



SCI-823-0.00

PID No. 77366

US 52 RAMP B OVER US 52 AND OHIO RIVER RD

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



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
US 52 Ramp B over U.S. 52 and Ohio River Road (CR 503)
SCI-823-0.00 Portsmouth Bypass
PID#77366**

Dear Mr. Siddiqi:

Submitted for review and comment is the Preliminary Design Report for US 52 Ramp B over US 52 and Ohio River Road (CR 503). Included are The TS&L drawings and the Final Geotechnical Report by DLZ, Ohio, dated June 19, 2007. Please find below our disposition to the April 17, 2007 comments by Jeff Crace, PE regarding the STS submittal.

- 1) We agree that Alternate 4 should be the recommended structure type. The superstructure is comprised of a five span steel plate girder (A709, grade 50W) made composite with the reinforced concrete deck. The substructure consists of stub abutments supported on piles with mechanically stabilized embankment and piers (integral straddle bents and expansion) supported on drilled shafts.*

This Alternative has been carried forward to the attached submittal.

- 2) Prior to the initiation of detail design a single drilled shaft to support each column for the integral piers should be investigated.*

The use of a single drilled shaft has been investigated by DLZ in their report dated June 19, 2007. In addition to the single drilled shaft, spread footings and short vertical piles were also recommended as feasible foundation types. The cost for each of the feasible foundation types were calculated and compared. As a result of this comparison, the pile foundation was found to be the most economical.

- 3) *It may be possible to locate the pier column nearest to the outside shoulder closer to the shoulder thereby reducing the required span of the integral pier cap. This can be accomplished a couple of different ways 1) utilizing a drilled shaft and casing, 2) the traffic can be temporarily shifted away from the pier that is being worked on and once completed the traffic can be shifted to the other side of the roadway.*

It has been possible to locate the pier columns at the outside shoulders closer to the edge of shoulder. To do this concrete barrier has been extended or added to protect the pier columns. The preliminary maintenance of traffic plans included in this submittal indicate that the construction along US 52 will be phased between work in the median and work on the outside shoulders.

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

Sincerely,

Michael D. Weeks by *AP*
Michael D. Weeks, P.E., P.S.
Project Manager

Cc: T. Barnitz, P.E.

TABLE OF CONTENTS

<u>Table of Contents</u>	<u>Page No.</u>
1. Introduction.....	1
2. Design Criteria.....	1
3. Subsurface Conditions and Foundation Recommendation...	1-2
4. Roadway.....	2-4
5. Proposed Structure Configuration.....	4-5
APPENDIX A	
• Site Plan (Sheets 1 & 2 of 19)	19 Sheets
• Typical Pier Details (Sheets 3 & 4 of 19)	
• Framing Plan (Sheet 5 of 19)	
• Wall 3 Details (Sheets 6-13 of 19)	
• Wall 4 Details (Sheets 14-19 of 19)	
APPENDIX B	
• Cost Estimate	4 Sheets

PRELIMINARY BRIDGE DESIGN NARRATIVE

1. Introduction

TranSystems is providing engineering services to the Ohio Department of Transportation for the design of new overpass structures for the proposed S.R. 823 ramps at the U.S. 52 interchange over Ohio River Road. This preliminary design report will address the overpass structure on Ramp B, which carries southbound traffic from S.R. 823 to eastbound U.S. 52. 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 November 20, 2006 to incorporate the updated roadway geometry. Following the submittal of the Type Study ODOT comments were received December 22, 2006. The comments requested that new span arrangements be investigated using straddle bent type piers. Addendums were prepared to the 11/20/06 Type Study to address two new span arrangements that use straddle bent type piers. Comments to the addendum were received April 17, 2007 and are incorporated into this submittal.

2. Design Criteria

The proposed structure will be 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 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 Ramp B and prepared bridge foundation recommendations in their report dated June 19, 2007.

In summary, five test borings (TR-62, TR-64, TR-66, TR-70A, TR-71A, TR-73A, B-48 through B-53) were drilled and all of them encountered bedrock at depths between 3.5 and 17 feet. Overburden consisted of natural granular and cohesive materials. The native overburden soils varied from occasional medium dense gravel with sand (A-1-b) to stiff to very stiff silt and clay (A-6a).

DLZ recommends the following three possible solutions for supporting the rear abutment:

- 1) pipe piles placed in prebored holes 12 inches larger than the diameter of the pile and a minimum of 5' deep into bedrock.
- 2) H-Piles driven to refusal on bedrock. *w/ sleeves*
- 3) drilled shafts socketed a minimum of 5' into competent bedrock.

DLZ recommends the following four possible solutions for supporting Piers 1 through 3:

- 1) pipe piles placed in prebored holes 12 inches larger than the diameter of the pile and a minimum of 5' deep into bedrock.
- 2) H-Piles driven to refusal on bedrock.
- 3) drilled shafts socketed a minimum of 5' into competent bedrock.
- 4) Spread footings bearing on bedrock.

DLZ recommends the two possible foundation types at Pier 4:

- 1) drilled shafts socketed a minimum of 5' into competent bedrock.
- 2) Spread footings bearing on bedrock.

DLZ recommends the two possible foundation types at the forward abutment:

- 1) drilled shafts socketed a minimum of 5' into competent bedrock.
- 2) pipe piles placed in prebored holes 12 inches larger than the diameter of the pile and a minimum of 5' deep into bedrock.

MSE wall evaluations were also performed by DLZ Ohio, Inc. and are presented in their 6/19/07 report. The MSE walls were evaluated with respect to bearing capacity, sliding, overturning, global stability and settlement. These wall evaluations reveal that MSE walls can be used at the rear and forward abutment locations. DLZ anticipates that the MSE wall at the forward abutment will bear on bedrock whereas the MSE wall at the rear abutment will bear on Item 203 Granular Material, Type C. Note that some portions of the forward MSE wall, on the right side, will bear upon Select Granular Backfill. DLZ recommends that a minimum of 5.0' of native soil below the leveling pad be removed and replaced with the compacted granular fill. The under cut is required to satisfy the undrained bearing capacity.

4. Roadway

The purpose of this project is to construct a new bypass state route – S.R. 823 – 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 the town to another interchange with US 23 north of the town in Valley Township. As part of the US 52 and SR 823 interchange on the south terminus of the proposed bypass, Ramp B carries southbound traffic from S.R. 823 to eastbound U.S. 52. The proposed Ramp B bridge will consist of one 16'-0" travel lane with a 6'-0" left shoulder and a 8'-0" right shoulder with 1'-6" straight face deflector parapets (SBR-1-99). Thus the bridge deck width will be 33'-0" out to out.

Alignment & Profile - The proposed horizontal geometry is along a curved alignment across the entire length of the ramp structure. The curve alignment may be defined by the following parameters: PI = Station 42+39.68, $\Delta = 35^{\circ}28'24"$ (Rt.), D_c (degree of curve) = $1^{\circ}36'00"$, R (radius) = 3580.99', $L_s = 200.00'$, $\Theta = 1^{\circ}36'00"$, $LT = 133.34'$, $ST = 66.67'$, $\Delta_c = 32^{\circ}16'24"$ (Rt.), $L_c = 2017.08'$, $T_s = 1245.51'$, and $E_s = 179.20'$. The proposed Ramp B structure is positioned within a horizontal curve, therefore the deck is superelevated. The superelevation rate and layout are based on Figure 202-7E of the ODOT Location and Design Manual, Volume One – Roadway Design (using a degree of curve of $1^{\circ}36'00"$ and design speed of 60 mph) and Figure 205 of the ODOT Bridge Design Manual, respectively. Using these design references results in a superelevation rate of 0.043 ft/ft (4.3%) across the ramp travel lane. The proposed ramp profile is located on the right edge of the traveled lane and is along a vertical curve beginning at 39+70 with PVI at Station 43+20.00, PVI Elevation = 598.98, $g_1 = 3.19\%$ and $g_2 = -0.87\%$. Horizontal and vertical sight distances, in accordance with the design standards, have been provided for the proposed alternative.

Several roadways, properties and two Norfolk Southern tracks are closely aligned in the proposed U.S. 52-S.R. 823 interchange. The close proximity of these roadways and their differences in elevation at various locations warrant the use of MSE walls to satisfy both grading continuity and safe/proper embankment limits. MSE walls will be required not just along the roadway portions of Ramps A and B, but also at the abutments of the respective overpass structures.

Vertical and Horizontal Clearances - The vertical profile of the ramp is dictated by the depth required for the structure. Vertical clearance was considered critical at this structure location. Ohio River Road is classified as an Urban Minor Arterial roadway and US 52 is classified as an Urban Principal Arterial. According to the ODOT Location and Design Manual, Volume One – Roadway Design, Figure 302-1E, a preferred vertical clearance of 17'-0" (minimum of 16'-6") should be provided over Arterial roadways such

as the ones at this site. The profile has been adjusted since the Type Study submittal to lower elevations and thus reduce construction costs, yet still satisfy vertical clearance requirements. Note that slightly higher clearances are provided at the fracture critical pier caps in use over the roadway. This is similar to the additional clearance provided for a pedestrian bridge over a highway as stipulated in Section 209.10 of the BDM.

Horizontal clearances will use guardrail or concrete barrier due to the skew of the crossing and the impact on span lengths. The minimum horizontal clearances under the structures will be in accordance with Figure 302-1E and the other sections it references. A description of the horizontal clearances follows:

US 52- The design designation of US 52 is an Urban Principal Arterial road with a 2030 ADT of 39,400 as shown in the PAVR submittal and as given by ODOT Office of Technical Services letter of 6/2/05. The design speed of US 52 is 60mph. US 52 currently has uncurbed outside shoulder with drainage ditches. Using this roadway classification in Figure 301-3E gives a guardrail offset of 12'-0" and a concrete barrier offset at the edge of the treated shoulder of 10'-0". Improvements are not planned on US 52; therefore, the proposed guardrail offsets along US 52 will match the existing guardrail offset of 10'-0" to the outside right shoulder. This offset will be used for proposed guardrail or concrete barrier along with the barrier clearances in Figure 603-2E behind the face of the barrier. A clear zone width of 30'-0" has been determined from Figure 600-1E based upon the roadway design data and the existing grading along US 52.

The proposed structure also includes piers in the median of US 52, thus, reducing the width of the existing median shoulders. The existing median width is 16'-0" with a 42" median barrier. The proposed column width is 5'-0" and the width of the barrier on either side of the column is 1'-2" from standard drawing RM-4.4 Type B, leaving 4'-4" of median shoulder on the northbound and southbound lanes. From figure 303-1E and note (p) of the same figure the required median shoulder width for a divided arterial is 4'-0".

Ohio River Road (CR-503)- The design designation of Ohio River Road is an Urban Minor Arterial and the ADT is unknown but it is assumed to be greater than 4000. The design speed is obtained from Figure 104-2E of the ODOT Location and Design Manual, Volume One – Roadway Design, recommending a design speed of 40-50 mph. The posted speed on Ohio River Road is 45mph and therefore a 50mph design speed selected. Using this information in Figure 301-4E of the L&D manual, the offset to the concrete barrier is at the edge of treated width of 10'-0". The concrete barrier will be Type D per standard drawing RM-4.5.

Drainage Design –The profile on the structure is in a positive grade of 3.19% leading into a 700' vertical curve starting at station 39+70. The high point of the vertical curve is just beyond the forward abutment at station 45+20, thereby draining the pavement towards the structure. Pavement spread calculations indicate that the spread will be contained in the shoulder for the length of the bridge beginning from the end of the MSE wall and barrier at the forward abutment. However, it was noted that the spread filled most of the shoulder at the rear abutment and flowed over the bridge joint to a catch basin off the bridge. This condition was similar to that proposed on the SR 823 structure over the Little Scioto River and ODOT commented that they preferred to minimize the amount of water flowing over the expansion joints. Similar to that structure, scuppers are included on the proposed structure at station 40+50 and Pier 1. The scupper at Pier 1 will need to be piped to outlet beyond the outside shoulder of US 52. The framing plan has been laid out to provide for 1'-6" overhangs at the proposed scupper locations.

Utilities - No utilities will be placed on the bridge. However, lighting and ITS conduits will be provided if necessary. The proposed structure requires the relocation of a waterline and electric line that run parallel to Ohio River Road.

Maintenance of Traffic - While the new bridge is under construction, traffic will be maintained on US 52. The preliminary maintenance of traffic plans included in the corresponding roadway submittal detail two interchangeable phases of construction on US 52. Phase 1A will allow for construction on the left and right sides of US 52 (MSE walls and piers). Phase 1B will allow for construction of the piers in the median of US 52. Additional limited closures may be required to set the pier caps and beams.

5. Proposed Structure Configuration

Span configuration: The proposed structure is a five span structure similar to one investigated in response to the ODOT comments. Substructure units were positioned at the following stations: centerline bearing rear abutment at Station 35+45.00, centerline Pier 1 at Station 36+97.50, centerline Pier 2 at Station 38+50.00, centerline Pier 3 at Station 39+95.00, centerline Pier 4 at Station 41+37.00, and centerline bearing forward abutment at Station 42+78.50. The resulting span lengths, measured along the baseline construction of Ramp B, are consequently 152'-6", 152'-6", 145'-0", 142'-0", and 141'-6" for an overall bridge length of 733'-6" from centerline bearing rear abutment to centerline bearing forward abutment. The positions of all substructure units satisfy horizontal clearances for Type D concrete barrier or the 30'-0" clear zone (see L & D Manual Volume I, Figure 603-2E, Figure 600-1E as well as the accompanying site plan).

Substructure:

- I. **Abutments:** Due to the horizontal curvature and a bearing-to-bearing length of 733'-6" (> 400' total length), a conventional, or stub-type, abutment is used at both the rear and forward abutments. The details of the abutments will follow ODOT Standard Drawing A-1-69. The forward abutment is founded on 16" diameter pipe piles embedded in 28" diameter rock sockets that are 5' deep into bedrock. The CIP piles with prebored holes were selected due to the low overburden at the location of forward abutment (see DLZ's 6/19/07 report). The rear abutment will be founded on driven HP 14x73 piles, placed in pile sleeves to prevent conflict with MSE embankment construction. The abutments are located behind mechanically stabilized earth (MSE) walls and both the abutments and MSE walls are oriented at a 0°00'00" skew with respect to the reference line that runs from centerline bearing rear abutment to centerline bearing forward abutment.
- II. **Piers:** The two piers outside of the US 52 median (Piers 3 and 4) will be T-Type piers. The remaining two piers will be straddle bents, comprised of a cap supported on columns positioned off of US 52. One column for both Pier 2 and Pier 3 will have to be positioned within the median of US 52 whereas the location of the other column must satisfy the minimum horizontal clearance with concrete Type D barrier. When both this horizontal clearance and the high skew angle at which the proposed Ramp B bridge crosses US 52 are considered simultaneously, the columns are positioned such that the pier cap must span approximately 49'-10" from centerline of column to centerline of column. To accommodate this length and the applied loads as well as provide a viable economic solution, an integral, built-up steel I-shaped pier cap will be used. Previous evaluations for the Type Study of S.R. 823 Ramp A (NB) over Ohio River Road revealed the structural and economic effectiveness of integral steel pier caps and because ODOT has also had past success with such caps, an integral built-up steel I-shaped pier cap is recommended for the proposed structure. Note that potential debris traps are likely to exist at the intersections of the girder and pier cap as well as stiffeners and a scupper and piping is proposed at Pier 1.

Consequently, in accordance with FHWA Technical Advisory, *Uncoated Weathering Steel in Structures*, Grade 50 steel is recommended for use as the integral I-shaped pier caps. Furthermore, using **lightly colored contrasting painted steel** will also make inspection of the pier caps easier. The girders should be painted a distance of **1 ½ times the depth of the girder** to either side of the pier cap.

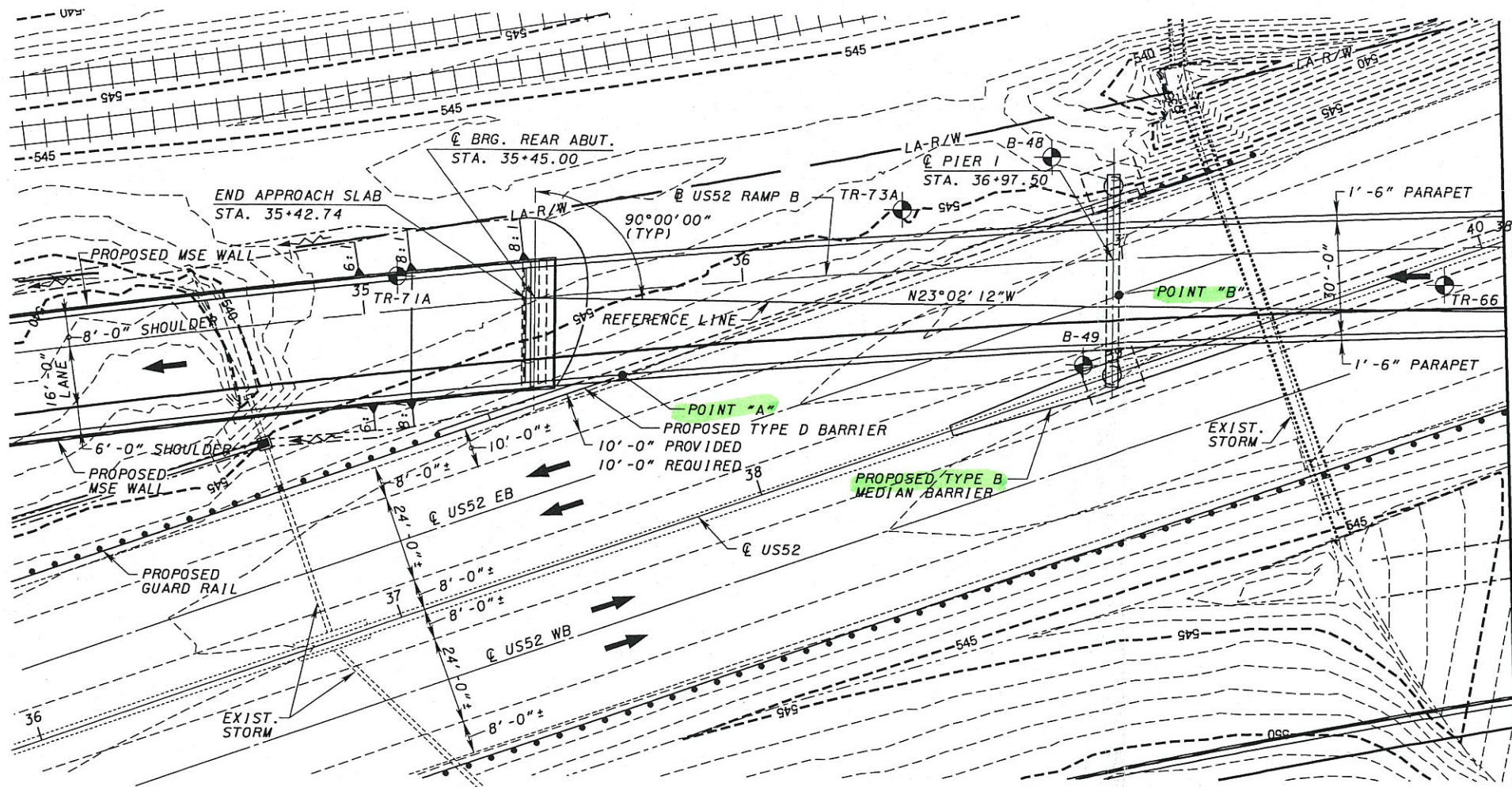
DLZ has provided recommendations for driven piles, spread footings and single drilled shafts at Piers 1-3. The recommendations at **Pier 4** are similar, however, rock was encountered at a very shallow depth and therefore **driven piles are not recommended**. Preliminary estimates for each foundation type were calculated and the construction costs estimated. The cost analysis revealed that **driven piles had the lowest construction cost at the Piers 1-3** and a **spread footing bearing on rock was the most economical at the Pier 4**. Similar analysis was also performed at the adjacent US 52 Ramp A structure and driven piles were also recommended at that location.

Superstructure:

- I. Deck and Girders: In order to support an HS-25 (Case I) and Alternate Military Loading as well as a Future Wearing Surface loading of 60 psf, the superstructure for Alternative 3 consists of 4-welded steel plate girders, Grade 50W, with 80" deep webs. The plate girders are dog-legged at the splice points (and placed parallel to one another between splices) to accommodate the horizontal curvature of the bridge. As shown in the framing plan, the girders are erected with a center-to-center spacing of $9'-6\frac{5}{8}" \pm$. As mentioned previously in the Drainage Design section, the framing plan has been developed to provide for a 1'-6" overhang at the proposed scupper locations. The thickness of the deck supported by these girders is $8\frac{3}{4}"$ (which includes a 1" monolithic wearing surface) and deck width is 30'-0" from toe-to-toe of parapet with an overall width of 33'-0".
- II. Bearings and Expansion Devices: **Since Piers 1 and 2 are integral** and thus treated as "fixed" piers, a preliminary evaluation of expansion devices at the abutments uses an expansion length of **152'-6" at the rear abutment** and an expansion length of **428'-6" at the forward abutment**. With such lengths, Section 306.3.3 of the ODOT Bridge Design Manual and ODOT Standard Drawing EXJ-4-87 reveal that a **3" strip seal expansion joint** can be used at the **rear abutment** whereas a **modular expansion device** is needed at the **forward abutment**. Note that this result is based on a preliminary evaluation of the bridge system and **does not account for horizontal curvature effects**. A preliminary **bearing evaluation results in a recommendation of pot bearings**. The large vertical reactions and thermal displacements/rotations at the abutments and piers (specifically at the **"expansion" Piers 3, and 4**) make it difficult to simultaneously satisfy the shear, compressive stress, rotation, and stability requirements of elastomeric bearing Methods A and B. When an elastomeric bearing does comply with these requirements, the resulting plan dimensions of the bearing are excessive and/or the thickness is greater than 5". Pot bearings provide a more direct and simple solution, one that can support large vertical reactions as well as the multi-directional displacements/rotations that will develop due to the horizontal curvature of these bridges.

APPENDIX A
Structure Plans





show scupper

- 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 = 3,580.93'
 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'

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'

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

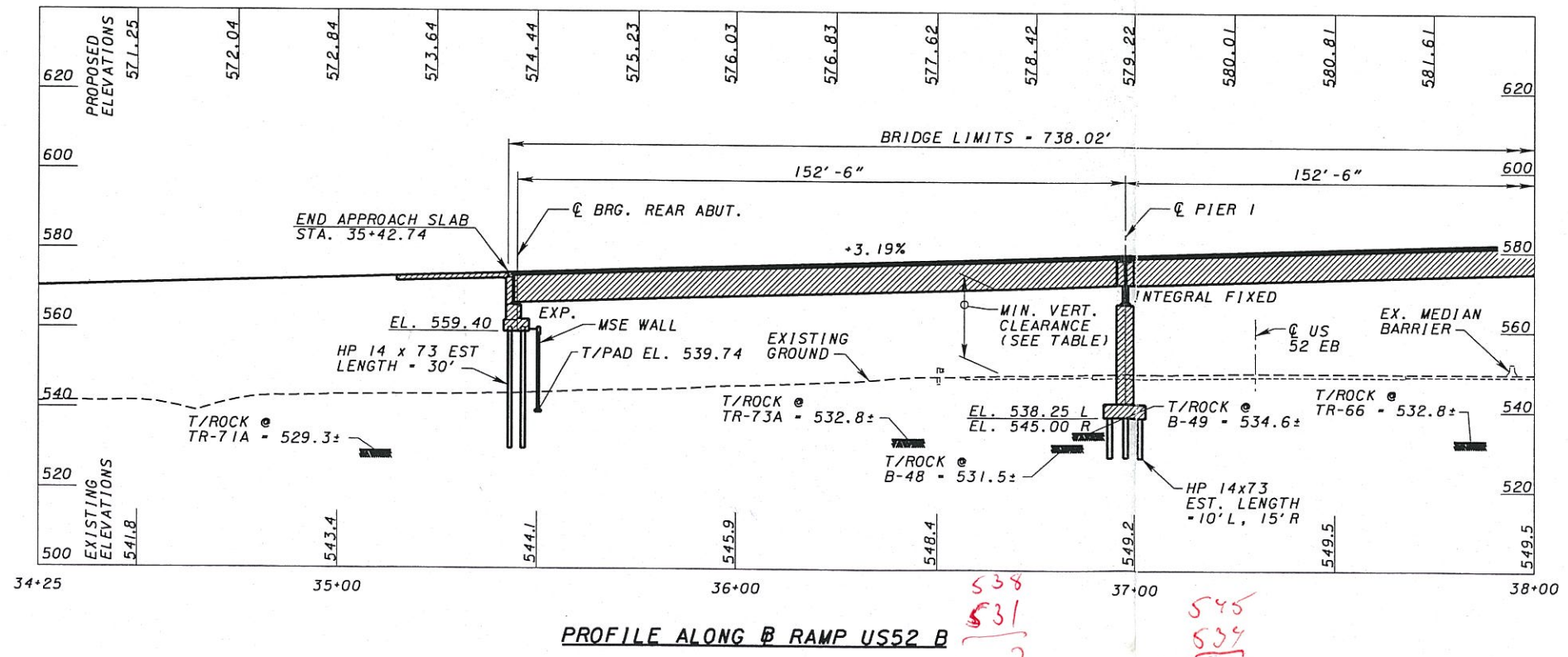
RAMP US52 B
 CURRENT YEAR ADT (2010) = 6700
 DESIGN YEAR ADT (2030) = 10500
 CURRENT YEAR ADTT (2010) = 938
 DESIGN YEAR ADTT (2030) = 1470

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)

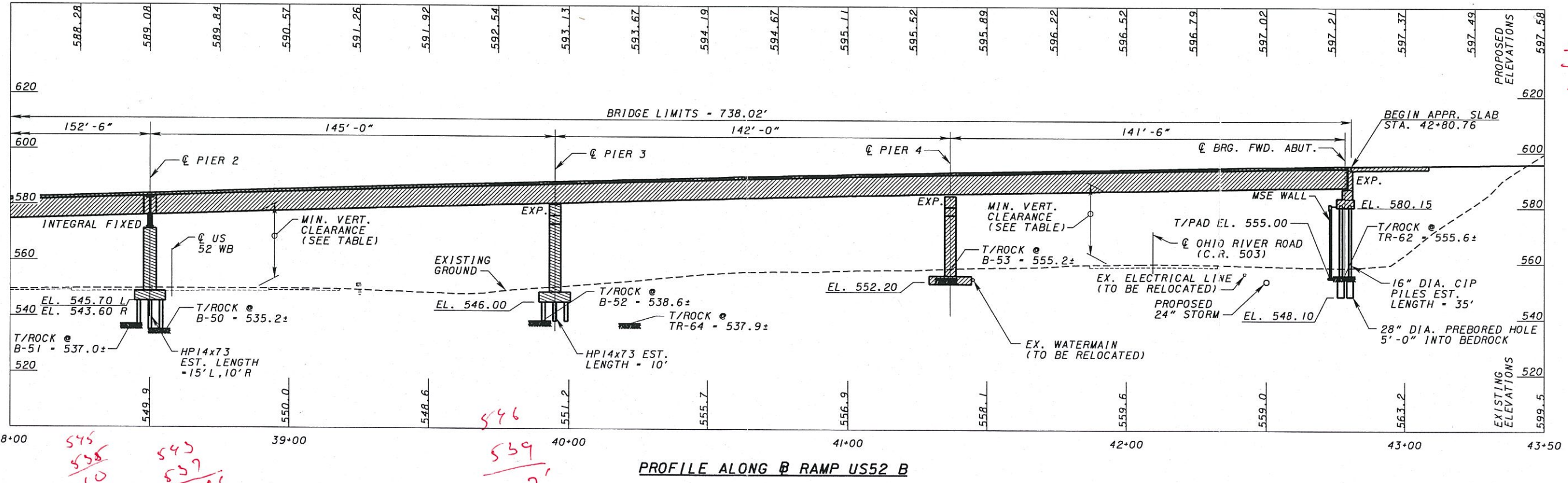
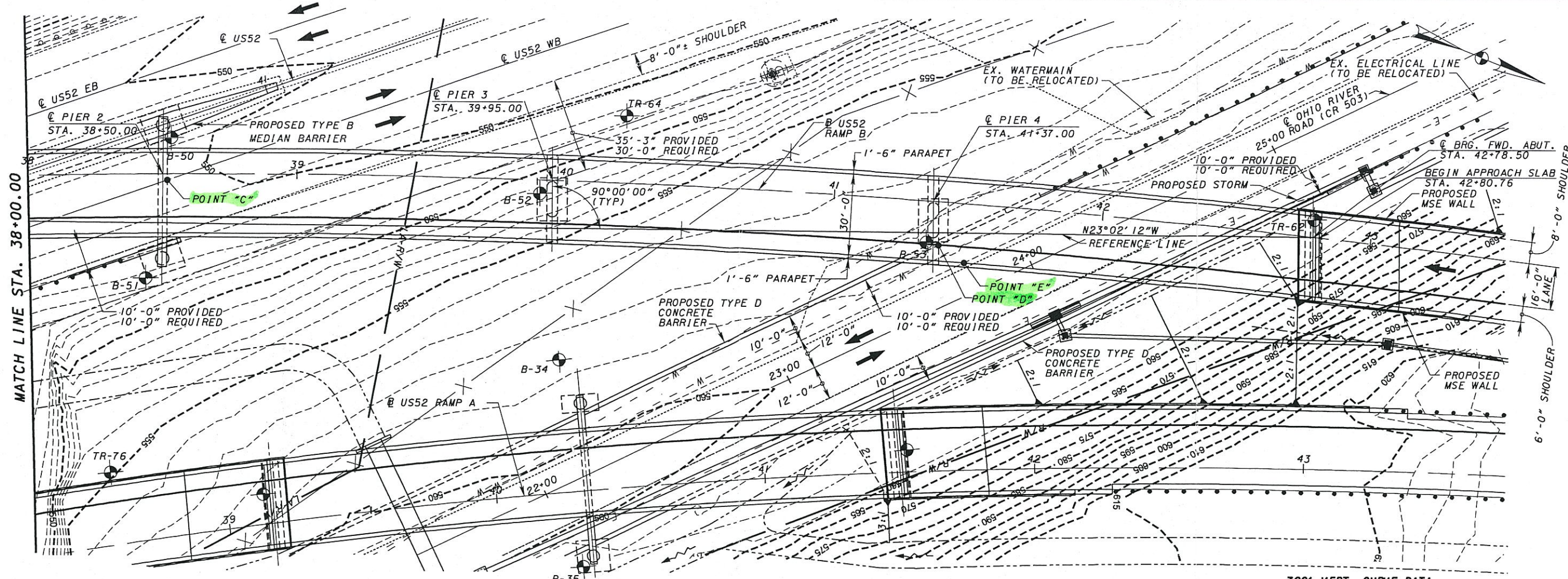
ROADWAY: 30'-0" TOE TO TOE OF PARAPETS
 LOADING: HS-25 (CASE 1) AND ALTERNATE MILITARY LOADING, FWS-60 PSF
 SKEW: 00°00'00" WITH RESPECT TO THE REFERENCE LINE (ALSO SEE FRAMING PLAN)
 SUPERELEVATION: 0.043 FT/FT
 CROWN:
 ALIGNMENT: 1°36'00" CURVE TO THE RIGHT
 WEARING SURFACE: MONOLITHIC CONCRETE
 APPROACH SLABS: AS-1-81 (30' LONG)
 LATITUDE: 38°44'49"N
 LONGITUDE: 82°52'18"W



538
531
545
539
11

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DESIGN AGENCY: **TransSystems**
 DATE: 09/26/07
 REVIEWED: MSL 09/26/07
 DRAWN: JDG
 DESIGNED: MTN
 CHECKED: PJP
 SC100 COUNTY: 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
 778
 847



1/8/2008
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TRAN Systems
 DESIGN AGENCY
 8941 PENNINGTON AVENUE, SUITE 200
 CLEVELAND, OHIO 44131

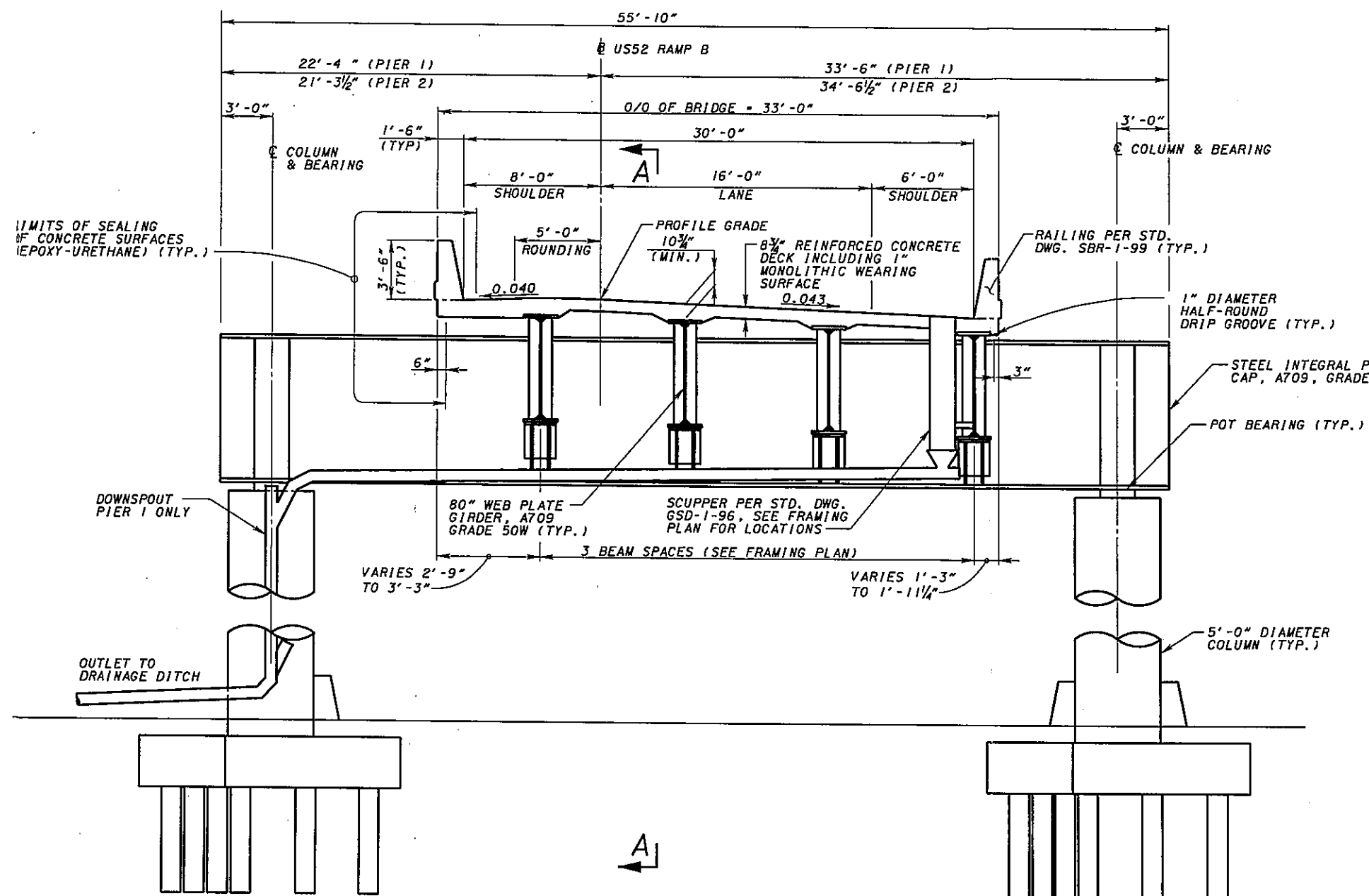
DESIGNED	MTN	CHECKED	PJP
DRAWN	JDG	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7306261		

SC1070 COUNTY STA. 35+42.74
 BRIDGE NO. SC1-823-0067L
 US52 RAMP B TO SOUTHBOUND SR823 STA. 42+80.76

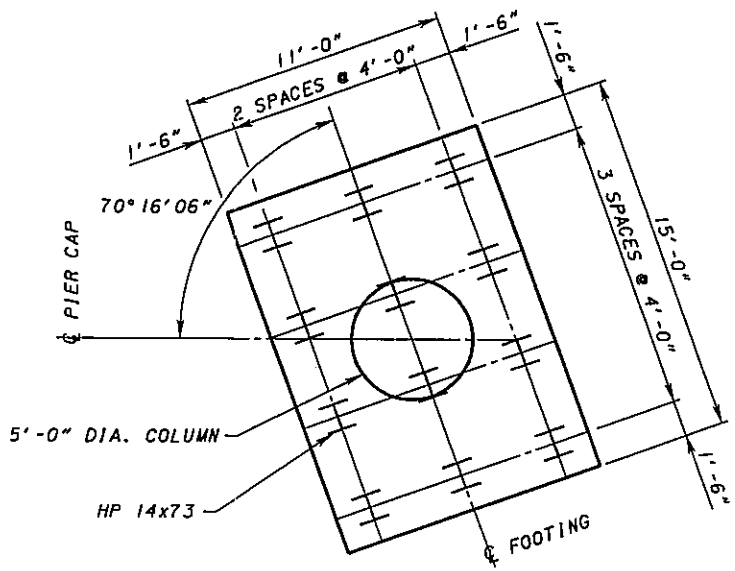
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 SCI-823-0.00
 PID 77366

2 / 19
 779
 847

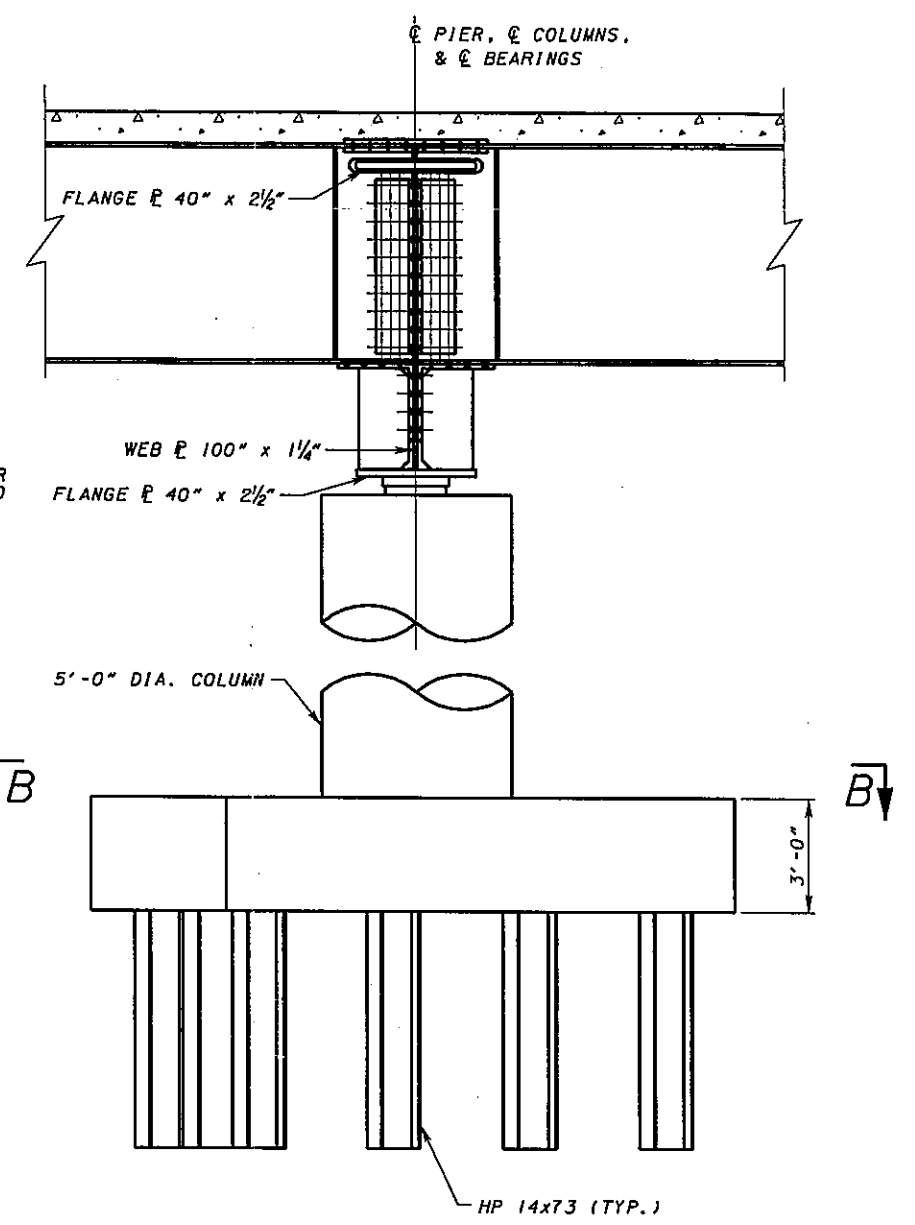
Block cost for MSE wall



ELEVATION
(PIER 1 SHOWN LOOKING UP STATION)
(PIER 2 SIMILAR)



SECTION B-B

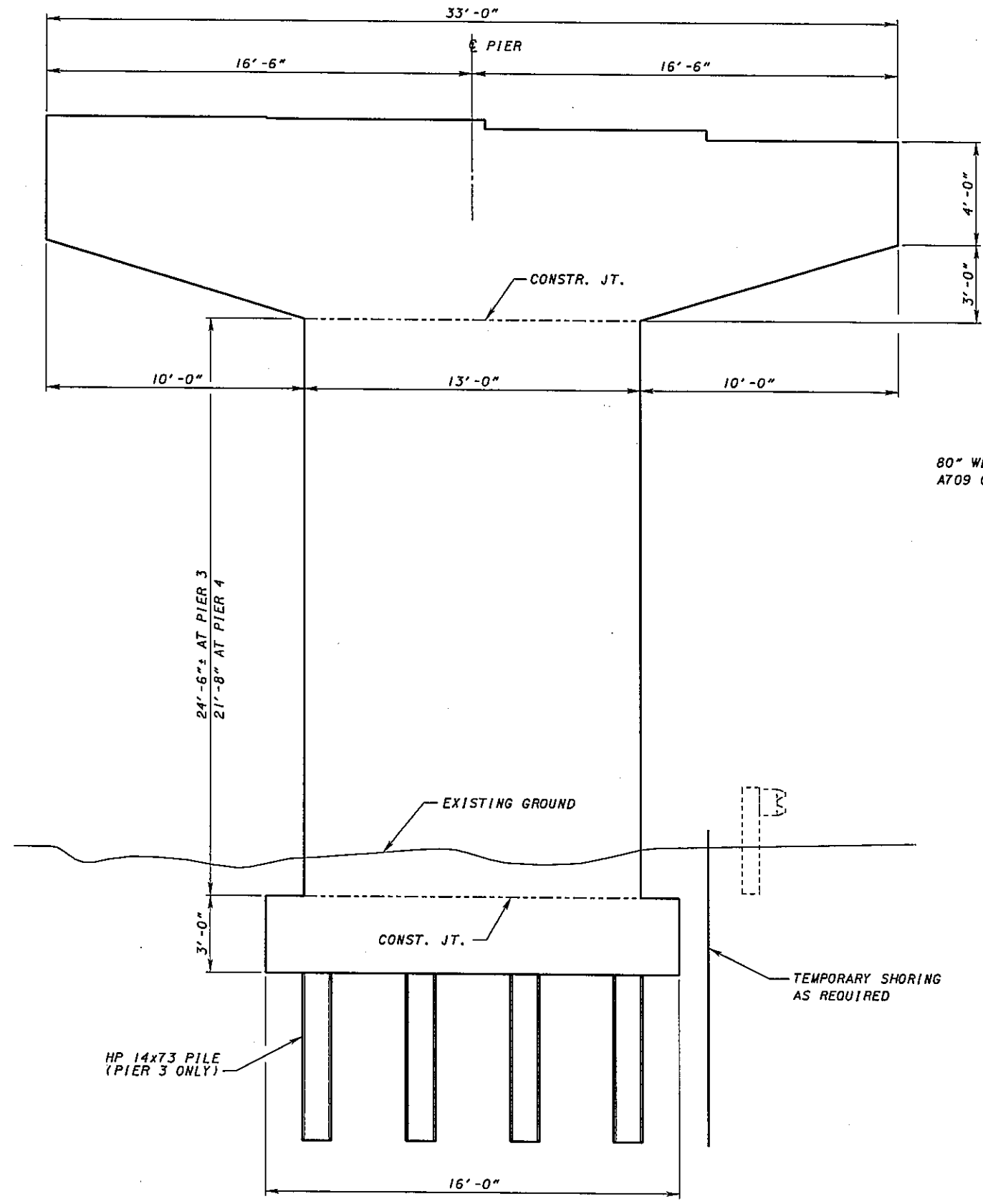


SECTION A-A

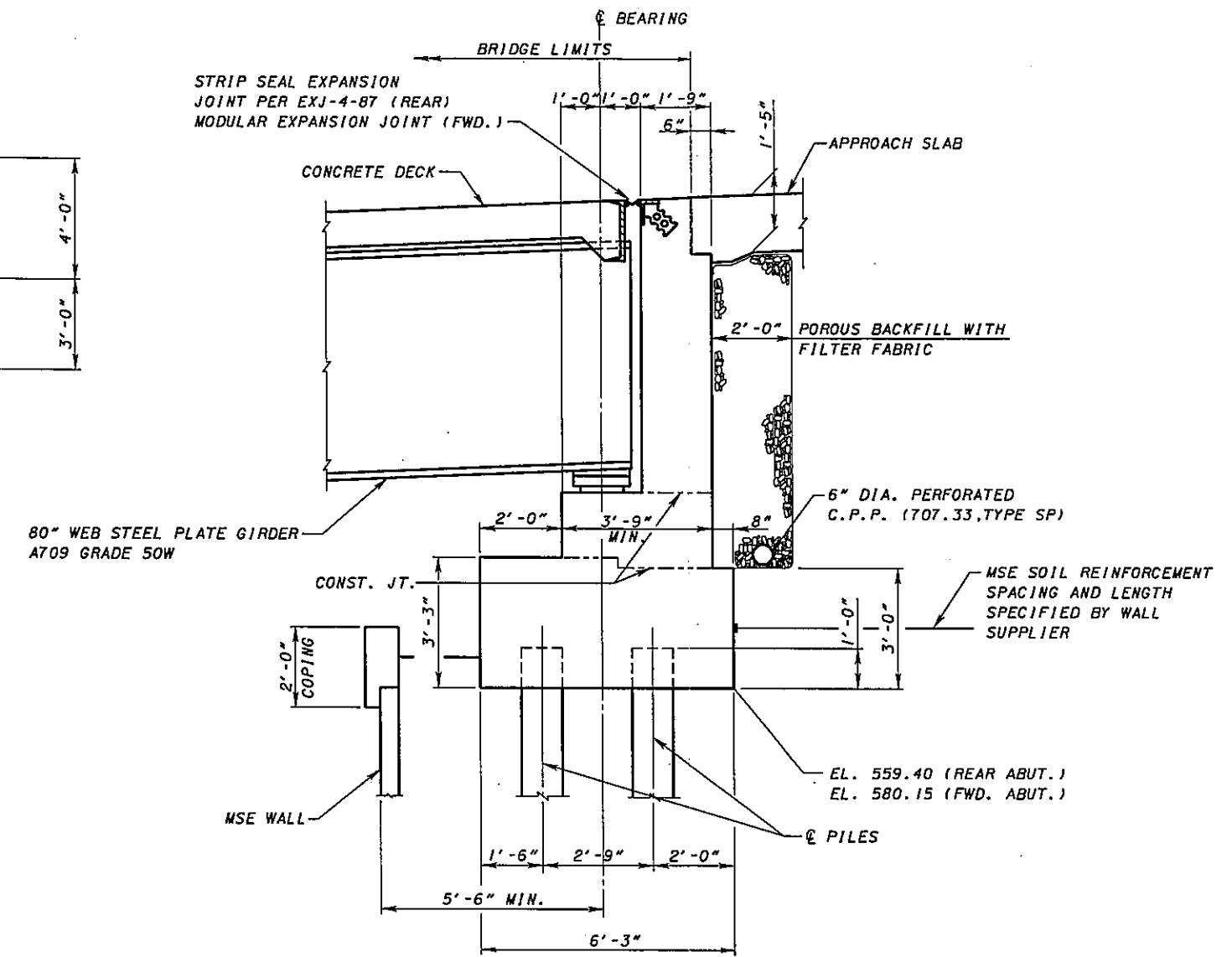
- NOTES:**
1. SUBSTRUCTURE DIMENSIONS ARE MEASURED ALONG ϕ PIER.
 2. SUPERSTRUCTURE DIMENSIONS ARE MEASURED NORMAL TO THE ϕ US52 RAMP B.
 3. FOR MAINTENANCE OF TRAFFIC DETAILS, SEE PRELIMINARY MAINTENANCE OF TRAFFIC SHEET X / X.

7:57:22 AM 1/8/2008 g:\co03\0064\bridge\cn\brs\us52\comp\1st\sr23_0067L.plt.dgn

DESIGN AGENCY DATE 09/26/07 REVIEWED MSL DRAWN JDC DESIGNED PJP CHECKED MSL
STRUCTURE FILE NUMBER 7.306261 REVISIONS
TYPICAL INTEGRAL PIER DETAILS BRIDGE NO. SC1-823-0067L US52 RAMP B TO SOUTHBOUND SR823
SC1-823-0.00 PID 77366
3/19 780 847



PIER 3 & 4 ELEVATION



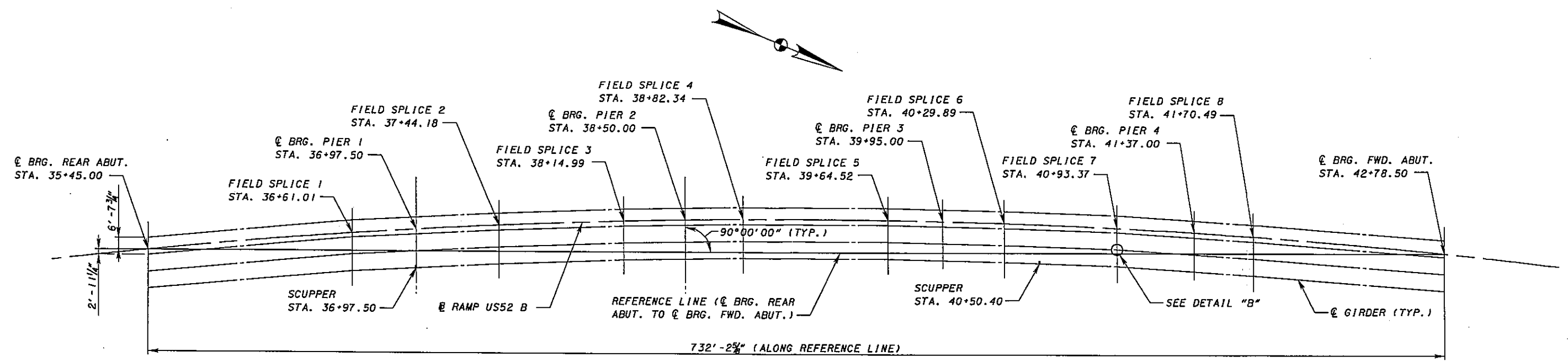
TYPICAL ABUTMENT SECTION

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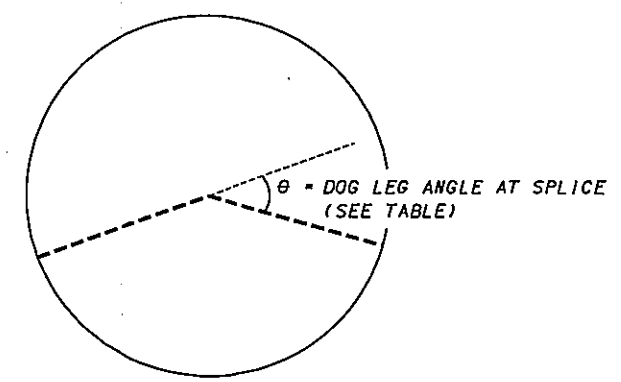
DESIGNED	FJP	CHECKED	MTN
DRAWN	JDG	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7306261		

TYPICAL PIER AND ABUTMENT DETAILS
 BRIDGE NO. SCI-823-0067L
 US52 RAMP B TO SOUTHBOUND SR823

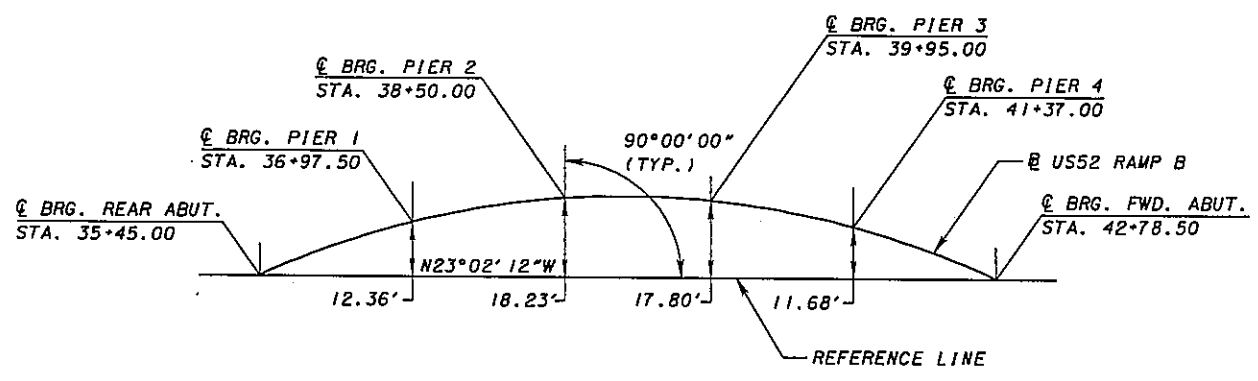
SCI-823-0.00
 PID 77366



FRAMING PLAN - PROPOSED 5 SPAN



DETAIL "B"



REFERENCE LINE SCHEMATIC

DOG LEG ANGLE AT SPLICES		
LOCATION	STATION	θ
SPLICE 1	STA. 36+61.01	2.11°
SPLICE 2	STA. 37+44.18	0.95°
SPLICE 3	STA. 38+14.99	1.11°
SPLICE 4	STA. 38+82.34	1.20°
SPLICE 5	STA. 39+64.52	1.19°
SPLICE 6	STA. 40+29.89	0.66°
SPLICE 7	STA. 40+93.37	1.81°
SPLICE 8	STA. 41+70.49	0.74°

GIRDER LENGTH AND SPACING			
FROM	TO	GIRDER LENGTH	GIRDER SPACING*
BRG. REAR ABUT.	SPLICE 1	116.05'	3 @ 9.55'
SPLICE 1	SPLICE 2	83.15'	3 @ 9.58'
SPLICE 2	SPLICE 3	70.81'	3 @ 9.58'
SPLICE 3	SPLICE 4	67.35'	3 @ 9.59'
SPLICE 4	SPLICE 5	82.18'	3 @ 9.59'
SPLICE 5	SPLICE 6	65.37'	3 @ 9.59'
SPLICE 6	SPLICE 7	63.46'	3 @ 9.58'
SPLICE 7	SPLICE 8	77.15'	3 @ 9.57'
SPLICE 8	BRG. FWD. ABUT.	107.94'	3 @ 9.56'

* GIRDER SPACING IS MEASURED NORMAL TO GIRDER CENTERLINE

7:57:10 AM 1/8/2008 g:\csp03\0064\bridge\cn\brs\us52-rampb\tsk\823-0067L-fp01.dgn

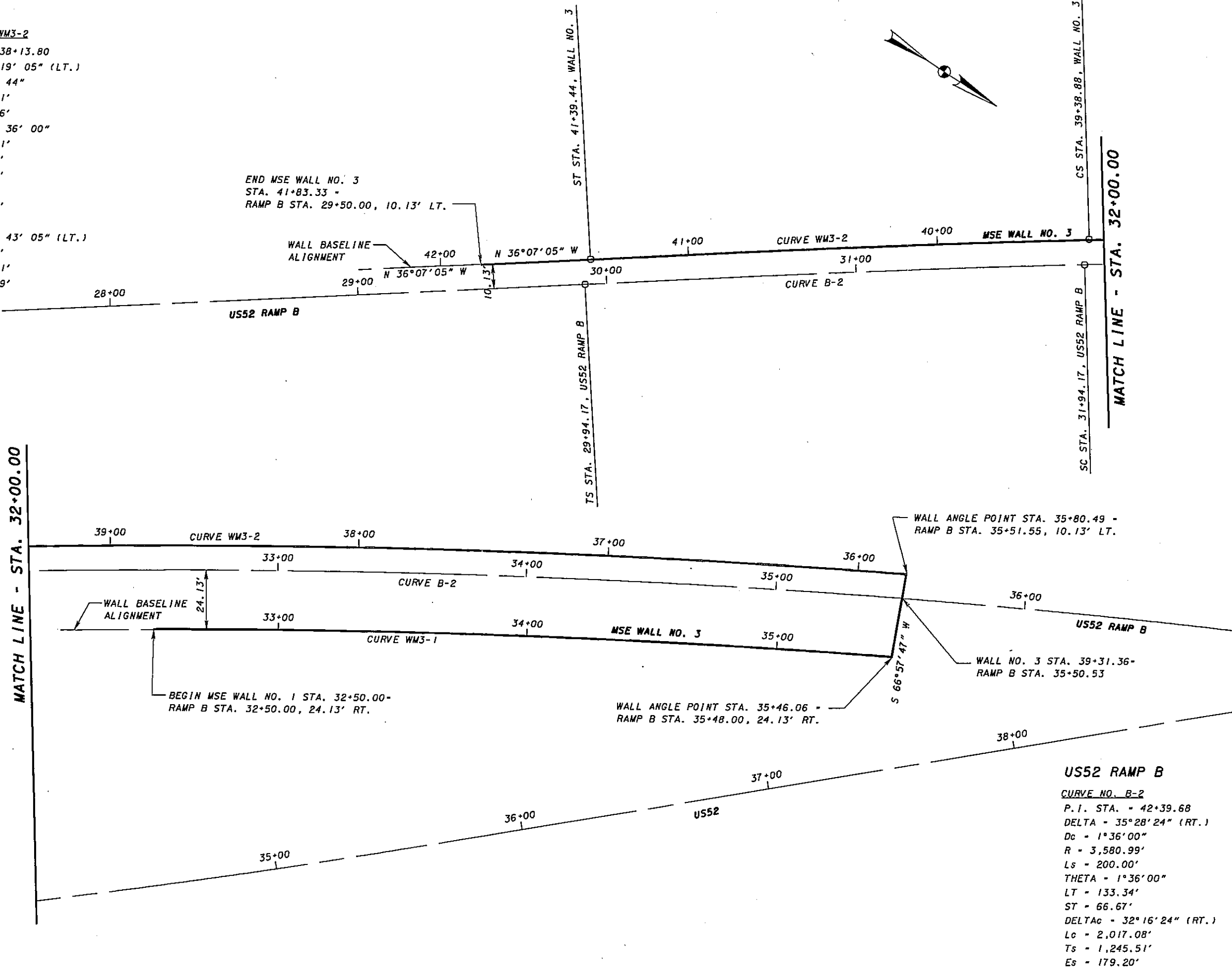
MSE WALL NO. 3

CURVE NO. WM3-1

P.I. STA = 33+98.12
 DELTA = 4° 46' 09" (RT.)
 Dc = 1° 36' 39"
 R = 3,556.86'
 T = 148.12'
 L = 296.06'
 E = 3.08'

CURVE NO. WM3-2

P.I. STA = 38+13.80
 DELTA = 7° 19' 05" (LT.)
 Dc = 1° 35' 44"
 R = 3,591.11'
 Ls2 = 200.56'
 THETA2 = 1° 36' 00"
 LT2 = 133.71'
 ST2 = 66.86'
 x2 = 200.54'
 y2 = 1.87'
 k2 = 100.28'
 p2 = 0.47'
 DELTAac = 5° 43' 05" (LT.)
 Lc = 358.39'
 Ts1 = 233.31'
 Ts2 = 326.29'
 Es = 7.57'



US52 RAMP B
 CURVE NO. 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'
 DELTAac = 32° 16' 24" (RT.)
 Lc = 2,017.08'
 Ts = 1,245.51'
 Es = 179.20'

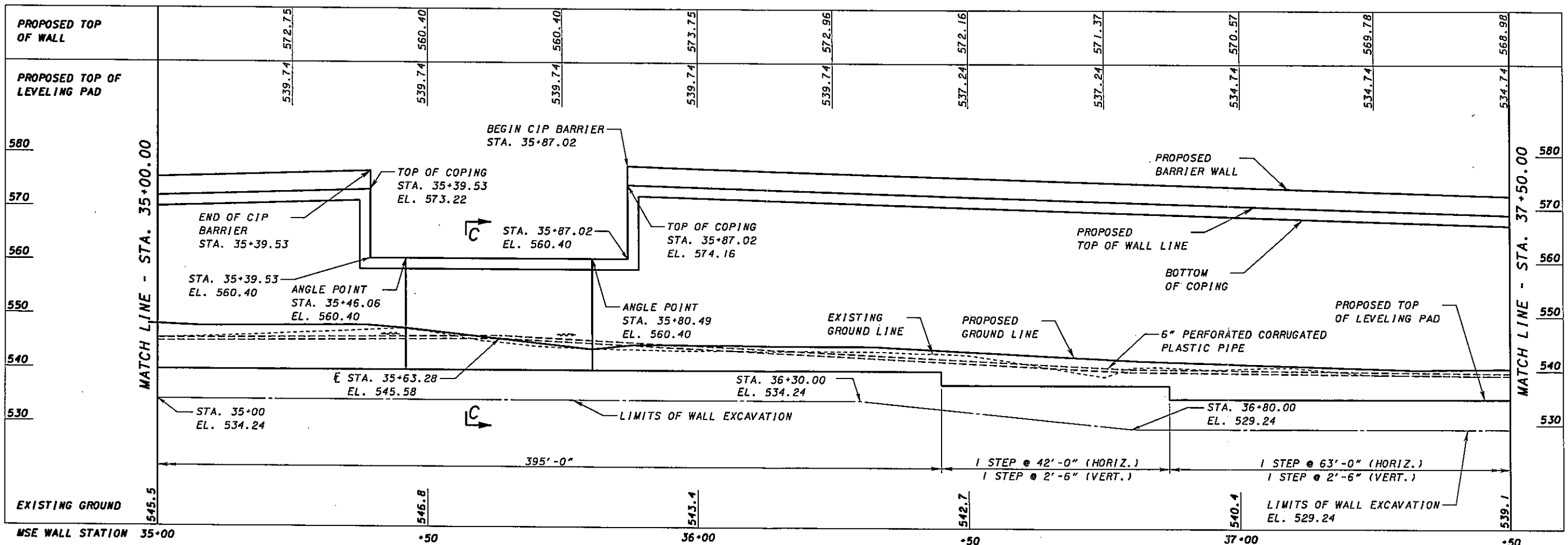
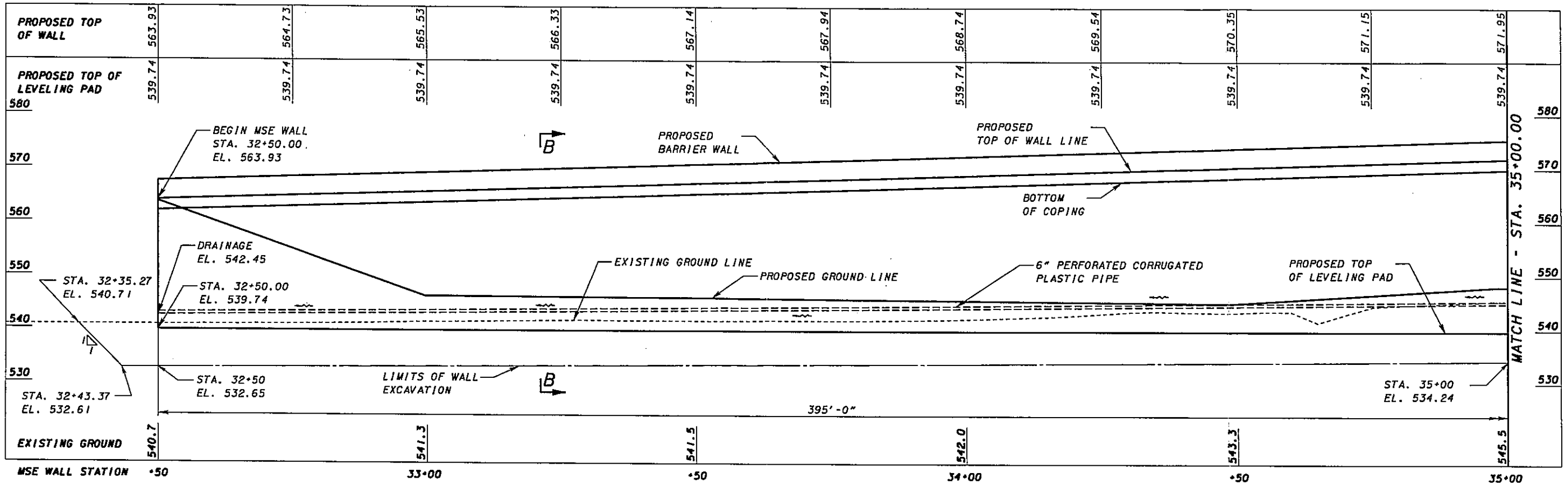
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DESIGNED	MTN	CHECKED	PJP
DRAWN	MSW	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7306261		

MSE WALL SCHEMATIC PLAN - WALL NO. 3
 BRIDGE NO. SCI-823-0067L
 US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)

SCI-823-0.00
 PID 77366

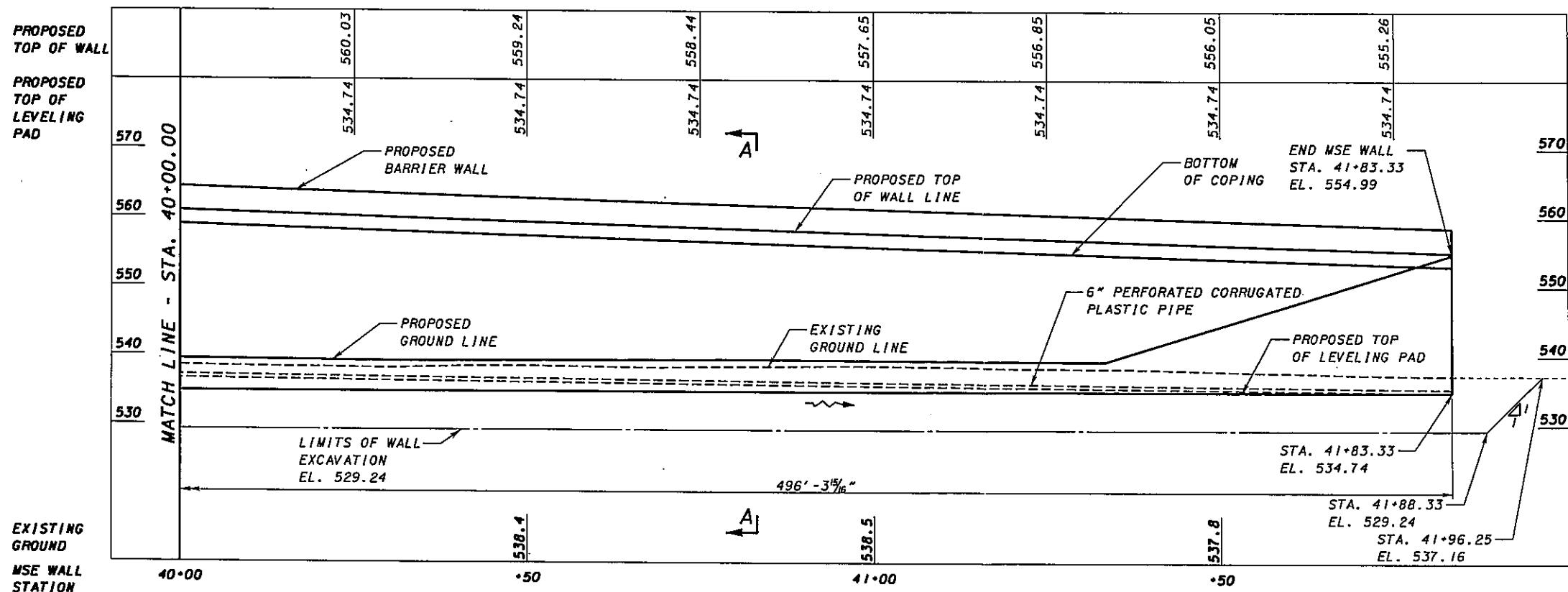
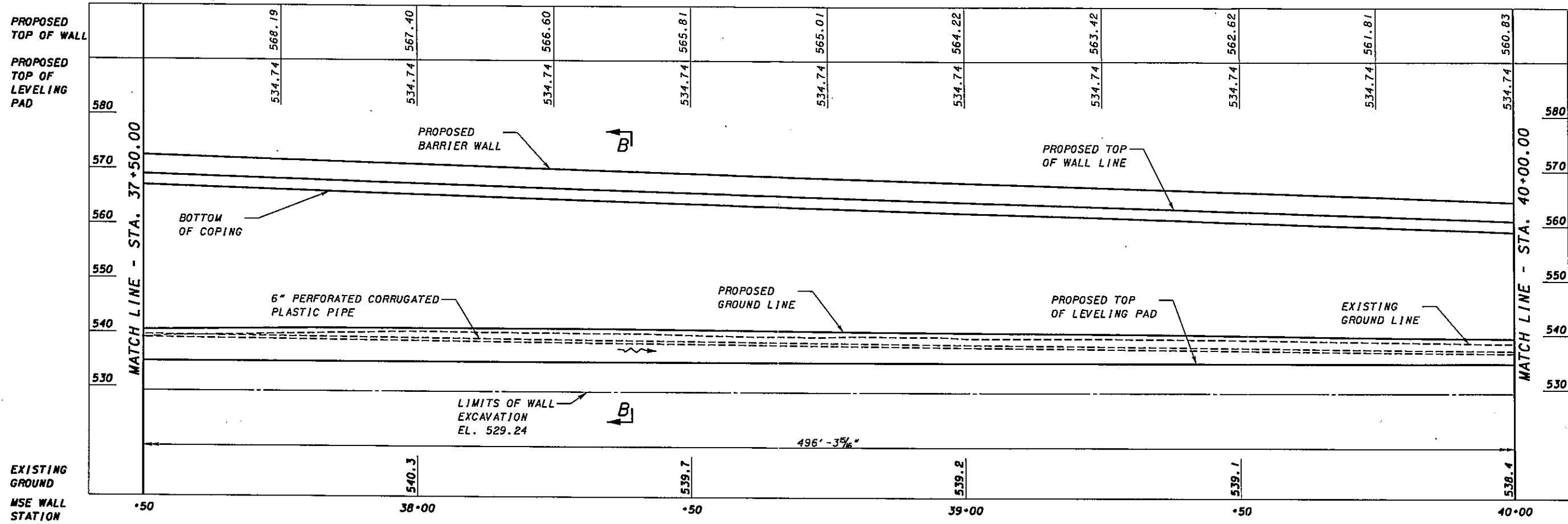


ELEVATION ALONG BASELINE WALL NO. 3

8/19/53 AM 1/8/2008 g:\c03\006\bridge\cn\bf\5\ue52r-omb\y\sk\B23-00671_mse-ear-01.dgn

DESIGNED	MTN
CHECKED	PJP
DRAWN	DJR
REVISY	
REVIEWED	MSL
DATE	09/26/07
STRUCTURE FILE NUMBER	7306261
SCI-823-0.00 PID 77366	
MSE WALL ELEVATION - WALL NO. 3 BRIDGE NO. SCI-823-0067L US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)	
7/19	
784 847	

8/9/2008 1/8/2008 g:\c003\0064\bridge\cm\brs\us52r\ombb\tes1\823-0067L.msar.eor.01a.dgn



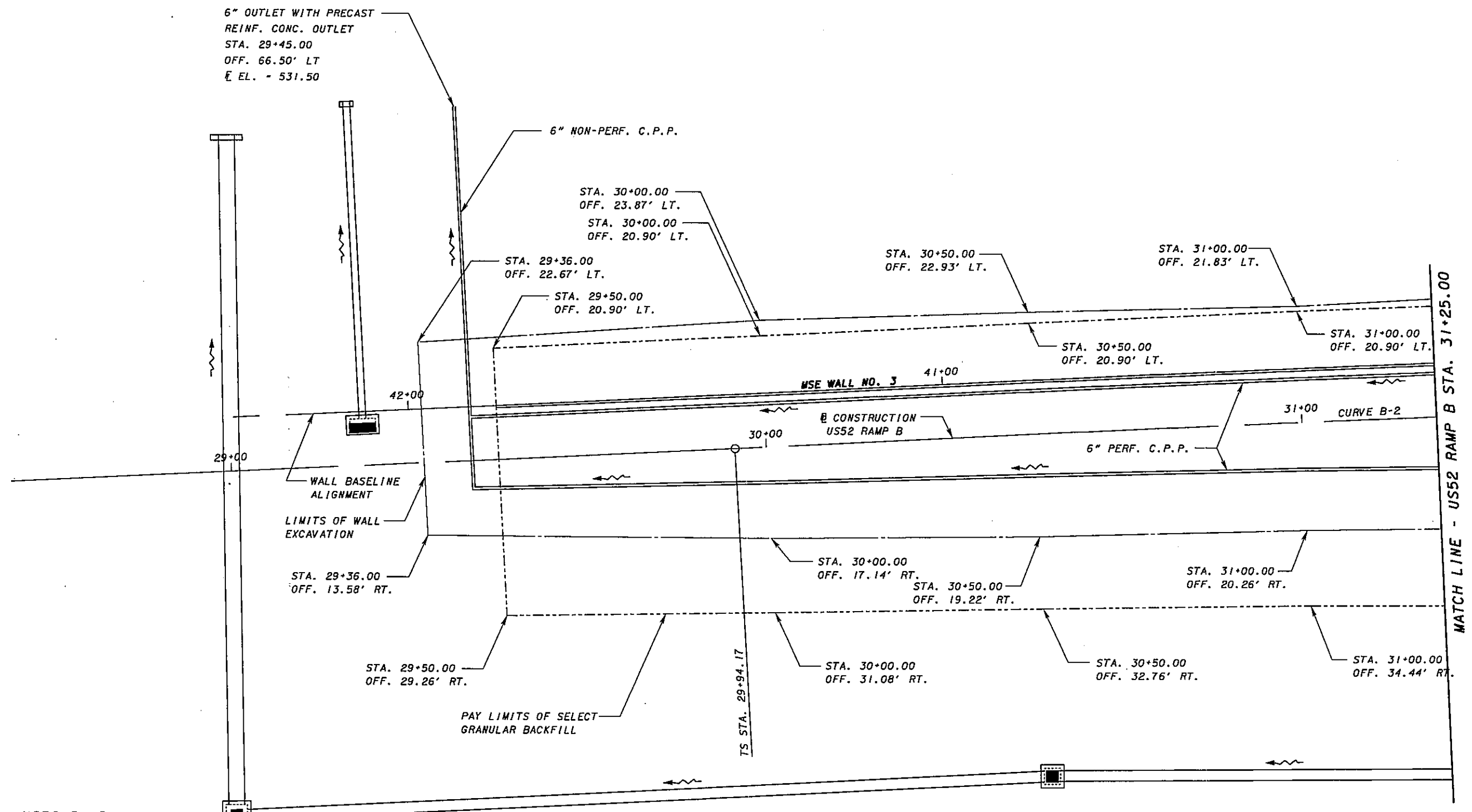
ELEVATION ALONG BASELINE WALL NO. 3



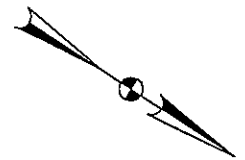
DESIGNED	MTN	CHECKED	PJP
DRAWN	DJR	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7306261		

MSE WALL ELEVATION - WALL NO. 3
 BRIDGE NO. SCI-823-0074L
 US52 RAMP B US52 AND CR503 (OHIO RIVER ROAD)

SCI-823-0.00
 PID 77366

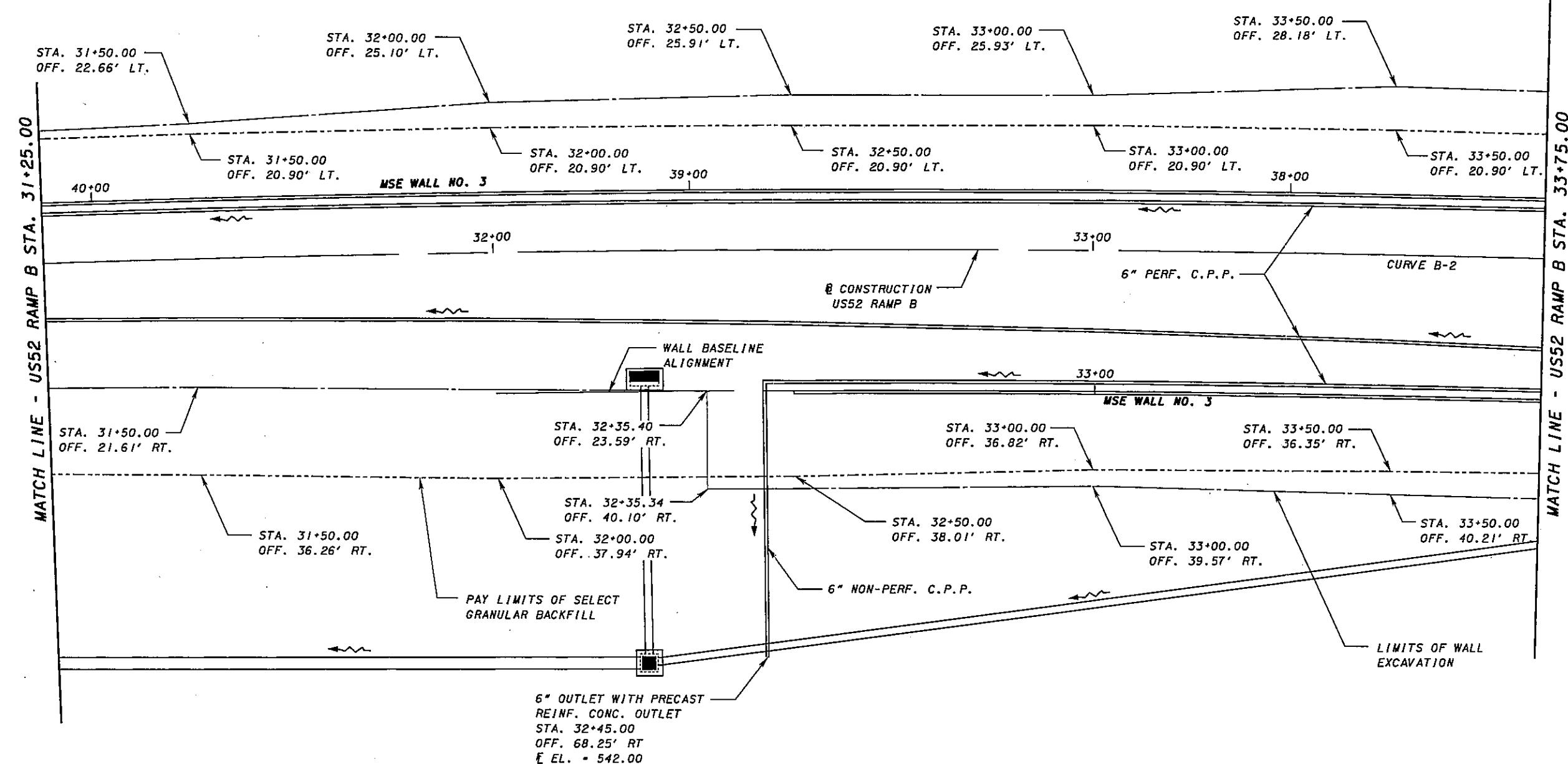


US52 RAMP B
 CURVE NO. B-2
 P.I. STA. = 42+39.68
 DELTA = 35°28'24" (RT.)
 Dc = 1°36'00"
 R = 3,580.99'
 Ls = 200.00'
 THETA = 1°36'00"
 LT = 133.34'
 ST = 66.67'
 DELTAc = 32°16'24" (RT.)
 Lc = 2,017.08'
 Ts = 1,245.51'
 Es = 179.20'

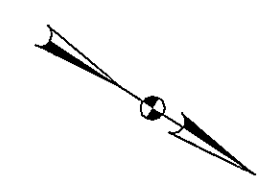


NOTE:
 1. STATIONING GIVEN FROM US52 RAMP B @ UNLESS OTHERWISE NOTED
 2. SEE MSE WALL LAYOUT PLAN FOR WALL GEOMETRY AND CURVE DATA.

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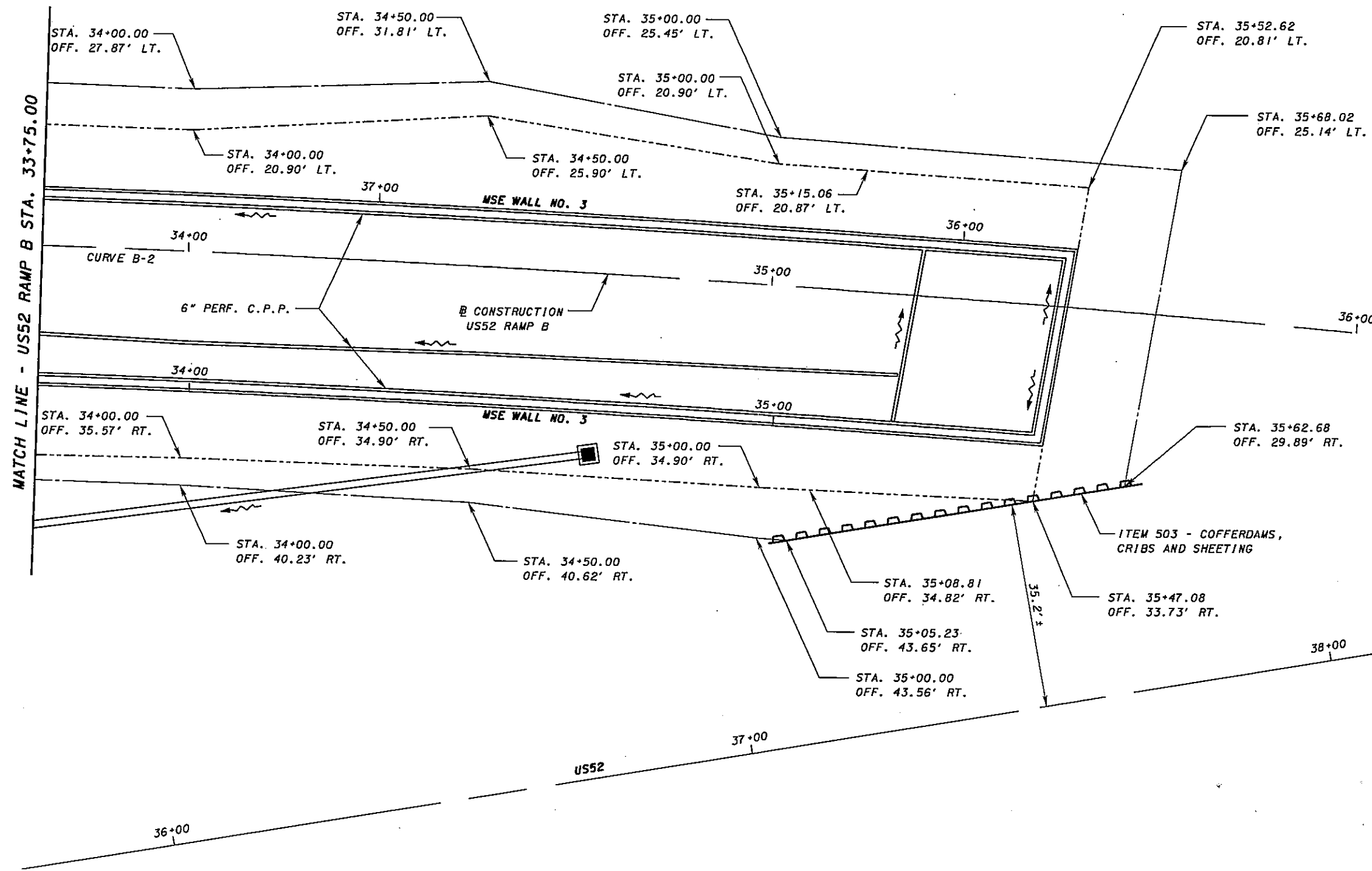


US52 RAMP B
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 P.I. STA. = 42+39.68
 DELTA = 35°28'24" (RT.)
 Dc = 1°36'00"
 R = 3,580.99'
 Ls = 200.00'
 THETA = 1°36'00"
 LT = 133.34'
 ST = 66.67'
 DELTAc = 32°16'24" (RT.)
 Lc = 2,017.08'
 Ts = 1,245.51'
 Es = 179.20'



NOTE:
 1. STATIONING GIVEN FROM US52 RAMP B @ UNLESS OTHERWISE NOTED
 2. SEE MSE WALL LAYOUT PLAN FOR WALL GEOMETRY AND CURVE DATA.

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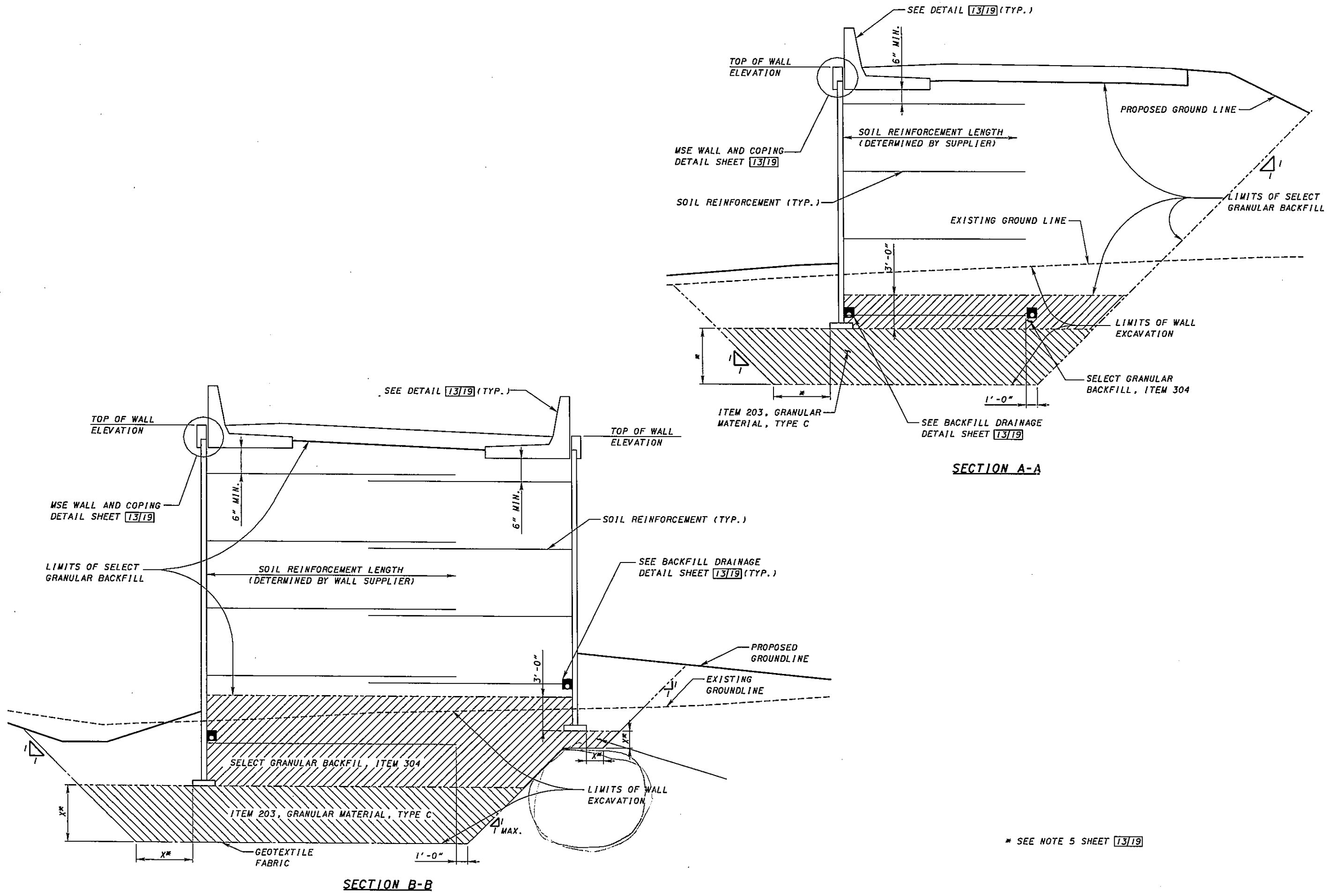
MATCH LINE - US52 RAMP B STA. 33+75.00

US52 RAMP B
 CURVE NO. 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'

NOTE:
 1. STATIONING GIVEN FROM US52 RAMP B @ UNLESS OTHERWISE NOTED
 2. SEE MSE WALL LAYOUT PLAN FOR WALL GEOMETRY AND CURVE DATA.

DESIGNED	DATE
MTN	09/26/07
CHECKED	STRUCTURE FILE NUMBER
PJP	7-306261
DRAWN	REVISOR
CAS	
REVIEWED	MSL
MSL	09/26/07
MSE WALL EXCAVATION AND DRAINAGE PLAN - WALL NO. 3 BRIDGE NO. SC1-823-0067L US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)	
SC1-823-0.00	PID 77366
11/19	788/847

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* SEE NOTE 5 SHEET 13/19



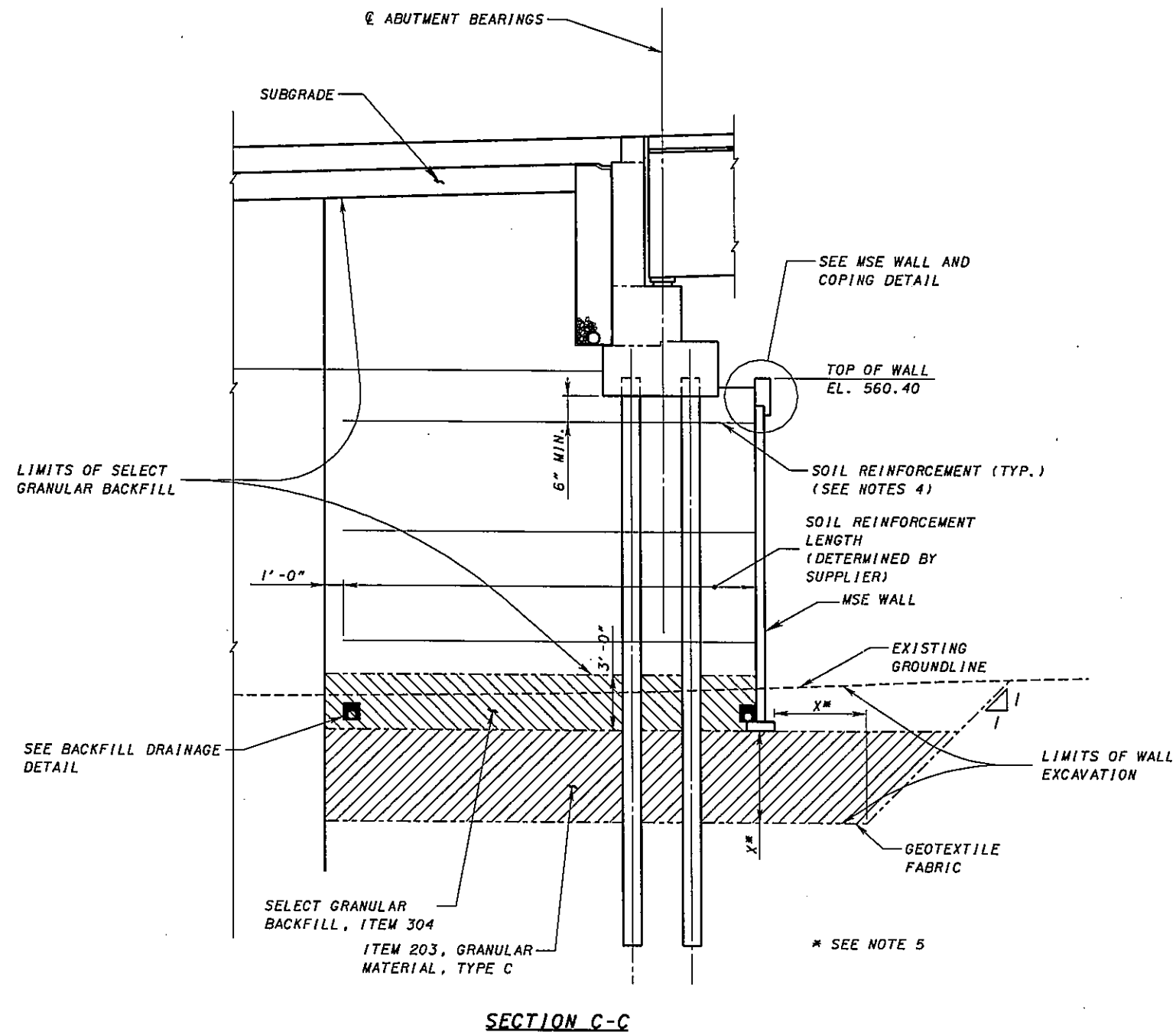
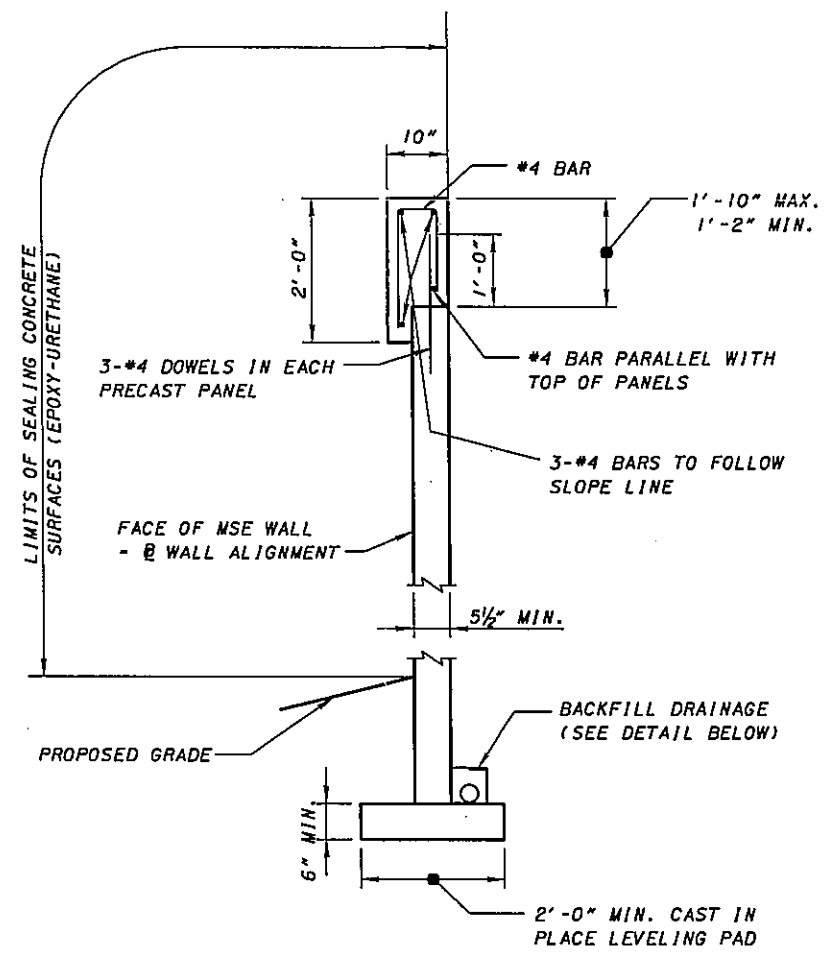
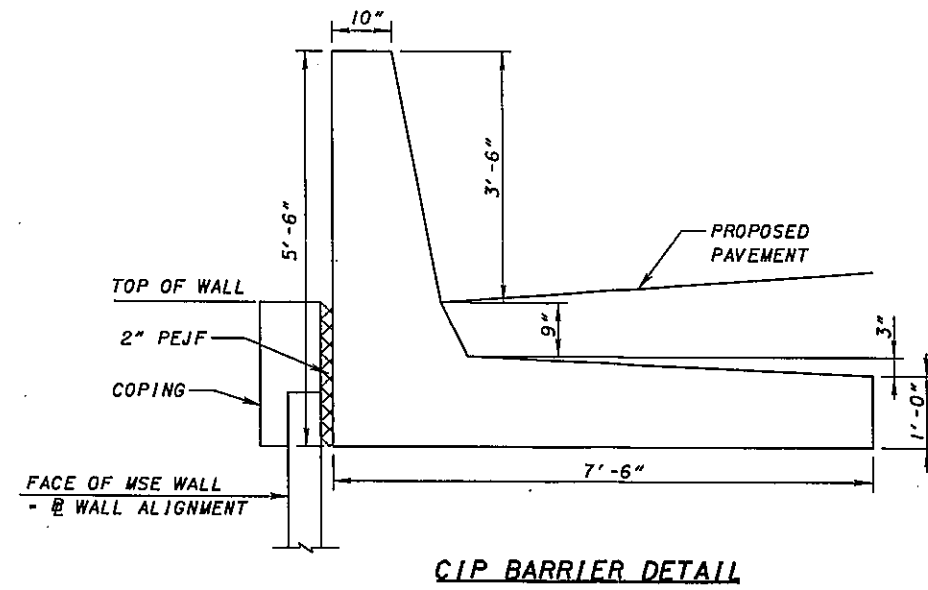
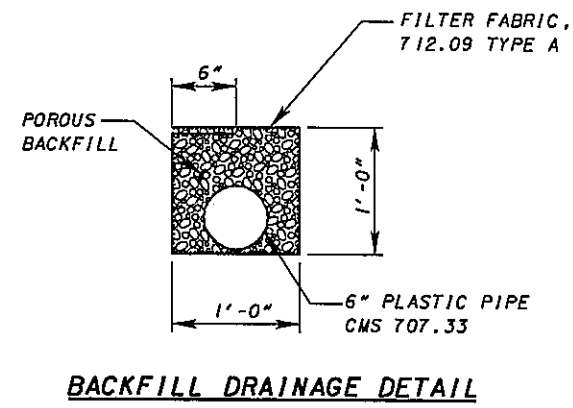
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DRAWN	DJR	REVISED	
REVIEWED	MSL	DATE	09/25/07
STRUCTURE FILE NUMBER	7306261		

MSE WALL DETAILS - WALL NO. 3
 BRIDGE NO. SC1-823-0067L
 US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)

SC1-823-0.00
 PID 77366

12/19

789
847



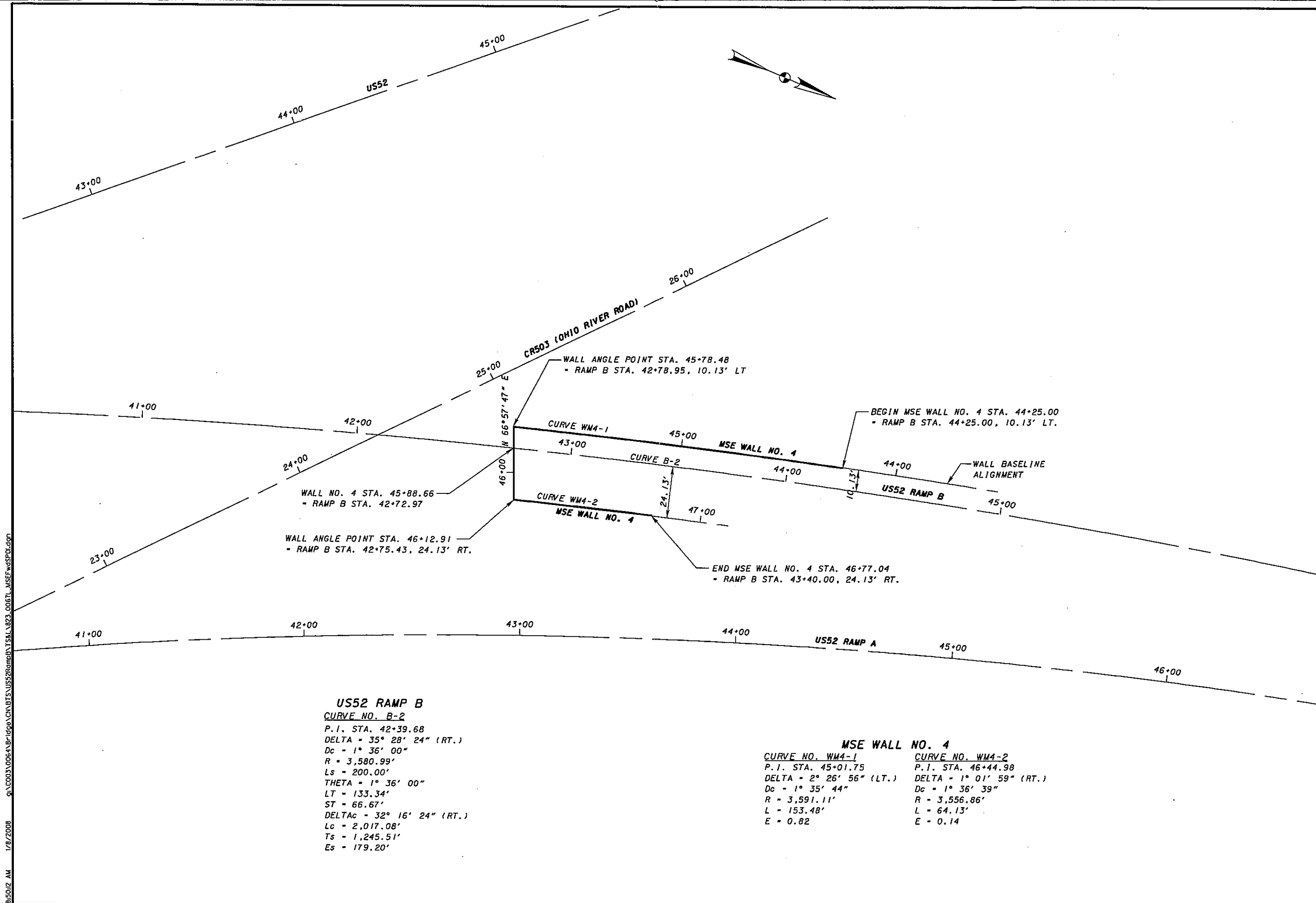
NOTES:

- SEE SITE PLAN DRAWING FOR BORING LOCATIONS AND APPROX. TOP OF ROCK ELEVATIONS
- THE SLOPING LINE WHICH DEFINES THE LIMIT OF THE SELECT GRANULAR BACKFILL IS NOT AN ALLOWABLE SLOPE FOR EXCAVATION. CUT THE SIDES OF ALL EXCAVATIONS TO PREVENT CAVING OR PROTECT THE EXCAVATIONS FROM CAVING.
- ALL REINFORCING STEEL TO BE EPOXY COATED
- PROPRIETARY RETAINING WALL DATA: THE PROPRIETARY WALL SUPPLIER SHALL DESIGN THE INTERNAL STABILITY OF A MECHANICALLY STABILIZED EARTH (MSE) WALL IN ACCORDANCE WITH THE SPECIAL PROVISIONS TO SUPPORT THE ABUTMENT. THE DESIGN FOR INTERNAL STABILITY SHALL INCLUDE AN UNFACTORED HORIZONTAL STRIP LOAD FROM THE SUPERSTRUCTURE OF _____ K/FT APPLIED PERPENDICULAR TO THE FACE OF WALL AT THE BASE OF THE CONCRETE FOOTING.
- SEE MSE WALL ELEVATION, SHEET 7819 FOR THE LIMIT OF WALL EXCAVATION ELEVATION. THE WALL EXCAVATION SHALL EXTEND IN FRONT OF THE WALL DISTANCE EQUAL TO THE DEPTH OF EXCAVATION BELOW THE LEVELING PAD.

8/9/08 11:53 AM 1/8/2008 g:\cc03\0066\br\ldg\cm\br\us52\cm\pb\ts\1823_00671_mse.rvt 02.dgn

DESIGN AGENCY Tan Systems 700 W. 10th St., Suite 300 Lincoln, NE 68502	
DATE 09/26/07	REVIEWED MSL
STRUCTURE FILE NUMBER 7306261	DRWN DJR
DESIGNED MTN	CHECKED PJP
MSE WALL DETAILS - WALL NO. 3 BRIDGE NO. SC1-823-0067L US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)	
SC1-823-0.00	PID 77366
13/19	790 847

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US52 RAMP B
CURVE NO. 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'

MSE WALL NO. 4

CURVE NO. WM4-1 P.I. STA. 45+01.75 DELTA = 2° 26' 56" (LT.) Dc = 1° 35' 44" R = 3,591.11' L = 153.48' E = 0.82	CURVE NO. WM4-2 P.I. STA. 46+44.98 DELTA = 1° 01' 59" (RT.) Dc = 1° 36' 39" R = 3,556.86' L = 64.13' E = 0.14
---	--

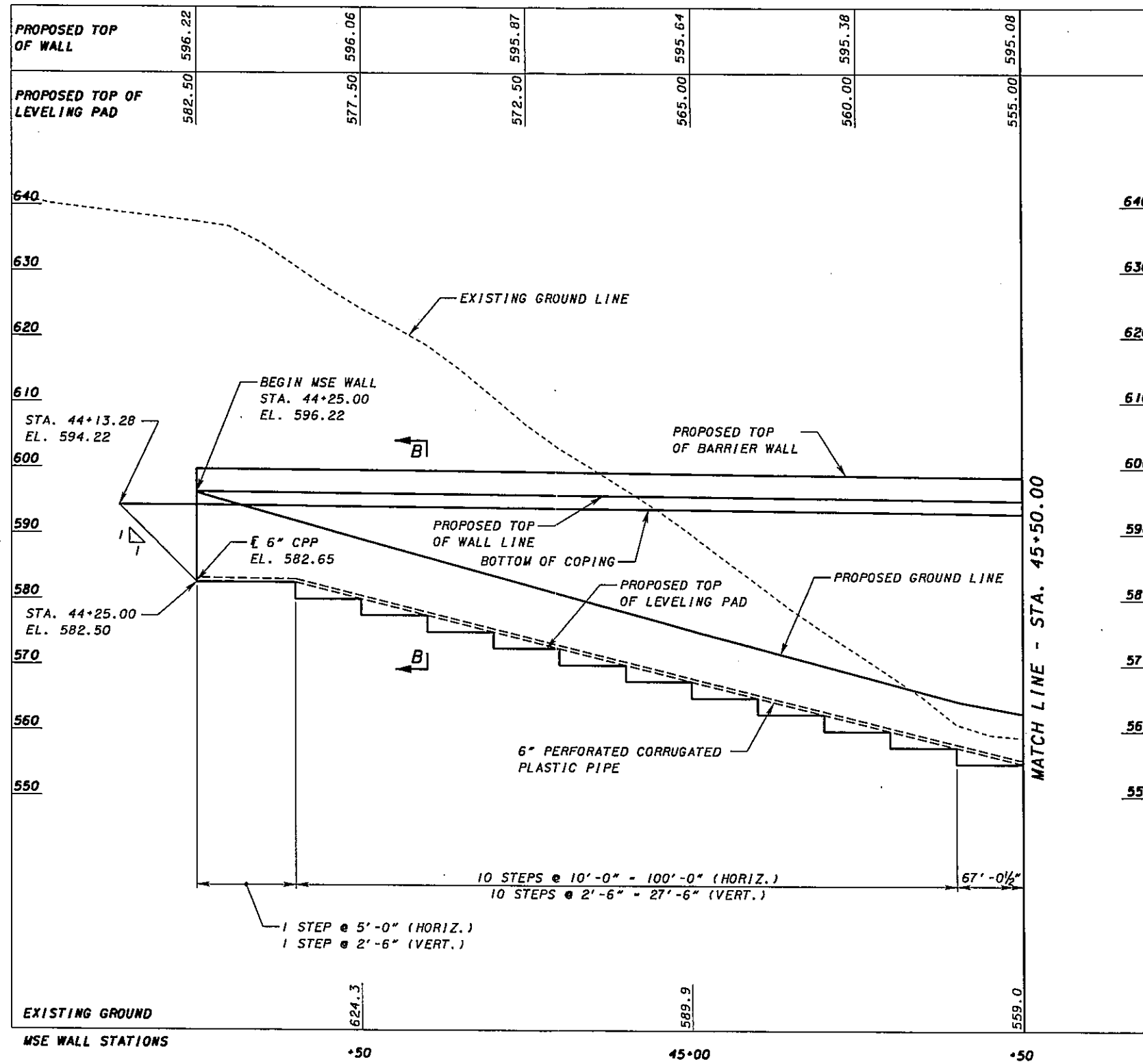


DESIGNED	MTN	CHECKED	PJP
DRAWN	DJR	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7306261		

MSE WALL SCHEMATIC PLAN - WALL NO. 4
 BRIDGE NO. SCI-823-0067L
 US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)

SCI-823-0.00
 PID 77366

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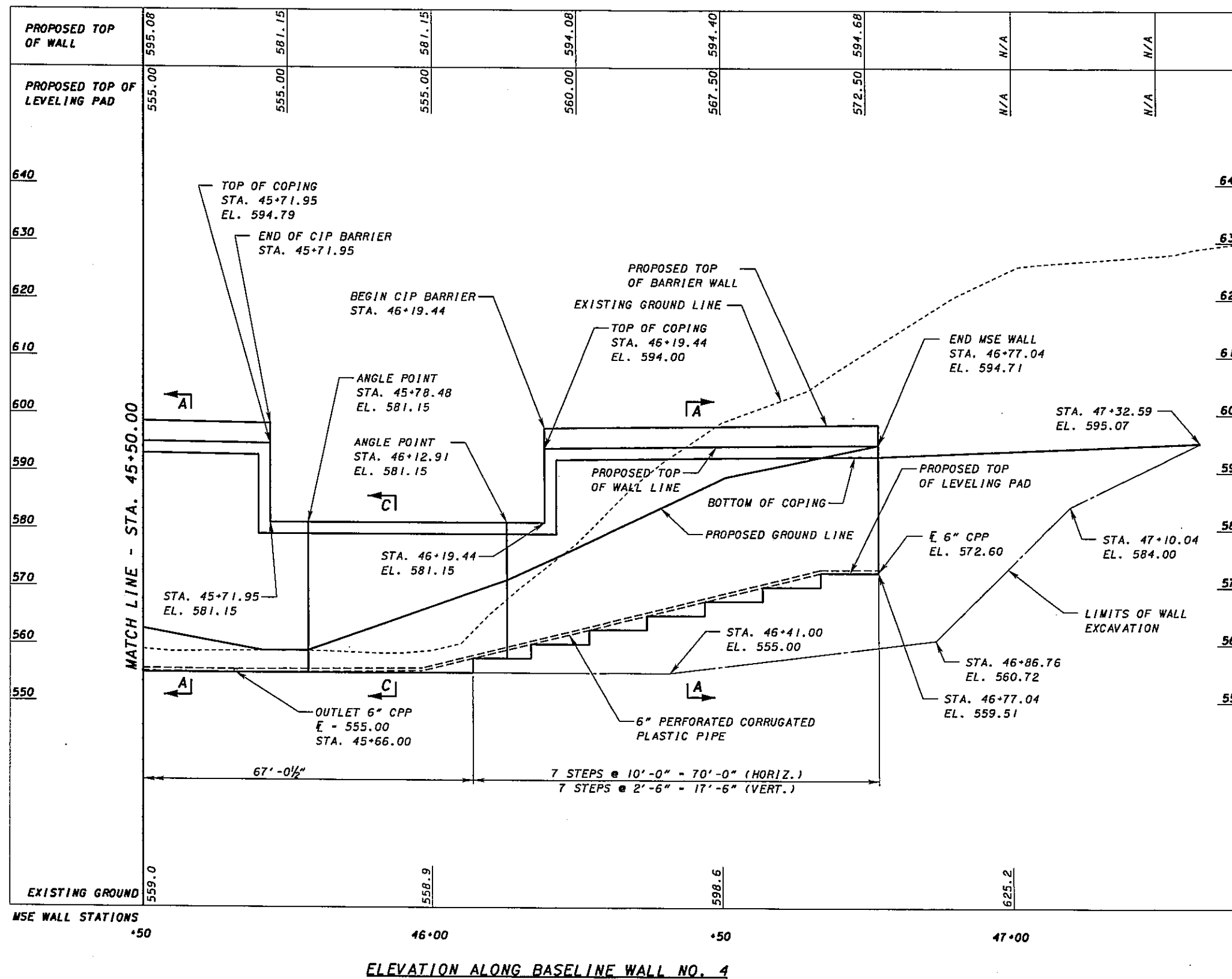


DESIGNED	MTN	CHECKED	PJP
DRAWN	DJR	REVIEWED	MSL
DATE	09/26/07	STRUCTURE FILE NUMBER	7306261

MSE WALL ELEVATION - WALL NO. 4
 BRIDGE NO. SCI-823-0067L
 US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)

SCI-823-0.00
 PID 77366

8:24:19 AM 1/8/2008 G:\C003\0064\Bridges\CON\BTS\USE2RampB\T&L\823_0067L_MSEF.wd01a.dgn



DESIGN AGENCY: **Systems**

DATE: 09/26/07

REVIEWED: MSL

STRUCTURE FILE NUMBER: 7306261

DESIGNED: MTN

CHECKED: PJP

DRAWN: DJR

REVIS: PJP

MSE WALL ELEVATION - WALL NO. 4

BRIDGE NO. SCI-823-0067L

US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)

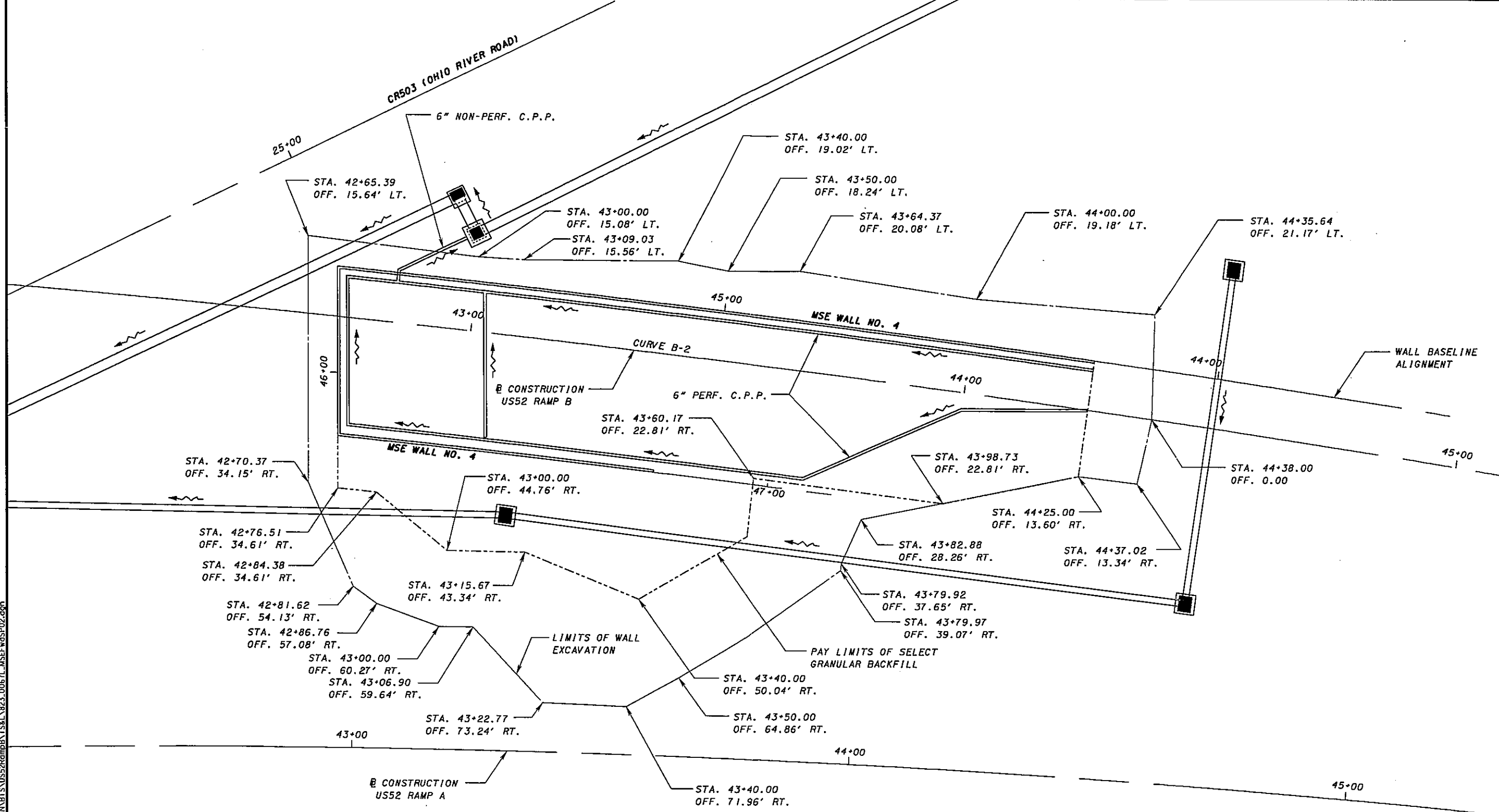
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PID 77366

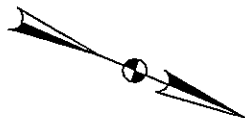
16/19

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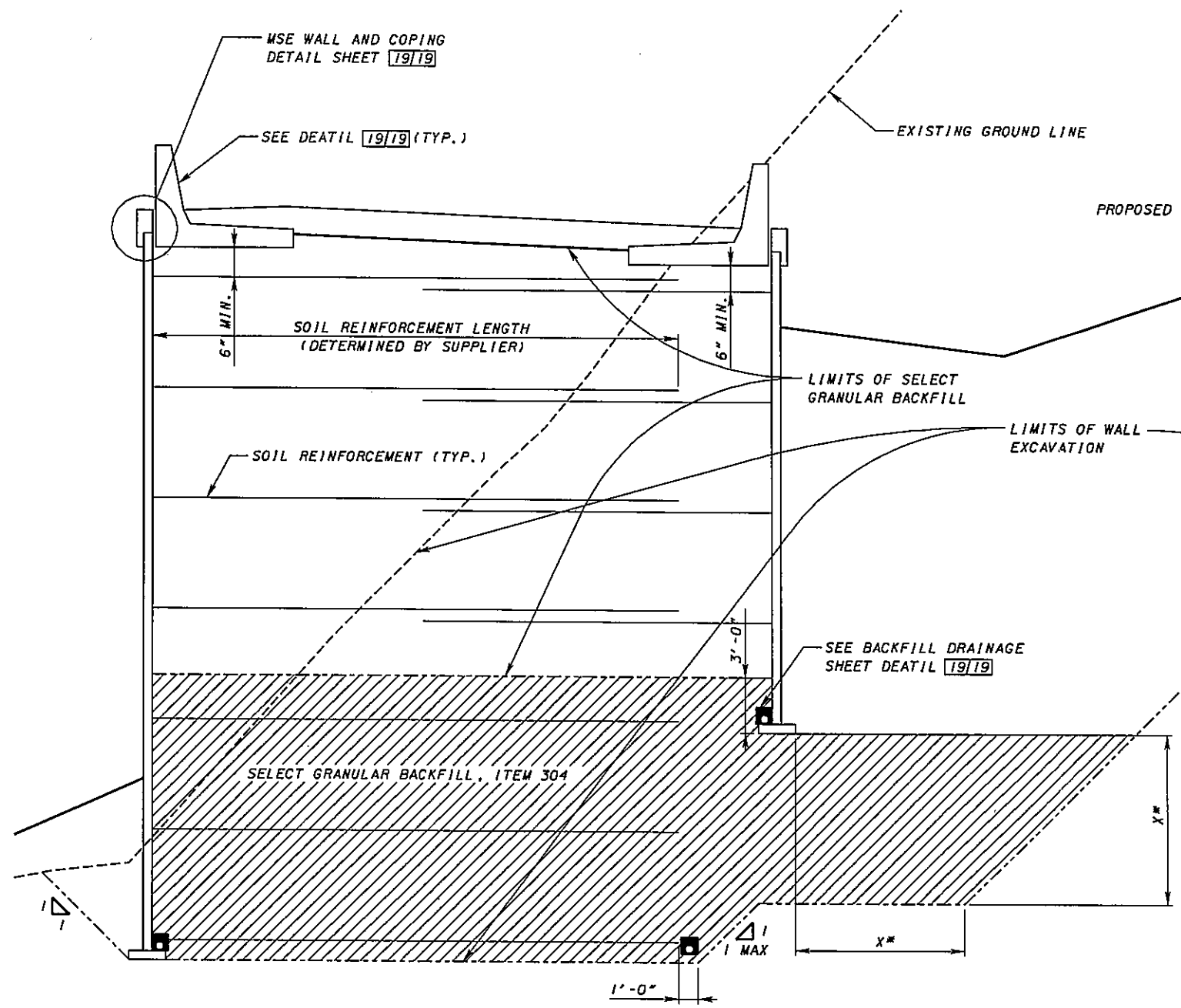
US52 RAMP B
 CURVE NO. B-2
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 DELTA = 35° 28' 24" (RT.)
 Dc = 1° 36' 00"
 R = 3,580.99'
 Ls = 200.00'
 THETA = 1° 36' 00"
 LT = 133.34'
 ST = 66.67'
 DELTAc = 32° 16' 24" (RT.)
 Lc = 2,017.08'
 Ts = 1,245.51'
 Es = 179.20'



NOTE:
 1. STATIONING GIVEN FROM US52 RAMP B @ UNLESS OTHERWISE NOTED
 2. SEE MSE WALL LAYOUT PLAN FOR WALL GEOMETRY AND CURVE DATA.

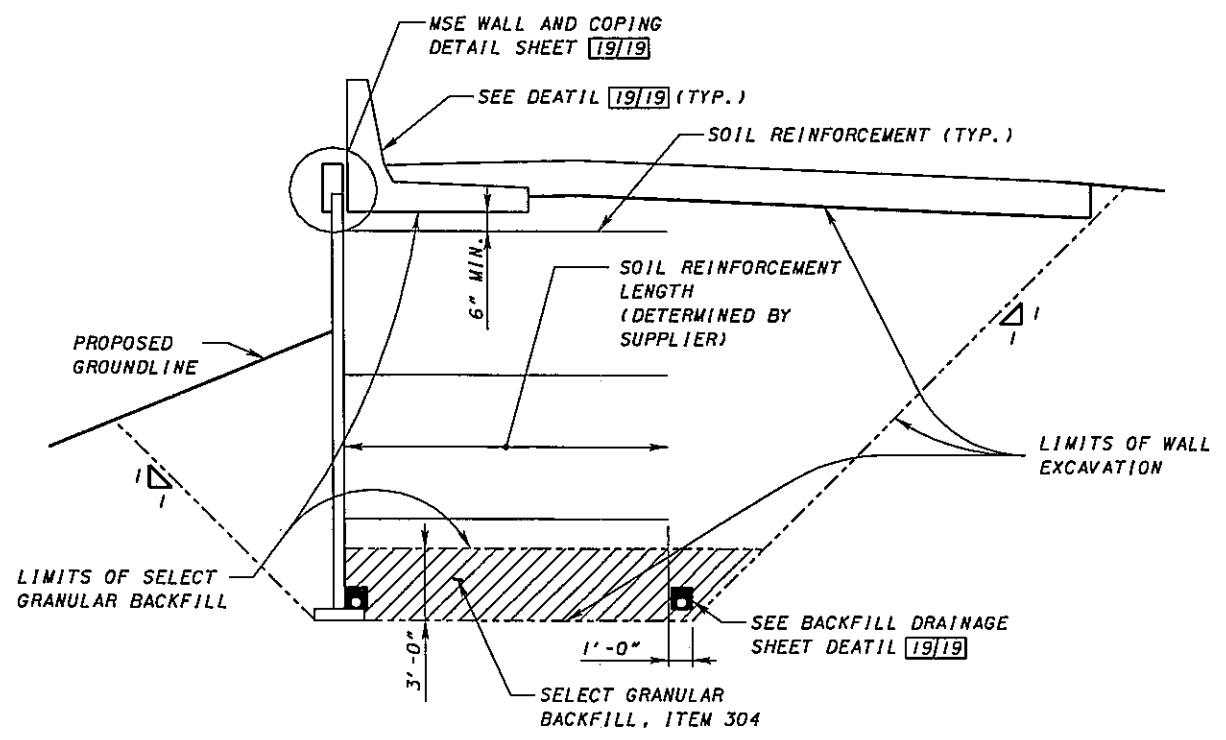
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8/19/2008 1/8/2008 g:\gs03\0064\bridge\en\brts\us52\ampb\ts&N23_0067L_msefw03.dgn



SECTION A-A

* SEE NOTE 5 SHEET 19/19



SECTION B-B



DESIGNED	MTN	CHECKED	PJP
DRAWN	DJR	REVISED	
REVIEWED	MSL	DATE	09/26/07
STRUCTURE FILE NUMBER	7 306261		

MSE WALL DETAILS - WALL NO. 4
 BRIDGE NO. SC1-823-0067L
 US52 RAMP B OVER US52 AND CR503 (OHIO RIVER RD.)

SC1-823-0.00
 PID 77366

18/19

795/847

APPENDIX B
Structure Cost Estimate



SCI-823-0.00 - PORTSMOUTH BYPASS

Proposed SR 823 Ramp US 52 B over US 52 and Ohio River Road

T,S&L

By: PJP
Checked: JRC

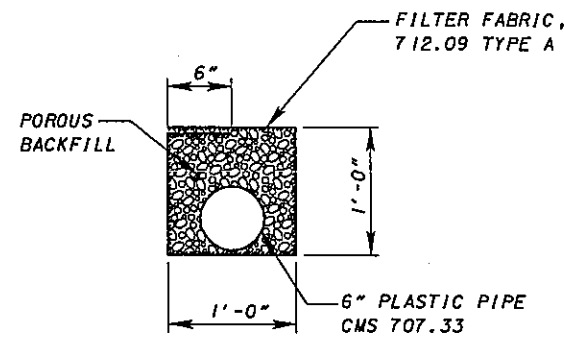
Date: 2/27/2007
Date: 3/2/2007

ALTERNATIVE COST SUMMARY

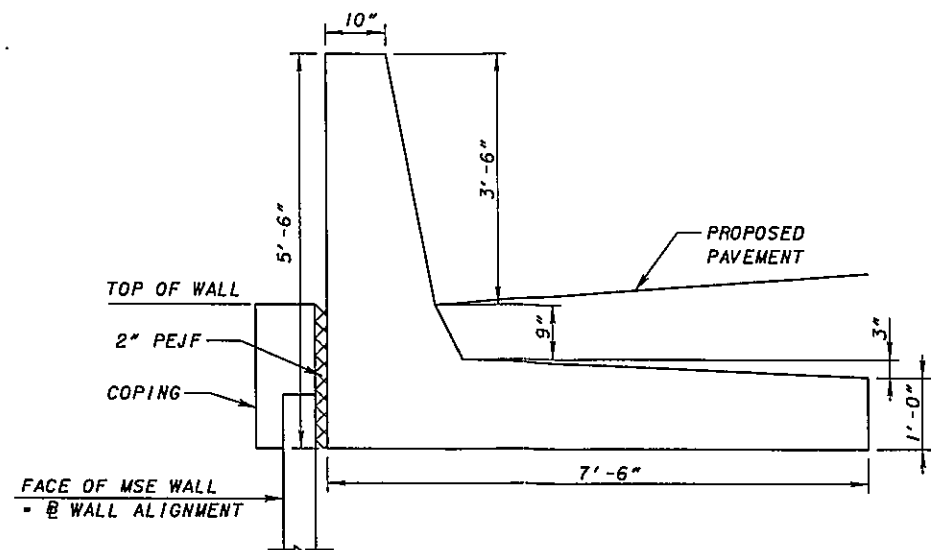
Alternative No.	Span Arrangement No. Spans Lengths	Total Span Length (ft.)	Framing Alternative	Proposed Stringer Section	Subtotal Superstructure Cost	Subtotal Substructure Cost	Structure Incidental Cost (16%)	Structure Contingency Cost (20%)	Total Alternative Const. Cost	Life Cycle Maintenance Cost	Total Relative Ownership Cost
4	5 152'-6" - 152'-6" - 145'-0" - 142'-0" - 141'-6"	733.50	4 Dog-Legged Plate Girders, Int. Stl I-Girder Pier Caps	80" Web Grade 50W	\$2,455,000	\$2,895,000	\$856,000	\$0	\$6,210,000	\$0	\$6,210,000

NOTES:

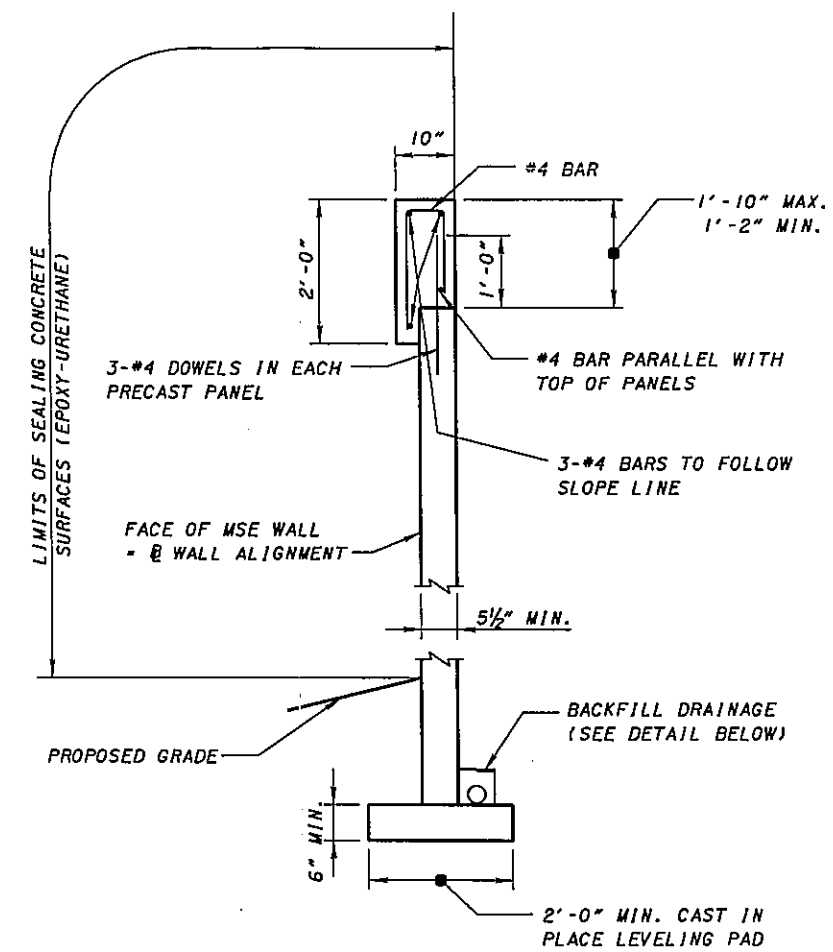
- Structure incidental cost allowance includes provision for structure excavation, porous backfill, sealing of concrete surfaces, bearings, and crushed aggregate slope protection costs.
- Estimated construction cost does not include existing structure removal (if any), which should be quantified seperately, if required.



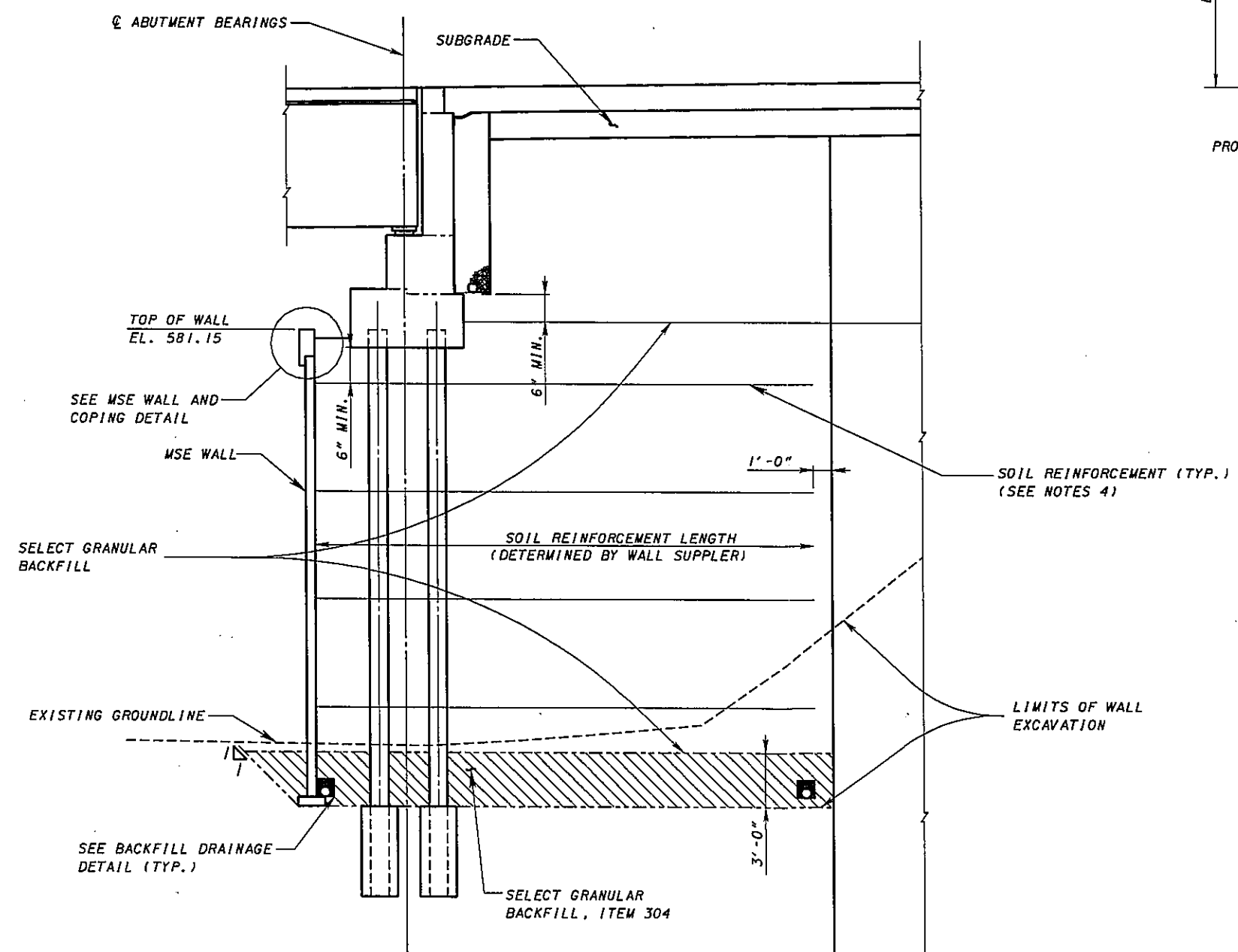
BACKFILL DRAINAGE DETAIL



CIP BARRIER DETAIL



MSE WALL AND COPING DETAIL



SECTION A-A

- NOTES**
- SEE SITE PLAN DRAWING FOR BORING LOCATIONS APPROX. TOP OF ROCK ELEVATIONS
 - THE SLOPING LINE WHICH DEFINES THE LIMIT OF THE SELECT GRANULAR BACKFILL IS NOT AN ALLOWABLE SLOPE FOR EXCAVATION. CUT THE SIDES OF ALL EXCAVATIONS TO PREVENT CAVING OR PROTECT THE EXCAVATIONS FROM CAVING.
 - ALL REINFORCING STEEL TO BE EPOXY COATED
 - PROPRIETARY RETAINING WALL DATA: THE PROPRIETARY WALL SUPPLIER SHALL DESIGN THE INTERNAL STABILITY OF A MECHANICALLY STABILIZED EARTH (MSE) WALL IN ACCORDANCE WITH THE SPECIAL PROVISIONS TO SUPPORT THE ABUTMENT. THE DESIGN FOR INTERNAL STABILITY SHALL INCLUDE AN UNFACTORED HORIZONTAL STRIP LOAD FROM THE SUPERSTRUCTURE OF _____ K/FT APPLIED PERPENDICULAR TO THE FACE OF WALL AT THE BASE OF THE CONCRETE FOOTING.
 - WALL EXCAVATION SHALL EXTEND TO THE BOTTOM OF THE LEVELING PAD, AS SHOWN ON THE MSE WALL ELEVATION OR THE TOP OF ROCK. SEE SHEETS [5&16/19] FOR MSE WALL ELEVATIONS. THE WALL EXCAVATION SHALL EXTEND A DISTANCE IN FRONT OF THE LEVELING PAD EQUAL TO THE DEPTH OF EXCAVATION BELOW THE LEVELING PAD. THE DEPARTMENT WILL APPROVE WALL EXCAVATION PRIOR TO FOUNDATION PREPARATION.

8/9/2008 1/8/2008 g:\p03\0064\br\dgp\con\br\us2r\amp\br\ts&1\B23_00571_msefwd02.dgn

DESIGNED MTN CHECKED PJP	DATE 09/26/07 REVIEWED MSL DRAWN DJR REVISED
STRUCTURE FILE NUMBER 7306261	
MSE WALL DETAILS - WALL NO. 4 BRIDGE NO. SC1-823-0067L US52 RAMP B OVER US52 AND CR503 (OHIO RIVER ROAD)	
SCI-823-0.00	PID 77366
19/19	
796 847	

SCI-823-0.00 - PORTSMOUTH BYPASS
Proposed SR 823 Ramp US 52 B over US 52 and Ohio River Road
T,S&L - STEEL PLATE GIRDER - SUPERSTRUCTURE

By: PJP
 Checked: JRC

Date: 2/27/2007
 Date: 3/2/2007

SUPERSTRUCTURE

Alternative No.	Span Arrangement No. Spans	Span Arrangement Lengths	Total Span Length (ft.)	Deck Length (ft.)	Deck Volume (cu. yd.)	Deck Concrete Cost	Deck Reinforcing Cost	Approach Slab Cost	Approach Roadway Cost	Framing Alternative	Proposed Girder Section	Structural Steel Weight (pounds)	Structural Steel Cost	Painting of Structural Steel Cost	Expansion Joint Cost	Subtotal Superstructure Cost
4	5	152'-6" - 152'-6" - 145'-0" - 142'-0" - 141'-6"	733.50	735.50	953	\$515,600	\$241,800	\$43,100	\$0	4 Dog-Legged Plate Girders, Int. Stl I-Girder Pier Caps	80" Web Grade 50W	1,035,800	\$1,610,200	\$0	\$44,200	\$2,455,000

COST SUPPORT CALCULATIONS

Deck Cross-Sectional Area:

Parapets:	No.	Individual Area (sq. ft.)	Parapet Area (sq. ft.)	Slab:	T (ft.)	W (ft.)	Slab Area	Haunch & Overhang Area	Total Concrete Area (sq. ft.)
Parapets	1	4.26	4.26	Bridge	0.73	33.00	24.1	2.4	35.0
Parapets	1	4.26	4.26						

Note: Deck width is out to out
 10% of deck area allowed for haunches and overhangs.

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 =			\$541.00

Based on parapet and slab percentages of total concrete area

Epoxy Coated Reinforcing Steel

Unit Cost (\$/lb):

Assume 285 lbs of reinforcing steel per cubic yard of deck concrete

	Year 2005	Annual Escalation	Year 2007
Deck Reinforcing	\$0.81	5.0%	\$0.89

Structural Steel

Unit Costs (\$/lb.):

	Cost Ratio	Year 2005	Annual Escalation	Year 2007	
Rolled Beams - Grade 50	n/a	\$1.17	5.0%	\$1.29	
Level 4 Plate Girders - Grade 50W	n/a	\$1.41	5.0%	\$1.55	Straight Girders
Level 5 Plate Girders - Grade 50W	n/a	\$1.50	5.0%	\$1.65	Curved

Painting of Structural Steel

Unit Costs (\$/lb.):

	Year 2006	Annual Escalation	Year 2007
Intermediate Coat	\$0.70	5.0%	\$0.74
Finish Coat	\$0.66	5.0%	\$0.70
Total			\$1.44

Construction Complexity Factor

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

Reinforced Concrete Approach Slabs (T=17")

Unit Cost (\$/sq. yd.):

Length = 30 ft. Width = 33 ft
 Area = 220 sq. yd.

	Year 2005	Annual Escalation	Year 2007
Approach Slabs	\$178.00	5.0%	\$196.00

Approach Roadway

	Year 2005	Annual Escalation	Year 2007	
Embankment fill	0.00 cu.yd.	\$4.00	5.0%	\$4.41
Roadway incl. base	0.00 sq.yd.	\$28.00	5.0%	\$28.67
Barrier (single faced)	0 ft.	\$50.00	5.0%	\$55.13
Barrier (dble faced)	0 ft.	\$80.00	5.0%	\$88.20

Expansion Joints

Unit Costs (\$/Lin.Ft.):

	Cost Ratio	Year 2005	Annual Escalation	Year 2007
Modular Expansion Joint	1.0	\$907.42	5.0%	#####
Strip Seal Expansion Joints	1.0	\$306.27	5.0%	\$337.66
Modular Expansion Joints Length				33 ft.
Strip Seal Expansion Joints Length				33 ft.

SCI-823-0.00 - PORTSMOUTH BYPASS

Proposed SR 823 Ramp US 52 B over US 52 and Ohio River Road
 STRUCTURE TYPE STUDY - STEEL PLATE GIRDER ALTERNATIVE 4 - SUBSTRUCTURE

By: PJP
 Checked: JRC

Date: 2/27/2007
 Date: 3/2/2007

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 Wall Cost	Pier Cap	Temporary Shoring Cost	Subtotal Substructure Cost
4	5	152'-6" - 152'-6" - 145'-0" - 142'-0" - 141'-6"	4 Dog-Legged Plate Girders, Int. Stl I-Girder Pier Caps	80" Web Grade 50W	\$227,300	\$45,800	\$48,600	\$8,400	\$62,100	#####	\$391,600	\$67,300	\$2,895,000

COST SUPPORT CALCULATIONS

Pier QC/QA Concrete, Class QSC1 Cost:

Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost
Cap	59	\$575.00	5.0%	\$634.00	\$37,410
Stem	241	\$575.00	5.0%	\$634.00	\$152,790
Footings	112	\$300.00	5.0%	\$331.00	\$37,070
Total	412				\$227,300

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

Number of Piles	Total Pile Length
84	1,080

HP 14x73 Steel Piles, Furnished & Driven

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

Number of Piles	Total Furn.
12	420

16" Dia. Piles, Furnished & Driven

Pier QC/QA Concrete, Class QSC1 Cost:

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					\$0

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

Furnished Driven	Year 2005 Unit Cost	Annual Escalation	Year 2007
	\$26.50	5.0%	\$29.20
Total	\$9.65	5.0%	\$10.60
			\$39.80

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

Furnished Driven	Year 2005 Unit Cost	Annual Escalation	Year 2007
	\$26.47	5.0%	\$29.20
Total	\$14.65	5.0%	\$16.20
			\$45.40

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

Number of Shafts	Total Shaft Length
0	0

Pier Foundations

SEE QUANTITY CALCULATIONS

Abutment QC/QA Concrete, Class QSC1 Cost:

Component	Volume (cu. yd.)	Year 2004	Annual Escalation	Year 2008	Total Cost
Abutment	105	\$420.00	5.0%	\$463.00	\$48,600
Wingwalls	0	\$420.00	5.0%	\$463.00	\$0

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

Year 2004 Unit Cost	Annual Escalation	Year 2007	Total Cost

Temporary Shoring and Support

Unit Costs (\$/sq. ft.):

Temp. Shoring Area (sq. ft.)	Temp. Girder Support (lump sum)		
2588	\$ -		
Year 2004 Unit Cost	Annual Escalation		
Year 2004	Year 2007		
Temporary Shoring	\$22.50	5.0%	\$26.00
Cofferdam	\$32.00	5.0%	\$37.00

Steel Straddle Bent Pier Cap

Component	Weight	Year 2006	Annual Escalation	Year 2007	Total Cost
Level 6 Structural Steel - Grade 50	123,500	\$1.65	5.0%	\$1.73	\$213,700

see quantity calculations for steel weight

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 2007	Total Area (sq. ft.)	Year 2005 Unit Cost	Annual Escalation	Year 2007		
Pier	\$0.81	5.0%	\$0.89	Alt. 4	33,721	\$55.00	5.0%	\$60.60
Abutment	\$0.81	5.0%	\$0.89					

Note: MSE wingwall lengths include full length required for ramp

Painting of Structural Steel

Unit Costs (\$/lb.):

Year 2006	Annual Escalation	Year 2007	
Intermediate Coat	\$0.70	5.0%	\$0.74
Finish Coat	\$0.66	5.0%	\$0.70
Total			\$1.44

Weight of Pier Cap
 Painting Cost 123,500
 \$177,900

SCI-823-0.00 - PORTSMOUTH BYPASS
Proposed SR 823 Ramp US 52 B over US 52 and Ohio River Road
STRUCTURE TYPE STUDY - STEEL PLATE GIRDER ALTERNATIVE 4 - QUANTITY CALCULATIONS

By: PJP
 Checked: JRC

Date: 2/27/2007
 Date: 3/2/2007

Pier Quantities														
Pier Location	Length	Cap				Stem				Footing				Total Volume
		Width	Depth	Area	Volume	Width	Height	Length	Volume	Width	Depth	Length	Volume	
Pier 1	0	0	0	0.00	0	8.8	24.75	8.8	1917	22	3	15.00	990	2907
Pier 2	0	0	0	0.00	0	8.8	28.35	8.8	2195	22	3	15.00	990	3185
Pier 3	33	4	6	24.00	792	4	24.5	13.0	1274	11	3	16.00	528	2594
Pier 4	33	4	6	24.00	792	4	21.67	13.0	1127	11	3	16.00	528	2447
Pier 5														0
Pier 6														0
Pier 7														0
Total (Cu.Ft.)					1584				6513				3036	11133
Total (Cu.Yd.)					59				241				112	412

Incl. L & R
 Piers

Pile Quantities													
Location	Load/girder (Kips)	# Girders	Total Girder Load	Subst Wt (kips)	Pile Cap.(Kips)	No. Piles	Increase Factor	Total Piles	Top Elev.	Bot Elev.	Pile Length	Total Pile Length (Feet)	
Rear Abut.	0	0	0	0	140	0	1	12	560.4	530.9	30.0	360	
Pier 1L	0	0	0	0	140	0	1	12	539.25	531	10.0	120	
Pier 1R	0	0	0	0	140	0	1	12	546	534.1	15.0	180	
Pier 2L	0	0	0	0	140	0	1	12	546.7	534.9	15.0	180	
Pier 2R	0	0	0	0	140	0	1	12	544.6	535.5	10.0	120	
Pier 3	0	0	0	0	140	0	1	12	547	537.6	10.0	120	
Pier 4	0	0	0	0	140	0	1	12	0	0	0.0	0	
Pier 5	0	0	0	0	140	0	1	0	0	0	0.0	0	
Fwd. Abut.	0	0	0	0	140	0	1	12	581.15	548.1	35.0	420	
Total								96				1500	

Abutment Quantities															
Abut Location	Length (feet)	Backwall				Beam Seat				Footing				Total Volume	
		Width	Depth	Area	Volume	Width	Height	Area	Volume	Width	Depth	Area	# Footi		Volume
Rear Abut	33.3	1.75	7.4	12.95	431	3.75	2.5	9.38	312	6.25	3.25	20.313	1	676	1420
Fwd. Abut	33.3	1.75	7.4	12.95	431	3.75	2.5	9.38	312	6.25	3.25	20.313	1	676	1420
Total (Cu.Ft.)					862				624				1353	2840	
Total (Cu.Yd.)					32				23				50	105	

Drilled Shafts													
Location	Total Shafts	Top Elev.	Bot Elev.	Shaft Length	Shaft Length Into Rock (Ft)	Drilled Shafts Above Bedrock							
						Top Elev.	Bot Elev.	Shaft Length	Shaft Length Above Rock (Ft)				
Rear Abut.	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 1	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 2	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 3	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 4	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 5	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 6	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Pier 7	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Fwd. Abut.	0	0	0	0.0	0	0	0	0.0	0	0	0.0	0	
Total	0			0				0				0	

MSE Abutment Wall Quantities				
Abut Location	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	0
FA Wing (R)	0	0	0	0
Total (Sq.Ft.)			33721	

Temporary Cofferdams				
Location	Wall			
	Height	Length	width	Area
Pier 1	15	88	0	1320
Pier 2	11	88	0	968
Pier 4	10	30	0	300
Total (Sq.Ft.)				2588

Superstructure Steel Quantities				
Location	Wt.of girder (lb/ft)	# Girders	Span Length	Total Weight
Span 1	353	4	152.50	215330
Span 2	353	4	152.50	215330
Span 3	353	4	145.00	204740
Span 4	353	4	142.00	200504
Span 5	353	4	141.50	199798
Span 6	0	0	0.00	0
Span 7	0	0	0.00	0
Span 8	0	0	0.00	0
Total			733.50	1035800

Pier Cap			
Cap Type	Steel		
Alt. 3	St.I-girder Int	123500	