VALUE ENGINEERING STUDY
OF
NH-164-1(24) (SR 138)
PI NUMBER: 721480

ATLANTA, GEORGIA
MARCH 4, 2004

Prepared by:
Ventry Engineering, L.L.C.

In Association With:

Georgia Department of Transportation

VALUE ENGINEERING STUDY
TEAM LEADER

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TABLE OF CONTENTS

I. INTRODUCTION

GENERAL

This Value Engineering report summarizes the results of the Value Engineering study performed by Ventry Engineering for the Georgia Department of Transportation. The study was performed during the week of March 4, 2004.

VALUE ENGINEERING METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:

1. Investigation
2. Speculation
3. Evaluation/Development
4. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:

- Constructability
- Traffic Control
- Ease of Construction
- Construction Cost

SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for the final plans and specifications.

RECOMMENDATION NUMBER 1- CONSTRUCTABILITY

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. This alternative revises the design of the new box culvert at Reeves Creek.

If this recommendation can be implemented, there is a possible **$162,121.**

RECOMMENDATION NUMBER 2- CONSTRUCTABILITY

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. This alternative uses in place embankment.

RECOMMENDATION NUMBER 3- STAGE CONSTRUCTION

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. This alternative clarifies the Stage one plans.

RECOMMENDATION NUMBER 4- STAGE CONSTRUCTION

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. This alternative insures that existing traffic signals are moved for the different construction stages.

RECOMMENDATION NUMBER 5- CONSTRUCTION TIME

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative changes the construction time from 24 months to 36 months.

RECOMMENDATION NUMBER 6- CONTRACTOR WORK HOURS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative restricts the contractor work hours.

RECOMMENDATION NUMBER 7- MATERIALS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative provides for an optional black base.

RECOMMENDATION NUMBER 8-OTHER

The Value Engineering Team also recommends that the following other Value Engineering Alternatives be implemented:

1. Walt Stephens Road is actually a continuation of SR 138. It is therefore recommended that the same typical section be used for Walt Stephens Road as for the mainline.
2. The potential of uncovering UST's needs to be addressed. Each potential location should include a note stating whether or not any UST's have been removed or name the party responsible to remove them.
3. In the Summary of Quantities, there is no quantity listed for Type 1 anchors. Rather, the quantity for Type 12 anchors is doubled. This needs to be revised
4. Commercial driveways should have a minimum of a 25' radius.
    - On the cross section sheets from +/- Sta 277 to +/- Sta 280, there is approximately 10' of shoulder width behind the guardrail. This is within the interior of a guardrail run and not in the area of shoulder flares for tapers. This should be reviewed for correctness. The earthwork to add this area could be quite significant.

II. LOCATION OF PROJECT

MAP

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
William F. Ventry, P.E., C.V.S.	Ventry Engineering	Team Leader	850/627-3900
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David Zoeckler	GADOT	District Construction	404-559-6658
Stan Petoski	GADOT	Traffic Safety & Design	404-635-8126
Lisa Myers	GADOT	Engineering Services	404-651-7468

PROJECT DESCRIPTION

This project consists of the widening and reconstruction of SR 138 from SR 138/Walt Stevens Road in Clayton County to I-75 in Henry County. The widening will consist of an urban four-lane roadway with a 20-ft. raised median for a length of 4.27 miles. There are no bridges involved with this project.

IV. INVESTIGATION PHASE

NH-164-1(24) (SR 138)
VALUE ENGINEERING STUDY BRIEFING
MARCH 4, 2004

NAME	AFFILIATION	PHONE
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Lisa Myers	GA DOT	404-651-7468

INVESTIGATION

The following areas have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. CONSTRUCTABILITY

B. STAGE CONSTRUCTION

C. CONSTRUCTION TIME

D. CONTRACTOR WORK HOURS

E. MATERIALS

V. SPECULATION PHASE

SPECULATION

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

A. CONSTRUCTABILITY
- Revise the design of the new box culvert at Reeves Creek
- Use in place embankment

B. STAGE CONSTRUCTION
- Clarify Stage one plans
- Insure that existing traffic signals are moved for the different construction stages

C. CONSTRUCTION TIME
- Change construction time from 24 months to 36 months

D. CONTRACTOR WORK HOURS
- Restrict contractor work hours

E. MATERIALS
- Provide for an optional black base

VI. EVALUATION/DEVELOPMENT PHASE

VI.(A) ALTERNATIVES

ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. CONSTRUCTABILITY

Value Engineering Alternative Number 1 - Revise the design of the new box culvert at Reese Creek

Value Engineering Alternative Number 2 - Use in place embankment

B. STAGE CONSTRUCTION

Value Engineering Alternative Number 1 - Clarify Stage one plans

Value Engineering Alternative Number 2 - Insure that existing traffic signals are moved for the different construction stages

C. CONSTRUCTION TIME

Value Engineering Alternative - Change construction time from 24 months to 36 months

D. CONTRACTOR WORK HOURS

Value Engineering Alternative - Restrict contractor work hours

E. MATERIALS

Value Engineering Alternative - Provide for an optional black base

VI.(B) ADVANTAGES AND DISADVANTAGES

EVALUATION/DEVELOPMENT

The following Advantages and Disadvantages as well as other pertinent information was developed for the Value Engineering Alternatives previously generated during the speculation phase.

A. CONSTRUCTABILITY

1. Reeves Creek culvert

Value Engineering Alternative Number 1
Reeves Creek is located at approximately Sta 284 and just back from North Mill Road. The existing drainage structure for this creek is a double 10'X12' concrete box culvert approximately 65' in length. The project plans proposes to construct a new double 10'X10' concrete box culvert of approximately 250' in length on different alignment.

Several issues were raised during and following the presentation of this project and are listed below:

- The proposed culvert's alignment was an extension of the flow lines from the upstream end to the downstream end.
- By following the flow line as described above, the top of the proposed culvert protrudes above the existing pavement surface.
- The staging plans do not address the need for separate and distinct staging for this culvert. In order to construct as proposed, a minimum length of the downstream end of the culvert would have to be constructed.
- A two-lane detour would have to then be constructed and traffic shifted to this completed section. This would be preliminary to the Stage II construction as shown in the plans.
- Members of the study team conducted an on-site inspection of the culvert. It was felt that the existing culvert was in satisfactory condition and could be extended. There was some siltation in the existing culvert, but the *Standard Specifications* requires clean out and maintenance of existing structures.

It is therefore the recommendation of this constructability review that the existing culvert be retained and extended on each end. The extensions both upstream and downstream would have to be skewed horizontally to align with the streambed. The extension on the outlet end of the culvert should not only be skewed horizontally, but vertically as well. A steeper grade on this outlet end will facilitate the structure's ability to remain cleaner.

Value Engineering Alternative Number 1 - Revise the design of the proposed new box culvert at Reese Creek to extend the existing box rather than replacing it.
Advantages
- Significantly simplifies staging
- Easier construction
- Does not require a temporary lane with temporary drainage structure
- Less construction cost
- Less construction time

Disadvantages
- None apparent

Conclusion
Carry forward for further evaluation

Insert 1

Insert 2

Insert 3

VALUE ENGINEERING ALTERNATIVE NUMBER 1
CONSTRUCTABILITY REEVES CREEK CULVERT
COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
10'x10' BOX CULVERT - CONCRETE	CY	$290.00	750.0	$217,500	570.0	$165,300
REMOVE WINGWALLS & PARAPETS	LS	$7,000.00	1.0	$7,000	1.0	$7,000
REMOVE EXISTING 10'x12' CONCRETE BOX CULVERT	LF	$135.00	65.0	$8,775	0.0	$0
TEMPORARY BASE & PAVEMENT	SY	$20.00	4000.0	$80,000	0.0	$0
SUBTOTAL				**$313,275**		**$172,300**
OTHER ITEMS AND CONTINGENCIES			10.0%	$31,328	10.0%	$17,230
SUBTOTAL				**$344,603**		**$189,530**
INFLATION			5.0%	$15,664	5.0%	$8,615
GRAND TOTAL				**$360,266**		**$198,145**

POSSIBLE SAVINGS $162,121

A. CONSTRUCTABILITY

2. Earthwork

Value Engineering Alternative Number 2

SR 138 is being reconstructed to an urban section from Walt Stephens Road to its interchange with I-75. The earthwork for this project includes two items – unclassified excavation and borrow. The quantity for the unclassified excavation is approximately 138,000 cubic yards and the borrow quantity is approximately 175,000 cubic yards.

In reviewing the staging plans and cross sections, it is evident that the contractor will have to be in a borrow situation before he is able to complete all of the unclassified excavation. The *Standard Specifications* require that the unclassified work be completed before the contractor begins borrow work. Therefore, it is recommended that the earthwork item for this project be changed to in place embankment. The contractor will have the flexibility of borrowing before completing the unclassified work. This recommendation also follows the guidelines of the Department for using the in place embankment item for an urban-type project. Construction management will also be easier by using the in place embankment item.

Value Engineering Alternative Number 2 - Use in place embankment

Advantages

- Easier to measure
- Does not require control of borrow pit by GADOT

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

B. STAGE CONSTRUCTION

1. Stage One

Value Engineering Alternative Number 1

The project is proposed to be completed in 3 separate stages of construction. The first stage is the widening on either side of the existing using temporary paving. This temporary widening will provide sufficient width for two 10' travel lanes so that Stage 2 work can be completed. The widening is at three locations along the project. In reviewing the Staging plans it is very difficult to identify the slight widening required due to its narrow width and the small scale of the plans. In order to better locate these sections, it is recommended that for those areas in Stage 1 that the plan view be blown up to a larger scale.

Value Engineering Alternative Number 1 - Clarify Stage one plans
Advantages
- Avoids confusion by contractor
- Easier to understand where temporary pavement is needed

Disadvantages
- None apparent

Conclusion
Carry forward for further evaluation

2. Traffic Signal Head Locations

Value Engineering Alternative Number 2

The project staging will necessitate the shifting of the two travel lanes from one side of the road to the other. Each shift, regardless of how slight, may cause the existing traffic signal heads to be out of proper view. It is therefore recommended that a General Note be added to the plans to address this potential problem. The note is to include that all signal heads will be visible as required by the *MUTCD.* Additionally, the approximate signal head location should be shown on the appropriate stage plans. A reference should also be made at each signalized intersection referring to the General Note.

Value Engineering Alternative Number 2 - Insure that existing traffic signals are moved for the different construction stages
Advantages
- Avoids breakdown at intersections
- Avoids contractor claim
- Contractor knows what to bid

Disadvantages
- None apparent

Conclusion
Carry forward for further evaluation

C. CONSTRUCTION TIME

The allotted time for the construction of this project was presented as being 24 months. The study team, including construction personnel, discussed the various complexities of the project including the staging, amount of earthwork involved, traffic, etc. It is recommended following this discussion that the construction time for this project be revised from 24 months to 36 months.

Value Engineering Alternative - Change construction time from 24 months to 36 months

Advantages

- Allows more adequate time to complete
- May make traffic control easier
- Staging may be easier

Disadvantages

- Longer disruption to local traffic and businesses

Conclusion

Carry forward for further evaluation

D. CONTRACTOR WORK HOURS

Lane Closures

The reconstruction of SR 138 will be completed in several stages and there should be a minimum number of occasions requiring the contractor to close one of the travel lanes and use flagger or pilot car control. However, in the event that this becomes necessary, the hours allowed for this single lane of travel needs to be identified. It is therefore recommended that the contract include a *Special Provision* to control the lane closures as follows:

Monday – Friday	9:00 PM to 5:00 AM
Saturday & Sunday	9:00 PM to 8:00 AM

In addition, the standard requirements should be included in the contract to address holidays, special events, etc.

Value Engineering Alternative - Restrict contractor work hours

Advantages

- May avoid major traffic congestion

Disadvantages

- Some work may have to be performed at night

Conclusion

Carry forward for further evaluation

E. MATERIALS

The base and paving requirements on Typical Section 1 offers an alternative in the use of the material to be used for the base. Other typical sections do not offer this alternative. It is recommended that the plans allow for alternative materials for each typical section. This would allow the contractor to have more versatility in his construction methods and could reduce the required construction time.

Value Engineering Alternative - Provide for an optional black base

Advantages

- Would give the contractor a option to speed construction
- Easier staging

Disadvantages

- Higher cost of material

Conclusion

Carry forward for further evaluation