



SCI-823-10.13

PID No. 79977

SR 823 OVER MORRIS LN & BLUE RUN RD (CR 54)

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

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TranSystems

5747 Perimeter Drive
Suite 240
Columbus, Ohio 43017
Tel 614 336 8480
Fax 614 336 8540

www.transystems.com

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 Morris Lane Blue Run Road (CR 54)
SCI-823-10.31 Portsmouth Bypass
PID#79977**

Dear Mr. Siddiqi:

Submitted for review and comment is the Preliminary Design Report for SR 823 over Morris Lane Blue Run Road (CR 54). Included are The TS&L drawings and the Final Geotechnical Report by DLZ, Ohio, and dated April 17, 2007. Please find below our disposition to the July 27, 2006 comments by Reza Zandi regarding the STS submittal.

1. Please verify County Road number shown in the title block.

The County Road number has been verified and revised in the title block.

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

Sincerely,

Michael D. Weeks by PVP
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 existing Morris Lane Blue Run Road (CR-54) and a relocated unnamed tributary to Candy Run. 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 5/19/06 to incorporate the updated roadway geometry. Comments were received from ODOT on 6/7/06. As a result of the comments on 6/7/06 the Type Study was revised to evaluate three span alternatives with 2.5:1 spill through slopes as recommended by the geotechnical engineer. Additional comments from ODOT were received on 7/3/06 recommending a three span concrete structure. The comments recommended additional investigations at the spill through slopes and also changes in span lengths and abutment heights. A final submittal was made to incorporate 2:1 spill through slopes and investigate the modifications to the span arrangements recommended by ODOT. The resulting recommended alternative has been developed for this Preliminary Design Report.

2. Design Criteria

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

3. Subsurface Conditions and Foundation Recommendation

DLZ Ohio, Inc. performed the subsurface exploration for the proposed bridge and prepared a Final Report dated May 17, 2007. An addendum to this report was issued July 13, 2007.

In summary, nine test borings (TR-4 through TR-6 and B-18 through B-23) were drilled and all encountered bedrock. The depth to bedrock varied across the site from 5' to 32' below existing ground. All borings encountered cohesive and granular soil deposits from clay (A-7-6) to dense sandy silt (A-4a).

DLZ recommended that the piers be founded on spread footings bearing on rock (20 tsf to 40 tsf) or end bearing drilled shafts (40 tsf). At the rear abutment DLZ has recommended drilled shafts or CIP piles that are prebored into competent bedrock or spread footings bearing in the proposed fill. The recommendations are similar at the forward abutment with the addition of driven piles bearing on bedrock. TranSystems requested some clarification from ODOT regarding the preferred foundation type at the abutments and as a result ODOT provided comments dated 6/26/07. The comments recommend that a spread footing be investigated for use at the abutments. DLZ has addressed the use of spread footings exclusively in the 7/13/07 addendum to the Final Report. The results of DLZ's analysis indicate that slope stability of the 2:1 spill through slopes will be greater than 1.5. Settlement analysis indicates that the calculated primary consolidation and the elastic settlement anticipated following the construction of the abutment will be less than 0.004 times the end span length in accordance with AASHTO section 4.4.7.2.5. Settlement platforms have been recommended and incorporated into the drawings. Additional coordination, during final design (Stage 2) will be required to determine if a surcharge will be used to further reduce the settlements.

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.

Both the left and right structures are similar and will consist of a 2 - 12'-0" travel lanes with 9'-6" median shoulders and 12'-0" outside shoulders. The median shoulder width was selected to match the roadway median width. Each bridge deck will be 48'-5½" out-to-out with a 1'-6" outside straight face deflector parapet (SBR-1-99) and a 1'-5 ½" inside straight face deflector parapet (similar to the roadway concrete median barrier but using a base width of 1'-5 ½" and top width of 6 ⅝"). The northbound and southbound bridge sections will be separated from one another, along their inside fascia, by 1". 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. Horizontal and vertical sight distances, in accordance with the design standards, have been provided along the length of the bridge.

Alignment & Profile: The proposed mainline alignment is tangent along entire length of both the left and right structures. The cross section has a crown at the profile grade line with a break at the median shoulder in accordance with the BDM. The proposed mainline profile grade line is located on the inside edge of pavement for both bridges and is in a 1600' sag vertical curve, PVI= 721+50, El. 759.94, G1 = -4.2% and G2 = 4.6%. Embankment slopes will be a maximum of 2:1 in order to minimize right-of-way impacts.

Morris Lane Blue Run Road will remain on its existing grade and alignment.

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 recommended structure discussed in this report. Note that over 15'-0" of vertical clearance is provided over Morris Lane-Blue Run Road.

A 13'-0" clear zone is based upon L&D figure 600-1E. The information input into Figure 600-1E is as follows:

1. The 2004 ADT for Morris Lane Blue Run Road is 251 as provided by the Scioto County Engineers Office.
2. The design speed is 55mph. Not that a posted speed limit was not found on this route.
3. Grading will be 6:1 to provide for drainage.

L&D figure 600-1 requires a 13' clear zone for these conditions.

Guardrail will be used on right hand side of Morris Lane Blue Run Road. The guardrail has been moved two feet beyond the clearance required in the L&D manual to avoid an existing waterline and telephone line.

Pavement Drainage - The collection of storm water runoff will be addressed off of the bridge, thus scuppers will not be required. Pavement drainage systems have been designed and are shown in the accompanying site and general plans.

Utilities - No utilities will be placed on the bridge. However, lighting and ITS conduits will be provided as necessary. An existing waterline and telephone line run parallel to Morris Lane Blue Run Rd. approximately 5' south of the south edge of pavement. **There is an existing aerial electric line also on the**

south side of Morris Lane Blue Run Rd. that will need to be relocated. There are no other utilities known at this point in time.

Maintenance of Traffic - While the new bridges are under construction, traffic will be maintained on existing Morris Lane Blue Run 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 comprised of a three span structure with span lengths of 100'-135'-90' for an overall length of 325'-0". The spans were determined by starting at the location of Pier #2 at the clear zone. The rear abutment span (span 3) was selected to use a 2:1 spill through slope, beginning at the clear zone, with a stub abutment. The center span of 135' was selected to allow for the use of a 72" modified AASHTO Type 4 section. The rear span length was selected to permit semi-integral abutments 2:1 foreslopes & backslopes to the relocated channel and guardrail along the south side of Morris Lane Blue Run Road. .

Substructure:

Abutments: Both the forward and rear abutments will be semi-integral type founded on spread footings in the proposed fill. Spread footing dimensions will be based on the 3.5ksf bearing capacity and loads transferred from the superstructure, however other abutment details of the abutments will follow ODOT Standard Construction drawings. Spread footings have been selected in compliance with the ODOT comments dated 6/26/07.

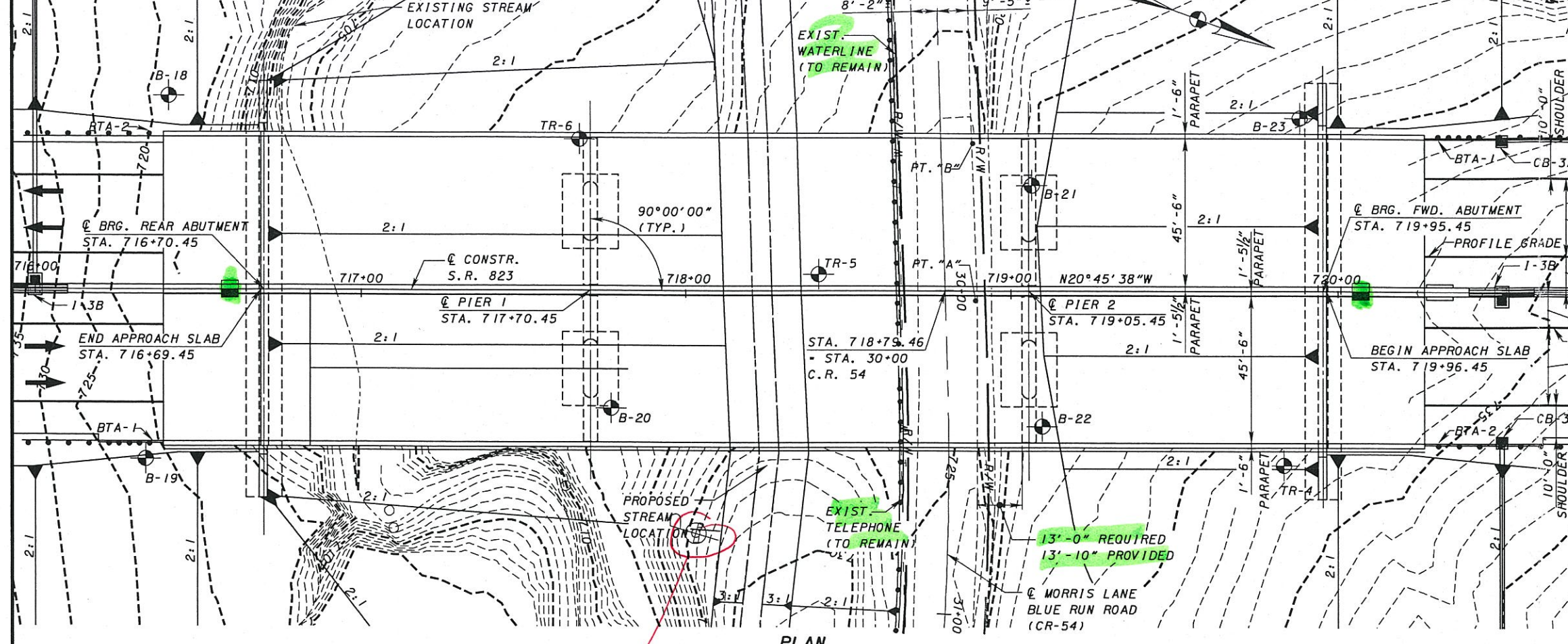
Piers: The proposed pier heights will vary from 68' to 54' and will be T-type founded on spread foundations on bedrock. The foundation elevations have been set in accordance with DLZ's recommendations corresponding to a 20ksf allowable bearing capacity. A higher bearing capacity was also recommended by DLZ at deeper depths. It is anticipated that this higher bearing capacity will not result in any significant reduction of the footing size and will also require more rock excavation.

Superstructure:

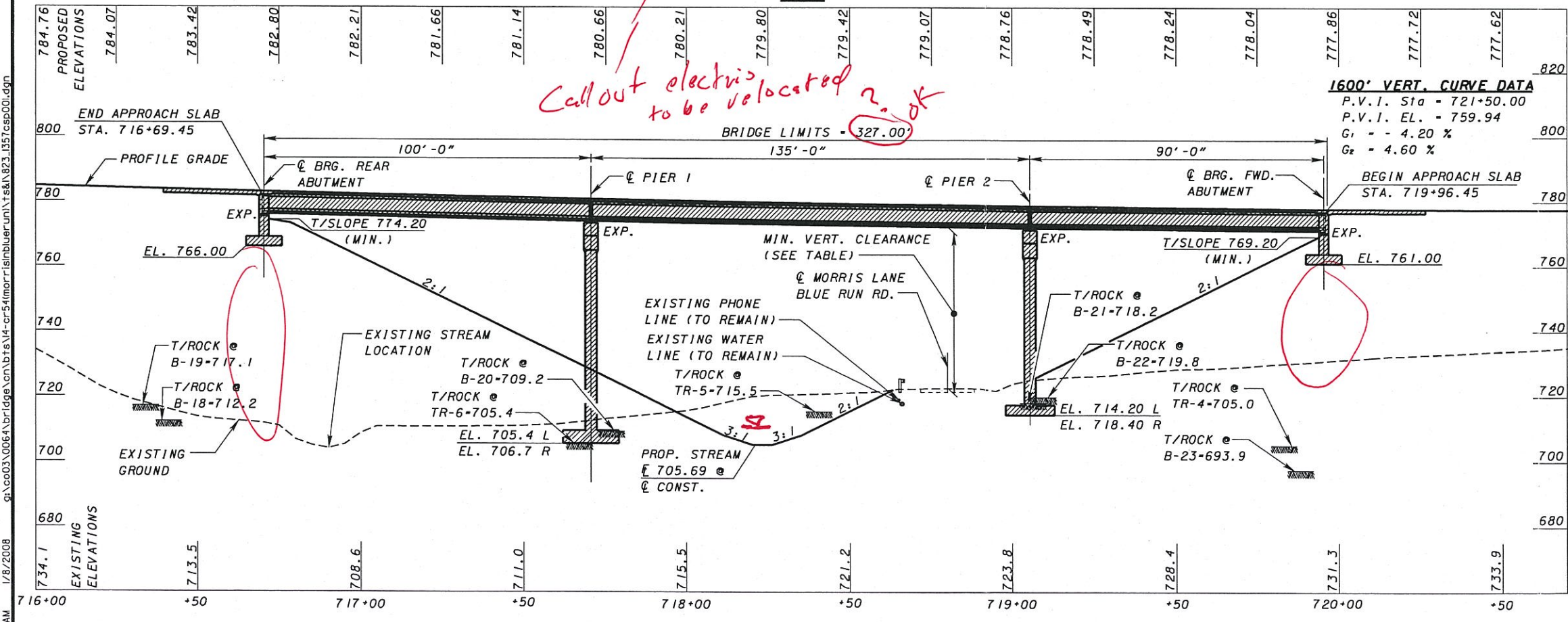
The preliminary design of this alternative consists of 6 - 72" AASHTO Type 4 Modified prestressed beams, spaced at 8'-6" with 2'-11 3/4" overhangs. The design loading applied was HS-25 with Alternate Military Loading and a future wearing surface of 60 psf. The preliminary design of these beams indicates that 6000psi release and 8000psi final concrete strengths will be required. Discussions with Ohio Prestressers Association indicate concrete strength and shipping feasibility were not of particular concern or reason for additional cost (please see attached correspondence). Elastomeric bearings are anticipated at all of the substructures. Both the left and right bridge width will be 45'-6" from toe to toe of parapets with an overall bridge deck width of 48'-5 1/2". Deck thickness, including a 1" monolithic wearing surface, is 8 1/2".

APPENDIX A
Structure Plans





PLAN



Call out electric to be relocated 2. OK

1600' VERT. CURVE DATA

P.V.I. Sta	= 721+50.00
P.V.I. EL.	= 759.94
G ₁	= - 4.20 %
G ₂	= 4.60 %

PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

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

TRAFFIC DATA

(S.R. 823)

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

HYDRAULIC DATA

DRAINAGE AREA = 147.8 acres

Q₅₀ = 294 cfs Q₁₀₀ = 353 cfs
 V₅₀ = 12.7 fps V₁₀₀ = 13.6 fps
 EL 50 = 709.53 EL 100 = 709.74

FIRST GUARDRAIL POSTS OFF BRIDGE LOCATIONS

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

- NOTES:**
- 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.

TABLE OF VERTICAL CLEARANCES

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

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

PROPOSED STRUCTURE

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

SPANS: 98'-9 1/2", 132'-7", 88'-9 1/2" (C/C BRG.)

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

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

SKEW: NONE

CROWN: 0.016 FT/FT

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

APPROACH SLABS: AS-1-B1 (30' LONG)

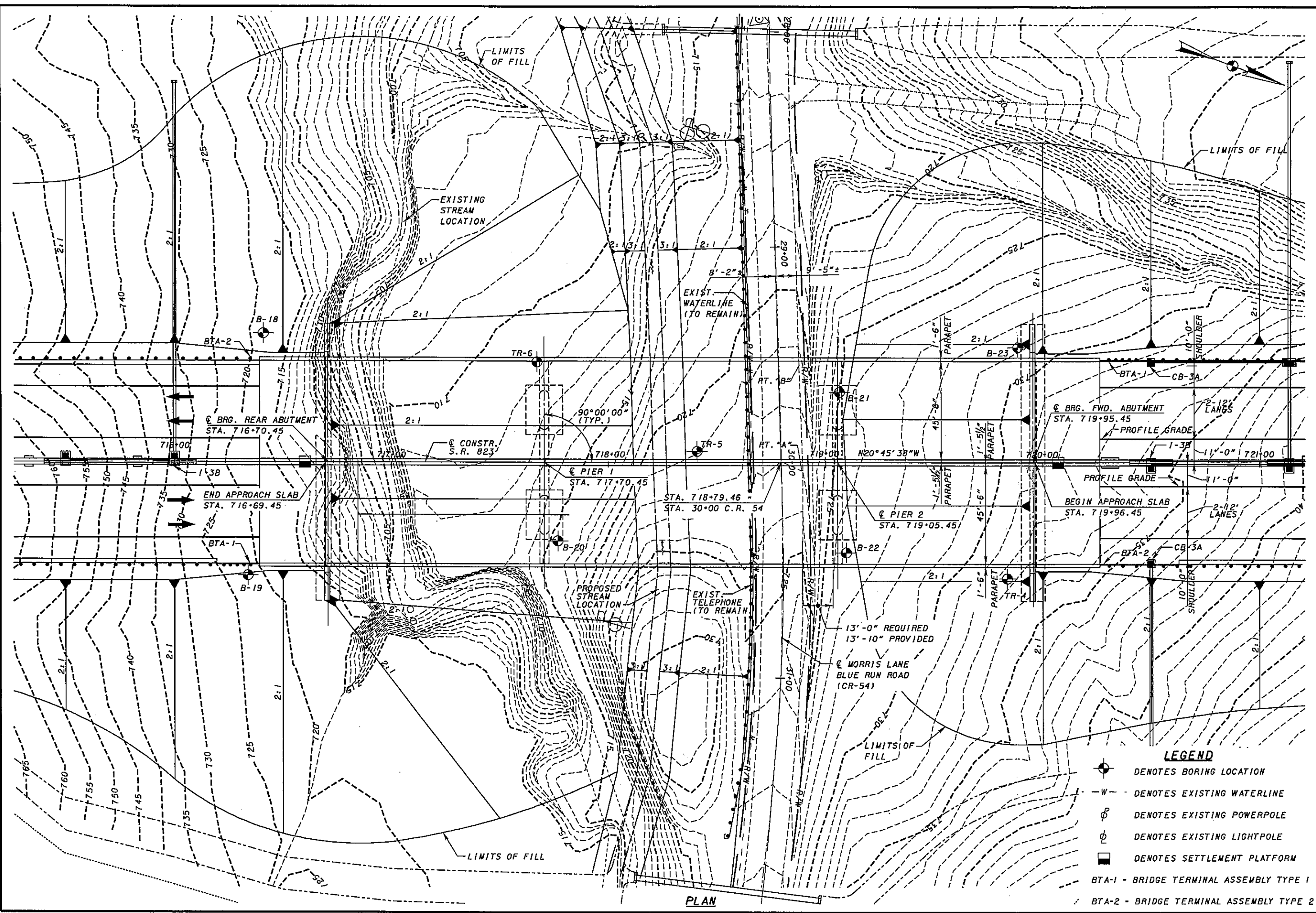
LATITUDE: 82° 56' 56" N

LONGITUDE: 38° 52' 59" W

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DESIGN AGENCY: **TranSystems**
 DATE: 06/08/07
 MSL: 06/08/07
 STRUCTURE FILE NUMBER: 730660/L/1, 730662BR
 DRAWN: CAS
 DESIGNED: PJP
 CHECKED: MSL
 SCIO TO COUNTY: STA. 716+69.45
 STA. 719+96.45
 SITE PLAN: BRIDGE NO. SCI-823-1357 L&R
 S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)
 SCI-823-10.13
 PID 79977
 1/4
 815
 864

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PLAN

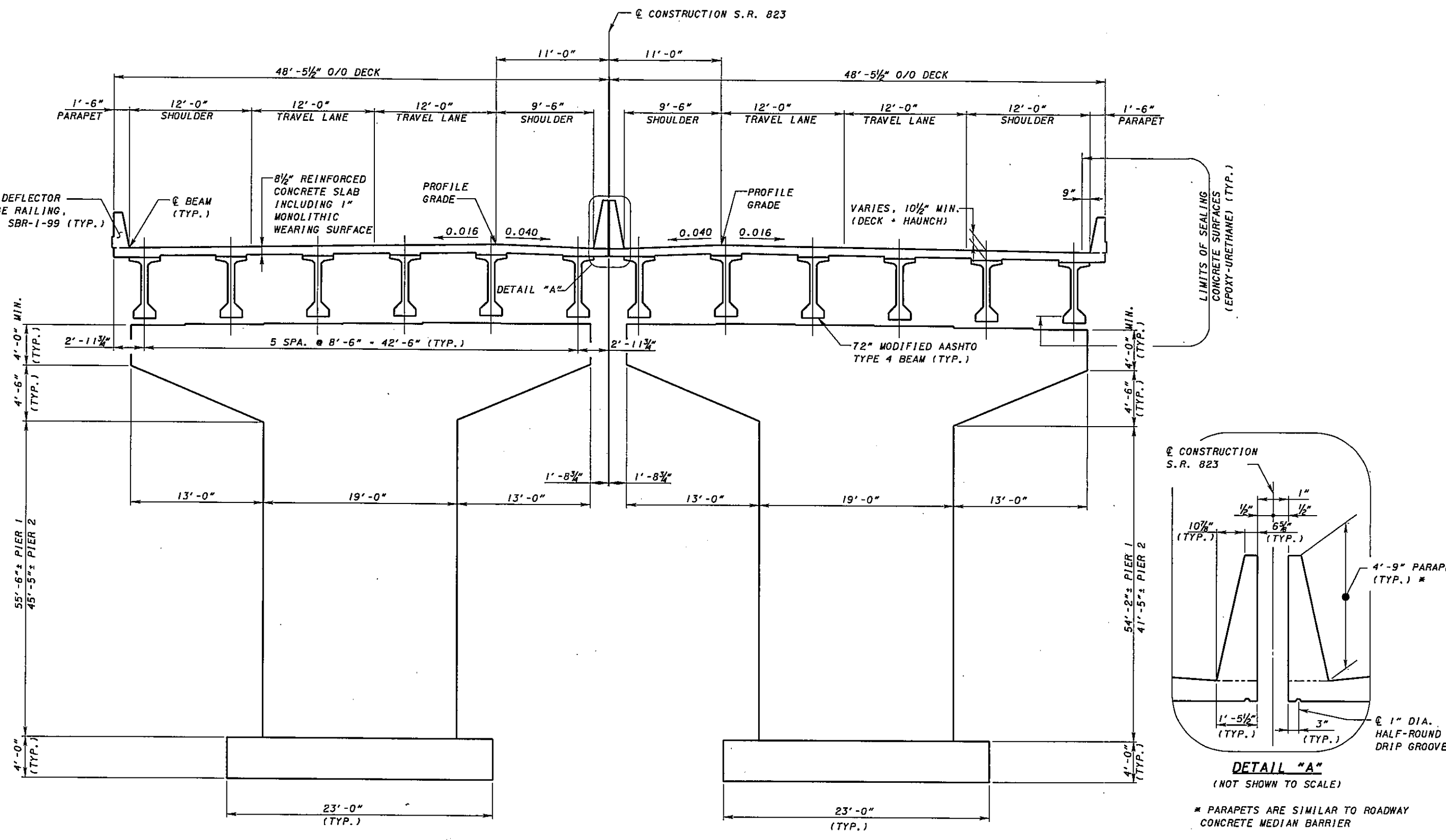
LEGEND

- 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

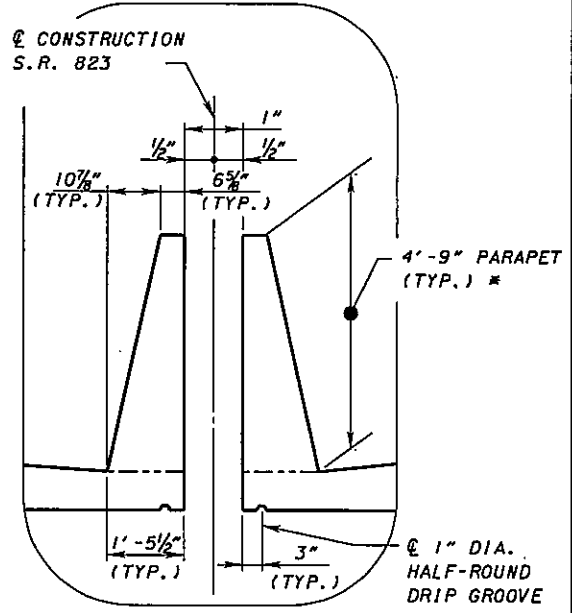
DESIGN AGENCY 510 PARKER AVE. SUITE 210 BURLINGAME, CA 94010	DESIGNED FJP MSL	DRAWN CAS MTH	REVIEWED MSL MTH	DATE 06/08/07
	SCIO TO COUNTY STA. 716+69.45 STA. 719+96.45	STRUCTURE FILE NUMBER 730662R 730662R	GENERAL PLAN BRIDGE NO. SCI-823-1357 L&R S. R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)	SC1-823-10.13 PID 7997

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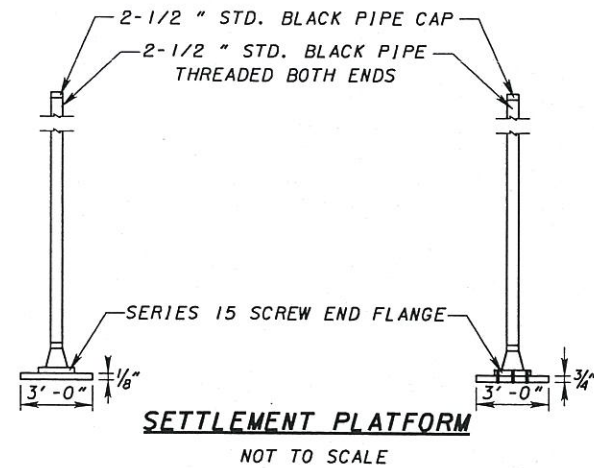


TYPICAL TRANSVERSE SECTION



DETAIL "A"
(NOT SHOWN TO SCALE)
* PARAPETS ARE SIMILAR TO ROADWAY CONCRETE MEDIAN BARRIER

DESIGN AGENCY Titan Systems 5415 PINEWOOD DRIVE, SUITE 204 DALLAS, TEXAS 75244	
DATE 06/08/07	REVISION MSL
FILE NUMBER 7306601.L, 7306628R	REVISION MTN
DRAWN CAS	CHECKED PJP
DESIGNED MSL	APPROVED PJP
TRANSVERSE SECTION BRIDGE NO. SCI-823-1357 L&R S.R. 823 OVER MORRIS LANE BLUE RUN (C.R. 54)	
SCI-823-10.13 PID 79977	
3	4
817 864	



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.

SUPERSTRUCTURE DEPTH	
ITEM	72" MODIFIED AASHTO TYPE 4 BEAM
SLAB (INCLUDING WEARING SURFACE)	8.5"
HAUNCH (BOTTOM OF SLAB TO TOP OF FLANGE)	2"
GIRDER DEPTH	72"
TOP OF WEARING SURFACE TO BOTTOM OF GIRDER FLANGE (INCH)	82.5"
TOP OF WEARING SURFACE TO BOTTOM OF GIRDER FLANGE (FEET)	6.875'

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 3/4" EXTERIOR GRADE PLYWOOD SHALL BE USED FOR THE BASE. THE PIPE SHALL BE 2 1/2" STANDARD BLACK PIPE WITH THREADED 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.

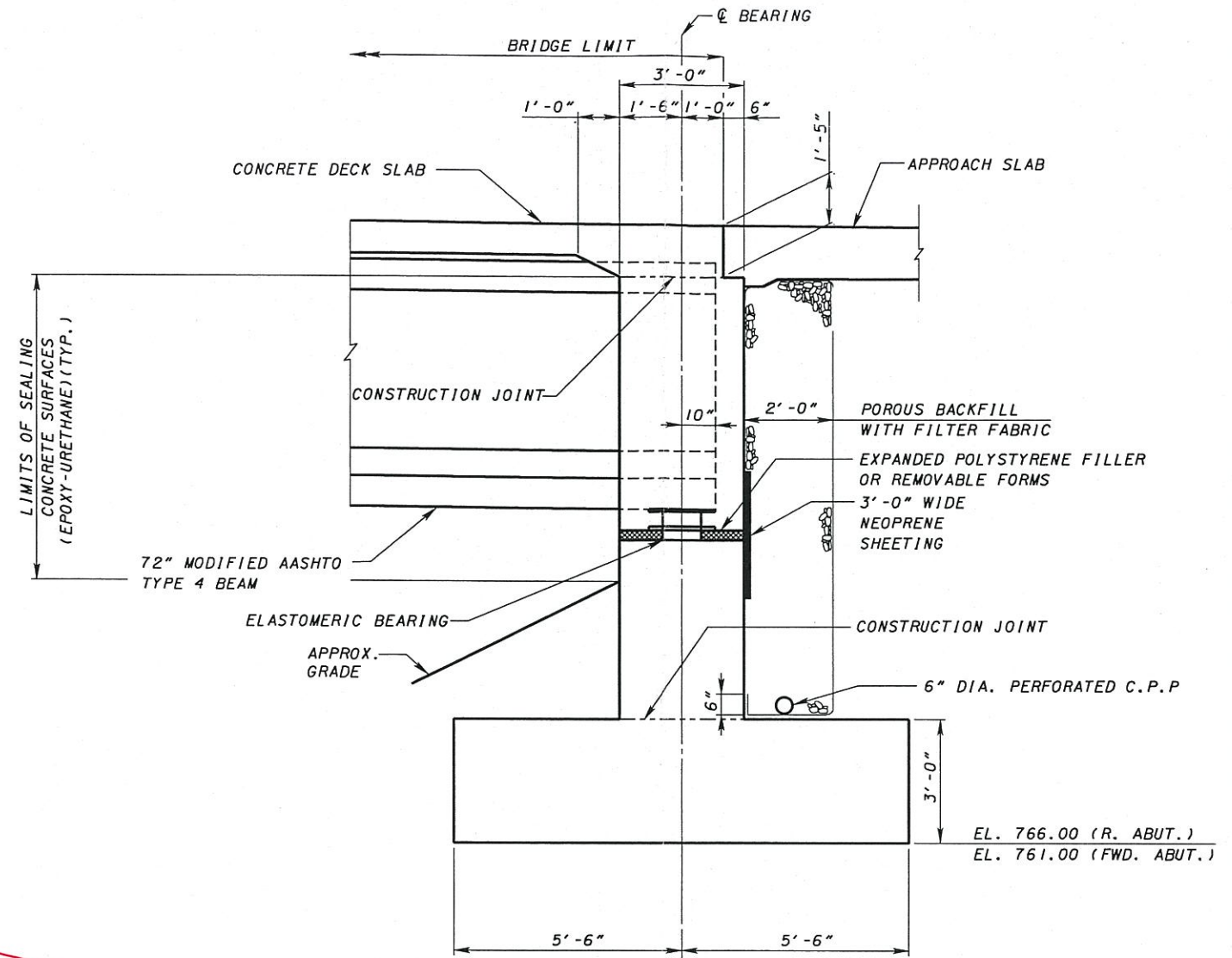
CONSTRUCTION METHODS: THE PLATFORM SHALL CONFORM TO THE DETAILS SHOWN ON THE PLANS.

THE PLATFORM AT THE FORWARD ABUTMENT SHALL BE PLACED ON THE IN-SITU SOIL PRIOR TO EMBANKMENT CONSTRUCTION. THE PLATFORM AT THE REAR ABUTMENT SHALL BE PLACED AT THE TOP OF THE FINISHED EMBANKMENT PRIOR TO SURCHARGE CONSTRUCTION.

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 SPREAD FOOTING 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.
2. ITEM 203 EMBANKMENT, AS PER PLAN: PLACE AND COMPACT EMBANKMENT MATERIAL IN 6 INCH LIFTS FOR THE CONSTRUCTION OF THE APPROACH EMBANKMENT BETWEEN STATIONS 714+70 TO 721+95.

7:48:45 AM 1/8/2008 g:\co03\0064\bridge\cn\brs\4-cr54\morris\in\bluer\um\158\823_1357\ce0001.dgn

DESIGN AGENCY
tranSystems
170 EAST PATE AVE. SUITE 300
CINCINNATI, OHIO, 45202

DATE	06/08/07
REVIEWED	MSL
STRUCTURE FILE NUMBER	730660 IL, 730662BR
DRAWN	CAS
CHECKED	MSL
DESIGNED	PJP

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

SCI-823-10.13
PID 7997

4 / 4

818
864

APPENDIX B
Structure Cost Estimate



SCI-823-0.00 - PORTSMOUTH BYPASS

S.R. 823 over Blue Run L/R
STRUCTURE TYPE STUDY

By: pjp
Checked:

Date: 6/7/2007
Date:

ALTERNATIVE COST SUMMARY

Alternative No.	Span Arrangement		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
4	1	97.25	97.25	5 Prestressed I-Girders /per BRIDGE	Modified AASHTO Type 4 (60")	\$841,000	\$1,304,000	\$343,200	\$0	\$2,490,000	\$0	\$2,490,000

NOTES:

- 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.
- Estimated construction cost does not include existing structure removal (if any), which should be quantified seperately, if required.

SCI-823-0.00 - PORTSMOUTH BYPASS
S.R. 823 over Blue Run L/R

STRUCTURE TYPE STUDY - PRESTRESSED CONCRETE GIRDER ALTERNATIVE 4 - SUPERSTRUCTURE

By: PJP
Checked:

Date: 6/7/2007
Date:

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
4	1	97.25	97.25	99.25	518	\$285,100	\$131,500	\$128,100	5 Prestressed I-Girders /per BRIDGE	Modified AASHTO Type 4 (60")	\$296,300	\$841,000	0%	\$841,000

* Includes Diaphragm Concrete

COST SUPPORT CALCULATIONS

Deck Cross-Sectional Area:

Parapets:		No.	Individual Area (sq. ft.)	Parapet Area (sq. ft.)	Slab:		Haunch & Overhang Area	Total Concrete Area (sq. ft.)
Parapets	1	1	4.26	4.26	T (ft.)	W (ft.)	Area	
Parapets	1	1	4.77	4.77	Left Bridge	48.50	35.4	47.9
					Right Bridge	48.50	35.4	47.9

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

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	\$905 ea.	5.0%	\$1,000 ea.	24	\$24,000
Modified Type 4 I-Beams (60")	\$250 per ft.	5.0%	\$280 ea.	972.5	\$272,300
TOTAL =					\$296,300

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.):	Year 2005	Annual Escalation	Year 2007
Length = 30 ft.			
Area = 327 sq. yd.			
Approach Slabs	\$178.00	5.0%	\$196.00

Expansion Joints

Unit Costs (\$/Lin.Ft.):	Cost Ratio	Year 2004	Annual Escalation	Year 2007

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 =			\$550.00

Based on parapet and slab percentages of total concrete area

Epoxy Coated Reinforcing Steel

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

SCI-823-0.00 - PORTSMOUTH BYPASS
S.R. 823 over Blue Run L/R

STRUCTURE TYPE STUDY - PRESTRESSED CONCRETE GIRDER ALTERNATIVE 4 - SUBSTRUCTURE

By: pjp
 Checked:

Date: 6/7/2007
 Date:

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	Additional Crane Cost	Earthwork Cost	Subtotal Substructure Cost
4	1	97.25	5 Prestressed I-Girders /per BRIDGE	Modified AASHTO Type 4 (60")	\$0	\$0	\$132,400	\$22,900	\$155,900	\$868,500	\$75,000	\$49,000	\$1,304,000

COST SUPPORT CALCULATIONS

Pier QC/QA Concrete, Class QSC1 Cost: (HP-Pile)						Pile Foundation Unit Cost (\$/ft.): 14" DIA. CIP Piles, Furnished & Driven							
Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost	Number of Piles		SEE QUANTITY CALCULATIONS		Total Pile Length			
Cap	0	\$575.00	5.0%	\$634.00	\$0	88				3,720			
Stem	0	\$575.00	5.0%	\$634.00	\$0								
Footings	0	\$300.00	5.0%	\$331.00	\$0								
Total Cost	0				\$0								
Pier QC/QA Concrete, Class QSC1 Cost: (Drilled Shaft)						Pile Foundation Unit Cost (\$/ft.):							
Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost	Furnished Driven		Year 2005 Unit Cost	Annual Escalation	Year 2007			
Cap	0	\$575.00	5.0%	\$634.00	\$0	Total		\$25.00	5.0%	\$27.60			
Columns	0	\$575.00	5.0%	\$634.00	\$0			\$13.00	5.0%	\$14.30			
Footings	0	\$300.00	5.0%	\$331.00	\$0					\$41.90			
Total Cost	0				\$0								
Abutment QC/QA Concrete, Class QSC1 Cost:						Shaft Foundation Unit Cost (\$/ft.): 36" Drilled Shaft							
Component	Volume (cu. yd.)	Year 2005	Annual Escalation	Year 2007	Total Cost	Number of Shafts		SEE QUANTITY CALCULATIONS		Total Shaft Length			
Abutment Including Wingwalls	286	\$420.00	5.0%	\$463.00	\$132,400	Alt. 4 0				0			
Excavation and Embankment Costs:						Shaft Foundation Unit Cost (\$/ft.):							
Component	Quantity	Year 2005	Annual Escalation	Year 2007	Total Cost	Year 2005 Unit Cost		Annual Escalation	Year 2007	Temporary Shoring and Support Unit Costs (\$/sq. ft.):			
Embankment	0	\$7.00	5.0%	\$7.72	\$0	\$125.00		5.0%	\$138.00	Temp. Shoring Area (sq. ft.)			
Excavation	7400	\$6.00	5.0%	\$6.62	\$49,000	Cost of Shafts: \$ -				Temp. Girder Support (lump sum)			
Wick Drains	0	\$1.00	5.0%	\$1.10	\$0					Alt. 4 0 \$ -			
Note: Structure Excavation included in contingency estimates.						MSE Abutment Unit Cost (\$/sq. ft.):							
Epoxy Coated Reinforcing Steel Unit Cost (\$/lb):						Alternative No.	Total Area (sq. ft.)	Year 2005 Unit Cost	Annual Escalation	Year 2007	Additional Crane Cost		
Assume 125 lbs of reinforcing steel per cubic yard of pier concrete.						4	15,762	\$50.00	5.0%	\$55.10	Temporary Shoring \$22.50 5.0% \$31.70		
Assume 90 lbs of reinforcing steel per cubic yard of abutment concrete.						MSE Abutment Undercut Cost:							
Year 2005	Annual Escalation	Year 2007			Alternative No.	Total Area (sq. ft.)	Depth (ft.)	Volume (cu. yd.)	Year 2005 Unit Cost	Annual Escalation	Year 2007	Cofferdam \$32.00 5.0% \$37.00	
Pier	\$0.81	5.0%	\$0.89	4		0	0.00	0	\$55.00	5.0%	\$60.60	Additional Crane Cost	
Abutment	\$0.81	5.0%	\$0.89									\$ 75,000	

SCI-823-0.00 - PORTSMOUTH BYPASS
S.R. 823 over Blue Run L/R

STRUCTURE TYPE STUDY - PRESTRESSED CONCRETE ALTERNATIVE 4 - QUANTITY CALCULATIONS

By: pjp
 Checked:

Date: 6/7/2007
 Date:

Pier Quantities														
Pier Locat	Length	Cap				Stem				Footing				Total Volu
		Width	Depth	Area	Volume	Width	Height	Length	Volume	Width	Depth	Length	Volume	
Pier 1 (Spr Ftg)				0.00	0				0				0	0
Pier 2 (Spr Ftg)				0.00	0				0				0	0
Pier 3														0
Pier 4														0
Pier 5														0
Pier 6														0
Pier 7														0
Total (Cu.Ft.)					0				0				0	0
Total (Cu.Yd.)					0				0				0	0
Qty x 2 (L/R)					0			0				0	0	

Pile Quantities													
Location	Load/girder (Kips)	# Girders	Total Girder	Subst Wt (kips)	Pile Cap.(Kips)	No. Piles	Increase Factor	Total Piles	Top Elev.	Bot Elev.	Pile Length	Total Pile Length	
Rear Abut.	0	0	0	0	140	0	1	40	802.9	760.0	45.0	1800	
Pier 1	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 2	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 3	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 4	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 5	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 6	0	0	0	0	140	0	1	0	0	0	2.0	0	
Pier 7	0	0	0	0	140	0	1	0	0	0	2.0	0	
Fwd. Abut.	0	0	0	0	140	0	1	48	805.1	766.7	40.0	1920	
Total								88				3720	
Total								88				3720	

Abutment Quantities*														
Abut Loca	Length (feet)	Backwall				Beam Seat				Footing				Total Volu
		Width	Depth	Area	Volume	Width	Height	Area	Volume	Width	Depth	Area	# Footing	
Rear Abut	0	0	0	0.00	0	0	0	0.00	0	0	3	0	1	0
Fwd. Abut	0	0	0	0.00	0	0	0	0.00	0	0	3	0	1	0
Total (Cu.Ft.)					0				0				0	0
Total (Cu.Yd.)					0				0				0	0
Qty x 2 (L/R)					0			0				0	286	

* Includes Wingwalls

36" Drilled Shafts for Piers													
Location	Load/girder (Kips)	# Girders	Total Load	Subst Wt (kips)	Pile Cap.(Kips)	No. Piles	Increase Factor	Total Shafts	Top Elev.	Bot Elev.	Pile Length	Total Shaft	
Rear Abut.	0	0	0	0	0	0	1	0	0	0	0.0	0	
Pier 1	0	0	0	0	0	0	1	0	0	0	2.0	0	
Pier 2	0	0	0	0	0	0	1	0	0	0	2.0	0	
Pier 3	0	0	0	0	0	0	1	0	0	0	0.0	0	
Pier 4	0	0	0	0	0	0	1	0	0	0	0.0	0	
Pier 5	0	0	0	0	0	0	1	0	0	0	0.0	0	
Pier 6	0	0	0	0	0	0	1	0	0	0	0.0	0	
Pier 7	0	0	0	0	0	0	1	0	0	0	0.0	0	
Fwd. Abut.	0	10	0	0	0	0	1	0	0	0	0.0	0	
Total								0				0	

Superstructure P/S Concrete Quantities							
Location	Type of girder	# Girders	Span Length	Total Length	Spacing Int.	No. of Int in span	Number of Total No. Int Diap. 1 in Span
Span 1	DD TYPE 4	10	97	973	24.31	8	3
Span 2		0	0	0	0.00		
Span 3		0	0	0	0.00		
Span 4		0	0	0	0.00		
Span 5		0	0	0	0.00		
Span 6		0	0	0	0.00		
Span 7		0	0	0	0.00		
Span 8		0	0	0	0.00		
Span 9		0	0	0	0.00		
Total	DD TYPE 4	10		973	Total		24