Georgia Department of Transportation

SR 25 CO/West Bay Street
From I-516 to the Bay Street Viaduct

NHS00-0002-00(923), P.I. No. 0002923
Chatham County, Georgia

Value Engineering Study Report

September 2009

Designer

McGee Partners

Value Engineering Consultant

Lewis & Zimmerman Associates

an ARCADIS company

an ARCADIS company

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Mr. Matthew J. Sanders, AVS
Value Engineering Specialist
Georgia Department of Transportation - Engineering Services
One Georgia Center – 5th Floor
600 West Peachtree Street
Atlanta, Georgia 30308

Re: NHS00-0002-00(923), P.I. No. 0002923
SR 25 CO/West Bay Street from I-516 to the Bay Street Viaduct
Value Engineering Study Report

Date:
September 3, 2009

Contact:
Howard Greenfield

Phone:
301.984.9590 x 20

Email:
hgreenfield@lza.com

Our ref:
MY097201.0000

Dear Mr. Sanders:

Lewis & Zimmerman Associates, Inc. is pleased to submit two hard copies and one electronic copy of the referenced value engineering (VE) study report documenting the study that took place on August 17 – 20, 2009. The objective of the VE effort was to identify opportunities to reduce costs and enhance the value of the project.

The VE team developed several ideas which provide opportunities to improve the value of the project for the City of Savannah, Chatham County and GDOT. Of particular interest are alternatives to reduce the extent of the project and reduce right-of-way impacts by reducing the typical section in several ways.

We thank you for your assistance during the course of the VE team's work. Please do not hesitate to call upon us if you or any of the reviewers have any questions regarding the information presented in this report.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.
an ARCADIS company

Howard B. Greenfield, PE, CVS
Vice President

Attachment
1 hard copy for McGee

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. for McGee Partners, Inc. The subject of the study was the SR 25 CO/West Bay Street Improvements from I-516 to the Bay Street Viaduct project (NHS00-0002-00(923), P.I. No. 0002923) being designed by McGee Partners for Chatham County and the Georgia Department of Transportation (GDOT). The project was at the Preliminary Design stage when the study was conducted August 17 – 20, 2009, in GDOT's Atlanta Headquarters building.

Comprising the VE team were a highway design engineer, a construction specialist and a Certified Value Specialist team leader. The team followed the six-phase VE Job Plan to guide its deliberations.

- Information Gathering Phase
- Function Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

PROJECT DESCRIPTION

The purpose of the project is to provide for safe and efficient traffic flow and to improve safety conditions for pedestrians traveling along and across West Bay Street. The project also provides for a more uniform design of West Bay Street from I-516 to downtown Savannah.

This project widens the four existing 10-ft-wide travel lanes to 12-ft-wide and includes a variable width (20 ft to 64 ft) raised median. The widened urban section with curb and gutter throughout will tie into the existing roadway sections, which consist of a four-lane section on the west end of the project at West Lathrop Avenue and an existing five-lane section at the east end of the project at the Bay Street Viaduct. New left and right turn lanes will be provided to facilitate access to businesses along the north side of West Bay Street.

Additional improvements include sidewalks and improved crosswalks that conform to Americans with Disabilities Act (ADA) regulations. The sidewalks will be 6-ft-wide and 8-ft-wide and set back 5 ft from the back of the curb. The raised median will eliminate mid-block turns and reduce the potential for accidents, as well as provide a safe refuge area for pedestrians that wish to cross the roadway. Full signalized intersections will be provided at West Lathrop Avenue, Graham Street, Carolan Street and West Lathrop Avenue. Median cuts will be provided for access to businesses on the north side of West Bay Street at Brittany Street/Tutan Street and Fell Street. The project will include a new piped storm water drainage system, plus new street lighting and landscaping throughout the corridor.

The estimated construction cost is $10.9 million. To construct this corridor it will also be necessary to acquire right-of-way at an estimated cost of $10.9 million including 24 complete property takes.

CONCERNS AND OBJECTIVES

This project is being developed to enhance vehicle and pedestrian safety and improve traffic operations within the corridor. To achieve these goals it will be necessary to acquire a significant amount of right-of-way at a cost which is equal to the construction cost. In addition, the City of Savannah and Chatham County desire to maintain the many historic properties along the corridor and not impact the existing live oak trees.

Storm water drainage design and construction is critical because the area is very flat and a myriad of storm water lines currently exist. The lines feed into a storm water pump station to keep the area from flooding under normal flood conditions. There is also a need to create space for sidewalks under the I-516 and I-516 Ramp bridges over SR 25 which requires the addition of expensive tie-back walls.

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific changes to the current design that will enhance its value by improving functionality, saving cost or a combination of the two.

RESULTS OF THE STUDY

The VE team generated 14 alternatives that address GDOT's project value objectives. Twelve alternatives provide cost reduction opportunities and two identified as design suggestions enhance safety or constructability. All of the alternatives are summarized on the following Summary of Potential Cost Savings table and detailed in Section Two of the report. Note that some of the alternatives are interrelated so that the total achievable cost savings will have to be determined once implementation decisions are made. The following highlights the alternatives that would have the greatest impact on the project.

Alternative Number (Alt. No.) G-1 suggests that the project start at the I-516 west ramp entrance in lieu of at the West Lathrop Avenue intersection. The reported traffic numbers in the design year in this area do not warrant construction west of the ramp. This would eliminate constructing two of the tie-back walls, new sidewalk, and new roadway and the re-working of the West Lathrop Avenue intersection. It may be necessary to perform some cosmetic work in the area such as installing crash walls between the bridge bent columns and impact attenuators at either end of the walls. The median west of the intersection may also have to be modified to accommodate the left turns from eastbound SR 25 CO/West Bay Street to northbound West Lathrop Avenue and restrict left turns from Old West Lathrop Avenue to SR 25 CO/West Bay Street.

Right-of-way is a key cost driver for this project. In Alt. No. ROW-1 the right-of-way is reduced in a heavily industrialized area by reducing the shoulder. Other ways to reduce right-of-way include reducing the lane widths, Alt. No. P-1 and reducing the curb and gutter width, Alt. No. CG-1. Collectively, these two ideas could reduce the typical section in this same section of roadway by 6 ft, thus adding to the right-of-way savings.

Reducing the amount of impervious typical section also reduces storm water runoff by 10%.

Over two miles of sidewalk is being constructed as part of the project. Limiting the sidewalk to 5-ft-wide in lieu of 6-ft or 8-ft-wide as illustrated in Alt. No. S-2 could save significant initial costs as well as long-term maintenance costs.

The cost of the storm water drainage could be reduced by using HDPE pipe in lieu of reinforced concrete pipe because it is faster and easier to install as shown in Alt. Nos. D-1 and D-2.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 25 CO/WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
GENERAL						
G-1	Start construction at the I-516 westbound on ramp in lieu of at the West Lathrop Avenue intersection	$1,467,991	$0	$1,467,991		$1,467,991
G-3	Add pedestrian cross walks at unsignalized intersections and add signs indicating vehicles are to stop for pedestrians in cross walks	DESIGN SUGGESTION				
RIGHT-OF-WAY						
ROW-1	Narrow the shoulder where the right-of-way is impacted from Sta. 44+70 right to Sta. 47+10 right and Sta. 37+00 to Sta. 44+10 left	$310,000	$0	$310,000		$310,000
ROW-4	Revise storm water drainage to avoid taking Parcel 63	$76,492	$0	$76,492		$76,492
PAVEMENT						
P-1	Use 11-ft-wide lanes in lieu of 12-ft-wide through lanes	$113,033	$0	$113,033		$113,033
P-2	Shorten the westbound left turn lane on West Bay Street at its intersection with Brittany Street	$21,680	$13,897	$7,783		$7,783

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 25 CO/WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

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DRAINAGE						
D-1	Use HDPE pipe in lieu of reinforced concrete pipe for all storm water drain pipe not under pavement	$590,149	$495,670	$94,479		$94,479
D-2	Use HDPE pipe in lieu of reinforced concrete pipe for all storm water drain pipe under side roads	$20,113	$16,927	$3,186		$3,186
D-3	Move 30-in-diameter storm water drain line between the I-516 bridge pier and new retaining wall to under the pavement	DESIGN SUGGESTION				
CURB AND GUTTER						
CG-1	Use 24-in-wide curb and gutter section in lieu of the 30-in-wide curb and gutter section	$409,657	$328,308	$81,349		$81,349
CG-2	Eliminate the curb and gutter and sidewalks from some of the side roads	$32,931	$0	$32,931		$32,931
SIDEWALK						
S-1	Use all 6-ft-wide sidewalks in lieu of some 8-ft-wide sidewalks	$29,765	$0	$29,765		$29,765
S-2	Use all 5-ft-wide sidewalks in lieu of 6-ft-wide and 8-ft-wide sidewalks	$101,928	$0	$101,928		$101,928
WALLS						
W-1	Use soil nail walls in lieu of tie-back walls behind the bridge	$238,143	$208,375	$29,768		$29,768

STUDY RESULTS

GENERAL

The results of this value engineering study conducted on the SR 25 CO/West Bay Street Improvements From I-516 to the Bay Street Viaduct project portray the benefits that can be realized by GDOT, the owner, the City of Savannah, Chatham County, the users and McGee Partners, the designer. The results will directly affect the project's design and will require coordination between GDOT and the design team to determine the disposition of each alternative.

During the conduct of the study, many ideas for potential value enhance were conceived and evaluated by the team for technical merit, applicability to the project, implementability considering the project's status, and the ability to meet the owner's project value objectives. Research performed on those ideas considered to have potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (typically without cost estimates). For each alternative developed the following information is provided:

- A summary of the original design;
- A description of the proposed change to the project;
- Sketches and design calculations, if appropriate;
- A capital cost comparison and life cycle discounted present worth cost comparison of the alternative and original design (where appropriate);
- A descriptive evaluation of the advantages and disadvantages of selecting the alternative; and
- A brief narrative to compare the original design and the proposed change and provide a rationale for implementing the change into the project.

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If unit quantities were not available, published data bases, such as the one produced by the RS Means Company, or team member or owner data bases were consulted. A composite markup of 9%, as described in Section Four, was used to generate an all-inclusive project cost for the construction items being compared.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is usually included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons include improved facility operation, ease of maintenance, ease of construction, safer working conditions, reduction in project risk, etc. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) to track it through the value analysis process and thus facilitate referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to a major project element listed below:

PROJECT ELEMENT	PREFIX
General	G
Right-of-Way	ROW
Pavement	P
Drainage	D
Curb and Gutter	CG
Sidewalk	S
Walls	W
Signals	SI

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings tables. The tables are divided into project elements for the convenience of the reviewer and are used to divide the results section. The complete documentation of the developed alternatives and design suggestions follow each of the tables.

KEY ISSUES

This project is being developed to enhance vehicle and pedestrian safety and improve traffic operations within the corridor. To achieve these goals it will be necessary to acquire a significant amount of right-of-way whose cost is equal to the construction cost. In addition, the City of Savannah and the Chatham County desire to not impact the existing live oak trees and maintain the many historic properties along the corridor.

Storm water drainage design and construction is critical because the area is very flat and a myriad of storm water lines currently exist. The lines feed into a storm water pump station to keep the area from flooding under normal flood conditions. There is also a need to create space for sidewalks under the I-516 and I-516 Ramp bridges over SR 25 which requires the addition of expensive tie-back walls.

STUDY OBJECTIVES

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific changes to the current design that will enhance its value by improving functionality, saving cost or a combination of the two.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of 12 alternatives and two design suggestions for consideration by the GDOT and designer. These alternatives and design suggestions address the key issues described above and are detailed in the remainder of this section of the report. The alternatives with the greatest potential to impact the project are highlighted below.

Alt. No. G-1 suggests that the project start at the I-516 west ramp entrance in lieu of at West Lathrop Avenue intersection. The reported traffic numbers in the design year (include traffic count) in this area do not warrant construction west of the ramp. This would eliminate constructing two of the tie-back walls, new sidewalk, and new roadway and the re-working of the West Lathrop Avenue intersection. It may be necessary to perform some cosmetic work in the area such as installing crash walls between the bridge bent columns and impact attenuators at either end of the walls. The median west of the intersection may also have to be modified to accommodate the left turns from eastbound SR 25 CO/West Bay Street to northbound West Lathrop Avenue and restrict left turns from Old West Lathrop Avenue to SR 25 CO/West Bay Street.

Right-of-way is a key cost driver for this project. Thus in Alt. No. ROW-1 the right-of-way is reduced in a heavily industrialized area by reducing the shoulder. Other ways to reduce right-of-way are to reduce the lane widths, Alt. No. P-1 and reduce the curb and gutter width, Alt. No. CG-1. Collectively, these two ideas could reduce the typical section in this same section of roadway by 6 ft, thus adding to the right-of-way cost savings. Reducing the amount of impervious typical section also reduces storm water runoff by 10%.

The cost of the storm water drainage could be reduced by using HDPE pipe in lieu of reinforced concrete pipe because it is faster and easier to install as shown in Alt. Nos. D-1 and D-2.

Over two miles of sidewalk is being constructed as part of the project. Limiting the sidewalk to 5-ft-wide in lieu of 6-ft or 8-ft-wide as illustrated in Alt. No. S-2 could save significant initial costs as well as long-term maintenance costs.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

When reviewing the study results, the reader should consider each part of an alternative or design suggestion on its own merit. There may be a tendency to disregard an alternative because of a concern about one part of it. Each area within an alternative or design suggestion that is acceptable should be considered for use in the final design, even if the entire alternative or design suggestion is not implemented. Variations of these alternatives and design suggestions by the owner or designer are encouraged.

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some of them are "mutually exclusive," so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

The reader should evaluate all alternatives carefully in order to select the combination of ideas with the greatest beneficial impact on the project. Once this has been accomplished, the total cost savings resulting from the VE study can be calculated based on implementing a revised, all-inclusive design solution.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 25 CO/WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

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RIGHT-OF-WAY						
ROW-1	Narrow the shoulder where the right-of-way is impacted from Sta. 44+70 right to Sta. 47+10 right and Sta. 37+00 to Sta. 44+10 left	$310,000	$0	$310,000		$310,000
ROW-4	Revise storm water drainage to avoid taking Parcel 63	$76,492	$0	$76,492		$76,492
PAVEMENT						
P-1	Use 11-ft-wide lanes in lieu of 12-ft-wide through lanes	$113,033	$0	$113,033		$113,033
P-2	Shorten the westbound left turn lane on West Bay Street at its intersection with Brittany Street	$21,680	$13,897	$7,783		$7,783

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **G-1**

DESCRIPTION: **BEGIN CONSTRUCTION TO THE WEST OF THE I-516 WESTBOUND RAMP TERMINAL**

SHEET NO.: **1 of 15**

ORIGINAL DESIGN: (sketch attached)

The project starts 550 ft west of the intersection of SR 25 CO/West Bay Street and West Lathrop Avenue.

ALTERNATIVE: (sketch attached)

Start the project just to the west of the I-516 westbound ramp terminal and eliminate the roadway widening from Sta 23+00 to Sta 34+00.

ADVANTAGES:

- Easier and faster to construct
- Avoids right-of-way easement requirements
- Reduces construction requirements

DISADVANTAGES:

- Reduces the amount of roadway improvements

DISCUSSION:

The roadway improvements between the I-516 westbound ramp terminal and the West Lathrop Avenue intersection include:

- Adding a right turn lane on SR 25 CO/West Bay Street westbound for 41 vehicles per hour (VPH) turning right onto West Lathrop Avenue during the peak hour in design year 2030
- Improving the right turn radius from SR 25 CO/West Bay Street eastbound to West Lathrop Avenue southbound
- Providing additional space on westbound SR 25 CO/West Bay Street west of the West Lathrop Avenue intersection to facilitate U-turns from eastbound to westbound
- Lengthening the left turn lane from SR 25 CO/West Bay Street eastbound onto West Lathrop Avenue northbound to accommodate 140 VPH
- Extending the median on the west side of the intersection to prevent traffic from Old West Lathrop Avenue making a left turn onto SR 25 CO/West Bay Street

Based on the traffic analysis prepared by Grice & Associates for the No Build Condition in the 2030 design year with the signals retimed (attached), the level of service (LOS) for the SR 25 CO/West Bay Street intersection is C or better for all movements except for the midday and PM peak hour SR 25 CO/West Bay Street eastbound left turn movement to West Lathrop Avenue which has an LOS D. Thus, none of the interchange improvements are required to meet the project's need and purpose.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,467,991	—	$ 1,467,991
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 1,467,991	—	$ 1,467,991

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT** *NHS00-0002-00(923) CHATHAM COUNTY*	ALTERNATIVE NO.: **G-1**
DESCRIPTION:	**BEGIN CONSTRUCTION TO THE WEST OF THE I-516 WESTBOUND RAMP TERMINAL**	SHEET NO.: **2 of 15**

DISCUSSION (continued):

The traffic analysis also shows that without the right turn lane, the LOS at West Lathrop Avenue is A or B depending upon the time of day, which is very acceptable.

Additional storage length for the eastbound left turn movement could be provided by extending the existing raised concrete median west to close off the opening for the existing left turn movement from Old West Lathrop Avenue, which is another goal for this project. This work can be accomplished as part of this project or with GDOT maintenance forces for a cost of about $25,000.

The necessity for the U-turns at this location is questionable. The limited number of vehicles desiring to go west on SR 25 CO/West Bay Street from Old West Lathrop Avenue could go to Augusta Avenue, turn left onto Augusta Avenue, left onto northbound West Lathrop Avenue and left onto SR 25 CO/West Bay Street.

It is also questionable whether the sidewalk on the north side of SR 25 CO/West Bay Street is needed. In order to use this sidewalk, a person would have to cross the free flowing entry ramp to I-516 westbound, which is not safe. In addition, the origin and destination of potential users of this sidewalk is not readily apparent.

Providing a protected right turn from eastbound SR 25 CO/West Bay Street to southbound West Lathrop Avenue is questionable given the maximum hourly volume of 23 vehicles.

To improve safety, it may be prudent to install the median barrier and impact attenuators in the center median and the column crash walls for the interior pier bents. However, this would only reduce the cost savings about $250,000.

STATE			
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Alt. G-1

Alt. No. G-1 Sht. 3 of 15

CURVE KC1
PI STA = 25+96.80
N = 762199.2140
E = 977298.4981
DELTA = 2°17'59.4"
R = 4000'
T = 80.29'
L = 160.56'
SE = NC

CENTERLINE INTERSECTION
WEST BAY STREET STA 25+71.01 =
OLD WEST LATHROP AVENUE STA 100+00.00

Work eliminated under Alt. G-1

BEGIN SWALK MATCH EXISTING STA 22+85, 32' LT

10' TRANSITON FROM EXISTING SWALK (TYP)

BEGIN TAPER BEGIN C&G 23+00.00 26.68' LT

PC = 25+16.51

END TAPER 25+47.90 36.00' LT

BEGIN TAPER 26+29.00 36.00' LT

END TAPER 27+29.80 48.00' LT

R 100.00' 27+29.80 148.00' LT

EXISTING STORM DRAIN PIPES AND SYSTEM TO REMAIN

TYPE IV STRAIN POLE 27+66, 70' LT

TO REMAIN

A1, A1.A, A1.B, A1.1, A2, A2.1, A3, A3.1, A3.2, A3.3, A3.4

DW02 14'

DW01 35'

REMOVE

R 4.00' 23+36.13 0.04' LT

R 4.00' 27+98.96 45.00' LT

R 5.00' 27+90.00 7.00' LT

R 2.00' (TYP) 28+16.67 40.00' LT

R 2.00' (TYP) 27+93.12 38.00' RT

R 2.00' 28+78.61 38.00' RT

BEGIN RAISED MEDIAN GDOT STD 9032B STA 23+32.13

BEGIN TAPER 24+80.00 6.76' RT

END TAPER 26+00.00 2.00' LT

END TAPER 26+00.00 34.00' RT

A8.1

BEGIN TAPER BEGIN C&G AND SWALK 23+00.00 27.26' LT

EXISTING STORM DRAIN PIPES AND SYSTEM TO REMAIN

R 18.00' 22+99.80 47.76' RT

R 18.00' 23+70.80 49.14' RT

R 20.00' 25+06.17 51.28' RT

A8, A9

A7.1, A7.7, A7.A

A6, A5, A4, A4.1, A4.2

R 40.00' 25+91.55 73.69' RT

R 100.00' 27+22.99 134.00' RT

TYPE IV STRAIN POLE 27+48, 78' RT

MATCH EXIST SE 0.47%

MATCH EXIST SE 1.70%

MATCH EXIST SE 0.88%

MATCH EXIST SE 1.23%

MATCH 0.18% 97+41

MATCH 0.39% 97+41

MATCH 0.20% 96+67

MATCH 0.37% 96+67

MATCH EXIST SE 1.70%

MATCH EXIST SE 1.80%

FLAT 97+47

FLAT 96+61

ENC 98+16

BNC 98+11

ENC 96+21

ENC 96+05

BNC 96+00

BNC 96+00 1.80% 95+94

1.70% 97+83

1.70% 95+91

S72°24' 32.6"E

61°45' 1.9"

N17°16' 14.5"E CONSTRUCTION ℄

N45°14' 46.5"E CONSTRUCTION ℄ OLD WEST LATHROP AVE

98+50

99+00

97+00

96+00

23+00

24+00

25+00

26+00

27+00

28+00

89°5

SR 25 CO/WEST BAY STREET

CURVE KC1

CURVE KC2

CONSTRUCTION ℄

EXISTING R/W

REQ'D R/W

PRC = 26+77.07

ANCHORAGE INVESTMENT, LLC

MEADOWS COMMERCIAL PROPERTIES, INC

LIMIT OF CONSTRUCTION OLD WEST LATHROP AVE STA 99+20.00

RAYMOND A. HARGROVES

WEST LATHROP AVENUE

24.55'

work eliminated Under Alt. G-1

CURVE KC2
PI STA = 27+44.61
N = 762160.2291
E = 977441.0899
DELTA = 1°56'04.3"
R = 4000'
T = 67.53'
L = 135.06'
SE = NC

SCALE IN FEET
20 40 80

REVISION DATES

PROPERTY AND EXISTING R/W LINE
PROPOSED R/W LINE
OFFICE OF WAY MARKER
RLINE
OR SWALE
L SECTION DITCH
SR 25

TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.
WARD EDWARDS, INC.
A JOINT VENTURE

NG R/W LINE
E
KER

SCALE IN FEET

TOE OF FILL
EASEMENT FOR CO
& MAINTENANCE
EASEMENT FOR CO
EASEMENT FOR

p:\300300i\proj\dgn\002923cp03.dgn | 2:40:29 PM | PRF 002923 Screen.tbl | p:\300300i\proj\dgn\002923cp04.dgn

ALT. NO. G-1 SH. 4 of 15

Begin Project under Alt. G-1

MATCH EXIST SE 0.47%
MATCH EXIST SE 1.70%
TO REMAIN
LIMIT OF CONSTRUCTION WEST LATHROP AVENUE STA 98+60.00
CENTERLINE INTERSECTION WEST BAY STREET STA 28+50.64 = WEST LATHROP AVENUE STA 97+02.88
B1 ADJUST TOP TO GRADE
TYPE IV STRAIN POLE 29+05, 85' LT
R 100.00' 29+74.75 136.00' LT
EXISTING PIPE AND DRAINAGE STRUCTURES ON BRIDGE TO REMAIN
EXISTING I-516 W BRIDGE ABUTMENT
EXISTING I-516 BRIDGE COLUMN (TYP)
EXISTING I-516 E BRIDGE ABUTMENT
BEGIN COLUMN CRASH WALL STA 30+65.00 38.00' LT
IMPACT ATTENUATOR TYPE P-3-B-28 STA 30+86.75 4.00' RT
END CRASH WALL STA 32+60.00 38.00' LT
EXIST. PIPE AND STRUCTURE TO REMAIN
END C&G MATCH EXIST. STA 33+92.20 62.26' LT
BEGIN C&G MATCH EXIST. STA 34+04.00 79.74' LT
I-516 WEST ON RAMP
EXISTING I-516 OFF RAMP BRIDGE ABUTMENT
BEGIN WALL NO. 2 34+80.15
EXIST. PI TO REMA
R 200.00' CENTER AT 35+12.92 248.00' LT
BEGIN WALL NO. 1 STA 29+74.00 49.50' LT
END WALL NO. 1 STA 32+60.00 49.50' LT
BEGIN CONCRETE MEDIAN BARRIER SPCL DES, TP S-2 STA 31+00.00 4.00' RT
EXISTING CONCRETE PAVING
ENC BNC 98+16 98+11
CONSTRUCTION ℄ N17°16' 14.5"E
98+00
1.70% 97+83
FLAT 97+47
MATCH 0.18% 97+41
MATCH 0.39% 97+41
100' (TYP) 16.67 00' LT
32' 32'
30'
R 2.00' (TYP) 29+02.75 40.00' LT
89°57' 17.8"
29+00
30+00 S72°46' 27.7"E CONSTRUCTION ℄
31+00
32+00
33+00 CONSTRUCTION ℄
34+00
S72°46' 27.7"E
TO REMAIN
R 4.00' 34+17.96 40.00' LT
BEGIN BARRIER TP 25S MODIFI STA 35+13.30 4.00' RT
BEGIN T-BEAM GUARDRAIL 32+60.00, 39.00' LT GDOT STD 4012C
BEGIN W-BEAM GUARDRAIL 33+35.39, 39.00' LT GDOT STD 4010
END GUARDRAIL 33+60.39, 39.00' LT GDOT STD 4012D TYPE 12 ANCHORAGE
R 5.00' 30+55.00 5.00' RT
R 2.00' (TYP) 28+78.61 38.00' RT
R 5.00' 29+13.00 5.00' RT
R 8.00' 29+05.02 44.00' RT
SR 25 CO/WEST BAY STREET
R 4.00' 30+98.09 38.00' RT
BEGIN BARRIER TP 25S MODIFIED STA 31+26.82 3.83' RT
30+95.17 43.03' RT
BEGIN CONCRETE MEDIAN BARRIER SPCL DES, TP S-2 STA 33+04.40 4.00' RT
END BARRIER TP 25S MODIFIE STA 35+41.99 4.01' RT
MATCH 0.20% 96+67
MATCH 0.37% 96+67
FLAT 96+61
26' 26'
ENC 96+21
R 2.00'
ENC 96+05
BNC 96+00 1.70% 95+91
BNC 96+00 1.80% 95+94
96+00
TYPE IV STRAIN POLE 29+34, 73' RT
BEGIN C&G AND SWALK STA 30+65.36 52.89' RT
BEGIN 7' SWALK STA 30+76.33 65.63' RT
BEGIN C&G STA 30+71.43 65.16' RT
R 194.00' CENTER AT 31+55.50 240.00' RT
TO REMAIN
C3.1A
EXISTING I-516 BRIDGE COLUMN (TYP)
EXISTING CONCRETE PAVING
BEGIN TAPER 34+00.00 46.00' RT
C3.2A
C3.1
C3.2
EXISTING I-516 E BRIDGE ABUTMENT
EXISTING I-516 W BRIDGE ABUTMENT
24.55'
WEST LATHROP AVENUE
MATCH EXIST SE 1.70%
MATCH EXIST SE 1.80%
LIMIT OF CONSTRUCTION WEST LATHROP AVENUE STA 95+40.00
I-516 EAST OFF RAMP
R 125.00' 29+99.77 159.00' RT
C7.2

XXXX - work eliminated under Project Alternate G-1

TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.
WARD EDWARDS, INC. | A JOINT

SCALE IN FEET

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
RIGHT OF WAY MARKER
CENTERLINE
DITCH OR SWALE

TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.
WARD EDWARDS INC | A JOINT

STATE	
GA	

2:40:30 PM | $PRFS | 002923 Screen.tbl | p:\300300\proj\dgn\002923cp05.dgn

Alt. No. G-1

Sht 5 of 15

SEE SHEET 14-01
MATCH LINE STA. 101+63

3 BIBLIA, INC.

5 BIBLIA, INC.

5 BIBLIA, INC.

6 BIBLIA, INC.

7 JAMES A. MOORE

10 JAMES A. MOORE

EXISTING I-516 W OFF RAMP BRIDGE ABUTMENT

WALL NO. 2
15

EXIST. PIPE TO REMAIN

0.00' ER AT 2.92 00' LT

END WALL NO. 2
35+70.00

BEGIN TAPER
36+00.00
48.00' LT

D1

D2.0

D2

D2.1

D2.2

D2.3

D2.4

EXISTING CONCRETE PAVING

C1.1

18"

REQ'D R/W

EXISTING R/W

CURVE KC3
PI STA = 37+29.70
N = 761868.5035
E = 978382.0122
DELTA = 3°36'11.9"
R = 4000'
T = 125.82'
L = 251.56'
SE = NC

END TAPER
37+00.00
34.00' LT

TYPE IV
STRAIN POLE
38+05.60,
52.40' LT

R 30.00'
38+01.21
64.00' LT

MATCH
EXIST SE
2.10%

ENC
101+38

ENC
101+36

DW03 24'

DW04 24'

101+00

N 16°23'15.1" E

BNC
100+84

FLAT
100+43

MATCH
0.42%
100+34

BNC
100+52

MATCH
0.33%
100+38

END PAVEMENT
CURB & GUTTER
STA 101+40.00

MATCH
EXIST SE
2.14%

CENTERLINE INTERSECTION
WEST BAY STREET STA 38+43.08
= GRAHAM STREET STA 100+00.00

TYPE IV
STRAIN POLE
38+80, 55.20' LT

R 30.00'
38+89.92
64.00' LT

DB1

DW06

TE2

E3

E4

REQ'D R/W

BEGIN TAPER
41+09.00
2.00' RT

BEGIN BARRIER
TP 25S MODIFIED
STA 35+13.30
4.00' RT

R 14.00'
35+56.00
2.00' RT

BEGIN TAPER
36+50.00
38.00' LT

36+03.88

48'

36'

18"

46' 27.7"E

35+00

36+00

37+00

38+00

92°42'58.8"

39+00

CONSTRUCTION ℄

40+00

41+00

CURVE KC3

CURVE KC4

R 4.00'
37+72.00
6.00' LT

MATCH
0.60%
99+66

MATCH
0.58%
99+64

FLAT
99+51

PRC = 38+55.44

R 2.00' (TYP)
38+63.03
38.00' RT

R 4.00'
39+09.00
6.00' RT

SR 25 CO/WEST BAY STREET

END TAPER
40+50.00
34.00' RT

BEGIN TAPER
39+50.00
46.00' RT

END BARRIER
TP 25S MODIFIED
STA 35+41.99
4.01' RT

R 4.00'
35+46.00
6.00' RT

BEGIN TAPER
35+57.00
10.00' RT

IMPACT ATTENUATOR
TYPE P-3-B-30
STA 35+63.22
4.07' RT

END TAPER
36+00.00
34.00' RT

END TAPER
36+53.00
2.00' LT

C3.3

C3.2

EXISTING R/W

EXISTING CONCRETE PAVING

END WALL NO. 3
35+80.00 D3

BEGIN WALL NO. 3
34+90.00

D3.1

D3.A

D3.2

QT

TYPE IV
STRAIN POLE
37+78.90, 50.40' RT

R 30.00'
37+91.91
64.00' RT

D2.5

D2.6

D2.7

D2.8

D4

4 UNITED HOUSE OF PRAYER FOR ALL PEOPLE

4 UNITED HOUSE OF PRAYER FOR ALL PEOPLE

EXISTING I-516 W OFF RAMP BRIDGE ABUTMENT

Keep Left Turn upgrade under Alt. G-1

Begin Work on Rt. Side - Alt. G-1

Keep Right+Turn Ln. Under Alt. G-1

GRAHAM STREET

99+00

CONSTRUCTION

ENC
99+37

BNC
99+12

EXISTING R/W

REQ'D R/W

98+25

MATCH
EXIST SE
3.444%

MATCH
EXIST SE
3.75%

LIMIT OF CONSTRUCTION
GRAHAM STREET
STA 98+75.00

99+00.48
34.00' RT

R 75.00'
39+31.22
121.00' RT

TO REMAIN

BEGIN
HEADER CURB
98+65.00
34.00' RT

END
HEADER CURB
39+97.94
60.34' RT

TYPE IV
STRAIN POLE
39+02, 69' RT

39+23.95
64.00' RT

E5

E6

E7

E8

DA1

F16

DW05

8 ROBERT T. MOCK

9 FRED S. STEPHENS

POWER & WHEEL

---

ers, Inc.

A JOINT

SCALE IN FEET

REVISION DATES

DEPARTY AND EXISTING R/W LINE
OFFICE: RED R/W LINE
T OF WAY MARKER
ERLINE
H OR SWALE

TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.

WARD EDWARDS, INC.

A JOINT

37+00 Lt. — 4940
44+70 Rt. — 4940

SCALE IN FEET

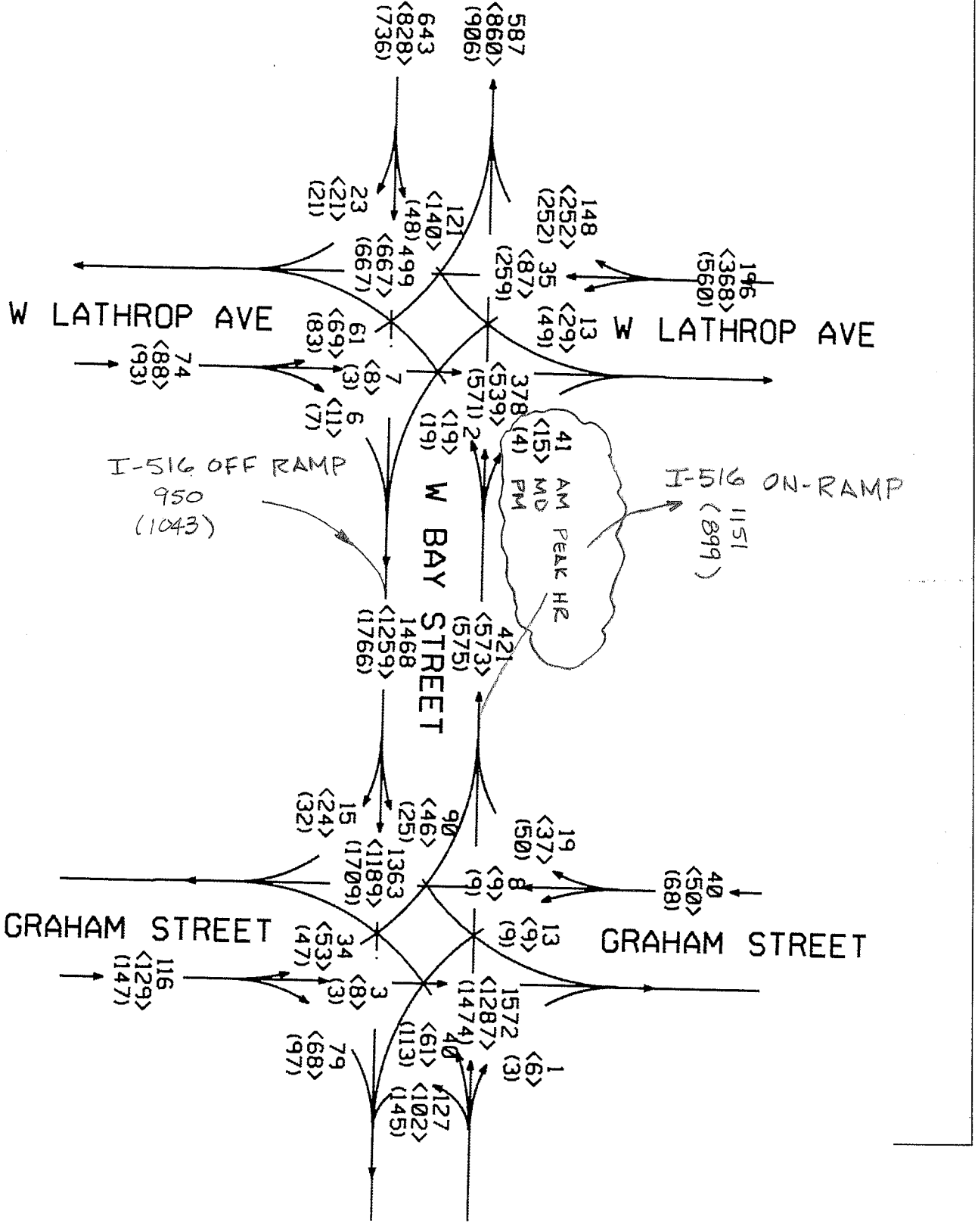
REVISION

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: G-1

☑ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 6 of 15



ALT. NO. G-1 Sht. 7 of 15

Table 6 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at Graham Street – Existing Conditions

Approach	Movement	AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	B	0.37	B	0.17	B	0.10
	Through	C	0.74	C	0.66	D	0.94
	Right						
Westbound	Left	B	0.15	B	0.21	B	0.47
	Through	C	0.84	C	0.69	C	0.79
	Right						
Northbound	Left						
	Through	B	0.06	B	0.10	B	0.08
	Right	A	0.11	A	0.09	A	0.13
Southbound	Left						
	Through	A	0.06	A	0.08	A	0.09
	Right						
Intersection	All	C	0.42	C	0.34	C	0.49

Table 7 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at West Lathrop Avenue – Existing Conditions

Approach	Movement	AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	F	0.93	F	1.08	D	0.37
	Through	B	0.30	B	0.32	B	0.32
	Right						
Westbound	Left	C	0.02	C	0.14	C	0.14
	Through	B	0.17	B	0.24	B	0.26
	Right	A	0.07	A	0.02	A	0.01
Northbound	Left						
	Through	B	0.07	B	0.08	B	0.10
	Right	A	0.01	A	0.02	A	0.01
Southbound	Left						
	Through	B	0.04	B	0.09	B	0.25
	Right	A	0.22	A	0.34	A	0.34
Intersection	All	C	0.34	C	0.44	B	0.38

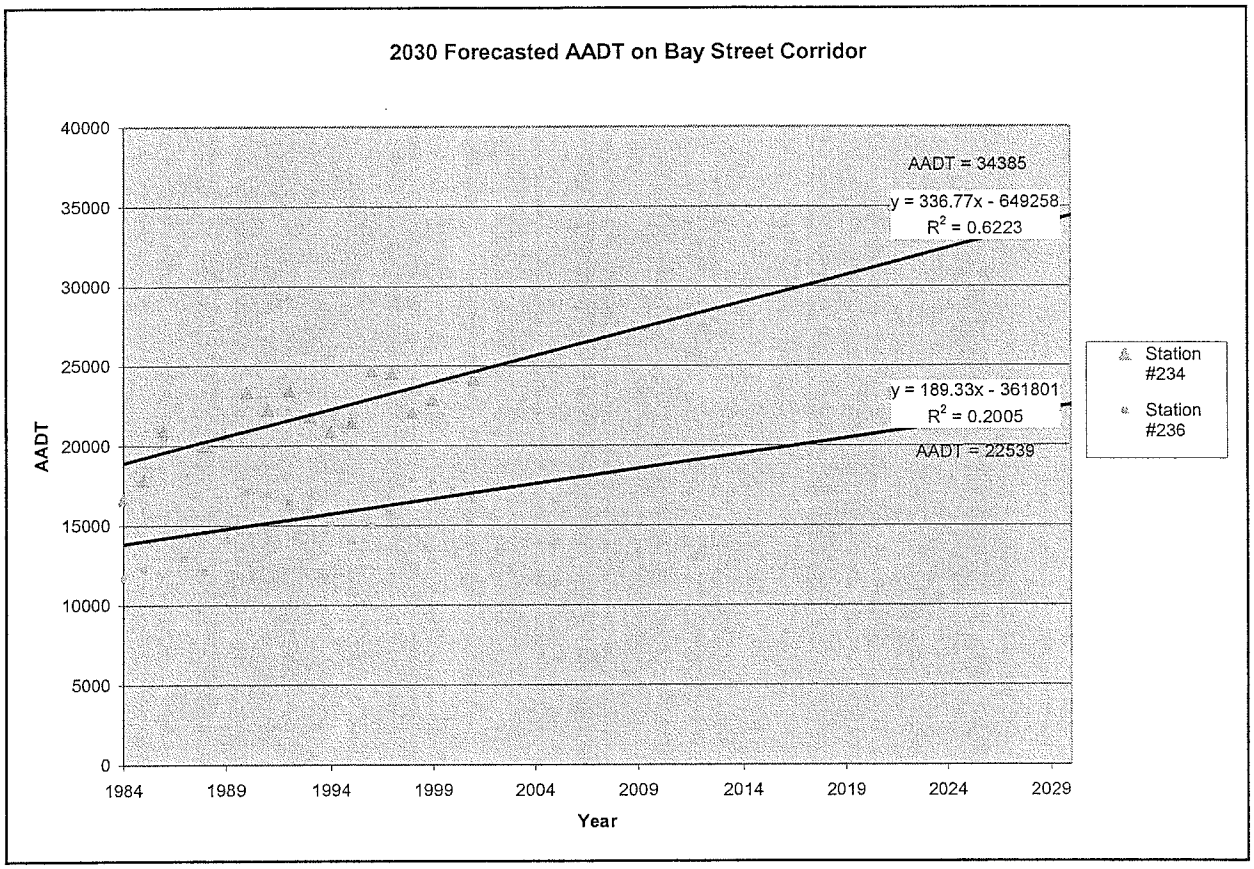


Figure 5-West Bay Street Year 2030 Traffic Forecasts

GDOT Count Station #234 was used in developing future year forecasts because this count station is centrally located within the study area. The estimated forecast ADT based on Count Station #234 is approximately 27,650 for the year 2010, and approximately 34,400 for the year 2030.

Due to the built out nature of the study area, growth factors for remaining side streets were assumed to be minimal, with the exception of West Lathrop Street where the impacts of a future port expansion was factored into the projections.

3.1 No Build Conditions Analysis

The no build analysis was conducted on the West Bay Street corridor to project traffic conditions in the corridor without improvements and to serve as a basis of comparison for the build condition analysis. Assuming the projected growth rates materialize, the intersections with existing operational and/or capacity restraints will worsen over time and become bottlenecks in the system. The no build analysis assumed the existing signals would be retimed in the future as part of an overall traffic signal maintenance program. The no build analysis results with optimized signal timing are shown on the following pages for the Years 2010 and 2030.

Table 11 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at Graham Street – Year 2010 Conditions

Approach	Movement	AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	B	0.44	B	0.21	A	0.12
	Through	C	0.81	C	0.79	C	0.89
	Right						
Westbound	Left	B	0.19	B	0.28	C	0.59
	Through	D	0.92	C	0.84	C	0.74
	Right						
Northbound	Left						
	Through	B	0.07	B	0.11	C	0.11
	Right	A	0.13	A	0.10	A	0.17
Southbound	Left						
	Through	B	0.06	A	0.08	A	0.12
	Right						
Intersection	All	C	0.53	C	0.44	C	0.59

WITH SIGNALS RETIMED

Table 12 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at West Lathrop Avenue – Year 2010 Conditions

Approach	Movement	AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	C	0.44	D	0.53	D	0.33
	Through	B	0.38	B	0.41	B	0.41
	Right						
Westbound	Left	C	0.02	C	0.15	D	0.15
	Through	C	0.29	D	0.40	B	0.35
	Right	A	0.09	C	0.03	A	0.01
Northbound	Left						
	Through	B	0.07	B	0.08	B	0.11
	Right	A	0.01	A	0.02	A	0.01
Southbound	Left						
	Through	B	0.04	B	0.10	B	0.27
	Right	A	0.23	A	0.36	A	0.36
Intersection	All	B	0.34	C	0.44	B	0.41

The analysis results show that all of the intersections would continue to operate at a LOS C or better in the year 2010 no build condition. Furthermore, with optimized signal timing at the intersections, some individual movements would operate at a better LOS than in the existing conditions with the existing signal timing in place; however the optimized signal timing would not improve vehicular or pedestrian safety conditions at the study intersections. The improved LOS situation between existing and future year conditions typically occurs at intersections that are well below capacity as green time can be reallocated to accommodate the projected travel demand, where on the other hand, intersections near capacity leave few options for retiming as the critical lane movements dictate signal timing in these situations. It should be noted that the eastbound approach of West Bay Street at Carolan Street would operate close to capacity in the year 2010.

The traffic analysis results for the future year 2030 no build conditions are presented in the tables on the following pages.

Table 13 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at East Lathrop Avenue – Year 2030 Conditions

		AM Peak Hour		MD Peak Hour		PM Peak Hour	
Approach	Movement	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	A	0.19	A	0.17	A	0.21
	Through	B	0.50	B	0.47	B	0.62
	Right	A	0.14	A	0.11	A	0.04
Westbound	Left	A	0.30	A	0.22	A	0.09
	Through	B	0.52	B	0.44	B	0.70
	Right	A	0.06	A	0.07	A	0.12
Northbound	Left	B	0.19	B	0.37	C	0.46
	Through	B	0.23	B	0.41	B	0.56
	Right						
Southbound	Left	B	0.27	B	0.34	C	0.36
	Through	B	0.38	B	0.39	B	0.35
	Right						
Intersection	All	B	0.55	B	0.45	B	0.74

WITH SIGNALS RETIMED

Table 16 – Signalized Intersection Volume to Capacity Ratio and Level of Service
West Bay Street at West Lathrop Avenue – Year 2030 Conditions

Approach	Movement	AM Peak Hour		MD Peak Hour		PM Peak Hour	
		LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio
Eastbound	Left	C	0.45	D	0.56	D	0.34
	Through	B	0.42	B	0.45	B	0.45
	Right						
Westbound	Left	C	0.02	C	0.15	D	0.15
	Through	C	0.32	D	0.45	B	0.39
	Right	A	0.09	C	0.03	A	0.01
Northbound	Left						
	Through	B	0.08	B	0.09	B	0.11
	Right	A	0.01	A	0.02	A	0.01
Southbound	Left						
	Through	B	0.04	B	0.11	B	0.28
	Right	A	0.24	A	0.37	A	0.37
Intersection	All	B	0.36	C	0.48	B	0.44

The analysis results show that all of the intersections would continue to operate at a LOS C or better in the year 2030 no build condition, with the exception of the intersection of West Bay Street at Carolan Street, which would operate at a LOS D in the PM peak hour without intersection improvements. This is consistent with the projected ADT of 34,400 being below the typical capacity of approximately 40,000 ADT for this type of facility.

Furthermore, similar to the year 2010 conditions with optimized signal timing at the intersections, some individual movements would actually operate at a better LOS than in the existing conditions with the existing signal timing in place.

3.2 West Bay Street at I-516 Interchange

As part of the overall analysis for the West Bay Street Traffic Study, the existing interchange between West Bay Street and Augusta Avenue with I-516 was evaluated to determine if any improvements to the interchange would be warranted to accommodate the projected travel demand in the area. Using the growth factor developed for the West Bay Street Corridor, a CORSIM analysis was conducted to evaluate the operations of the various interchange elements including ramps and the freeway mainline. The results of the CORSIM analysis are presented in Appendix D.

The CORSIM analysis results illustrate that all freeway elements would continue to operate at an LOS D or better during the AM, Midday, and PM peak hours in the design year 2030. No queuing or merging problems were observed in the animation. This is consistent with the relatively low volumes projected within the study area.

- Based on the criteria listed in the GDOT Manual of Guidance for Auxiliary Lanes (6638-1), one hundred and fifty foot (150') right turn lanes are recommended on the eastbound approaches of West Bay Street at the intersections of West Lathrop Street and Graham Street. However, the Level of Service would be acceptable at these intersections with or without right turn lanes. Tables 18 and 19 below compare the LOS with and without right turns at the intersections of West Bay Street at West Lathrop Street, Graham Street, and Carolan Street.

Table 18 – Signalized Intersection Level of Service Comparison With and Without Right Turn Lanes-Year 2010

Year 2010						
Intersection of West Bay Street at	LOS w/o RT Lane			LOS with RT Lane		
	AM	Midday	PM	AM	Midday	PM
West Lathrop Avenue	A	B	B	A	B	B
Graham Street	B	A	B	B	A	B
Carolan Street	B	B	B	B	B	B

Table 19 – Signalized Intersection Level of Service Comparison With and Without Right Turn Lanes-Year 2030

Year 2030						
Intersection of West Bay Street at	LOS w/o RT Lane			LOS with RT Lane		
	AM	Midday	PM	AM	Midday	PM
West Lathrop Avenue	A	B	B	A	B	B
Graham Street	B	B	B	B	B	B
Carolan Street	B	B	C	B	B	C

- Truck traffic accessing the industrial areas north of the study area is recommended to be directed to the East and West Lathrop intersection where turning radii are greatest. As part of the overall access management plan, the truck traffic will need to be considered, including providing local truck access for businesses along the north side of West Bay Street via Rogers Street. Radii to accommodate truck traffic are recommended in all quadrants of the East and West Lathrop Avenues intersections and the north quadrants of the Graham Street, Jenks/Cleland Street, and Carolan Street intersections.
- To maintain the 660' GDOT minimum distance between median openings while still providing access to truck and vehicle traffic along West Bay Street, median openings are recommended at the existing signalized intersections of East and West Lathrop Avenues, Graham Street, and Carolan Street. Additionally, to accommodate truck traffic accessing businesses along Rogers Street, a median opening is recommended at Jenks/Cleland Street.

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

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SHEET NO.: 13 of 15

(R/W) Easements Saved:

Parcel 1: $170,050.00* (incl. 148% markup)
Parcel 2: $ 76,260.00* (incl. 148% markup)
Total: $246,310.00*

* R/W costs from the Actual R/W property Acquisition estimates provided by the Designer.

Cost Savings for less Traffic Control
Based on Designers Project Cost Estimate*

$\frac{.21 mi}{1.29 mi} \times \$2,500,000^{*} \approx \$400,000$

Save 1 new Traffic Signal Location:

$\frac{\$581,000}{4 \text{ Locations}} \approx \$145,000/\text{Location}$

Erosion Control: (Temp. & Permanent)
Project: $220,000 (from GDOT estimate) x 11% = 25,000

Concrete Islands = $\frac{2,125 sf}{9 sf/sy} = 236 sy$

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: G-1

SHEET NO.: 14 of 15

For Wall #1, 2 & 3 Costs See Alt. W-1

Full Depth Pavement Unit Cost:
(* = unit costs from GDOT Cost Estimate)

→ (12.5mm): $\frac{165 Lbs}{SY} \times \frac{T}{2000 Lbs} \times \frac{SY}{9 sf} \times \frac{\$ 70^{*}}{T} = \frac{\$ 0.64}{sf}$

→ (19mm): $\frac{220 Lbs}{SY} \times \frac{T}{2000 Lbs} \times \frac{SY}{9 sf} \times \frac{\$ 70^{*}}{T} = \frac{\$ 0.86}{sf}$

→ (25mm): $\frac{440 Lbs}{SY} \times \frac{T}{2000 Lbs} \times \frac{SY}{9 sf} \times \frac{\$ 60^{*}}{T} = \frac{\$ 1.47}{SF}$

→ (12"GAB): $\frac{1' \times .075 T}{cf} \times \frac{\$ 17.04}{T} = \frac{\$ 1.28}{sf}$

Total = $\frac{\$ 4.25}{sf}$ ←

Full-Depth Pavement Saved.
$[(517' \times 12') + (\frac{43' \times 90'}{2}) + (\frac{110' \times 20'}{2}) + (200' \times 6') + (80' \times 8') + (\frac{160' \times 4'}{2})] = 11,400$ sf ←

Curb & gutter Saved: Tp 2 (8"x30") = 2,450 LF ←
Tp 7 (8"x30") = 1,240 LF ←

Overlay existing pavement: 82,800 s.f. ←

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **G-1**

SHEET NO.: **15 of 15**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full depth pavement	SF	11,400	4.25	48,450			
Overlay existing	SF	82,800	1.00	82,800			
Curb and gutter TP2	LF	2,450	15.00	36,750			
Curb and gutter TP7	LF	1,240	13.10	16,244			
Catch basins	EA	20	2,430.00	48,600			
Drop inlets	EA	11	2,360.00	25,960			
Manholes	EA	5	2,270.00	11,350			
18 in RCP pipe	LF	1,260	36.30	45,738			
24 in RCP pipe	LF	300	41.80	12,540			
30 in RCP pipe	LF	440	53.30	23,452			
Less traffic control	LS	1	400,000.00	400,000			
Misc. incidentals including minor earthwork, striping, etc.	LS	1	30,000.00	30,000			
Traffic signal	EA	1	145,000.00	145,000			
Erosion control	LS	1	25,000.00	25,000			
Concrete islands	SY	236	54.60	12,886			
Save walls 1 and 3	LS	1	156,040.00	156,040			
Right-of-way easements (see calculations) includes markup				246,310			
Subtotal				1,120,808			
Markup (%) at 9%				100,873			
TOTAL				1,467,991			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **G-3**

DESCRIPTION: **ADD CROSSWALK AT UNSIGNALIZED INTERSECTIONS WITH WARNING SIGNS SAYING THAT VEHICLES MUST STOP FOR PEDESTRIANS IN CROSSWALK**

SHEET NO.: **1 of 1**

ORIGINAL DESIGN:

Crosswalks are provided only at the four signalized intersections in the corridor.

ALTERNATIVE:

Provide crosswalks at all intersections in the corridor and add signs warning of crosswalks and that vehicles must stop for pedestrians in the crosswalks.

ADVANTAGES:

- Defines specific locations for pedestrian crossings and warns drivers to look for these crossings

DISADVANTAGES:

- None apparent

DISCUSSION:

As currently planned, "safe" pedestrian crossings of SR 25 CO/West Bay Street are limited to four locations. Two of the distances between these locations are approximately 3,060 ft apart and 1,440 ft apart. Expecting a pedestrian to walk 1,500 ft or 700 ft to cross at these locations is unrealistic.

Thus it is most probable that pedestrians will cross wherever they desire. These random crossings will lead to continued accidents. Providing periodic crosswalks will aid in limiting crossing points and provide warnings to drivers about potential crossings. Given the fact that there is a median throughout the corridor, the longest distance a pedestrian would have to travel is 36 ft, passing through a right turn lane or a left turn lane and two through lanes before reaching the median or the other side of the street. Random crossings could be as great as 48 ft, one right turn lane, two through lanes and one left turn lanes, thus increasing crossing time and exposure to traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **ROW-1**

DESCRIPTION: **NARROW THE SHOULDER WIDTH BY 4 FEET WHERE THE RIGHT-OF-WAY IS IMPACTED FROM STA. 44+70 RIGHT TO STA. 47+10 RIGHT AND STA. 37+00 TO STA. 44+10 LEFT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The current design has a 6 ft grass strip between the back of the curb and the sidewalk on the shoulder.

ALTERNATIVE: (sketch attached)

Reduce the grass strip to 2 ft in lieu of 6 ft, narrowing the shoulder by 4 ft.

ADVANTAGES:

- Less right-of-way cost
- Slightly less excavation; narrower typical section
- Less maintenance (mowing) required

DISADVANTAGES:

- Sidewalks would jog around curb-cut type driveways

DISCUSSION:

This alternative proposes to reduce the required right-of-way by reducing the proposed shoulder widths. The alternate cost estimate does not include the parcels that are "total takes" since these properties will be acquired. The shoulders are narrowed by reducing the current design grass strip in from 6 ft to 2 ft, thus narrowing the shoulder by 4 ft. The only areas that this would save right-of-way cost are from Sta. 37+00 left to Sta. 47+10 left and from Sta. 44+70 right to Sta. 47+10 right. The other areas of the project are "total takes," or the roadway is being widened either inside the existing right-of-way and there is no right-of-way savings by narrowing the shoulders. It is important to note that this would be 8 ft of total right-of-way savings from Sta. 44+70 to Sta. 47+10 (both shoulders in this section of SR 25).

The 6 ft strip is needed to accommodate sidewalks not having to "jog" around curb-cut type driveways. However, in these areas of "saved right-of-way," the commercial drives are the street-type design that do not require the additional setback for sidewalks.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 310,000	—	$ 310,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 310,000	—	$ 310,000

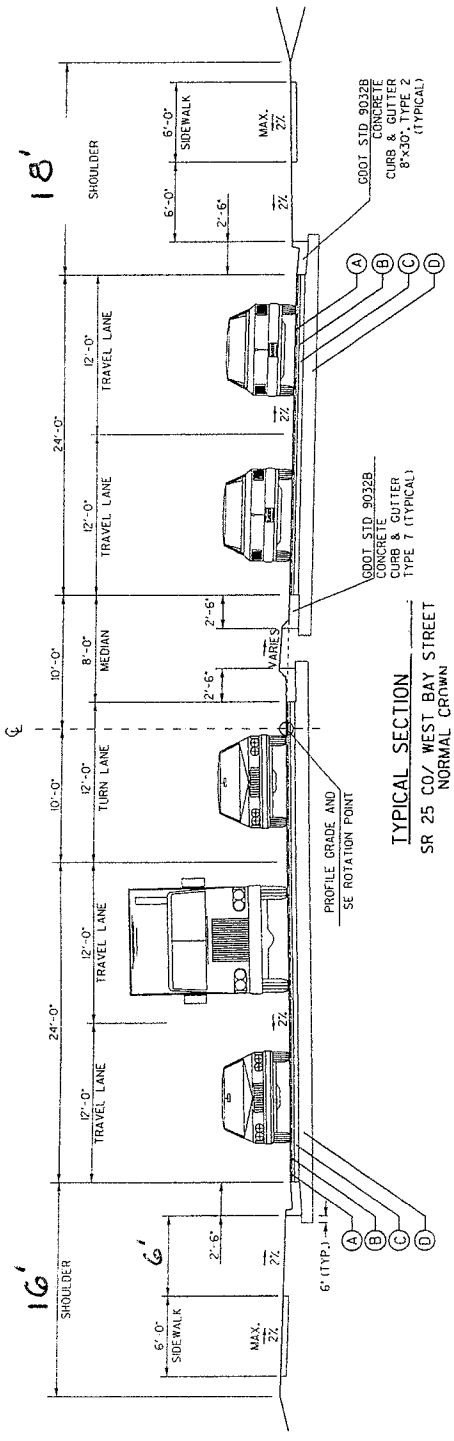
PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: ROW-1

☐ AS DESIGNED ☐ ALTERNATIVE ☒ Both

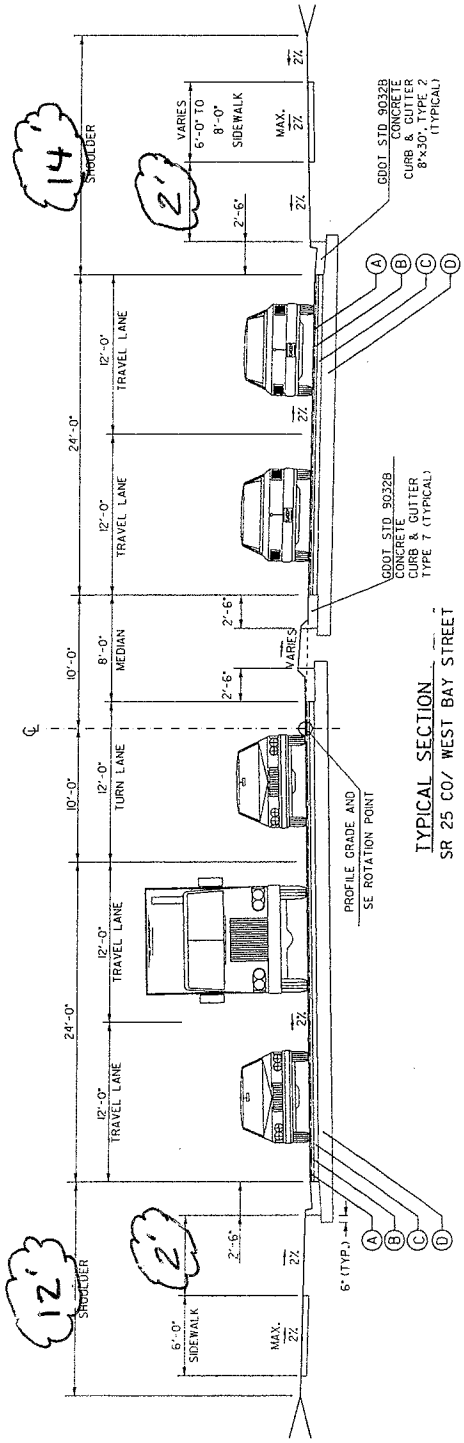
SHEET NO.: 2 of 4

Original Shoulders



TYPICAL SECTION
SR 25 CO/ WEST BAY STREET
NORMAL CROWN

Alternate Shoulders



TYPICAL SECTION
SR 25 CO/ WEST BAY STREET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: ROW-1

SHEET NO.: 3 of 4

R/W Saved under Alternate ROW-1 Design (Original)

Sta. 37+00 Lt. → 47+10 Lt.
(4' x 1,010') = 4,040 sf

Sta. 44+70 Rt → 47+10 Rt
(4' x 240) = 960 sf

Total R/W Saved: 5,000 sf

Damages Saved: Parcels 6, 10, 16, 17 (4 Parcels)
(Parking, etc.)

$\frac{\$476,000}{19 \text{ Parcels}} = \$25,000/\text{Parcel}$ (Total Consequential damages ($476,000 for 19 parcels) is from GDOT R/W estimate)

COST WORKSHEET

PROJECT:	**SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**	ALTERNATIVE NO.:	**ROW-1**
	NHS00-0002-00(923) CHATHAM COUNTY	SHEET NO.:	**4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Right-of-way saved	SF	5,000	5.00	25,000			
Consequential damage saved	parcel	4	25,000.00	100,000			
Subtotal				125,000			
Markup (%) at	**148%**			185,000			
TOTAL				310,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **ROW-4**

DESCRIPTION: **REVISE STORM WATER DRAINAGE TO AVOID TAKING PARCEL 63**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The current design has a 24 inch storm drain pipe crossing Parcel 63 which causes a total take.

ALTERNATIVE: (sketch attached)

Change the storm drain pipe design along Parcel 63 to avoid total take and change the right-of-way to a temporary easement.

ADVANTAGES:

- Reduces construction material requirements – less 24 inch storm drain pipe
- Reduces right-of-way requirements
- Avoids historic impacts to Parcel 63

DISADVANTAGES:

- None apparent

DISCUSSION:

The proposed junction of the new 24 in storm pipe, L2, and the existing storm drain pipe at Sta. 164+80 right can be moved (see sketch) to avoid impacting Parcel 63. The GDOT Right-of-Way Acquisition Information Sheet shows Parcel 63 as a total take. By moving the storm drain pipe, the construction limits will be off of the parcel. Use a temporary easement, if necessary, for the temporary erosion control and construction "space."

There are two options to move the constructions in, if it is necessary, for additional clearance from Parcel 63:

- Steepen the proposed 4:1 slope
- Reduce the 6 ft grass strip between the back of the curb and the sidewalk to 2 ft. It is important to note there are no driveways along this "block," therefore the 2 ft grass strip can be used for sidewalk placement.

Eliminating the required right-of-way on Parcel 63 also avoids the boundary of the historic district in this area.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 76,492	—	$ 76,492
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 76,492	—	$ 76,492

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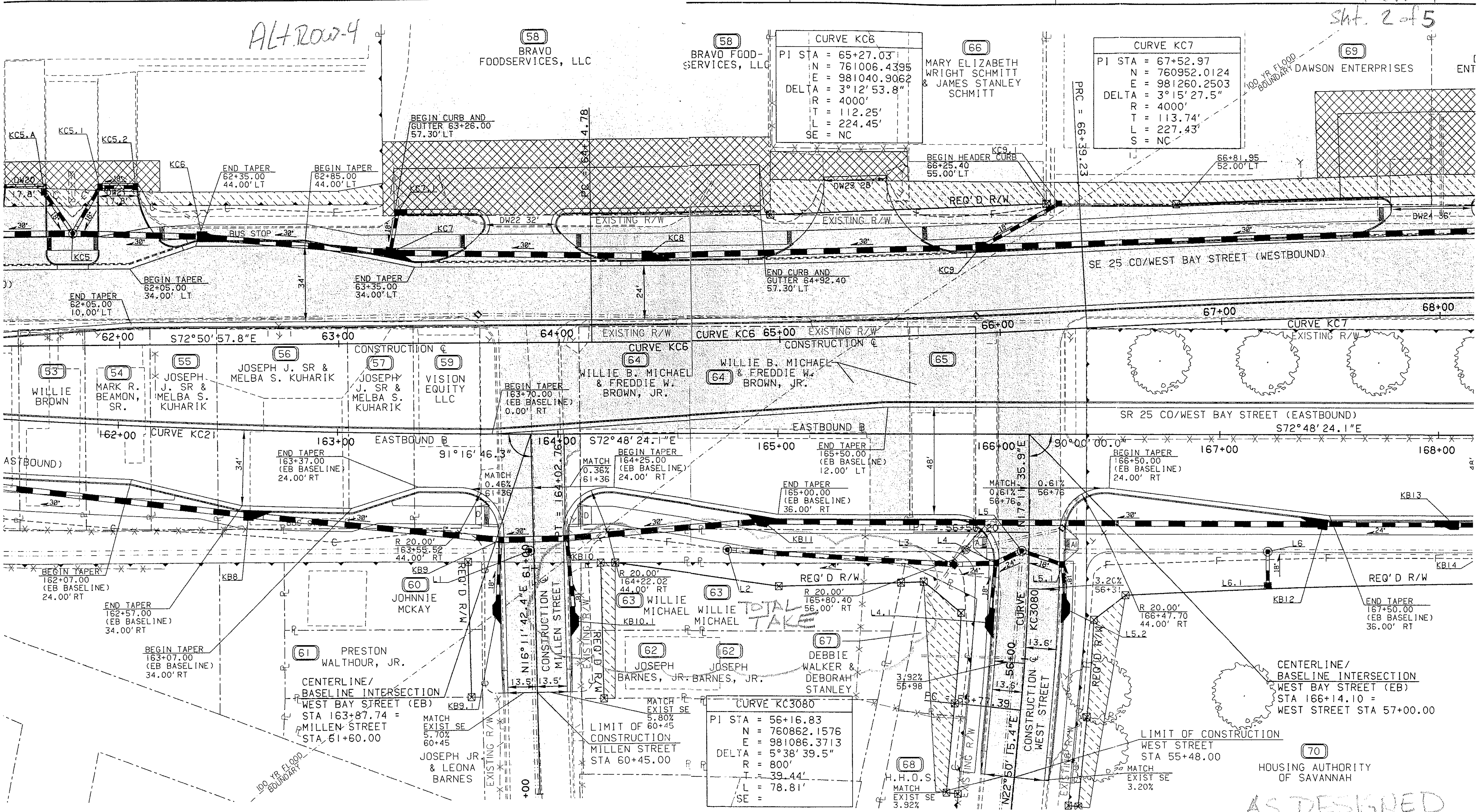
ALT. NO. ROW-4
Sht. 2 of 5



Alt Row-4
58 BRAVO FOODSERVICES, LLC
58 BRAVO FOOD-SERVICES, LLC
CURVE KC6
PI STA = 65+27.03
N = 761006.4395
E = 981040.9062
DELTA = 3°12'53.8"
R = 4000'
T = 112.25'
L = 224.45'
SE = NC
66 MARY ELIZABETH WRIGHT SCHMITT & JAMES STANLEY SCHMITT
PRC = 66+39.23
CURVE KC7
PI STA = 67+52.97
N = 760952.0124
E = 981260.2503
DELTA = 3°15'27.5"
R = 4000'
T = 113.74'
L = 227.43'
S = NC
100 YR FLOOD BOUNDARY
69 DAWSON ENTERPRISES
BEGIN CURB AND GUTTER 63+26.00 57.30' LT
PC = 64+04.78
BEGIN HEADER CURB 66+25.40 55.00' LT
66+81.95 52.00' LT
END TAPER 62+35.00 44.00' LT
BEGIN TAPER 62+85.00 44.00' LT
BUS STOP
REQ'D R/W
EXISTING R/W
SE 25 CO/WEST BAY STREET (WESTBOUND)
BEGIN TAPER 62+05.00 34.00' LT
END TAPER 63+35.00 34.00' LT
END CURB AND GUTTER 64+92.40 57.30' LT
END TAPER 62+05.00 10.00' LT
S72°50'57.8"E
CONSTRUCTION ℄
CURVE KC6
CURVE KC7
53 WILLIE BROWN
54 MARK R. BEAMON, SR.
55 JOSEPH J. SR & MELBA S. KUHARIK
56 JOSEPH J. SR & MELBA S. KUHARIK
57 JOSEPH J. SR & MELBA S. KUHARIK
59 VISION EQUITY LLC
64 WILLIE B. MICHAEL & FREDDIE W. BROWN, JR.
65
BEGIN TAPER 163+70.00 (EB BASELINE) 0.00' RT
SR 25 CO/WEST BAY STREET (EASTBOUND)
S72°48'24.1"E
EASTBOUND B
CURVE KC21
91°16'46.3"
90°00'00.0"
END TAPER 163+37.00 (EB BASELINE) 24.00' RT
BEGIN TAPER 164+25.00 (EB BASELINE) 24.00' RT
END TAPER 165+50.00 (EB BASELINE) 12.00' LT
END TAPER 165+00.00 (EB BASELINE) 36.00' RT
BEGIN TAPER 166+50.00 (EB BASELINE) 24.00' RT
PT = 164+02.76
PI = 55+56.20
BEGIN TAPER 162+07.00 (EB BASELINE) 24.00' RT
END TAPER 162+57.00 (EB BASELINE) 34.00' RT
BEGIN TAPER 163+07.00 (EB BASELINE) 34.00' RT
R 20.00' 163+55.52 44.00' RT
R 20.00' 164+22.02 44.00' RT
R 20.00' 165+80.40 56.00' RT
R 20.00' 166+47.70 44.00' RT
60 JOHNNIE MCKAY
61 PRESTON WALTHOUR, JR.
62 JOSEPH BARNES, JR.
63 WILLIE MICHAEL
67 DEBBIE WALKER & DEBORAH STANLEY
68 H.H.O.S
70 HOUSING AUTHORITY OF SAVANNAH
TOTAL TAKE
N16°11'42.4"E
CONSTRUCTION ℄ MILLEN STREET
N17°11'35.9"E
N22°50'15.4"E
CONSTRUCTION ℄ WEST STREET
CURVE KC3080
CENTERLINE/BASELINE INTERSECTION WEST BAY STREET (EB) STA 163+87.74 = MILLEN STREET STA 61+60.00
CENTERLINE/BASELINE INTERSECTION WEST BAY STREET (EB) STA 166+14.10 = WEST STREET STA 57+00.00
CURVE KC3080
PI STA = 56+16.83
N = 760862.1576
E = 981086.3713
DELTA = 5°38'39.5"
R = 800'
T = 39.44'
L = 78.81'
SE =
PC = 55+77.39
MATCH EXIST SE 5.70% 60+45
MATCH EXIST SE 5.80% 60+45
LIMIT OF CONSTRUCTION MILLEN STREET STA 60+45.00
LIMIT OF CONSTRUCTION WEST STREET STA 55+48.00
MATCH EXIST SE 3.92%
MATCH EXIST SE 3.20%
JOSEPH JR. & LEONA BARNES
END TAPER 167+50.00 (EB BASELINE) 36.00' RT
AS DESIGNED

-F- - - -F-	TOE OF FILL
	EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
	EASEMENT FOR CONSTR OF SLOPES
	EASEMENT FOR CONSTR OF DRIVES

...Y AND EXISTING R/W LINE
...ED R/W LINE
...OF WAY MARKER
...LINE
...OR SWALE

McGee Partners, Inc.
WARD EDWARDS, INC. A JOINT VENTURE

REVISION DATES

DEP... OFFICE:

SCALE IN FEET

McGee Partners, Inc.
WARD EDWARDS, INC. A JOINT VENTURE

ALT. NO ROW-4 Sht. 3 of 5

ALT. ROW-4

CURVE KC6	
PI STA	65+27.03
N	761006.4395
E	981040.9062
DELTA	3°12'53.8"
R	4000'
T	112.25'
L	224.45'
SE	NC

CURVE KC7	
PI STA	67+52.97
N	760952.0124
E	981260.2503
DELTA	3°15'27.5"
R	4000'
T	113.74'
L	227.43'
S	NC

CURVE KC3080	
PI STA	56+16.83
N	760862.1576
E	981086.3713
DELTA	5°38'39.5"
R	800'
T	39.44'
L	78.81'
SE	

58 BRAVO FOODSERVICES, LLC

58 BRAVO FOOD-SERVICES, LLC

66 MARY ELIZABETH WRIGHT SCHMITT & JAMES STANLEY SCHMITT

69 DAWSON ENTERPRISES

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55 JOSEPH J. SR & MELBA S. KUHARIK

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59 VISION EQUITY LLC

64 WILLIE B. MICHAEL & FREDDIE W. BROWN, JR.

65

60 JOHNNIE MCKAY

61 PRESTON WALTHOUR, JR.

63 WILLIE MICHAEL WILLIE MICHAEL

62 JOSEPH BARNES, JR.

62 JOSEPH BARNES, JR.

67 DEBBIE WALKER & DEBORAH STANLEY

68 H.H.O.S

70 HOUSING AUTHORITY OF SAVANNAH

JOSEPH JR & LEONA BARNES

KC5.A, KC5.1, KC5.2, KC6, KC7, KC7.1, KC8, KC9, KC5, KC9.1

DW20 17.8', DW21 17.8', DW22 32', DW23 28', DW24 56'

BEGIN CURB AND GUTTER 63+26.00 57.30' LT

END TAPER 62+35.00 44.00' LT

BEGIN TAPER 62+85.00 44.00' LT

BEGIN HEADER CURB 66+25.40 55.00' LT

66+81.95 52.00' LT

END CURB AND GUTTER 64+92.40 57.30' LT

BEGIN TAPER 62+05.00 34.00' LT

END TAPER 62+05.00 10.00' LT

END TAPER 63+35.00 34.00' LT

BEGIN TAPER 163+70.00 (EB BASELINE) 0.00' RT

END TAPER 163+37.00 (EB BASELINE) 24.00' RT

BEGIN TAPER 164+25.00 (EB BASELINE) 24.00' RT

END TAPER 165+50.00 (EB BASELINE) 12.00' LT

END TAPER 165+00.00 (EB BASELINE) 36.00' RT

BEGIN TAPER 166+50.00 (EB BASELINE) 24.00' RT

BEGIN TAPER 162+07.00 (EB BASELINE) 24.00' RT

END TAPER 162+57.00 (EB BASELINE) 34.00' RT

BEGIN TAPER 163+07.00 (EB BASELINE) 34.00' RT

END TAPER 167+50.00 (EB BASELINE) 36.00' RT

R 20.00' 163+55.52 44.00' RT

R 20.00' 164+22.02 44.00' RT

R 20.00' 165+80.40 56.00' RT

R 20.00' 166+47.70 44.00' RT

MATCH 0.36% 61+36

MATCH 0.46% 61+36

MATCH 0.61% 56+76

0.61% 56+76

MATCH EXIST SE 5.80% 60+45

MATCH EXIST SE 5.70% 60+45

MATCH EXIST SE 3.92%

MATCH EXIST SE 3.20%

3.92% 55+98

3.20% 56+31

PRC = 64+39.23

PC = 64+04.78

PC = 55+75.39

PRC = 56+56.20

PT = 164+02.76

CURVE KC21

CURVE KC3080

CURVE KC6

CURVE KC7

L1, L2, L3, L4, L4.1, L5, L5.1, L5.2, L6, L6.1, L7

KB8, KB8.1, KB9, KB9.1, KB10, KB10.1, KB11, KB12, KB13, KB14

REQ'D R/W

EXISTING R/W

CONSTRUCTION ℄

CENTERLINE/ BASELINE INTERSECTION WEST BAY STREET (EB) STA 163+87.74 = MILLEN STREET STA 61+60.00

CENTERLINE/ BASELINE INTERSECTION WEST BAY STREET (EB) STA 166+14.10 = WEST STREET STA 57+00.00

LIMIT OF CONSTRUCTION MILLEN STREET STA 60+45.00

LIMIT OF CONSTRUCTION WEST STREET STA 55+48.00

100 YR FLOOD BOUNDARY

SE 25 CO/WEST BAY STREET (WESTBOUND)

SR 25 CO/WEST BAY STREET (EASTBOUND)

EASTBOUND B

BUS STOP

S72°50'57.8"E

S72°48'24.1"E

N16°11'42.4"E

N22°50'15.4"E

N17°11'35.9"E

91°16'46.3"

90°00'00.0"

move Pipe Connection & use Temp. Easem't L2

ALTERNATIVE

McGee Partners, Inc.

WARD EDWARDS, INC. A JOINT VENTURE

SCALE IN FEET

REVISION DATES

DEPT AND EXISTING R/W LINE

OFFICE: ED R/W LINE

OF WAY MARKER

LINE

OR SWALE

TOE OF FILL

EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES

EASEMENT FOR CONSTR OF SLOPES

EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.

WARD EDWARDS, INC. A JOINT

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: ROW-4

SHEET NO.: 4 of 5

24" Storm Drain Pipe saved under Alt. ROW-4

24" R.C.P. = 90 L.F.

Both proposed and Alt. Design Require the M.H./L2.

Parcel 63 Total Take saved from GDOT R/W acquisition information Sheet.
Total Take = $66,414 (includes 148% markup)

COST WORKSHEET

PROJECT:	**SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**	ALTERNATIVE NO.:	**ROW-4**
	NHS00-0002-00(923) CHATHAM COUNTY	SHEET NO.:	**5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
24 in storm drain pipe	LF	90	41.80	3,762			
Right-of-way Parcel 63	LS	1	66,414.00	66,414			
Subtotal				70,176			
Markup (%) at 9%				6,316			
TOTAL				76,492			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **P-1**

DESCRIPTION: **USE 11-FT-WIDE THROUGH LANES IN LIEU OF 12-FT-WIDE THROUGH LANES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

Construct all through lanes 12–ft-wide on West Bay Street.

ALTERNATIVE: (sketch attached)

Construct all through lanes 11-ft-wide on West Bay Street. Keep turning lanes 12 ft wide. Make no changes to the side roads.

ADVANTAGES:

- Reduces pavement requirements
- Reduces storm water volume by 9%
- Reduces long-term maintenance requirements
- Shortens pedestrian crossing
- Increases green space in the median if the outside edge of the pavement is maintained
- Narrower lanes tend to act as a traffic calming measure, which is beneficial in an area where pedestrians may cross the road at any location

DISADVANTAGES:

- Perceived sense of constriction to drivers
- Higher gutter spread

DISCUSSION:

The interstate freeways passing through Atlanta have 11-ft-wide lanes. Traffic flows smoothly even at speeds greater than 70 mph. On West Bay Street where the speed limit is 35 mph, construction of 11-ft-wide lanes will pose little danger. With 24-in-wide gutters, the effective travel width will be 11 ft + 2 ft = 13 ft. Even if the gutters are reduced to 18 inches as proposed in Alt. No. CG-1, the effective width is still 12 ft 6 in.

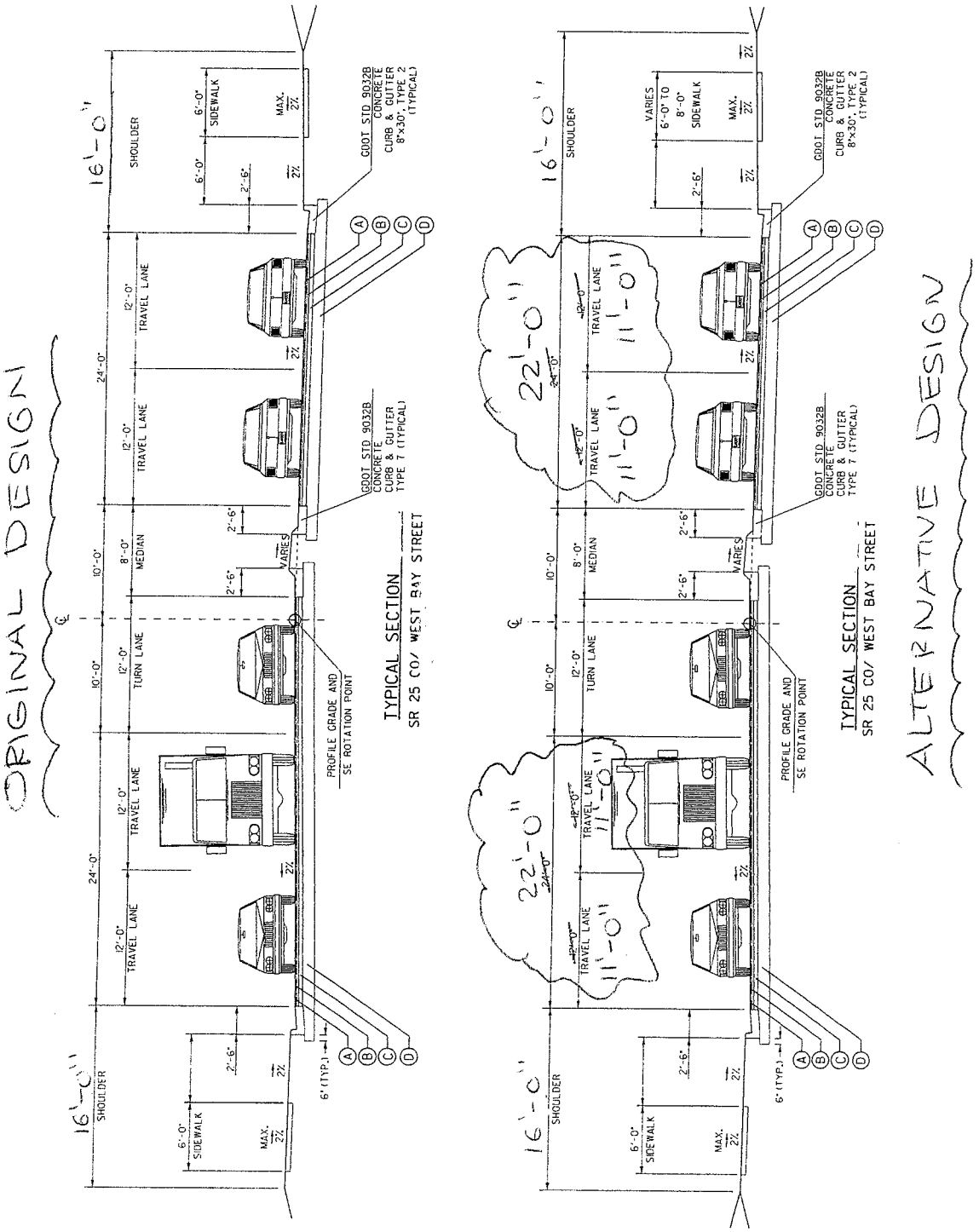
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 113,033	—	$ 113,033
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 113,033	—	$ 113,033

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: P-1

☒ AS DESIGNED ☒ ALTERNATIVE

SHEET NO.: 2 of 4



PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: P-1

SHEET NO.: 3 of 4

Full Depth Pavement Unit Cost:
(* = unit costs from GDOT Cost Estimate)

→ (12.5mm): $\frac{165 lbs}{SY} \times \frac{T}{2000 lbs} \times \frac{SY}{9sf} \times \frac{\$70^*}{T} = \frac{\$0.64}{sf}$

→ (19mm): $\frac{220 lbs}{SY} \times \frac{T}{2000 lbs} \times \frac{SY}{9sf} \times \frac{\$70^*}{T} = \frac{\$0.86}{sf}$

→ (25mm): $\frac{440 lbs}{SY} \times \frac{T}{2000 lbs} \times \frac{SY}{9sf} \times \frac{\$60}{T} = \frac{\$1.47}{SF}$

→ (12"GAB): $1' \times .075 \frac{T}{cf} \times \frac{\$17.04}{T} = \frac{\$1.28}{sf}$

Total = $\frac{\$4.25}{sf}$

The widening of Bay Street essentially begins from West Bathrop Avenue at STA. 29+00 and ends at about STA. 90+00 for a total length of 6,100 feet.

Thus, the area of pavement saved by going from 12' wide to 11' wide on all-four through lanes:

6,100' x 4' = 24,400 sf.

COST WORKSHEET

PROJECT:	SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT	ALTERNATIVE NO.:	P-1
	NHS00-0002-00(923) CHATHAM COUNTY	SHEET NO.:	4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Pavement	SF	24,400	4.25	103,700			
Subtotal				103,700			
Markup (%) at 9%				9,333			
TOTAL				113,033			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **P-2**

DESCRIPTION: **SHORTEN THE WESTBOUND LEFT TURN LANE ON BAY STREET AT THE INTERSECTION WITH BRITTANY STREET**

SHEET NO.: **1 of 7**

ORIGINAL DESIGN: (sketch attached)

Traveling eastbound on Bay Street, the original design provides 300 ft of storage length and 180 ft of taper for the vehicles turning left onto Brittany Street.

ALTERNATIVE: (sketch attached)

Provide 200 ft of storage length and 100 ft of taper for the vehicles turning left onto Brittany Street. The storage length will be from Sta. 47+82 to Sta. 49+82. The taper length will be from Sta. 49+82 to Sta. 50+82.

ADVANTAGES:

- Reduces amount of pavement
- Increases green space in the median
- Reduces amount of long-term pavement maintenance

DISADVANTAGES:

- None apparent

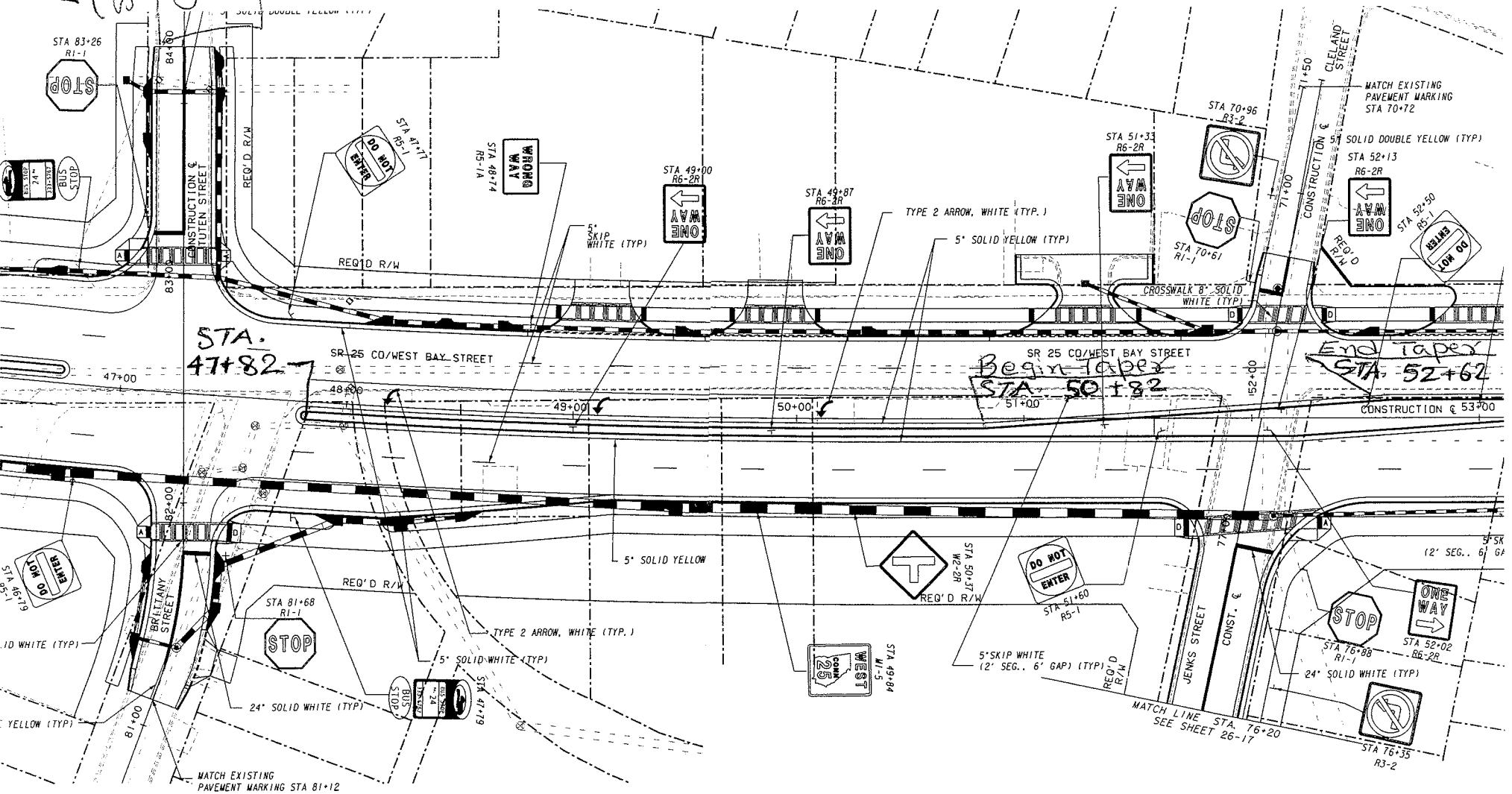
DISCUSSION:

Per Georgia Construction Detail M-3, the minimum storage length required for an arterial with 35 mph is 200 ft and the minimum taper length required is 100 ft. The traffic count for the design year 2030 is not provided for vehicles turning left from Bay Street to Brittany Street. The assumption is that traffic turning left on Jenks Street from Bay Street will be divided equally between Brittany Street and Baker Street since the median of Jenks Street will be closed. This results in a maximum of 59 vehicles making the left turn in the peak hour.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 21,680	—	$ 21,680
ALTERNATIVE	$ 13,897	—	$ 13,897
SAVINGS (Original minus Alternative)	$ 7,783	—	$ 7,783

P2 Sheet 2 of 4

Original Design



GRICE
& ASSOCIATES, INC.
TWO MIDTOWN PLAZA
1349 WEST PEACHTREE STREET, N.E.
SUITE 1290
ATLANTA, GEORGIA 30309
404.577.6300 / 404.577.6310 FAX

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SCALE IN FEET
0 20 40 80

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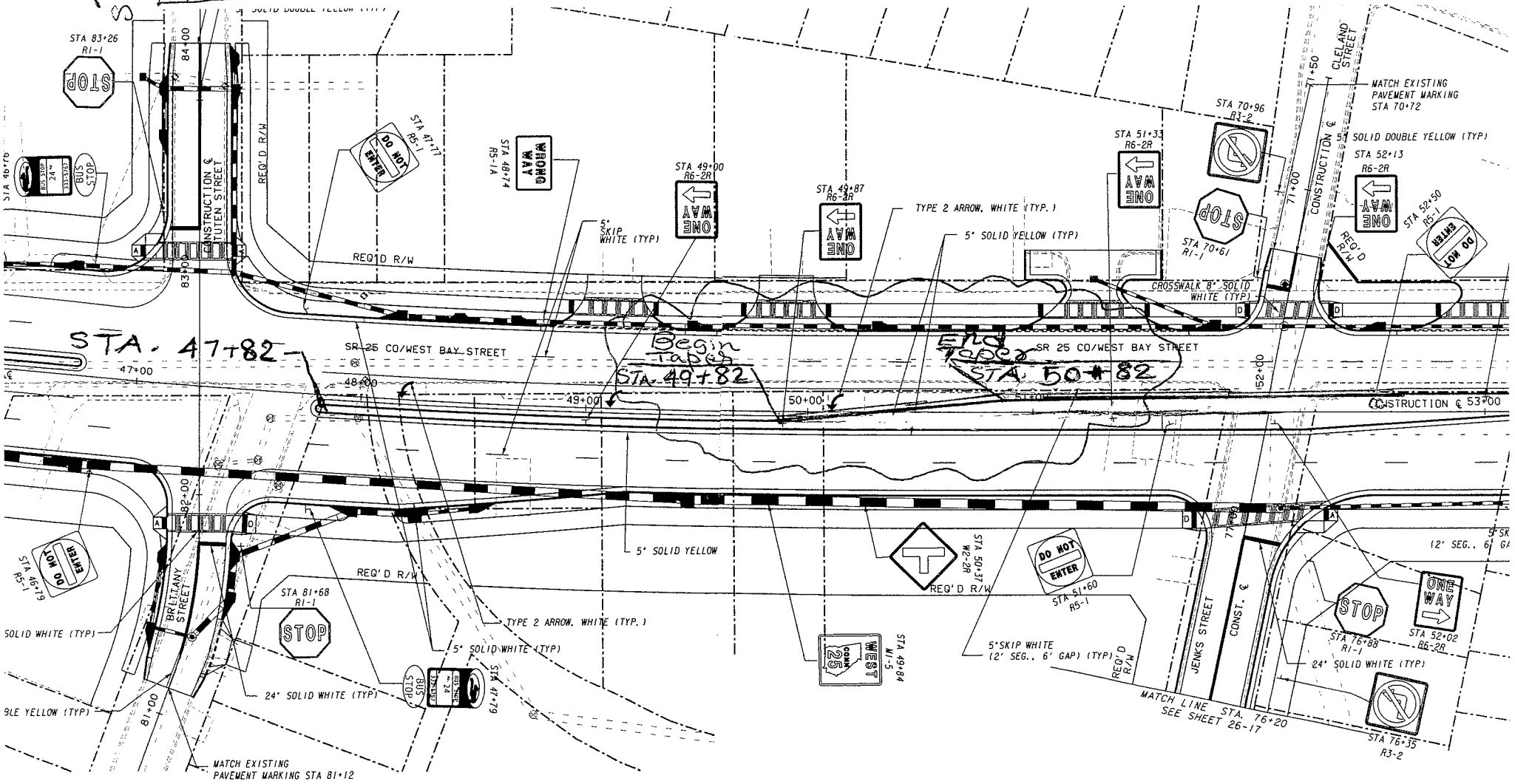
0 20

P-2 Sheet 3 of 7 Alternative Design



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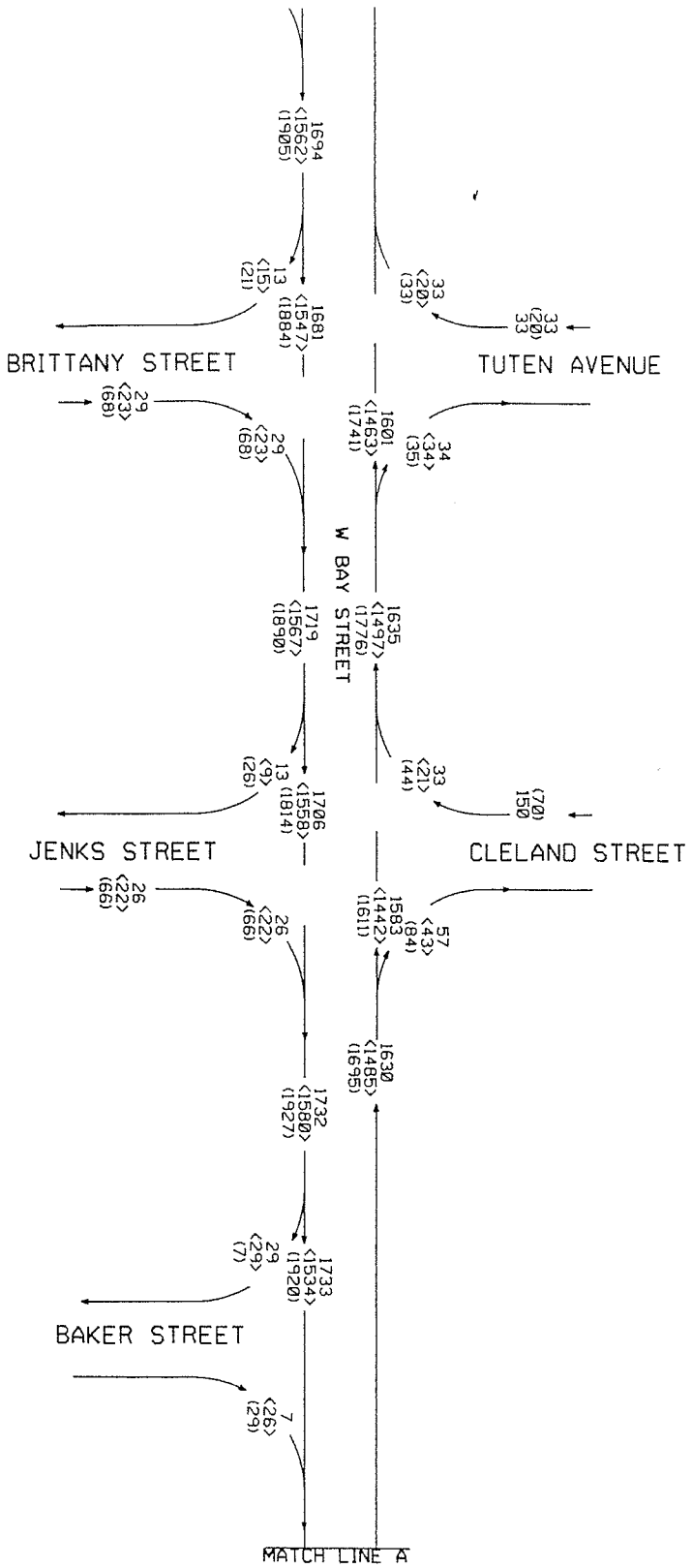
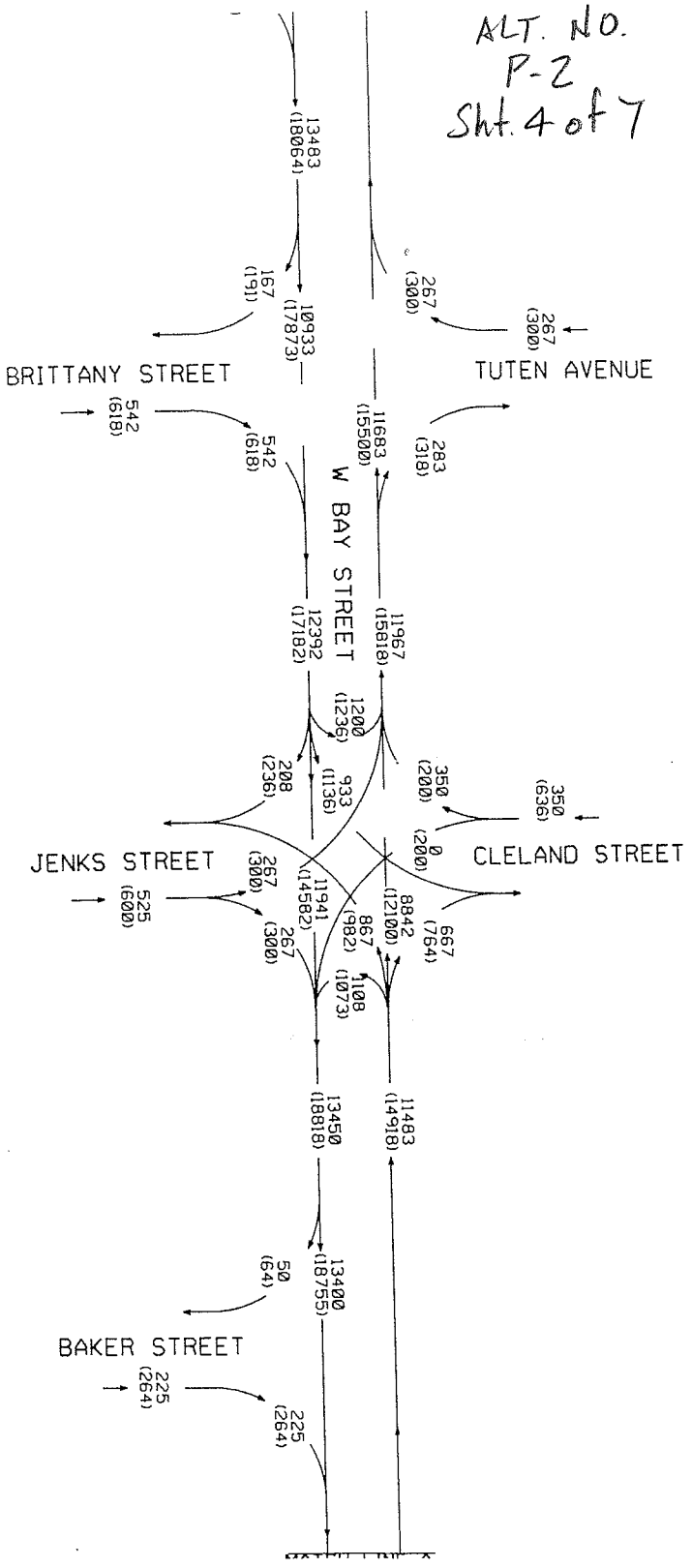
0 20

ALT. NO.
P-2
Sht. 4 of 7

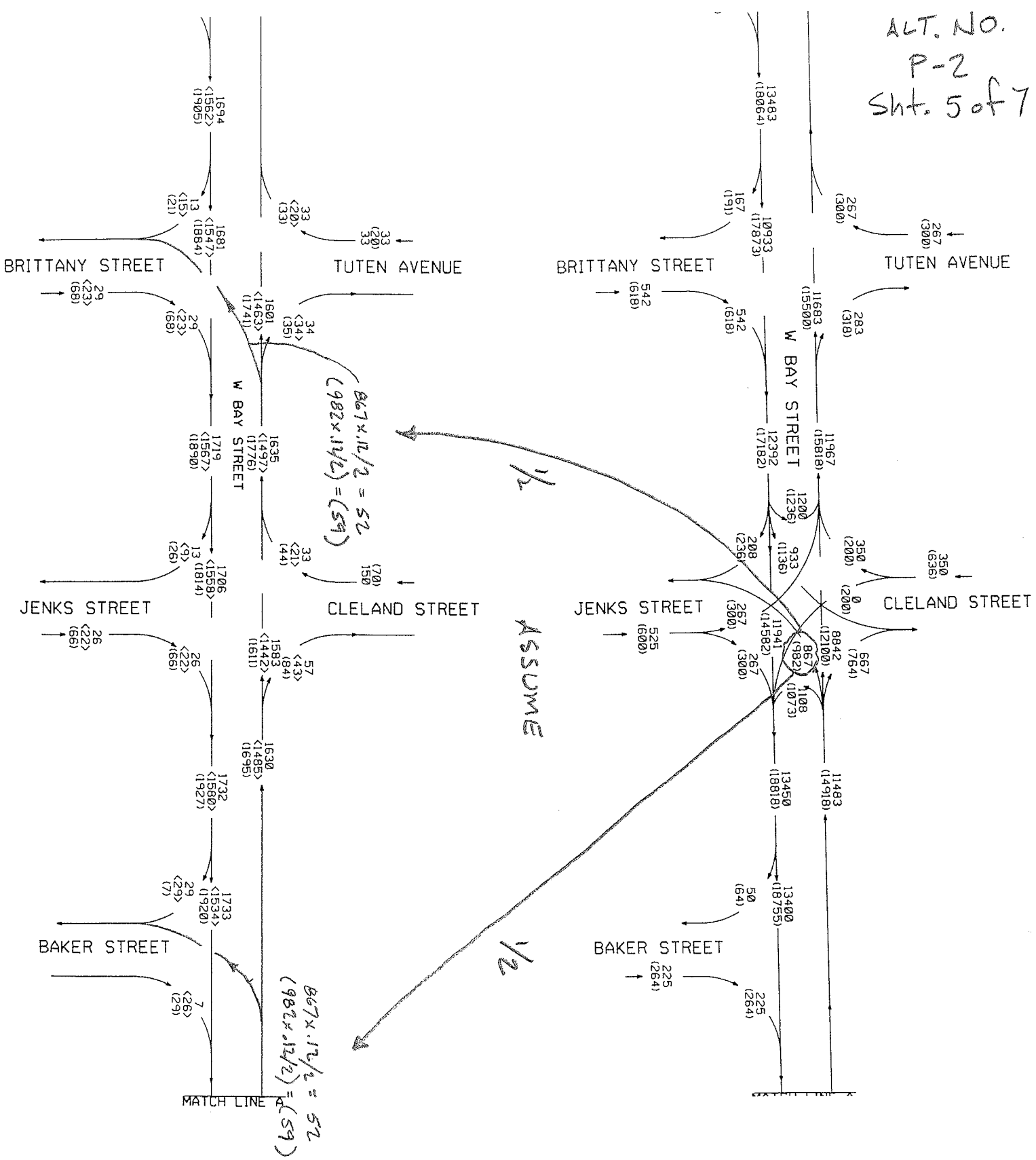


2030 DHV
PEAK HOURS
(ASSUMING MEDIAN OPENING @ JENKS STREET)



AVE. DAILY TRAFFIC
(ASSUMING MEDIAN OPENING @ JENKS STREET)

ALT. NO.
P-2
Sht. 5 of 7



2030 DHV
PEAK HOURS
(ASSUME MEDIAN OPENINGS
@ BAKER & BRITTANY ST)

AVE. DAILY
TRAFFIC
(ASSUME MEDIAN
OPENINGS @
BAKER & BRITTANY ST.)

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: P-2

SHEET NO.: 6 of 7

Full Depth Pavement Unit Cost:
(* = unit costs from GDOT cost Estimate)

→ (12.5mm): $\frac{165\text{Lbs}}{\text{SY}} \times \frac{\text{T}}{2000\text{Lbs}} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$70^{*}}{\text{T}} = \frac{\$0.64}{\text{sf}}$

→ (19mm): $\frac{220\text{Lbs}}{\text{SY}} \times \frac{\text{T}}{2000\text{Lbs}} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$70^{*}}{\text{T}} = \frac{\$0.86}{\text{sf}}$

→ (25mm): $\frac{440\text{Lbs}}{\text{SY}} \times \frac{\text{T}}{2000\text{Lbs}} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$60}{\text{T}} = \frac{\$1.47}{\text{SF}}$

→ (12"GAB): $\frac{1'\times.075\text{T}}{\text{CY}} \times \frac{\$17.04}{\text{T}} = \frac{\$1.28}{\text{sf}}$

Total = $\frac{\$4.25}{\text{sf}}$

Pavement Area

Original Design: $(300\times12)+(\frac{1}{2}\times12\times180) = 4{,}680$ sf

Alternate Design: $(200\times12)+(\frac{1}{2}\times12\times100) = 3{,}000$ sf

COST WORKSHEET

PROJECT:	SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT	ALTERNATIVE NO.:	P-2
	NHS00-0002-00(923) CHATHAM COUNTY	SHEET NO.:	7 of 7

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Pavement	SF	4,680	4.25	19,890	3,000	4.25	12,750
Subtotal				19,890			12,750
Markup (%) at 9%				1,790			1,148
TOTAL				21,680			13,898

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 25 CO/WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
DRAINAGE						
D-1	Use HDPE pipe in lieu of reinforced concrete pipe for all storm water drain pipe not under pavement	$590,149	$495,670	$94,479		$94,479
D-2	Use HDPE pipe in lieu of reinforced concrete pipe for all storm water drain pipe under side roads	$20,113	$16,927	$3,186		$3,186
D-3	Move 30-in-diameter storm water drain line between the I-516 bridge pier and new retaining wall to under the pavement	DESIGN SUGGESTION				
CURB AND GUTTER						
CG-1	Use 24-in-wide curb and gutter section in lieu of the 30-in-wide curb and gutter section	$409,657	$328,308	$81,349		$81,349
CG-2	Eliminate the curb and gutter and sidewalks from some of the side roads	$32,931	$0	$32,931		$32,931
SIDEWALK						
S-1	Use all 6-ft-wide sidewalks in lieu of some 8-ft-wide sidewalks	$29,765	$0	$29,765		$29,765
S-2	Use all 5-ft-wide sidewalks in lieu of 6-ft-wide and 8-ft-wide sidewalks	$101,928	$0	$101,928		$101,928
WALLS						
W-1	Use soil nail walls in lieu of tie-back walls behind the bridge	$238,143	$208,375	$29,768		$29,768

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **D-1**

DESCRIPTION: **USE HDPE PIPE IN LIEU OF RCP PIPE FOR ALL PIPE NOT UNDER ROADWAY PAVEMENT**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design uses reinforced concrete pipe (RCP) for the storm drain system.

ALTERNATIVE:

Use high-density polyethylene (HDPE) pipe for all storm drain pipe not under roadway pavement.

ADVANTAGES:

- The smooth surface of the HDPE pipe will assist flow in this flat area
- Improves constructability
- Less construction time required
- HDPE pipe comes in 20 ft lengths versus RCP, which comes in 8 ft lengths, thus fewer pieces to handle
- HDPE pipe is lightweight for easier installation

DISADVANTAGES:

- Requires 6 in foundation material backfill TP2

DISCUSSION:

The HDPE pipe is approved by GDOT as shown in the soil report (attached) for longitudinal storm drain system. The HDPE pipe requires a 6 in foundation backfill material, TP2 base. GDOT might consider bidding the storm drain pipe for both items (RCP versus HDPE) with the lowest unit bid price determining what type of pipe will be used. This would keep the price competitive.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 590,149	—	$ 590,149
ALTERNATIVE	$ 495,670	—	$ 495,670
SAVINGS (Original minus Alternative)	$ 94,479	—	$ 94,479

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: D-1

SHEET NO.: 2 of 5

18" Storm Drain Pipe = 5,300'
24" Storm Drain Pipe = 2,905'
30" Storm Drain Pipe = 2,725'
36" Storm Drain Pipe = 240'
42" Storm Drain Pipe = 480'
48" Storm Drain Pipe = 240'

Found. Backfill Tp2 for Alternate Design
HDPE Pipe (6")

$\frac{1.5' \times .5' \times 5{,}300'}{27 cf/cy} = 147 cy$

$\frac{2' \times .5' \times 2{,}905'}{27 cf/cy} = 108 cy$

$\frac{2.5' \times .5' \times 2{,}725'}{27 cf/cy} = 126 cy$

$\frac{3' \times .5' \times 240}{27 cf/cy} = 14 cy$

$\frac{3.5' \times .5' \times 480}{27 cf/cy} = 31 cy$

$\frac{4' \times .5' \times 240'}{27 cf/cy} = 18 cy$

Total = 444 cy

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: D-1

SHEET NO.: 3 of 5

18" HDPE Pipe Unit Costs:
material + install

18" HDPE = $7.30/LF + $18/LF = $25.30/LF

24" HDPE = $11.80/LF + $24/LF = $35.80/LF

30" HDPE = $16.80/LF + $30/LF = $46.80/LF

36" HDPE = $22.50/LF + $36/LF = $58.50/LF

42" HDPE = $29.70/LF + $42/LF = $71.70/LF

48" HDPE = $38.70/LF + $48 = $86.70/LF

Alt. D-1
4/5

pH 6.7
Resistance 1989
Project No.: NHS-0002-00(923) County: Chatham P.I. No.: 0002923

Pipe Culvert Material Alternates

For Coastal Plain Region

TYPE OF PIPE INSTALLATION				CONCRETE	CORRUGATED STEEL AASHTO M-36		CORRUGATED ALUMINUM AASHTO M-196	PLASTIC			
					ALUMINUM COATED (TYPE 2) CORR. STEEL	PLAIN ZINC COATED	PLAIN UNCOATED ALUMINUM	CORR. POLY-ETHYLENE AASHTO M-252	CORR. POLY-ETHYLENE SMOOTHED LINED AASHTO M-294 TYPE "S"	POLY VINYL CHLORIDE (PVC) PROFILE WALL AASHTO M-304	POLY VINYL CHLORIDE (PVC) CORRUGATED SMOOTH INTERIOR ASTM F-949
STORM DRAIN	LONGITUDINAL INTERSTATE AND TRAVEL BEARING			X							
	LONGITUDINAL NON-INTERSTATE AND NON-TRAVEL BEARING			X			X		X	X	X
	CROSS DRAIN	GRADE ≤ 10%	ADT < 250	X			X		X	X	X
			250 < ADT < 1500	X			X				X
			ADT > 1500	X							
		GRADE > 10%	ADT < 250				X		X	X	X
			ADT > 250				X				X
SIDE DRAIN				X			X		X	X	X
PERMANENT SLOPE DRAIN					X	X	X		X	X	X
PERFORATED UNDERDRAIN					X	X	X	X	X		X

NOTE:

1. Allowable materials are indicated by an "X".
2. Structural requirements of storm drain pipe will be in accordance with Georgia Standard 1030-D or 1030-P, whichever is applicable, and the Standard Specifications.
3. Graded aggregate backfill shall be used in cross drain applications for all plastic pipes (AASHTO M-294, HDPE pipe; AASHTO M-304, PVC pipe; ASTM F-949, PVC pipe).

Rev. 10-04-05

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

ALTERNATIVE NO.: **D-1**

NHS00-0002-00(923) CHATHAM COUNTY

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
18 in RCP	LF	5,300	36.30	192,390			
24 in RCP	LF	2,905	41.80	121,429			
30 in RCP	LF	2,725	53.30	145,243			
36 in RCP	LF	240	62.22	14,933			
42 in RCP	LF	480	87.72	42,106			
48 in RCP	LF	240	105.50	25,320			
18 in HDPE	LF				5,300	25.30	134,090
24 in HDPE	LF				2,905	35.80	103,999
30 in HDPE	LF				2,725	46.80	127,530
36 in HDPE	LF				240	58.50	14,040
42 in HDPE	LF				480	71.70	34,416
48 in HDPE	LF				240	86.70	20,808
Foundation backfill material TP2	CY				444	44.73	19,860
Subtotal				541,421			454,743
Markup (%) at 9%				48,728			40,927
TOTAL				590,149			495,670

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **D-2**

DESCRIPTION: **USE HDPE PIPE IN LIEU OF RCP PIPE FOR ALL PIPE NOT UNDER SIDEROAD PAVEMENT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design uses reinforced concrete pipe (RCP) for the storm drain system.

ALTERNATIVE:

Use HDPE (high-density polyethylene) pipe for all storm drain pipe not under roadway pavement.

ADVANTAGES:

- The smooth surface of the HDPE pipe will assist flow in this flat area
- Improves constructability
- Less construction time required
- HDPE pipe comes in 20 ft lengths versus RCP, which comes in 8 ft lengths, thus fewer pieces to handle
- HDPE pipe is lightweight for easier installation

DISADVANTAGES:

- Requires 6 in foundation material backfill TP2

DISCUSSION:

Alt. No. D-1 already proposes HDPE pipe for storm drains not under roadway pavement. The purpose of this alternative is to show the cost savings if HDPE pipe is also used under all side roads with light traffic.

HDPE pipe is being used by the City of San Diego under major city streets adjacent to the water front where the ground is extremely flat, similar to the situation in Savannah.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 20,113	—	$ 20,113
ALTERNATIVE	$ 16,927	—	$ 16,927
SAVINGS (Original minus Alternative)	$ 3,186	—	$ 3,186

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: D-2

SHEET NO.: 2 of 4

18" Storm drain Pipe = 180 L.F.
24" Storm drain Pipe = 50 L.F.
30" Storm drain Pipe = 135 L.F.
42" Storm drain Pipe = 30 L.F.

Foundation Backfill Material, Tp2, for Alternate Design HDPE pipe. (6")

$$\frac{1.5' \times .5' \times 180'}{27 cf/cy} = 5 cy$$

$$\frac{2' \times .5' \times 50'}{27 cf/cy} = 2 cy$$

$$\frac{2.5 \times .5' \times 135'}{27 cf/cy} = 7 cy$$

$$\frac{3.5' \times .5' \times 30'}{27 cf/cy} = 2 cy$$

Total = 16 cy

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: D-2

SHEET NO.: 3 of 4

18" HDPE Pipe Unit Costs:
material + install

18" HDPE = $7.30/LF + $18/LF = $25.30/LF

24" HDPE = $11.80/LF + $24/LF = $35.80/LF

30" HDPE = $16.80/LF + $30/LF = $46.80/LF

36" HDPE = $22.50/LF + $36/LF = $58.50/LF

42" HDPE = $29.70/LF + $42/LF = $71.70/LF

48" HDPE = $38.70/LF + $48 = $86.70/LF

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **D-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
18 in RCP	LF	180	36.30	6,534			
24 in RCP	LF	50	41.80	2,090			
30 in RCP	LF	135	53.30	7,196			
42 in RCP	LF	30	87.72	2,632			
18 in HDPE	LF				180	25.30	4,554
24 in HDPE	LF				50	35.80	1,790
30 in HDPE	LF				135	46.80	6,318
42 in HDPE	LF				30	71.70	2,151
Foundation backfill material TP2	CY				16	44.73	716
Subtotal				18,452			15,529
Markup (%) at 9%				1,661			1,398
TOTAL				20,113			16,927

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **D-3**

DESCRIPTION: **MOVE THE 30-IN-DIAMETER STORM DRAIN LINE BETWEEN THE I-516 BRIDGE PIER AND NEW RETAINING WALL TO UNDER THE NEW PAVEMENT**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

A new 30-in-diameter storm drain line is to be constructed between the existing I-516 bridge foundations and the new retaining wall along the westbound lane that will create an area for the new sidewalk to be installed behind the bridge pier columns.

ALTERNATIVE: (sketch attached)

Move the 30-in-diameter storm drain line to under the new pavement.

ADVANTAGES:

- Easier and faster to construct
- Avoids potential to damage the new retaining wall during construction

DISADVANTAGES:

- Places storm drain line under the pavement thus requiring traffic to be detoured if a future repair is required

DISCUSSION:

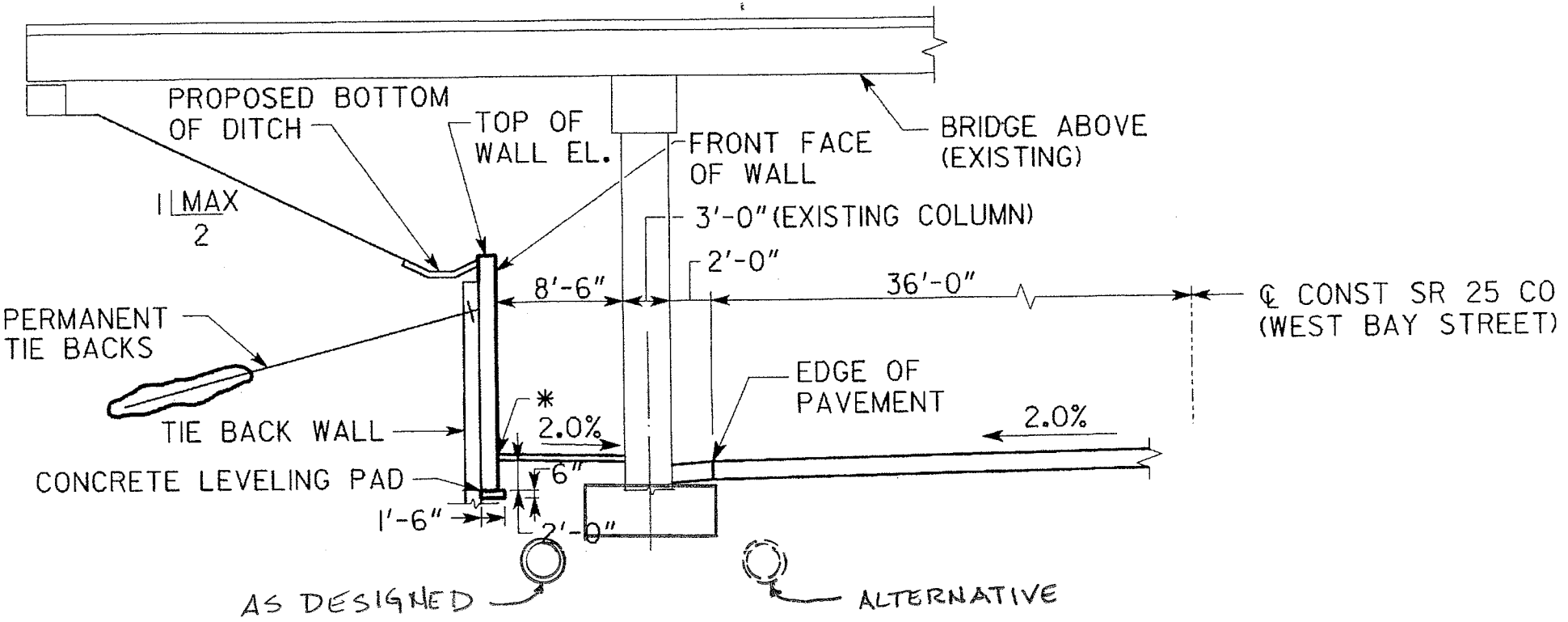
Constructing the storm drain line in the location shown will be difficult because of the new retaining wall and the existing bridge pier footings. By moving the pipe into the roadway, these obstacles are avoided making it easier and faster to install the line. This should result in a cost savings for the project by avoiding a construction risk.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

EL

DESIGN DATA

INS -------- AASHTO 17TH EDITION 2002



NO SCALE

ALT. NO. D-3 SHT. 2 of 3.

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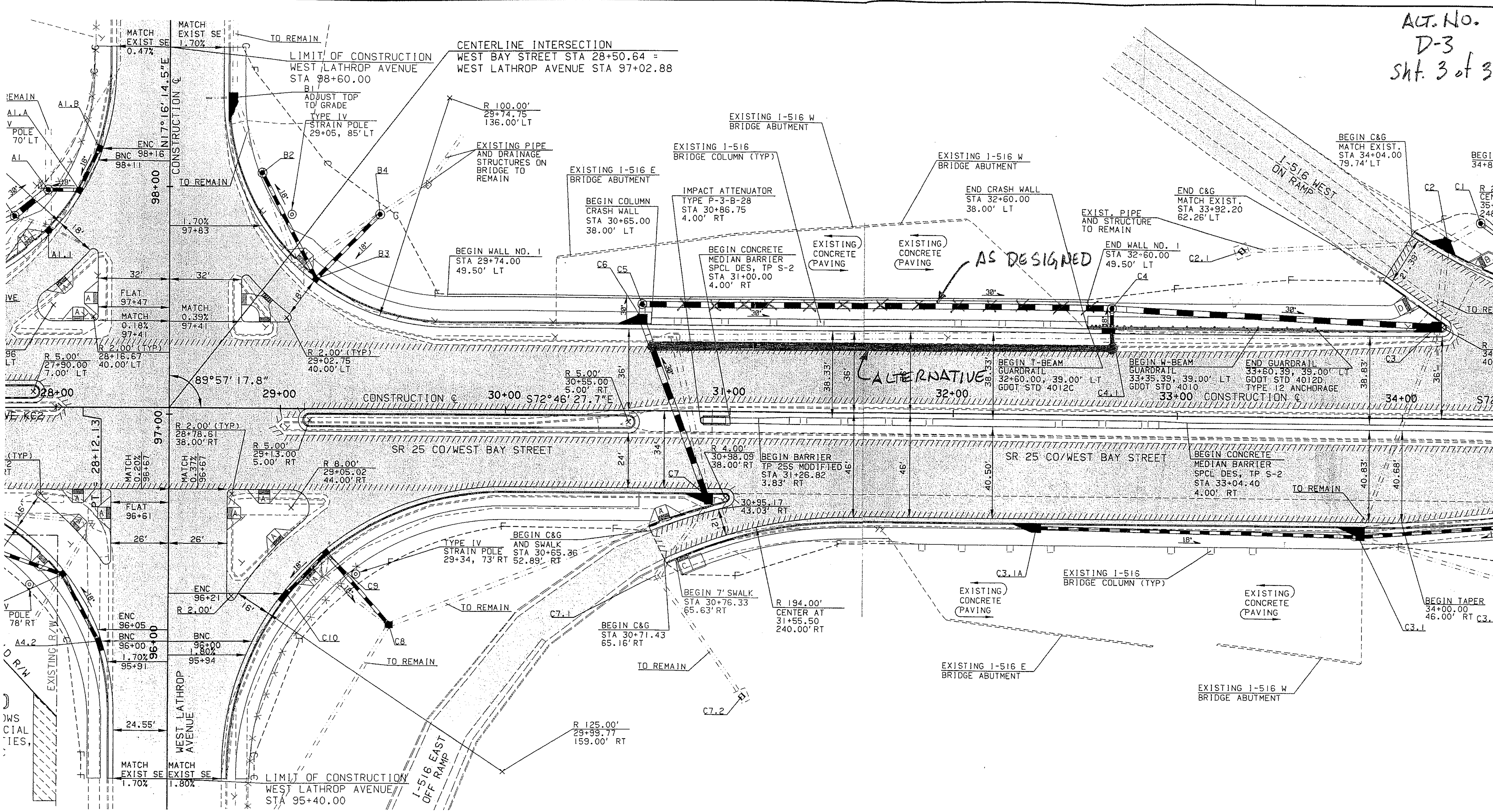


ACT. NO.
D-3
Sht. 3 of 3
MATCH EXIST SE 0.47%
MATCH EXIST SE 1.70%
TO REMAIN
LIMIT OF CONSTRUCTION
WEST LATHROP AVENUE
STA 98+60.00
CENTERLINE INTERSECTION
WEST BAY STREET STA 28+50.64 =
WEST LATHROP AVENUE STA 97+02.88
B1
ADJUST TOP TO GRADE
TYPE IV STRAIN POLE 29+05, 85' LT
R 100.00' 29+74.75 136.00' LT
EXISTING PIPE AND DRAINAGE STRUCTURES ON BRIDGE TO REMAIN
EXISTING I-516 W BRIDGE ABUTMENT
EXISTING I-516 BRIDGE COLUMN (TYP)
EXISTING I-516 E BRIDGE ABUTMENT
IMPACT ATTENUATOR TYPE P-3-B-28 STA 30+86.75 4.00' RT
BEGIN COLUMN CRASH WALL STA 30+65.00 38.00' LT
BEGIN WALL NO. 1 STA 29+74.00 49.50' LT
BEGIN CONCRETE MEDIAN BARRIER SPCL DES, TP S-2 STA 31+00.00 4.00' RT
EXISTING CONCRETE PAVING
END CRASH WALL STA 32+60.00 38.00' LT
AS DESIGNED
ALTERNATIVE
EXIST. PIPE AND STRUCTURE TO REMAIN
END WALL NO. 1 STA 32+60.00 49.50' LT
END C&G MATCH EXIST. STA 33+92.20 62.26' LT
BEGIN C&G MATCH EXIST. STA 34+04.00 79.74' LT
I-516 WEST ON RAMP
CONSTRUCTION ℄
N17°16'14.5"E
98+00
97+00
96+00
28+12.13
CONSTRUCTION ℄ 30+00 S72°46'27.7"E 31+00 32+00 33+00 34+00
89°57'17.8"
29+00
28+00
BEGIN T-BEAM GUARDRAIL 32+60.00, 39.00' LT GDOT STD 4012C
BEGIN W-BEAM GUARDRAIL 33+35.39, 39.00' LT GDOT STD 4010
END GUARDRAIL 33+60.39, 39.00' LT GDOT STD 4012D, TYPE 12 ANCHORAGE
SR 25 CO/WEST BAY STREET
R 2.00' (TYP) 28+78.61 38.00' RT
R 5.00' 29+13.00 5.00' RT
R 8.00' 29+05.02 44.00' RT
R 4.00' 30+98.09 38.00' RT
BEGIN BARRIER TP 25S MODIFIED STA 31+26.82 3.83' RT
30+95.17 43.03' RT
BEGIN CONCRETE MEDIAN BARRIER SPCL DES, TP S-2 STA 33+04.40 4.00' RT
TYPE IV STRAIN POLE 29+34, 73' RT
BEGIN C&G AND SWALK STA 30+65.36 52.89' RT
BEGIN 7' SWALK STA 30+76.33 65.63' RT
R 194.00' CENTER AT 31+55.50 240.00' RT
BEGIN C&G STA 30+71.43 65.16' RT
EXISTING I-516 BRIDGE COLUMN (TYP)
EXISTING I-516 E BRIDGE ABUTMENT
EXISTING I-516 W BRIDGE ABUTMENT
BEGIN TAPER 34+00.00 46.00' RT
R 125.00' 29+99.77 159.00' RT
I-516 EAST OFF RAMP
WEST LATHROP AVENUE
MATCH EXIST SE 1.70%
MATCH EXIST SE 1.80%
LIMIT OF CONSTRUCTION
WEST LATHROP AVENUE
STA 95+40.00
ENC 98+16
BNC 98+11
1.70% 97+83
FLAT 97+47
MATCH 0.18% 97+41
MATCH 0.39% 97+41
R 5.00' 27+90.00 7.00' LT
R 2.00' (TYP) 28+16.67 40.00' LT
R 2.00' (TYP) 29+02.75 40.00' LT
R 5.00' 30+55.00 5.00' RT
FLAT 96+61
ENC 96+21
R 2.00'
ENC 96+05
BNC 96+00
1.70% 95+91
BNC 96+00
1.80% 95+94
TO REMAIN
C1 C2 C2.1 C3 C3.1 C3.1A C4 C4.1 C5 C6 C7 C7.1 C7.2 C8 C9 C10
B2 B3 B4

W LINE
TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partners, Inc.

WARD

REV

...RTY AND EXISTING R/W LINE
...IRED R/W LINE
...T OF WAY MARKER
...ERLINE
...H OR SWALE

TOE OF FILL
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

McGee Partne...

WARD

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **CG-1**

DESCRIPTION: **USE 24-IN-WIDE CURB AND GUTTER IN LIEU OF 30-IN-WIDE CURB AND GUTTER**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

Construct 30-in-wide Type 2 curb and gutter on the sidewalk side of the road and 30 in Type 7 curb and gutter on both sides of the median.

ALTERNATIVE: (sketch attached)

Construct 24–in-wide Type 2 curb and gutter on the sidewalk side of the road and 24 in Type 7 curb and gutter on both sides of the median.

ADVANTAGES:

- Reduces the amount of storm water to be collected
- Reduces concrete requirement

DISADVANTAGES:

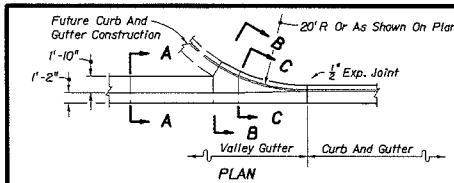
- Will increase gutter spread

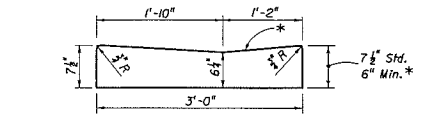
DISCUSSION:

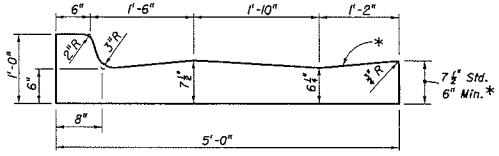
The higher gutter spread may require extra curb inlets and pipes. However, in most cases the curb inlets are not spaced at the maximum allowable distance, therefore there is extra capacity. In addition, the narrow gutter pan results in a one ft reduction in impermeable area, reducing the storm water volume by 4% for a two-lane section of roadway. This combination of events should result in no net increase in curb inlets.

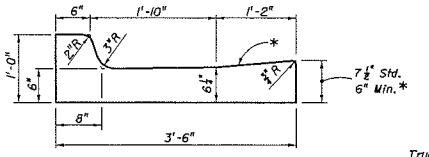
Note that the Florida DOT typically uses 1 ft 6 in gutter pans as shown on the attached sketches.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 409,657	—	$ 409,657
ALTERNATIVE	$ 328,308	—	$ 328,308
SAVINGS (Original minus Alternative)	$ 81,349	—	$ 81,349





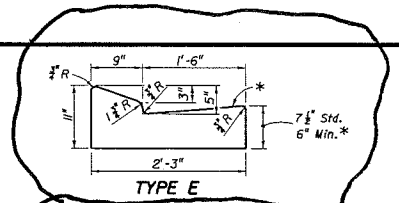


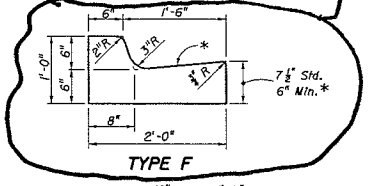


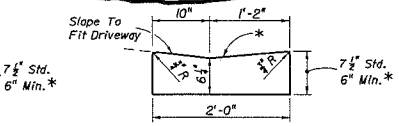
VALLEY GUTTER

* When used on high side of roadways, the cross slope of the gutter shall match the cross slope of the adjacent pavement. The thickness of the lip shall be 6", unless otherwise shown on plans.

◪ Rotate entire section so that gutter cross slope matches slope of adjacent circulating roadway pavement.

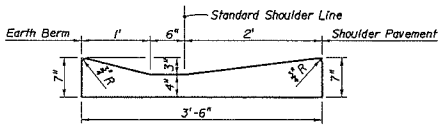




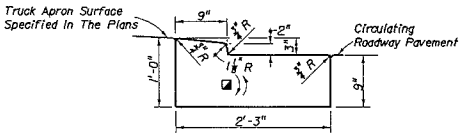


Note: To be paid for as parent curb.

DROP CURB



SHOULDER GUTTER

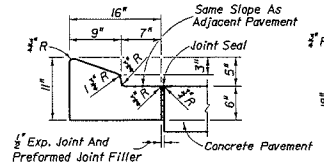


TRAFFIC BEARING SECTION FOR USE IN ROUNDABOUT CENTRAL ISLAND CONSTRUCTION

TYPE RA

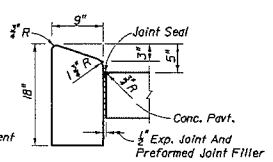
Note: For use adjacent to concrete or flexible pavement. For details depicting usage adjacent to flexible pavement, see diagram right. Expansion joint, preformed joint filler and joint seal are required between curb & gutter and concrete pavement only, see diagram right.

CONCRETE CURB AND GUTTER

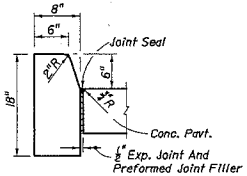


For details depicting usage adjacent to flexible pavement, see diagram right.

TYPE A



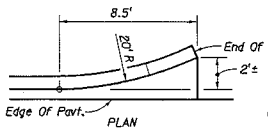
TYPE B

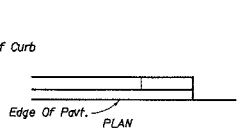


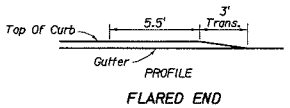
TYPE D

Note: For use adjacent to concrete or flexible pavement, concrete shown. Expansion joint, preformed joint filler and joint seal are required between curbs and concrete pavement only, see diagram right.

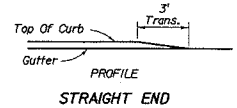
CONCRETE CURB





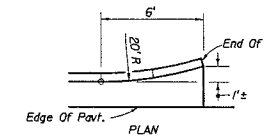


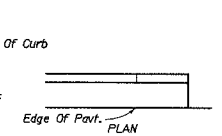
FLARED END

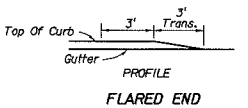


STRAIGHT END

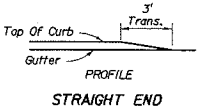
CURB TYPE A







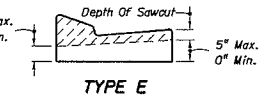
FLARED END



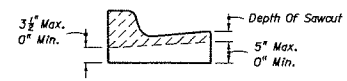
STRAIGHT END

CURB TYPE E & F

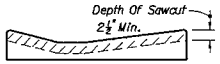
CURB AND GUTTER ENDINGS



TYPE E



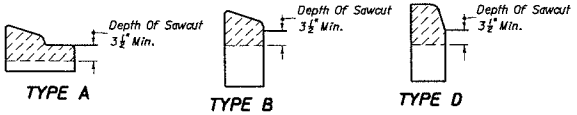
TYPE F



SHOULDER GUTTER

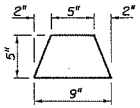
Sawcuts should be avoided within valley gutter and within curb and gutter endings.

CONTRACTION JOINT IN CURB AND GUTTER

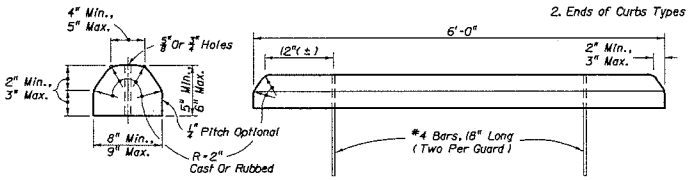


TYPE A **TYPE B** **TYPE D**

CONTRACTION JOINT IN CURB



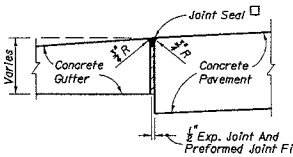
ASPHALTIC CONCRETE CURB



CONCRETE BUMPER GUARD

△ Applies to both high and low sides of pavement, low side shown. Applies to shoulder gutter only where adjoining traffic lanes.

CURB AND GUTTER AND TYPE A CURB ADJACENT TO FLEXIBLE PAVEMENT



□ Applies to both high and low sides of pavement, low side shown.

EXPANSION JOINT BETWEEN GUTTER AND CONCRETE PAVEMENT

GENERAL NOTES

1. For curb, gutter and curb & gutter provide ⅛"-¼" contraction joints at 10' centers (max.). Contraction joints adjacent to concrete pavement on tangents and flat curves are to match the pavement joints, with intermediate joints not to exceed 10' centers. Curb, gutter and curb & gutter expansion joints shall be located in accordance with Section 520 of the standard specifications.

2. Ends of Curbs Types B and D shall transition from full to zero heights in 3'.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CURB & CURB AND GUTTER

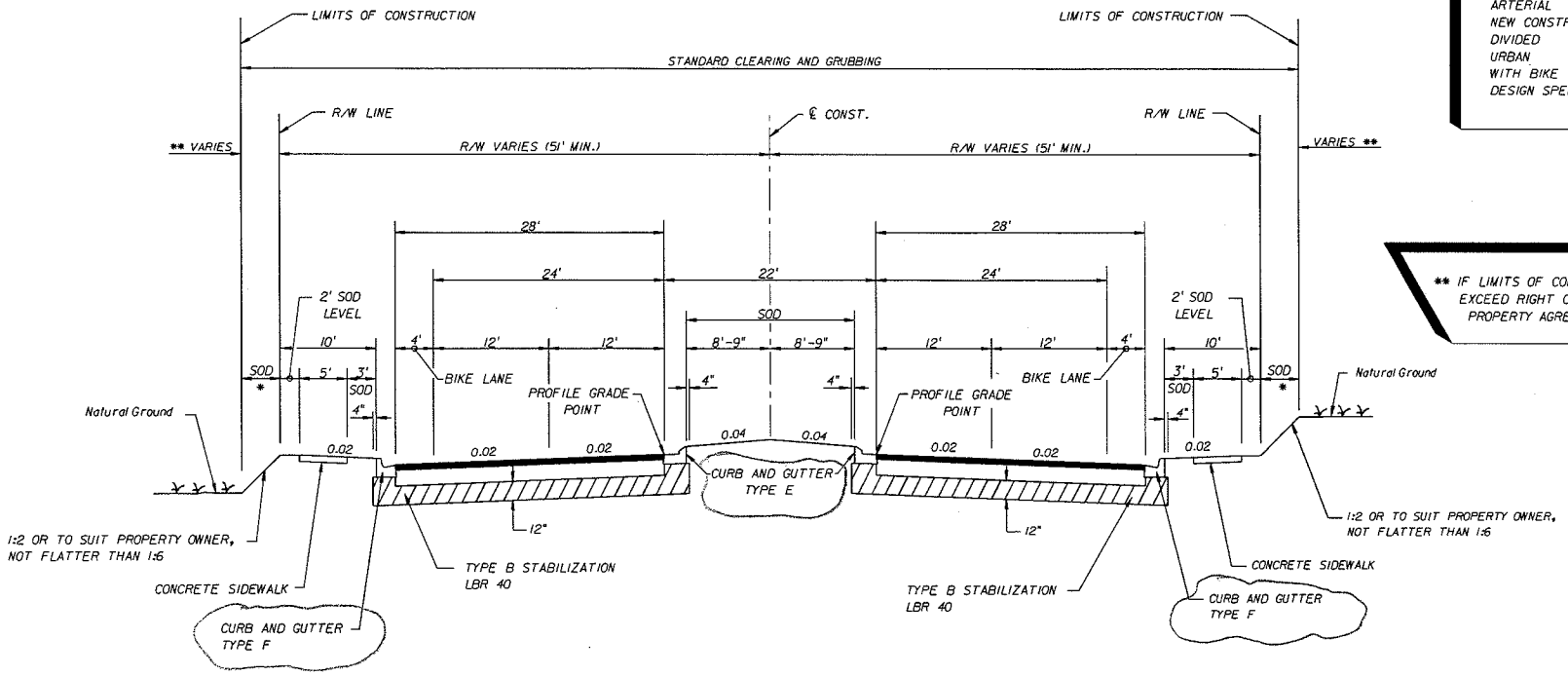
	Names	Dates
Designed By		
Drawn By		
Checked By		

Approved By _____ Roadway Design Engineer

Revision	Sheet No.	Index No.
00	1 of 1	300

FROM FLORIDA DOT

ALT. NO. C9-1 SHT. 2 of 4



4-LANE
ARTERIAL
NEW CONSTRUCTION
DIVIDED
URBAN
WITH BIKE LANES
DESIGN SPEED 45 MPH OR LESS

** IF LIMITS OF CONSTRUCTION EXCEED RIGHT OF WAY, A PROPERTY AGREEMENT IS REQUIRED.

* TURF OR SOD

TYPICAL SECTION
SR 00 (WILSON STREET)
STA. 98+40.00 TO STA. 202+33.00

NEW CONSTRUCTION

OPTIONAL BASE GROUP 9 WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1½")
AND FRICTION COURSE FC-12.5 (TRAFFIC B) (1½") (RUBBER)

TRAFFIC DATA

CURRENT YEAR = 1998 AADT = 22800
ESTIMATED OPENING YEAR = 2000 AADT = 25800
ESTIMATED DESIGN YEAR = 2020 AADT = 30600
K = 6% D = 55% T = 2% (24 HOUR)
DESIGN HOUR T = 1%
DESIGN SPEED = 45 MPH

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR. POSTED SPEED (MPH) IS OPTIONAL.

FOR STANDARD TYPICAL SECTION NOTES REFER TO EXHIBIT 6-1, THIS CHAPTER.

EXHIBIT TYP-5
Date: 1/1/09

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TYPICAL SECTION	SHEET NO.
ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
10	LEON	123456-1-52-01		

rd960jf 12/30/2008 3:08:05 PM N:\Private\RCS\Manuals\PPM\R-Record PPM\Eng\2009\B-Master Update Package\Vol2\Exhibits\er0

FROM FLORIDA DOT

ALT NO. CG-1 Sht. 3 of 4

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **CG-1**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
30 in Type 2 curb and gutter	LF	15,300	14.96	228,888			
30 in Type 7 curb and gutter	LF	11,200	13.12	146,944			
24 in Type 2 curb and gutter	LF				15,300	12.00	183,600
30 in Type 7 curb and gutter	LF				11,200	10.50	117,600
Subtotal				375,832			301,200
Markup (%) at 9%				33,825			27,108
TOTAL				409,657			328,308

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **CG-2**

DESCRIPTION: **ELIMINATE CURB AND GUTTER, SIDEWALK AND SIDE DRAINS FROM FOUR SIDE ROADS**

SHEET NO.: **1 of 9**

ORIGINAL DESIGN: (sketch attached)

Install curb and gutter, sidewalk and side drains on: (A) Graham Street, (B) Kirkland Street, (C) Scarborough Street and (D) Norton Street.

ALTERNATIVE: (sketch attached)

Eliminate new curb and gutter, sidewalk and some of the side drains from the above side streets.

ADVANTAGES:

- Saves construction time
- Saves money
- Limits area of disturbance

DISADVANTAGES:

- Constituents may not like as is conditions on the side roads

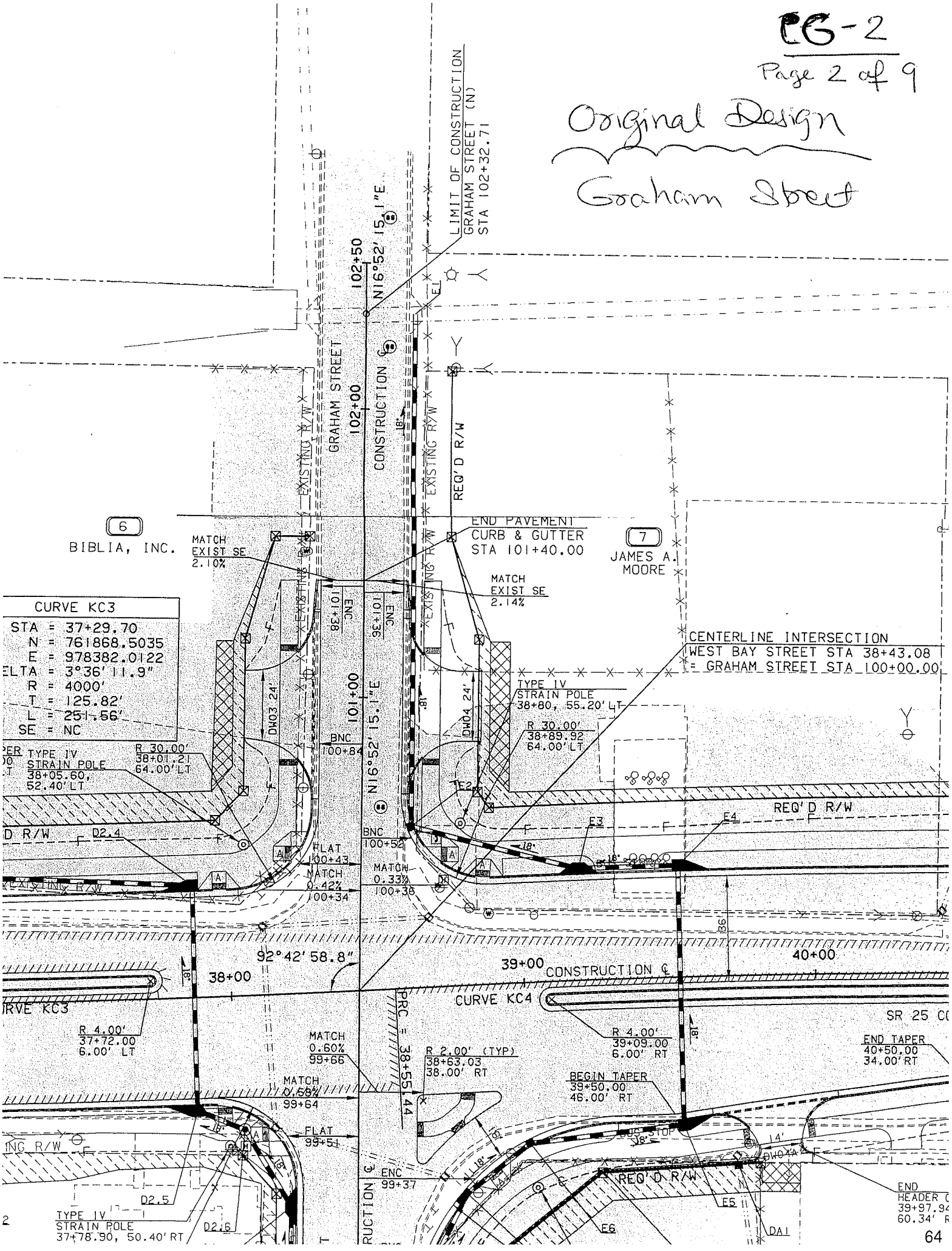
DISCUSSION:

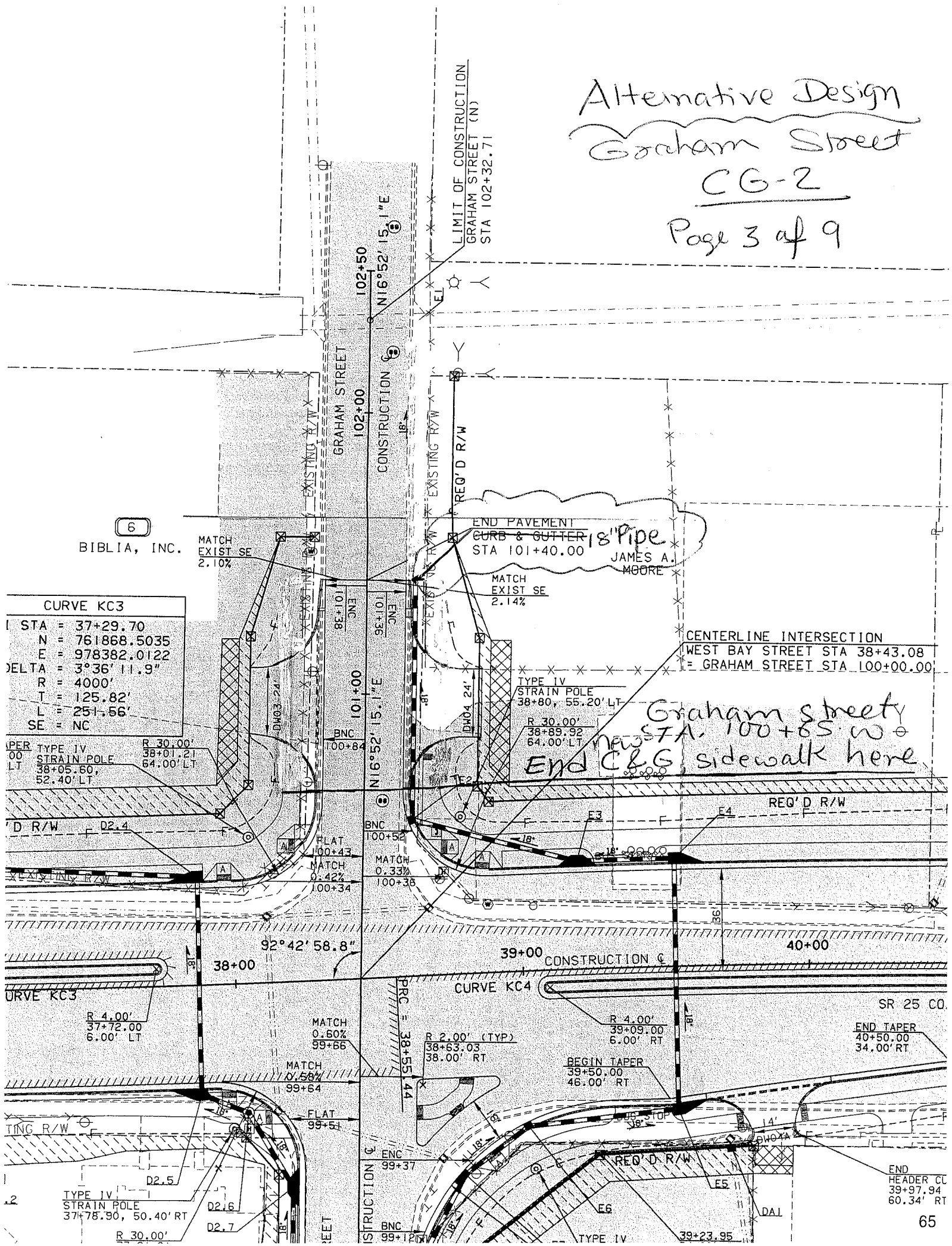
There is no appreciable advantage in removing existing curb and gutter and putting new ones along with 6-ft-wide sidewalks on the side roads. Considerable time and money can be saved by eliminating them.

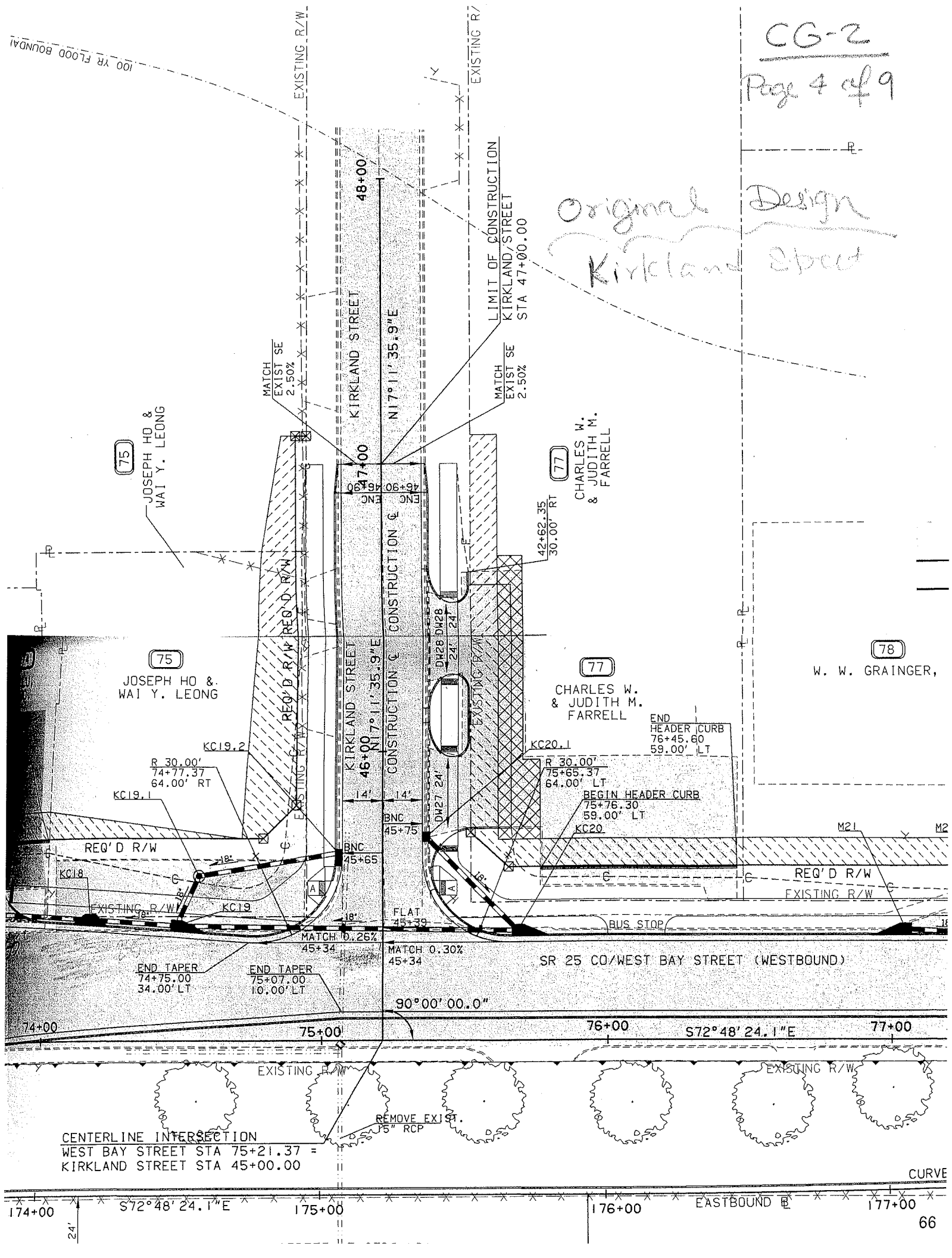
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 32,931	—	$ 32,931
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 32,931	—	$ 32,931

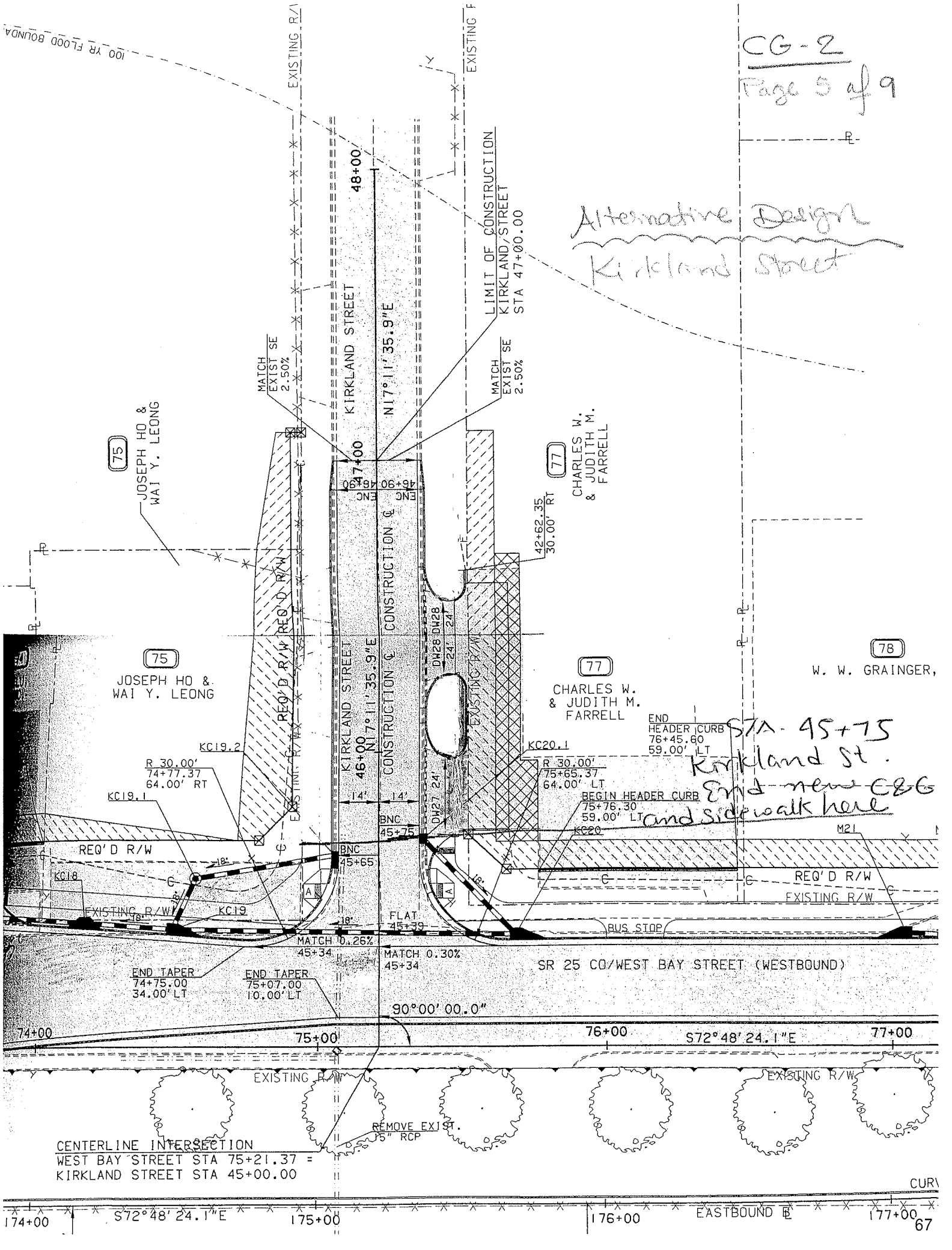
Original Design

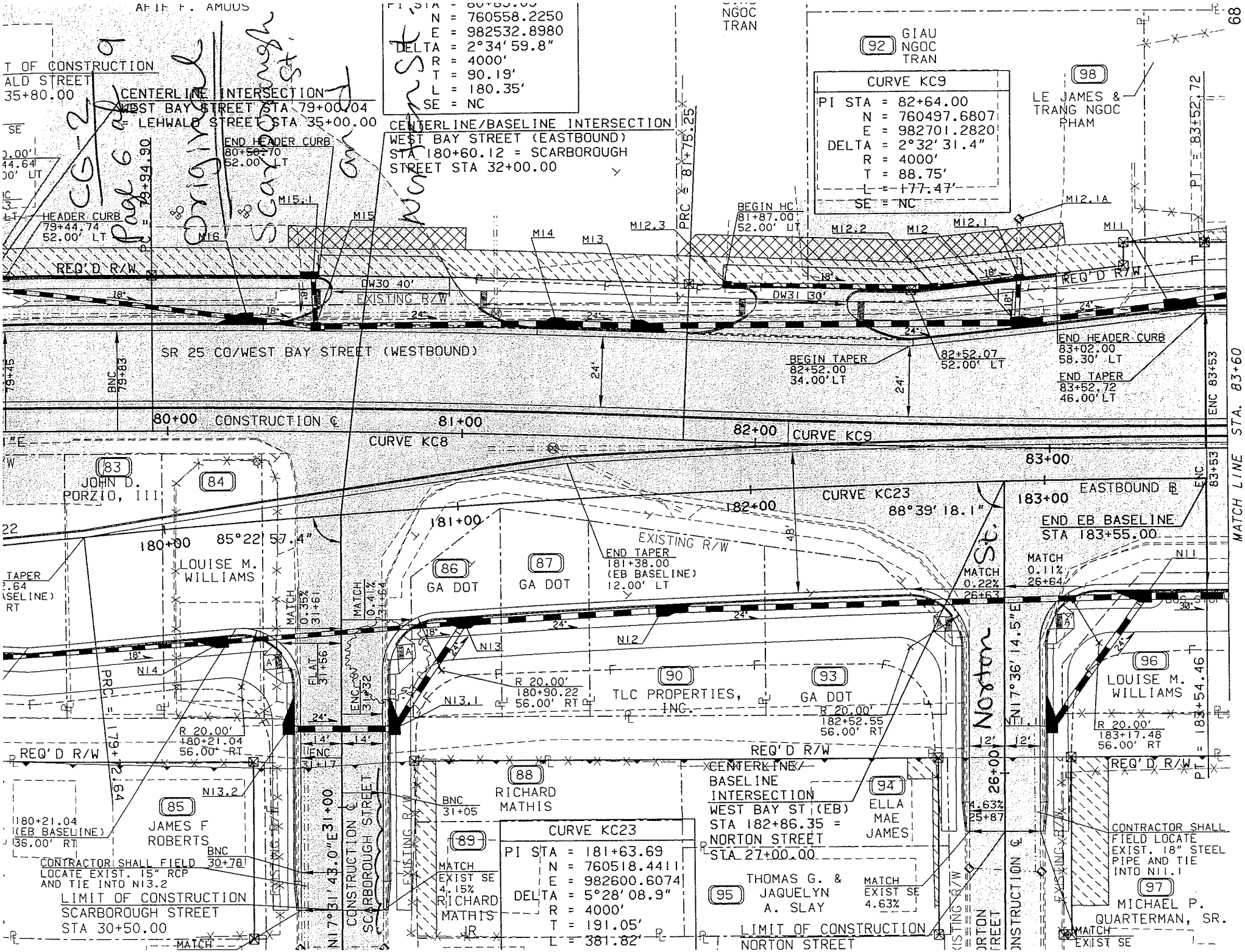
Graham Street

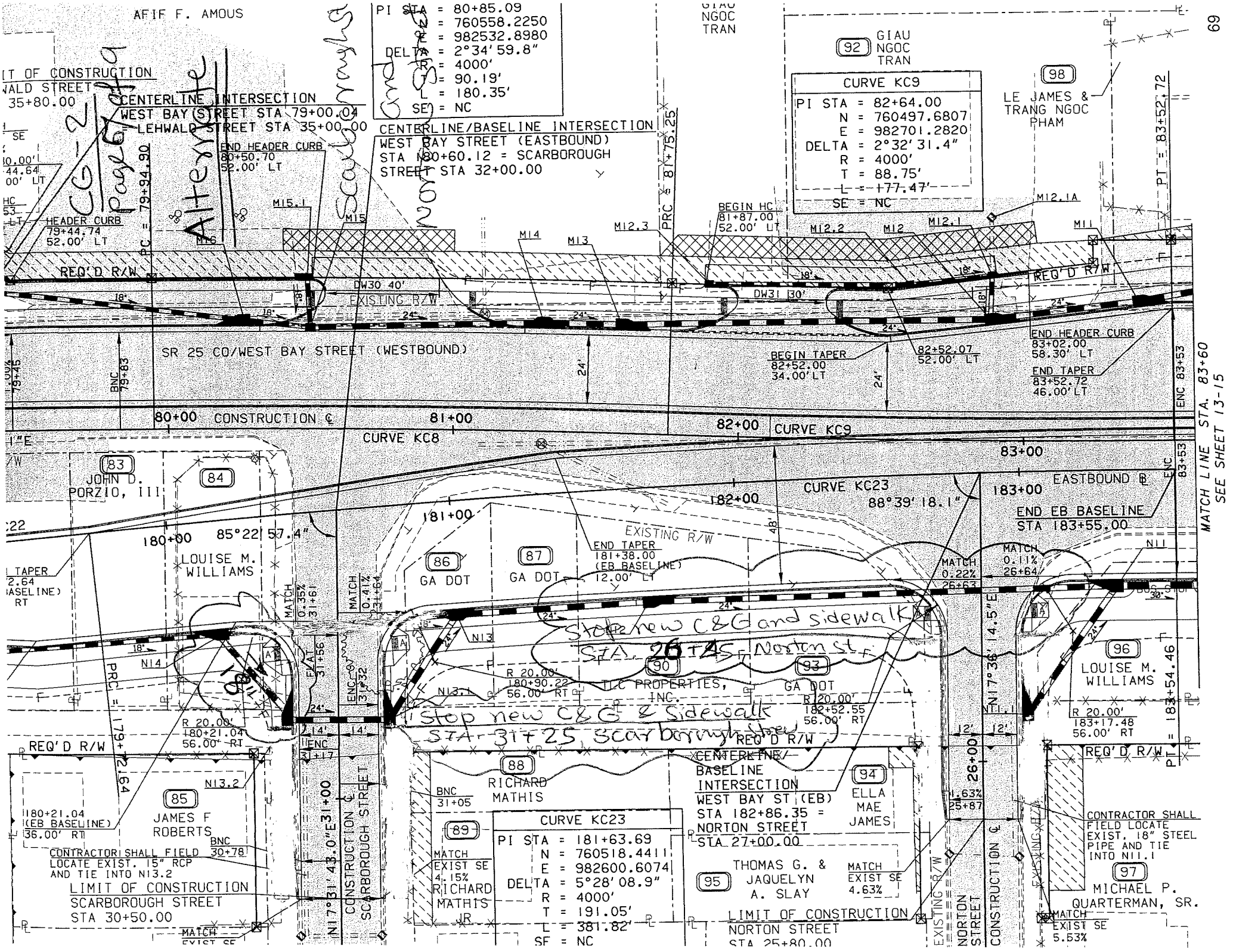



Alternative Design
Graham Street
CG-2
Page 3 of 9
LIMIT OF CONSTRUCTION
GRAHAM STREET (N)
STA 102+32.71
N16°52' 15.1"E
102+50
102+00
101+00
GRAHAM STREET
CONSTRUCTION ℄
EXISTING R/W
REQ'D R/W
6
BIBLIA, INC.
MATCH
EXIST SE
2.10%
END PAVEMENT
CURB & GUTTER
STA 101+40.00
18" Pipe
JAMES A.
MOORE
MATCH
EXIST SE
2.14%
CENTERLINE INTERSECTION
WEST BAY STREET STA 38+43.08
= GRAHAM STREET STA 100+00.00
CURVE KC3
STA = 37+29.70
N = 761868.5035
E = 978382.0122
DELTA = 3°36' 11.9"
R = 4000'
T = 125.82'
L = 251.56'
SE = NC
TYPE IV
STRAIN POLE
38+05.60,
52.40' LT
R 30.00'
38+01.21
64.00' LT
ENC
101+38
ENC
101+36
BNC
100+84
DW03 24"
DW04 24"
TYPE IV
STRAIN POLE
38+80, 55.20' LT
R 30.00'
38+89.92
64.00' LT
Graham Street
new STA. 100+65.00
End C&G, sidewalk here
REQ'D R/W
D2.4
BNC
100+52
FLAT
100+43
MATCH
0.42%
100+34
MATCH
0.33%
100+38
E3
E4
92°42' 58.8"
38+00
39+00
CONSTRUCTION ℄
40+00
CURVE KC4
SR 25 CO.
R 4.00'
37+72.00
6.00' LT
MATCH
0.60%
99+66
MATCH
0.58%
99+64
FLAT
99+54
PRC = 38+55.44
R 2.00' (TYP)
38+63.03
38.00' RT
R 4.00'
39+09.00
6.00' RT
END TAPER
40+50.00
34.00' RT
BEGIN TAPER
39+50.00
46.00' RT
BUS STOP
14'
DW01A
ENC
99+37
REQ'D R/W
E5
E6
D2.5
D2.6
D2.7
TYPE IV
STRAIN POLE
37+78.90, 50.40' RT
R 30.00'
BNC
99+12
TYPE IV
39+23.95
DA1
END
HEADER CL
39+97.94
60.34' RT


CG-2
Page 4 of 9
Original Design
Kirkland Street
EXISTING R/W
100 YR FLOOD BOUNDARY
LIMIT OF CONSTRUCTION
KIRKLAND/STREET
STA 47+00.00
48+00
KIRKLAND STREET
N17°11'35.9"E
MATCH EXIST SE 2.50%
47+00
46+90.46 ENC
42+62.35
30.00' RT
75
JOSEPH HO &
WAI Y. LEONG
77
CHARLES W.
& JUDITH M.
FARRELL
78
W. W. GRAINGER,
REQ'D R/W
CONSTRUCTION ℄
DW28
DW27
24'
KC19.2
R 30.00'
74+77.37
64.00' RT
KC19.1
14'
BNC
45+75
45+65
KC18
KC19
18"
FLAT
45+39
MATCH 0.26%
45+34
MATCH 0.30%
45+34
END TAPER
74+75.00
34.00' LT
END TAPER
75+07.00
10.00' LT
KC20.1
END
HEADER CURB
76+45.60
59.00' LT
R 30.00'
75+65.37
64.00' LT
BEGIN HEADER CURB
75+76.30
59.00' LT
KC20
M21
M2
BUS STOP
SR 25 CO/WEST BAY STREET (WESTBOUND)
90°00'00.0"
S72°48'24.1"E
74+00
75+00
76+00
77+00
REMOVE EXIST.
15" RCP
CENTERLINE INTERSECTION
WEST BAY STREET STA 75+21.37 =
KIRKLAND STREET STA 45+00.00
CURVE
174+00
175+00
176+00
177+00
EASTBOUND ℄
24'


CG-2
Page 5 of 9
Alternative Design
Kirkland Street
EXISTING R/W
LIMIT OF CONSTRUCTION
KIRKLAND/STREET
STA 47+00.00
48+00
KIRKLAND STREET
N17°11'35.9"E
MATCH
EXIST SE
2.50%
47+00
46+90 ENC
46+90 ENC
75
JOSEPH HO &
WAI Y. LEONG
77
CHARLES W.
& JUDITH M.
FARRELL
42+62.35
30.00' RT
78
W. W. GRAINGER,
REQ'D R/W
CONSTRUCTION ℄
46+00
N17°11'35.9"E
KIRKLAND STREET
EXISTING R/W
DW28
DW27
24'
14'
KC19.2
R 30.00'
74+77.37
64.00' RT
KC19.1
KC18
KC19
BNC
45+75
BNC
45+65
FLAT
45+39
KC20.1
R 30.00'
75+65.37
64.00' LT
END
HEADER CURB
76+45.60
59.00' LT
BEGIN HEADER CURB
75+76.30
59.00' LT
KC20
M21
BUS STOP
STA. 45+75
Kirkland St.
End new C&G
and sidewalk here
MATCH 0.26%
45+34
MATCH 0.30%
45+34
END TAPER
74+75.00
34.00' LT
END TAPER
75+07.00
10.00' LT
SR 25 CO/WEST BAY STREET (WESTBOUND)
90°00'00.0"
S72°48'24.1"E
74+00
75+00
76+00
77+00
REMOVE EXIST.
15" RCP
CENTERLINE INTERSECTION
WEST BAY STREET STA 75+21.37 =
KIRKLAND STREET STA 45+00.00
174+00
175+00
176+00
177+00
EASTBOUND ℄


CENTERLINE INTERSECTION
WEST BAY STREET STA 79+00.04
= LEHWALD STREET STA 35+00.00
CENTERLINE/BASELINE INTERSECTION
WEST BAY STREET (EASTBOUND)
STA 180+60.12 = SCARBOROUGH
STREET STA 32+00.00
PI STA = 80+85.05
N = 760558.2250
E = 982532.8980
DELTA = 2°34'59.8"
R = 4000'
T = 90.19'
L = 180.35'
SE = NC
CURVE KC9
PI STA = 82+64.00
N = 760497.6807
E = 982701.2820
DELTA = 2°32'31.4"
R = 4000'
T = 88.75'
L = 177.47'
SE = NC
CURVE KC23
PI STA = 181+63.69
N = 760518.4411
E = 982600.6074
DELTA = 5°28'08.9"
R = 4000'
T = 191.05'
L = 381.82'
CENTERLINE/ BASELINE INTERSECTION
WEST BAY ST (EB)
STA 182+86.35 =
NORTON STREET
STA 27+00.00
SR 25 CO/WEST BAY STREET (WESTBOUND)
REQ'D R/W
EXISTING R/W
CONSTRUCTION ℄
SCARBOROUGH STREET
NORTON STREET
LIMIT OF CONSTRUCTION
SCARBOROUGH STREET
STA 30+50.00
LIMIT OF CONSTRUCTION
NORTON STREET
BEGIN HC
81+87.00
52.00' LT
END HEADER CURB
80+56.70
52.00' LT
HEADER CURB
79+44.74
52.00' LT
BEGIN TAPER
82+52.00
34.00' LT
82+52.07
52.00' LT
END HEADER CURB
83+02.00
58.30' LT
END TAPER
83+52.72
46.00' LT
END TAPER
181+38.00
(EB BASELINE)
12.00' LT
END EB BASELINE
STA 183+55.00
R 20.00'
180+21.04
56.00' RT
R 20.00'
180+90.22
56.00' RT
R 20.00'
182+52.55
56.00' RT
R 20.00'
183+17.48
56.00' RT
CONTRACTOR SHALL FIELD LOCATE EXIST. 15" RCP AND TIE INTO N13.2
CONTRACTOR SHALL FIELD LOCATE EXIST. 18" STEEL PIPE AND TIE INTO N11.1
JOHN D. PORZIO, III
LOUISE M. WILLIAMS
GA DOT
GA DOT
TLC PROPERTIES, INC.
GA DOT
RICHARD MATHIS
ELLA MAE JAMES
JAMES F ROBERTS
THOMAS G. & JAQUELYN A. SLAY
RICHARD MATHIS JR
LOUISE M. WILLIAMS
MICHAEL P. QUARTERMAN, SR.
GIAU NGOC TRAN
LE JAMES & TRANG NGOC PHAM
CURVE KC8
CURVE KC9
CURVE KC23
88°39'18.1"
85°22'57.4"
MATCH LINE STA. 83+60


AFIF F. AMOUS
PI STA = 80+85.09
N = 760558.2250
E = 982532.8980
DELTA = 2°34'59.8"
R = 4000'
T = 90.19'
L = 180.35'
SE = NC
CENTERLINE INTERSECTION
WEST BAY STREET STA 79+00.04
LEHWALD STREET STA 35+00.00
CENTERLINE/BASELINE INTERSECTION
WEST BAY STREET (EASTBOUND)
STA 180+60.12 = SCARBOROUGH STREET STA 32+00.00
GIAU NGOC TRAN
92 GIAU NGOC TRAN
CURVE KC9
PI STA = 82+64.00
N = 760497.6807
E = 982701.2820
DELTA = 2°32'31.4"
R = 4000'
T = 88.75'
L = 177.47'
SE = NC
98 LE JAMES & TRANG NGOC PHAM
PRC = 81+75.25
PT = 83+52.72
BEGIN HC 81+87.00 52.00' LT
END HEADER CURB 80+50.70 52.00' LT
HEADER CURB 79+44.74 52.00' LT
PC = 79+94.90
M15.1
M15
M16
M14
M13
M12.3
M12.2
M12
M12.1
M12.1A
M11
REQ'D R/W
EXISTING R/W
DW30 40'
DW31 130'
18'
24'
SR 25 CO/WEST BAY STREET (WESTBOUND)
BEGIN TAPER 82+52.00 34.00'LT
82+52.07 52.00' LT
END HEADER CURB 83+02.00 58.30' LT
END TAPER 83+52.72 46.00' LT
BNC 79+83
79+45
80+00 CONSTRUCTION ℄
81+00
82+00
CURVE KC8
CURVE KC9
83+00
CURVE KC23
88°39'18.1"
183+00 EASTBOUND ℄
END EB BASELINE STA 183+55.00
ENC 83+53
MATCH LINE STA. 83+60
SEE SHEET 13-15
83 JOHN D. PORZIO, III
84
85°22'57.4"
180+00
181+00
182+00
LOUISE M. WILLIAMS
86 GA DOT
87 GA DOT
END TAPER 181+38.00 (EB BASELINE) 12.00' LT
EXISTING R/W
48'
MATCH 0.35% 31+61
MATCH 0.41% 31+64
MATCH 0.22% 26+63
MATCH 0.11% 26+64
FLAT 31+56
ENC 31+32
ENC 31+17
N13
N14
N13.1
N13.2
R 20.00' 180+90.22 56.00' RT
R 20.00' 180+21.04 56.00' RT
R 20.00' 182+52.55 56.00' RT
R 20.00' 183+17.48 56.00' RT
90 TLC PROPERTIES, INC.
93 GA DOT
96 LOUISE M. WILLIAMS
N17°36'14.5"E
183+54.46
PT = 183+54.46
REQ'D R/W
12'
30' BUS STOP
Stop new C&G and sidewalk STA. 26+45 Norton St.
Stop new C&G & Sidewalk STA. 31+25 Scarborough Blvd
CG-2 Type
Alternate
Scarborough
88 RICHARD MATHIS
89
94 ELLA MAE JAMES
95 THOMAS G. & JAQUELYN A. SLAY
97 MICHAEL P. QUARTERMAN, SR.
BNC 31+05
MATCH EXIST SE 4.15%
MATCH EXIST SE 4.63%
MATCH EXIST SE 5.53%
CONTRACTOR SHALL FIELD LOCATE EXIST. 15" RCP AND TIE INTO N13.2
CONTRACTOR SHALL FIELD LOCATE EXIST. 18" STEEL PIPE AND TIE INTO N11.1
180+21.04 (EB BASELINE) 36.00' RT
BNC 30+78
LIMIT OF CONSTRUCTION SCARBOROUGH STREET STA 30+50.00
LIMIT OF CONSTRUCTION NORTON STREET STA 25+80.00
CONSTRUCTION ℄ SCARBOROUGH STREET
N17°31'43.0"E 31+00
PRC = 179+72.64
CURVE KC23
PI STA = 181+63.69
N = 760518.4411
E = 982600.6074
DELTA = 5°28'08.9"
R = 4000'
T = 191.05'
L = 381.82'
SE = NC
EXISTING R/W
NORTON STREET
CONSTRUCTION ℄
26+00
1.63% 25+87
69

CALCULATIONS

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: CG-2

SHEET NO.: 8 of 9

Graham Street;

Sidewalk; $(101+40.00 - 100+65.00) 6 \times 2/9 = 100$ SY

30" Type 2 C&G; $75' \times 2 = 150$ LF

18" Pipe; 90 LF

Kirkland Street;

Sidewalk: $[(47+00.00 - 45+75.00) + 105' + 70'] \times \frac{6}{9} = 200$ SY

30" Type 2 C&G; $(47+00.00 - 45+75.00) 2 = 250$ LF

Scarborough Street;

Sidewalk; $(31+25.00 - 30+50.00) 6 \times \frac{2}{9} = 100$ SY

30" Type 2 C&G; $75' \times 2 = 150$ LF

18" Pipe; $80' - 30' = 50$ LF.

Norton Street;

Sidewalk: $(26+45 - 25+80) 6 \times \frac{2}{9} = 87$ SY

30" Type 2 C&G; $65' \times 2 = 130$ LF

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **CG-2**

SHEET NO.: **9 of 9**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Graham Street							
Sidewalk	SY	100	30.72	3,072			
30 in Type 2 curb and gutter	LF	150	14.96	2,244			
18 in pipe	LF	90	36.27	3,264			
Subtotal				8,580			
Kirkland Street							
Sidewalk	SY	200	30.72	6,144			
30 in Type 2 curb and gutter	LF	250	14.96	3,740			
Subtotal				9,884			
Scarborough Street							
Sidewalk	SY	100	30.72	3,072			
30 in Type 2 curb and gutter	LF	150	14.96	2,244			
18 in pipe	LF	50	36.27	1,814			
Subtotal				7,130			
Norton Street							
Sidewalk	SY	87	30.72	2,673			
30 in Type 2 curb and gutter	LF	130	14.96	1,945			
Subtotal				4,618			
Subtotal				30,212			
Markup (%) at 9%				2,719			
TOTAL				32,931			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **S-1**

DESCRIPTION: **USE 6-FT-WIDE SIDEWALKS ON THE SOUTH SIDE OF THE ROAD FROM KENILWORTH STREET TO EAST LATHROP AVENUE**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

Construct an 8-ft-wide sidewalk from Kenilworth Street to East Lathrop Avenue on the south side of the road.

ALTERNATIVE:

Construct a 6-ft-wide sidewalk from Kenilworth Street to East Lathrop Avenue on the south side of the road.

ADVANTAGES:

- Reduces concrete requirements
- Uniformity is maintained
- Less sidewalk to maintain

DISADVANTAGES:

- None apparent

DISCUSSION:

Five-ft-wide sidewalks in an urban section are the standard. Since sidewalks will be provided on both sides of the road, a width of 6 ft appears sufficient. This is not a bicycle route, thus the extra width is not necessary for this purpose. Right-of-way cost savings are not included because mostly entire parcels will be acquired.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 29,765	—	$ 29,765
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 29,765	—	$ 29,765

CALCULATIONS

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: S-1

SHEET NO.: 2 of 3

8' ~~wide~~ side walk is from STA. 45+00 to STA. 85+00 only on the south side of the road.

Total length: 4,000 feet.

6' width will save: 4000 x (8-6) = 8,000 sf
or 888.8 SY

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **S-1**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
4-in-thick concrete sidewalk	SY	889	30.72	27,307			
Subtotal				27,307			
Markup (%) at 9%				2,458			
TOTAL				29,765			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **S-2**

DESCRIPTION: **USE 5-FT-WIDE SIDEWALKS IN LIEU OF 6-FT-WIDE AND 8-FT-WIDE SIDEWALKS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The current design has 6-ft-wide and 8-ft-wide sidewalks along the entire length of the project.

ALTERNATIVE: (sketch attached)

Build 5-ft-wide sidewalks along the entire length of the project.

ADVANTAGES:

- Reduces concrete requirements
- Accommodates narrowing the shoulders, if desired, to save right-of-way, etc.
- Less sidewalk to maintain

DISADVANTAGES:

- None apparent

DISCUSSION:

The current design uses 6-ft-wide and 8-ft-wide sidewalks, however 5-ft-wide sidewalks meet ADA standards and are also the typical width of sidewalks for urban pedestrian traffic. Reducing the sidewalk will allow the shoulders to be narrowed, if desired, to save right-of-way and reduce damages. It is important to note that this is not a bicycle route, thus the extra wide sidewalks (8 ft) are not being used as a multi-use trail.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 101,928	—	$ 101,928
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 101,928	—	$ 101,928

SKETCHES

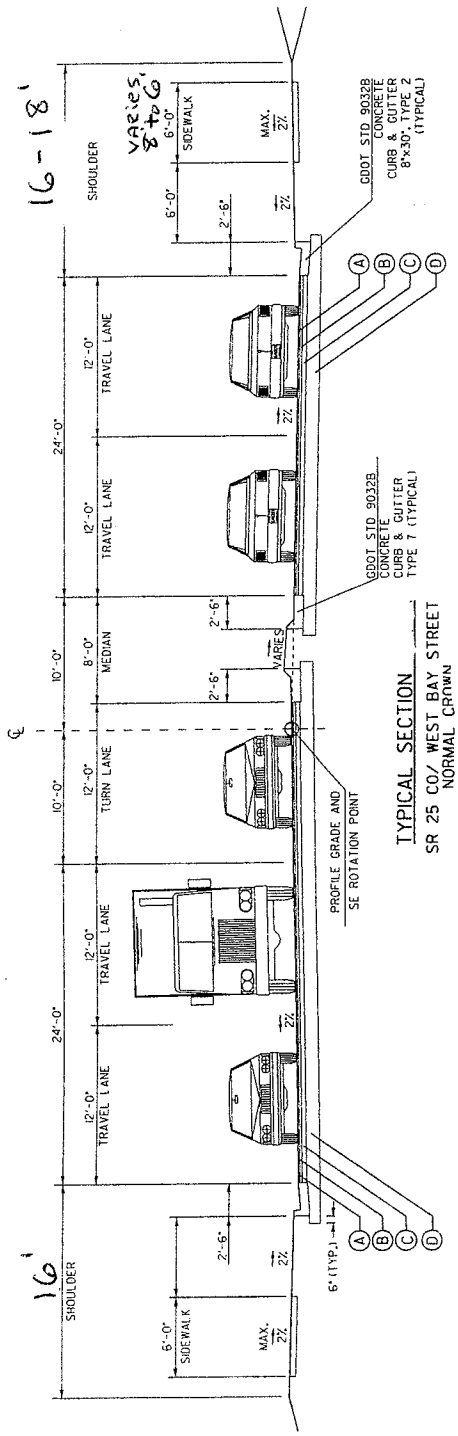
PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: S-2

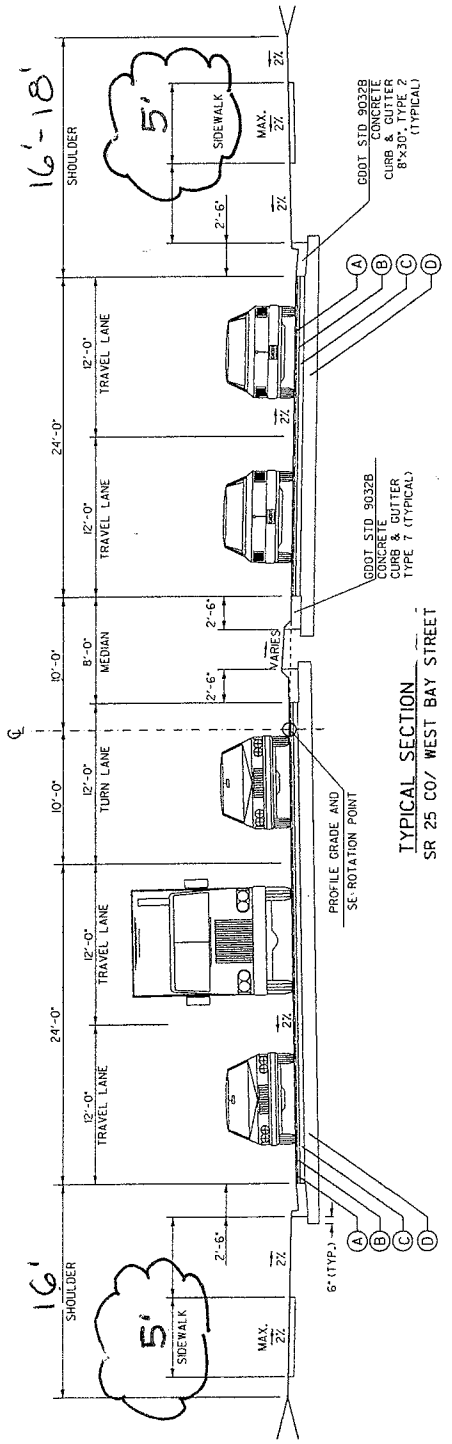
☐ AS DESIGNED ☐ ALTERNATIVE ☒ Both

SHEET NO.: 2 of 4

Original - Design Sidewalks



Alternate - Design Sidewalks



CALCULATIONS

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: S-2

SHEET NO.: 3 of 4

5ft. sidewalk required under Alt. S-2
The 8ft. sidewalk is from STA 45+00 to STA. 85+00 only on the Right (South) side of SR 25.

$(8'-5') \times 4{,}000 = 12{,}000$ s.f. or 1,333 s.y. (saved)

The 6ft wide sidewalk is on the remainder of the project

11,600 s.y. − 1,333 s.y. = 10,267 s.y. of 6' sidewalk

1' ← 1' saved (6'-5')

$\frac{1'}{6'} \times 10{,}267$ s.y. = 1,711 s.y. (saved)

Total saved with 5' sidewalks =
1,333 s.y. + 1,711 = 3,044 s.y.

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **S-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Sidwalk saved	SY	3,044	30.72	93,512			
Subtotal				93,512			
Markup (%) at 9%				8,416			
TOTAL				101,928			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **W-1**

DESCRIPTION: **USE SOIL NAIL WALLS IN LIEU OF TIE-BACK WALLS UNDER THE HIGHWAY BRIDGES**

SHEET NO.: **1 of 8**

ORIGINAL DESIGN: (sketch attached)

Tie-back walls are used to create space behind the bridge columns of the I-516 northbound exit ramp and I-516 mainline over SR 25 CO / West Bay Street to create space for a new sidewalk.

ALTERNATIVE: (sketch attached)

Use soil nail walls under the highway bridges.

ADVANTAGES:

- The contractor does not have to come back and tension the soil nails which saves time not only in omitting that step, but also in doing all the grouting of the nail at one time instead of in stages
- Some time savings comes from not having to do so much excavation and not having to compact the subgrade as the contractor would for a different type of wall

DISADVANTAGES:

- Designer must determine through a geotechnical investigation whether the soil nail wall can be constructed in the existing embankment material

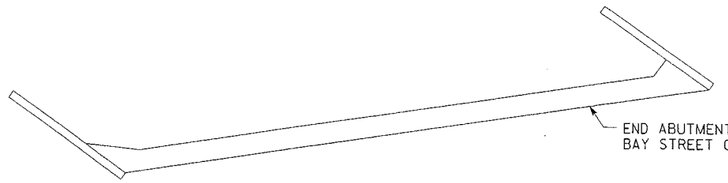
DISCUSSION:

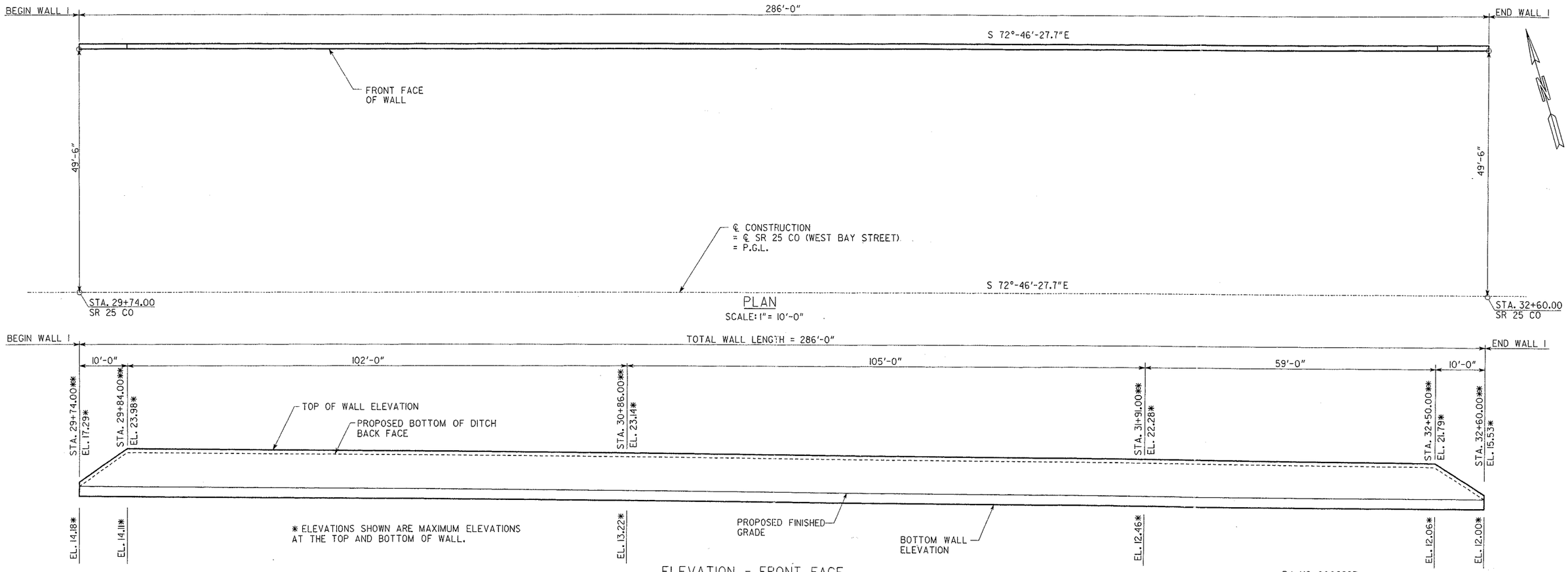
Substituting a soil nail wall for the tie-back wall will reduce the time required to construct the wall due to not having to come back and tension the soil nails as well as allowing the grouting to be performed in one step. The time savings results in an overall cost saving for the project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 238,143	—	$ 238,143
ALTERNATIVE	$ 208,375	—	$ 208,375
SAVINGS (Original minus Alternative)	$ 29,768	—	$ 29,768

GA. NHS-0002-00(923)

ALT. NO. W-1
Sht. 2 of 8



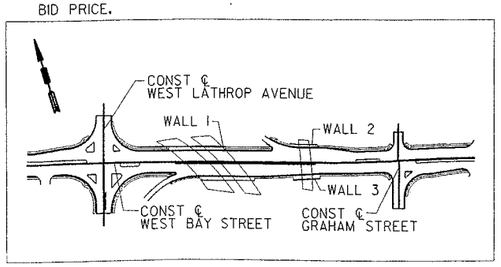


PLAN
SCALE: 1" = 10'-0"

* ELEVATIONS SHOWN ARE MAXIMUM ELEVATIONS AT THE TOP AND BOTTOM OF WALL.

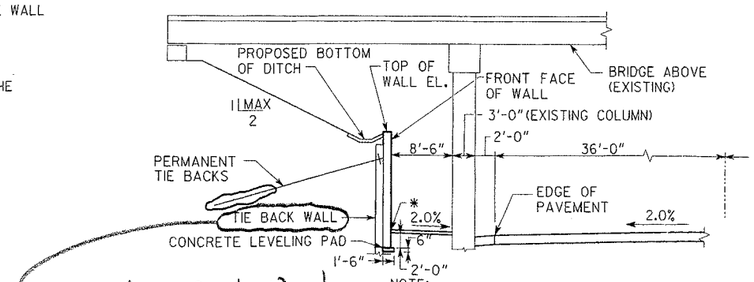
ELEVATION - FRONT FACE
SCALE: HORIZONTAL 1" = 10'-0"
VERTICAL 1" = 10'-0"

NOTES:
1. ** STATIONS ARE ALONG SR 25 CO CONSTRUCTION ℄. OFFSETS ARE GIVEN TO FRONT FACE OF WALL.
2. WALL FACING SHALL BE CAST-IN-PLACE CONCRETE. PNEUMATICALLY APPLIED CONCRETE WILL NOT BE PERMITTED.
3. THESE PLANS ARE CONCEPTUAL AND ARE FOR ILLUSTRATIVE PURPOSES ONLY. EXACT NUMBER OF ANCHORS, THEIR LOCATIONS, AND DESIGN LOADS SHALL BE PROVIDED BY THE CONTRACTOR FOR THE WALL SYSTEM BID. THE WALL IS CONSIDERED A CONTRACTOR PROPOSED ALTERNATE. THE PRESENCE OF THESE CONCEPTUAL PLANS IN THE CONTRACT DOCUMENTS IN NO WAY RELIEVES THE CONTRACTOR FROM PROVIDING A WALL SYSTEM WHICH PROVIDES STRUCTURAL ADEQUACY, INCLUDING ANCHOR TESTING, IN ACCORDANCE WITH SECTION 617 OF THE GEORGIA DOT SPECIFICATIONS, AT THE BID PRICE.



DESIGN DATA

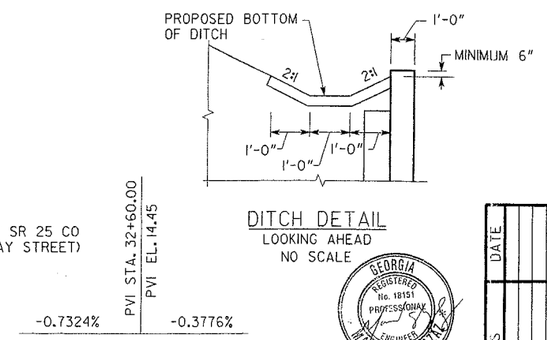
SPECIFICATIONS -------- AASHTO 17TH EDITION 2002



NOTE:
* - PROPOSED FINISHED GRADE

Use Soil Nail Wall

WALL I TYPICAL SECTION
LOOKING AHEAD
NO SCALE



SR 25 CO PROPOSED GRADE DATA
ALONG PROFILE GRADE LINE

DITCH DETAIL
LOOKING AHEAD
NO SCALE

GEORGIA REGISTERED No. 18151 PROFESSIONAL ENGINEER HAMOOD SHARIATI
Jan 30, 2007

P.I. NO. 0002923
WALL NO. 1

McGee Partners, Inc.

WARD EDWARDS, INC. — Engineering · Planning · Science · Surveying — A JOINT VENTURE

Heath & Lineback Engineers INCORPORATED
2390 CANTON ROAD
MARIETTA, GEORGIA 30066

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
WALL 1
SR 25 CO (WEST BAY STREET) IMPROVEMENT
CHATHAM COUNTY NHS-0002-00(923)

SCALE: AS NOTED JANUARY 2007

DATE
REVISIONS

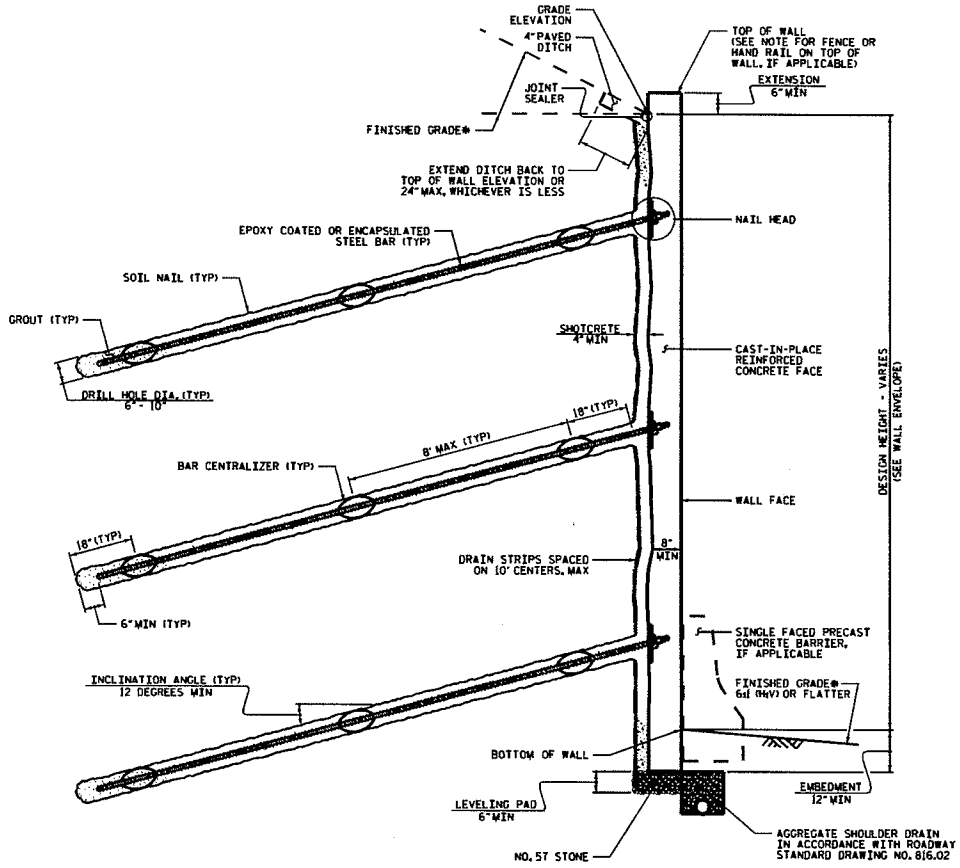
PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: W-1

☐ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 3 of 8

GEOTECHNICAL ENGINEER	ENGINEER
SIGNATURE DATE	SIGNATURE DATE



SOIL NAIL WALL TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

NOTES

FOR SOIL NAIL RETAINING WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION.

FOR GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

A CONCRETE BARRIER RAIL WITH A MOMENT SLAB IS REQUIRED ABOVE RETAINING WALL NO. _. SEE PLANS AND SOIL NAIL RETAINING WALLS PROVISION FOR DETAILS OF A CONCRETE BARRIER RAIL WITH A MOMENT SLAB.

A FENCE OR HAND RAIL IS REQUIRED ON TOP OF RETAINING WALL NO. _. SEE ROADWAY PLANS FOR FENCE OR HAND RAIL ATTACHMENT DETAILS.

AN _____ ARCHITECTURAL FINISH IS REQUIRED FOR THE CAST-IN-PLACE REINFORCED CONCRETE FACE FOR RETAINING WALL NO. _.

A BRICK VENEER IS REQUIRED FOR RETAINING WALL NO. _ AS SHOWN. SUBMIT BRICK SAMPLES FOR APPROVAL BEFORE BEGINNING SOIL NAIL WALL CONSTRUCTION.

BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR RETAINING WALL NO. _, SURVEY EXISTING GROUND ELEVATIONS SHOWN ON THE WALL PROFILE VIEW (WALL ENVELOPE) AND SUBMIT A REVISED WALL ENVELOPE FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THIS ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALL NO. _ FOR WALL HEIGHTS EQUAL TO THE DESIGN HEIGHT (DIFFERENCE BETWEEN GRADE ELEVATION AND BOTTOM OF WALL ELEVATION) PLUS EMBEDMENT (DIFFERENCE BETWEEN BOTTOM OF WALL ELEVATION AND TOP OF LEVELING PAD ELEVATION).

DESIGN RETAINING WALL NO. _ FOR THE FOLLOWING:
1) MINIMUM SERVICE LIFE = 75 OR 100 YEARS
2) MINIMUM EMBEDMENT ELEVATION = _____ FT
3) IN-SITU ASSUMED MATERIAL PARAMETERS ABOVE ELEVATION _____ FT:
   UNIT WEIGHT, gamma = ___ PCF
   FRICTION ANGLE, phi = __ DEGREES
   COHESION, c = ___ PSF
4) IN-SITU ASSUMED MATERIAL PARAMETERS BELOW ELEVATION _____ FT:
   UNIT WEIGHT, gamma = ___ PCF
   FRICTION ANGLE, phi = __ DEGREES
   COHESION, c = ___ PSF

THE MINIMUM EMBEDMENT ELEVATION FOR RETAINING WALL NO. _ INCLUDES EMBEDMENT FOR SCOUR.

DESIGN RETAINING WALL NO. _ FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DESIGN RETAINING WALL NO. _ FOR THE POINT LINE OR SIDE SURCHARGE LOAD SHOWN.

DESIGN RETAINING WALL NO. _ FOR A PIPE EXTENDING THROUGH THE WALL AS SHOWN. VERIFY PIPE LOCATION AND ELEVATION BEFORE BEGINNING SOIL NAIL WALL DESIGN OR CONSTRUCTION.

FOUNDATIONS FOR OVERHEAD SIGNS, HIGH MOUNT LUMINARIES OR SIGNAL POLES WILL BE LOCATED BEHIND RETAINING WALL NO. _ AND WILL OR MAY INTERFERE WITH SOIL NAILS. SUBMIT PROPOSED CONSTRUCTION METHODS FOR THESE FOUNDATIONS WITH THE SOIL NAIL WALL CONSTRUCTION PLAN SUBMITTAL.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL OR MAY INTERFERE WITH SOIL NAILS FOR RETAINING WALL NO. _.

FOUNDATIONS FOR END BENT NO. _ LOCATED AT STATION _____ WILL OR MAY INTERFERE WITH SOIL NAILS FOR RETAINING WALL NO. _. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

"TEMPORARY SHORING" IS OR MAY BE REQUIRED FOR RETAINING WALL NO. _ IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE ROADWAY STRUCTURE OR TRAFFIC CONTROL PLANS.

"TEMPORARY SHORING FOR WALL CONSTRUCTION" IS OR MAY BE REQUIRED FOR RETAINING WALL NO. _. FOR TEMPORARY SHORING FOR WALL CONSTRUCTION, SUBMIT WORKING DRAWINGS AND DESIGN CALCULATIONS WITH THE SOIL NAIL WALL DESIGN SUBMITTAL AND DESIGN AND CONSTRUCT THE SHORING IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. NO SEPARATE PAYMENT WILL BE MADE FOR TEMPORARY SHORING FOR WALL CONSTRUCTION. PAYMENT WILL BE CONSIDERED INCIDENTAL TO THE COST OF THE SOIL NAIL RETAINING WALL.

PROJECT NO.: _____

_____ *COUNTY*

STATION: _____

SHEET OF

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

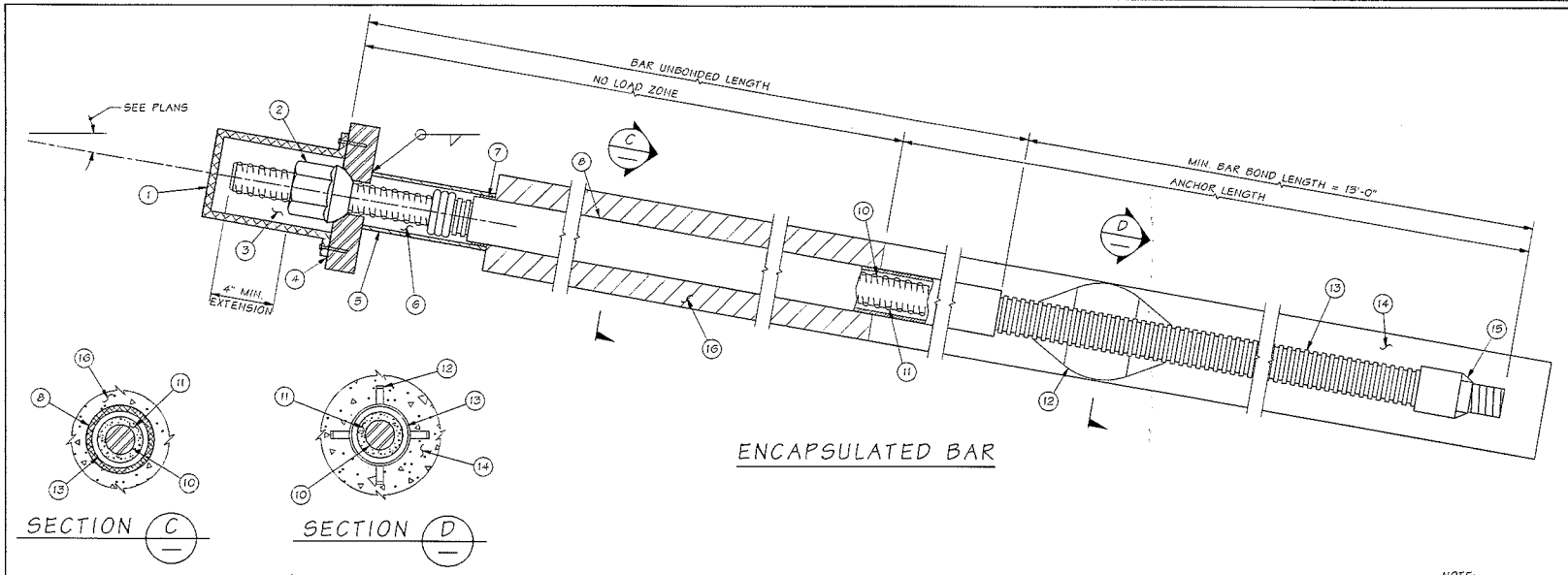
STD CELL Wall_SoilNail

SOIL NAIL WALL TYPICAL & NOTES

SHEET NO. _ TOTAL SHEETS

DATE: 9-15-09

ALT. NO. W-1 SN4 of 8



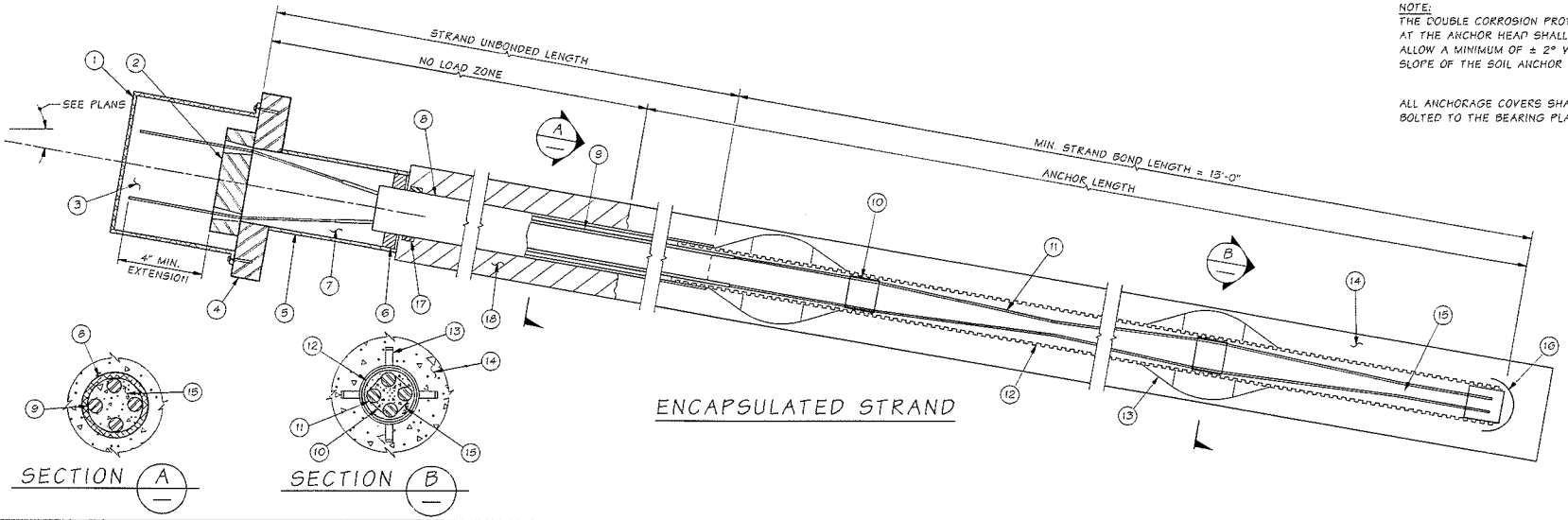
ENCAPSULATED BAR

SECTION C

SECTION D

NOTE:
THE DOUBLE CORROSION PROTECTION SYSTEM AT THE ANCHOR HEAD SHALL BE DETAILED TO ALLOW A MINIMUM OF ± 2° VARIATION IN THE SLOPE OF THE SOIL ANCHOR FOR PLACEMENT TOLERANCE.

ALL ANCHORAGE COVERS SHALL BE BOLTED TO THE BEARING PLATES.



ENCAPSULATED STRAND

SECTION A

SECTION B

Bridge Design Engr.	M:\STANDARDS\Walls\PERMANENT GROUND ANCHOR.MAN				REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Supervisor					10	WASH.			
Designed By									
Checked By					JOB NUMBER				
Detailed By									
Bridge Projects Engr.									
Prelim. Plan By									
Architect/Specialist	DATE	REVISION	BY	APP'D					

Wed Jul 16 09:11:37 2008

BRIDGE AND STRUCTURES OFFICE

Washington State Department of Transportation

SOLDIER PILE/TIEBACK WALL
PERMANENT GROUND ANCHOR DETAILS

BRIDGE SHEET NO

SHEET

OF

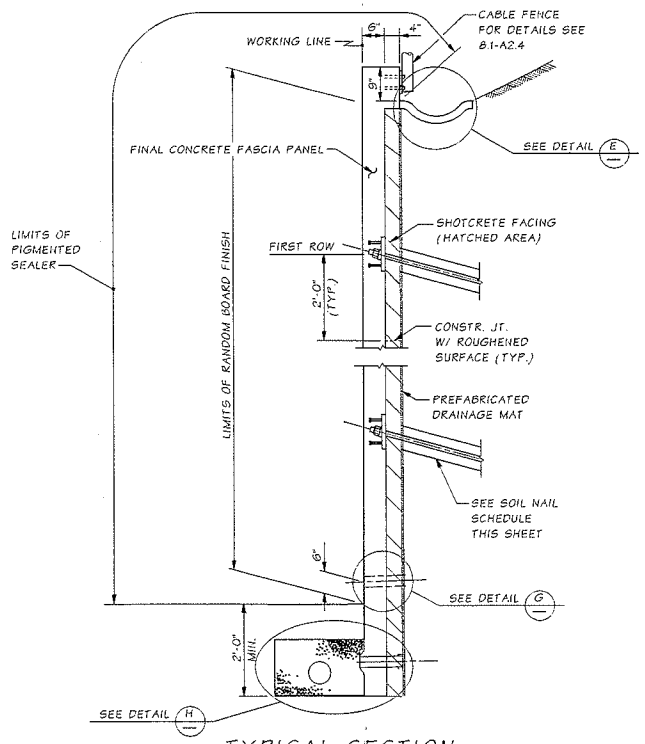
SHEETS

SR ____ JOB NO. ____ SHEET ____

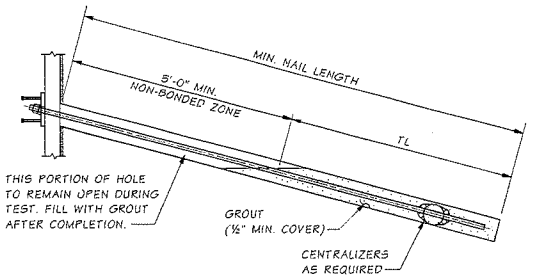
8.1-A3-6

83

ALT. NO. W-1 5 of 8

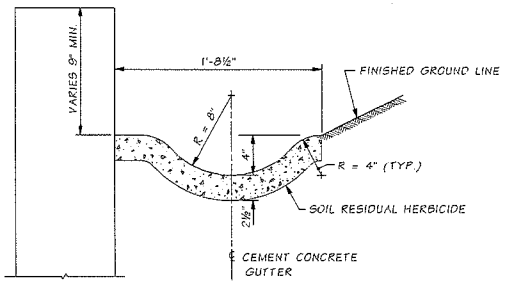


TYPICAL SECTION
SOIL NAIL WALL

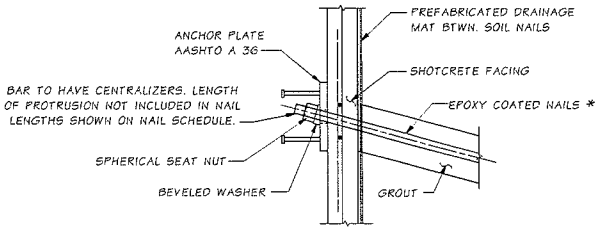


TL = TEST LOAD = (BOND LENGTH) X (DESIGN LOAD TRANSFER)

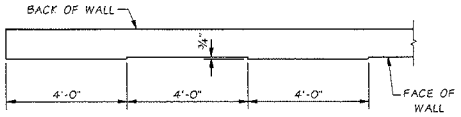
TEST NAIL DETAIL



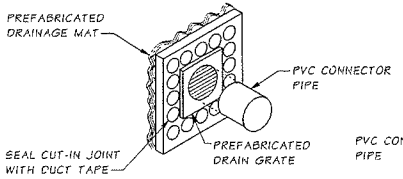
DETAIL E
CEMENT CONCRETE GUTTER



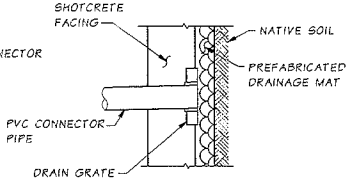
NAIL HEAD DETAIL
* DOUBLE CORROSION PROTECTION REQUIRED FOR SOIL NAILS AT LOCATIONS SHOWN. SEE SOIL NAIL LAYOUTS FOR DETAILS



PLAN
WALL FACE FINISH

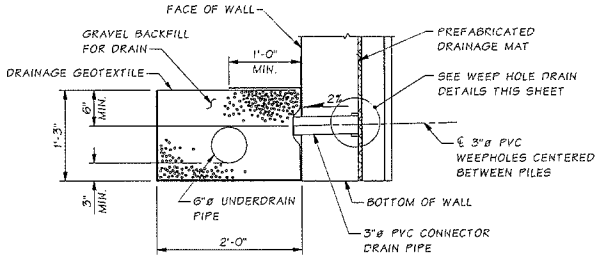


ISOMETRIC VIEW

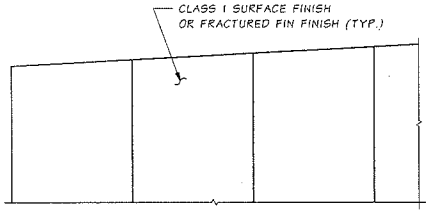


SECTIONAL VIEW

DETAIL G
DRAIN GRATE INSTALLATION SHALL NOT DISRUPT PREFABRICATED DRAINAGE MAT



DETAIL H
TYPICAL FABRIC
DRAIN CONNECTION
TO UNDERDRAIN PIPE



ELEVATION
WALL FACE FINISH

Bridge Design Engr.	M:\STANDARDS\Walls\SOIL NAIL TYP SECT.MAN										
Supervisor						REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS	BRIDGE AND STRUCTURES OFFICE
Designed By						10	WASH.				Washington State Department of Transportation
Checked By						JOB NUMBER					SOIL NAIL WALL SECTION
Detailed By											BRIDGE SHEET NO.
Bridge Projects Engr.											SHEET OF SHEETS
Prelim. Plan By											
Architect/Specialist	DATE	REVISION	BY	APP'D							

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SR ____ JOB NO. ____ SHEET ____

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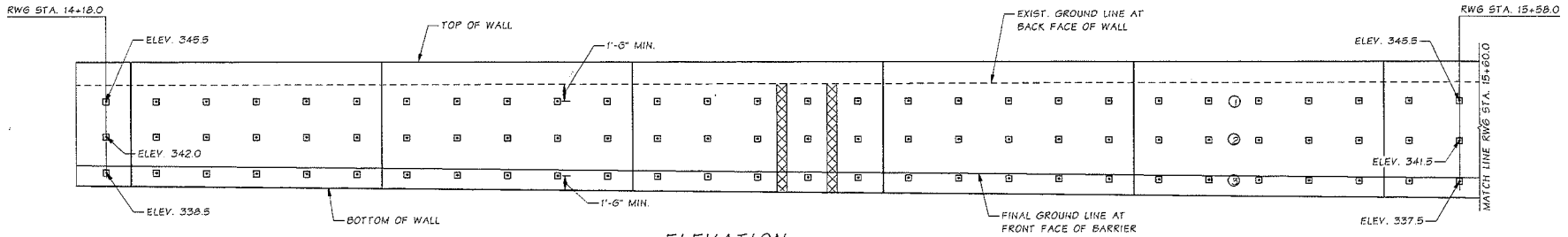
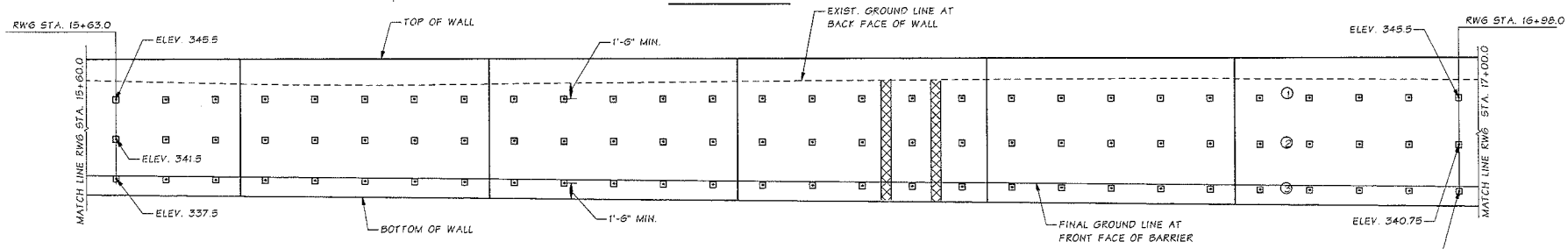
84

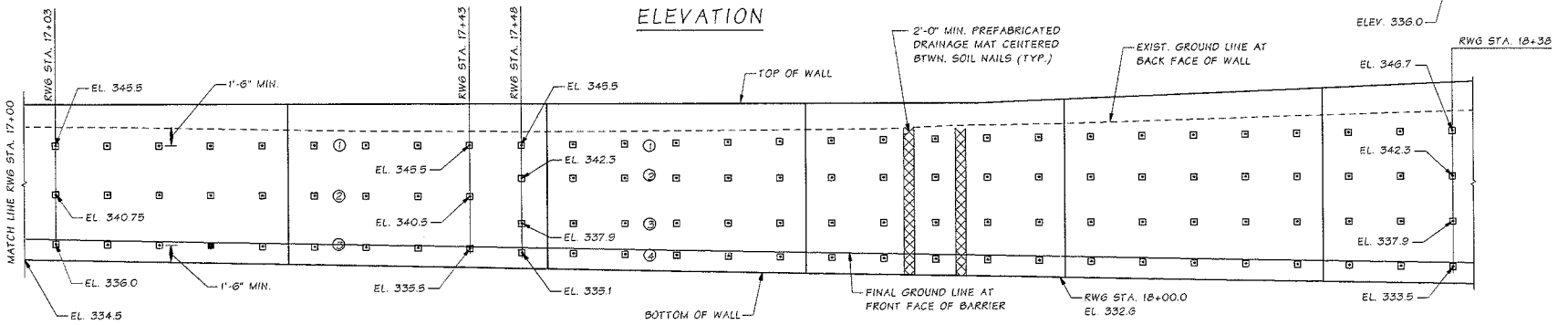
ALT NO. W-1 6-08



ELEVATION



ELEVATION



ELEVATION

Bridge Design Engr.	M:\STANDARDS\Walls\SOIL NAIL ELEVATION.MAN				REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS	BRIDGE AND STRUCTURES OFFICE
Supervisor					10	WASH.				Washington State Department of Transportation
Designed By					JOB NUMBER					SOIL NAIL LAYOUT
Checked By										BRIDGE SHEET NO.
Detailed By										SHEET OF SHEETS
Bridge Projects Engr.										
Prelim. Plan By										
Architect/Specialist	DATE	REVISION	BY	APP'D						

Wed Jul 15 09:11:39 2009

SR NO. JOB NO. SHEET

B.1-A4-1

85

ALT. NO. W-1 7 of 8

COST WORKSHEET

PROJECT: **SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**

NHS00-0002-00(923) CHATHAM COUNTY

ALTERNATIVE NO.: **W-1**

SHEET NO.: **8 of 8**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Tie-back walls							
Wall No. 1	SF	1,119	80.00	89,520			
Wall No. 2	SF	892	80.00	71,360			
Wall No. 3	SF	720	80.00	57,600			
Soil nail walls							
Wall No. 1	SF				1,119	70.00	78,330
Wall No. 2	SF				892	70.00	62,440
Wall No. 3	SF				720	70.00	50,400
Subtotal				218,480			191,170
Markup (%) at 9%				19,663			17,205
TOTAL				238,143			208,375

PROJECT DESCRIPTION

INTRODUCTION

The SR 25 CO/West Bay Street Improvements From I-516 to the Bay Street Viaduct (NHS00-0002-00(923), P.I. No. 0002923) project is being developed by McGee Partners, Inc. for Chatham County and GDOT. West Bay Street funnels automobile and light, medium and heavy truck traffic traveling from Interstate 516 (I-516) to businesses along West Bay Street and in downtown Savannah. West Bay Street is classified as an Urban Principal Arterial with a posted speed limit of 35 miles per hour (mph). Existing land use along the project corridor is predominately residential on the south side of West Bay Street and commercial properties, including retail, service and freight businesses along the north side. The existing sidewalks are in poor condition and are immediately adjacent to the curb. There are insufficient crossings to allow pedestrians to safely cross West Bay Street.

The purpose of the project is to provide for safe and efficient traffic flow and to improve safety conditions for pedestrians traveling along and across West Bay Street. The project also provides for a more uniform design of West Bay Street from I-516 to downtown Savannah.

This project widens the four existing 10-ft-wide travel lanes to 12-ft-wide and includes a variable width (20 ft to 64 ft) raised median. The widened section will tie into the existing roadway sections consisting of a four-lane section on the west end of the project and an existing five-lane section at the east end of the project. New left and right turn lanes are provided to facilitate access to businesses along the north side of West Bay Street. Additional improvements include sidewalks and improved crosswalks. Sidewalks and crosswalks conform to Americans with Disabilities Act (ADA) regulations. The raised median eliminates mid-block turns and reduces the potential for accidents, as well as provides a safe refuge area for pedestrians that wish to cross the roadway.

PROJECT DESCRIPTION

The project starts about 700 ft west of West Lathrop Avenue. A new median is added and a left turn pocket is provided for eastbound West Bay Street to West Lathrop Avenue. A free right turn lane is also provided to southbound West Lathrop Avenue and from southbound West Lathrop Avenue to westbound West Bay Street. Raised medians are provided at each corner of the intersection to create free right turn lanes to each leg of the intersection. A new right turn lane from westbound West Bay Street to northbound West Lathrop Avenue is created by removing the existing curb and gutter and sidewalk, adding a crash wall between the I-516 pier bent columns, creating space behind the bridge columns by installing a tie-back wall in the slope pavement area, and installing an 8 ft 6-in-wide sidewalk between the columns and the new wall. The new right turn lane will start just west of the entry ramp to I-516 westbound. Between Graham Street and the entry ramp, a new westbound right turn lane will be created.

Between the center bridge piers for the I-516 and I-516 off ramp bridges over West Bay Street and the entry ramp to I-516 westbound, the median will have a concrete crash barrier and attenuators at each end.

Between Graham Street and Kenilworth Street, the right-of-way will be extended to the north to allow two through lanes in each direction separated by a 20-ft-wide median. A left turn pocket will be created in the median for westbound to southbound traffic onto Graham Street.

Starting at Kenilworth Street, the right-of-way will be expanded to the south. Brittany Street will be realigned to match up with Tuten Street on the north side of West Bay Street. Left turn pockets will be provided in the median to accommodate turns from West Bay Street to these two streets. A right turn pocket will be provided for the Tuten Street northbound to West Bay Street eastbound movement and Brittany Street southbound to West Bay Street westbound movement.

Moving east, Jenks Street and Cleland Street will be separated by the median and the Hudson Street intersection with West Bay Street will be eliminated. A driveway will provide access to the business at the former intersection and a left turn pocket in the median will allow for the eastbound to northbound movement. At the Fell Street intersection, a pocket for the northbound to eastbound movement onto West Bay Street will be provided.

Beginning at Fell Street, the median gradually expands to 64 ft wide to encompass existing live oak trees and the right-of-way is pushed further south. Pockets for buses to park are created in both directions just west of the Millen Street intersection with eastbound West Bay Street. A right turn pocket is provided just east of Millen Street for access to West Street. A full intersection is provided at Carolan Street. Right turn pockets are provided for both eastbound and westbound West Bay Street as well as left turn pockets in the median. Raised medians are used at all four corners of the intersection to provide free right turn lanes in all directions. A bus pull-off area is provided for the eastbound side just east of the intersection.

Starting near the intersection of Kirkland Street with westbound West Bay Street, the median narrows. A right turn pocket is provided for eastbound West Bay Street for the turn onto Ferrill Street. As the median continues to narrow, a right turn lane is created on eastbound West Bay Street for turns onto Scarborough Street, Norton Street and East Lathrop Avenue. A full intersection is created at East Lathrop Avenue with left turn pockets in the median in each direction. A right turn pocket from East Lathrop Avenue southbound is also provided. To the east of East Lathrop Avenue the median continues about 370 ft before ending. At this point, West Bay Street becomes five lanes, three westbound and two eastbound with no median as is the current condition.

Traffic signals are to be provided at the following locations along West Bay Street:

- West Lathrop Avenue
- Graham Street
- Carolan Street
- East Lathrop Avenue

A full series of crosswalks will be created at these locations.

Six-ft-wide sidewalks will be provided on both sides of the road for the entire corridor except for the eastbound side between Fell Street and Ferrill Street where it will be 8 ft wide. Tie-back walls will be used where the I-516 northbound off-ramp bridge crosses over West Bay Street to create room for sidewalks in the slope pavement areas.

Storm water drainage will be provided by longitudinal pipelines along both sides of West Bay Street that will connect to existing north-south interceptors that lead to the City of Savannah storm water pumping station on the north side of West Bay Street. Curb inlets and catch basins will collect the storm water and pipes will convey the flow from the main roadway and side streets to the longitudinal lines.

As much of the existing pavement as possible will be reused. It will be milled and overlayed. The new pavement section will consist of:

• Asphaltic Concrete Surface – 12.5 SMA	1.5 inches
• Asphaltic Concrete Binder – 19 mm superpave	2.0 inches
• Asphaltic Concrete Base – 25 mm superpave	1.0 inches
• Asphaltic Concrete Base – 25 mm superpave	3.0 inches
• Graded Aggregate Base	12.0 inches
Total Thickness	19.5 inches

New street lighting and landscaping will be provided along the entire corridor.

The estimated construction cost is $10.9 million.

To construct this corridor it will also be necessary to acquire right-of-way. Its estimated cost is $10.9 million including 24 complete takes.

A map of the project is provided on the following page.

PRF
$$PENTABLE$$
DGN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL S
GA	NHS00-0002-00(923)	1	

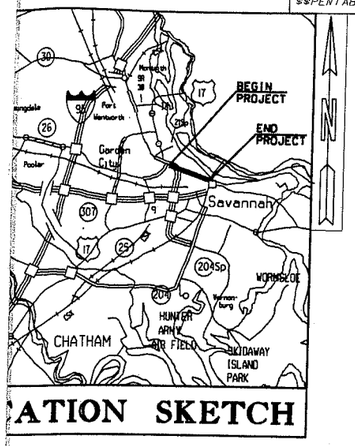
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED

SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT

FEDERAL AID PROJECT

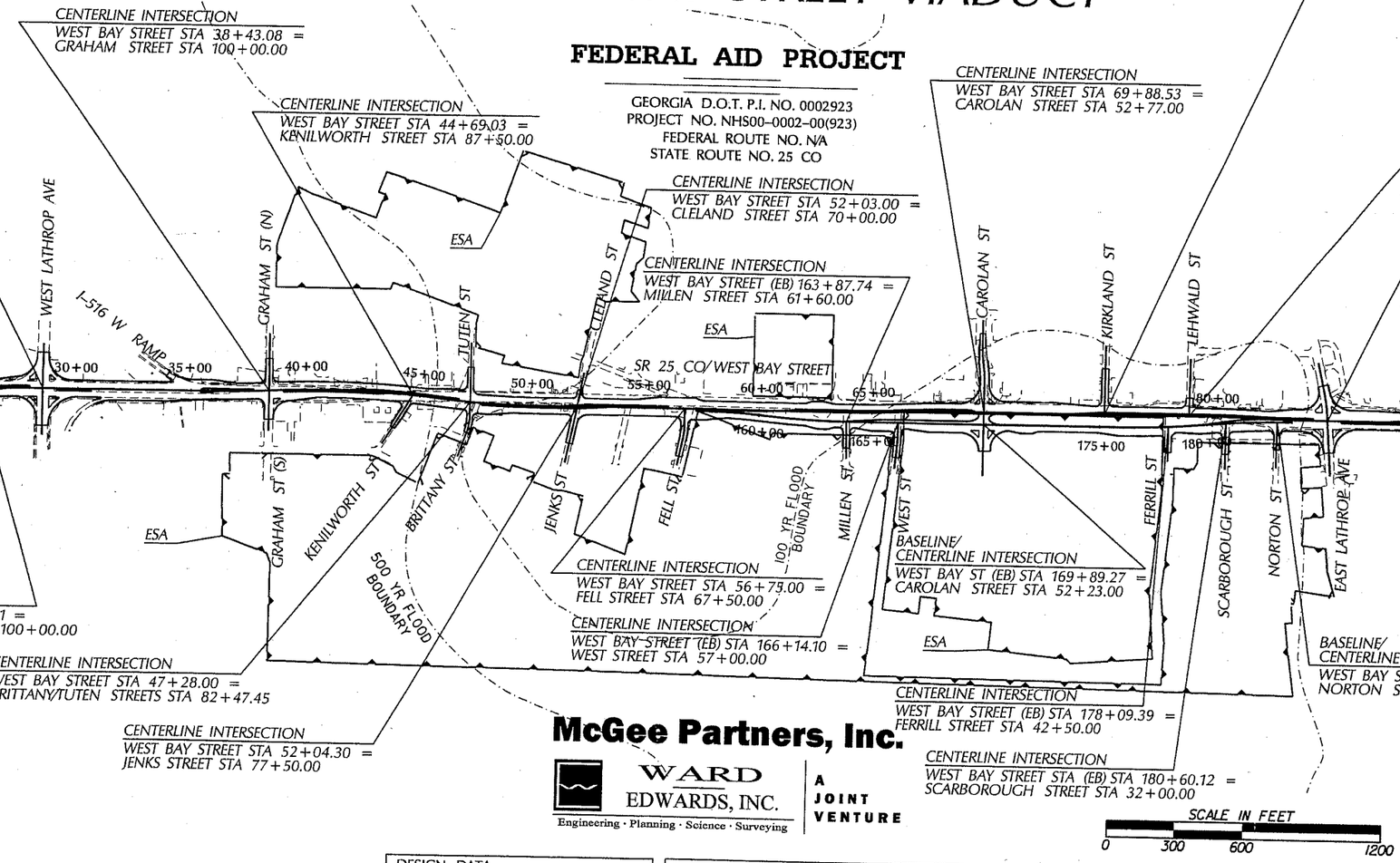
GEORGIA D.O.T. P.I. NO. 0002923
PROJECT NO. NHS00-0002-00(923)
FEDERAL ROUTE NO. N/A
STATE ROUTE NO. 25 CO



ATION SKETCH

THE CO-ORDINATES LISTED ARE EAST ZONE
CO-ORDINATES BASED ON THE GA. STATE PLANE
RDINATE SYSTEM OF 1985.
ONTAL DATUM : NAD83
AL DATUM : NAVD88

POINT COORDINATE
TION 56+94.50
761251.9407
980245.3928



SCALE IN FEET
0 300 600 1200

ON & DESIGN APPROVAL DATE:

ROJECT IS LOCATED 100% IN CHATHAM COUNTY,
CONGRESSIONAL DISTRICT

T DESIGNATION: EXEMPT

ASSIFICATION: MAJOR

ONAL CLASSIFICATION : URBAN PRINCIPAL ARTERIAL

T DESIGNED IN ENGLISH UNITS

LENCES IN THIS DOCUMENT, WHICH INCLUDES ALL PAPERS, WRITINGS, DOCUMENTS, DRAWINGS OR PHOTOGRAPHS USED, BE USED IN CONNECTION WITH THIS DOCUMENT, TO "STATE HIGHWAY DEPARTMENT OF GEORGIA", "STATE HIGHWAY ENT", "GEORGIA STATE HIGHWAY DEPARTMENT", "HIGHWAY DEPARTMENT", OR "DEPARTMENT" WHEN THE CONTEXT THEREOF HE STATE HIGHWAY DEPARTMENT OF GEORGIA MEAN, AND SHALL BE DEEMED TO MEAN THE DEPARTMENT OF TRANSPORTATION.

, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS, OR IN ANY WAY INDICATED THEREBY, WHETHER BY S OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT SPORTATION IN ANY WAY. THE ATTENTION OF THE BIDDER IS SPECIFICALLY DIRECTED TO SUBSECTIONS 102.04, 102.05, 03 OF THE SPECIFICATIONS.

DESIGN DATA		
TRAFFIC A.D.T.:	27,650	(2010)
TRAFFIC A.D.T.:	34,385	(2030)
TRAFFIC D.H.V.:	3877	(2030)
DIRECTIONAL DIST.:	56%	
% TRUCKS:	10%	
% 24 HR. TRUCKS:	10.9%	
SPEED DESIGN:	35 MPH	

LENGTH OF PROJECT	COUNTY NO. 051
	MILES
NET LENGTH OF ROADWAY	1.291
NET LENGTH OF BRIDGES	0.000
NET LENGTH OF PROJECT	1.291
NET LENGTH OF EXCEPTIONS	0.000
GROSS LENGTH OF PROJECT	1.291

McGee Partners, Inc.

WARD EDWARDS, INC.
Engineering · Planning · Science · Surveying

A JOINT VENTURE

P.E. STAMP HERE

PLANS PREPARED BY
McGee Partners, In
UNDER THE SUPERVISION OF:
R. CHRISTOPHER MARSENGILL, P.E.

RECOMMENDED FOR APPROVAL:

DATE STATE URBAN DESIGN ENGINEER

DATE CHIEF ENGINEER

PLANS COMPLETED DATE

REVISION DATES:

VALUE ANALYSIS AND CONCLUSIONS

GENERAL

This section describes the value analysis (VA) procedure used during the VE study conducted for McGee Partners, Inc. and GDOT by Lewis & Zimmerman Associates, Inc. on the SR 25 CO / West Bay Street Improvements From I-516 to the Bay Street Viaduct (NHS00-0002-00(923); P.I. No. 0002923) project in Chatham County. The workshop was performed at the Preliminary design completion stage. McGee Partners, Inc. has been selected by Chatham County, to assist with the development of the project and has provided information for the VE team to use as the basis of the studies.

A systematic approach was used in the VE study, which was divided into three parts: (1) Preparation Effort, (2) Workshop Effort, and (3) Post-Workshop Effort. A task flow diagram outlining each of the procedures included in the VE study is attached for reference.

Following this description of the VA procedure, separate narratives and supporting documentation identify the following:

- VE workshop participants
- Economic data
- Cost model
- Function analysis
- Creative ideas and evaluations

PREPARATION EFFORT

Preparation for the workshop consisted of scheduling workshop participants and tasks and gathering necessary project documents for team members to review before attending the workshop. Documents such as those listed below were used as the basis for generating VE alternatives and for determining the cost implications of the selected VE alternatives:

- SR 25 CO / West Bay Street Improvements From I-516 to the Bay Street Viaduct (NHS-0002-00(923); PID No. 0002923) Preliminary Design Drawings, dated 5/28/2009, prepared by McGee Partners, Inc.
- Flexible Pavement Design Analysis, dated 8/10/09, prepared by McGee Partners, Inc.
- Preliminary Field Plan Review Inspection Report, Project Number: NHS00-0002-00(923), Chatham County, PI No.:0002923, SR 25 Conn/Bay Street From I-516 to the Bay Street Viaduct, Inspection Date: July 21, 2009, Report Date: July 23, 2009, prepared by GDOT personnel
- Soil Survey Report, SR 25 CO/West Bay Street Improvements From I-516 to Bay Street Viaduct, GDOT Project No. NHS-0002-00(923), PI No. 0002923, Chatham County, Georgia, prepared by Willmer Engineering, Inc., dated January 30, 2006.

Value Engineering Study Task Flow Diagram

Preparation Effort

Coordination Project
- Verify Schedule
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Outline Needed Background Data
- Define *Project Value Objectives*
- Identify Project Constraints

→

Prepare for Workshop
- Collect Project Data
- Distribute Data to Team Members
- Team Members Become Familiar with Project

→

Construct Cost Models
- Construct Cost Models
- Construct Graphic Function Analysis
- Outline High Cost Areas

→

LCC Model
- Roadway
- Bridges
- MOT
- Energy
- User Impact

Workshop Effort

Information Phase
- Introduction by VETL
- Project Description and Presentation by Designer
- Outline Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)

→

Function Identification and Analysis Phase
- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms

List Ideas Generated During Function Analysis

→

Speculation Phase
- Introduction by VETL
- Creative Idea Listing:
  - Quantity of ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking
- Use Checklist for Ideas

→

Evaluation Phase
- Eliminate Impractical Ideas
- Rank Ideas with Advantages/ Disadvantages
- Evaluate Alternatives (Include Non-Economic considerations: Safety, Reliability, Environment, Aesthetics, O&M, etc.)
- Select Best Ideas for Implementation

→

Development Phase
- Develop Proposed Alternatives
- Prepare Alternative Design Sketches
- Estimate Costs
- Perform Life Cycle Comparison
  - Initial Cost
  - Redesign Cost
  - O&M Cost
  - LCC Cost

→

Presentation Phase
- Summarize Findings
- Present VE Ideas to Owner/ User/Designer
- Oral Presentation

Post-Workshop Effort

VE Study Report
- Develop Implementation VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

→

Implementation Phase
- Participate in Implementation Meeting with Owner/User/ Designer/ VE Team, as needed
- Prepare Final VE Report

→

Final Acceptance
- Redesign by Designer

- West Bay Street Operational and Safety Improvement Project, Chatham County, Georgia, Traffic Engineering Study prepared for: Chatham County Department of Public Works, dated 6/23/04, prepared by Grice & Associates, Inc.
- Estimate Report for file "0002923", dated prepared by McGee Partners, Inc.
- Updated Preliminary Right of Way Cost Estimate, dated January 15, 2009, prepared by Moreland Altobelli Associates, Inc.
- NHS-0002-00(923) Chatham County, P.I. No. 0002923, SR 25 Connector Widening, Approved Concept Report, dated February 9, 2005, prepared by GDOT
- Westside Bypass Bay St. Overpass, Chatham County, Bridge Drawings, dated June 1970, prepared by Jones and Fellers Architects and Engineers
- Westside Bypass Ramp "L" Over Bay Street, Chatham County, Bridge Drawings, dated June 1970, prepared by Jones and Fellers Architects and Engineers

Information relating to the project's purpose and need, owner concerns, project stakeholder concerns, design criteria, project constraints, funding sources and availability, regulatory agency approval requirements, and the project's schedule and costs is very important as it provides the VE team with insight about how the project has progressed to its current state.

Project cost information provided by the designers is used by the VE team as the basis for a comparative analysis with similar projects. To prepare for this exercise, the VE team leader used the cost estimate prepared by McGee Partners, Inc. to develop a cost model for the project. The model was used to distribute the total project cost among the various elements of the project. The VE team used this model to identify the high-cost elements that drive the project and the element providing little or no value so that the team could focus on reducing or eliminating their impact.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and one-half-day effort beginning with an orientation/kickoff meeting on Monday, August 17, 2009, and concluding with the final VE Presentation on Thursday, August 20, 2009. During the workshop, the VE Job Plan was followed in compliance with the U.S. Federal Highway Administration guidelines for conducting a VE study. The Job Plan guided the search for alternatives to mitigate or eliminate high-cost drivers, secondary functions providing little or no value, and potential project risks. Alternatives to specifically address the owner's project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructability, and providing missing functions were also considered. The Job Plan includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Creative/Speculation Phase
- Evaluation of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

Information Phase

At the beginning of the study, the decisions that have influenced the project's design and proposed construction methods have to be reviewed and understood. For this reason, the workshop began with a presentation of the project by GDOT and McGee Partners to the team. The presentation highlighted the information provided in the documentation reviewed by the VE team before the workshop and expanded on it to include a history of the project's development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarification about the information provided.

Function Identification and Analysis Phase

Having gained some information on the project, the VE team proceeded to define the functions provided by the project, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project or if there are disproportionate amounts of money spent on support functions. Elements performing support functions add cost to the project but have a relatively low worth to the basic function.

Function is defined as the intended use of a physical or process element. The team attempted to identify functions in the simplest manner using measurable noun/verb word combinations. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions, which were recorded on Random Function Analysis Worksheets (provided in this section). Then the individual function(s) of the major components of the project depicted on the cost models were identified.

After identifying the functions, the team classified the functions according to the following:

Abbreviation	Type of Function	Definition
HO	Higher Order	The primary reason the project is being considered or project goal.
B	Basic	A function that must occur for the project to meet its higher order functions.
S	Secondary	A function that occurs because of the concept or process selected and may or may not be necessary.
R/S	Required Secondary	A secondary function that may not be necessary to perform the basic function but must be included to satisfy other requirements or the project cannot proceed.
G	Goal	Secondary goal of the project.
O	Objective	Criteria to be met
LO	Lower Order	A function that serves as a project input.

Higher order and basic functions provide value, while secondary functions tend to reduce value. The goal of the next job phase is to reduce the impact of secondary functions and thereby enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions indicated by a specific project element using the cost estimate and cost models. Where possible, they seek to find the lowest cost, or worth, to perform the function. This is

accomplished using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. By identifying the cost and worth of a function or group of functions, cost/worth ratios were calculated. Cost/worth ratios greater than one indicated that less than optimum value was being provided. Those project functions or elements with high cost/worth ratios became prime targets for value improvement.

As well as looking at areas with high cost/worth ratios, the team used the cost models previously prepared to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high-cost elements or functions, they also became initial targets for value enhancement.

Overall, these exercises stimulated the VE team members to focus on apparently low value areas and initially channel their creative idea development in these places.

Creative/Speculation Phase

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to other elements in the project, and secondary functions providing little or no value and using the classic brainstorming technique, the VE team began to generate as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying constructability were also encouraged. At this stage of the process, the VE team was looking for a large quantity of ideas and free association of ideas. A Creative Idea Listing worksheet was generated and organized by the function or project element being addressed.

GDOT may wish to review these creative lists since they may contain ideas that were not pursued by the VE team but can be further evaluated for potential use in the design.

Evaluation Phase

Since the goal of the Creative/Speculation Phase was to conceive as many ideas as possible without regard for technical merit or applicability to the project goals, the Evaluation Phase focused on identifying those ideas that do respond to the project value objectives and are worthy of additional research and development before being presented to the owner. The selection process consisted of the VE team evaluating the ideas originated during the Creative/Speculation Phase based on GDOT's value objectives identified through conversations during the opening presentation. Based on the team's understanding of the owner's value objectives, each idea was compared with the present design concept, and the advantages and disadvantages of each idea were discussed. How well an idea met the design criteria was also reviewed.

Based on the results of these reviews, the VE team rated the idea by consensus using a scale of 1 to 5, with 5 or 4 indicating an idea with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 3 indicating an idea that provides marginal value but could be used if the project was having budget problems, 2 indicating an idea with a major technical flaw, and 1 indicating an idea that does not respond to project requirements. Generally, ideas rated 4 and 5 are pursued in the next phase and presented to the owner during the Presentation Phase.

The team also used the designation "DS" to indicate a design suggestion, which is an idea that may not have specific quantifiable cost savings but may reduce project risk, improve constructability, help to

minimize claims, enhance operability, ease maintenance, reduce schedule time, or enhance project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed. These are also developed in the next phase of the VE process.

Development Phase

In this phase, each highly rated idea was expanded into a workable solution designated as a VE alternative. The development consisted of describing the current design and the alternative solution, preparing a life cycle cost comparison where applicable, describing the advantages and disadvantages of the proposed alternative solution, and writing a brief narrative to compare the original design to the proposed change and provide a rationale for implementing the idea into the design. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in Section Two of this report.

Design suggestions include the same information as the alternatives except that no cost analysis is performed. They too are included in Section Two.

Presentation Phase

The goals of the last phase of the workshop were to summarize the results of the study, to prepare draft Summary of Potential Cost Saving worksheets to hand out at the presentation, and to present the key VE alternatives and design suggestions to GDOT and the McGee Partners design team. The presentation was held on Thursday, August 20, 2009, at the GDOT Headquarters office in Atlanta, Georgia. The purpose of the meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Procedures for implementing the results of the study were discussed, and arrangements were made for the reviewers of the VE report to contact the VE team in order to obtain further clarifications, if necessary. Draft copies of the Summary of Potential Cost Savings worksheets were given to the owner and design team to facilitate a timely review and speedy implementation of the selected ideas.

POST-WORKSHOP EFFORT

The post-workshop portion of the VE study consisted of the preparation of this VE Study Report. Personnel from GDOT and the McGee Partners design team will analyze each alternative and prepare a short response, recommending incorporation of the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. LZA is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

Upon completing their reviews, GDOT will decide which alternatives to implement.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise in the unique project elements involved with the SR 25 CO/West Bay Street Improvements From I-516 to the Bay Street Viaduct project. The multidisciplinary team comprised professionals with highway design and construction experience and a working knowledge of VE procedures. The following lists the VE team members:

Participant	Specialization	Affiliation
Joe Leoni, PE	Highway Design	ARCADIS US, Inc.
Paresh J. Parikh	Constructability	Delon Hampton Associates
Howard B. Greenfield, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

DESIGNER'S PRESENTATION

An overview of the project was presented on Monday, August 17, 2009, by representatives from GDOT and the McGee Partners design team. The purpose of this meeting, in addition to being an integral part of the Information Phase of the VE study, was to bring the VE team up-to-speed regarding the overall project specifics. Additionally, the meeting afforded the owner and design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention. An attendance list for the meeting is attached.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted by the VE team on Thursday, August 20, 2009 at the GDOT Headquarters office in Atlanta, Georgia to review VE alternatives with the owner and representatives from the design team. Copies of the Draft Summary of Potential Cost Savings worksheet were provided to the attendees. Attendees checked off their names on the attendance list from the opening presentation.

VE STUDY SIGN-IN SHEET

Project No.: NHS00-0002-00(923) County: Chatham PI No.: 0002923 Date: Aug. 17-20, 2009

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓Lisa L. Myers	00244168	Engineering Services	404-631-1770	lmyers@dot.ga.gov
✓Matt Sanders	00284154	Engineering Services	404-631-1752	msanders@dot.ga.gov
James K. Magnus	00208161	Construction	404-631-1971	jmagnus@dot.ga.gov
Ken Werho	00258268	Traffic Operations	404-635-8144	kwerho@dot.ga.gov
Ron Wishon	00208180	Engineering Services	404-631-1753	rwishon@dot.ga.gov
✓Tommy Crochet	—	Mcbee Partners	770-938-6400	Tcrochet@mcgeepartners.com
✓Paresh J. Parikh	—	DHA/VE Study Group	404-524-8030	pparikh@dlohampton.com
✓Howard Greenfield	—	Lewis & Zimmerman	301-984-9590	hgreenfield@lza.com
✓Joe Leoni	—	ARCADIS	770-431-8666	joe.leoni@ARCADIS-US.com
✓Chris Marsengill	—	McGee Partners, Inc	770-938-6400	cmarsengille@mcgeepartners.com
Larry Bowman	00901426	GDOT/OEL	404-699-4441	lbowman@dot.ga.gov
✓Matt Thompson	—	McGee Partners	770-938-6400	mthompson@mcgeepartners.com
✓MARCELA COLL	00832509	URBAN DESIGN	404-631-1692	mcoll@dot.ga.gov
ALBERT WELCH	00354150	URBAN DESIGN	404-631-1690	AWELCH@...
DIST. VIDEO INCLUDED:				
SLADE COLE	00279105	ASST. AREA ENGINEER	912) 651-2144	GEORGESLADE.COLE@DOT.GA.GOV
THURSDAY ONLY:				
✓BEN BUCHAN	00200360	URBAN DESIGN	404) 631-1700	bbuchan@dot.ga.gov
✓DARRELL RICHARDSON	00255889	Urban	404-631-1705	drichardson@...
✓PAMELA TROWBRIDGE		CHATHAM CO. (VIA PHONE)		

15 TOTAL ATTENDED MONDAY. 12 TOTAL ATTENDED THURSDAY

ECONOMIC DATA

The comparisons of life cycle costs between the VE alternatives and the current design solutions were performed on the basis of discounted present worth. To accomplish this, the VE team developed economic criteria to use in its calculations based on information gathered from GDOT and the design team. The following parameters were used when calculating discounted present worth:

Year of Analysis:	2009
Construction Start Date:	Unknown
Construction Completion Date:	Unknown
Planning Period (n):	20
Discount Rate (i):	3%

When computing capital costs, direct material, labor and equipment costs are marked up using a composite markup of 9% that includes:

Engineering and Inspection	5%
Construction Contingency	4%

COMMENT ON THE COST ESTIMATE

The cost estimate did not have any costs for the tie-back walls being used to create space behind the I-516 bridge columns or in the slope protection in front of the I-516 ramp bridge abutments. The cost of these walls is as follows:

Wall #1	1119 SF	@ $80.00/sf	=	$ 89,520
Wall #2	892 SF	@ $80.00/sf	=	$ 71,360
Wall #2	720 SF	@ $80.00/sf	=	$ 57,600
TOTAL			=	$218,480

COST MODEL

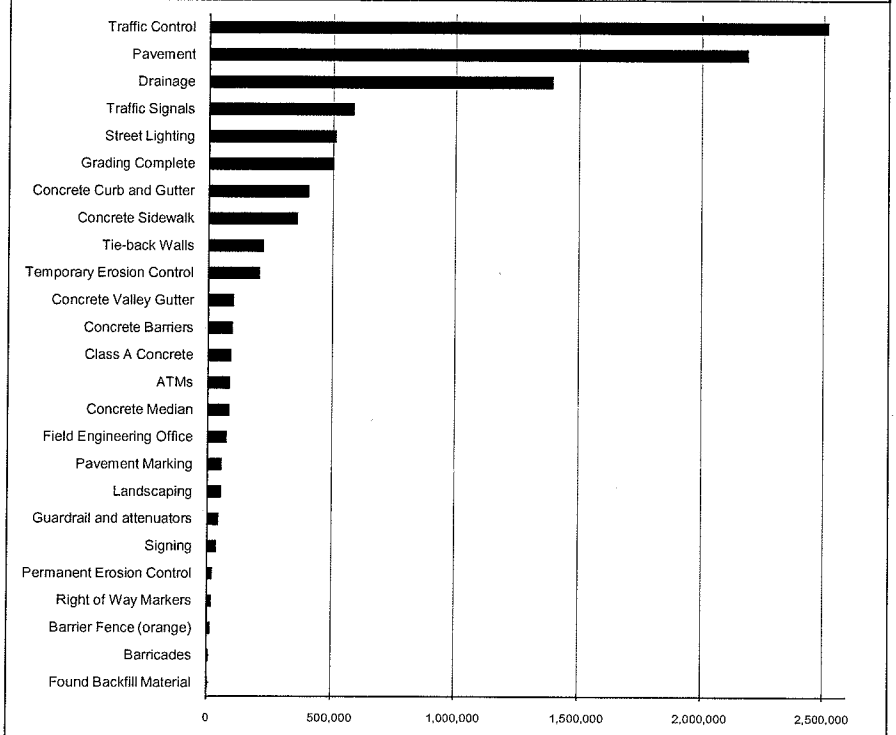
The VE team prepared a Pareto Chart, or Cost Histogram, for the project that follows this page. This Cost Histogram displays the major construction elements identified in the cost estimate prepared by the designer in descending order of magnitude and thus identifies the high cost areas in the project. The high cost elements provide the VE team with one focus for its work during the study.

The right-of-way cost is $10.9 million compared to the project's construction cost of approximately $11 million. Thus the team focused its efforts on reducing the right-of-way cost. With respect to the construction costs, traffic control, pavement, and drainage are the real cost drivers of the project.

COST HISTOGRAM

PROJECT: SR 25 CO / WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Traffic Control	2,515,800	26.12%	26.12%
Pavement	2,185,174	22.69%	48.81%
Drainage	1,389,812	14.43%	63.24%
Traffic Signals	581,402	6.04%	69.27%
Street Lighting	508,932	5.28%	74.56%
Grading Complete	500,000	5.19%	79.75%
Concrete Curb and Gutter	400,972	4.16%	83.91%
Concrete Sidewalk	356,352	3.70%	87.61%
Tie-back Walls	218,480	2.27%	89.88%
Temporary Erosion Control	203,544	2.11%	91.99%
Concrete Valley Gutter	100,947	1.05%	93.04%
Concrete Barriers	97,000	1.01%	94.05%
Class A Concrete	91,344	0.95%	95.00%
ATMs	86,527	0.90%	95.90%
Concrete Median	84,231	0.87%	96.77%
Field Engineering Office	73,914	0.77%	97.54%
Pavement Marking	54,670	0.57%	98.10%
Landscaping	53,913	0.56%	98.66%
Guardrail and attenuators	42,434	0.44%	99.10%
Signing	33,719	0.35%	99.46%
Permanent Erosion Control	18,853	0.20%	99.65%
Right of Way Markers	15,123	0.16%	99.81%
Barrier Fence (orange)	11,050	0.11%	99.92%
Barricades	5,225	0.05%	99.98%
Found Backfill Material	2,237	0.02%	100.00%
Subtotal	$ 9,631,655	100.00%	
Engineering and Inspection @ 5.00%	$ 481,583		
Construction Contingency @ 4.00%	$ 385,266		
Total Fuel Adjustment	$ 236,526		
Total Liquid AC Adjustment	$ 455,255		
Utilities	$ 24,100		
TOTAL	$ 11,214,385	Comp Mark-up:	9%



Costs in graph are not marked-up.

FUNCTION ANALYSIS

A function analysis was performed to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain the given project purpose and need, (4) identify other public goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheet completed by the team for the project in its entirety and the various elements follow.

RANDOM FUNCTION ANALYSIS

PROJECT: **SR 25 CO/ WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

SHEET NO.: **1 of 2**

DESCRIPTION		FUNCTION		
		VERB	NOUN	KIND
PROJECT		Enhance	Vehicle Safety	HO
		Enhance	Pedestrian Safety	HO
		Separate	Pedestrians from Travel Way	B
		Increase	Space Between Vehicles	B
		Separate	Opposing Vehicles	B
		Improve	Traffic Operations	HO
		Save	Trees	G
Drainage		Collect	Storm Water	B
		Convey	Storm Water	B
		Enhance	Safety	B
Traffic Control	$$$	Facilitate	Construction	S
Pavement	$$	Support	Vehicles	B
		Smooth	Ride	B
Walls		Create	Space	S
Right-of-Way Acquisition	$$$	Create	Space	B
Traffic Signals		Assign	Right-of-Way	B
Street Lighting		Illuminate	Space	B
		Enhance	Safety	B
Grading		Clear	Area	S
		Establish	Elevation	B
Curb and Gutter		Define	Roadway	B
		Direct	Storm Water	B

Function defined as: Action Verb
Measurable Noun

Kind: B = Basic
S = Secondary
RS = Required Secondary
HO = Higher Order
LO = Lower Order

RANDOM FUNCTION ANALYSIS

PROJECT: **SR 25 CO/ WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

SHEET NO.: **2 of 2**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Sidewalk	Facilitate	Pedestrian Movement	B
	Direct	Pedestrians	B
	Support	Pedestrians	B
Temporary Erosion Control	Protect	Environment During Construction	S
	Prevent	Erosion	S
Permanent Erosion Control	Prevent	Erosion	S
	Protect	Environment	RS
Concrete Valley Gutter	Collect	Storm Water	B
	Convey	Storm Water	B

Function defined as: Action Verb
Measurable Noun

Kind: B = Basic
S = Secondary
RS = Required Secondary
HO = Higher Order
LO = Lower Order

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the Creative/Speculation Phase, numerous ideas were generated for the project using conventional brainstorming techniques. These ideas were recorded and are shown with their corresponding ranking on the attached Creative Idea Listing Worksheets. For the convenience of tracking an idea through the VA process, the ideas were grouped into the following project elements and numbered according to the order in which they were conceived. The following letter prefixes were used to identify the project elements.

PROJECT ELEMENT	PREFIX
General	G
Right-of-Way	ROW
Pavement	P
Drainage	D
Sidewalk	S
Curb and Gutter	CG
Walls	W
Signals	SI

The ideas were ranked on a qualitative scale of 1 to 5 on how well the VE team believed the idea met the project purpose and need criteria. To assist the team in evaluating the creative ideas, the advantages and disadvantages of each new idea compared to the existing design solution were discussed based on the owner's value objectives for the project, which are the following:

- Saves costs
- Maintains safety
- Reduces environmental impacts
- Helps drainage
- Enhances traffic operations

After discussing each idea, the team evaluated the ideas by consensus. This produced 14 ideas rated 4 or 5 or design suggestions to research and develop into formal VE alternatives to be included in the Study Results section of the report. Highly rated ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT: **SR 25 CO/ WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

SHEET NO.: **1 of 2**

NO.	IDEA DESCRIPTION	RATING
	GENERAL	
G-1	Terminate construction I-516 westbound on ramp	4
G-2	Add fences to restrict pedestrian crossings	2
G-3	Add pedestrian cross walks at unsignalized intersections with signs for stopping at pedestrian cross walks	DS
G-4	Shift alignment to the south between I-516 ramp overpass to Brittany Street	1
	RIGHT-OF-WAY	
ROW-1	Narrow the shoulder where right-of-way is impacted	4
ROW-2	Start narrowing the median west of Ferrill Street	2
ROW-3	Narrow the median between Fell and West Streets	2
	PAVEMENT	
P-1	Use 11-ft-wide lanes in lieu of 12-ft-wide through lanes	4
P-2	Shorten turn lanes	5
	DRAINAGE	
D-1	Use HDPE pipe in lieu of reinforced concrete pipe for all pipe not under the pavement	5
D-2	Use HDPE pipe in lieu of reinforced concrete pipe for all pipe under the pavement at side roads	5
D-3	Move 30-in-diameter storm drain line next to the new retaining wall under the I-516 bridge to under the roadway	DS
	SIDEWALKS	
S-1	Use all 6-ft-wide sidewalks in lieu of some 8-ft-wide sidewalks	5
S-2	Use all 5-ft-wide sidewalks in lieu of 8-ft-wide and 6-ft-wide sidewalks	3
S-3	Use asphalt concrete in lieu of cast-in-place concrete for sidewalks	2

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed
DS = Design suggestion ABD = Already being done

CREATIVE IDEA LISTING

PROJECT: **SR 25 CO/ WEST BAY STREET IMPROVEMENTS FROM I-516 TO THE BAY STREET VIADUCT**
NHS00-0002-00(923) Chatham County

SHEET NO.: **2 of 2**

NO.	IDEA DESCRIPTION	RATING
	CURB AND GUTTER	
CG-1	Use 24-in-wide curb and gutter section in lieu of a 30-in-wide curb and gutter section	4
CG-2	Delete curb and gutter and sidewalks at cross streets	4
	SIGNALS	
SI-1	Reuse existing signals	1

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed
DS = Design suggestion ABD = Already being done