VALUE ENGINEERING CONSTRUCTABILITY STUDY OF THE

WIDENING AND RECONSTRUCTION OF SR 54

PROJECT NUMBER: NH-IM-75-2(174)

PI NUMBER: 712630

Clayton County, Georgia

ATLANTA, GEORGIA

August 16 and August 18, 2006

Prepared by:

VE GROUP, L.L.C.

In Association With:

Georgia Department of Transportation

VALUE ENGINEERING STUDY
TEAM LEADER

_____

William F. Ventry, P.E., C.V.S.
C.V.S. Registration No. 840603(LIFE)

Date: _____

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I. INTRODUCTION

GENERAL

This Value Engineering report summarizes the results of the Value Engineering study performed by VE GROUP for the Georgia Department of Transportation. The study was performed on August 16 and 18, 2006.

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

I. INTRODUCTION

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.

I. CONSTRUCTABILITY

RECOMMENDATION NUMBER 1: TEMPORARY BARRIER

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative eliminates the conflict with beams.***

II. MATERIALS

RECOMMENDATION NUMBER 2: EARTHWORK

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. The Value Engineering Alternative used geofoam blocks.

III. CONTRACTOR WORK HOURS

RECOMMENDATION NUMBER 3: LANE CLOSURES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative does not allow closures during peaks.***

IV. CONSTRUCTION TIME

RECOMMENDATION NUMBER 5: LENGTH OF TIME

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative establishes time based on railroad construction.***

V. STAGE CONSTRUCTION

RECOMMENDATION NUMBER 6: LOCAL ACCESS/CONSTRUCTION ACCESS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative utilizes Lee Street for traffic control and to improve construction access.***

If this recommendation can be implemented, there is a possible savings of ***$128,750***

II. LOCATION OF PROJECT

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
William F. Ventry, P.E., C.V.S.	VE Group	Team Leader	850/627-3900
Bruce Nicholson	VE Group	Construction	850-627-3900
Tom Hartley, P.E., C.V.S.	VE Group	Roadway Design/Traffic	850/627-3900
John Ledbetter, Jr., P.E., R.L.S.	VE Group	Structures	850/627-3900

PROJECT DESCRIPTION

The project consists of the widening and reconstruction of SR 54, the reconstruction of the interchange at SR 54 and I-75, and the reconstruction of the existing railroad bridge over I-75. The reconstructed bridges will accommodate the future widening of I-75 to include barrier separated HOV lanes as well as a future collector-distributor system parallel to I-75. The SR 54 reconstruction includes widening to a 4-lane urban section, with an additional fifth and sixth lane at required locations and raised median throughout. The SR 54 and I-75 interchange configuration will remain as a partial cloverleaf.

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

WIDENING AND RECONSTRUCTION OF SR 54 August 16 and 18, 2006		
NAME	AFFILIATION	PHONE
William F. Ventry, P.E., C.V.S.	VE Group	850/627-3900
Bruce Nicholson	VE Group	850/627-3900
Tom Hartley, P.E., C.V.S.	VE Group	850/627-3900
John Ledbetter, Jr., P.E., R.L.S.	VE Group	850/627-3900
Robert Reid	Consultant Design	404/463-4831
Lonnie Jones	GO Construction	404/656-5306
Clayton Bennet	Bridge	404/656-5283
Ken Werho	Traffic Safety & Design	404/635-8144
Kevin Skinner	Moreland Altobelli	770/263-5945
Michael Lankford	D-7 Construction	404/599-6699
Lisa Myers	Engineering Services	404/651-7468

IV. INVESTIGATION PHASE

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

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

II. MATERIALS

A. EARTHWORK

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

V. SPECULATION PHASE

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

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

- **Eliminate conflict with beams.**

II. MATERIALS

A. EARTHWORK

- **Use geofoam blocks.**

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

- **No closures during peaks.**

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

- **Establish time based on railroad construction.**

V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

- **Utilize Lee Street for traffic control and to improve construction access.**

VI. EVALUATION PHASE

A. ALTERNATIVES

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

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

Value Engineering Alternative: ***Eliminate conflict with beams.***

II. MATERIALS

A. EARTHWORK

Value Engineering Alternative: ***Use geofoam blocks.***

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

Value Engineering Alternative: ***No closures during peaks.***

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

Value Engineering Alternative: ***Establish time based on railroad construction.***

V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

Value Engineering Alternative: ***Utilize Lee Street for traffic control and to improve construction access.***

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

II. MATERIALS

A. EARTHWORK

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

VI. DESIGN COMMENTS

VII. DEVELOPMENT PHASE

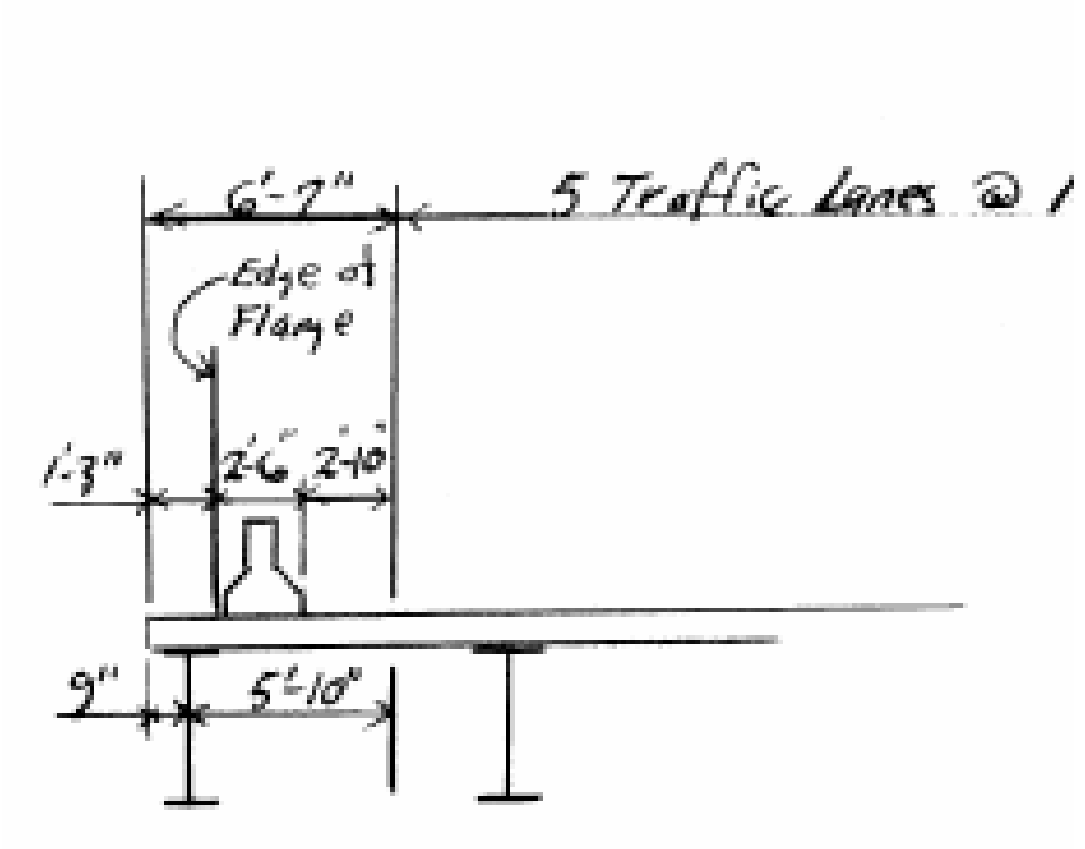
I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

1. "As Proposed"

Temporary traffic barriers are proposed for stages 4 and 5 to protect traffic at the deck cut lines on the SR 54 Bridge. There is a possibility of conflict between the bolted temporary attachment to the deck and the beams supporting the deck. For stage 4, which is maintaining traffic on the existing bridge, the location of the temporary barrier does not result in the bolted connection encroaching on the steel beam flange. If the edge of the barrier coincides with the edge of the beam flange, the barrier clears the traffic lane by approximately 2 ft.-10 in.

However, the temporary barrier location for stage 5, which is maintaining traffic on the left side of the new SR 54 Bridge, results in the bolted connection penetrating the flange of the bulb tee.



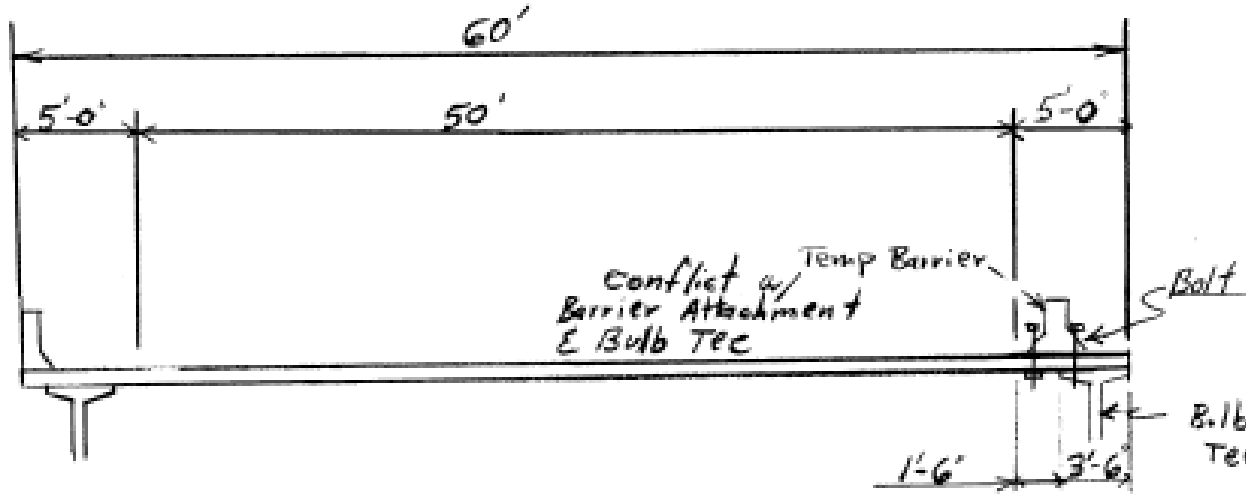
STAGE 4 TEMPORARY BARRIER

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

1. "As Proposed"



STAGE 5 TEMPORARY BARRIER

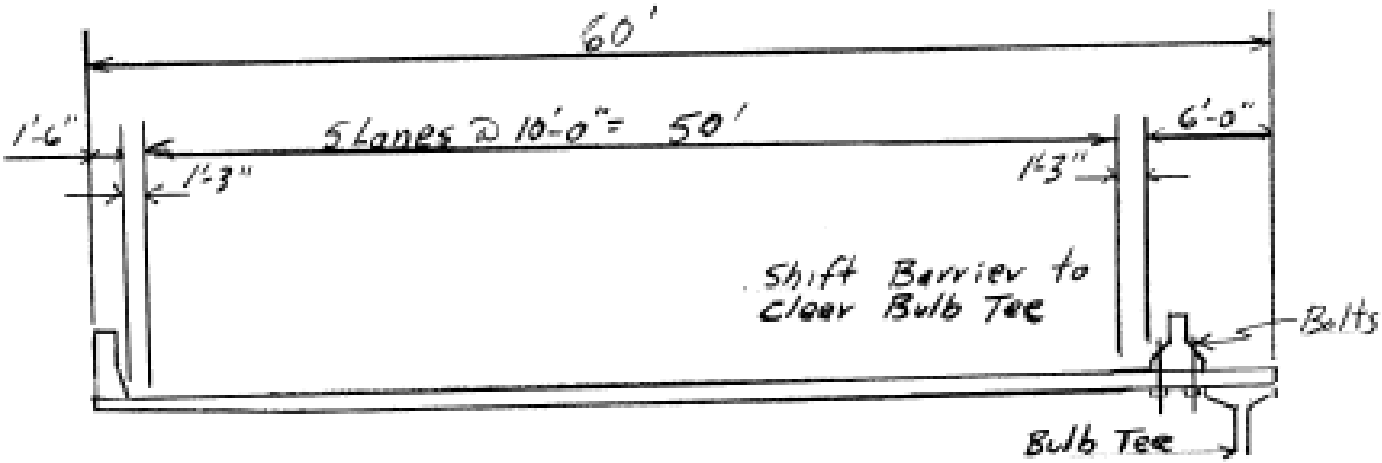
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. TEMPORARY BARRIER

2. Value Engineering Alternative

The Value Engineering Alternative consists of shifting the temporary barrier for stage 5 away from the bulb tee toward the traffic lanes. If the edge of the temporary barrier is made to line up with the flange of the bulb tee, there will be 1 ft. – 3 in. between the traffic lanes and both the permanent bridge barrier and the temporary barrier. With this shift, the temporary bolted attachment will clear the bulb tee flange.



STAGE 5 VALUE ENGINEERING ALTERNATIVE

VII. DEVELOPMENT PHASE

II. MATERIALS

A. EARTHWORK

1. "As Proposed"

The cost estimate for Project NH-IM-75-2 (174) uses two items for earthwork – unclassified excavation and borrow excavation. The cost estimate includes over 120,000 cubic yards of earthwork. Of this, almost half is borrow excavation. The price for unclassified excavation for this project is $5.69 per cubic yard and the price for borrow excavation is $4.81. The overall estimated price for the earthwork for this project is more than $643,000.

II. MATERIALS

A. EARTHWORK

2. Value Engineering Alternative

The study team reviewed the earthwork items for this project. With the urban, built-out characteristics of this area, locating a ready source of borrow will be difficult. Also, all the material will have to be transported in. We therefore feel that the price will be much higher than stated in the cost estimate. In consulting the estimating section of GDOT, there was concurrence that the $4.81per cubic yard price for borrow excavation was probably less than one-half of what the actual bid price will be.

The project plans on both sheets 18 & 19 show that the earthwork item is to be Grading Complete. This differs from the cost estimate which has an unclassified excavation item and a borrow excavation item. The estimated quantities between the project plans and the cost estimate also do not agree with a huge discrepancy between the different items:

	COST ESTIMATE	PROJECT PLANS
UNCLASSIFIED	62,500 CY	96,254 CY
BORROW EXCAVATION	59,800 CY	
EMBANKMENT		196,643 CY

In a review of the plans, there does not appear to be any profile changes that can be made to reduce the need for borrow excavation. In looking at the quantities above there is a need of 60,000 to 100,000 cubic yards of borrow excavation. An additional inquiry to the consultant designer confirmed that the project plans were more accurate in the quantities shown. This indicates that the earthwork item will probably cost closer to $1.5 million.

With the amount of material needed to build this project, alternative methods should be considered. On the following pages are some photos of a Geofoam material being used for embankment on the Interstate Highway System in Utah.

II. MATERIALS

A. EARTHWORK

2. Value Engineering Alternative *(continued)*

II. MATERIALS

A. EARTHWORK

2. *Value Engineering Alternative* *(continued)*

The Geofoam Research Center at Syracuse University has completed a report of the application of this material on I-15 IN Utah.

This material may prove to be somewhat higher in cost than typical borrow excavation; however there are several significant advantages:

1. Light-weight and easy to transport
2. Environmentally friendly – does not erode
3. Does not require the use of compactive or other routine grading equipment
4. Reduces the amount of construction time needed
5. Can be molded or shaped to fit the need
6. Fewer work stoppages due to inclement weather

After our review of the earthwork for the reconstruction of the interchange of I-75 with GA 54, the study team recommends that the pay item for the earthwork be as indicated in the project plans – Grading Complete. A further recommendation is that the Georgia Department of Transportation be innovative in encouraging and allowing the use of alternative materials such as the Geofoam blocks shown above.

VII. DEVELOPMENT PHASE

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

1. "As Proposed"

Special Provisions stipulating the contractor's work hours have not yet been completed so any restricted work hours have not yet been established.

III. CONTRACTOR WORK HOURS

A. LANE CLOSURES

2. Value Engineering Alternative

As discussed during the presentation, this is a major commercial, industrial and residential area. Congestion is prevalent during a significant portion of the day. The study team recommends consideration be given to the following suggestions for lane closures for this project:

1. No northbound lane closures on I-75 from 6:00 AM to 9:00 AM.

2. No southbound lane closures on I-75 from 3:00 PM to 7:00 PM.

3. Any lane closures on GA 54 reducing the available lanes to only one in either direction must be made between 9:00 PM and 6:00 AM.

4. No work from the Wednesday before Thanksgiving until the following Monday.

5. Now work from the weekend before Christmas to the Monday following New Year's Day.

6. No work on the GA Tax-Free weekend.

7. No work allowed on national holidays not discussed above.

8. No work allowed on the day prior to and the day after major NASCAR events at Atlanta International Raceway in McDonough.

The above are suggestions. It is recommended that the local Area Office be involved in the final decisions on the restricted work times.

VII. DEVELOPMENT PHASE

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

1. "As Proposed"

The construction time required for the project was discussed during the project briefing. It was stated that the project would require 36 months to complete.

IV. CONSTRUCTION TIME

A. LENGTH OF TIME

2. Value Engineering Alternative

There are several complex issues when considering the amount of time that will be required for the completion of the project.

With the changes in the profile grade of SR 54 and with the Norfolk Southern Railway, the associated bridges will have to be built in stages. In other states, the experience is that a staged bridge costs about $15 more per square foot. So not only will the staging make this project more expensive, but will also require more time.

The interchange area of I-75 and SR 54 is in a densely developed commercial, industrial, and residential area. Due to the already existing congestion from this development, the contractor work hours are going to be impacted, resulting in a significant portion of this project being constructed at night. There also will be some seasonal and holiday restrictions when the contractor will not be allowed to work.

The proposed construction time of 36 months seems to be reasonable. This time could be reduced to 30 months with very attractive incentives. It is the study team's recommendation that these incentives be included in the contract due to the impact to the general public created by this project.

VII. DEVELOPMENT PHASE

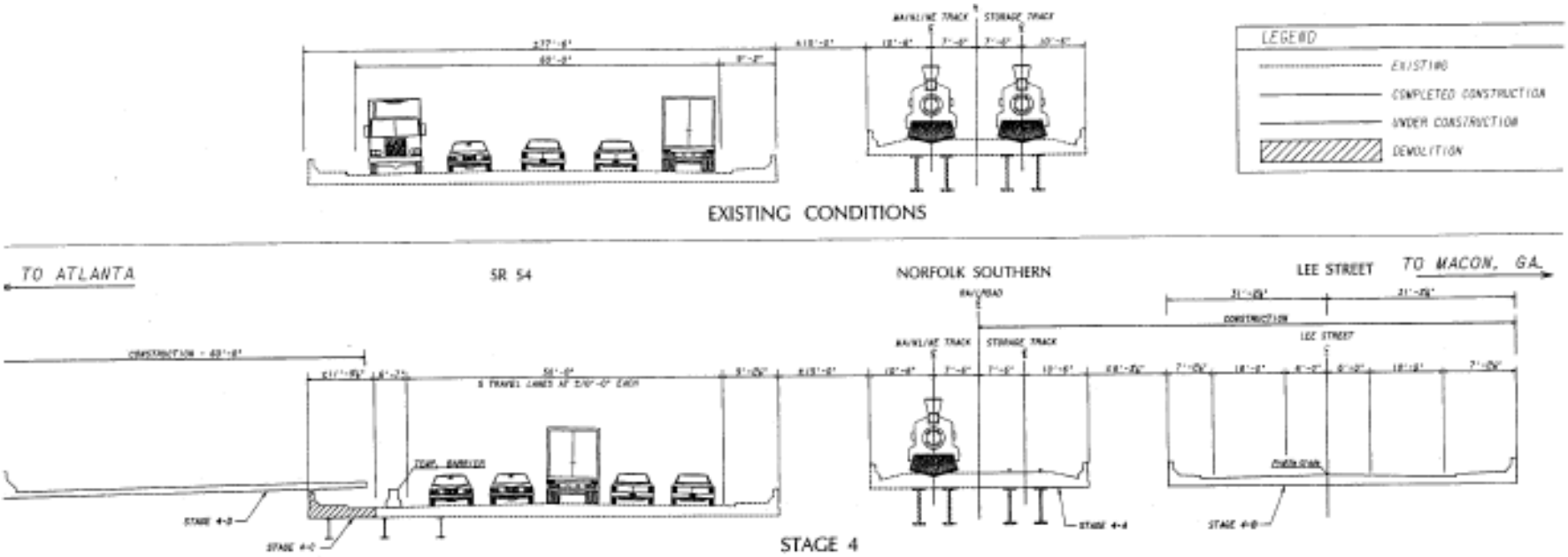
V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

1. "As Proposed"

The construction staging plan for this project includes 7 different stages. Stages 1 - 3 are for I-75 mainline and ramp construction. Stages 4 -7 are for work on SR 54. These stages for SR 54 are shown on the following pages with a description of the work to be accomplished.

With this Staging Plan, difficulties arise with the positioning of construction equipment during Stage 5 when work is being done to complete the second half of the Railroad Bridge and the right half of the SR 54 Bridge.



STAGE 4-A: RAILROAD BRIDGE CONSTRUCTION

- COORDINATE OFF-SITE CONSTRUCTION OF NORFOLK SOUTHERN STORAGE TRACKS.
- CLOSE RAILROAD OPERATION ON SOUTHERN TRACK (STORAGE TRACK)
- REMOVE SOUTHERN HALF OF EXISTING RAILROAD BRIDGE.
- CONSTRUCT SOUTHERN HALF OF RAILROAD BRIDGE.
- CONSTRUCTION OF BRIDGE TO INCLUDE UPGRADE OF TRACKS AND TIE-INS FOR COMMUTER RAIL OPERATION
- CONTRACTOR TO SECURE NORFOLK SOUTHERN RAILROAD APPROVAL PRIOR TO ANY WORK ASSOCIATED WITH THE EXISTING RAILROAD BRIDGE

STAGE 4-B: LEE STREET BRIDGE CONSTRUCTION

- UPON COMPLETION OF SOUTHERN HALF OF RAILROAD BRIDGE, CONSTRUCT LEE STREET BRIDGE IN ITS ENTIRETY.

STAGE 4-C: SR 54 BRIDGE CONSTRUCTION

- OBLITERATE EXISTING PAVEMENT MARKING.
- PLACE TEMPORARY PAVEMENT MARKINGS FOR 5 LANE OPERATION USING 10'-0" LANE WIDTH.
- INSTALL TEMPORARY BARRIER ON THE NORTH SIDE.
- REMOVE 11'-9½"+/- OF EXISTING SR 54 BRIDGE (NORTH SIDE)

STAGE 4-D: SR 54 BRIDGE CONSTRUCTION

- CONSTRUCT 60'-0" WIDE SR 54 BRIDGE (NORTH SIDE).
- DURING STAGE 4 EXISTING TRAFFIC OPERATION WILL BE MAINTAINED ON EXISTING SR 54 BRIDGE.

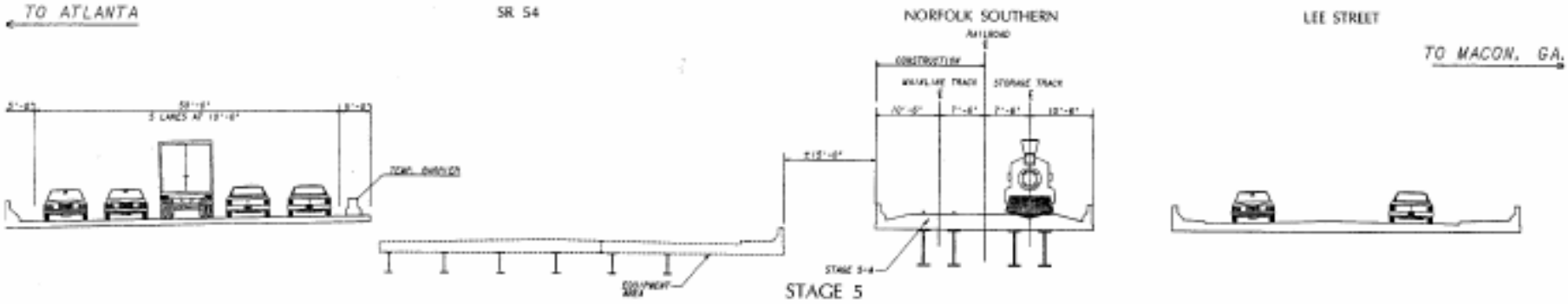
REVISIONS

Maryland Alphelli Associates, Inc.

Department of Transportation
State of Georgia

S.R. 54 @ I-75
BRIDGE STAGING SECTIONS

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
1. "AS PROPOSED"



STAGE 5

- MAINTAIN TRAFFIC ON I-75 FROM STAGE 3
- PLACE PERMANENT PAVEMENT MARKING ON LEE STREET BRIDGE AND OPEN TO TRAFFIC
- PLACE TEMPORARY PAVEMENT MARKING FOR 5 LANE TRAFFIC OPERATION ON NEWLY CONSTRUCTED SR 54 BRIDGE (NORTHSIDE)
- PLACE TEMPORARY BARRIER ON NEWLY CONSTRUCTED SOUTH SIDE

STAGE 5-A1 RAILROAD BRIDGE CONSTRUCTION

- CLOSE RAILROAD OPERATION ON NORTHERN TRACK (MAINLINE TRACK)
- PLACE RAILROAD TRAFFIC ON SOUTHERN TRACK
- REMOVE NORTHERN HALF OF EXISTING RAILROAD BRIDGE.
- CONSTRUCT NORTHERN HALF OF RAILROAD BRIDGE.
- CONTRACTOR TO SECURE NORFOLK SOUTHERN RAILROAD APPROVAL PRIOR TO ANY WORK ASSOCIATED WITH THE EXISTING OF RAILROAD BRIDGE
- USE REMAINING EXISTING SR 54 BRIDGE FOR CONSTRUCTION EQUIPMENT, STAGING AREA AND BEAM LAUNCHING.

LEGEND

- EXISTING
- COMPLETED CONSTRUCTION
- UNDER CONSTRUCTION
- DEMOLITION

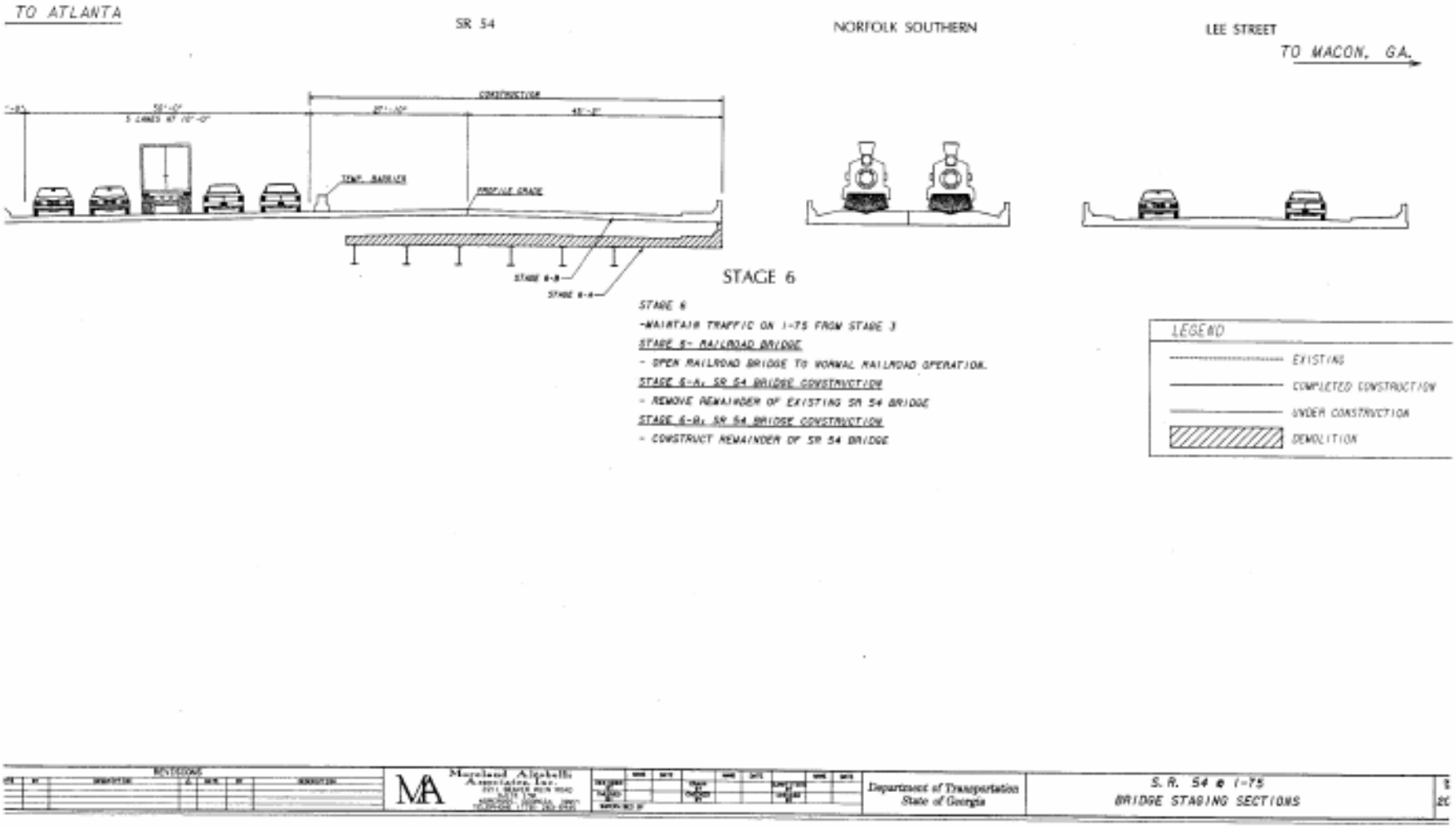
REVISIONS

Maryland Algebeli Associates Inc.

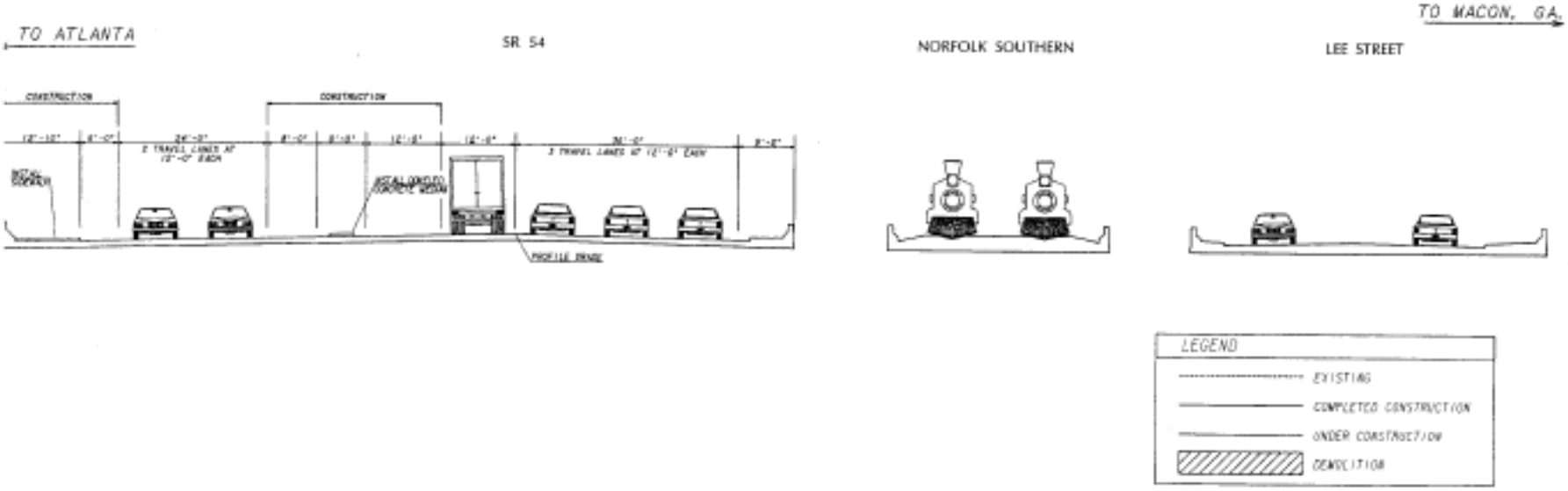
Department of Transportation
State of Georgia

S.R. 54 @ I-75
BRIDGE STAGING SECTIONS

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
1. "AS PROPOSED"



VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
1. "AS PROPOSED"



STAGE 7

STAGE 7

- REPLACE PAVEMENT MARKINGS ON I-75 TO MATCH EXISTING TRAFFIC PATTERNS.
- OPEN I-75 TO TRAFFIC

STAGE 7-SR 54 BRIDGE CONSTRUCTION

- PLACE PERMANENT PAVEMENT MARKING FOR EASTBOUND TRAFFIC OPERATION
- PLACE TEMPORARY PAVEMENT MARKING FOR TWO WESTBOUND LANES.
- INSTALL COMPLETED CONCRETE MEDIAN.
- CONSTRUCT SIDEWALK ON NORTHSIDE.
- PLACE PERMANENT PAVEMENT MARKINGS ON REMAINING PORTIONS OF SR 54.

REVISIONS

Department of Transportation
State of Georgia

S.R. 54 @ I-75
BRIDGE STAGING SECTIONS

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
1. "AS PROPOSED"

VII. DEVELOPMENT PHASE

V. STAGE CONSTRUCTION

A. LOCAL ACCESS/CONSTRUCTION ACCESS

2. Value Engineering Alternative

The Value Engineering Team recommends reducing the SR 54 staging from 4 stages to 2 stages. The Value Engineering Team believes the use of the newly constructed Lee Street Bridge as a detour bridge would greatly reduce the construction time and the changing of the traffic patterns.

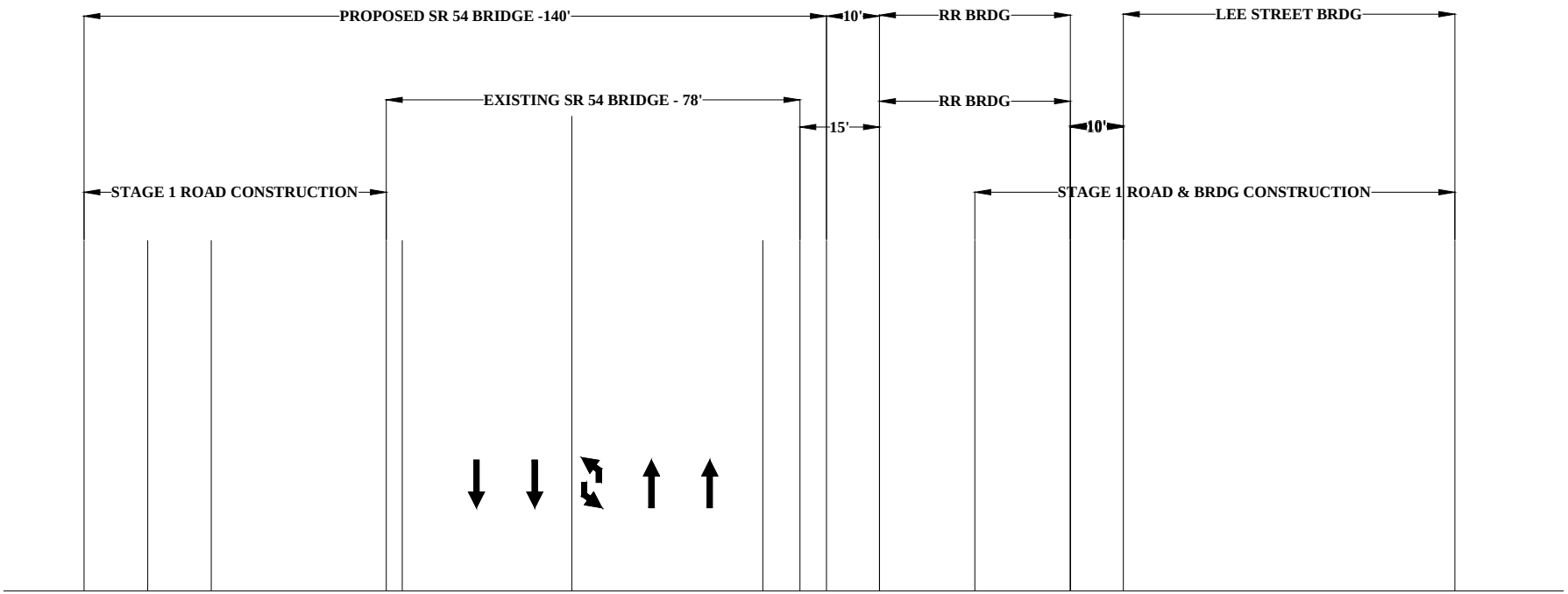
STAGE 1:

1. Maintain traffic on the existing roadway.
2. Widen the SR 54 roadway on the left side.
3. Construct the Lee Street Bridge
4. Construct half the Railroad Bridge
5. Widen Lee Street roadway to accommodate 4 lanes of traffic.

STAGE 2:

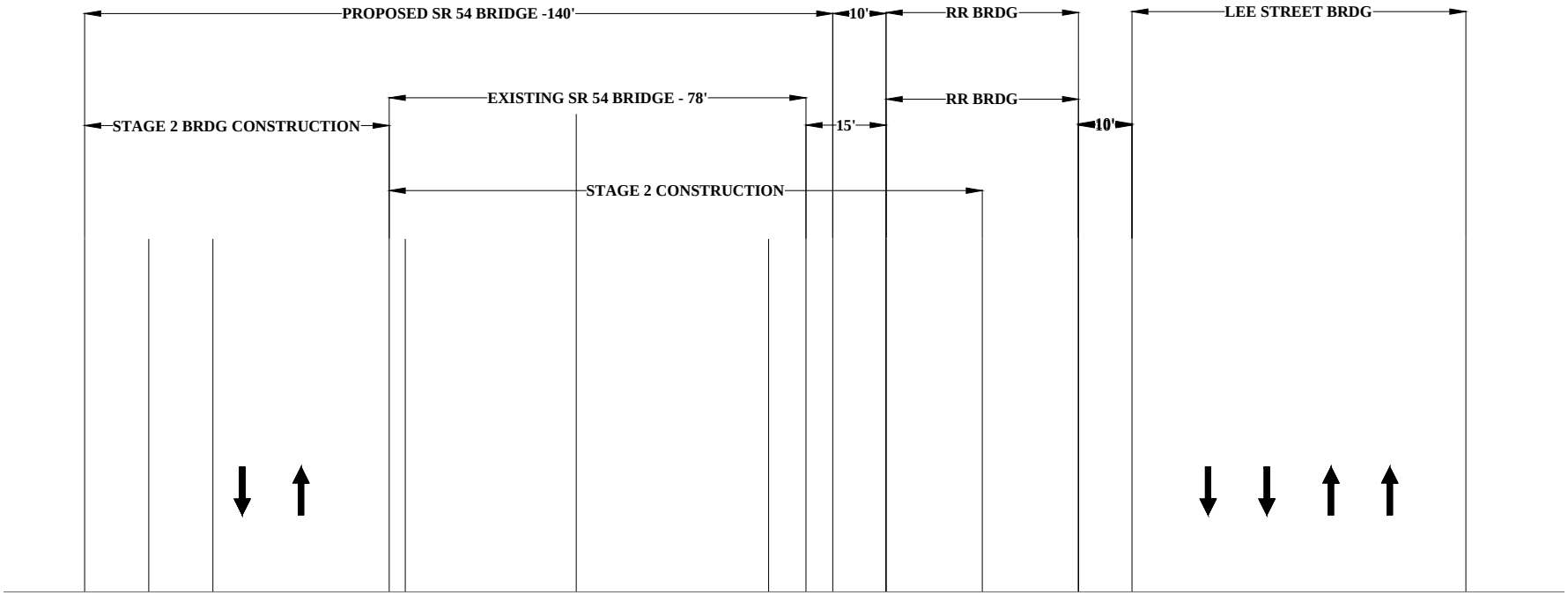
1. Move traffic to the newly constructed Lee Street Bridge and widened Lee Street. I-75 Ramp Traffic will use the newly widened SR 54 pavement. Left turning southbound off ramp traffic will use South Lake Parkway for access to Lee Street to travel to the north and northbound off ramp traffic will use Adamson Parkway to connect with Lee Street to travel south. Similar movements will be made by on ramp traffic.
2. Construct the SR 54 Bridge over I-75.
3. Construct the remaining half of the Railroad Bridge.
4. Widen and resurface the remaining portion of SR 54.

With this staging and MOT plan, the Value Engineering Team believes the construction time for this project could be reduced by 12 to 24 months. It will also allow more room for construction equipment staging.



STAGE 1 MOT

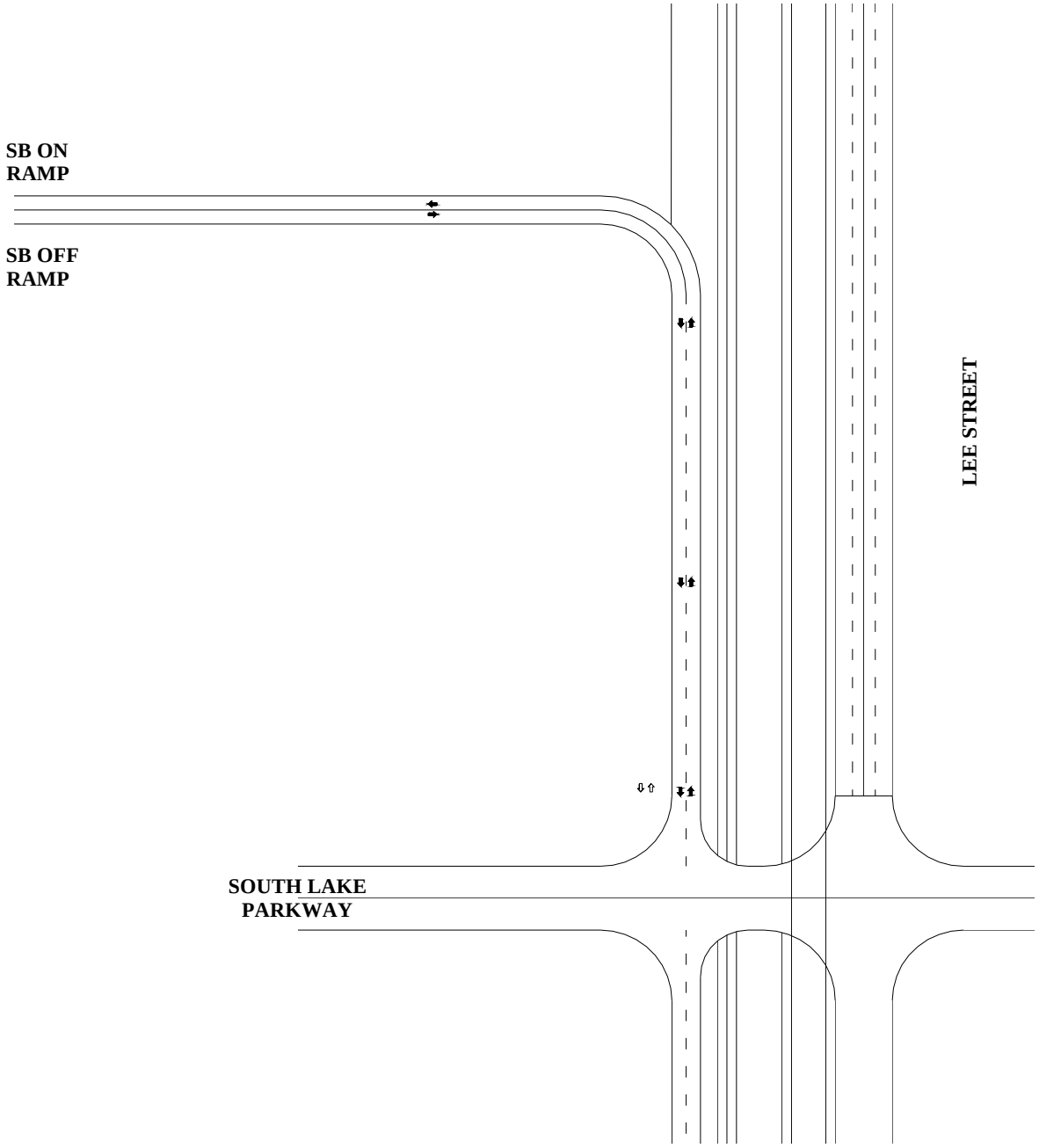
VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
2. VALUE ENGINEERING ALTERNATIVE



TRAFFIC TO/FROM I-75 RAMP

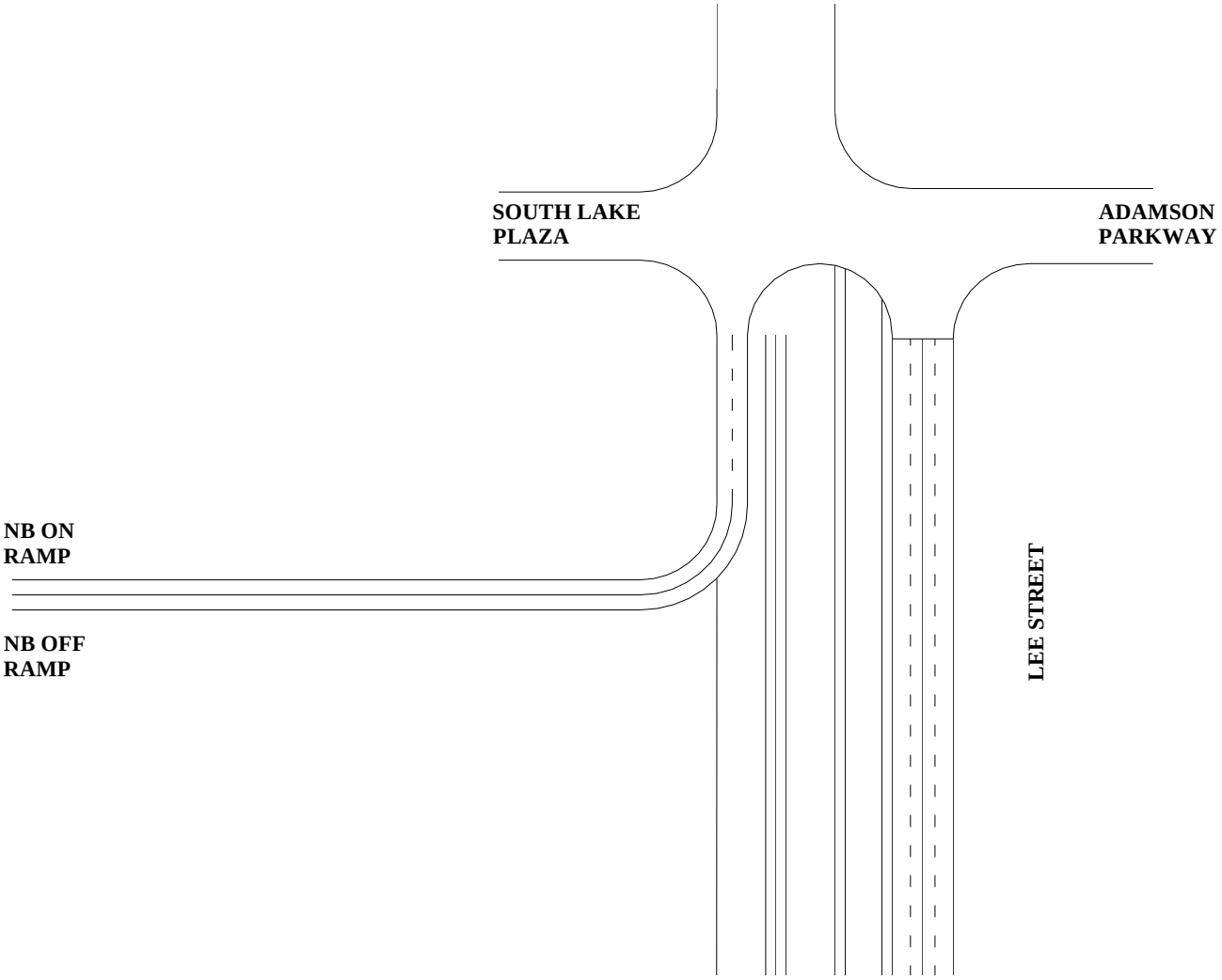
STAGE 2 MOT

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
2. VALUE ENGINEERING ALTERNATIVE



SOUTH BOUND ON/OFF RAMP TRAFFIC TO LEE STREET

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
2. VALUE ENGINEERING ALTERNATIVE



NORTH BOUND ON/OFF RAMP TO LEE STREET

VII. DEVELOPMENT PHASE
V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
2. VALUE ENGINEERING ALTERNATIVE

V. STAGE CONSTRUCTION
A. LOCAL ACCESS/CONSTRUCTION ACCESS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
"AS PROPOSED" MOT	LS	$515,000	1.0	$515,000	0.0	$0
VALUE ENGINEERING ALTERNATIVE MOT	LS	$386,250	0.0	$0	1.0	$386,250
GRAND TOTAL				**$515,000**		**$386,250**

POSSIBLE SAVINGS: $128,750

VII. DEVELOPMENT PHASE

VI. DESIGN COMMENTS

1. If the detail for sediment basins D-22 is included, then D-21 needs to be included since this shows the detail for the primary spillway and the inlet baffle.

2. The logo signs at Sta. 4311 and Sta. 4311+30 are too close together. These signs need to be separated.

3. The staging legend needs to be included on all staging sheets.

4. GA STD 9031L and 9031R are not included in the list of Standards. Since these Standards are listed in the Summary of Quantities box for concrete retaining walls they need to be in the plans.