VALUE ENGINEERING CONSTRUCTABILITY STUDY OF

US 1/SR 4 WIDENING

PROJECT NUMBER: EDS-545(28) and BR-0001-00(218)

ATLANTA, GEORGIA

MARCH 21, 2006

Prepared by:
VE GROUP, L.L.C.

In Association With:

Georgia Department of Transportation

VALUE ENGINEERING STUDY
TEAM LEADER

_____

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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 March 21, 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

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

- Ease of construction
- Impact to wetlands
- Construction Time
- Maintenance during construction
- Future maintenance
- Impact to local traffic
- Impact to local businesses

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.

RECOMMENDATION NUMBER 1- CONSTRUCTABILITY

The Value Engineering Team recommends that the Value Engineering Alternatives be implemented.

A. MULTIPLE LINES OF PIPES

Value Engineering Alternative - Replace pipes with box culverts.

If this recommendation can be implemented, there is a possible savings of ***$ 117,027.***

B. FILL IN WETLANDS

Value Engineering Alternative - Consider placing stone rather than excavating and using filter fabric.

C. BRIDGES

Value Engineering Alternative - Reduce the number of spans.

If this recommendation can be implemented, there is a possible savings of ***$957,776 .***

RECOMMENDATION NUMBER 2- MATERIALS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented.

A. SHOULDER PAVEMENT TYPICAL

Value Enhancement Alternative - Use full depth pavement for entire typical section.

If this recommendation can be implemented, there is a possible cost increase of ***$ 460,660.***

SUMMARY OF RECOMMENDATIONS *(continued)*

RECOMMENDATION NUMBER 3- TRAFFIC CONTROL

The Value Engineering Team recommends that the Value Engineering Alternative be implemented.

A. ROAD CLOSINGS AND DETOURS

Value Enhancement Alternative **-** Eliminate closing where possible.

If this recommendation can be implemented, there is a possible cost increase of ***$ 66,806.***

RECOMMENDATION NUMBER 4- CONTRACTOR WORK HOURS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented.

A. RESTRICTED HOURS

Value Engineering Alternative **-** Change to no work hour restrictions.

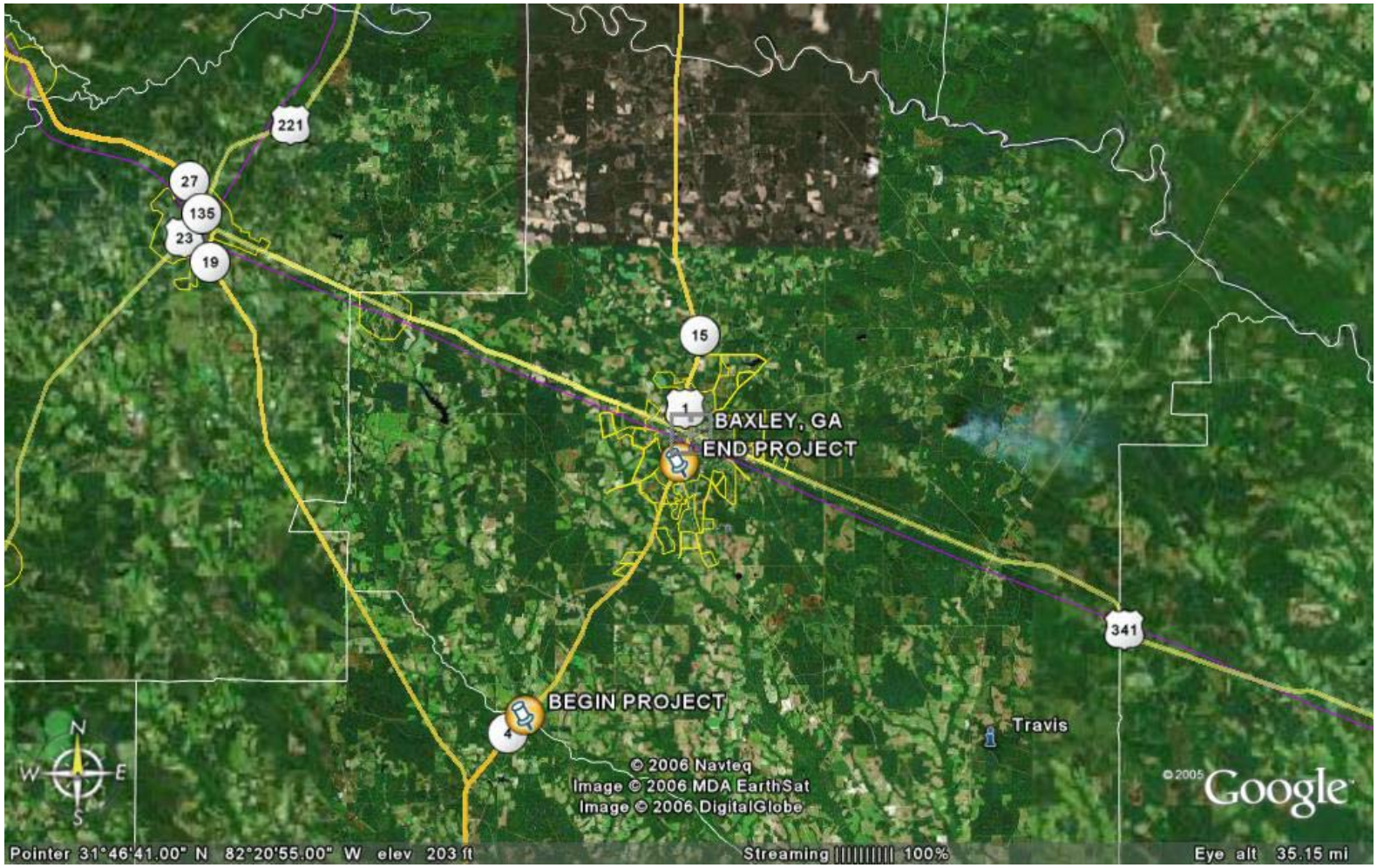
RECOMMENDATION NUMBER 5- CONSTRUCTION TIME

The Value Engineering Team recommends that the Value Engineering Alternative be implemented.

A. INTERIM COMPLETION DATES

Value Engineering Alternative **-** Use an interim completion time of 18 months for the curb and gutter section and use 30 months for the remainder of the project.

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

This project consists of the widening of US 1/SR 4 beginning at the Bacon County line to just north of the SR 15 intersection in Appling County for a project length of 8.87 miles. BR-0001-00(218) consists of the existing bridge replacements on the US 1/SR 4 southbound lanes at Black Water and Sweet Water Creeks.

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

US 1/SR 4 WIDENING **March 21, 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
Lisa Myers	GDOT	404/651-7468
Allen Krivsky	Heath & Lineback Engineers	770/424-1668
Vincent Wilson	GDOT	404/656-5302
Paul Candit	GDOT	404/699-4413
David DeLoach	GDOT	912/366-1090
Will Murphy	GDOT	912/427-5733
Thomas Cox	GDOT	404/463-7486
Bill Nicholson	HGBD	912/354-4626

STUDY RESOURCES

NAME	AFFILIATION	PHONE
Wade Harris	GDOT	404/656-6844
Mitch Pearson	GDOT	404/656-6844
Troy Patterson	GDOT	404/656-6844

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. MULTIPLE LINES OF PIPES**
- **B. FILL IN WETLANDS**
- **C. BRIDGES**

II. MATERIALS

- **A. SHOULDER PAVEMENT TYPICAL**

III. TRAFFIC CONTROL/MAINTENANCE OF TRAFFIC

- **A. ROAD CLOSINGS AND DETOURS**

IV. CONTRACTOR WORK HOURS

- **A. RESTRICTED HOURS**

V. CONSTRUCTION TIME

- **A. INTERIM COMPLETION DATES**

V. SPECULATION PHASE

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

I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPES

- Replace pipes with box culverts.

B. FILL IN WETLANDS

- Consider placing stone rather than excavating and using filter fabric.

C. BRIDGES

- Reduce the number of spans.

II. MATERIALS

A. SHOULDER PAVEMENT TYPICAL

- Use full depth pavement for entire typical section.

III. TRAFFIC CONTROL/MAINTENANCE OF TRAFFIC

A. ROAD CLOSINGS AND DETOURS

- Eliminate closing where possible.

IV. CONTRACTOR WORK HOURS

A. RESTRICTED HOURS

- Change to no work hour restrictions.

V. CONSTRUCTION TIME

A. INTERIM COMPLETION DATES

- Use an interim completion time of 18 months for the curb and gutter section.
- Use 30 months for the remainder of the project.

VI. EVALUATION PHASE

A. ALTERNATIVES

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

I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPES

Value Engineering Alternative - *Replace pipes with box culverts.*

B. FILL IN WETLANDS

Value Engineering Alternative - *Consider placing stone rather than excavating and using filter fabric.*

C. BRIDGES

Value Engineering Alternative - *Reduce the number of spans.*

II. MATERIALS

A. SHOULDER PAVEMENT TYPICAL

Value Engineering Alternative - *Use full depth pavement for entire typical section.*

III. TRAFFIC CONTROL/MAINTENANCE OF TRAFFIC

A. ROAD CLOSINGS AND DETOURS

Value Engineering Alternative - *Eliminate closing where possible.*

IV. CONTRACTOR WORK HOURS

A. RESTRICTED HOURS

Value Engineering Alternative - *Change to no work hour restrictions.*

V. CONSTRUCTION TIME

A. INTERIM COMPLETION DATES

Value Engineering Alternative - *Use an interim completion time of 18 months for the curb and gutter section and use 30 months for the remainder of the project.*

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

B. FILL IN WETLANDS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C. BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

II. MATERIALS

A. SHOULDER PAVEMENT TYPICAL

(1) AS PROPOSED
(2) VALUE ENGINEERING ENHANCEMENT

VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

CR 116

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

CR 112

(3) AS PROPOSED
(4) VALUE ENGINEERING ALTERNATIVE

CR 90

(5) AS PROPOSED
(6) VALUE ENGINEERING ALTERNATIVE

IV. CONTRACTOR WORK HOURS

A. RESTRICTED HOURS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

V. CONSTRUCTION TIME

A. INTERIM COMPLETION DATES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPES

1. "As Proposed"

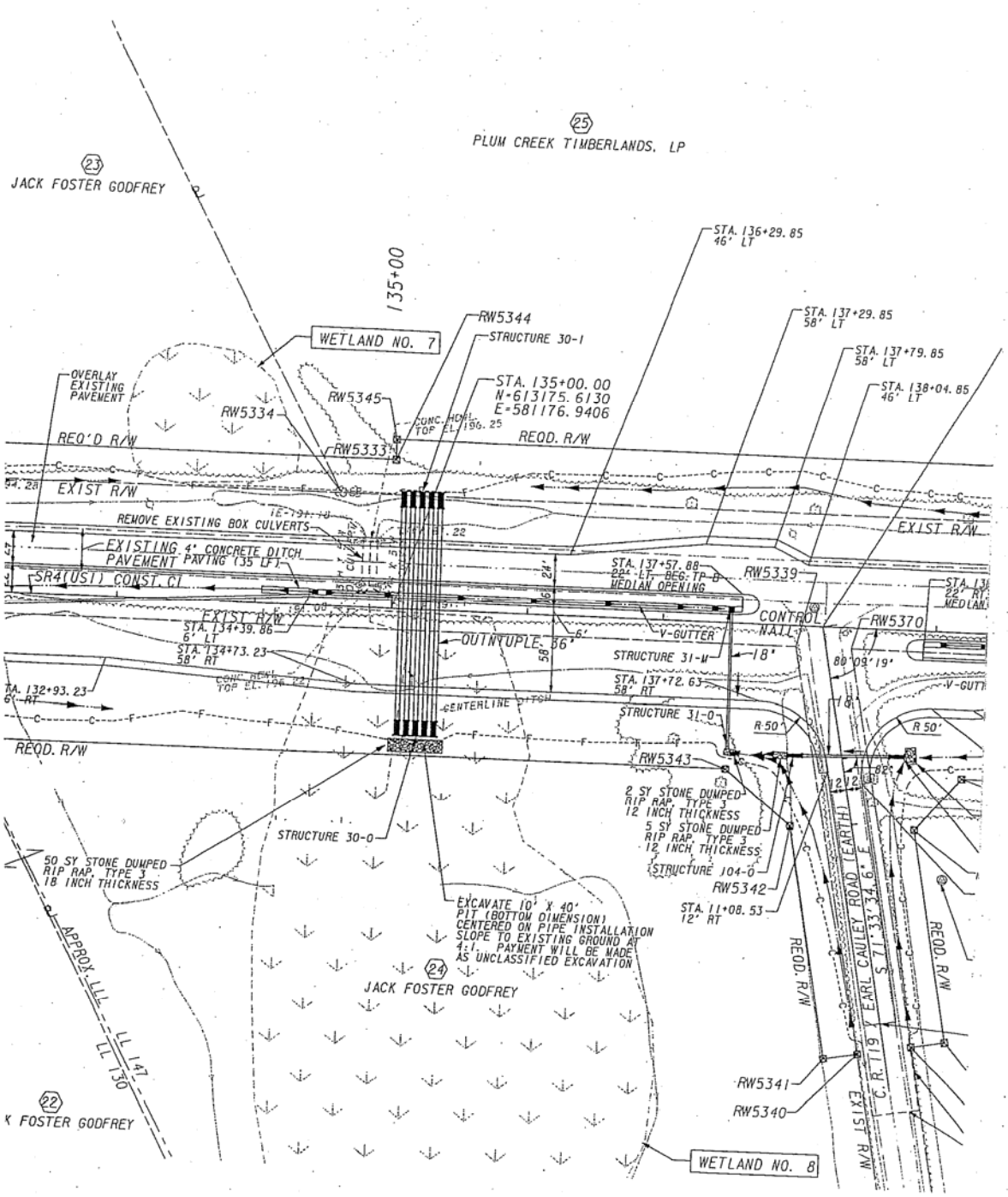
Project EDS-545 (28) is in the relative flat area of South Georgia. Due to this flat terrain, there is very little cover available for drainage structures and most of the drainage structures are installed in multiple lines. There are several locations on this project where existing culverts are replaced by multiple lines of pipe.

Sta. 135+20: The existing structure at this location is a triple 3'x 5' concrete box culvert approximately 48' long. The project proposes to replace this culvert with five lines of 36" RCP with each line being approximately 160' long.

Sta. 216+20: The existing structure at this location is shown on the construction plans as a triple 5'x3' concrete box culvert. However, it is shown on the drainage cross sections as an existing 3'x5' concrete box culvert. The project proposes to replace this culvert with seven lines of 36" RCP with each line being approximately 152' long.

Sta. 392+00: The existing structure at this location is a 4'x4' concrete box culvert. The project proposes to replace this culvert with three lines of 48" RCP with each line being approximately 172' long. The drainage cross section lists this proposed pipe as a double line of 48" pipe.

In each of the above situations, the existing culvert must be removed and disposed of by the contractor. Safety end sections will also be required on the inlet and outlet end of each line of pipe. The appropriate amount of foundation backfill will also be required for each location. Construction will be faced with an added problem of maintaining storm water runoff between the new lines of pipe and the existing box culverts.

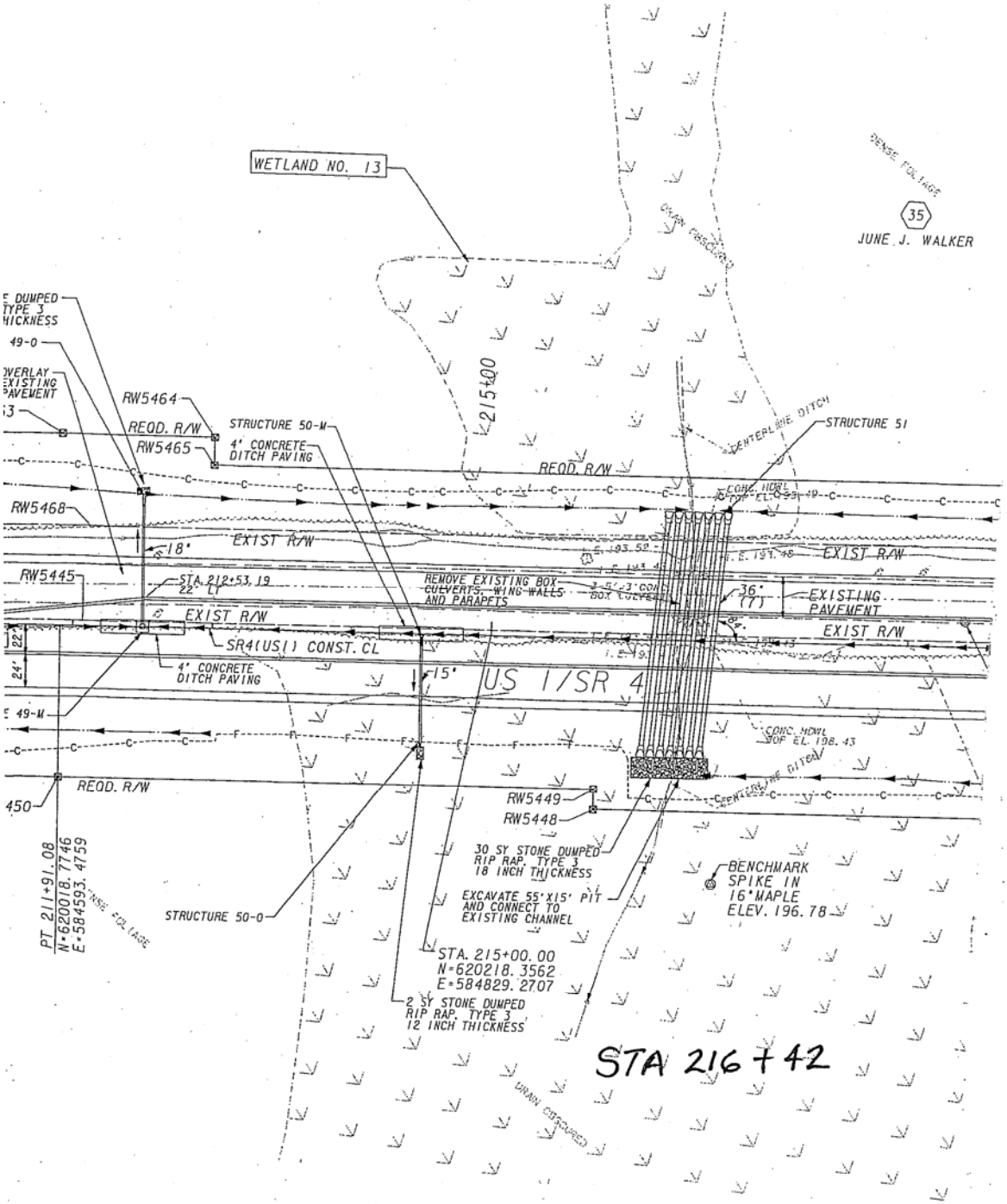


STA 135+20

I. CONSTRUCTABILITY

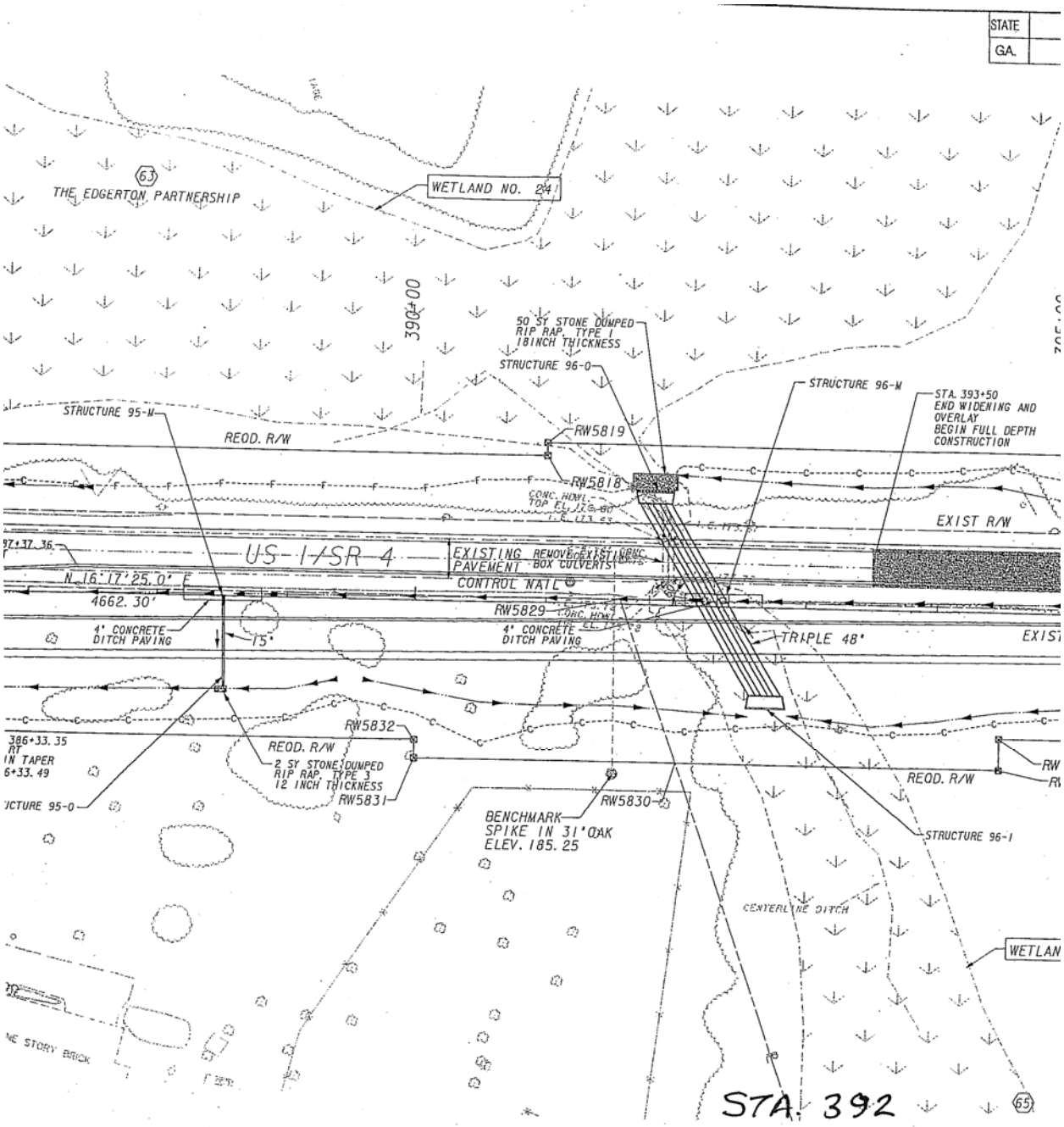
A. MULTIPLE LINES OF PIPE

AS PROPOSED



I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPE AS PROPOSED



I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPE

AS PROPOSED

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

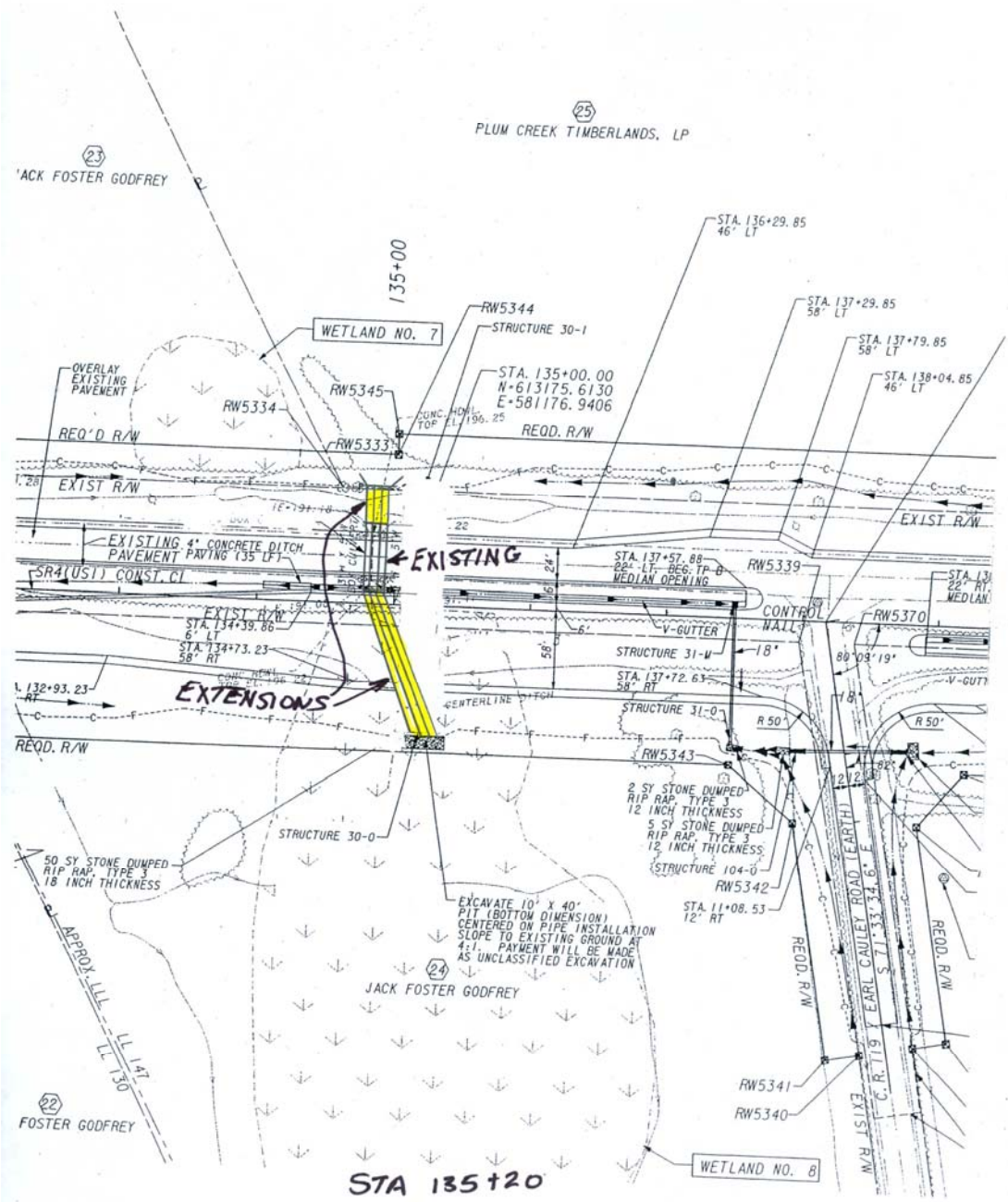
A. MULTIPLE LINES OF PIPES

2. Value Engineering Alternative

The Value Engineering Alternative to the as proposed use of multiple lines of pipe is to extend the existing culverts. There are several reasons why this method of construction is preferable.

- The footprint for multiple lines of pipe is much larger because of the spacing between pipes.
- The cost of extending the culverts is less than installing the multiple lines of pipe at these locations. An estimated $120,000 can be saved.
- The extensions will mean that the structure will virtually be complete when the traffic is shifted to the new lanes.
- The culverts should be much more maintainable than multiple lines of pipe.
- Storm water runoff will be easier to maintain since the water remains in the existing structures.

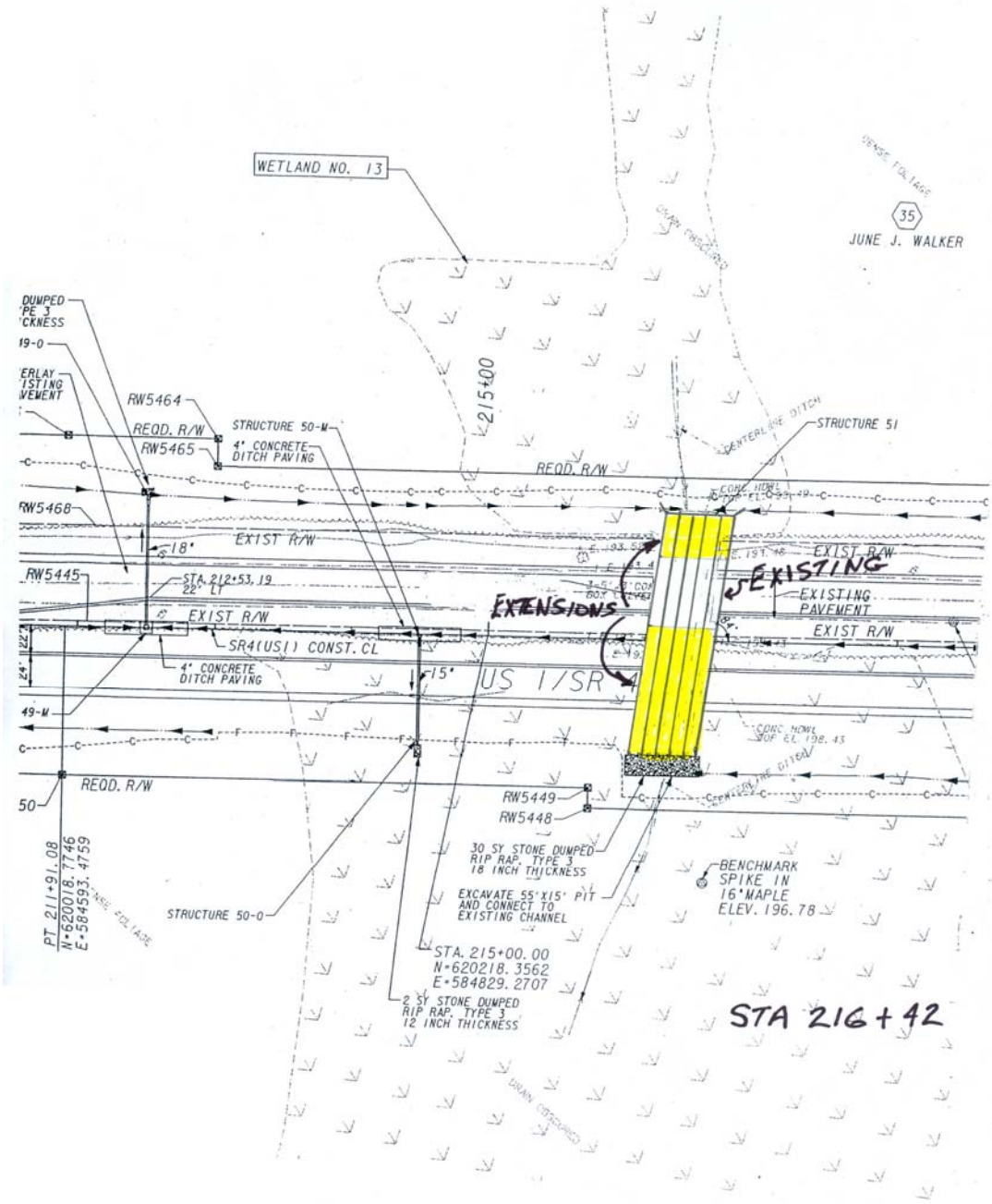
It is therefore recommended by the study team that the existing culverts be extended at the three locations reviewed rather than replacing them with multiple lines of pipe.



I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPE

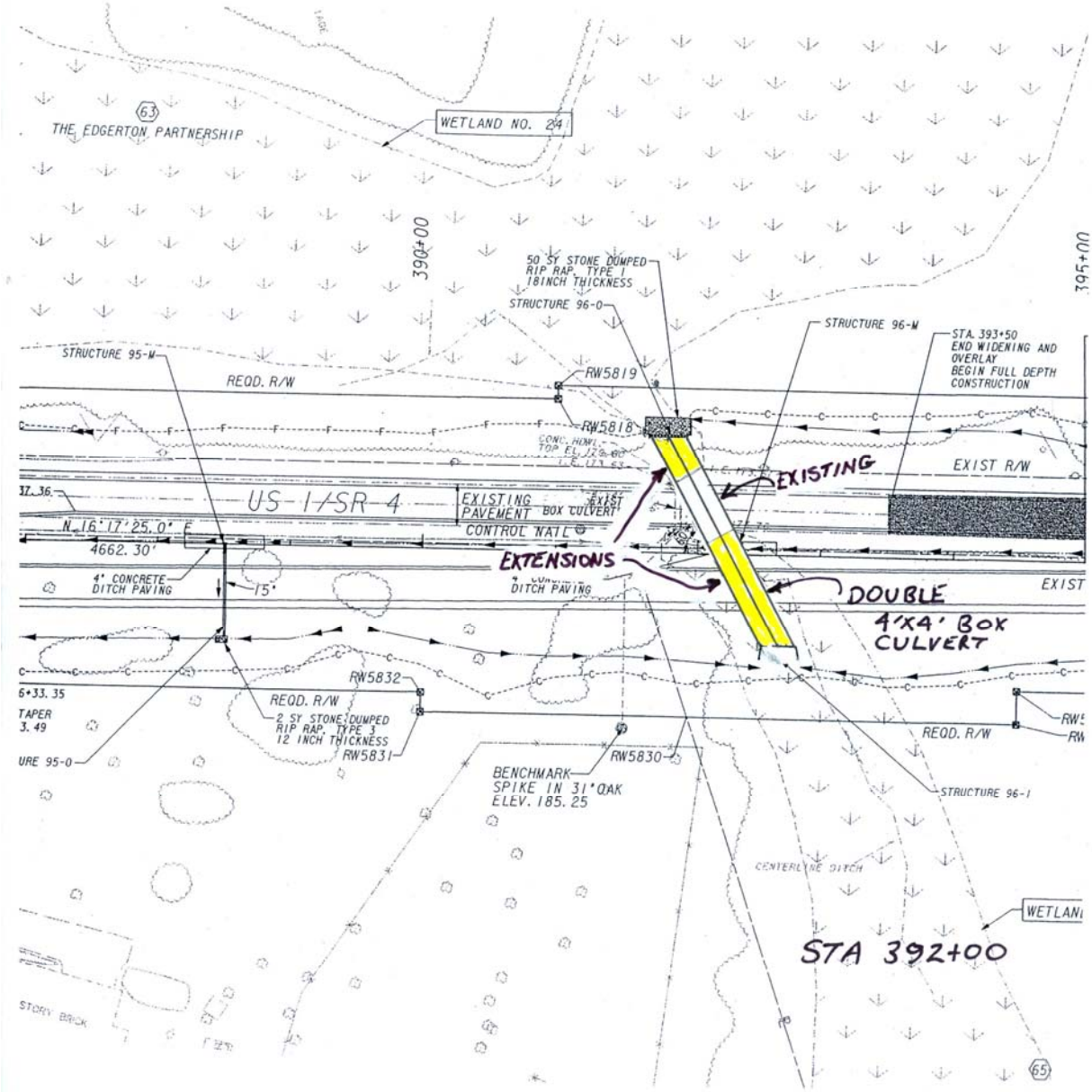
V E ALTERNATIVE



I. CONSTRUCTABILITY

A. MULTIPLE LINES OF PIPE

VE ALTERNATIVE



I. CONSTRUCTABILITY
A. MULTIPLE LINES OF PIPE

VE ALTERNATIVE

I. CONSTRUCTABILITY
A. MULTIPLE LINES IN PIPES
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
STA. 135+20 5 LANES OF 36” RCP	LF	$77.03	800.0	$61,624	0.0	$0
STA. 135+20 36” SAFETY & SECTIONS	EA	$2,200.00	10.0	$22,000	0.0	$0
STA. 135+20 REMOVE EXISTING CULVERT	LS	$2,500.00	1.0	$2,500	0.0	$0
STA. 135+20 EXTEND EXISTING 3’x5’ BOX CULVERT CONCRETE	CY	$467.21	0.0	$0	130.0	$60,737
STA. 135+20 EXTEND EXISTING 3’x5’ BOX CULVERT REMOVE WINGWALLS & PARAPET	EA	$1,000.00	0.0	$0	2.0	$2,000
STA. 135+20 FOUNDATION BACKFILL MATERIAL TYPE II	CY	$36.00	110.0	$3,960	50.0	$1,800
STA. 216+42 7 LINES OF 36” RCP	LF	$77.03	1,071.0	$82,499	0.0	$0
STA. 216+42 36” SAFETY END SECTIONS	EA	$2,200.00	14.0	$30,800	0.0	$0
STA. 216+42 REMOVE EXISTING CULVERT	LS	$2,500.00	1.0	$2,500	0.0	$0
STA. 216+42 EXTEND EXISTING 5’x3’ BOX CULVERT CONCRETE	CY	$467.21	0.0	$0	110.0	$51,393
STA. 216+42 EXTEND EXISTING 5’x3’ BOX CULVERT REMOVE WINGWALLS & PARAPET	EA	$1,000.00	0.0	$0	2.0	$2,000
STA. 216+42 FOUNDATION BACKFILL MATERIAL TYPE II	CY	$36.00	135.0	$4,860	50.0	$1,800
STA. 392 3 LINES OF 48” RCP	LF	$123.11	344.0	$42,350	0.0	$0
STA 392 48” SAFETY END SECTIONS	EA	$3,995.00	6.0	$23,970	0.0	$0
STA. 392 REMOVE EXISTING CULVERT	LS	$2,500.00	1.0	$2,500	0.0	$0

CONTINUED BELOW

I. CONSTRUCTABILITY
A. MULTIPLE LINES IN PIPES
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET *(CONTINUED)*

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
STA 392 EXTEND EXISTING 4'x4' BOX CULVERT CONCRETE	CY	$467.21	0	$0	135.0	$63,073
STA. 392 EXTEND EXISTING 4'x4' BOX CULVERT REMOVE WINGWALLS & PARAPET	EA	$1,000.00	0	$0	2.0	$2,000
STA. 392 FOUNDATION BACKFILL MATERIAL TYPE II	CY	$36.00	115.0	$4,414	45.0	$1,620
SUBTOTAL				**$283,703**		**$186,424**
MOBILIZATION (THIS IS SUB+CONTIN. x %=)	0%			$0		$0
TRAFFIC CONTROL/MOT	0%			$0		$0
CONTINGENCY	10%			$28,370		$18,642
INFLATION @ 5% PER YEAR FOR 2 YEARS	10.3%			$29,221		$19,202
GRAND TOTAL				**$341,295**		**$224,268**

POSSIBLE SAVINGS: $117,027

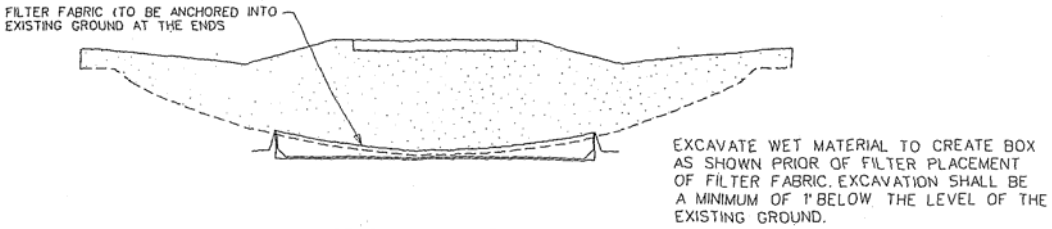
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

B. FILL IN WETLANDS

1. "As Proposed"

There are many low-lying areas in the corridor of SR 4/US 1 along this project. This is evidenced by the fact that there are almost 20 acres of wetlands being impacted that must be mitigated. The condition of numerous locations has further been identified as having wet material that needs to be removed to a minimum level of 1' below the existing ground. These areas are then backfilled by first placing a layer of filter fabric. A list of these locations is included in the summary of quantities section of the plans.



FILTER FABRIC DETAIL

FILTER FABRIC WILL BE PLACED AS SHOWN IN AREAS DETERMINED TO BE TOO WET FOR STABILIZATION PURPOSES. THE LOCATIONS PROPOSED FOR FILTER FABRIC PLACEMENT ARE:

29+00+/- to 31+00+/- RIGHT
61+50+/- to 65+50+/- LEFT AND RIGHT
82+00+/- to 93+00+/- RIGHT
106+50+/- to 123+00+/- RIGHT
133+00+/- to 144+50+/- LEFT AND RIGHT
152+00+/- to 164+00+/- LEFT AND RIGHT
179+00+/- to 182+00+/- RIGHT
194+00+/- to 202+00+/- LEFT AND RIGHT
213+00+/- to 230+00+/- LEFT AND RIGHT
237+50+/- to 241+00+/- RIGHT
252+00+/- to 258+00+/- LEFT AND RIGHT
261+00+/- to 269+00+/- LEFT AND RIGHT
274+00+/- to 284+00+/- LEFT AND RIGHT
310+50+/- to 318+00+/- RIGHT
333+00+/- to 335+15+/- LEFT AND RIGHT
337+35+/- to 343+50+/- LEFT AND RIGHT
369+50+/- to 374+00+/- RIGHT
376+00+/- to 379+00+/- RIGHT
383+00+/- to 384+00+/- RIGHT
391+50+/- to 393+00+/- LEFT AND RIGHT
428+00+/- to 432+00+/- RIGHT
441+00+/- to 448+50+/- LEFT AND RIGHT
458+50+/- to 459+50+/- LEFT AND RIGHT
475+00+/- to 478+50+/- RIGHT
22+00+/- to 24+00+/- (CR112) LEFT AND RIGHT
15+50+/- to 17+00+/- (CS681) LEFT AND RIGHT

I. CONSTRUCTABILITY
B. FILL IN WETLANDS

AS PROPOSED

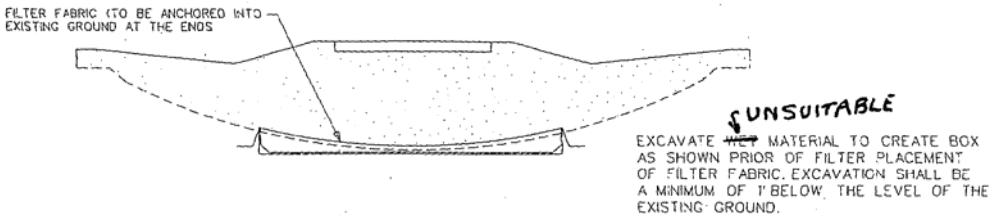
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

B. FILL IN WETLANDS

2. Value Engineering Alternative

Because of the characteristics of this area, the wording of this proposal for the placing of the filter fabric could be misconstrued to mean that all wetland areas require the described treatment. It is the recommendation of the study team that the wording of this requirement be changed from stating the "excavation of wet material" to the "excavation of unsuitable material". Further, in the descriptions of the locations that have been identified, the wording should be changed from "areas determined to be too wet for stabilization" to "areas determined to contain unsuitable material for stabilization". It is further recommended that a note be placed that other locations may be determined and treated as directed by the engineer.



FILTER FABRIC DETAIL

FILTER FABRIC WILL BE PLACED AS SHOWN IN AREAS DETERMINED TO CONTAIN UNSUITABLE MATERIAL ~~TO BE TOO WET~~ FOR STABILIZATION PURPOSES. THE LOCATIONS PROPOSED FOR FILTER FABRIC PLACEMENT ARE:

29+00+/- to 31+00+/- RIGHT
61+50+/- to 65+50+/- LEFT AND RIGHT
82+00+/- to 93+00+/- RIGHT
106+50+/- to 123+00+/- RIGHT
133+00+/- to 144+50+/- LEFT AND RIGHT
152+00+/- to 164+00+/- LEFT AND RIGHT
179+00+/- to 182+00+/- RIGHT
194+00+/- to 202+00+/- LEFT AND RIGHT
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391+50+/- to 393+00+/- LEFT AND RIGHT
428+00+/- to 432+00+/- RIGHT
441+00+/- to 448+50+/- LEFT AND RIGHT
456+50+/- to 459+50+/- LEFT AND RIGHT
475+00+/- to 478+50+/- RIGHT
22+00+/- to 24+00+/- (CR112) LEFT AND RIGHT
15+50+/- to 17+00+/- (CS681) LEFT AND RIGHT

OTHER LOCATIONS TO BE DETERMINED BY THE ENGINEER

I. CONSTRUCTABILITY
B. FILL IN WETLANDS

VE ALTERNATIVE

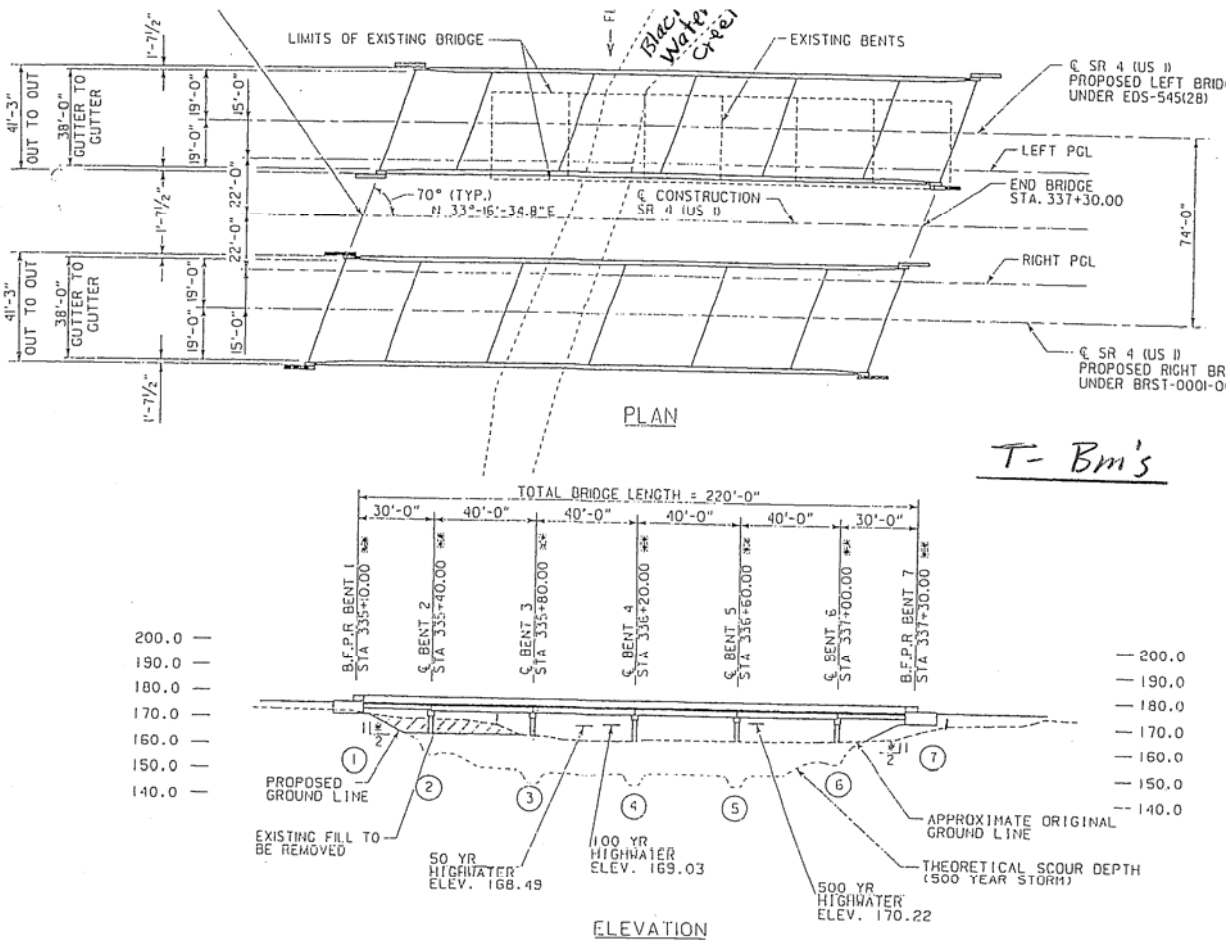
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

C. BRIDGES

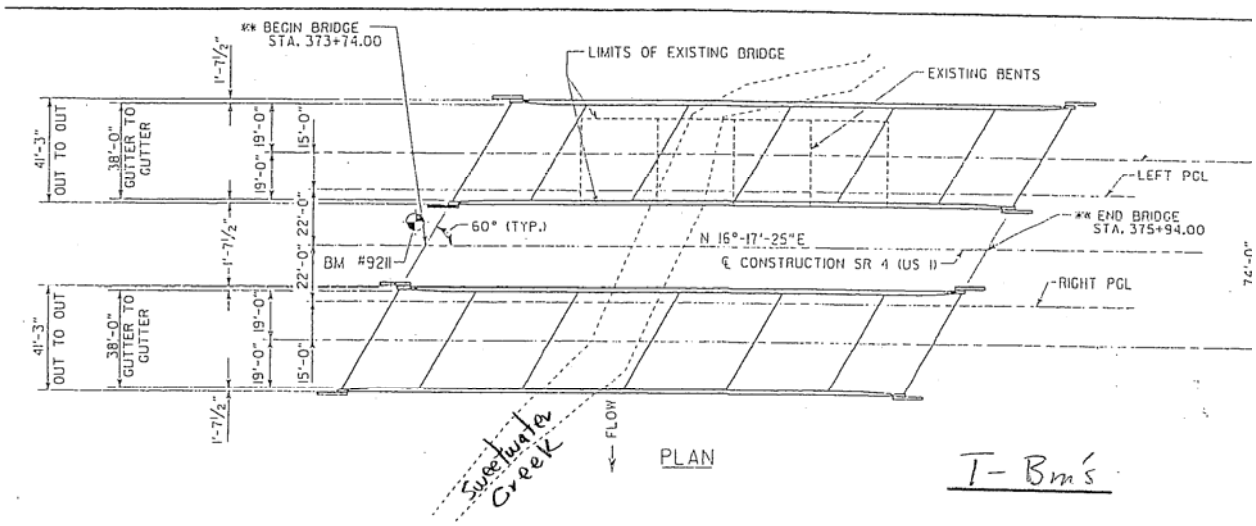
1. "As Proposed"

The as-proposed design at the Black Water Creek and Sweetwater Creek stream crossings consists of dual bridges 220 ft. long and 41.25 ft. wide. There are four 40-ft. spans and two 30-ft. spans. The superstructure is composed of T-Beams supported on steel H pile bents. The duals at Black Water Creek are on a 70^0 skew, while the duals at Sweetwater are on a 60^0 skew. The bridges are designed to be 2 ft. above the 100-year high water line. The extra 1 ft. is provided in case the contractor chooses to use PSC beams. The new proposed bridges at Black Water Creek replace an existing 180-ft. bridge, and the new bridges at Sweetwater Creek replace an existing 120 ft.bridge. The existing bridges have been in place since 1954.

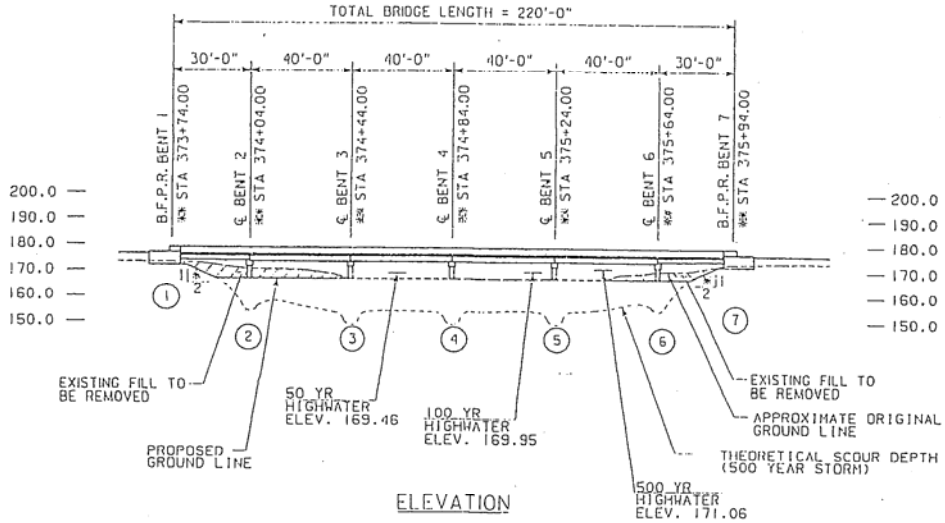


I-C

AS PROPOSED



I- Bm's



I-C

AS PROPOSED

VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

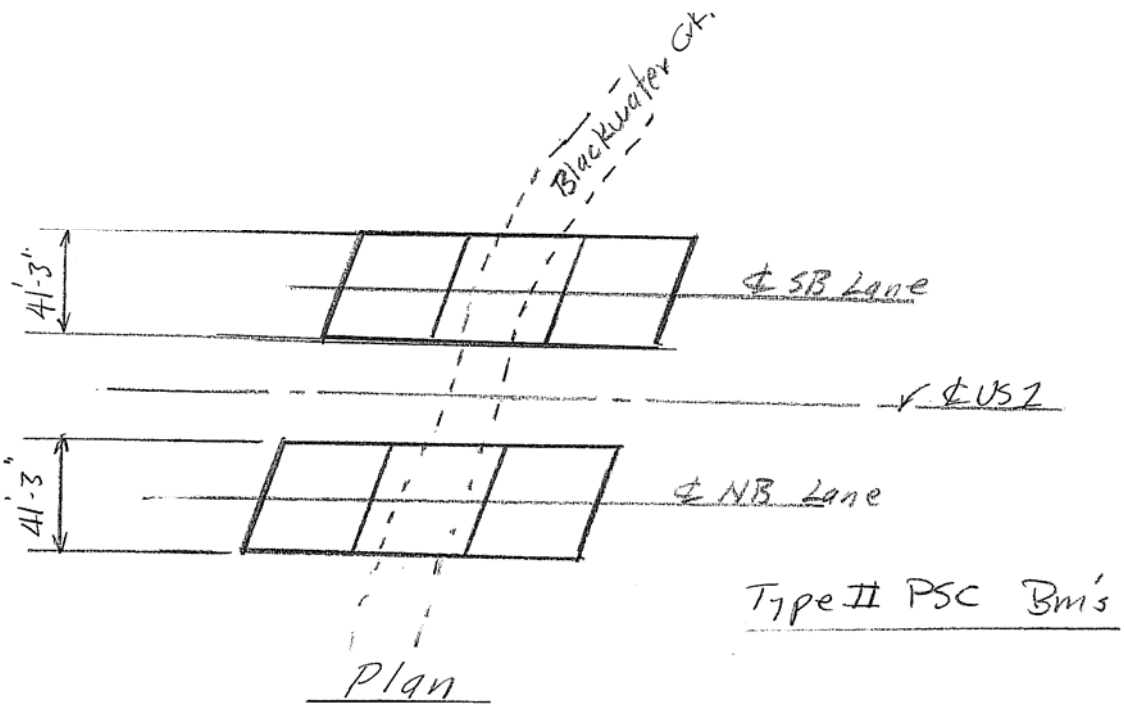
C. BRIDGES

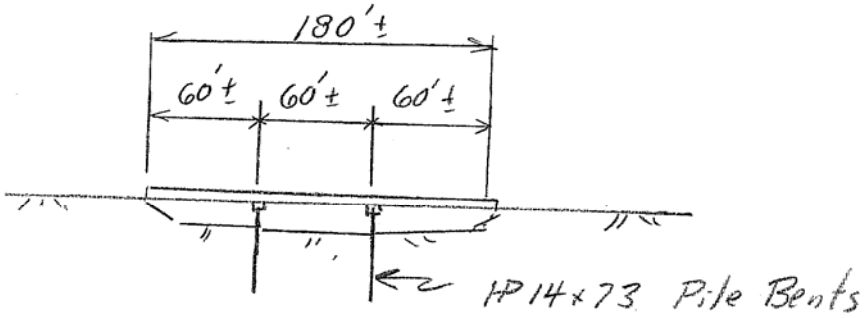
2. Value Engineering Alternative

The Value Engineering Alternative at both of these bridge sites is to use the length of the existing bridges with 60-ft. spans, and a superstructure of Type III PSC beams. At Black Water Creek the Value Engineering Alternative will be 180-ft. long with 3 spans at 60 ft. while at Sweetwater Creek the Value Engineering Alternative will be 120 ft. long with 2 spans at 60 ft. The superstructure will be supported on steel H pile bents. There will be 7 lines of Type III PSC beams, and the pile bents will have 7 HP 14 x 73 piles. Increasing the span lengths and shortening the bridges reduce the environmental impact on the streams in at least two ways:

1. The amount of bent construction in the water or wetlands is cut from 20 pile bents to 6 pile bents.

2. The total construction time will be shortened, so disturbance to the wetlands is minimized.

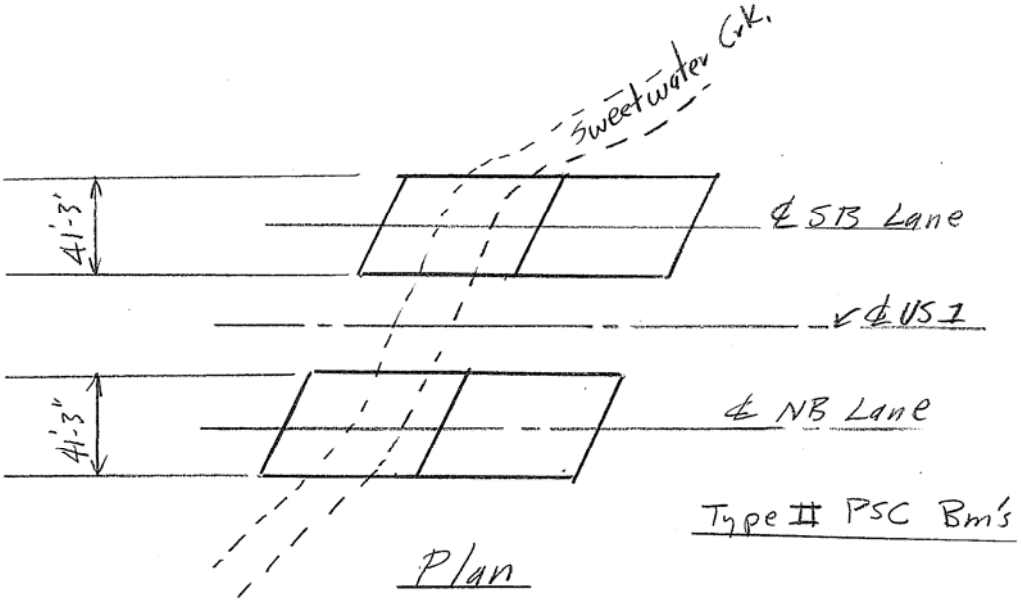




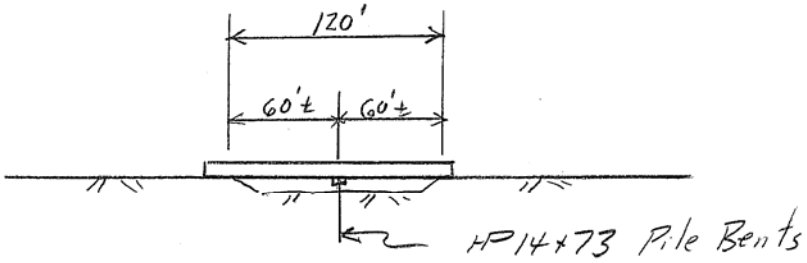
Elevation

T-2

VE ALT



Plan



Elevation

I-C

VE ALT

I. CONSTRUCTABILITY
C. BRIDGES
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
US #1 OVER BLACK WATER CREEK T-BEAM SUPERSTRUCTURE	LS	$711,862.00	1.0	$711,862	0.0	$0
BLACK WATER TYPE II PSC BEAMS SUPERSTRUCTURE	LF	$115.00	0.0	$0	2,520.0	$289,800
BLACK WATER CONCRETE DECK SUPERSTRUCTURE	CY	$623.00	.0	$0	320.0	$199,360
BLACK WATER HP STEEL H PILES	LF	$44.00	2,000.0	$88,000	1,120.0	$49,280
BLACK WATER BENT CAP	CY	$500.00	160.0	$80,000	64.0	$32,000
EMBANKMENT	CY	$5.00	0.0	$0	225.0	$1,125
BASE AND PAVEMENT	SY	$37.00	0.0	$0	364.0	$13,468
US #1 OVER SWEETWATER CREEK T-BEAM SUPERSTRUCTURE	LS	$726,570.00	1.0	$726,570	0.0	$0
SWEETWATER TYPE II PSC BEAMS SUPERSTRUCTURE	LF	$115.00	0.0	$0	1,680.0	$193,200
SWEETWATER CONCRETE DECK SUPERSTRUCTURE	CY	$623.00	0.0	$0	213.0	$132,699
SWEETWATER HP STEEL H PILES	LF	$44.00	2,000.0	$88,000	560.0	$24,640
SWEETWATER BENT CAP	CY	$500.00	184.0	$92,000	36.0	$18,000
EMBANKMENT	CY	$5.00	0.0	$0	555.0	$2,775
BASE AND PAVEMENT	SY	$37.00	0.0	$0	917.0	$33,929
SUBTOTAL				**$1,786,432**		**$990,276**
E&C	10%			$178,643		99,028
INFLATION	10.3%			184,002		101,998
GRAND TOTAL				**$2,149,078**		**$1,191,302**

POSSIBLE SAVINGS: $957,776

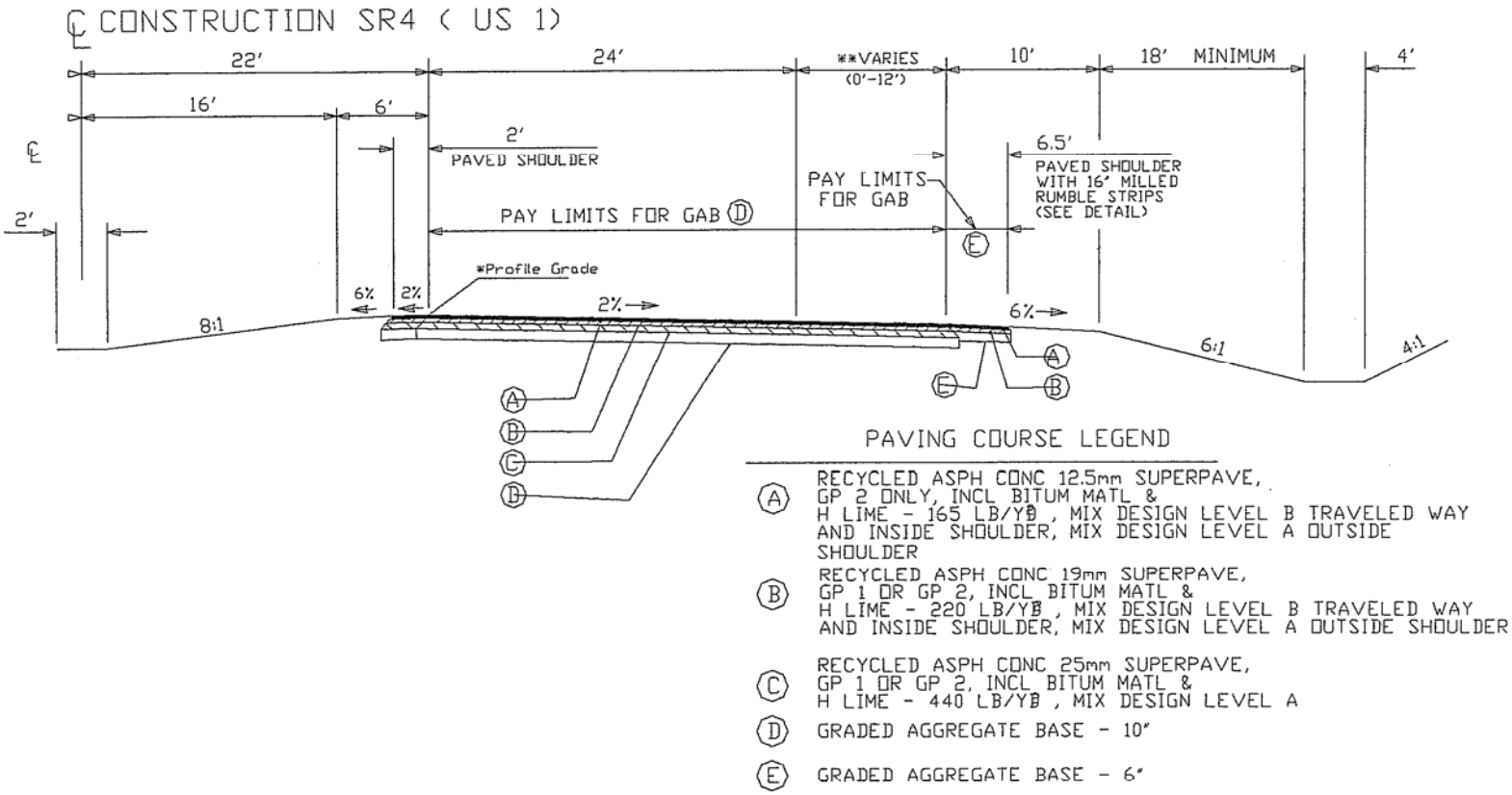
VII. DEVELOPMENT PHASE

II. MATERIALS

A. SHOULDER PAVEMENT TYPICAL

1. "As Proposed"

The roadway shoulders are to be constructed with a Graded Aggregate Base of 6" as shown on the following sheet.



AS PROPOSED SHOULDER PAVEMENT

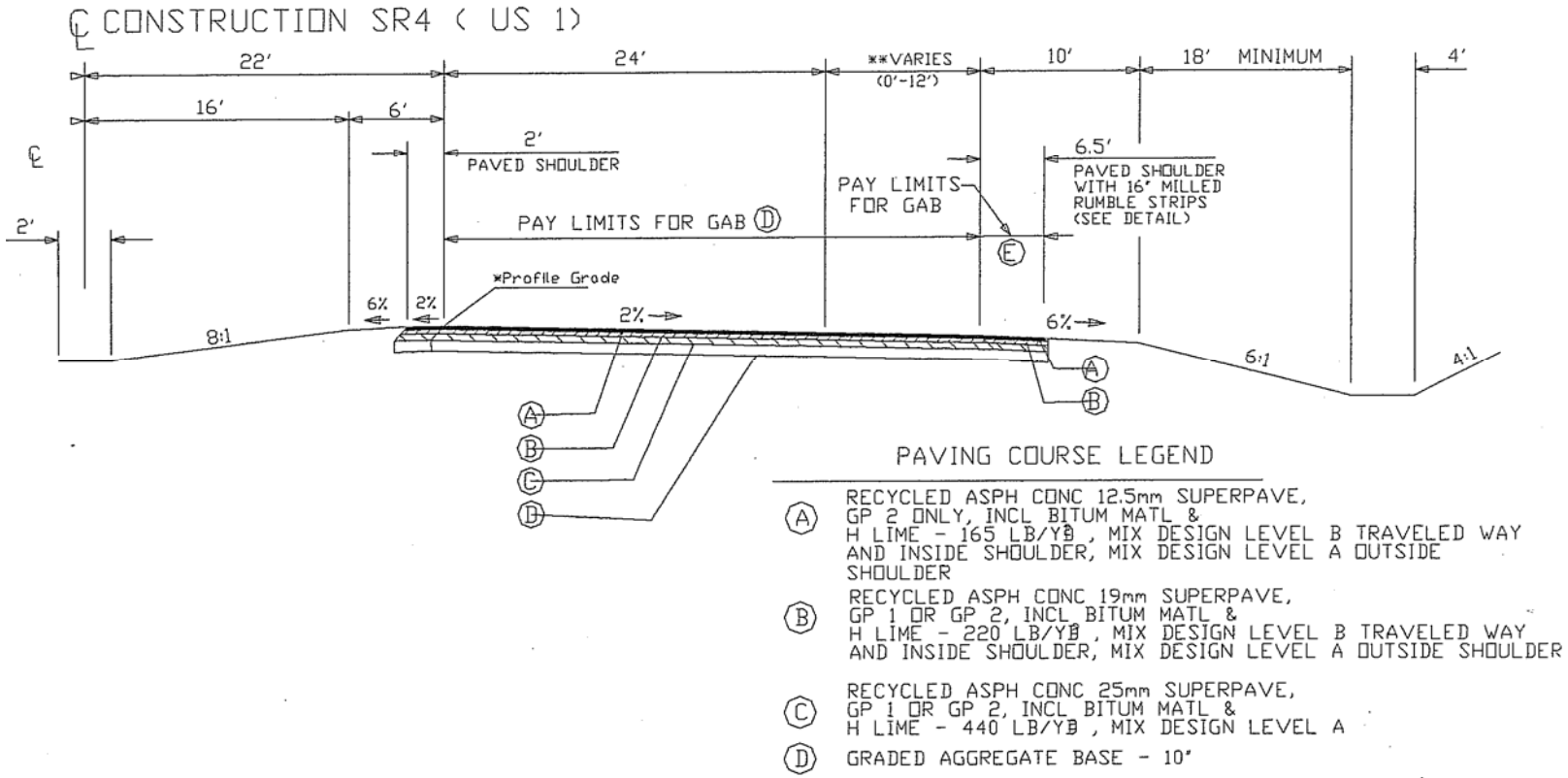
VII. DEVELOPMENT PHASE

II. MATERIALS

A. SHOULDER PAVEMENT TYPICAL

2. Value Engineering Enhancement

The as-proposed shoulder pavement creates the possibility of having a longitudinal joint between the travel way and the shoulder. This longitudinal joint and the impervious subgrade may create an opportunity for pumping water up through the longitudinal joint and damaging the travel lane pavement as well as the shoulder pavement. The Value Engineering Team recommends changing the shoulder base to the full depth of 10” of Graded Aggregate Base as shown on the following sheet.



VALUE ENGINEERING ALTERNATIVE

II. MATERIALS
A. SHOULDER PAVEMENT TYPICAL
VALUE ENGINEERING ENHANCEMENT
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
6" GRADED AGGREGATE BASE	SY	$8.00	105,050.0	$840,400	0.0	$0
10" AGGREGATE BASE	SY	$12.00	276,300.0	$3,315,600	381,350.0	$4,576,200
BORROW EXCAVATION	CY	$6.00	130,000.0	$780,000	123,814.2	$742,885
SUBTOTAL				**$4,936,000**		**$5,319,085**
INFLATION 2 years @ 5%	2	5.0%	10.3%	$505,940		$545,206
TRAFFIC CONTROL/MOT				$0		$0
CONTINGENCY	10%			$493,600		$531,909
RIGHT-OF-WAY	AC	$10,000.00	0.0	$0	0.0	$0
GRAND TOTAL				**$5,935,540**		**$6,396,200**

POSSIBLE COST INCREASE: $460,660

VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 116

1. "As Proposed"

The US 1/CR 116 intersection requires a detour because of a 5-ft. grade differential that will be developed as the new northbound lanes are constructed. CR 116 will be re-routed at an intersection about 4,000 ft. east of US 1 and directed north to CR 112 to head west to US 1. For some drivers this will increase their trip length by almost 2 miles.

VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 116

2. Value Engineering Alternative

The Value Engineering Team recommends eliminating the road closure and detour by raising the grade of CR 90 as the northbound roadway grade is constructed. This is accomplished by placing all the fill necessary to complete the subgrade of northbound US 1 within 30 to 50 ft. of the intersection, maintaining traffic on existing CR 90 and US 1. When the grades have been completed north and south of the intersection, the contractor will concentrate on the gap left for the intersection. Flaggers will be necessary to separate construction equipment and vehicular traffic during this process. A suitable riding surface will be applied to the subgrade until the paving operation is completed. Raising the grade of CR 90 and the intersection with northbound US 1 is expected to take one day.

The advantages of this alternative are the elimination of circuitous travel and the need to place all the necessary detour signs for the detour. The disadvantage is the one-day of letting traffic through the intersection under construction.

There does not appear to be any large additional costs or cost saving associated with this alternative, but will benefit the local traffic by not having to use a detour.

VII. DEVELOPMENT PHASE

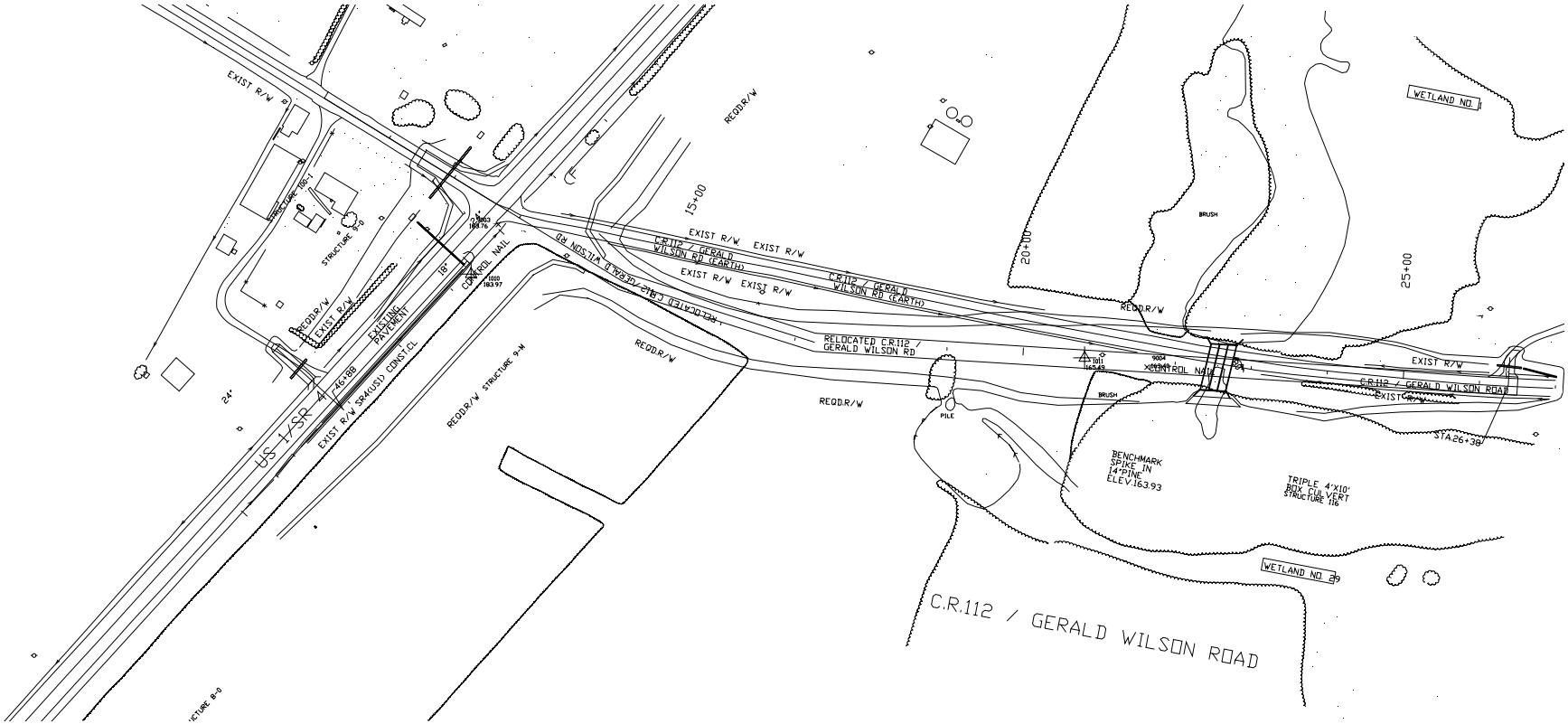
III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 112

3. "As Proposed"

The US 1/CR 112 intersection will require a detour because of skew reduction and replacing pipe culverts with a box culvert. Traffic will be directed to east CR 114 about 2,500 ft. west of US 1 to go north on US 1 or continue west another 1,000 ft. to turn south to CR 116 then west to US 1. Again this may add up to 2 miles of travel for some drivers.



III. TRAFFIC CONTROL
A. ROAD CLOSINGS AND DETOURS
ROAD CLOSURE AND DETOUR OF CR 112
"AS PROPOSED"

VII. DEVELOPMENT PHASE

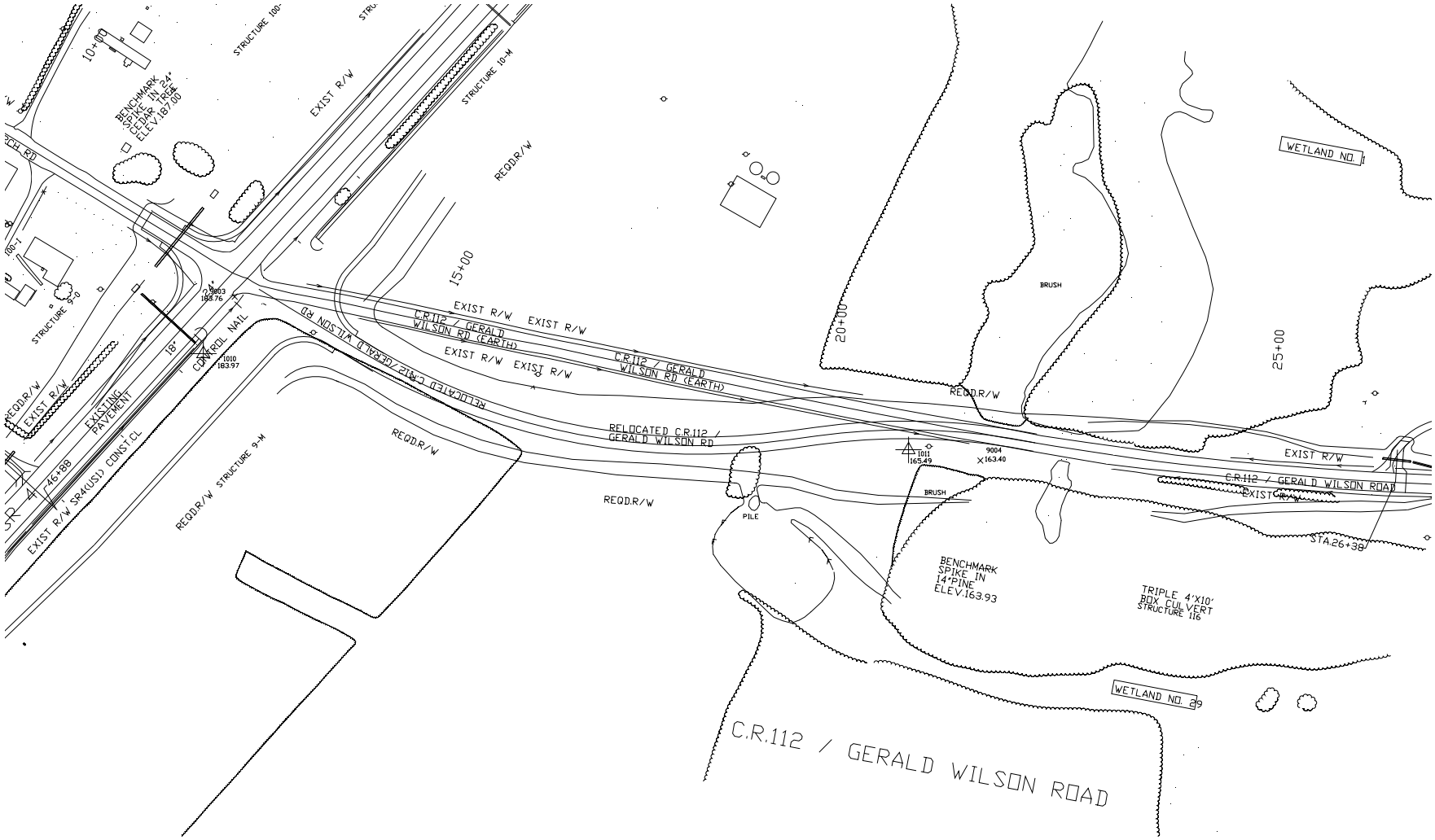
III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 112

4. Value Engineering Alternative

The Value Engineering Team recommends changing the geometry of CR 112 to eliminate the need to replace the pipe culvert approximately 950 ft. east of US 1 under CR 112.



III. TRAFFIC CONTROL
A. ROAD CLOSINGS AND DETOURS
ROAD CLOSURE AND DETOUR OF CR 112
VALUE ENGINEERING ALTERNATIVE NUMBER 1

VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 90

5. "As Proposed"

CR 90 east of its intersection with US 1 will be closed and traffic detoured in order to revise the profile of CR 90 east of the intersection. It appears the profile grade will be lowered up to 2 ft. below the existing profile. Traffic will be directed north to CR 89 to go west about 3,000 ft. to a "T" intersection, then south to CR 90. Drivers will have to drive up to an additional 2 miles.

VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

A. ROAD CLOSINGS AND DETOURS

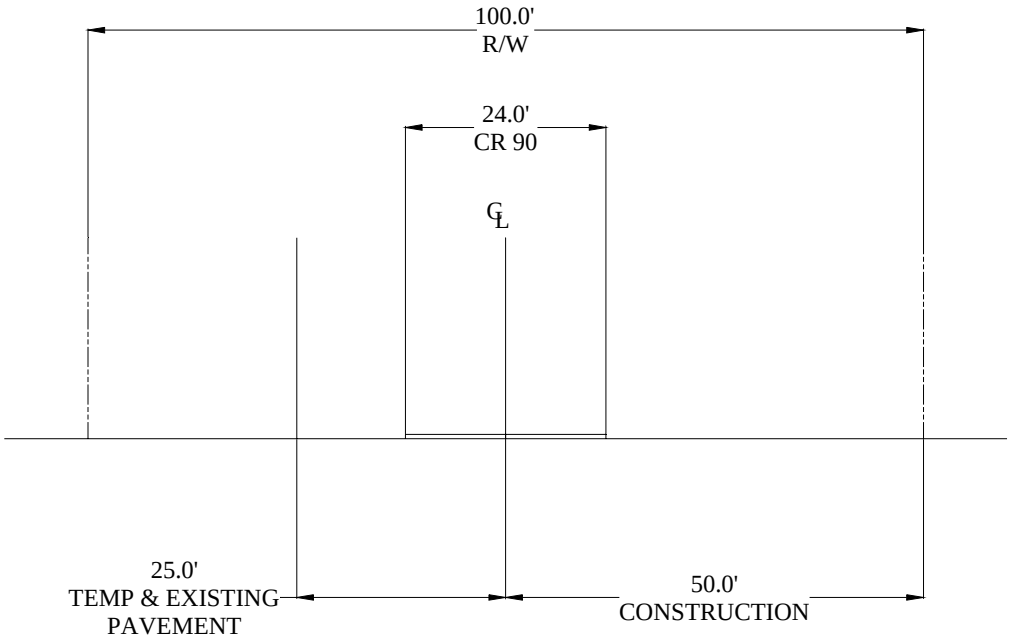
Road Closure and Detour of CR 90

6. Value Engineering Alternative

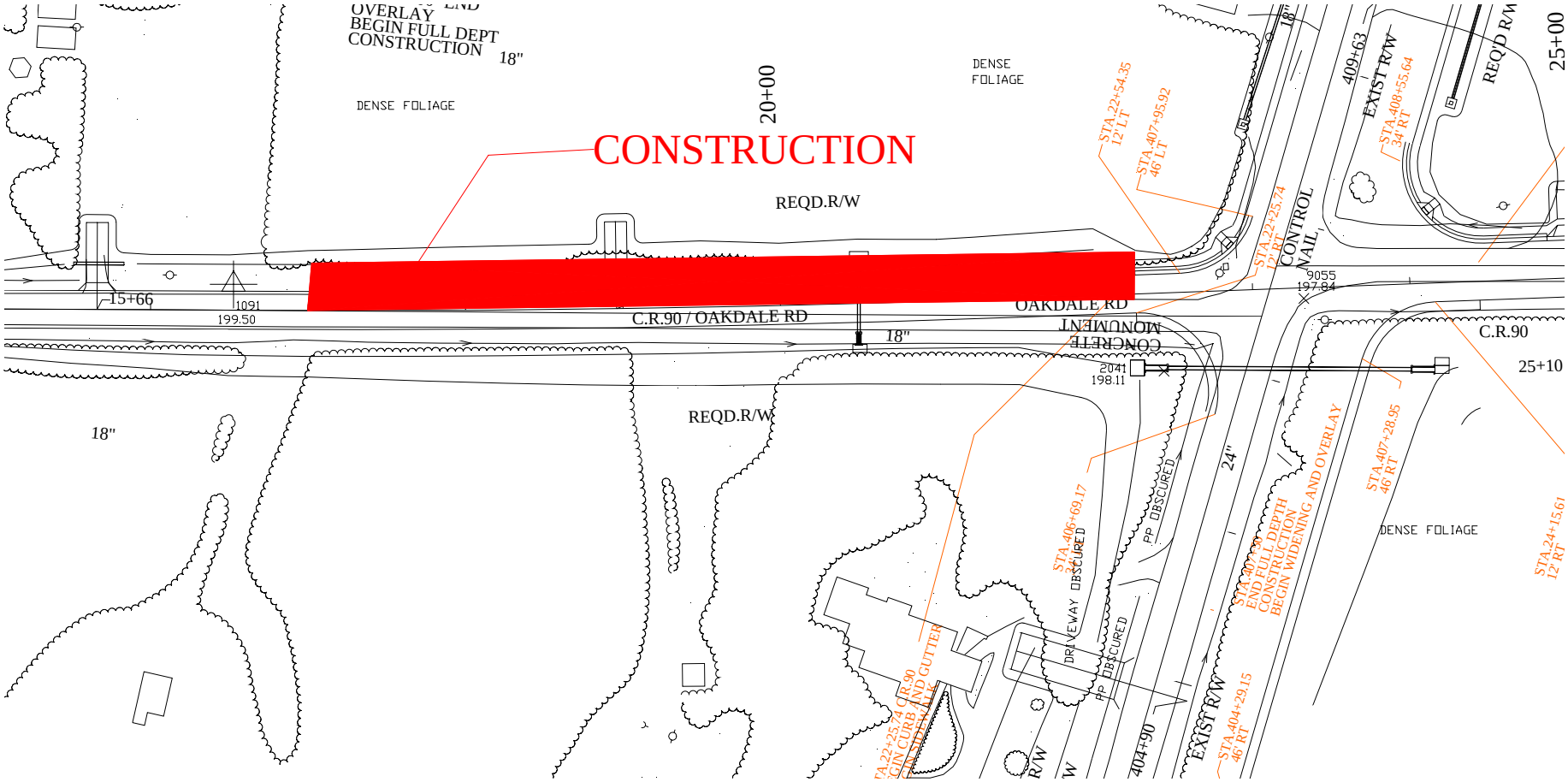
The Value Engineering Team recommends constructing the roadway in two phases using 13 ft. to 25 ft. of temporary pavement outside of each phase as shown below. In Phase I the eastbound lane would be widened with temporary pavement to a width of 25' to accommodate two-way traffic. Traffic would be diverted to the existing and widened lane while the westbound lane and westbound temporary pavement are constructed.

Traffic is then diverted to the newly constructed westbound lane and the temporary widening while the eastbound lane is constructed at its lower grade. When the eastbound lane has been constructed the temporary pavement will be removed.

Temporary pavement would consist of 6" GAB and 1.5" of asphalt.



CR 90 PHASE I MOT


OVERLAY
BEGIN FULL DEPT
CONSTRUCTION
18"
DENSE FOLIAGE
20+00
DENSE
FOLIAGE
CONSTRUCTION
REQD.R/W
STA.22+54.35
12' LT
STA.407+95.92
46' LT
STA.22+25.74
12' RT
CONTROL
NAIL
409+63
EXIST R/W
STA.408+55.64
34' RT
REQ'D R/W
25+00
15+66
1091
199.50
C.R.90 / OAKDALE RD
OAKDALE RD
18"
CONCRETE
MONUMENT
9055
197.84
C.R.90
2041
198.11
25+10
REQD.R/W
18"
24"
STA.406+69.17
34' RT
PP OBSCURED
DRIVEWAY OBSCURED
PP OBSCURED
STA.407+28.95
46' RT
DENSE FOLIAGE
STA.24+15.61
12' RT
STA.22+25.74 C.R.90
BEGIN CURB AND GUTTER
BEGIN SIDEWALK
404+90
EXIST R/W
STA.404+29.15
46' RT

PHASE I

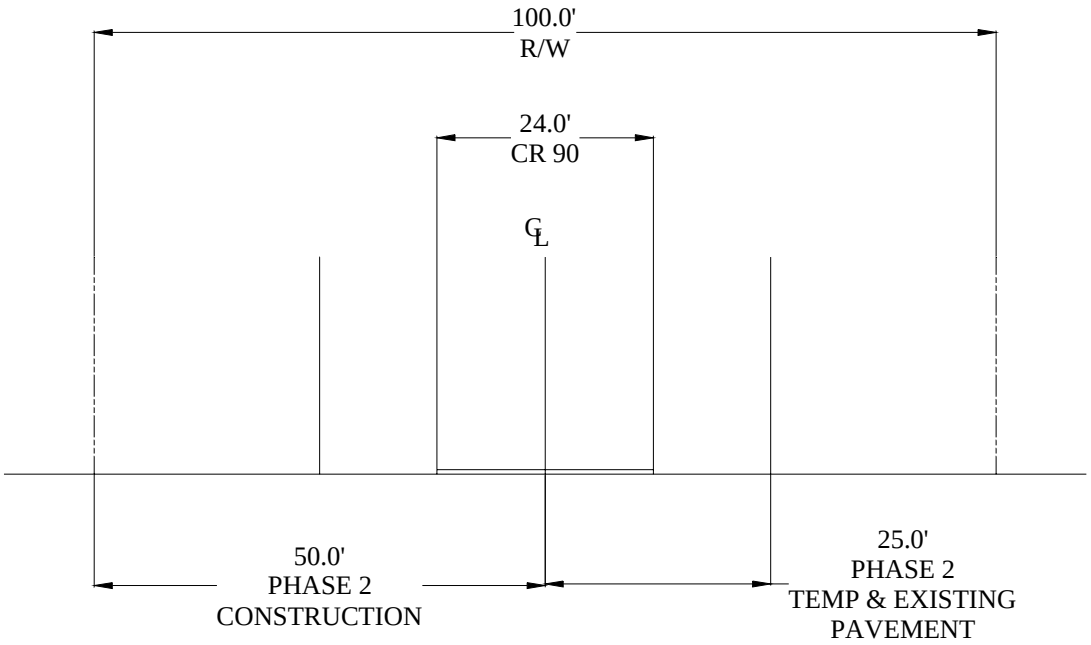
VII. DEVELOPMENT PHASE

III. TRAFFIC CONTROL

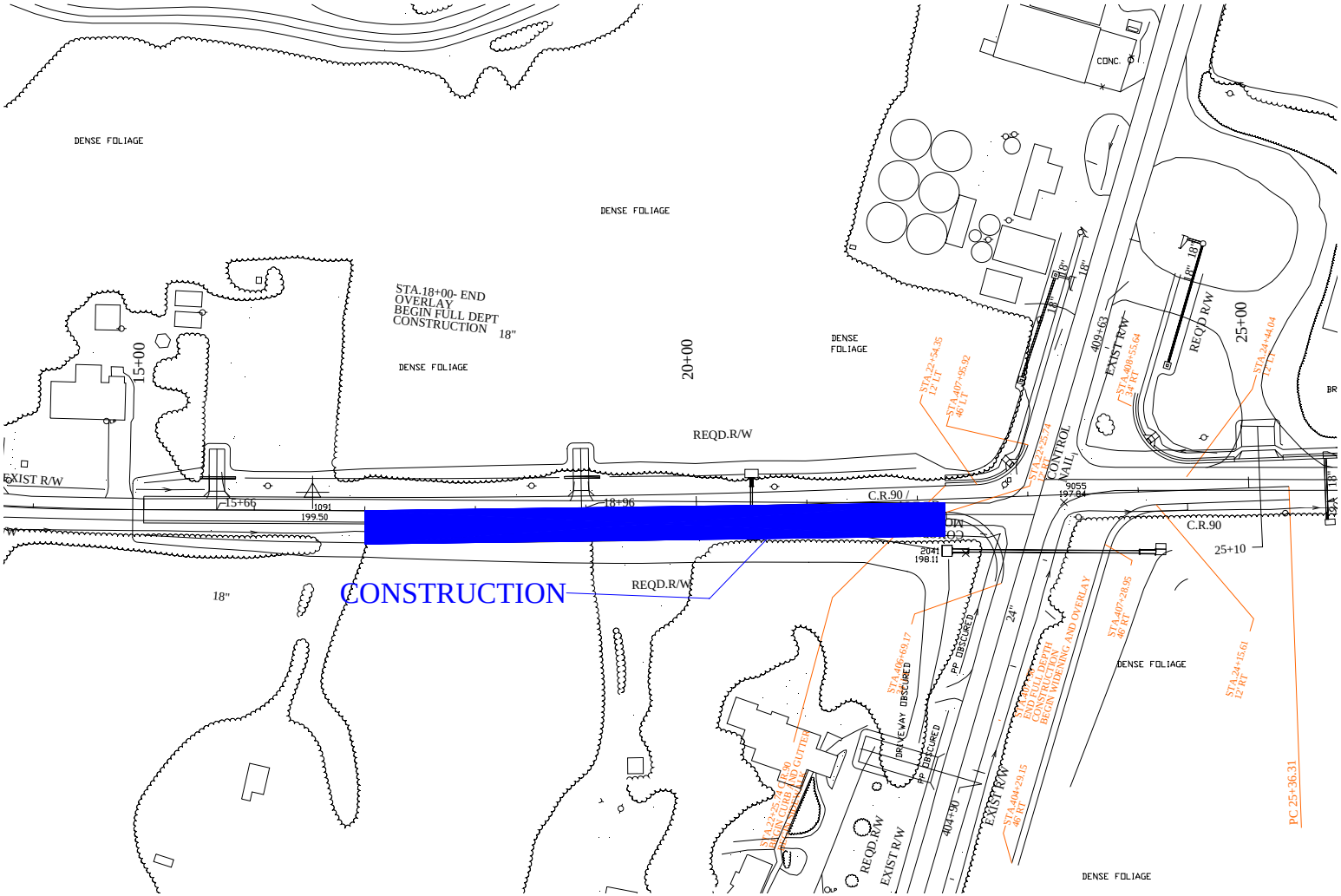
A. ROAD CLOSINGS AND DETOURS

Road Closure and Detour of CR 90

6. Value Engineering Alternative Number 1



CR 90 PHASE 2 MOT


DENSE FOLIAGE
DENSE FOLIAGE
STA.18+00- END OVERLAY BEGIN FULL DEPT CONSTRUCTION
18"
DENSE FOLIAGE
DENSE FOLIAGE
15+00
20+00
25+00
REQD.R/W
EXIST R/W
15+66
1091
199.50
18+96
C.R.90
CONSTRUCTION
REQD.R/W
18"
CONTROL NAIL
9055
197.84
C.R.90
25+10
2041
198.11
409+63
EXIST R/W
REQD R/W
STA.22+54.35
12' LT
STA.407+95.92
46' LT
STA.22+25.74
12' RT
STA.408+55.64
34' RT
STA.24+44.04
12' LT
STA.406+69.17
STA.407+28.95
46' RT
STA.24+15.61
12' RT
STA.404+29.15
46' RT
PC 25+36.31
DRIVEWAY OBSCURED
PP OBSCURED
PP OBSCURED
24"
404+90
EXIST R/W
REQD.R/W
EXIST R/W
DENSE FOLIAGE
DENSE FOLIAGE
CONC.

PHASE II

III. TRAFFIC CONTROL
A. ROAD CLOSINGS AND DETOURS
CR 90 TEMPORARY PAVEMENT
VALUE ENGINEERING ENHANCEMENT
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
TEMPORARY PAVEMENT 6" GAB/1.5" ASPHALT	SY	$12.50	0.0	$0	4,444.4	$55,556
SUBTOTAL				**$0**		**$55,556**
INFLATION 2 years @ 5%	2	5.0%	10.25%	$0		$5,694
TRAFFIC CONTROL/MOT				$0		$0
CONTINGENCY	10%			$40		$5,556
RIGHT-OF-WAY	AC	$10,000.00	0.0	$0	0.0	$0
GRAND TOTAL				**$0**		**$66,806**

POSSIBLE COST INCREASE: $66,806

VII. DEVELOPMENT PHASE

IV. CONTRACTOR WORK HOURS

A. RESTRICTED HOURS

1. "As Proposed"

There are restricted work hours in this project to limit the times that the contractor can interfere with traffic or have lane closures. These restrictions include no lane closures in the AM peak between 7:00 and 9:00 and also no lane closures in the PM peak between 4:00 and 6:00. There is also a requirement that there be no work on Sunday.

VII. DEVELOPMENT PHASE

IV. CONTRACTOR WORK HOURS

A. RESTRICTED HOURS

2. Value Engineering Alternative

The existing traffic volumes along this corridor of SR 4/US 1 range from approximately 4,000 vehicles per day to 6,500 vehicles per day. This means that during the peak hours, there is an estimated 650 vehicles total in both directions. It is therefore the recommendation of the study team that there be no restrictions placed in the proposed contract to restrict work hours, as well as days when work can be performed.

VII. DEVELOPMENT PHASE

V. CONSTRUCTION TIME

A. INTERIM COMPLETION DATES

1. "As Proposed"

Proposed construction time for this project is 36 months. This time was determined because there is almost 9 miles of base and paving, four new bridge structures including the removal of two existing bridges, and the staging of traffic.

VII. DEVELOPMENT PHASE

V. CONSTRUCTION TIME

A. INTERIM COMPLETION DATES

2. Value Engineering Alternative

During the discussion of the construction of this project it was felt that the bridges would be the controlling factor for the project south of CR 90/Oakdale Road. The bridges are essentially straight forward and the two bridges in the future northbound lanes should be constructed simultaneously and should take no more than 9 to 12 months for both. Traffic could then be shifted, original bridges removed and the two new bridges in the southbound lanes could be constructed in a similar 9 to 12 month time frame. Therefore, it is the recommendation of the study team that the overall project time be reduced to 30 months.

Further, most of the corridor of SR 1 is rural in nature except the section north of SR 90/Oakdale Road. This is an urban section and there are numerous businesses that could be adversely affected by the construction. There is the consideration for the number of utilities that must be relocated in this area and also the fact that there will be a closed drainage system. However, the study team feels that traffic should be inconvenienced as short a time as possible and also that special efforts need to be taken to not impact adjoining businesses. It is therefore the further recommendation of the study team that an intermediate completion date of 18 months be included in the contract requirements for the completion of that portion of this project from near CR 90/Oakdale Road to the north end of the project. The beginning of this restricted time constraint would be the actual start of any work that impedes traffic.