

VALUE ENGINEERING WORKSHOP

BUFORD HIGHWAY AND PLEASANT HILL ROAD

Gwinnett County, Georgia

PREPARED FOR:



Georgia Department of Transportation
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Atlanta, Georgia 30334-1002

PREPARED BY:

U.S. COST



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VALUE ENGINEERING TEAM STUDY

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VALUE ENGINEERING TEAM STUDY

PROJECT DESCRIPTION AND BACKGROUND

The PI # 132890 project consists of the construction of a new grade separated interchange at the intersection of SR 13/Buford Highway and Pleasant Hill Road near the City of Duluth. The project begins on Pleasant Hill Road approximately 600 feet west of Summit Ridge Parkway and extends easterly along Pleasant Hill Road to approximately 400 feet east of Bank Street. The typical section is 6-lane urban, with a 20 foot raised median. On Buford Highway, project construction limits extend approximately 1,800 feet south and 1,300 feet north of Pleasant Hill Road. New bridges on this project will consist of Norfolk Southern Railroad over Pleasant Hill Road and Buford Highway over Pleasant Hill Road. The Norfolk Southern RR has on the average 35 movements per day and is very disruptive to traffic on Pleasant Hill Road.

Major structures are proposed as follows:

- One Norfolk Southern bridge over Pleasant Hill Road 143 lf long
- Single Buford Highway bridge over Pleasant Hill road
- One temporary Norfolk Southern RR bridge/trestle over Pleasant Hill Road 315' lf long.

Signalized On-grade intersections are proposed as follows:

- On grade intersection at new North Loop ramp and Buford Highway
- On grade intersection at new South Loop ramp and Buford Highway
- On grade intersection at Summit Ridge Parkway
- On grade intersection at Sunset Street

The Design Cost Estimates for the project indicate the following:

- Buford Highway & Pleasant Hill Road Interchange PI # 132890 with an ECC of \$ ±27 Million, plus ROW cost of \$ ±20 Million. ROW is in the process of being appraised and will be purchase or condemned within the next six months.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

CONCERNS AND OBJECTIVES:

This project is part of an overall scheme to widen and reconstruct Buford Highway & Pleasant Hill Road Interchange, Gwinnett County, Georgia. Over the past fifteen years upgrades have been slowly coming together, spurred by the increased traffic that traverses through Gwinnett County, Georgia. The following are some of the highlighted concerns and objectives noted by the VE team for project:

BUFORD HIGHWAY & PLEASANT HILL ROAD INTERCHANGE

CONCERNS/OBSERVATIONS	PROBLEMS/OBJECTIVES
Construction Detour	Cost of detour is about 40% of total cost of project.
RR Bridge construction – Temporary and Permanent	Building two bridges has a high cost impact Cost of temporary bridge is costly. Should build only one RR bridge
Impact and Approvals	Bridge Construction alternates and/or suggested changes may require re-submittal to RR Gwinnett County for approval. Also delays in bid advertisement and award.
Material haul distances	Cost and location of borrow material site have not been identified. Barrow required for temporary road and disposal of excess at end of construction.
Construction sequence/Constructibility	Coordination of this project and traffic management will be difficult at best.
Temporary intersections layout	Not ideal and costly.
Cost Estimate	Over all cost estimate appears (10-15%) low especially unit prices on bridge construction, traffic control, erosion control for a four year construction schedule
Four on-grade signalized intersections	45 mph speed rural traffic and signal lights are prone to cause accidents.
Five Phasing Schedule	Five phase construction of detour and new road alignment will be 3-4 years of disruption to the public
Escalation and inflation to mid-point of construction	To update the budget, estimate has been escalated/inflated to 2004. With award date in mid 2005, and mid point of construction in 2007, some adjustments are needed.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

INTRODUCTION:

U.S. Cost Incorporated conducted the Value Engineering Team Study on Buford Highway & Pleasant Hill Road Interchange in Gwinnett County, Georgia. The V.E. study was conducted for three (3) days, 17-19 August 2004, at the Georgia Department of Transportation Conference Room #274 in Atlanta, GA. The study team was furnished with a 95% design package. The following individuals were members of the V.E. team:

Name	Firm	Discipline
Lindsey Gardner, P.E., CVS	U.S. Cost, Inc.	VETL
Alex Stone, P.E.	MAAI	Roadway Designer
Sam Deeb, P.E.	MAAI	Bridge Designer
Chris Parypinski, P.E.	MAAI	Constructibility
Lisa Myers	GDOT	Value Engineer
George Bradfield	GDOT	Cost Engineer
Jim Simpson	GDOT	Project Liaison

INFORMATION PHASE/FUNCTION ANALYSIS:

The V.E. team was first briefed on the project designed by Kimley-Horn and Associates, Inc., and Georgia DOT representatives in an orientation meeting the morning of the first day of the V.E. Study. The briefing gave insight into the current design, and also into the aspects of the Buford Highway & Pleasant Hill Road Interchange urban plan, which impact the site. The briefing included a review of the design requirements and rationale for the location and arrangement of the major functional areas in addition to an overview of the four different bridge structural systems. Discussions regarding project funding, required functions, and project criteria followed the design presentation.

As a basic part of the V.E. process, the team conducted a partial function analysis session on Buford Highway & Pleasant Hill Road Interchange to identify the needs and goals of the project and facilitate the creative idea session, by addressing functions as opposed to the specific design elements.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

The Basic Function of the project is to *Enhance Economy*. A strong secondary function is to *Enhance Travel & Reduce Congestion* by adding two additional lanes with depressed median on the western side of the existing Gwinnett County, Georgia. A detailed project function analysis of the characteristics of the project and their relationships is presented in Appendix A.

RISK ANALYSIS:

The group identified the following project risk elements, which may impact the project. This exercise served as a catalyst for the Creative Phase of the study, when several ideas were suggested which would mitigate these project construction risks.

Risk Elements

- Maintaining uninterrupted flow of traffic of existing and detour roads during construction
- RR bridge creating a negative visual impact for commuters on Pleasant Hill Road
- Delays and impact on the traveling/commuting public/interstate commerce
- Contractor Phasing Coordination and traffic control
- Poor Progress/Quality By A Low Bid Construction Contractor
- Accidents at at-grade intersections
- Delay impacts on utility relocations – GA Pwr, Gas Company, water and sewer lines
- Failure to meet GDOT advertisement/let date currently scheduled for February 05
- Accidents and potential lawsuits during construction
- Delays due to excessive rock blasting
- Traffic management and detours during construction

PROJECT CRITERIA:

During the meeting, project goals, criteria and sensitivities were also identified. The following prioritized listing identifies the key items of which the V.E. team should be aware. Criteria with a score of 5 or higher were considered of prime importance, and those criteria therefore must be considered in the review of any design alternative. The ranking below is the V.E. teams' impression of the sensitivity of the criteria from discussions held with Georgia DOT and the A/E representatives.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

Project Criteria Analysis:

Life Safety	10
Operational Issues	10
RR Interruptions	10
RR Criteria Compliance	10
Constructibility	8
GDOT Criteria Compliance	8
Functionality	8
Life Cycle Cost (Analysis)	8
AASHTO 2001 Compliance	7
Local Code Restrictions	7
Maintenance and Operations	6
Cost Savings Impact	2

CREATIVE PHASE:

The Creative Phase of the V.E. study was initiated the morning of the second day of the study. A total of nineteen (19) creative ideas were generated for further investigation by the team. Many of the creative ideas focused on enhancements to the roadway safety, line of sight, excavation techniques, utility locations, and drainage impact, plus various other design elements of the Project. Additional ideas were generated reflecting alternative materials based on an understanding of local construction products and materials and the relative costs of installing them.

A listing of all creative ideas on Buford Highway & Pleasant Hill Road Interchange is included in Appendix A.

EVALUATION PHASE:

The ideas generated during the Creative Phase were reviewed and evaluated by the VE team during a meeting held on the morning of the second study day. The intent of the meeting was to allow the V.E. team an opportunity to discuss and evaluate the ideas. A few of the V.E. ideas were dropped at that time as being conceptually unacceptable or in conflict with established Criteria, Right of Way (ROW) conflicts, previous agreements, or local construction methods. The ranking system consisted of VE team representatives assigning a designation to each idea. Those ideas, which the V.E. Team felt had the most promise, were given a designation of 1-5 on acceptability and 1-5 on cost impact, for a maximum rating of 10 points. This is a time management tool to identify those proposals that have the greatest potential. Approximately sixteen (16) out of the original nineteen (19) creative ideas were deemed promising for further investigation and analysis by the V.E. team.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

The time management ranking system used by the VE team is as follows:

FEASIBILITY OF IDEA

- 5 points - Excellent Idea
- 4 points - Good Idea
- 3 points - Fair Idea
- 2 points – Marginal Idea
- 1 point - Poor Idea –do not develop

COST IMPACT

- 5 points - > \$ 500,000
- 4 points - \$400,000 to 499,999
- 3 points - \$300,000 to 399,999
- 2 points - \$200,000 to 299,999
- 1 point – zero to \$199,999
- DS – Design Suggestion – sometimes reflects an increase in cost

DEVELOPMENT PHASE:

The specific proposals found in the body of this report represent the positive results of Investigations by the V.E. team on the Buford Highway & Pleasant Hill Road Interchange Project PI # 132890. Each proposal represents a quality enhancing or cost saving alternative, which is documented by words, drawings and numbers. The proposal format presents the idea, describes the original design element proposed for change and the proposed change, lists the perceived advantages and disadvantages of the proposed change and supports the idea with a detailed cost estimate for the original and proposed design. Where necessary for clarity, the proposal also includes thumbnail design drawings and supporting engineering calculations.

Many of the V.E. proposals may require some level of redesign on specific portions of the project to implement the modification. Further, several of the V.E. ideas may involve modifications to the Criteria, or current goals, of Buford Highway & Pleasant Hill Road Interchange project. These ideas are presented to initiate additional discussion and investigation during the next phase of design.

PRESENTATION PHASE:

A final presentation was not scheduled for the last day of the study.

VALUE ENGINEERING TEAM STUDY

KEY INFORMATION/NOTES

RESOLUTION PHASE:

Upon receipt of the Final Value Engineering Report, Buford Highway & Pleasant Hill Road Interchange, Kimley-Horn and Associates and Georgia DOT design representatives are requested to prepare written comments on the acceptability of each of the V.E. proposals. Responses should include the rationale for accepting, rejecting, or modifying the V.E. proposal.

BASIS OF V.E. COST SAVINGS:

The cost information for proposals in this report are based on the cost data prepared by the design A/E /Georgia Department of Transportation designers and bid tabs. Therefore, the savings presented in the proposals is a general order of magnitude (estimate of the potential savings) if the idea were to be accepted. These figures are solely intended to identify the most attractive design solution, and are not prepared to represent a net deduction to the overall project budget. The costs are in 2004 dollars. All life cycle cost analyses are prepared utilizing Present Worth methodology, a 25-year economic period, a 4.0% net discount factor (inclusive of inflation), and 3% escalation in the cost of utilities. With a bid opening of February 2005 it is the opinion of the V.E. Team that the estimate is 10% -15% low and needs to be re-evaluated. All proposals have been marked up 15% (10% for contingencies and 5% escalation).

SUSTAINABLE/GREEN DESIGN PROPOSALS:

Sustainable design incorporates energy conservation, increased use of renewable energy sources, the reduction or elimination of toxic and harmful substances in facilities, efficiency in resource and material utilization, recycling of building materials, the use of recycled material, the reduction of waste products during both the construction and operation of the facility, and facility maintenance practices that reduce or eliminate harmful effects on people and the natural environment. In keeping with the National Policy objective of building all new facilities with sustainable design features, the VE team proposed sustainable design elements and/or practices. Specifically, Proposal RW-1.0 proposes to utilize the blasted rock material as the graded aggregate base course material for this project.

VALUE ENGINEERING TEAM STUDY

SUMMARY OF RECOMMENDATIONS

IDEA NO.	IDEA DESCRIPTION	SAVINGS
	ROADWAY (RW)	
RW 1.0	Use crush excavated rock for graded aggregate base course	173,000
RW 3.0	Narrow proposed median on Pleasant Hill Road from 20' to 10'-5" by using median barrier	450,000
RW 3.1	Narrow proposed median on Pleasant Hill Road from 20'-0" to 12'-0"	345,000
RW 4.0	Revise ramps A/B to more closely match Ramps C/D	336,000
RW 6.0	Delete the hatched median on the Pleasant Hill Road detour, and use 11'-0" wide travel lanes	108,000
RW 7.0	Use the detour alignment as the permanent alignment to minimize reconstruction costs, and traffic disruptions	2,332,000
RW 8.0	Show paved shoulders on ramps having the same cross slope as the ramp	Design Suggestion
RW 9.0	Raise profile of Pleasant Hill Road to reduce clearances underneath the proposed Buford Highway Bridge	42,000
	STRUCTURAL/BRIDGES (SB)	
SB - 3.0	Build/construct RR bridge with pre-stress concrete boxes in lieu of steel beams	800,000
SB - 3.1	Build two-track bridge with room for future single track bridge ilo three track bridge for unknown future RR expansion	800,000
SB - 4.0	Construct RR tracks on shoring/retaining wall ilo temporary trestle bridge	1,100,000
SB - 4.1	Use Conspan units for detour of RR ilo construction of trestle bridge	1,000,000
SR - 6.0	Allow the use of High Pressure Concrete with 54" Bulb Tees for construction of Buford Hwy bridge	32,000
SB - 7.0	Install/use parallel bents on Buford Hwy bridge	34,000
SB - 12.0	Use tunneling method for both Buford Highway bridge and RR bridge location with daylight areas between then	4,000,000

VALUE ENGINEERING TEAM STUDY

PROPOSAL COMBINATION SCHEMES

This study includes recommendations that are mutually exclusive to other proposals whereby acceptance of one proposal eliminates other proposals from further consideration. Also, the V.E. Team recognizes that the current project is at the 95% design phase and any design changes will delay bid award, require re-design time and associated costs, and possibly require additional public hearings on proposed changes to the road layout. Thus, the V.E. Team recommends two (2) proposal combination schemes for consideration:

- Scheme #1 represents a combination of ideas to build the temporary road profile as the final road profile with some changes and, when complete, the existing Pleasant Hill Road will remain in its original location as a road with no thru traffic.
- Scheme #2 is a combination of ideas to depress Pleasant Hill Road below the existing RR profile in order to avoid constructing an expensive temporary RR trestle. This scheme will have improved visual impact at the RR crossing and will improve the maintenance of traffic on Pleasant Hill Road during construction. Pleasant Hill is being depressed under the current design and this recommendation will require additional depression of the road.

Both proposal combination schemes will reduce the construction time and interruptions to the traveling public by a minimum of twelve (12) months, in addition to other benefits and potential disadvantages identified in the individual proposals included in this report. The V.E. Team feels the advantages, cost savings, and reduced construction time for these schemes far outweigh the disadvantages.

SCHEME # 1

IDEA NO.	IDEA DESCRIPTION	SAVINGS
RW 1.0	Use crush excavated rock for graded aggregate base course	173,000
RW 3.0	Narrow proposed median on Pleasant Hill Road from 20' to 10'-5" by using median barrier	450,000
RW 3.1	Narrow proposed median on Pleasant Hill Road from 20'-0" to 12'-0"	345,000
RW 4.0	Revise ramps A/B to more closely match Ramps C/D	336,000
RW 6.0	Delete the hatched median on the Pleasant Hill Road detour, and use 11'-0" wide travel lanes	108,000
RW 8.0	Show paved shoulders on ramps having the same cross slope as the ramp	Design Suggestion
SB - 12	Use tunneling method for both Buford Highway bridge and RR bridge location with daylight areas between then	4,000,000
	Potential Optimum Savings	\$5,067,000

VALUE ENGINEERING TEAM STUDY

PROPOSAL COMBINATION SCHEMES

SCHEME #2

IDEA NO.	IDEA DESCRIPTION	SAVINGS
RW 3.0	Narrow proposed median on Pleasant Hill Road from 20' to 10'-5" by using median barrier	450,000
RW 3.1	Narrow proposed median on Pleasant Hill Road from 20'-0" to 12'-0"	345,000
RW 4.0	Revise ramps A/B to more closely match Ramps C/D	336,000
RW 7.0	Use the detour alignment as the permanent alignment to minimize reconstruction costs, and traffic disruptions	2,332,000
RW 8.0	Show paved shoulders on ramps having the same cross slope as the ramp	Design Suggestion
RW 9.0	Raise profile of Pleasant Hill Road to reduce clearances underneath the proposed Buford Highway Bridge	42,000
SB - 3.0	Build/construct RR bridge with pre-stress concrete boxes in lieu of steel beams	800,000
SB - 3.1	Build two-track bridge with room for future single track bridge in lieu of three track bridge for unknown future RR expansion	800,000
SB - 4.0	Construct RR tracks on shoring/retaining wall in lieu of temporary trestle bridge	1,100,000
SB - 4.1	Use "CONSPAN" units for detour of RR in lieu of construction of trestle bridge	1,000,000
SR - 6.0	Allow the use of High Pressure Concrete with 54" Bulb Tees for construction of Buford Hwy bridge	32,000
SB - 7.0	Install/use parallel bents on Buford Hwy bridge	34,000
	Potential Optimum Savings	\$ 5,126,000

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-1.0
PAGE NUMBER:	1 of 3

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: TO CRUSH EXCAVATED ROCK AND USE FOR GRADED AGGREGATE BASE (GAB) COURSE.
--

ORIGINAL DESIGN: The original design requires the placement of over 90,000 tons of GAB in the construction of the temporary alignments of Pleasant Hill Road and Buford Highway, the new loop ramps and the reconstruction of Pleasant Hill Road. There will be approximately 30,000 tons of GAB needed to build Pleasant Hill Road, the proposed ramps and the widening on Buford Highway.

PROPOSED CHANGE: The proposed change would allow for an on site crushing operation to be used to crush and grade the aggregate to be used for GAB. Graded aggregate base course.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 517,500		\$ 517,500
PROPOSED CHANGE:	\$ 345,000		\$ 345,000
		SAVINGS:	\$ 172,500

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-1.0
PAGE NUMBER:	2 of 3

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$172,500.

Reduced cost for GAB.

Acceptable construction technique and allowed GDOT.

Reduced haul distance, would allow for faster placement reducing construction time.

Reduces the amount of project waste material.

DISADVANTAGES:

Require a large staging area to set up rock crushing equipment, and store material before and after crushing.

Requires additional testing to verify that excavated rock meets GDOT standards for crushing and GAB.

JUSTIFICATION:

On site crushing will decrease construction cost due to decreased GAB prices and unclassified excavation prices, while decreasing construction time.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	RW-1.0
PAGE NUMBER:	3 of 3

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Graded Aggregate Base Course	1	TN	30,000	15	450,000
SUBTOTAL:					450,000
15% MARK UP:					67,000
TOTAL:					517,500

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Graded Aggregate Base Course	7	TN	30,000	10	300,000
SUBTOTAL:					300,000
15% MARK UP:					45,000
TOTAL:					345,000

Note: Other source from recent project in Gwinnett County where contractor crushed on site.

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-3.0
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: NARROW PROPOSED MEDIAN ON PLEASANT HILL ROAD FROM 20' TO 12'

ORIGINAL DESIGN: The original design has a Typical Section for Pleasant Hill Road that includes a 20' raised concrete median.

PROPOSED CHANGE: The proposed change would taper the concrete median from Station 124+23 to Station 140+35. The concrete median can be tapered down from 20' to 12' wide in this area. This would include enough width for the 4' bridge columns, Type 7 curb and gutter, and concrete side barriers to protect the columns.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 8,924,279		\$ 8,924,279
PROPOSED CHANGE:	\$ 8,578,806		\$ 8,578,806
		SAVINGS:	\$ 345,473

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-3.0
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

- Reduces total LCC costs by \$345,473.
- Reduces earthwork and rock blasting.
- Reduces bridge spans and total lengths
- Reduces concrete median quantities.

DISADVANTAGES:

- Additional design time and costs will be required to modify the roadway section.
- The additional design time could cause a delay in the construction letting date.
- Typical section varies by introducing more tapers to roadway section.

JUSTIFICATION:

Since there will be limited access on the depressed roadway section of Pleasant Hill Road, there is no need to have a full 20' median. This smaller median has been used by GDOT on other roadways successfully.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-3.0

PAGE NUMBER: 3 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Railroad Bridge	7	SF	8,305	257.73	2,140,442
Highway Bridge	7	SF	18,748	52.52	984,700
Concrete Median, 4 IN	1	SY	3,454	27.50	94,985
Unclassified Excavation	1	CY	378,343	12.00	4,540,116
SUBTOTAL:					7,760,243
15% MARK UP:					1,164,036
TOTAL:					8,924,279

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Railroad Bridge	7	SF	7,841	257.73	2,020,861
Highway Bridge	7	SF	17,961	52.52	943,312
Concrete Median, 4 IN	1	SY	2,181	27.50	59,978
Unclassified Excavation	1	CY	369,640	12.00	4,435,680
SUBTOTAL:					7,459,831
15% MARK UP:					1,118,975
TOTAL:					8,578,806

7 – Used total cost of bridges in designer’s cost estimate, divided by total area to obtain a cost per sq. ft. used this unit cost to calculate proposed change.

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: RW-3.0

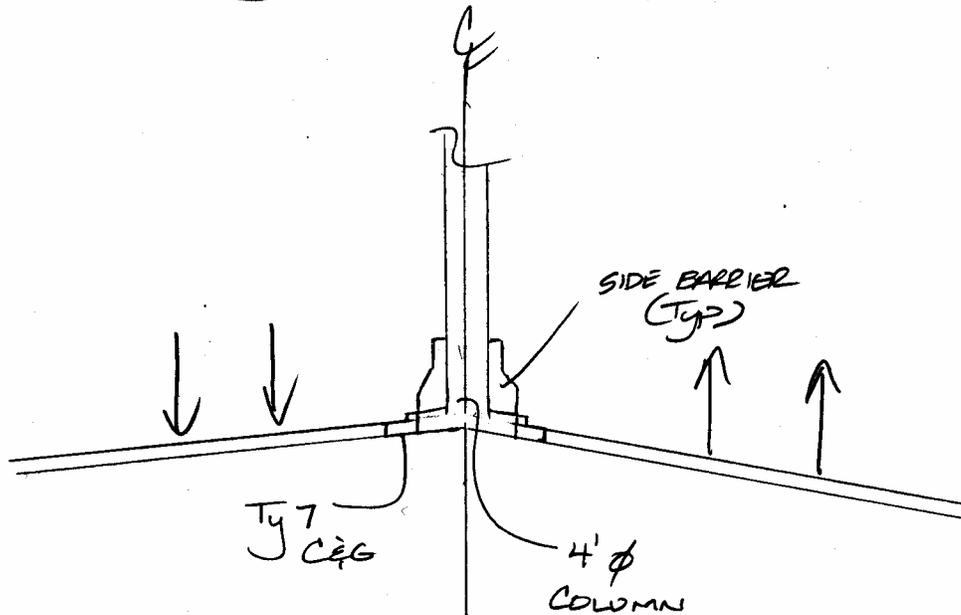
PAGE NUMBER: 4 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: MEDIAN CONCRETE BRIDGES
EARTHWORK.

TYPICAL SECTION
RW-3.0



$$\begin{aligned} \text{MEDIAN} &= 4' \phi + 2'-6'' + 2'-6'' \times 2 \\ &= 11'-6'' \text{ MIN} \end{aligned}$$

$$\text{USE} = 12'-0''$$

CALCULATIONS

PROPOSAL NUMBER:	RW-3.0
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Median Concrete
Bridges
Earthwork

Bridges:

RR Bridge:

Total Cost: \$2,140,442
Total SF: 8304.875
Cost/SF= 257.733199

New SF= 7840.875
Total Cost: \$2,020,854

Savings \$119,588

Highway Bridge:

Total Cost: \$984,718
Total SF: 18748.38135
Cost/SF= 52.52282752

New SF= 17961.04775
Total Cost: \$943,365

Savings \$41,353

Median Concrete:

Begin Sta	End Sta	Width	Area (SY)
12423	12603	4	80
12603	13855	8	1112.888889
13855	14035	4	80

Total Area 1272.888889

Cost/SF \$27.50

Total Cost \$35,004.44

Earthwork:

Begin Sta	End Sta	Width	Avg. Height	Area (SF)	Incr. Vol.	Cum. Vol.
12423	12603	4	23	92	613.3333	613.3333
12603	13855	8	21.5	172	7975.704	8589.037
13855	14035	4	4.25	17	113.3333	8702.37

Excavation Cost/CY= \$12.00

Total Cost= \$104,428.44

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-3.1
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: NARROW PROPOSED MEDIAN ON PLEASANT HILL ROAD FROM 20' TO 10.5' BY USING MEDIAN BARRIER.

ORIGINAL DESIGN: The original design has a Typical Section for Pleasant Hill Road that includes a 20' raised concrete median.

PROPOSED CHANGE: The proposed change would taper the concrete median from Station 124+23 to Station 140+35. The concrete median can be tapered down from 20' to 10.5' wide in this area. This would include enough width for the 4' bridge columns, side barriers, and 2' inside shoulders.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 8,924,279		\$ 8,924,279
PROPOSED CHANGE:	\$ 8,472,815		\$ 8,472,815
		SAVINGS:	\$ 451,464

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-3.1
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

- Reduces total LCC costs by \$451,464.
- Reduces earthwork and rock blasting.
- Reduces bridge spans and total lengths.
- Reduces concrete median quantities.

DISADVANTAGES:

- Additional design time and costs will be required to modify the roadway section.
- The additional design time could cause a delay in the construction letting date.
- Typical section varies by introducing more tapers to roadway section.

JUSTIFICATION:

Since there will be limited access on the depressed roadway section of Pleasant Hill Road, there is no need to have a full 20’ median. Costs for barrier and Crash Cushions were not included, since the current design does not have these quantities and are warranted; thus, there is no additional quantities needed in the proposed design. This type of median design has been accepted and installed by GDOT on other road ways successfully.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-3.1

PAGE NUMBER: 3 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Railroad Bridge	7	SF	8,305	257.73	2,140,442
Highway Bridge	7	SF	18,748	52.52	984,700
Concrete Median, 4 IN	1	SY	3,454	27.50	94,985
Unclassified Excavation	1	CY	378,343	12.00	4,540,116
SUBTOTAL:					7,760,243
15% MARK UP:					1,164,036
TOTAL:					8,924,279

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Railroad Bridge	7	SF	7,754	257.73	1,998,438
Highway Bridge	7	SF	17,688	52.52	928,974
Concrete Median, 4 IN	1	SY	878	27.50	24,145
Unclassified Excavation	1	CY	368,009	12.00	4,416,108
SUBTOTAL:					7,367,665
15% MARK UP:					1,105,150
TOTAL:					8,472,815

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:

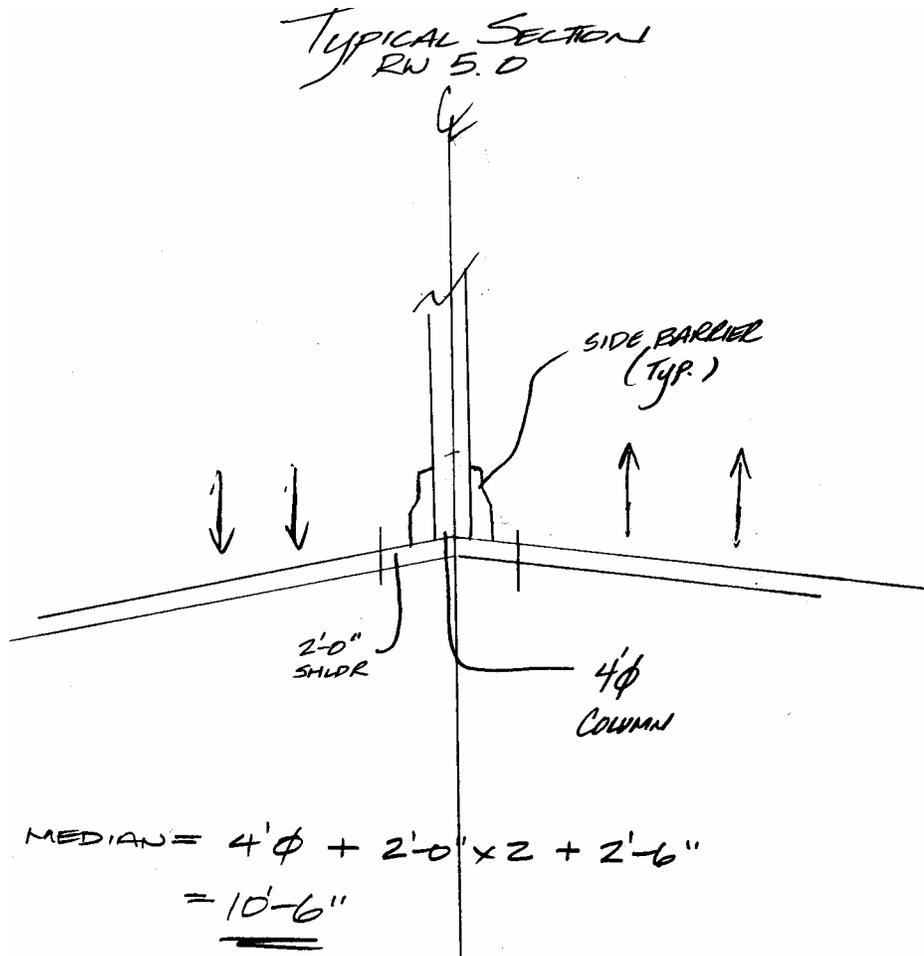
RW-3.1

PAGE NUMBER:

4 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



CALCULATIONS

PROPOSAL NUMBER:	RW-3.1
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Revised:
 Add Concrete Barrier
 Median Concrete
 Bridges
 Earthwork

Bridges:

RR Bridge:

Total Cost: \$2,140,442
 Total SF: 8304.875
 Cost/SF= 257.733199

New SF= 7753.875
 Total Cost: \$1,998,431

Savings \$142,011

Highway Bridge:

Total Cost: \$984,718
 Total SF: 18748.38135
 Cost/SF= 52.52282752

New SF= 17687.29775
 Total Cost: \$928,987

Savings \$55,731

Median Concrete:

Median Barrier

Begin Sta	End Sta	Width	Area (SY)	Begin Sta	End Sta	Length
12423	12603	4.75	95	12603	13855	1252
12603	14035	15	2386.666667			
13855	14035	4.75	95			

Total Area 2576.666667

Cost/SF \$27.50

Total Cost \$70,858.33

Earthwork:

Begin Sta	End Sta	Width	Avg. Height	Area (SF)	Incr. Vol.	Cum. Vol.
12423	12603	4.75	23	109.25	728.3333	728.3333
12603	13855	9.5	21.5	204.25	9471.148	10199.48
13855	14035	4.75	4.25	20.1875	134.5833	10334.06

Excavation Cost/CY= \$12.00

Total Cost= \$124,008.78

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-4.0
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: REVISE DESIGN OF RAMPS A/B TO MORE CLOSELY MATCH RAMPS C/D.

ORIGINAL DESIGN: The original Ramps A and B use horizontal curves approx. 312' and 252' Radii, and tie in with Buford Highway at approximately. Sta. 210+54.57.

PROPOSED CHANGE: The proposed recommendation is to redesign Ramps A and B to use radii similar to Ramps C/D, approx. 172' Radius, and will tie in with Buford Highway 200' NE of current design.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$657,527		\$ 657,527
PROPOSED CHANGE:	\$322,000		\$ 322,000
		SAVINGS:	\$ 335,527

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-4.0
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

- Total LCC savings of \$335,000.
- Reduces Right-of-way costs.
- Interchange is more symmetrical.
- AutoZone property existing driveway will line up with Ramp A/ B terminals at Buford Highway.

DISADVANTAGES:

- Additional design time and costs will be required to modify the proposed profile.
- The additional design time could cause a delay in the construction letting date.
- Design speed for exit ramp (Ramp A) will be reduced from 30 to 25 mph.
- Reduced distance to develop an additional right turn lane onto Buford Hwy NE.

JUSTIFICATION:

By tightening the curve radii on Ramps A/B, over a half an acre of ROW acquisition can be avoided, and the exiting driveway for the AutoZone property can be left in place.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-4.0

PAGE NUMBER: 3 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Area of Right-of-Way	7	SF	56,000	10	560,000
12.5mm Superpave	1	TN	77	40	3,080
19mm Superpave	1	TN	103	38	3,914
Graded Aggregate Base	1	TN	316	15	4,740
Bitum. Tack Coat	1	GAL	28	1	28
SUBTOTAL:					571,762
15% MARK UP:					85,765
TOTAL:					657,527

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Area of Right-of-Way	7	SF	28,000	10	280,000
12.5mm Superpave	1	TN	0	40	0
19mm Superpave	1	TN	0	38	0
Graded Aggregate Base	1	TN	0	15	0
Bitum. Tack Coat	1	GAL	0	1	0
SUBTOTAL:					280,000
15% MARK UP:					42,000
TOTAL:					322,000

SOURCES

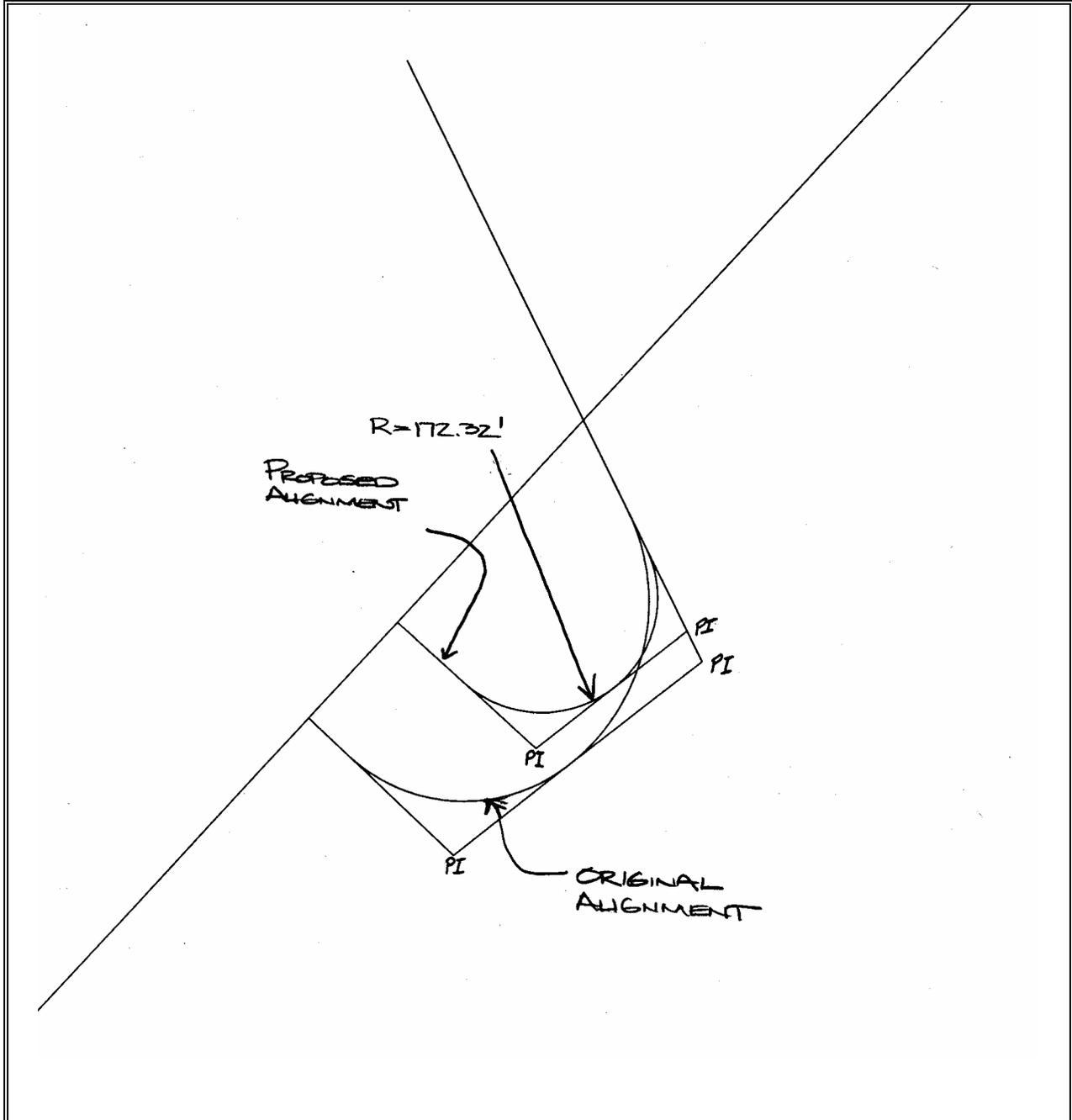
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|--|--|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. CES Data Base 3. CACES Data Base 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Other (Specify) |
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PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	RW-4.0
PAGE NUMBER:	4 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



CALCULATIONS

PROPOSAL NUMBER:	RW-4.0
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

1) Right-of-Way Costs

Additional Remainder of Land

= 140' X 200'
= 28000 SF

2) Wall Heights

Station	Plan Elev.	Prop. Elev.	Wall Height Savings (FT)	Incr. Wall (SF)	Cum. Wall #2(SF)	Cum. Wall #5(SF)
13200	1039.39	1039.54	0.15	3.75	3.75	3.75
13250	1040.05	1040.3	0.25	10	13.75	13.75
13300	1040.99	1041.33	0.34	14.75	28.5	28.5
13350	1042.21	1042.63	0.42	19	47.5	47.5
13400	1043.7	1044.19	0.49	22.75	70.25	70.25
13450	1045.46	1046.03	0.57	26.5	96.75	96.75
13500	1047.51	1048.14	0.63	30	126.75	126.75
13550	1049.82	1050.48	0.66	32.25	159	159

Columns - Bridge #2

2.1728395 CY of Savings

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-6.0
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: DELETE THE HATCHED MEDIAN ON THE PLEASANT HILL ROAD DETOUR, AND USE 11' TRAVEL LANES.

ORIGINAL DESIGN: The original design requires that a temporary roadway for Pleasant Hill Road and Buford Highway be built to full depth typical section, with the 12' travel lanes and a hatched median.

PROPOSED CHANGE: The proposed change would eliminate the hatched median between station 309+60 and 314+80 as well as reduce the lane width by one foot between stations 305+80 332+00.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 108,079		\$ 108,079
PROPOSED CHANGE:	\$ 0		\$ 0
		SAVINGS:	\$ 108,079

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-6.0
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$108,000.

Reduced in Borrow Material.

Reduction in GAB and Asphalt.

DISADVANTAGES:

Requires redesign of Pleasant Hill Road detour plan sheets, maintenance of traffic sheets, detour cross sections, and detour signing and marking plan.

Redesign could delay construction letting.

JUSTIFICATION:

By reducing the lane width and the unnecessary hatch median on detour of Pleasant Hill Road, construction savings can be reduced.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	RW-6.0
PAGE NUMBER:	3 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Borrow Excavation	1	CY	3,620	10	36,200
Recy. Asph. Concrete 25mm	1	TN	613	35	21,455
Recy. Asph. Concrete 19mm	1	TN	409	38	15,542
Recy. Asph. Concrete 12.5mm	1	TN	154	40	6,160
GR Aggr. Base Crs	1	TN	975	15	14,625
SUBTOTAL:					93,982
15 % MARK UP:					14,097
TOTAL:					108,079

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
SUBTOTAL:					
15 % MARK UP:					
TOTAL:					

SOURCES

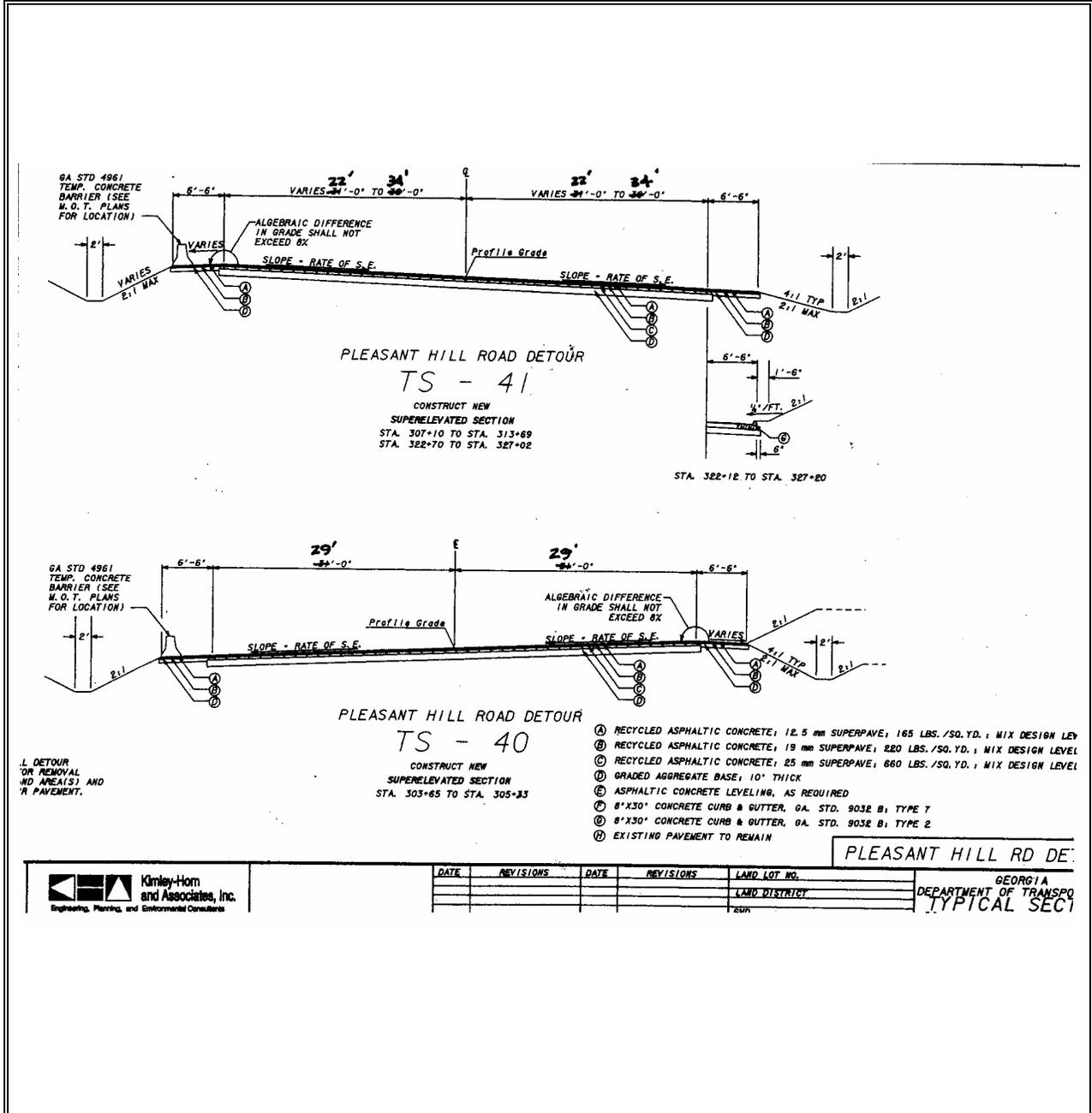
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|----------------------------|-----------------------------------|
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| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER:	RW-6.0
PAGE NUMBER:	4 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

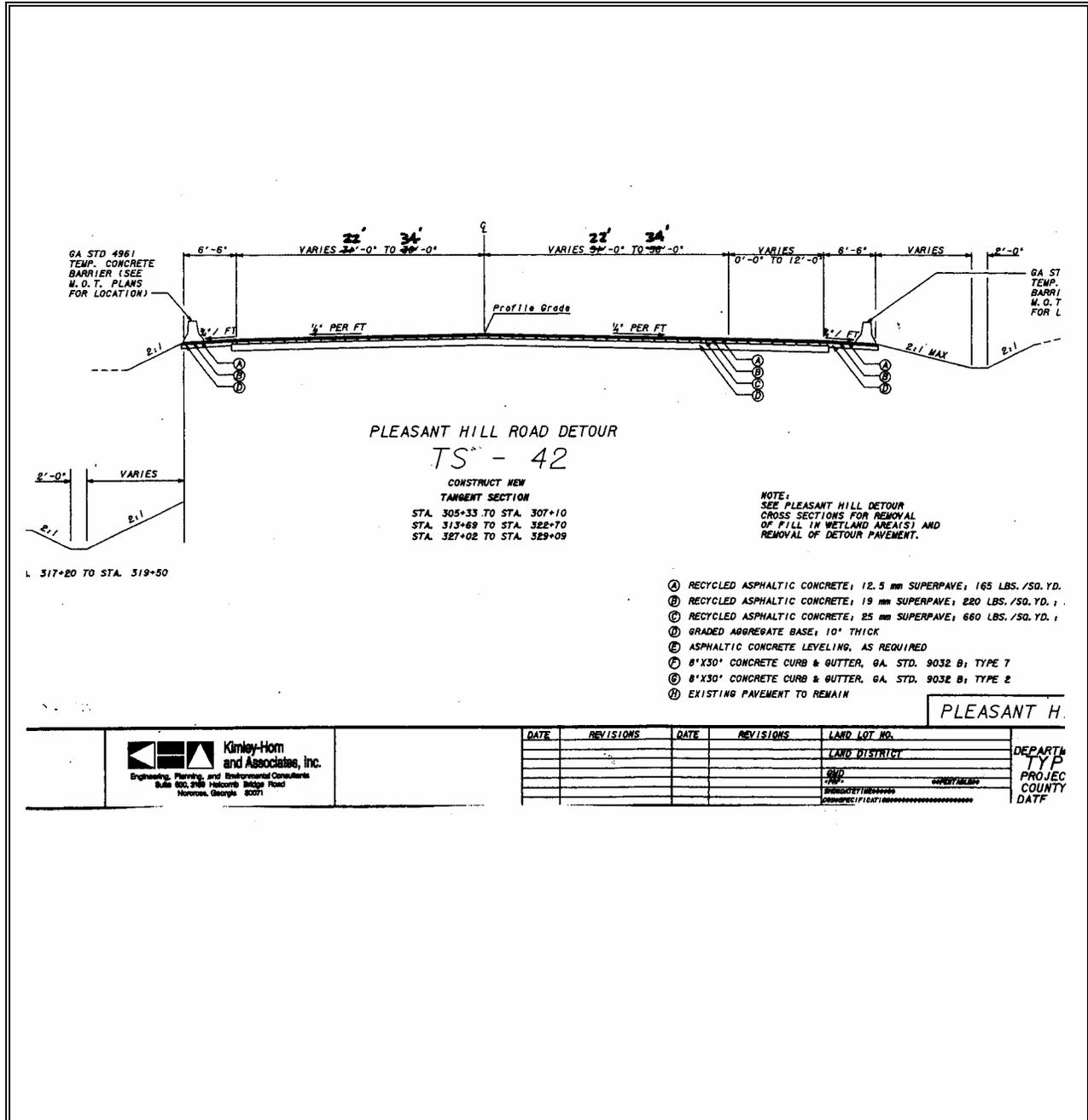


PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	RW-6.0
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



Kimley-Horn and Associates, Inc.
 Engineering, Planning, and Environmental Consultants
 Suite 600, 2180 Veterans Bridge Road
 Norcross, Georgia 30071

DATE	REVISIONS	DATE	REVISIONS	LAND LOT NO.	DEPART
					TYP
					PROJEC
					COUNTY
					DATF

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-7.0
PAGE NUMBER:	1 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: USE THE DETOUR ALIGNMENT AS THE PERMANENT ALIGNMENT TO MINIMIZE RECONSTRUCTION COSTS, AND TRAFFIC DISRUPTIONS.

ORIGINAL DESIGN: The original design requires that a temporary roadway for Pleasant Hill Road and Buford Highway be built to a full depth typical section, with the final alignment being built and traffic being shifted back to the final alignment and the detour section having to be removed and disposed of.

PROPOSED CHANGE: The proposed change would use the proposed detour alignment for Pleasant Hill Road as the final alignment, allowing for the majority of construction to be done with the least amount of disruption to traffic. There will be minimal disruptions during construction and a much faster re-routing of traffic onto new road.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 4,746,624		\$ 4,746,624
PROPOSED CHANGE:	\$ 2,415,000		\$ 2,415,000
		SAVINGS:	\$ 2,331,624

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-7.0
PAGE NUMBER:	2 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$2,331,624.

Meets design standards with minimal redesign of the horizontal alignment.

Reduced construction time by 12 – 18 months.

Reduction in unclassified embankment, GAB, Asphalt, Precast Barrier, and, Impact Attenuators.

Reduced disruption to traffic, by having fewer shifts.

Deletion of Wall #3.

DISADVANTAGES:

Increased right of way impacts, may require acquisition of 12 town homes.

Introduces 4 curves to Pleasant Hill Road that are not currently there.

Requires significant redesign costs, and time for the redesign of the ramps, final roadway section, walls and bridges.

Requires additional geotechnical investigation for the new location of the bridges and walls.

Delays construction contract.

Requires additional environmental studies.

Additional impacts to utilities. Relocation may require another public hearing Gwinnett County may object to changes at this late date.

JUSTIFICATION:

By using the detour alignment, significant construction savings, in time and money can be achieved.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-7.0

PAGE NUMBER: 3 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Unclassified Excavation	1	CY	273,328	12	3,279,936
Recy. Asph. Concrete 25mm	1	TN	6,467	35	226,345
Recy. Asph. Concrete 19mm	1	TN	4,311	38	163,818
Recy. Asph. Concrete 12.5mm	1	TN	1,617	40	64,680
GR Aggr. Base Crs	1	TN	10,288	15	154,320
Precast Concrete Median Barrier, Method No. #3	1	LF	1,800	25	45,000
Impact Attenuator Unit	1	EA	2	25,000	50,000
Perm Soil Nail Wall-Wall 3	1	LS	1	143,400	143,400
SUBTOTAL:					4,127,499
15 % MARK UP:					619,125
TOTAL:					4,746,624

SOURCES

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. CES Data Base 3. CACES Data Base 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Other (Specify) |
|--|--|

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-7.0

PAGE NUMBER: 4 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Unclassified Excavation	1	CY	0	12	0
Recy. Asph. Concrete 25mm	1	TN	0	35	0
Recy. Asph. Concrete 19mm	1	TN	0	38	0
Recy. Asph. Concrete 12.5mm	1	TN	0	40	0
GR Aggr. Base Crs	1	TN	0	15	0
Precast Concrete Median Barrier, Method No. #3	1	LF	0	25	0
Impact Attenuator Unit	1	EA	0	25,000	0
Perm Soil Nail Wall-Wall 3	1	LS	0	143,400	0
Right of Way (town homes)	7	EA	12	175,000	2,100,000
SUBTOTAL:					2,100,000
15 % MARK UP:					315,000
TOTAL:					2,415,000

SOURCES

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. CES Data Base 3. CACES Data Base 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Other (Specify) |
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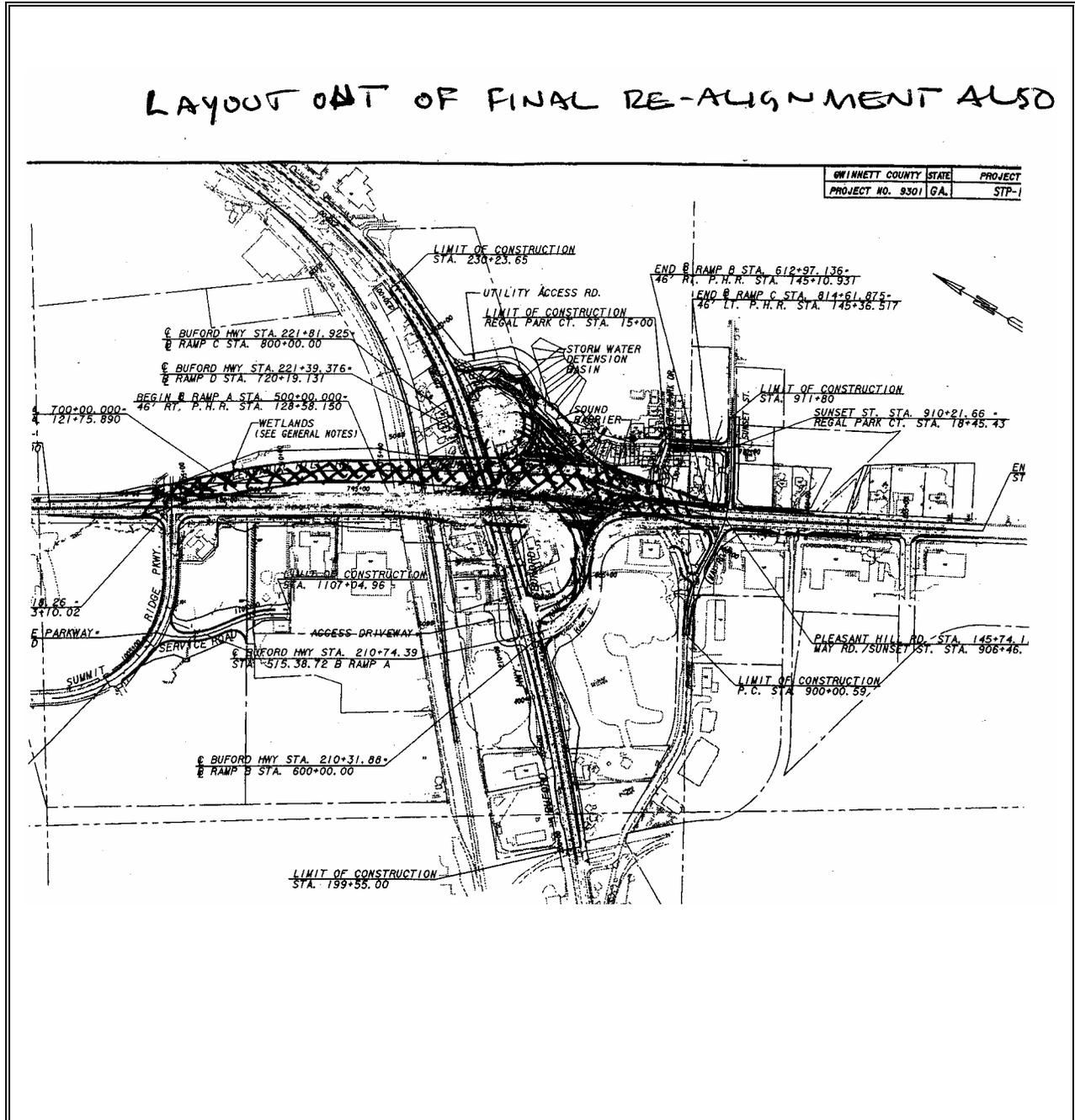
PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	RW-7.0
PAGE NUMBER:	5 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

LAYOUT OUT OF FINAL RE-ALIGNMENT ALSO



CALCULATIONS

PROPOSAL NUMBER:	RW-7.0
PAGE NUMBER:	6 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Earthwork Volumes RW-7

Station	Approx. End Area(SF)	Distance	Volume(CY)
117+50	0	0	0
118+00	285	50	264
118+50	400	50	634
119+00	550	50	880
119+50	780	50	1231
120+00	975	50	1625
120+50	1444	50	2240
121+00	2100	50	3281
121+50	2000	50	3796
122+00	1960	50	3667
122+50	2385	50	4023
123+00	2750	50	4755
123+50	2915	50	5245
124+00	3270	50	5728
124+50	3450	50	6222
125+00	3215	50	6171
125+50	3540	50	6255
126+00	3813	50	6808
126+50	4156	50	7387
127+00	3889	50	7449
127+50	4226	50	7514
128+00	4279	50	7875
128+50	4300	50	7943
129+00	4214	50	7883
129+50	3770	50	7393
130+00	3780	50	6991
130+50	4060	50	7259
131+00	4176	50	7626
131+50	4500	50	8033
132+00	4650	50	8472
132+50	4640	50	8602
133+00	4785	50	8727
133+50	4930	50	8995
134+00	4760	50	8972
134+50	4500	50	8574
135+00	4680	50	8500
135+50	4515	50	8514
136+00	3240	50	7181
136+50	3152	50	5919
137+00	3474	50	6135
137+50	3900	50	6828
138+00	4779	50	8036
138+50	4302	50	8408
139+00	1872	50	5717
139+50	1018	50	6236
140+00	611	50	1508
140+50	380	50	918
141+00	300	50	630
141+50	0		278
TOTAL			273328

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-8.0
PAGE NUMBER:	1 of 2

PROJECT TITLE: BUFORD HWY & PLEASANT HILL ROAD

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: SHOW PAVED SHOULDERS ON RAMPS HAVING THE SAME CROSS SLOPE AS THE RAMP.

ORIGINAL DESIGN: The original design Typical sections 21, 22, 23, 24, and 25 show a section of the paved shoulder having a 1/2"/1' cross slope which is different than the cross slope of the roadway.

PROPOSED CHANGE: The proposed recommendation is to show all shoulder cross slopes matching the cross slope of the roadway.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:			
PROPOSED CHANGE:			
SAVINGS:			Design Suggestion

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-8.0
PAGE NUMBER:	2 of 2

PROJECT TITLE: BUFORD HWY & PLEASANT HILL ROAD
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Removes a stage of construction for the ramps, the shoulders will be able to be constructed at the same time as the travel lane.

Meets GDOT and AASHTO standards.

DISADVANTAGES:

Additional redesign costs.

JUSTIFICATION:

Redesign of cross slopes will meet current design standards, while reducing construction time at a minimal redesign cost.

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	RW-9.0
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: RAISE PROFILE OF PLEASANT HILL ROAD TO REDUCE CLEARANCES UNDERNEATH THE PROPOSED BUFORD HIGHWAY BRIDGE.

ORIGINAL DESIGN: The profile of original design for Pleasant Hill Road allows for a clearance of 17'-11 3/16" underneath the Buford Highway bridge (STA 134+43, APPROX).

PROPOSED CHANGE: The proposed recommendation is for the profile to be raised in order to make a minimum clearance of 17'-0" underneath the Buford Highway bridge. (Reduction of 11').

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$6,462,156		\$ 6,462,156
PROPOSED CHANGE:	\$6,420,058		\$ 6,420,058
		SAVINGS:	\$ 42,098

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	RW-9.0
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$42,098.

Reduces the grade from 4.912% to 4.747%.

Sight distance slightly improved.

Proposed tieback wall heights will be reduced.

Reduces the amount of excavation needed to build the roadway.

DISADVANTAGES:

Additional design time and costs will be required to modify the proposed profile.

The additional design time could cause a delay in the construction letting date.

JUSTIFICATION:

Minimizing clearances over/under proposed bridges is good engineering practice. Savings are minimal, and might not be justified compared to the re-design costs involved in changing plans that are 90% complete.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: RW-9.0

PAGE NUMBER: 3 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Unclassified Excavation	1	CY	378,343	12.00	4,540,116
Permanent Anchored Wall #2	1	SF	13,434	34.65	465,350
Permanent Anchored Wall #5	1	SF	15,673	34.65	543,000
Class A Concrete	1	CY	185	382.70	70,800
SUBTOTAL:					5,619,266
15% MARK UP:					842,890
TOTAL:					6,462,156

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Unclassified Excavation	1	CY	376,260	12.00	4,515,120
Permanent Anchored Wall #2	1	SF	13,275	34.65	459,979
Permanent Anchored Wall #5	1	SF	15,514	34.65	537,560
Class A Concrete	1	CY	183	382.70	70,000
SUBTOTAL:					5,582,659
15% MARK UP:					837,399
TOTAL:					6,420,058

SOURCES

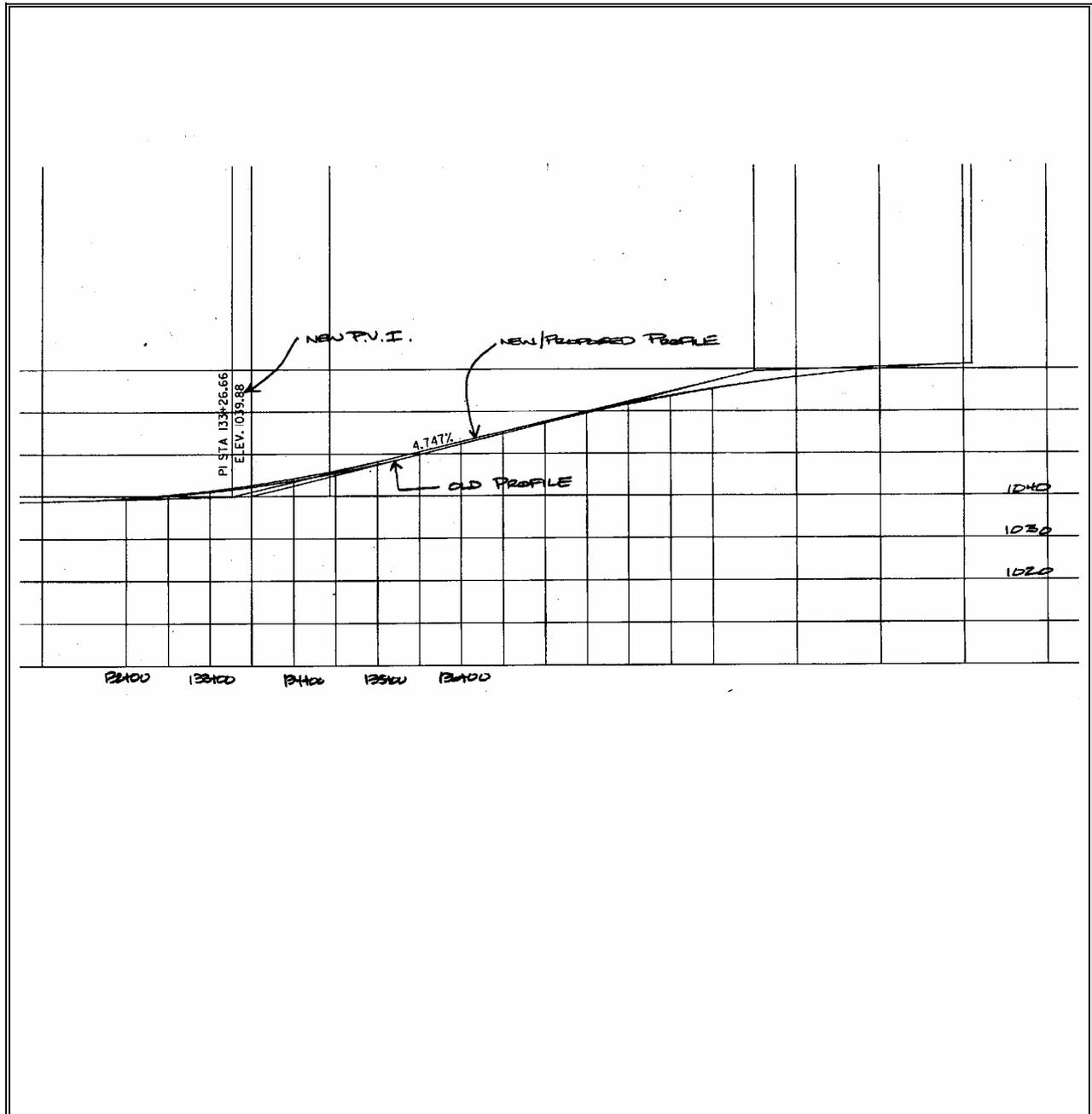
- | | |
|----------------------------|-----------------------------------|
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| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	RW-9.0
PAGE NUMBER:	4 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



CALCULATIONS

PROPOSAL NUMBER:	RW-9.0
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Buford Highway @ Pleasant Hill Road
 Proposal # RW-9.0
 Quantities

Wall Heights
 Excavation

1) Excavation

Station	Plan Elev.	Prop. Elev.	Area of Excav.	Savings (SF)	Incr. Vol. (CY)	Total Vol. (CY)
13200	1039.39	1039.54	23.10		21.38889	21.3888889
13250	1040.05	1040.3	40.00		58.42593	79.81481481
13300	1040.99	1041.33	55.76		88.66667	168.4814815
13350	1042.21	1042.63	70.98		117.3519	285.8333333
13400	1043.7	1044.19	85.26		144.6667	430.5
13450	1045.46	1046.03	102.03		173.4167	603.9166667
13500	1047.51	1048.14	121.59		207.0556	810.9722222
13550	1049.82	1050.48	132.00		234.8056	1045.777778
13600	1052.28	1052.86	116.00		229.6296	1275.407407
13650	1054.73	1055.23	100.00		200	1475.407407
13700	1057.19	1057.6	82.00		168.5185	1643.925926
13750	1059.5	1059.86	72.00		142.5926	1786.518519
13800	1061.61	1061.9	58.00		120.3704	1906.888889
13850	1063.51	1063.75	48.00		98.14815	2005.037037
13900	1065.21	1065.39	36.00		77.77778	2082.814815

2) Wall Heights

Station	Plan Elev.	Prop. Elev.	Wall Height Savings (FT)	Incr. Wall (SF)	Cum. Wall #2(SF)	Cum. Wall #5(SF)
13200	1039.39	1039.54	0.15	3.75	3.75	3.75
13250	1040.05	1040.3	0.25	10	13.75	13.75
13300	1040.99	1041.33	0.34	14.75	28.5	28.5
13350	1042.21	1042.63	0.42	19	47.5	47.5
13400	1043.7	1044.19	0.49	22.75	70.25	70.25
13450	1045.46	1046.03	0.57	26.5	96.75	96.75
13500	1047.51	1048.14	0.63	30	126.75	126.75
13550	1049.82	1050.48	0.66	32.25	159	159

Columns - Bridge #2
 2.1728395 CY of Savings

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-3.0
PAGE NUMBER:	1 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: BUILD RR BRIDGE WITH PRESTRESS CONCRETE BOXES IN LIEU OF STEEL BEAMS.

ORIGINAL DESIGN: The original design proposes to construct a three track RR bridge of 143' ± in length and 58'-0" wide with a steel beam superstructure.

PROPOSED CHANGE: The proposed design recommends the construction of the RR bridge with 66" x 33" triple prestressed boxes per track in lieu of a steel beam superstructure.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$2,461,508		\$ 2,461,508
PROPOSED CHANGE:	\$1,684,175		\$ 1,684,175
		SAVINGS:	\$ 777,333

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-3.0
PAGE NUMBER:	2 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$777,333.

Faster Construction.

Less time for setting beams and framing.

Less material required.

Product is available.

Less long term maintenance with concrete.

DISADVANTAGES:

Requires HPC Prestressed Concrete box designs.

JUSTIFICATION:

Reduction in material and maintenance costs associated with steel beams and the faster construction of prestressed concrete boxes furnish a better design. Concrete bridge structures are normally the standard for GDOT projects.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: SB-3.0

PAGE NUMBER: 3 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Steel Beam Norfolk RR Bridge	1	Lump Sum	1	2,140,442	2,140,442
SUBTOTAL:					2,140,442
15% MARK UP:					321,066
TOTAL:					2,461,508

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Prestressed Concrete Box Norfolk RR Bridge	1 & 6	Lump Sum	1	1,464,500	1,464,500
SUBTOTAL:					1,464,500
15% MARK UP:					219,675
TOTAL:					1,684,175

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-3.0
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PAGE NUMBER:	4 of 4
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PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Total cost of bridge as designed= 2,140,442

Total cost of superstructure steel= 991,000

Cost of Prestress box/LF= 200/LF

3 boxes/track + 2 additional for access road=11 boxes

Length of bridge =143.2083

Total cost of superstructure boxes= 143.2083 x 11 x 200/LF=315,058

Total cost of CB bridge=2,140,442-991,000+315,058=1,464,500

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-3.1
PAGE NUMBER:	1 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: BUILD TWO-TRACK BRIDGE WITH ROOM FOR FUTURE SINGLE-TRACK BRIDGE.

ORIGINAL DESIGN: The original design proposes a three track RR bridge of 143' ± in length and 58'-0" wide. Allowing for a future third rail.

PROPOSED CHANGE: The proposed design recommends the construction of a two-track bridge with 39'-0" wide and enough room for the construction of a single bridge for the third track in the future. If needed.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$2,461,508		\$ 2,461,508
PROPOSED CHANGE:	\$1,655,178		\$ 1,655,178
		SAVINGS:	\$ 806,330

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-3.1
PAGE NUMBER:	2 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

- Total life cycle cost savings of \$806,330.
- Faster Construction.
- Less time for setting beams.
- Less materials – and reduced cost at this time.

DISADVANTAGES:

- Net Present value analysis may lead to more costs in the future than now.
- Future track bridge construction may disrupt traffic on Pleasant hill.
- Substructure for the future track bridge needs to be constructed in the present.

JUSTIFICATION:

The reduction in construction costs outweigh the need for future track construction at this time. Normally future expansion occurs many years out and therefore not justified with current day dollars.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: SB-3.1

PAGE NUMBER: 3 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
3-Track Norfolk RR Bridge	1	Lump Sum	1	2,140,442	2,140,442
SUBTOTAL:					2,140,442
15 % MARK UP:					321,066
TOTAL:					2,461,508

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
2-track Norfolk RR Bridge	1	Lump Sum	1	1,439,285	1,439,285
SUBTOTAL:					1,439,285
15 % MARK UP:					215,893
TOTAL:					1,655,178

SOURCES

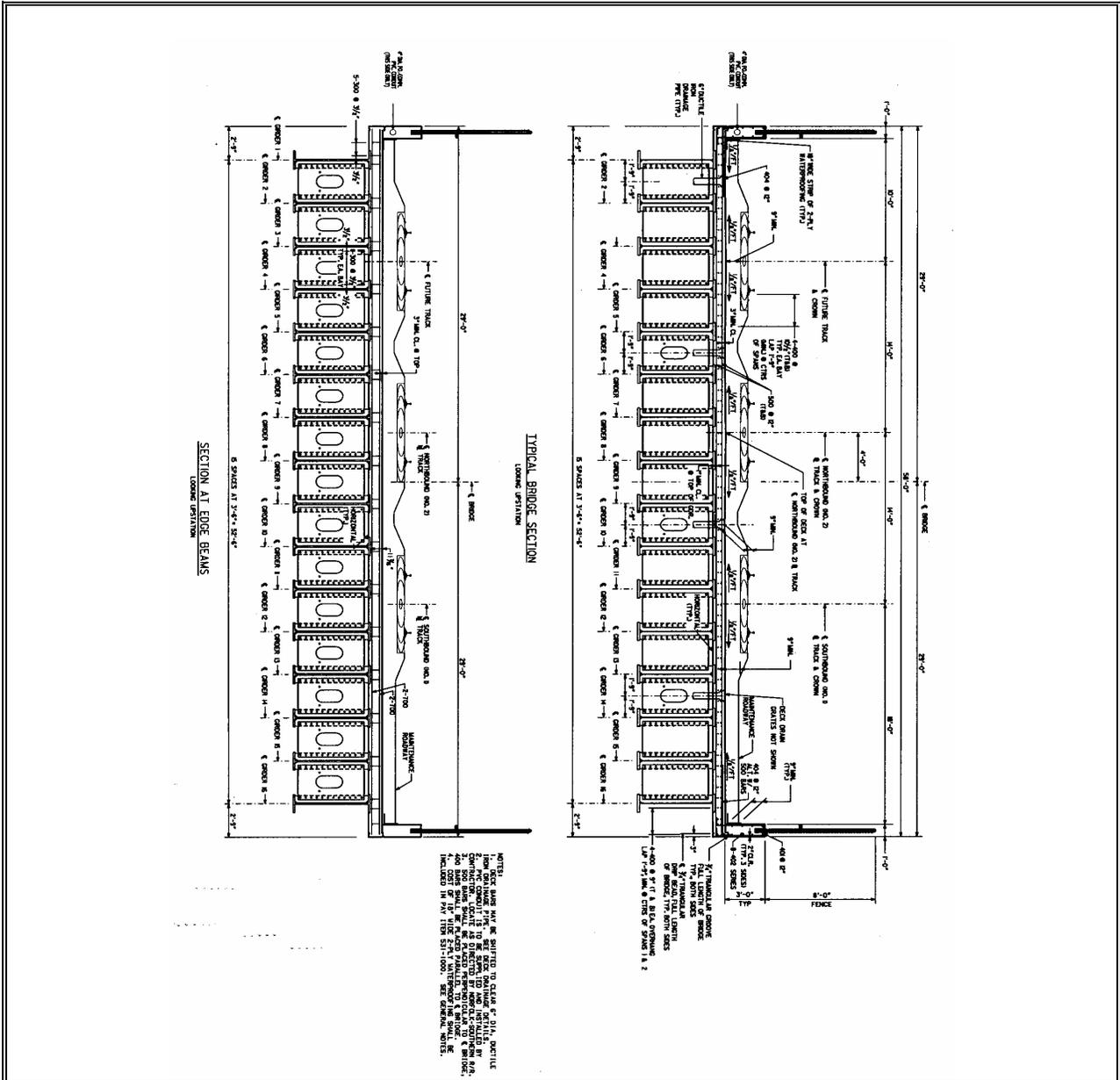
- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER:	SB-3.1
PAGE NUMBER:	4 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

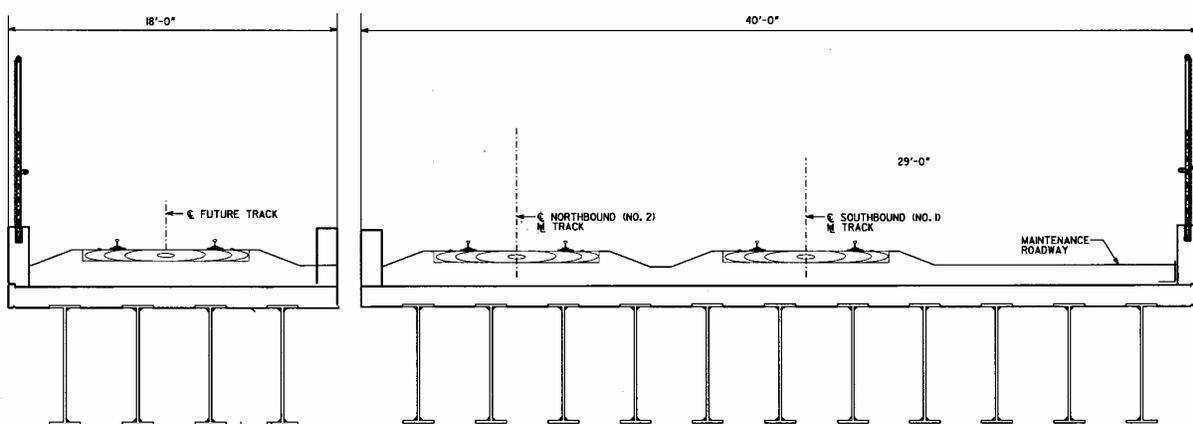


PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	SB-3.1
PAGE NUMBER:	5 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



SECTION AT EDGE BEAMS
LOOKING UPSTATION

PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-3.1
PAGE NUMBER:	6 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Total cost of bridge as designed= 2,140,442

Total area of bridge= 58 x 143.2083=8,306

Cost/ SF= 257.70

Two track bridge area= 39 x 143.2083 = 5585.12

Total cost of two track bridge= 257.7*5585.12=1,439,285

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-4.0
PAGE NUMBER:	1 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: CONSTRUCT RR TRACKS ON SHORING/RETAINING WALL IN LIEU OF TEMPORARY TRESTLE BRIDGE.

ORIGINAL DESIGN: The original design proposes a 315 feet ± trestle bridge as a detour railroad bridge with ensuing excavation.

PROPOSED CHANGE: The proposed design proposes the utilization of shoring and retaining walls that is offset a 26'-0" minimum distance from the existing NB track mainline

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$ 1,598,943		\$ 1,598,943
PROPOSED CHANGE:	\$ 530,437		\$ 530,437
		SAVINGS:	\$ 1,068,506

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-4.0
PAGE NUMBER:	2 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$1,068,506.

Faster Construction time.

Less skilled workforce/Less labor.

Improves safety.

Reduces cost of expensive temporary RR trestle bridge.

DISADVANTAGES:

Close proximity of construction between wall and new bridge.

Heavy equipment near operating tracks.

JUSTIFICATION:

Construction time and materials are drastically reduced by expediting construction and minimizing labor.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: SB-4.0

PAGE NUMBER: 3 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT – GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Detour RR Bridge	1		1	1,390,385	1,390,385
SUBTOTAL:					1,390,385
15% MARK UP:					208,558
TOTAL:					1,598,943

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Detour On Grade RR Tracks Shoring	4		1	200,000	200,000
Detour On Grade RR Tracks Retaining Wall	7		1	261,250	261,250
SUBTOTAL:					461,250
15% MARK UP:					69,187
TOTAL:					530,437

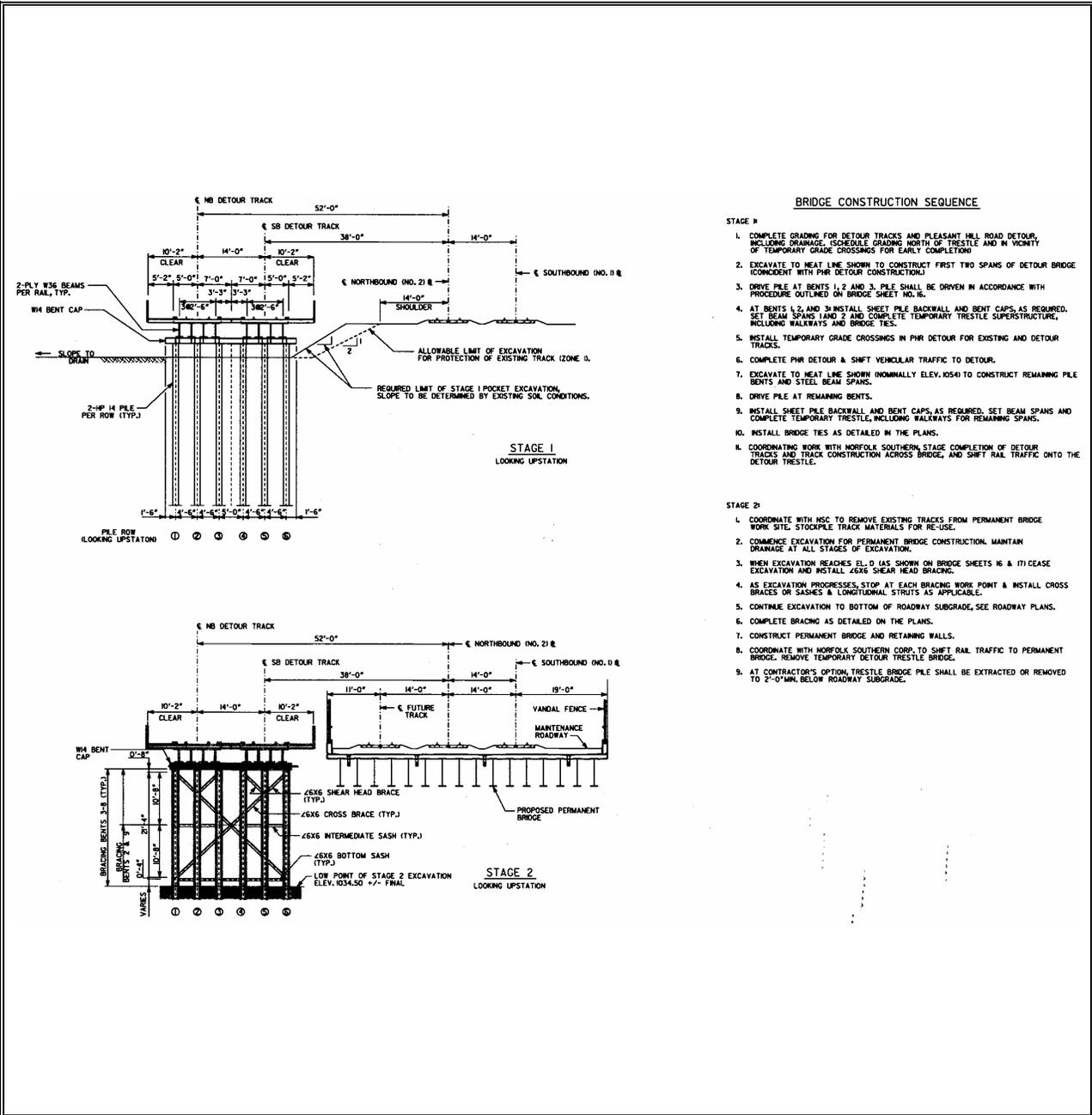
SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
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ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER:	SB-4.0
PAGE NUMBER:	4 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT – GWINNETT COUNTY, GA

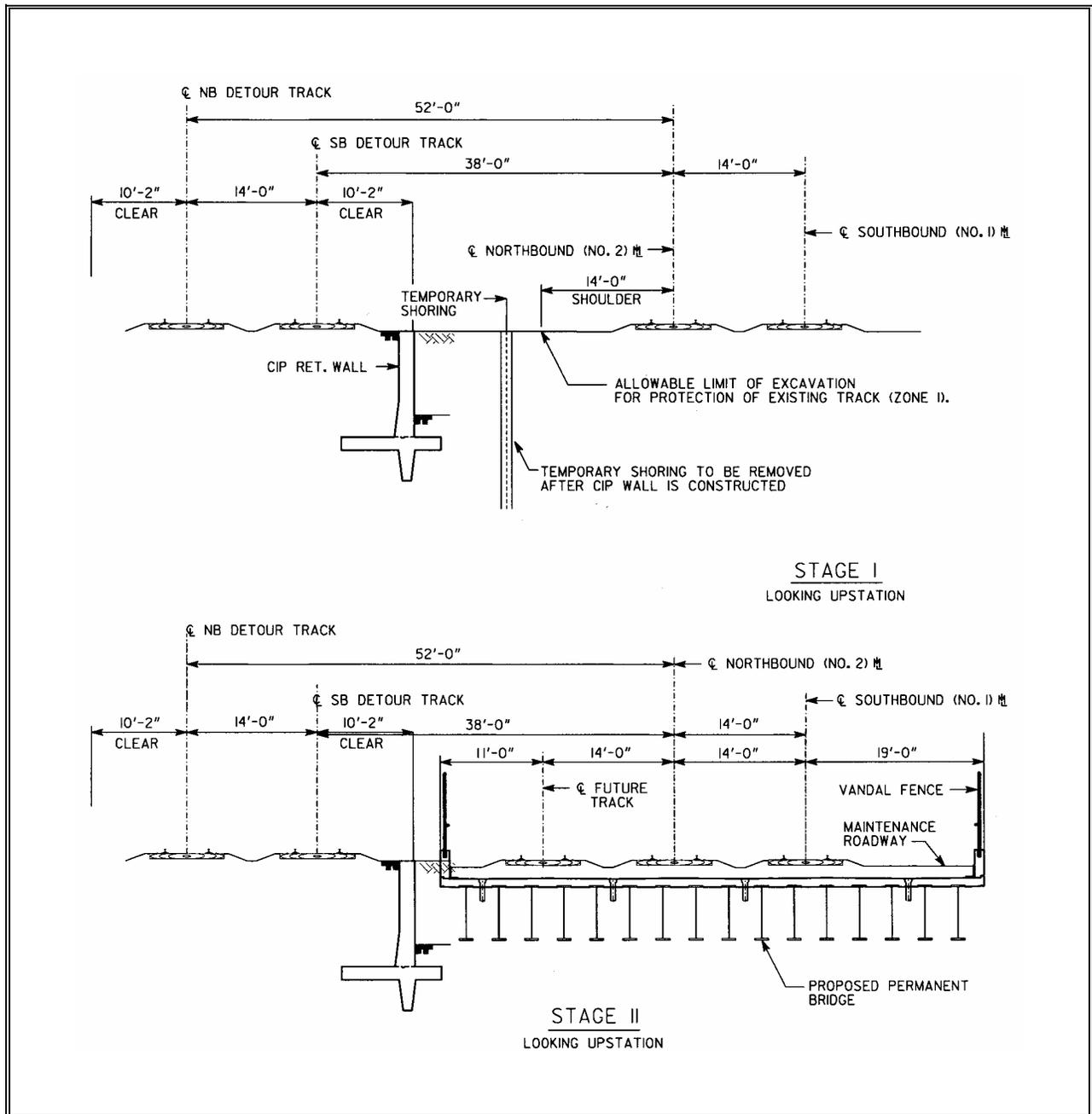


PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER:	SB-4.0
PAGE NUMBER:	5 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT – GWINNETT COUNTY, GA



PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-4.0
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PAGE NUMBER:	6 of 6
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PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT – GWINNETT COUNTY, GA

Length of wall = $(140' + 25 + 25)$

190 ft.

Height of wall = 25 ft.

Total 50 ft. = 4750

Cost/SF (From Experience) = 55/SF

= 261,250

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-4.1
PAGE NUMBER:	2 of 3

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$998,643.

Faster Construction time (12 – 18 months).

Less skilled workforce/Less labor.

Improves safety.

DISADVANTAGES:

Close proximity of construction between wall and new bridge.

Heavy equipment near operating tracks may require RR approval

JUSTIFICATION:

Construction time and materials are drastically reduced by expediting construction and minimizing labor.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: SB-4.1

PAGE NUMBER: 3 of 3

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Detour RR Bridge	1	Lump Sum	1	1,390,385	1,390,385
SUBTOTAL:					1,390,385
15% MARK UP:					208,558
TOTAL:					1,598,943

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Detour On Grade RR Tracks Shoring	4	Lump Sum	1	200,000	200,000
Conspan Detour Bridge	6	LF	140	\$2300	322,000
SUBTOTAL:					522,000
15% MARK UP:					78,300
TOTAL:					600,300

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-6.0
PAGE NUMBER:	1 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: USE HPC WITH 54" BT BEAMS ON BUFORD HWY BRIDGE.

ORIGINAL DESIGN: The original design proposes a two span 63" BT beam bridge with spans of 98'-3" & 92'-3" respectively.

PROPOSED CHANGE: The proposed design recommends the utilization of HPC concrete in conjunction with 54" BT beams and possibly reduce the number of beams by one and increase spacing to 8'-11" with 4'-7 1/2" spacing which improves clearances.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$1,132,426		\$ 1,132,426
PROPOSED CHANGE:	\$1,100,183		\$ 1,100,183
		SAVINGS:	\$ 32,243

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-6.0
PAGE NUMBER:	2 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$32,243.

State of the art construction materials.

Less time for setting beams.

Reduced difficulty delivery of beams.

DISADVANTAGES:

HPC 54” BT costs offset the 63” BT costs.

Newly developed concrete strengths with less practical field information about behavior.

JUSTIFICATION:

State of the art material usage and fewer beams to contend with.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	SB-6.0
PAGE NUMBER:	3 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Buford Hwy Bridge w/63"BT	1		1	984,718	984,718
SUBTOTAL:					984,718
15% MARK UP:					147,708
TOTAL:					1,132,426

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Buford Hwy Bridge w/54"BT	1		1	956,681	956,681
SUBTOTAL:					956,681
15% MARK UP:					143,502
TOTAL:					1,100,183

SOURCES

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. CES Data Base 3. CACES Data Base 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Other (Specify) |
|--|--|

PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-6.0
PAGE NUMBER:	4 of 4

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Total length of spans are 98.25' and 92.25'
Endwall depths =1.5' x 2 ends=3'
Edge beam widths=1' x 2 ends=2'
Single beam lengths=98.25'+92.25'-3'-2'=185.5'
Beam spacing of 8'-11" w/4'-7 1/2" overhang = 11 beams
Total beam length= 2,040.5
Price of 54" BT with HPC=63" BT=\$129.5
Total beam price=264,245

Total 63" BT beam price=292,282

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-7.0
PAGE NUMBER:	1 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: USE // BENTS ON BUFORD HIGHWAY BRIDGE.

ORIGINAL DESIGN: The original design proposes a two span 63” BT beam bridge with skewed bents with different lengths.

PROPOSED CHANGE: The proposed design recommends the utilization parallel bents to the centerline intermediate bent with end bents of variable offsets to tie back wall thereby eliminating the various beam lengths.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$1,132,426		\$ 1,132,426
PROPOSED CHANGE:	\$1,098,812		\$ 1,098,812
		SAVINGS:	\$ 33,614

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-7.0
PAGE NUMBER:	2 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$33,614.

Uniform beam lengths per span.

Less fabrication time and costs with same lengths.

Less chance of errors in fabrication, design and review.

DISADVANTAGES:

Redesign Time.

Variable offset to Tie back wall from End bents.

JUSTIFICATION:

Fabrication and labeling process is simplified as well as the shop drawing review stage is much simpler.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER: SB-7.0

PAGE NUMBER: 3 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Buford Hwy Bridge w/skewed bents	1		1	984,718	984,718
SUBTOTAL:					984,718
15% MARK UP:					147,708
TOTAL:					1,132,426

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Buford Hwy Bridge w/parallel Bents	6		1	955,489	955,489
SUBTOTAL:					955,489
15% MARK UP:					143,323
TOTAL:					1,098,812

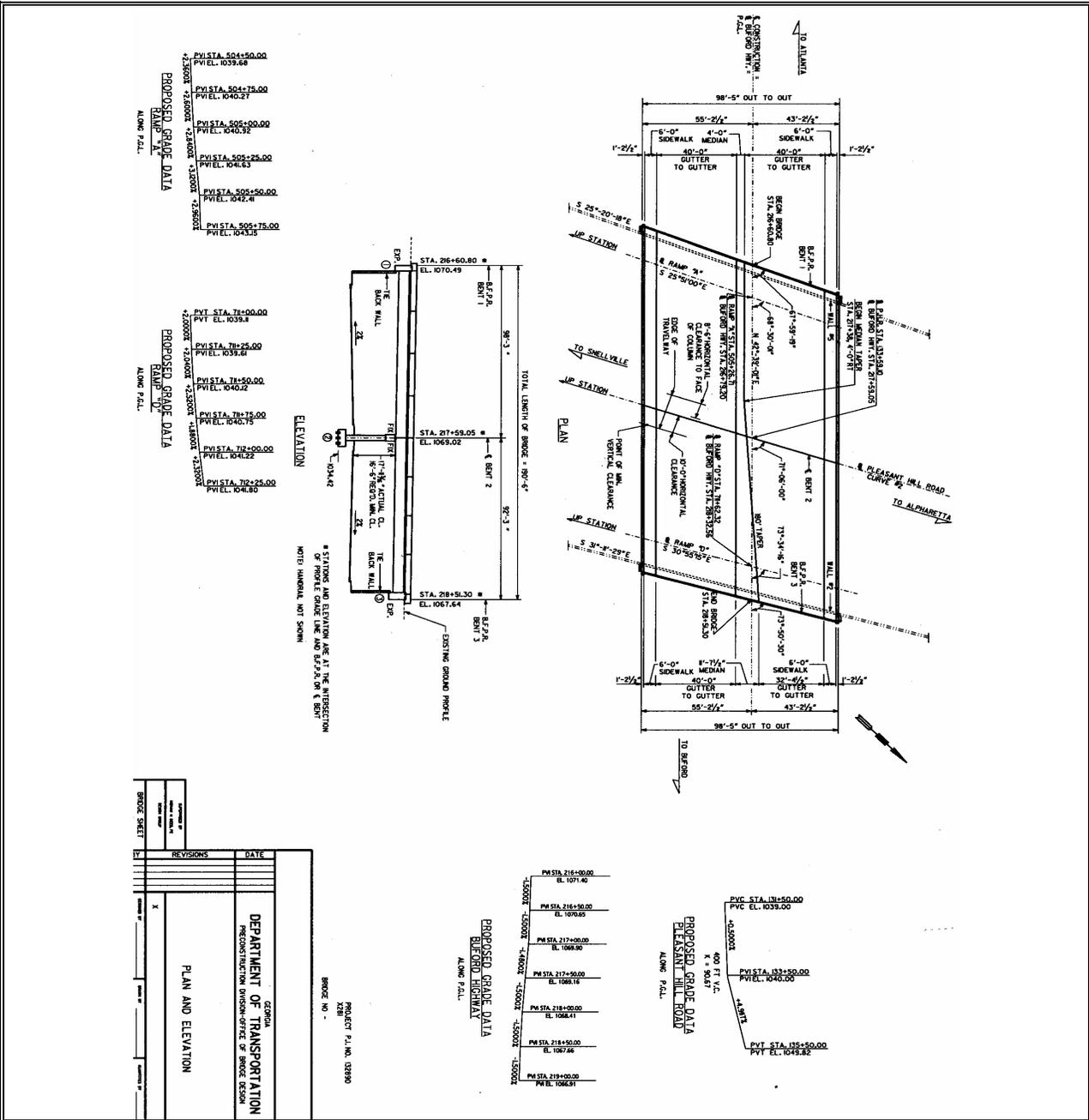
SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
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| 4. Means Estimating Manual | |

ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER:	SB-7.0
PAGE NUMBER:	4 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA



PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-7.0
PAGE NUMBER:	6 of 6

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Total Cost of beams as designed=\$292,282

Fabricator Discount for uniform beam lengths=10%

Total uniform Beam fabrication= 90%x 292,282 = 263,053

Total bridge cost estimate=984,718

Total new bridge cost=984,718-292,282+263,053=955,489

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER:	SB-10.0
PAGE NUMBER:	1 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

PROPOSAL DESCRIPTION: USE TUNNELING FOR BOTH BUFORD AND RR LOCATIONS WITH DAYLIGHT AREA BETWEEN THEM.

ORIGINAL DESIGN: The original design proposes a 143 feet ± RR bridge and a 190.5 feet Buford highway bridge

PROPOSED CHANGE: The proposed design recommends the utilization tunneling, jack and bore, in both locations in lieu of bridge construction and allow for a daylight area between the tunnels along pleasant hill road. With this recommendation, and as the RR allows, a detour RR bridge will not be required. Jack and boring occurs under train traffic.

	INITIAL COST	OPERATING COST	TOTAL LIFE-CYCLE COST
ORIGINAL DESIGN:	\$5,192,877		\$ 5,192,877
PROPOSED CHANGE:	\$1,263,850		\$ 1,263,850
SAVINGS:			\$ 3,929,027

ADVANTAGES/DISADVANTAGES/JUSTIFICATION

PROPOSAL NUMBER:	SB-10.0
PAGE NUMBER:	2 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.
PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ADVANTAGES:

Total life cycle cost savings of \$3,929,027.

Faster Construction time (24 months).

Less labor.

Improves safety.

Improved visual impact/aesthetics with elimination of RR bridge.

DISADVANTAGES:

Tunneling under Train traffic.

Heavy equipment near operating tracks will require additional coordination, may require/recommend specialized contractors.

Specialized equipment.

JUSTIFICATION:

Construction time and materials are drastically reduced by expediting construction and minimizing labor as well provides as a more aesthetic visual horizon.

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	SB-10.0
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PAGE NUMBER:	3 of 5
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PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Bridges 1, 2, & 3	1	Lump Sum	1	4,515,545	4,515,545
SUBTOTAL:					4,515,545
15% MARK UP:					677,332
TOTAL:					5,192,877

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Tunneling both bridges	4	LF	157	7000	1,099,000
SUBTOTAL:					1,099,000
15% MARK UP:					164,850
TOTAL:					1,263,850

SOURCES

- | | |
|----------------------------|-----------------------------------|
| 1. Project Cost Estimate | 5. Richardson's Estimating Manual |
| 2. CES Data Base | 6. Vendor (Specify) |
| 3. CACES Data Base | 7. Other (Specify) |
| 4. Means Estimating Manual | |

ORIGINAL DESIGN CALCULATIONS

PROPOSAL NUMBER:	SB-10.0
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PAGE NUMBER:	4 of 5
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PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Bridge 1 Cost=2,140,442

Bridge 2 Cost= 984,718

Bridge 3 Cost= 1,390,385

Total Cost= 4,515,545

PROPOSED CHANGE CALCULATIONS

PROPOSAL NUMBER:	SB-10.0
PAGE NUMBER:	5 of 5

PROJECT TITLE: BUFORD HWY & PLEASANT HILL RD.

PROJECT LOCATION: GEORGIA DOT - GWINNETT COUNTY, GA

Tunneling Cost per LF per GDOT cost estimate personnel=6000/LF of divided arterial

Cost of additional items of retaining walls, etc.= 1000/LF

Total cost of tunneling per linear foot=7000/LF

Total length of bridges = 99' + 58'=157'

Total Cost=157 x 7000=1,099,000

VALUE ENGINEERING TEAM STUDY

CONTACT DIRECTORY

NAME	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
Lisa L. Myers	Engineering Services	404-651-7468	lisa.myers@dot.state.ga.us
Jim Simpson	Road Design	404-657-9192	jim.simpson@dot.state.ga.us
Joe King	Bridge Design	404-656-5195	joe.king@dot.state.ga.us
Jenny Harris-Dunham	Bridge Design	404-656-5198	jenny.harris-dunham@dot.state.ga.us
Sharon Evans	Traffic Safety & Design	404-635-8155	sharon.evans@dot.state.ga.us
Jennifer Mathis	Environment/Location	404-699-6882	jennifer.mathis@dot.state.ga.us
Jerry Milligan	Right of Way	770-986-1541	jerry.milligan@dot.state.ga.us
Mike Dover	Construction	770-532-5528	mike.dover@dot.state.ga.us
Martin Bryant	Right of Way	770-985-1531	martin.bryant@dot.state.ga.us
Bill Pate	Kimley-Horn & Assoc.	770-825-0744	bill.pate@kimley-horn.com
Lindsey Gardner	US Cost	757-496-3055	lgardner@uscost.com
Alex Stone	Moreland Altobelli	770-263-5945	astone@maai.net
Fulvio Jaramillo	Moreland Altobelli	770-263-5945	fjaramillo@maai.net
Chris Parypinski	Moreland Altobelli	770-263-5945	chris.parypinski@gwinnettcounty.com

VALUE ENGINEERING TEAM STUDY

COST MODEL

	COST	% OF
	\$	TOTAL
RIGHT OF WAY - ESTIMATED WAG	\$20,000,000	44.44%
UNCLASSIFIED EXCAVATION	\$5,418,254	12.04%
CONTINGENCIES (10%)	\$2,447,794	5.44%
BRIDGE #1 NS OVER PLEASANT HILL RD	\$2,140,442	4.76%
RECYCLED ASPHALT CONCRETE 25MM	\$1,616,440	3.59%
RAILROAD CONSTRUCTION	\$1,600,000	3.56%
BRIDGE #3 NS TEMPORARY DETOUR TRESTLE BRIDGE	\$1,390,385	3.09%
AGGREGATE BASE	\$1,355,445	3.01%
CONCRETE CURB, GUTTER, MEDIAN, DRIVES, APPROACH	\$1,259,958	2.80%
CLEARING AND GRUBBING	\$1,000,000	2.22%
BRIDGE #2 BUFORD HWY OVER PLEASANT HILL RD	\$984,716	2.19%
EROSION CONTROL TEMPORARY	\$856,007	1.90%
OTHER RECYCLED ASPHALT TACK COAT	\$855,800	1.90%
INFLATION FOR 1 YEARS (3% PER YEAR)	\$807,772	1.80%
SIGNS, STRIPS, SIGNALS & LIGHTS	\$800,000	1.78%
MISCELLANEOUS	\$800,000	1.78%
CLASS B CONC. BASE OF PAVEMENT WIDENING	\$752,325	1.67%
TRAFFIC CONTROL (CONTRACTOR)	\$751,350	1.67%
RECYCLED ASPHALT CONCRETE 12.5MM	\$575,760	1.28%
PERM ANCHORED WALL , ROCK BOLTS, SOIL NAILS, SOUND	\$507,760	1.13%
CONCRETE BARRIER - TYPE 20, 21, 22 & 7R	\$454,790	1.01%
STORM DRAINAGE PIPE - SIZES 18" TO 42"	\$423,705	0.94%
OTHER DRAINAGE - FLARES, CB, INLETS, MH, AGG BED	\$397,605	0.88%
FIELD ENGINEER	\$50,000	0.11%
EROSION CONTROL PERMANENT	\$20,870	0.05%
TOTALS (\$)	\$47,267,178	100.00%

VALUE ENGINEERING TEAM STUDY

FUNCTION ANALYSIS

The following functions for Buford Highway & Pleasant Hill Road Interchange were identified during discussions with the Georgia DOT design representatives (design team consultants) on the first day of the study. These two word functions consist of an active verb, and a quantifiable (measurable) noun. The functions represent the proposed capital improvement expenditures of Buford Highway & Pleasant Hill Road Interchange, and assist the V.E. team in becoming familiar with the needs of the project and the long-term goals for these improvements of the Buford Highway & Pleasant Hill Road Interchange. The Basic Function of the project is to “Enhance Economy”. The following are considered by the V.E. team to be Secondary and Supporting Functions.

Verb	Noun	Verb	Noun
Construct	RR Bridge	Reduce	Congestion
Reduce	Cost	Bridge	PHR
Add	Lanes	Construct	Bridges
Construct	Intersections	Identify	Centerline
Adjust	Grades	Identify	Edge
Serve	Communities	Reuse	Materials
Serve	Public	Package	Contracts
Protect	Commuters	Develop	Options
Satisfy	Users	Develop	Alternatives
Support	Councils	Define	Performance
Minimize	Lawsuits	Develop	Specification
Improve	Access	Reduce	Liability
Enhance	Image	Re-cycle	Materials
Enhance	Signage	Drain	Median
Reduce	Risk	Enhance	Maintainability
Relieve	Traffic	Minimize	Relocations
Enhance	Economy	Expedite	Travel
Reduce	Delays	Improve	Functions
Maintain	Passage	Improve	Drainage
Improve	Constructibility	Correct	Drainage
Benefit	Community	Protect	Environment

VALUE ENGINEERING TEAM STUDY

FUNCTION ANALYSIS

Verb	Noun	Verb	Noun
Improve	Flow	Accommodate	
Increase	Capacity	Reduce	Risks
Add	Lanes	Accommodate	Breakdowns
Increase	Speeds	Protect	Species
Reduce	Delays	Protect	Students
Straighten	Alignment	Segregate	Materials
Improve	Line-of-Sight	Store	Materials
Improve	Visibility	Access	Materials
Enhance	Visibility	Access	Storage
Straighten	Road	Remove	Soils
Reduce	Interruptions	Communicate	Changes
Reduce	Delays	Relocate	Soils
Identify	Passing	Condemn	Property
Accommodate	Passing	Purchase	ROW
Minimize	Intersections	Contain	Flow
Improve	Intersections	Control	Flow
Reduce	Accidents	Stage	Materials
Improve	Safety	Complete	Corridor
Separate	Lanes	Reduce	Congestion
Provide	Detours	Satisfy	Codes
Install	Medians	Meet	Schedules
Enhance	Definition	Improve	
Assure	Safety	Improve	Functions
Accommodate	Hauling	Satisfy	Agencies
Expedite	Hauling	Utilize	Guidelines
Minimize	Hauling	Construct	Bridge
Control	Traffic	Support	County
Maintain	Passage	Support	Tourism
Phase	Construction	Access	Fair
Utilize	Resources	Protect	Species
Maximize	Utilization	Improve	Weaving
Protect	Landmarks	Help	Commuters
Guide	Traffic	Satisfy	Public
Transmit	Information	Satisfy	Commuters
Manage	Traffic	Support	Weight

VALUE ENGINEERING TEAM STUDY

COST DRIVER ANALYSIS

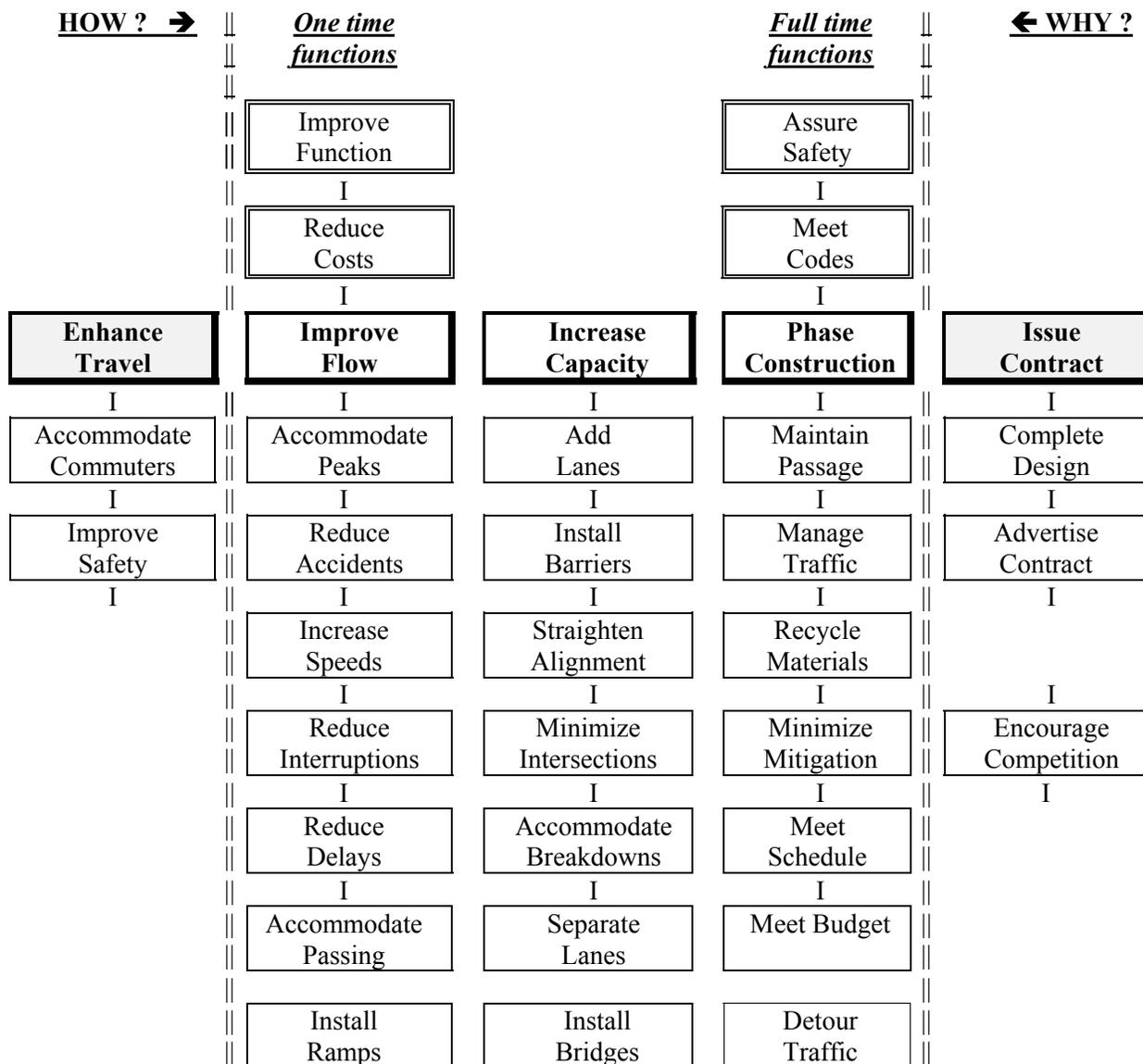
The V.E. team reviewed the project cost elements and identified the controlling elements or cost drivers for the Buford Highway & Pleasant Hill Road Interchange, Project PI # 132890. The cost drivers are used in the brainstorming process as a focal point of discussion and for idea generation.

<u>Element</u>	<u>Function</u>	<u>Cost Driver</u>
Excavation	Improve Interchange Relieve Congestion Adjust Grade Improve Alignment Improve Drainage	Disposal Sites Demolition/Removal Shoulder Width Road Length & Width
Road Section	Support Weight Maintain Surface Support Vehicles Distribute Load Overlay Road Lengthen Ramps Detour Traffic	Base Course Materials Source of Materials Wearing Surface Drainage System Road Length & Width Median Width Shoulder Width
Bridges (\$5.5 Million)	Bridge Railroads Bridge Roads Improve Safety Support Weight Support Vehicles Connect Communities	Bridge Heights Foundation Protection Materials Used Structural Design Length of Beams Lengths of Bridge Wall Construction Number of Spans
Earth Stabilization	Insure Safety Reduce Risk Minimize Lawsuits	Require Methods Material Types Material Quantities Areas of Application Frequency of Use
Traffic Management	Insure Safety Maintain Passage Avoid Delays Assist Commuters Assist Tourist	Methods of Control Frequency of Control Duration of Control

VALUE ENGINEERING TEAM STUDY

F.A.S.T. DIAGRAM

Note: For those unfamiliar with F.A.S.T. diagrams, the functional critical path is shown by the row of heavily lined boxes. Moving to the right should answer HOW the functions are being accomplished; moving to the left should answer the WHY question. Vertical dashed lines define the Project Scope addressed by the V.E. Team. Upper left functions in dotted boxes are Design/Team objectives, and upper right functions in the dotted boxes are inherent project requirements. Functions shown vertically under each heavy box are those, which are intended to be accomplished concurrently with their respective critical path functions. The F.A.S.T. Diagram shown represents only a few key functions extracted from the above list of functions developed by the V.E. Team. There are numerous secondary functions identified in the above list that are necessary and support the primary function of "Enhance Economy".



BRAINSTORMING OR SPECULATION

PROJECT TITLE: Buford Highway & Pleasant Hill Road Interchange

PROJECT LOCATION: GWINNETT COUNTY, GEORGIA

NUMBER	IDEA	RANK
STRUCTURAL/BRIDGE (SB)		
1.0	Shorten RR trestle bridge and install MSE walls ilo cantilever walls as designed	Drop
2.0	Reduce excessive clearances on bridges to reduce profile	4/1
3.0	Construct a concrete box RR bridge ilo steel beam bridge as shown	5/4
4.0	Construct sheet pile shoring/concrete cantilever walls for permanent RR bridge ilo constructing a expensive temporary RR trestle bridge	5/5
5.0	Use HPC concrete for 54" bulb tee members on Buford Highway bridge ilo regular concrete for 63" bulb tee members.	5/2
6.0	Use parallel bents on Buford Hwy bridge ilo irregular length bents	5/1
7.0	Support cantilever walls with pile foundation ilo footing to prevent future settlement	Drop
8.0	Provide design guidance and detail in the contract documents for the RR cantilever wall design to field change	DS
9.0	Use "Conspan" for detour RR bridge detour ilo temporary trestle	5/5
10.0	Construct two track RR bridge ilo three track RR bridge	3/5

ROADWAY (RW)

1.0	Allow the use of blasted rock material as GAB for proposed roads	4/1
2.0	Retain at grade intersection and improved Buford Highway and Pleasant Hill Road	2/5
3.0	Install 10'-0" wide median ilo 20'-0" median as currently proposed	4/2
4.0	Install narrower median without curb and gutter on Pleasant Hill Rd.	4/2
5.0	Reduce detour lane widths to 11'-0" wide and eliminate the at grade median except and turning intersections.	4/1
6.0	Evaluate/Consider tunneling under existing RR ilo construction of temporary and final RR bridges. (allow as contractors option in bid package	4/5
7.0	In lieu of constructing a temporary detour route, consider/evaluate converting the detour route as the new route. (no interruptions to public)	2/5
8.0	Reduce/modify profile to match exact field conditions	3/1
9.0	Evaluate the need for both shoulders and curb and gutters on new ramps	DS

VALUE ENGINEERING WORKSHOP AGENDA

BUFORD HIGHWAY & PLEASANT HILL ROAD INTERCHANGE GWINNETT COUNTY, GEORGIA

STP-189-(29) PI No. 132890

24 HOUR - V.E. STUDY
17-19 AUGUST 2004

The value engineering workshop for the subject project will be conducted for three (3) days from 17-19 August 2004, at the Georgia Department of Transportation General Office, Personnel Conference Room #274, #2 Capitol Square, Atlanta, GA; POC – Lisa Myers @ (404) 651-7468 voice, (404) 463-6161 Fax

TUESDAY	0800 - 0815	Introduction Phase	Lindsey Gardner, P.E., CVS Team Leader, U.S. Cost, Inc. (V.E. Team Only)
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The VETL will review previous events along with activities planned for the week and outline several areas which may be investigated by the V.E. team.

	0815 - 1000	Review of Project Plans	V.E. Team Only
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The team members will review the project plans, cost estimates, available calculations, cost models, and cost bar graphs to gain a working knowledge of the project.

	1000 - 1200	Project Design Briefing	V.E. Team; (A/E), GDOT
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The A/E project design manager will discuss the project requirements and the proposed design solution(s) in some detail. The V.E. team members will ask questions as appropriate to completely understand the GDOT project requirements as established by the user and the proposed design solution (both alternatives considered and those recommended by the design team).

	1200-1300	Lunch	
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TUES. (cont.) 1300 - 1700 **Creative Phase** V.E. Team

The V.E. team will creatively review, (Brainstorm), and tabulate possible design alternatives for the project. While the designer's solution will serve as the "baseline", the team will identify alternatives not in the recommended solution, but deserving of further investigation. Generally, a brainstorming session will produce between 75 and 100 creative design alternatives. Each system will be carefully analyzed with the basic questions in mind:

- What is the system/item?***
- What does it do (what is its basic function)?***
- What must it do?***
- What does it cost?***
- What is the item worth?***
- What else will do the same, or a better job?***
- What does that alternative cost?***

During the creative phase, the team will not judge the ideas. The essential requirements for the project, however, must always be considered.

WEDNESDAY 0800 - 1000 **Analysis Phase** V.E. Team, GDOT Reps

During this phase, all of the ideas or alternatives will be ranked according to their potential for life-cycle (25-year) cost reduction and the potential for acceptance by the user, designers, and other appropriate parties.

1000 - 1200 **Project Assignments** VETL

Each team member will be assigned a number of ideas for further development. The ideas will be those with the highest rankings. In general, the ideas will be assigned according to technical discipline; road design, structures, and constructability.

1200 – 1300 Lunch

WEDS (cont.) 1300 - 1700 **Development Phase** V.E. Team

During the development phase, each team member will gather information and prepare written proposals for those ideas assigned to him/her. These may require additional discussions with the A/E, outside contractors and suppliers, and other specialists to fully define the alternative. The team members will prepare sketches, perform calculations and develop other data to support each proposal. In addition, costs will be prepared for each alternative as originally designed, and as proposed by the V.E. team. Life-cycle costs for operation, maintenance and related annual costs will also be considered.

THURSDAY 0800 - 1200 **Development Phase (Continued)**

1200 - 1300 Lunch

1300 - 1630 **Development Phase (Continued)**

1630 - 1700 **Summary of Results/Workshop Conclusion** VETL

The study will be concluded. The final report will be delivered within eight working days of the study's conclusion.

NOTES: LAPTOP COMPUTERS ARE REQUIRED FOR VE DEVELOPMENT

1. V.E. team members should bring to the workshop any technical and pricing reference manuals which may be used during the study. These may include design handbooks, code documents, estimating price guides, and related documents. Calculators, pencils, sketch paper, scales, and other similar items will also be useful.
2. It is critical that outside telephone calls and other interruptions of the study team members be held to an absolute minimum during the week to allow for efficient, uninterrupted concentration on the Value Engineering Study.
3. Questions concerning the proposed study should be directed to Lindsey Gardner at (757) 496-3055 or;

U.S. Cost Incorporated
Mr. Tom Orr, P.E.
1200 Abernathy Road
Atlanta, GA 30328
(770) 481-1600
e-mail: torr@uscost.com

**OPINION OF PROBABLE CONSTRUCTION COST
PLEASANT HILL ROAD/BUFORD HIGHWAY/NORFOLK SOUTHERN RAILROAD GRADE SEPARATION**

Project No. STP-189-1(29)

P. I. No. 132890

Prepared by: Kimley-Horn and Associates, Inc.

County: Gwinnett

Date: 07/22/04

Gwinnett Co. Project No. 9301

ITEM NO.	ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL COST
150-1000	TRAFFIC CONTROL - PROJECT - STP-189-1(29)	LS	1	\$750,000.00	\$750,000
150-5000	TRAFFIC CONTROL - TEMPORARY SAND LOADED ATTENUATOR MODULE	EA	3	\$450.00	\$1,350
153-1300	FIELD ENGINEERS OFFICE TP 3	EA	1	\$50,000.00	\$50,000
201-1500	CLEARING AND GRUBBING STP-189-1(29)	LS	1	\$1,000,000.00	\$1,000,000
205-0001	UNCLASSIFIED EXCAVATION	CY	378343	\$12.00	\$4,540,116
206-0002	BORROW EXCAVATION, INCL MATERIAL	CY	69073	\$10.00	\$690,730
207-0203	FOUNDATION BACKFILL MATERIAL, TYPE II	CY	5512	\$34.00	\$187,408
232-0001	RAILROAD CONSTRUCTION	LS	1	\$1,600,000.00	\$1,600,000
310-1101	GR AGGR BASE CRS, INCL MATL	TN	90363	\$15.00	\$1,355,445
402-1812	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	TN	2664	\$37.50	\$99,900
402-3113	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	TN	14394	\$40.00	\$575,760
402-3121	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	TN	46184	\$35.00	\$1,616,440
402-3190	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	TN	12534	\$38.00	\$476,292
413-1000	BITUM TACK COAT	GL	18876	\$1.00	\$18,876
433-1000	REINF CONC APPROACH SLAB	SY	692	\$125.00	\$86,500
441-0016	DRIVEWAY CONCRETE, 6 IN TK	SY	37	\$27.50	\$1,018
441-0018	DRIVEWAY CONCRETE, 8 IN TK	SY	18	\$32.00	\$576
441-0106	CONC SIDEWALK, 4 IN	SY	12374	\$22.50	\$278,415
441-0204	PLAIN CONC DITCH PAVING, 4 IN	SY	114	\$27.50	\$3,135
441-0303	CONCRETE SPILLWAY, TYPE 3	EA	1	\$1,400.00	\$1,400
441-0740	CONCRETE MEDIAN, 4-INCH	SY	3454	\$27.50	\$94,985
441-0754	CONCRETE MEDIAN, 7.5-INCH	SY	1417	\$44.00	\$62,348
441-4030	CONCRETE VALLEY GUTTER, 8-INCH	SY	389	\$37.50	\$14,588
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	LF	260	\$13.00	\$3,380
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	LF	26099	\$10.50	\$274,040
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	LF	4896	\$10.50	\$51,408
446-1002	PVMT REINF FABRIC STRIPS, TP 2, INCL BITUM BINDER	LF	15542	\$2.50	\$38,855
457-1005	GEOGRID REINFORCEMENT, TYPE A	SY	1600	\$5.00	\$8,000
500-3002	CLASS AA CONCRETE	CY	1213	\$425.00	\$515,525
500-3201	CLASS B CONCRETE, RETAINING WALL	CY	266	\$350.00	\$93,100
500-9999	CLASS B CONC, BASE OR PVMT WIDENING	CY	4299	\$175.00	\$752,325
511-1000	BAR REINFORCEMENT STEEL	LB	146656	\$0.50	\$70,329
522-1000	SHORING	LS	1	\$200,000.00	\$200,000
573-2006	UNDDR PIPE INCL DRAINAGE AGGR, 6 IN	LF	6231	\$11.00	\$68,541
617-0510	PERMANENT ANCHORED WALL, NO. 2 (13434)	LS	1	\$465,350.00	\$465,350
617-0510	PERMANENT ANCHORED WALL, NO. 5 (15673)	LS	1	\$543,000.00	\$543,000
621-3020	CONCRETE BARRIER, TYPE 20	LF	65	\$60.00	\$3,900
621-3021	CONCRETE BARRIER, TYPE 21	LF	150	\$70.00	\$10,500
621-3022	CONCRETE BARRIER, TYPE 22	LF	578	\$180.00	\$104,040
621-4080	CONCRETE SIDE BARRIER, TYPE 7R	LF	1134	\$150.00	\$170,100
622-1033	PRECAST CONCRETE MEDIAN BARRIER, METHOD NO. 3	LF	4139	\$25.00	\$103,475
624-0400	SOUND BARRIER, TYPE B	SF	15862	\$17.50	\$277,585
628-0100	PERMANENT SOIL NAILED WALL--WALL NO. 3 (3310)	LS	1	\$143,400.00	\$143,400
628-XXXX	ROCK BOLTS, TYPE I, DOUBLE CORROSION PROTECTED	EA	31	\$1,400.00	\$43,400
628-XXXX	ROCK BOLTS, TYPE II, DOUBLE CORROSION PROTECTED	EA	22	\$1,000.00	\$22,000
628-XXXX	ROCK BOLTS, TYPE III, DOUBLE CORROSION PROTECTED	EA	19	\$1,125.00	\$21,375
634-1200	RIGHT OF WAY MARKERS	EA	116	\$80.00	\$9,280
641-1200	GUARDRAIL, TP W	LF	2385	\$10.00	\$23,850
641-5001	GUARDRAIL ANCHORAGE, TP 1	EA	9	\$400.00	\$3,600
641-5012	GUARDRAIL ANCHORAGE, TP 12	EA	5	\$1,400.00	\$7,000
643-1152	CHAIN LINK FENCE, ZINC COATED, 6 FT, 9 GA	LF	2419	\$11.75	\$28,423
650-1100	IMPACT ATTENUATOR UNIT, (CRASH COMPRESSION CUSHION) TYPE P-	EA	2	\$25,000.00	\$50,000
700-6910	PERMANENT GRASSING	AC	16	\$950.00	\$15,200
700-7000	AGRICULTURAL LIME	TN	16	\$50.00	\$800
700-7010	LIQUID LIME	GL	39	\$24.00	\$936
700-8000	FERTILIZER MIXED GRADE	TN	11	\$250.00	\$2,750
700-8100	FERTILIZER NITROGEN CONTENT	LB	789	\$1.50	\$1,184
163-0232	TEMPORARY GRASSING	AC	8	\$450.00	\$3,600
163-0240	MULCH	TN	503	\$225.00	\$113,175
163-0300	CONSTRUCTION EXIT	EA	46	\$1,200.00	\$55,200
163-0503	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	EA	10	\$275.00	\$2,750
165-0010	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	LF	1794	\$1.00	\$1,794
165-0030	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	LF	7624	\$1.25	\$9,530
166-0087	MAINTENANCE OF SILT CONTROL GATE, TP 3	EA	10	\$100.00	\$1,000
165-0101	MAINTENANCE OF CONSTRUCTION EXIT	EA	46	\$375.00	\$17,250
171-0010	TEMPORARY SILT FENCE, TYPE A	LF	3588	\$2.25	\$8,073
171-0030	TEMPORARY SILT FENCE, TYPE C	LF	15247	\$3.00	\$45,741
716-2000	EROSION CONTROL MATS, SLOPES	SY	478315	\$1.25	\$597,894

636-1020	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	SF	110	\$17.50	\$1,925
636-1029	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 3	SF	98	\$18.50	\$1,813
636-1031	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING TP 6	SF	12	\$19.50	\$234
636-1032	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING TP 6	SF	144	\$15.00	\$2,160
636-2070	GALV STEEL POSTS, TP 7	LF	303	\$12.00	\$3,636
636-2080	GALV STEEL POSTS, TP 8	LF	336	\$14.00	\$4,704
636-3010	GROUND-MOUNTED BREAKAWAY SIGN SUPPORT	EA	24	\$425.00	\$10,200
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$50,000.00	\$50,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$5,000.00	\$5,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$5,000.00	\$5,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$20,000.00	\$20,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$50,000.00	\$50,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$35,000.00	\$35,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$30,000.00	\$30,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$75,000.00	\$75,000
647-0220	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	LS	1	\$50,000.00	\$50,000
647-1000	TRAFFIC SIGNAL INSTALLATION NO. 1	LS	1	\$75,000.00	\$75,000
647-1000	TRAFFIC SIGNAL INSTALLATION NO. 2	LS	1	\$85,000.00	\$85,000
647-1000	TRAFFIC SIGNAL INSTALLATION NO. 3	LS	1	\$85,000.00	\$85,000
647-1000	TRAFFIC SIGNAL INSTALLATION NO. 4	LS	1	\$10,000.00	\$10,000
653-0100	THERMOPLASTIC PVMT MARKING, RR/HWY CROSSING SYMBOL	EA	6	\$400.00	\$2,400
653-0110	THERMOPLASTIC PVMT MARKING, ARROW, TP 1	EA	3	\$72.50	\$218
653-0120	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	EA	127	\$70.00	\$8,890
653-0130	THERMOPLASTIC PVMT MARKING, ARROW, TP 3	EA	5	\$105.00	\$525
653-0170	THERMOPLASTIC PVMT MARKING, ARROW, TP 7	EA	3	\$80.00	\$240
653-0210	THERMOPLASTIC PVMT MARKING, WORD, TP 1	EA	22	\$95.00	\$2,090
653-1501	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	LF	44617	\$0.30	\$13,385
653-1502	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	LF	39371	\$0.30	\$11,811
653-1704	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	LF	958	\$4.50	\$4,311
653-1804	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	LF	4346	\$1.75	\$7,606
653-3501	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	GLF	36012	\$0.20	\$7,202
653-3502	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, YELLOW	GLF	7434	\$0.20	\$1,487
653-6004	THERMOPLASTIC TRAF STRIPING, WHITE	SY	14610	\$2.50	\$36,525
653-6006	THERMOPLASTIC TRAF STRIPING, YELLOW	SY	4466	\$2.50	\$11,165
654-1001	RAISED PVMT MARKERS TP 1	EA	200	\$4.00	\$800
654-1003	RAISED PVMT MARKERS TP 3	EA	979	\$4.00	\$3,916
654-1010	RAISED PVMT MARKERS TP 10	EA	110	\$30.00	\$3,300
657-1054	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, WHITE, TP PB	LF	726	\$4.00	\$2,904
657-3054	PREFORMED PLASTIC SKIP PVMT MKG, 5 IN, WHITE, TP PB	GLF	557	\$1.75	\$975
657-5017	PREFORMED PLASTIC PVMT MKG, WORDS AND/OR SYM, ARROW TP 2,	EA	2	\$280.00	\$560
657-8054	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, YELLOW, TP PB	LF	429	\$4.00	\$1,716
550-1180	STORM DRAIN PIPE, 18 IN, H 1-10	LF	9881	\$24.00	\$237,144
550-1181	STORM DRAIN PIPE, 18 IN, H 10-15	LF	392	\$25.50	\$9,996
550-1183	STORM DRAIN PIPE, 18 IN, H 20-25	LF	575	\$27.50	\$15,813
550-1240	STORM DRAIN PIPE, 24 IN, H 1-10	LF	1490	\$30.00	\$44,700
550-1241	STORM DRAIN PIPE, 24 IN, H 10-15	LF	115	\$31.00	\$3,565
550-1243	STORM DRAIN PIPE, 24 IN, H 20-25	LF	328	\$35.00	\$11,480
550-1300	STORM DRAIN PIPE, 30 IN, H 1-10	LF	465	\$37.50	\$17,438
550-1360	STORM DRAIN PIPE, 36 IN, H 1-10	LF	1824	\$43.50	\$79,344
550-1421	STORM DRAIN PIPE, 42 IN, H 10-15	LF	65	\$65.00	\$4,225
550-4218	FLARED END SECTION 18 IN, STORM DRAIN	EA	17	\$405.00	\$6,885
550-4224	FLARED END SECTION 24 IN, STORM DRAIN	EA	3	\$430.00	\$1,290
550-4230	FLARED END SECTION 30 IN, STORM DRAIN	EA	1	\$550.00	\$550
550-4236	FLARED END SECTION 36 IN, STORM DRAIN	EA	5	\$725.00	\$3,625
576-1018	SLOPE DRAIN PIPE, 18 IN	LF	78	\$21.00	\$1,638
603-2018	STN DUMPED RIP RAP, TP 1, 18 IN	SY	149	\$19.00	\$2,831
603-7000	PLASTIC FILTER FABRIC	SY	149	\$2.75	\$410
611-3030	RECONSTR STORM SEW MANHOLE, TYPE 1	EA	2	\$1,750.00	\$3,500
615-1000	JACK OR BORE PIPE-36 IN. DIA.	LF	221	\$250.00	\$55,250
668-1100	CATCH BASIN, GP 1	EA	114	\$1,700.00	\$193,800
668-1110	CATCH BASIN, GP 1, ADDL DEPTH	LF	123	\$160.00	\$19,680
668-1200	CATCH BASIN, GP 2	EA	1	\$1,600.00	\$1,600
668-1210	CATCH BASIN, GP 2, ADDL DEPTH	LF	8	\$185.00	\$1,480
668-2100	DROP INLET, GP 1	EA	16	\$1,450.00	\$23,200
668-2110	DROP INLET, GP 1, ADDL DEPTH	LF	25	\$150.00	\$3,750
668-4300	STORM SEWER MANHOLE, TP 1	EA	3	\$1,675.00	\$5,025
668-4311	STORM SEWER MANHOLE, TP 1, ADDL DEPTH, CL 1	LF	5	\$410.00	\$2,050
668-5000	JUNCTION BOX	EA	2	\$1,250.00	\$2,500