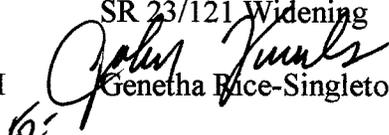


D.O.T. 66

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P. I. No. 0007143, Candler County **OFFICE** Preconstruction
CSSTP-0007-00(143)
SR 23/121 Widening **DATE** October 17, 2006
FROM  Genetha Rice-Singleton, Assistant Director of Preconstruction
TO  SEE DISTRIBUTION

SUBJECT APPROVED PROJECT CONCEPT REPORT

Attached for your files is the approval for subject project.

GRS/cj

Attachment

DISTRIBUTION:

Brian Summers
Harvey Keeper
Ken Thompson
Jamie Simpson
Michael Henry
Keith Golden
Joe Palladi (file copy)
Paul Liles
Babs Abubakari
Glenn Durrence
BOARD MEMBER

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
Traffic Safety and Design

RECEIVED
SEP 29 2006
OFFICE OF PLANNING

PROJECT CONCEPT REPORT

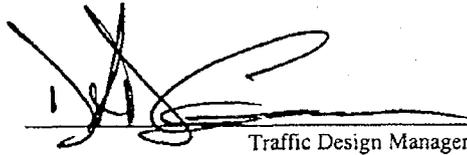
SR 23/121 Widening from I-16 to Lytell Street (CS 610)

Project Number: CSSTP-0007-00(143)
P.I. NO. 0007143
County: CANDLER

FEDERAL ROUTE NO: N/A
STATE ROUTE NO: 23/121

Prepared by:

DATE 9-27-2006

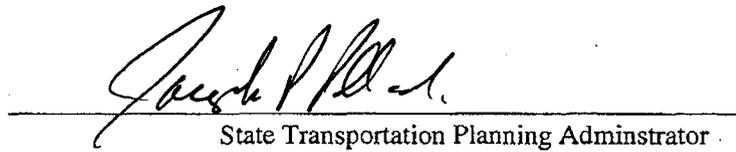

Traffic Design Manager

DATE 9-28-2006

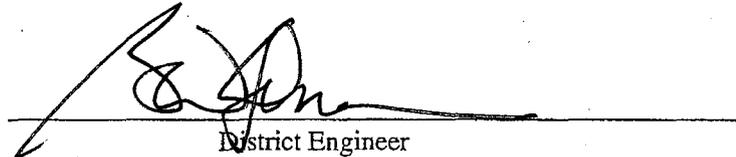

State Traffic Safety & Design Engineer

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

DATE 9/29/06


State Transportation Planning Administrator

DATE 10-6-06


District Engineer

DATE 10/17/06


Chief Engineer

NOTICE OF LOCATION AND DESIGN APPROVAL

CSSTP-0007-00(143), Candler County
P. I. NUMBER 0007143

Notice is hereby given in compliance with Georgia Code 22-2-109 that the Georgia Department of Transportation has approved the Location and Design of this project.

The date of location approval is: **OCTOBER 17, 2006**

This project is located in Candler County within the City of Metter. Construction will take place on State Route 23 from I-16 to Lytell Street 1 between mile post 6.41 and mile post 6.81.

SR 23/121 is a four lane undivided rural arterial running north-south through Metter, GA. Project CSSTP-0007-00(143) proposes to widen the existing section between I-16 and Lytell Street (CS 610) to a five lane urban section with a 14 ft two-way-left-turn-lane. Five ft sidewalks are also proposed on both sides of the road. The outside shoulders are to be 12 feet wide with 30" curb and gutter, and 5 foot sidewalks. Right-turn bays have been replaced where they existed previously. The 5 lane section ends at Lytell Street by creating a right-turn bay northbound and adding a lane south. The remainder of the width is tapered out from Lytell Street to Stripling Street.

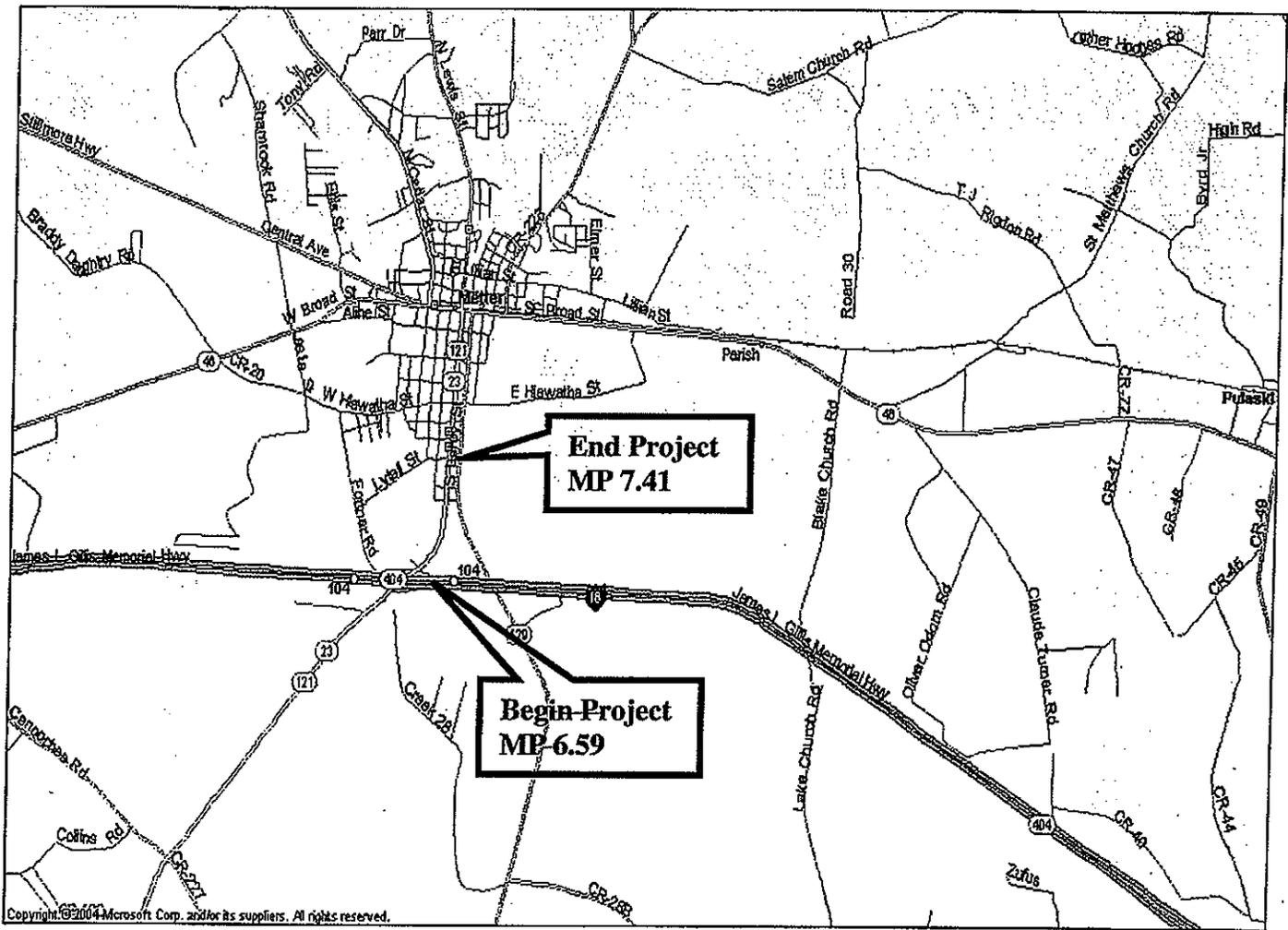
Drawings, maps, or plats of the proposed project, as approved, are on file and are available for public inspection at the Georgia Department of Transportation:

Claude Jackson, Area Six Engineer (Statesboro)
claude.jackson@dot.state.ga.us
17213 US Highway 301 North
Statesboro, Georgia 30458
(912) 871-1103

Any interested party may obtain a copy of the drawings or maps or plats or portions thereof by paying a nominal fee and requesting in writing to:

Keith Golden, P.E., State Traffic Safety and Design Engineer
Office of Traffic Safety and Design
Phillip.allen@dot.state.ga.us
935 East Confederate Avenue, Bldg. 24
Atlanta, Georgia 30316
(404) 635-8115

Any written request or communication in reference to this project or notice SHOULD include the Project and P. I. Numbers as noted at the top of this notice.



LOCATION MAP

Project: STP-0007-00(143) Candler County, PI No: 0007143
Description: SR23/121 Widening from Interstate 16 to Lytell Street

Need and Purpose:

SR23/121 is a multi-lane rural facility with a posted speed of 45 mph in Metter. This segment starts at I-16 and runs North through the commercial district of Metter. This corridor has many retail businesses including fast food restaurants, motels and a gas station that services traffic along I-16. This area is congested and has many driveways and side roads that have conflicting turning movements from the through lanes, which causes accidents and delays in the corridor.

Although SR 23/121 operates at acceptable level of service under existing and future conditions, safety is becoming a serious issue as the town of Metter grows in population and business. Accident data from 2001 to 2004 indicates 68 reported accidents (39 injuries, 2 fatalities). Out of these, 34 accidents were rear-end/angle, caused potentially by left or right turn movements in or out of the many commercial driveways along the corridor. Accident rates were higher than the state average in the year 2000. A shared-center left turn lane is will reduce the risk of rear end collision to left turning vehicles waiting in the through lane. At the same time, this two-way left turn lane will provide refuge to vehicles exiting the driveways, thereby reducing the number of angle collisions.

Replacing the rural section with an urban section will reduce the right-of-way impact to the adjacent properties and will also provide sidewalks, which have become a necessity for pedestrian safety in this commercially developing area. The section will be widened symmetrically to minimize property impacts.

Description of the proposed project:

SR 23/121 is a four lane undivided rural arterial running north-south through Metter, GA. Project CSSTP-0007-00(143) proposes to widen the existing section between I-16 and Lytell Street (CS 610) to a five lane urban section with a 14 ft two-way-left-turn-lane. Five ft sidewalks are also proposed on both sides of the road. The outside shoulders are to be 12 feet wide with 30" curb and gutter, and 5 foot sidewalks. Right-turn bays have been replaced where they existed previously. The 5 lane section ends at Lytell Street by creating a right-turn bay northbound and adding a lane south. The remainder of the width is tapered out from Lytell Street to Stripling Street.

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

PDP Classification: Major , or Minor

Federal Oversight: Full Oversight , Exempt , State Funded , or Other

Functional Classification: Rural Minor Arterial

U. S. Route Number(s): N/A State Route Number(s): 23/121 County Route Number(s): N/A

Traffic (AADT): Base Year: (2007) 10,032 Design Year (2027): 15,203

Existing design features:

- Typical section: Undivided rural section with four 11 ft lanes and variable width grass shoulders and ditches.
- Posted Speed:45 mph
- Minimum radius of curve:.....1645 ft
- Maximum superelevation rate for curve:.....4.00%
- Maximum degree of curvature:.....3.5°
- Maximum grade:.....3.00%

Proposed Design Features:

- Proposed Typical section (see attached): The improvement includes widening the existing section to a five lane urban undivided with two 12 ft through lanes in each direction and a 14 ft two-way-left-turn-lane. The section will have urban shoulders including a 30" curb and gutter, a two ft grass strip and a five ft sidewalk.
- Proposed design speed:.....45 mph
- Proposed maximum grade:.....3.00%
- Maximum grade allowable:.....6.00%
- Proposed maximum grade driveway:.....11.00%
- Proposed minimum radius of curve:..... 1645 ft
- Proposed maximum degree of curve:..... 3.5°
- Minimum radius allowable:.....730 ft
- Proposed superelevation rate for curves:.....4.00%
- Right-of-way:.....110 ft

- Easements: Temporary , Permanent , Utility , Other .
- Type of access control: Full , Partial , By Permit , Other .
- Number of parcels: 31 Number of displacements:
 - Business: 0
 - Residences: 0
 - Mobile homes: 0
 - Other: 0

- Structures: N/A
- Major intersections: None
- Design Exceptions to controlling criteria anticipated:

	<u>UNDETERMINED</u>	<u>YES</u>	<u>NO</u>
○ HORIZONTAL ALIGNMENT:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ ROADWAY WIDTH:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ SHOULDER WIDTH:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ VERTICAL GRADES:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ CROSS SLOPES:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ STOPPING SIGHT DISTANCE:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ SUPERELEVATION RATES:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ HORIZONTAL CLEARANCE:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ SPEED DESIGN:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ VERTICAL CLEARANCE:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ BRIDGE WIDTH:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
○ BRIDGE STRUCTURAL CAPACITY:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- Design Variances: None expected
- Environmental concerns: None anticipated
- Level of environmental analysis:
 - Are Time Savings Procedures appropriate? Yes , No .
 - Categorical exclusion .
 - Environmental Assessment/Finding of No Significant Impact (FONSI) , or
 - Environmental Impact Statement (EIS) .

- Utility involvements: *Water, sewer, electricity, phone, gas*

Project responsibilities:

- Design, URS Corporation
- Right of Way Acquisition, GDOT
- Relocation of Utilities, GDOT
- Letting to contract, GDOT
- Supervision of Construction, GDOT
- Providing material pits, Contractor

Coordination:

- 1) Concept meeting date and brief summary: *To be arranged with GDOT.*
- 2) P. A. R. meetings, dates and results: *Not required*
- 3) FEMA, USCG, and/or TVA: *None*
- 4) Public involvement. *Public information meeting to be held at Candler County request*
- 5) Local government comments: *None*
- 6) Other projects in the area: *None*
- 7) Other coordination to date: *None*
- 8) Railroad Coordination: *None*

Scheduling – Responsible Parties' Estimate

- Time to complete the environmental process: 18 months
- Time to complete preliminary construction plans: 6 months
- Time to complete right of way plans: 4 months
- Time to complete the Section 404 Permit: 0 months
- Time to complete final construction plans: 4 months
- Time to purchase right of way: 6 months
- Other major items that will affect the project schedule: N/A

Other Alternates considered:

1. No build: Safety remains an issue.
2. Two 12 ft lanes with a 14 ft shared-center left turn lane: This alternate does not provide sufficient capacity in the design year 2027.
3. Four 12 ft lanes with raised median: Although capacity and safety requirements are partially met, this alternate blocks full access to some businesses increasing congestion at the median openings. This may cause community disapproval and new safety issues. This alternate is not warranted based on the design criteria in Frank Danchetz's memorandum dated Jan 7, 2003.

Comments: None

Attachments:

1. Construction Cost Estimate
2. Typical Sections
3. Approved TE Study
4. Concept Layout
5. Concept Team Meeting Minutes
6. Notice of Location and Design Approval

PRELIMINARY COST ESTIMATE

PROJECT No.: CSSTP-0007-00(143) Candler

PREPARED BY: Nick Castronova/URS Corporation PROJECT LENGTH: 0.81 miles

ESTIMATED LETTING DATE: None

PROGRAMMING PROCESS CONCEPT DEVELOPMENT DURING PROJECT DEV.

PROJECT COST		
A. RIGHT-OF-WAY:		
1. PROPERTY (LAND & EASEMENT)		\$ 0.00
2. DISPLACEMENTS: RES: 0 BUS: 0 M.H.: 0		\$ 0.00
3. OTHER COST (ADM./COST, INFLATION)		\$ 0.00
	SUBTOTAL:A	\$ 233318
B. REIMBURSABLE UTILITIES:		
1. RAILROAD		\$ 0.00
2. TRANSMISSION LINES		\$ 0.00
3. SERVICES		\$ 0.00
	SUBTOTAL:B	\$ 0.00
C. CONSTRUCTION:		
1. MAJOR STRUCTURES	N/A	\$ 0.00
	SUBTOTAL:C-1	\$ 0.00
2. GRADING AND DRAINAGE:		
a. EARTHWORK (12,500 cy @ \$3.00)		\$ 37,500.00
b. DRAINAGE:		
1) Curb and Gutter (9,000 ft @ \$20.00/ft)		\$ 180,000.00
2) Longitudinal System		
Catch Basins (30 @ \$2000/EA)		\$ 60,000.00
Pipe - 18" (8,600 ft @ \$35/ft)		\$ 301,000.00
Flared End Sections (4 @ \$500/EA)		\$ 2,000.00
	SUBTOTAL:C-2	\$ 580,500.00

PROJECT COST

3. BASE AND PAVING:		
a. AGGREGATE BASE (6,000 tons @ \$20/ton)		\$ 120,000.00
b. ASPHALT PAVING:		
9.5mm Superpave (2,800 tons @ \$60/ton)	\$ 168,000.00	
19mm Superpave (1,250 tons @ \$60/ton)	\$ 75,000.00	
25mm Superpave (1,900 tons @ \$60/ton)	\$ 114,000.00	
	SUBTOTAL:C-3.b	\$ 357,000.00
	SUBTOTAL:C-3	\$ 477,000.00
4. LUMP ITEMS:		
a. GRASSING (2.5 acre @ \$5,000/acre)		\$ 12,500.00
b. CLEARING AND GRUBBING (5.0 acres @ \$8,000/acre)		\$ 40,000.00
c. LANDSCAPING		\$ 10,000.00
d. EROSION CONTROL (1.0 mile @ \$50,000/mile)		\$ 50,000.00
e. TRAFFIC CONTROL		\$ 100,000.00
	SUBTOTAL:C-4	\$ 212,500.00
5. MISCELLANEOUS:		
a. SIGNAL		\$ 0.00
b. SIGNING - MARKING		\$ 30,000.00
d. SIDEWALK (4700 yd ² @ \$30.00/ yd ²)		\$ 141,000.00
e. GUARDRAIL (1500 LF @ \$70.00/ LF)		\$ 105,000.00
	SUBTOTAL:C-5	\$ 276,000.00
6. SPECIAL FEATURES:		
	SUBTOTAL:C-6	\$ 0.00

ESTIMATE SUMMARY	
A. RIGHT-OF-WAY	\$ 233318
B. REIMBURSABLE UTILITIES	\$ 0.00
C. CONSTRUCTION	
1. MAJOR STRUCTURES	\$ 0.00
2. GRADING AND DRAINAGE	\$ 580,500.00
3. BASE AND PAVING	\$ 477,000.00
4. LUMP ITEMS	\$ 212,500.00
5. MISCELLANEOUS	\$ 276,000.00
6. SPECIAL FEATURES	\$ 0.00
SUBTOTAL CONSTRUCTION COST	\$ 1,779,318.00
E. & C. (10%)	\$ 177931.00
INFLATION (5% PER YEAR)	\$ 97862.00
NUMBER OF YEARS	1
TOTAL CONSTRUCTION COST	\$
GRAND TOTAL PROJECT COST	\$ 2,055,112.00

This project is 100% in Candler County.

MINUTES OF THE CONCEPT TEAM MEETING

The concept meeting for Georgia DOT Project No. CSSTP-0007-00(143), PI No. 0007143, Candler County was held at the Metter City Hall. The meeting was held in the conference room on March 16th, 2006 at 10:00 AM.

The meeting attendees included Charity Belford (GDOT TS&D), Derrick Cameron (GDOT, TS&D), Jerome Sheffield (GDOT, Dist. Constr), C.R. Jackson (GDOT), Aghdas Ghazi (GDOT), Allen Proctor (City of Statesboro), Jeff Church (Gresham Smith and Partners), Billy Trapnell (City of Metter), Kent Campbell (Candler County), James Brantley (City of Metter), Stewart Jarrell (Pineland Telephone), Milton Futch (County Administrator), Teresa Scott (GDOT/Jessup), George Shenk (GDOT/Jesup Utilities), Cynthia Phillips (GDOT Traff Ops), Randy Ellison (Metter Police Dept), Don Harris (URS Corporation), Ali Sayyed (URS Corporation).

Derrick Cameron welcomed the attendees and briefly introduced the project as an element of the GDOT's safety improvement efforts with a letting date of September 2007. He then asked everyone to introduce themselves.

The meeting proceeded as Don Harris explained the project in detail. He emphasized that the number of serious accidents including 39 injuries and 2 fatalities, is the major reason for implementing this safety improvement. This high accident rate is directly linked to the escalating commercial growth and traffic. Don continued by describing the geometry of the improvement and its development process. He confirmed that the plans were submitted for utility and right of way costs in January but a response has not been received yet. He also indicated that there was no apparent major utility relocations or right of way impacts. He then opened the floor for any questions and comments.

At that point, C.R. Jackson presented an on-going concept of introducing Clifton Drive between the Cliftons/Shell and KFC. The idea of using Clifton Drive as a joint-use Drive or a relocation-extension of Fortner Rd to SR 129 was discussed. He also suggested installing a traffic signal and make this modification part of the mainline project. Milton Futch illustrated a sketch of the driveway. Don outlined the 100 ft right of way on the main layout. Billy Trapnell said that with the introduction of Clifton Drive, Fortner Rd could be converted to a right-in-right-out access. The existing drives on the west side of SR 121 would also be consolidated to line up with the proposed intersection. It was noted that additional survey may be required in this section of the project.

Questions and Comments:

Derrick: Are these property owners aware of this modification?

Milton: Some of them were told about it few years ago.

Don: They may need to be revisited before we proceed with the design.

Derrick: Are we sure we meet warrants for a traffic signal?

Cynthia: We will have to perform signal warrant analysis.

Don: Until we tie into SR 129, it is very unlikely the signal warrants would be met just by using Clifton as a joint-use Drive. The traffic volumes would not be sufficient. In that case, signal will be installed as part of the extension of the roadway.

Milton: What will be the estimated cost of that signal?

Derrick: About \$50-75,000

Don: Probably span wire installation. The right turn lane should also be extended further back.

Derrick: Left turns into KFC from the joint-use drive will queue and back up to SR 23.

Billy: Put driveways for the KFC and Clifton at the back to provide sufficient throat length for the joint use drive.

CR indicated that careful consideration of the breakover and driveway grades needs to be given by the designer. Particularly on the high side of the superelevated curve.

Jeff: Easements need to be made permanent.

Jeff: Can we add more joint use driveways?

Derrick: We certainly will approve. It is recommended that the District reviews it.

Teresa: Since many businesses are involved, should there be a Public Information Meeting (PIM) arranged?

Derrick: Yes. Especially if joint use driveways are being proposed.

It was noted however that PIM is not required since the project has been classified as a Categorical Exclusion for NEPA.

Billy: Adding curb and gutter is an improvement to the businesses. They will be happy.

Billy also suggested to look into providing a joint use driveway between the KFC and Exxon by centering it at the property line.

Don: Who is the surveyor?

Jeff: Toole Surveying in Augusta (formerly known as WR Toole)

Don: Lets cut the sidewalk and curb-gutter before the radius return for I-16 WB off ramp.

Jeff: Can we try putting 4:1 slopes at the beginning part of the segment in order to avoid the guardrail?

Don: We will be chasing the down slopes and end up with much broader construction limits. We may also have to replace most of the concrete flumes out there.

Jeff: We might need to see if putting an urban shoulder wide enough to meet the clear zone will help eliminating the need of guardrail. If we have to replace the concrete flumes in some areas, how does it compare with the cost of guardrail.

Jeff also suggested eliminating the curb and gutter north of Lytell Street where the project is transitioning back to a two lane section. It was agreed to look at alternate side slopes to see if the need for guardrail could be eliminated.

Derrick: Lets proceed with the design of the mainline. We will notify the team when an answer is reached on the Clifton Drive.

Upon review of the Clifton Road location in the field, no other issues were discussed. Sufficient room was available to reconstruct the driveway that C.R. expressed some concern about. It was also agreed that a maximum 4% breakover could occur between the mainline and the right turn lanes, if necessary to flatten some of the driveway grades and lessen the length required for reconstruction.

**TRAFFIC ENGINEERING STUDY
FOR
SR 23/121 corridor from I-16 to Lytell Street**

Prepared for:
Georgia Department of Transportation
State of Georgia
935 East Confederate Avenue, Building 24
Atlanta, Georgia 30316

Prepared by:
URS Corporation
1000 Abernathy Road
400 Northpark Town Center, Suite 900
Atlanta, Georgia 30328

September 13, 2005

Introduction

This report evaluates traffic operations and safety throughout the SR 23/121 corridor from I-16 to Lytell Street. Existing counts were conducted and growth rates applied for evaluating future conditions. The Multilane Highways Operational Analysis module of Highway Capacity Software 2000 (HCS 2000) was utilized in analyzing traffic operations during the highest peak hour. In addition, crash data provided by GDOT for the years of 2001 to 2004 was reviewed to identify possible safety issues.

Existing Conditions

SR 23/121 is currently an existing four (4)-lane undivided roadway with a posted speed limit of 45 miles per hour. Minor street intersections throughout the subject corridor are two-way stop controlled with no existing utilization of traffic signal control. On March 29-30, 2005 twenty-four (24) hour classification counts along SR 23 just north of I-16 were conducted. These counts indicate that there are approximately 9,624 vehicles currently utilizing SR 23/121 between I-16 and Lytell Street with nine (9) percent comprised of heavy truck trips. There is approximately a 50/50 trip distribution between northbound and southbound trips. During the PM peak hour (5:00pm-6:00pm) there are approximately 713 vehicle trips along SR 23.

Roadway Segment Analysis

Multilane Highways Operational Analysis results indicate that SR 23/121 from I-16 to Lytell Street currently operates at a LOS A and will continue to operate at a LOS A in the base year 2007 and design year 2027. In calculating base year and design year volumes a growth rate of 2.1% was applied to existing counts and projected to 2007 and 2027. This growth rate was derived using linear regression from existing count information and historical count data provided by GDOT.

Analysis was also performed utilizing a three (3) lane section with a center-shared left turn lane in contrast to the existing and proposed configurations. This section is comprised of two (2) through lanes, thus the *Two-Lane Module of HCS 2000* was utilized in the analysis. Results indicate a current LOS of C which is generally considered acceptable in such rural areas; however, the facility currently operates at a LOS A. Existing traffic volumes were then grown to 2007 and 2027. Analysis results indicate a LOS of C in 2007 and an unacceptable LOS of D in 2027 which is a significant disparity from the projected LOS A in both 2007 and 2027. The following table summarizes analysis results:

Year	DHV (bi-directional)	LOS	LOS (3 lane section)
Existing	713	A	C
2007	743	A	C
2027	1126	A	D

Analysis results are presented in the Appendix.

Traffic Accident Analysis

Traffic accident data for the years of 2001 through 2004 was made available through GDOT for the SR 23/121 corridor from I-16 to Lytell Street. In this time frame there were 68 accidents with 39 injuries and 2 fatalities. Of the 68 accidents, there were 34 rear-end/angled accidents where the potential for occurrences would be reduced with the implementation of a shared-center left turn lane.

For the year 2003 (which is the latest year that a comparable statewide average is available), the accident rate for this section of road is 290 per 100 million vehicle miles of travel, which is below the comparable statewide average of 304. For this same year, the injury rate on this section of roadway was 36 per 100 million vehicle miles of travel, which is below a comparable statewide average of 122.

A summary of traffic accident data is presented in the Appendix.

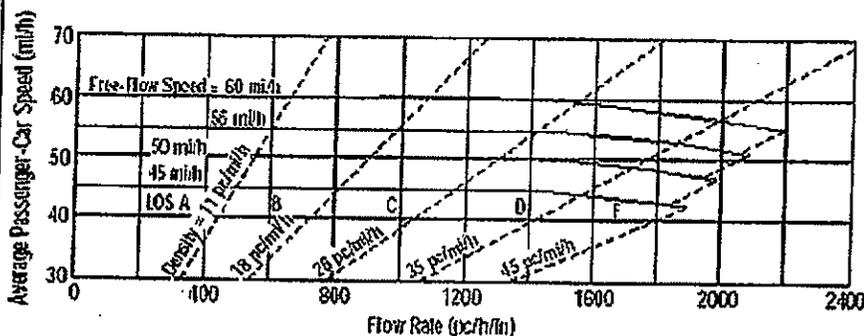
Recommendations and Conclusions

In conclusion, the SR 23/121 corridor from I-16 to Lytell Street currently operates at an acceptable level of service (LOS) and is forecast to in 2007 and 2027; however, safety issues exist regarding vehicles entering and exiting driveways along the corridor. There is a significant risk of rear-end collisions as a result of vehicles waiting for sufficient gaps in opposing traffic to navigate left turn movements from SR 23/121. In addition, vehicles entering the SR 23/121 corridor are at increased risk for angled collisions due to misjudgment of anticipated gaps in oncoming traffic. With the installation of a center-shared left turn lane, left turning vehicles are effectively removed from through traffic and entering vehicles are provided with a storage/transition area in the event of gap misjudgment. Thus, the risks of rear-end/angled collisions are reduced, as are the risks of angled collisions.

Analysis results indicate current conditions would operate acceptably with a three (3) lane section; however, they are forecast to deteriorate to unacceptable levels by the year 2027. Therefore, a reduction in the existing four (4) lane section is not recommended. Also, as local driving habits have become acclimated to the available capacity, a reduction in capacity could present additional safety-related issues.

Appendix

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Code
Operational (LOS)	FFS, H , v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_f
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_f

General Information		Site Information	
Analyst	Sonny Smoak	Highway/Direction to	SR 23/121
Agency or Company	URS Corporation	Travel	
Date Performed	6/2/2005	From/To	I-16/Lytell Street
Analysis Time Period	Existing Peak Hour (5pm-6pm)	Jurisdiction	Candler County (C)
		Analysis Year	2005

Project Description Traffic Engineering Evaluation

Oper. (LOS)
 Des. (N)
 Plan. (vp)

Flow Inputs

Volume, V (veh/h)	360	Peak-Hour Factor, PHF	0.90
AADT(veh/h)		%Trucks and Buses, P_T	7
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade	Length (mi) 0.00
Driver Type Adjustment	1.00		Up/Down % 0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	0.966

Speed Inputs	Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)
Access Points, A (A/mi)	0	f_A (mi/h)
Median Type, M		
FFS (measured)	45.0	

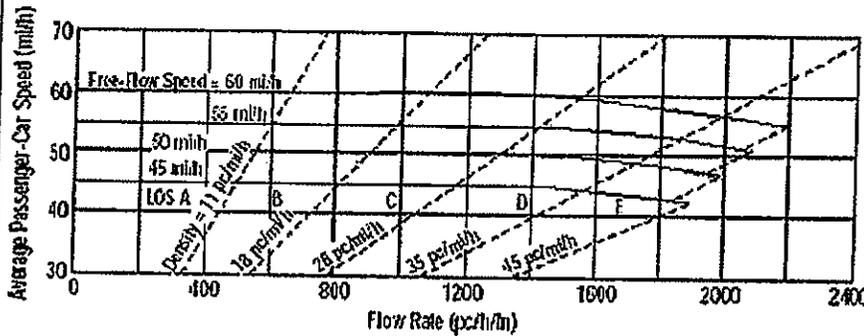
Base Free-Flow Speed, BFFS		f_M (mi/h) FFS (mi/h)	45.0
Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	206	Required Number of Lanes, N	
Speed, S (mi/h)	45.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	4.6	Max Service Flow Rate (pc/h/ln)	
LOS	A	Design LOS	

HCS2000™

Copyright © 2003 University of Florida, All Rights Reserved

Version 4.1d

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Code
Operational (LOS)	FFS, N , v_p	C
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_f
Planning (LOS)	FFS, N , AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_f

General Information

Analyst: Sonny Smoak
 Agency or Company: URS Corporation
 Date Performed: 6/2/2005
 Analysis Time Period: 2007 Peak Hour (5pm-6pm)

Site Information

Highway/Direction to Travel: SR 23/121
 From/To: I-16/Lytell Street
 Jurisdiction: Candler County (C)
 Analysis Year: 2005

Project Description: Traffic Engineering Evaluation

Oper.(LOS)

Des. (N)

Plan. (v_p)

Flow Inputs

Volume, V (veh/h): 375
 AADT(veh/h):
 Peak-Hour Prop of AADT (veh/d):
 Peak-Hour Direction Prop, D :
 DDHV (veh/h):
 Driver Type Adjustment: 1.00

Peak-Hour Factor, PHF: 0.90
 %Trucks and Buses, P_T : 7
 %RVs, P_R : 0
 General Terrain: Level
 Grade Length (mi): 0.00
 Up/Down %: 0.00
 Number of Lanes: 2

Calculate Flow Adjustments

f_p : 1.00
 E_T : 1.5

E_R : 1.2
 f_{HV} : 0.966

Speed Inputs

Lane Width, LW (ft): 12.0
 Total Lateral Clearance, LC (ft): 12.0
 Access Points, A (A/mi): 0
 Median Type, M :
 FFS (measured): 45.0

Calc Speed Adj and FFS

f_{LW} (mi/h)
 f_{LC} (mi/h)
 f_A (mi/h)

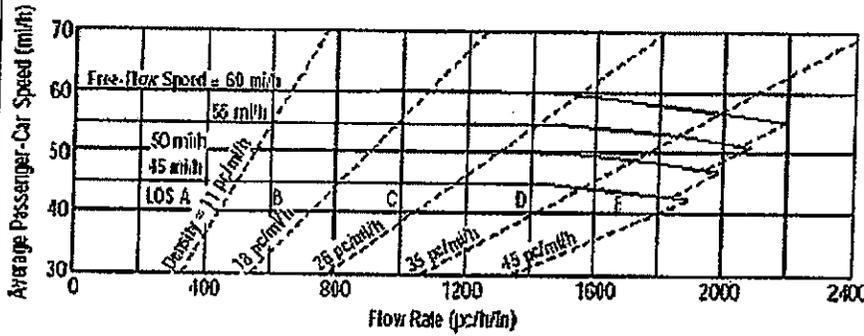
Base Free-Flow Speed, BFFS		f_M (mi/h)	
		FFS (mi/h)	45.0
Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	215	Required Number of Lanes, N	
Speed, S (mi/h)	45.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	4.8	Max Service Flow Rate (pc/h/ln)	
LOS	A	Design LOS	

HCS2000™

Copyright © 2003 University of Florida, All Rights Reserved

Version 4.1 d

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Q
Operational (LOS)	FFS, N , v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_p
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_p

General Information		Site Information	
Analyst	Sonny Smoak	Highway/Direction to	SR 23/121
Agency or Company	URS Corporation	Travel	
Date Performed	6/2/2005	From/To	I-16/Lytell Street
Analysis Time Period	2027 Peak Hour (5pm-6pm)	Jurisdiction	Candler County (C)
Project Description	Traffic Engineering Evaluation		
<input checked="" type="checkbox"/> Oper. (LOS)		<input type="checkbox"/> Des. (N)	
		<input type="checkbox"/> Plan. (vp)	

Flow Inputs			
Volume, V (veh/h)	568	Peak-Hour Factor, PHF	0.90
AAADT(veh/h)		% Trucks and Buses, P_T	7
Peak-Hour Prop of AAADT (veh/d)		% RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade	Length (mi) 0.00
Driver Type Adjustment	1.00		Up/Down % 0.00
		Number of Lanes	2

Calculate Flow Adjustments			
f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	0.966

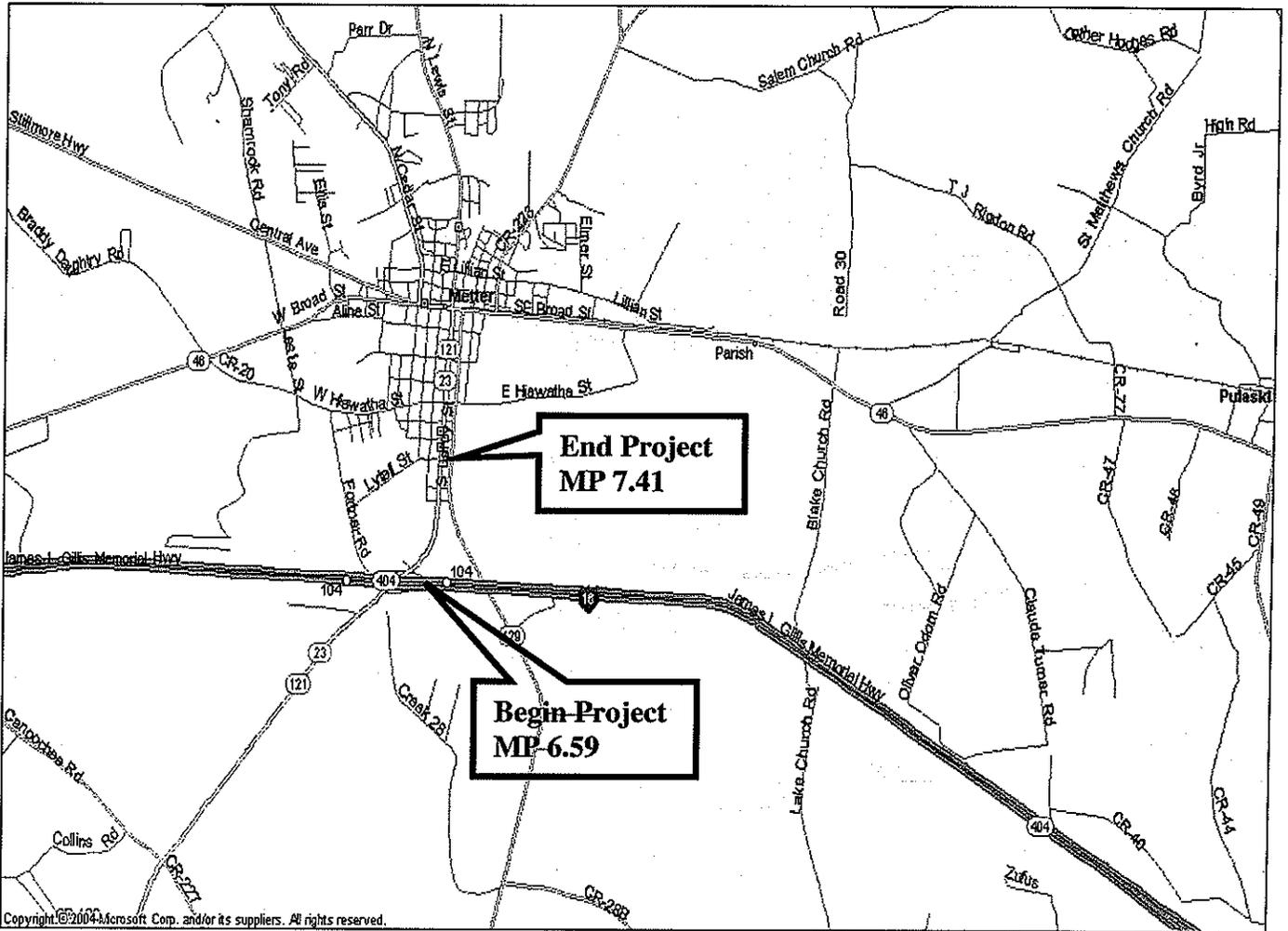
Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	
Access Points, A (A/mi)	0	f_A (mi/h)	
Median Type, M			
FFS (measured)	45.0		

Base Free-Flow Speed, BFFS		f_M (mi/h)	
		FFS (mi/h)	45.0
Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	326	Required Number of Lanes, N	
Speed, S (mi/h)	45.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	7.2	Max Service Flow Rate (pc/h/ln)	
LOS	A	Design LOS	

HCS2000™

Copyright © 2003 University of Florida, All Rights Reserved

Version 4.1d



LOCATION MAP

Project: STP-0007-00(143) Candler County, PI No: 0007143
Description: SR23/121 Widening from Interstate 16 to Lytell Street

Need and Purpose:

SR23/121 is a multi-lane rural facility with a posted speed of 45 mph in Metter. This segment starts at I-16 and runs North through the commercial district of Metter. This corridor has many retail businesses including fast food restaurants, motels and a gas station that services traffic along I-16. This area is congested and has many driveways and side roads that have conflicting turning movements from the through lanes, which causes accidents and delays in the corridor.

Although SR 23/121 operates at acceptable level of service under existing and future conditions, safety is becoming a serious issue as the town of Metter grows in population and business. Accident data from 2001 to 2004 indicates 68 reported accidents (39 injuries, 2 fatalities). Out of these, 34 accidents were rear-end/angle, caused potentially by left or right turn movements in or out of the many commercial driveways along the corridor. Accident rates were higher than the state average in the year 2000. A shared-center left turn lane is will reduce the risk of rear end collision to left turning vehicles waiting in the through lane. At the same time, this two-way left turn lane will provide refuge to vehicles exiting the driveways, thereby reducing the number of angle collisions.

Replacing the rural section with an urban section will reduce the right-of-way impact to the adjacent properties and will also provide sidewalks, which have become a necessity for pedestrian safety in this commercially developing area. The section will be widened symmetrically to minimize property impacts.

Description of the proposed project:

SR 23/121 is a four lane undivided rural arterial running north-south through Metter, GA. Project CSSTP-0007-00(143) proposes to widen the existing section between I-16 and Lytell Street (CS 610) to a five lane urban section with a 14 ft two-way-left-turn-lane. Five ft sidewalks are also proposed on both sides of the road. The outside shoulders are to be 12 feet wide with 30" curb and gutter, and 5 foot sidewalks. Right-turn bays have been replaced where they existed previously. The 5 lane section ends at Lytell Street by creating a right-turn bay northbound and adding a lane south. The remainder of the width is tapered out from Lytell Street to Stripling Street.

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

PDP Classification: Major , or Minor

Federal Oversight: Full Oversight , Exempt , State Funded , or Other

Functional Classification: Rural Minor Arterial

U. S. Route Number(s): N/A State Route Number(s): 23/121 County Route Number(s): N/A

Traffic (AADT): Base Year: (2007) 10,032 Design Year (2027): 15,203

- Design Variances: None expected
- Environmental concerns: None anticipated
- Level of environmental analysis:
 - Are Time Savings Procedures appropriate? Yes , No ,
 - Categorical exclusion ,
 - Environmental Assessment/Finding of No Significant Impact (FONSI) , or
 - Environmental Impact Statement (EIS) .

- Utility involvements: *Water, sewer, electricity, phone, gas*

Project responsibilities:

- Design, URS Corporation
- Right of Way Acquisition, GDOT
- Relocation of Utilities, GDOT
- Letting to contract, GDOT
- Supervision of Construction, GDOT
- Providing material pits, Contractor

Coordination:

- 1) Concept meeting date and brief summary: *To be arranged with GDOT.*
- 2) P. A. R. meetings, dates and results: *Not required*
- 3) FEMA, USCG, and/or TVA: *None*
- 4) Public involvement. *Public information meeting to be held at Candler County request*
- 5) Local government comments: *None*
- 6) Other projects in the area: *None*
- 7) Other coordination to date: *None*
- 8) Railroad Coordination: *None*

Scheduling – Responsible Parties’ Estimate

- Time to complete the environmental process: 18 months
- Time to complete preliminary construction plans: 6 months
- Time to complete right of way plans: 4 months
- Time to complete the Section 404 Permit: 0 months
- Time to complete final construction plans: 4 months
- Time to purchase right of way: 6 months
- Other major items that will affect the project schedule: N/A

Other Alternates considered:

1. No build: Safety remains an issue.
2. Two 12 ft lanes with a 14 ft shared-center left turn lane: This alternate does not provide sufficient capacity in the design year 2027.
3. Four 12 ft lanes with raised median: Although capacity and safety requirements are partially met, this alternate blocks full access to some businesses increasing congestion at the median openings. This may cause community disapproval and new safety issues. This alternate is not warranted based on the design criteria in Frank Danchetz’s memorandum dated Jan 7, 2003.

Comments: None

Attachments:

1. Construction Cost Estimate
2. Typical Sections
3. Approved TE Study
4. Concept Layout

PRELIMINARY COST ESTIMATE

PROJECT No.: CSSTP-0007-00(143) Candler

PREPARED BY: Nick Castronova/URS Corporation PROJECT LENGTH: 0.81 miles

ESTIMATED LETTING DATE: None

PROGRAMMING PROCESS CONCEPT DEVELOPMENT DURING PROJECT DEV.

PROJECT COST	
A. RIGHT-OF-WAY:	
1. PROPERTY (LAND & EASEMENT)	\$ 0.00
2. DISPLACEMENTS: RES: 0 BUS: 0 M.H.: 0	\$ 0.00
3. OTHER COST (ADM./COST, INFLATION)	\$ 0.00
SUBTOTAL:A	\$ 233,318.00
B. REIMBURSABLE UTILITIES:	
1. RAILROAD	\$ 0.00
2. TRANSMISSION LINES	\$ 0.00
3. SERVICES	\$ 0.00
SUBTOTAL:B	\$ 0.00
C. CONSTRUCTION:	
1. MAJOR STRUCTURES	N/A
SUBTOTAL:C-1	\$ 0.00
2. GRADING AND DRAINAGE:	
a. EARTHWORK (12,500 cy @ \$3.00)	\$ 37,500.00
b. DRAINAGE:	
1) Curb and Gutter (9,000 ft @ \$20.00/ft)	\$ 180,000.00
2) Longitudinal System	
Catch Basins (30 @ \$2000/EA)	\$ 60,000.00
Pipe - 18" (8,600 ft @ \$35/ft)	\$ 301,000.00
Flared End Sections (4 @ \$500/EA)	\$ 2,000.00
SUBTOTAL:C-2	\$ 580,500.00

PROJECT COST		
3. BASE AND PAVING:		
a. AGGREGATE BASE (6,000 tons @ \$20/ton)		\$ 120,000.00
b. ASPHALT PAVING:		
9.5mm Superpave (2,800 tons @ \$60/ton)	\$ 168,000.00	
19mm Superpave (1,250 tons @ \$60/ton)	\$ 75,000.00	
25mm Superpave (1,900 tons @ \$60/ton)	\$ 114,000.00	
	SUBTOTAL:C-3.b	\$ 357,000.00
	SUBTOTAL:C-3	\$ 477,000.00
4. LUMP ITEMS:		
a. GRASSING (2.5 acre @ \$5,000/acre)		\$ 12,500.00
b. CLEARING AND GRUBBING (5.0 acres @ \$8,000/acre)		\$ 40,000.00
c. LANDSCAPING		\$ 10,000.00
d. EROSION CONTROL (1.0 mile @ \$50,000/mile)		\$ 50,000.00
e. TRAFFIC CONTROL		\$ 100,000.00
	SUBTOTAL:C-4	\$ 212,500.00
5. MISCELLANEOUS:		
a. SIGNAL		\$ 0.00
b. SIGNING - MARKING		\$ 30,000.00
d. SIDEWALK (4700 yd ² @ \$30.00/ yd ²)		\$ 141,000.00
e. GUARDRAIL (1500 LF @ \$70.00/ LF)		\$ 105,000.00
	SUBTOTAL:C-5	\$ 276,000.00
6. SPECIAL FEATURES:		
	SUBTOTAL:C-6	\$ 0.00

ESTIMATE SUMMARY	
A. RIGHT-OF-WAY	\$ 233318
B. REIMBURSABLE UTILITIES	\$ 0.00
C. CONSTRUCTION	
1. MAJOR STRUCTURES	\$ 0.00
2. GRADING AND DRAINAGE	\$ 580,500.00
3. BASE AND PAVING	\$ 477,000.00
4. LUMP ITEMS	\$ 212,500.00
5. MISCELLANEOUS	\$ 276,000.00
6. SPECIAL FEATURES	\$ 0.00
SUBTOTAL CONSTRUCTION COST	\$ 1,779,318.00
E. & C. (10%)	\$ 177931.00
INFLATION (5% PER YEAR)	\$ 97862.00
NUMBER OF YEARS	1
TOTAL CONSTRUCTION COST	\$
GRAND TOTAL PROJECT COST	\$ 2,055,112.00

This project is 100% in Candler County.

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Sonny Smoak	Highway	SR23
Agency or Company	URS Corporation	From/To	US 16 to Lytell Street
Date Performed	8/16/2005	Jurisdiction	
Analysis Time Period	2027 Weekday Peak Hour	Analysis Year	2027

Input Data	
<p>Diagram showing a two-way two-lane highway segment. It includes labels for Shoulder width (ft), Lane width (ft), and Segment length, L_1 (mi). A circular symbol with a cross is labeled 'Show North Arrow'.</p>	<input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway Terrain <input checked="" type="checkbox"/> Level <input type="checkbox"/> Rolling Two-way hourly volume 1126 veh/h Directional split 50 / 50 Peak-hour factor, PHF 0.90 No-passing zone 0 % Trucks and Buses, P_T 9 % % Recreational vehicles, P_R 2 % Access points/ mi 8

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.991
Two-way flow rate ¹ , v_p (pc/h) $v_p=V/(PHF \cdot f_G \cdot f_{HV})$	1262
v_p * highest directional split proportion ² (pc/h)	631
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed
Field Measured speed, S_{FM} (mi/h)	Base free-flow speed, $BFFS_{FM}$ (mi/h) 60.0
Observed volume, V_f (veh/h)	Adj. for lane width and shoulder width ³ , f_{LS} (Exhibit 20-5) (mi/h) 0.0
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$ (mi/h) 58.0	Adj. for access points, f_A (Exhibit 20-6) (mi/h) 2.0
	Free-flow speed, FFS ($FSS=BFFS \cdot f_{LS} \cdot f_A$) (mi/h) 58.0
Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	0.0
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p \cdot f_{np}$	48.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0 ¹
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate ¹ , v_p (pc/h) $v_p=V/(PHF \cdot f_G \cdot f_{HV})$	1251
v_p * highest directional split proportion ² (pc/h)	626
Base percent time-spent-following, $BPTSF$ (%) $BPTSF=100(1-e^{-0.000879v_p})$	66.7
Adj. for directional distribution and no-passing zone, f_{dhp} (%)(Exh. 20-12)	0.0
	66.7

Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{dnp}$	
Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3,200$	0.39
Peak 15-min veh-miles of travel, VMT_{15} (veh-mi) $VMT_{15}=0.25L_1(V/PHF)$	313
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $VMT_{60}=V \cdot L_t$	1126
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15}=VMT_{15}/ATS$	6.5
Notes	
1. If $v_p \geq 3,200$ pc/h, terminate analysis-the LOS is F. 2. If highest directional split $v_p \geq 1,700$ pc/h, terminated anlysis-the LOS is F.	

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1d

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

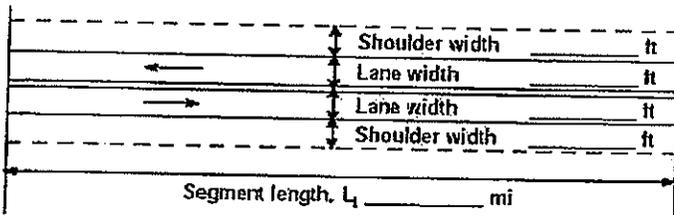
General Information

Analyst: Sonny Smoak
 Agency or Company: URS Corporation
 Date Performed: 8/16/2005
 Analysis Time Period: 2007 Weekday Peak Hour

Site Information

Highway: SR23
 From/To: US 16 to Lytell Street
 Jurisdiction:
 Analysis Year: 2007

Input Data



Class I highway Class II highway

Terrain: Level Rolling

Two-way hourly volume: 743 veh/h
 Directional split: 50 / 50
 Peak-hour factor, PHF: 0.90
 No-passing zone: 0

% Trucks and Buses, P_T: 9 %
 % Recreational vehicles, P_R: 2 %
 Access points/ ml: 8



Average Travel Speed

Grade adjustment factor, f _G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E _T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f _{HV} f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.982
Two-way flow rate ¹ , v _p (pc/h) v _p =VI(PHF * f _G * f _{HV})	840
v _p * highest directional split proportion ² (pc/h)	420
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed
Field Measured speed, S _{FM} (mi/h)	Base free-flow speed, BFFS _{FM} (mi/h) 60.0
Observed volume, V _f (veh/h)	Adj. for lane width and shoulder width ³ , f _{LS} (Exhibit 20-5) (mi/h) 0.0
Free-flow speed, FFS FFS=S _{FM} +0.00776(V _f /f _{HV}) (mi/h) 58.0	Adj. for access points, f _A (Exhibit 20-6) (mi/h) 2.0
	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) (mi/h) 58.0
Adj. for no-passing zones, f _{np} (mi/h) (Exhibit 20-11)	0.0
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v _p -f _{np}	51.5

Percent Time-Spent-Following

Grade Adjustment factor, f _G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E _T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f _{HV} f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.991
Two-way flow rate ¹ , v _p (pc/h) v _p =VI(PHF * f _G * f _{HV})	833
v _p * highest directional split proportion ² (pc/h)	417
Base percent time-spent-following, BPTSF(%) BPTSF=100(1-e ^{-0.000879v_p})	51.9
Adj. for directional distribution and no-passing zone, f _{whp} (%)(Exh. 20-12)	0.0
	51.9

Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)		C
Volume to capacity ratio $v/c = V_p / 3,200$		0.26
Peak 15-min veh-miles of travel, VMT_{15} (veh-mi) $VMT_{15} = 0.25L_1(V/PHF)$		206
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $VMT_{60} = V * L_1$		743
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS$		4.0
Notes		
1. If $v_p \geq 3,200$ pc/h, terminate analysis-the LOS is F. 2. If highest directional split $v_p \geq 1,700$ pc/h, terminated analysis-the LOS is F.		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1d

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

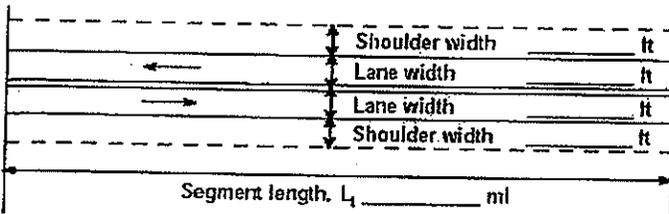
General Information

Analyst: Sonny Smoak
 Agency or Company: URS Corporation
 Date Performed: 8/16/2005
 Analysis Time Period: Existing Weekday Peak Hour

Site Information

Highway: SR23
 From/To: US 16 to Lytell Street
 Jurisdiction:
 Analysis Year: 2005

Input Data

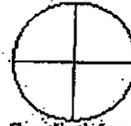


Class I highway Class II highway

Terrain: Level Rolling

Two-way hourly volume: 713 veh/h
 Directional split: 50 / 50
 Peak-hour factor, PHF: 0.90
 No-passing zone: 0

% Trucks and Buses, P_T : 9 %
 % Recreational vehicles, P_R : 2 %
 Access points/ mi: 8



Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.982
Two-way flow rate ¹ , v_p (pc/h) $v_p = VI (PHF * f_G * f_{HV})$	806
v_p * highest directional split proportion ² (pc/h)	403
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed
Field Measured speed, S_{FM} (mi/h)	Base free-flow speed, $BFFS_{FM}$ (mi/h): 60.0
Observed volume, V_f (veh/h)	Adj. for lane width and shoulder width ³ , f_{LS} (Exhibit 20-5) (mi/h): 0.0
Free-flow speed, FFS $FFS = S_{FM} + 0.00776(V_f / f_{HV})$ (mi/h): 58.0	Adj. for access points, f_A (Exhibit 20-6) (mi/h): 2.0
	Free-flow speed, FFS ($FSS = BFFS - f_{LS} - f_A$) (mi/h): 58.0
Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	0.0
Average travel speed, ATS (mi/h) $ATS = FFS - 0.00776 v_p - f_{np}$	51.7

Percent Time Spent Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.991
Two-way flow rate ¹ , v_p (pc/h) $v_p = VI (PHF * f_G * f_{HV})$	799
v_p * highest directional split proportion ² (pc/h)	400
Base percent time-spent-following, $BPTSF$ (%) $BPTSF = 100(1 - e^{-0.000879 v_p})$	50.5
Adj. for directional distribution and no-passing zone, $f_{d/hp}$ (%) (Exh. 20-12)	0.0
	50.5

Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{dnp}$		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)		C
Volume to capacity ratio v/c $v/c=V_p/3,200$		0.25
Peak 15-min veh-miles of travel, VMT_{15} (veh-mi) $VMT_{15}=0.25L_1(V/PHF)$		198
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $VMT_{60}=V*L_t$		713
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15}=VMT_{15}/ATS$		3.8
Notes		
1. If $v_p \geq 3,200$ pc/h, terminate analysis-the LOS is F. 2. If highest directional split $v_p \geq 1,700$ pc/h, terminated analysis-the LOS is F.		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1d

