  
Buddy Gratton, P.E.  
Director, Pre-Construction

David E. Studstill, Jr.  
David E. Studstill, P.E.  
Chief Engineer

DEPARTMENT OF TRANSPORTATION

BY Larry E. Dent  
Harold E. Binnerbohl  
Deputy Commissioner  
Larry E. Dent

(SEAL)

ATTEST:  
Earl L. Mahfuz  
Earl L. Mahfuz  
Treasurer

BRASELTON, GEORGIA

BY P. Abraham  
MAYOR

(SEAL)

Danielle Austin  
WITNESS

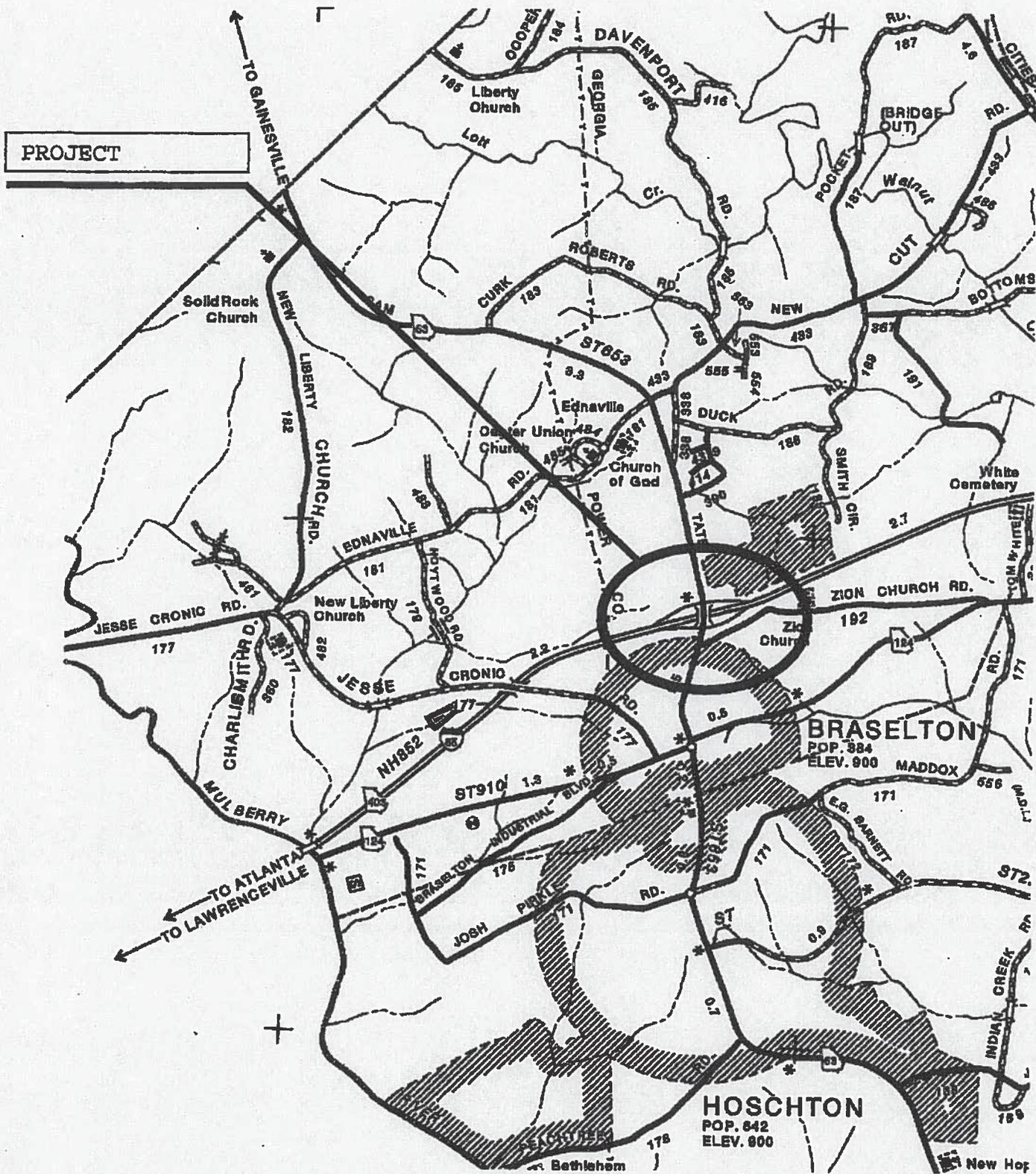
Cathy Smith  
Notary Public  
Notary Public, Jackson County, Georgia  
My Commission Expires August 7, 2007

This Agreement approved by the City Council at a meeting held at

Braselton Community Center  
the 5th day of May,  
2006.

[Signature]  
City Clerk

LOCATION SKETCH



Appendix A  
A Resolution of The Town of Braselton

STATE OF GEORGIA

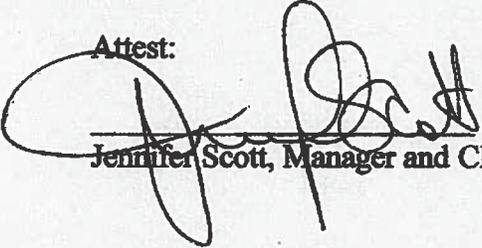
COUNTIES OF Barrow, Gwinnett, Hall and Jackson

WHEREAS, at a regular meeting of the Town of Braselton, held on May 8, 2006, a motion was made and duly seconded that the Mayor of the Town of Braselton be authorized to execute the lighting agreements for high mast lighting at I-85 and State Highways 211 and 53 as proposed by the Georgia Department of Transportation.

BY: 

Mayor Pat Graham

Attest:

  
Jennifer Scott, Manager and Clerk