VALUE ENGINEERING CONSTRUCTABILITY STUDY

OF THE

WIDENING AND RECONSTRUCTION OF
SR 146/CLOUD SPRINGS ROAD

PROJECT NUMBER: STP-1111(7)
PI NUMBER: 650440

ATLANTA, GEORGIA

June 20 & 22, 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: _____

TABLE OF CONTENTS

ITEM NO.	DESCRIPTION	PAGE NO.
I.	INTRODUCTION	1
II.	LOCATION OF PROJECT	3
III.	TEAM MEMBERS AND PROJECT DESCRIPTION	4
IV.	INVESTIGATION PHASE	5
V.	SPECULATION PHASE	7
VI.	EVALUATION PHASE	8
	A. ALTERNATIVES	8
VII.	DEVELOPMENT PHASE	9
I.	CONSTRUCTABILITY	10
	A. DUAL TRUNK LINES	10
	(1) AS PROPOSED	10
	(2) VALUE ENGINEERING ALTERNATIVE	16
	B. TYPICAL SECTION	24
	(1) AS PROPOSED	24
	(2) VALUE ENHANCEMENT ALTERNATIVE	25
II.	MATERIALS	27
	A. BRIDGE OVER CHICKAMAUGA CREEK	27
	(1) AS PROPOSED	27
	(2) VALUE ENGINEERING ALTERNATIVE NO. 1	30
	(3) VALUE ENGINEERING ALTERNATIVE NO. 2	33
	B. HEADER CURB	36
	(1) AS PROPOSED	36
	(2) VALUE ENGINEERING ALTERNATIVE	38

TABLE OF CONTENTS

ITEM NO.	DESCRIPTION	PAGE NO.
VII.	**DEVELOPMENT PHASE** *(continued)*	
III.	**CONSTRUCTION TIME**	41
	A. LENGTH OF TIME	41
	(1) AS PROPOSED	41
	(2) VALUE ENGINEERING ALTERNATIVE	42
IV.	**STAGE CONSTRUCTION**	43
	A. BOX CULVERTS	43
	(1) AS PROPOSED	43
	(2) VALUE ENGINEERING ALTERNATIVE	46
V.	**DESIGN COMMENTS**	49

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 June 20 and 22, 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

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

A. DUAL TRUNK LINES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative is to use a single trunk line.***

If this recommendation can be implemented, there is a possible savings of **$193,358.**

B. TYPICAL SECTION

The Value Engineering Team recommends that the Value Enhancement Alternative be implemented. ***The Value Enhancement Alternative is to use sidewalks on both sides and to include positive drainage design for this section.***

If this recommendation can be implemented, there is a possible cost increase of **$182,233.**

I. INTRODUCTION

SUMMARY OF RECOMMENDATIONS

RECOMMENDATION NUMBER 2: MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. ***Value Engineering Alternative Number 1 is to lengthen and widen the bridge and eliminate the proposed 15 box culverts.***

If this recommendation can be implemented, there is a possible savings of **$ 517,541.**

A. BRIDGE OVER CHICKAMAUGA CREEK

The Value Engineering Team also recommends that the Value Engineering Alternative Number 2 be implemented. ***Value Engineering Alternative No. 2 is to use all drill shaft foundations.***

If this recommendation can be implemented, there is a possible savings of **$ 20,801.**

B. HEADER CURB

The Value Engineering Team recommends that the Value Engineering Alternative be implemented***. The Value Engineering Alternative is to use curb and gutter.***

If this recommendation can be implemented, there is a possible savings of **$ 9,214.**

RECOMMENDATION NUMBER 3: CONSTRUCTION TIME

A. LENGTH OF TIME

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***The Value Engineering Alternative is to reduce the length of time to 24 months.***

RECOMMENDATION NUMBER 4: STAGE CONSTRUCTION

A. BOX CULVERTS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented***. The Value Engineering Alternative is to include the culverts in the staging plans.***

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP-1111(7)	1	

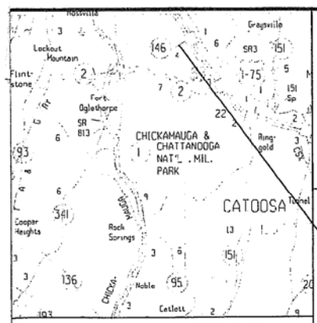
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

Metric

PLAN AND PROFILE OF PROPOSED
WIDENING OF S.R.146 / CLOUD SPRINGS ROAD IN CATOOSA COUNTY

FROM WEST OF C.R.54 / REDBUD AVENUE
TO I-75 INTERCHANGE

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

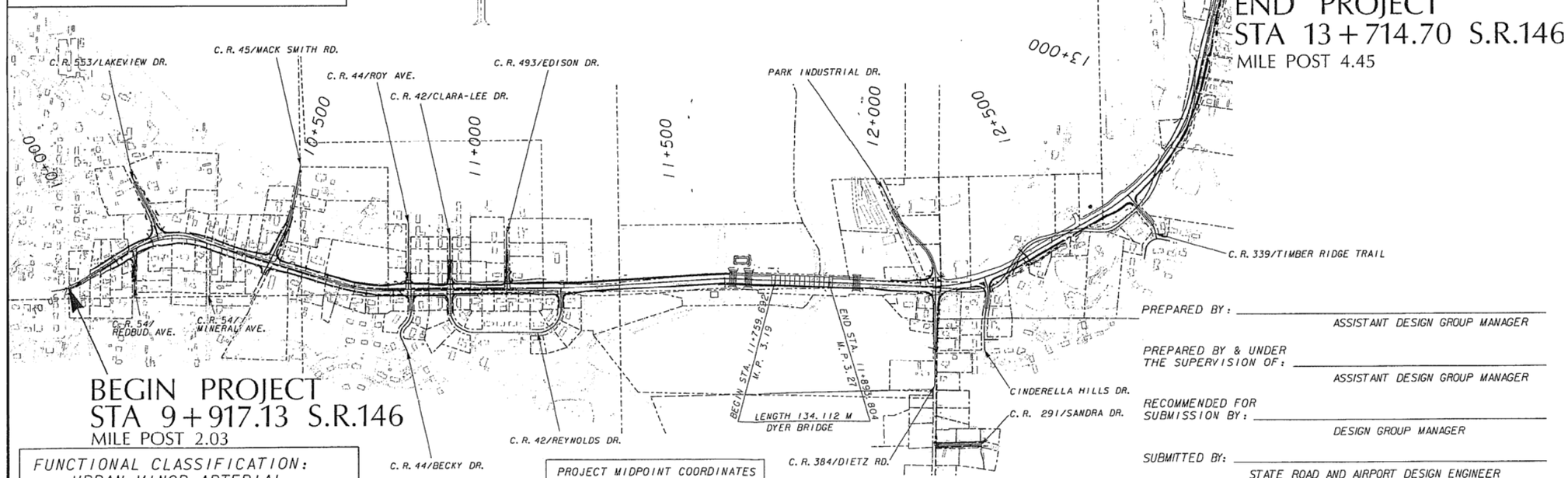


LOCATION SKETCH

DESIGN DATA:	
TRAFFIC A. D. T.	24000 (2006)
TRAFFIC A. D. T.	38400 (2026)
TRAFFIC D. H. V.	1850
DIRECTIONAL DIST.	50%
% TRUCKS	6%
24 HR. TRUCKS %	4%
SPEED DESIGN	70 km/h

STP-1111(7)

FEDERAL ROUTE " M1111
STATE ROUTE " 146
P.I. NO. 650440



PREPARED BY: _____
ASSISTANT DESIGN GROUP MANAGER

PREPARED BY & UNDER THE SUPERVISION OF: _____
ASSISTANT DESIGN GROUP MANAGER

RECOMMENDED FOR SUBMISSION BY: _____
DESIGN GROUP MANAGER

SUBMITTED BY: _____
STATE ROAD AND AIRPORT DESIGN ENGINEER

DATE CHIEF ENGINEER

PLANS COMPLETED - -	
REVISIONS	

FUNCTIONAL CLASSIFICATION:
URBAN MINOR ARTERIAL

PROJECT DESIGNATION: EXEMPT
PROJECT UNITS: METRIC

THIS PROJECT IS LOCATED 100 PERCENT WITHIN CATOOSA COUNTY.
THIS PROJECT IS LOCATED 100 PERCENT WITHIN CONGRESSIONAL DISTRICT NO. 9

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO SUBSECTIONS 102.04, 102.05, AND 104.03 OF THE SPECIFICATIONS.

PROJECT MIDPOINT COORDINATES	
N:	550195.656285
E:	605085.364621
STA.	11+815.915

SCALE: 1:5,000

This project is prepared using the Horizontal Georgia Coordinate System of 1985 (NAD 1983) west zone, and the North American Vertical Datum (NAVD) 1988.

L & D DATE: JUNE 12,2001

LENGTH OF PROJECT	COUNTY NO. 185 KILOMETERS
NET LENGTH OF ROADWAY	3.664
NET LENGTH OF BRIDGES	0.134
NET LENGTH OF PROJECT	3.798
NET LENGTH OF EXCEPTIONS	0.000
GROSS LENGTH OF PROJECT	3.798

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 146/Cloud Springs Road in Catoosa County. The project begins just west of CR 54/Redbud Avenue and extends east following existing alignment across West Chickamauga Creek to CR 384/Dietz Road. The project then bears off onto new location just east of CR 339/Timber Ridge Trail where it returns to follow the existing location to the end of the project at the southbound exit and entrance ramps of the I-75 interchange. The existing bridge over West Chickamauga Creek will be widened to the north. The typical section provides for two lanes in each direction separated by a 6.0 M wide raised median. The project consists of 3.6 M wide urban shoulders on both sides of the roadway from the beginning of the project to just east of CR 42/Reynolds Drive. From this point to the end of the project, the urban shoulder continues on the south side and a 3.6 M rural shoulder is proposed on the north side including a 2.0 M wide partial depth paved shoulder. The total project length is 3.798 kilometers.

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

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
Lisa Favors	GDOT	404/699-6883
Ruth Forrester	GDOT	404/699-6882
Quinn Hazelbacker	GDOT	404/699-4432
Fletcher Miller	GDOT	404/656-5383
Mike Davidson	GDOT	404/656-5383
Steve Gaston	GDOT	404/656-5197
Kenny Beckworth	GDOT	770/387-3609
Jacob Achorn	GDOT	404/656-5383
Nabil Raad	GDOT	404/635-8126

STUDY RESOURCES

NAME	AFFILIATION	PHONE
Troy Patterson	GDOT	404-656-6845

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. DUAL TRUNK LINES**
- **B. TYPICAL SECTION**

II. MATERIALS

- **A. BRIDGE OVER CHICKAMAUGA CREEK**
- **B. HEADER CURB**

III. CONSTRUCTION TIME

- **A. LENGTH OF TIME**

IV. STAGE CONSTRUCTION

- **A. BOX CULVERTS**

V. SPECULATION PHASE

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

I. CONSTRUCTABILITY

A. DUAL TRUNK LINES

- Use a single trunk line

B. TYPICAL SECTION

- Use sidewalks on both sides or increase the width on one side
- Include positive drainage design for this section

II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

- Lengthen and widen the bridge and eliminate the proposed 15 box culverts
- Use all drill shaft foundations

B. HEADER CURB

- Use curb and gutter

III. CONSTRUCTION TIME

A. LENGTH OF TIME

- Reduce the length of time to 24 months

IV. STAGE CONSTRUCTION

A. BOX CULVERTS

- Include in the staging plans

VI. EVALUATION PHASE

A. ALTERNATIVES

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

I. CONSTRUCTABILITY

A. DUAL TRUNK LINES

Value Engineering Alternative: ***Use a single trunk line.***

B. TYPICAL SECTION

Value Enhancement Alternative: ***Use sidewalks on both sides or increase the width on one side and include positive drainage design for this section.***

II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

Value Engineering Alternative Number 1: ***Lengthen and widen the bridge and eliminate the proposed 15 box culverts.***

Value Engineering Alternative Number 2: ***Use all drill shaft foundations.***

B. HEADER CURB

Value Engineering Alternative: ***Use curb and gutter.***

III. CONSTRUCTION TIME

A. LENGTH OF TIME

Value Engineering Alternative: ***Reduce the length of time to 24 months.***

IV. STAGE CONSTRUCTION

A. BOX CULVERTS

Value Engineering Alternative: ***Include in the staging plans.***

VI. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

A. DUAL TRUNK LINES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

B. TYPICAL SECTION

(1) AS PROPOSED
(2) VALUE ENHANCEMENT ALTERNATIVE

II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2

B. HEADER CURB

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

III. CONSTRUCTION TIME

A. LENGTH OF TIME

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

IV. STAGE CONSTRUCTION

A. BOX CULVERTS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

V. DESIGN COMMENTS

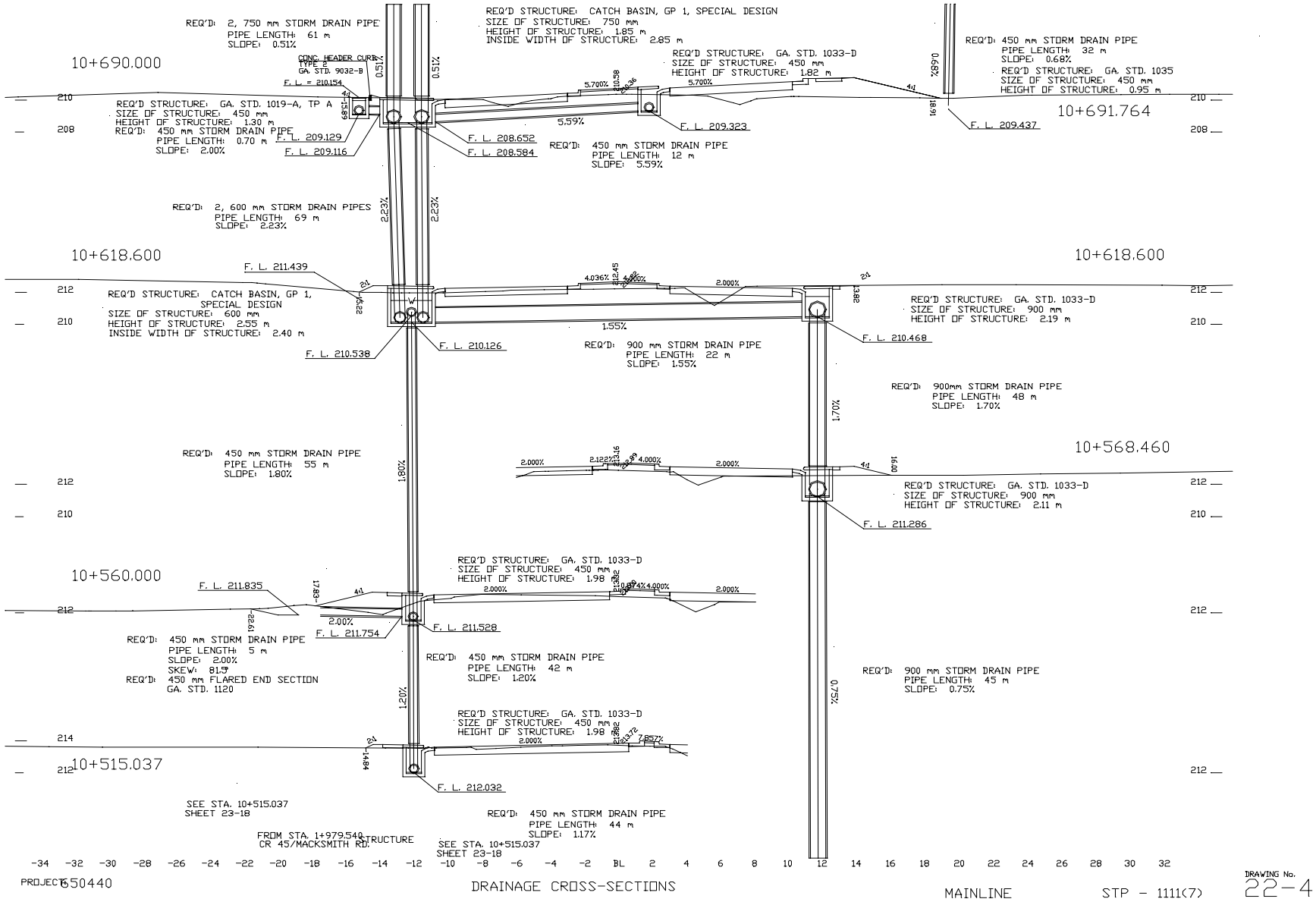
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

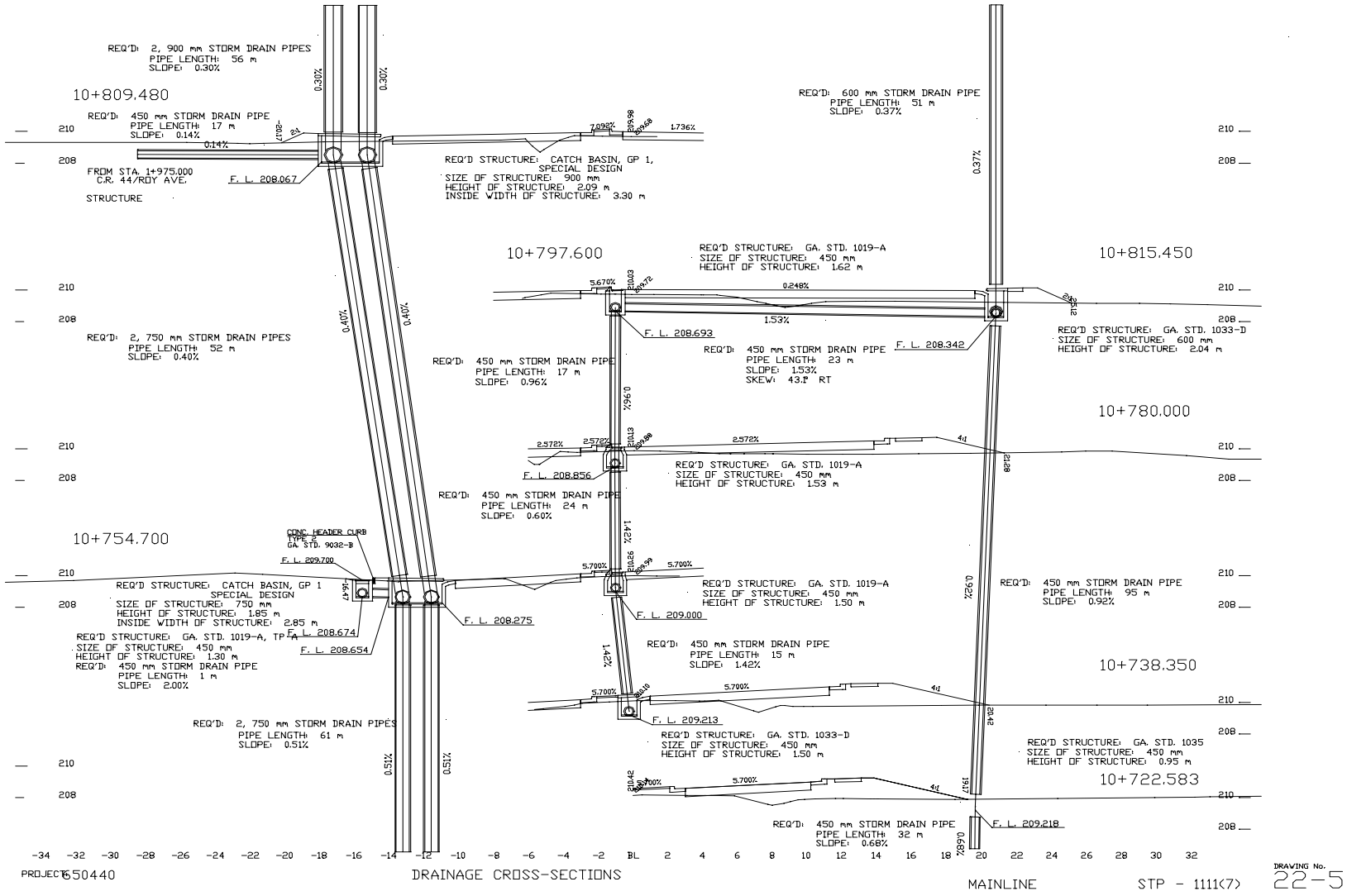
A, DUAL TRUNK LINES

1. "As Proposed"

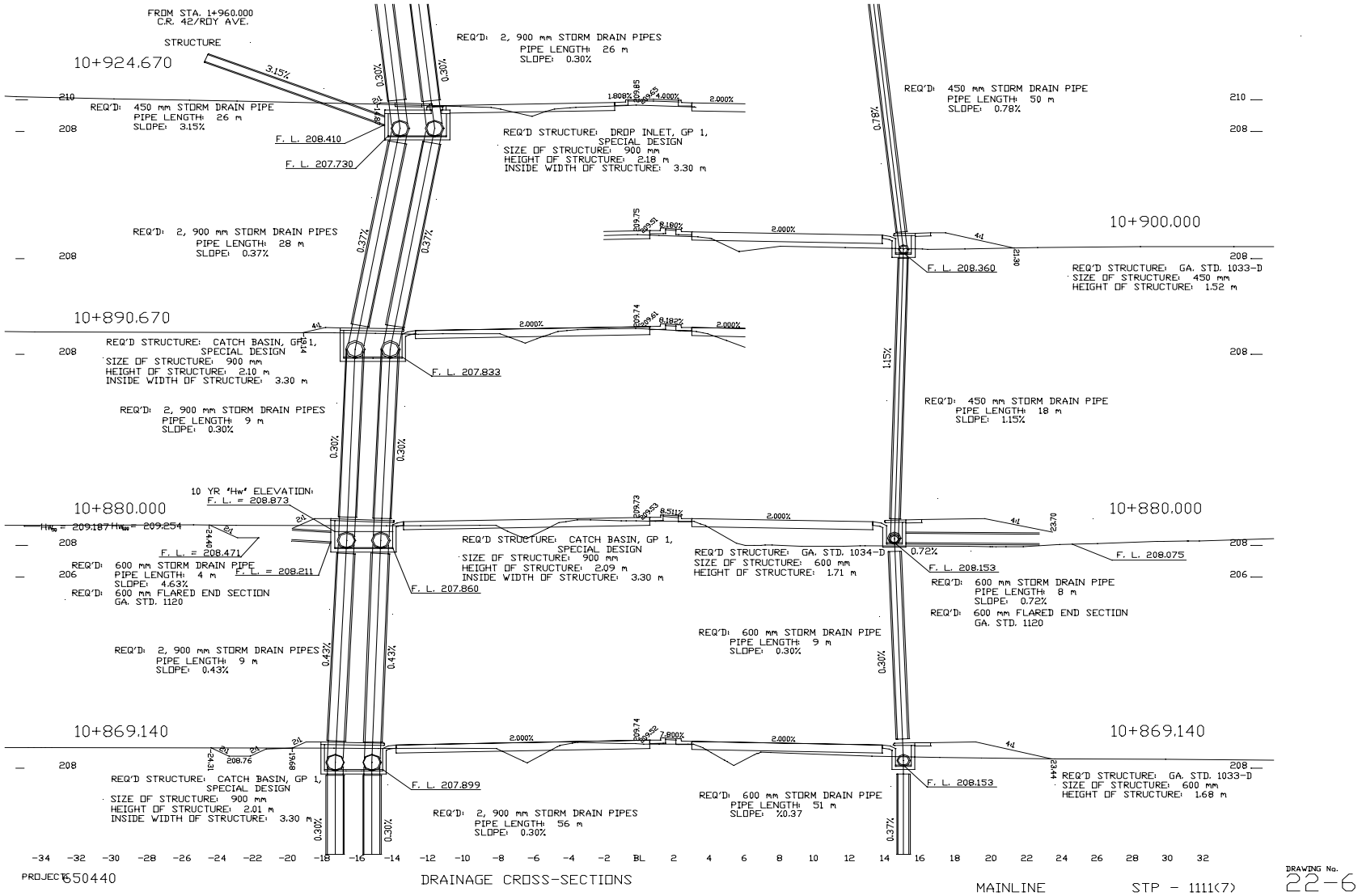
The proposed drainage system for the project contains a dual trunk line from STA. 10+618 to the west concrete box culvert at approximately STA. 11+641. The dual trunk line out falls in the west box of the box culvert.



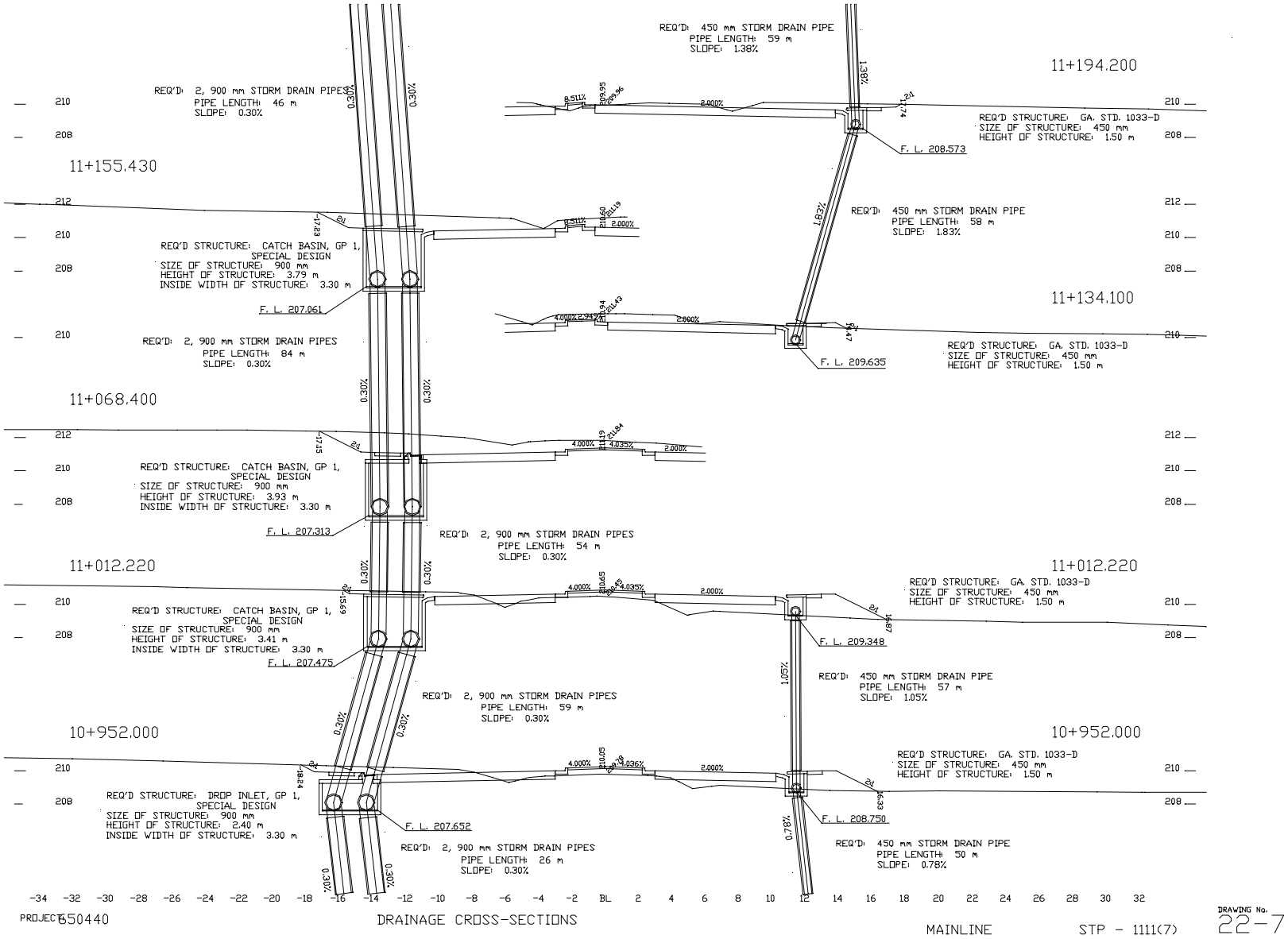
AS PROPOSED DUAL TRUNK LINE



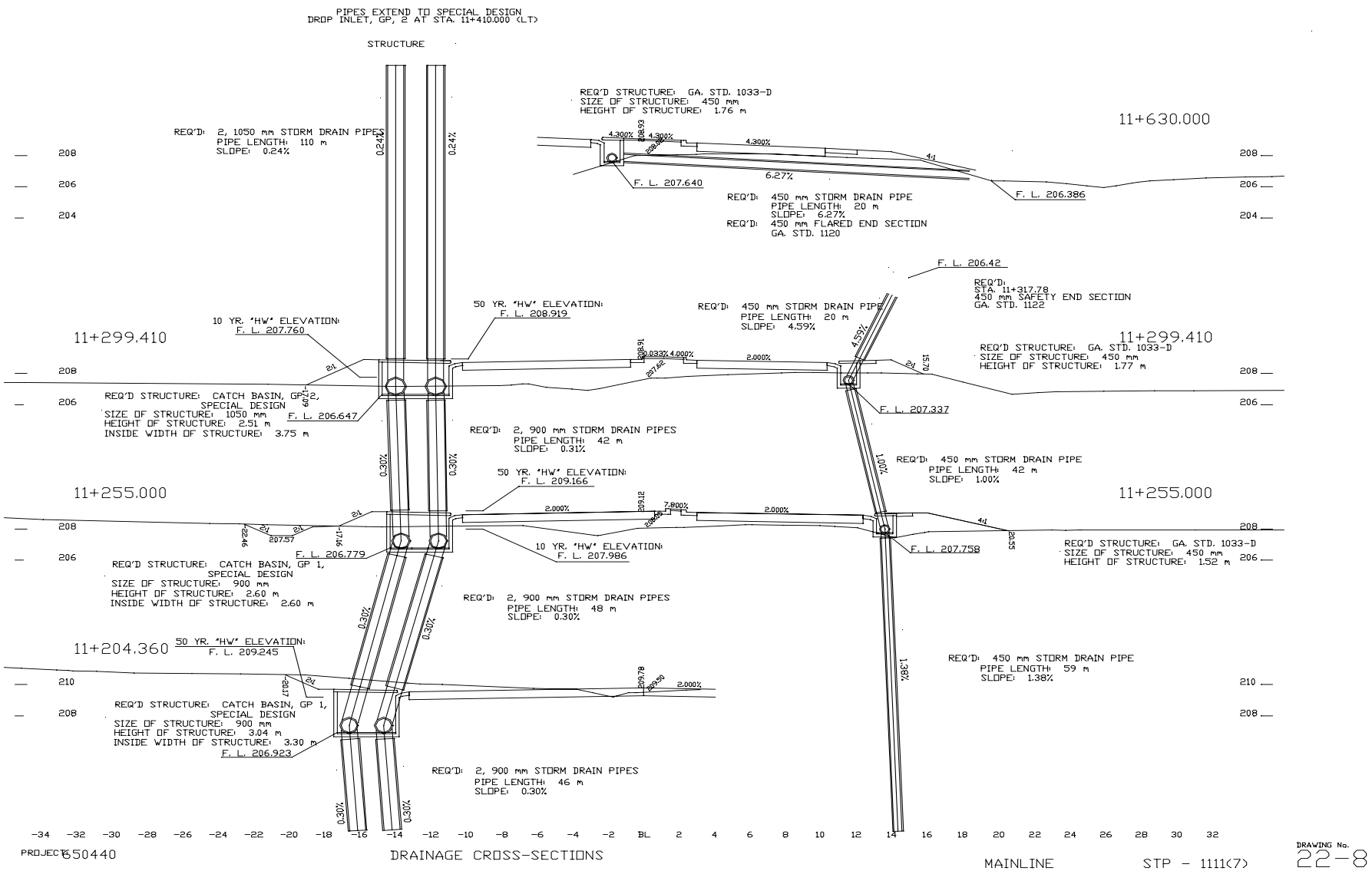
AS PROPOSED DUAL TRUNK LINE



AS PROPOSED DUAL TRUNK LINE



AS PROPOSED DUAL TRUNK LINE



AS PROPOSED DUAL TRUNK LINE

VII. DEVELOPMENT PHASE

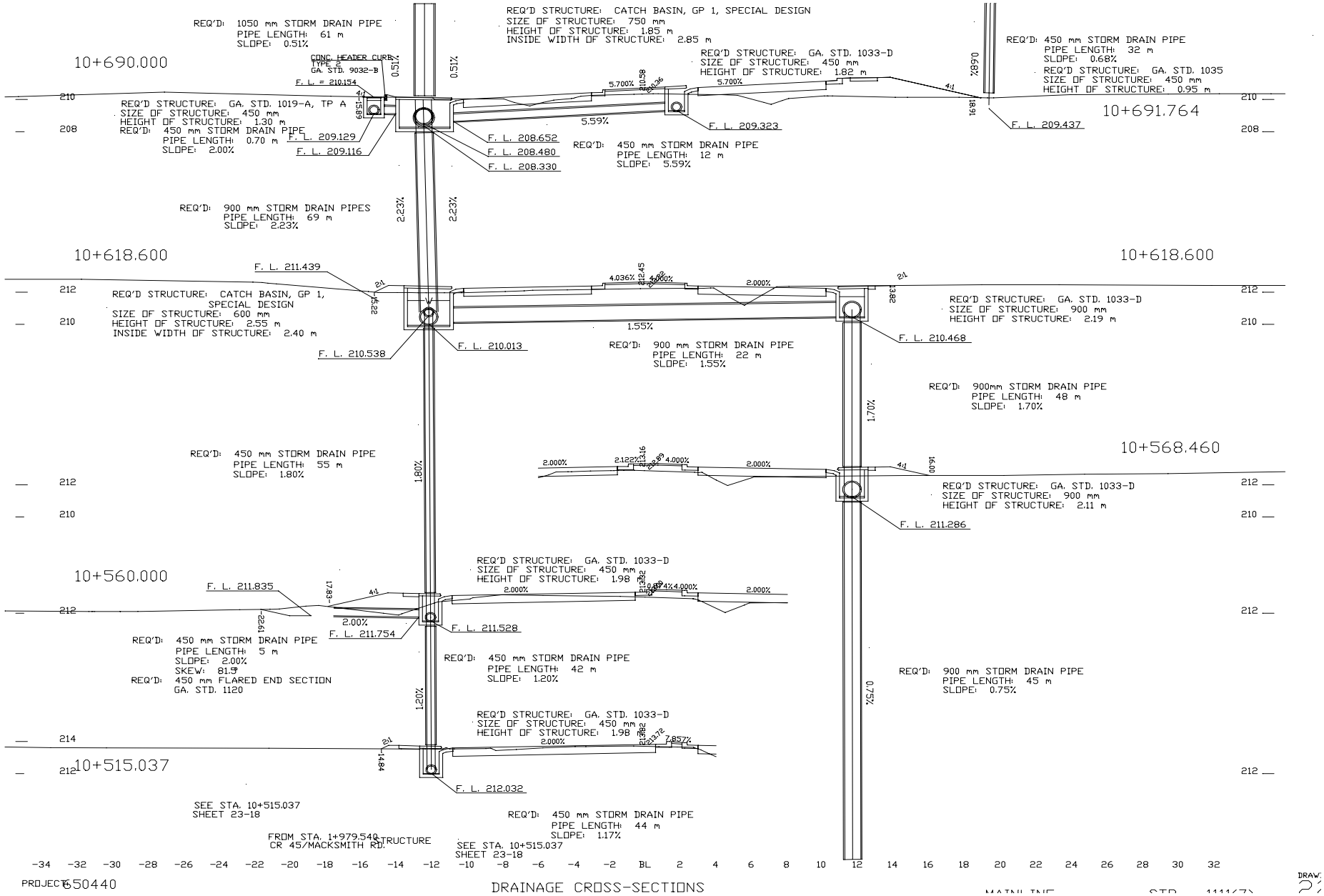
I. CONSTRUCTABILITY

A. DUAL TRUNK LINES

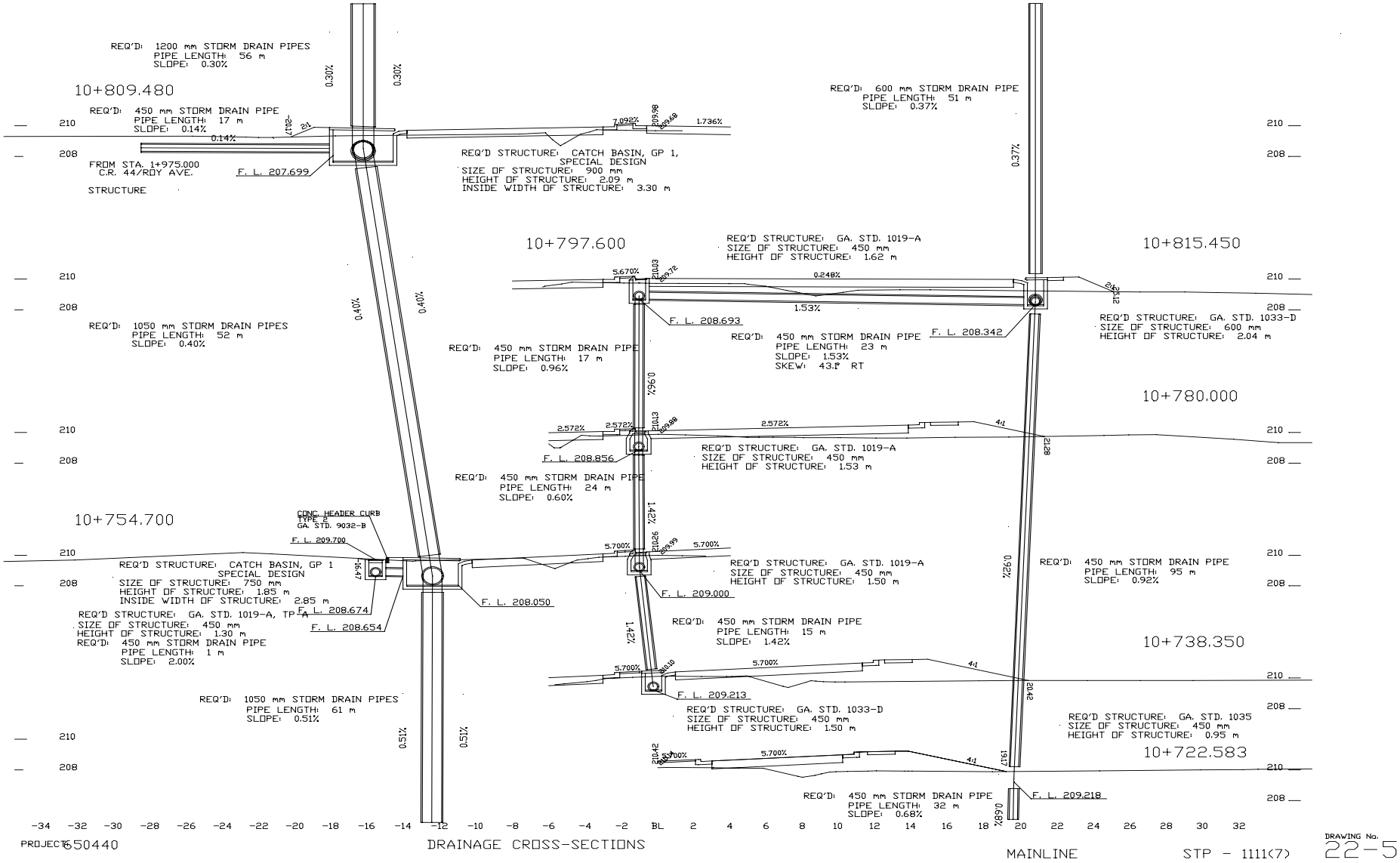
2. Value Engineering Alternative

The Value Engineering Team recommends converting the Dual Trunk Line to a Single Trunk Line. Increasing the pipe size by 300 mm equals approximately the same cross sectional area of dual pipes. A single pipe also provides better hydraulic characteristics by reducing the number of joints and reducing the wetted area of the pipe; which is where the majority of friction losses occur. The disadvantages of increasing the diameter of the pipe is that the inverts of the pipe, as well as the inverts of the boxes are lowered approximately 300 mm to keep the top of the pipe at the same elevation.

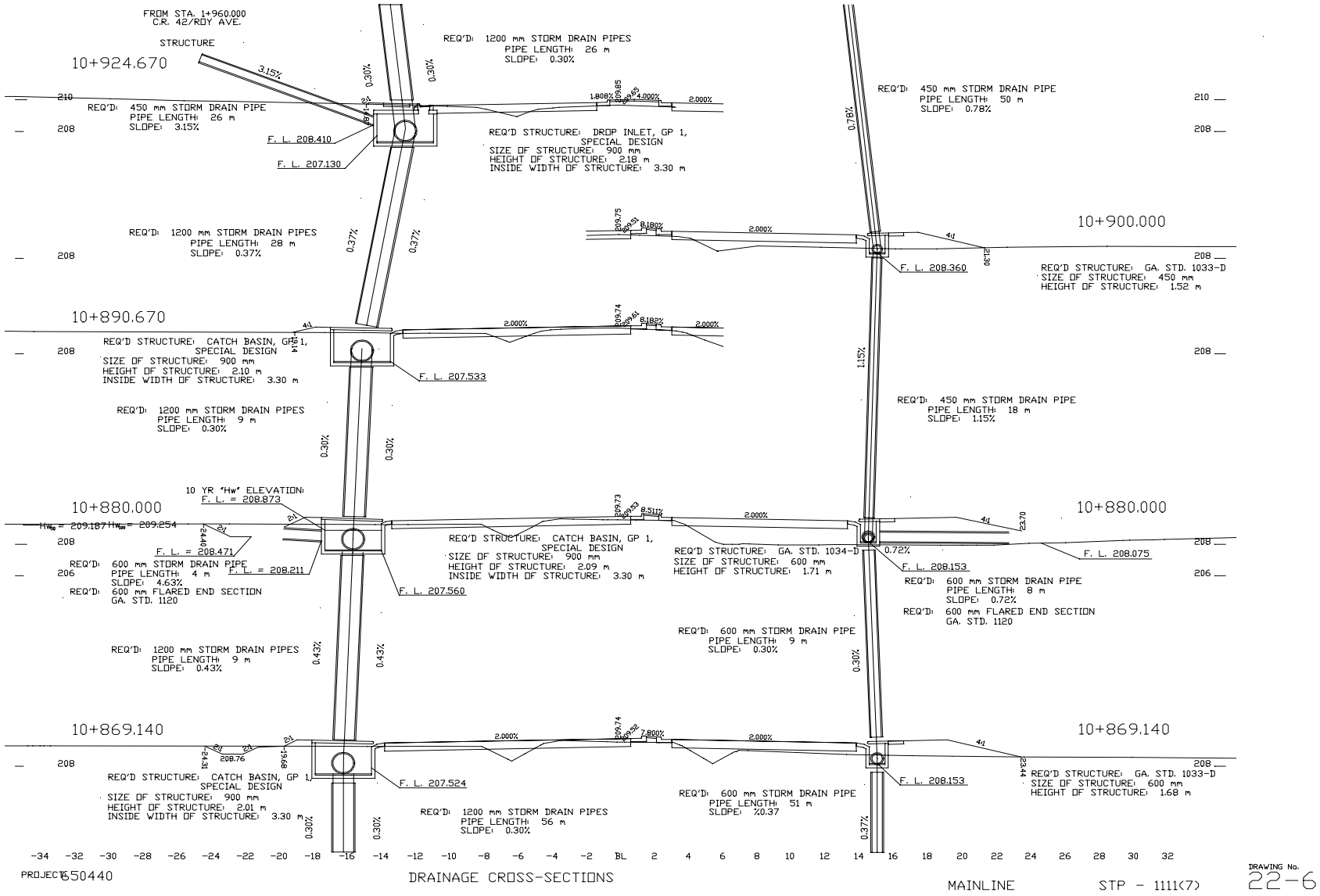
The Value Engineering Team felt that another disadvantage was that it would impact the structural integrity of the box culvert and its flow characteristics by connecting the dual 1,050 mm pipes into its wall. We therefore added another structure to divert the storm water to the left side of the roadway and into the flood plain adjacent to the box culvert. We also took the liberty of connecting boxes from the right side of the roadway to the trunk line instead of channeling the storm water into the up stream side of the bridge.



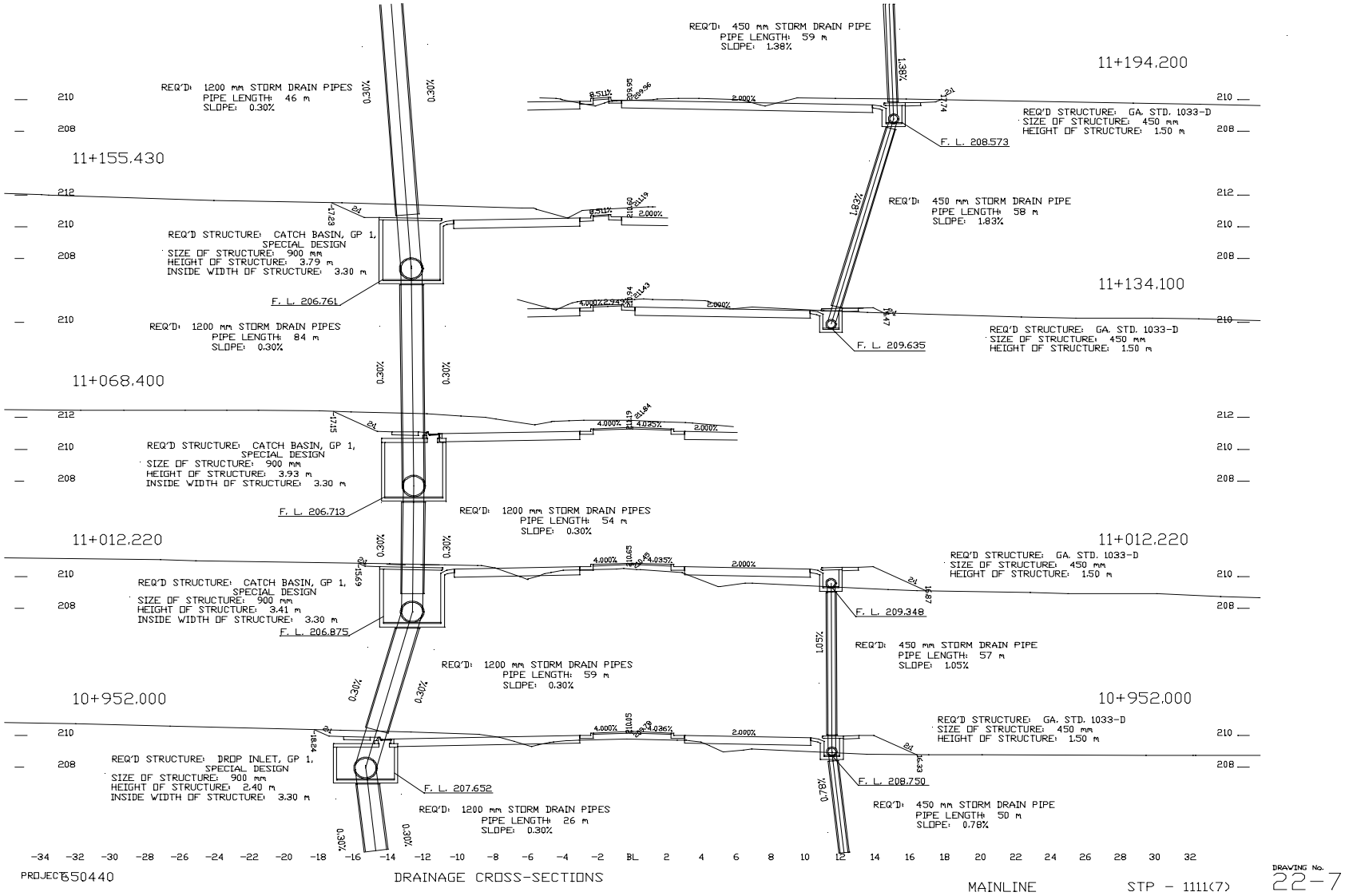
VALUE ENGINEERING ALTERNATIVE TRUNK LINE



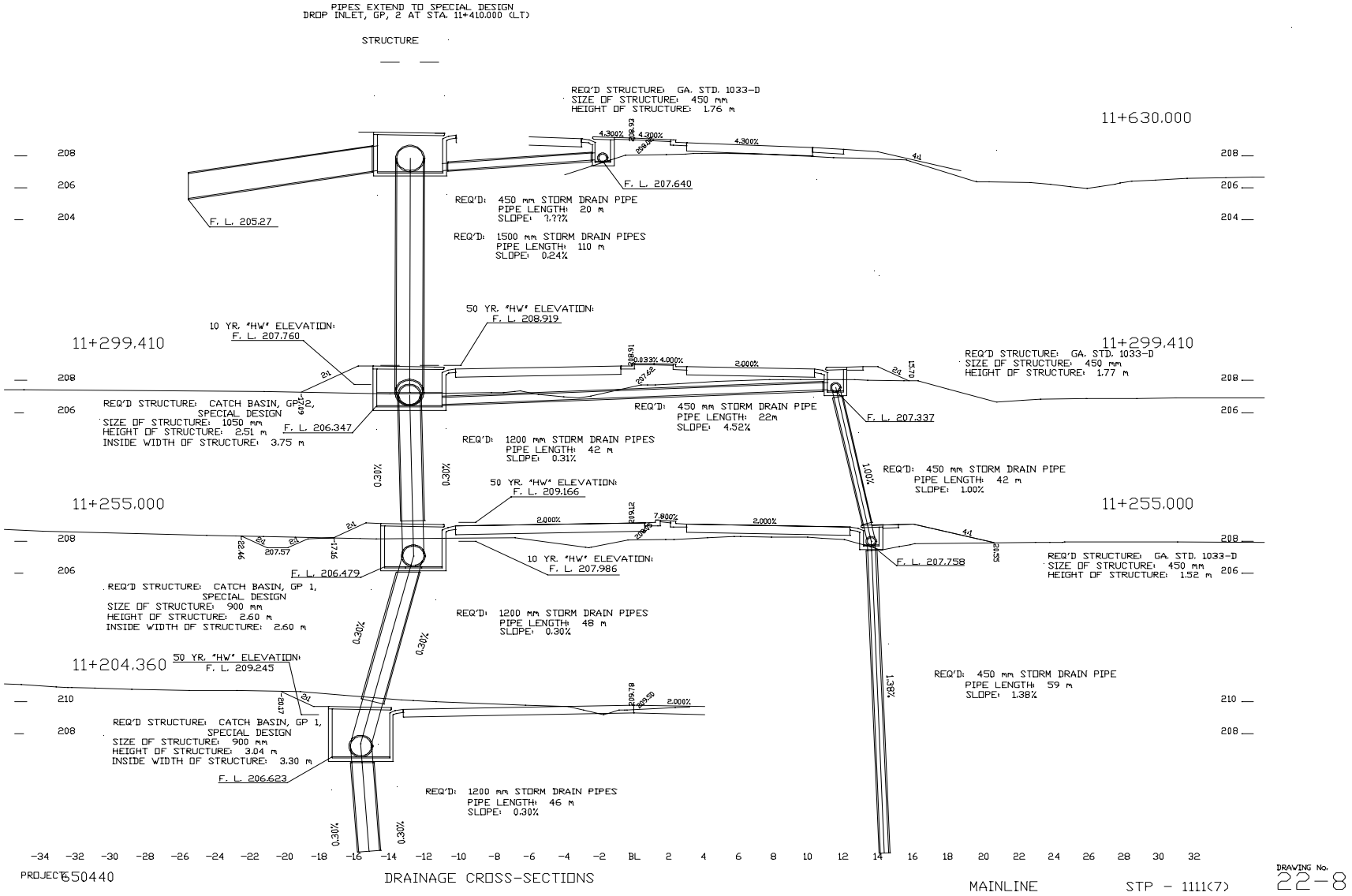
VALUE ENGINEERING ALTERNATIVE TRUNK LINE



VALUE ENGINEERING ALTERNATIVE TRUNK LINE



VALUE ENGINEERING ALTERNATIVE TRUNK LINE



VALUE ENGINEERING ALTERNATIVE TRUNK LINE

DUAL TRUNK LINES VALUE ENGINEERING ALTERNATIVE COST COMPARISON SHEET						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
450mm DRAINAGE PIPE	M	$94.44	41.0	$3,872	38.0	$3,589
600 mm DRAINAGE PIPE	M	$125.67	138.0	$17,342	0.0	$0
750 mm DRAINAGE PIPE	M	$153.22	226.0	$34,628	0.0	$0
900 mm DRAINAGE PIPE	M	$193.00	922.0	$177,946	69.0	$13,317
1050 mm DRAINAGE PIPE	M	$222.13	682.6	$151,626	113.0	$25,101
1200 mm DRAINAGE PIPE	M	$269.38	0.0	$0	461.0	$124,184
1500 mm DRAINAGE PIPE	M	$485.17	0.0	$0	100.0	$48,517
SAFETY END SECTION 450 mm	EA	$578.61	1.0	$579	0.0	$0
450 mm FLARED END SECTION	EA	$382.09	1.0	$382	0.0	$0
CATCH BASIN, GP 1, SPCL DESIGN	EA	$1,800.00	3.0	$5,400	0.0	$0
CATCH BASIN, GP 1, ADDL DEPTH, SPCL DESIGN	M	$665.68	1.4	$932	0.0	$0
DROP INLET, GP 2, SPCL DES	EA	$1,748.00	3.0	$5,244	3.0	$5,244
DROP INLET, GP 2, ADDL DEPTH, SPCL DES	M	$700.00	2.5	$1,750	3.4	$2,380
CATCH BASIN, GP 2, SPCL DESIGN	EA	$1,800.00	9.0	$16,200	13.0	$23,400
CATCH BASIN, GP 2, ADDL DEPTH, SPCL DESIGN	M	$665.68	5.6	$3,728	10.9	$7,256
HEAD WALL 1500 mm	EA	$2,500.00	0.0	$0	1.0	$2,500
SUBTOTAL				**$419,629**		**$255,488**

Continued

DUAL TRUNK LINES
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET (continued)

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
SUBTOTAL				**$419,629**		**$255,488**
INFLATIONS			**5.0%**	$20,981	**5.0%**	$12,774
TRAFFIC CONTROL/MOT			**2.8%**	$11,750	**2.8%**	$7,154
CONTINGENCY			**10.0%**	$41,963	**10.0%**	$25,549
GRAND TOTAL				**$494,323**		**$300,965**

POSSIBLE SAVINGS: $193,358

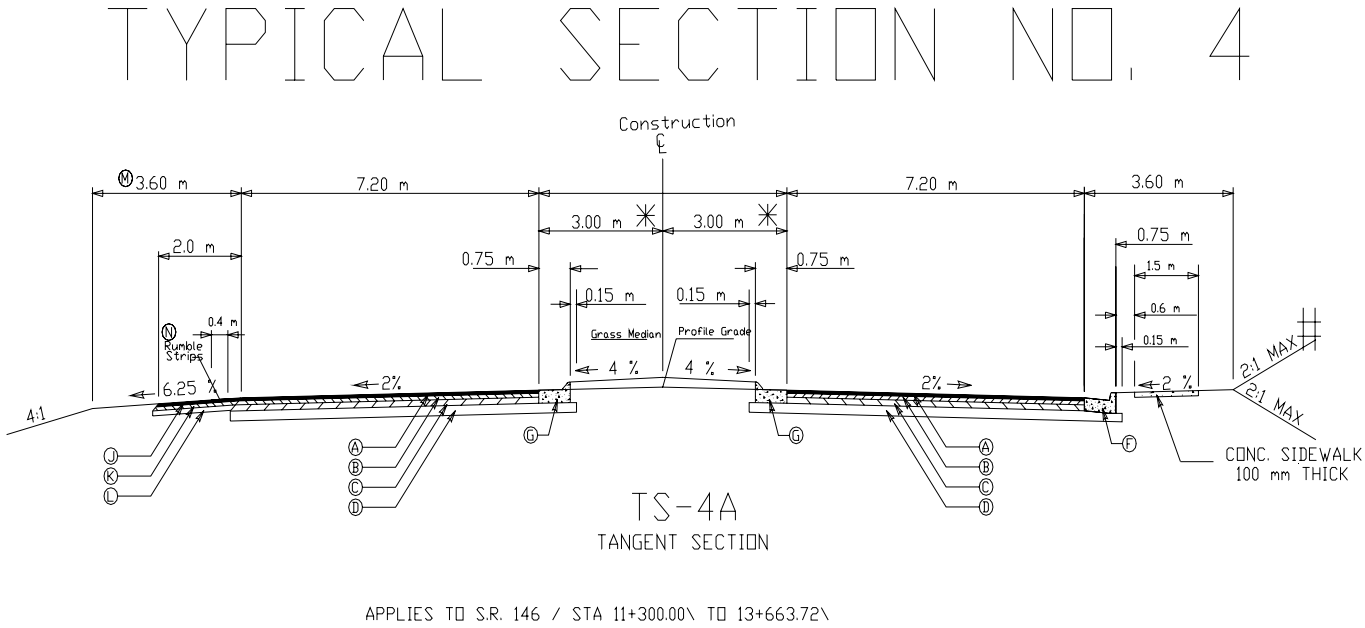
VII. DEVELOPMENT PHASE

I. CONSTRUCTABILITY

B. TYPICAL SECTION

1. "As Proposed"

The proposed Typical Section for this project is an urban typical from the beginning of the project to STA. 11+300 where it transitions into an urban/rural typical. This urban/rural typical consists of an outside shoulder and curb and gutter in the median and the right side is curb and gutter with a 1.5 M sidewalk. Most of the development is on the right side of the roadway except for a mall on the left side at STA. 13+100.



AS PROPOSED URBAN/RURAL TYPICAL SECTION

VII. DEVELOPMENT PHASE

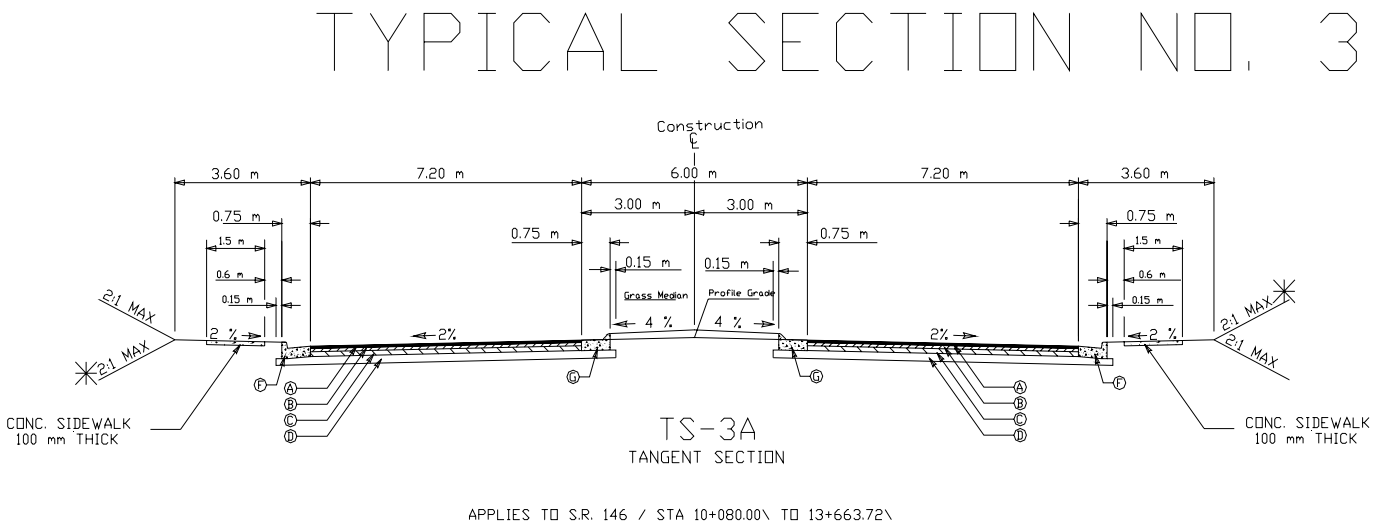
I. CONSTRUCTABILITY

B. TYPICAL SECTION

2. Value Enhancement Alternative

According to the *AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities*, "Sidewalks should connect to street systems and destinations in a safe and convenient manner. Where sidewalks are provided on only one side of a roadway, the overall connectivity of the sidewalk is weakened, as well as pedestrian safety and accessibility. Sidewalks provided on only one side of the street often require pedestrians to cross streets unnecessarily to meet their travel needs. As a result, the level of exposure of pedestrians to potential conflicts is increased. Therefore, sidewalks on only one side of the street are not generally recommended. However, a sidewalk on one side of the street may be appropriate where only that side of the street is developed. A sidewalk on one side of the street may also be adequate for some local streets on an interim basis, especially when this improves a condition where there were no sidewalks previously."

In view of the above guide, the Value Engineering Team recommends constructing the urban typical section for the entire project, as shown below:



VE ALTERNATIVE TYPICAL SECTION

In addition to adding the sidewalk and curb and gutter to the right side of the roadway, a closed drainage system will have to be added. The review of the plans also indicated that there was no proposed closed drainage system designed for the right side of the roadway, which is added to the Value Enhancement Alternative.

TYPICAL SECTION
VALUE ENHANCEMENT ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
SIDEWALK	SM	$24.86	0.0	$0	2932.5	$72,902
CURB & GUTTER	M	$33.95	0.0	$0	1955.0	$66,372
PAVEMENT	SM	$9.17	3910.0	$35,855	0.0	$0
450mm DRAINAGE PIPE	M	$94.44		$0	180.0	$16,999
CATCH BASIN, GP 1	EA	$1,868.02		$0	18.0	$33,624
SUBTOTAL				**$35,855**		**$189,898**
INFLATIONS			**5.0%**	$1,972	**5.0%**	$10,444
TRAFFIC CONTROL/MOT			**2.8%**	$1,004	**2.8%**	$5,317
CONTINGENCY			**10.0%**	$3,585	**10.0%**	$18,990
GRAND TOTAL				**$42,416**		**$224,649**

POSSIBLE COST INCREASE **$182,233**

VII. DEVELOPMENT PHASE

II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

1. "As Proposed"

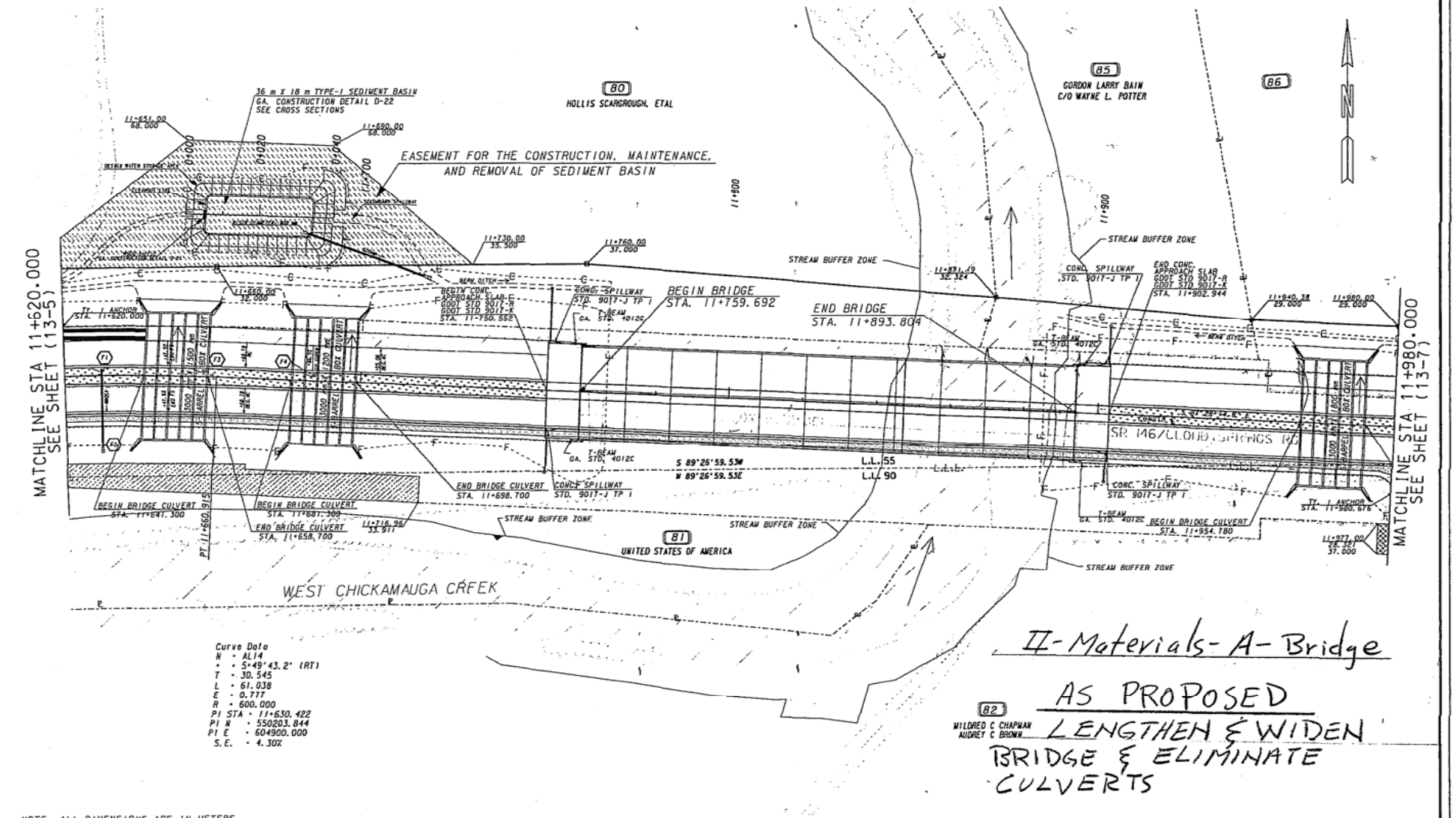
The as-proposed design consists of a new 11 span bridge, and 3 groups of triple-double box culverts. Each span is 12,192 mm long, and the total bridge length is 134,112 mm. The triple-double groups are: 5@ 3,000 mm x 1,500 mm, 5@ 3,000 mm x 1,200 mm, and 5@ 3,000 mm x 1,800 mm The combined overflow opening provided by the triple-double box culverts is 67.5 sm.

The new bridge parallels the existing bridge and is composed of a 6-T-beam superstructure 13,200 mm wide. The superstructure is supported on 2-column bents.

There are 5 bents founded on 1,200 mm drilled shafts, and 5 bents founded on spread footings.

There are 2 groups of triple-double box culverts west of the bridge and 1 group east of the bridge. The triple-double box culverts were added in this Contract as overflow structures because the existing bridge has an insufficient waterway opening.

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP-1111(7)	44	



II-Materials-A-Bridge

AS PROPOSED

LENGTHEN & WIDEN BRIDGE & ELIMINATE CULVERTS

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

PROPERTY AND EXISTING R/W LINE	
REQUIRED R/W LINE	
CONSTRUCTION LIMITS	
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	
EASEMENT FOR CONSTR OF SLOPES	
EASEMENT FOR CONSTR OF DRIVES	
BEGIN LIMIT OF ACCESS	BLA
END LIMIT OF ACCESS	ELA
LIMIT OF ACCESS	
R/W AND LIMIT OF ACCESS	

RATIO = 1:500

0 10 20 40

SCALE IN METERS

DATE	REVISIONS	DATE	REVISIONS

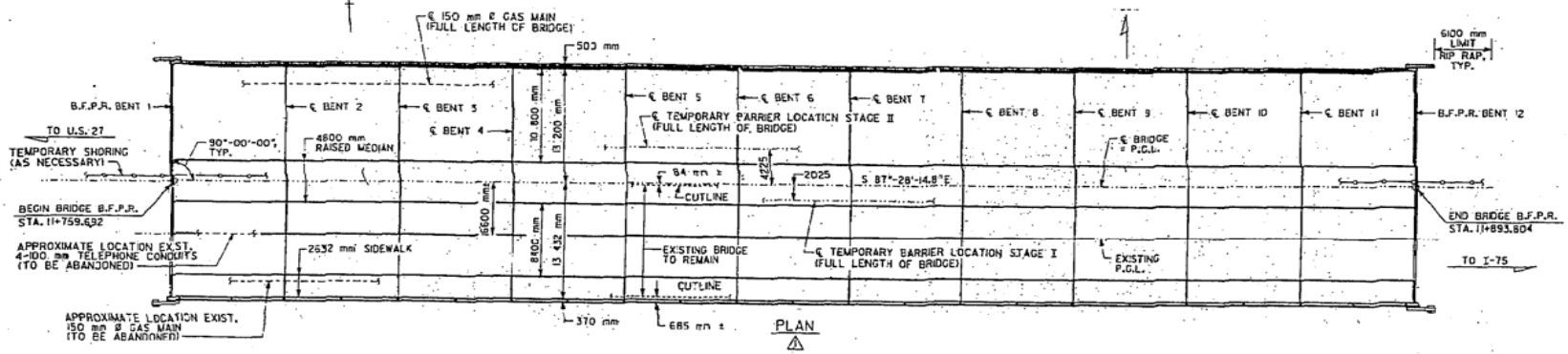
SEE GA. CONSTRUCTION DETAIL A-3

Type A Skewed Ramp Type B Type D

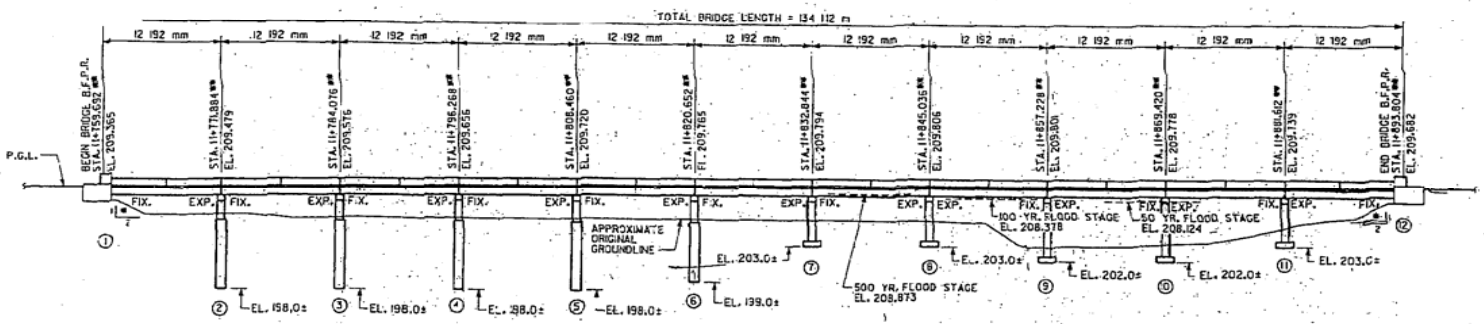
GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
PROJECT STP-1111(7)
COUNTY CATOOSA
DATE

DRAWING No. 13-6

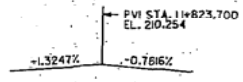
STATE	PROJECT NUMBER	SHEET NO.	DATE SHEET
GA.	STP-111(7)	421	



PLAN



ELEVATION



182.880 m V.C.

S.R. 146
VERTICAL CURVE DATA

NOTE: VERTICAL CURVE DATA TAKEN FROM EXISTING PLANS. DATA HAS BEEN ADJUSTED FOR BEARING PAD INSTALLATION AND HORIZONTAL SHIFT IN P.G.L.

NOTES: END BENT PILES NOT SHOWN.

HANDRAIL ON RIGHT SIDE OF BRIDGE NOT SHOWN. (SEE GA. STD. 3626 FOR DETAILS)

* - SLOPE NORMAL TO END BENT.

** - STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ℄ BENT.

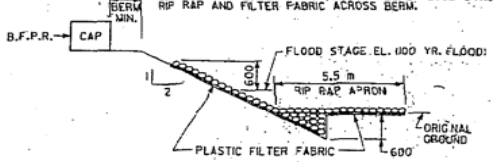
II-Materials-A-Bridge
AS PROPOSED
USE ALL DRILLED SHAFTS

CONSTRUCTION SEQUENCE

1. PLACE TEMPORARY BARRIERS AT LOCATION 1, MAINTAINING 2 - 3.6 m TRAFFIC LANES ON EXISTING BRIDGE.
2. REMOVE EXISTING BARRIER, WINGWALLS AND ENDPOST. (LEFT SIDE OF EXISTING BRIDGE)
3. BUILD STAGE I ACCORDING TO PLANS.
4. RELOCATE TEMPORARY BARRIERS TO LOCATION 2, MAINTAINING 2 - 3.6 m TRAFFIC LANES ON NEW SECTION OF BRIDGE.
5. JACK BRIDGE TO INSTALL BEARING PADS UNDER EXISTING T-BEAMS.
6. REMOVE EXISTING OVERHANG, BARRIER AND ENDPOST. (RIGHT SIDE OF EXISTING BRIDGE)
7. BUILD STAGE II ACCORDING TO PLANS (OVERLAY EXISTING BRIDGE DECK AND CONSTRUCT SIDEWALK AND RAISED MEDIAN).
8. REMOVE TEMPORARY BARRIER AND OPEN COMPLETED BRIDGE TO TRAFFIC.

THE AFOREMENTIONED SEQUENCE SHALL BE COORDINATED WITH ROADWAY OPERATIONS, SEE ROADWAY PLANS. IN LIEU OF THE ABOVE CONSTRUCTION SEQUENCE, THE CONTRACTOR MAY SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR APPROVAL.

PLACE RIP RAP AND FILTER FABRIC FROM 600 mm BELOW ORIGINAL GROUND TO 600 mm ABOVE FLOOD STAGE ELEVATION. EXTEND RIP RAP AND FILTER FABRIC 6 m BEYOND END OF WINGWALLS UNLESS OTHERWISE NOTED. WHERE BERM ELEVATION IS LOWER THAN 600 mm ABOVE FLOOD STAGE, EXTEND RIP RAP AND FILTER FABRIC ACROSS BERM.



RIP RAP DETAIL
NO SCALE

BRIDGE SERIAL NO. 047-0016-0
BRIDGE I.D. NO. 047-001460-003.31E
BRIDGE P.I. NO. 650440

BRIDGE NO. 1

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PLAN AND ELEVATION
S.R. 146 (CLOUD SPRINGS ROAD)
OVER WEST CHICKAMAUGA CREEK
CATOOSA COUNTY STP-111(7)

SCALE: 1:250 (UNLESS NOTED) AUGUST 2005

BY	REVISIONS	DATE
DOF	NOTES, DETAILS	3/17/06

BRIDGE SHEET 1 OF 13

DESIGNED DOF | CHECKED CLC | REVIEWED WMD/HST
DRAWN WMC | DESIGN GROUP SBR | APPROVED PVL

FILENAME: C650440BLDGN

VII. DEVELOPMENT PHASE

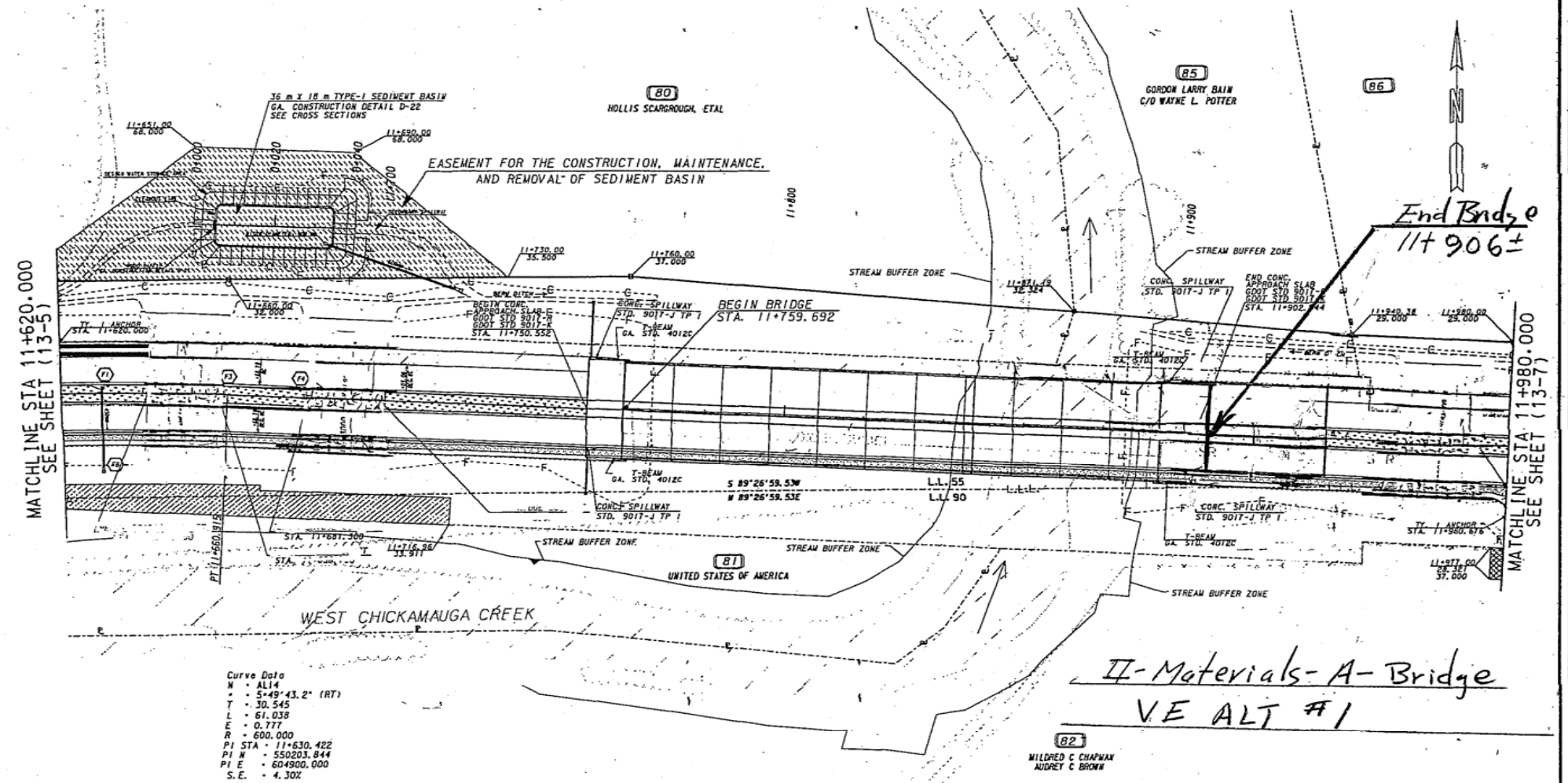
II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

2. Value Engineering Alternative Number 1

This Value Engineering Alternative consists of lengthening the proposed widened bridge to provide a larger waterway opening, so that the triple-double box culverts can be eliminated. The total opening provided by the 3 groups of triple-double box culverts is approximately 67.5 sm. By adding 1- 12,192 mm span to the east end of the bridge, about 40 sm of opening is made available to mitigate flooding. Lengthening the bridge provides a more efficient waterway opening than that provided by the triple-double box culverts. The constriction and friction of the culvert walls are removed. Also, by lengthening the bridge on the east end, the additional opening is adjacent to the main channel. Therefore, it is judged that the 40 sm opening under the bridge is equivalent to the 67.5 sm opening of the box culverts. In order to lengthen the existing bridge, the east end bent will have to be removed and replaced by an interior bent, and the existing embankment will have to be excavated.

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP-1111(7)	44	



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	R/W AND LIMIT OF ACCESS
EASEMENT FOR CONSTR OF SLOPES	
EASEMENT FOR CONSTR OF DRIVES	

RATIO = 1:500

0 10 20 40

SCALE IN METERS

DATE	REVISIONS	DATE	REVISIONS

SEE GA. CONSTRUCTION DETAIL A-3

Type A Skewed Ramp Type B Type D

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
PROJECT STP-1111(7)
COUNTY CATOOSA
DATE

DRAWING No. 13-6

A. BRIDGE OVER CHICKAMAUGA CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
134,112 mm Bridge	SM	$914.00	1770.0	$1,617,780		
Triple-Double Box Culverts	LS	$951,714.00	1.0	$951,714		
146,302 mm Bridge	SM	$914.00			1931.0	$1,764,934
Existing End Bent Removal	SM	$301.00			163.0	$49,063
Lengthen Existing Bridge	SM	$914.00			327.0	$298,878
Embankment Removal	CM	$32.00		$0	540.0	$17,280
SUBTOTAL				**$2,569,494**		**$2,130,155**
E&C			10.0%	$256,949	10.0%	$213,016
TRAFFIC CONTROL/MOT			2.8%	$71,946	2.8%	$59,644
INFLATION			5.0%	$128,475	5.0%	$106,508
GRAND TOTAL				**$3,026,864**		**$2,509,323**

POSSIBLE SAVINGS: $517,541

VII. DEVELOPMENT PHASE

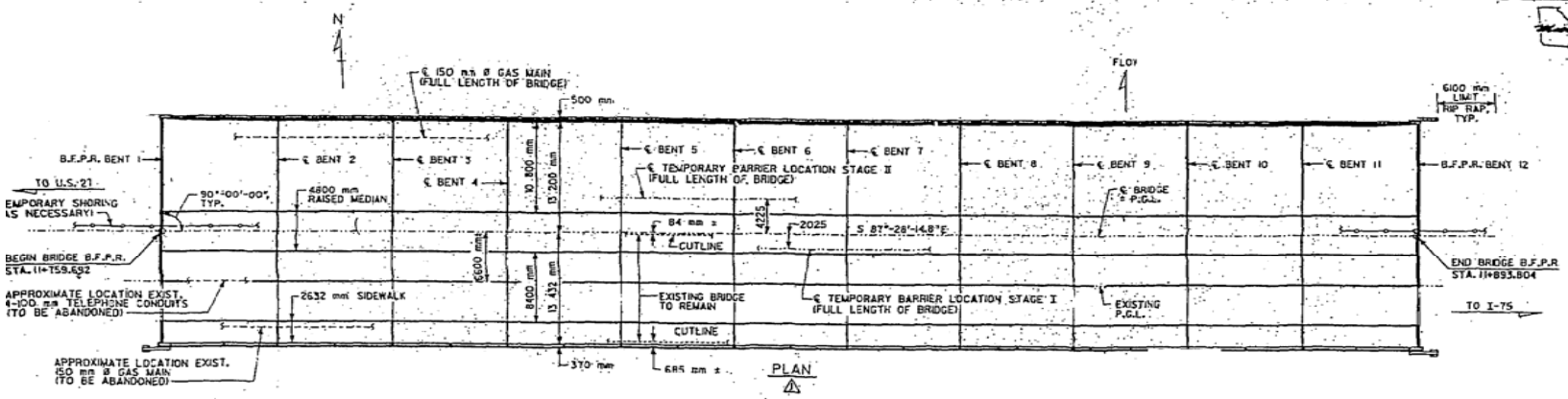
II. MATERIALS

A. BRIDGE OVER CHICKAMAUGA CREEK

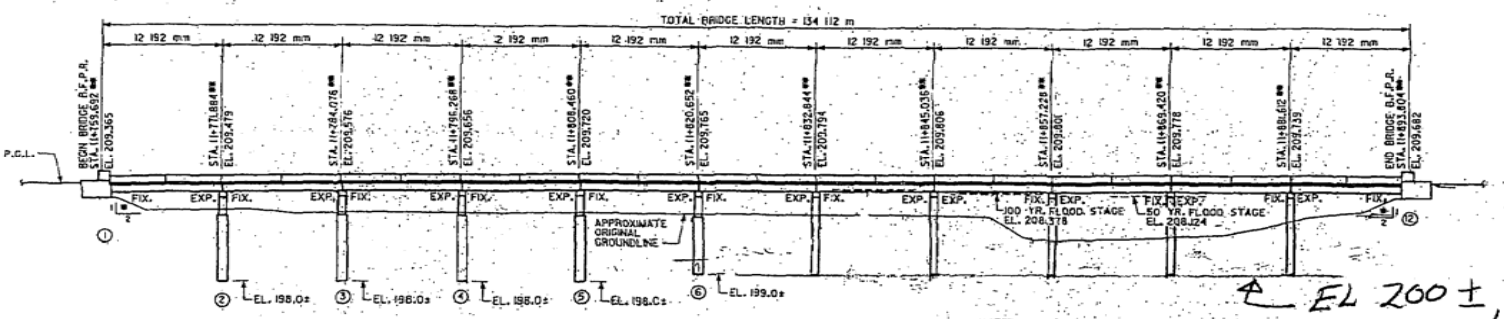
3. Value Engineering Alternative Number 2

This alternative consists of using drilled shafts to support all the interior bents. This entails eliminating the proposed footings and columns below ground and the required foundation excavation for the 5 proposed bents founded on spread footings. The shaft tip elevation for the value engineered drilled shafts is Elevation 200 +/-. This results in about two drilled shaft diameters (2,439 mm) being socketed into the rock, taking the bottom of footing elevation as the top of good rock. Two shaft diameters into good rock will provide sufficient lateral fixity, end bearing, and skin friction.

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP-1111(7)	421	



PLAN



ELEVATION

EL 200 ±

II Materials-A-Bridge
VE ALT #2
USE ALL DRILLED SHAFTS

NOTES: END BENT PILES NOT SHOWN.
HANDRAIL ON RIGHT SIDE OF BRIDGE NOT SHOWN. (SEE GA. STD. 3626 FOR DETAILS)
* - SLOPE NORMAL TO END BENT.
** - STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ℄ BENT.

CONSTRUCTION SEQUENCE

1. PLACE TEMPORARY BARRIERS AT LOCATION 1, MAINTAINING 2 - 3.6 m TRAFFIC LANES ON EXISTING BRIDGE.
2. REMOVE EXISTING BARRIER, WINGWALLS AND ENDPOST. (LEFT SIDE OF EXISTING BRIDGE).
3. BUILD STAGE I ACCORDING TO PLANS.
4. RELOCATE TEMPORARY BARRIERS TO LOCATION 2, MAINTAINING 2 - 3.6 m TRAFFIC LANES ON NEW SECTION OF BRIDGE.
5. JACK BRIDGE TO INSTALL BEARING PADS UNDER EXISTING T-BEAMS.
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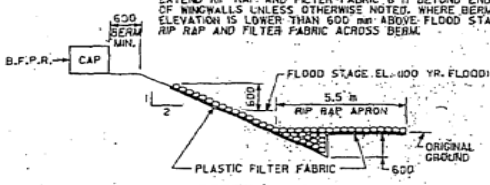


RIP RAP DETAIL
NO SCALE

BRIDGE SERIAL NO. 047-0015-0
BRIDGE I.D. NO. 047-00146D-003.31E
BRIDGE P.I. NO. 650440

BRIDGE NO. 1

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PLAN AND ELEVATION
S.R. 146 (CLOUD SPRINGS ROAD)
OVER WEST CHICKAMAUGA CREEK
CATOOSA COUNTY STP-1111(7)

SCALE: 1:250 (UNLESS NOTED) AUGUST 2005

BY	DATE	REVISIONS	DATE
		NOTES, DETAILS	3/7/06

BRIDGE SHEET 1 OF 13

DESIGNED DOF | CHECKED DLC | REVIEWED RMO/HST
DRAWN WJC | DESIGN GROUP SHR | APPROVED PVL

A. BRIDGE OVER CHICKAMAUGA CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
10 Spread Footings	CM	$1,176.00	22.0	$25,872		
10 Columns below Ground Line	CM	$1,176.00	10.0	$11,760		
Bents 7 & 8 Foundation Excavation	CM	$59.00	450.0	$26,550		
Bents 9, 10, & 11 Cofferdams	LS	$25,000.00	3.0	$75,000		
10 Drilled Shafts	LM	$3,198.00			38.0	$121,524
SUBTOTAL				**$139,182**		**$121,524**
E & C			10.0%	$13,918	10.0%	$12,152
TRAFFIC CONTROL/MOT			2.8%	$3,897	2.8%	$3,403
INFLATION			5.0%	$6,959	5.0%	$6,076
GRAND TOTAL				**$163,956**		**$143,155**

POSSIBLE SAVINGS: $20,801

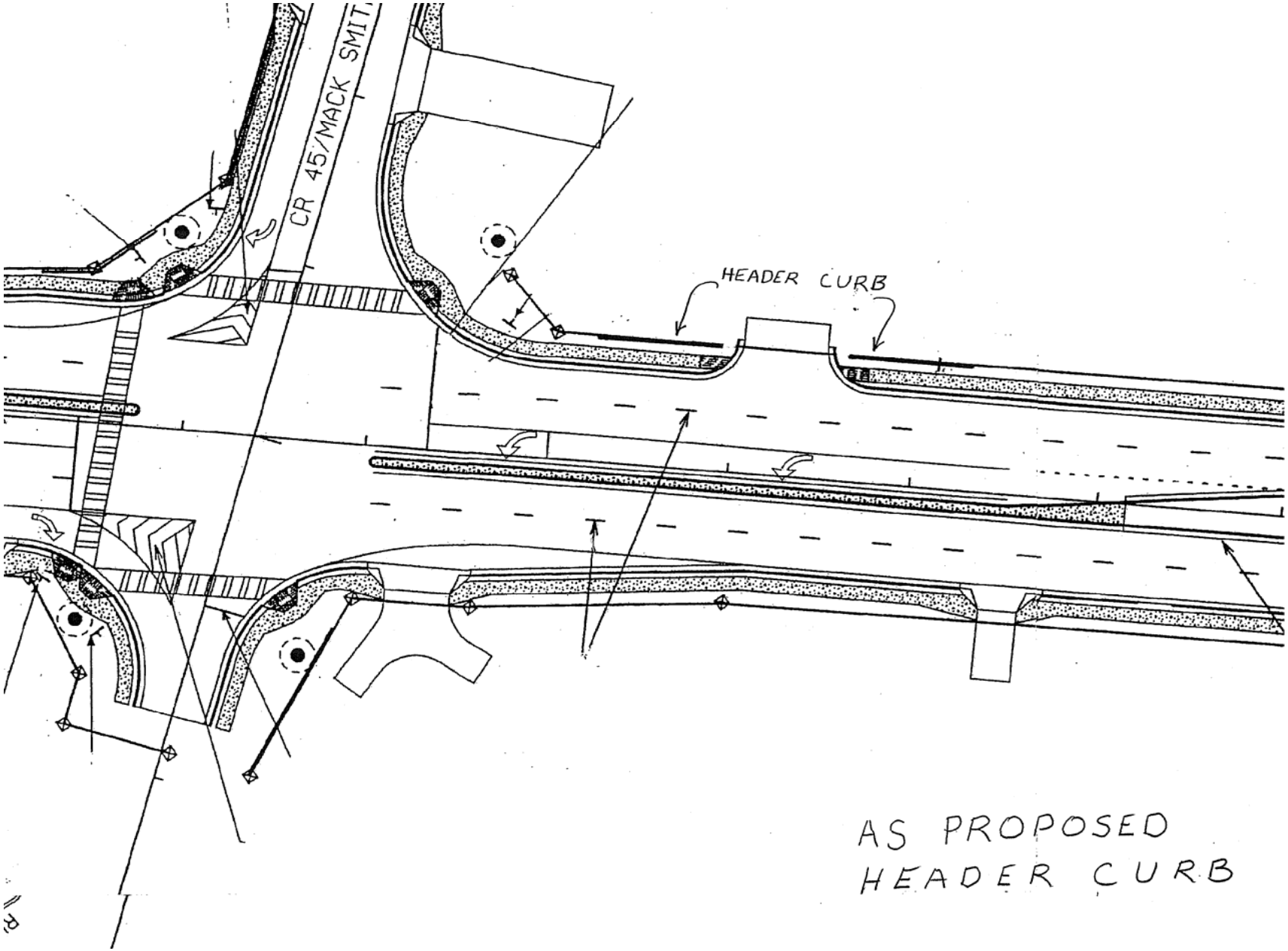
VII. DEVELOPMENT PHASE

II. MATERIALS

B. HEADER CURB

1. "As Proposed"

The study project is primarily in an urban setting with curb and gutter along the roadway. The proposed design is to place header curb along portions of the project for right-of-way and slope control. Three types (150 mm, 200 mm, and 250 mm) are proposed.


CR 45/MACK SMIT
HEADER CURB
AS PROPOSED
HEADER CURB

VII. DEVELOPMENT PHASE

II. MATERIALS

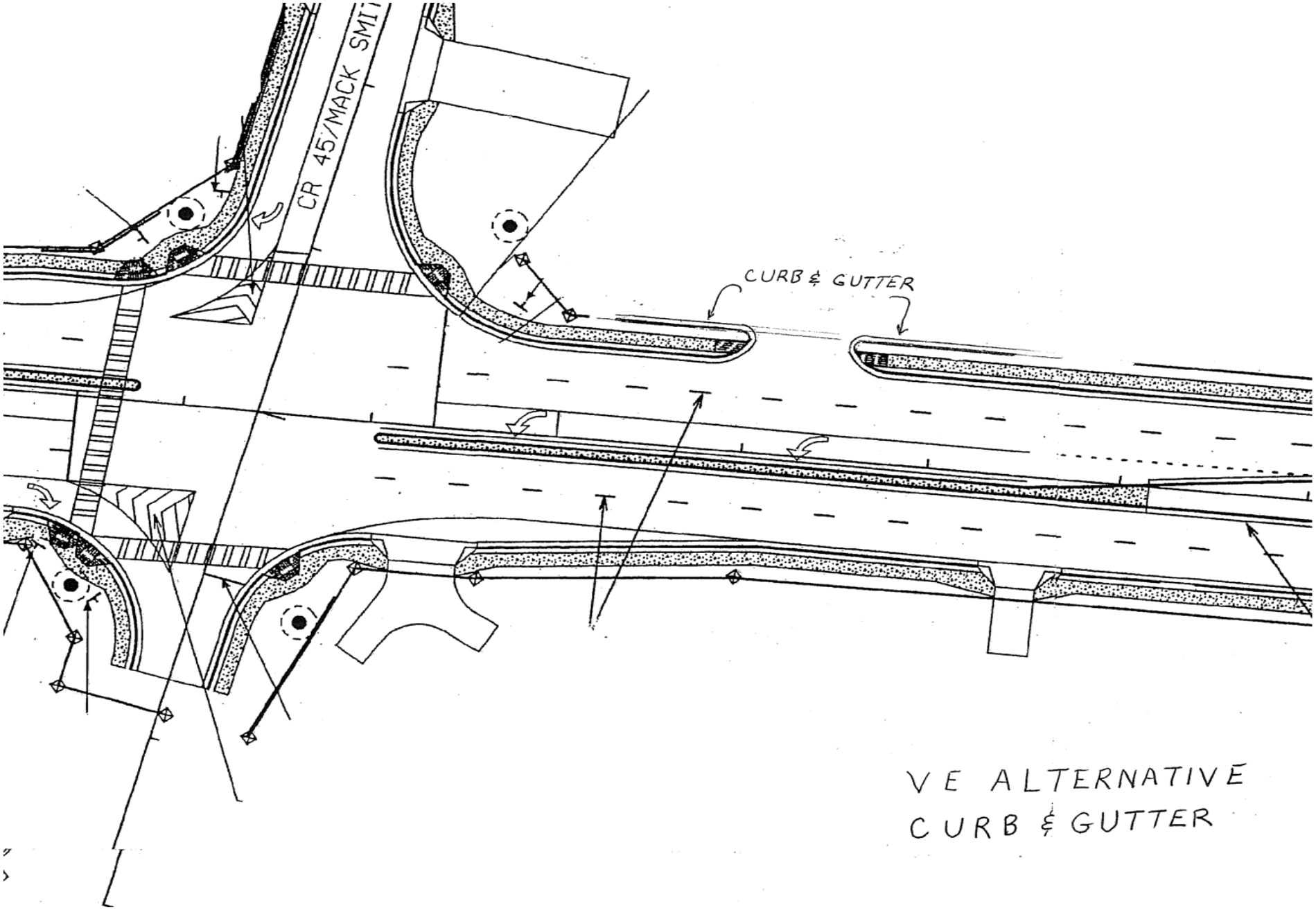
B. HEADER CURB

2. Value Engineering Alternative

It is the recommendation of the value engineering study team that the header curb be replaced with concrete curb and gutter, 200 mm X 750 mm, Type 2. In the "As Proposed" sketch, there is a gap between the curb and gutter used along the roadway and the header curb at the right-of-way line. This will introduce a drainage problem that shouldn't be there if the curbing is continuous.

Changing from curb and gutter to header curb will make construction more difficult and time-consuming by the contractor having to change methods of construction. Curb and gutter is easily placed by machine while header curb more often has to be formed and then poured. There is a short section of 250 mm header curb in the proposed project, but the slope can be steepened by 50 mm without any difficulty.

Additionally, the cost of curb and gutter is less than header curb.



VE ALTERNATIVE
CURB & GUTTER

B. HEADER CURB
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CONCRETE HEADER CURB, 150 MM, TP 2	LM1	$40.73	932.0	$37,960	0.0	$0
CONCRETE HEADER CURB, 200 MM, TP 3	LM1	$48.96	7.0	$343	0.0	$0
CONCRETE HEADER CURB, 250 MM, TP 4	LM1	$50.00	85.0	$4,250	0.0	$0
CONCRETE CURB & GUTTER, 200 MM X 750 MM, TP 2	LM1	$33.95	2735.0	$92,853	3759.0	$127,618
SUBTOTAL				**$135,406**		**$127,618**
INFLATION			5.0%	$7,447	5.0%	$7,019
TRAFFIC CONTROL/MOT			2.8%	$3,791	2.8%	$3,573
CONTINGENCY			10.0%	$13,541	10.0%	$12,762
GRAND TOTAL				**$160,186**		**$150,972**

POSSIBLE SAVINGS: $9,214

VII. DEVELOPMENT PHASE

III. CONSTRUCTION TIME

A. LENGTH OF TIME

1. "As Proposed"

A construction time of 30 months was proposed by the design team at the briefing for this project.

VII. DEVELOPMENT PHASE

III. CONSTRUCTION TIME

A. LENGTH OF TIME

2. Value Engineering Alternative

During the discussion of the construction of this project it was felt that the drainage and bridge construction would be the controlling factors for this project. The drainage, particularly the culverts, should take no more than 9 months to complete each stage. Each bridge should take no longer than 10 months. Therefore, it is the recommendation of the study team that the overall time allowed for the construction of this project should be 24 months.

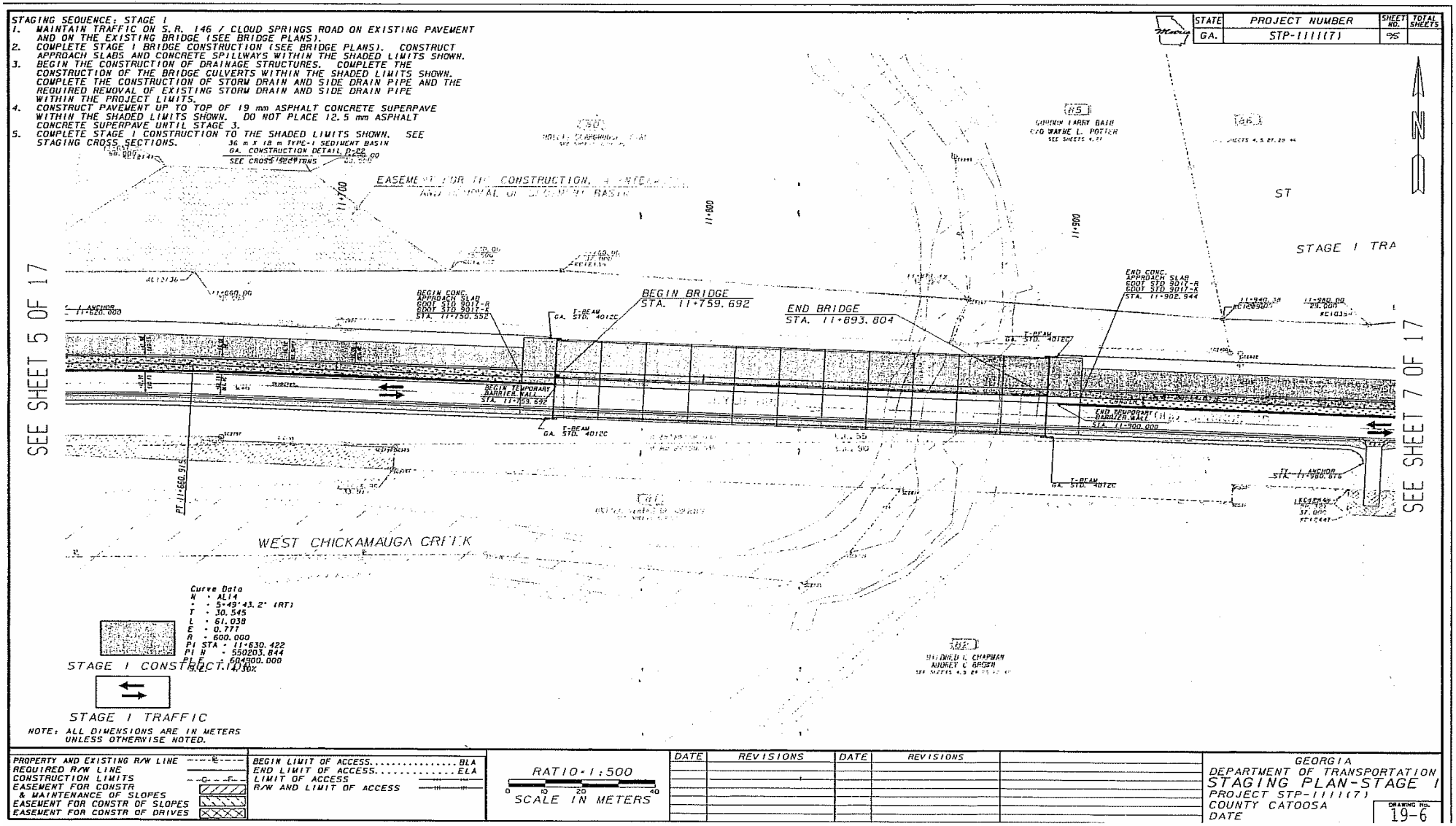
VII. DEVELOPMENT PHASE

IV. STAGE CONSTRUCTION

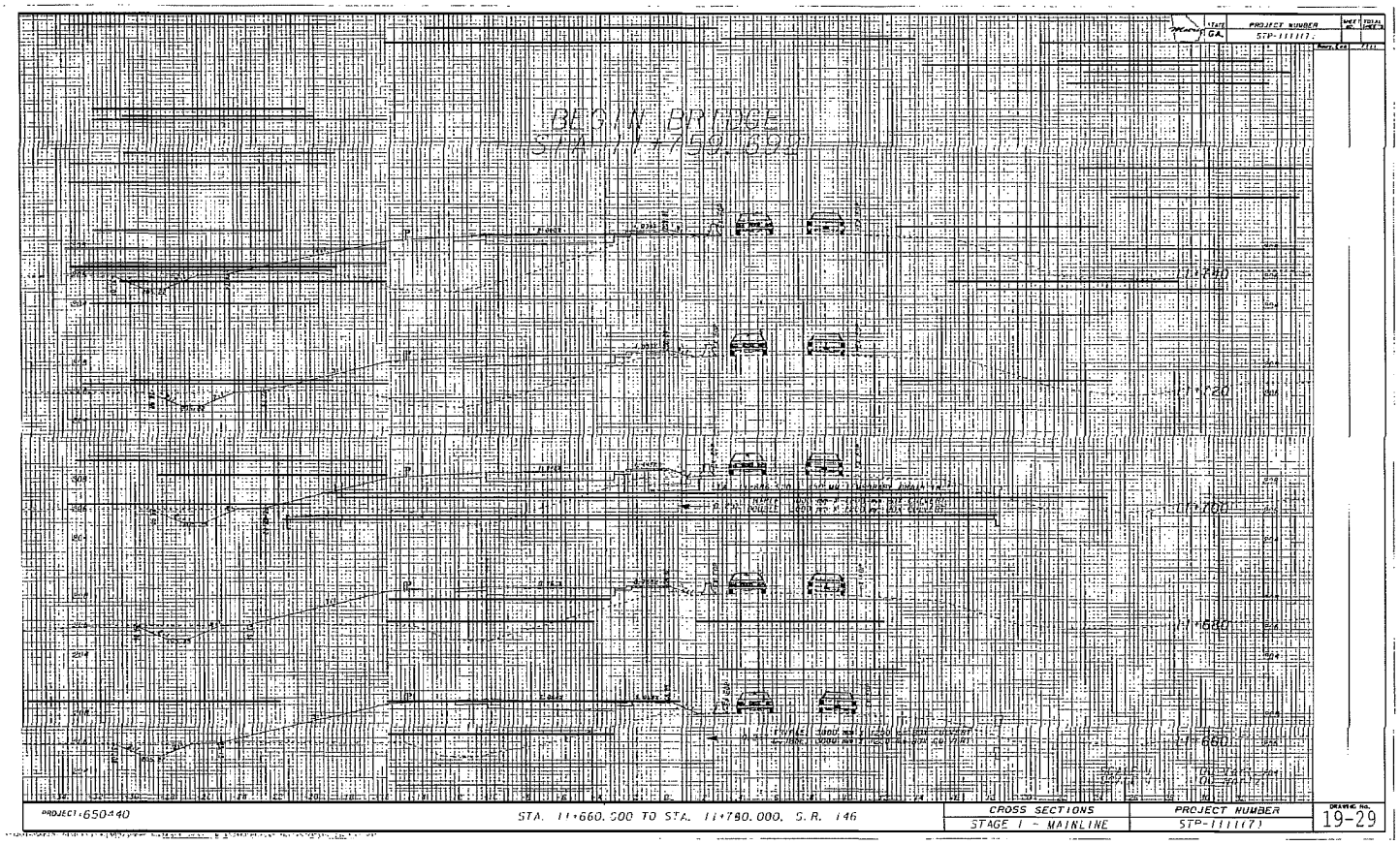
A. BOX CULVERTS

1. "As Proposed"

The staging for this project is essentially straightforward. The first stage consists of maintaining traffic at its current location and constructing the westbound traffic lanes including drainage and the westbound bridge. After completion of Stage 1, traffic will be shifted to the new lanes and the remainder of the construction will be completed.



VII. DEVELOPMENT PHASE
IV. STAGE CONSTRUCTION
A. BOX CULVERTS
1. "AS PROPOSED"



AS PROPOSED
STAGING
CROSS SECTION VIEW

VII. DEVELOPMENT PHASE

IV. STAGE CONSTRUCTION

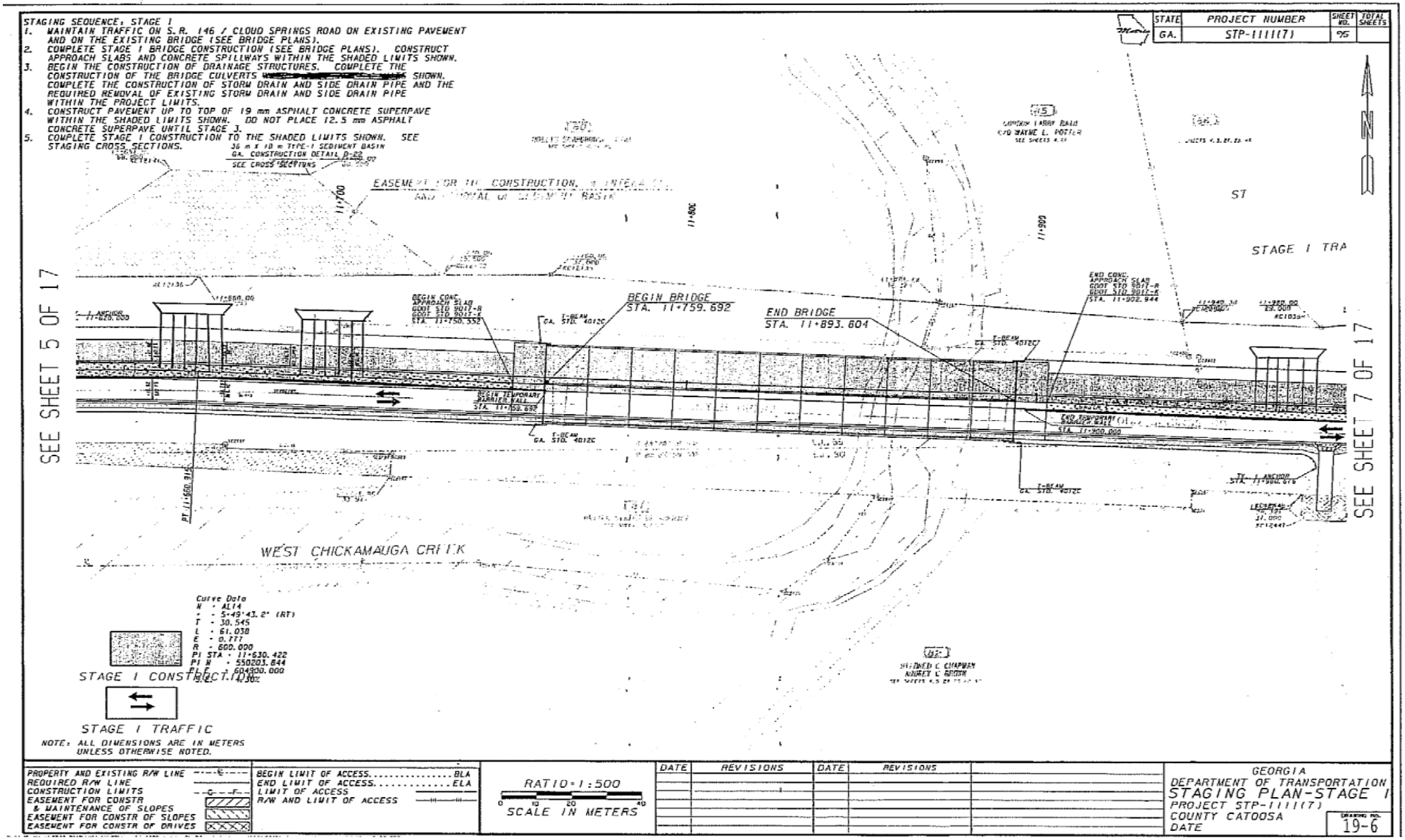
A. BOX CULVERTS

2. Value Engineering Alternative

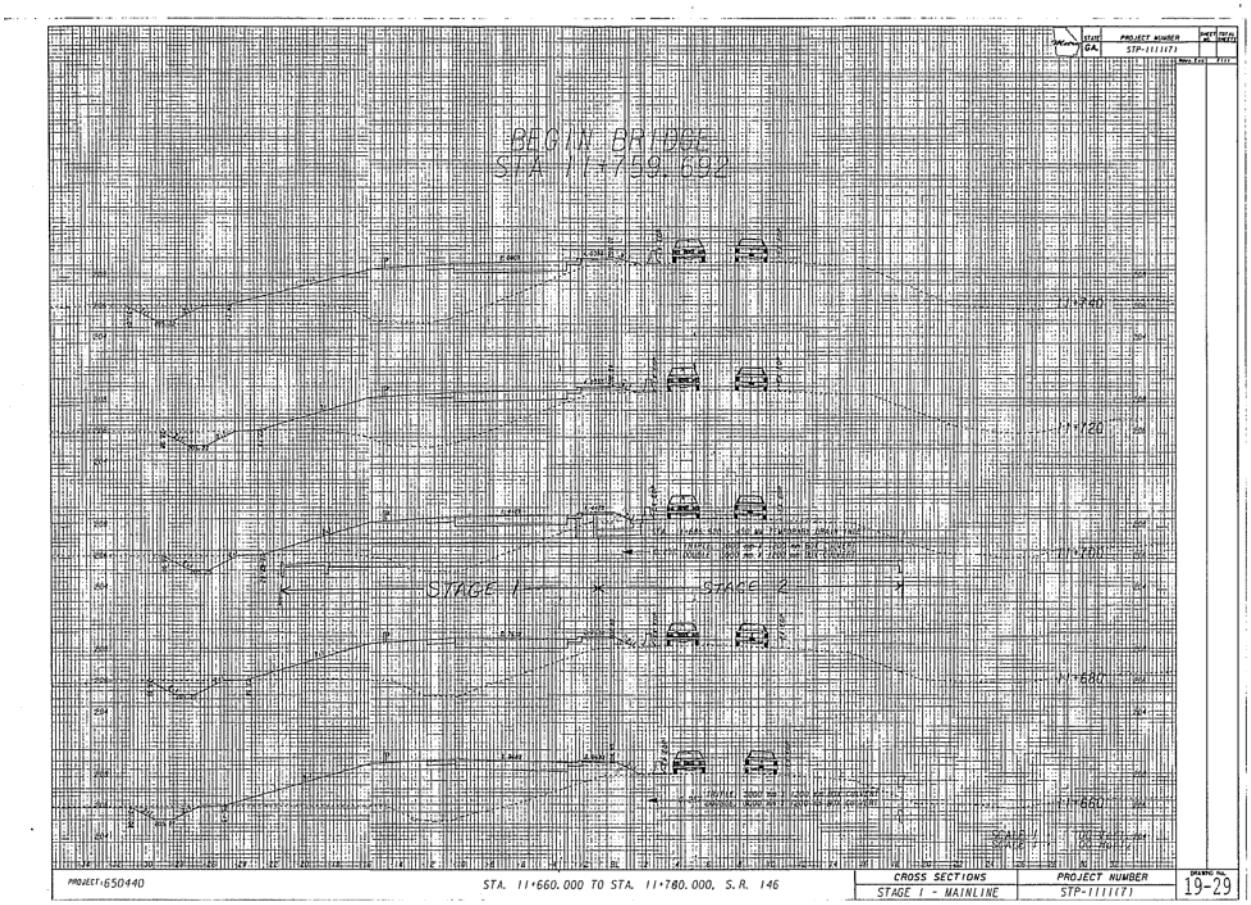
The Stage 1 plans treat the three proposed culvert locations basically as if they were not there. In fact, the staging cross sections for Stage 1 show the culvert under the roadway as already being completed. The plan view for the culverts indicates that they are to be constructed all the way to the edge of Stage 1 traffic (see Note # 3). The plan view in Stage 2 shows construction only to the centerline.

If the three triple double culverts remain in the project, it is recommended that the staging plans be modified as described herein. In Stage 1 the culverts need to be shown on the plan view and Note #3 reworded by stating that the culverts are to be constructed to approximately mid-point. Shoring will be required to retain the embankment. A temporary drainage structure is shown for the culvert at Sta. 11+690 but not for the other two. A note should be added that the contractor will take steps to assure that positive drainage is always maintained. The Stage 2 cross section plans should be modified to show temporary concrete median barrier, since there will be a hole at the culvert locations.

If the VE team's recommendation to eliminate the three triple double culverts is approved, then this staging recommendation would not be necessary.



VII. DEVELOPMENT PHASE
IV. STAGE CONSTRUCTION
A. BOX CULVERTS
2. VALUE ENGINEERING ALTERNATIVE



V E ALTERNATIVE

STAGING

CROSS SECTION VIEW

VII. DEVELOPMENT PHASE

V. DESIGN COMMENTS

1. Slope control for cuts of less than 10 ft. needs to be added to the Typical Section.

2. Only two square meters of sand-cement bag rip-rap is proposed. It is recommended that consideration be given to changing this to stone dumped rip-rap. There are significant quantities of the rip rap item proposed. This will eliminate an item and get a better price. A review of pay items should be made to try to eliminate any small quantities if possible.

3. The staging plans with the addition of vehicles and drums add a visual dimension to the plans that make them much more effective. It is suggested that this become a standard.

4. It is recommended that a CMS be added to the project for Redbud Avenue construction. The CMS should advise of the road's being closed during daylight hours and then advise of the pavement ending during night hours.