



SCI-823-10.13

PID No. 79977

SR 823 OVER LUCASVILLE MINFORD Rd (CR 28)

PRELIMINARY DESIGN REPORT SUBMITTAL

Prepared for:

OHIO DEPARTMENT OF TRANSPORTATION

DISTRICT 9

650 EASTERN AVE.

CHILLICOTHE, OHIO 45601

JANUARY 14, 2008

Prepared by:

STRUCTURAL ENGINEERING

FEB 29 2008

RECEIVED



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TranSystems

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January 14, 2008

Mr. Jawdat Siddiqi, PE
Office of Structural Engineering
Ohio Department of Transportation
1980 W. Broad Street
Columbus, Ohio 43223

**SUBJECT: Preliminary Design Report Submittal
SR 823 over Lucasville Minford Road (CR 28)
SCI-823-10.13 Portsmouth Bypass
PID#79977**

Dear Mr. Siddiqi:

Submitted for review and comment is the Preliminary Design Report for SR 823 over Lucasville Minford Road (CR 28). Included are The TS&L drawings and the Final Geotechnical Report by DLZ, Ohio, and dated June 27, 2007. Please find below our disposition to the December 22, 2006 comments by Reza Zandi regarding the STS submittal.

- 1) *We agree that the proposed structure should consist of a three span prestressed concrete I-beam composite with the reinforced concrete deck superstructure and that the cap and column piers should be supported on piles.*

We have carried this option forward to the attached PDR.

- 2) *After further review and deliberation, we recommend utilizing integral abutments. The following issues were contemplated prior to making the final recommendation.*
 - a) *The fact that battered pile should be avoided when negative skin friction (down drag) is expected.*
 - b) *We anticipate that the placement of the embankment will cause the in-situ soil to undergo long term consolidation to cause down drag forces to be applied to the piles, see Bridge Design Manual section 202.2.3.3.c.*

Will comply.

- 3) *Although, we would prefer the horizontal clearance shown to the pier column but in this case there should be a reference to the closest obstruction which is the toe of the slopes.*

The clearance to the toe of slope has been removed. The grading limits will be shown on the site plan however the roadway cross sections are the appropriate place to show the location of the toe of slope. The dimension was included at the STS since cross sections were not included with the submittal.

- 4) *Verify the skew angle shown in Proposed Structure data block.*

The skew angle has been verified and revised.

- 5) *Show the profile grade on the site plan's Elevation View.*

Will comply.

- 6) *Revise the inside shoulder width to match the roadway typical section as per District 9 request.*

Will comply.

- 7) *Prior to driving piles, construct the spill through slope and the bridge approach embankment behind the abutments up to the level of the subgrade elevation for a minimum distance of 200 feet behind the abutments. Do not begin excavation for the abutment footing and the installation of the abutment piles until after the above required embankment has been constructed and a __ calendar day waiting period has elapsed. The Engineer may adjust the waiting period based upon the settlement platform readings.*

Embankment construction note to be included in final plans by others. The estimated consolidation time of 280 days has been included in the attached geotechnical report and plans.

- 8) *Please include the following note in the plans.*

ITEM SPECIAL—SETTLEMENT PLATFORMS

Description: This item consists of furnishing, constructing, and maintaining settlement platforms and obtaining settlement readings as required by the plans or as directed by the Engineer. At the option and expense of the Contractor, additional settlement platforms may be installed at locations approved by the Engineer. Settlement readings shall be taken weekly during construction and during any specified waiting period. The readings shall be plotted on graph paper presenting deformation (on the negative y-axis) and fill height (on the positive y-axis) versus time (on the x-axis). A copy of each cumulative plot

shall be sent to the Office of Geotechnical Engineering, Attention: Geotechnical Design Coordinator, after each settlement reading is recorded.

Materials: Sound lumber such as 19mm (3/4-inch) exterior grade plywood shall be used for the base. The pipe shall be 64mm (2-1/2-inch) standard black pipe with threaded fittings as shown on the plans. A steel plate 915mm x 915mm x 3.2mm (36" x 36" x 1/8") may be substituted for the lumber for the platforms, at the Contractor's option.

Construction Methods: The platform shall conform to the details shown on the plans. The platform shall be set on a level surface. The pipe shall be firmly secured to the platform and shall be maintained in a plumb position during the placement of the embankment. The pipe shall be marked at intervals to facilitate measurement of the depth of fill. The Contractor shall stop work in any location where the settlement platform has been disturbed or damaged. Platforms or pipes damaged or displaced during construction shall be restored to their proper condition at the Contractor's expense.

Prior to paving, the top of the settlement platform pipe shall be cut off 600mm (two feet) below the finished surface of the subgrade or finished ground surface, whichever is applicable.

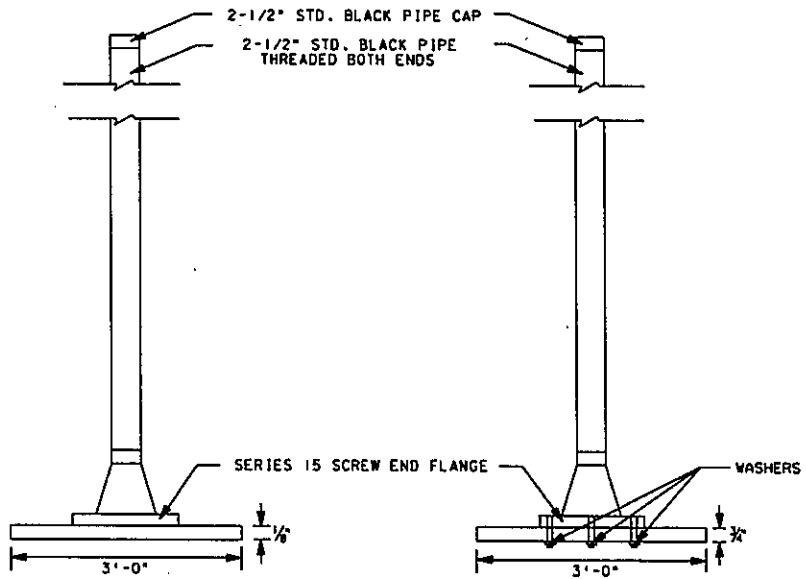
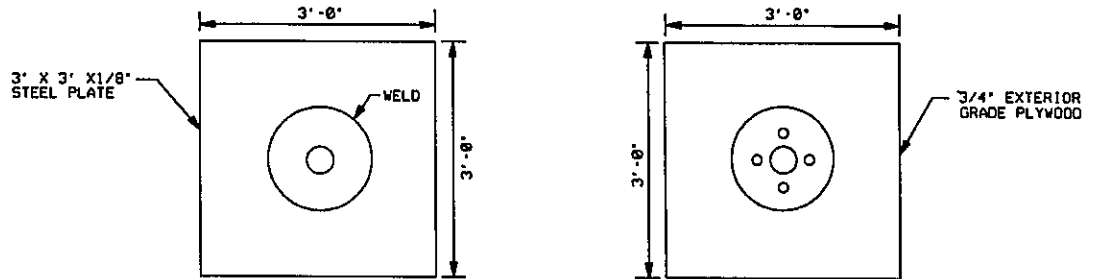
Method of Measurement: The number of settlement platforms to be paid for shall be the actual number of settlement platforms completed, maintained, and accepted by the Engineer.

Basis of Payment: Payment shall be made at the contract unit price each for "Item Special – Settlement Platforms" which is compensation for constructing, maintaining, and monitoring the settlement platforms including furnishing all labor, equipment, materials, and incidentals necessary to complete the work. Payment shall not be made for settlement platforms which become useless due to damage caused by the Contractor's operations.

(Note: The following plan detail must accompany this note.)

SETTLEMENT PLATFORM

NOT TO SCALE



NOTES:

1. SETTLEMENT PLATFORMS SHALL BE PLACED AT THE LOCATION INDICATED IN THE PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. CONTRACTOR HAS OPTION OF USING EITHER STEEL OR PLYWOOD PLATFORM BASE.
3. CONTRACTOR SHALL FURNISH MATERIALS AND LABOR TO EXTEND PIPE UP THROUGH ENTIRE FILL.
4. SETTLEMENT PLATFORMS SHALL BE ANCHORED BY STAKES DRIVEN AT EACH CORNER TO PREVENT OVERTURNING.

DATE: 5-11-1999

W:/Geotech/settnew.dgn 01/17/03 03:19:07 PM

Settlement platform notes and details have been included.

Please don't hesitate to call me or Dr. Michael Lenett (513 621 1981) if there are any questions.

Sincerely,

Michael D. Weeks by RP
Michael D. Weeks, P.E., P.S.
Project Manager

Cc: T. Barnitz, P.E.

PRELIMINARY DESIGN REPORT NARRATIVE

1. Introduction

TranSystems Corporation is providing engineering services to the Ohio Department of Transportation for the design of new left and right overpass structures that will carry the proposed S.R. 823 bypass over Lucasville-Minford Road (CR 28). As requested by the Scope of Services, a Preliminary Design Report is to be submitted as part of Step 8 of the Major PDP process. The purpose of this report is to summarize the structure type selected for final design. A revised Type Study was submitted on 11/30/06 to incorporate the updated roadway geometry. Comments and approval of the structure type were received on December 22, 2006.

2. Design Criteria

The proposed structure types are designed according to the current version of the Ohio Department of Transportation Bridge Design Manual (BDM) and the 2002 AASHTO Standard Specifications for Highway Bridges, 17th Edition. Horizontal clearances (clear zone width and horizontal sight distance) and vertical clearances are based on the Ohio Department of Transportation Location and Design (L&D) Manual, Volume One – Roadway Design.

3. Subsurface Conditions and Foundation Recommendation

DLZ Ohio, Inc. performed the subsurface exploration for the proposed bridge and prepared the Final Foundation Recommendations in their report dated June 27, 2007.

In summary, four (4) test borings (TR-11, TR-12, TR-13 and TR-14) were drilled and all encountered sandstone bedrock between 33.5 and 43 feet below the existing ground surface. Generally cohesive soils were encountered from the bottom of the 3"-6" topsoil layer to the top of the bedrock. The cohesive soils ranged from sandy silt (A-4a) to clay (A-7-6), and were generally soft to very stiff.

As the location of bedrock is at moderate depths, HP pile foundations driven to refusal on bedrock have been recommended for the proposed abutments and piers. Both the rear and forward abutment foundations will be on compacted embankment fill. Subsequently, it is recommended that the abutment piles not be driven until the majority of primary consolidation settlement of both the in-situ soil, which may be compressible, and the embankment has occurred. This will avoid having high down-drag forces that could significantly reduce the load-carrying capacity of the piles. Settlement calculations, assuming the use of wick drains, have shown that a waiting period of 280 days corresponding to 98.6% of the primary consolidation will eliminate any potential down-drag on the piles. Additionally, the piles should be placed in prebored holes through the proposed embankment to minimize any possible down-drag forces. Since the piles will be driven to refusal onto hard bedrock, DLZ has recommended using steel points.

Stability analysis of spill through slopes was also performed by DLZ. The evaluations reveal that the slope stability is inadequate for the undrained condition. The use of wick drains and monitoring of pore water pressures is recommended to maintain a drained condition under the embankments. DLZ also recommends the embankment be built in stages (32' max) to maintain stability of the embankment. Additional details regarding instrumentation and other construction controls are included in the DLZ report on the Lucasville-Minford Road Interchange dated November 29, 2006.

4. Roadway

The purpose of this project is to construct a new bypass state route around the town of Portsmouth, Ohio. The proposed alignment will carry two lanes of traffic, 15 plus miles in either direction, from an interchange with US 52 just east of Portsmouth to another interchange with US 23, located north of Portsmouth in Valley Township.

An interchange with Lucasville-Minford Road is planned as part of the bypass. Due to the interchange configuration, each structure of the Lucasville-Minford crossing has a unique cross section. The **median shoulder widths, on the bridges, match the width of the approach roadway**, as recommended by the District. The left structure's cross section consists of two through 12'-0" travel lanes, a 12'-0" deceleration lane, and a 9'-6" median shoulder and 10'-0" outside shoulder. Including a 1'-5 1/2" inside median parapet (similar to a the roadway concrete median barrier but using a base width of 1'-5 1/2" and top width of 6 5/8") and a 1'-6" outside straight face deflector parapet (SBR-1-99) yields a left structure deck width of 58'-5 1/2" out to out.

The right structure has a variable width cross section due to a tapered acceleration lane. From left to right, this bridge's cross section consists of a 1'-5 1/2" median parapet, a 9'-6" median shoulder, two 12'-0" travel lanes, a tapered acceleration ramp, a 10'-0" wide shoulder and a 1'-6" outside parapet. The overall width of the structure varies from 66'-11 1/4" to 61'-8 3/8".

The northbound and southbound bridge sections will be separated from one another, along their inside fascia, by 1". Horizontal and vertical sight distances, in accordance with the design standards, have been provided for all alternatives considered.

Alignment & Profile: The proposed SR 823 horizontal geometry is along a tangent alignment across the entire length of both the left and right structures. The profile grade line for both bridge sections will be located at the inside edge of pavement, which is 11'-0" from the centerline of construction of S.R. 823. This profile lies within a 1300' vertical curve with P.V.I. at Station 535+00.00, elevation = 742.19, $g_1 = -2.90\%$ and $g_2 = 4.00\%$. The horizontal and vertical geometry for all alternatives considered are the same. Embankment slopes will be a maximum 2:1 in order to minimize right-of-way impacts.

The existing Lucasville-Minford Road will be widened from 2-lanes, to a **3-lane cross section with 36'-0"** pavement width. The proposed alignment is tangent under the structure. The proposed vertical profile of Lucasville-Minford Road is in a vertical curve under the structure. The vertical curve is 500' long, PVI = 20+00.00, Elev. = 714.26, $g_1 = -0.80\%$ and $g_2 = +2.80\%$.

Vertical and Horizontal Clearances: Since the proposed vertical alignment for all overpass structures on this project was dictated by the overall design of the new bypass profile, vertical clearance was not a critical design issue for the proposed structure. For the proposed structure of this report, more than 15'-0" of preferred vertical clearance is provided.

The 23'-0" clear zone from edge of traveled way is based on Figure 600-1E of the ODOT L&D Manual, Volume One. The information input into Figure 600-1E is as follows:

1. existing Lucasville-Minford Road may be classified as a Rural Major Collector and the design speed is **55 mph**;
2. the design year ADT for Lucasville Minford Road is **6000** per the June 2005 letter from ODOT's Office of Technical Services.
3. proposed Lucasville-Minford will have open drainage and ditch slopes of **6:1** are proposed

Using the identified parameters of items 1) through 3) in Figure 600-1E results in the minimum horizontal clear zone width of 23'-0".

Drainage Design - The collection of storm water runoff will be addressed off of the bridge, thus scuppers will not be required. Pavement drainage around the bridge has been designed and is shown in the site plans and general plan.

Utilities - No utilities will be placed on the bridge. However, lighting and ITS conduits will be provided as necessary.

Maintenance of Traffic - While the new bridges are under construction, traffic will be maintained on the existing Lucasville-Minford Rd. It is anticipated that there will be limited closures during construction for beam setting.

5. Proposed Structure Configuration

Span configuration: The proposed structure is a three span bridge with spans of 76'-0", 107'-9", 76'-0". The overall bridge length is 259.75' centerline of abutment to centerline of abutment. This span arrangement allows for the use of integral abutments and meets the horizontal clearances required at the piers. The 2:1 spill through slopes allow for the proposed ditches required for drainage and meet clear zone grading requirements. The dimensions of widened Lucasville Minford road and the roadside ditches with 2:1 spill through slopes were used to determine the locations of both abutments. Pier 1 was placed at the clear zone and Pier 2 placed to make both end spans the same. The substructures are oriented parallel to Lucasville-Minford Road resulting in a 23°52'35" LF skew.

Substructure:

Abutments: Both the forward and rear abutments will be integral type supported on H-piles as they are located in new embankment fill. The piles shall be HP14x73 with a design capacity of 95-tons per pile, driven to refusal on bedrock. The details of the abutments will follow ODOT Standard Construction Drawings. Integral type abutments were recommended by ODOT to eliminate the use of battered piles. The construction of the embankment was included for construction with Phase 1 of the SR 823 By-pass project. Consideration should be given to constructing both rear and forward embankments in Phase 1 along with the proper controls.

Piers: The proposed piers are cap and column type piers consistent with section 204.5 of the BDM for use at highway grade separations. The pier heights will be approximately 43'-45' for both piers. The proposed piers will be supported on HP 14x73 piles with a design capacity of 95-tons per pile, driven to refusal on bedrock.

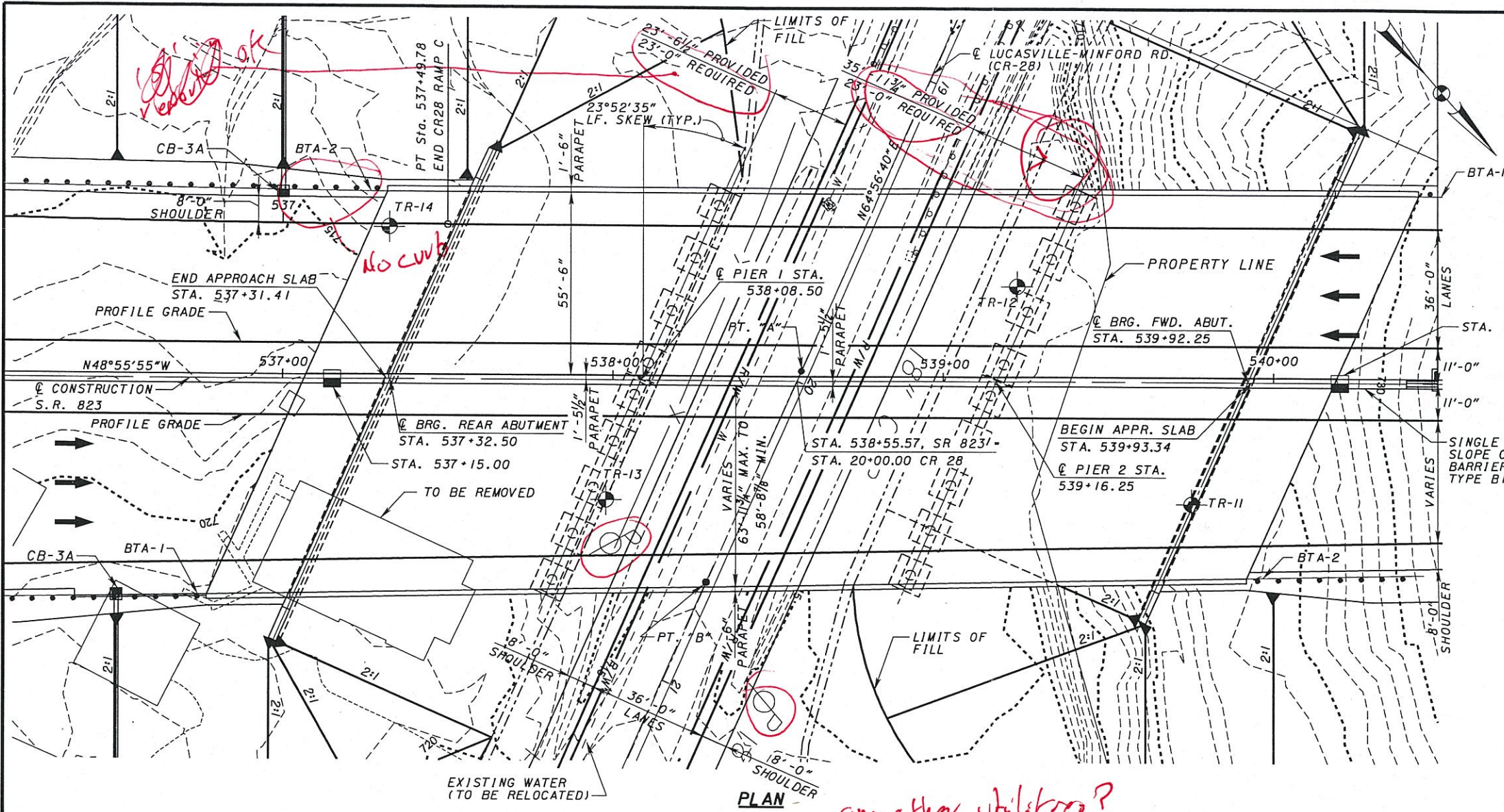
Superstructure:

The preliminary design for the proposed structure is 7 - 60" AASHTO Type 4 prestressed beams, spaced at 8'-9", for the left bridge and 8 - 60" AASHTO Type 4 prestressed beams for the right. The right structure has a variable width due to a tapering acceleration lane. The exterior beam on the right side was set parallel to the taper and the remaining beams placed parallel to the centerline of SR 823. This arrangement has 6 equal beam spaces at 8'-9" and 1 variable beam space, tapering from 8'-5 3/4" to 3'-2 7/8". Both bridges will have constant 2'-11 3/4" overhangs and will accommodate the HS25 design loadings. The structures will be simple span for non-composite dead loads and continuous for superimposed and live loads. In accordance with the BDM the beams are also checked for a simply supported condition under all loads except the future wearing surface. This analysis indicates that

standard concrete strengths of 5000 psi at release and 7000 psi final are required. The left bridge width will be 55'-6" from toe to toe of parapets with an overall bridge deck width of 58'-5 1/2", while the right bridge will be 63'-11 3/4" max. to 58'-8 7/8" min. toe to toe of parapets, and 66'-11 1/4" max. to 61'-8 3/8" min. overall bridge width. Deck thickness, including a 1" monolithic wearing surface, is 8 1/2".

APPENDIX A
Structure Plans





BENCHMARK 1	BENCHMARK 2
(TO BE PROVIDED LATER)	(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			FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS	
LOCATION	"A"	"B"	LOCATION	STATION
PROPOSED	36.07'	34.03'	NB REAR ABUT.	536+73.04
REQUIRED	15.00'	15.00'	SB REAR ABUT.	537+27.39
			NB FWD. ABUT.	539+96.17
			SB FWD. ABUT.	540+47.72

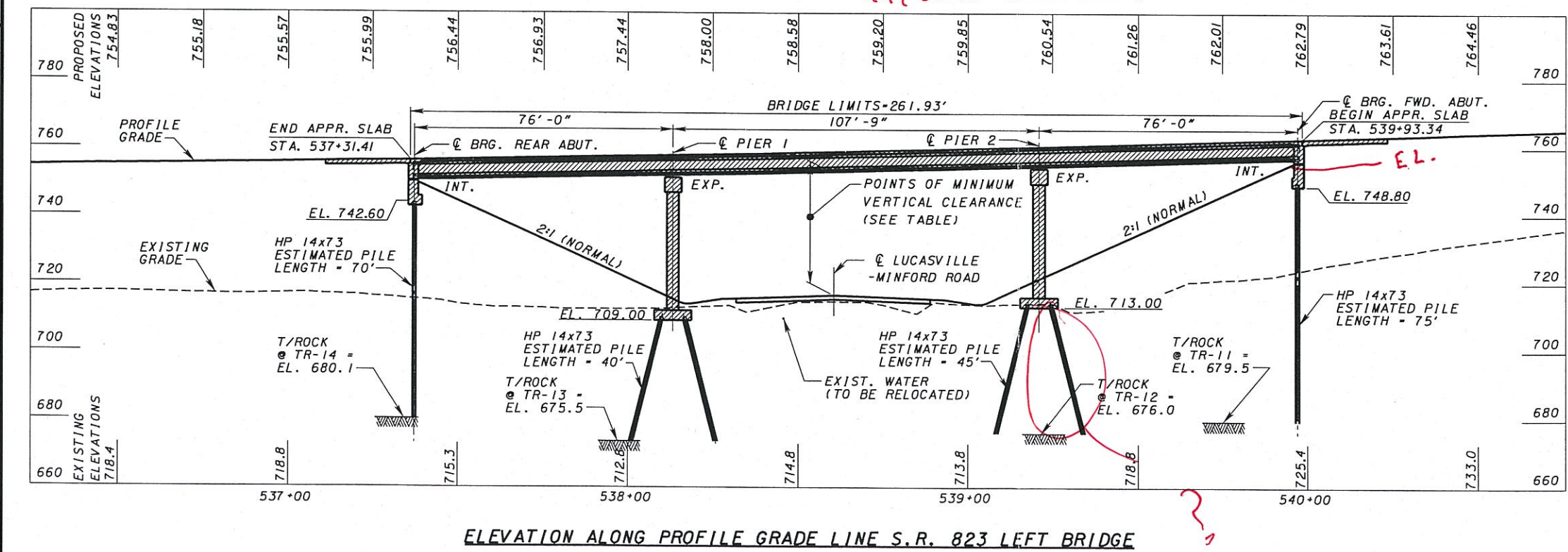
- NOTES:**
- ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
 - EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
 - THE PROPOSED PROFILE GRADE IS WITHIN BRIDGE LIMITS. SEE ROADWAY PLANS FOR PAVEMENT ELEVATIONS BEYOND BRIDGE LIMITS.

- 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'-9 1/2", 105'-4", 74' 9 1/2" (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-B1 (25' LONG)	
LATITUDE: 38°51'48" N	
LONGITUDE: 82°53'45" W	



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DESIGN AGENCY: **Trail Systems**
 5747 PENNINGTON DRIVE, SUITE 200
 GURLEA, OHIO 43024

DATE: 09/28/07
 REVIEWED: MSL
 STRUCTURE FILE NUMBER: 7306547

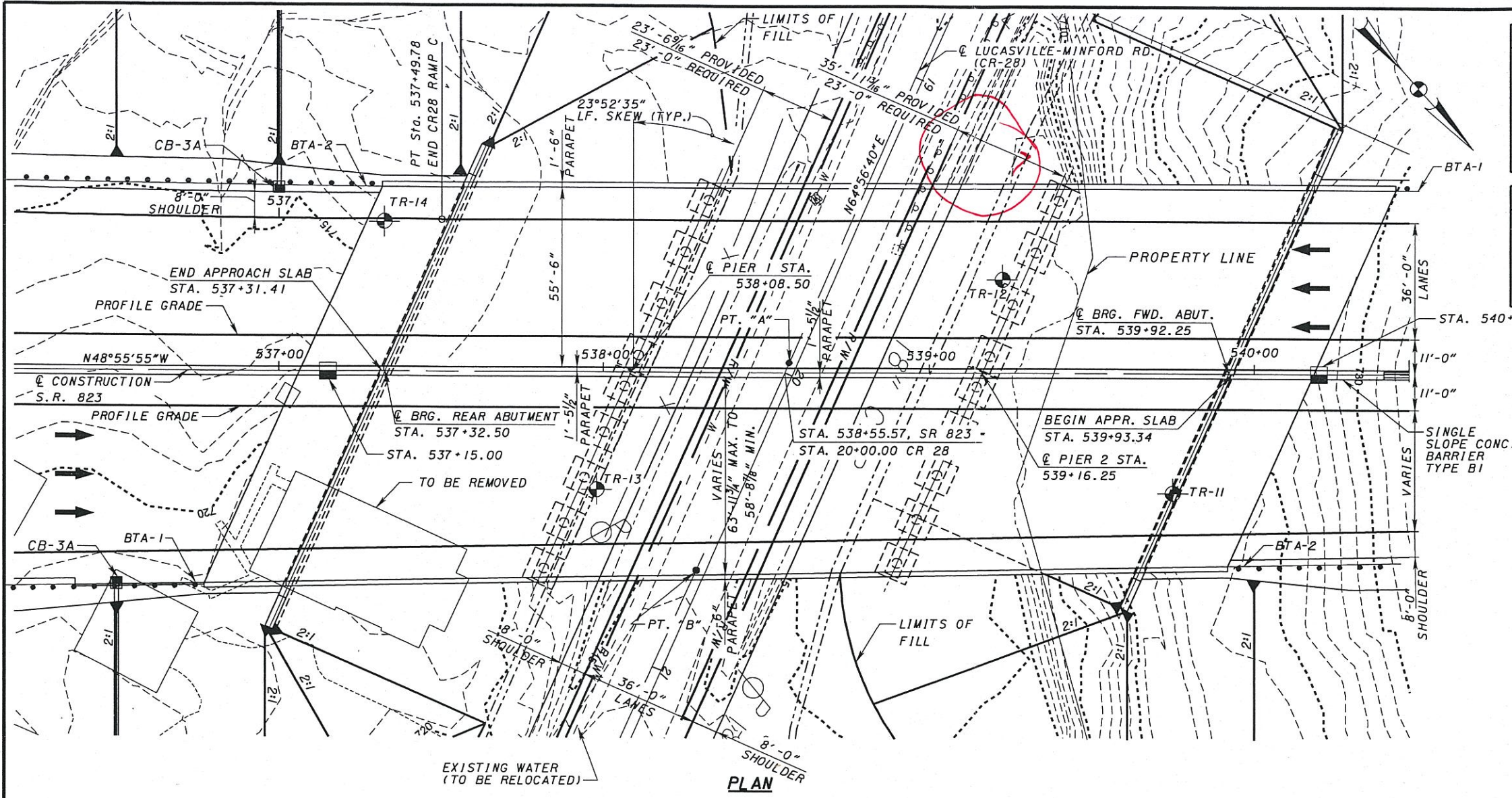
DRAWN: PJP
 DESIGNED: PJP
 CHECKED: MSL

SC1070 COUNTY
 BRIDGE NO. SC1-823-1018 L
 STA. 537+31.41
 STA. 539+93.34

SITE PLAN
 BRIDGE NO. SC1-823-1018 L
 SR 823 OVER LUCASVILLE-MINFORD ROAD (CR-28)

SC1-823-10.13
 PID 79977

1/6
 801
 864



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

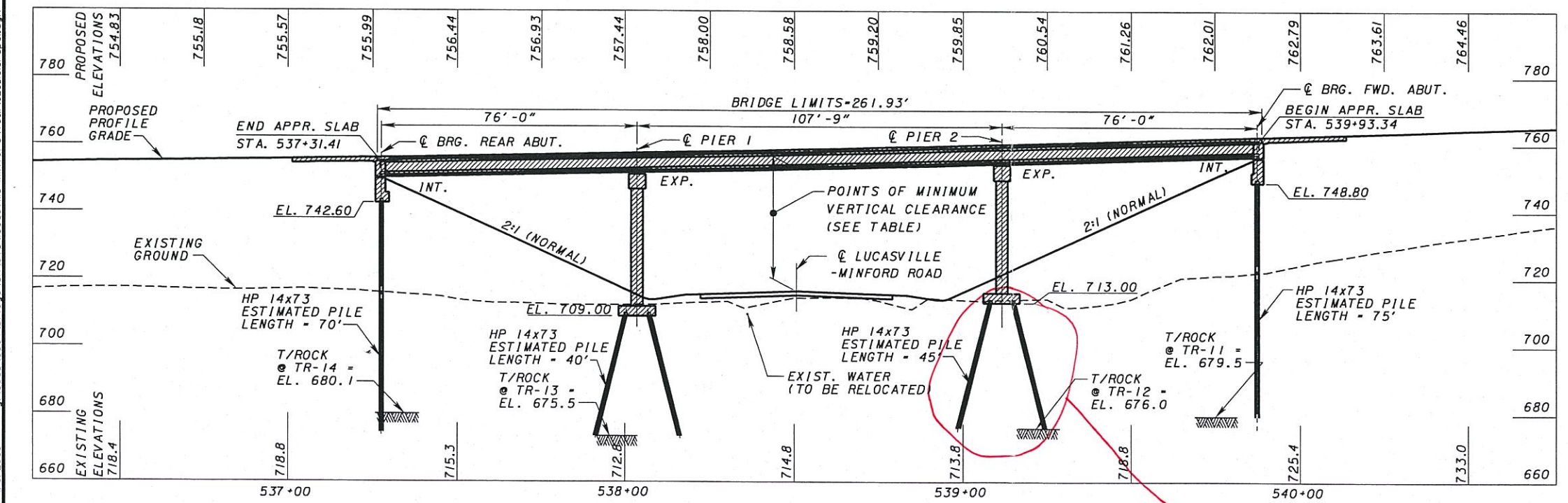
TRAFFIC DATA	
(SR 823)	
CURRENT YEAR ADT (2010) = 19,800	
CURRENT YEAR ADTT (2010) = 4752	
DESIGN YEAR ADT (2030) = 26,000	
DESIGN YEAR ADTT (2030) = 6240	

TABLE OF VERTICAL CLEARANCES			FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS	
LOCATION	"A"	"B"	LOCATION	STATION
PROPOSED	36.07'	34.03'	NB REAR ABUT.	536+73.04
REQUIRED	15.00'	15.00'	SB REAR ABUT.	537+27.39
			NB FWD. ABUT.	539+96.17
			SB FWD. ABUT.	540+47.72

- NOTES:**
- ALL SHEETS WITH PLAN DIMENSIONS ARE SHOWN HORIZONTAL.
 - EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
 - 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
G₁ = -2.90%
G₂ = +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'-9 1/2", 105'-4", 74' 9 1/2" (C/C BRG.)	
ROADWAY: VARIES, 63'-11 3/4" TO 58'-8 7/8" 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-I-BI (25' LONG)	
LATITUDE: 38°51'48" N	
LONGITUDE: 82°53'45" W	



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

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DESIGN AGENCY: **Trail Systems**
 5047 PENNY DRIVE, SUITE 200
 GURIN, OHIO 43027

DATE: 09/28/07
 DESIGNED: MSL
 CHECKED: PJP
 DRAWN: PJP
 REVISIONS:

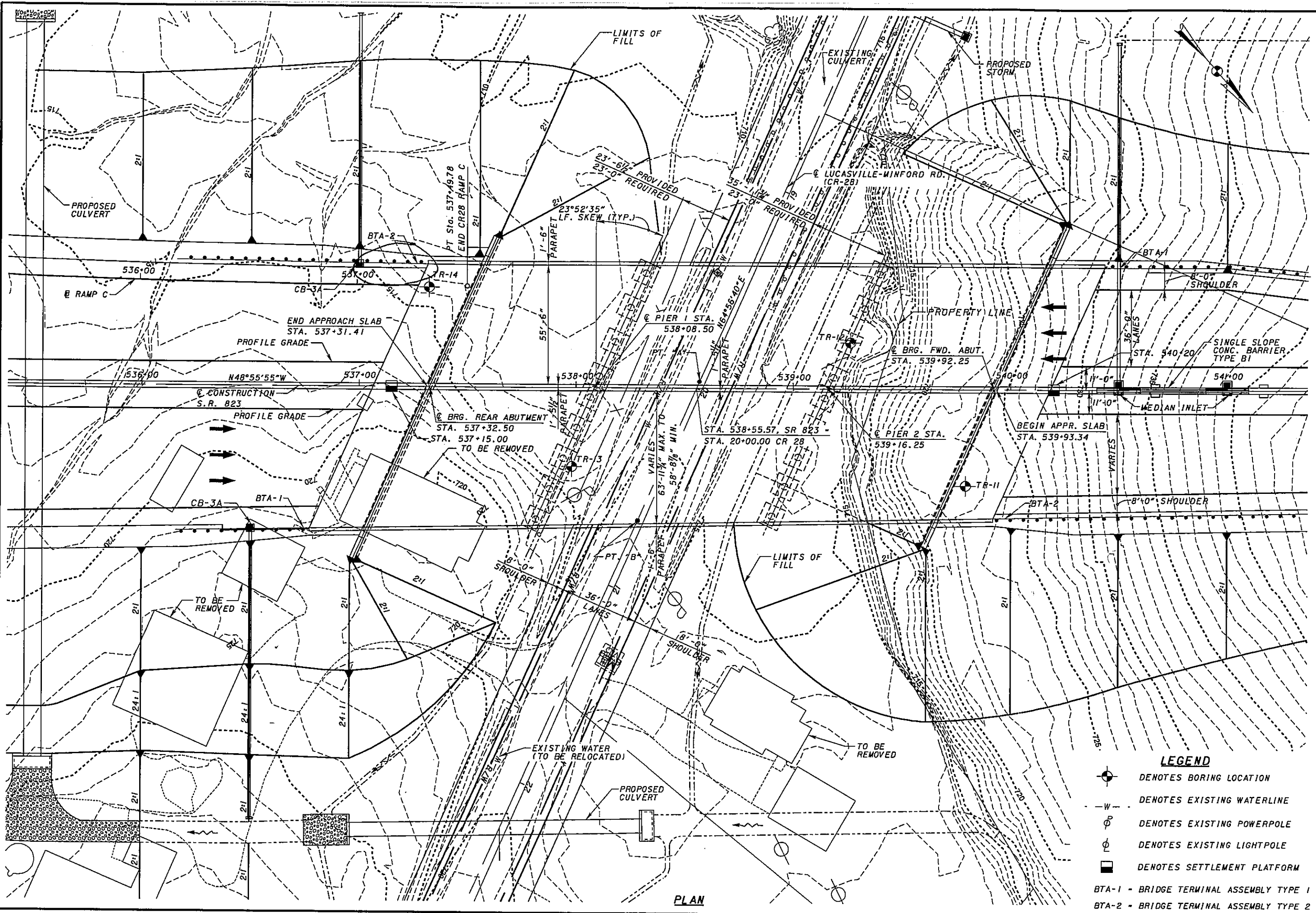
SCIO TO COUNTY: STA. 537+31.41
 BRIDGE NO. SCI-823-1018 R
 SR 823 OVER LUCASVILLE-MINFORD ROAD (CR-28)

STRUCTURE FILE NUMBER: 7306555
 STA. 539+93.34

SITE PLAN
 SCI-823-10.13
 PID 7997

2/6
 802
 864

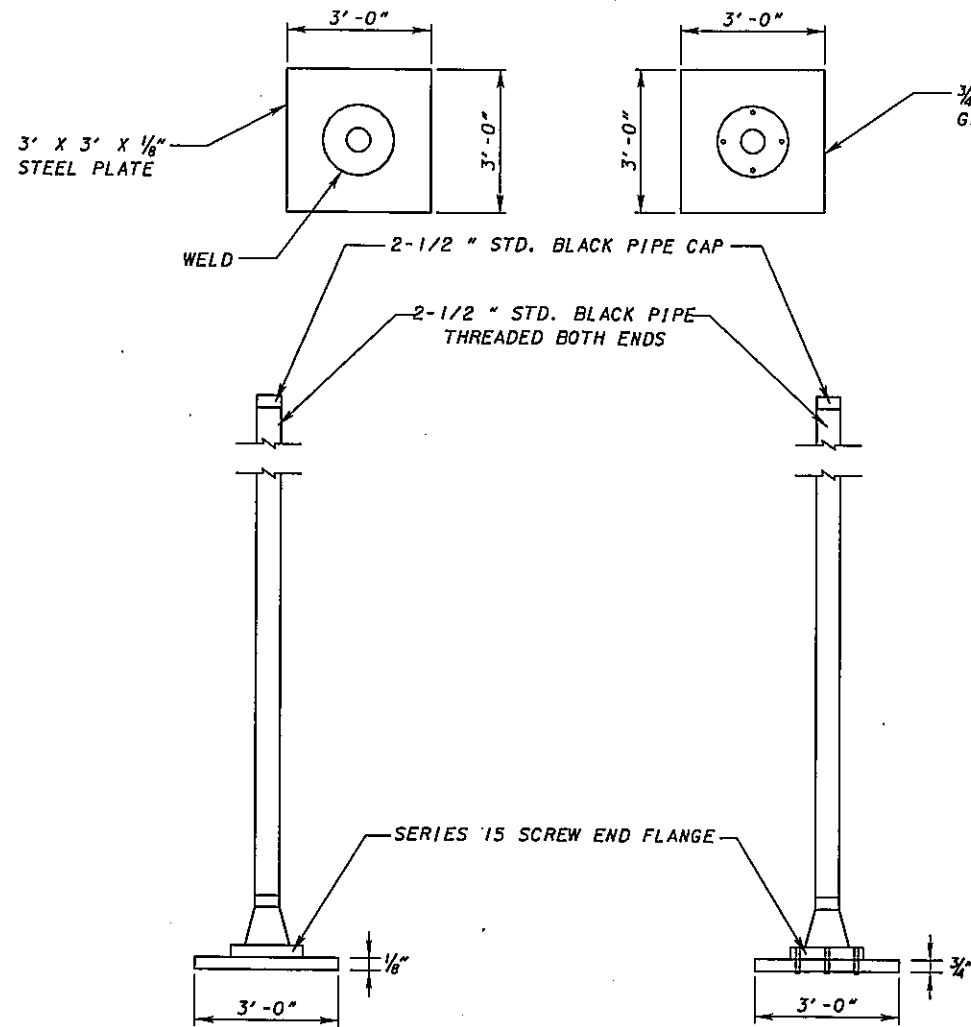
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PLAN

- LEGEND**
- DENOTES BORING LOCATION
 - DENOTES EXISTING WATERLINE
 - DENOTES EXISTING POWERPOLE
 - DENOTES EXISTING LIGHTPOLE
 - DENOTES SETTLEMENT PLATFORM
- BTA-1 - BRIDGE TERMINAL ASSEMBLY TYPE 1
 BTA-2 - BRIDGE TERMINAL ASSEMBLY TYPE 2

 <small>DESIGN AGENCY</small> <small>5114 PENNINGTON DRIVE, SUITE 200</small> <small>BRIDGE, OHIO 43004</small>												
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DRAWN	REVISED	DATE	FILE NUMBER									
JPG	MSL	09/28/07	73065471, 73065551									
CHECKED	MSL											
<p>GENERAL PLAN</p> <p>BRIDGE NO. SCI-823-1018 L&R</p> <p>SR 823 OVER LUCASVILLE-WINFORD ROAD (CR-28)</p>												
<p>SCI-823-10.13</p> <p>PID 79977</p>												
<p>3 / 6</p> <p>803 864</p>												



SETTLEMENT PLATFORM
NOT TO SCALE

NOTES:

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3. CONTRACTOR SHALL FURNISH MATERIALS AND LABOR TO EXTEND PIPE UP THROUGH ENTIRE FILL.
4. SETTLEMENT PLATFORMS SHALL BE ANCHORED BY STAKES DRIVEN AT EACH CORNER TO PREVENT OVERTURNING.

ITEM SPECIAL-SETTLEMENT PLATFORMS

DESCRIPTION: THIS ITEM CONSISTS OF FURNISHING, CONSTRUCTING, AND MAINTAINING SETTLEMENT PLATFORMS AND OBTAINING SETTLEMENT READINGS AS REQUIRED BY THE PLANS OR AS DIRECTED BY THE ENGINEER. AT THE OPTION AND EXPENSE OF THE CONTRACTOR, ADDITIONAL SETTLEMENT PLATFORMS MAY BE INSTALLED AT LOCATIONS APPROVED BY THE ENGINEER. SETTLEMENT READINGS SHALL BE TAKEN WEEKLY DURING CONSTRUCTION AND DURING ANY SPECIFIED WAITING PERIOD. THE READINGS SHALL BE PLOTTED ON GRAPH PAPER PRESENTING DEFORMATION (ON THE NEGATIVE Y-AXIS) AND FILL HEIGHT (ON THE POSITIVE Y-AXIS) VERSUS TIME (ON THE X-AXIS). A COPY OF EACH CUMULATIVE PLOT SHALL BE SENT TO THE OFFICE OF GEOTECHNICAL ENGINEERING, ATTENTION: GEOTECHNICAL DESIGN COORDINATOR, AFTER EACH SETTLEMENT READING IS RECORDED.

SUPERSTRUCTURE DEPTH	
ITEM	60" MODIFIED AASHTO TYPE 4 BEAM
SLAB (INCLUDING WEARING SURFACE)	8 1/2"
HAUNCH (BOTTOM OF SLAB TO TOP OF FLANGE)	2"
GIRDER DEPTH	60"
TOP OF WEARING SURFACE TO BOTTOM OF GIRDER FLANGE (INCH)	70.50"
TOP OF WEARING SURFACE TO BOTTOM OF GIRDER FLANGE (FEET)	5.875'

MATERIALS: SOUND LUMBER SUCH AS 3/4" EXTERIOR GRADE PLYWOOD SHALL BE USED FOR THE BASE. THE PIPE SHALL BE 2 1/2" STANDARD BLACK PIPE WITH HREADED FITTINGS AS SHOWN ON THE PLANS. A STEEL PLATE 36" X 36" X 1/8" MAY BE SUBSTITUTED FOR THE LUMBER FOR THE PLATFORMS, AT THE CONTRACTOR'S OPTION.

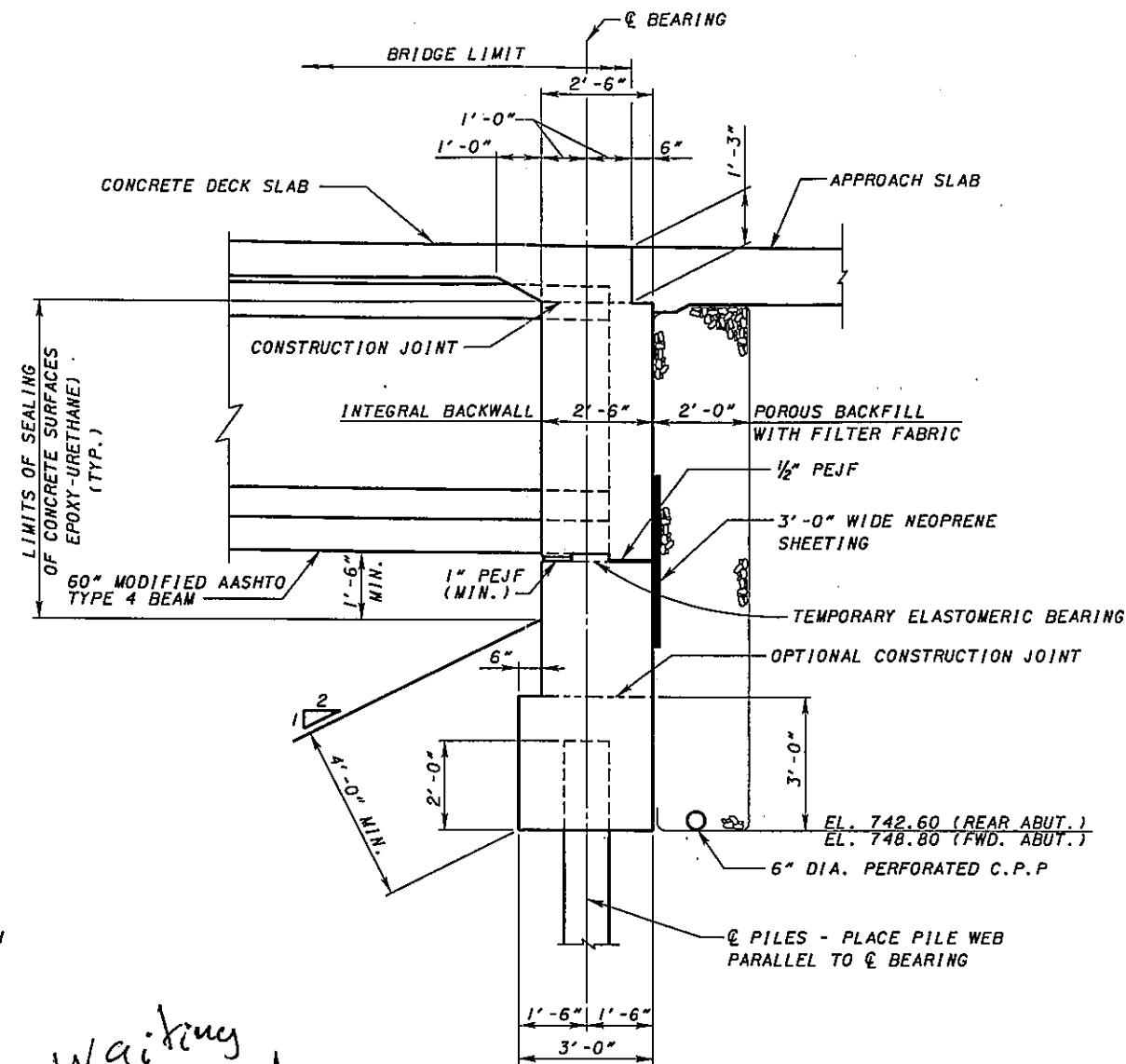
CONSTRUCTION METHODS: THE PLATFORM SHALL CONFORM TO THE DETAILS SHOW ON THE PLANS.

THE PLATFORM SHALL BE SET ON A LEVEL SURFACE. THE PIPE SHALL BE FIRMLY SECURED TO THE PLATFORM AND SHALL BE MAINTAINED IN A PLUMB POSITION DURING THE PLACEMENT OF THE EMBANKMENT. THE PIPE SHALL BE MARKED AT INTERVALS TO FACILITATE MEASUREMENT OF THE DEPTH OF FILL. THE CONTRACTOR SHALL STOP WORK IN ANY LOCATION WHERE THE SETTLEMENT PLATFORM HAS BEEN DISTURBED OR DAMAGED. PLATFORMS OR PIPES DAMAGED OR DISPLACED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR PROPER CONDITION AT THE CONTRACTOR'S EXPENSE.

PRIOR TO PAVING, THE TOP OF THE SETTLEMENT PLATFORM PIPE SHALL BE CUT OFF 2 FEET BELOW THE FINISHED SURFACE OF THE SUBGRADE OR FINISHED GROUND SURFACE, WHICHEVER IS APPLICABLE.

METHOD OF MEASUREMENT: THE NUMBER OF SETTLEMENT PLATFORMS TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF SETTLEMENT PLATFORMS COMPLETED, MAINTAINED, AND ACCEPTED BY THE ENGINEER.

BASIS OF PAYMENT: PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE EACH FOR "ITEM SPECIAL--SETTLEMENT PLATFORMS" WHICH IS COMPENSATION FOR CONSTRUCTING, MAINTAINING, AND MONITORING THE SETTLEMENT PLATFORMS INCLUDING FURNISHING ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK. PAYMENT SHALL NOT BE MADE FOR SETTLEMENT PLATFORMS WHICH BECOME USELESS DUE TO DAMAGE CAUSED BY THE CONTRACTOR'S OPERATIONS.




ABUTMENT SECTION

NOTES:

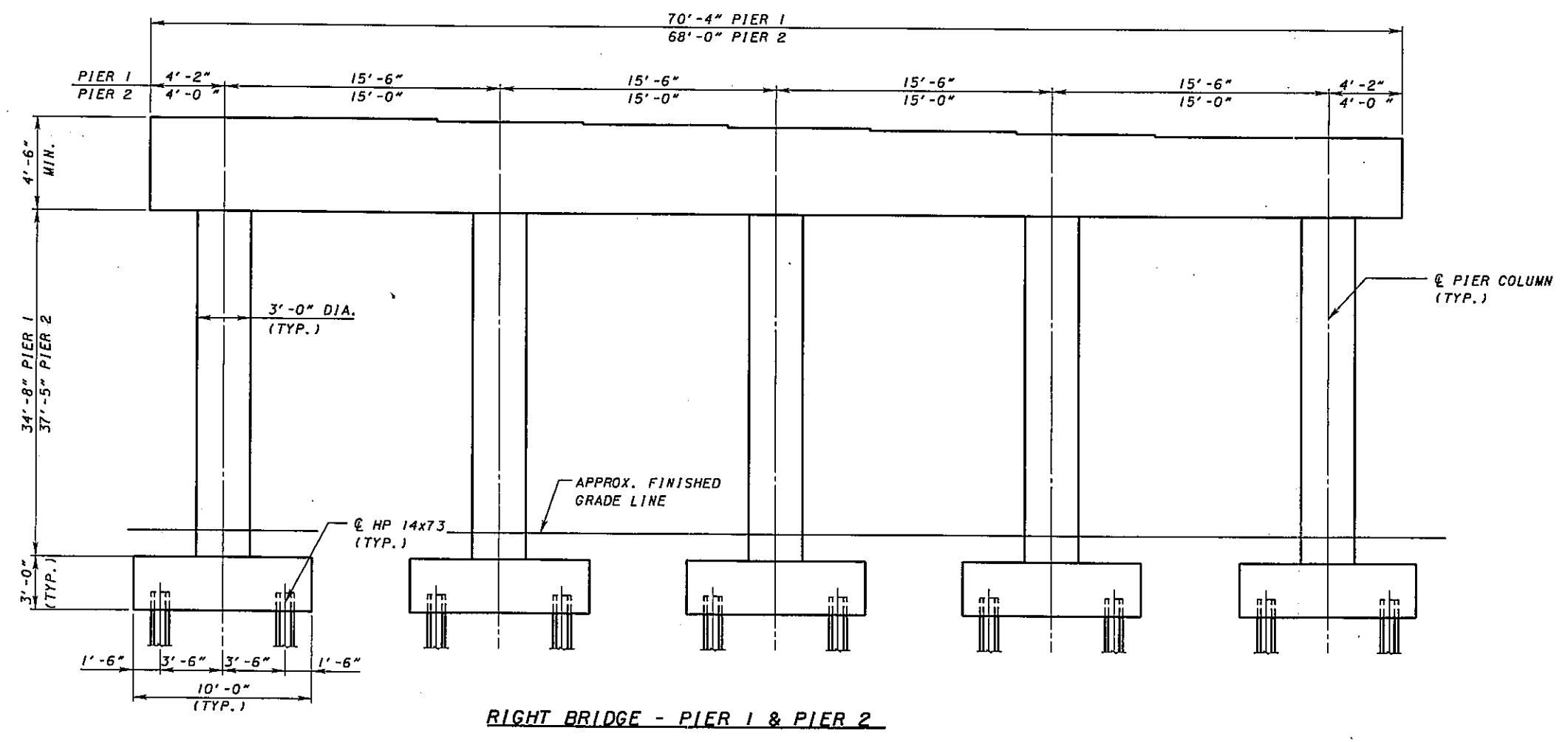
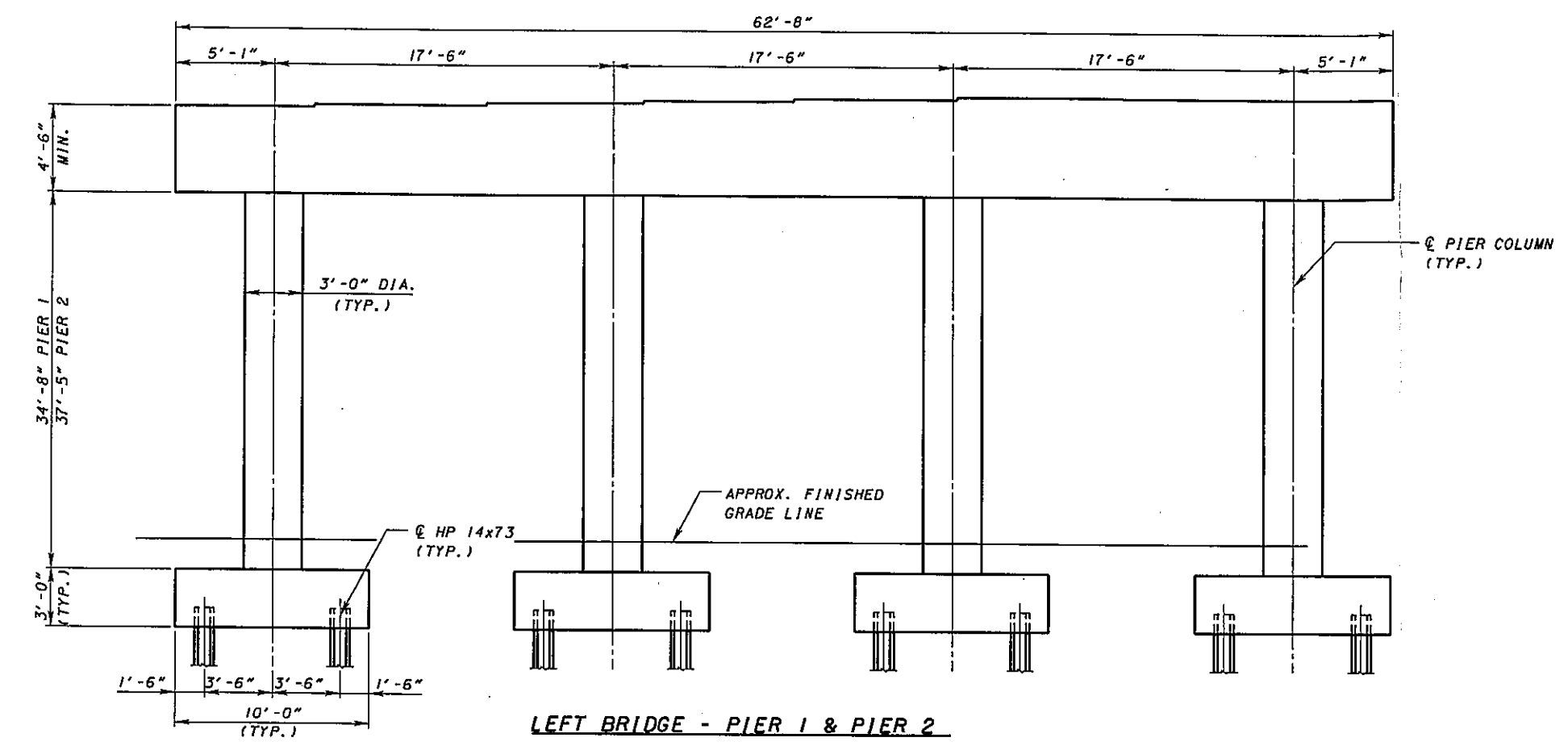
1. CONSTRUCTION CONSTRAINTS: PRIOR TO CONSTRUCTING THE PILE FOUNDATIONS, CONSTRUCT THE BRIDGE APPROACH EMBANKMENTS BEHIND THE ABUTMENT UP AT A 1:1 SLOPE FROM THE BOTTOM OF THE HEEL OF THE FOOTING TO SUBGRADE ELEVATION AND FOR A MINIMUM DISTANCE OF 250 FEET BEHIND THE ABUTMENTS. AFTER THE ABUTMENT FOOTING AND BREASTWALL ARE COMPLETED AND PRIOR TO SETTING SUPERSTRUCTURE MEMBERS, CONSTRUCT THE EMBANKMENT IMMEDIATELY BEHIND THE ABUTMENT UP TO THE BEAM SEAT ELEVATION AND ON A 1:1 SLOPE UP TO THE SUBGRADE ELEVATION, WITH TYPE B GRANULAR MATERIAL CONFORMING TO 703.16.C. PILE FOUNDATION CONSTRUCTION SHALL NOT BEGIN UNTIL SETTLEMENT PLATFORMS HAVE INDICATED 98% OF THE TOTAL CALCULATED SETTLEMENT HAS OCCURRED. THE CALCULATED TIME FOR THIS SETTLEMENT IS 280 DAYS USING WICK DRAINS AS SPECIFIED IN THE WICK DRAIN AND INSTRUMENTATION PLANS SHEET XX OF XX. ACTUAL WAITING PERIODS MAY BE MODIFIED BY THE ENGINEER BASED UPON THE SETTLEMENT READINGS
2. ITEM 203 EMBANKMENT, AS PER PLAN: PLACE AND COMPACT EMBANKMENT MATERIAL IN 6 INCH (150 MM) LIFTS FOR THE CONSTRUCTION OF THE APPROACH EMBANKMENT BETWEEN STATIONS ** TO **.
3. ITEM 507 PREBORED HOLES SHALL BE CONSTRUCTED THROUGH THE NEW EMBANKMENT.

Waiting period

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 DESIGN AGENCY
 DATE 09/28/07
 REVIEWED MSL
 STRUCTURE FILE NUMBER 73065471, 7306555R
 DRAWN PJP
 CHECKED MSL
 DESIGNED PJP
 REVISIONS
 ABUTMENT SECTION
 BRIDGE NO. SCI-823-1018 L&R
 SR823 OVER LUCASVILLE MINFORD ROAD (CR 503)
 SCI-823-10.13
 PID 79977
 4 / 6
 804
 864

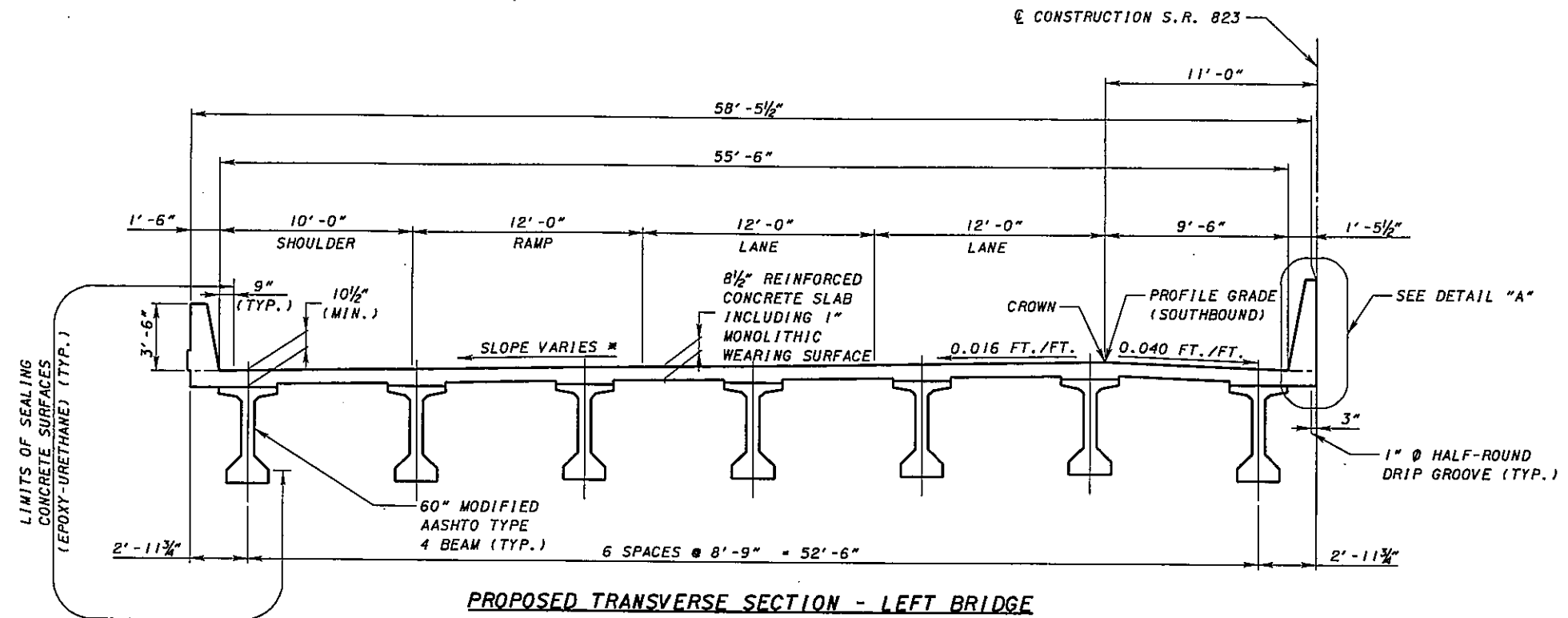
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DESIGNED	PJP	CHECKED	MSL
DRAWN	PJP	REVISED	
REVIEWED	MSL	DATE	09/28/07
		STRUCTURE FILE NUMBER	7306547L, 7306555R

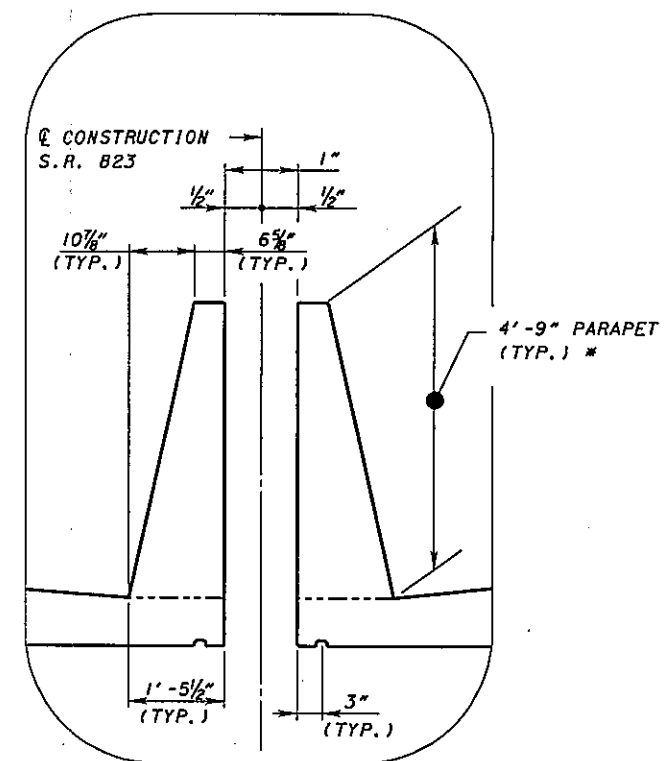
PIER DETAILS
 BRIDGE NO. SCI-823-1018 L&R
 SR823 OVER LUCASVILLE MINFORD ROAD (CR 503)

SCI-823-10.13
 PID 79977



PROPOSED TRANSVERSE SECTION - LEFT BRIDGE

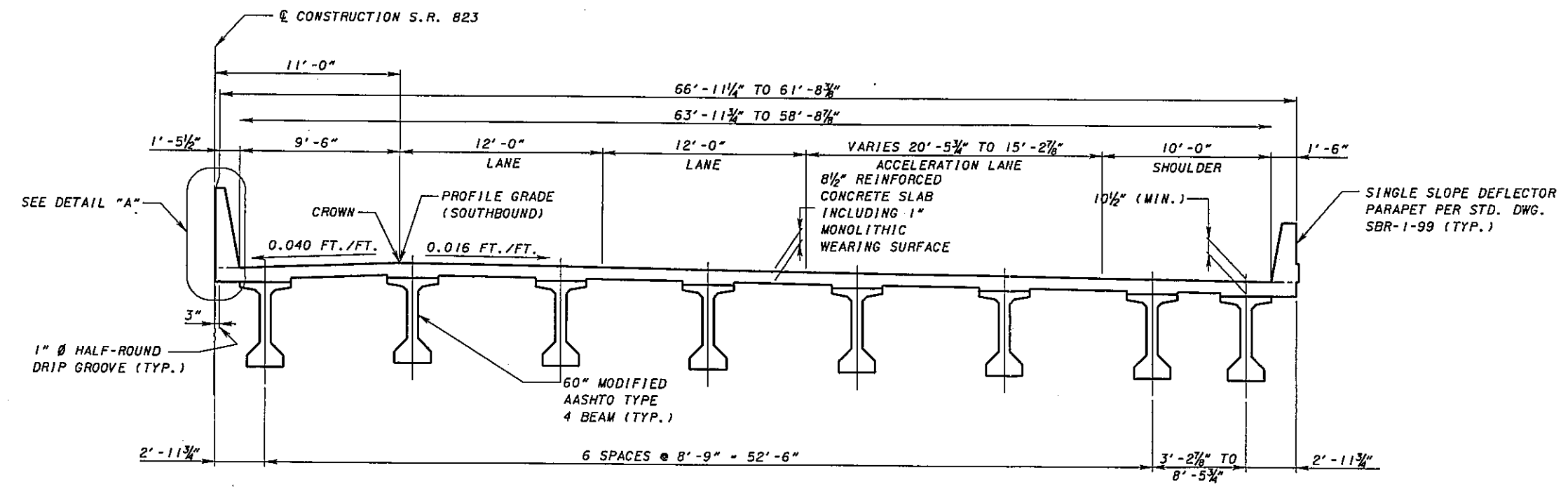
* RAMP CROSS SLOPE TRANSITION
 STA. 537+39.79 (RAMP C) = 0.027 FT./FT.
 TO STA. 537+69.79 (SR 823) = 0.016 FT./FT.



DETAIL "A"

(NOT SHOWN TO SCALE)

* PARAPETS ARE SIMILAR TO ROADWAY MEDIAN BARRIER



PROPOSED TRANSVERSE SECTION - RIGHT BRIDGE

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APPENDIX B
Structure Cost Estimate



By: PJP
Checked: MSL

Date: 7/17/2007
Date: 9/28/2007

ALTERNATIVE COST SUMMARY

Alternative No.	Span Arrangement No. Spans Lengths	Total Span Length (ft.)	Framing Alternative	Proposed Stringer Section	Subtotal Superstructure Cost	Subtotal Substructure Cost	Structure Incidental Cost (16%)	Structure Contingency Cost (20%)	Total Alternative Cost	Life Cycle Maintenance Cost	Total Relative Ownership Cost
1	3 76'-0" - 107'-9" - 76'-0"	259.75	15 Prestressed I-Girders, 7 on the Left Bridge and 8 on the Right Bridge	Modified AASHTO Type 4 (60")	\$2,303,000	\$914,000	\$514,700	\$0	\$3,730,000	\$0	\$3,730,000

NOTES:

1. Structure incidental cost allowance includes provision for structure excavation, porous backfill, sealing of concrete surfaces, structural steel painting, bearings, and crushed aggregate slope protection costs.
2. Estimated construction cost does not include existing structure removal (if any), which should be quantified separately, if required.
3. See Roadway for wick drain and other embankment construction cost.

SCI-823-0.00 - PORTSMOUTH BYPASS
S.R. 823 over Lucasville - Minford Road L&R
TS&L SUBMITTAL

By: PJP
 Checked: MSL

Date: 7/17/2007
 Date: 9/28/2007

SUPERSTRUCTURE

Alternative No.	Span Arrangement No. Spans Lengths	Total Span Length (ft.)	Deck Length (ft.)	Deck Volume (cu. yd.)	Deck Concrete Cost	Deck Reinforcing Cost	Approach Slab Cost	Framing Alternative	Proposed Girder Section	Concrete Girder Cost	Subtotal Superstructure Cost	Construction Complexity Factor	Subtotal Superstructure Cost
1	3 76'-0" - 107'-9" - 76'-0"	259.75	261.75	1244	\$689,200	\$315,500	\$121,500	15 Prestressed I-Girders, 7 on the Left Bridge and 8 on the Right	Modified AASHTO Type 4 (60")	\$1,176,800	\$2,303,000	0%	\$2,303,000

COST SUPPORT CALCULATIONS

Deck Cross-Sectional Area:

Parapets:		Individual Area (sq. ft.)		Parapet Area (sq. ft.)	Slab:		
No.	Area (sq. ft.)	No.	Area (sq. ft.)	Area (sq. ft.)	T (ft.)	W (ft.)	Total Concrete Area (sq. ft.)
Parapets 1	4.26	Parapets 1	4.26	41.4	0.71	58.50	54.6
Parapets 1	4.77	Parapets 1	4.77	45.6	0.71	64.35	59.2
					Haunch & Overhang Area		
					4.1		
					4.6		

Prestressed Concrete Girders

Unit Costs:	Year 2005	Annual Escalation	Year 2007	No. Required	
AASHTO Type IV Beams					
Pier Diaphragms	\$1,800 ea.	5.0%	\$1,980 ea.	0	\$0
Abutment Diaphragms	\$1,200 ea.	5.0%	\$1,320 ea.	0	\$0
Intermediate Diaphragms	\$1,200 ea.	5.0%	\$1,320 ea.	65	\$85,800
Modified Type 4 I-Beams (60")	\$250 per ft.	5.0%	\$280 ea.	3896	\$1,090,950
TOTAL =					\$1,176,750

Construction Complexity Factor

Percent of Superstructure = 0% Due to Deck forming, Screed and Varying Girder Spaces

QC/QA Concrete, Class QSC2

Unit Cost (\$/cu. yd.):	Year 2005	Annual Escalation	Year 2007
Deck	\$525.00	5.0%	\$579.00
Parapets	\$385.00	5.0%	\$424.00
Weighted Average =			\$554.00

Based on parapet and slab percentages of total concrete area

Reinforced Concrete Approach Slabs (T=15")

Unit Cost (\$/sq. yd.):
 Length = 25 ft. Width = 123 ft
 Area = 341 sq. yd.

Unit Cost (\$/sq. yd.):	Year 2005	Annual Escalation	Year 2007
Approach Slabs	\$161.00	5.0%	\$178.00

Epoxy Coated Reinforcing Steel

Unit Cost (\$/lb):
 Assume 285 lbs of reinforcing steel per cubic yard of deck concrete

Unit Cost (\$/lb):	Year 2005	Annual Escalation	Year 2007
Deck Reinforcing	\$0.81	5.0%	\$0.89

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S.R. 823 over Lucasville - Minford Road L&R

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SUBSTRUCTURE

Alternative No.	Span Arrangement No. Spans	Lengths	Framing Alternative	Proposed Stringer Section	Pier Concrete Cost	Pier Reinforcing Cost	Abutment Concrete Cost	Abutment Reinforcing Cost	Pile Foundation Cost	MSE Abutment & Wingwall Cost	Additional Crane Cost	Subtotal Substructure Cost
1	3	76'-0" - 107'-9" - 76'-0"	15 Prestressed I-Girders, 7 on the Left Bridge and 8 on the	Modified AASHTO Type 4 (60")	\$299,500	\$63,200	\$164,800	\$28,500	\$283,400	\$0	\$75,000	\$914,000

COST SUPPORT CALCULATIONS

Pier QC/QA Concrete, Class QSC1 Cost: (Spread Footing)

Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost
Cap	198	\$575.00	5.0%	\$634.00	\$125,530
Stem	170	\$575.00	5.0%	\$634.00	\$107,780
Footings	200	\$300.00	5.0%	\$331.00	\$66,200
Total	568				\$299,500

Pile Foundation Unit Cost (\$/ft.):

HP 14X73 Piles, Furnished & Driven

Number of Piles	Total Pile Length
128	7,120

Pier QC/QA Concrete, Class QSC1 Cost: (Drilled Shaft)

Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost
Cap	0	\$575.00	5.0%	\$634.00	\$0
Columns	0	\$575.00	5.0%	\$634.00	\$0
Footings	0	\$300.00	5.0%	\$331.00	\$0
Total Cost					\$0

Pile Foundation Unit Cost (\$/ft.):

Furnished	Year 2005 Unit Cost	Annual Escalation	Year 2007
Driven	\$26.47	5.0%	\$29.20
Total	\$9.62	5.0%	\$10.60
			\$39.80

Shaft Foundation Unit Cost (\$/ft.):

36" Drilled Shaft

Number of Shafts	Total Shaft Length
Alt. 1 0	0

Abutment QC/QA Concrete, Class QSC1 Cost:

Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost
Abutment	356	\$420.00	5.0%	\$463.00	\$164,800

Shaft Foundation Unit Cost (\$/ft.):

Unit Cost	Escalation	2008
\$300.00	5.0%	\$365.00

Temporary Shoring and Support Unit Costs (\$/sq. ft.):

	Temp. Shoring Area (sq. ft.)	Temp. Girder Support (lump sum)
Alt. 1	0	\$ -

	Year 2004 Unit Cost	Annual Escalation	Year 2008
Temporary Shoring	\$22.50	5.0%	\$27.30
Cofferdam	\$32.00	5.0%	\$38.90

Note: Winwalls included in the Abutment Quantity

Cost of Shafts: \$ -

Epoxy Coated Reinforcing Steel

Unit Cost (\$/lb):
 Assume 125 lbs of reinforcing steel per cubic yard of pier concrete.
 Assume 90 lbs of reinforcing steel per cubic yard of abutment concrete.

	Year 2005	Annual Escalation	Year 2008
Pier	\$0.81	5.0%	\$0.89
Abutment	\$0.81	5.0%	\$0.89

MSE Abutment Unit Cost (\$/sq. ft.):

Total Area (sq. ft.)	Year 2005 Unit Cost	Annual Escalation	Year 2008
Alt. 1 0	\$50.00	5.0%	\$57.90

Additional Crane Cost

\$ 75,000

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 Date: 9/28/2007

Pier Location	Pier Quantities														Total Volume
	Cap				Columns				Footings						
	Length	Width	Height	Volume	Dia	#	Height	Volume	Width	Height	Length	#	Volume		
Pier 1 L	62.67	4.5	4.5	1269.1	3	4	34.7	980.2	10	3	10	4	1200	3449	
Pier 1 R	70.33	4.5	4.5	1424.2	3	5	34.7	1225.2	10	3	10	5	1500	4149	
Pier 2 L	62.67	4.5	4.5	1269.1	3	4	37.5	1060.3	10	3	10	4	1200	3529	
Pier 2 R	68	4.5	4.5	1377.0	3	5	37.5	1325.4	10	3	10	5	1500	4202	
														0	
														0	
Total (Cu.Ft.)				5339				4591					5400	15330	
Total (Cu.Yd.)				198				170					200	568	

Location	Load/girder (Kips)	# Girders	Total Girder Load	Subst Wt (kips)	Pile Cap. (Kips)	No. Piles	Increase Factor	Pile Quantities				
								Total Piles	Top Elev.	Bot Elev.	Pile Length	Total Pile Length (Feet)
Rear Abut.	0	0	0	0	0	0	1	28	744.6	674.6	70.0	1960
Pier 1 L								16	710	673.8	40.0	640
Pier 1 R								20	710	673.8	40.0	800
Pier 2 L								16	714	673.2	45.0	720
Pier 2 R								20	714	673.2	45.0	900
											0.0	0.0
											0.0	0.0
Fwd. Abut.	0.00	0	0	0	0	0	1	28	750.8	678.6	75.0	2100
Total								128				7120

Abut Location	Length (feet)	Abutment Quantities													Total Volume	
		Backwall				Beam Seat				Footings						
		Width	Depth	Area	Volume	Width	Height	Area	Volume	Width	Depth	Area	No.	Volume		
Rear Abut																
Fwd. Abut																
Total (Cu.Ft.)					0				0					0		0
Total (Cu.Yd.)					0				0					0		356

Location	Load/girder (Kips)	# Girders	Total Load	Subst Wt (kips)	Pile Cap. (Kips)	No. Piles	Increase Factor	36" Drilled Shafts for Piers				
								Total Shafts	Top Elev.	Bot Elev.	Pile Length	Total Shaft Length (Feet)
Rear Abut.	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
	0	0	0	0	0	0	1	0	0	0	0.0	0
Fwd. Abut.	0	0	0	0	0	0	1	0	0	0	0.0	0
Total							1	0	0	0	0.0	0

Abut Location	MSE Abutment Wall Quantities			
	Wall			
	Height	Length	Area	Volume
Rear Abut	0	0	0.0	
RA Wing (L)	0	0	0.0	
RA Wing (R)	0	0	0.0	
Fwd Abut	0	0	0.0	
FA Wing (L)	0	0	0.0	
FA Wing (R)	0	0	0.0	
Total (Sq.Ft.)			0	

Superstructure P/S Concrete Quantities					Spacing Int.	No. of Int in span	Number of Int Diap. 1 location	Total No. in Span
Location	Type of girder	# Girders	Girder Length (ft.)	Total Length (ft.)				
Span 1	MOD TYPE 4 60	15	76.00	1140	0.00			13
Span 2	MOD TYPE 4 60	15	107.75	1616	0.00			39
Span 3	MOD TYPE 4 60	15	76.00	1140	0.00			13
Span 4		0	0	0	0.00			0
Span 5		0	0	0	0.00			0
Span 6		0	0	0	0.00			0
Span 7		0	0	0	0.00			0
Span 8		0	0	0	0.00			0
Span 9		0	0	0	0.00			0
Total	MOD TYPE 4 60	45		3896				65