SCI-823-0.00

PID Nos. 19415, 77366, 79977

823 Portsmouth Bypass

An Appalachian Development Highway

Scioto County

Value Engineering Study Report

Draft Stage 2 Design Phase

December 2007

Design Team

TranSystems

DLZ

HDR

Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.

Lewis & Zimmerman Associates, Inc.
Taking the Chance out of Change

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January 28, 2008

Ms. G. Jeanne Braxton
Value Engineering Coordinator
Ohio Department of Transportation
Central Office, Office of Production
1980 West Broad Street
Columbus, Ohio 43223-1102

re: SCI-823-0.00, PID Nos. 19415, 77366 and 79977, Portsmouth Bypass
Harrison, Jefferson, Madison and Porter Townships, Scioto County
Value Engineering Study Report

Dear Ms. Braxton:

Lewis & Zimmerman Associates, Inc. is pleased to submit ten copies of the referenced value engineering study report. The objective of the VE effort was to identify opportunities to improve the value of the project by fulfilling the basic functions of promoting regional economic development, improving safety, and reducing capital cost.

Although the project is a straightforward design of a rural, four-lane limited access highway, the VE team was concerned with the cost of constructing the highway in a hilly and mountainous area, and with the amount of rock waste and disposal. The four interchanges, SR 52, Scioto County Airport, Lucasville/Minford Roads, and SR 23, appear to have potential for simplification and realignment to help reduce the overall cost.

We thank you and the representatives from the Ohio Department of Transportation for their assistance to the VE team. Please call us if you have any questions as you review this report and determine implementation.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

Luis M. Venegas, PE, CVS, FSAVE, LEED AP
Vice President

01-31-08P02:42 RCVD

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EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the events and results of the value engineering (VE) study conducted by Lewis & Zimmerman Associates, Inc. for the Ohio Department of Transportation (ODOT). The subject of the study was the SR 823 Portsmouth Bypass, Appalachian Development Highway Project, comprising the following projects located in Scioto County:

- SCI-823-6.81 - PID No. 19415, Madison and Harrison Townships,
- SCI-823-0.00 - PID No. 77366, City of Portsmouth, Porter and Harrison Townships, and
- SCI-823-10.13 - PID No. 79977, Madison and Jefferson Townships.

The design team comprises TranSystems, DLZ, and HDR Engineering.

The VE workshop was held December 3 – 6, 2007 in ODOT's Central Office in Columbus. The draft Stage 2 design documents were used as the basis of the study.

PROJECT DESCRIPTION

This project involves a new four-lane, divided limited-access freeway approximately 16 miles long that will provide for full moving, free-flowing interchanges connecting to United States (US) Route 23 and US 52. Diamond interchanges will be constructed in the vicinity of the Scioto County Airport and at Lucasville/Minford Road. The projects are in the City of Portsmouth and the Townships of Harrison, Jefferson, Madison, and Porter, all in Scioto County.

The anticipated cost of construction is as follows:

• Estimate SCI823 - PID 19415, dated December 21, 2006:	$ 68,682,147
• Estimate SCI823 - PID 77366, dated November 27, 2006:	144,072,491
• Estimate SCI823 - PID 79977, dated November 27, 2007:	155,547,679
	$368,202,317

The numbers include a contingency of 15%.

CONCERNS AND OBJECTIVES

The projects are relatively straightforward for the design of a new rural four-lane limited access highway. The cost to construct a highway in the hilly and mountainous terrain of the project area was a major concern of the VE team, as were the rock waste and disposal.

The four interchanges, US 52, Scioto County Airport, Lucasville/Minford Roads, and US 23, appear to have some potential for simplification/realignment to help reduce the overall cost of the projects. As such, the objectives of the VE effort were to identify opportunities that would improve the value

of the project in terms of fulfilling the basic functions of promoting regional economic development by moving goods and people while increasing capacity and improving safety, and where possible, to reduce capital cost.

RESULTS

Below are some of the alternatives developed by the VE team.

Rock/Soil Cuts and Waste Material

With regard to the traversed terrain, Alternative Number (Alt. No.) 9 increases the inclination of the rock cuts to reduce the amount of waste produced and lower costs by about $10 million.

The current design calls for the use of benches in both the soil and rock cuts to allow for a certain order of assurance that if sloughing occurs, a shelf would exist to capture the debris; however, as noted in Alt. No. 10/29, these benches can act as springboards, lofting debris onto the highway below, so eliminating the benches is recommended and saves up to $2 million. Alt. No. 11B reduces costs by close to $700,000 by using steeper slopes without impacting the right-of-way.

Disposing of the excess rock and soil waste on land adjacent to the facility could render savings approaching $9,800,000, as indicated in Alt. No. 31/51. Using fill berms, perhaps from excavated material, in lieu of guardrails, as recommended in Alt. No. 59, could save about $1,800,000.

Several design suggestions addressed additional issues that could not be quantified but should be explored as the design proceeds. These include:

- Alt. No. 5 – Raise pipe outlets in high fill area;
- Alt. No. 14B – Use 2:1 foreslopes for catchment ditches;
- Alt. No. 23 – Sell the excess rock as an aggregate source; and
- Alt. No. 34/57 – Use waste to create developable land at or close to the interchanges.

Interchanges and Roadway Improvements

Three competing alternatives were generated for the US 23 Interchange that could help reduce its overall cost. Alt. No. 25A converts the entire interchange into a roundabout, as traffic would already be at a reduced speed, and calculates a potential savings of nearly $7,200,000. Alt. No. 25B eliminates the ramp bridges at this interchange with savings of close to $6,900,000. And, Alt. No. 25C reconfigures the interchange and simplifies the geometry, saving about $1,400,000.

Alt. No. 54 reduces the three-span ramps at US 23 over the railroad to two-span ramps, saving about $4,500,000.

Alt. No. 65 splits Ramp B at the US 52 Interchange into two separate bridges to simplify construction and reduce costs by about $1,100,000.

The current design indicates the use of several underdrains at most of the typical sections. Since past experience shows that the quantity of underdrains proposed in this area is unnecessary, Alt. No. 52 eliminates some of the underdrains, reducing costs by $560,000.

Alt. No. 61 employs clear zone grading rather than the proposed safety grading for a savings of about $47,000.

Bridges

Reducing the bridge spans by providing shorter retaining walls and safety barriers could render savings of about $1,300,000, as detailed in Alt. No. 40.

Construction contractors have the opportunity to submit valid Value Engineering Change Proposals (VECPs) wherein they would share 50/50 in any potential savings arising from the accepted VECPs with the Department. Alt. No. 39 reviewed the proposed bridge designs and compared them with recently submitted and accepted VECPs. The result of this comparison is to recommend incorporating specific changes in the design rather than waiting for a VECP and take advantage of the full savings prior to selling the project. This reduces costs by close to $1 million.

Another specific VECP item is brought to bear as a design suggestion - Alt. No. 67 which uses 50 ksi (kips [1,000 pounds] per square inch of strength) H-Piles driven to bedrock to reduce the number of required piles. This stems from the fact that availability of 50 ksi steel for H-Pile applications has recently led many contractors to submit VECPs for this application and thus share 50/50 with the Department any potential savings arising from the accepted VECP.

Other

If, as noted in Alt. No. 43/21, breaking the projects into smaller bid packages and changing the phasing will enable the use of excavated material earlier, a savings close to $6,200,000 is possible.

VE TEAM

Comprising the VE team were the following ODOT and LZA project team members:

G. Jeanne Braxton	Value Engineering Coordinator	ODOT, Office of Production
Jeff Crace, PE	Preliminary Design Engineer	ODOT, Office of Structural
Eugene C. Geiger, PE	Administrator	ODOT, Office of Geotechnical
Stephen A. Taliaferro, PE, MS	Transportation Engineer	ODOT, Office of Geotechnical
David A. Bame, PE	Area Engineer	ODOT, District 9
Tom Barnitz, PE	Project/Contract Manager	ODOT, District 9
Daniel E. Beasley, PE	Construction Area Engineer	ODOT, District 9
Gary E. Cochenour, PE	Production Administrator	ODOT, District 9
Adam Johnson, PE	Transportation Engineer	FHWA
Luther A. Miracle, PE	Division Manager, Transportation	DLZ
Johnny Ng, PE	Structural Project Manager	DLZ
Steve Riedy	Geotechnical Engineer	DLZ
James M. Breitinger, PE	Senior Project Manager	HDR Engineering (HDR)
Brad Hyre, PE	Senior Transportation Engineer	HDR
Christian H. Nyberg, PE	Senior Bridge Engineer	HDR
James M. Sheahan, PE	Geotechnical Engineering	HDR
Kent Pease, PE	Senior Geotechnical Engineer	Lyman Henn, Inc.
Luis M. Venegas, PE, CVS, FSAVE, LEED® AP	Value Engineer Facilitator	Lewis & Zimmerman

PROJECT MAP

The project will connect to US 23 just north of Lucasville and to US 52 just west of Wheelersburg. These termini were determined as follows:

- South of the terminus point, US 23 contains numerous traffic signals, including the built-up area of Lucasville where US 23 is reduced to 25 mph. North of this point, the facility is a limited-access expressway with a 55 mph speed limit.
- US 52 west of the SR 140 interchange becomes part of the city street system in New Boston, with numerous driveways and traffic signals. To the east, US 52 is a freeway with interchanges. The general terminus for the southern end of the bypass is between New Boston and Wheelersburg. The exact connection point is constrained by the geometrics of the existing roadway and existing interchange with SR 140.

The general study area for the proposed bypass was determined based upon meeting the intent of the Airport Bypass Concept resulting from the planning study. The general factors were:

- Connect to US 23 north of Lucasville;
- Connect to US 52 between SR 140 (Sciotoville) and Wheelersburg; and
- Pass in close proximity to the Scioto County Airport to enhance visibility and access to the Little Scioto River Valley.

The attached maps highlight the project area.

SUMMARY

The attached Summary of VE Alternatives outlines all of the alternatives and design suggestions developed by the VE team. Some of the alternatives are mutually exclusive or interrelated so that addition of all project cost savings does not equal total savings for the project. A full listing of all of the ideas considered by the VE team can be found on the Creative Idea Listing worksheets in the Value Analysis and Conclusions section of this report.

SUMMARY OF POTENTIAL COST SAVINGS

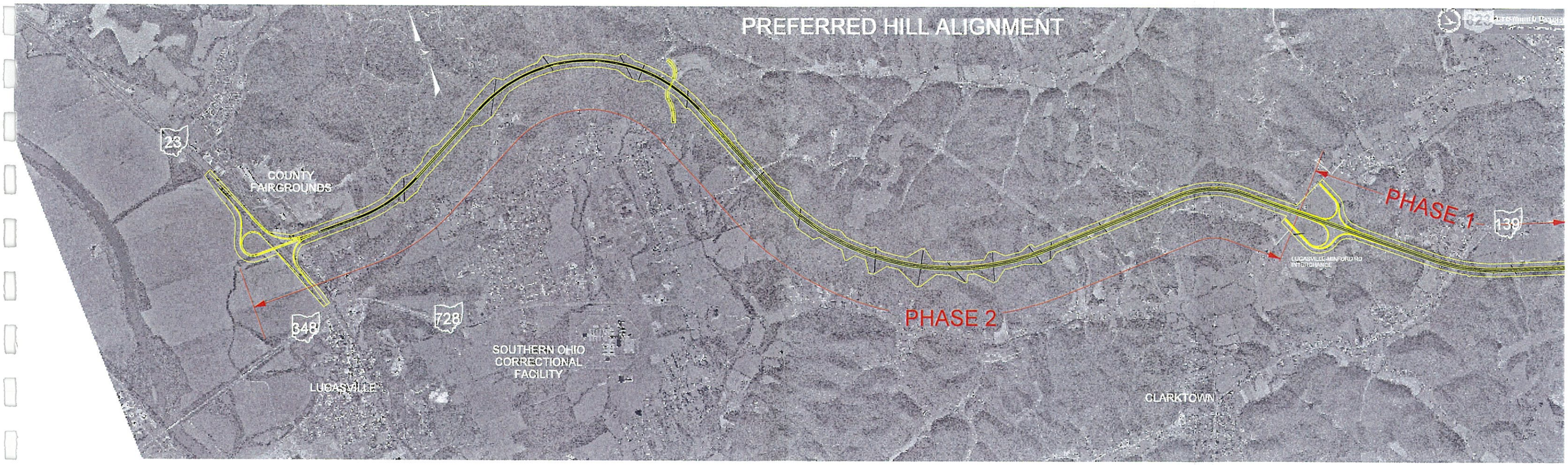
PROJECT: **SCI-823-0.00 - PID 19415, 79977 AND 77366**
Scioto County, Ohio

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
1	Reduce the legal speed to 60 mph	DESIGN SUGGESTION				
2/30	Use high fill culverts	$ 165,906,462	$ 165,811,019	$ 95,443		$ 95,443
5	Raise pipe outlet in high fill areas	DESIGN SUGGESTION				
9	Increase inclination of the rock cuts	$ 10,069,400	$ -	$ 10,069,400		$10,069,400
10/28	Eliminate benches in soil and rock cuts	$ 113,740,000	$ 111,860,000	$ 1,880,000		$ 1,880,000
11A	Use steepened fill slopes where advantageous at toe of design slope without impact to the right-of-way	$ 79,862	$ -	$ 79,862		$ 79,862
11B	Use steepened fill slopes where advantageous at top of design slope to reduce culvert length and stream impacts	$ 3,588,000	$ 2,898,000	$ 690,000		$ 690,000
12	Use rock fall mesh and reduce catchment ditch width	$ 707	$ 1,540	$ (833)		$ (833)
14B	Use 2:1 foreslopes for catchment ditches	DESIGN SUGGESTION				
19	Use ground nail walls to avoid some soil cuts at sliver cuts	$ 340,144	$ 177,100	$ 163,044		$ 163,044
23	Sell excess rock as an aggregate source	DESIGN SUGGESTION				
25A	Use a roundabout at the US 23 Interchange	$ 13,376,685	$ 6,143,301	$ 7,233,384		$ 7,233,384
25B	Eliminate the ramp bridges at the US 23 Interchange	$ 13,376,685	$ 6,486,000	$ 6,890,685		$ 6,890,685
25C	Reconfigure the US 23 Interchange	$ 13,376,685	$ 12,006,690	$ 1,369,995		$ 1,369,995
26	Eliminate exclusive right-turn lanes at intersections, particularly along Shumway Hollow Road	$ 1,821,060	$ 1,525,205	$ 295,855		$ 295,855
31/51	Dispose of excess rock/soil on land adjacent to the facility	$ 21,505,000	$ 11,730,000	$ 9,775,000		$ 9,775,000
33	Consider relocating SR 335 approximately 14 ft. east to facilitate construction of right-turn lane without the need for a retaining wall at Shumway Hollow Road	$ 753,107	$ 52,379	$ 700,728		$ 700,728
34/57	Use waste to create developable land at or close to interchanges	DESIGN SUGGESTION				
39	Consider the Value Engineering Change Proposal (VECP) potential of specific structures	$ 1,019,820	$ -	$ 1,019,820		$ 1,019,820

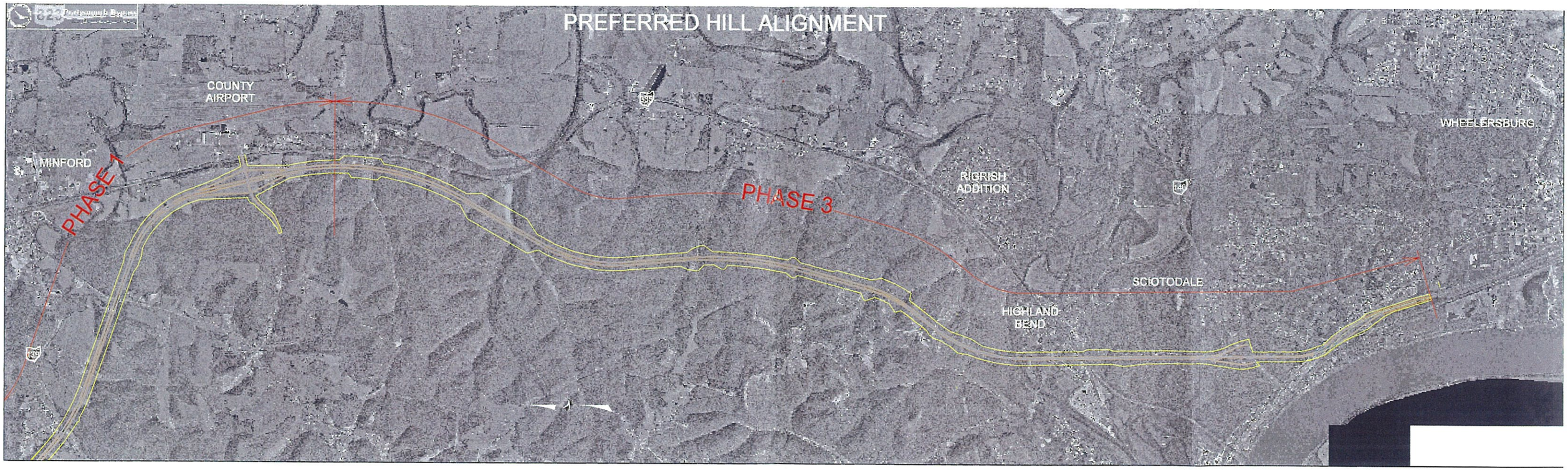
SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SCI-823-0.00 - PID 19415, 79977 AND 77366**
Scioto County, Ohio

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
40	Reduce bridge spans by providing short retaining wall and safety barrier	$ 9,106,850	$ 7,774,000	$ 1,332,850		$ 1,332,850
43/21	Break project into smaller bid packages and change the phasing to use excavated material early	$ 68,582,027	$ 62,422,658	$ 6,159,369		$ 6,159,369
45	Modify subgrade preparation to improve drainage and potentially increase strength of pavement design	DESIGN SUGGESTION				
52	Eliminate some underdrains	$ 1,863,000	$ 1,301,985	$ 561,015		$ 561,015
54	Reduce 3-span ramps at US 23 over railroad to a single-span or 2-span ramps	$ 8,475,500	$ 4,006,600	$ 4,468,900		$ 4,468,900
59	Use fill berms in lieu of guardrails	$ 7,957,034	$ 6,184,194	$ 1,772,840		$ 1,772,840
61	Replace safety grading with clear zone grading	$ 382,778	$ 335,628	$ 47,150		$ 47,150
63	Sell separate clearing and grubbing contract	DESIGN SUGGESTION				
64	Survey trees for marketability	DESIGN SUGGESTION				
65	Split Ramp B into two separate bridges at the US 52 interchange	$ 7,070,657	$ 5,988,471	$ 1,082,186		$ 1,082,186
67	Ensure the use of 50 ksi H-piles driven to bedrock	DESIGN SUGGESTION				


PREFERRED HILL ALIGNMENT
23
COUNTY
FAIRGROUNDS
348
728
SOUTHERN OHIO
CORRECTIONAL
FACILITY
LUCASVILLE
PHASE 1
139
LUCASVILLE-MINFORD RD
INTERCHANGE
PHASE 2
CLARKTOWN

PREFERRED HILL ALIGNMENT



Study Results

STUDY RESULTS

INTRODUCTION

The results are the major feature of a value engineering study since they represent the benefits that can be realized on the project by the owner, users and designer. The results will directly affect the project design and will require coordination among the stakeholders to determine the ultimate acceptance of each alternative.

RESULTS OF THE STUDY

The VE team generated 67 ideas for improvement during the workshop. The evaluation of these ideas was based upon their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructibility and soundness of the idea.

Of the ideas generated, 39 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 24 developed alternatives with an impact on project costs and 11 design suggestions. These alternatives and design suggestions are presented in detail following this narrative and on the Summary of VE Alternatives tables.

EVALUATION OF ALTERNATIVES

Each alternative should be evaluated on its own merit. There may be a tendency to disregard an alternative because of concern about one portion of it. Separate consideration should be given to each of the areas within an alternative that are acceptable and those parts should be considered in the final design, even if the entire alternative is not implemented.

Cost is the primary basis of comparison for alternative designs. To ensure that costs are comparable within the alternatives proposed by the VE team, the designer's cost estimates, where possible, were used as the pricing basis. Where appropriate, the impact of energy costs, replacement costs, and effect on operations and maintenance are shown within each alternative.

Some of the alternatives are interrelated, so acceptance of one may preclude the acceptance of another. The reader should evaluate those alternatives carefully to select the ideas with the greatest beneficial impact to the project.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SCI-823-0.00 - PID 19415, 79977 AND 77366**
Scioto County, Ohio

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
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2/30	Use high fill culverts	$ 165,906,462	$ 165,811,019	$ 95,443		$ 95,443
5	Raise pipe outlet in high fill areas	DESIGN SUGGESTION				
9	Increase inclination of the rock cuts	$ 10,069,400	$ -	$ 10,069,400		$10,069,400
10/28	Eliminate benches in soil and rock cuts	$ 113,740,000	$ 111,860,000	$ 1,880,000		$ 1,880,000
11A	Use steepen fill slopes where advantageous at toe of design slope without impact to the right-of-way	$ 79,862	$ -	$ 79,862		$ 79,862
11B	Use steepen fill slopes where advantageous at top of design slope to reduce culvert length and stream impacts	$ 3,588,000	$ 2,898,000	$ 690,000		$ 690,000
12	Use rock fall mesh and reduce catchment ditch width	$ 707	$ 1,540	$ (833)		$ (833)
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23	Sell excess rock as an aggregate source	DESIGN SUGGESTION				
25A	Use a roundabout at the US 23 Interchange	$ 13,376,685	$ 6,143,301	$ 7,233,384		$ 7,233,384
25B	Eliminate the ramp bridges at the US 23 Interchange	$ 13,376,685	$ 6,486,000	$ 6,890,685		$ 6,890,685
25C	Reconfigure the US 23 Interchange	$ 13,376,685	$ 12,006,690	$ 1,369,995		$ 1,369,995
26	Eliminate exclusive right-turn lanes at intersections, particularly along Shumway Hollow Road	$ 1,821,060	$ 1,525,205	$ 295,855		$ 295,855
31/51	Dispose of excess rock/soil on land adjacent to the facility	$ 21,505,000	$ 11,730,000	$ 9,775,000		$ 9,775,000
33	Consider relocating SR 335 approximately 14 ft. east to facilitate construction of right-turn lane without the need for a retaining wall at Shumway Hollow Road	$ 753,107	$ 52,379	$ 700,728		$ 700,728
34/57	Use waste to create developable land at or close to interchanges	DESIGN SUGGESTION				
39	Consider the Value Engineering Change Proposal (VECP) potential of specific structures	$ 1,019,820	$ -	$ 1,019,820		$ 1,019,820

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**1**
DESCRIPTION:	**REDUCE THE LEGAL SPEED TO 60 MPH**	SHEET NO.:	**1 of 2**

ORIGINAL DESIGN:

The current design is a limited access 4-lane freeway with interchanges, a legal speed of 65 mph, and a design speed of 70 mph.

ALTERNATIVE:

Change to a limited access super 2-lane freeway with at-grade crossings and truck lanes, a legal speed of 60 mph, and a design speed of 70 mph.

ADVANTAGES:

- May eliminate design exceptions
- Allows for maximizing available funding dollars towards the entire project
- Provides one thru-lane in each direction
- Offers potential economic development opportunities sooner rather than later

DISADVANTAGES:

- Eliminates two lanes
- Provides temporary at-grade crossings
- Decreases safety temporarily
- May need to allow for public involvement
- Increases overall project cost
- May require signalized intersections

DISCUSSION:

Designing to a 70 mph speed but posting a 60 mph speed would allow for the construction of a super 2-lane freeway, maximizing the available funding dollars by providing the traveling public with a useful facility several years earlier.

This would allow economic development growth and the immediate transport of goods along the corridor. In addition, potential new companies would be assured of the state's commitment to upgrade the facility to a 4-lane facility due to its original design parameters.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE ___	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

CALCULATIONS

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 1

SHEET NO.: 2 of 2

LA 4-L FREEWAY	LA 2-L FREEWAY
SLM 0.00 - 6.81 = $21.1 M/MILE	100% EARTHWORK = $166.6M
SLM 6.81 - 10.13 = $20.6/MILE	50% BRIDGES = $51.5M
SLM 10.13 - 17.04 = $22.6/MILE	50% PAVEMENT = $21.1M
TOTAL @ $21.7 M/MI = $368.9M	TOTAL @ $14.1M/MI = $239.7M

PHASE I FUNDS = $69M
PHASE II " = $156M
} TOTAL = $225M < $239.7M ⇒ USING PHASE I + II FUNDS ONLY WOULD ALLOW FOR CONSTRUCTION OF A USEFUL FACILITY.

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**2/30**
DESCRIPTION:	**USE HIGH FILL CULVERTS AND/OR USE FILL TO RAISE OR ELIMINATE CULVERTS**	SHEET NO.:	**1 of 3**

ORIGINAL DESIGN:

The profile was lowered to eliminate high-fill culverts (special culverts) based on a 12-2005 study included in the additional study report.

ALTERNATIVE:

Minimize cut and waste by raising the profile in key areas and using high-fill culverts. Look at individual gulleys for the opportunity to fill the gulleys to raise the culverts and use standard culverts.

ADVANTAGES:

- Reduces costs
- Improves profile
- Advantageous use of project waste

DISADVANTAGES:

- Uses non-standard culverts

DISCUSSION:

Phase 2, as designed, requires a large amount of rock cut and results in a lot of waste. The profile rolls up and down. The rock cut can be reduced and the profile could be flatter by raising the low areas.

A second look at key areas in Phase 2 is recommended.

Cut quantity should be double checked.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 165,906,462	—	$ 165,906,462
ALTERNATIVE	$ 165,811,019	—	$ 165,811,019
SAVINGS (Original minus Alternative)	$ 95,443	—	$ 95,443

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 2 / 30

SHEET NO.: 2 of 3

USE THE QUANTITIES SHOWN IN THE OPTION SUMMARY SPREADSHEET, EXCEPT CALCULATE THE WASTE WITH A SWELL FACTOR. USE PRICES FROM LATEST ESTIMATE FOR EARTHWORK.

OPTION 1:

CUT	24,972,016	* $3.30	= $82,407,652
FILL	22,753,610	* $0.60	= 13,652,166
WASTE	9,710,010	* $1.10	= 10,681,011
			$106,740,829

OPTION 6:

CUT	25,119,314	* $3.30	= $82,893,934
FILL	22,160,155	* $0.60	= 13,296,093
WASTE	10,495,031	* $1.10	= 11,544,534
			$107,734,561

Δ = $993,732

THE CUT QUANTITIES SEEM TOO SIMILAR BETWEEN THE OPTIONS WITH A 0.6% DIFFERENCE. IT SEEMS THERE WOULD BE MUCH MORE CUT IN OPTION 6 THAN IN OPTION 1. IT IS ESTIMATED THAT THE COST SAVINGS ARE GREATER THAN SHOWN BECAUSE THERE IS PROBABLY MORE CUT AND WASTE SAVED THAN SHOWN.

COMBINE THIS WITH FILLING SELECT GULLEYS, THE COST SAVINGS FOR THIS ACTION IS NOT INCLUDED SINCE WE DID NOT HAVE THE TIME TO CALCULATE.

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 2 / 30

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
CULVERT	LUMP	1	LUMP	14,825,942	1	LUMP	15,413,220
CUT	CY	(SEE CALCS)		82,893,934	(SEE CALCS)		82,407,652
FILL	CY	"	"	13,296,093	"	"	13,652,166
WASTE	CY	"	"	11,544,534	"	"	10,681,011
GUARDRAIL	LF	133614	10	1,366,140	168,960	10	1,689,600
PAVEMENT	SF	7038009	2.89	20,339,846	7038009	2.89	20,339,846
	NOTE: CUT QUANTITIES SHOULD BE DOUBLE CHECKED.						
	Sub-total			144,266,489			144,183,495
Mark-up at	15.00%			21,639,973			21,627,524
	TOTAL			165,906,462			165,811,019

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	5
DESCRIPTION:	**RAISE PIPE OUTLET IN HIGH FILL AREAS**	SHEET NO.:	1 of 2

ORIGINAL DESIGN:

Pipes are placed with an outlet at the toe of the fill.

ALTERNATIVE: (Sketch attached)

Raise the pipe outlet to shorten the pipe and construct a lined channel down fill slope.

ADVANTAGES:

- Shortens pipes
- Reduces cost
- Eases replacement of pipe at end of life

DISADVANTAGES:

- Requires maintenance of outlet ditch

DISCUSSION:

This allows shorter pipes and can reduce required pipe strength due to reduction in cover height.

Careful construction of outlet ditch is crucial. Grout bedding may be required for outlet ditch to aggregate.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MARTIN		R117	

CULVERT SITUATION

KY 40
STA 4+450
1350mm PIPE CULVERT
SKEW 0°
SHEET 1 OF 2

ITEM NO. 12-154.04

Design pH Level	Max. Cover Height	Culvert Pipe 1350mm	Class IV Channel Lining	Ditch Exc.	Class A Reinforcing Concrete	Steel
	Lin. M	Lin. M	Cu. M	Cu. M	Cu. M	Kg
M	3	38.09	85.18	120.2	5.98	264

Page 2 of 2

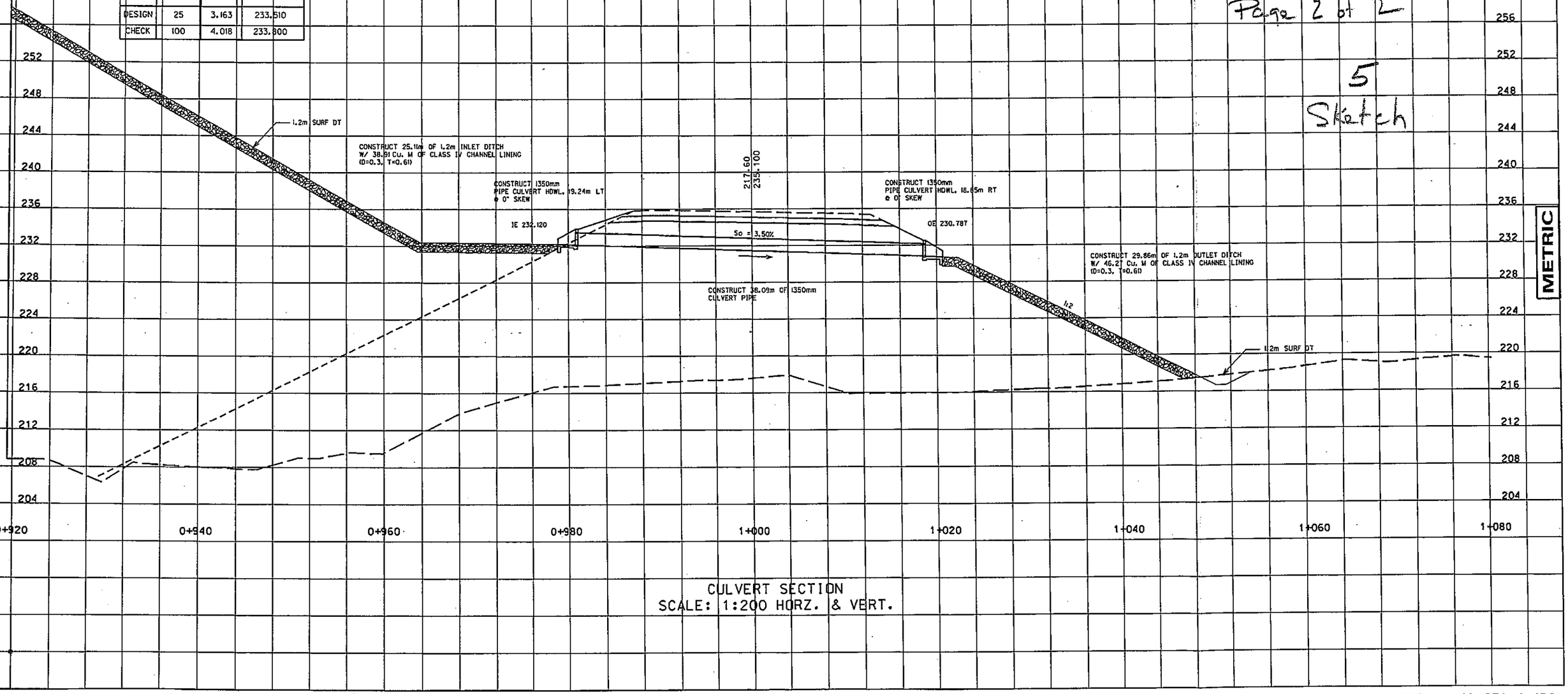
5
Sketch

MATCH LINE HOLLY BUSH ACCESS

FROM ARCHIVED KY 645 PROJECT

FLOOD EVALUATION DATA

	RETURN INTERVAL (YRS)	Q (CMS)	H. W. ELEV. (m)
DESIGN	25	3.163	233.510
CHECK	100	4.018	233.800



CULVERT SECTION
SCALE: 1:200 HORZ. & VERT.

METRIC

PIPE SECTION SHEET KY 40 STA 4+450

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**9**
DESCRIPTION:	**INCREASE THE INCLINATION OF THE ROCK CUTS**	SHEET NO.:	**1 of 7**

ORIGINAL DESIGN: (Sketch attached)

The design of rock cut slopes ranges from ½H:1V to 1H:1V.

ALTERNATIVE: (Sketch attached)

Based on additional review of rock data, increase the slope inclination of at least some of the rock cut slopes from ½H:1H to ¼H:1V.

ADVANTAGES:

- Reduces excavation volume and costs
- Steeper cut slopes may reduce the horizontal projection of rocks falling from the cuts, thereby allowing for a narrower catchment ditch

DISADVANTAGES:

- May result in poorer performance of the rock slopes with more rockfall and additional long-term maintenance costs

DISCUSSION:

Design of rock cuts is based on recommendations and design standards in GB3 which are based on rock quality information such as unconfined compressive strength, Rock Quality Designation (RQD) and Slake Durability Index (SDI) test results. Past performance of cuts in the formations are also considered where available. Based on a general review of evaluation results consistent with the VE study timeframe and scope of the project, results indicate that many of the cuts contain rock in the "Good" to "Very Good" classification where Table A recommends a range of cut slopes of ¼:1 or ½:1, indicating that either inclination could be used. While there may be intervals of poorer quality, weathered and broken rock, particularly closer to the ground surface, this alternative is intended to consider the use of the ¼:1 rather than the ½:1 slope where either would fit within the GB3 criteria.

While the GB3 criteria calls for the same catchment ditch widths for ¼:1 or ½:1 slopes, based on past experience with rockfall analyses it is anticipated that steeper slopes would not increase the potential risks of rock falls reaching the roadway and analysis may show a lower risk. A comparative analysis of the two slopes should also consider the risk and potential for an increase in long-term maintenance costs associated with the steeper slopes, particularly where the rock data shows more borderline conditions, such as possible localized weathering in borings or SDI data or greater potential for impacts from joints and fracturing based on geology and/or boring data.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 10,069,400	—	$ 10,069,400
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 10,069,400	—	$ 10,069,400

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*	ALTERNATIVE NO.:	**9**
DESCRIPTION:	**INCREASE THE INCLINATION OF THE ROCK CUTS**	SHEET NO.:	**2 of 7**

DISCUSSION: (continued)

Steepening the cut slopes is assumed to be practical and economical for this alternative only if:

1. the rock mass in a specific area is of sufficient quality to meet the design requirements ("Good" to "Very Good");
2. the limits of the high quality rock mass are relatively well defined;
3. the area of the higher quality rock mass is relatively large; and
4. an assessment of potential impacts from long-term rockfalls including potential costs for maintenance (cleanout) of rockfall is acceptable.

To evaluate potential cost savings, three sections taken from the Phase II, Stage 1 segment of the project were evaluated. These were in cuts of varying depth with centerline cut depths of 80 ft., 115 ft. and 180 ft. For each, ½:1 cut slopes were changed to ¼:1 slope but flatter slopes, assumed to be in shale or near-surface weathered zones were not changed. Costs savings developed for this alternative are assumed to be the maximum possible.

In summary, there is potentially a cost savings from increasing the inclination of rock cuts in competent sandstone to ¼:1.

HDR | ONE COMPANY *Many Solutions™*

Project: Portsmouth Bypass	Computed: JMS	Date: 12.5.07	
Subject: VE STUDY	Checked:	Date:	
Task: Est ΔVolume for Steepened Slopes	Page: 3	of: 7	
Job #:	No:		

NOTES

- Refer to attached sheets 2 thru 4
- SECTIONS ARE FROM STAGE 1 SECTIONS, PHASE 1 AREA AS INDICATED.
- ONLY 1/2:1 slopes ARE steepened to 1/4:1.

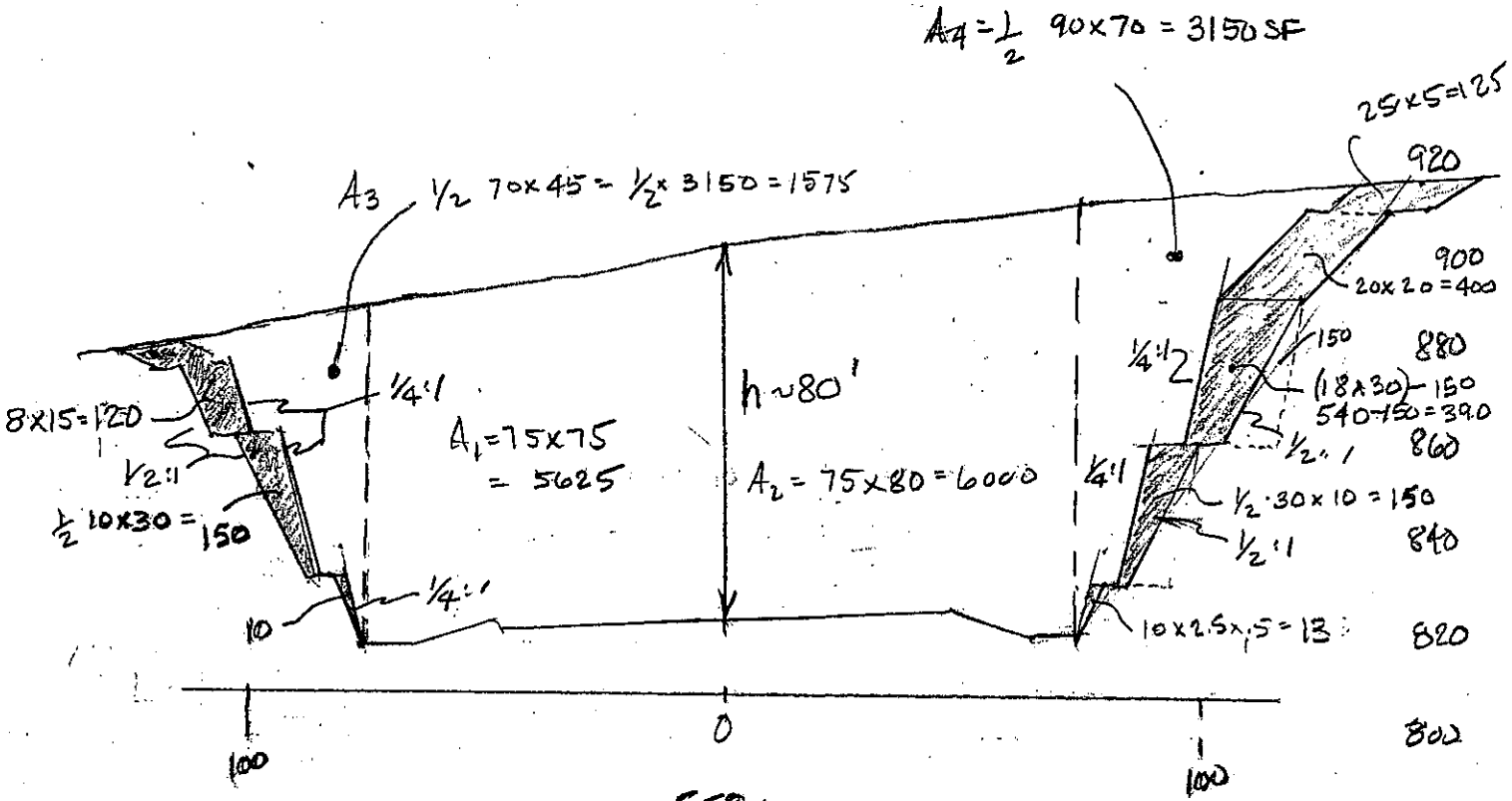
RESULTS

STATION	℄ CUT DEPTH	% REDUCTION IN AREA
559+00	80'	8%
629+50	115'	9%
667+00	180'	13%

FOR VE STUDY USE . 10% REDUCTION

HDR | ONE COMPANY *Many Solutions™*

Project: Portsmouth Bypass.	Computed: JMS	Date: 12.5.07	
Subject: VE STUDY	Checked:	Date:	
Task: Est ΔV for Steepened Slopes	Page: 4	of: 7	
Job #:	No:		



559+0
(PHASE II)

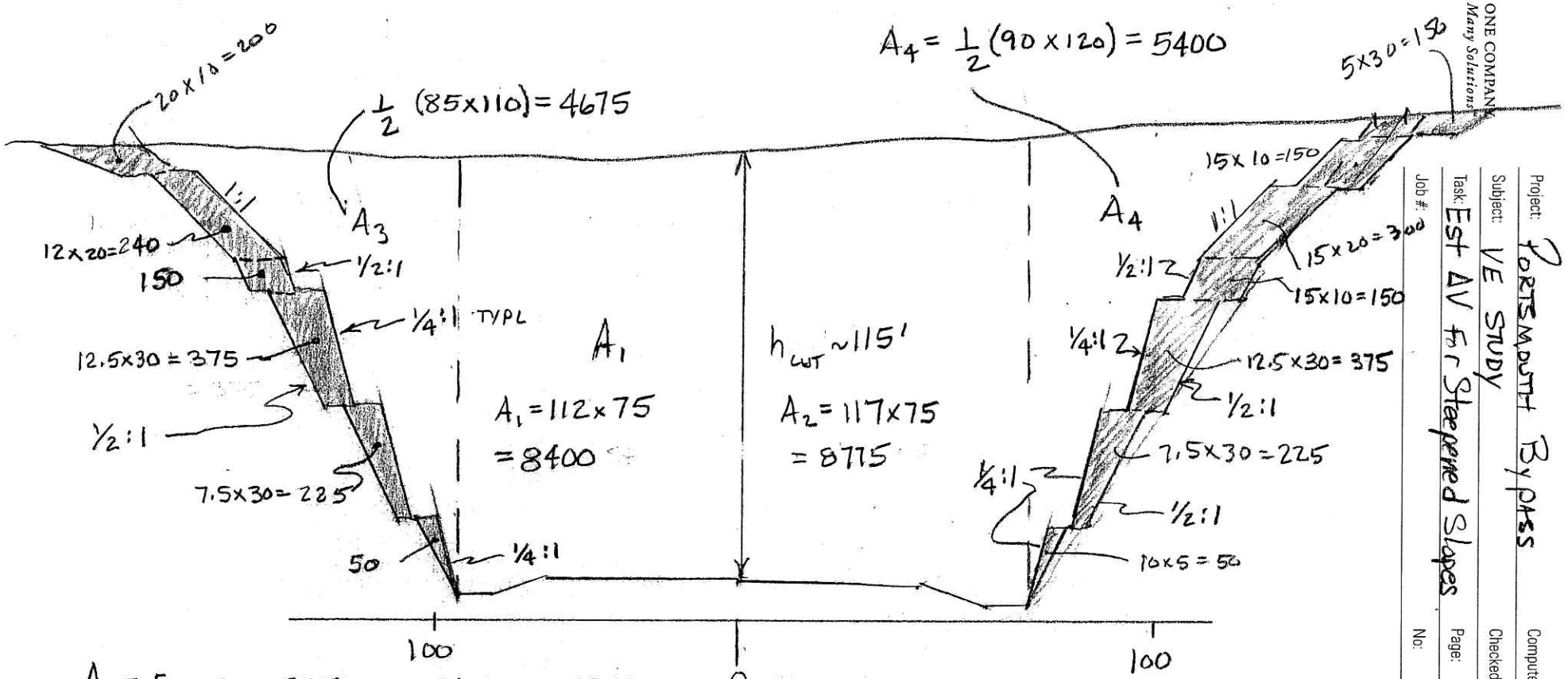
A_L = AREA LEFT (SHADED)
= 10+150+120 = 280 SF

A_R = AREA RIGHT (SHADED)
= 125+400+390+150+13
= 1088 SF

$$A_T = A_1 + A_2 + A_3 + A_4 + A_L + A_R = 5625 + 6000 + 1575 + 3150 + 280 + 1088$$
$$= 17718 \text{ SF}$$

$A_L + A_R$ = 1368 SF (REDUCTION)

$$\% \text{ REDUCTION} = \frac{1368}{17718} = 8\%$$



$A_T = A_1 + A_2 + A_3 + A_4 + A_L + A_R = 8400 + 8775 + 4675 + 5400 + 1240 + 1400 = 29,890\ SF$

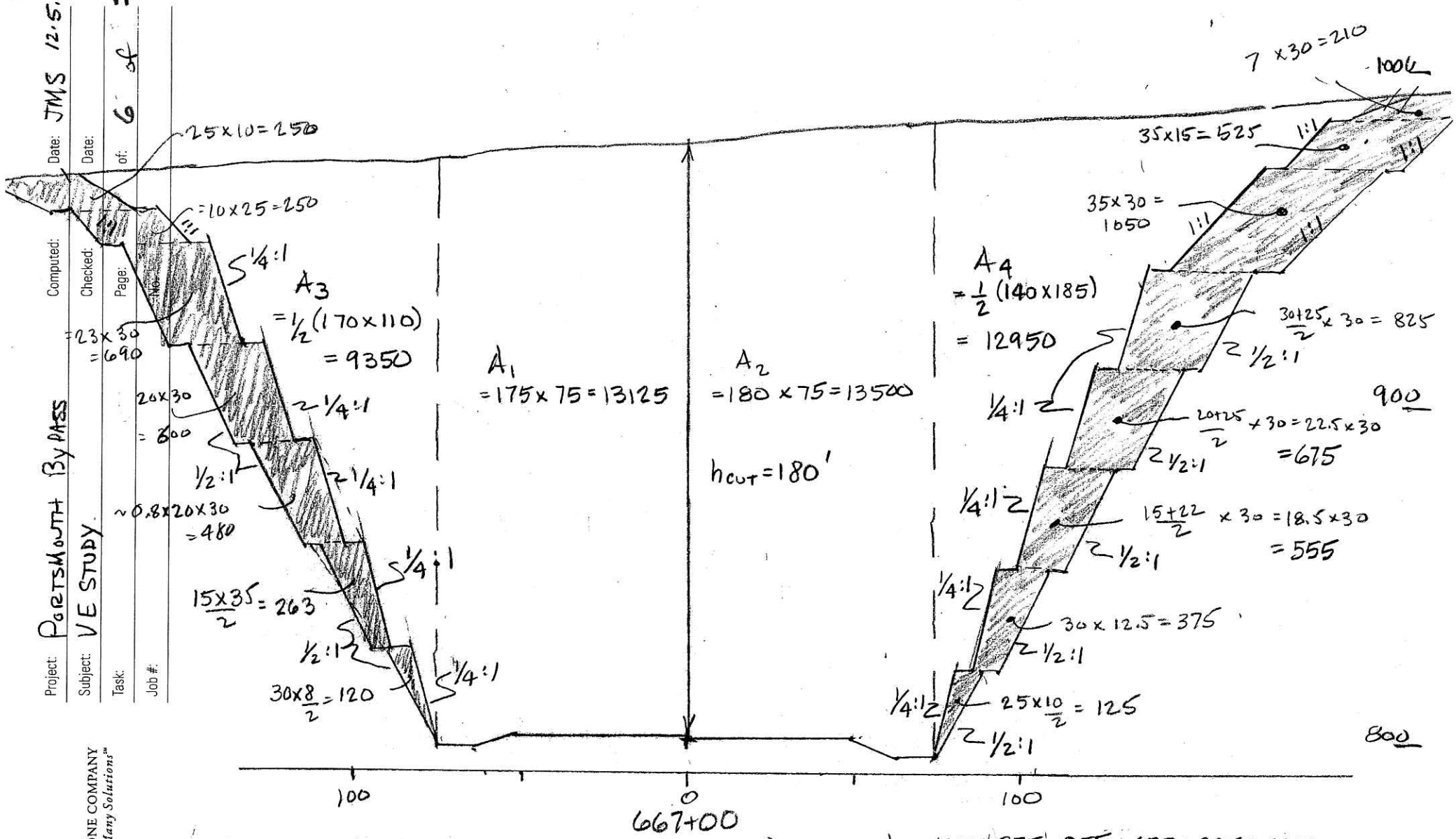
$A_L + A_R = 1240 + 1400 = 2640\ SF.$ (REDUCTION)

% REDUCTION $= \frac{2640}{29\,890} = 9\%$

9

9

Project: PORTSMOUTH BY PASS
Subject: VE STUDY
Task:
Job #:
Computed: JMS 12.5.07
Checked:
Page: 6 of 7
No.
Date:
Date:



$A_L = 120+263+480+600+690+250+250 = 2653$ (PHASE II)

$A_R = 125+375+555+675+825+1050+525+210 = 4340$

$A_T = A_1 + A_2 + A_3 + A_4 + A_L + A_R = 13125+13500+9350+12950+2653+4340 = 55918\ SF$

$A_L + A_R = 2653+4340 = 6993$ (REDUCTION)

$\%\ \text{REDUCTION} = \frac{6993}{55918} = 13\%$

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COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 9

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Phase I Rock Excavation		570,000	4.40	2,508,000			
Phase II Rock Excavation		1,420,000	4.40	6,248,000			
Phase III Rock Excavation			4.40				

Units are based on a 10% reduction of "Excavation-Rock" for each Phase where that excavation would be wasted. On Phase III, the current earthwork estimate would require borrow even with the 0.5:1 cut slopes so no reduction is provided in that Phase. If future evaluations of the Phase reduce the necessary borrow to a waste condition, steeper slopes could be considered.

		Original Total	Proposed Total
	Sub-total	8,756,000	
Mark-up at	15.00%	1,313,400	
	TOTAL	10,069,400	

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SCI-823-0.00PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*

ALTERNATIVE NO.: **10/28**

DESCRIPTION: **ELIMINATE THE BENCHES IN THE SOIL AND ROCK CUT**

SHEET NO.: **1 of 7**

ORIGINAL DESIGN: (Sketch attached)

Present rock and soil cuts include the following benches:

1. Overburden at 10 ft. wide: These are between the overburden and rock. The primary purpose is to accommodate changes in the interface location during construction. A secondary benefit is to serve as a rockfall catchment for the soil cut.
2. Lithologic at 10 ft. wide: These are at geologic contacts where typically there is a competent rock (such as sandstone) overlying soft rock (such as shale) to avoid undercutting from erosion of the softer rock type.
3. Construction at 5 ft. wide every 30 ft. of cut height (for 0.5:1 cut slopes): These are included in the cross sections to accommodate the offset of pre-split drill blast holes between benches. In practice, the width is used during the construction process, but not left as benches.

ALTERNATIVE: (Sketch attached)

Eliminate the benches.

ADVANTAGES:

- Reduces the cut volume and construction cost
- Reduces rockfall impact zone in that the benches can deflect falling rocks resulting in them flying farther from the cut base
- Reduces rockfall in that the outside edges of benches can be locations of focused weathering and therefore a source of rockfall

DISADVANTAGES:

- Eliminates the beneficial functions of the benches noted above
- If no overburden bench is provided, the risk of having to acquire additional right-of-way increases

DISCUSSION:

Each of the three bench types are evaluated independently:

1. Overburden Benches: The overburden benches would be eliminated with the use of probe holes at approximate 25-ft. intervals during construction. The purpose of the probe holes is to identify the top of rock and eliminate the need for a contingency bench to catch up. Cost evaluations compare the cost of excavation to the cost of the probe holes. In most cases, the ground surface topography is relatively flat near the interface location. Therefore, there is a relatively small savings of excavation volume. Also, the secondary benefits of the benches would be eliminated. *Not recommended.*

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 113,740,000	—	$ 113,740,000
ALTERNATIVE	$ 111,860,000	—	$ 111,860,000
SAVINGS	$ 1,880,000	—	$ 1,880,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**10/28**
DESCRIPTION:	**ELIMINATE THE BENCHES IN THE SOIL AND ROCK CUT**	SHEET NO.:	**2 of 7**

DISCUSSION: (continued)

2. Lithographic Benches: The function of lithographic benches to avoid undesirable weathering undercutting is necessary, so the benches should not be eliminated. *Not recommended.*
3. Construction Benches: The design suggests that the rock cuts be presented on the cross-section in the plans either:
   - without the benches. Discussions with ODOT personnel, especially construction engineers, revealed that showing the benches on the plans is necessary due to the way construction is conducted and administered, and that elimination of the benches on the plans would create problems for construction and construction administration.

   or

   - with the benches and the steep portions slightly steeper to result in an overall inclination of 0.5:1. If the steep portions of the slopes were steepened while keeping the benches, the inclinations would change to 0.33:1 for an overall 0.5:1 slope. This is an odd slope inclination and would cause problems during construction.
4. Elimination of the construction benches could save excavation volume and therefore cost. Although elimination of these benches could reduce costs, there would be complications for construction which may or may not be acceptable to ODOT. *Recommended with the above caveats.*

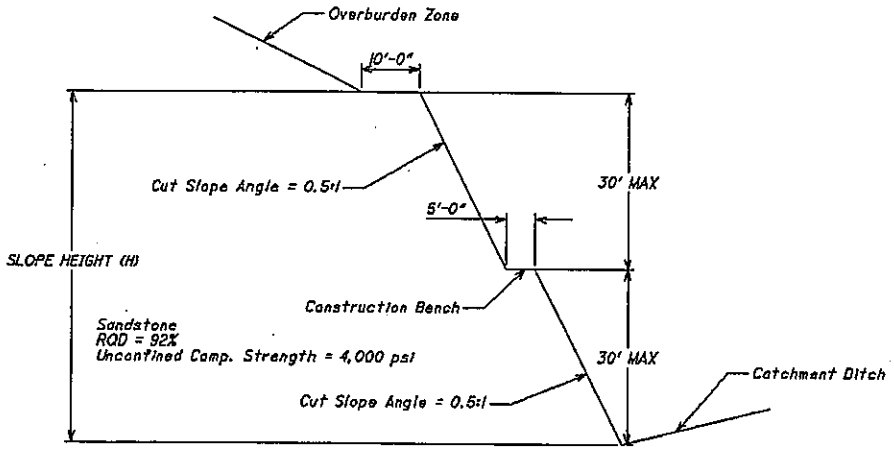
PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 10/28

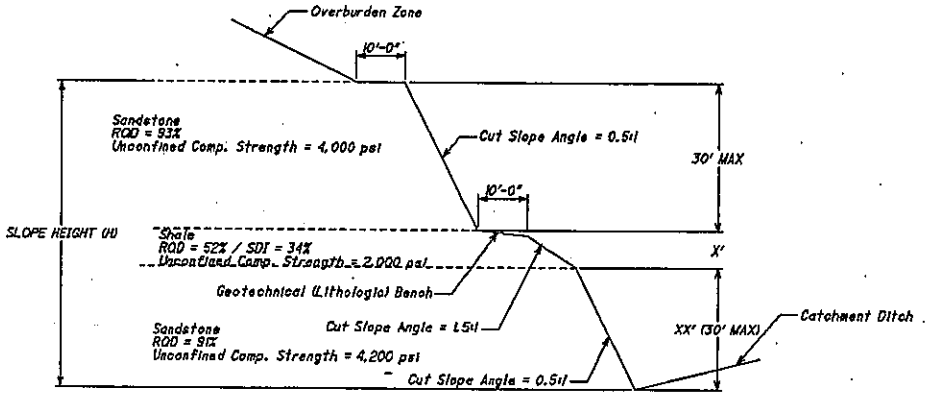
☑ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 3 of 7

Appendix – Design Examples



Example 1 - Continuous Competent Rock



Example 2 – Weatherable Bed of <10' Thickness Between Competent Rock Types

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 10/28

☑ AS DESIGNED ☑ ALTERNATIVE

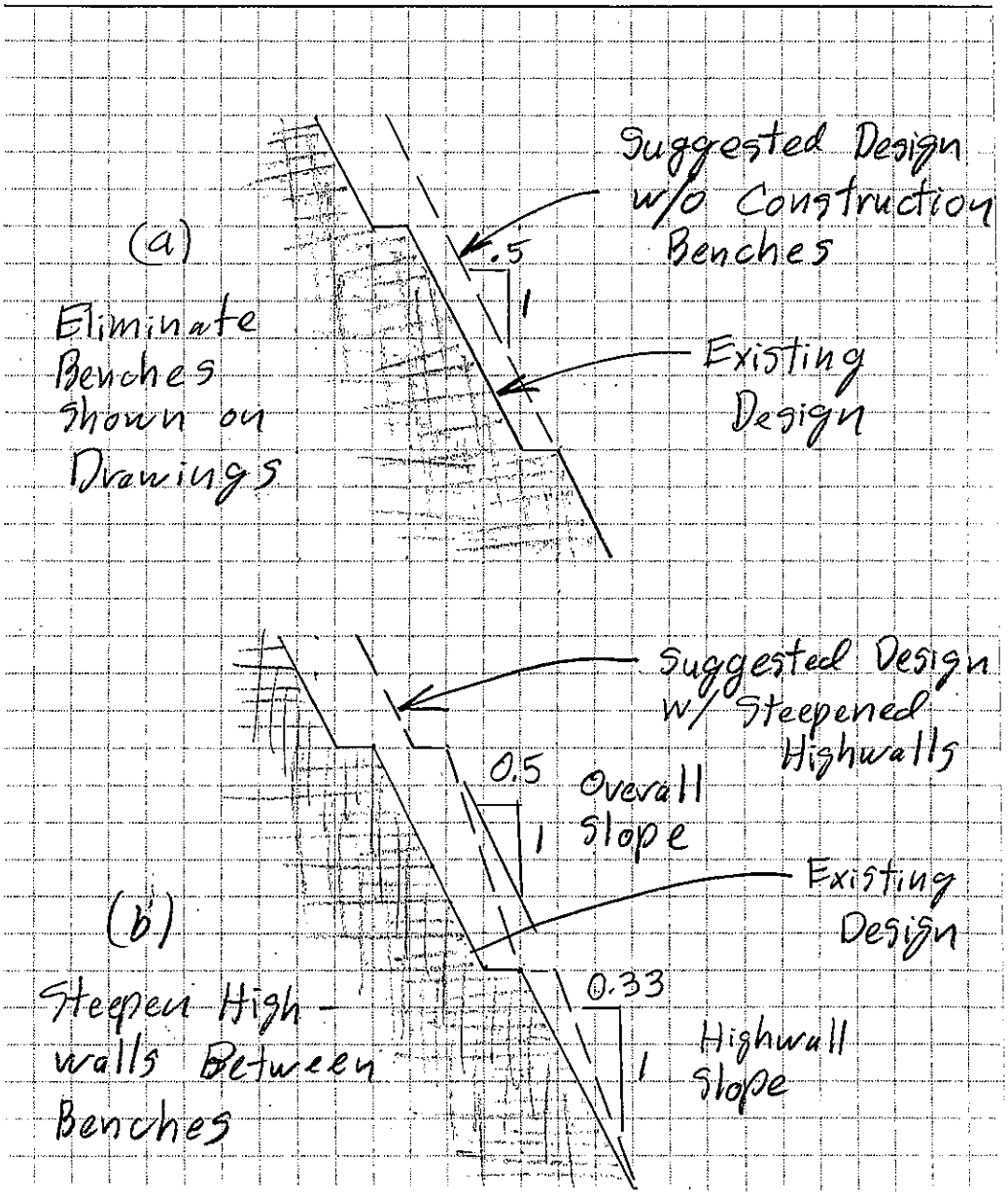
SHEET NO.: 4 of 7

CALCULATIONS

Client

Project

Subject



PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 10/28

SHEET NO.: 5 of 7

Purpose: Determine reduction in excavation volume due to elimination of construction benches for 0.5H:1V highwalls of cuts.

Method: Use 120 ft deep cut and estimate graphically the original X-sect area and the area savings. Use section at 428+00 as example.

Calcs: Existing X-sect area

$83.5 \text{ squares} \times (20' \times 20'/\text{sq}) = 33{,}400 \text{ ft}^2$

Savings

L side $= 5' \times 110' = 550 \text{ ft}^2$

R side $= 5' \times 100' = 500 \text{ ft}^2$

$1050. \text{ ft}^2$

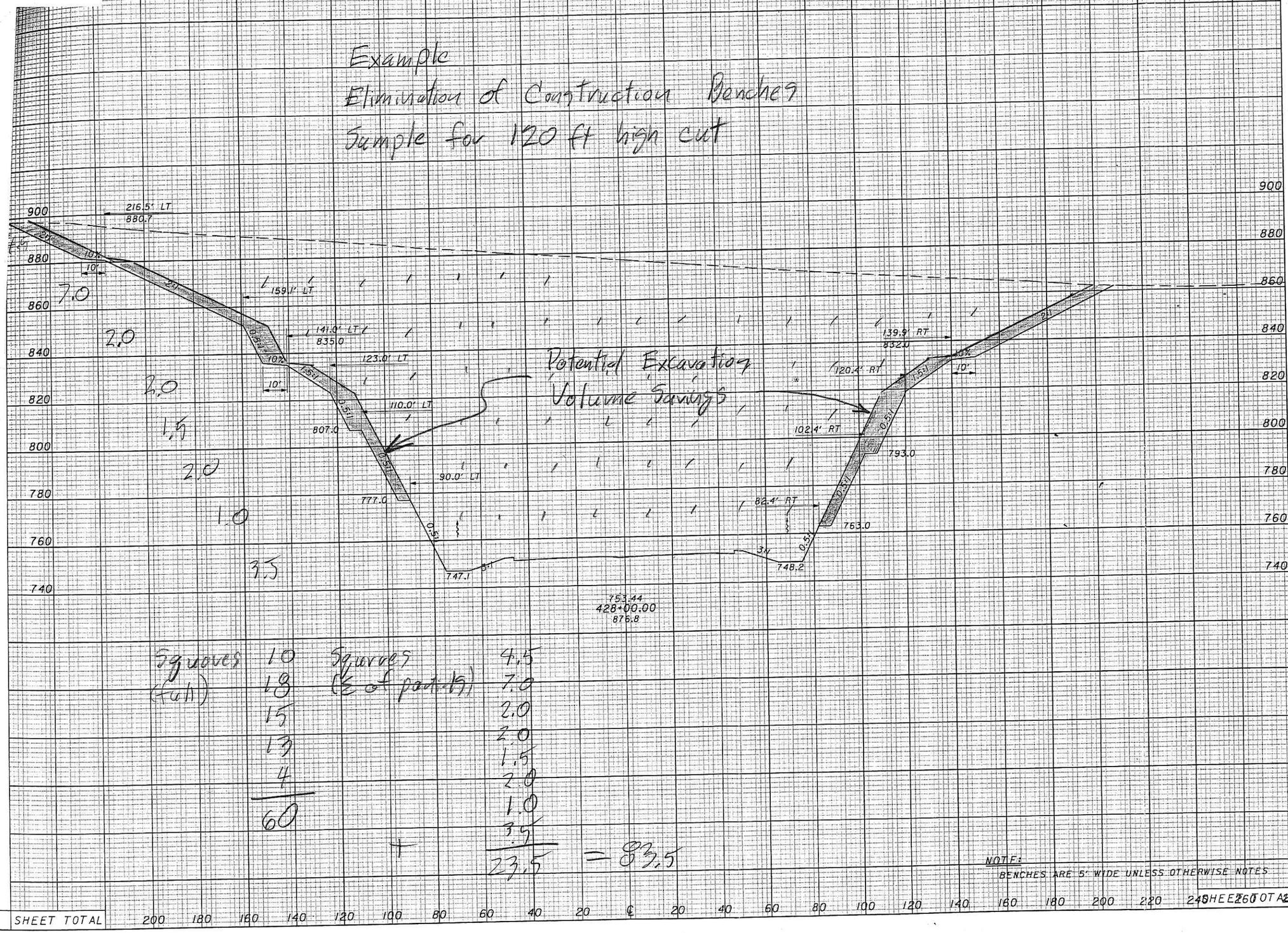
Proportional savings $\frac{1{,}050}{33{,}400} = 0.0165$

$= \boxed{1.65\%}$

Note: Calculation only for elimination of construction benches, not overburden or lithologic benches.

10/28
SHEET 6 OF 7

Example
Elimination of Construction Benches
Sample for 120 ft high cut



Squares (Full)		Squares (& of partial)	
	10		4.5
	18		7.0
	15		2.0
	13		2.0
	4		1.5
			2.0
			1.0
			3.5
	60	+	23.5 = 83.5

CUT | FILL | CUT | FILL | CALCULATE | CHECKED

CROSS SECTIONS
SR823 - STA. 428+00.00

SCI-823-6.81

176

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 10/20

SHEET NO.: 7 of 7

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Ph I Rock Ex	CY	5.7M	3.3	18.81M	5.61M	3.3	18.50 M
Ph II " "	CY	14.2M	3.3	46.92M	13.98M	3.3	46.14 M
Ph III " "	CY	10.1M	3.3	33.17M	9.89M	3.3	32.62M

Note: The cost savings calc does not include the cost of disposal of excess excavation which is embedded in the excavation cost. The true cost savings, including disposal could be as much as 0.60$/cy more.

	Sub-total			98.90			97.27 M
Mark-up at	15%			14.84			14.59
	TOTAL			113.74			111.86

1.63M

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**11A**
DESCRIPTION:	**USE STEEPENED FILL SLOPES WHERE ADVANTAGEOUS AT TOE OF DESIGN SLOPE WITHOUT IMPACT TO THE RIGHT-OF-WAY**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 2H:1V slopes in all fill areas. Flattened slopes are used in many areas to allow waste of excess material.

ALTERNATIVE: (Sketch attached)

Use steepened fill slopes of 1½H:1V for fills constructed with durable rock.

Use a hinge point at the toe of the 2H:1V design slope to widen the fill top allowing more (waste) fill to be placed within the template without impacting the right-of-way.

ADVANTAGES:

- Allows additional waste to be placed in fills while resulting toe of slopes are unchanged from those with 2H:1V slopes
- Reduces cost

DISADVANTAGES:

- The importance of using durable rock in the fill (quality control in construction) is more important if 1½:1 slopes are built to maintain adequate stability within the fill and possibly global stability involving the fill and foundation in some locations

DISCUSSION:

For a fill height of 50 ft. on relatively flat existing ground, the increase in width at the top of the fill using 1½:1 fill slopes vs. 2:1 slopes is approximately 50 ft.; for a 100-ft.-deep-fill, the increase is about 100 ft. and the top width increases with fill height. The effect allows more fill placement in the template (See attached sketches).

See cost sheet for "unit costs."

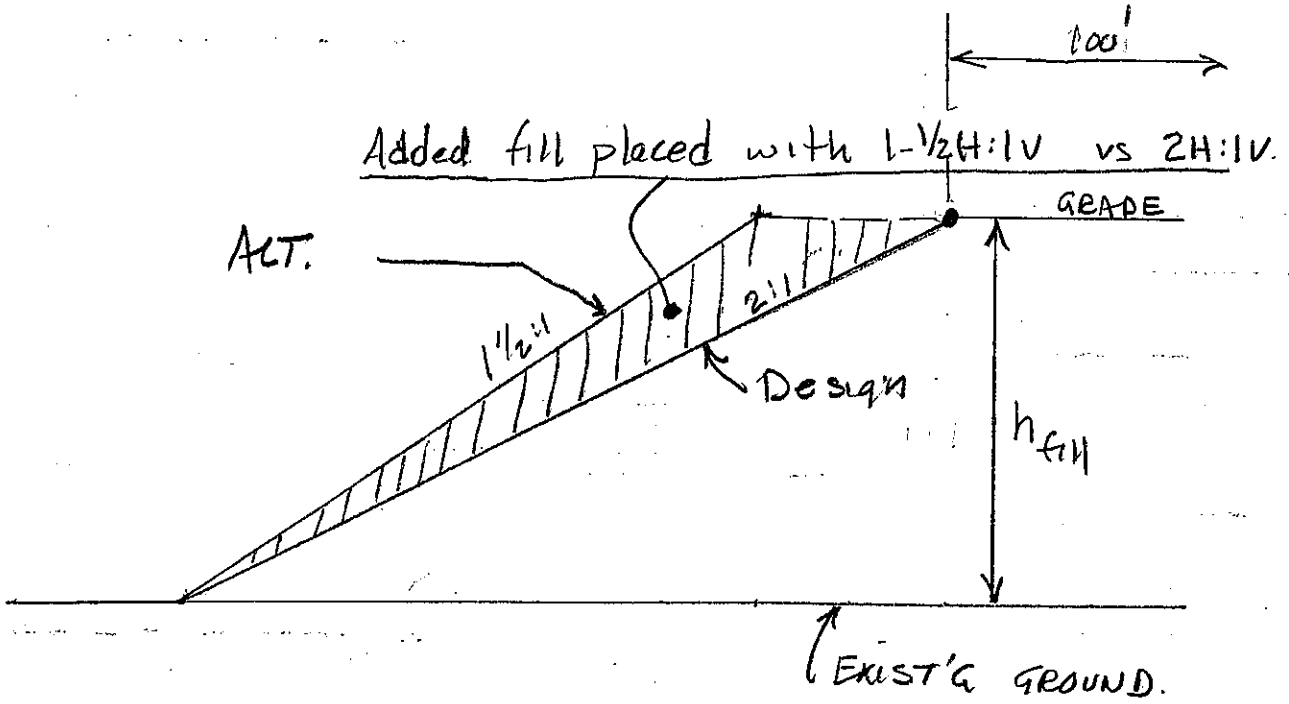
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 79,862	—	$ 79,862
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 79,862	—	$ 79,862

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 11A

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 2 of 4



Based on areas of fill cross section, with height of fill h_f shown and top width of 100' to slope break with 2H:1V slopes, the added area of fill and volume for a 100-foot long segment is as follows:

h_{fill}	Diff (%)	Diff (vol)/100' segment
50	12.5%	4630 CY
100	16.7%	18,519 CY
150	18.8%	41,667 CY
200	20.0%	74,074 CY

CALCULATIONS

PROJECT: **SCI-823-0.00PID Nos. 19415, 77366, and 79977**
Scioto County, Ohio

ALTERNATIVE NO.: **11A**

DESCRIPTION: **USE STEEPENED FILL SLOPES WHERE ADVANTAGEOUS AT TOE OF DESIGN SLOPE WITHOUT IMPACT TO THE RIGHT-OF-WAY**

SHEET NO.: **3 of 4**

Fill Hgt	Top w/ 2H:1V (Ft)	Bottom w/ 2H:1V (Ft)	Bottom w/ 1½H:1V (Ft)	Top w/ 1½H:1V (Ft)	Area w/ 1½H:1V (SF)	Area w/ 2H:1V (SF)	Difference (SF)	Difference (%)	Difference per 100' (CY)
50	100	300	300	150	11250	10000	1250	12.5%	4630
100	100	500	500	200	35000	30000	5000	16.7%	18519
150	100	700	700	250	71250	60000	11250	18.8%	41667
200	100	900	900	300	120000	100000	20000	20.0%	74074

COST WORKSHEET

PROJECT: **SCI-823-0.00PID Nos. 19415, 77366, and 79977** ALTERNATIVE NO: **11A**

Scioto County, Ohio

SHEET NO.: **4 of 4**

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
UNIT COSTS:							
100-ft. segment with Fill-height 50 ft.	CY	4,630	0.50	2,315			
100-ft. segment with Fill-height of 100 ft.	CY	18,519	0.50	9,260			
100-ft. segment with Fill-height of 150 ft.	CY	41,667	0.50	20,834			
100-ft. segment with Fill-height of 200 ft.	CY	74,074	0.50	37,037			

	Sub-total		69,445	
Mark-up at	**15.00%**		10,417	
	TOTAL		79,862	

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**11B**
DESCRIPTION:	**USE STEEPENED FILL SLOPES WHERE ADVANTAGEOUS AT TOP OF DESIGN SLOPE TO REDUCE CULVERT LENGTH AND STREAM IMPACTS**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 2H:1V slopes in all fill areas. Flattened slopes are used in many areas to allow waste of excess material.

ALTERNATIVE: (Sketch attached)

Use steepened fill slopes of 1½H:1V for fills constructed with durable rock.

Use a hinge point at the top of the 2H:1V design slope to reduce the fill bottom width, reduce culvert lengths (particularly box culverts), steam impacts and other features that offer cost savings.

ADVANTAGES:

- Reduces the length of the culverts, which could result in savings of about $1,500 - $3,000/LF with box culverts depending on fill cover depth and size
- Reduces stream impacts by reducing the impact of fills
- Reduces right-of-way impacts

DISADVANTAGES:

- Since the overall project is expected to have significant waste and an attempt is made to waste within the grading template, steepening of slopes would reduce the use of wasted material or require that other waste areas be found
- The importance of using durable rock in the fill (quality control in construction) is more important if 1½:1 slopes are built to maintain adequate stability within the fill and possibly global stability involving the fill and foundation in some locations

DISCUSSION:

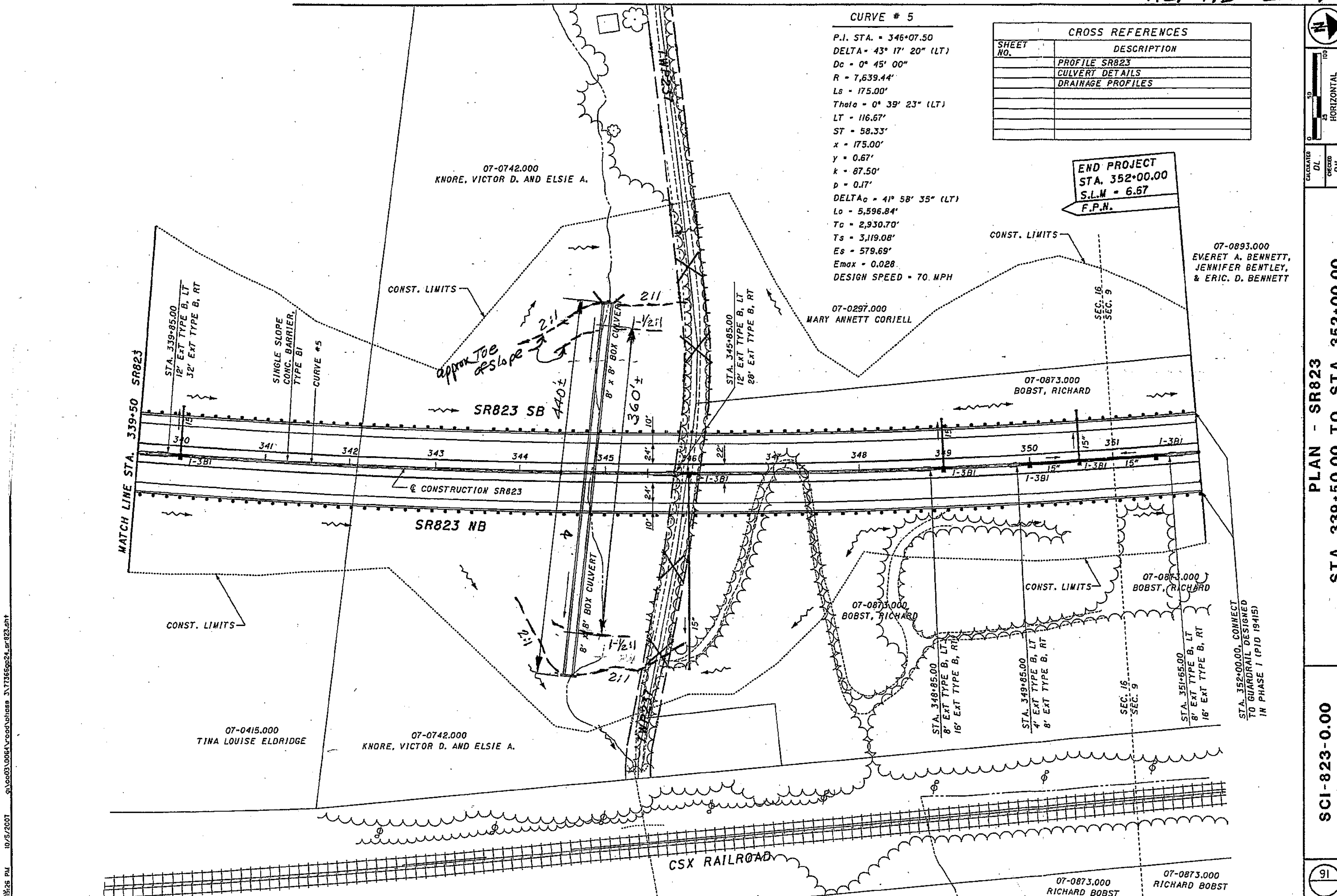
For a fill height of 50 ft. on relatively flat existing ground, the reduction in width at the base of the fill using 1½:1 fill slopes vs. 2:1 slopes is approximately 50 ft.; for a 100-foot deep fill, the reduction is about 100 ft. and the reduction increases with fill height. The steepened slope would therefore result in a reduction in culvert lengths and stream impacts. The cost savings would be especially significant when a box culvert costing several thousand dollars per foot is required (See attached sketches).

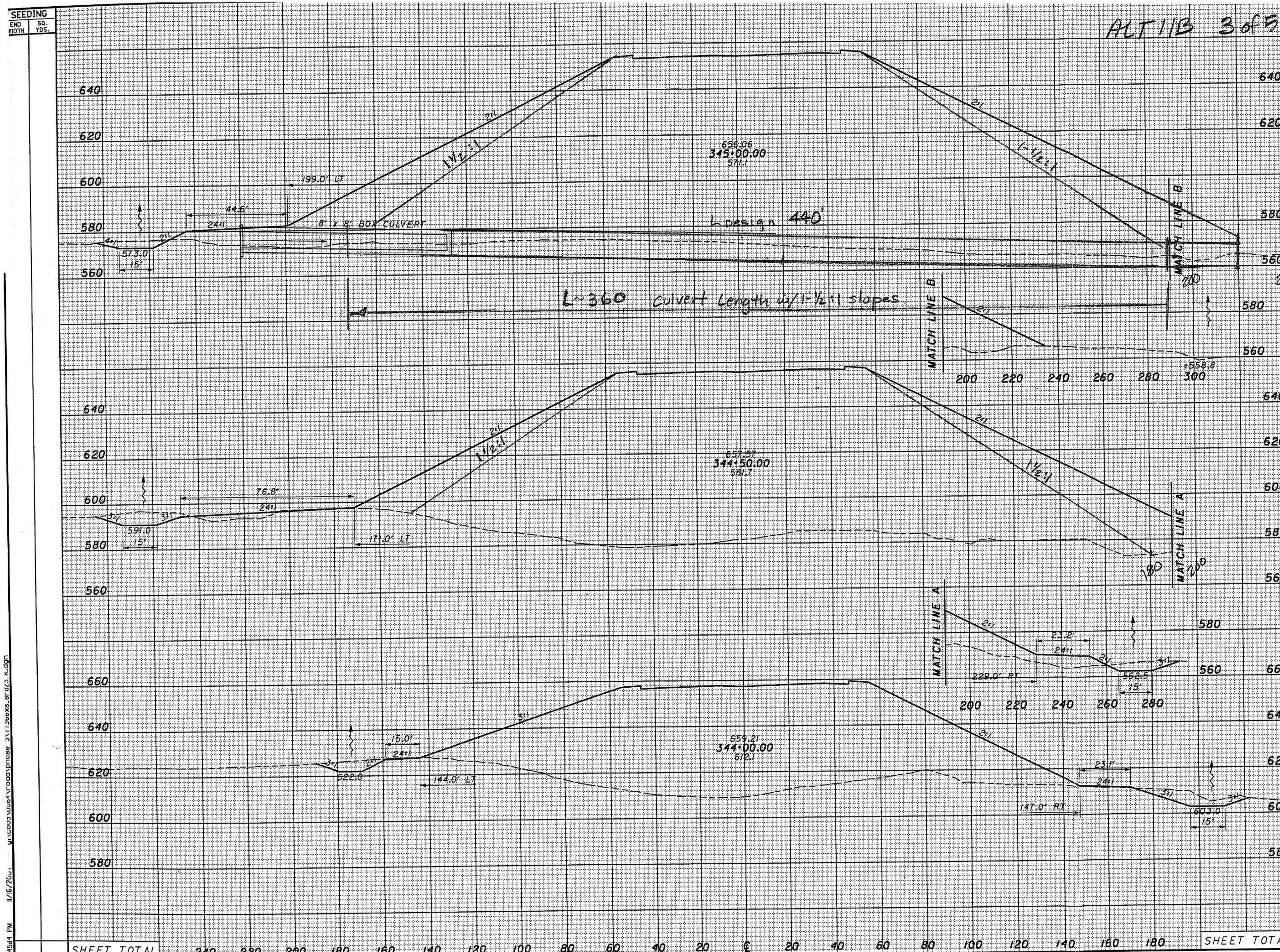
Since this approach would also reduce the amount of fill in these areas and the project has significant waste, it would require that the material be wasted in other areas on or outside the project limits (See attached sketches).

The cost summary is based on "example" culverts to illustrate savings on specific locations but may apply to other culverts in current or future locations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 3,588,000	—	$ 3,588,000
ALTERNATIVE	$ 2,898,000	—	$ 2,898,000
SAVINGS	$ 690,000	—	$ 690,000

ALT 11B 2 of 5


CURVE # 5
P.I. STA. = 346+07.50
DELTA = 43° 17' 20" (LT)
Dc = 0° 45' 00"
R = 7,639.44'
Ls = 175.00'
Theta = 0° 39' 23" (LT)
LT = 116.67'
ST = 58.33'
x = 175.00'
y = 0.67'
k = 87.50'
p = 0.17'
DELTAc = 41° 58' 35" (LT)
Lc = 5,596.84'
Tc = 2,930.70'
Ts = 3,119.08'
Es = 579.69'
Emax = 0.028
DESIGN SPEED = 70 MPH
CROSS REFERENCES
SHEET NO.
DESCRIPTION
PROFILE SR823
CULVERT DETAILS
DRAINAGE PROFILES
END PROJECT
STA. 352+00.00
S.L.M = 6.67
F.P.N.
HORIZONTAL SCALE IN FEET
CALCULATED DL
CHECKED RN
07-0742.000
KNORE, VICTOR D. AND ELSIE A.
07-0297.000
MARY ANNETT CORIELL
07-0893.000
EVERET A. BENNETT, JENNIFER BENTLEY, & ERIC D. BENNETT
07-0873.000
BOBST, RICHARD
07-0415.000
TINA LOUISE ELDRIDGE
07-0873.000
RICHARD BOBST
CONST. LIMITS
STA. 339+85.00
12' ExT TYPE B, LT
32' ExT TYPE B, RT
SINGLE SLOPE CONC. BARRIER, TYPE BI
CURVE #5
STA. 345+85.00
12' ExT TYPE B, LT
28' ExT TYPE B, RT
STA. 348+85.00
8' ExT TYPE B, LT
16' ExT TYPE B, RT
STA. 349+85.00
4' ExT TYPE B, LT
8' ExT TYPE B, RT
STA. 351+65.00
8' ExT TYPE B, LT
16' ExT TYPE B, RT
STA. 352+00.00, CONNECT TO GUARDRAIL DESIGNED IN PHASE 1 (PID 19415)
SEC. 16
SEC. 9
MATCH LINE STA. 339+50 SR823
SR823 SB
SR823 NB
℄ CONSTRUCTION SR823
8' x 8' BOX CULVERT
approx Toe of Slope
2:1
1-1/2:1
440'±
360'±
1-381
CSX RAILROAD
PLAN - SR823
STA. 339+50.00 TO STA. 352+00.00
SCI-823-0.00
91



CROSS SECTIONS

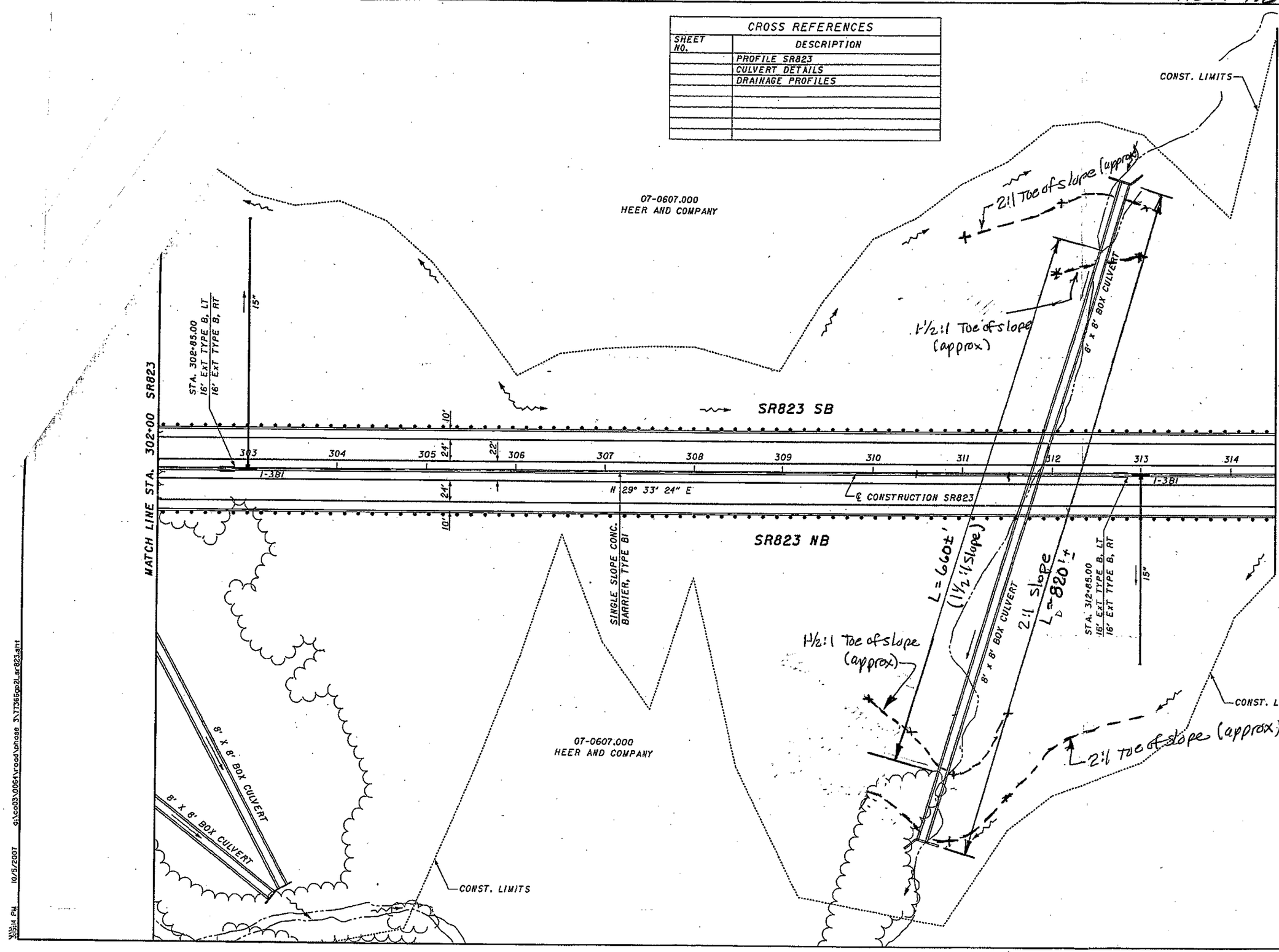
SR823 -STA. 344+00.00 TO STA. 345+00.00

SCI-823-0.00

516

ALT. 1CB 4 of 5

CROSS REFERENCES	
SHEET NO.	DESCRIPTION
	PROFILE SR823
	CULVERT DETAILS
	DRAINAGE PROFILES



HORIZONTAL SCALE IN FEET
0 25 50 100

CALCULATED DL
CHECKED RH

PLAN - SR823
STA. 302+00.00 TO STA. 314+50.00

SCI-823-0.00

85

10/5/2007 g:\co03\00641\road\phase 3\17365gp2l_sr823.sht
3:51:14 PM

COST WORKSHEET

PROJECT: **SCI-823-0.00PID Nos. 19415, 77366, and 79977**
Scioto County, Ohio

ALTERNATIVE NO: **11B**

SHEET NO.: **5 of 5**

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Note: Unit prices are from 2/9/2006							
Add'l Studies, Portsmouth Bypass							
Examples:							
8' x 8' Box Culvert (~ Sta 345)		440	1,500	660,000	360	1,500	540,000
Height of Fill at CL ~ 80'							
8' x 8' Box Culvert (~ Sta 312)		820	3,000	2,460,000	660	3,000	1,980,000
Height of Fill at CL ~ 190'							
	Sub-total			3,120,000			2,520,000
Mark-up at	15.00%			468,000			378,000
	TOTAL			3,588,000			2,898,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**12**
DESCRIPTION:	**USE ROCKFALL MESH AND REDUCE CATCHMENT DITCH WIDTH**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

Rock cuts are bare and the catchment ditches are designed for rockfall initiated from the full height of the cuts. Rockfall catchment ditches are 25 ft. wide.

ALTERNATIVE: (Sketch attached)

Use rockfall mesh to contain rockfall. Rocks rattle down behind the mesh and have an effective free fall height of approximately 25 ft. Result is that the catchment ditches can be 10 ft. wide, a reduction of 15 ft.

ADVANTAGES:

- Reduces cost
- Reduces excavation volume for disposal

DISADVANTAGES:

- Mesh requires maintenance to remove rocks and repair
- Visual appearance may not be as pleasing to highway users as bare rock

DISCUSSION:

Evaluation of the cost savings from a reduction in excavation volume is less than the cost of the rockfall mesh by a factor of two. This assessment includes the disposal cost for excess excavation.

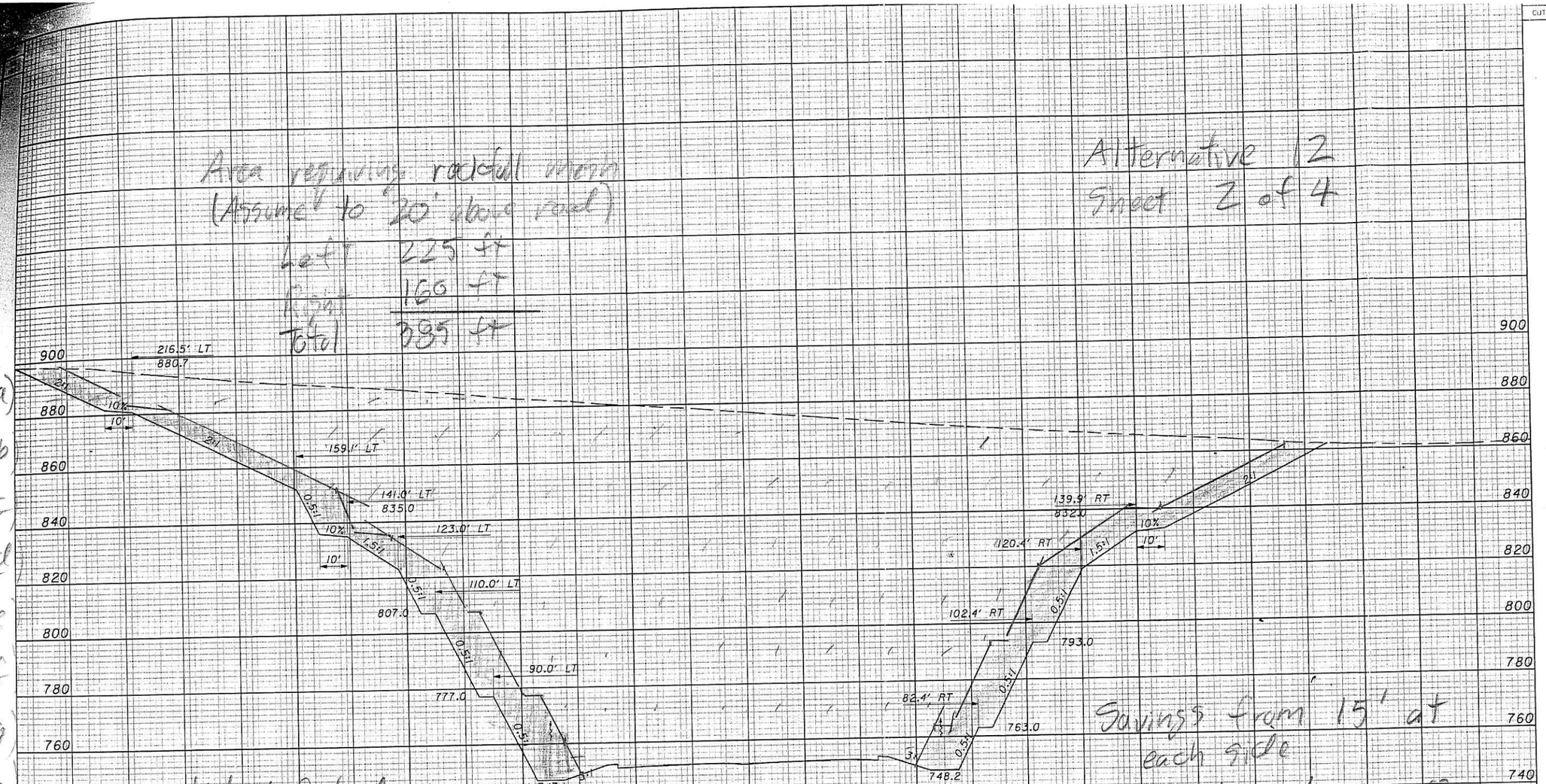
Note: Costs are unit costs per linear foot.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 707	—	$ 707
ALTERNATIVE	$ 1,540	—	$ 1,540
SAVINGS	$ (833)	—	$ (833)

Area requiring rockfall mesh
(Assume 0' to 20' above road)

Left	225 ft
Right	160 ft
Total	385 ft

Alternative 12
Sheet 2 of 4



Initial X-Sect Area
to be joined

Squares: 4.5
14.5
16.5
13.5
11.5
10.0
4.0
3.5
83 × 400 ft²/9 = 33,200 ft²

Savings from 15' at each side

Left: 15' × 150 = 2,250
Right 15' × 110' = 1,650
3,900

NOTE:
BENCHES ARE 5' WIDE UNLESS OTHERWISE NOTES

	CUT	FILL	CUT	FILL
SHEET TOTAL				
SHEET TOTAL				

CALCULATED
CHECKED

CROSS SECTIONS
SR823 - STA. 428+00.00

SCI-823-6.81

176

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 12

SHEET NO.: 3 of 4

Purpose: Compare costs for using wire rockfall mesh with a reduction of 15 ft in ditch width.

Assumptions: Base savings on typical section at sta 428+00 which is a 130 ft cut in a trench.

Cut Reduction:

Initial x-sect area of cut = 33,200 ft²
(See drawing, by counting sq)

Savings in cut x-sect area = 3,900 ft²
(See drawing for calc)

Proportional reduction = 0.12 ⇒ 11.75%

Cost Δ:

For this section using a 1 ft slice along the highway

Rock Ex savings = $(3{,}900\ ft^2)(1\ ft)/27$
= 144 cy

Cost of Ex = 3.3 $/cy excav + 1.6 $/cy disp
= 4.9 $/cy

Cost reduct = $(144\ cy)(4.9\ \$/cy) = \$707$

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 12

SHEET NO.: 4 of 4

Cost of rockfall mesh = $4.00/SF based on 3 projects in Colorado (Wolf Cr Pass, Hwy 6 rockslide repair, Hwy 50/Blue Cr Canyon)

Area of rockfall mesh from drawing = 395 ft

Assuming 1 ft long section = 395 ft²

Cost = (395 ft²)($4.00/SF) = $ 1,540

Cost Δ = Excavation Savings $ 707

Mesh Cost 1540

-833

Cost Increase - No benefit

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**14B**
DESCRIPTION:	**USE A 2:1 FORESLOPE FOR CATCHMENT DITCHES**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

Current catchment ditch configuration includes a 3:1 foreslope with a 10-ft.-wide flat area at the base of the slope.

ALTERNATIVE: (Sketch attached)

Use a 2:1 foreslope in lieu of the 3:1 foreslope.

ADVANTAGES:

- Reduces catchment ditch width

DISADVANTAGES:

- Lack of FHWA data on rockfall along a 2:1 foreslope creates design uncertainty

DISCUSSION:

Current ODOT catchment ditch standards do not discuss the use of a 2:1 foreslope.

The use of a 2:1 foreslope for the catchment ditch may lessen the necessary ditch width, reducing the entire excavation for the cross-section cut.

Recommendation is made for consideration of an expansion of ODOT Geotech Bulletin 3 Table C to include guidelines for a 2:1 foreslope and for use in this project design.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**19**
DESCRIPTION:	**USE GROUND NAIL WALLS TO AVOID SOME SOIL CUTS IN SLIVER CUTS**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design employs both rock and soil cuts continuously from the road to the daylight point.

ALTERNATIVE: (Sketch attached)

Use ground nail walls to avoid some soil cuts in sliver cuts.

ADVANTAGES:

- Reduces cost
- Reduces disturbed areas
- Reduces right-of-way
- Reduces waste

DISADVANTAGES:

- Long-term performance may require periodic maintenance or repair
- Creates potential design issues for the walls in cohesive soils

DISCUSSION:

Where there are sliver cuts in the soil, there are potential benefits for using ground nail walls to reduce cut volumes and disturbance areas. The cost analysis is only for wall cost vs. excavation cost. Other cost advantages not quantified are for reduced seeding/revegetation and smaller areas.

Upon review of the cross sections and calculating costs, it appears that there is a cost savings for only three reaches; all I Phase II: (1) STA 481+00 to STA 481+50, (2) STA 670+00 to STA 671+00, and (3) 791+00 to STA 793+50.

If the costs of slope treatment and right-of-way acquisition are included, there could be other areas where ground nail walls are beneficial.

An additional opportunity for ground nail walls is at SR-234 (Shumway Hollow Road) where there is a sliver cut.

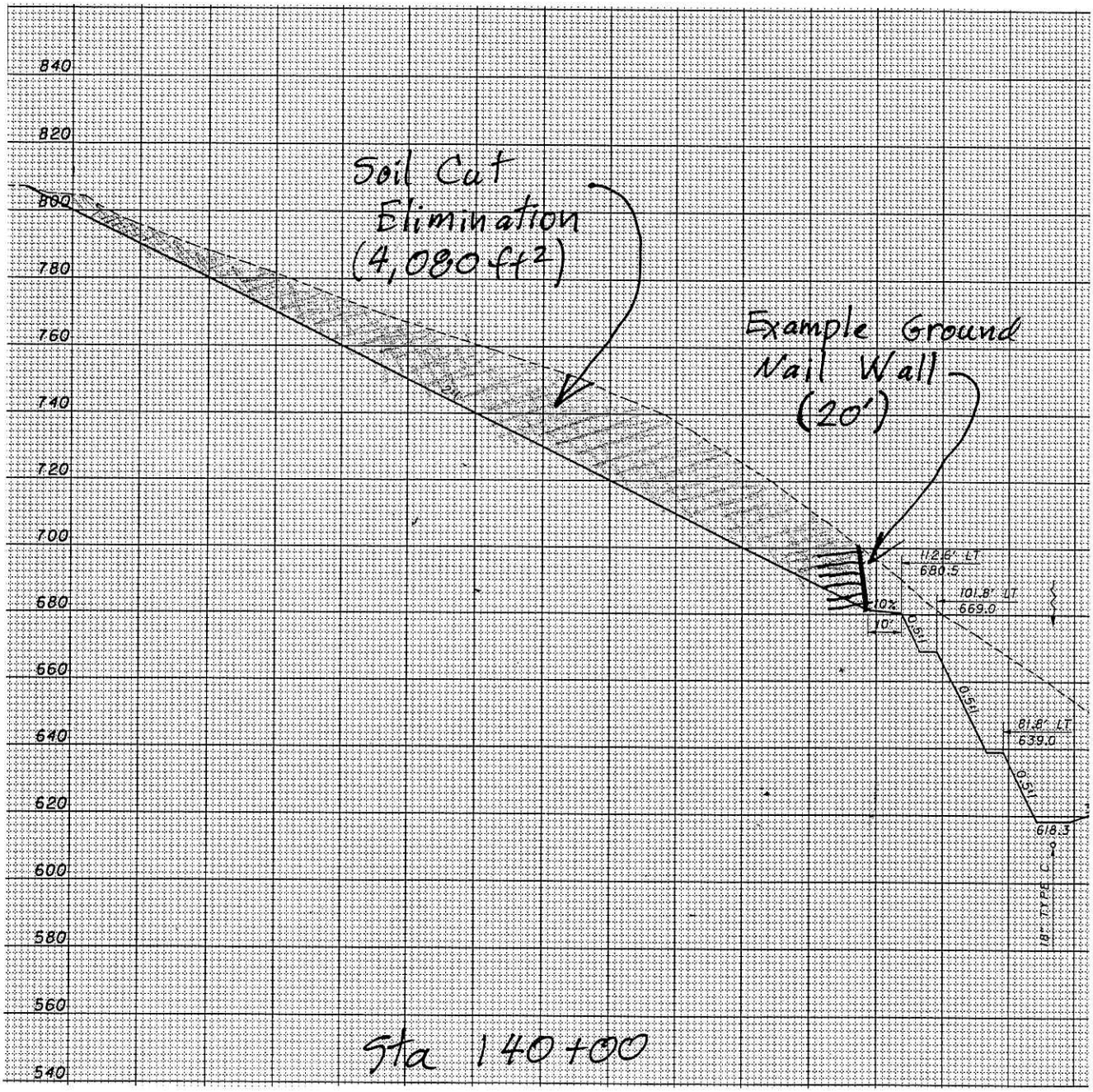
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 340,144	—	$ 340,144
ALTERNATIVE	$ 177,100	—	$ 177,100
SAVINGS	$ 163,044	—	$ 163,044

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 19

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 2 of 5



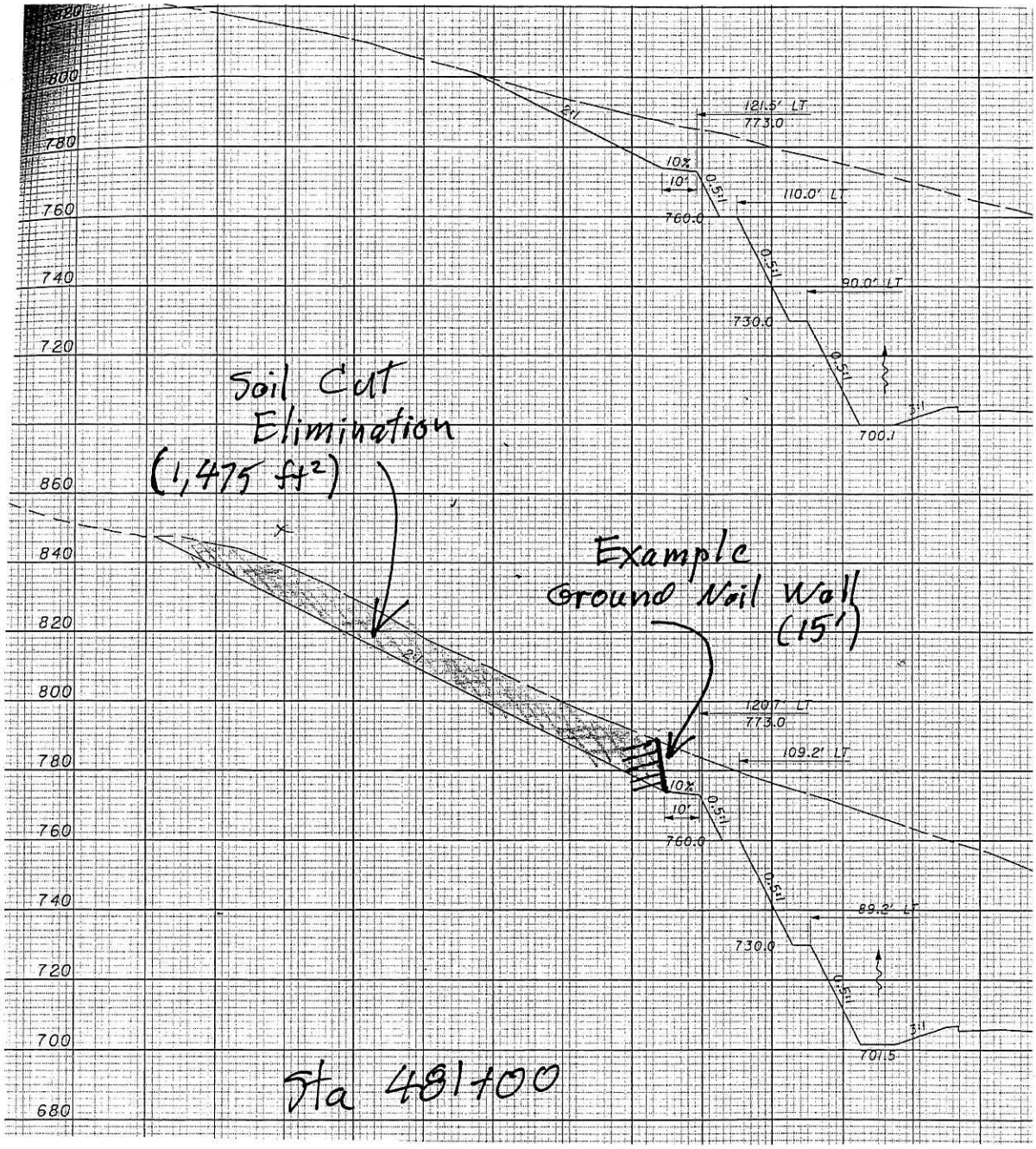
SKETCHES

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 19

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 3 of 5



PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**19**
DESCRIPTION:	**USE GROUND NAIL WALLS TO AVOID SOME SOIL CUTS IN SLIVER CUTS**	SHEET NO.:	**4 of 5**

Ground Nail Wall Cost Basis

Range in costs for 2 Colorado projects (Wolf creek pass & Shale bluffs) = $ 20 - 90/SF w/ Typical range $ 30 - $ 45/SF. Mountainous environment, both are highway projects. Also have previously discussed costs w/ several contractors within approx same range.

Base cost estimates on $35/SF. Working conditions are not as severe as for an alpine environment.

Excavation Costs

Excavation $ 3.30/cy + disp $ 1.10/cy = total $ 4.40/cy

Seeding & Mulch / Sodding $ 1.0/sy (A benefit but not included in cost comparison)

Quantities & Costs

See attached spreadsheet

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977,**
PORTSMOUTH BYPASS, Scioto County, Ohio
Stage 1 Design

ALTERNATIVE NO.: 19

SHEET NO.: 5 of 5

CALCULATIONS

Portsmith Bypass VE
Quantity and cost summary

Alternative 19
Sheet 6 of 6

Phase	Stations		Length (FT)	Wall Ht (FT)	Ave Cut X-sect (SF)	Ex Vol (CY)	Wall Area (SF)	Costs Wall ($)	Ex & disp ($)	Save ($)
								35	4.4	
I	43400	43850	450	22	3150	52,500	9,900	346,500	231,000	-115,500
	47900	48150	250	15	1475	13,657	3,750	131,250	60,093	-71,157
II	67000	67100	100	10	8250	30,556	1,000	35,000	134,444	99,444
	68050	68150	100	10	1500	5,556	1,000	35,000	24,444	-10,556
	79100	79350	250	12	2592	24,000	3,000	105,000	105,600	600
	48100	48150	50	8	6840	12,667	400	14,000	55,733	41,733
	83500	83600	100	25	5280	19,556	2,500	87,500	86,044	-1,456
III	13950	14350	400	20	4080	60,444	8,000	280,000	265,956	-14,044
	18800	19950	1150	17.5	1400	59,630	20,125	704,375	262,370	-442,005
						Totals for positives		154,000	295,778	141,778
						Contingency	0.15	23,100	44,367	21,267
						TOTALS W/ CONTINGENCY		177,100	340,144	163,044

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**23**
DESCRIPTION:	**SELL EXCESS ROCK AS AN AGGREGATE SOURCE**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

The contractor is responsible for disposal of excess excavation.

ALTERNATIVE:

Investigate the local aggregates business and facilitate beneficial use of the excess excavation with local quarries. This assumes that the sandstone is suitable for use as aggregates, which needs to be evaluated.

ADVANTAGES:

- Takes advantage of a created resource
- Reduces cost
- Reduces bids in the area

DISADVANTAGES:

- May be perceived as a government entity competing with local businesses
- May be perceived as government "playing favoritism"
- New endeavor for ODOT

DISCUSSION:

If one or more nearby quarries can be identified to accept the waste rock, this would save on disposal costs and may even be a cost benefit for the project. Similarly, there could be beneficial use destinations for other materials identified prior to bid, such as for use in dams, embankments, or general site fill at developments. A pre-sale agreement or other legal instrument could be used to guarantee a destination for the rock. With this approach, the contractors would not only have a destination for waste rock, but there could be revenue generated which could go either directly to ODOT, or to the contractor with a commensurate reduction in bid price.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**25A**
DESCRIPTION:	**USE A ROUNDABOUT AT THE US 23 INTERCHANGE**	SHEET NO.:	**1 of 6**

ORIGINAL DESIGN: (Sketch attached)

A full flow systems interchange with all movements is provided (grade separated).

Ramp design speed is 35 mph minimum.

ALTERNATIVE: (Sketch attached)

Use an at grade high speed roundabout with three circulating lanes and a circulatory speed design of 45 mph with slip ramps for US 23 northbound to SR 83 eastbound.

ADVANTAGES:

- Reduces cost

DISADVANTAGES:

- Defies public expectation (high speed, high volume roundabout)
- Increases AG and wetland impacts
- Increases signage and lighting required
- Increases pavement area (initial cost and long-term maintenance)
- Increases real estate costs

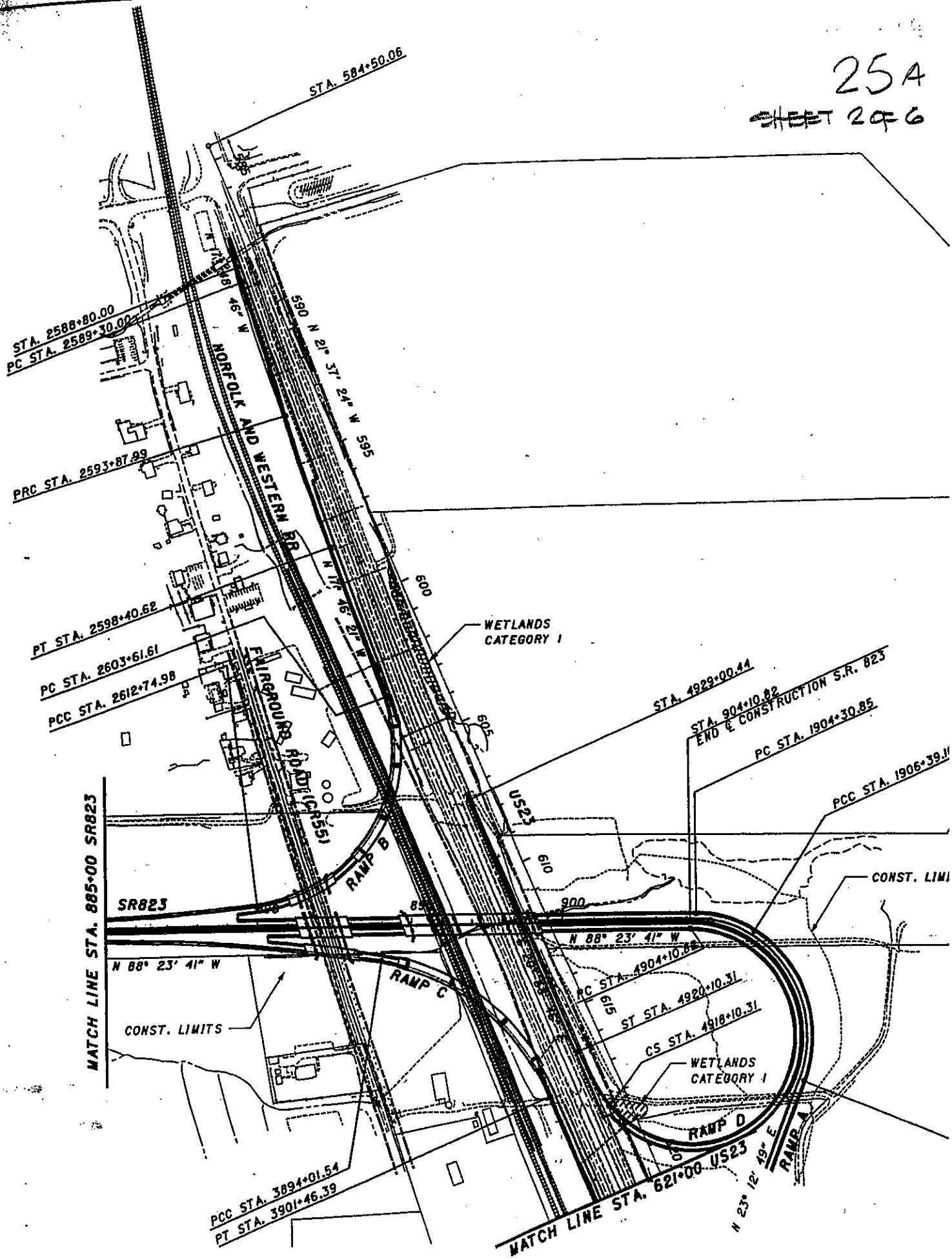
DISCUSSION:

A modern roundabout shows initial promise. Eliminate all but main line SR 823 structures over Norfolk and Western Railroad and CR 55 (Fairground Road), thus reducing initial and recurring maintenance costs for structures. Requires additional pavement and traffic control with overhead lighting.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 13,376,685	—	$ 13,376,685
ALTERNATIVE	$ 6,143,301	—	$ 6,143,301
SAVINGS	$ 7,233,384	—	$ 7,233,384

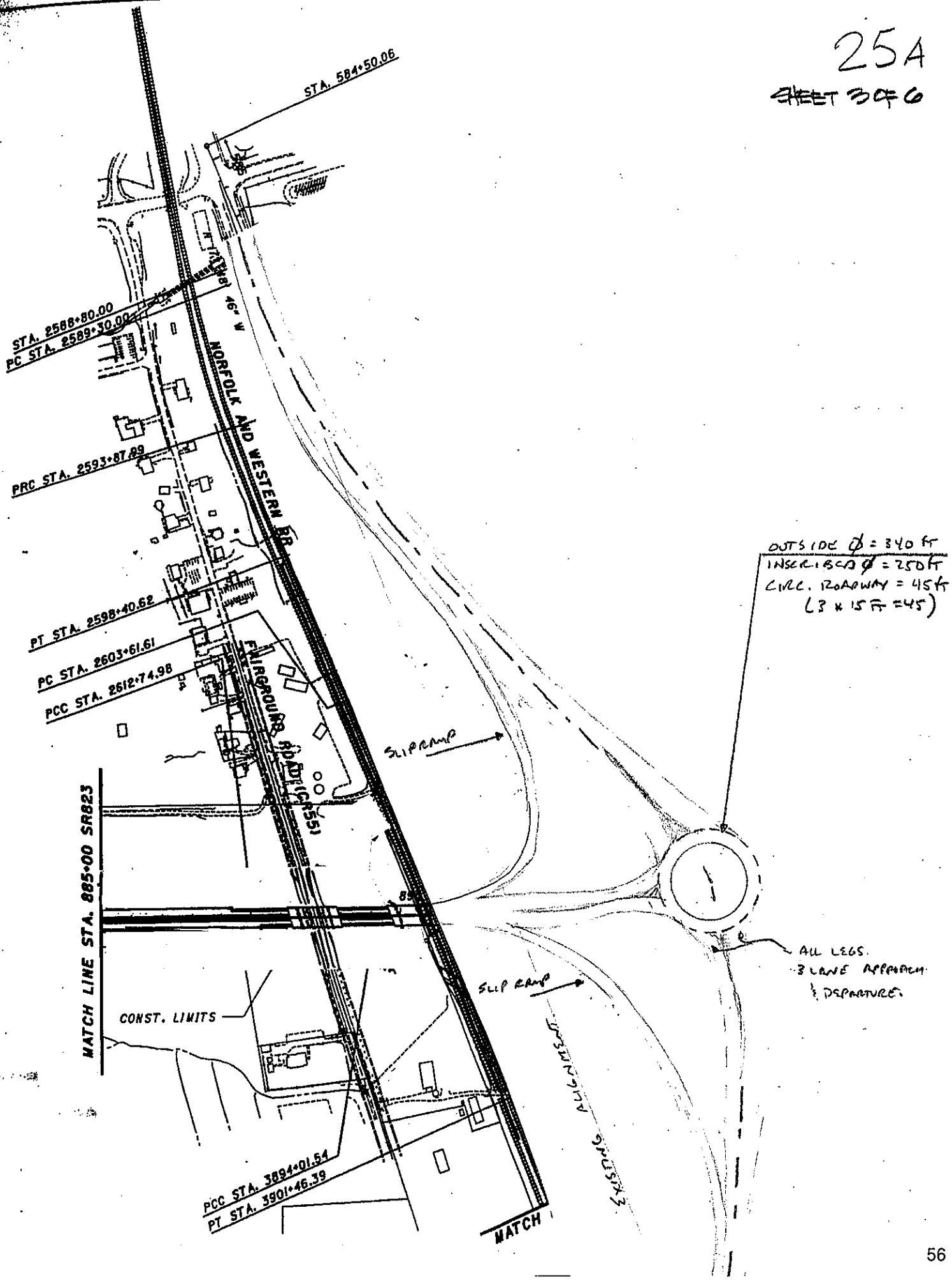
25A

SHEET 2 OF 6



25A

SHEET 3 OF 6



PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 2SA

SHEET NO.: 4 of 6

KDOT ROUNDABOUT GUIDANCE → RURAL 2 LANE 175 - 250 FT INSCRIBED CIRCLE
CIRCULATING ROADWAY 15 FT / LANE.
3 LANES LIKELY NEEDED.
15 x 3 = 45 FT
250 + 45 + 45 ⇒ 340 FT.

A CURSORY LOOK AT THE TRAFFIC VOLUMES IN SIDRA FOR A 2 LANE ROUND ABOUT W/ 45 MPH DESIGN SPEED SHOWS PROMISE. LOS C FOR THROUGH MOVEMENTS IN DESIGN YEAR. V/C > 0.80 ON SLIP RAMPS (0.80 IS R.E.S. RECOMMENDED MAX FOR ROUND ABOUTS)

- A 3-LANE ROUND ABOUT WAS NOT MODELED BUT SHOULD ALLEVIATE THE V/C ISSUE.
- DESIGN SPEED CAN BE INCREASED, THOUGH GUIDANCE ON APPROPRIATENESS IS SCARCE.
- FURTHER CONSIDERATION NEEDED ON DESIGN SPEED FOR SLIP RAMPS AND ROUND ABOUT WITH REGARD TO THE SPEED DIFFERITIAL BETWEEN SR 823 AND US 23.

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 25A

SHEET NO.: 5 of 6

ADDITIONAL PAVEMENT — SOUTH LEG US 23 — 4 LANES @ 2500 ft — 10,000
2 LANES @ 1500 ft. — 3,000

NORTH LEG US 23 — 4 LANES @ 2500 ft — 10,000
2 LANES @ 1500 ft — 3,000

26,000 LANE ft.

ASSUME RAMPS B & C ARE AWASH WITH ORIGIONAL DESIGN

SR 823 — 6 LANES @ 500 ft. — 3,000 ft.

29,000

TR 2

MAIN LINE PAVEMENT $\frac{12 * 29{,}000\ ft^2}{9\ ft} = 38{,}667$ S.Y.

@ $38 / S.Y $\Rightarrow$ $1,469,333 $\Big\rangle$ = $2,173,321

CIRCULATOR $\frac{(\pi(340^2 - 250^2))\ ft^2}{9\ ft^2} \rightarrow 18526 * 38 =$ $703,988

PAVEMENT REMOVAL / COMMON EX. $2\left[2300\ ft * \frac{160\ ft}{27} * 3\ ft\right] = 51{,}111$ C.Y.

ROCK EXEC $330. C.Y. = $168,667

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 25 A

SHEET NO.: 6 of 6

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
SR 823 OVER RR & US 23	LS	1.0		3,516,450.00			ø
SR 823 OVER RR	LS	—	—	—	1.0		2,000,000
RAMP B OVER FAIR ROAD	LS	1.1		573,300.00			ø
RAMP B OVER RR	LS	1.0		3,066,000			ø
RAMP C OVER FAIR ROAD	LS	1.1		619,500			ø
RAMP C OVER RR	LS	1.0		3,856,650			ø
COMMON EX./PVMT REM.	C.Y.				51,111		168,667
(USED PUBLIC EX. NUMBER)							
PAVEMENT	S.Y.				57193		2,173,334
ADDITIONAL MISC.							
LIGHTING	LS						500,000
STRIPPING							
SIGNAGE							
DRAINAGE							
REAL ESTATE	-						500,000
STRUCTURE MAINTENANCE				PRICELESS			
Sub-total				11,631,900			5,342,001
Mark-up at	15%			1,744,785			801,300
TOTAL				13,376,685			6,143,301

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**25B**
DESCRIPTION:	**ELIMINATE THE RAMP BRIDGES AT THE US 23 INTERCHANGE**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Ramp B and Ramp C bridges cross over the railroad and Fairground Road.

ALTERNATIVE: (Sketch attached)

Move US 23 east at the intersection to eliminate Ramp B and Ramp C bridges over the railroad and Fairground Road.

ADVANTAGES:

- Reduces cost
- Eliminates curve ramps
- Reduces maintenance for bridges over the railroad

DISADVANTAGES:

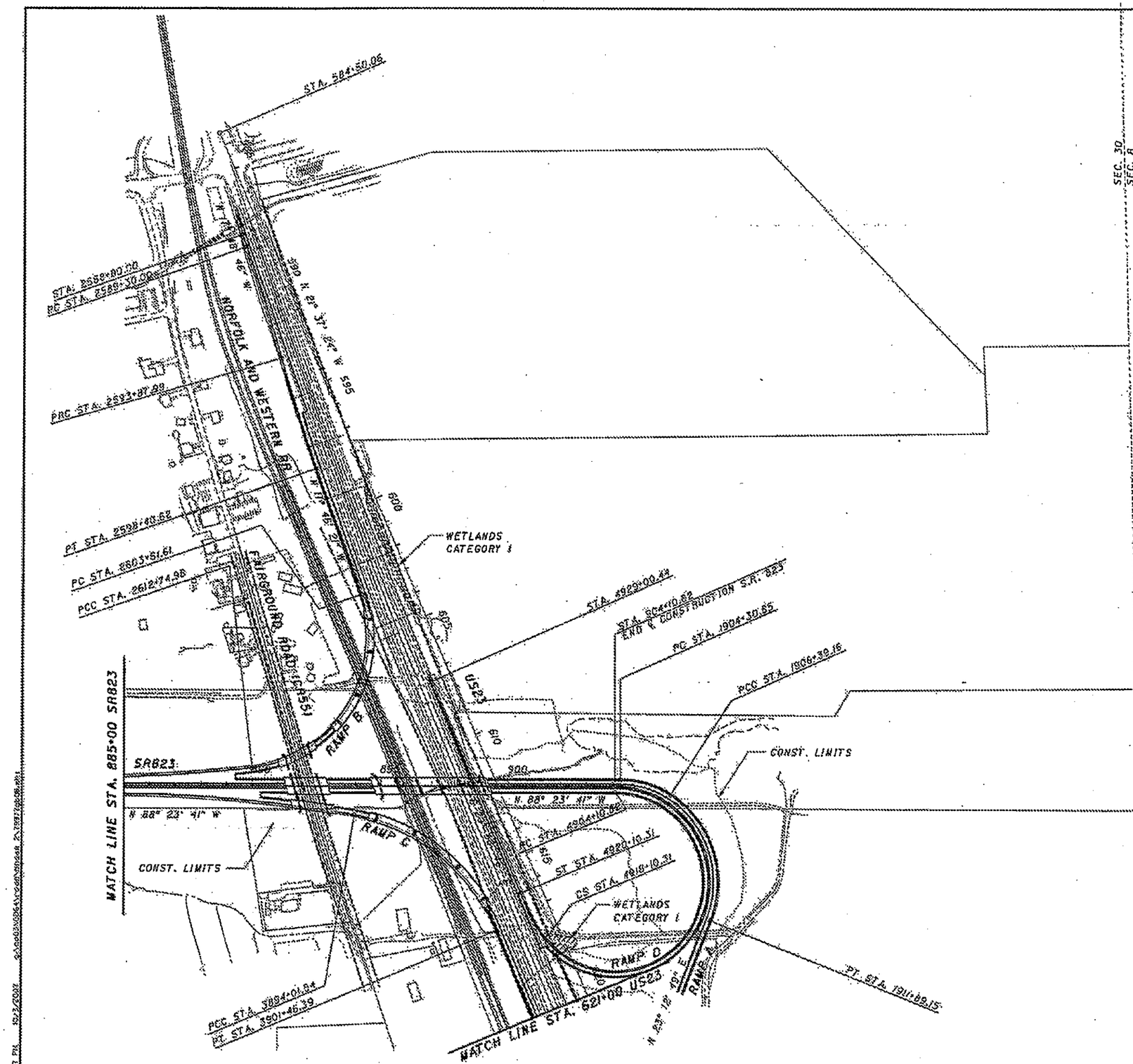
- Increases AG and wetland impacts
- Increases pavement area (initial cost and long-term maintenance)
- Increases real estate costs
- Provides a curved alignment on US 23

DISCUSSION:

Reverse curve on US 23 needs to be investigated to meet the required design speed limits.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 13,376,685	—	$ 13,376,685
ALTERNATIVE	$ 6,486,000	—	$ 6,486,000
SAVINGS	$ 6,890,685	—	$ 6,890,685

25B
245



LEGEND:

X - REMOVAL

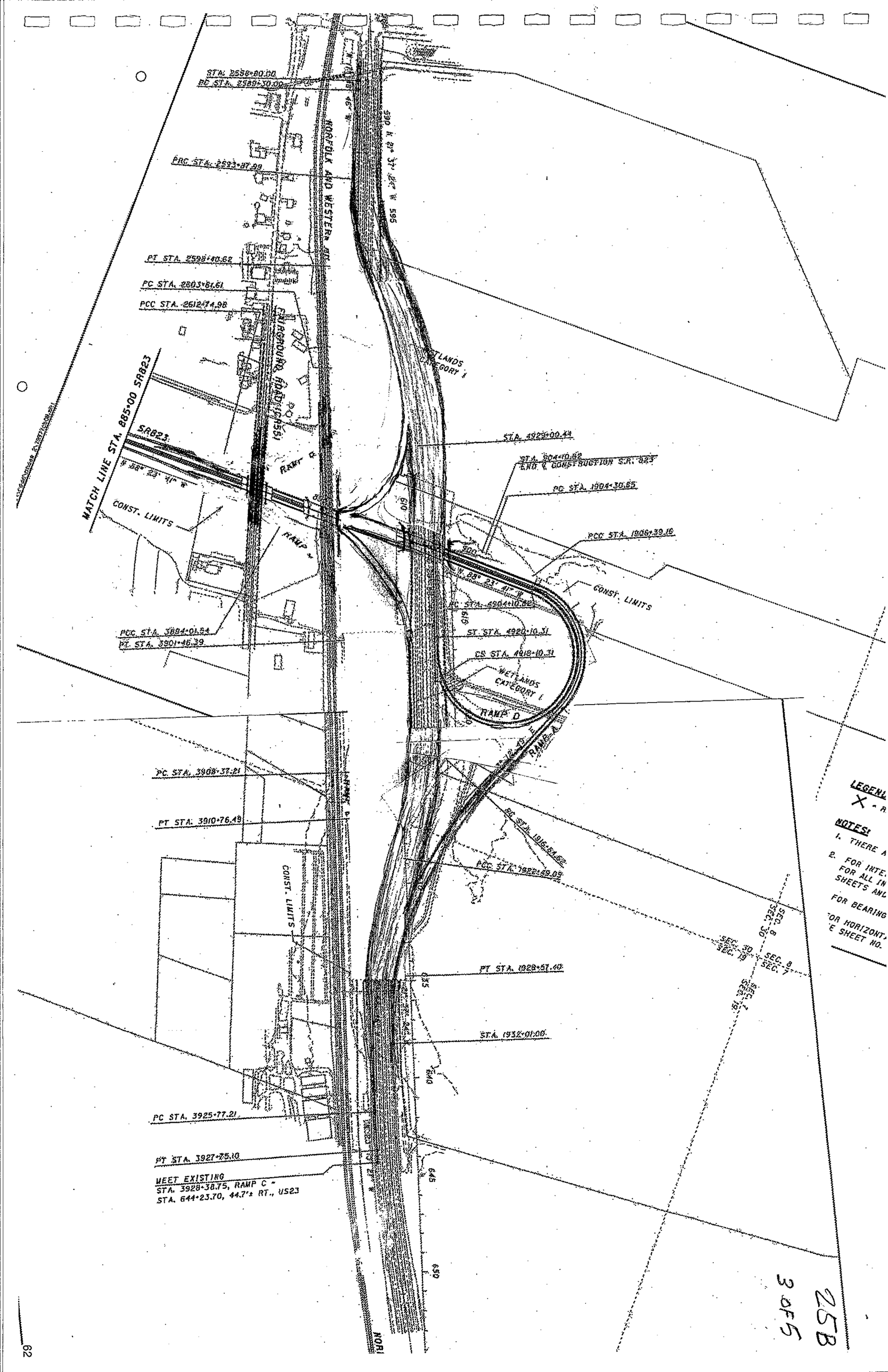
NOTES:

1. THERE ARE NO LANDSCAPING AREAS WITHIN THE WORK LIMITS.
2. FOR INTERSECTION STATIONS AND FOR INTERSECTION ANGLES FOR ALL INTERSECTING ROADWAYS, SEE INTERSECTION DETAIL SHEETS AND PLAN SHEETS.
3. FOR BEARINGS ON SIDEROADS SEE PLAN SHEETS.
4. FOR HORIZONTAL CURVE DATA SEE PLAN SHEETS AND SEE SHEET NO.

HORIZONTAL SCALE IN FEET

SCHEMATIC PLAN - SR823
STA. 885+00.00 TO STA. 904+79.54

SCI-823-10.31



LEGEND

X - R

NOTES:

1. THERE A
2. FOR INTE... FOR ALL IN... SHEETS AN...

FOR BEARING...

FOR HORIZONT... E SHEET NO.

3 of 5

258

62

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 25 B

SHEET NO.: 4 of 5

ADDITIONAL PAVEMENT :

SOUTH US 23	4 LANES @ 2500'	= 10,000'
	2 LANES @ 1500'	= 3,000'
NORTH US 23	4 LANES @ 2500'	= 10,000'
	2 LANES @ 1500'	= 3,000'
SR. 823	6 LANES @ 500'	= 3000'
		29000 LANE FT.

MAIN LINE PAVEMENT $\frac{12 \times 29000}{9} = 38667$ S.Y.

$38667 \times \$38/\text{S.Y.} = \$1,470,000$

PAVEMENT REMOVAL : (SEE ALT. 1) $\$170,000$

$\$1,640,000$

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 25B

SHEET NO.: 5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
SR 823 OVER R.R. & US 23	L.S.	1		3,516,450			
RAMP B OVER FAIRGROUND	L.S.	1		573,300			
" " " R.R.	L.S.	1		3,066,000			
RAMP C " FAIRGROUND	L.S.	1		619,500			
" " " R.R.	L.S.	1		3,856,650			
SR 823 OVER. R.R.	L.S.				1		2,000,000
SR. 823 OVER. US 23	L.S.				1		2,000,000
COMMON EX./PVMT. REMOVAL	C.Y.				51,111	3.30	170,000
PAVEMENT.	S.Y.				38,667	38.00	1,470,000
Sub-total				1,163,900			5,640,000
Mark-up at	15%			1,744,785			846,000
TOTAL				13,376,685			6,486,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**25C**
DESCRIPTION:	**RECONFIGURE THE US 23 INTERCHANGE**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A full interchange with curved girder ramps (B & C) over the railroad and Fairground Road is provided.

ALTERNATIVE: (Sketch attached)

Eliminate Ramp B and replace with a ramp parallel to northbound US 23 with a continuous right turn and a widened mainline bridge.

ADVANTAGES:

- Reduces cost
- Reduces right-of-way
- Eliminates two bridges

DISADVANTAGES:

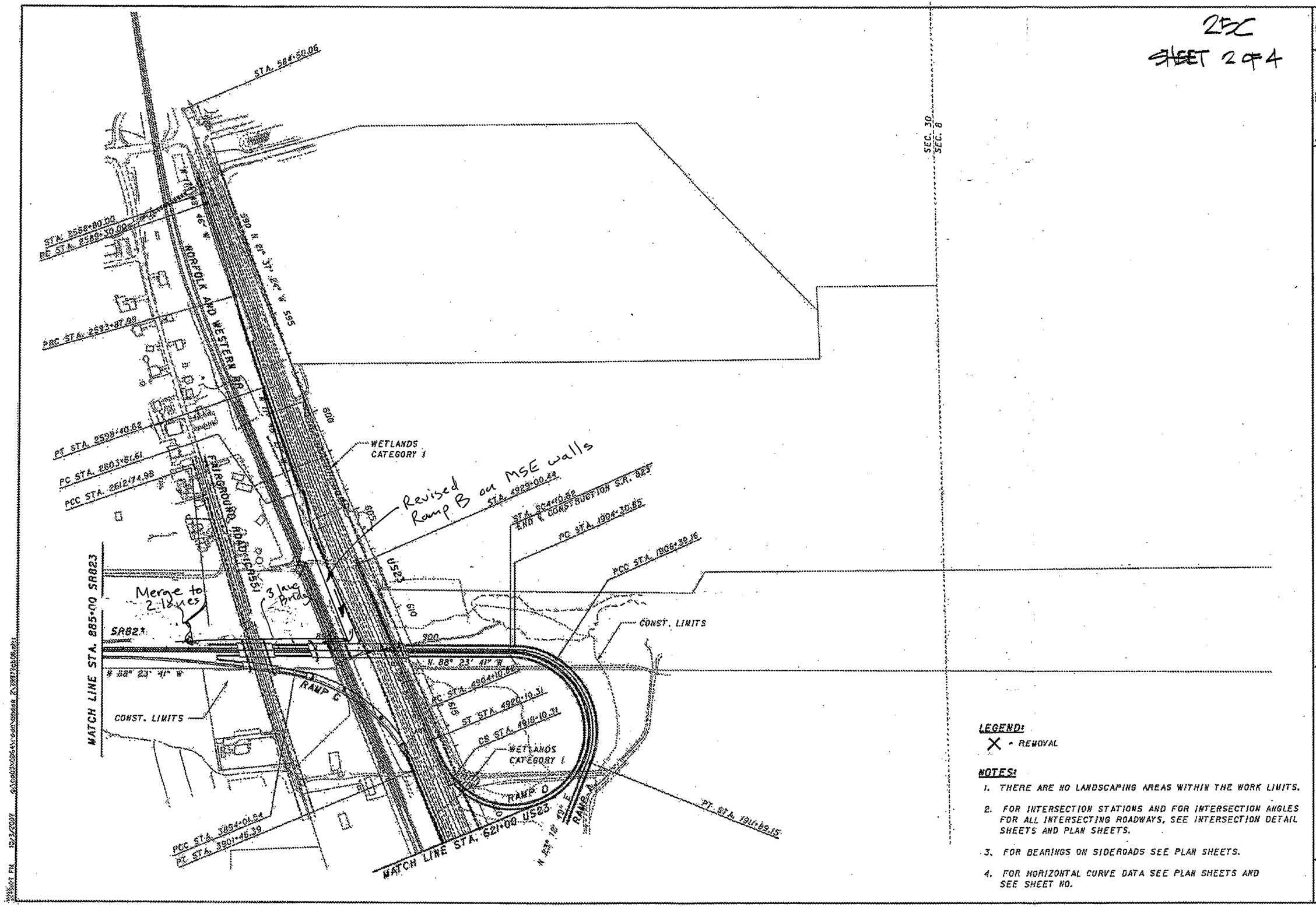
- None apparent

DISCUSSION:

ADT for northbound US 23 (Ramp B) is only 3600. Posted speed for US 23 is 45 mph immediately south of SR 823 interchange.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 13,376,685	—	$ 13,376,685
ALTERNATIVE	$ 12,006,690	—	$ 12,006,690
SAVINGS	$ 1,369,995	—	$ 1,369,995

25C
SHEET 2 OF 4



LEGEND:

X - REMOVAL

NOTES:

1. THERE ARE NO LANDSCAPING AREAS WITHIN THE WORK LIMITS.
2. FOR INTERSECTION STATIONS AND FOR INTERSECTION ANGLES FOR ALL INTERSECTING ROADWAYS, SEE INTERSECTION DETAIL SHEETS AND PLAN SHEETS.
3. FOR BEARINGS ON SIDEROADS SEE PLAN SHEETS.
4. FOR HORIZONTAL CURVE DATA SEE PLAN SHEETS AND SEE SHEET NO.

HORIZONTAL SCALE IN FEET
0 100 200 400

SCHEMATIC PLAN - SR823
STA. 885+00.00 TO STA. 904+79.54

SCI-823-10.31

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 25C

SHEET NO.: 3 of 4

Ramp B length @ 4% → 625' for 25' rise

MSE area say 800' * 15' avg. ht. * 2 walls
= 24,000 □'

Bridge widening: say 12' additional over RR & Fairground Rd.

L = 367' + 100' = 467'
* 12' wide = 5600 □'

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 25C

SHEET NO.: 4 of

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original Est.	Lump			11,631,900			11,631,900
Deduct Ramp B over RR							-3,066,000
Deduct Ramp B over Fairground							573,300
Sub total							7,992,600
add MSE Walls	S.F.				24,000	60	1,440,000
add bridge deck	S.F.				5,600	180	1,008,000
	Sub-total			11,631,900			10,440,600
Mark-up at	@ 15%			1,744,785			1,566,090
	TOTAL			13,376,685			12,006,690

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**26**
DESCRIPTION:	**ELIMINATE RIGHT-TURN LANES AT INTERSECTIONS, PARTICULARLY ALONG SHUMWAY HOLLOW ROAD**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

All intersections are designed with right-turn lanes.

At the relocated Shumway Hollow Road (SHR) intersection with Ramp A, exclusive right-turn lane extends back onto the bridge over the railroad and to the intersection with SR 335.

ALTERNATIVE: (Sketch attached)

Along Shumway Hollow Road:

- Eliminate exclusive right-turn lanes from SHR onto 823 Ramps A & C
- Eliminate 200 ft. of striped-out lane on SHR eastbound approach to Ramps C and D intersection, taper lane out immediately after intersection (westbound direction)
- Eliminate right-most westbound lane on SHR bridge over railroad. Only need one westbound lane, since no right-turn lane onto Ramp A; increase shoulder to 12 ft. to accommodate turning trucks.
- Eliminate one beam line.

ADVANTAGES:

- Reduces cost
- Reduces maintenance

DISADVANTAGES:

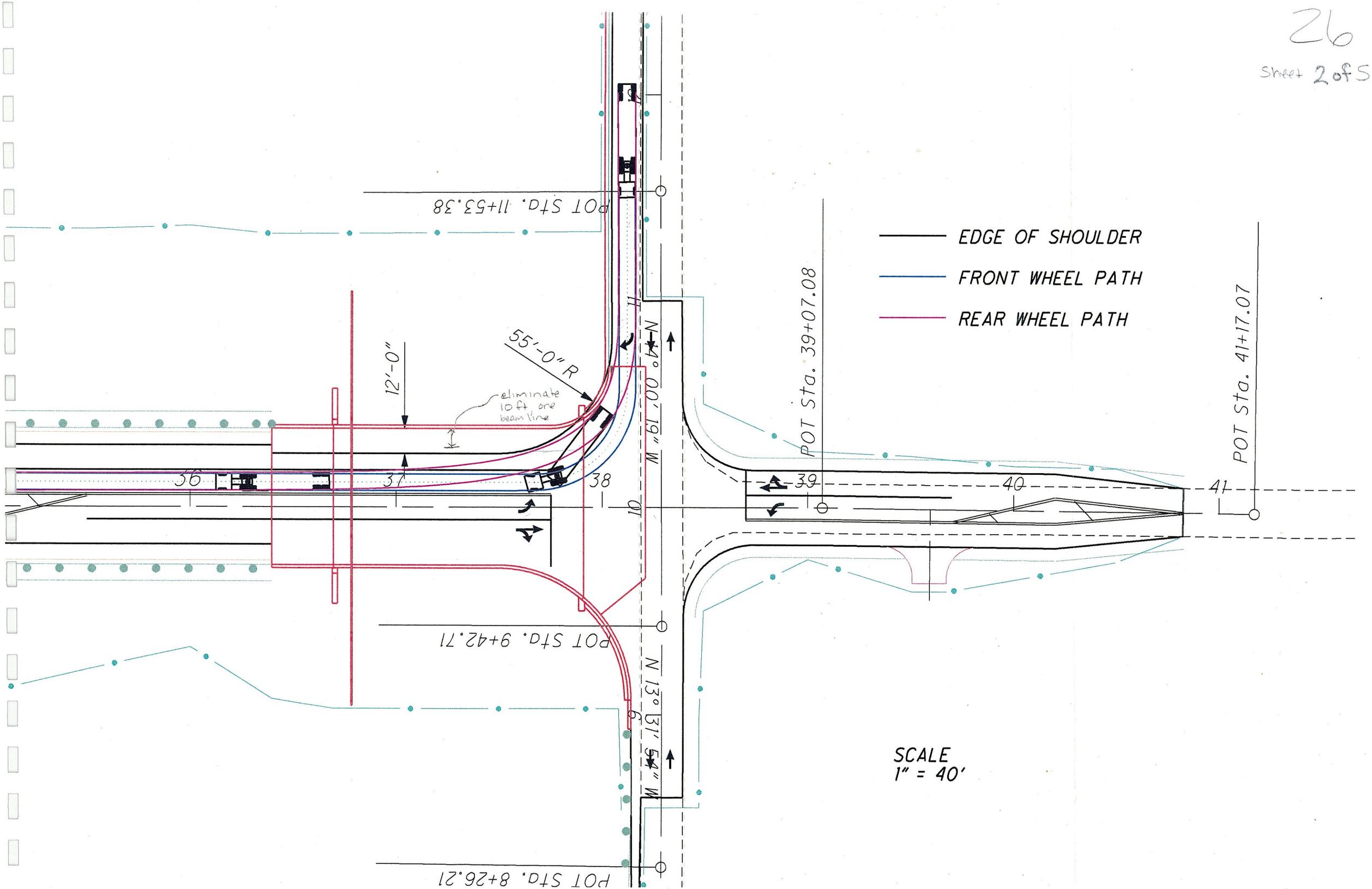
- None apparent

DISCUSSION:

Although not all right-turns from ramps are warranted, it is necessary to keep all for consistency and to accommodate future growth at the reviewed intersections.

Along Shumway Hollow Road, design year traffic does not warrant exclusive right-turn lanes. Although there is minimal savings from pavement reduction, reducing the right-turn lane back onto the bridge over the railroad provides larger savings.

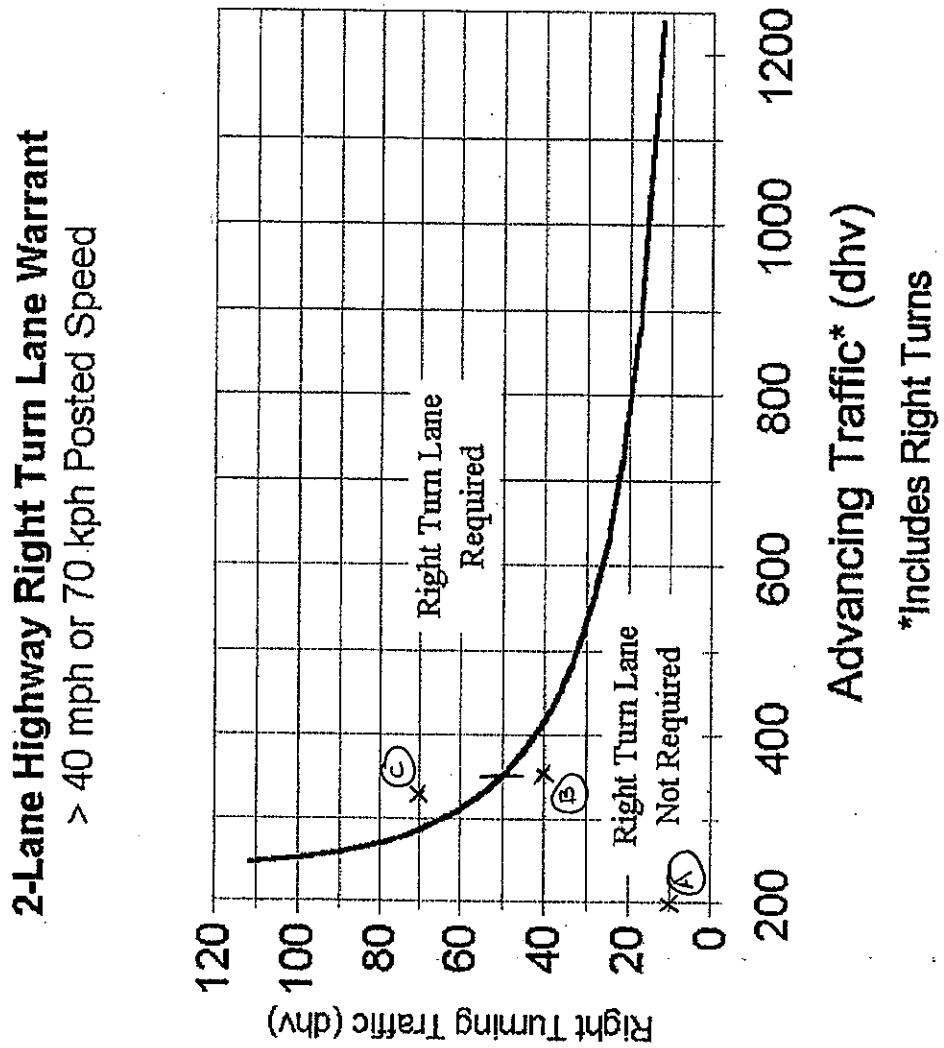
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,821,060	—	$ 1,821,060
ALTERNATIVE	$ 1,525,205	—	$ 1,525,205
SAVINGS	$ 295,855	—	$ 295,855


EDGE OF SHOULDER
FRONT WHEEL PATH
REAR WHEEL PATH
POT Sta. 11+53.38
POT Sta. 9+42.71
POT Sta. 8+26.21
POT Sta. 39+07.08
POT Sta. 41+17.07
55'-0" R
12'-0"
eliminate 10 ft. one beam line
N 40° 00' 19" W
N 13° 51' 54" W
11
10
9
36
37
38
39
40
41
SCALE
1" = 40'

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6bE

REFERENCE SECTION
401.6.3



October 2004

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.:

SHEET NO.: 4 of 5

Relocated Shumway Hollow Rd (SHR)

- Right turn EB onto Ramp C
  see Fig 401-6bE - rt. turn lane (A) not req.
  20 → DHV's
  10 ↓
- Right-turn WB onto Ramp A
  see Fig 401-6bE - rt. turn lane (B) not req.
  ↑ 40 DHVs
  ← 350
- Right-turn SB 335 to WB SHR
  see Fig 401-6bE - rt. turn lane (C) req.
  260 ↱ 70 ↓ DHVs

traffic volumes from 2030 traffic plate in Portsmouth Bypass Workshop Book, dated 01/26/05

Proposed SHR bridge over CSX - 2 12' lanes + shldrs each direction
- Checked need for right most lane, which becomes exclusive righ-turn lane onto Ramp A
- Ran autoturn for WB-50 turning right + left from SR335 see attached run. Add'l 12 ft not needed for turning if shoulder can be used for rear wheel track. Will need to increase intersection radius from 30 ft to 55 ft, and rec. increasing shldr to 12 ft. Designer needs to verify final widths.

Cost Calcs.

Pvmt eliminated on SHR

At Ramp C - 200 ft × 12 ≒ 270 sy
At Ramp A - 235 ft × 12 ≒ 315 sy
Reduce 200 ft of striped middle lane on SHR EB approach to Ramp C/D.
- 200 ft × 12 ≒ 270 sy
855 sy

Bridge savings from elim. one 12 ft lane
10' × 121.50' length = 1215 sf

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 26

SHEET NO.: 5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Pavement Reduction	SY	855	$38*	$32,490	0		$0
Bridge	SF	8384	$185**	$1,551,040	7169	$185	$1,326,265

* use mainline pvmt cost, none provided on est. for sideroads

** use SF cost from 823 over SHR. Lump sum cost for CSX bridge incl. SR335 retaining wall

	Sub-total				1,583,530		1,326,265
Mark-up at	15.00%				237,530		198,940
	TOTAL				1,821,060		1,525,205

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**31/51**
DESCRIPTION:	**DISPOSE OF EXCESS ROCK/SOIL ON LAND ADJACENT TO FACILITY**	SHEET NO.:	**1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The original design has already made use of a portion of available environmental footprint to get rid of excess rocks/soil.

ALTERNATIVE: (Sketch attached)

Use the entire available footprint that is environmentally cleared for rock/soil disposal. In addition, opportunities should be evaluated in specific areas where excess rock/soil is being generated and decide if additional areas need to be cleared to facilitate placing excess material in hollows adjacent to the highway.

ADVANTAGES:

- Provides environmental clearance and right-of-way for contractor to place excess rock/soil
- Prevents delays in project schedule due to contractor having to secure permits
- Reduces cost for disposal for project

DISADVANTAGES:

- Requires additional environmental work if areas are outside of cleared environmental footprint
- Requires additional right-of-way required

DISCUSSION:

ODOT can best make use of the work put in the environmental clearance by using the land cleared environmentally for roadway purposes. This can be accomplished by extending the soil/rock disposal limits to the extent allowable per the approved record of decision. This will also allow for easy access by the contractor to approved areas for placing excess material, which will result in lower overall project cost.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 21,505,000	—	$ 21,505,000
ALTERNATIVE	$ 11,730,000	—	$ 11,730,000
SAVINGS	$ 9,775,000	—	$ 9,775,000

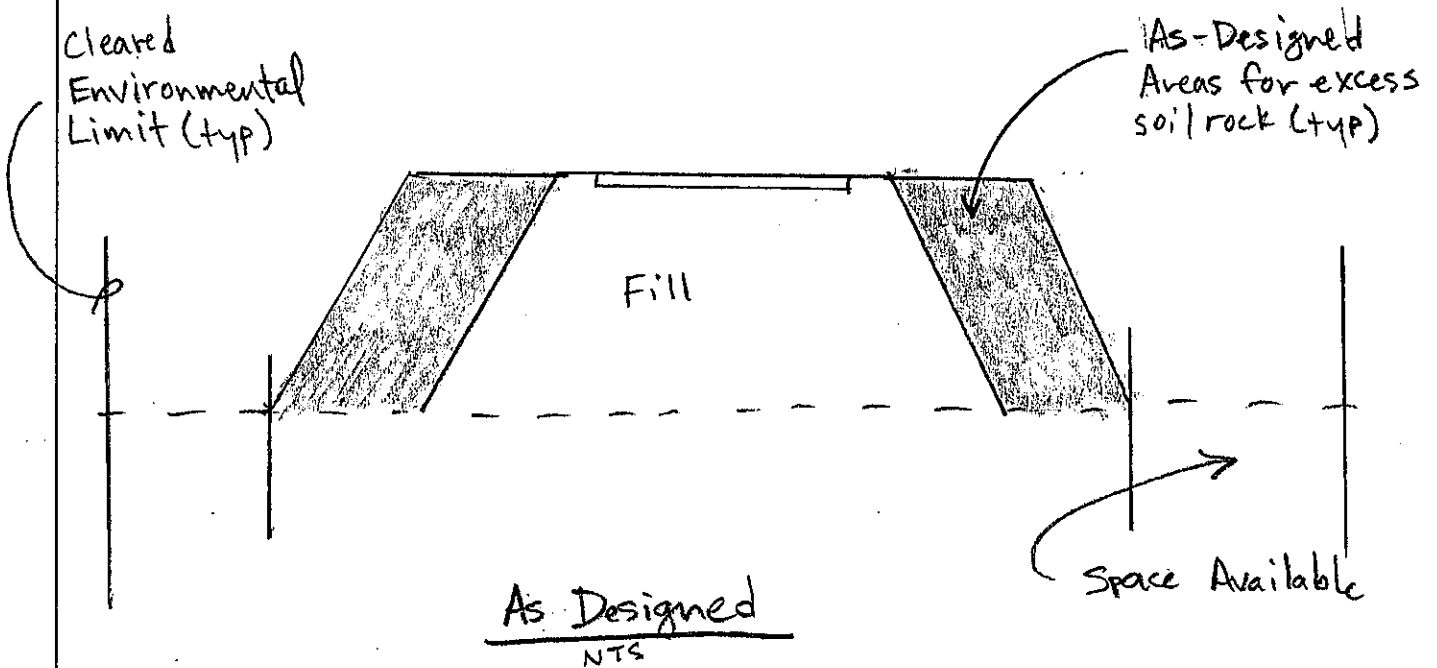
SKETCHES

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

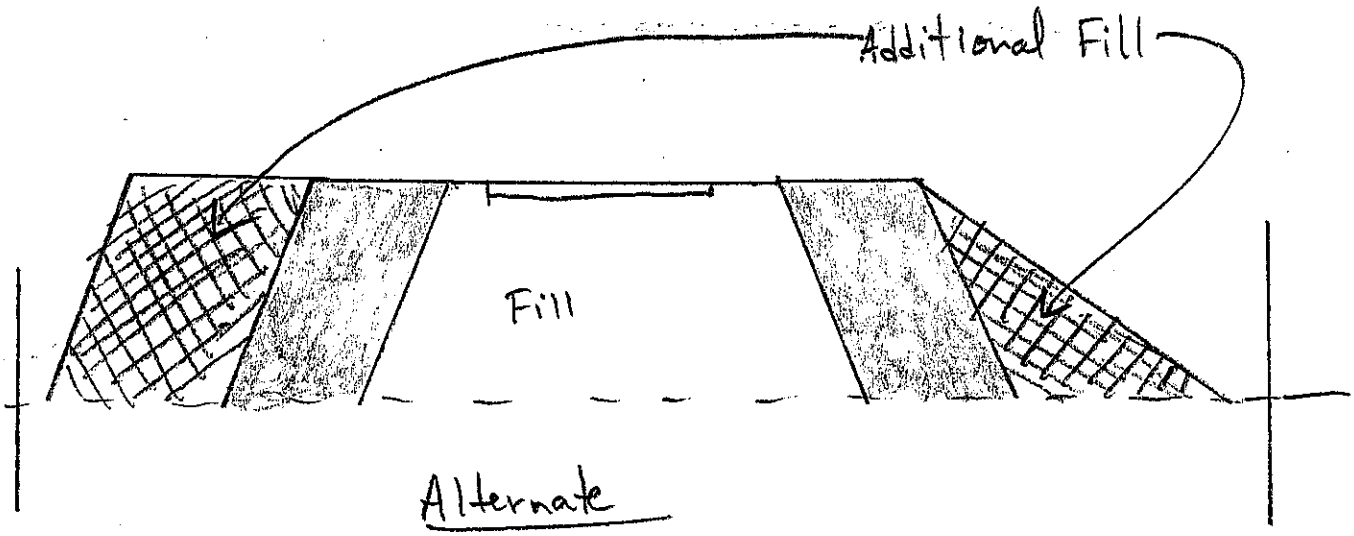
ALTERNATIVE NO.: 31/51

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 2 of 3



As Designed
NTS



Alternate
NTS

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 31/51

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Excess Soil/Rock Disposal							
- Phase 1	Mcy	4	1.1	4,400,000	4	0.60	2,400,000
- Phase 2	Mcy	13	1.1	14,300,000	13	0.60	7,800,000
Mcy = (million cubic yards)							
Sub-total				18,700,000			10,200,000
Mark-up at 15.00%				2,805,000			1,530,000
TOTAL				21,505,000			11,730,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	33
DESCRIPTION:	**RELOCATE SR 335 ≈ 14 FT. EAST TO FACILITATE CONSTRUCTION OF RIGHT-TURN LANE WITHOUT THE NEED FOR A RETAINING WALL**	SHEET NO.:	1 of 7

ORIGINAL DESIGN: (Sketch attached)

The original design uses ≈ 451 linear ft. (lf) of retaining wall to facilitate construction of the proposed right-turn lane from SR 335 to relocated Shumway Hollow Road.

The height of the retained fill varies from 17 ft. to 23 ft.

ALTERNATIVE: (Sketch attached)

Eliminate the need for the retaining wall and:

- Use current SR 335 southbound lane as a right-turn lane
- Use current SR 335 northbound lane as relocated SR 335 southbound
- Construct new lane (east side) to carry relocated SR 335 northbound
- Relocate approximately 1,650 ft. of ditch

ADVANTAGES:

- Reduces cost
- Eliminate retaining wall and associated maintenance
- Uses existing right-of-way as opposed to railroad right-of-way
- Eliminates need for backfill material to bring subgrade for turn lane up to the proposed grade

DISADVANTAGES:

- Requires realignment of a portion of SR 335
- Results in possible traffic impacts during construction (single-lane closure)
- Results in possible encroachment on property owners on east side of SR 335

DISCUSSION:

Elimination of the retaining wall seems possible using an additional lane to relocate SR 335 through traffic to the east. This will allow the current southbound lane to be used as the right-turn lane.

Could reduce concerns about the Shumway Hollow Road over railroad bridge forward abutment.

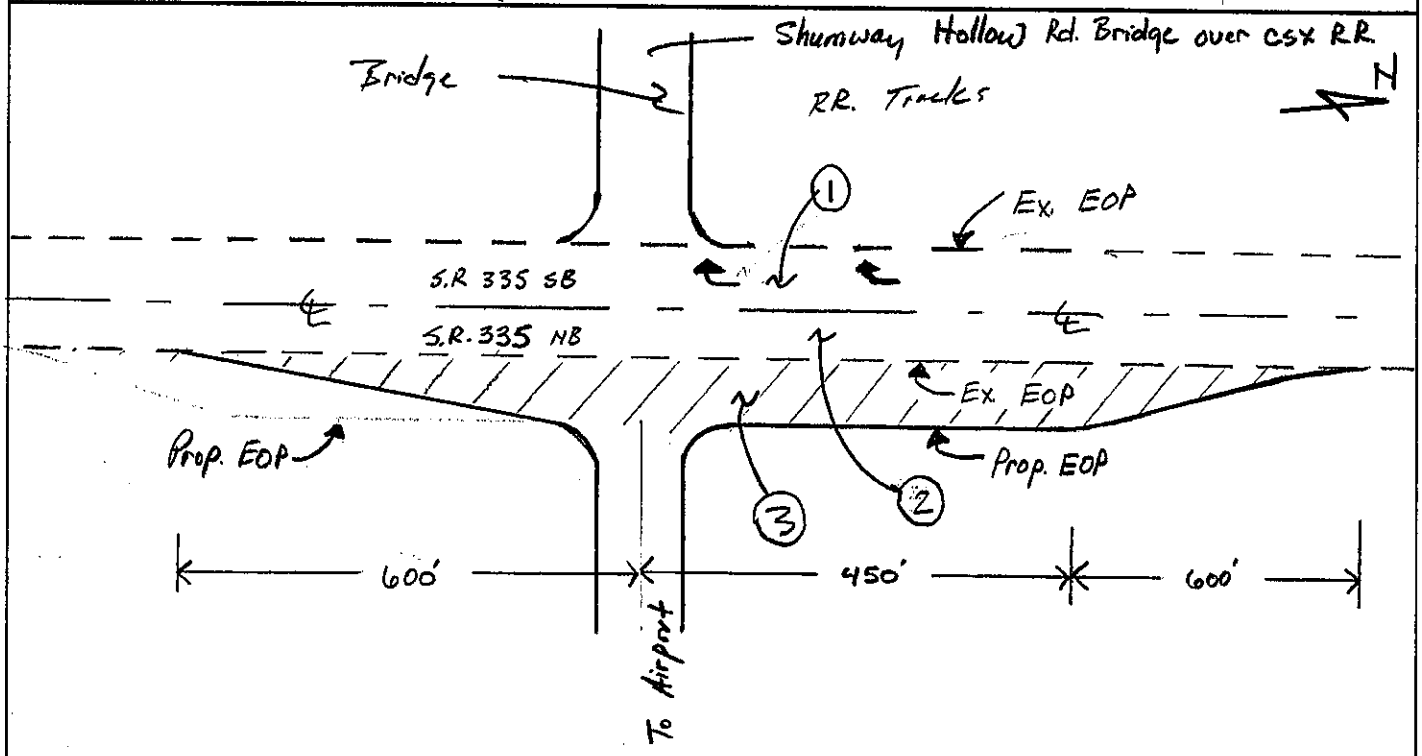
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 753,107	—	$ 753,107
ALTERNATIVE	$ 52,379	—	$ 52,379
SAVINGS	$ 700,728	—	$ 700,728

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 33

☐ AS DESIGNED ☒ ALTERNATIVE

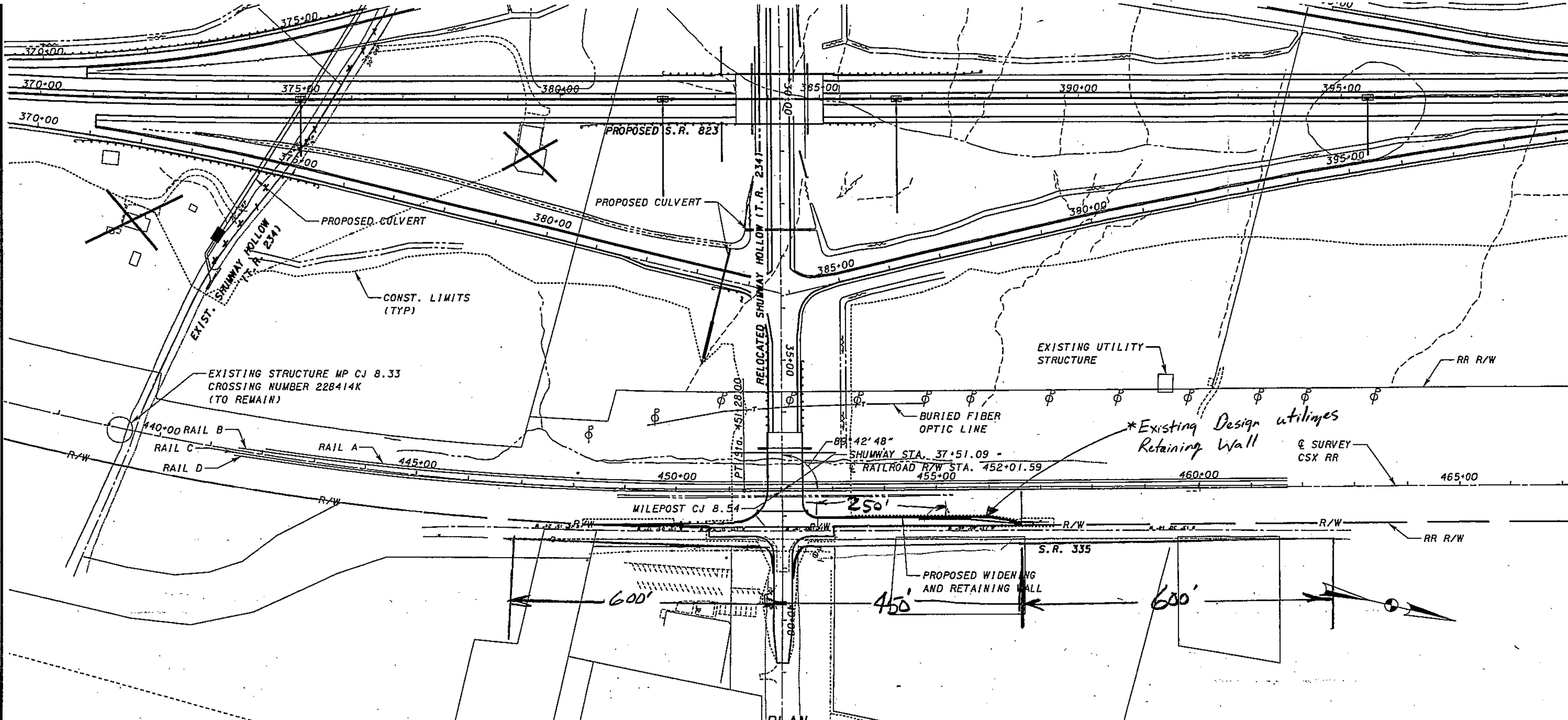
SHEET NO.: 2 of 7



(1.) Utilize current southbound lane as right turn lane onto Relocated Shumway Hollow Rd.

(2.) Utilize current northbound lane as new (relocateded) southbound lane for S.R. 335.

(3.) Construct short (≤450') length of pavement for new lane for northbound S.R 335. Assume 600' taper for lane shifts.



PLAN

Elevation	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461
RAIL A ELEVATIONS		629.37	629.28	629.36	629.48	629.70	629.96	630.13	630.27	630.47	630.76	631.03	631.33	631.57	631.77	632.15	632.37	632.57	632.77	
RAIL B ELEVATIONS	629.44	629.45	629.36	629.40	629.61	629.79	630.02	630.18	630.33	630.53	630.79	631.06	631.33	631.55	631.77	632.14	632.37	632.57	632.74	
RAIL C ELEVATIONS	629.61	629.58	629.66	629.79	629.85	629.90	629.59	629.67	629.88	630.24	630.60	630.86	631.17	631.45	631.72	631.96	632.18	632.46	632.72	
RAIL D ELEVATIONS	629.61	629.59	629.71	629.81	629.86	629.90	629.66	629.72	629.89	630.27	630.60	630.86	631.19	631.46	631.73	631.99	632.19	632.48	632.74	

Vertical scale: 660, 640, 620, 600

PROFILE ALONG TOP OF RAIL

UTILITY CONTACTS

SPRINT COMMUNICATIONS, INC.
DANA COSTA JR.
11815 HIGHWAY DRIVE
SUITE 400
CINCINNATI, OH 45214

33 sketch

HORIZONTAL SCALE IN FEET (0, 50, 100, 200)

Sheet 3 of 7

DESIGN AGENCY: TranSystems, 5747 Perimeter Drive, Suite 240, Dublin, Ohio 43017

DESIGNED	DRAWN	REVIEWED	DATE
PJP	MTN	JRC	07/26/06
CHECKED	REVISED	STRUCTURE FILE NUMBER	

SUPPLEMENTAL SITE PLAN

RELOCATED SHUMWAY HOLLOW (T.R. 234) OVER CSX MILEPOST CJ 8.54

SCI-823-6.81
PID 19415

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 33

SHEET NO.: 4 of 7

Retaining Wall

- Approximate Length of Retaining Wall: 451' total
  Retained Height: 17' to 23' Average H_{Ret} = 20'
  Total number of drilled shafts = 77
  30" diameter, 10' deep rock socket.

- Short Retaining Wall (south of relocated Shumway Hollow Rd.)
  Length = 45 ft. Average Height = 23 ft. (retained)
  Estimated Cost ≈ $75 per sq ft.
  Area = (23')(45') = 1035 ft²
  Estimated Cost (2007) = ($75/sq ft.)(1035 sq ft.) = $77,625

- Longer Retaining wall (north of relocated Shumway Hollow Rd)
  Length = 406 ft. Average Height = 20 ft. (retained)
  Estimated Cost ≈ $69.50/sq. ft.
  Area = (406')(20') = 8,120 ft²
  Estimated Cost (2007) = ($69.50/sq. ft.)(8,120 ft²) = $564,340

* Total Retaining Wall Cost = $564,340 + $77,625 = $641,965

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 33

SHEET NO.: 5 of 7

* Currently Proposed Right Turn Lane

12' Lane - 250 ft. length Taper ≃ 180'
Surfacing Area = 4,080 ft^2 = 453 yd^2

Roadway Cost ≃ \$28.50/yd^2
Estimated Cost ≃ \$12,911

* Relocated NB S.R. 335, 12' lane

12' Lane - 450 ft length
Tapers (2) 600 ft length

Surfacing Area = $(12')(450) + 2(\frac{1}{2})(12')(600') = 12,600\ ft^2$
= 1400 yd^2

Roadway Cost ≃ \$28.50/yd^2
Estimated Cost ≃ \$39,900

* Excavation for new (relocated) ditch
Assume 2' deep, Assume 28 ft^2 per linear foot.

Length = 1650 ft. Estimated Cost = $(1650\ ft)(28\ ft^2)\left(\frac{1\ yd^3}{27\ ft^3}\right)(\$3.30/yd^3)$
Estimated Cost = \$5,647

Alternative No. 33
Sheet 6 of 7
R. Braun

Retaining Wall Cost Estimate

Provided by ODOT Estimating Dept.

SC1-823-6.81

12-5-07

USE 30" DIA. SHAFTS

69 SOCKETS INTO SANDSTONE @ 10' = 690'

SOME ABOVE ROCK DRILLING REQUIRED

SAY 69 SHAFTS ABOVE ROCK @ 18' = 1242'

690' IN ROCK @ 125 = $86,250

1242' ABOVE ROCK @ 85.00 = $105,570

USE W21 x 73 BEAMS @ AVERAGE HT. 30'

69 x 30' = 2070' x 40.00/FT = $82,800

73#/FT @ 0.55/LB = 40.15/FT

PRECAST CONCRETE PANELS

(26' x 132' x 192' + 14.5' + 44.5') x 19' = 7,771 SQFT
(409')

7771 SQFT @ $17.50/SQFT = $136,000

POROUS BACKFILL 2' x 19' x 409' x 1/27 = 575 CU YD

575 CU YD @ 60.00 = $34,500

6" PERF. DRAIN PIPE 500' @ 8.00 = $4,000

? UNCLASS. EXCV. TO REMOVE EARTH TO PLACE PRECAST PANELS

½ 410' x 12' x 10' x 1/27 = 1822 CU YD

1822 CU YD x 50.00 = $91,100

TOTAL WALL 1 $540,220

540,220 ÷ 7,771 SQFT = $69.50/SQFT

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 33

SHEET NO.: 7 of 7

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Retaining Wall -1	SF	1035	$75	$77,625			
Retaining Wall -2	SF	8120	$69.50	$564,340			
Pavement	SY	453	$28.50	$12,911	1400	$28.50	$39,900
Excavation (ditch relocation)	CY				1711	$3.30	$5,647
	Sub-total			654876			45,547
Mark-up at	15%			98,231			6,832
	TOTAL			753,107			52,379

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**34/57**
DESCRIPTION:	**USE WASTE TO CREATE DEVELOPABLE LAND AT OR CLOSE TO INTERCHANGES**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

The current design does not create any developable land.

ALTERNATIVE:

Use excess waste rock/soil to create ground for development by another entity such as the government, ODOT, port authority or private.

ADVANTAGES:

- Makes beneficial use of excess material
- Spurs economic development
- May reduce overall cost of disposal of excess material while providing beneficial end use

DISADVANTAGES:

- Legality of acquiring property needs to be researched
- Not sure if this alternative will be less/more expensive than if contractor finds waste areas
- Requires clearing the lands through NEPA
- Increases environmental work and costs for ODOT
- Difficulty coordinating multiple agencies

DISCUSSION:

It may be possible to dispose of excess soil/rock at locations close to the planned interchanges to help create economic development. Several real estate, environmental, and legal issues need to be discussed by ODOT prior to developing this alternative. Once these hurdles are cleared, ODOT would seek development opportunities to pursue with other entities.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**39**
DESCRIPTION:	**CONSIDER THE VALUE ENGINEERING CHANGE PROPOSAL POTENTIAL OF SPECIFIC STRUCTURES**	SHEET NO.:	**1 of 21**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the following structures:
SCI-823-0067 L - See Alt. No. 65;
SCI-823-0074 R - 2 span with MSE walls, steal beams with integral steel bent;
SCI-823-0117 L – Single span, concrete beams, MSE walls;
SCI-823-0122 – Single span, concrete I-beams, rear abutment on MSE wall and forward abutment on drilled shafts;
SCI-823-0214 L & R – Three spans, steel girders;
SCI-823-0229 L & R – Three equal spans, concrete I-beams;
SCI-823-0727 L & R – Single span, concrete I-beams, MSE walls;
SCI-823-0837 L & R – Two spans, concrete I-beams, MSE walls;
SCI-823-0917 L & R – Two spans, concrete I-beams, MSE walls;
SCI-823-1018 L & R – Three spans, concrete I-beams;
SCI-823-1096 L & R – Single span, concrete I-beams, MSE walls;
SCI-823-1096 L & R – Single span, concrete I-beams, MSE walls;
SCI-823-1357 L & R – Three Span, concrete I-beams;
SCI-823-1593 Ramp B – Single Span, concrete I-beam;
SCI-823-1594 - Single Span, concrete I-beam; and
SCI-823-1595 - Single Span, concrete I-beam.

ALTERNATIVE: (Sketch attached)

Consider the following changes to these structures:
SCI-823-0067 L - See Alt. No. 65;
SCI-823-0074 R – No change;
SCI-823-0117 L – No change;
SCI-823-0122 – No change;
SCI-823- 0214 L & R – Potential to shorten end spans approximately 10 each;
SCI-823- 0229 L & R – No change;
SCI-823-0727 L & R – Potential to shorten spans based on the required horizontal clear zone;
SCI-823-0837 L & R – Potential to shorten spans by 5 ft. each;
SCI-823-0917 L & R – Potential to shorten spans by 15 ft. each;
SCI-823-1018 L & R – No change, it was determined that MSE walls are beyond normal practice;
SCI-823-1096 L & R – No change;
SCI-823-1357 L & R – No change;
SCI-823-1593 Ramp B – Potential to shorten span 14 ft. based on the required horizontal clear zone;
SCI-823-1594 - Potential to shorten span 14 ft. based on the required horizontal clear zone; and
SCI-823-1595 - Potential to shorten span 14 ft. based on the required horizontal clear zone.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,019,820	—	$ 1,019,820
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 1,019,820	—	$ 1,019,820

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**39**
DESCRIPTION:	**CONSIDER THE VALUE ENGINEERING CHANGE PROPOSAL POTENTIAL OF SPECIFIC STRUCTURES**	SHEET NO.:	**2 of 21**

ADVANTAGES:

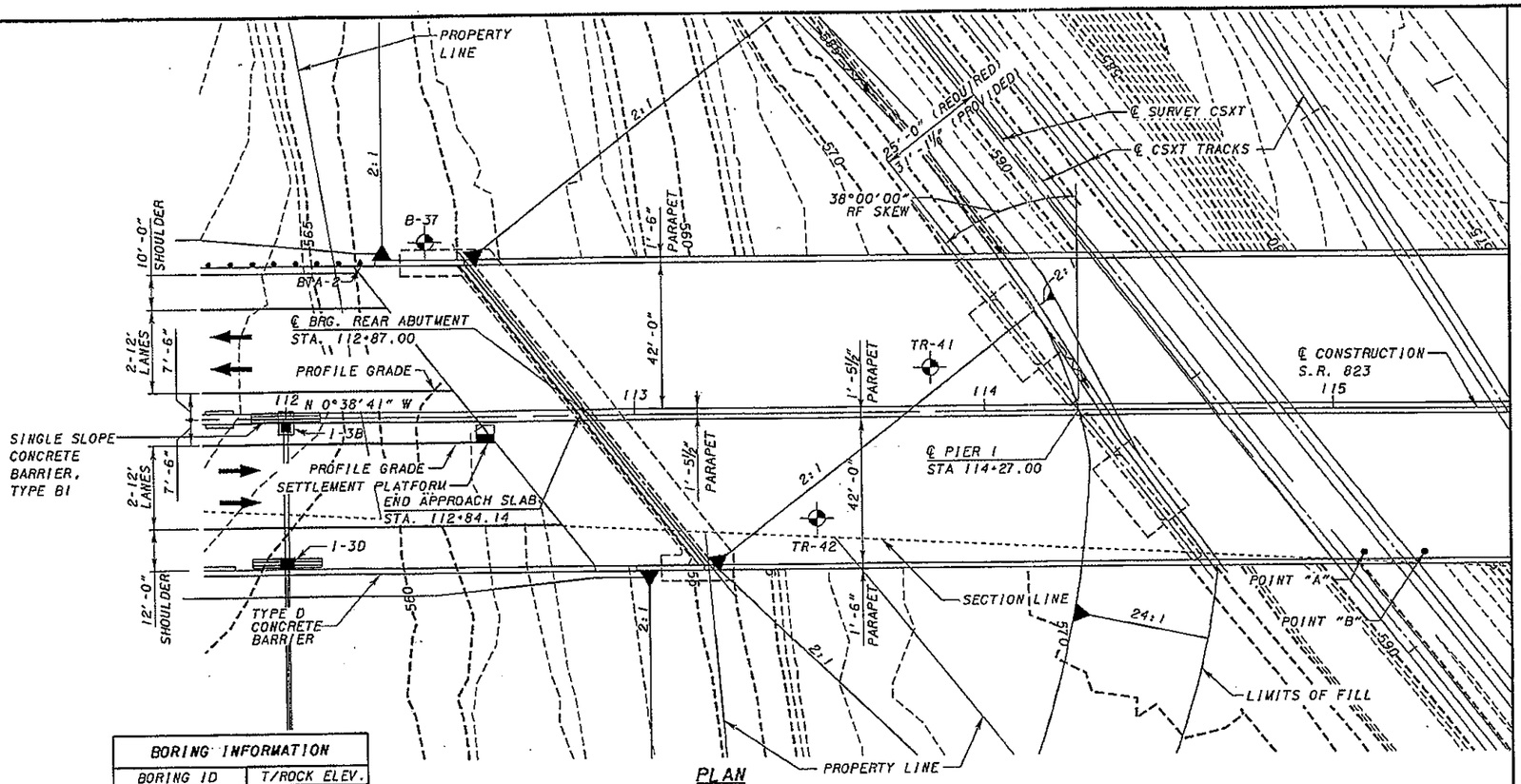
- Provides more economical structures
- ODOT benefits from all the savings

DISADVANTAGES:

- Cannot anticipate future material costs
- Some contractors perform certain tasks more efficiently than others which makes it impossible to predict what the least cost structure will be for each contractor

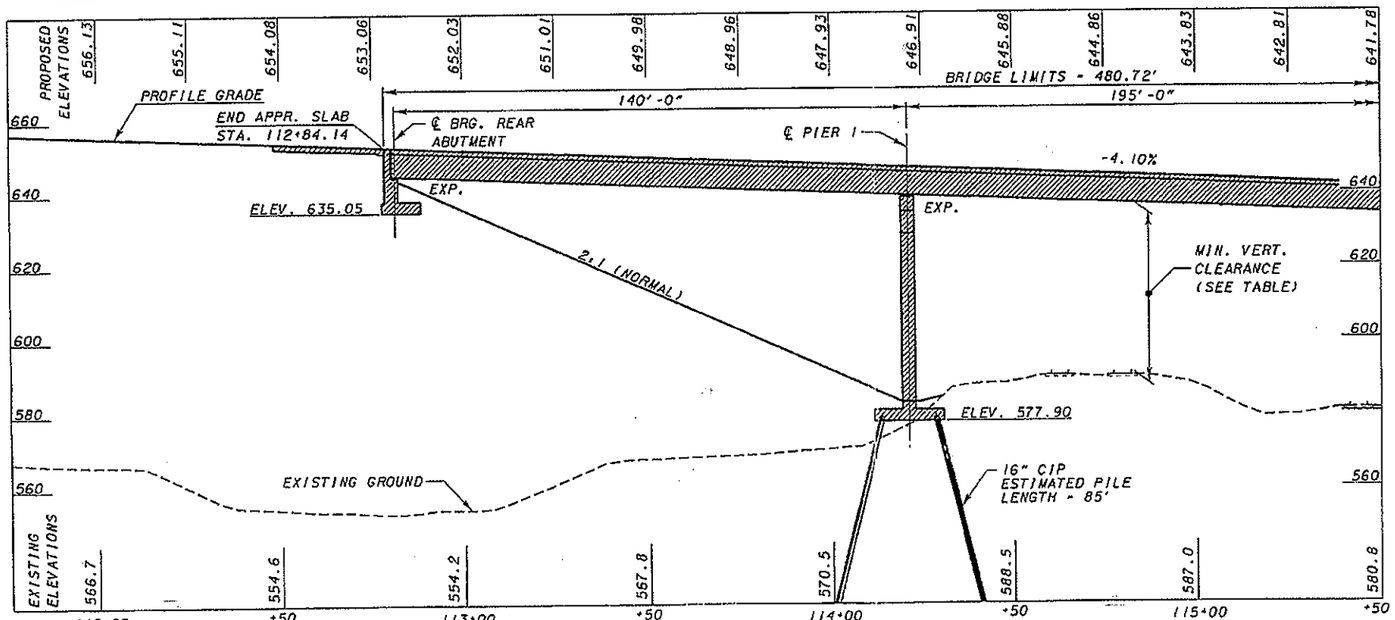
DISCUSSION:

VECPs submitted by the contractor allow it to increase profits by receiving one-half of the final savings. If potential changes can be made prior to the sale of the contract, ODOT can realize all of the savings.



PLAN

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-41	482.4
TR-42	476.0
B-37	472.2



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

MATCHLINE STA. 115+50

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS	
LOCATION	STATION
REAR ABUT. (SB)	112+22.11
FWD. ABUT. (SB)	117+48.15

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	44.69'	44.15'
REQUIRED	23.0'	23.0'

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
S.R. 823
CURRENT YEAR ADT (2010) - 21,200
DESIGN YEAR ADT (2030) - 31,200
CURRENT YEAR ADTT (2010) - 2,968
DESIGN YEAR ADTT (2030) - 4,368

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
⌖ - BORING LOCATION

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

PROPOSED STRUCTURE

TYPE: 3 SPAN CONTINUOUS 74" WEB A709 GRADE 50W STEEL PLATE GIRDER WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY REINFORCED CONCRETE T-TYPE PIERS AND STUB TYPE ABUTMENTS.

SPANS: 140'-0" - 195'-0" - 140'-0" C/C BRGS

ROADWAY: 2 - 42'-0" T/T OF PARAPETS

LOADING: HS-25 (CASE I) AND ALTERNATE MILITARY LOADING, FUTURE WEARING SURFACE = 60 PSF

SKEW: 38°00'00" RF

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30' LONG)

LATITUDE: 38°46'06" N

LONGITUDE: 82°52'36" W

DESIGN AGENT: Ives Systems, 114 POLARIS PKWY., SUITE 240, WESTERVILLE, OHIO 43082

DESIGNED PJP | DRAWN PJP | CHECKED MSL | REVISED | REVISED MSL | DATE 9/28/07 | STRUCTURE FILE NUMBER 7306326

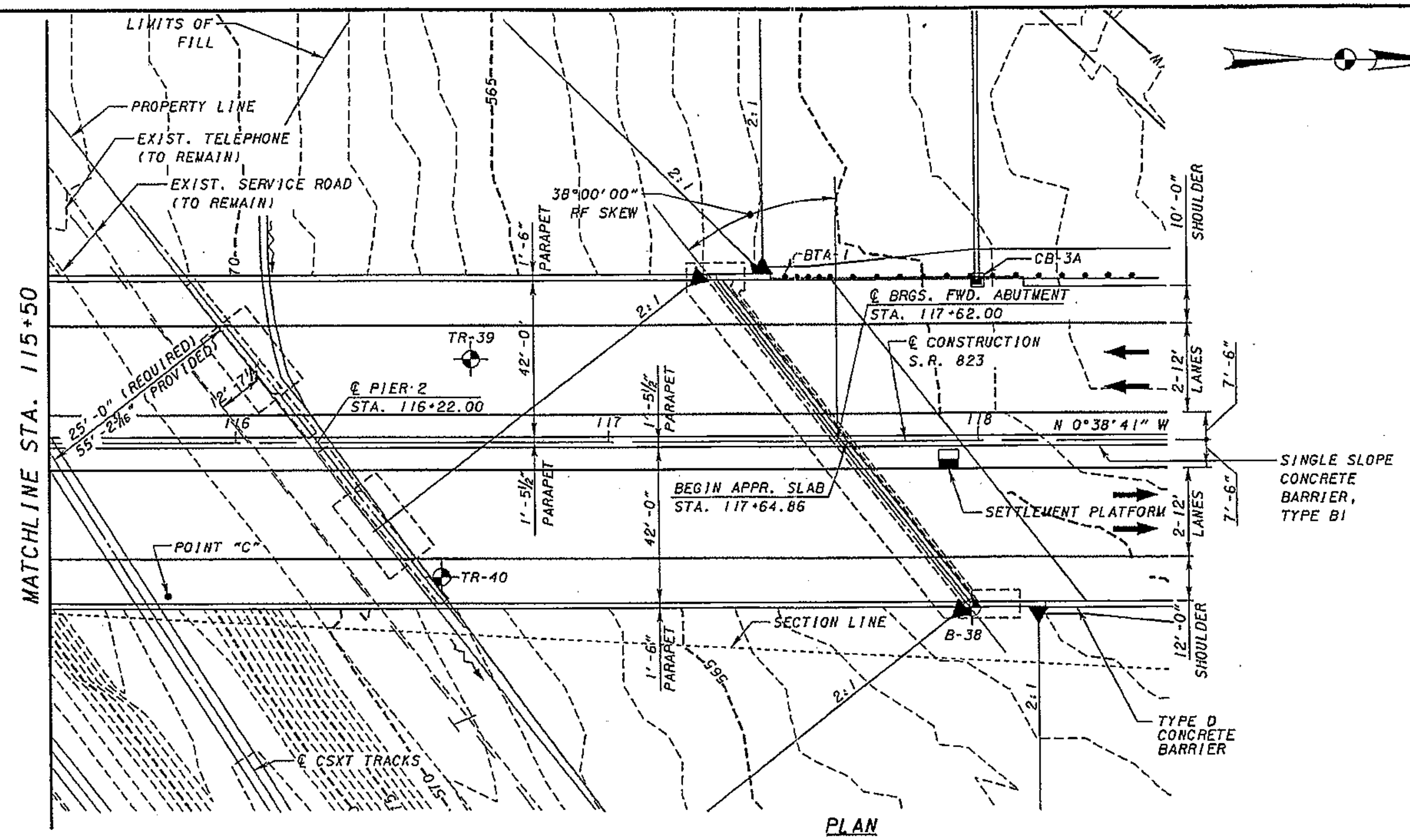
SCIOTO COUNTY
STA. 112+84.14
STA. 117+64.86

SITE PLAN
BRIDGE NO. SCI-823-0214 L
S.R. 823 OVER CSXT RAILROAD

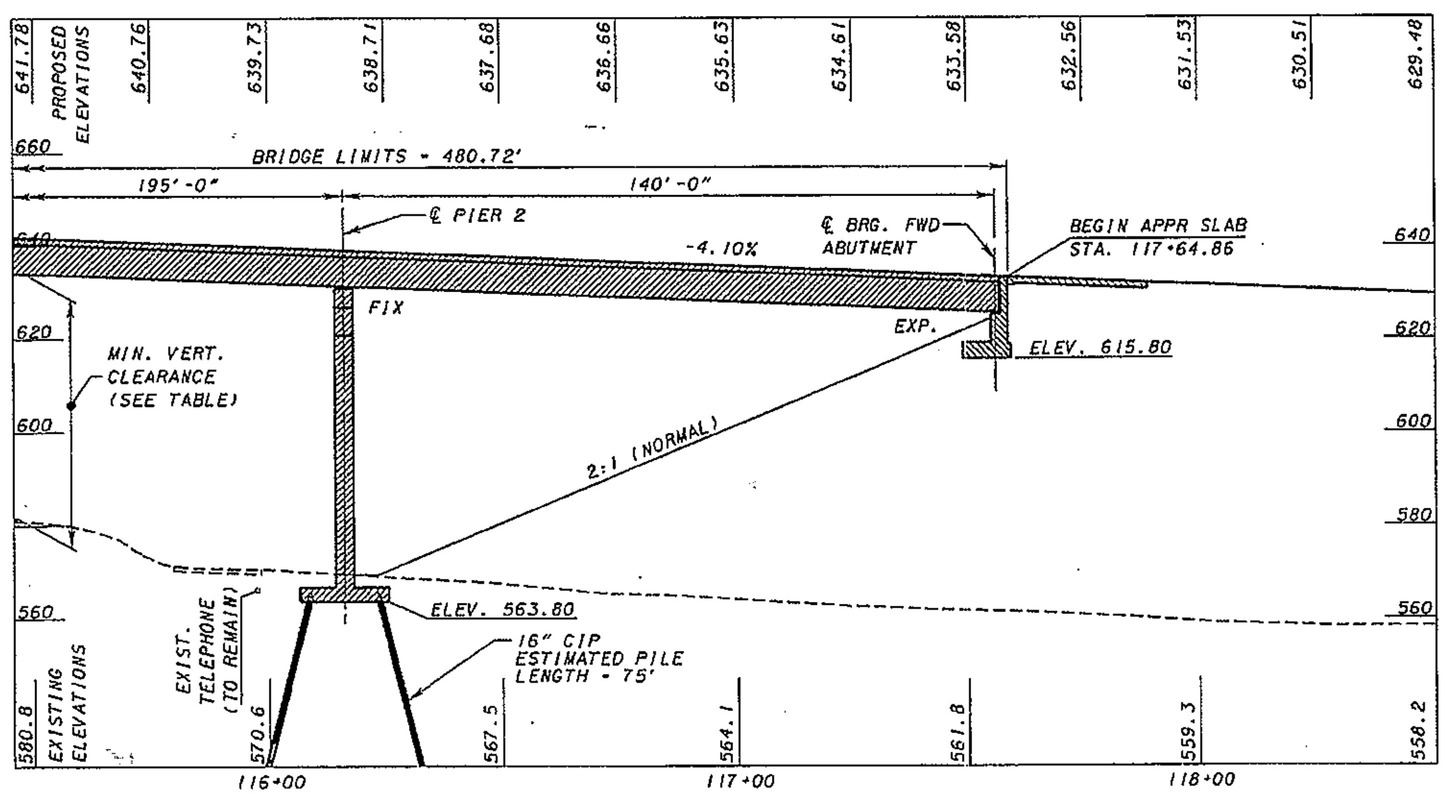
SCI-823-0.00
PID 77366

1 | 8

39
SHEET 4 OF 21



PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-39	479.2
TR-40	472.9
B-38	476.2

TABLE OF VERTICAL CLEARANCES		
LOCATION	"C"	
PROPOSED	49.62'	
REQUIRED	23.0'	

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

DESIGN AGENCY: TranSystems
DESIGNED PJP | DRAWN PJP | REVIEWED MSL | DATE 9/24/07
CHECKED MSL | REVISED | STRUCTURE FILE NUMBER 7306326

SCIOTO COUNTY
STA. 112+84.14
STA. 117+64.86

SITE PLAN
BRIDGE NO. SCI-823-0214 L
S.R. 823 OVER CSXT RAILROAD

SCI-823-0.00
PID 77366

2/8

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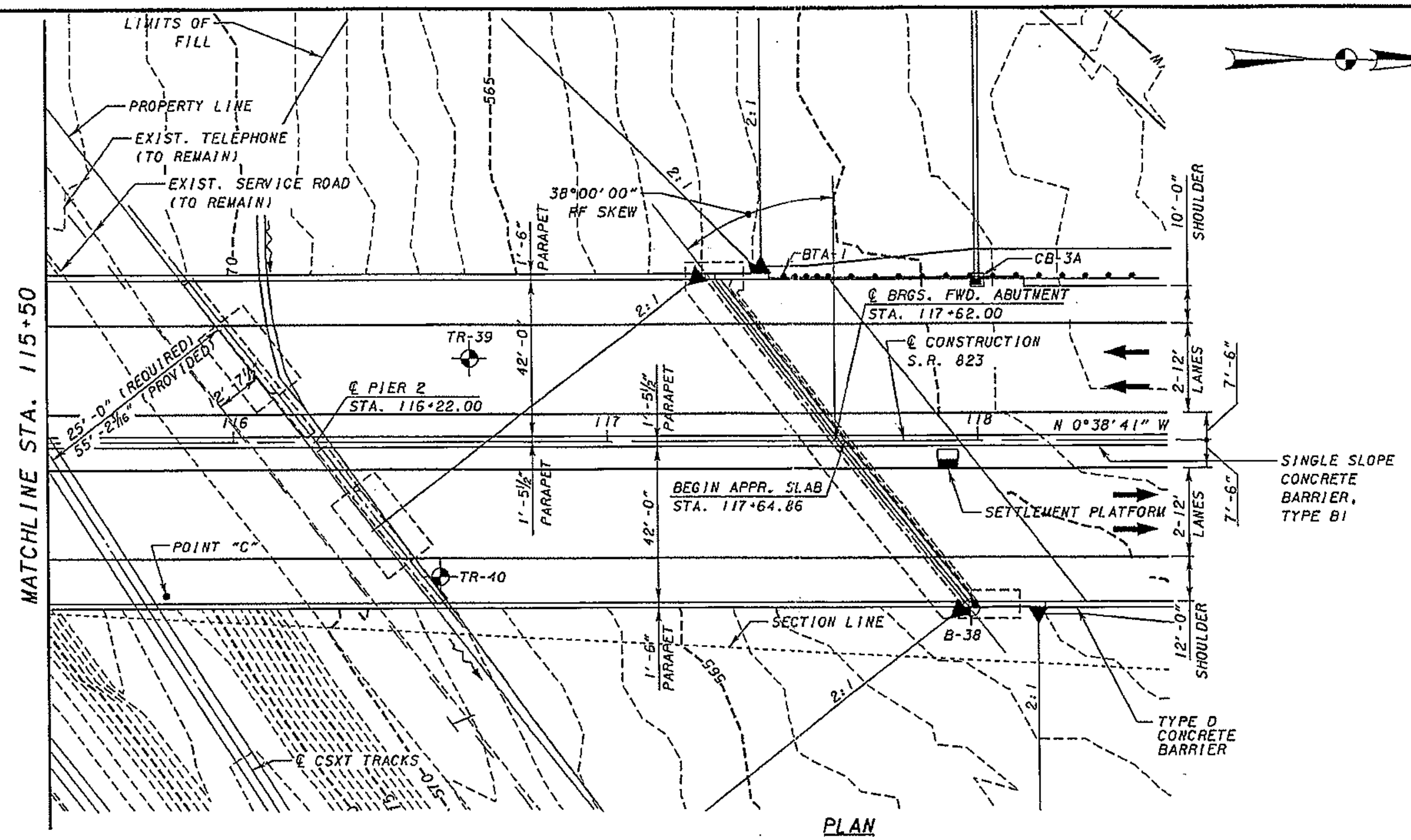
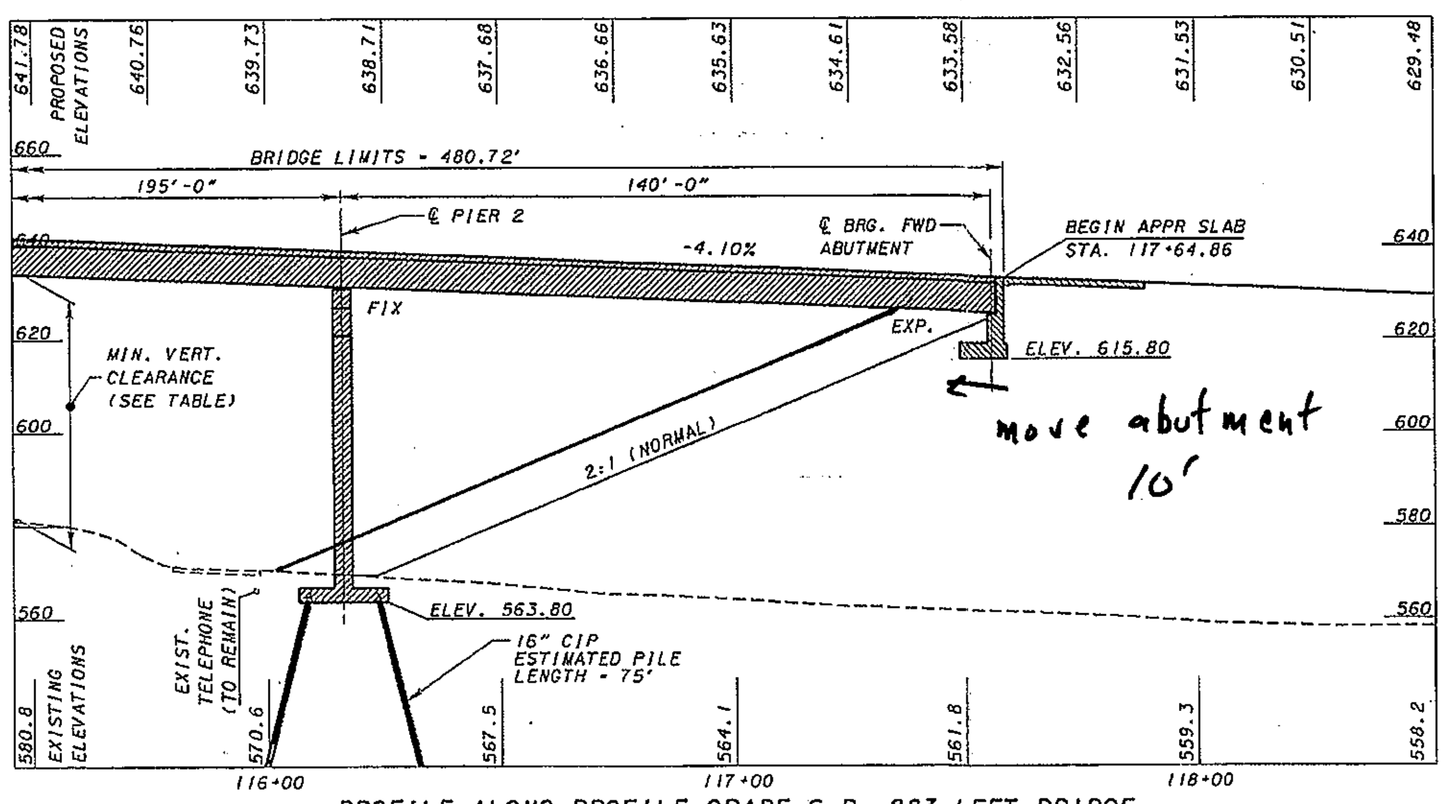
SHEET 5 of 21



PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-39	479.2
TR-40	472.9
B-38	476.2

TABLE OF VERTICAL CLEARANCES		
LOCATION	"C"	
PROPOSED	49.62'	
REQUIRED	23.0'	

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

DESIGN AGENCY: TranSystems

DESIGNED PJP | CHECKED MSL | DRAWN PJP | REVISED | REVIEWED MSL | DATE 9/24/07 | STRUCTURE FILE NUMBER 7306326

SCIOTO COUNTY STA. 112+84.14 STA. 117+64.86

SITE PLAN
BRIDGE NO. SCI-823-0214 L
S.R. 823 OVER CSXT RAILROAD

SCI-823-0.00
PID 77366

2/8

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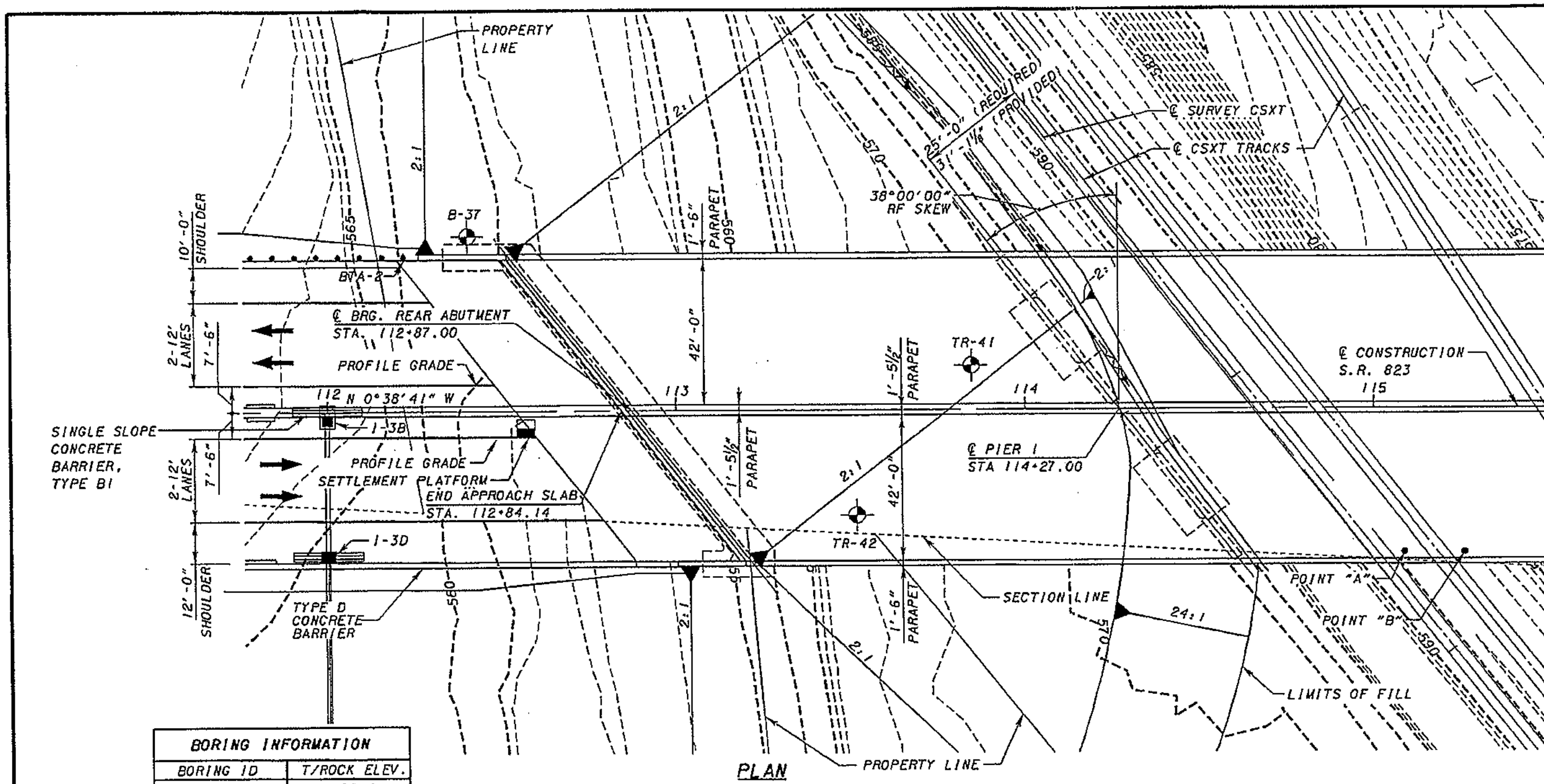
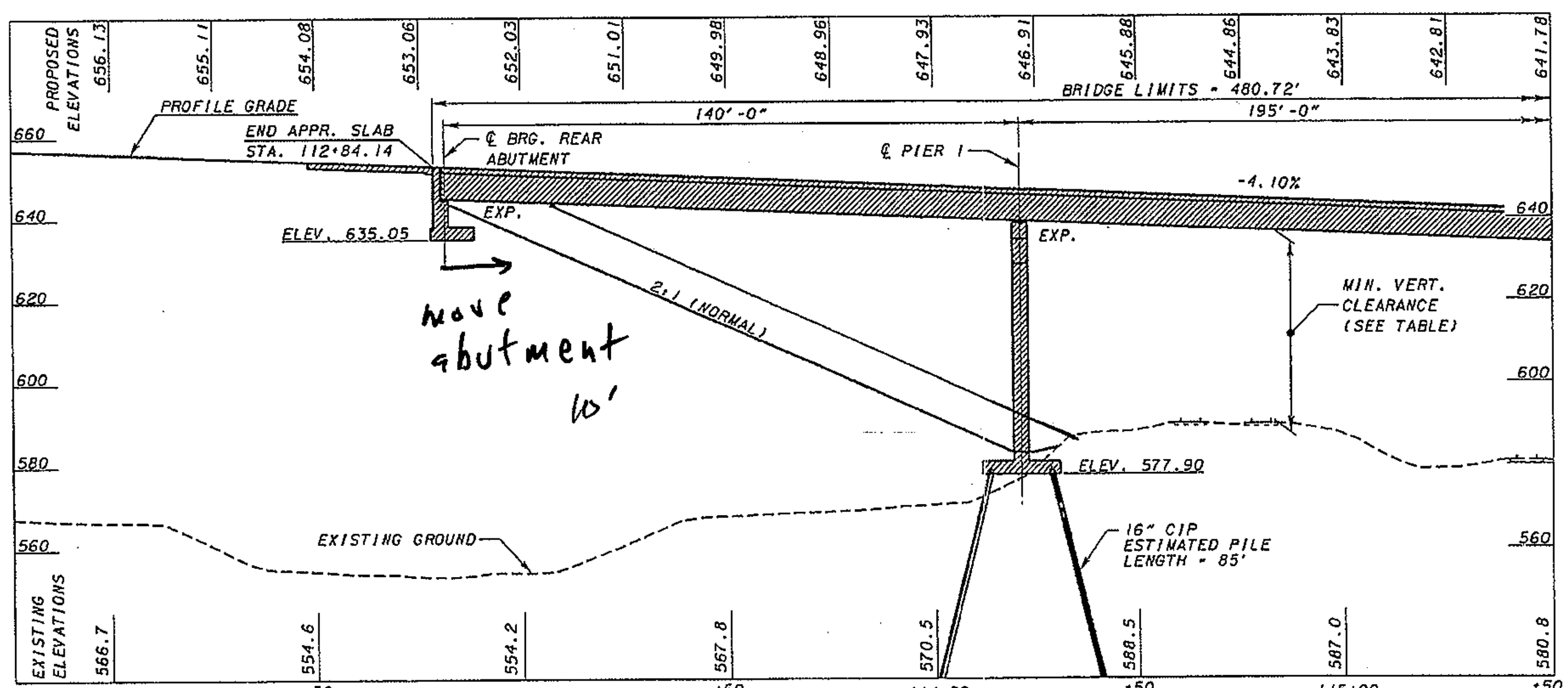
SHEET 6 OF A



PLAN

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-41	482.4
TR-42	476.0
B-37	472.2



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS	
LOCATION	STATION
REAR ABUT. (SB)	112+22.11
FWD. ABUT. (SB)	117+48.15

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	44.69'	44.15'
REQUIRED	23.0'	23.0'

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

S.R. 823
CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

LEGEND

BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2
= BORING LOCATION

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

PROPOSED STRUCTURE

TYPE: 3 SPAN CONTINUOUS 74" WEB A709 GRADE 50W STEEL PLATE GIRDER WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY REINFORCED CONCRETE T-TYPE PIERS AND STUB TYPE ABUTMENTS.
SPANS: 140'-0" - 195'-0" - 140'-0" C/C BRGS
ROADWAY: 2 - 42'-0" T/T OF PARAPETS
LOADING: HS-25 (CASE I) AND ALTERNATE MILITARY LOADING, FUTURE WEARING SURFACE = 60 PSF
SKEW: 38°00'00" RF
CROWN: 0.016 FT/FT
ALIGNMENT: TANGENT
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30' LONG)
LATITUDE: 38°46'06" N
LONGITUDE: 82°52'36" W

DESIGN AGENCY: TranSystems
DESIGNED PJP | CHECKED MSL | DRAWN PJP | REVISED | REVIEWED MSL | DATE 9/28/07 | STRUCTURE FILE NUMBER 7306326

SCIOTO COUNTY
STA. 112+84.14
STA. 117+64.86

SITE PLAN
BRIDGE NO. SCI-823-0214 L
S.R. 823 OVER CSXT RAILROAD

SCI-823-0.00
PID 77366

1 / 8

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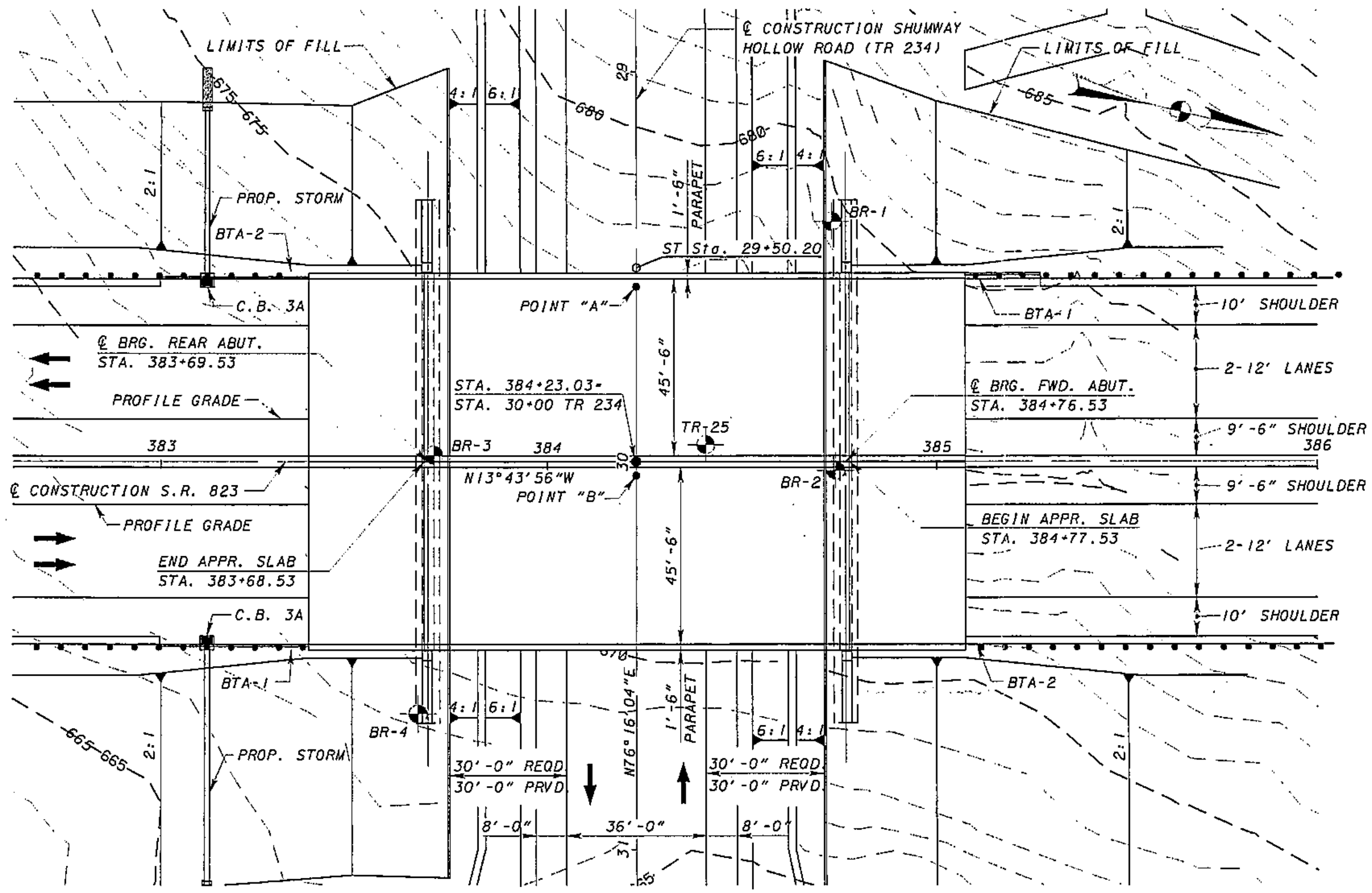
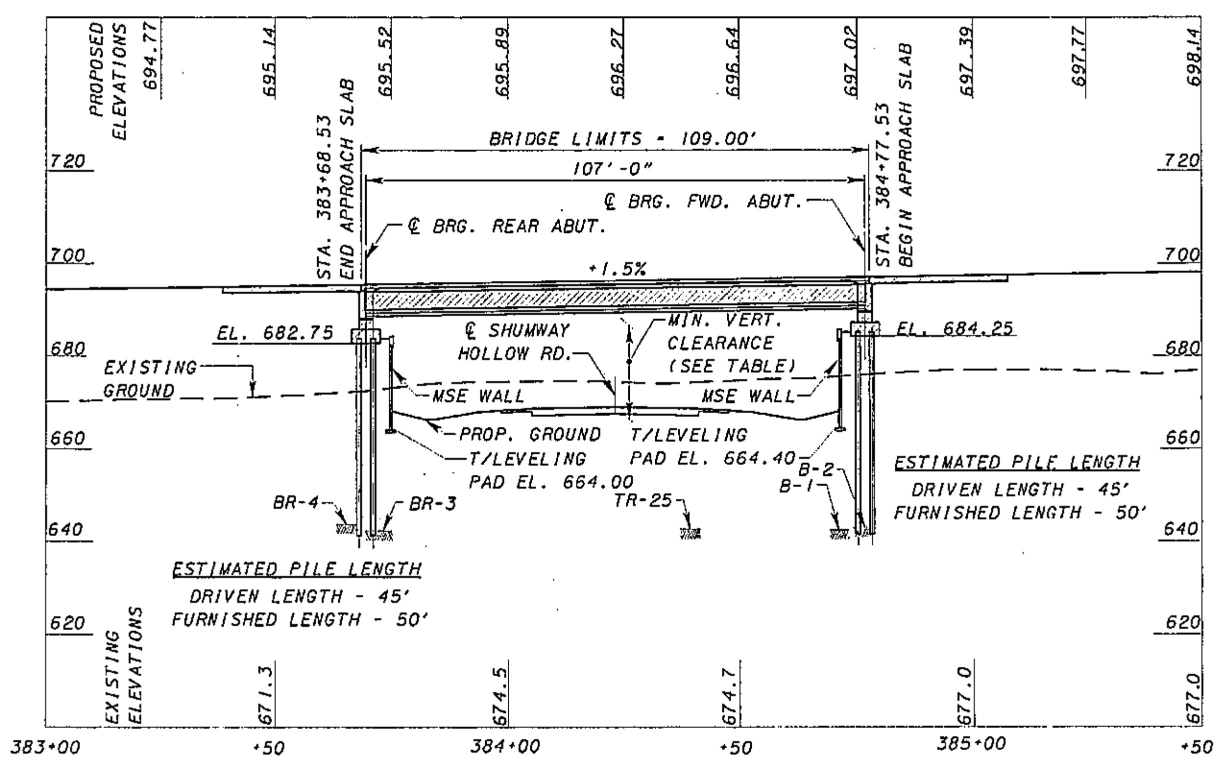
39
SHEET 7 OF 21

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	383+34.39	RT.
REAR ABUT.	383+34.28	LT.
FWD. ABUT.	385+11.78	RT.
FWD. ABUT.	385+11.68	LT.



PLAN



ELEVATIONS ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	19.13'	20.13'
PREFERRED	17.0'	17.0'

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-25	642.6
B-1	642.5
B-2	643.0
B-3	642.3
B-4	643.7

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
S.R. 823
CURRENT YEAR ADT (2010) - 19,800 DESIGN YEAR ADT (2030) - 26,000 CURRENT YEAR ADTT (2010) -2,772 DESIGN YEAR ADTT (2030) - 3,640

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

ALL NEW PILES SHALL BE HP 14x73 PILES AND HAVE A MAXIMUM CAPACITY OF 95 TONS PER PILE.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN, 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY SEMI-INTEGRAL ABUTMENTS FOUNDED ON PILES AND MSE WALL EMBANKMENTS

SPANS: 107'-0" C/C BEARINGS
ROADWAY: 45'-6" TOE TO TOE OF PARAPETS
LOADING: HS-25 AND ALTERNATE MILITARY LOADING FWS-60 PSF
SKEW: NONE
CROWN: 0.016 FT/FT
ALIGNMENT: TANGENT
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30' LONG)
LATITUDE: 38°50'30" N
LONGITUDE: 82°51'30" W

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
⊕ - BORING LOCATION

DESIGN AGENCY: TranSystems
DESIGNED PJP | CHECKED MSL | DRAWN CAS | REVISED | REVIEWED JRC | DATE 12/7/06 | STRUCTURE FILE NUMBER 7306423L, 7306431R

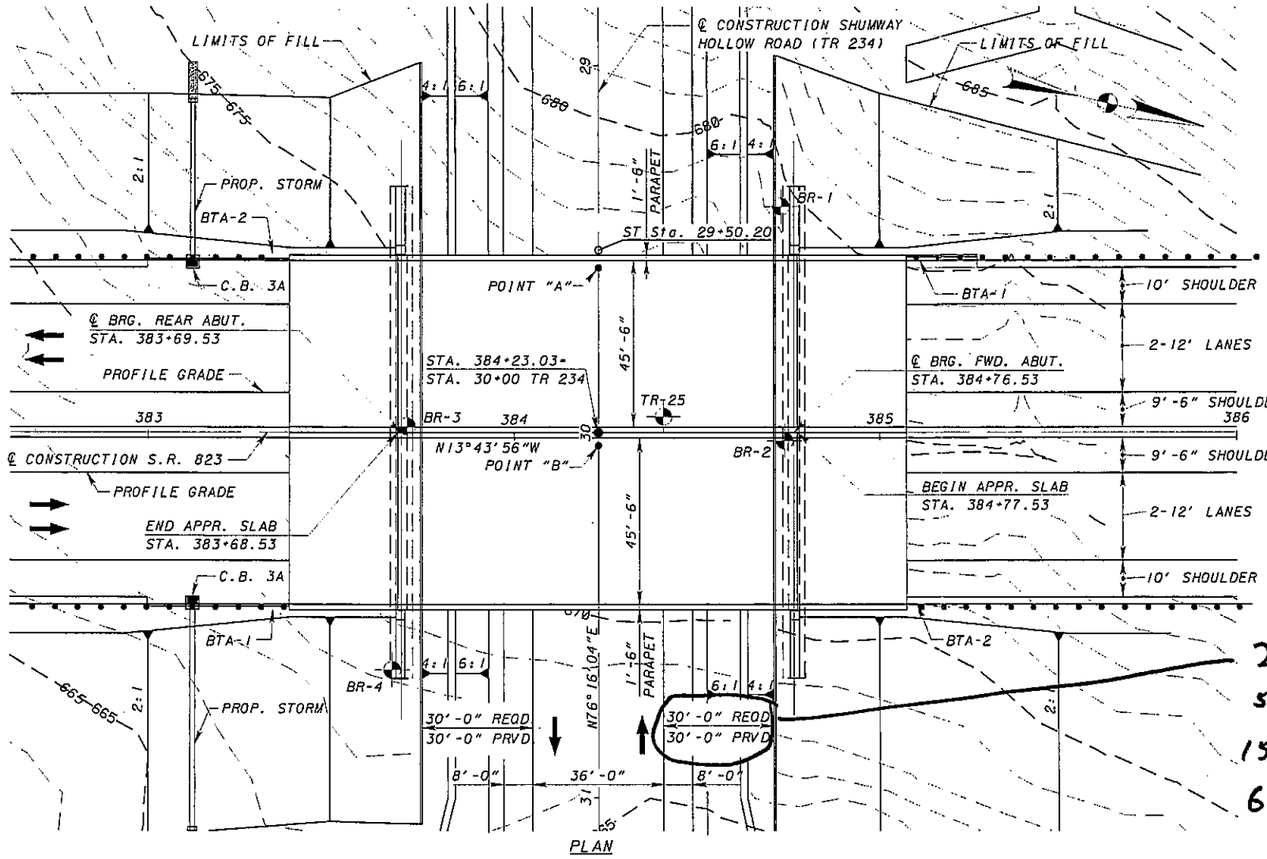
SCIOTO COUNTY
STA. 383+68.53
STA. 384+77.53

SITE PLAN
BRIDGE NO. SCI-823-0727 L&R
S.R. 823 OVER SHUMWAY HOLLOW ROAD (TR-234)

SCI-823-6.81
PID 19415

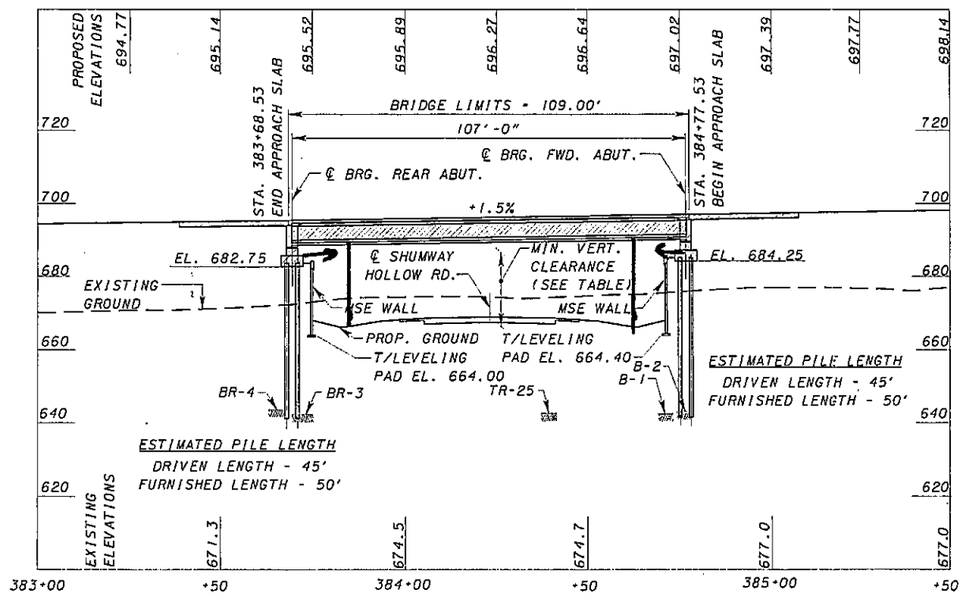
1 / 4

550 / 571



PLAN

21'
55 mph
1500 - 6000 ADT
6:1 slope



ELEVATIONS ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	383+34.39	RT.
REAR ABUT.	383+34.28	LT.
FWD. ABUT.	385+11.78	RT.
FWD. ABUT.	385+11.68	LT.

SHEET 8 OF 24

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
S.R. 823
CURRENT YEAR ADT (2010) - 19,800
DESIGN YEAR ADT (2030) - 26,000
CURRENT YEAR ADTT (2010) -2,772
DESIGN YEAR ADTT (2030) - 3,640

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

ALL NEW PILES SHALL BE HP 14x73 PILES AND HAVE A MAXIMUM CAPACITY OF 95 TONS PER PILE.

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	19.13'	20.13'
PREFERRED	17.0'	17.0'

BORING INFORMATION	
BORING ID	T/ROCK ELEV.
TR-25	642.6
B-1	642.5
B-2	643.0
B-3	642.3
B-4	643.7

PROPOSED STRUCTURE
TYPE: SINGLE SPAN, 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY SEMI-INTEGRAL ABUTMENTS FOUNDED ON PILES AND MSE WALL EMBANKMENTS
SPANS: 107'-0" C/C BEARINGS
ROADWAY: 45'-6" TOE TO TOE OF PARAPETS
LOADING: HS-25 AND ALTERNATE MILITARY LOADING FWS=60 PSF
SKEW: NONE
CROWN: 0.016 FT/FT
ALIGNMENT: TANGENT
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30' LONG)
LATITUDE: 38°50'30" N
LONGITUDE: 82°51'30" W

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
⌖ - BORING LOCATION

DESIGN AGENCY: Tran Systems, 5747 PERIMETER DRIVE, SUITE 240, DUBLIN, OHIO 43017
DESIGNED PJP | DRAWN CAS | CHECKED MSL | REVISED
REVISED JRC | DATE 12/7/06 | STRUCTURE FILE NUMBER 7306423L, 7306431R

SCIOTO COUNTY
STA. 383+68.53
STA. 384+77.53

SITE PLAN
BRIDGE NO. SCI-823-0727 L&R (TR-234)
S.R. 823 OVER SHUMWAY HOLLOW ROAD

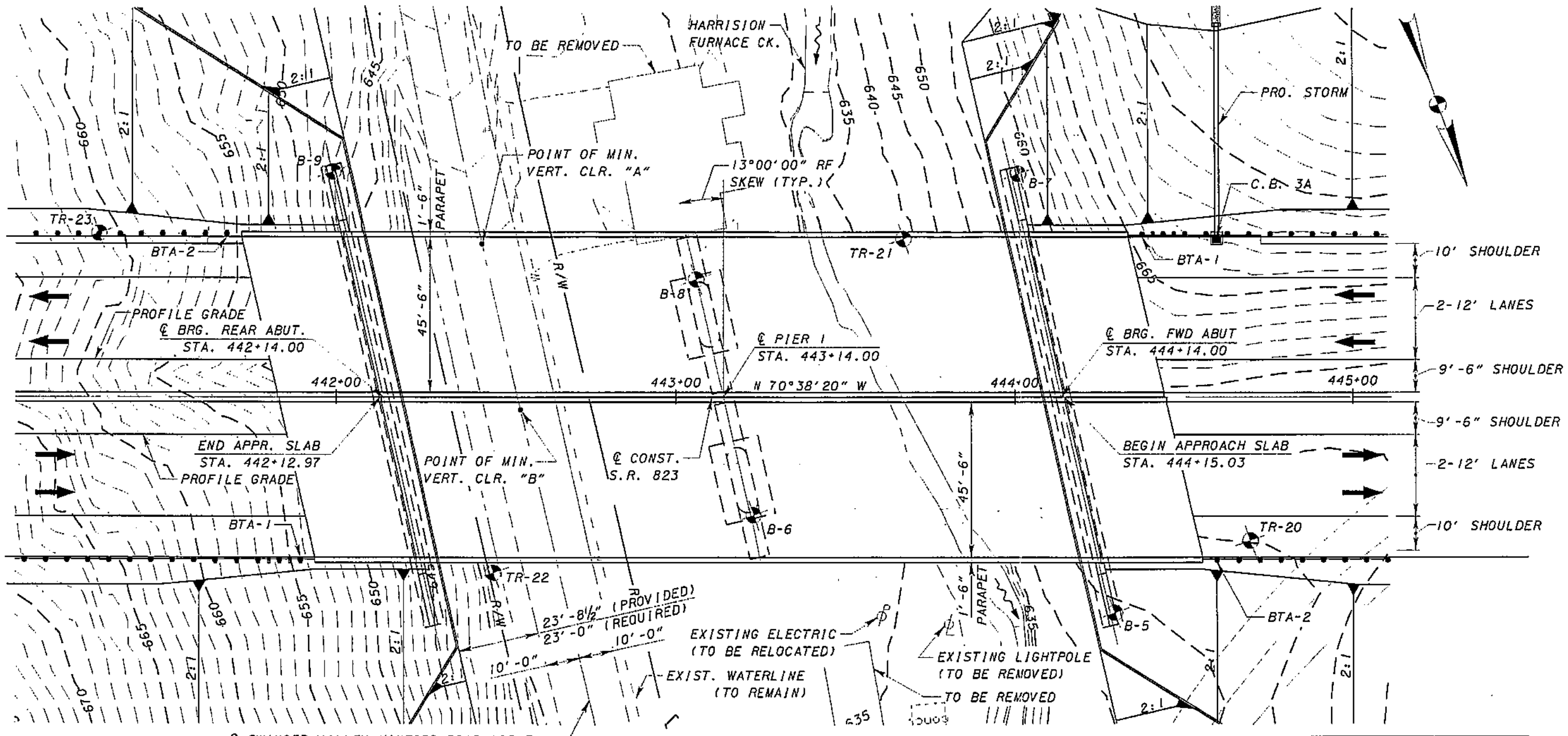
SCI-823-6.81
PID 19415

1 / 4

550
571

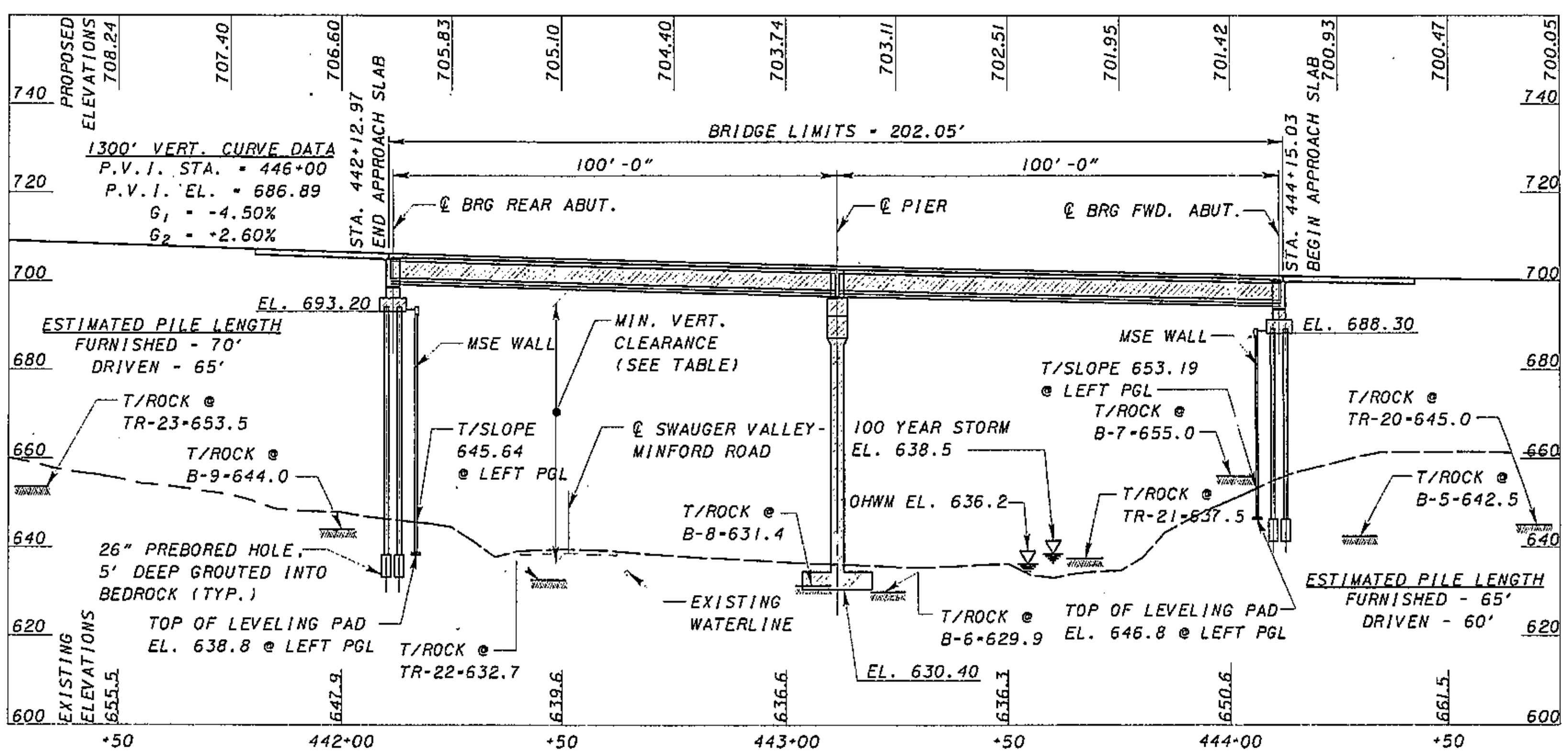
FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	441+89.68	RT.
REAR ABUT.	441+67.87	LT.
FWD. ABUT.	444+60.13	RT.
FWD. ABUT.	444+38.32	LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)



PLAN

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	56.82' ±	58.72' ±
PREFERRED	15.0'	15.0'



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

TRAFFIC DATA
(SR 823)
CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

HYDRAULIC DATA	
DRAINAGE AREA = 0.873 sq.mi. = 558.9 acres	
Q_{50} = 493 cfs	Q_{100} = 581 cfs
V_{50} = 6.5 fps	V_{100} = 6.9 fps
EL_{50} = 638.2	EL_{100} = 638.5
OHWM: EL. 636.2	
AREA BELOW OHWM: 0.17 ACRES	
TEMP. FILL BELOW OHWM: 1130 CY	

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

ALL NEW PILES SHALL BE 14" DIA. C.I.P. REINFORCED CONCRETE PILES AND HAVE A MAXIMUM CAPACITY OF 70 TONS PER PILE

PROPOSED STRUCTURE

TYPE: 2 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS AND T-TYPE PIERS.

SPANS: 100'-0", 100'-0" (℄ BRGS/℄ PIER, ℄ PIER/℄ BRGS)

ROADWAY: 2 - 45'-6" TOE TO TOE OF PARAPETS

LOADING: HS-25 AND ALTERNATE MILITARY LOADING; FWS = 60 PSF

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30 FT LONG)

LATITUDE: 38°51'00"N

LONGITUDE: 82°52'03"W

LEGEND

BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1

BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2

⊕ = BORING LOCATION

DESIGN AGENCY: TranSystems

DESIGNED: MSL | CHECKED: PJP | DRAWN: MTN | REVISED: | REVIEWED: JRC | DATE: 12/7/06 | STRUCTURE FILE NUMBER: 7306458

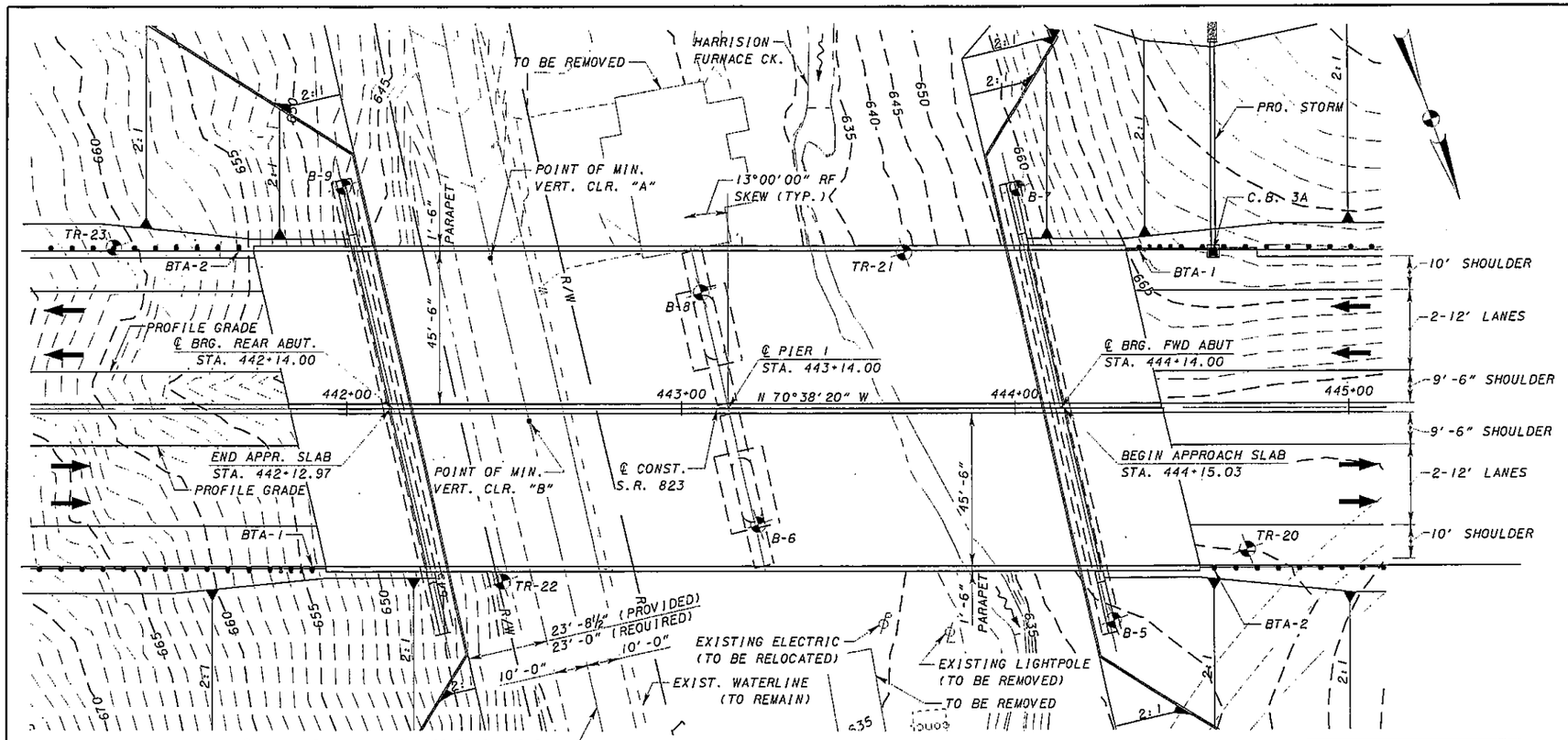
SCIOTO COUNTY
STA. 442+12.97
STA. 444+15.03

SITE PLAN
BRIDGE NO. SCI-823-0837 L
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR-31)

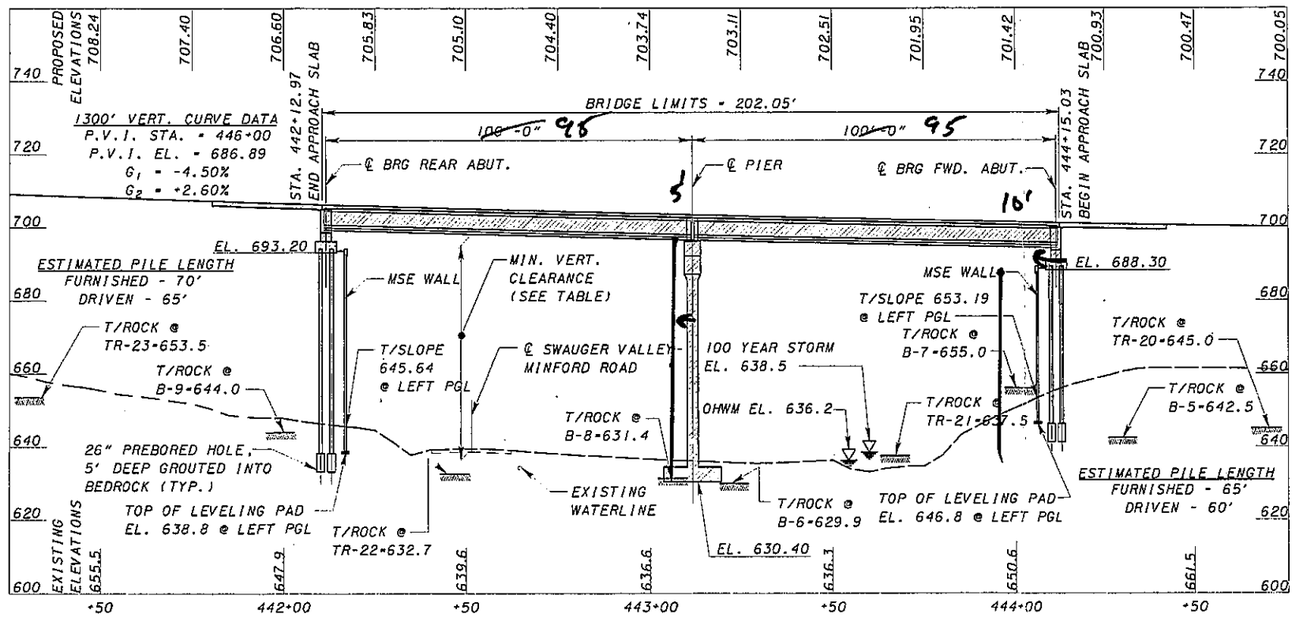
SCI-823-6.81
PID 19415

1 / 7

554 / 571



PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	441+89.68	RT.
REAR ABUT.	441+67.87	LT.
FWD. ABUT.	444+60.13	RT.
FWD. ABUT.	444+38.32	LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

(SR 823)
CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

HYDRAULIC DATA

DRAINAGE AREA = 0.873 sq.mi. = 558.9 acres

Q_{50} = 493 cfs Q_{100} = 581 cfs
V_{50} = 6.5 fps V_{100} = 6.9 fps
EL 50 = 638.2 EL_{100} = 638.5
OHWM: EL. 636.2
AREA BELOW OHWM: 0.17 ACRES
TEMP. FILL BELOW OHWM: 1130 CY

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	56.82' ±	58.72' ±
PREFERRED	15.0'	15.0'

NOTES:
1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:
ALL NEW PILES SHALL BE 14" DIA. C.I.P. REINFORCED CONCRETE PILES AND HAVE A MAXIMUM CAPACITY OF 70 TONS PER PILE

PROPOSED STRUCTURE

TYPE: 2 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS AND T-TYPE PIERS.

SPANS: 100'-0", 100'-0" (℄ BRGS/℄ PIER, ℄ PIER/℄BRGS)

ROADWAY: 2 - 45'-6" TOE TO TOE OF PARAPETS

LOADING: HS-25 AND ALTERNATE MILITARY LOADING; FWS = 60 PSF

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30 FT LONG)
LATITUDE: 38°51'00"N
LONGITUDE: 82°52'03"W

LEGEND
BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2
-B- = BORING LOCATION

DESIGN AGENCY: Trans Systems, 5747 PERIMETER DRIVE, SUITE 120, DUBLIN, OHIO 43017
DATE: 12/7/06
REVIEWED: JRC
DRAWN: MTN
DESIGNED: MSL
CHECKED: PJP
REVISED:
STRUCTURE FILE NUMBER: 7306458

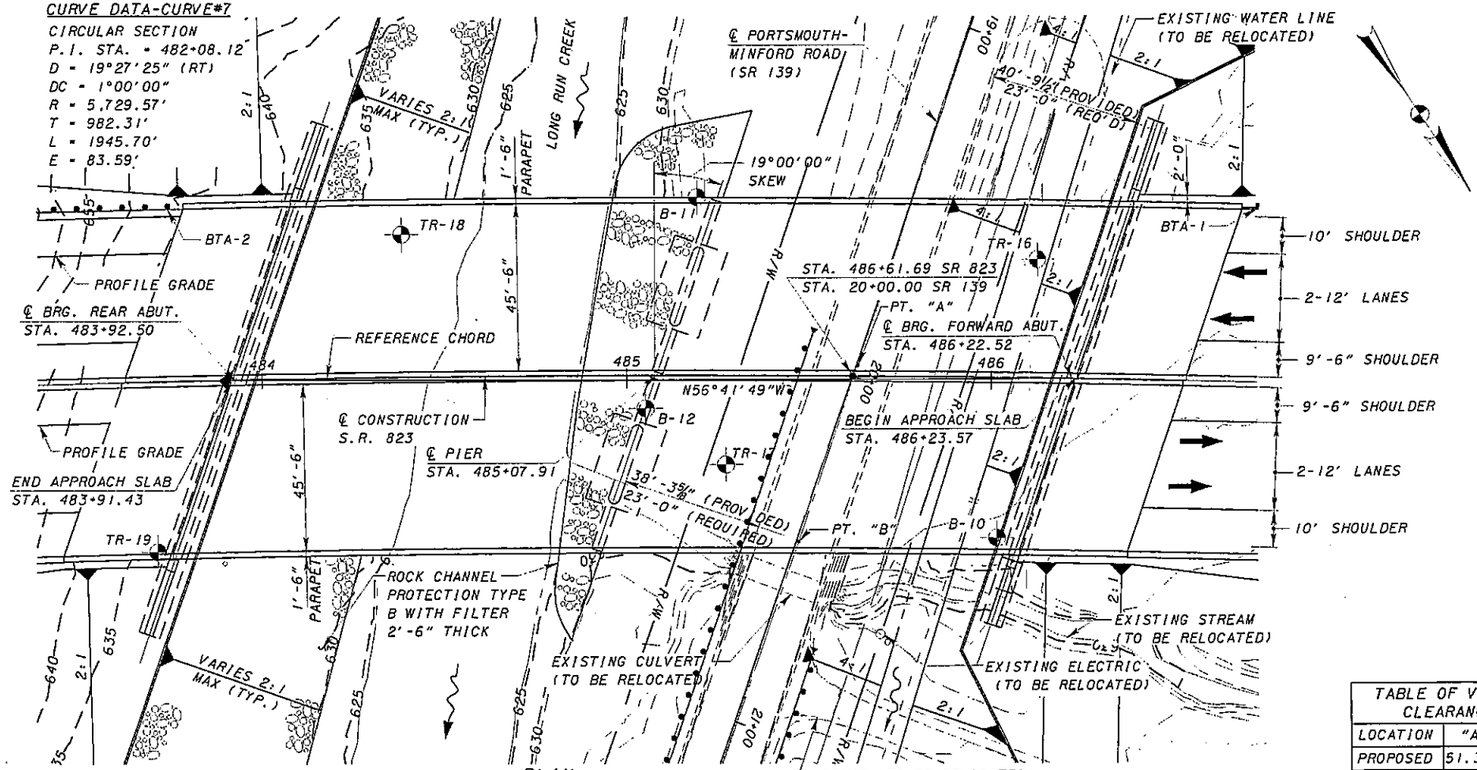
SCIOTO COUNTY
STA. 442+12.97
STA. 444+15.03

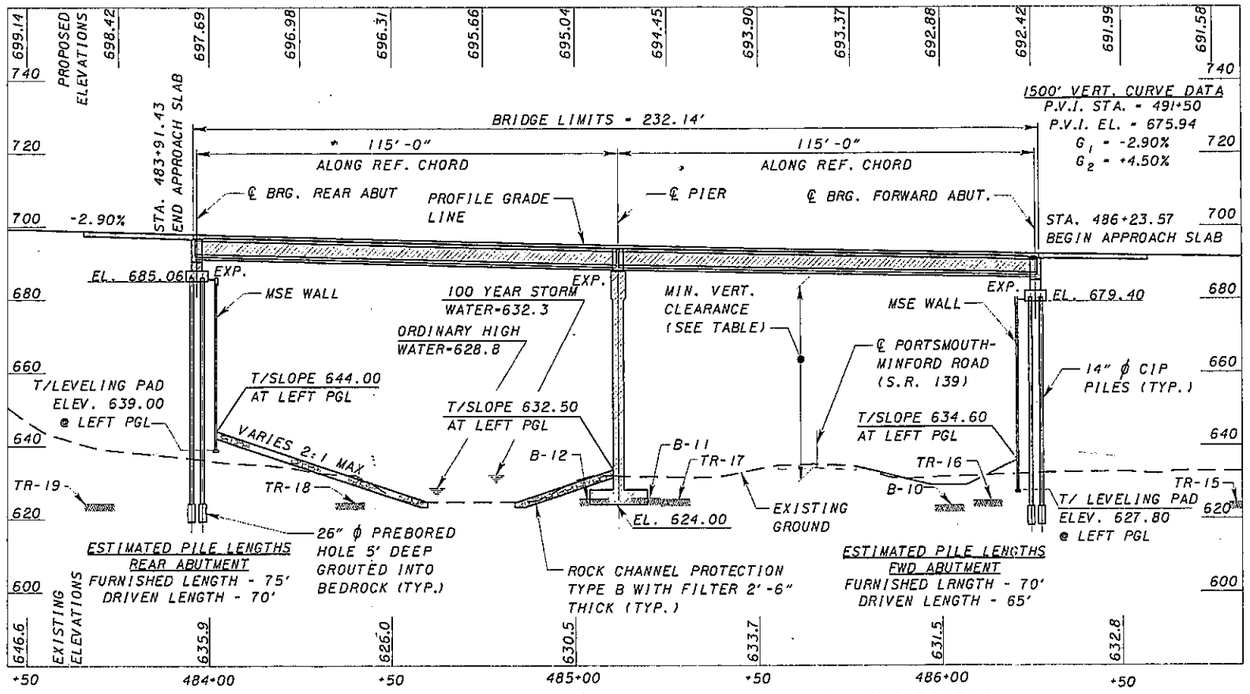
SITE PLAN
BRIDGE NO. SCI-823-0837 L
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

1 / 7

554
571





PROFILE ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	483+74.60	47.00 LT.
FWD. ABUT.	486+72.41	47.00 LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
(SR 823)
CURRENT YEAR ADT (2010) = 19,800
DESIGN YEAR ADT (2030) = 26,000
CURRENT YEAR ADTT (2010) = 2,772
DESIGN YEAR ADTT (2030) = 3,640

HYDRAULIC DATA	
DRAINAGE AREA = 13.424 sq.mi. = 8591 acres	
Q_{50} = 2230 cfs	Q_{100} = 2572 cfs
V_{50} = 6.0 fps	V_{100} = 6.2 fps
EL_{50} = 631.8	EL_{100} = 632.3
OHWM: =628.8	
AREA BELOW OHWM: 0.13 ACRES	
TEMP. FILL BELOW OHWM: 835 CY	

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	51.38' ±	50.47' ±
PREFERRED	17.0'	17.0'

BORING INFORMATION	
No.	T/ROCK ELEV.
TR-15	624.3
TR-16	624.9
TR-17	625.4
TR-18	624.5
TR-19	624.3
B-10	623.6
B-11	625.7
B-12	625.5

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

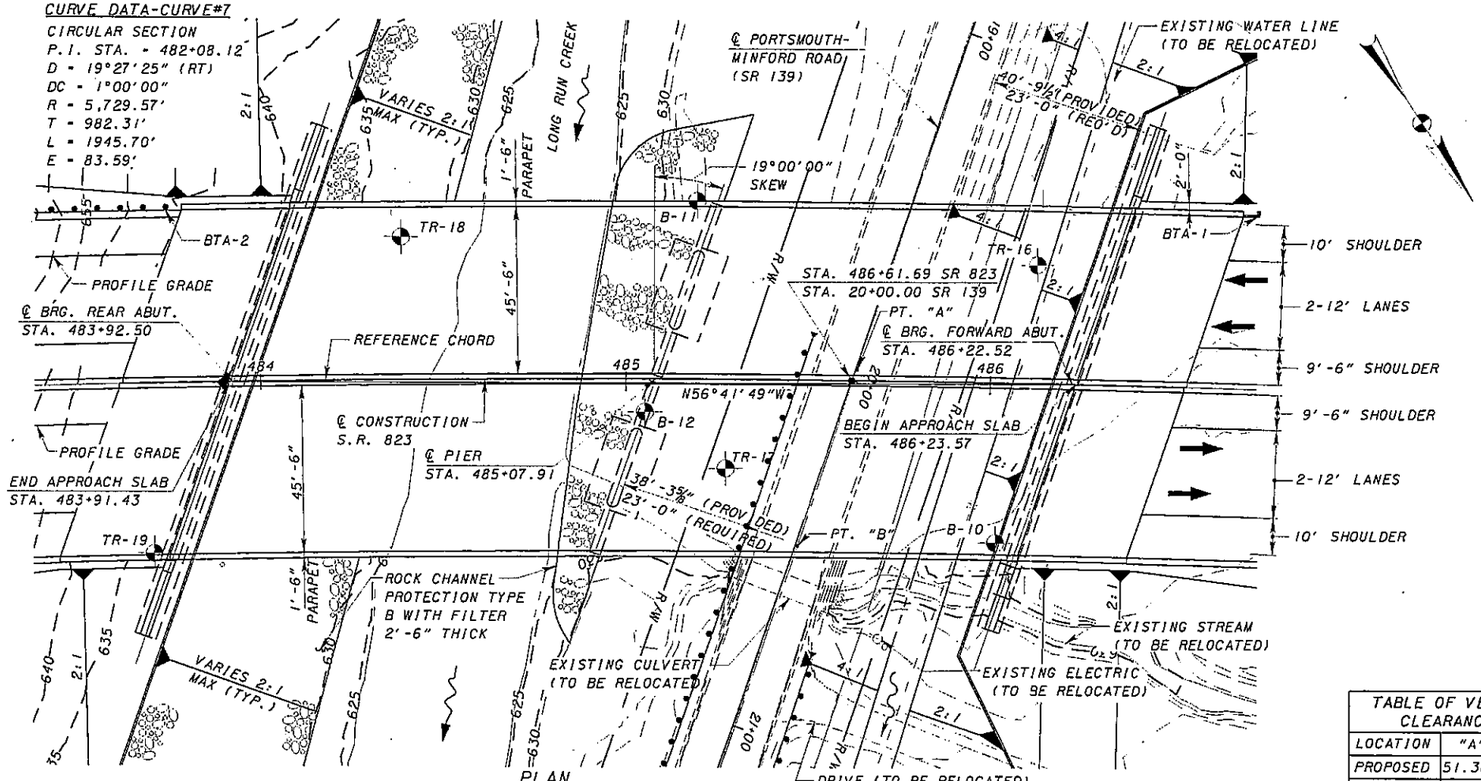
ALL NEW PILES SHALL BE 14" ϕ CIP PILES AND HAVE A MAXIMUM CAPACITY OF 70 TONS PER PILE. SPREAD FOOTINGS SHALL HAVE AN ALLOWABLE BEARING CAPACITY OF 40 TSF.

PROPOSED STRUCTURE
TYPE: 2 SPAN CONTINOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS, T-TYPE PIERS, AND MSE WALL SUPPORTED EMBANKMENT.
SPANS: 115'-0", 115'-0" (℄ BRGS/℄PIER, ℄ PIER/℄ BRGS) (MEASURED ALONG REF. CHORD)
ROADWAY: 2-45'-6" TOE TO TOE OF PARAPETS.
LOADING: HS-25 AND ALTERNATE MILITARY LOADING, FWS = 60 PSF.
SKEW: 19°00'00" (LF) WITH RESPECT TO REF. CHORD.
SUPER ELEVATION: 0.036 FT/FT.
ALIGNMENT: 1°00'00" CURVE TO THE RIGHT.
WEARING SURFACE: MONOLITHIC CONCRETE.
APPROACH SLABS: AS-1-81 (30'-0" LONG).
LATITUDE: 38° 51' 30" N
LONGITUDE: 82° 52' 00" W

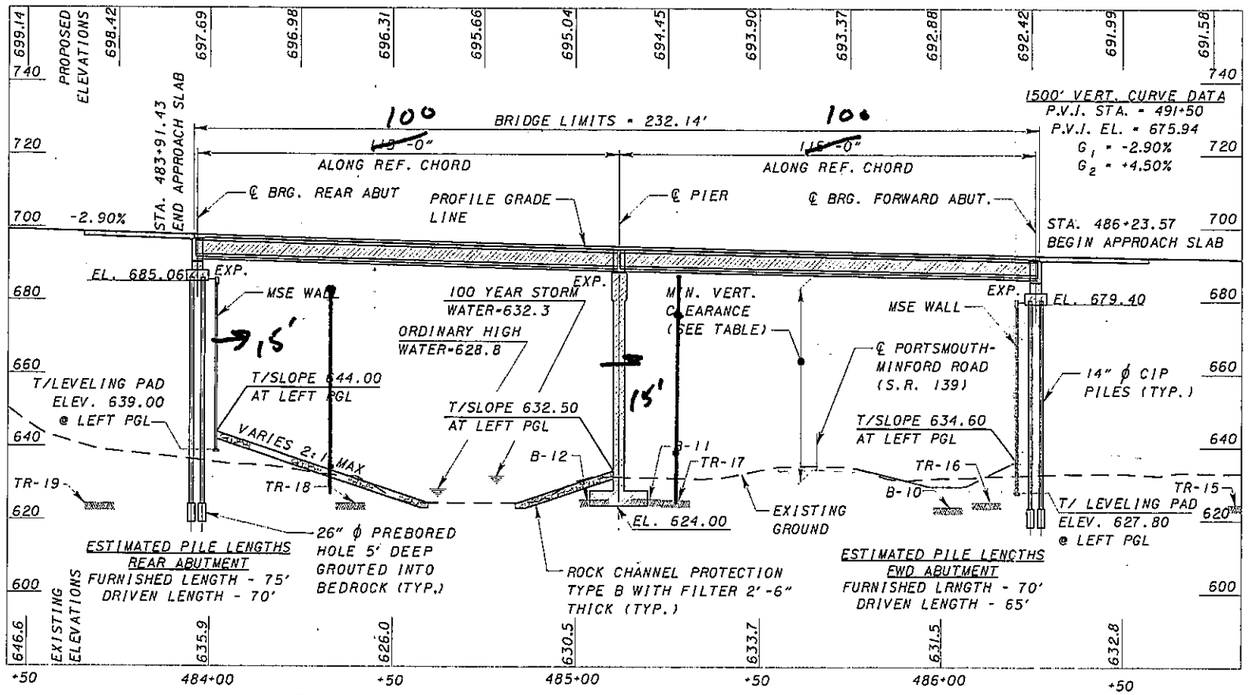
LEGEND

BTA-1 : BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 : BRIDGE TERMINAL ASSEMBLY TYPE 2
⊕ : BORING LOCATION

DESIGN AGENCY: TranSystems, 4700 ASHWOOD DRIVE, SUITE 250, BLUE ASH, OHIO 45241
DATE REVISED: 12/7/06 — JRC
STRUCTURE FILE NUMBER: 7306474L
DRAWN: AWB — REVISED
DESIGNED: PJP — CHECKED: MSL
SCIOTO COUNTY — STA. 483+91.43 — STA. 486+23.57
SITE PLAN
BRIDGE NO. SCI-823-0917-L
S.R. 823 OVER PORTSMOUTH-MINFORD RD. (S.R. 139)
SCI-823-6.81
PID 19415
1 / 7
56 I / 57 I



PLAN



PROFILE ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	483+74.60	47.00 LT.
FWD. ABUT.	486+72.41	47.00 LT.

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
(SR 823)
CURRENT YEAR ADT (2010) = 19,800
DESIGN YEAR ADT (2030) = 26,000
CURRENT YEAR ADTT (2010) = 2,772
DESIGN YEAR ADTT (2030) = 3,640

HYDRAULIC DATA	
DRAINAGE AREA = 13.424 sq.mi. = 8591 acres	
Q_{50} = 2230 cfs	Q_{100} = 2572 cfs
V_{50} = 6.0 fps	V_{100} = 6.2 fps
EL_{50} = 631.8	EL_{100} = 632.3
OHWM: 628.8	
AREA BELOW OHWM: 0.13 ACRES	
TEMP. FILL BELOW OHWM: 835 CY	

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	51.38' ±	50.47' ±
PREFERRED	17.0'	17.0'

BORING INFORMATION	
No.	T/ROCK ELEV.
TR-15	624.3
TR-16	624.9
TR-17	625.4
TR-18	624.5
TR-19	624.3
B-10	623.6
B-11	625.7
B-12	625.5

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

FOUNDATION DATA:

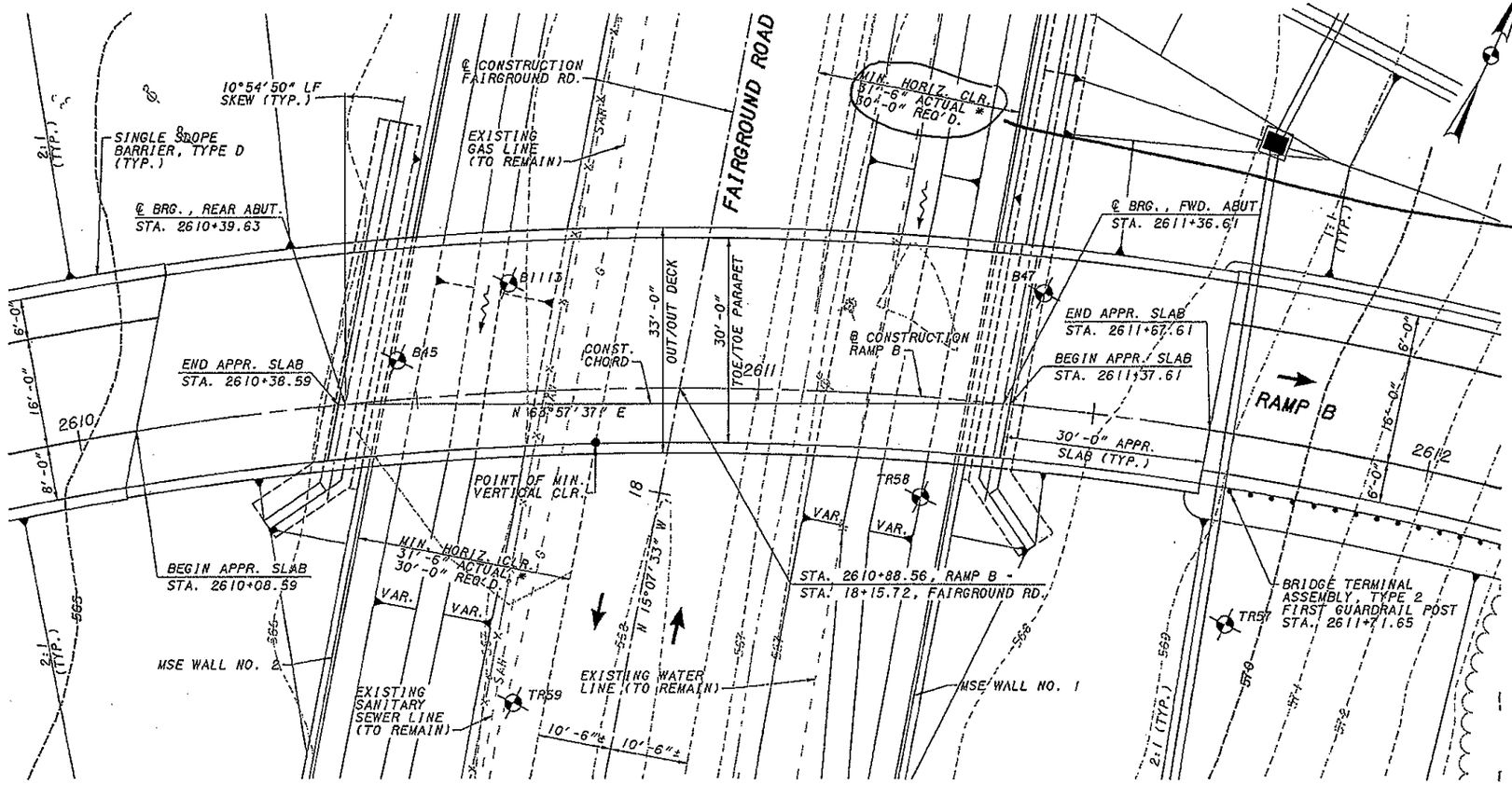
ALL NEW PILES SHALL BE 14" ℄ CIP PILES AND HAVE A MAXIMUM CAPACITY OF 70 TONS PER PILE. SPREAD FOOTINGS SHALL HAVE AN ALLOWABLE BEARING CAPACITY OF 40 TSF.

PROPOSED STRUCTURE
TYPE: 2 SPAN CONTINOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS, T-TYPE PIERS, AND MSE WALL SUPPORTED EMBANKMENT.
SPANS: 115'-0", 115'-0" (℄ BRGS/℄PIER, ℄ PIER/℄ BRGS) (MEASURED ALONG REF. CHORD)
ROADWAY: 2-45'-6" TOE TO TOE OF PARAPETS.
LOADING: HS-25 AND ALTERNATE MILITARY LOADING, FWS = 60 PSF.
SKEW: 19°00'00" (LF) WITH RESPECT TO REF. CHORD.
SUPER ELEVATION: 0.036 FT/FT.
ALIGNMENT: 1°00'00" CURVE TO THE RIGHT.
WEARING SURFACE: MONOLITHIC CONCRETE.
APPROACH SLABS: AS-1-81 (30'-0" LONG).
LATITUDE: 38° 51' 30" N
LONGITUDE: 82° 52' 00" W

LEGEND

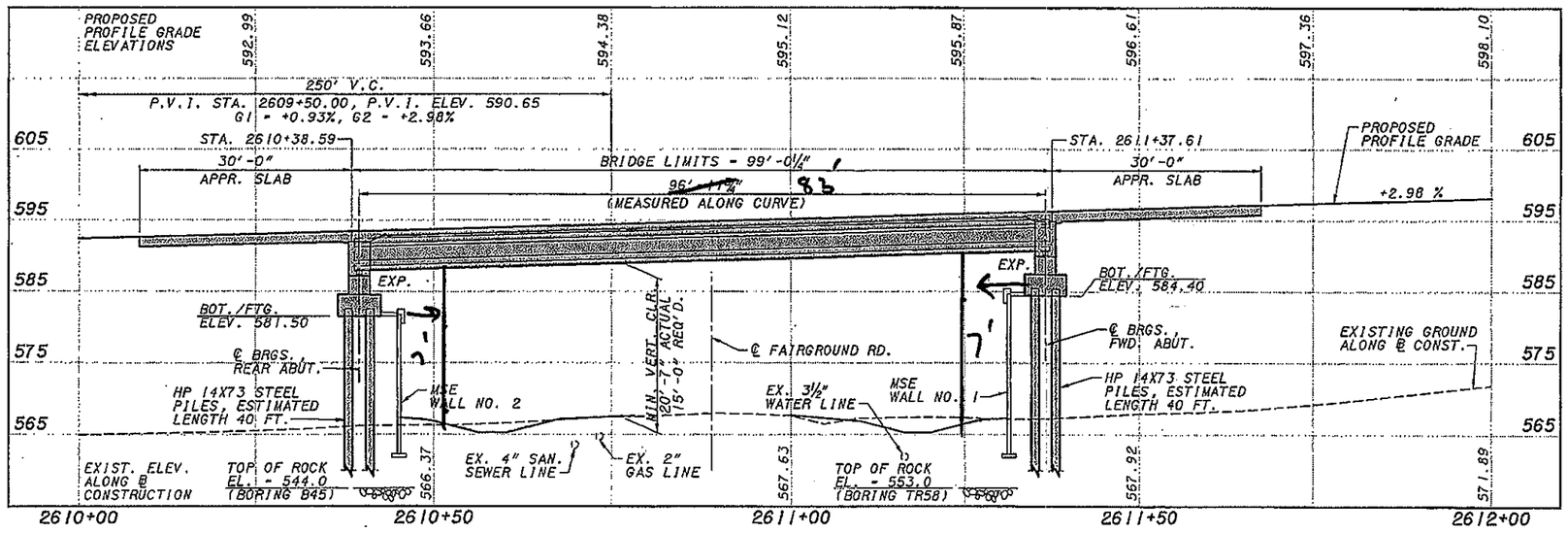
BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
⌖ - BORING LOCATION

DESIGN AGENCY: Transystems, 37 W. BROAD ST., SUITE 240, COLUMBUS, OHIO 43215
DATE: 12/7/06
REVIEWED: JRC
DRAWN: AWB
DESIGNED: PJP
CHECKED: MSL
STRUCTURE FILE NUMBER: 7306474L
REVISED
REVISED
SCIOTO COUNTY STA. 483+91.43 STA. 486+23.57
SITE PLAN
BRIDGE NO. SCI-823-0917-L
S.R. 823 OVER PORTSMOUTH-MINFORD RD. (S.R. 139)
SCI-823-6.81
PID 19415
1 / 7
561 / 571



PLAN

* 31'-6" PROVIDED TO PERMIT FUTURE 12'-0" LANE



PROFILE ALONG ℄ CONSTRUCTION, RAMP B

BENCHMARKS

39

SHEET 13 OF 21

CURVE DATA - RAMP B
P.I. Sta = 2609+99.07
Δ = 102° 45' 15" (RT)
Do = 11° 15' 00"
R = 509.30'
T = 637.46'
L = 913.37'
E = 306.63'

23'
55 mph
> 6,000 ADT
6:1 or Flatter

TRAFFIC DATA
CURRENT ADT (2010) = 2700
DESIGN ADT (2030) = 3600
DESIGN ADTT = 500

LEGEND
INDICATES BORING LOCATION

DRAFT
NOT FOR REVIEW.
NOT FOR VALUE ENGINEERING
STUDY ONLY.

NOTES
EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
POWER AND TELEPHONE LINES TO BE RELOCATED.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS
LENGTH OF SPAN: 96'-11 3/4" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION
ROADWAY: 30'-0" TOE/TOE PARAPETS
SIDEWALK: NONE
DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²
SKEW: 10°54'50" LEFT FORWARD, MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30'-0" LONG)
ALIGNMENT: HORIZONTALLY CURVED (℄ RADIUS = 509.30')
SUPERELEVATION: 0.071 FT/FT
LATITUDE: N 38°53'31"
LONGITUDE: W 82°59'51"

DESIGN AGENCY: CH2MHILL, 5775 Perimeter Drive, Suite 190, Dublin, Ohio 43017
DESIGNED: DGS | DRAWN: JBA | CHECKED: SKT | REVISED: | REVIEWED: SCJ | DATE: 10/07
STRUCTURE FILE NUMBER: 7306717
SCIOTO COUNTY
STA. 2610+38.59 TO STA. 2611+37.61

SITE PLAN
BRIDGE NO. SCI-823-1593
RAMP B OVER FAIRGROUND ROAD

SCI-823-10.13
PID 79977

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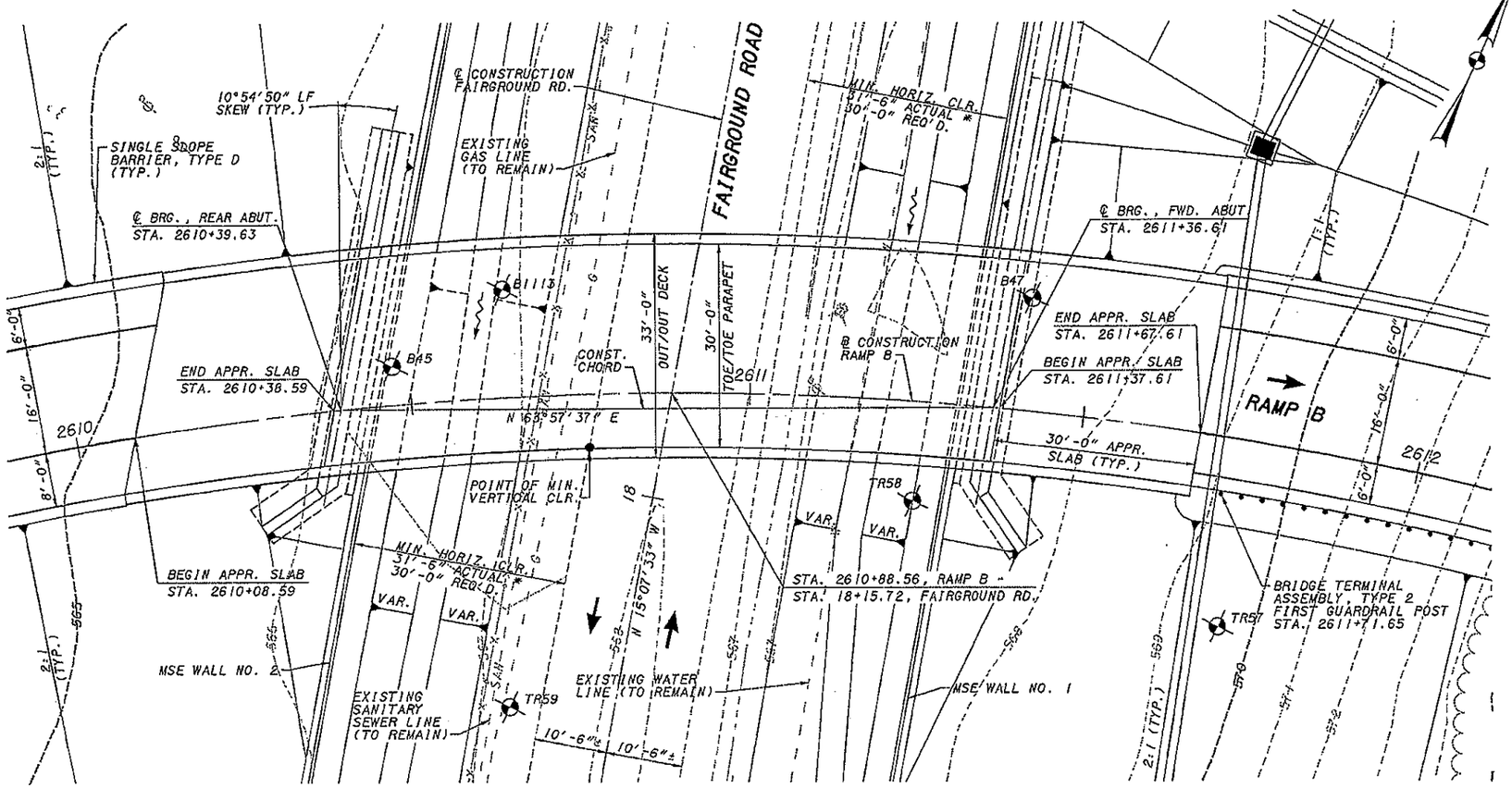
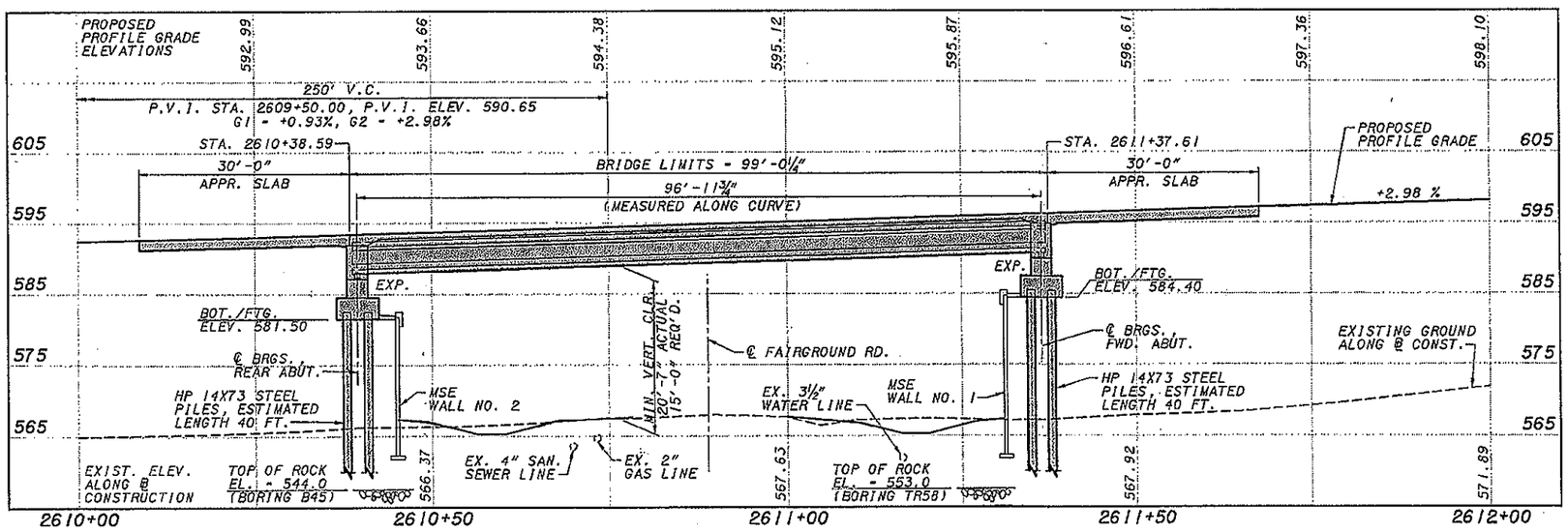


PLAN

* 31'-6" PROVIDED TO PERMIT FUTURE 12'-0" LANE



PROFILE ALONG ℄ CONSTRUCTION, RAMP B

BENCHMARKS

39
SHEET 14 OF 21

CURVE DATA - RAMP B
P.I. Sta = 2609+99.07
Δ = 102° 45' 15" (RT)
Do = 11° 15' 00"
R = 509.30'
T = 637.46'
L = 913.37'
E = 306.63'

TRAFFIC DATA

CURRENT ADT (2010) = 2700
DESIGN ADT (2030) = 3600
DESIGN ADTT = 500

LEGEND

INDICATES BORING LOCATION

DRAFT NOT FOR REVIEW. NOT FOR VALUE ENGINEERING STUDY ONLY.

NOTES

EARTHWORK LIMITS SHOWN ARE APPROXIMATE; ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

POWER AND TELEPHONE LINES TO BE RELOCATED.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS

LENGTH OF SPAN: 96'-11 3/4" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION

ROADWAY: 30'-0" TOE/TOE PARAPETS

SIDEWALK: NONE

DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²

SKEW: 10°54'50" LEFT FORWARD, MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30'-0" LONG)

ALIGNMENT: HORIZONTALLY CURVED (℄ RADIUS = 509.30')

SUPERELEVATION: 0.071 FT/FT

LATITUDE: N 38°53'31"

LONGITUDE: W 82°59'51"

DESIGN AGENT: CH2MHILL, 6775 Perimeter Drive, Suite 190, Dublin, Ohio 43017

DESIGNED	DRAWN	REVIEWED	DATE
DGS	JBA	SCJ	10/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
SKT		7306717	

SCIOTO COUNTY
STA. 2610+38.59 TO STA. 2611+37.61

SITE PLAN
BRIDGE NO. SCI-823-1593
RAMP B OVER FAIRGROUND ROAD

SCI-823-10.13
PID 79977

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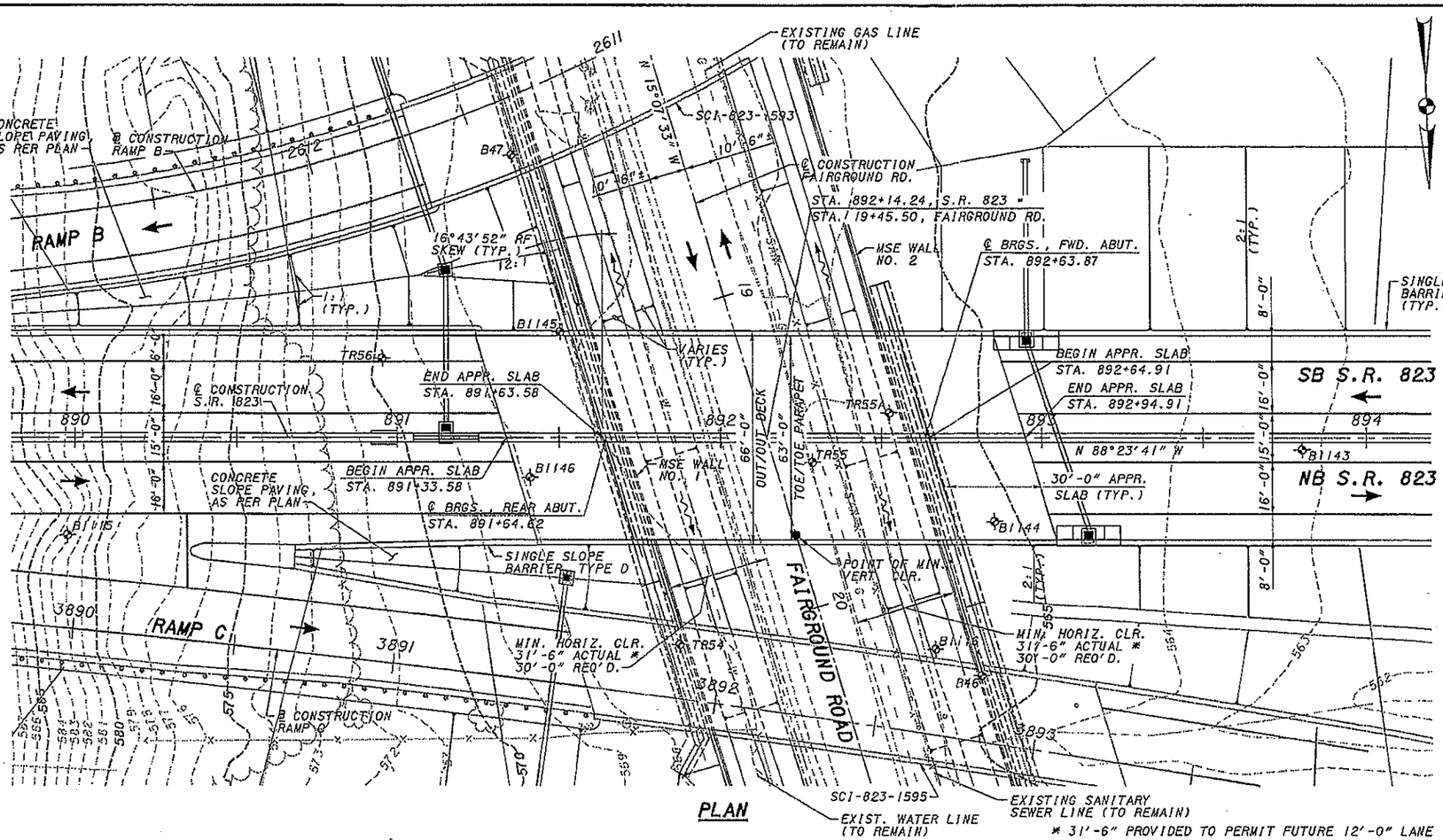
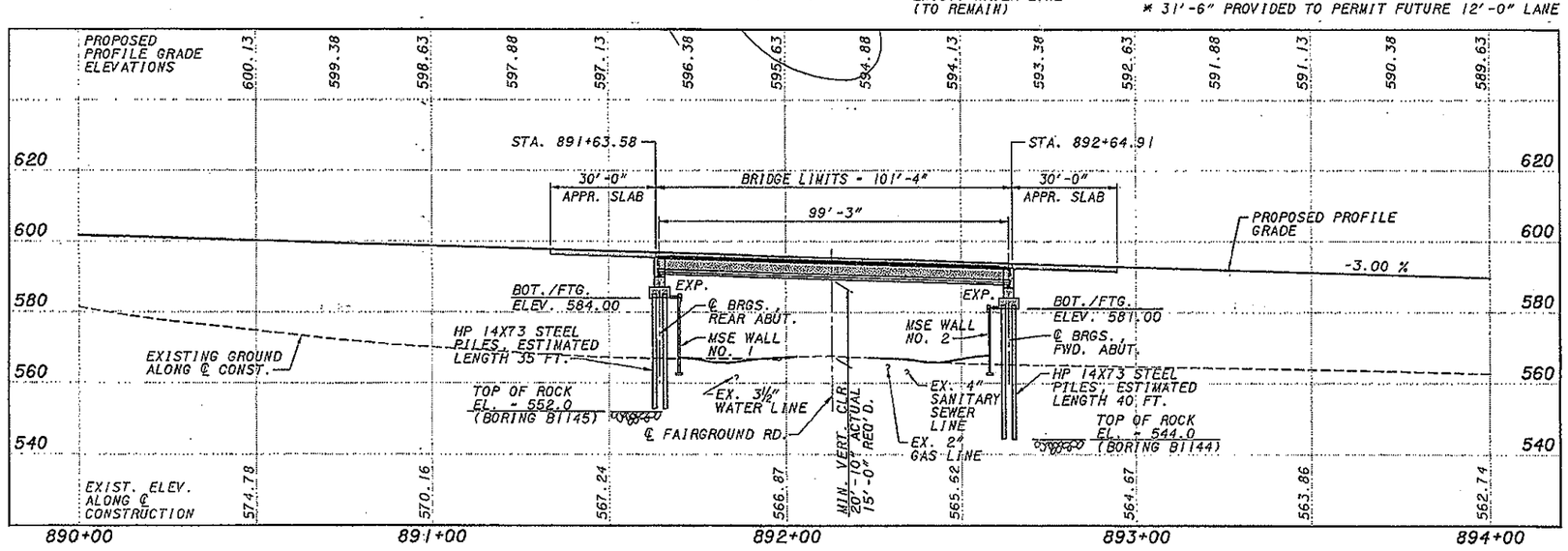


PLAN



PROFILE ALONG PROFILE GRADE LINE, S.R. 823

BENCHMARKS

39

SHEET 15 OF 21

TRAFFIC DATA

CURRENT ADT (2010) - 8900
DESIGN ADT (2030) - 13000
DESIGN ADTT = 1820

LEGEND

⊹ INDICATES BORING LOCATION

DRAFT NOT FOR REVIEW. NOT FOR VALUE ENGINEERING STUDY ONLY.

NOTES

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

POWER AND TELEPHONE LINES TO BE RELOCATED.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS

LENGTH OF SPAN: 99'-3" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION

ROADWAY: 30'-1⅛" TOE/TOE PARAPETS (RB)
30'-1⅛" TOE/TOE PARAPETS (LB)

SIDEWALK: NONE

DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²

SKEW: 16°43'52" RIGHT FORWARD

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30'-0" LONG)

ALIGNMENT: TANGENT

CROWN: 0.016 FT/FT

LATITUDE: N 38°53'32"

LONGITUDE: W 82°59'52"

DESIGN AGENCY
CH2MHILL
5775 Perimeter Drive, Suite 190
Dublin, Ohio 43017

DESIGNED	DRAWN	REVIEWED	DATE
JBA	JBA	SCJ	09/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
SKT		7306725	

SCIOTO COUNTY
STA. 891+63.58
TO STA. 892+64.91

SITE PLAN
BRIDGE NO. SCI-823-1594
S.R. 823 OVER FAIRGROUND ROAD

SCI-823-10.13
PID 79977

1/3

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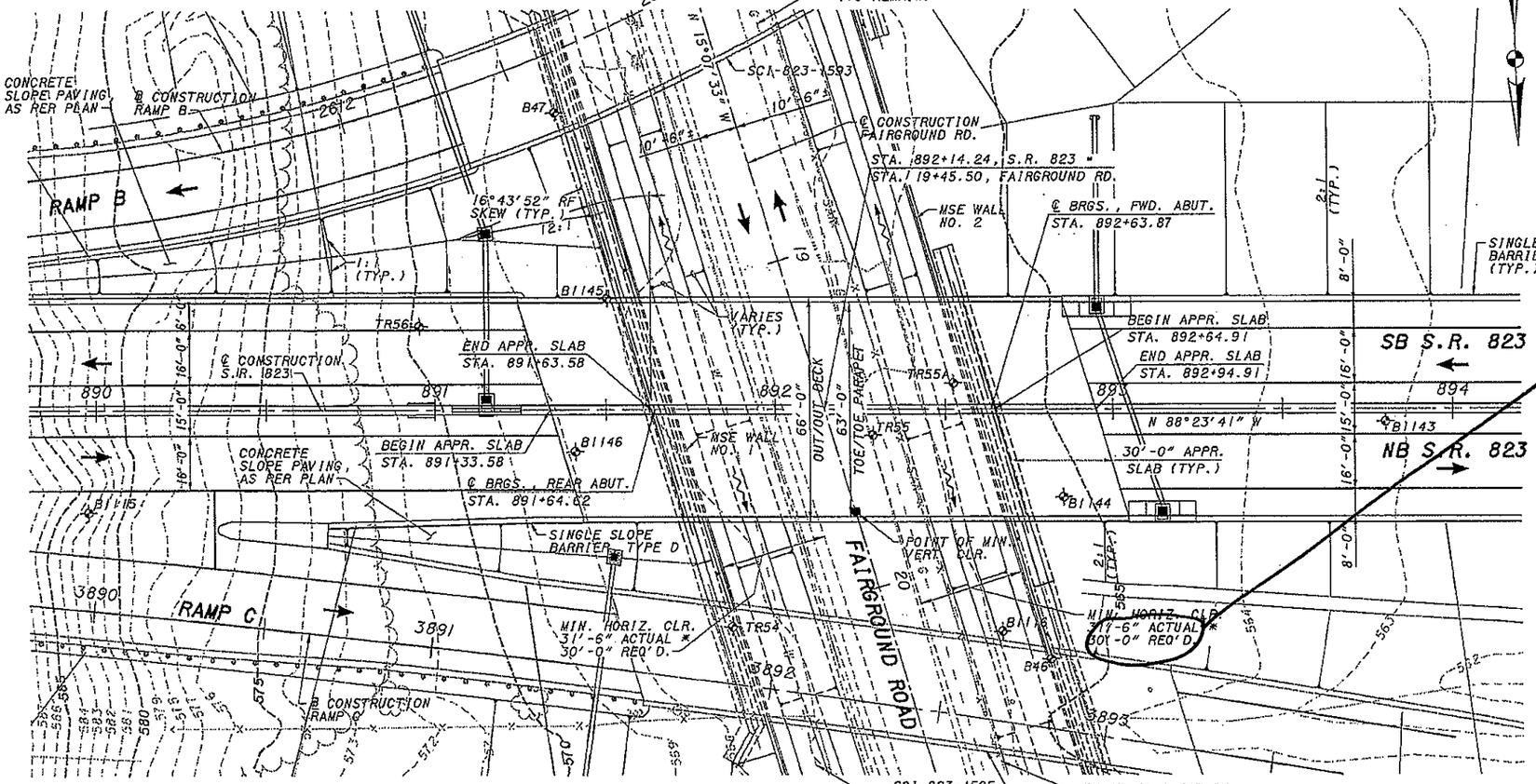
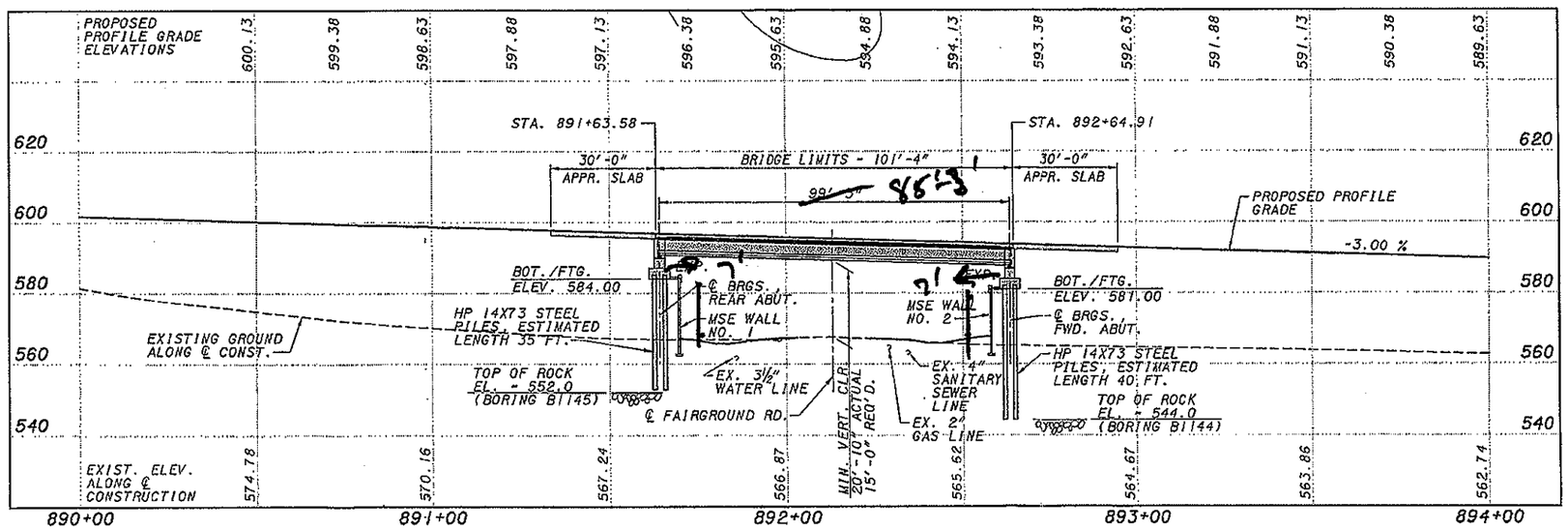


PLAN

* 31'-6" PROVIDED TO PERMIT FUTURE 12'-0" LANE



PROFILE ALONG PROFILE GRADE LINE, S.R. 823

23'
55 mph
76,800 ADT
6:1 or Flatter

BENCHMARKS

39

SHEET 16 OF 21

DESIGN AGENCY
CH2MHILL
5775 Perimeter Drive, Suite 190
Dublin, Ohio 43017

DRAWN	REVIEWED	DATE
JBA	SCJ	09/07
DESIGNED	REVISED	STRUCTURE FILE NUMBER
JBA		7306725
CHECKED		
SKT		

SCIOTO COUNTY
STA. 891+63.58
TO STA. 892+64.91

TRAFFIC DATA

CURRENT ADT (2010) - 8900
DESIGN ADT (2030) - 13000
DESIGN ADTT - 1820

LEGEND

⊕ INDICATES BORING LOCATION

DRAFT NOT FOR REVIEW. NOT FOR VALUE ENGINEERING STUDY ONLY.

NOTES

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

POWER AND TELEPHONE LINES TO BE RELOCATED.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS

LENGTH OF SPAN: 99'-3" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION

ROADWAY: 30'-1⅛" TOE/TOE PARAPETS (RB)
30'-1⅛" TOE/TOE PARAPETS (LB)

SIDEWALK: NONE

DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²

SKEW: 16°43'52" RIGHT FORWARD

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30'-0" LONG)

ALIGNMENT: TANGENT

CROWN: 0.016 FT/FT

LATITUDE: N 38°53'32"

LONGITUDE: W 82°59'52"

SITE PLAN
BRIDGE NO. SCI-823-1594
S.R. 823 OVER FAIRGROUND ROAD

SCI-823-10.13
PID 79977

1 / 3

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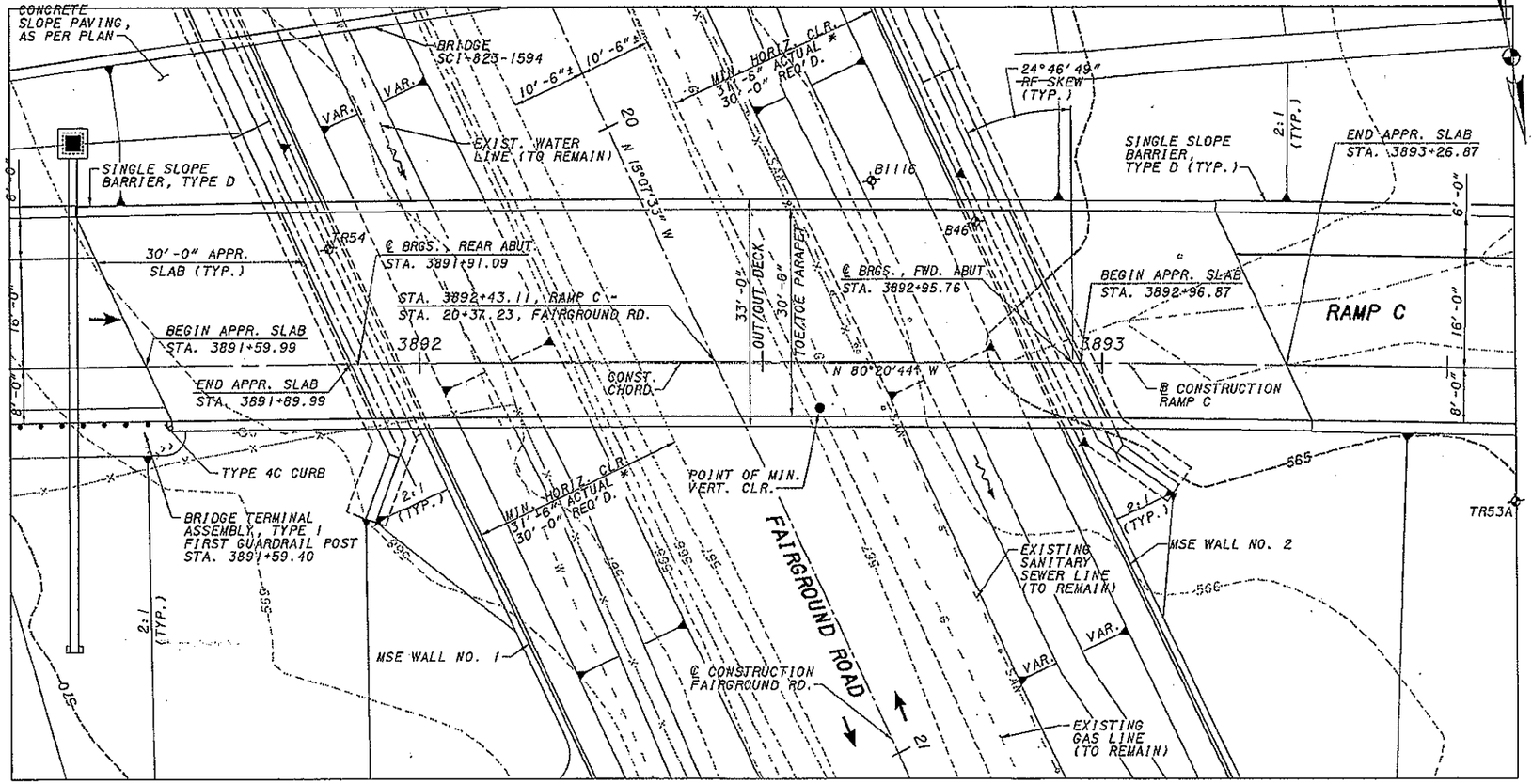
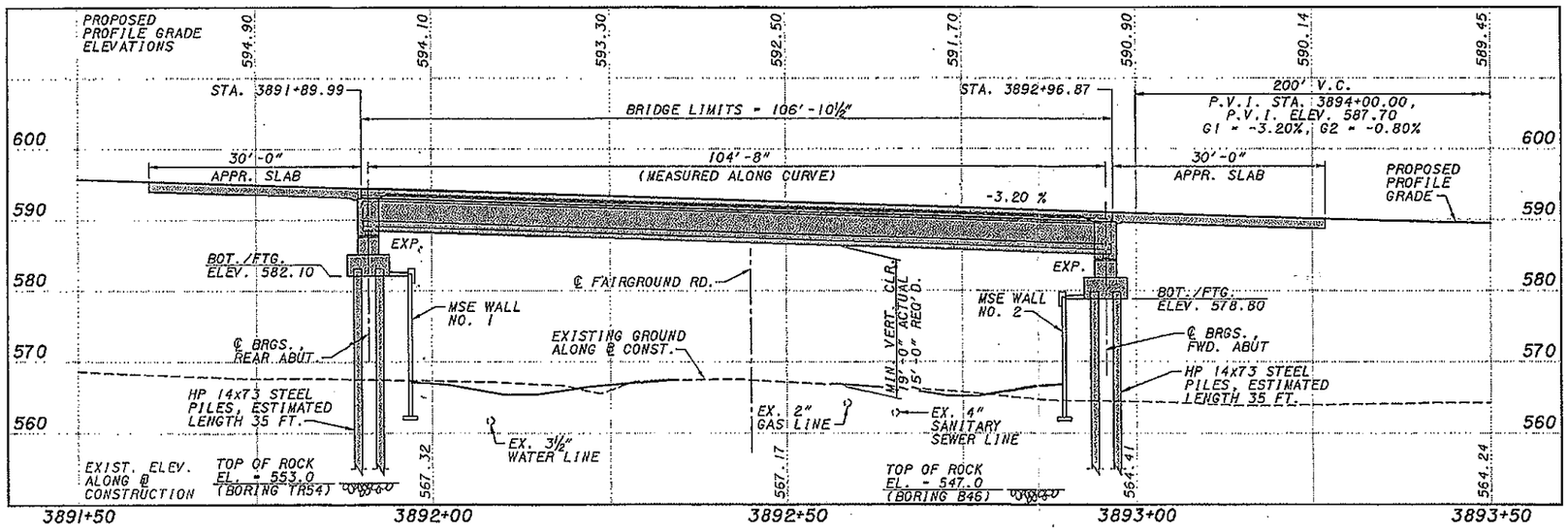


PLAN

* 31'-6" PROVIDED TO PERMIT FUTURE 12'-0" LANE



PROFILE ALONG ℄ CONSTRUCTION, RAMP C

BENCHMARKS

39

SHEET 17 of 21

CURVE DATA - RAMP C

P.I. Sta - 3889+21.16
Δ - 9° 37' 49" (RT)
Dc - 1° 00' 00"
R - 5,729.58'
T - 482.65'
L - 963.03'
E - 20.29'

TRAFFIC DATA

CURRENT ADT (2010) - 6200
DESIGN ADT (2030) - 9400
DESIGN ADTT - 1320

LEGEND

INDICATES BORING LOCATION

NOTES

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. FINAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

POWER AND TELEPHONE LINES TO BE RELOCATED

DRAFT NOT FOR REVIEW. NOT FOR VALUE ENGINEERING STUDY ONLY.

PROPOSED STRUCTURE	
TYPE:	SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS
LENGTH OF SPAN:	104'-8" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION
ROADWAY:	30'-0" TOE/TOE PARAPETS
SIDEWALK:	NONE
DESIGN LOADING:	HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²
SKEW:	24°46'49" RIGHT FORWARD, MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD
WEARING SURFACE:	MONOLITHIC CONCRETE
APPROACH SLABS:	AS-1-81 (30'-0" LONG)
ALIGNMENT:	HORIZONTALLY CURVED (℄ RADIUS = 5729.58')
SUPERELEVATION:	0.029 FT/FT
LATITUDE:	N 38°53'33"
LONGITUDE:	W 82°59'52"

DESIGN AGENCY
CH2MHILL
5775 Perimeter Drive, Suite 190
Dublin, Ohio 43017

DESIGNED	DRAWN	REVIEWED	DATE
DGS	JBA	SCJ	09/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
SKT		7306733	

SCIOTO COUNTY
STA. 3891+89.99
TO STA. 3892+96.87

SITE PLAN
BRIDGE NO. SCI-823-1595
RAMP C OVER FAIRGROUND ROAD

SCI-823-10.13
PID 79977

8147

1 / 3

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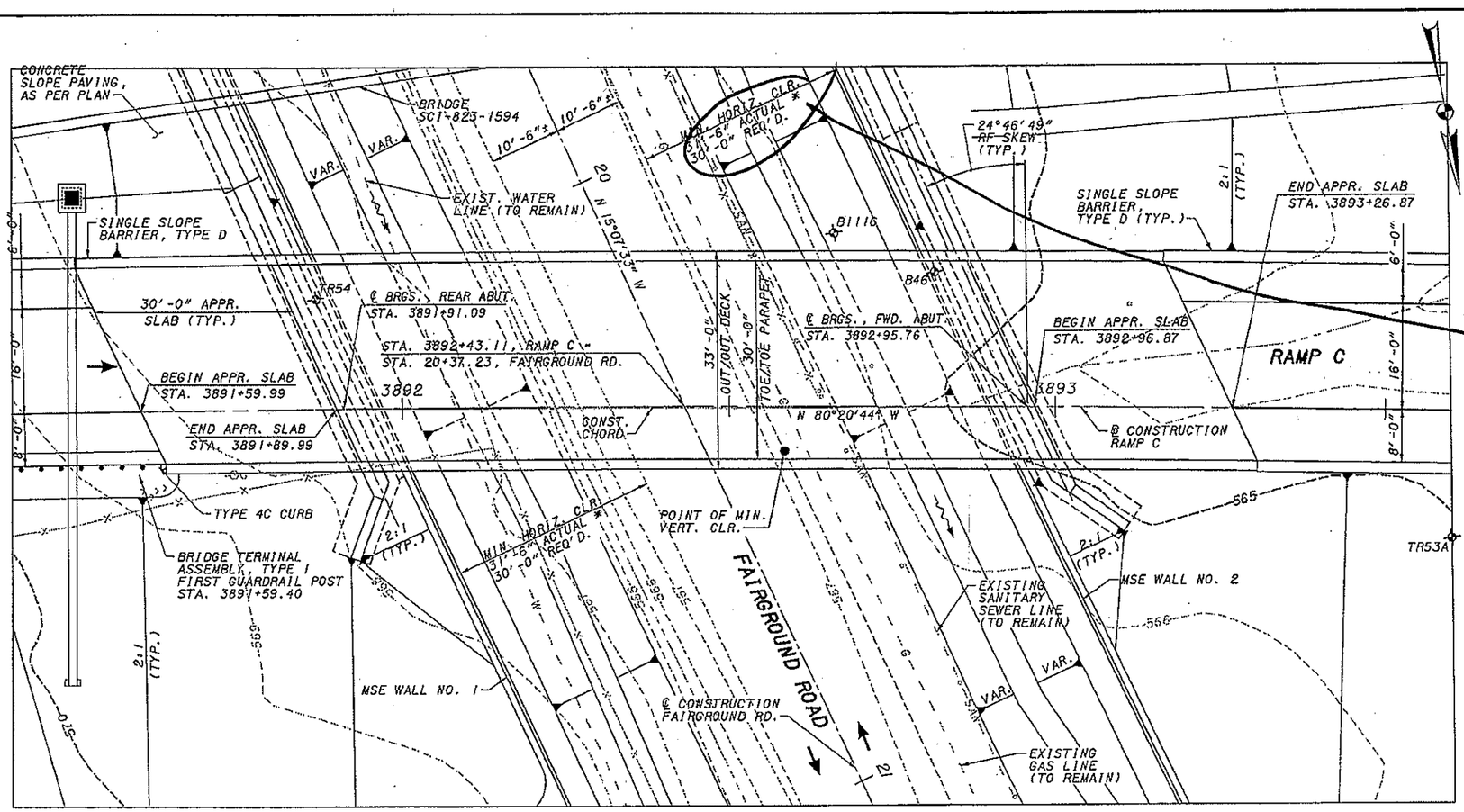
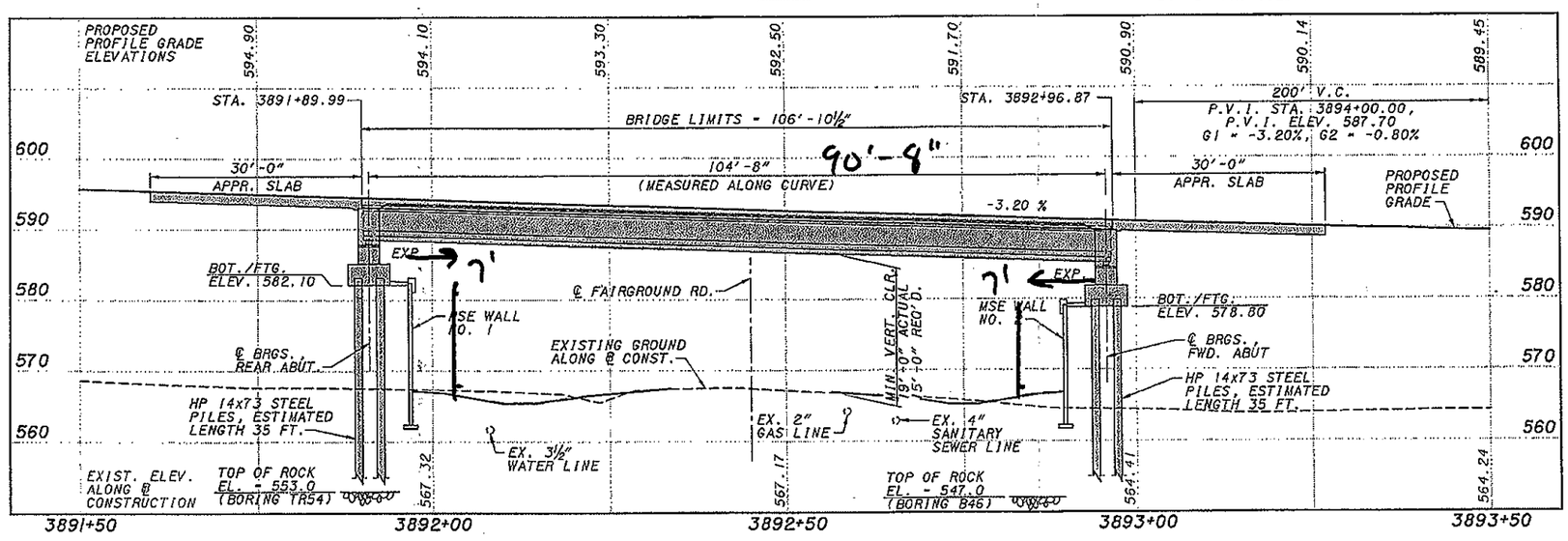


PLAN

* 31'-6" PROVIDED TO PERMIT FUTURE 12'-0" LANE



PROFILE ALONG ℄ CONSTRUCTION, RAMP C

BENCHMARKS

39

~~SHEET~~ 18 OF 21

CURVE DATA - RAMP C
P.I. Sta. = 3889+21.16
Δ = 9° 37' 49" (RT)
Dc = 1° 00' 00"
R = 5,729.58'
T = 482.65'
L = 963.03'
E = 20.29'

23'
55 mph
>6,000 ADT
6:1 or Flatter

TRAFFIC DATA
CURRENT ADT (2010) = 6200
DESIGN ADT (2030) = 9400
DESIGN ADTT = 1320

LEGEND
⌖ INDICATES BORING LOCATION

NOTES
EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ROADWAY SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
POWER AND TELEPHONE LINES TO BE RELOCATED

DRAFT NOT FOR REVIEW. NOT FOR VALUE ENGINEERING STUDY ONLY.

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED CONCRETE I-BEAMS WITH REINFORCED CONCRETE DECK AND SEMI-INTEGRAL ABUTMENTS ON MSE WALLS
LENGTH OF SPAN: 104'-8" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION
ROADWAY: 30'-0" TOE/TOE PARAPETS
SIDEWALK: NONE
DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²
SKEW: 24°46'49" RIGHT FORWARD, MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30'-0" LONG)
ALIGNMENT: HORIZONTALLY CURVED @ RADIUS = 5729.58'
SUPERELEVATION: 0.029 FT/FT
LATITUDE: N 38°53'33"
LONGITUDE: W 82°59'52"

DESIGN AGENCY CH2MHILL 6775 Perimeter Drive, Suite 190 Dublin, Ohio 43017
DESIGNED DGS | DRAWN JBA | CHECKED SKT | REVIEWED SCJ | REVISED | DATE 09/07
STRUCTURE FILE NUMBER 7306733
SCIOTO COUNTY STA. 3891+89.99 TO STA. 3892+96.87
SCI-823-10.13 PID 79977
SITE PLAN
BRIDGE NO. SCI-823-1595 RAMP C OVER FAIRGROUND ROAD
8147
1 / 3

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PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 39

SHEET NO.: 19 of 21

SCI-823-0214 LtR

Reduce span length 10 feet on each end span.

(10' + 10') x 45' = 900 ft² x 2 bridges = 1,800 ft²

1,800 ft² x 100 $/ft² = $180,000

SCI-823-0727 LtR

Reduce span length 18' total

18' x 45' = 810 ft² x 2 bridges = 1,620 ft²

1,620 ft² x 100 $/ft² = $162,000

SCI-823-.0837

10' x 45' = 450 ft² x 2 bridges = 900 ft²

900 ft² x 100 $/ft² = $90,000

Total 432,000

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 39

SHEET NO.: 20 of 21

SCI-823-0917

$30' \times 45' = 1,350 ft^2 \times 2 \text{ bridges} = 2,700 ft^2$

$2,700 ft^2 \times 100 \$/ft = \$270,000$

SCI-823-1593

$14' \times 33' = 462 ft^2 \times 100 \$/ft^2 = \$46,200$

SCI-823-1594

$14' \times 33' = 462 ft^2 \times 2 \text{ bridges} = 924 ft^2$

$924 ft^2 \times 100 \$/ft^2 = \$92,400$

SCI-823-1595

$14' \times 33' = 462 ft^2 \times 100 \$/ft^2 = \$46,200$

subtotal $\$454,800$

grand total

$\$432,000 + \$454,800 = \$886,800$

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 39

SHEET NO.: 21 of 21

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
SCI 823 STRUCTURES							
0214 L&R	SF	1800	100	180,000			
0727 L&R	SF	1620	100	162,000			
0837	SF	900	100	90,000			
0917	SF	2700	100	270,000			
1593	SF	462	100	46,200			
1594	SF	924	100	92,400			
1595	SF	462	100	46,200			
	Sub-total			886,800			
Mark-up at	15.00%			133,020			
	TOTAL			1,019,820			

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SCI-823-0.00 - PID 19415, 79977 AND 77366**
Scioto County, Ohio

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
40	Reduce bridge spans by providing short retaining wall and safety barrier	$ 9,106,850	$ 7,774,000	$ 1,332,850		$ 1,332,850
43/21	Break project into smaller bid packages and change the phasing to use excavated material early	$ 68,582,027	$ 62,422,658	$ 6,159,369		$ 6,159,369
45	Modify subgrade preparation to improve drainage and potentially increase strength of pavement design	DESIGN SUGGESTION				
52	Eliminate some underdrains	$ 1,863,000	$ 1,301,985	$ 561,015		$ 561,015
54	Reduce 3-span ramps at US 23 over railroad to a single-span or 2-span ramps	$ 8,475,500	$ 4,006,600	$ 4,468,900		$ 4,468,900
59	Use fill berms in lieu of guardrails	$ 7,957,034	$ 6,184,194	$ 1,772,840		$ 1,772,840
61	Replace safety grading with clear zone grading	$ 382,778	$ 335,628	$ 47,150		$ 47,150
63	Sell separate clearing and grubbing contract	DESIGN SUGGESTION				
64	Survey trees for marketability	DESIGN SUGGESTION				
65	Split Ramp B into two separate bridges at the US 52 interchange	$ 7,070,657	$ 5,988,471	$ 1,082,186		$ 1,082,186
67	Ensure the use of 50 ksi H-piles driven to bedrock	DESIGN SUGGESTION				

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**40**
DESCRIPTION:	**REDUCE BRIDGE SPANS BY PROVIDING SHORT RETAINING WALL/SAFETY BARRIER**	SHEET NO.:	**1 of 12**

ORIGINAL DESIGN: (Sketch attached)

The following sketches are attached:

SCI-823-1018 L&R – Site Plan
SCI-823-1018 L&R – Pier Details
SCI-823-1357 L&R – Site Plan
SCI-823-1357 L&R – Pier Details

ALTERNATIVE: (Sketch attached)

Make the revisions as shown on the following sketches:

Revised SCI-823-1018 L&R – Site Plan
Revised SCI-823-1018 L&R – Pier Details
Revised SCI-823-1357 L&R – Site Plan
Revised SCI-823-1357 L&R – Pier Details

ADVANTAGES:

- Reduces bridge span length
- Shallows or reduces beams

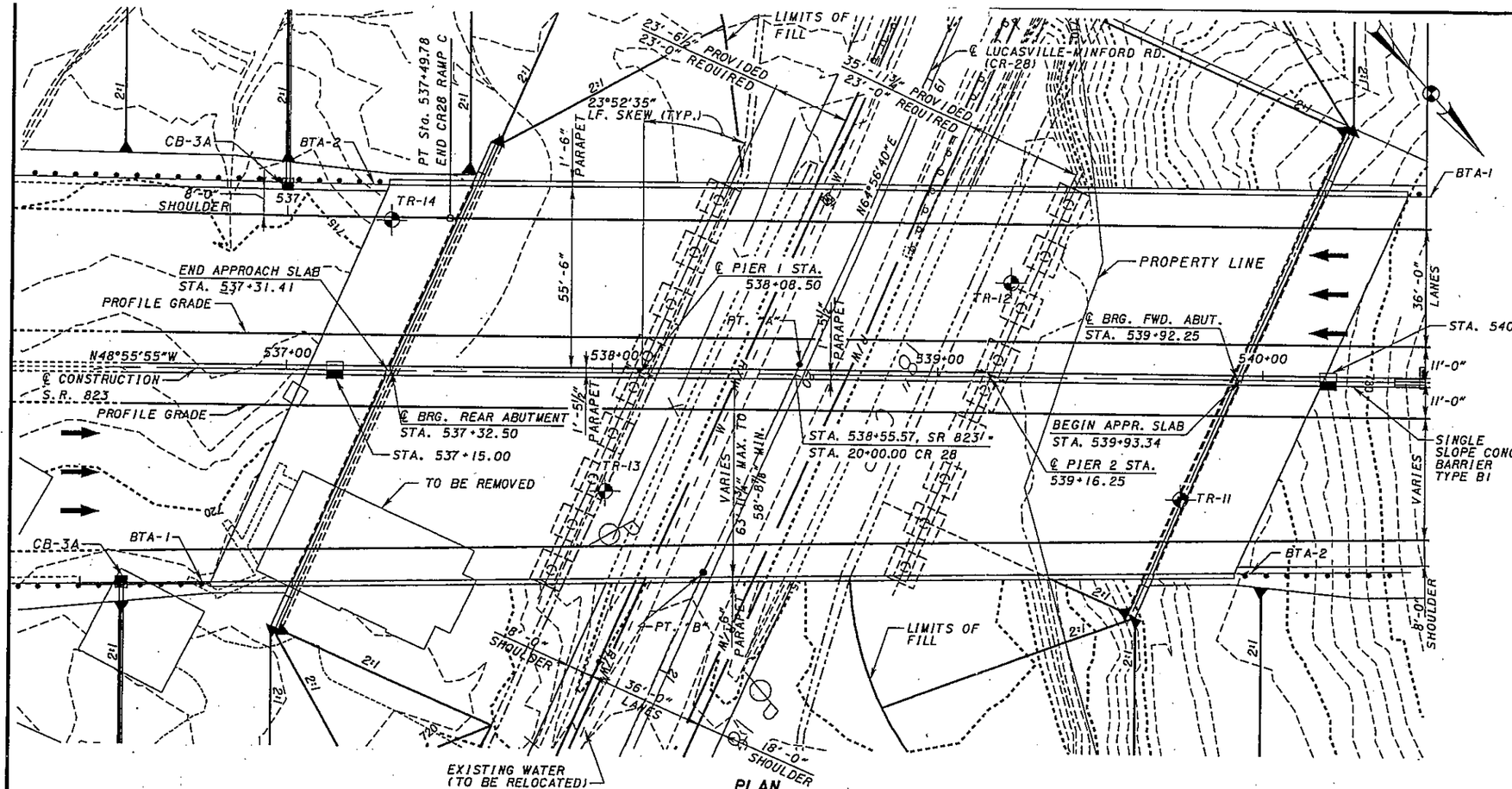
DISADVANTAGES:

- Requires a short wall/safety barrier
- Requires larger footing for piers

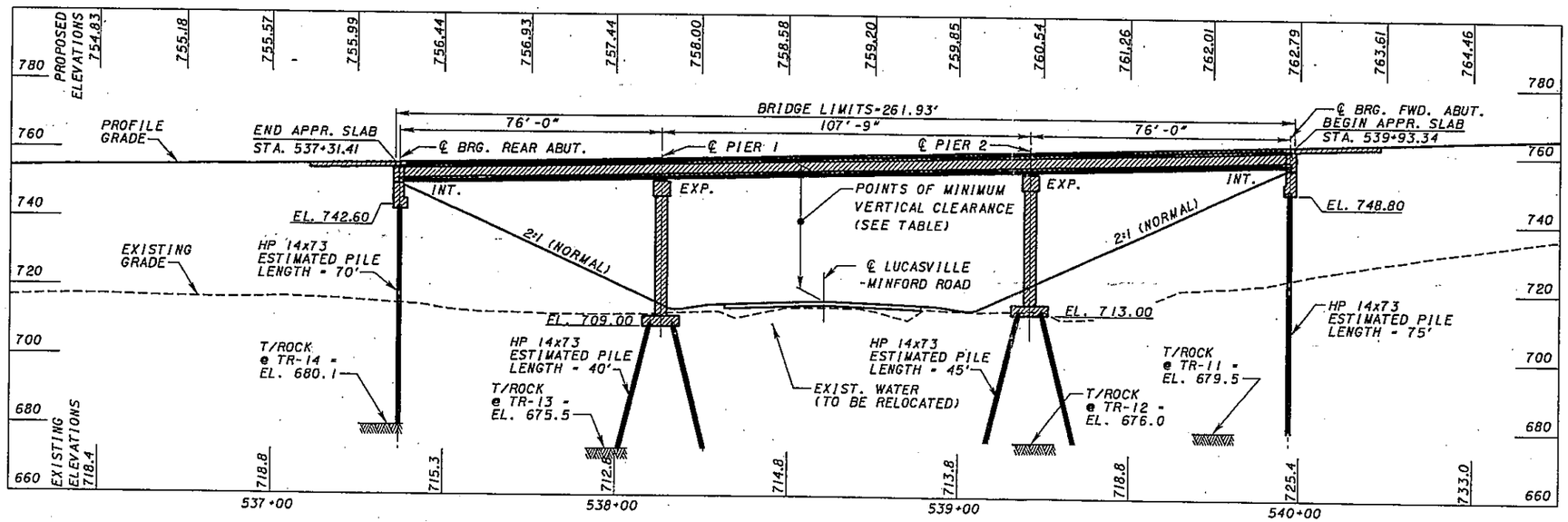
DISCUSSION:

Similar change may apply to other bridges. Savings is approximately $600,000 per bridge for the attached two example bridges.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 9,106,850	—	$ 9,106,850
ALTERNATIVE	$ 7,774,000	—	$ 7,774,000
SAVINGS	$ 1,332,850	—	$ 1,332,850



PLAN



ELEVATION ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	40 SHEET 2 OF 12 (TO BE PROVIDED LATER)

TRAFFIC DATA

(SR 823)
CURRENT YEAR ADT (2010) - 19,800
CURRENT YEAR ADTT (2010) - 4752
DESIGN YEAR ADT (2030) - 26,000
DESIGN YEAR ADTT (2030) - 6240

TABLE OF VERTICAL CLEARANCES

LOCATION	"A"	"B"
PROPOSED	36.07'	34.03'
REQUIRED	15.00'	15.00'

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS

LOCATION	STATION
NB REAR ABUT.	536+73.04
SB REAR ABUT.	537+27.39
NB FWD. ABUT.	539+96.17
SB FWD. ABUT.	540+47.72

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
- BORING LOCATION
- SETTLEMENT PLATFORM

1300' VERT. CURVE DATA

P.V.I. STA. - 535+00.00
P.V.I. ELEV. 742.19
G_1 = -2.90%
G_2 = +4.00%

PROPOSED STRUCTURE

TYPE: THREE SPAN, 60" MODIFIED AASTHO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY INTEGRAL ABUTMENTS AND CAP AND COLUMN PIERS

SPANS: 74'-9½", 105'-4", 74' 9½" (C/C BRG.)

ROADWAY: 55'-6" T/T OF BARRIER

LOADING: HS-25, ALTERNATE MILITARY LOADING AND FWS = 60psf

SKEW: 23°52'35" LF

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (25' LONG)

LATITUDE: 38°51'48" N

LONGITUDE: 82°53'45" W

DESIGN AGENCY: TranSystems, 5747 PERIMETER DRIVE, SUITE 140, DUBLIN, OHIO 43017

DATE: 09/28/07
REVISED: MSL
DRAWN: PJP
DESIGNED: PJP
CHECKED: MSL
STRUCTURE FILE NUMBER: 7306547

SCIOTO COUNTY
STA. 537+31.41
STA. 539+93.34

SITE PLAN
BRIDGE NO. SCI-823-1018 L
SR 823 OVER LUCASVILLE-MINFORD ROAD (CR-28)

SCI-823-10.31
PID 79977

1 / 6

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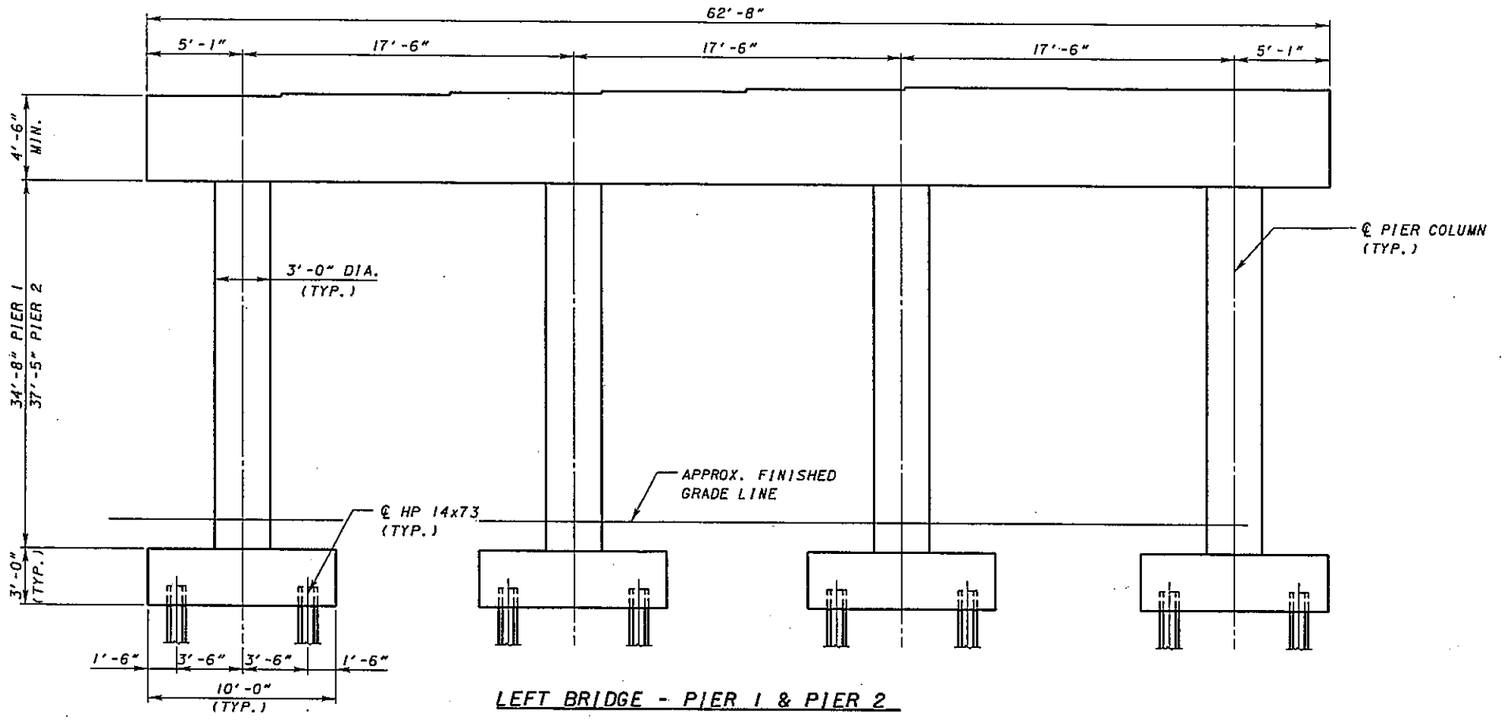
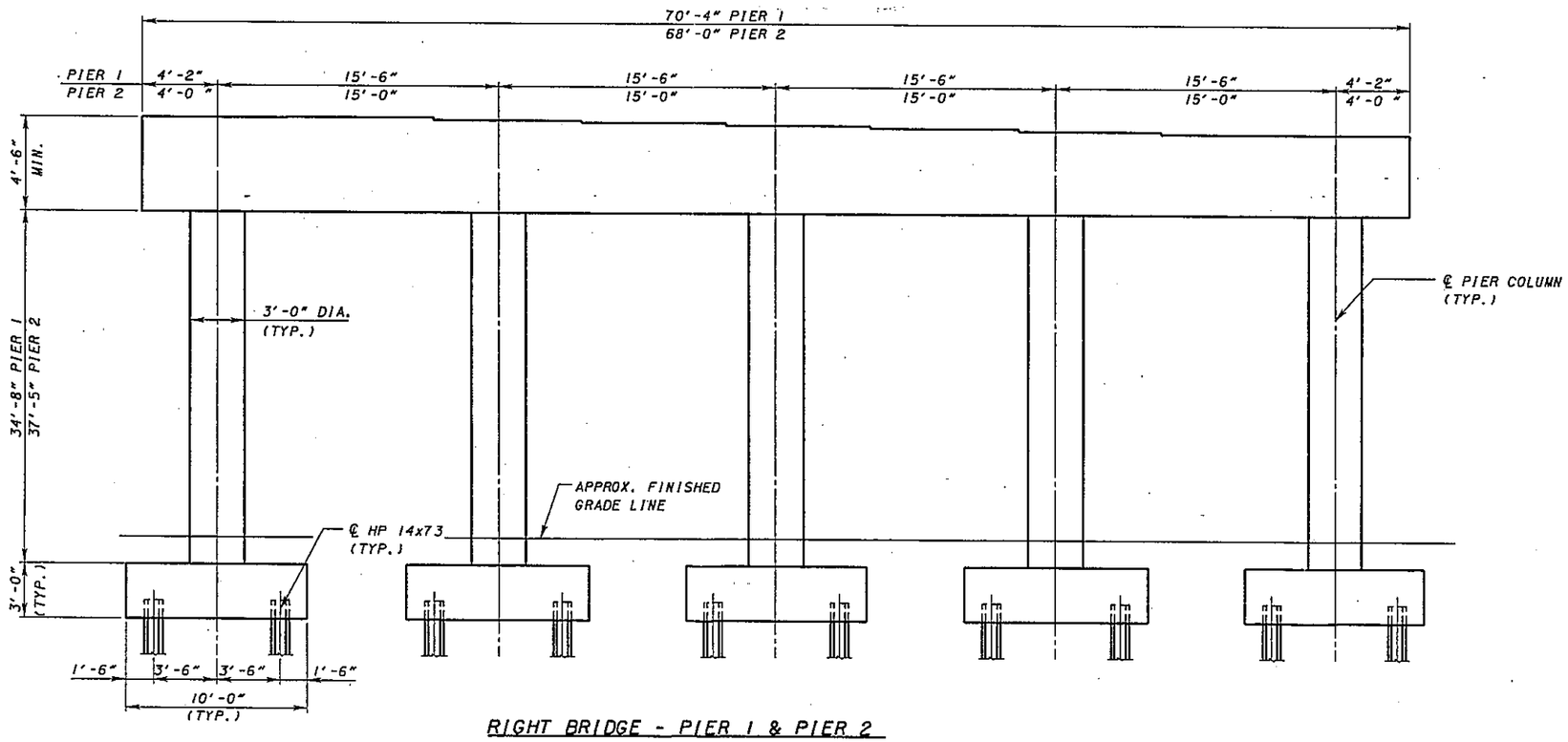
SHEET 3 OF 12



LEFT BRIDGE - PIER 1 & PIER 2



RIGHT BRIDGE - PIER 1 & PIER 2

DESIGN AGENCY: Gram Systems, 370 TOWNE SQUARE, SUITE 240, DELAWARE, OHIO 43017

DESIGNED	DRAWN	REVISED	DATE
PJP	PJP	MSL	09/28/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MSL		73065471, 73065558	

PIER DETAILS

BRIDGE NO. SCI-823-1018 L&R

SR823 OVER LUCASVILLE MINFORD ROAD (CR 503)

SCI-823-10.31

PID 79977

5/6

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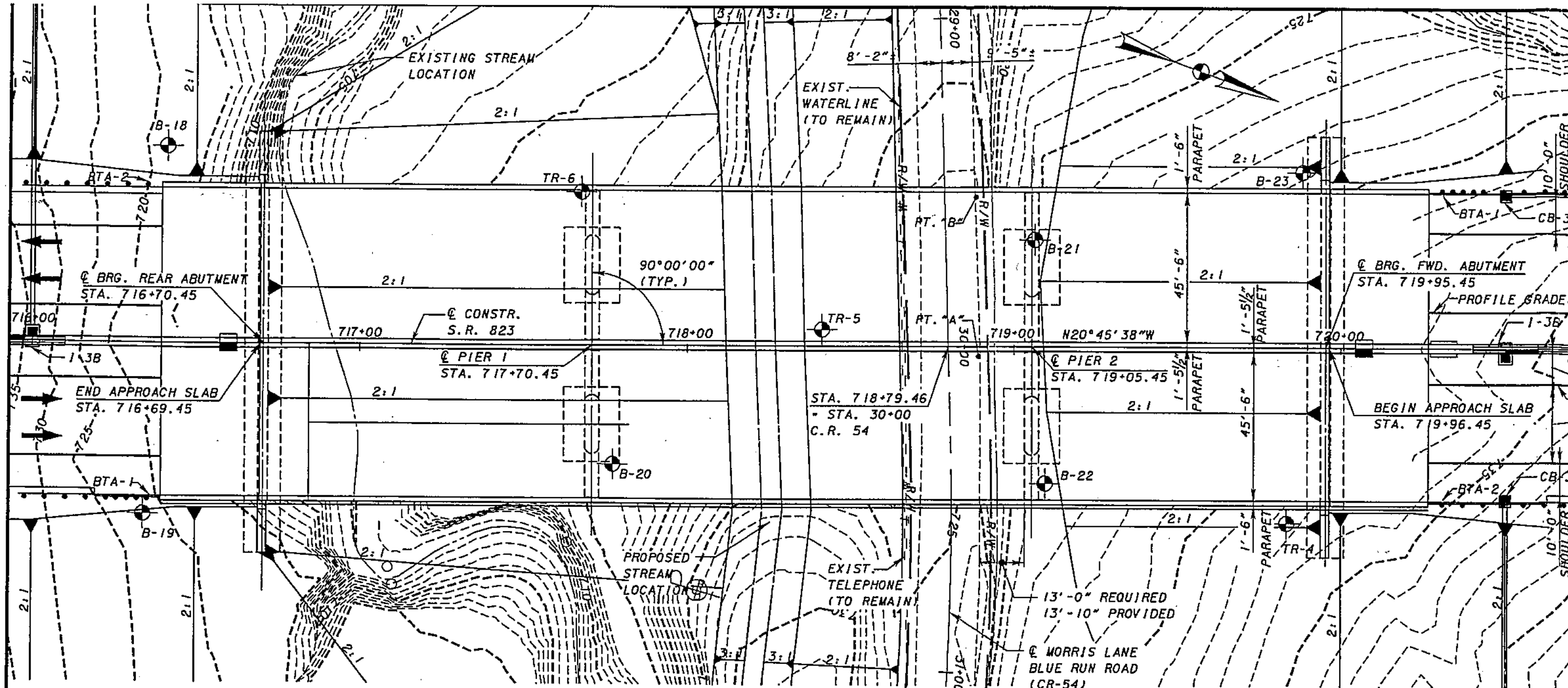
40 SHEET 40 OF 12

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA
(S.R. 823)
CURRENT YEAR ADT (2010) = 19,800
DESIGN YEAR ADT (2030) = 26,000
CURRENT YEAR ADTT (2010) = 2,772
DESIGN YEAR ADTT (2030) = 3,640

HYDRAULIC DATA	
DRAINAGE AREA = 147.8 acres	
Q_{50} = 294 cfs	Q_{100} = 353 cfs
V_{50} = 12.7 fps	V_{100} = 13.6 fps
EL_{50} = 709.53	EL_{100} = 709.74

FIRST GUARDRAIL POSTS OFF BRIDGE LOCATIONS	
LOCATION	STA.
REAR ABUT. (NB)	716+35.30
REAR ABUT. (SB)	716+35.20
FWD. ABUT. (NB)	720+30.70
FWD. ABUT. (SB)	720+30.60



PLAN

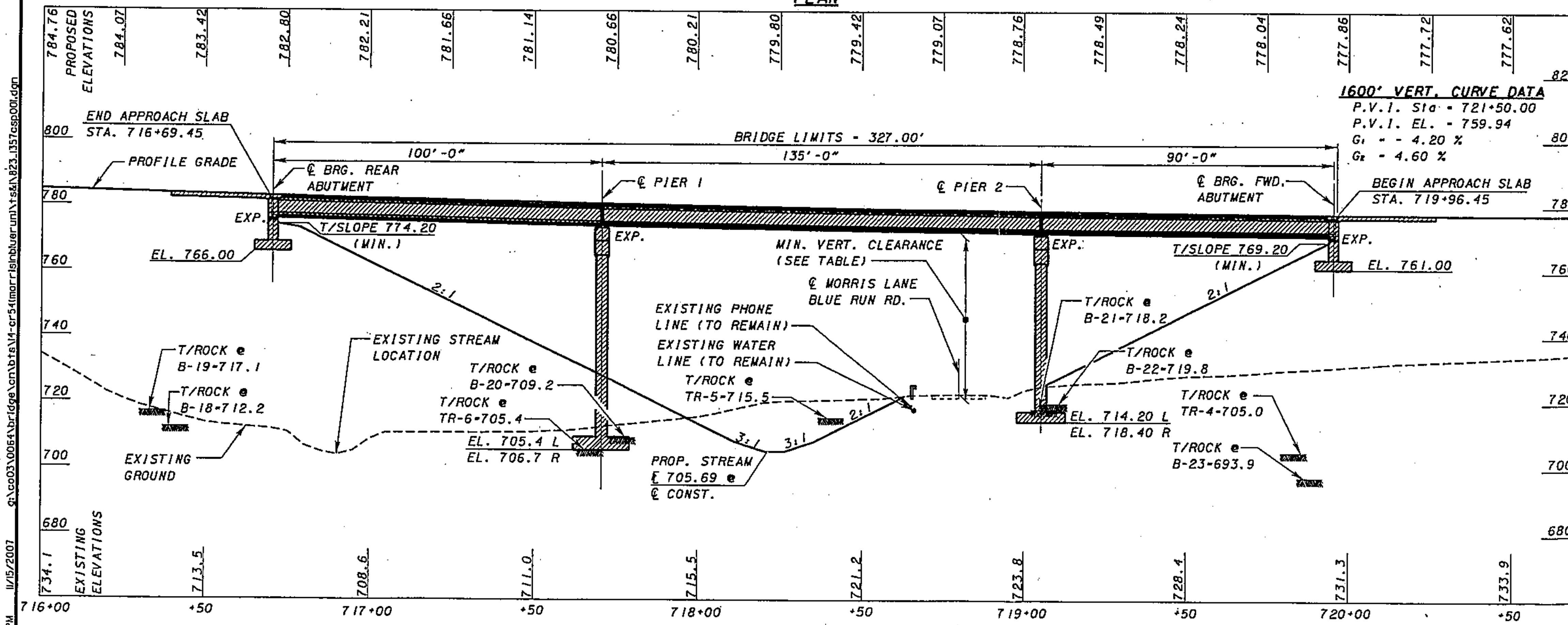
NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

TABLE OF VERTICAL CLEARANCES		
LOCATION	"A"	"B"
PROPOSED	49.08'	46.28'
PREFERRED	15.0'	15.0'

LEGEND

BTA-1 = BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 = BRIDGE TERMINAL ASSEMBLY TYPE 2
= BORING LOCATION
= SETTLEMENT PLATFORM



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

PROPOSED STRUCTURE

TYPE: 3 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY T-TYPE PIERS AND SEMI-INTEGRAL ABUTMENT SUBSTRUCTURES ON SPREAD FOOTINGS.

SPANS: 98'-9½", 132'-7", 88'-9½" (C/C BRG.)

ROADWAY: 2 - 45'-6" T/T PARAPETS

LOADING: HS-25 AND ALTERTNATE MILITARY LOADING, FWS-60 PSF

SKEW: NONE

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30' LONG)

LATITUDE: 82° 56' 56" N

LONGITUDE: 38° 52' 59" W

TranSystems

DESIGNED PJP | CHECKED MSL | DRAWN CAS | REVISED MTN | REVIEWED MSL | DATE 06/08/07 | STRUCTURE FILE NUMBER 7306601L, 7306628R

SCIOTO COUNTY STA. 716+69.45 STA. 719+96.45

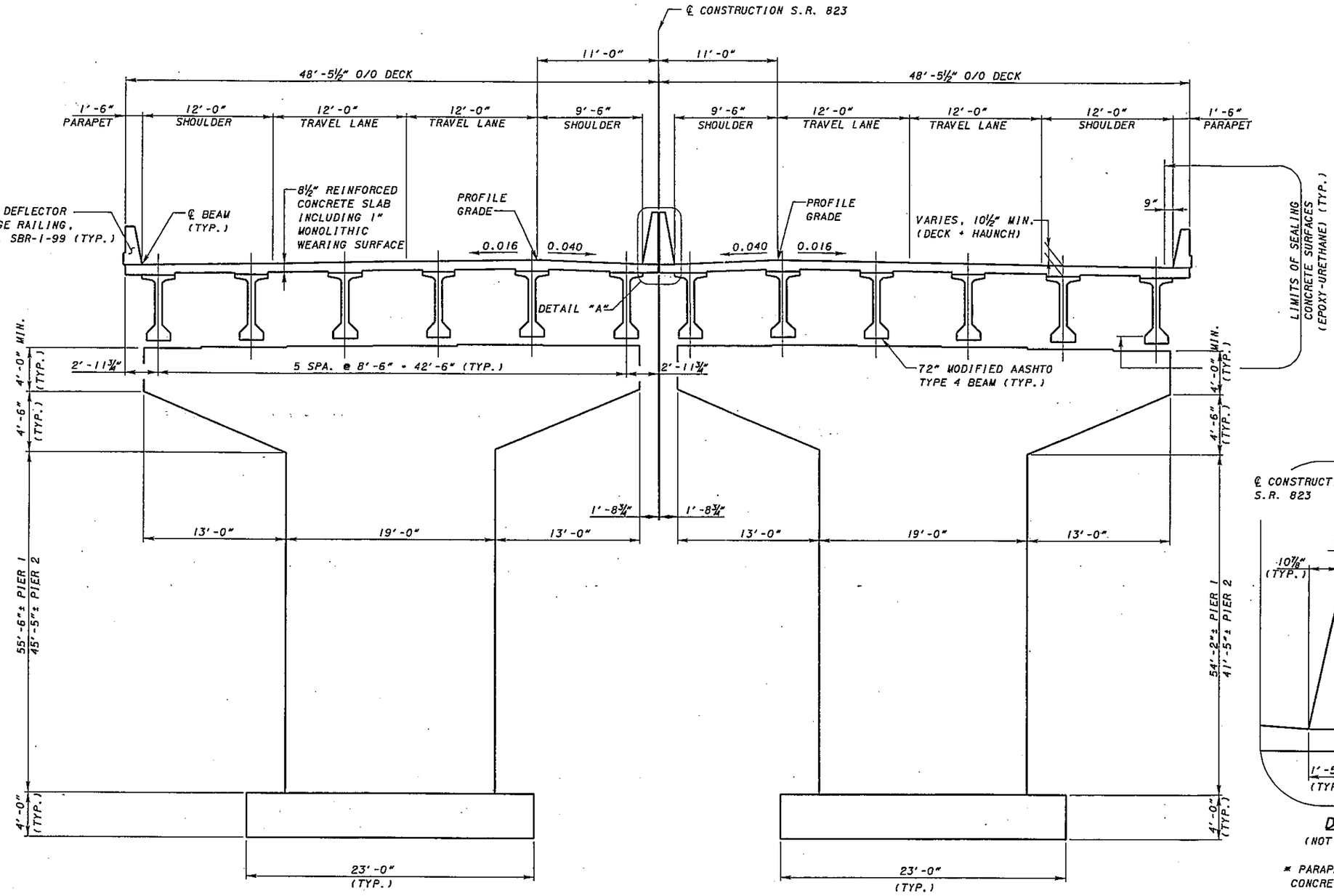
SITE PLAN

BRIDGE NO. SCI-823-1357 L&R
S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)

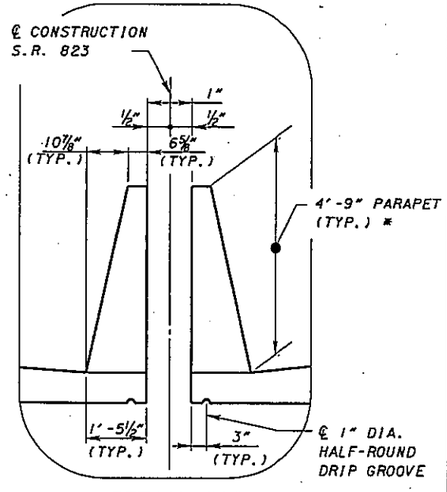
SCI-823-10.31
PID 79977

1/4

40
SHEET 5 OF 12



TYPICAL TRANSVERSE SECTION



DETAIL "A"
(NOT SHOWN TO SCALE)

* PARAPETS ARE SIMILAR TO ROADWAY CONCRETE MEDIAN BARRIER

DESIGN AGENCY: T.Y. Lin International Systems, 351 THEATER DRIVE, SUITE 110, COLUMBUS, OHIO 43081
REVIEWED MSL DATE 06/08/07
DRAWN CAS REVISED MTN
DESIGNED MSL CHECKED PJP
STRUCTURE FILE NUMBER 7306601L, 7306628R

TRANSVERSE SECTION
BRIDGE NO. SCI-823-1357 L&R
S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)

SCI-823-10.31
PID 79977

3 | 4

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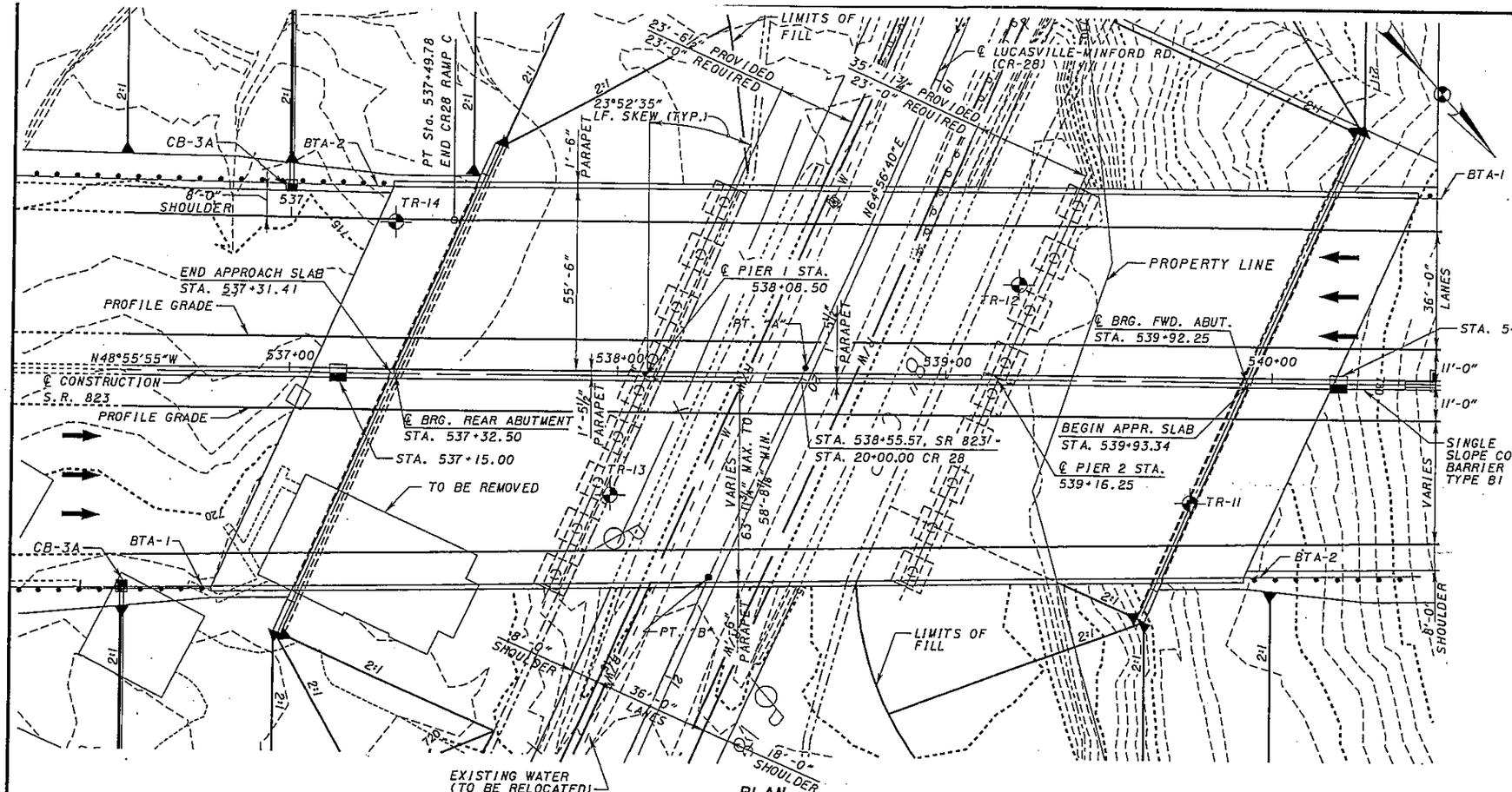
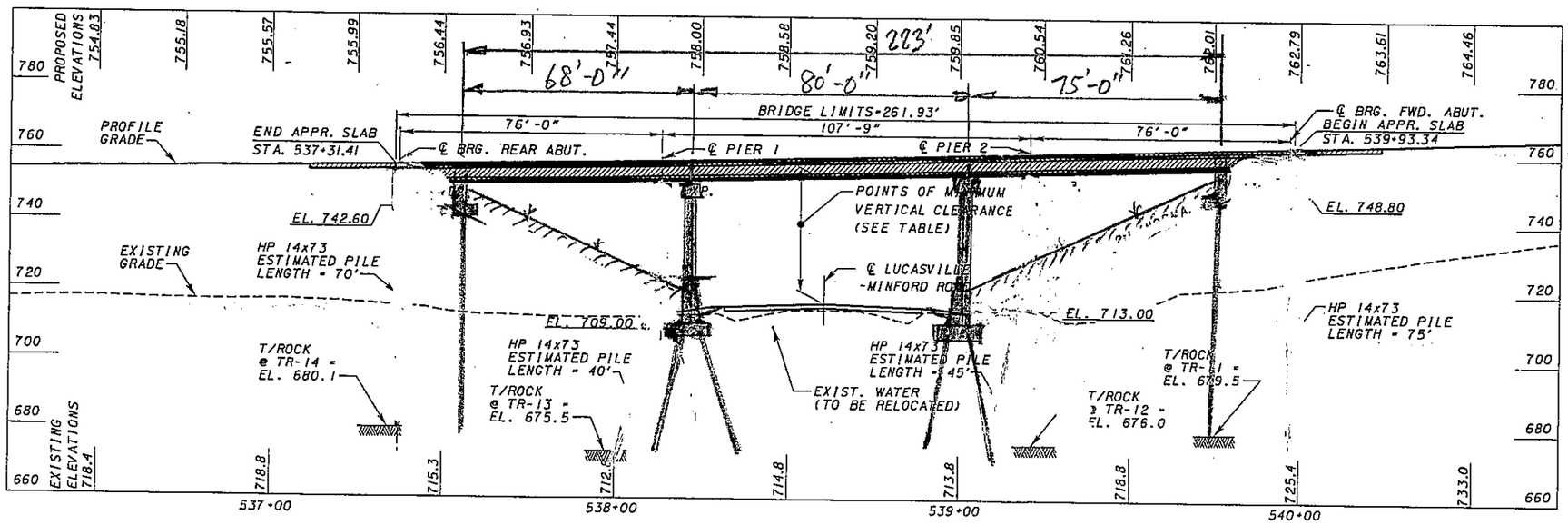


PLAN



ELEVATION ALONG PROFILE GRADE LINE S.R. 823 LEFT BRIDGE

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	40 SHEET 6 OF 12 (TO BE PROVIDED LATER)

TRAFFIC DATA

(SR 823)
CURRENT YEAR ADT (2010) - 19,800
CURRENT YEAR ADTT (2010) - 4752
DESIGN YEAR ADT (2030) - 26,000
DESIGN YEAR ADTT (2030) - 6240

TABLE OF VERTICAL CLEARANCES

LOCATION	"A"	"B"
PROPOSED	36.07'	34.03'
REQUIRED	15.00'	15.00'

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS

LOCATION	STATION
NB REAR ABUT.	536+73.04
SB REAR ABUT.	537+27.39
NB FWD. ABUT.	539+96.17
SB FWD. ABUT.	540+47.72

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
- BORING LOCATION
- SETTLEMENT PLATFORM

1300' VERT. CURVE DATA

P.V.I. STA. = 535+00.00
P.V.I. ELEV. 742.19
G_1 = -2.90%
G_2 = +4.00%

PROPOSED STRUCTURE

TYPE: THREE SPAN, 60" MODIFIED AASTHO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY INTEGRAL ABUTMENTS AND CAP AND COLUMN PIERS

SPANS: 74'-9½", 105'-4", 74' 9½" (C/C BRG.)

ROADWAY: 55'-6" T/T OF BARRIER

LOADING: HS-25, ALTERNATE MILITARY LOADING AND FWS = 60psf

SKEW: 23°52'35" LF

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (25' LONG)

LATITUDE: 38°51'48" N

LONGITUDE: 82°53'45" W

DESIGN AGENCY: TranSystems, 5747 PERIMETER DRIVE, SUITE 240, DUBLIN, OHIO 43017

DATE REVISED: 09/28/07 MSL

STRUCTURE FILE NUMBER: 7306547

DRAWN: PJP

REVISED:

DESIGNED: PJP

CHECKED: MSL

SCIOTO COUNTY
STA. 537+31.41
STA. 539+93.34

SITE PLAN
BRIDGE NO. SCI-823-1018 L
SR 823 OVER LUCASVILLE-MINFORD ROAD (CR-28)

SCI-823-10.31
PID 79977

1 / 6

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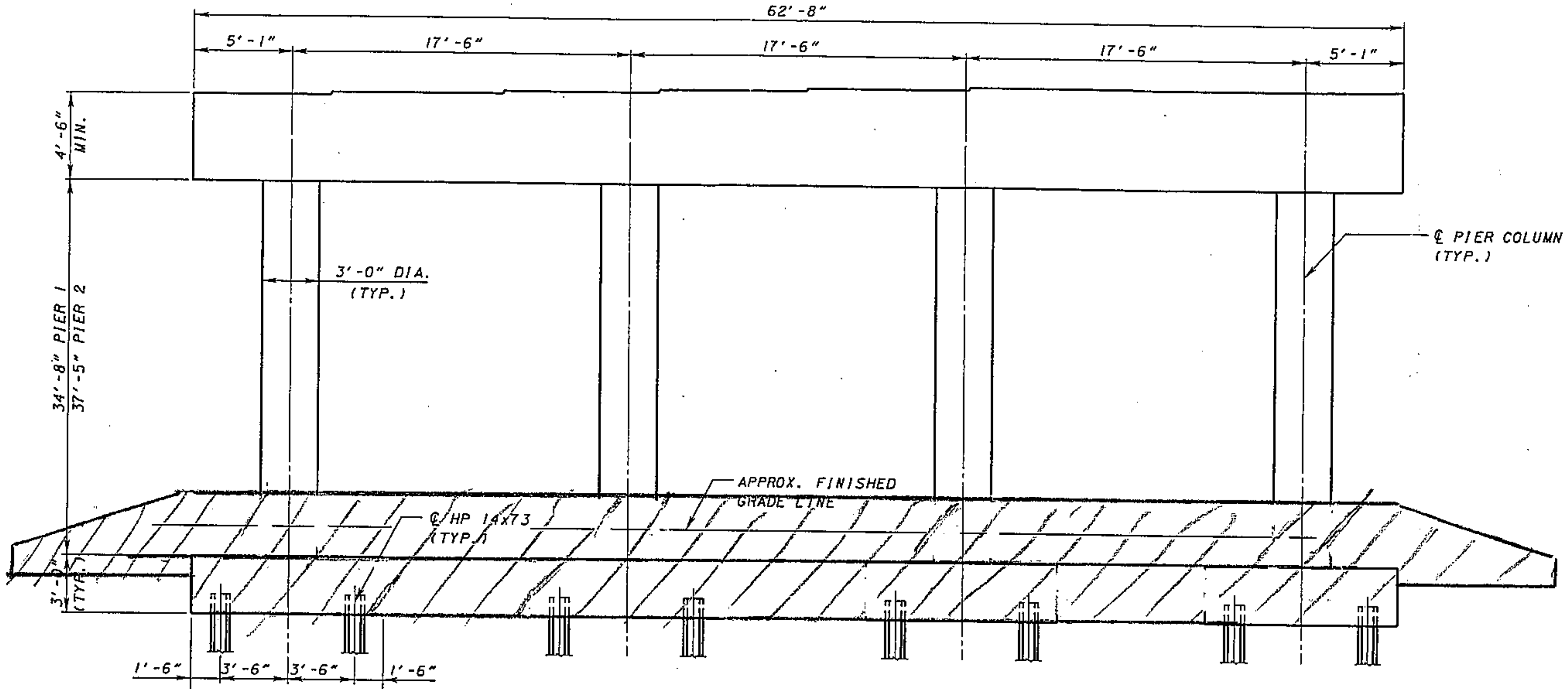
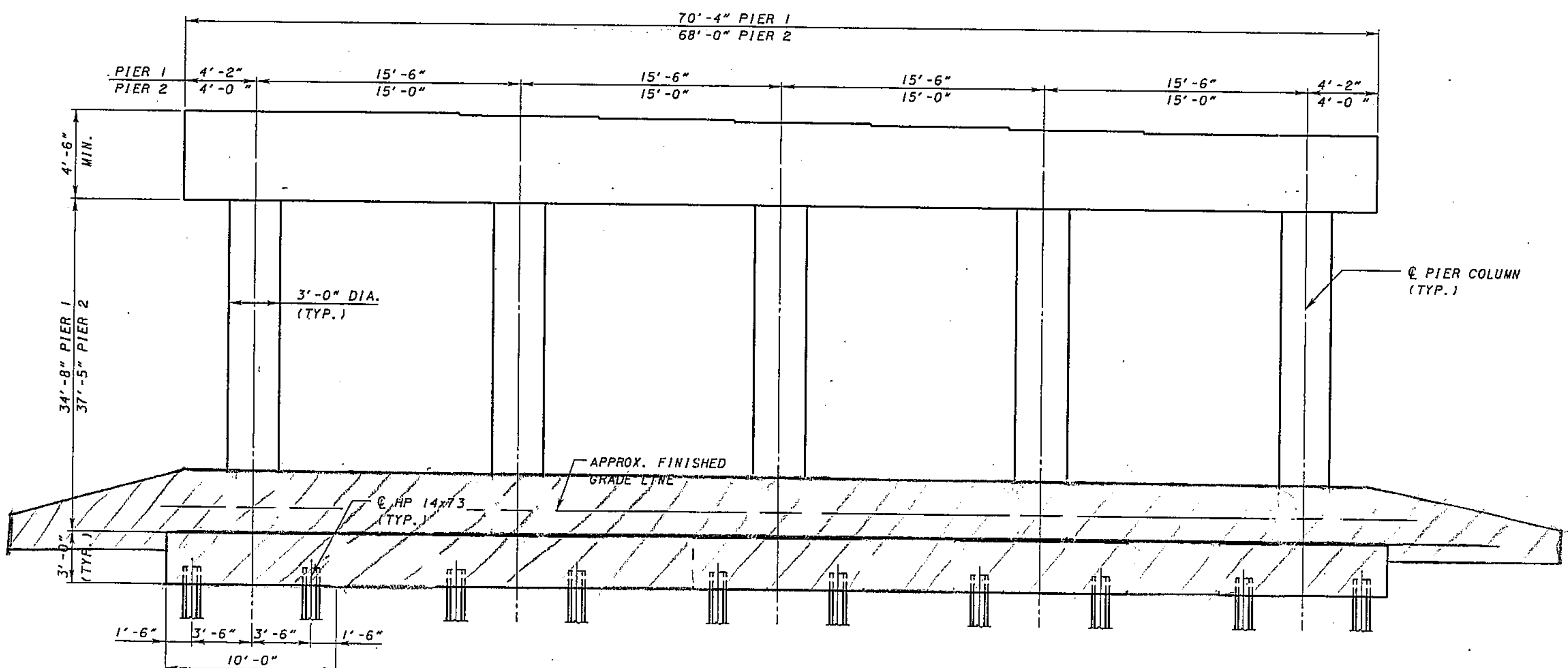


LEFT BRIDGE - PIER 1 & PIER 2



RIGHT BRIDGE - PIER 1 & PIER 2

DESIGN AGENCY: TranSystems

DESIGNED	DRAWN	REVIEWED	DATE
PJP	PJP	MSL	09/28/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MSL		7306547L, 7306555R	

PIER DETAILS
BRIDGE NO. SCI-823-1018 L&R
SR823 OVER LUCASVILLE MINFORD ROAD (CR 503)

SCI-823-10.31
PID 79977

5/6

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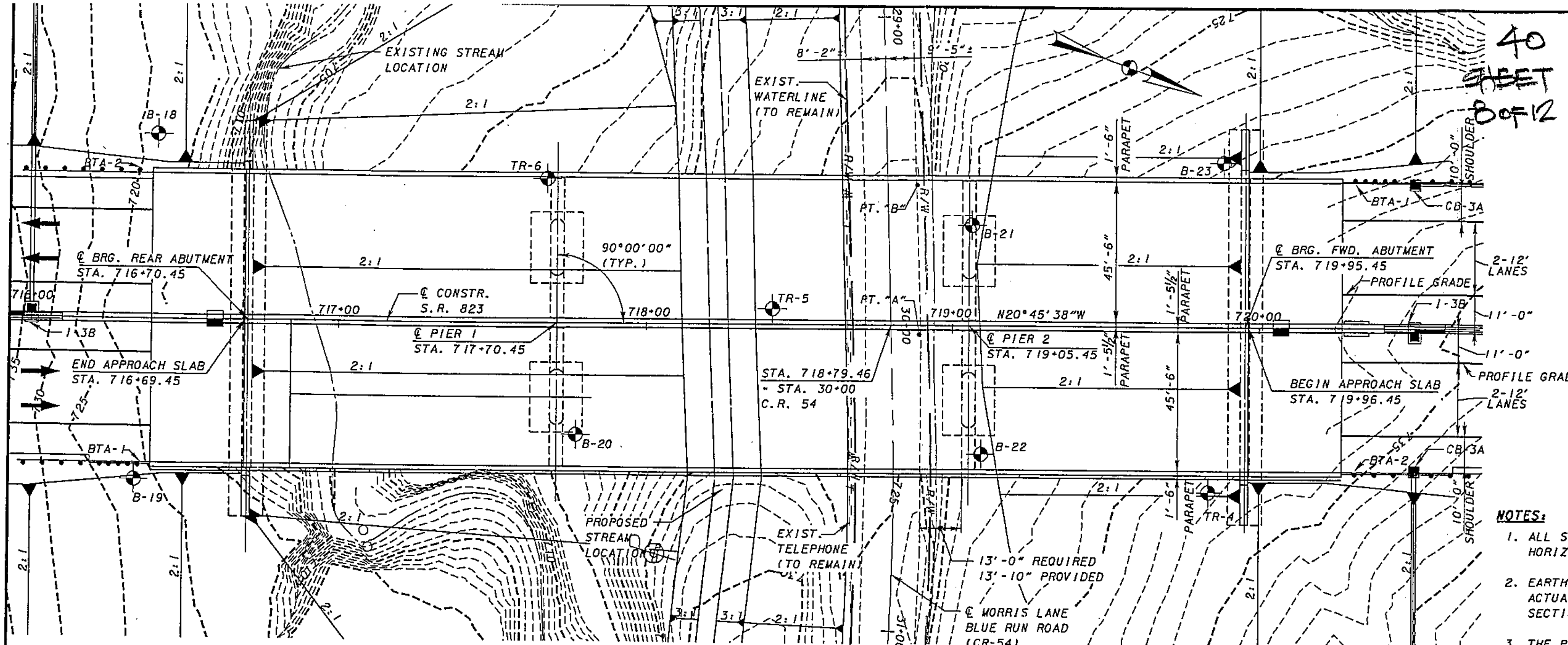
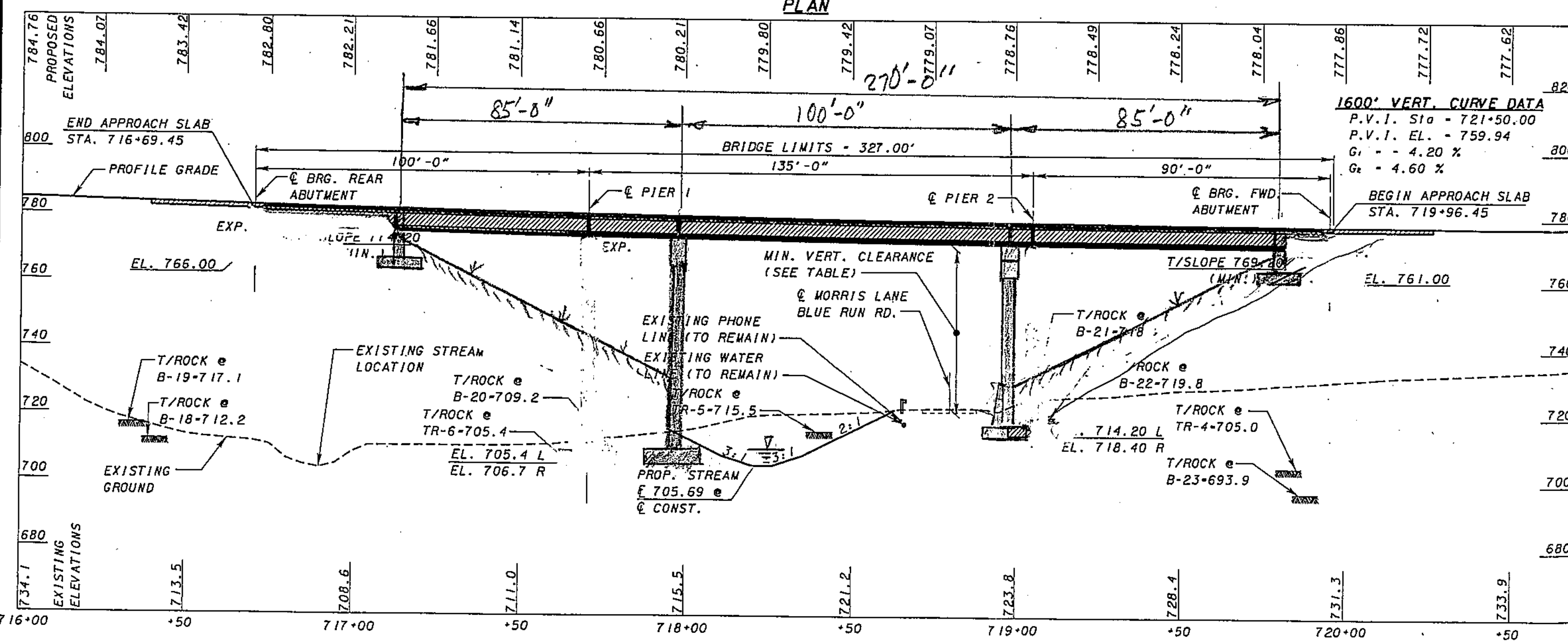


PLAN



PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

40 SHEET 8 of 12

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

(S.R. 823)
CURRENT YEAR ADT (2010) - 19,800
DESIGN YEAR ADT (2030) - 26,000
CURRENT YEAR ADTT (2010) - 2,772
DESIGN YEAR ADTT (2030) - 3,640

HYDRAULIC DATA

DRAINAGE AREA - 147.8 acres
Q_{50} - 294 cfs Q_{100} - 353 cfs
V_{50} - 12.7 fps V_{100} - 13.6 fps
EL_{50} - 709.53 EL_{100} - 709.74

FIRST GUARDRAIL POSTS OFF BRIDGE LOCATIONS

LOCATION	STA.
REAR ABUT. (NB)	716+35.30
REAR ABUT. (SB)	716+35.20
FWD. ABUT. (NB)	720+30.70
FWD. ABUT. (SB)	720+30.60

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

TABLE OF VERTICAL CLEARANCES

LOCATION	"A"	"B"
PROPOSED	49.08'	46.28'
PREFERRED	15.0'	15.0'

LEGEND

BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2
⊕ - BORING LOCATION
▣ - SETTLEMENT PLATFORM

PROPOSED STRUCTURE

TYPE: 3 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAM WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED BY T-TYPE PIERS AND SEMI-INTEGRAL ABUTMENT SUBSTRUCTURES ON SPREAD FOOTINGS.

SPANS: 98'-9½", 132'-7", 88'-9½" (C/C BRG.)

ROADWAY: 2 - 45'-6" T/T PARAPETS

LOADING: HS-25 AND ALTERTNATE MILITARY LOADING, FWS-60 PSF

SKEW: NONE

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30' LONG)

LATITUDE: 82° 56' 56" N

LONGITUDE: 38° 52' 59" W

DESIGN AGENCY: TranSystems

DESIGNED	CHECKED	DRAWN	REVISED	REVIEWED	DATE	STRUCTURE FILE NUMBER
PJP	MSL	CAS	MTN	MSL	06/08/07	7306601, 7306628R

SCIOTO COUNTY
STA. 716+69.45
STA. 719+96.45

SITE PLAN

BRIDGE NO. SCI-823-1357 L&R
S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)

SCI-823-10.31
PID 79977

1 / 4

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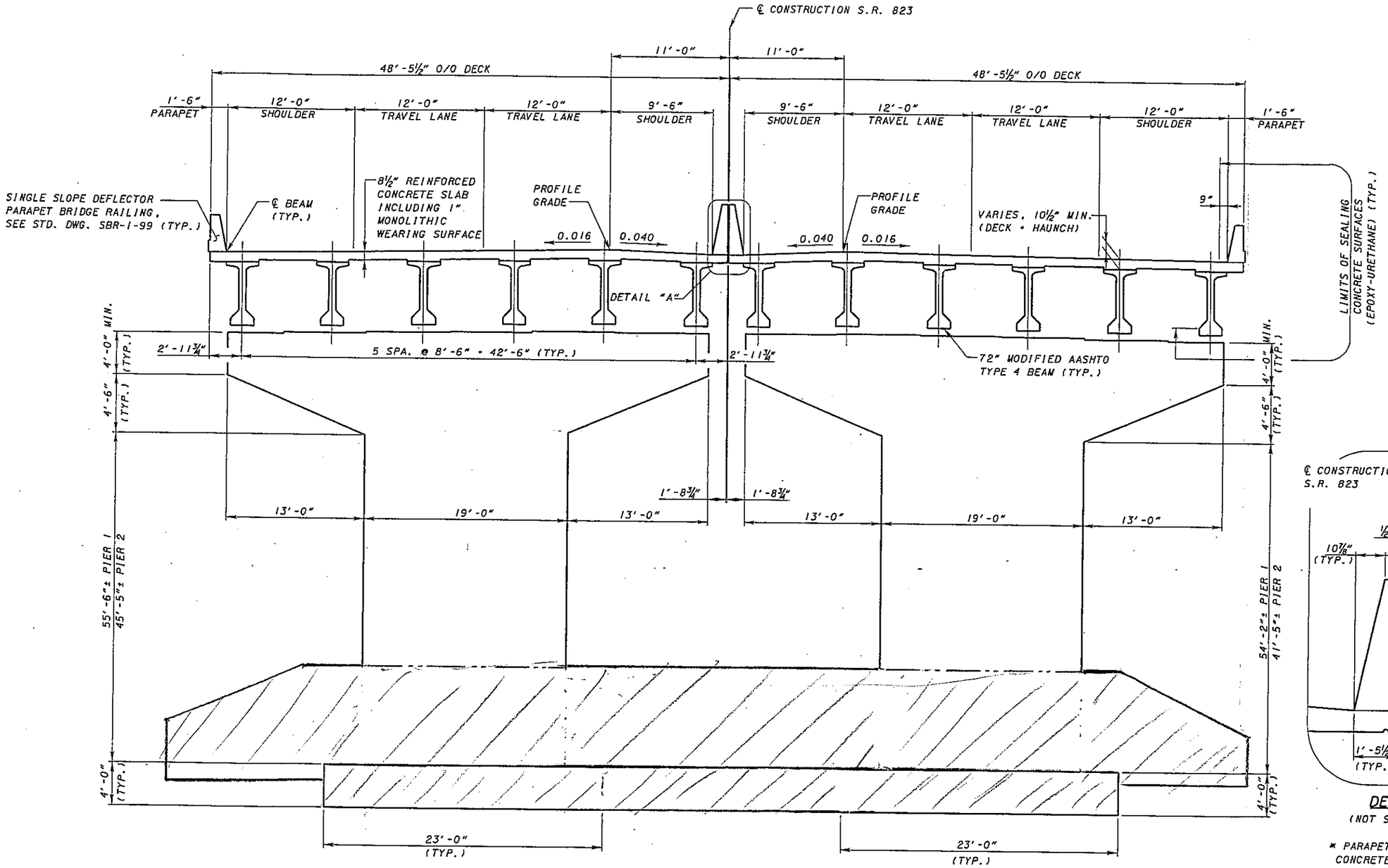
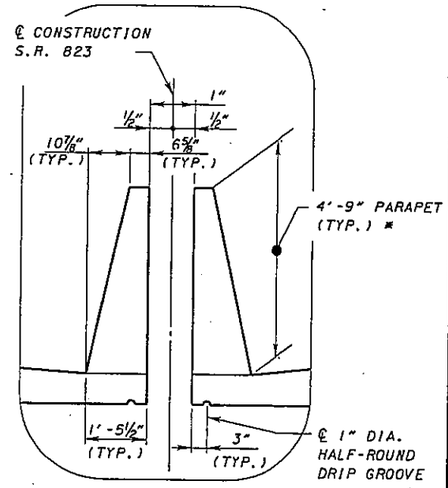
SHEET 9 OF 12



TYPICAL TRANSVERSE SECTION



DETAIL "A"

(NOT SHOWN TO SCALE)

* PARAPETS ARE SIMILAR TO ROADWAY CONCRETE MEDIAN BARRIER

DESIGN AGENCY: Trail Systems, 5151 PINNACLE POINT, DRIVE 100, DUBLIN, OHIO 43017

DATE: 06/08/07 | REVISED: MSL | STRUCTURE FILE NUMBER: 7306601L, 7306628R

DRAWN: CAS | REVISED: MTN

DESIGNED: MSL | CHECKED: PJP

TRANSVERSE SECTION

BRIDGE NO. SCI-823-1357 L&R

S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)

SCI-823-10.31

PID 79977

3 / 4

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PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 40

SHEET NO.: 10 of 12

BRIDGE OVER C.R. 54 :

WALL/BARRIER :

WALL LENGTH = 110'
" WIDTH = 3'
" HEIGHT = 10'

27 | 3300'
122 c.y. @ $450/c.y. = $54,900

FOOTING (ADD'L) :

FOOTING LENGTH = 20'
" WIDTH = 18'
" HEIGHT = 4'

27 | 1440'
53 c.y. @ $350/c.y. = $18,700

BRIDGE : 4,189,000 × 270/327 = $3,458,800

3,532,400

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 4O

SHEET NO.: 11 of 12

BRIDGE OVER C.R. 28 :

WALL/BARRIER :

WALL LENGTH : 80' + 90' = 170'
" WIDTH : = 3'
" HEIGHT : = 4'

27 | 2040 ^{13}
76 C.Y. @ $450/c.y. = $34,200

FOOTING : 7 x 10' x 3' x 6' = 1260 ^{13}
= 47 C.Y. @ $350/c.y. = $ 16,500

BRIDGE : 3730,000 x 223/262 = $ 3,174,800

3225,500

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 40

SHEET NO.: 12 of 12

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
SR823 OVER LUCASVILLE-MINFORD RD. (CR28) L/R	1	1	L.S	3,730,000	1	L.S	3,230,000
SR-823 OVER MORRIS LANE-BLUE RUN RD. (CR54) L/R	1	1	L.S.	4,189,000	1	L.S.	3,530,000
	Sub-total			7,919,000			6,760,000
Mark-up at	15.00%			1,187,850			1,014,000
	TOTAL			9,106,850			7,774,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**43/21**
DESCRIPTION:	**BREAK PROJECT INTO SMALLER BID PACKAGES AND CHANGE PHASING TO USE EXCAVATED MATERIAL EARLY**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

3 Phases – 1 Construction contract per phase:
Phase 1 – 3.2 miles approximately $69 million construction cost (Example) = 1 Contract
Phase 2 – 7.0 miles approximately $156 million construction cost
Phase 3 - 6.5 miles approximately $144 million construction cost

ALTERNATIVE: (Sketch attached)

Break the contract into multiple, smaller contracts, e.g.,

Earthwork, minor drainage = $30,441,437
Bridges:
- Swauger Valley-Minford = $4,770,000
- Shumway Hollow = $1,890,000
- CSXT Railroad = $2,619,700
- Portsmouth-Minford = $5,100,000

Pavement, noise walls, median drainage, concrete barrier, GR = $14,438,689

ADVANTAGES:

- Increases competitiveness in bids
- Increases employment opportunities for local tradesmen
- Reduces contract sizes to allow smaller contractors
- Allows local contractors to bid on project and spur local economy
- Simplifies contract administration
- Minimizes potential claims/disputes
- Allows for consolidation period in fill areas

DISADVANTAGES:

- Increases contract administration cost (soft cost only)
- Increases design costs in breaking into multiple bid packages (est. @ < 10%)
- May extend construction time by 6 to 12 months

COST SUMMARY (Example of Phase 1 Only)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 68,582,027	—	$ 68,582,027
ALTERNATIVE	$ 62,422,658	—	$ 62,422,658
SAVINGS	$ 6,159,369	—	$ 6,159,369

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**43/21**
DESCRIPTION:	**BREAK PROJECT INTO SMALLER BID PACKAGES AND CHANGE PHASING TO USE EXCAVATED MATERIAL EARLY**	SHEET NO.:	**2 of 4**

DISCUSSION:

Alter phase lengths and/or additional phases by locations where cut and fill quantities are approximately balanced. Within these phases break project into multiple contracts by work type. An example is to sell the earthwork and culverts as one contract, then sell structures as another, and finally sell pavement, drainage and traffic control as a final contract

In reality, work is typically completed in phases in any case.

CALCULATIONS

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 43 : 21

SHEET NO.: 3 of 4

AS AN EXAMPLE PHASE I SHOWN:

EARTHWORK, MINOR DRAINAGE

EXCAVATION	= $18,810,000
EMBANKMENT	= $ 2,040,000
CLEAR & GRUB	= $ 345,000
TREES REM.	= $ 792,000
MITIGATION	= $ 732,840
WASTE	= $ 3,289,000
SEED & MULCH	= $ 1,109,504
RCP	= $ 78,800
EROSION CONTROL	= $ 591,000
OTHER E C	= $ 9,850
MINOR DRAINAGE	= $ 1,684,000
BLDG. DEMO	= $ 60,000
WETLAND CONST.	= $ 522,624
MT, MOBIL, BOND, ETC	= $ 376,819
TOTAL	= $ 30,441,437

MAJOR BRIDGES

SWAUGER VALLEY	= $ 4,770,000
SHUMWAY HOLLOW	= $ 1,890,000
CSXT RR + BOND	= $ 2,619,700
PORTSMOUTH-MINFORD	= $ 5,100,000
MT, MOBIL, BOND, ETC	= $ 376,819
TOTAL	= $ 14,756,519

PAVEMENT, NOISE WALLS, MEDIAN DRAINAGE, CONCRETE BARRIER, GUARDRAIL

CONCRETE BARRIER	= $ 1,368,000
GUARDRAIL	= $ 332,850
UNDER DRAINS	= $ 319,100
MEDIAN DRAINAGE	= $ 1,047,000
PAVING	= $ 9,625,400
LIGHTING	= $ 600,000
SIGNS	= $ 87,500
PAVEMENT MARKINGS	= $ 45,020
NOISE WALLS	= $ 637,000
MT, MOBIL, BOND, ETC	= $ 376,819
TOTAL	= $ 14,438,589

DESIGN REVISIONS

ORIGINAL @ $ 2,200,000

10% EXPENSE = $ 220,000 (A)

MULTIPLE PAY ITEMS

ORIGINAL @ $ 700,000

50% EXPENSE = $ 350,000 (B)

EARTHWORK, MINOR DRAINAGE

10% SAVINGS = ($ 3,044,144) (C)

MAJOR BRIDGES

10% SAVINGS = ($ 477,000) (D)
" " = ($ 189,000) (E)
" " = ($ 261,970) (F)
" " = ($ 510,000) (G)

PAVEMENT, NOISE WALLS, ETC...

10% SAVINGS = ($ 1,443,859) (H)

TOTAL SAVINGS = (A) + (B) + (C) + (D) + (E) + (F) + (G) + (H)

= $ 5,355,973.00

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 43 & 21

SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
SEE CALCULATION SHEET							
-							
	Sub-total			59,636,545			54,280,572
Mark-up at	15%			8,945,482			8,142,086
	TOTAL			68,582,027			62,422,658

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**45**
DESCRIPTION:	**MODIFY SUBGRADE PREPARATION TO IMPROVE DRAINAGE AND POTENTIALLY INCREASE STRENGTH OF PAVEMENT DESIGN**	SHEET NO.:	**1 of 2**

ORIGINAL DESIGN: (Sketch attached)

The current design employs conventional subgrade preparation including underdrains.

ALTERNATIVE: (Sketch attached)

Use durable rock, which should be available from most excavations, to provide a 3-ft.-thick blanket of graded durable rock at subgrade on fills and in cut areas.

ADVANTAGES:

- Improves drainage of subgrade
- Improves subgrade strength, which can be considered in pavement design
- Eliminates underdrains

DISADVANTAGES:

- Not a common Department solution
- May not be readily known to local area contractors and thus requires a learning curve
- Increases construction management effort to assure proper subgrade preparation

DISCUSSION:

Given the large quantity of durable rock, construction of a graded 3-ft.-thick "rock blanket" or "rock subgrade" immediately below subgrade will provide a continuously drainable subgrade, eliminating underdrains that will likely be installed in rock fill at the top of embankments or in rocky backfill thru rock cuts. This blanket or subgrade would consist of durable rock meeting a specification, which would be developed to describe quality, gradation and compaction requirements but would be practical and allow use of anticipated readily available sandstone on the project. For example, the specification could call for gradation of the rock in the lower 24 in. of the blanket to be no greater than 6 in. and contain no more than 5% fines by visual examination. The final 12 in. could be no greater than 2 in. in size with a similar maximum % fines.

In embankments, this 3-ft. zone or blanket would be placed at the top of the rockfill or random embankment placed using conventional specifications, and would begin 3 ft. below subgrade to provide a suitable finished grade in at the subgrade surface.

In cuts, the 3-ft. blanket would be created by undercutting rock and/or soil to an elevation 3 ft. below subgrade, then backfilling as described for fills to subgrade elevation.

The detail for construction and the specification would call for grading of the surface at the base of this blanket to drain toward outlet slopes or ditches. In the cuts, the base of the undercut would be graded, as much as practicable, to allow free flow to the adjacent ditches.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

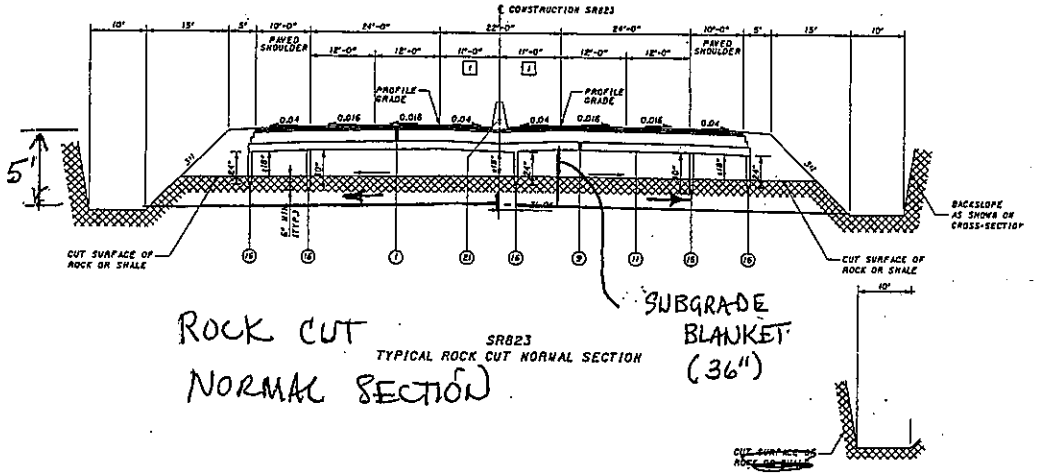
SKETCH

PROJECT: **SCI-823-0.00PID Nos. 19415, 77366, and 79977**
Scioto County, Ohio

ALTERNATIVE NO.: **45**

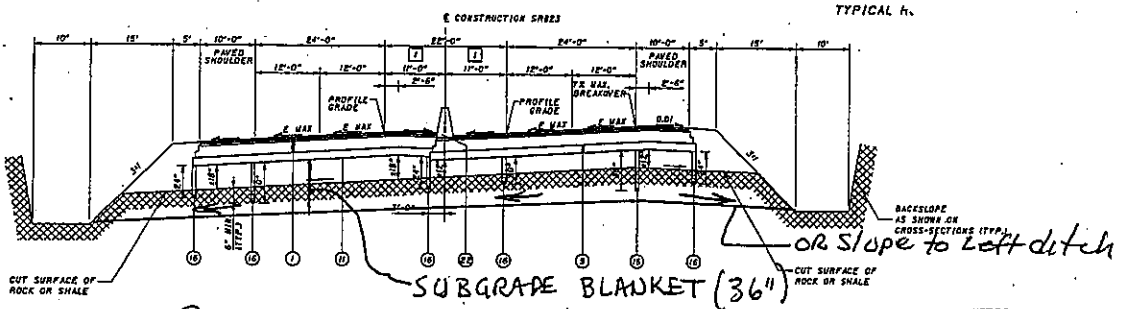
ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: **2 of 2**



ROCK CUT NORMAL SECTION

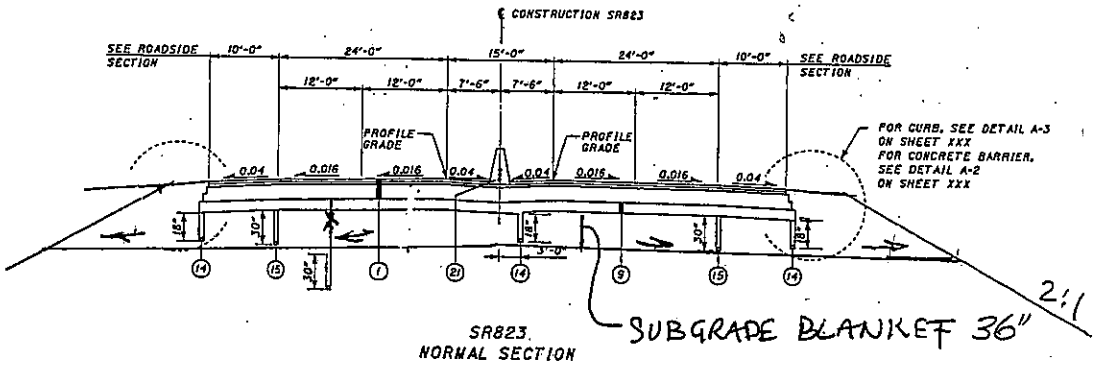
SR823
TYPICAL ROCK CUT NORMAL SECTION



ROCK CUT — SUPERELEVATED

SR823
TYPICAL ROCK CUT SUPERELEVATION SECTION (OPPOSITE HAND ALSO)

NOTES:
1. FOR LEGEND AND BASE STEP DETAIL SEE SHEET xx
[1] FOR MEDIAN WIDTH SEE PLAN SHEETS



SR823.
NORMAL SECTION

EMBANKMENT SECTION
(SIMILAR FOR SUPERELEVATED SECTION).

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**52**
DESCRIPTION:	**ELIMINATE SOME UNDERDRAINS**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The mainline typically includes 5 or 6 underdrains consisting of one at each edge of shoulder at the outside edge of the traffic lane.

ALTERNATIVE: (Sketch attached)

Construct the underdrains at the edge of the shoulders and eliminate those at the outside edges of the traffic lanes.

ADVANTAGES:

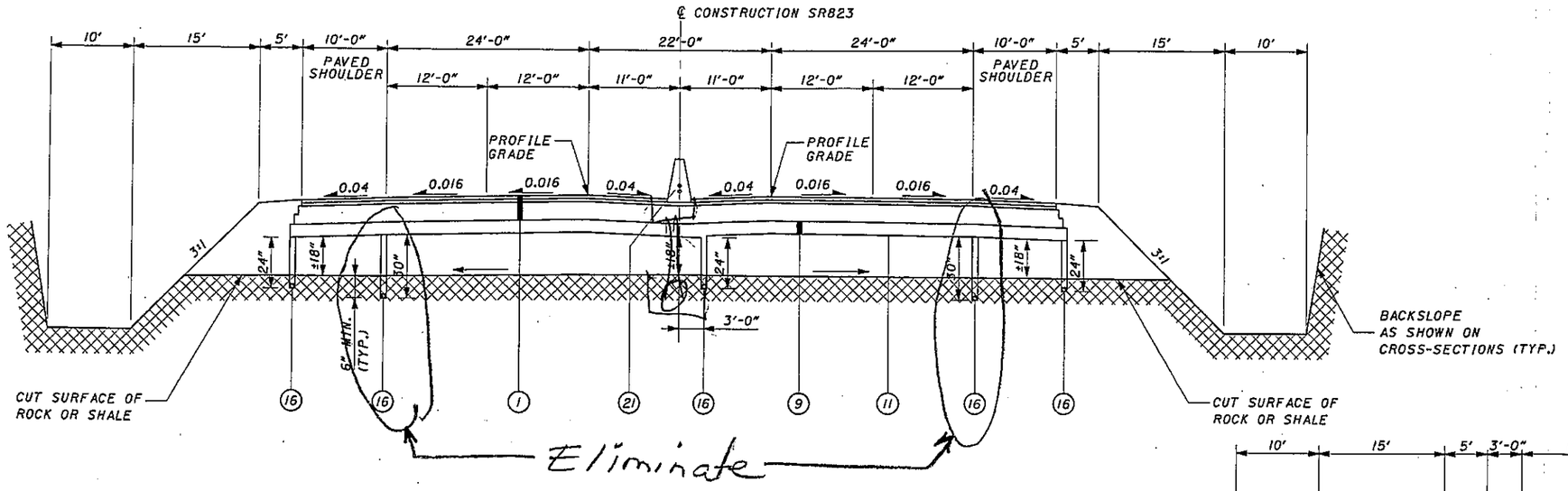
- Reduces cost
- Simplifies construction
- Facilitates construction

DISADVANTAGES:

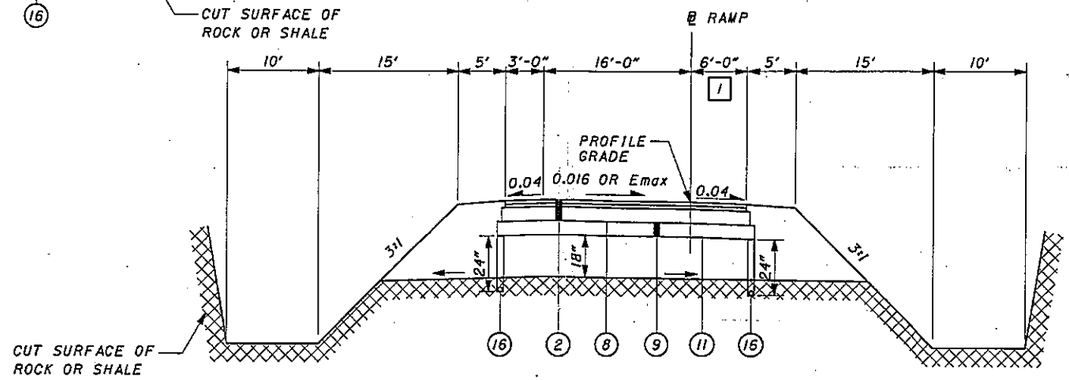
- Question of adequate subgrade drainage

COST SUMMARY (Example of Phase 1 Only)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,863,000	—	$ 1,863,000
ALTERNATIVE	$ 1,301,985	—	$ 1,301,985
SAVINGS	$ 561,015	—	$ 561,015

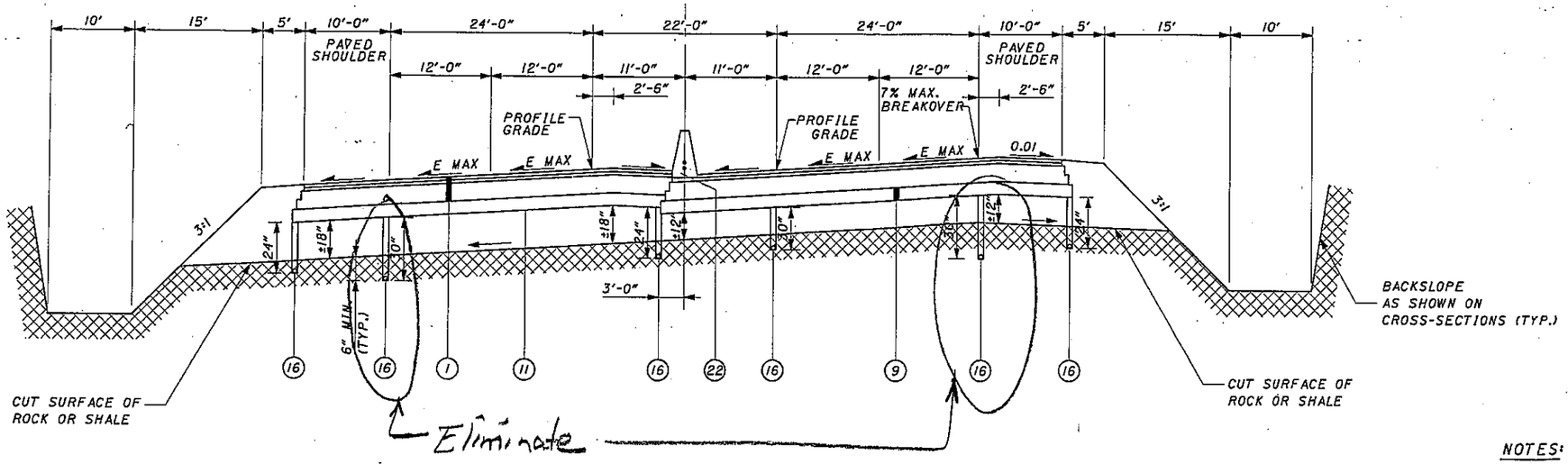
52
SHEET 2 OF 4



SR823
TYPICAL ROCK CUT NORMAL SECTION



INTERCHANGE RAMPS
TYPICAL ROCK CUT SECTION (OPPOSITE HAND ALSO)



SR823
TYPICAL ROCK CUT SUPERELEVATION SECTION (OPPOSITE HAND ALSO)

NOTES:

1. FOR LEGEND AND BASE STEP DETAIL SEE SHEET XX

TYPICAL SECTIONS - DRIVEWAYS

SCI-823-6.81

16

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 52

SHEET NO.: 3 of 4

Phase 1 3.191 miles (16,848 l.f)

$319,100

Lucas - Minford — 157,088 l.f.
~ 8000' Ramp — 23,392 l.f.
Airport — 250,651
~ 6000' Ramp

Phase 2 6.966 miles (36,780 l.f.)

$696,600

US 23 — 228,680
~ 4000' Ramp — 155,120
$ 472,523

Phase 3 6.043 miles (31,907 l.f.)

$604,300 orig

Scioto dale — original 197,442 l.f.
~ 3000' Ramp — new 133,629 l.f.
$ 408,987

Since no drains would be eliminated on the ramp typical section, the relative cost for each section based on the original estimate is adjusted based on the percentage of main roadway length and ratio of 2 of 6 drains being eliminated

original	new
$ 319,100	250,651
$ 696,600	472,523
$ 604,300	408,987
1,620,000	1,132,161

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 52

SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Underdrains	MILE	16.20	100,000	1,620,000	16.20	69,886	1,132,161
Sub-total				1,620,000			1,132,161
Mark-up at	15 %			243,000			169,824
TOTAL				1,863,000			1,301,985

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**54**
DESCRIPTION:	**REDUCE 3-SPAN RAMPS AT US 23 OVER RAILROAD TO SINGLE OR 2-SPAN RAMPS**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Ramps B and C are currently 3-span curved steel plate girder bridges. The Norfolk Southern (NS) Railroad will not permit temporary shoring between tracks which makes assembly of curved girders very difficult and costly.

ALTERNATIVE: (Sketch attached)

For the 2-span alternative: The team looked at eliminating forward span and balancing main span with a longer rear span. Without temporary shoring in main span, rear span will likely experience uplift making construction very challenging. *Not Recommended.*

For the single-span alternative: Use a single plate girder span over the NS Railroad on a chorded alignment and oversized deck that allows a curved roadway and barrier alignment. Provide mechanically stabilized earth (MSE) wall and sloped embankment approaches. Culverts will be needed to maintain existing drainage.

ADVANTAGES:

- Reduces cost
- Simplifies construction
- Eliminates curved girders
- Girders up to 2 feet shallower allowing lower profile

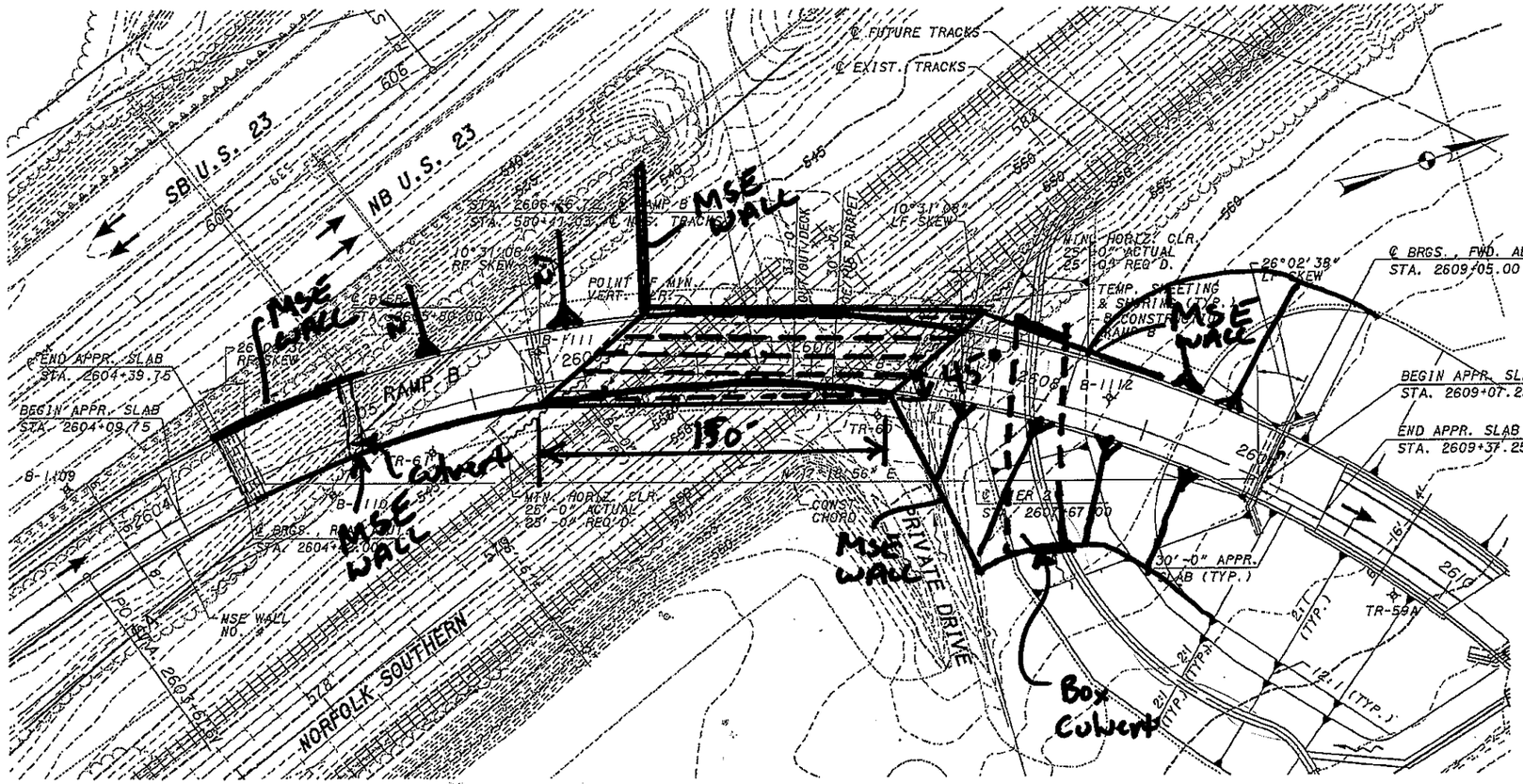
DISADVANTAGES:

- Produces skewed (45°) bridges
- Affects aesthetics

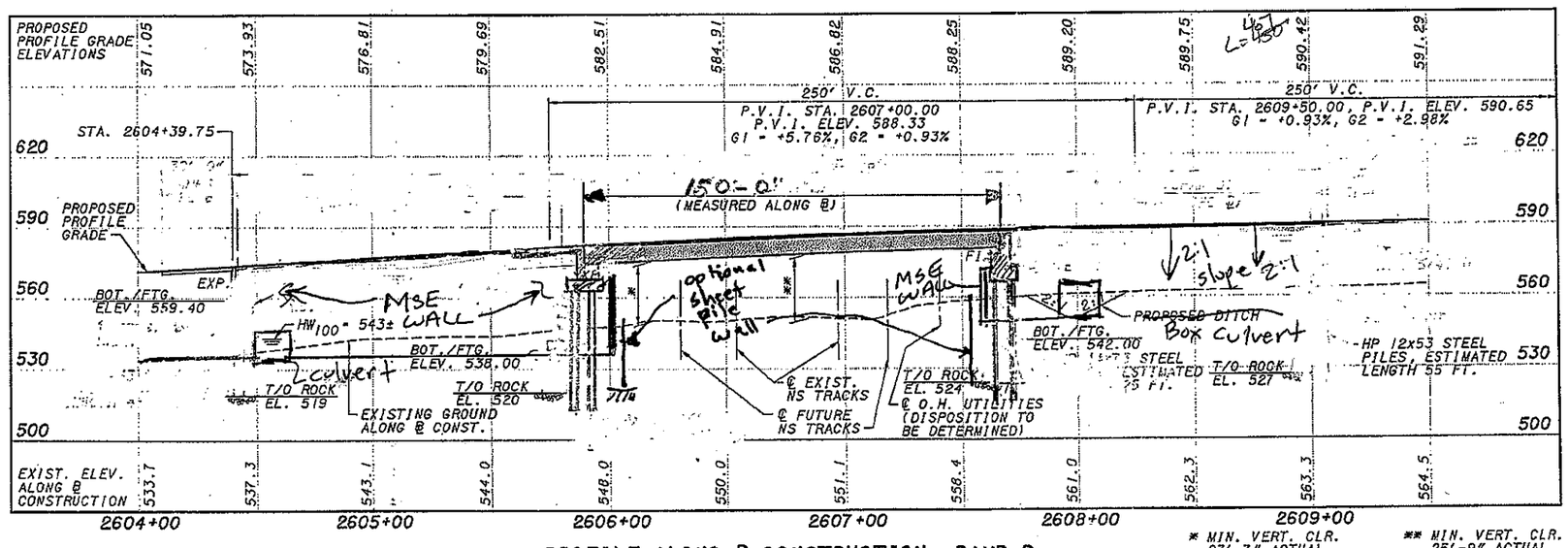
DISCUSSION:

To avoid any potential settlement of the railroad tracks near the new, proposed MSE wall, sheet piling to rock could be installed in front of MSE to isolate settlement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 8,475,500	—	$ 8,475,500
ALTERNATIVE	$ 4,006,600	—	$ 4,006,600
SAVINGS	$ 4,468,900	—	$ 4,468,900



PLAN



PROFILE ALONG ℄ CONSTRUCTION, RAMP B

* MIN. VERT. CLR. 23'-7" ACTUAL 23'-3" REQ'D.

** MIN. VERT. CLR. 25'-9" ACTUAL 23'-2⅛" REQ'D.

BENCHMARKS
FA
SHEET 2 OF 5

CURVE B-3
P.I. STA. = 2609+99.07
Δ = 102° 45' 15" (RT.)
Dc = 11°15'00"
R = 509.30'
T = 637.46'
L = 913.37'
E = 306.63'
emax = 0.071

Deck Area = 15,411

TRAFFIC DATA
CURRENT ADT (2010) = 2700
DESIGN ADT (2030) = 3600
DESIGN ADTT = 500

LEGEND
✧ DENOTES SOIL BORING LOCATION

NOTE
EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

DRAFT NOT FOR REVIEW. FOR VALUE ENGINEERING STUDY ONLY.

PROPOSED STRUCTURE

TYPE: THREE SPAN COMPOSITE CURVED STEEL PLATE GIRDERS (WEATHERED ASTM A709, GR 50W) WITH REINFORCED CONCRETE DECK ON JOINTED STUB ABUTMENT ON MSE WALL (REAR) AND JOINTED STUB ABUTMENT BEHIND 2:1 EMBANKMENT (FWD.) WITH T-TYPE PIERS

LENGTH OF SPAN: 138'-0", 187'-0", 138'-0" C-C BEARINGS, MEASURED ALONG ℄ CONSTRUCTION

ROADWAY: 30'-0" TOE/TOE PARAPETS

SIDEWALK: NONE

DESIGN LOADING: HS25 (CASE II) AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT

SKEW: 26°02'37" RF (REAR ABUTMENT), 10°31'06" RF (PIER 1), 10°31'06" LF (PIER 2), 26°02'38" LF (FORWARD ABUTMENT), MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30'-0" LONG)

ALIGNMENT: HORIZONTALLY CURVED (℄ RADIUS= 509.30 FT.)

SUPERELEVATION: 0.071 FT/FT

LATITUDE: N 38°53'28"

LONGITUDE: W 82°59'54"

DESIGN AGENCY
CH2MHILL
5775 Perimeter Drive, Suite 190
Dublin, Ohio 43017

DESIGNED	DRAWN	REVIEWED	DATE
DGS	JBA	VKH	11/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
SCJ		7306776	

SCIOTO COUNTY
STA. 2604+39.75
TO STA. 2609+07.25

SITE PLAN
BRIDGE NO. SCI-823-1598
RAMP B OVER NORFOLK SOUTHERN

SCI-823-10.13
PID 79977

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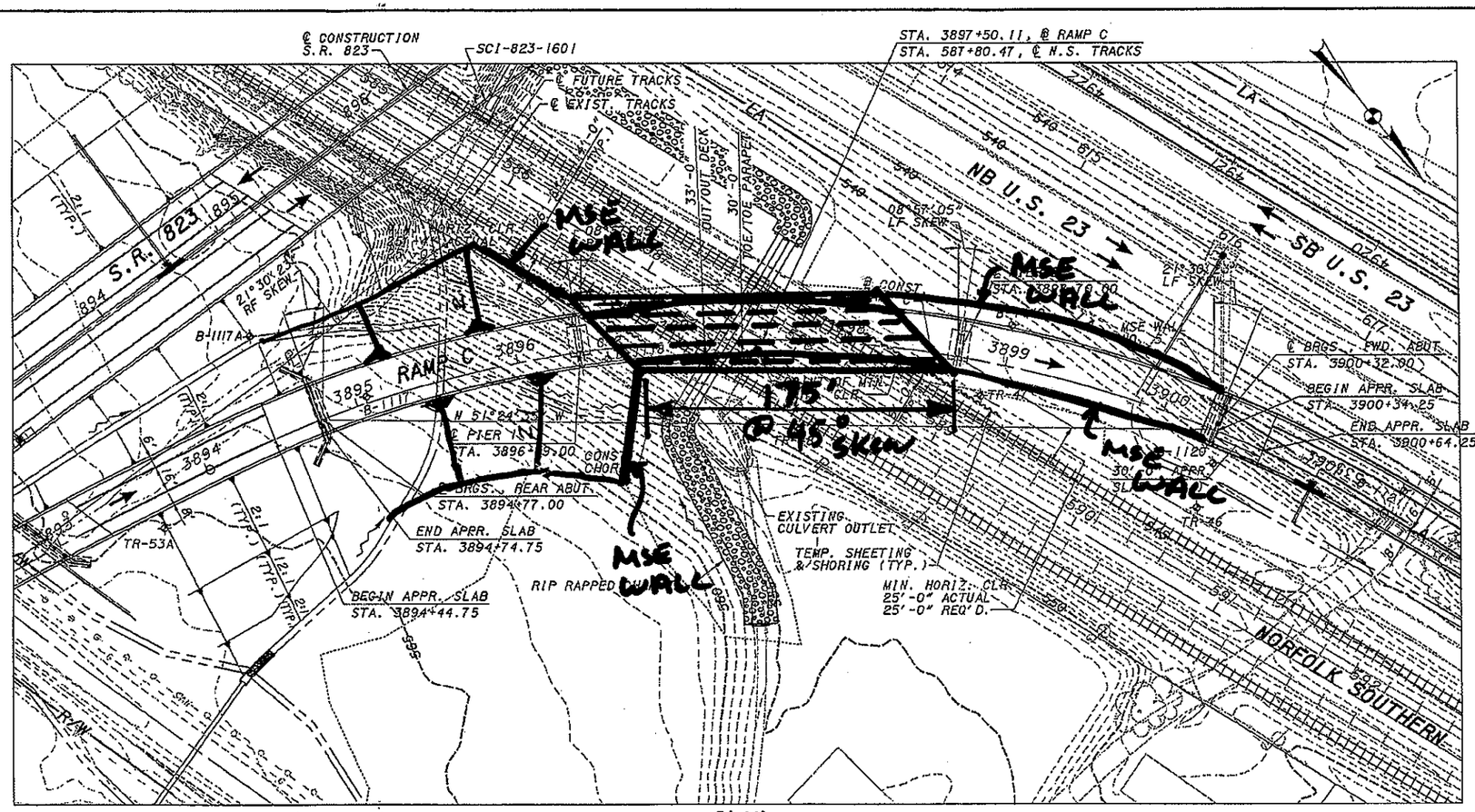
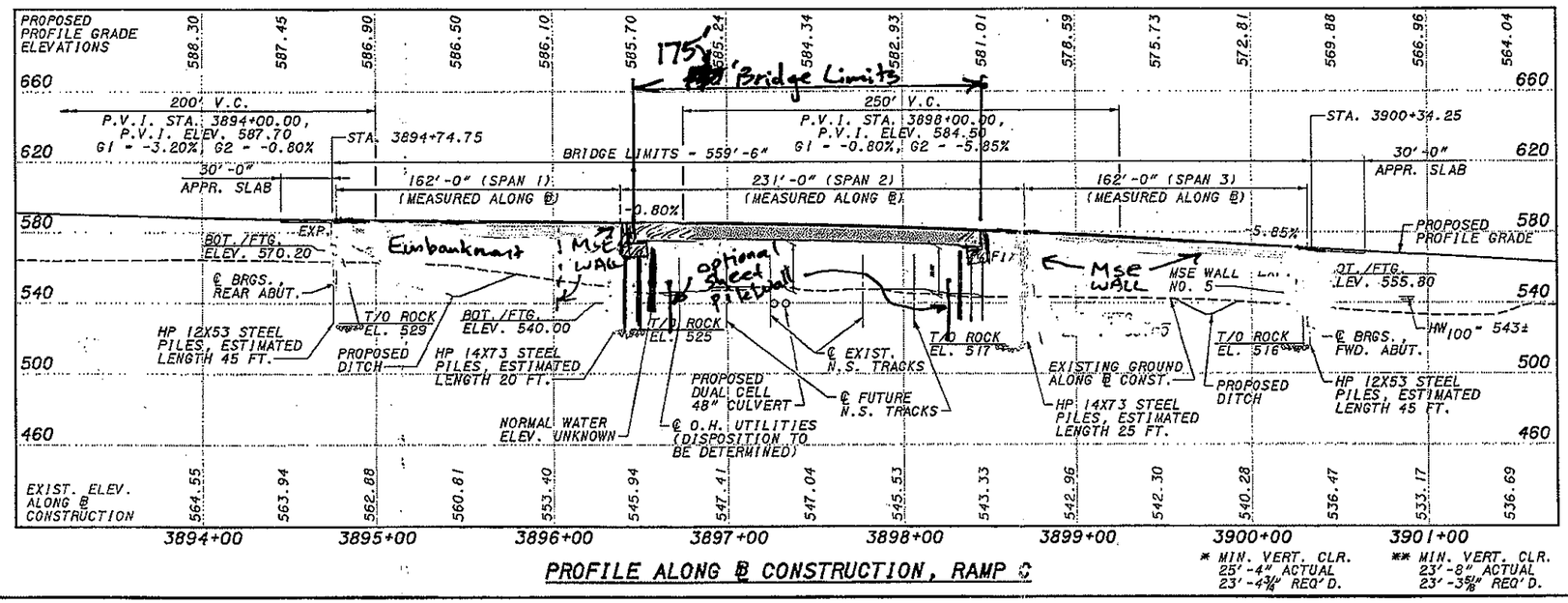


PLAN



PROFILE ALONG © CONSTRUCTION, RAMP C

BENCHMARKS
E4
~~SHEET~~ 3 OF 5

CURVE C-2
P.I. STA. = 3898+09.03
Δ = 57°43'34" (RT.)
Do = 07°45'00"
R = 739.30'
T = 407.49'
L = 744.85'
E = 104.87'
emax = 0.069

$7,370,000 ÷ 33,880 ft² = $217/ft²

TRAFFIC DATA
CURRENT ADT (2010) = 6200
DESIGN ADT (2030) = 9400
DESIGN ADTT = 1320

Deck Area = 18,480

new area = 1'

DRAFT NOT FOR REVIEW. FOR VALUE ENGINEERING STUDY ONLY.

LEGEND
⊕ DENOTES SOIL BORING LOCATION

NOTE
EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

PROPOSED STRUCTURE

TYPE: THREE-SPAN COMPOSITE CURVED STEEL PLATE GIRDERS (WEATHERED ASTM A709, GR 50W) WITH REINFORCED CONCRETE DECK ON JOINTED STUB ABUTMENT (REAR) AND JOINTED STUB ABUTMENT ON MSE WALL (FWD.) WITH T-TYPE PIERS
LENGTH OF SPAN: 162'-0", 231'-0", 162'-0" C-C BEARINGS, MEASURED ALONG © CONSTRUCTION
ROADWAY: 30'-0" TOE/TOE PARAPETS
SIDEWALK: NONE
DESIGN LOADING: HS25 (CASE II) AND THE ALTERNATE MILITARY LOADING, FWS = 60 LB/FT²
SKEW: 21°30'23" RF (REAR ABUTMENT), 08°57'05" RF (PIER 1), 08°57'05" LF (PIER 2), 21°30'23" LF (FORWARD ABUTMENT), MEASURED FROM THE NORMAL TO THE CONSTRUCTION CHORD
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30'-0" LONG)
ALIGNMENT: HORIZONTALLY CURVED (@ RADIUS- 739.30 FT.)
SUPERELEVATION: 0.069 FT/FT
LATITUDE: N 38°53'34"
LONGITUDE: W 82°59'57"

DESIGN AGENT: CH2MHILL, 5775 Perimeter Drive, Suite 190, Dublin, Ohio 43017
DATE: 11/07
REVIEWED: VKH
STRUCTURE FILE NUMBER: 7306814
DRAWN: JBA
DESIGNED: SKT
REVISED:
CHECKED: DGS

SCIOTO COUNTY
STA. 3894+74.75
TO STA. 3900+34.25

SITE PLAN
BRIDGE NO. SCI-823-1603
RAMP C OVER NORFOLK SOUTHERN

SCI-823-10.13
PID 79977

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PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 54

SHEET NO.: 4 of 5

Existing bridge unit cost $\frac{\$7,370,000}{33,880\,ft^2} = \$217/ft^2$

Proposed Bridges: Ramp B: $L = 150'$ $w = 40' \Rightarrow 6,000\,ft^2$

Ramp C: $L = 175'$ $w = 40' \Rightarrow 7,000\,ft^2$

Assume Unit Cost 15% less due to reduced steel requirements

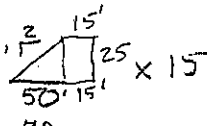
$\therefore$ Unit cost = $\$217/ft^2 * 0.85 = \$185/ft^2$

Additional MSE Wall - Say Avg. Ht = 15'

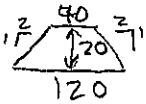
Ramp B: Rear - $115' + 50' + 60' = 225' \Rightarrow 3,375\,\square'$
Fwd - $70' + 50' + 80' = 200' \Rightarrow 3,000'$
$6,375\,\square'$

Ramp C: Rear - $60' + 50' + 50' = 160' \Rightarrow 2,400\,\square'$
Fwd - $170' + 50' + 150' = 370' \Rightarrow 5,550\,\square'$
$7,950\,\square'$

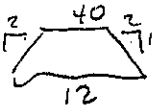
Total = 14,325

Embankment: Ramp B: 

$\times 150' \Rightarrow 5,500$ C.Y.



$\times 100' \Rightarrow 6,000$ C.Y.

Ramp C: 

$\times 100' = 6,000$ C.Y.

17,500 C.Y.

Pavement: (ramp B) $467' - 150'$ + (ramp C) $580' - 155' = 742'$

$742' \times 30'w / 9 = 2500$ S.Y.

Culverts: $100' + 60' = 160'$

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 54

SHEET NO.: 5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
3-Span Plate Girder Bridge	SF	33,880	217.00	7,370,000			
Single Span Plate Girder Bridge	SF				13,000	185.00	2,405,000
Additional MSE Walls	SF				14,300	60.00	858,000
Additional Embankment	CY				17,500	4.00	70,000
Additional Pavement	SY				2,500	38.00	95,000
Culverts	LF				160	350.00	56,000
	Sub-total			7,370,000			3,484,000
Mark-up at	15.00%			1,105,500			522,600
	TOTAL			8,475,500			4,006,600

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**59**
DESCRIPTION:	**USE FILL BERMS IN LIEU OF GUARDRAILS**	SHEET NO.:	**1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The current design includes barrier grading with 10 ft. at 12:1 and 2:1 fill slope.

ALTERNATIVE: (Sketch attached)

Use a berm with 21 ft. at 6:1, 10-ft. flat ditch, 2:1 backlsope and 10-ft. top width berm.

ADVANTAGES:

- Reduces cost
- Uses waste from project
- Eliminates guardrail

DISADVANTAGES:

- Requires lengthening pipes
- Meets clearzone grading, but does not meet safety grading

DISCUSSION:

The estimated unit price for waste is $1.10 and the estimated price for embankment is $0.60. Using excess material for embankment provides a cost reduction.

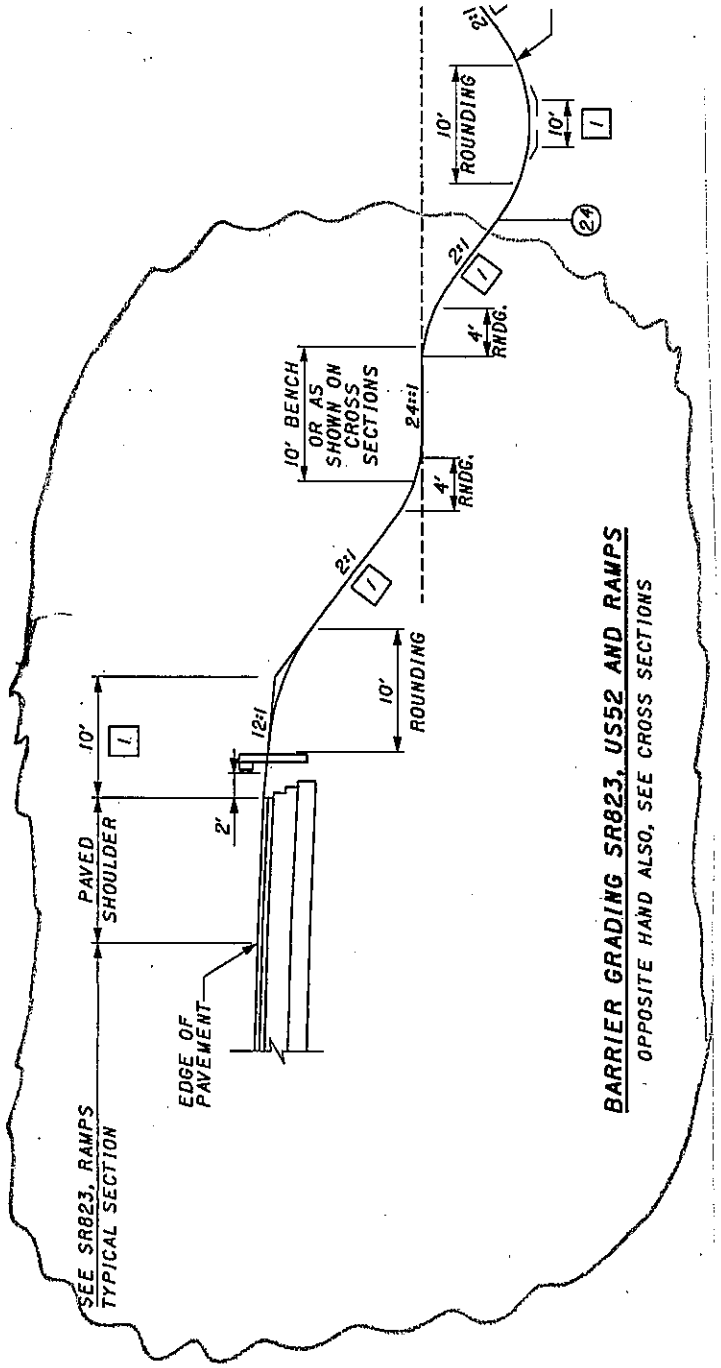
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 7,957,034	—	$ 7,957,034
ALTERNATIVE	$ 6,184,194	—	$ 6,184,194
SAVINGS	$ 1,772,840	—	$ 1,772,840

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 59

☑ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 2 of 6

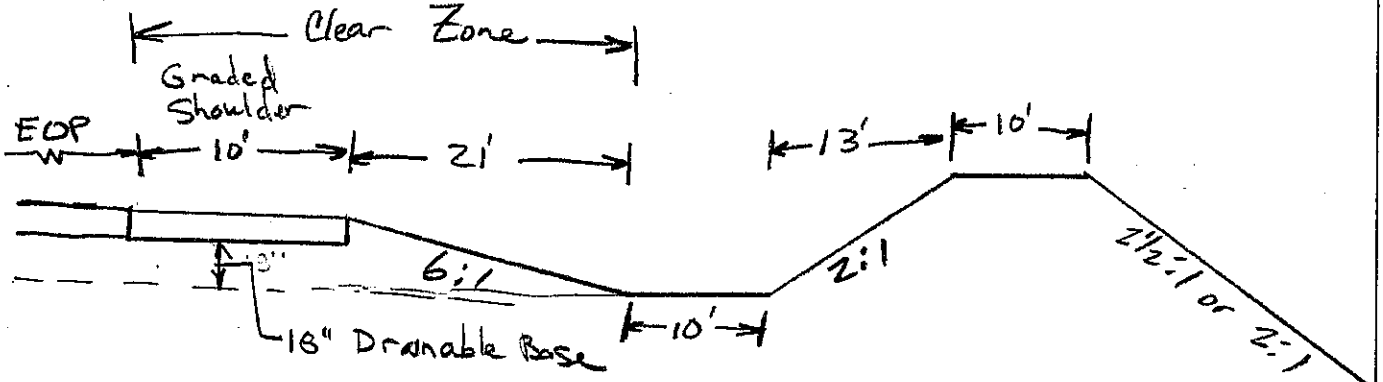


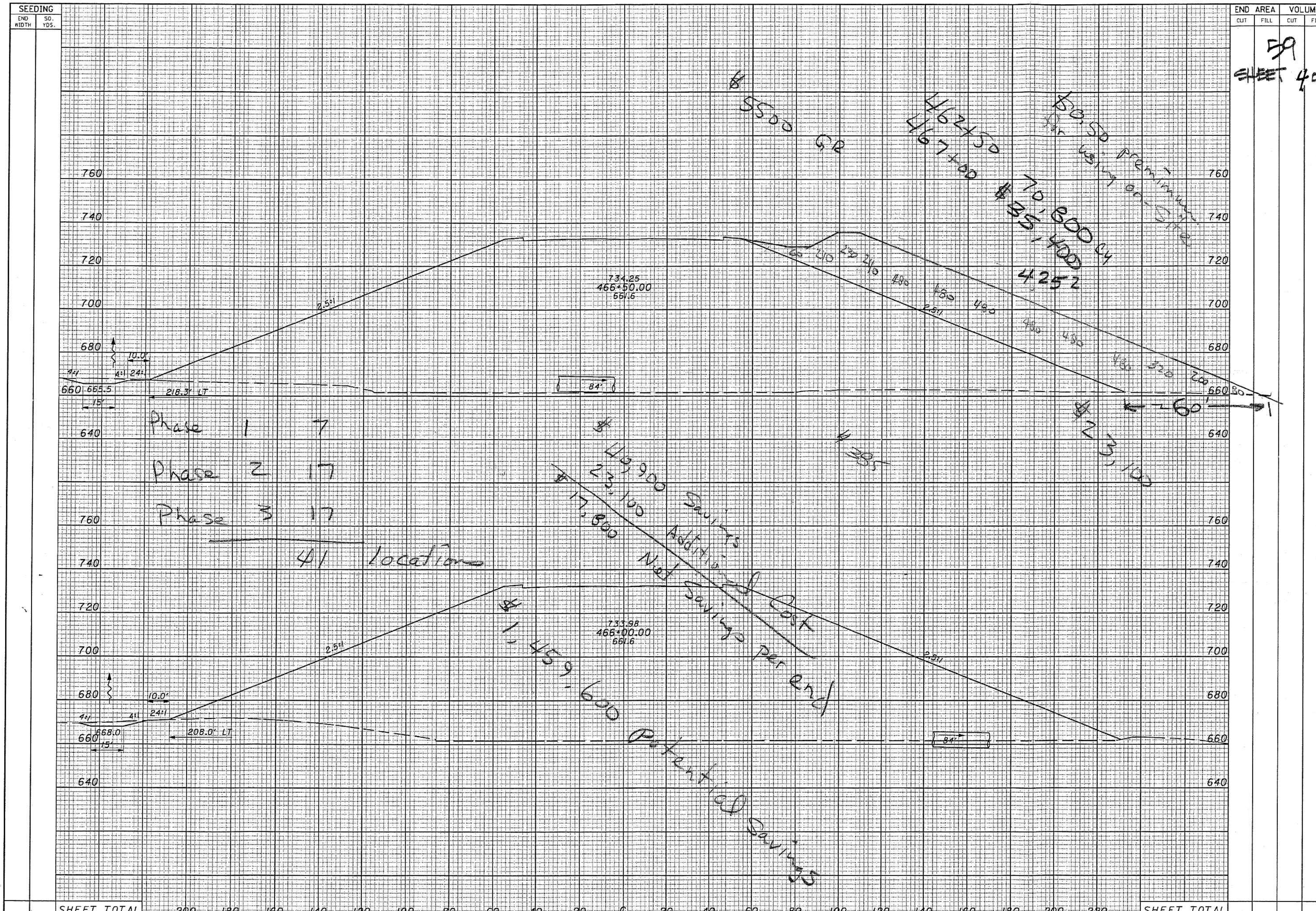
PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 59

☐ AS DESIGNED ☒ ALTERNATIVE

SHEET NO.: 3 of 6





CROSS SECTIONS

SR823 - STA. 466+00.00 TO STA. 466+50.00

SCI-823-6.81

214

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 59

SHEET NO.: 5 of 6

Sta 462+50 to Sta 467+00

Berm right side ~ 70,800 c.y. @ 0.60 $ 42,480
Extend 84" Pipe ~ 60 L.F. @ $385 $ 23,100

$ 65,580

Cost Reduction

Waste ~ 70,800 c.y. @ 1.10 $ 77,880
Guardrail ~ 650 L.F @ 10.00 $ 6,500

$ 84,380

Savings $18,800 one side

There are 41 possible location where this should be considered. Assuming both left and right sides are modified, a per site savings of $37,600 would be realized or for 41 sites $1,541,600 potential project savings

COST WORKSHEET

PROJECT:	SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio **Stage 1 Design**	ALTERNATIVE NO: 59 SHEET NO.: 6 of 6

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Fill Embankment	CY				5805600	0.60	3,483,360
Waste	CY	5805600	1.10	6,386,160			
Guardrail	LF	53300	10.00	533,000			
Pipe	LF				4920	$385	1,894,200
	Sub-total			6,919,160			5,377,560
Mark-up at	15%			1,037,874			806,634
	TOTAL			7,957,034			6,184,194

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**61**
DESCRIPTION:	**REPLACE SAFETY GRADING WITH CLEARZONE GRADING**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN: (Sketch attached)

Guardrail is used in locations where safety grading is not met:

- In cut slopes with 2:1 back slopes and/or slope steeper than 6:1 thru clearzone
- In fill slopes steeper than 6:1 through clearzone or with toe ditches with back slopes steeper than 3:1

ALTERNATIVE: (Sketch attached)

Remove the guardrail where clearzone requirements are met.

ADVANTAGES:

- Reduces cost
- Eliminates obstruction/hazard of guardrail in areas where clearzone grading is met
- Allows for use of false cut/mound to waste material (See Alt. No. 59)
- Meets American Association of State Highway Transportation Officials (AASHTO) roadside design guidelines

DISADVANTAGES:

- Deviates from ODOT guides for use of safety grading on freeways

DISCUSSION:

Due to the mountainous terrain, it is very difficult to meet safety grading, the result is the extensive use of guardrail, even in locations where clearzone criteria can be met.

In lieu of adding a guardrail, an obstruction itself, just to meet safety grading, it is recommended that clearzone grading be used. This meets AASHTO and Federal Highway Administration (FHWA) guidelines. It also allows for flexibility in wasting material on-site.

COST SUMMARY (Reviewed Phase 1 Only)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 382,778	—	$ 382,778
ALTERNATIVE	$ 335,628	—	$ 335,628
SAVINGS	$ 47,150	—	$ 47,150

SKETCHES

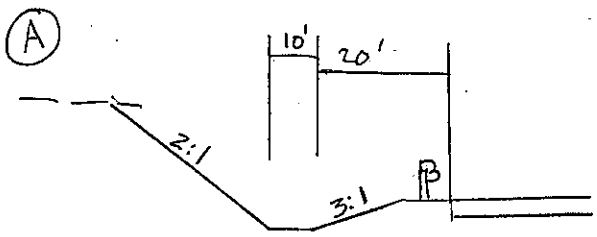
PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 61

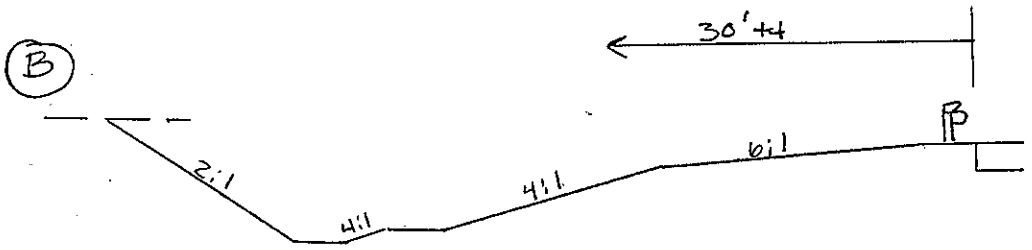
☐ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 2 of 4

EXISTING

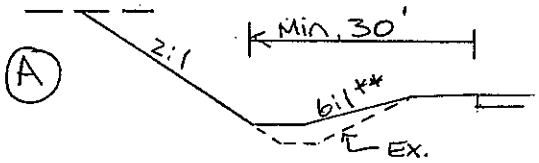


Ex 359+00 Lt



Ex. 436+00 Lt

PROPOSED



** or use up to 4:1 if needed for underdrain drainage

(B) Exist. ok as-is for clearzone grading, eliminate guardrail

PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 6 1

SHEET NO.: 3 of 4

Reviewed Phase 1 plans only, very likely will apply to locations in Ph. 2 & 3,

Possible Ph. 1 locations (approx)

355+00 → 364+00	Lt	900 lf
367+00 → 375+00	Lt	800 lf
434+50 → 440+50	Lt & Rt	1200 lf
445+00 → 450+00	Rt	500 lf
475+00 → 482+00	Rt	700 lf
		4100 lf

Guardrail as designed –

Ph. 1	33,285 lf
2	72,653 lf
3	63,022 lf

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design
Reviewed Ph. 1 only

ALTERNATIVE NO: 61

SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
0154 OC-RDWY Guardrail	LF	33,285	$10	$332,850	29,185	$10	291,850
	Sub-total			332,850			291,850
Mark-up at	15.00%			49,928			43,778
	TOTAL			382,778			335,628

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**63**
DESCRIPTION:	**SELL SEPARATE CLEARING AND GRUBBING CONTRACTS**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN: (Sketch attached)

It is assumed that trees will be cleared and grubbed under the main contract by phase as phases are sold.

ALTERNATIVE: (Sketch attached)

Sell a separate conventional tree removal contract with the traditional plan notes as has been sold in District 9 in the past. This would be done by phase as phases are sold.

ADVANTAGES:

- Provides control of tree removal window (due to the Indiana Bat Habitat restrictions) so that earthwork can begin as soon as possible after main contract is awarded

DISADVANTAGES:

- Requires two contracts in lieu of one

DISCUSSION:

Work can begin shortly after the main contract has been sold without being delayed by the Indiana Bat Habitat restrictions.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**64**
DESCRIPTION:	**SURVEY TREE FOR MARKETABILITY**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

It is assumed that trees will be cleared and grubbed under the main contract by phases as phases are sold. No information is provided as to species quantity (board ft.) of trees.

ALTERNATIVE:

1. Sell separate conventional tree removal contract with the traditional plan notes (District 9) and provide estimate of board ft. and species of trees in the contract documents (by phase as phases are sold).

2. Obtain competitive bids from logging companies, similar to the way Ohio Department of Natural Resources (ODNR) sells timber tracts. Use appropriate notes in the contract to obtain desired results (by phase as phases are sold). Possible interagency coordination with ODNR/ODOT.

ADVANTAGES:

- Provides control of tree removal window (due to Indiana Tree Bat Habitat) so that earthwork can begin as soon as possible after main contract is awarded (applies to 1 and 2 above)
- Improves competitive bidding (applies to 1 and 2 above)
- Reduces risk to bidder (applies to 1 and 2 above) and translates into reduced cost for the owner
- ODOT actually receives compensation for tree removal (applies to 2 above only)
- Real value of trees will have been estimated but experts for real estate appropriation purposes if and when the need arises (typically after the trees have been removed)

DISADVANTAGES:

- Requires two contracts in lieu of one (applies to 1 and 2 above)
- ODOT has not prosecuted a contract in this manner which could be problematic (applies to 2 above only)
- May require outside ODOT expertise (applies to 2 above)

DISCUSSION:

Possible advantage to ODOT in realizing the value of the resource (trees).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**65**
DESCRIPTION:	**SPLIT RAMP B INTO TWO BRIDGES AT THE US 52 INTERCHANGE**	SHEET NO.:	**1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for a 5-span steel plate girder structure with a total length of 738 ft.

ALTERNATIVE: (Sketch attached)

Use two shorter bridges: a 3-span steel plate girder bridge with a length of 415 ft. and a single-span concrete I-beam girder bridge with a length of 110 ft. with embankment between the bridges.

ADVANTAGES:

- Reduces superstructure length from 738 ft. to 460 ft.
- Reduces initial cost
- Provides additional fill/embankment area
- Allows shallower beams over WB US 52
- Allows use of precast concrete I beams over WB US 52

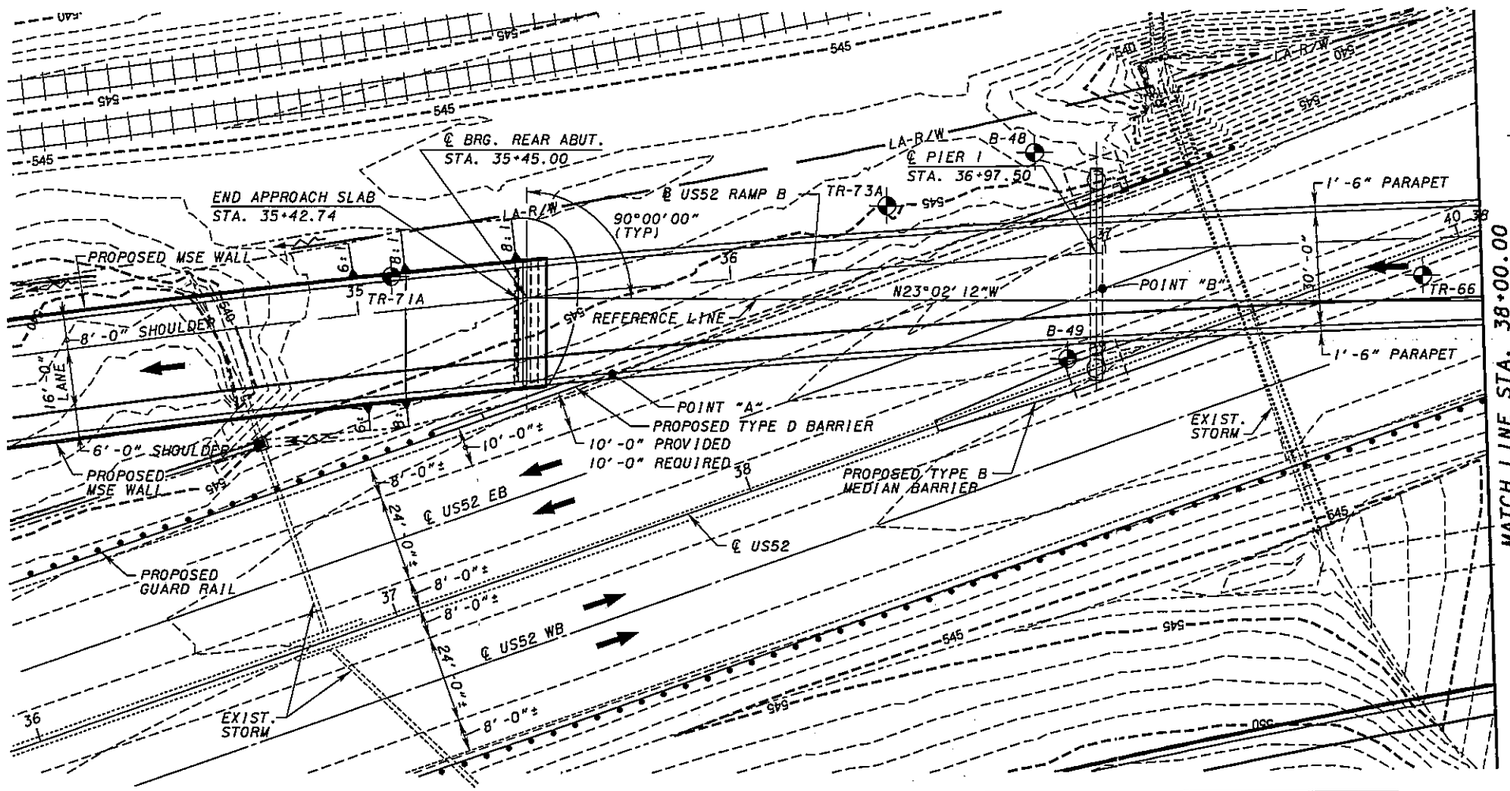
DISADVANTAGES:

- Highly skews the bridge (60°) over US 52
- May complicate water main relocation

DISCUSSION:

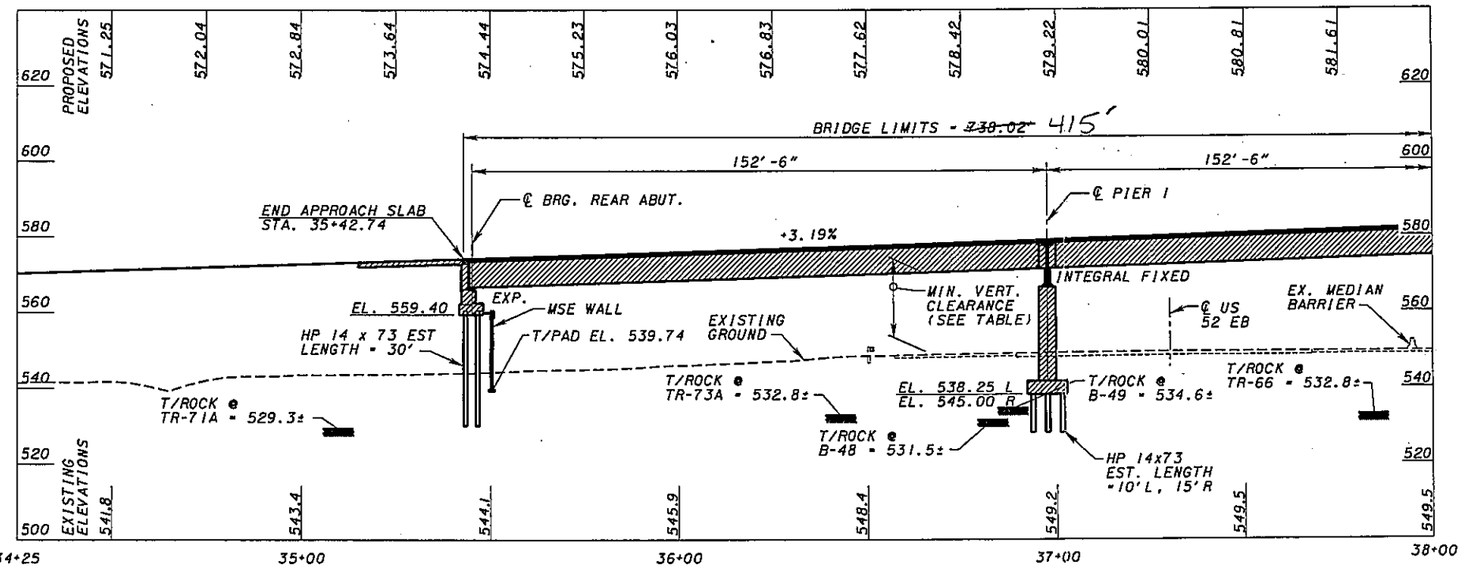
Proposed configuration breaks the original 738-ft. steel bridge into two bridges (415 ft. 3-span steel bridge and 110 foot single-span precast concrete bridge) with 213 ft. of pavement on embankment in between and a shallower concrete span over WB US 52. Skew on concrete span could be reduced with a longer single span if preferred.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 7,070,657	—	$ 7,070,657
ALTERNATIVE	$ 5,988,471	—	$ 5,988,471
SAVINGS	$ 1,082,186	—	$ 1,082,186



PLAN

TABLE OF VERTICAL CLEARANCES					
LOCATION	"A"	"B"	"C"	"D"	"E"
PROPOSED	17.97'	18.66'	22.94'	17.85'	24.38'
PREFERRED	17.0'	17.0'	17.0'	17.0'	17.0'



PROFILE ALONG ℄ RAMP US52 B

AS DESIGNED

NOTES:

1. ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
3. THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

HORIZONTAL CURVE DATA

CURVE B-2
P.I. STA. = 42+39.68
DELTA = 35°28'24" (RT)
Dc = 1°36'00"
R = 3,580.99'
Ls = 200.00'
Theta = 1°36'00"
LT = 133.34'
ST = 66.67'
DELTAc = 32°16'24" (RT)
Lc = 2,017.08'
Ts = 1,245.51'
Es = 179.20'

700' VERT. CURVE DATA
P.V.I. STA. = 43+20.00
P.V.I. ELEV. = 598.98
G1 = +3.19%
G2 = -0.87%

BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(TO BE PROVIDED LATER)

TRAFFIC DATA

RAMP US52 B
CURRENT YEAR ADT (2010) = 6700
DESIGN YEAR ADT (2030) = 10500
CURRENT YEAR ADTT (2010) = 938
DESIGN YEAR ADTT (2030) = 1470

PROPOSED STRUCTURE

TYPE: 5 SPAN CONTINUOUS STEEL PLATE GIRDER A709 GRADE 50W, DOG LEGGED AT SPLICES, WITH COMPOSITE REINFORCED CONCRETE DECK SUPPORTED ON INTEGRAL PIER AND STUB ABUTMENTS FOUNDED ON PILES AND MSE WALL EMBANKMENTS

SPANS: 152'-6", 152'-6", 145'-0", 142'-0", 141'-6" (ALONG BASELINE RAMP B)

ROADWAY: 30'-0" TOE TO TOE OF PARAPETS

LOADING: HS-25 (CASE I) AND ALTERNATE MILITARY LOADING, FWS=60 PSF

SKEW: 00°00'00" WITH RESPECT TO THE REFERENCE LINE (ALSO SEE FRAMING PLAN)

SUPERELEVATION: 0.043 FT/FT

CROWN:

ALIGNMENT: 1°36'00" CURVE TO THE RIGHT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-81 (30' LONG)

LATITUDE: 38°44'49"N

LONGITUDE: 82°52'18"W

DESIGN AGENCY: Tram Systems, 541 KENMORE BLVD., SUITE 340, AKRON, OHIO 44301

DATE: 09/26/07
REVISED: MSL
STRUCTURE FILE NUMBER: 7306261
DRAWN: JDG
REVISED:
DESIGNED: MTH
CHECKED: PJP

SCIOTO COUNTY
STA. 35+42.74
STA. 42+80.76

SITE PLAN
BRIDGE NO. SCI-823-0067L
US52 RAMP B TO SOUTHBOUND SR823

SCI-823-0.00
PID 77366

1 / 19

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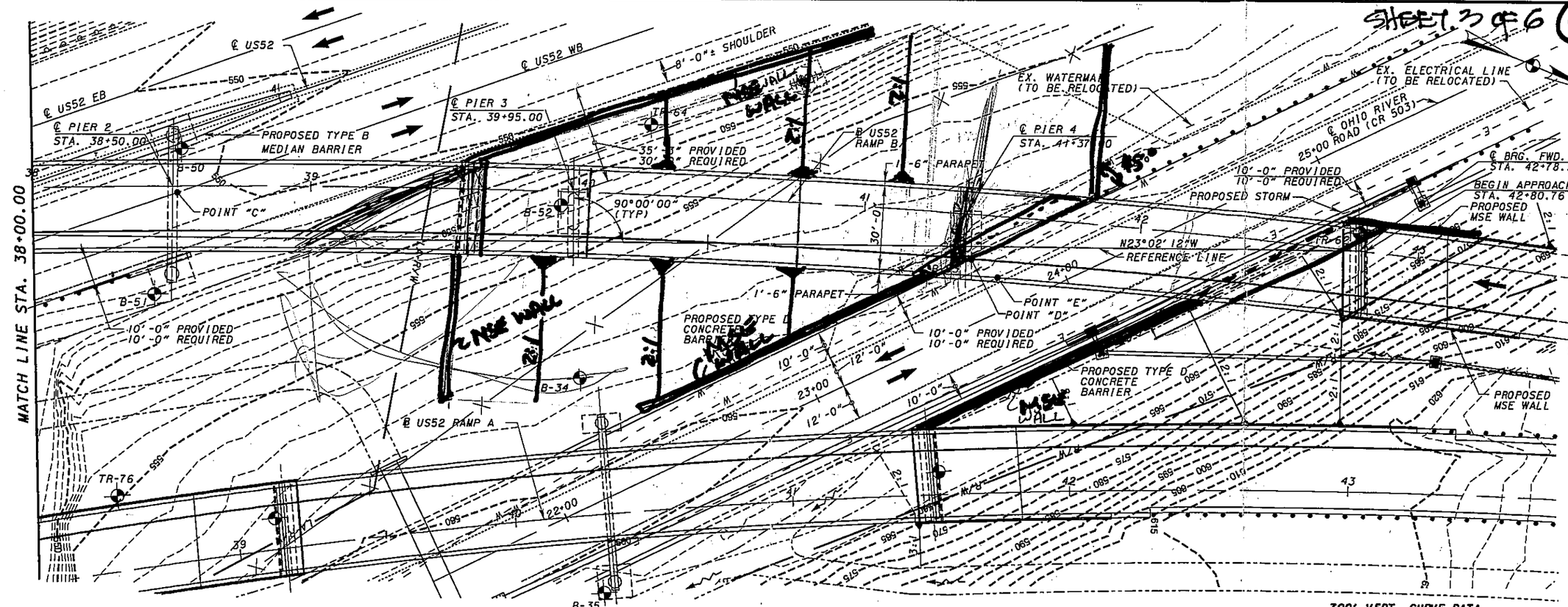
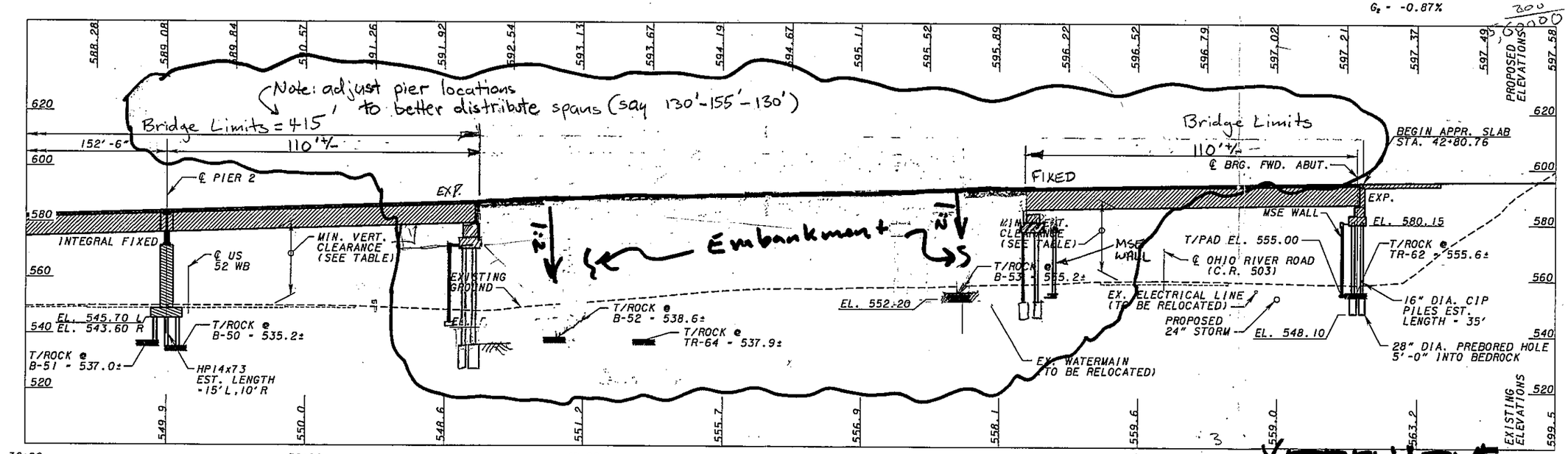


PLAN

700' VERT. CURVE DATA
P.V.I. STA. = 43+20.00
P.V.I. ELEV. = 598.98
G_1 = +3.19%
G_2 = -0.87%

280+
300
5000



PROFILE ALONG ℄ RAMP US52 B

150
.7
1056

ALTERNATIVE

DESIGN AGENCY	Team Systems, 541 PERIMETER DRIVE, SUITE 100, DUBLIN, OHIO 43017
DESIGNED	MTN
DRAWN	JDG
CHECKED	PJP
REVISED	
REVISED	MSL
DATE	09/26/07
STRUCTURE FILE NUMBER	7306261

SCIOTO COUNTY
STA. 35+42.74
STA. 42+80.76

SITE PLAN
BRIDGE NO. SCI-823-0067L
US52 RAMP B TO SOUTHBOUND SR823

SCI-823-0.00
PID 77366

2 / 19

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PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 6

SHEET NO.: 4 of 6

Exist. Deck Area = 33'*735' = 24,250 □' cost/ft² = $\frac{\$2,455,000}{24,250\ □'} = \$101/ft$

Prop. steel deck area = 33'*415' = 13,700 □' ⇒ steel superstructure cost
= 13,700*$101 = $1,383,700

Determine cost of stub abut w/piles:

conc. ⇒ $45,800/2 abut = $23,000 ea
rebar ⇒ 90 lb/cy * 105 cy * 0.89 $/# ÷ 2 abut = $4200 ea
piles ⇒ 35'*12 piles * $45 ea ft = 19,000 ea
46,200 ea abut.

Determine cost of ea. conc. pier

		rebar@125#/yd
Stem	47 cy	5900
Ftg	20 cy	2500
cap	30 cy	3800
	ftg@$331 ⇒ 6,620	12,220*.89 = $10,800
cap & stem@$631 ⇒	48,800	
	$55,440 ea	

Determine Cost of Conc. superstructure (110' single span)
Per PCI design manual, assume BT-72 (6" shallower than proposed)
@ 10'-0" spacing
From Portsmouth-Minford Bridge: $\left(\frac{\$1,884,000}{90'*330'}\right) = \$67/ft^2$

New bridge deck area = 110'*33' = 3630 □'
new cost ⇒ 3630 □' * $67 = $244,000

New MSE wall area (use $60/ft²)
East Abut. ⇒ 140'+85' = 225' @ ± 12' Havg. ht = 2700 □'
West Abut ⇒ 180'+60' = 240' @ ± 12' = 2900 □'
Add to Full Abuts ⇒ 60'*16' = 960 □
Total MSE wall = 6560 □' * $60 = $394,000

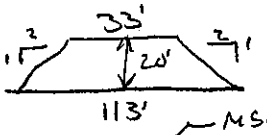
PROJECT: **SCI-823-0.00, 823-6.81, and 823-10.13; PID Nos. 19415, 77366, and 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO.: 65

SHEET NO.: 5 of 6

Additional Pavement: (200'-60') (app. slab) * 33'/9 = 515 □yd.
@ $38/yd² = $29,000

Additional Embankment:

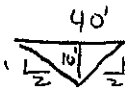


=> 54 cy/ft

MSE granular fill

L = 200 - 40' = 160'

160' * 54 cy/ft = 8651 yd³



@ West abut. => add 80' * ½ * 40 * 10/27 = 600cy

Total = 9200 yds @ $4.00/yd = $37,000

Integral Pier Costs

concrete:	$49,450
footing:	$12,250
rebar:	$12,816
steel:	$102,300
piles:	$13,500
	$190,000 ea.

COST WORKSHEET

PROJECT: **SCI-823-0.00, 823-6.81, & 823-10.13; PID Nos. 19415, 77366, & 79977, PORTSMOUTH BYPASS, Scioto County, Ohio**
Stage 1 Design

ALTERNATIVE NO: 65

SHEET NO.: 6 of 6

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Steel Superstructure	SF	24,250	101.00	2,449,250	13,700	101.00	1,383,700
Concrete Superstructure	SF				3,630	67.00	243,210
Abutments on Piles	EA	2	46,200	92,400	4	46,200	184,800
Concrete Piers	EA	2	55,400				
Integral Piers	EA	2	190,000	380,000			
MSE Walls	SF	33,721	60.60	2,043,493	40,281	60.60	2,441,029
Embankment	CY				9,200	4.00	36,800
Pavement	SY				515	38.00	19,570
Shoring	LS			67,300			
Steel Pier Painting	LS			177,900			
Approach Slabs & Joints	LS			90,000			180,000
Structures Subtotal				5,300,343			4,489,109
Stuctures Contingency at 16%				848,055			718,257
Structures Subtotal				6,148,397			5,207,366
Sub-total				6,148,397			5,207,366
Mark-up at	15.00%			922,260			781,105
TOTAL				7,070,657			5,988,471

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SCI-823-0.00PID Nos. 19415, 77366, and 79977** *Scioto County, Ohio*	ALTERNATIVE NO.:	**67**
DESCRIPTION:	**ENSURE THE USE OF 50 KSI H-PILES DRIVEN TO BEDROCK**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

It is assumed the current design calls for the use of 36 kips per square inch (ksi) steel for H-piles driven to bedrock.

ALTERNATIVE:

Use 50 ksi H-Piles driven to bedrock to reduce the number of required piles.

ADVANTAGES:

- Provides a more economical use of piles
- ODOT benefits from full potential savings
- Implements a common practice as 50 ksi steel is available for this application

DISADVANTAGES:

- None apparent

DISCUSSION:

The availability of 50 ksi steel for H-Pile applications has recently led many contractors to submit VECPs to use 50 ksi H-Piles that reduce the number of required H-Piles and thus share 50/50 with ODOT any potential savings arising from the accepted VECPs.

If the contract documents and design are changed to allow the use of 50 ksi steel for H-Piles driven to bedrock prior to selling the project, then ODOT can benefit from receiving the full potential savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

Project Description

PROJECT DESCRIPTION

GENERAL CHARACTERISTICS

This project is a four-lane, divided, limited-access freeway, approximately 15-16 miles in length, with full movement, free-flowing interchanges connecting to United States Route 23 (US 23) and US 52 and a diamond interchange anticipated in the vicinity of the Scioto County Airport. The project is located in Scioto County, 90 miles south of Columbus and 45 minutes northwest of Huntington, West Virginia. The terrain is hilly, at more than 300 ft. high, and comprises dense deciduous woodlands in hills and agricultural lands in valleys. The formations are mostly sandstone and siltstone in hills and silty soils in valleys. Little Scioto River valley and floodplain are between SR 140 and the Scioto County Airport. There is a CSX single-track railroad line along SR 335 and a Norfolk and Southern double-track railroad line along US 23 and US 52.

HISTORY

- 1960's – SR 423 Northeast Bypass. Construction plans were developed, but the project was not built due to shifting statewide priorities and emerging environmental concerns.
- 1980's - West Bypass. Intensive studies were required for a large number of Native American sites. The project ultimately was canceled for lack of funding and changed priorities.
- 1990's - Great Lakes/Mid-Atlantic High Priority Corridor, also known as 1-73/I-74. This project stalled in 1996 when the Ohio Turnpike Commission decided that it was not financially feasible to proceed with any of the 1-73/1-74 projects. There was substantial public support for the turnpike's concept and alignment, which is similar to the current proposal.
- November 30, 1998 — Southeastern Ohio Highway Compact. This compact was an agreement among Congressman Ted Strickland, the Ohio Department of Transportation (ODOT) and local transportation advocates. It specified federal earmarks, Appalachian Regional (ARC) Commission funding, and ODOT monies to be allocated across four projects in the region. As part of this agreement, the Portsmouth project received $55 million of funding.
- June 1999 — A planning study was initiated. The Portsmouth Transportation Study examined the transportation and socio-economic needs of the Portsmouth area and evaluated a wide range of alternatives for addressing the identified needs.
- April 2001 — ODOT finalizes the study and begins to move forward with the preferred option from the planning study, known as the Airport Bypass Concept (Feasibility Study Report for US 23 Portsmouth Transportation Study, April 2001).

PURPOSE AND NEED

The existing route has 88 intersections, 30 traffic signals, 512 driveways and four field drives. It contains three steep grades and seven excessive curves, and over one-third of the route is posted 35miles per hour (mph) or less. Through traffic must turn several times within Portsmouth to stay on the signed route. Numerous access points and traffic signals restrict the route's ability to serve the intended function of a primary arterial — movement of through traffic.

Five other potential through routes were found to have similar deficiencies. Those with fewer conflict points possessed a greater degree of substandard design features, such as steep grades and excessive

curves. There is no roadway through the study area that substantially meets design standards without numerous intersections, traffic signals and access points.

TRAFFIC VOLUMES AND LEVELS OF SERVICE

US 23 and US 52 currently carry over 19,000 vehicles per day. With an acceptable intersection peak-hour level of service (LOS) defined as LOS C in rural areas and LOS D in urban areas, only one intersection currently is over capacity along the existing route from Lucasville to Wheelersburg - the intersection of US 23 and SR 728 north of Lucasville, which functions at LOS D. Based on traffic projections for the year 2025, five intersections will be over capacity. Three intersections will function at LOS E: US 23S/US 52E, US 23N/U5 52W, and US 52W/SR 139. Two intersections will function at LOS F: US 23/SR 728 and US 23/Coles Boulevard.

An Origin/Destination survey found that through-trips disperse over six through-routes, including substandard County and State routes.

If all through-trips were concentrated on US 23 and US 52, it would function at LOS F.

SAFETY

A crash analysis for 1996-1998 found that sections of existing US 23 and US 52 experience accident rates nearly twice the statewide average. Each alternative through-route contains at least one high-accident section.

REGIONAL MOBILITY

US 23 is a designated Appalachian Corridor from Columbus, Ohio to Asheville, North Carolina. South of Asheville, the corridor continues as US Interstate Highway 26 (I-26 to Charleston, South Carolina and from there continues along I-95 to Florida.

The ARC funding of the Appalachian Development Highway System is intended to provide improved transportation infrastructure to impoverished areas. The need for basic mobility and access is defined in one of the five major goals established by the ARC. It states: "Appalachian communities will have the physical infrastructure necessary for self-sustaining economic development and improved quality of life." (Setting a Regional Agenda; ARC Strategic Plan: 1997-2002).

According to the ARC, the Portsmouth Bypass is one of three "missing links" on the Appalachian Corridor that extends from Asheville, North Carolina to Columbus, Ohio. Access Ohio, ODOT's long-range plan, contains similar goals to improve mobility and foster economic development. US 23 is designated as a "macro-corridor" in Access Ohio.

Because transportation's influence on economic development hinges on mobility, mobility was identified as a concern within the study area due to the "missing link" in the Appalachian corridor from Asheville, North Carolina, to Columbus, Ohio. Closing this gap in a multi-state corridor would provide a nearly complete controlled-access alternative to I-77 and I-75 between Orlando, Florida and Columbus, Ohio.

The proposed bypass would reduce the distance from Lucasville to Wheelersburg from 24.6 miles to approximately 16 miles and cut the travel time for through trips by nearly 16 minutes.

ECONOMIC ISSUES

Portsmouth grew into a thriving manufacturing town and reached its peak population of over 50,000 in the early 1900s. Since then, the population of Portsmouth has declined substantially to its current population of 22,676.

Scioto County is one of Ohio's poorest counties. It includes the New Boston School District, which is Ohio's poorest school district.

Scioto County is one of 29 counties under jurisdiction of the ARC. It is one of nine counties that received the lowest category of "distressed." Twenty-five percent of residents live in poverty.

Scioto County experiences an above-average unemployment rate. For August 2000, unemployment in the County reached 8.3%, nearly twice the statewide average of 3.9% for the same period. Scioto County has had consistently higher rates of unemployment than in Ohio overall.

Based upon poverty and income statistics from the 1990 Census, the average annual income per capita in Scioto County was $9,253 in 1990 compared to the statewide average of $13,461.

On October 14, 1999, Ohio's Governor Robert Taft persuaded the ARC to find methods to direct Appalachian funding to the "neediest communities." A motion requesting the ARC to modify spending policies was unanimously passed by the Commission on this date. Scioto County fits both national and state criteria as a "neediest" community.

The Portsmouth Transportation Study stakeholders group emphasized the distressed economic condition of Scioto County as indicative of the need for additional transportation investment in the area. The group asserted that improved transportation infrastructure would enhance Scioto County's competitive position in attracting new business.

Local officials' intuitive stance is supported by Roger Schmenner's "Making Business Location Decisions" (1989), which presents results of a survey of 159 companies that had opened new plants. For new plant openings, 42% of the surveyed companies said that location on an expressway was a prerequisite. Another 35% stated that an expressway was desirable.

Portsmouth is built on a narrow strip of flat ground less than one mile wide adjacent to the Ohio River. The Scioto River Valley in the western portion of the study area is mostly floodplain and floodway. Only narrow strips of land may be developed along existing US 23 and SR 104 in this valley. The hills north of Portsmouth are high, steep and undeveloped.

An exception to the predominant hilly terrain is the Little Scioto River Valley. This valley is over one mile wide and contains only small amounts of floodplain. Most of this valley is currently agricultural.

The planning study determined that a bypass had the potential to improve the marketability of the valley in addition to the existing economic development sites. In the valley, there are approximately 3,000 acres within one-half mile of the proposed bypass that are relatively flat, not in floodplain, utilities available, and airport and rail nearby. North from the airport area is a wide valley of similar

property, several miles long, that is the only large concentration of such property in the county.

These additional acres translate to 3,850 potential jobs by 2025, nearly twice the potential job creation of the existing sites.

The SR 823 Portsmouth Bypass Project will:

- Enhance the economic development potential of the region;
- Efficiently serve future traffic volumes and divert through traffic from the local roadway system;
- Improve regional mobility and reduce travel time; and
- Provide a facility meeting current safety standards.

PROJECT AREA AND LOGICAL TERMINI

The project will connect to US 23 just north of Lucasville and to US 52 just west of Wheelersburg. These termini were determined as follows:

- South of the terminus point, US 23 contains numerous traffic signals, including the built-up area of Lucasville where US 23 is reduced to 25 mph. North of this point, the facility is a limited-access expressway with a 55 mph speed limit.
- US 52 west of the SR 140 interchange becomes part of the city street system in New Boston, with numerous driveways and traffic signals. To the east, US 52 is a freeway with interchanges. The general terminus for the southern end of the bypass is between New Boston and Wheelersburg. The exact connection point is constrained by the geometrics of the existing roadway and existing interchange with SR 140.

The general study area for the proposed bypass was determined based upon meeting the intent of the Airport Bypass Concept resulting from the planning study. The general factors were:

- Connect to US 23 north of Lucasville;
- Connect to US 52 between SR 140 (Sciotoville) and Wheelersburg; and
- Pass in close proximity to the Scioto County Airport to enhance visibility and access to the Little Scioto River Valley.

The more specific study area limits were initially proposed based upon topographic constraints. Following an environmental scoping meeting in October 2001, the study area was revised to reflect concerns and priorities of the project team and involved agencies.

CONSTRUCTION COSTS

The anticipated costs of construction are based on the following: (1) Estimate SCI823 PID 19415 dated December 21, 2006, (2) Estimate SCI823 PID 77366 dated November 27, 2006 and (3) Estimate SCI823 PID 79977 dated November 27, 2007 construction cost estimates prepared by TranSystems. These documents list the construction costs as $68,682,147, $144,072,491, and $155,547,679 respectively for a grand total of $368,202,317. The numbers include a contingency of 15%.

Value Analysis & Conclusions

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the procedures used during the VE study on the Portsmouth Bypass, Appalachian Development Highway Project. It is followed by separate narratives and conclusions concerning:

- Value Engineering Workshop Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) pre-study preparation; 2) VE workshop; and 3) post-study. A task flow diagram that outlines each of the procedures included in the VE study is attached for reference.

PREPARATION EFFORT

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks, gathering necessary background information on the facility, and compiling project data into a cost model and graphic cost histogram. Information relating to the design, construction, and operation of the facility is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the facility was also a part of the analysis.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Speculation Phase
- Evaluation Phase
- Development Phase
- Presentation Phase

Value Engineering Study Task Flow Diagram

Preparation Effort

Coordination Project
- Verify Schedule
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Outline Needed Background Data
- Define *Project Value Objectives*
- Identify Project Constraints

→

Prepare for Workshop
- Collect Project Data
- Distribute Data to Team Members
- Team Members Become Familiar with Project

→

Construct Cost Models
- Construct Cost Models
- Construct Graphic Function Analysis
- Outline High Cost Areas

→

LCC Model
- Roadway
- Bridges
- MOT
- Energy
- User Impact

Workshop Effort

Information Phase
- Introduction by VETL
- Project Description and Presentation by Designer
- Outline Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)

→

Function Identification and Analysis Phase
- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms

List Ideas Generated During Function Analysis

→

Speculation Phase
- Introduction by VETL
- Creative Idea Listing:
  - Quantity of ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking
- Use Checklist for Ideas

→

Evaluation Phase
- Eliminate Impractical Ideas
- Rank Ideas with Advantages/ Disadvantages
- Evaluate Alternatives (Include Non-Economic considerations: Safety, Reliability, Environment, Aesthetics, O&M, etc.)
- Select Best Ideas for Implementation

→

Development Phase
- Develop Proposed Alternatives
- Prepare Alternative Design Sketches
- Estimate Costs
- Perform Life Cycle Comparison
  - Initial Cost
  - Redesign Cost
  - O&M Cost
  - LCC Cost

→

Presentation Phase
- Summarize Findings
- Present VE Ideas to Owner/ User/Designer
- Oral Presentation

Post-Workshop Effort

VE Study Report
- Develop Implementation VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

→

Implementation Phase
- Participate in Implementation Meeting with Owner/User/ Designer/ VE Team, as needed
- Prepare Final VE Report

→

Final Acceptance
- Redesign by Designer

Information Phase

At the beginning of the workshop, the conditions and decisions that have influenced the development of the project must be reviewed and understood. For this reason, the development manager presented information about the project to the VE team on first day of the session. Following the presentation, the VE team discussed the project using the following documents:

- PowerPoint Presentation entitled 823 Portsmouth Bypass, An Appalachian Development Highway, SCI-823 Stage 1 VE Session; a compilation prepared by TranSystems Corporation Corporation; dated December 3, 2007;
- Half Size Construction Drawings for SCI-823-6.81, PID No. 19415, Madison & Harrison Townships, Scioto County, Stage 1 Submission; prepared by TranSystems Corporation Corporation, for the State of Ohio Department of Transportation; undated;
- Half Size Construction Drawings for SCI-823-0.00, PID No. 77366, City of Portsmouth, Porter & Harrison Townships, Scioto County, Stage 1 Submission; prepared by TranSystems Corporation, for the State of Ohio Department of Transportation; run date October 5, 2007;
- Half Size Construction Drawings for SCI-823-10.13, PID No. 79977, Madison & Jefferson Townships, Scioto County, Stage 1 Submission; prepared by TranSystems Corporation, for the State of Ohio Department of Transportation; run date November 16, 2007;
- Half Size Soil Profile Drawings for SCI-823-6.81; prepared by DLZ, for the State of Ohio Department of Transportation; run date November 30, 2006;
- Preliminary Design Report Submittal for SR 823 over Shumway Hollow Road (TR-234), SCI-823-6.81 Portsmouth Bypass, PID# 19415; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated November 30, 2006;
- Preliminary Design Report Submittal for Shumway Hollow Road over CSXT, SCI-823-6.81 Portsmouth Bypass, PID# 19415; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated November 30, 2006;
- Preliminary Design Report Submittal for SR 823 over Portsmouth-Minford Road (SR-139), SCI-823-6.81 Portsmouth Bypass, PID# 19415; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated November 30, 2006;
- Preliminary Design Report Submittal for US 52 Ramp B over U.S. 52 and Ohio River Road (CR 503), SCI-823-0.00 Portsmouth Bypass, PID# 77366; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated October 15, 2007;
- Preliminary Design Report Submittal for US 52 Ramp A over Ohio River Road (CR 503), SCI-823-0.00 Portsmouth Bypass, PID# 77366; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated October 15, 2007;
- Report of Subsurface Exploration for MSE Retaining Walls; US 52 Ramp A and Ramp B over Ohio River Road and US 52: Project SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio; prepared by DLZ for TranSystems Corporation for the State of Ohio Department of Transportation; District 9; dated November 16, 2007;
- Report of Subsurface Exploration for Pavement Design Information; Phase 1 – Mainline and Side Road CBR Values; Project SCI-823-6.81, Phase 1 – Stage 1, Scioto County, Ohio; prepared by DLZ for TranSystems Corporation for the State of Ohio Department of Transportation; District 9; dated November 29, 2006;
- Report of Subsurface Exploration for Pavement Design Information; Phase 3 – Mainline and Side Road CBR Values; Project SCI-823-0.00, Phase 3 – Stage 1, Scioto County, Ohio; prepared by DLZ for TranSystems Corporation for the State of Ohio Department of Transportation; District 9; dated November 16, 2007;

- Report of Subsurface Exploration for Embankments (Station 50+23 to 352+00); Project SCI-823-0.00 Phase 3 – Stage 1, Scioto County, Ohio; prepared by DLZ for TranSystems Corporation for the State of Ohio Department of Transportation; District 9; dated November 16, 2007;
- Hydraulic Calculations for SCI-823-0.00, PID 19415 (Portsmouth Bypass), Stage 1; prepared by TranSystems Corporation; dated December 3, 2007;
- Hydraulic Calculations for SCI-823-6.81, PID 19415 (Portsmouth Bypass), Stage 1; prepared by TranSystems Corporation; dated December 21, 2006;
- Hydraulic Calculations for SCI-823-10.31, PID 19415 (Portsmouth Bypass), Stage 1; prepared by TranSystems Corporation; dated December 3, 2007;
- Bearing Capacity and Settlement Evaluation Report for SCI-823-0.00 Portsmouth Bypass prepared by DLZ for TranSystems Corporation for: (1) Culvert at STA 379+00 TW234 Ramp C dated August 23, 2007; (2) Culvert at STA 535+50 dated August 22, 2007; (3) Culvert at STA 528+50 CR 28 Ramp A dated August 22, 2007; (4) Culvert at STA 534+30 Ramp A dated August 20, 2007; (5) Culvert at STA 619+73.25 dated November 14, 2007; (6) Culvert at STA 609+50 dated November 14, 2007; (7) Culvert at STA 117+50 dated November 14, 2007; (8) Culvert at STA 815+00 dated August 23, 2007; (9) Culvert at STA 635+90 dated August 23, 2007; (10) Culvert at STA 412+07 dated August 20, 2007; (11) Culvert at STA 854+39 dated August 17, 2007; (12) Culvert at STA 823+45 dated August 17, 2007; (13) Culvert at STA 600+75 dated August 16, 2007; (14) Culvert at STA 466+45 dated August 16, 2007; (15) Culvert at STA 10+78 CR 28 dated August 15, 2007; (16) Culvert at STA 868+91 dated August 14, 2007; (17) Culvert at STA 857+16 dated August 14, 2007; (18) Culvert at STA 796+06.29 dated August 14, 2007; (19) Culvert at STA 543+00 C.R. 28 Ramp D dated August 14, 2007; (20) Culvert at STA 404+13 dated August 14, 2007; (21) Culvert at STA 617+51 dated August 13, 2007; (22) Culvert at STA 528+00 CR 28 ramp B dated August 13, 2007; (23) Culvert at STA 474+10 dated August 13, 2007; (24) Culvert at STA 383+50 TW234 Ramp B dated August 13, 2007; (25) Culvert at STA 375+08 dated August 13, 2007; (26) Culvert at STA 32+50 TW234 dated August 13, 2007; (27) Culvert at STA 22+23 CR 28 dated August 1, 2007; (28) Culvert at STA 504+60 dated July 26, 2007; (29) Culvert at STA 485+02.43 SR 139 dated July 25, 2007; (30) Culvert at STA 364+36 dated July 25, 2007; (31) Culvert at STA 353+88 dated July 25, 2007; and (32) Culvert at STA 26+00 TW 234 dated July 25, 2007;
- Additional Studies for 823 Portsmouth Bypass, An Appalachian Development Highway; prepared by TranSystems Corporation for the State of Ohio Department of Transportation; dated February 9, 2006;
- Design File CDs for: (1) Project SCI-823-6.81, PID 19415 undated; (2) Project SCI-823-10.13, PID 79977 undated; and (3) Project SCI-823-0.00, PID 77366 undated; prepared by TranSystems Corporation for VE Team;
- Estimate (1) SCI823 PID 19415 prepared by TranSystems Corporation; dated December 21, 2006; (2) SCI823 PID 77366 prepared by TranSystems Corporation; dated November 27, 2007; and (3) SCI823 PID 79977 prepared by TranSystems Corporation; dated November 27, 2007; and
- Value Engineering Study Report 80% Feasibility Alternative Stage for State Road 823 – Portsmouth Bypass, Scioto County, Ohio; prepared by Lewis & Zimmerman Associates, Inc.; dated September 2002.

Function Identification and Analysis Phase

Based on historical and background data, a cost model and graphic function analysis were developed for this project by major construction elements. They were used to distribute costs by project element, serve as a basis for alternative functional categorization, and assign worth to the categories, where

worth is the least cost to provide the required function, as determined by the VE team. The VE team identified the functions of the various project elements and subsystems by using random function generation techniques resulting in the attached Random Function Analysis worksheet and Function Analysis Systems Technique (F.A.S.T.) diagram.

Speculation Phase

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, or to improve the quality of the project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and association of ideas.

ODOT District 9 (D9) and the design team may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the creative phase. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were then developed further.

The VE team would like to develop all ideas, but time constraints usually limit the number that can be developed. Therefore, each idea was compared with the present schematic design concepts, in terms of how well it met the design intent. Advantages and disadvantages were discussed, and each team member rated the ideas on a scale of 1-5, with the best ideas rated 5. Total scores were summed for each idea and only highly-rated ideas were developed into alternatives. In cases where there was little cost impact, but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. The design team should review this listing for possible incorporation of ideas into the project.

The creative listing was re-evaluated frequently during the process of developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally high-rated items may not have been developed into alternatives.

Development Phase

During the development phase, each highly rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the Study Results section.

Presentation Phase

The last phase of the VE study was the presentation of the findings. The VE alternatives were screened by the VE team before draft copies of the Summary of Potential Cost Savings worksheets were provided to ODOT, D9, and TranSystems Corporation representatives during an informal oral presentation on the last day of the study. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

POST-WORKSHOP EFFORT

The post-study portion of the VE study includes the preparation of this report. Personnel from ODOT, D9, and TranSystems Corporation will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. Lewis & Zimmerman Associates, Inc. is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct Value Engineering (VE) study on the following project: SCI-823-0.00, SCI-823-6.81, SCI-823-10.13; PIDs 19415, 79977 and 77366, PORTSMOUTH BYPASS project in Scioto County, Ohio. It is expected the owner, the State of Ohio Department of Transportation (ODOT) and the design consultant, TranSystems Corporation (TranSystems), will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

VE Study Agenda

The VE study will follow the outline described below and be conducted December 3 - 6, 2007. The study will be held in Conference Room 1C, of ODOT's Central Office located at 1980 West Broad Street, Columbus, Ohio 43223-1102. The point-of-contact is Ms. Jeanne Braxton, Value Engineering Coordinator and can be contacted at 614-466-1373; jeanne.braxton@dot.state.oh.us.

Monday, December 3rd

9:00 am – 9:15 am **General Introduction of all Parties and review of the VE Process**

9:15 am - 10:15 am **Owner's/Designer's Presentation**

ODOT and TranSystems are to present information concerning the projects including, but not necessarily limited to: rationale for design, criteria for specific areas of study, project constraints, and the reasons for design decisions.

10:15 am - 12:00 noon **Commence Function Analysis Phase**

The VE team will continue their familiarization with the cost models and project data for each area of study; define the function of each project element or system in the cost model; select the primary or basic functions; and determine the worth, or least cost, to provide the function. Cost/worth or value index ratios will be calculated, and high cost/low worth areas for study identified. In addition, the VE team will continue defining the function of each element/system to gain a thorough understanding of the project's needs and requirements.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Conclude the Function Analysis Phase and Commence the Creative Phase**

The VE team will conduct a brainstorming session and list as many ideas as possible for consideration. The aim is to obtain a large quantity of ideas through free association, by eliminating roadblocks to creativity and deferring judgment.

Tuesday, December 4th

8:30 am - 10:00 am **Conclude Creative Phase and Complete Evaluation/Analytical Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas for further development.

10:00 am - 12:00 noon **Development Phase**

VE team will develop creative ideas into alternate design solutions. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives for change will be developed and supported with sketches, calculations and written substantiation.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Continue Development Phase**

Wednesday, December 5th

8:30 am - 12:00 am **Continue Development Phase**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 4:00 pm **Conclude Development Phase**

4:00 pm – 5:00 pm **Commence Summary Worksheets for Information oral Presentation**

Upon completion of the Development Phase, the VE facilitator will commence preparation of the summary worksheets based on the alternatives developed by the VE team. The summary worksheets will form the basis of the informal oral presentation.

Thursday, December 6th

8:30 am - 11:00 am **Conclude Development Phase**

11:00 am - 12:00 noon **Finalize Summary Worksheets and Prepare for Oral Presentation Strategies**

12:00 noon - 1:00 pm **Lunch**

1:00 pm – 2:30 pm **Informal Oral Presentation**

The VE team presents its alternatives to the owner and design team representatives and is available to clarify any points. The process for accepting/rejecting VE alternatives is described and a target schedule for meeting to finalize implementation decisions is established.

2:30 pm **Adjourn**

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise on the project elements involved. Team members consisted of a multidisciplinary group with professional design experience and a working knowledge of VE procedures. This team was primarily composed of ODOT personnel, representatives from the design consultant firms of DLZ and HDR Engineering, Inc., one Federal Highway Administration (FHWA) representative and one independent geotechnical/rock engineer from the consultant firm of Lyman Henn, Inc. The VE team included the following:

G. Jeanne Braxton	Value Engineering Coordinator	ODOT, Office of Production
Jeff Crace, PE	Preliminary Design Engineer	ODOT, Office of Structural
Eugene C. Geiger, PE	Administrator	ODOT, Office of Geotechnical
Stephen A. Taliaferro, PE, MS	Transportation Engineer	ODOT, Office of Geotechnical
David A. Bame, PE	Area Engineer	ODOT, District 9
Tom Barnitz, PE	Project/Contract Manager	ODOT, District 9
Daniel E. Beasley, PE	Construction Area Engineer	ODOT, District 9
Gary E. Cochenour, PE	Production Administrator	ODOT, District 9
Adam Johnson, PE	Transportation Engineer	FHWA
Luther A. Miracle, PE	Division Manager, Transportation	DLZ
Johnny Ng, PE	Structural Project Manager	DLZ
Steve Riedy	Geotechnical Engineer	DLZ
James M. Breitinger, PE	Senior Project Manager	HDR Engineering (HDR)
Brad Hyre, PE	Senior Transportation Engineer	HDR
Christian H. Nyberg, PE	Senior Bridge Engineer	HDR
James M. Sheahan, PE	Geotechnical Engineering	HDR
Kent Pease, PE	Senior Geotechnical Engineer	Lyman Henn, Inc.
Luis M. Venegas, PE, CVS, FSAVE, LEED® AP	Value Engineer Facilitator	Lewis & Zimmerman Associates

OWNER'S/DESIGNER'S PRESENTATION

ODOT, the owner, and the design teams of TranSystems, DLZ and HDR, and District 9, presented an overview of the projects on Monday, December 3, 2007. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team "up-to-speed" regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM'S FINAL PRESENTATION

The VE team conducted a presentation on Thursday, December 6, 2007 to ODOT, TranSystems, DLZ, HDR and D9 representatives. Copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use by all parties concerned.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS

PROJECT: **SCI-823-0.00, 823-6.81, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*		Date: **December 3 - 6, 2007**
NAME & E-MAIL (PLEASE PRINT)	**ORGANIZATION/TITLE**	**PHONE/FAX**
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Tom Barnitz, PE em: tom.barnitz@dot.state.oh.us	ODOT, District 9 Major New Project Manager and Contract Manager	ph: 740-774-8877 cell: fx: 740-774-9076
Daniel (Dan) E. Beasley, PE em: dan.beasely@dot.state.oh.us	ODOT, District 9 Construction Area Engineer	ph: 740-774-8909 cell: 937-217-4232 fx: 740-774-8886
G. Jeanne Braxton em: jeanne.braxton@dot.state.oh.us	ODOT, Office of Production Value Engineering Coordinator	ph: 614-466-1373 cell: fx: 614-752-6405
Gary E. Cochenour, PE em: gary.cochenour@dot.state.oh.us	ODOT, District 9 Production Administrator	ph: 740-774-9051 cell: fx: 740-774-9076
Jeff Crace, PE em: jeff.crace@dot.state.oh.us	ODOT, Office of Structural Engineering Preliminary Design Engineer	ph: 614-466-2744 cell: fx: 614-752-4824
Eugene (Gene) C. Geiger, PE em: gene.geiger@dot.state.oh.us	ODOT, Office of Geotechnical Engineering Administrator	ph: 614-275-1318 cell: fx: 614-275-1354
Jim Graham, PE em: jim.graham@dot.state.oh.us	ODOT, District 11 Highway Management Administrator	ph: 330-308-3980 cell: 330-204-0955 fx:
Gary E. Link em: gary.link@dot.state.oh.us	ODOT, Southwest Real Estate, District 8 Real Estate Administrator 3	ph: 513-933-6670 cell: fx: 513-932-8779

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS

PROJECT: **SCI-823-0.00, 823-6.81, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*		Date: **December 3 - 6, 2007**
NAME & E-MAIL (PLEASE PRINT)	**ORGANIZATION/TITLE**	**PHONE/FAX**
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Adam Johnson, PE em: adam.johnson@fhwa.dot.gov	Department of Transportation (DOT), Federal Highway Administration (FHWA) Transportation Engineer	ph: 614-380-6843 cell: fx: 614-280-6876
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Andrew M. Jalbrzikowski em: ajalbrzikowski@dlz.com	DLZ Geologist	ph: 614-888-0040 cell: 614-778-1587 Fx: 614-848-6712
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Johnny Ng, PE em: jng@dlz.com	DLZ Structural Project Manager	ph: 614-888-0040 cell: fx: 614-848-6712

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS

PROJECT: **SCI-823-0.00, 823-6.81, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*		Date: **December 3 - 6, 2007**
NAME & E-MAIL (PLEASE PRINT)	**ORGANIZATION/TITLE**	**PHONE/FAX**
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James (Jim) M. Breitinger, PE em: jimbreitinger@hdrinc.com	HDR Engineering, Inc. (HDR) Senior Project Manager	ph: 614-418-1764 cell: 614-570-0853 fx: 614-570-0853
Brad Hyre, PE em: brad.hyre@hdrinc.com	HDR Senior Transportation Engineer, Project Manager for Final Design Phases 1 and 3	ph: 513-984-7500 cell: 513-509-7231 fx: 513-984-7580
Christian (Chris) H. Nyberg, PE em: chris.nyberg@hdrinc.com	HDR Senior Bridge Engineer	ph: 513-984-7500 cell: fx: 513-984-7580
James (Jim) M. Sheahan, PE em: jim.sheahan@hdrinc.com	HDR Geotechnical Engineering National Director	ph: 412-497-6039 cell: 412-400-4963 fx: 412-497-6080
Kent Pease, PE em: kpease@lymanhenn.com	Lyman Henn, Inc. Senior Engineer, Geotechnical / Rock Engineer	ph: 303-534-1100 cell: 303-241-3101 fx: 303-534-1777
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em:		ph: cell: fx:
em:		ph: cell: fx:

ECONOMIC DATA

The VE team developed economic criteria to evaluate the information gathered from ODOT and TranSystems. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	2007
Construction Start Up:	2011 and Long Range
Construction Duration:	±36 Months (TranSystens)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	75 years for Bridges
Discount Rate/Interest:	2.50% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)
Inflation/Escalation Rate:	
SCI823- PID 19415	None – Present Worth Dollars for Year 2006 (Per TranSystems)
SCI823- PID 79977	None – Present Worth Dollars for Year 2007 (Per TranSystems)
SCI823- PID 77366	None – Present Worth Dollars for Year 2007 (Per TranSystems)
Uniform Present Worth (UPW) Factor:	23.1452 for 35 years 33.7227 for 75 years
Cost of Power:	$0.07/kWHr (kilowatt hour) (assumed)
Operation and Maintenance Costs (Industry Norms):	
Equipment - With Many Moving Parts	5.00%-5.50%+ of Capital Cost
Equipment - With Minimal Moving Parts	3.50%-4.00% of Capital Cost
Equipment - Electronic	3.00% of Capital Cost
Structural	1.00%-2.00% (or less) of Capital Cost
Composite Construction Mark-Up: (Composed of: Contingency at 15.00%,)	15.00% (1.1500)

COST ESTIMATE SUMMARY AND COST HISTOGRAMS

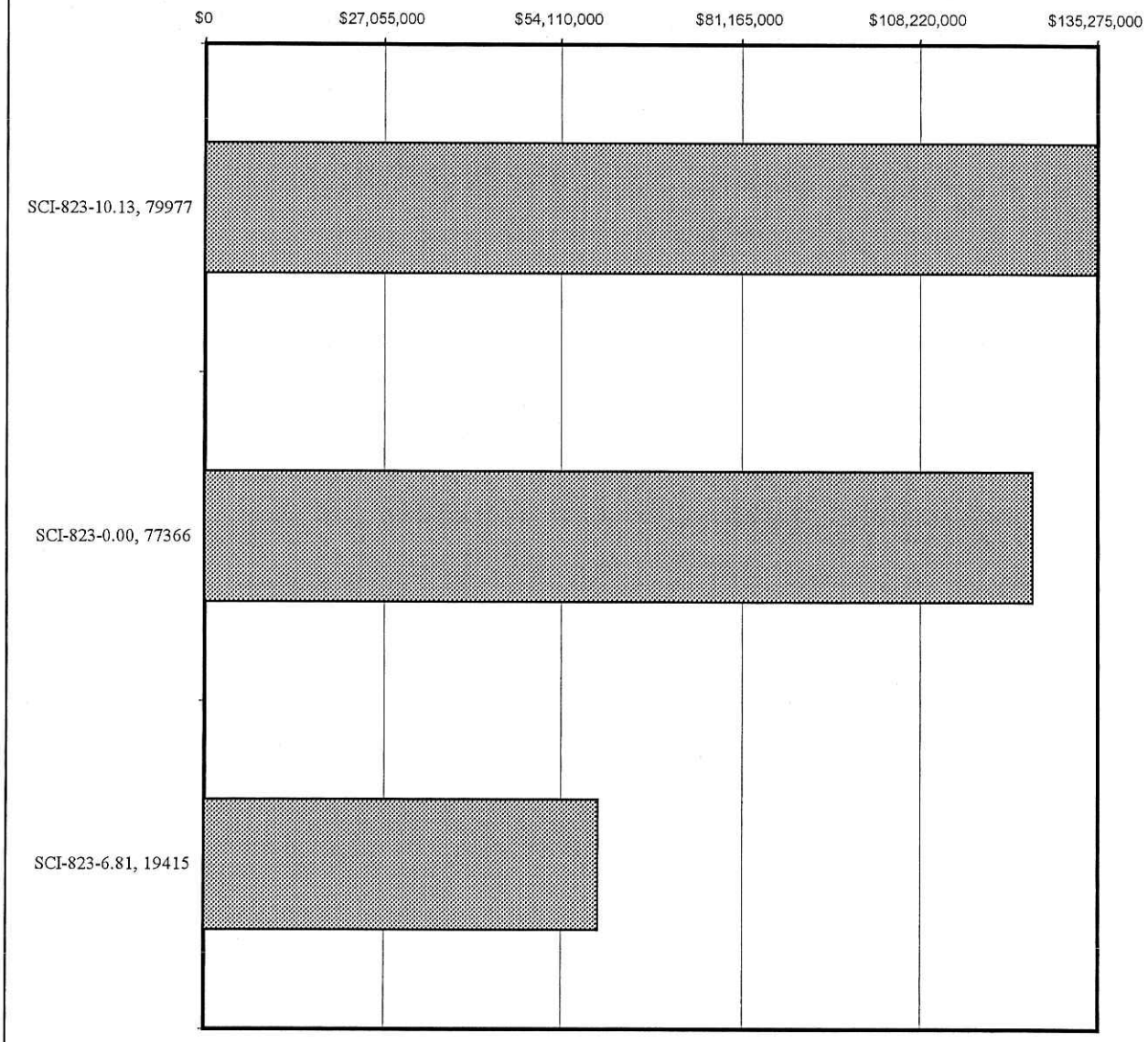
The VE team leader prepared the cost model for the project, which is arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and is based on the following: (1) Estimate SCI823 PID 19415 dated December 21, 2006, (2) Estimate SCI823 PID 77366 dated November 27, 2006 and (3) Estimate SCI823 PID 79977 dated November 27, 2007 construction cost estimates prepared by TranSystems. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

- Minimize rock excavation
- Minimize and size and quantity of structures (bridges/culverts)
- Reduce quantity of pavement
- Minimize/eliminate retaining walls
- Minimize embankments

COST HISTOGRAM

PROJECT: **SCI-823-6.81, SCI-823-0.00 and SCI-823-10.13,**
PID Nos. 19415, 77366, and 79977
Scioto County, Ohio

TOTAL PROJECT	COST	PERCENT	CUM. PERCENT
SCI-823-10.13, 79977	135,258,852	42.25%	42.25%
SCI-823-0.00, 77366	125,280,427	39.13%	81.37%
SCI-823-6.81, 19415	59,636,650	18.63%	100.00%
Construction Subtotal	**$ 320,175,929**	**100.00%**	
Contingency @ 15.00%	$ 48,026,389		
TOTAL CONSTRUCTION	**$ 368,202,318**	**Comp Mark-up:**	15.00%



Costs in graph are not marked-up.

FUNCTION ANALYSIS

Function analysis was performed to define the requirements for each project element and ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. Random Function Analysis worksheets for the project are attached. This part of function analysis stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function.

In addition to the random function analysis, the VE facilitator worked with members of the study team to develop a Function Analysis System Technique (F.A.S.T.) diagram for each phase. The F.A.S.T. diagram was used to show the flow of function within the phases. It helps confirm the project is addressing those issues that have been voiced by the owner as being important. The diagrams were generated by asking the key question: "What is the most important function to be accomplished by this phase?" The answer is characterized by a verb/noun pair. In turn, another question is asked: "Why?" The answer is again listed in a verb/noun pair, and the process continued from left to right. If the result is a true F.A.S.T. diagram, the flow of functions from right to left will answer the question "Why?" No F.A.S.T. diagram is ever completed. The readers of this report may wish to challenge themselves to see how far they can carry the construction of the F.A.S.T. diagram.

This F.A.S.T. diagram notes the critical function paths and identifies the projects' basic functions as MOVE/GOODS and PEOPLE by Increasing/Capacity and Improving/Geometry. The F.A.S.T. diagram is included at the end of this section of the report.

RANDOM FUNCTION ANALYSIS

PROJECT: **SCI-823-0.00; PID Nos. 19415, 77366, and 79977**
Scioto County, Ohio

SHEET NO.: **1 of 1**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
PORTSMOUTH BYPASS (Construction of a new four-lane, limited access highway traversing the Townships of Harrison, Jefferson, Madison, and Porter in Scioto County, Ohio)	Promote	Economic Development	HO
	Promote	Growth	HO
	Complete	Corridor	HO
	Move	**Goods**	**B**
	Move	**People**	**B**
	Increase	**Capacity**	**B**
	Improve	Geometry	RS
	Reduce	Travel Time	G/O
	Improve	Safety	RS
	Improve	Level of Service	S
	Improve	(Facility) Access	RS
	Bypass	Portsmouth	S
	Span	Waterway	RS
	Control	Access	S

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; O = Objective; G = Goal; U = Unwanted

FUNCTION ANALYSIS SYSTEMS TECHNIQUE (F. A. S. T.)

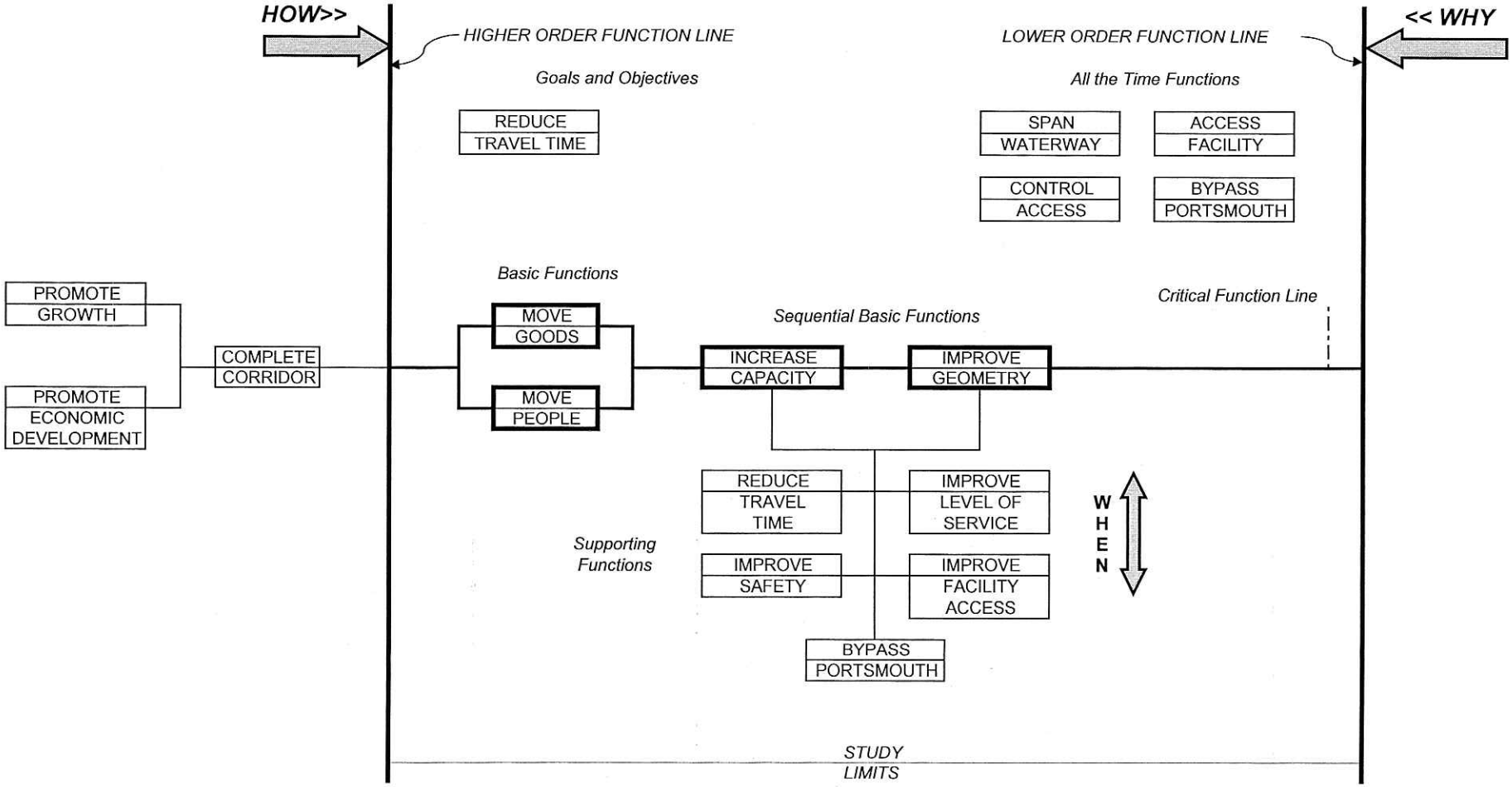
PORTSMOUTH BYPASS

SCI-823-0.00, SCI-823-6.81, and SCI-823-10.13

PID Nos. 19415, 77366, and 79977

Ohio Department of Transportation

Scioto County, Ohio



CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the Speculation Phase of the VE workshop, numerous ideas, alternative proposals and recommendations were generated using conventional brainstorming techniques as recorded on the following pages. These ideas were discussed and the advantages/disadvantages of each listed. The VE team compared each of the ideas with the concept solution determining whether it improved value, was equal in value, or lessened the value of the solution.

The ideas were ranked on a scale of 1 to 5 on how well the VE team believed the idea met necessary criteria and program needs. The higher rated ideas were developed into formal alternatives. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved operations, efficiency, constructibility or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also used when an idea is difficult to price but improves the functionality of the project or system, and is deemed to be of significant value to the owner, user, operator or designer.

Typically, all ideas rated 4 or 5 are included in the study report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research that indicated the concept as not being cost-effective or technically feasible.

The reader is encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT:	**SCI-823-0.00, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*	SHEET NO.: **1 of 3**

NO.	IDEA DESCIRPTION	RATING
1	Reduce the design speed	4
2	Accept more high fill culverts (>100 feet) (with Alt. Nos. 4, 5, and 30)	4
3	Use at-grade intersections	2
4	Increase maximum road grade (with Alt. Nos. 2, 5 and 30)	4
5	Raise culverts (with Alt. Nos. 2, 4, and 30)	4
6	Reduce through-lane width	3
7	Reduce median width	2
8	Investigate use of tunnel(s) at north end (See Alt. No. 20)	4
9	Steepen rock slopes	4
10	Eliminate benches	4
11	Use rock fill to steepen slopes	4
12	Use rock fall mesh	3
13	Eliminate curbing in rock cut areas	4
14	Soften base of rock cut areas	3
15	Use Super-Two with truck passing lanes	2+
16	Use more bridges in lieu of culverts	2
17	Use guardrail	ABD
18	Stack lanes in mountainous terrain	2
19	Use ground nail walls in some soil cut areas	4
20	Consider tunneling at specific areas (See Alt. No. 8)	4
21	Change phasing to use excavated material early	4
22	Reduce lighting where possible	2
23	ODOT to go into the aggregate business or presale agreement to local quarries, job reuse, etc.)	DS
24	Reconfigure the Lucasville/Minford Interchange	4
25	Reconfigure the US 23 Interchange	4
26	Eliminate right-turn lanes at intersections (SR 335) (with Alt. No. 33)	4
27	In tangent sections drain to shoulders	1
28	Use soil borings in lieu of overburden benches	4

Rating: 1 → 2 = Not to be Developed; DS = Design Suggestion; 3 – 4 = Varying Degree of Development Potential; ABD = Already Being Done; 5 = Most Likely to be Developed; N/A = Not Applicable

CREATIVE IDEA LISTING

PROJECT:	**SCI-823-0.00, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*	SHEET NO.: **2 of 3**

NO.	IDEA DESCIRPTION	RATING
29	Realign mainline to avoid AEP [American Electric Power] transmission towers	3
30	Raise profile to balance cut and fill (with Alt. Nos. 2, 4, and 5)	4
31	Dispose waste within right-of-way/facility (with Alt. Nos. 34, 51, 56, and 57)	4
32	Post lower speed limits on non-ODOT roads	2
33	Consider relocating SR 335 to the east to keep right-turn lane and eliminate retaining wall (with Alt. 26)	4
34	Use waste to create developable land (with Alt. No. 31, 51, 56, and 57)	4
35	At the Little Scioto Bridge, move south abutment further south to reduce abutment height	ABD
36	Eliminate noise walls	2
37	Reduce the size of the oversized culverts	2
38	Minimize number of structures by cul-de-sacing selective cross roads	3
39	Reevaluate bridges to assess potential Value Engineering Change Proposals (VECP)	4
40	Reduce bridge spans by providing barriers	4
41	Use ODOT forces for all signs	1
42	Use ODOT forces for striping	1
43	Break project into smaller bid packages	DS
44	Reduce the amount of off-mainline work	2
45	Consider reducing the design to reduce cost of subgrade preparation and pavement	4
46	Allow total road closure	2
47	Optimize ODOT blasting specification	ABD
48	Privatize facility	1
49	Reconfigure the US 52/SR 140 Interchange	4
50	Reduce swell factor	DS
51	Fill entire valley ahead of construction to eliminate culverts (with Alt. Nos. 31, 34, 56, and 57)	4
52	Eliminate an underdrain from each side of the typical section	4
53	Realign the airport interchange by using current alignment of Shumway Hollow Road	2
54	Use two spans at US 23 in lieu of three spans	4

Rating: 1 → 2 = Not to be Developed; DS = Design Suggestion; 3 – 4 = Varying Degree of Development Potential; ABD = Already Being Done; 5 = Most Likely to be Developed; N/A = Not Applicable

CREATIVE IDEA LISTING

PROJECT:	**SCI-823-0.00, PID Nos. 19415, 77366, and 79977,** *Scioto County, Ohio*	SHEET NO.: **3 of 3**

NO.	IDEA DESCIRPTION	RATING
55	Add interchange(s) to further promote economic development	2
56	Create an industrial site at US 23 (with Alt. Nos. 31, 34, 51, and 57)	4
57	Create a recreational area with waste (with Alt. Nos. 31, 34, 51, and 56)	4
58	Use fill mounding/berms in lieu of noise walls	4
59	Eliminate guardrails with fill mounds	4
60	Toll road the facility	1
61	Change from safety grading to safe zone grading	4
62	Coordinate building demolition as one contract vs. three phases	ABD
63	Sell clearing and grubbing contract separately (with Alt. No. 64)	4
64	Survey trees for marketability (with Alt. No. 63)	4
65	Split Ramp B into two separate structure at US 523 interchange	4
66	Balance Phase 3 by removing flattened slopes	ABD
67	Ensure the use of 50 ksi H piles to bedrock	DS

Rating: 1 → 2 = Not to be Developed; DS = Design Suggestion; 3 – 4 = Varying Degree of Development Potential; ABD = Already Being Done; 5 = Most Likely to be Developed; N/A = Not Applicable