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Transmittal

Attention: Tom Barnitz, P.E. Date: 2/27/2008 Job No: 45878

To: ODOT District 9
650 Eastern Avenue
Chillicothe, OH 45601

Phone: 740-774-8877

Regarding: SCI-823-Phase1: Structure Type Study (SCI-823-0837 L/R)

We are sending you: ☒ **Attached** ☐ **Under separate cover via _____ the following items**

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☒ Other Reports

Copies	Date	No.	Description
2	2/19/08	Each	Structure Type Study (SCI-823-0837 L/R)

STRUCTURAL ENGINEERING
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Remarks The attached Structure Type Study for the SR-823 mainline bridge over Swauger Valley – Minford Road was prepared in response to OSE's request to further study a 3-span and 4-span alternatives.

Copy to Project File Signed

If enclosures are not as noted, please notify us at once

Christian H. Nyberg, P.E. Senior Bridge Engineer

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SCI-823-0681 (Portsmouth Bypass)

Proposed Twin Structures, Structure Type Study
Bridge No. SCI-823-0837 L/R
S.R. 823 over Swauger Valley-Minford Road (C.R. 31)

STRUCTURE TYPE STUDY
SCI-823-0837 L/R

Prepared for
Ohio Department of Transportation
District 9
650 Eastern Ave.
Chillicothe, Ohio 45601

February 18, 2008
KZF Comm. No. 5355.02

KZF DESIGN

KZF DESIGN INC. Architecture | Engineering | Interiors | Planning 655 Eden Park Drive Cincinnati, OH 45202-6000 TEL 513 621 6211 FAX 513 621 6530 WEB www.kzf.com

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I. Executive Summary

Purpose

This report focuses on determining a recommended preferred structure alternative that should be designed for Bridge SCI-823-0837 L/R in Scioto County, Ohio. A previous Structure Type Study, *S.R. 823 over Swauger Valley-Minford Road*, dated 04/07/06, was submitted to ODOT District 9 and the following alternatives were considered:

- Alternate 1 – Two-Span 100'-100', Concrete I-Beam Modified AASHTO Type 4 (72"), Semi-Integral Type behind MSE Walls
- Alternate 2 – Two-Span 100'-100', Steel Plate Girder, Semi-Integral Type behind MSE Walls
- Alternate 2A – Two Span 100'-100', Steel Plate Girder, Semi-Integral Type behind MSE Walls
- Alternate 3 – Three Span 128.5'-183.5', 128.5', Steel Plate Girder, Stub Type with 2:1 spill through slopes

As requested by the Scope of Services, "Concern about the proposed MSE Wall heights were introduced recently and the District wishes to reevaluate the Structure Type Study"; therefore, an investigation of a 3 and 4 span bridge was done. In this report, the following two Alternatives were considered:

- **Alternative 1 (Preferred Alternative) – Four-Span 94.75-94.5'-94.5'-94.75', Concrete I-Beam Modified AASHTO Type 4 (72"), Semi-Integral Type Abutments with 2:1 spill through slopes**
- Alternative 2 – Three Span 128.5'-183.5', 128.5', Steel Plate Girder, Stub Type with 2:1 spill through slopes (Alternate 3 from Previous Structure Type Study)

A four-span steel beam on stub type abutments with 2:1 spill through slope alternate was not considered due to cost of steel compared to the cost of concrete. A steel beam option that has the same span configuration as a prestressed concrete I-beam option would be more costly and therefore not a cost effective option to analyze. A three-span concrete option was not considered to due the span configuration and the feasibility of acquiring and constructing a 180'+/- prestressed concrete I-beam and delivering it on site.

Method

The updated 2004 version of the Ohio Department of Transportation Bridge Design Manual and the updated 2002 AASHTO Standard Specifications for Highway Bridges, 17th Edition were used as guidelines for the basis of the content of this report. Horizontal and Vertical clearances

are based on the Ohio Department of Transportation Location and Design Manual, Volume One – Roadway Design. Due to the MSE Wall heights and the concern of their height, a three and four span configuration with 2:1 spill through slopes was analyzed.

Conclusions

For the proposed structure, we recommend a four span prestressed concrete I-beam superstructure supported by semi-integral abutments with 2:1 spill through slopes. The total proposed bridge length is 385'-3" c/c bearings.

II. Introduction

General Description and Overview

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 from an interchange with US 52 just east of the town to another interchange with US 23 north of the town in Valley Township. Each of the proposed bridge sections will consist of two 12'-0" travel lanes with 9'-6" median shoulder and 12'-0" outside shoulders. Each bridge deck width will be 48'-5½" out-to-out with 1'-5½" inside straight face deflector parapet and 1'-6" outside straight face deflector parapet. Collection of storm water runoff will be addressed off the bridge. There are no utilities that will be placed on the bridge. However, lighting and ITS conduits will be provided when necessary.

Bridge and Roadway Alignments

The proposed horizontal geometry is along a tangent alignment across the entire length of both the left and right structures. The proposed mainline profile for each bridge is located on the inside edge of pavement which is 11'-0" from the centerline of survey and construction S.R. 823. The left and right profiles are within a 1300' vertical curve with PVI at Station 446+00.00 (PVI elevation = 686.89'), g_1 = -4.50% and g_2 = 2.60%. Embankment slopes will be a maximum 2:1 in order to minimize right-of-way impacts.

As Per the Scope of Services (See Appendix), we investigated a 3 and 4 span bridge with bridge limits of approximately 360-365 feet. Descriptions of these alternatives will be discussed in more detail later in this report.

The proposed bridges will carry traffic north and south on state route 823 from interchange with US 52 to interchange with US 23. These bridges are on a tangent alignment. Since these twin structures vertical alignments were dictated by the overall vertical design of the new bypass

profile, clearance was not an issue. More than 15'-0" of preferred vertical clearance is provided for the alternatives considered in this study. The existing Swauger Valley-Minford Road is on a tangent alignment and therefore neglects horizontal sight distance. Per L&D manual Volume 1, a minimum horizontal clearance of 23'-0" is required and satisfied on each alternative. An existing creek, which parallels the road, will be maintained on the west side of Swauger Valley-Minford Road.

Maintenance of Traffic

Since this structure is to be constructed on a new alignment, there is not any specific maintenance of traffic or stage construction issues that need to be addressed in the plans for this bridge.

Maintenance and Inspection Access

The proposed structure type (four span prestressed concrete I-beam on semi-integral abutments) does not require the addition of any special design features for maintenance and inspection access.

III. Design Considerations

Design Criteria for Bridge No. SCI-823-0837 L/R

- Road Type, classification: 2-lane limited access highway
- Speed: 65 mph
- Traffic: ADT (2010) = 21,200 ADT (2030) = 31,200
  ADTT (2010) = 2,968 ADTT (2030) = 4,368
- Bridge Typical section is 45'-6" t/t barrier: this will include a 2-12'(min.) lanes roadway, 12'(min.) right shoulder, 4'(min.) left shoulder
- Loading: HS25 and Alternate Military Loading with 60 psf for future wearing surface
- Outside Barrier: SBR-1-99
- Inside Barrier: SBR-1-99, As Per Plan
- Deck Drainage: No scuppers required
- Approach Slab: AS-1-81, 30' long

IV. Narrative of Bridge Alternatives

Alternative 1 (Four-Span 94'-9", 94'-6", 94'-6", and 94'-9", Concrete I-Beam Modified AASHTO Type 4 (72"), Semi-Integral Type Abutments with 2:1 spill through slopes, 13 degree skew)

This four span alternative is investigated as requested by the Scope of Services. The location of the creek, the horizontal clear zone width of 23'-0" for Swauger Valley-Minford Road and the height and length of the embankments (due to the 2:1 spill through slope) help dictate the location of the substructure units. When these factors are considered along with having a constant length for all of the beams, four spans with lengths of 94'-9", 94-6", 94-6" and 94'-9" center to center bearing are defined.

The total bearing-to-bearing length of this alternative is 385'-3". Referencing Figure 203 in the ODOT Bridge Design Manual, with a skew of 13 degrees and a bridge length of 385'-3", a semi-integral abutment design is recommended. Referencing Table 2 on page 7 of the *Subsurface Exploration Report*, dated 09/26/06, Pipe Piles shall be used on the abutments. Straight wingwalls will be provided. Abutment and wingwall details will follow ODOT Standard Drawings.

Piers 1,2 and 3 of this four-span structure are T-type piers supported on spread footings founded on bedrock. A T-type is selected over a cap-and-column type due to the anticipated height of pier, which is approximately 60'. The columns of a 60' cap-and-column pier may be considered slender columns and to minimize/eliminate these slenderness effects, the wide and thick stem of a T-type pier is useful. The dimensions of the spread footings were calculated using an allowable bearing capacity of 80 ksf (reference Table 2 on page 7 of the *Subsurface Exploration Report*, dated 09/26/06).

The superstructures for both the left and right bridges of this alternative consist of 5 prestressed, precast concrete I-beam Modified AASHTO Type 4 (72") spaced at 10'-4" on center. This satisfies the HS-25 and Alternate Military Loading as well as a Future Wearing Surface loading of 60 psf. Each bridge width is 45'-6" from toe-to-toe of parapets with an overall bridge deck width of 48'-5½". Deck thickness, including a 1" monolithic wearing surface, is 8¾".

The bridge construction cost for Alternative 1 is estimated to be $5,386,823.04 in year 2010 dollars. Since maintenance on concrete structures is significantly less than maintenance on steel structures and the construction cost of this alternative is less than Alternative 2, a life cycle cost analysis was not done.

Alternative 2 (Three-Span 128'-6", 183'-6", and 128'-6", Steel Plate Girder, Stub Type with 2:1 spill through slopes (Alternate 3 from Previous Structure Type Study)

Alternative 2 is a continuous steel plate girder bridge. The height and length of the embankments (due to the 2:1 slope), the creek location, and the horizontal clear zone width of 23'-0" for Swauger Valley-Minford Road help dictate the substructure unit locations and respective span lengths. When these factors are considered along with the end span-to-middle span ratios of ODOT BDM 205.6, three spans with lengths of 128'-6", 183'-6", and 128'-6" center-to-center bearing are defined (0.70 end span-to-middle span ratio).

The total bearing-to-bearing length of this alternative is 440'-6". Because this length exceeds 400', a conventional abutment such as a stub type abutment is recommended regardless of skew angle (refer to Figure 203 of the ODOT Bridge Design Manual). Referencing Table 2 on page 7 of the *Subsurface Exploration Report*, dated 09/26/06, Pipe Piles shall be used on the abutments. Straight wingwalls will be provided. Abutment and wingwall details will follow ODOT Standard Drawings.

Piers 1 and 2 of this three-span structure are T-type piers supported on spread footings founded on bedrock. As with Alternate 1, T-type piers are selected to minimize/eliminate column slenderness effects.

The superstructures for both the left and right bridges of this alternative consist of 5-continuous steel plate girders, grade 50W, with 60" deep webs spaced at 9'-6" on center. This satisfies the HS-25 (Case I) and Alternate Military Loading as well as a Future Wearing Surface loading of 60 psf. Each bridge width is 42'-0" from toe-to-toe of parapets with an overall bridge deck width of 45'-0". Dck thickness, including a 1" monolithic wearing surface, is 8¾".

The initial bridge construction cost for Alternative 2 is estimated to be $5,940,000 in year 2008 dollars (refer to Appendix D).

V. Cost Comparison

Table 1					
Alternate	Total Cost	Structure Contingency Cost (20%)	Grand Total Alternate Cost	$ Difference	% More
1	$4,489,019.20	$897,803.84	$5,386,823.04	$0.00	0%
2	$4,952,000.00	$990,400.00	$5,940,000.00	$553,176.96	10%

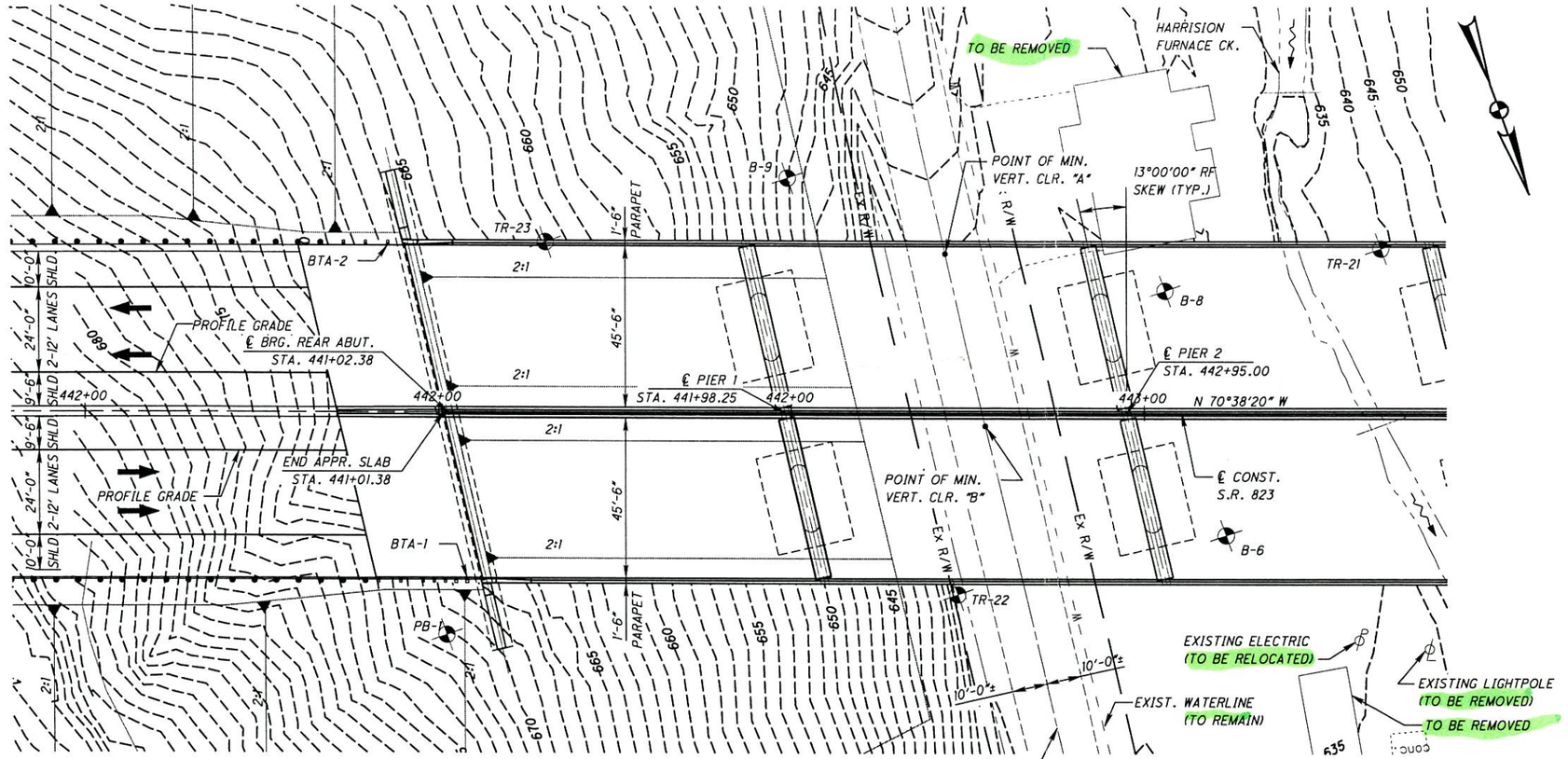
VI. Conclusions and Recommendations

After reassessing the previous Structure Type Study, we recommend that the most economical Structure Alternative 1 (Four-Span 94'-9", 94'-6", 94'-6", and 94'-9", Concrete I-Beam Modified AASHTO Type 4 (72"), Semi-Integral Type Abutments with 2:1 spill through slopes, 13 degree skew) be designated as the preferred alternative design for this structure.

VII. Appendices

APPENDIX A

Recommended Alternative, Site Plan, Transverse Section and Misc. Details



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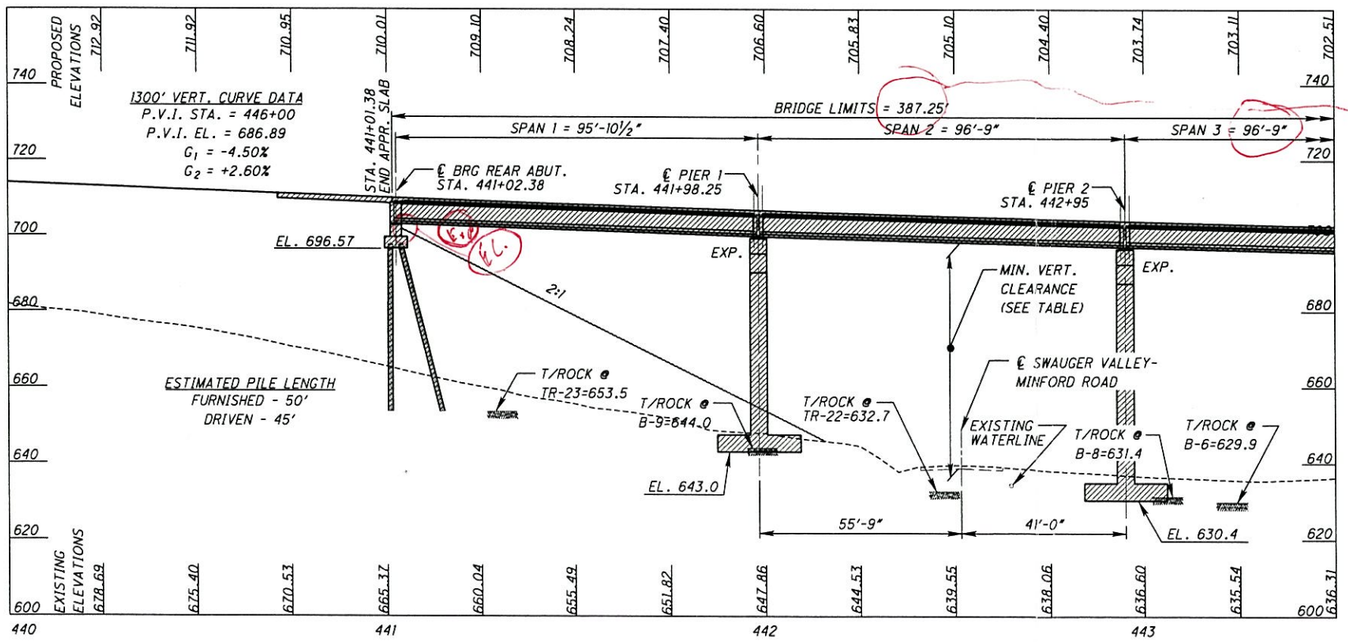

PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	440+85.73	LT.
FWD. ABUT.	444+82.11	LT.

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

TRAFFIC DATA

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

HYDRAULIC DATA

DRAINAGE AREA = 0.873 sq.mi. = 558.9 acres

Q_{50} = 493 cfs — Q_{100} = 581 cfs
V_{50} = 6.5 fps — V_{100} = 6.9 fps
EL 50= 638.2 — EL 100= 638.5

OHWM: EL. 636.2
AREA BELOW OHWM: 0.17 ACRES
TEMP. FILL BELOW OHWM: 1130 CY

NOTES:

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

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

PROPOSED STRUCTURE

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

SPANS: 94'-9", 94'-6", 94'-6", 94'-9" c/c BEARINGS

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

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

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

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

LATITUDE: 38°51'00"N

LONGITUDE: 82°52'03"W

check for Live Load 54"

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

LEGEND

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

DESIGN AGENCY
K Z DESIGN
Architecture | Engineering | Interiors | Planning
437 OSBORN, NE, Bldg 1 Fairfax Park Office Condominiums, Grove City, OH 43123
TEL: 614.871.8787 FAX: 614.871.8788 www.kzdesign.com

DESIGNED	DRAWN	REVIEWED	DATE
DEF	RBK	BMB	02/18/08
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DAT.		7306458	

SCIOTO COUNTY
STA. 441+01.38
STA. 444+98.63

SITE PLAN - ALTERNATE 1
BRIDGE NO. SCI-823-0837 L
S.R. 823 OVER SWAUGER VALLEY MINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

1 / 4

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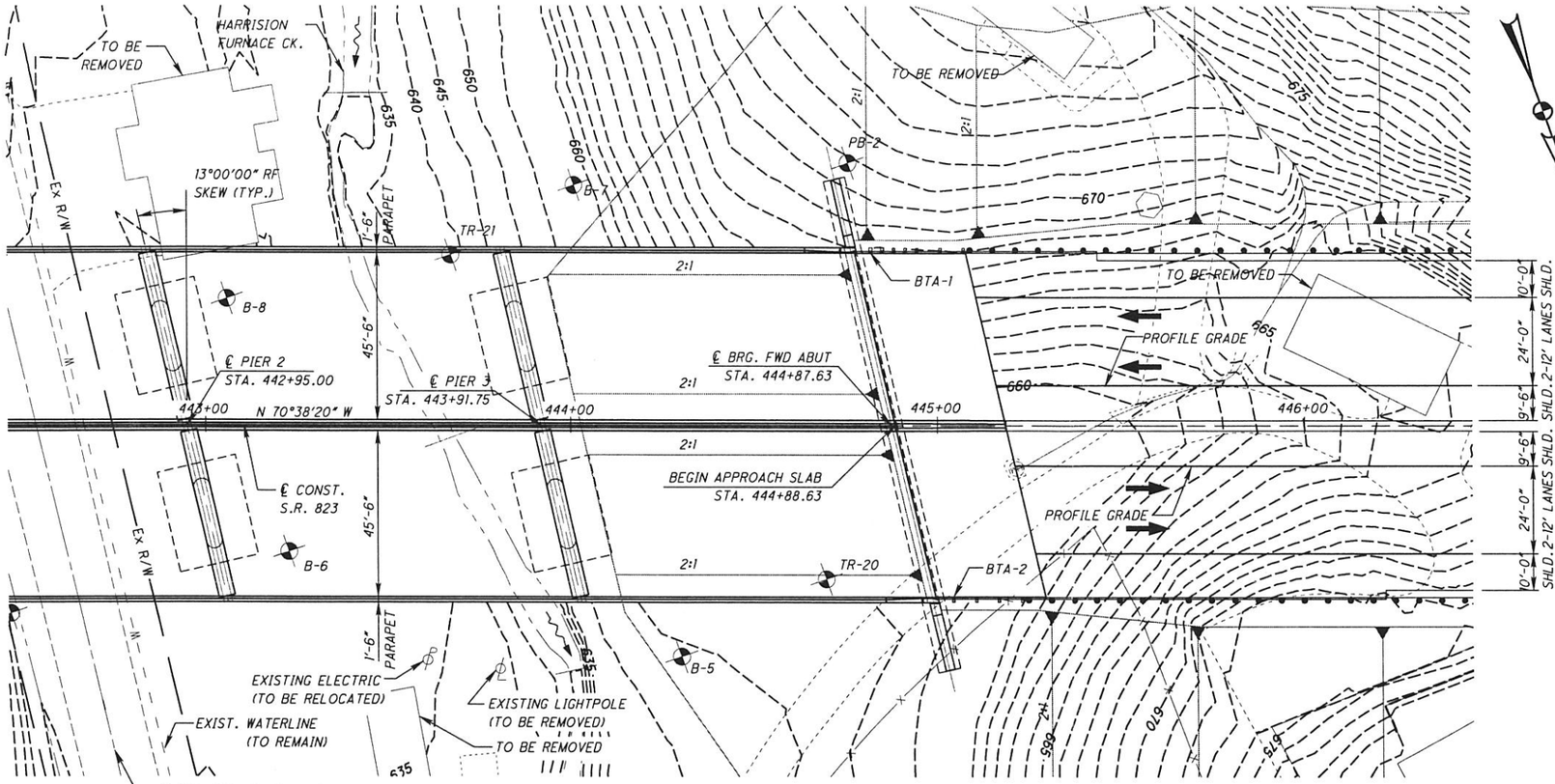

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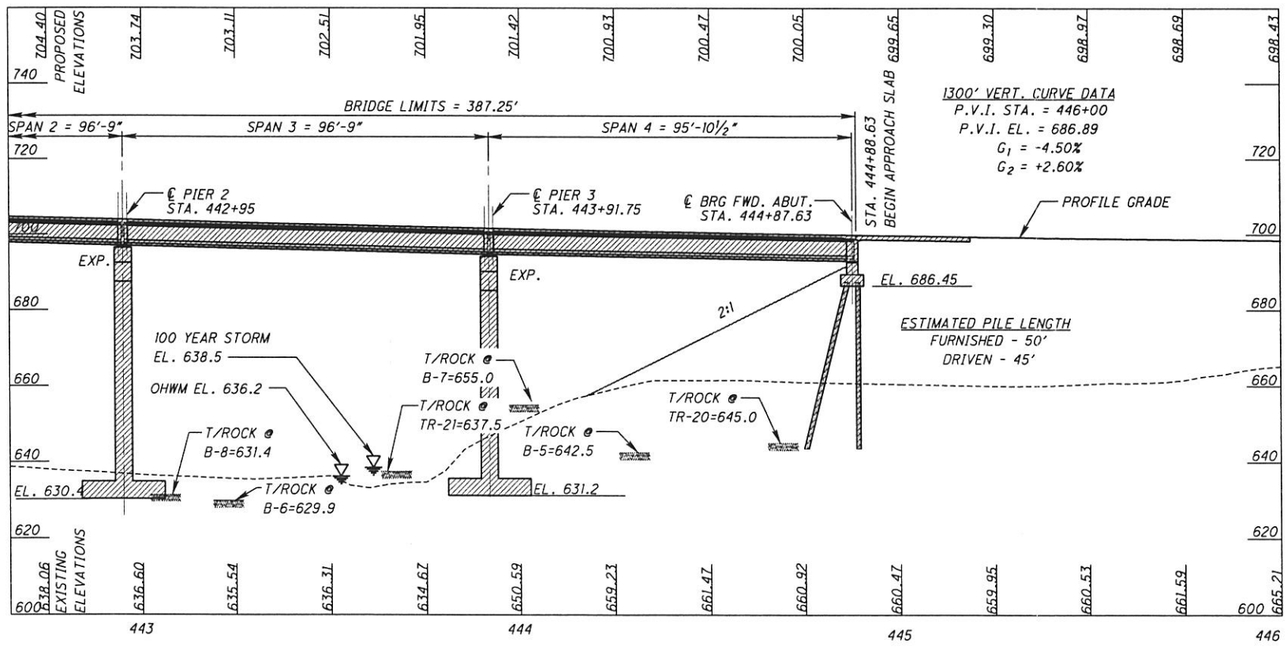

PROFILE ALONG PROFILE GRADE S.R. 823 LEFT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	440+85.73	LT.
FWD. ABUT.	444+82.11	LT.

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

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

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

NOTES:

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2. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
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FOUNDATION DATA:

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PROPOSED STRUCTURE
TYPE: 4 SPAN CONTINUOUS 72" MODIFIED AASHTO TYPE 4 PRESTRESSED CONCRETE I-BEAMS WITH COMPOSITE REINFORCED CONCRETE DECK ON SEMI-INTEGRAL ABUTMENTS AND T-TYPE PIERS.
SPANS: 94'-9", 94'-6", 94'-6", 94'-9" c/c BEARINGS
ROADWAY: 45'-6" TOE TO TOE OF PARAPETS
LOADING: HS-25 AND ALTERNATE MILITARY LOADING; FWS = 60 PSF
SKEW: 13°00'00" RF
CROWN: 0.016 FT./FT.
ALIGNMENT: TANGENT
WEARING SURFACE: MONOLITHIC CONCRETE
APPROACH SLABS: AS-1-81 (30 FT LONG)
LATITUDE: 38°51'00"N
LONGITUDE: 82°52'03"W

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

LEGEND

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

DESIGN AGENCY
KZ DESIGN
Architecture | Engineering | Interiors | Planning
KZ DESIGN, INC. 66 East Main St. Ste. Gahanna, OH 43230-4130
TEL: 614.471.1177 FAX: 614.471.1188 www.kzdesign.com

DESIGNED DEF | DRAWN RBK | REVIEWED BMB | DATE 02/18/08
CHECKED DAT | REVISED | STRUCTURE FILE NUMBER 7306458

SCIOTO COUNTY
STA. 441+01.38
STA. 444+88.63

SITE PLAN - ALTERNATE 1
BRIDGE NO. SCI-823-0837 L
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

2 / 4

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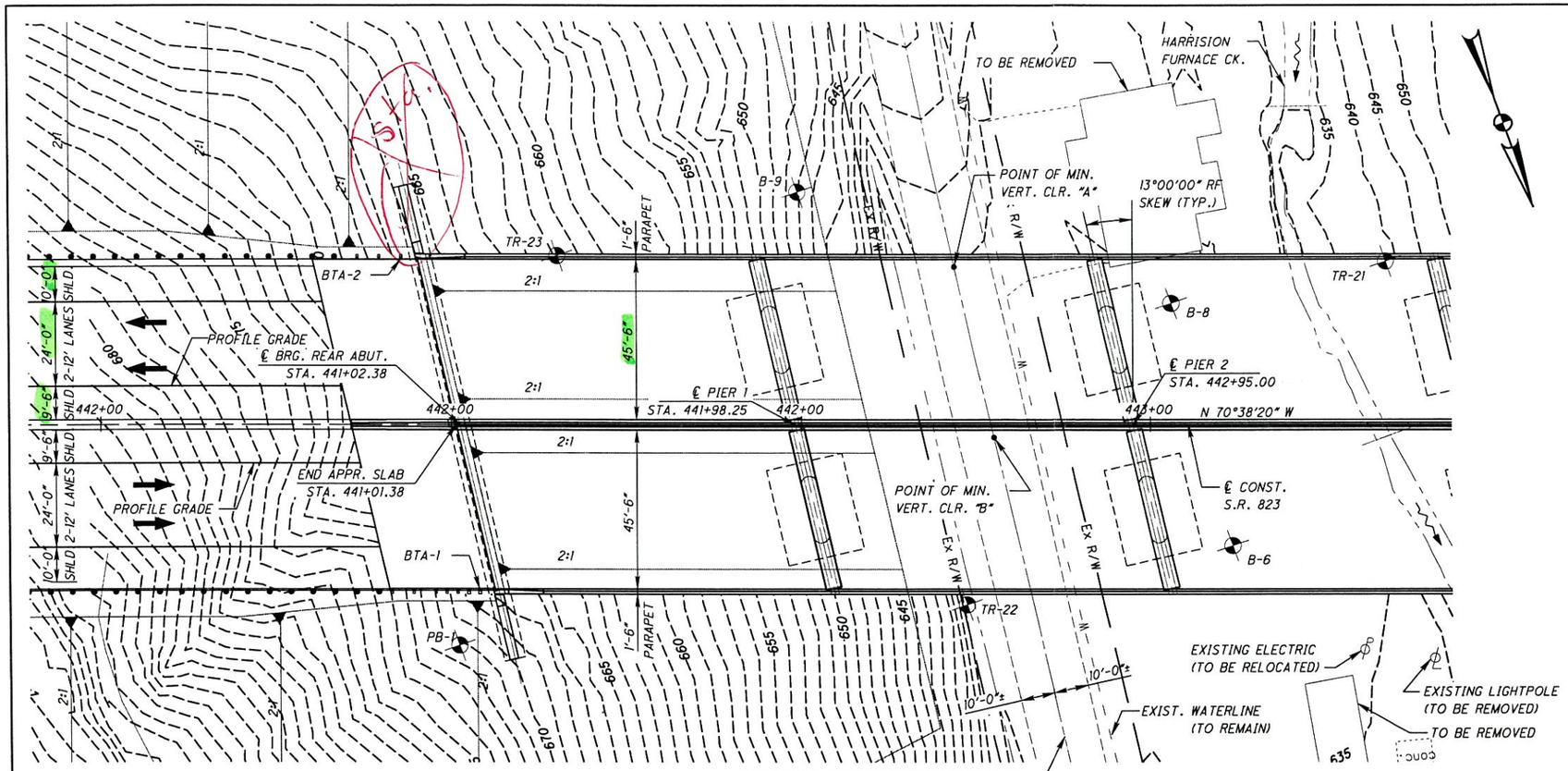

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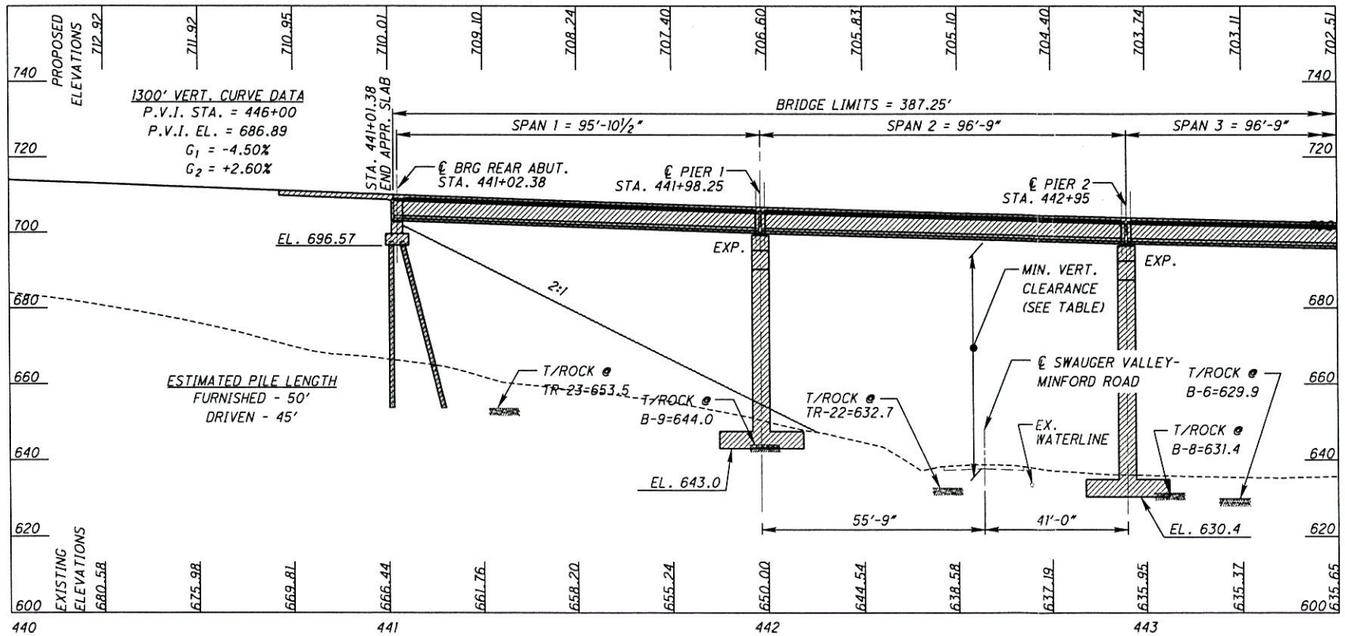

PROFILE ALONG PROFILE GRADE S.R. 823 RIGHT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
LOCATION	STATION	OFFSET
REAR ABUT.	441+07.89	RT.
FWD. ABUT.	445+04.27	RT.

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

TRAFFIC DATA

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AREA BELOW OHWM: 0.17 ACRES
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ROADWAY: 45'-6" TOE TO TOE OF PARAPETS

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

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

ALIGNMENT: TANGENT

WEARING SURFACE: MONOLITHIC CONCRETE

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

LATITUDE: 38°51'00"N

LONGITUDE: 82°52'03"W

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

LEGEND

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

DESIGN AGENCY
K Z DESIGN
Architecture | Engineering | Interiors | Planning
KZ DESIGN, INC. 88 East Main Street, Suite 200, Somerset, OH 43783-1200
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DESIGNED DEF | DRAWN RBK | REVIEWED BMB | DATE 02/18/08
CHECKED DAT | REVISED | STRUCTURE FILE NUMBER 7306466

SCIOTO COUNTY
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BRIDGE NO. SCI-823-0837 R
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

3 / 4

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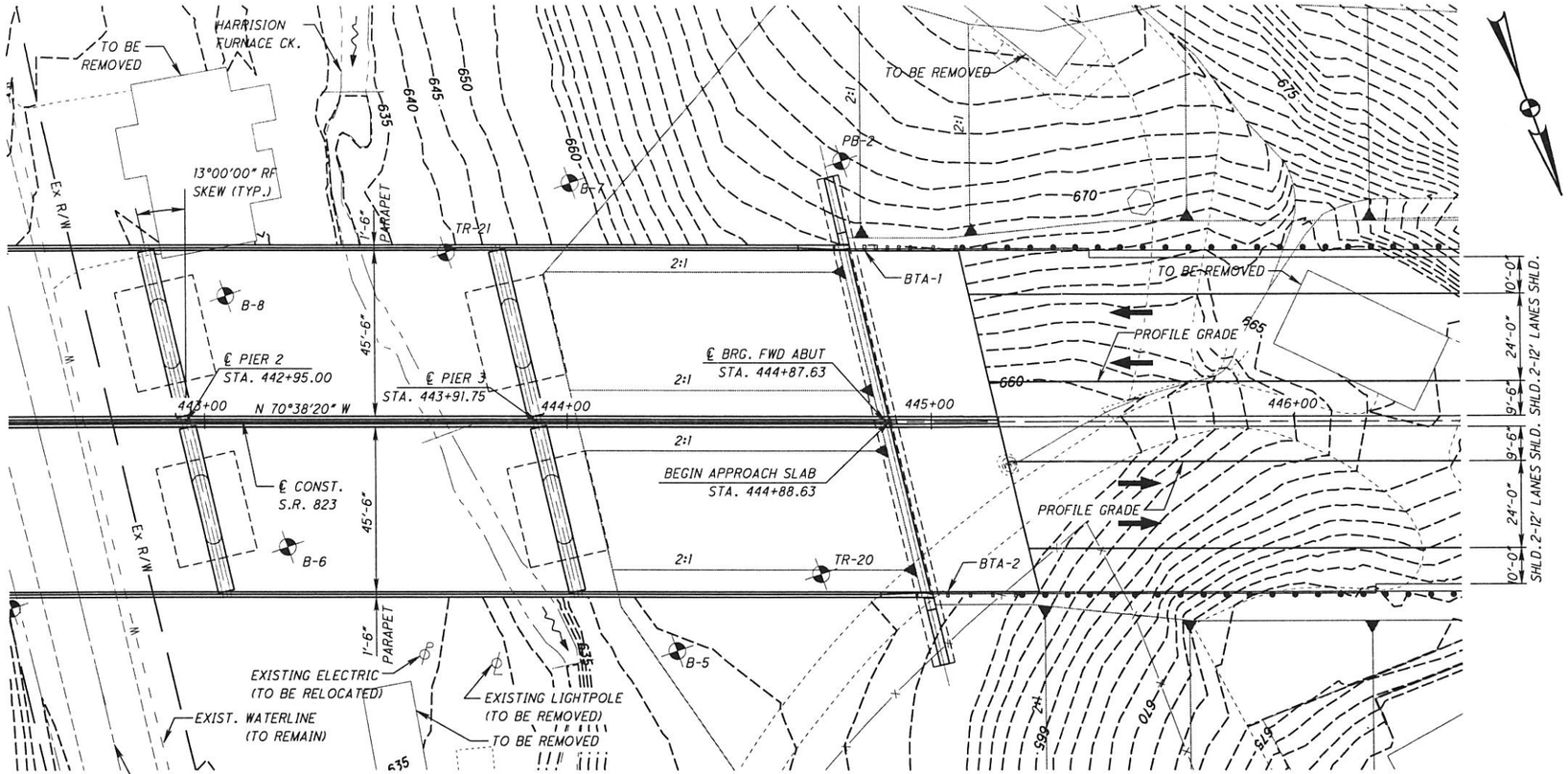

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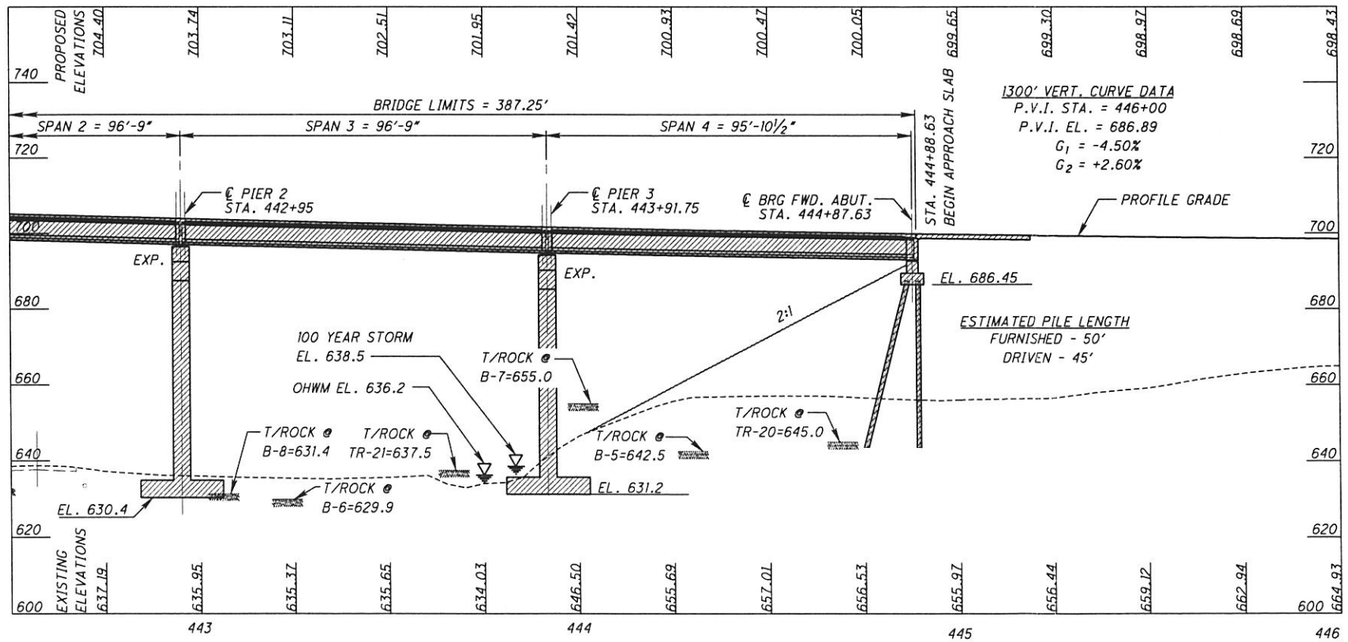

PROFILE ALONG PROFILE GRADE S.R. 823 RIGHT BRIDGE

FIRST GUARDRAIL POST OFF BRIDGE LOCATIONS		
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CURRENT YEAR ADT (2010) = 21,200
DESIGN YEAR ADT (2030) = 31,200
CURRENT YEAR ADTT (2010) = 2,968
DESIGN YEAR ADTT (2030) = 4,368

HYDRAULIC DATA

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

NOTES:

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

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

PROPOSED STRUCTURE

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

SPANS: 94'-9", 94'-6", 94'-6", 94'-9" c/c BEARINGS

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

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

SKEW: 13°00'00" RF

CROWN: 0.016 FT./FT.

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

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

LEGEND

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

DESIGN AGENCY
KZ DESIGN
Architecture | Engineering | Interiors | Planning
427 DODDS NE • SUITE 204 • FAX (330) 678-2175 • KENT, OHIO 44240
TEL (330) 678-2175

DESIGNED	DRAWN	REVIEWED	DATE
DEF	RBK	BMB	02/18/08
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DAT		7306466	

SCIOTO COUNTY
STA. 441+01.38
STA. 444+88.63

SITE PLAN - ALTERNATE 1
BRIDGE NO. SCI-823-0837 R
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

4 / 4

$FILE$ $DATE$ $TIME$

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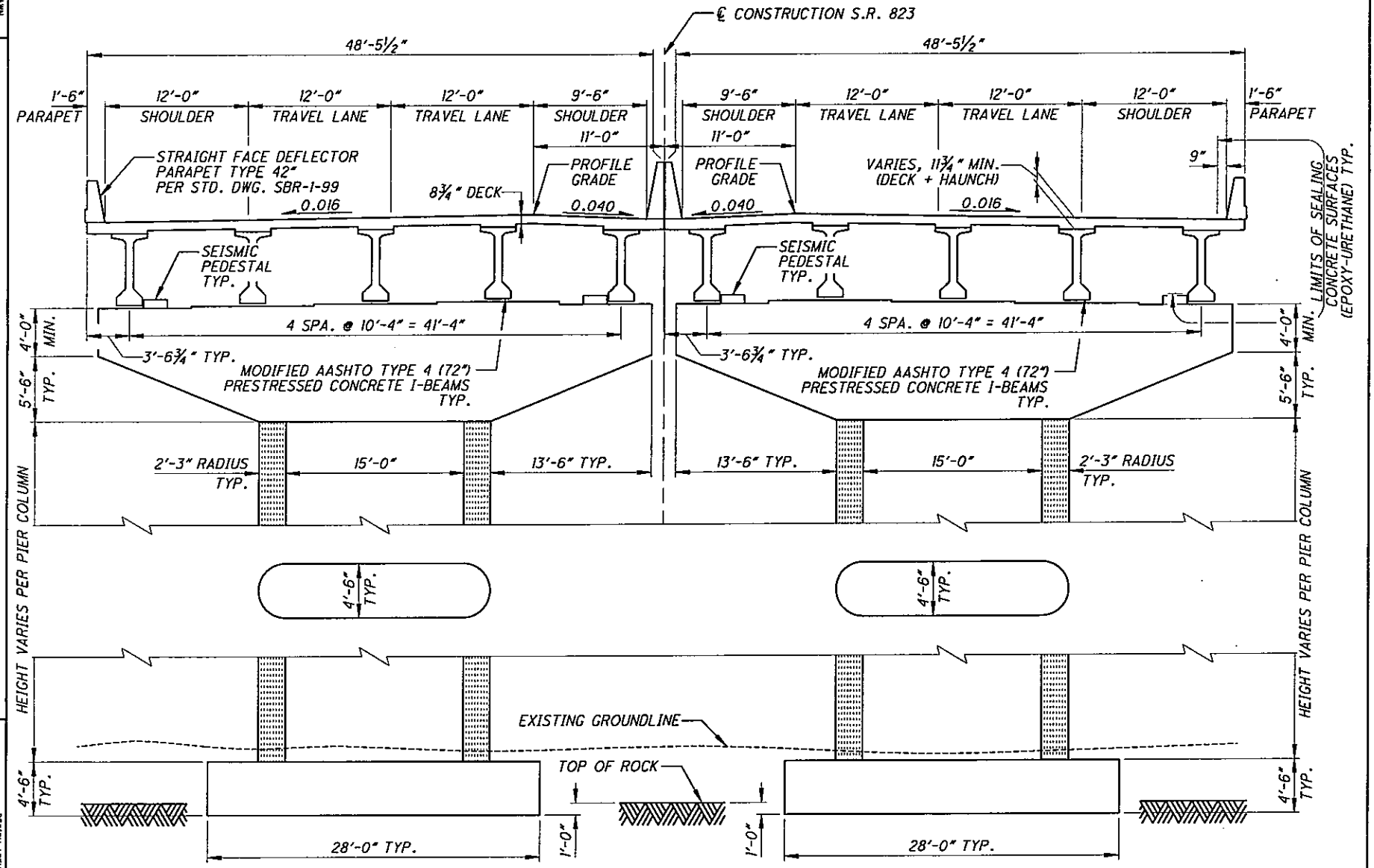

TRANSVERSE SECTION OF DECK @ PIER

DRAWN RBK
DATE 02/18/08

AL TERNATE I TRANSVERSE SECTION
BRIDGE NO. SCI-823-0837 L/R
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (C.R. 31)

DESIGN AGENCY
KZ DESIGN
Architecture | Engineering | Interiors | Planning

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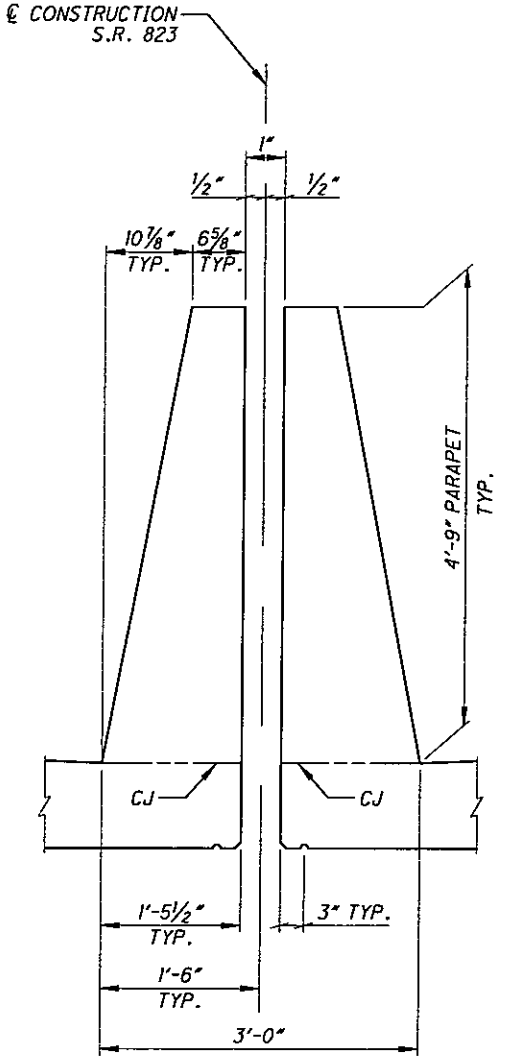
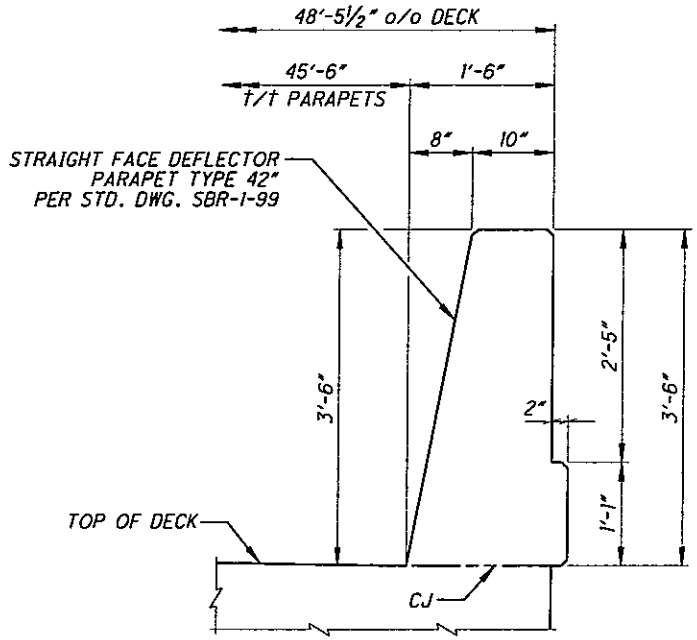
DRAWN RBK
DATE 02/18/08

ALTERNATE I PARAPET SECTIONS
BRIDGE NO. SCI-823-0837 L/R
S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (C.R. 31)

DESIGN AGENCY
KZ DESIGN
Architecture | Engineering | Planning



MEDIAN PARAPET SECTION
FOR PRESTRESSED I-BEAMS
SIMILAR TO ROADWAY CONCRETE MEDIAN BARRER,
SINGLE SLOPE, TYPE B1



OUTSIDE PARAPET SECTION
FOR PRESTRESSED I-BEAMS

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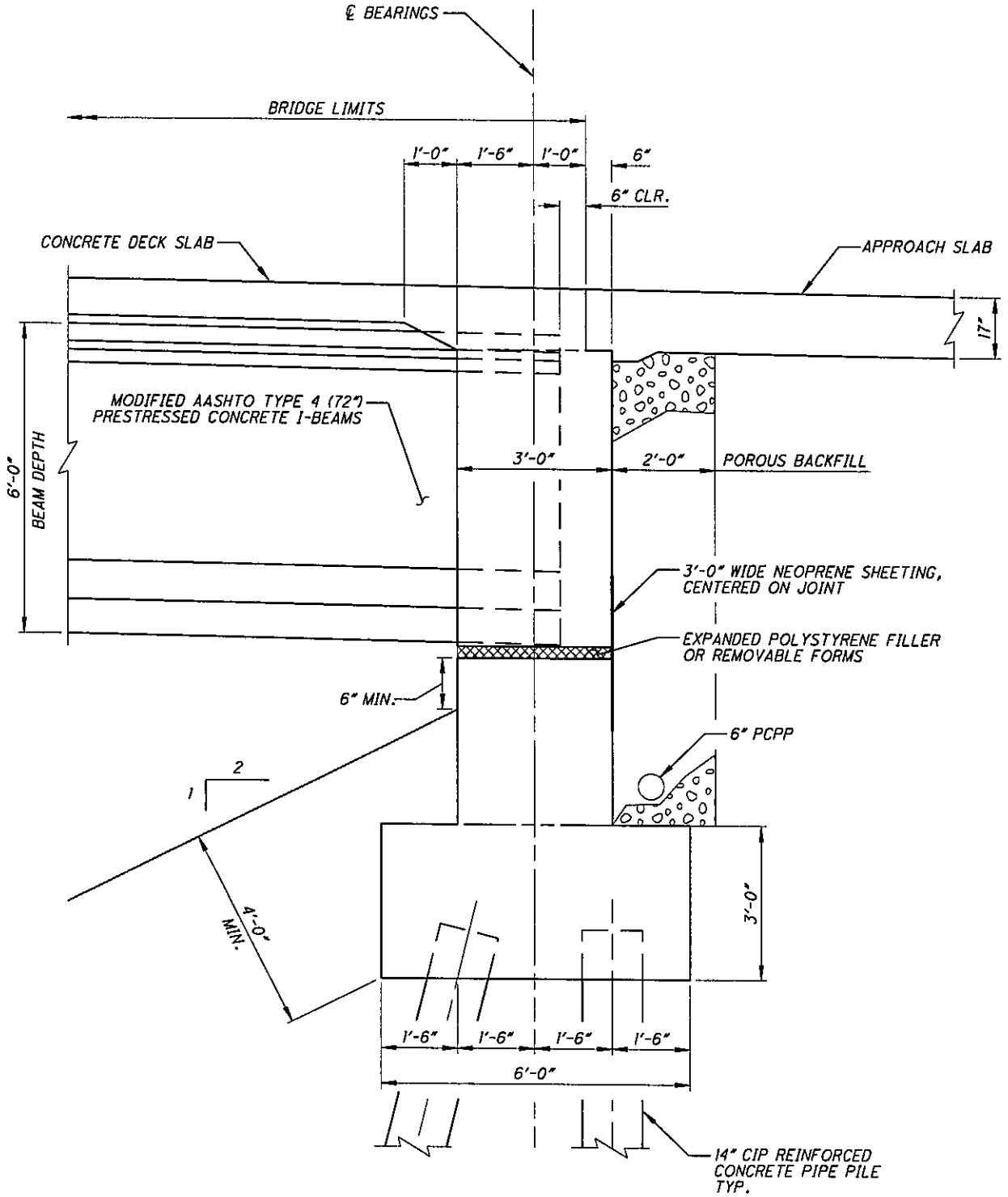

SEMI-INTEGRAL ABUTMENT
FORWARD ABUTMENT SHOWN, REAR ABUTMENT SIMILAR

DRAWN RBK DATE 02/18/08	ALTERNATE 1 ABUTMENT SECTION BRIDGE NO. SCI-823-0837 L/R S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (C.R. 31)	DESIGN AGENCY KZ DESIGN Architecture | Engineering | Interiors | Planning

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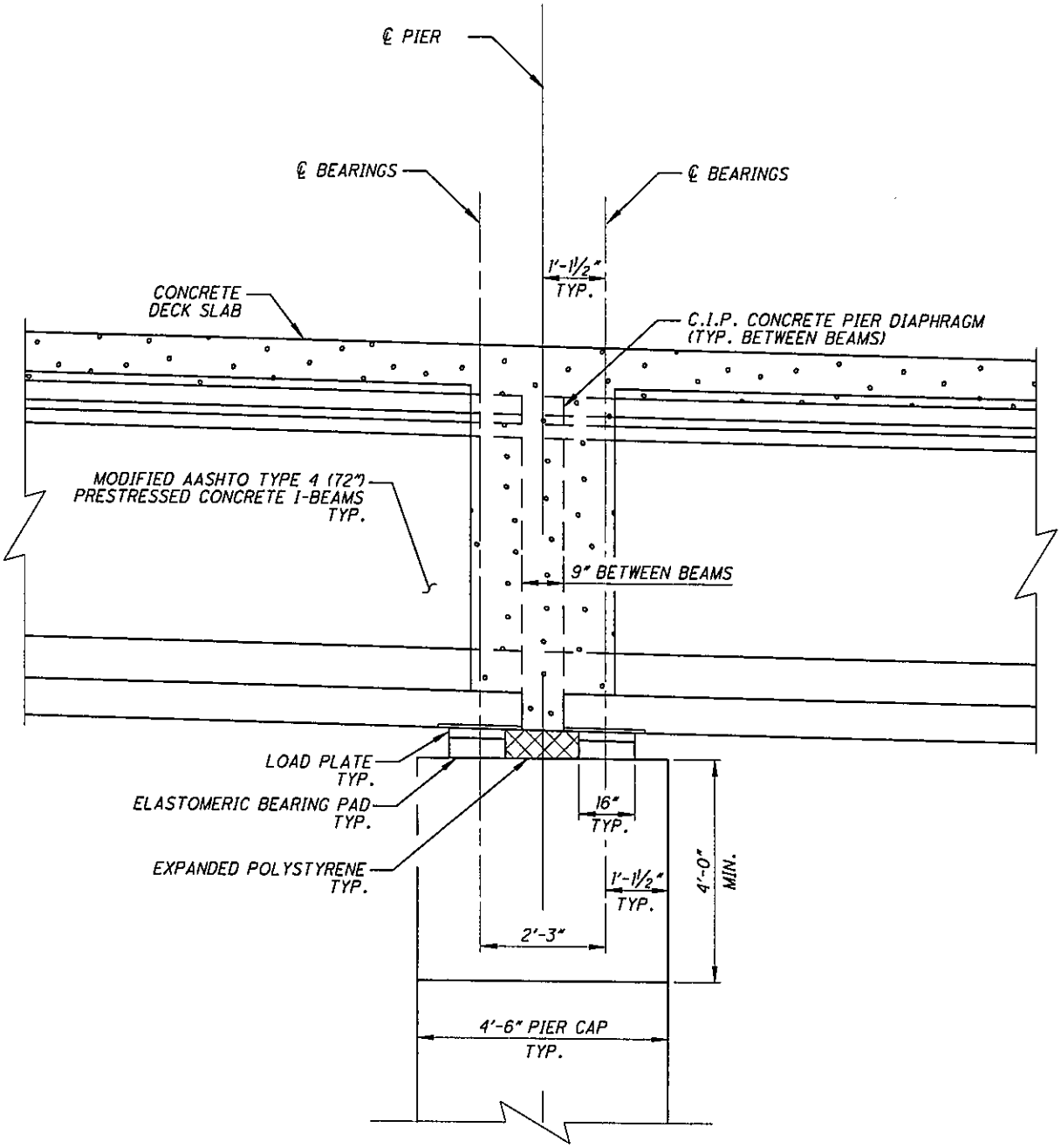

EXPANSION PIER SECTION
MEASURED NORMAL TO PIER

DRAWN RBK DATE 02/18/08	ALTERNATE 1 PIER SECTION BRIDGE NO. SCI-823-0837 L/R S.R. 823 OVER SWAUGER VALLEY-MINFORD ROAD (C.R. 31)	DESIGN AGENCY KZ DESIGN Architecture | Engineering | Interiors | Planning

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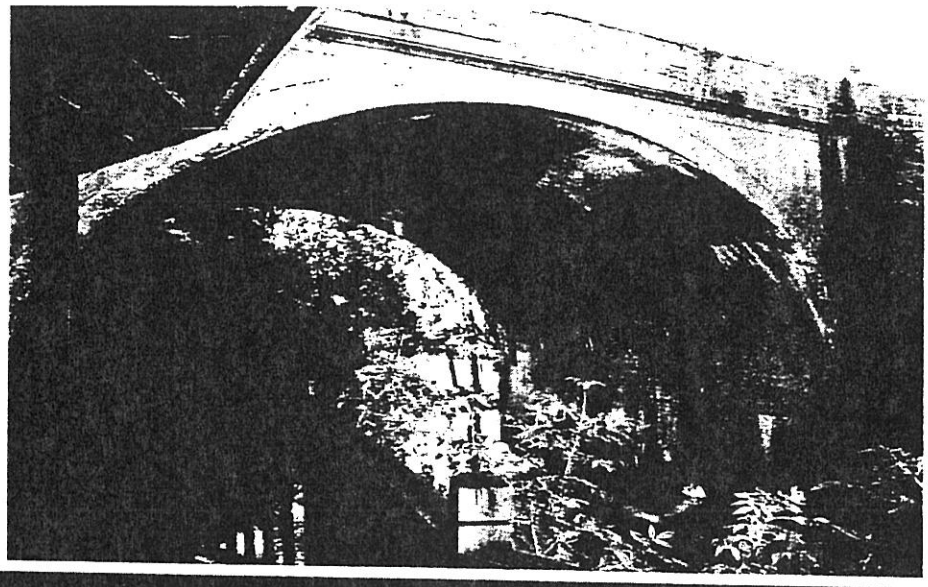
APPENDIX B

Foundation Recommendation



Report of:

Subsurface Exploration
Bridge and MSE Retaining Walls
SR 823 Over Swauger Valley-Minford Road
SCI-823-0.00 Portsmouth Bypass
Scioto County, Ohio

Prepared for:

TranSystems Corporation
5747 Perimeter Drive, Suite 240
Dublin, Ohio 43017

Ohio Department of Transportation
District 9

DLZ Ohio, Inc.
6121 Huntley Road
Columbus, OH 43229
Phone: (614) 888-0040
Fax: (614) 436-0161

DLZ Job No. 0121-3370.03

September 26, 2006

Prepared by

DLZ

in. During simultaneous concrete placement and casing removal operations, sufficient concrete should be maintained inside the casing to offset the hydrostatic head of any groundwater. Extreme care must be exercised during concrete placement and removal of the casing so that soil intrusion is avoided.

Spread footings bearing in the MSE wall fill may also be considered to support the abutments. As per the Bridge Design Manual 204.6.2.1, an allowable bearing capacity of 4 ksf may be used to design the footings. The MSE walls as proposed will be founded on bedrock or granular fill placed on bedrock. As such, the anticipated settlements of spread footings bearing on the fill are anticipated to be negligible.

5.1.2 Piers

Spread footings can be constructed on the rock encountered by the borings to support the piers. Competent bedrock was generally encountered within two to three feet of the soil-rock interface. Spread footings bearing on competent bedrock may be designed using an allowable bearing capacity of 80 ksf (40 tsf).

Currently, lateral loading and uplift is not anticipated to be a concern at this site. However, if spread footings cannot be used at the piers, drilled shafts may be considered to support the piers. If drilled shafts are used to support the foundation of the piers, a minimum of 5-foot deep socket into competent rock is required. The drilled shafts should be straight (not belled) and may be designed based on an allowable bearing pressure of 80 ksf (40 tsf).

It is recommended that skin friction in the overburden soil/fill and shallow rock socket be neglected. The bearing surface should be clean and free of loose material and water prior to placement of concrete. The drilled center-to-center spacing of drilled shafts should generally be no less than 2.5 times their diameter. A qualified representative of the Geotechnical Engineer should field verify that the drilled shafts are founded on competent bearing materials and the installation procedures meet specifications.

If adequate capacity cannot be developed with reasonable shaft diameter, consideration should be given to the use of deeper rock sockets. Neglecting the upper two feet of the socket, allowable sidewall shear stress/adhesion of 7,500 pounds per square foot may be used. If deeper sockets are used, the shafts should be designed such that design loads are carried entirely by the socket resistance ignoring any end bearing.

Precautions should be taken to ensure appropriate drilled shaft construction practices are followed. See section 5.1.1 for more information.

Table 2 below summarizes the site conditions and foundation recommendations. It should be noted that the bedrock surface varies widely across the project area.

The approximate bearing elevations presented below indicate the elevations at the boring locations only. Variations in the elevation at which competent bedrock is encountered should be anticipated.

Table 2-Summary of Foundation Recommendation

Structural Element	Structure / Boring	Existing Ground Surface Elevation (Feet)	Foundation Type	Approximate Bearing Elevation (Feet)	Allowable Bearing Capacity
Rear Abutment	Left / B-9	647.5 +	Pipe Piles	636.5 *	Pile Capacity ++
			Drilled Shafts	636.5 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
	Right / TR-22	636.2	Pipe Piles	625.2 *	Pile Capacity ++
			Drilled Shafts	625.2 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
Pier	Left / B-8	638.4	Spread Footings	627.9	80 ksf
			Drilled Shafts	622.9 *	80 ksf +++
	Right / B-6	635.9	Spread Footings	627.4	80 ksf
			Drilled Shafts	622.4 *	80 ksf +++
Forward Abutment	Left / B-7	658.0 +	Pipe Piles	647.0 *	Pile Capacity ++
			Drilled Shafts	647.0 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
	Right / B-5	644.0 +	Pipe Piles	635.5 *	Pile Capacity ++
			Drilled Shafts	635.5 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf

* Includes 5-foot socket into competent rock.

** Bearing elevation should be determined by a qualified engineer as the foundation alternative is selected.

+ Ground surface elevation was estimated from the established topographic mapping in lieu of as-drilled survey information.

++ Pile capacity should conform to ODOT BDM 202.2.3.2.

+++ End bearing capacity only.

5.2 Mechanically Stabilized Earth (MSE) Retaining Wall Recommendations

It is understood that MSE walls would be used to construct the embankments and contain the abutments. Recommendations for the MSE wall are presented in the following sections. The MSE wall should be constructed per the recommendations presented in this report and in conformance with the manufacturer's specifications.

5.2.1 MSE Walls: General Information

An MSE retaining wall essentially consists of good quality backfill material with layers of metal or plastic reinforcing that are attached to concrete facing panels. The MSE wall and associated backfill should be constructed in accordance with the specifications of the manufacturer of the MSE wall.

APPENDIX C

Quantities and Cost Analysis for Alternative 1

Estimate 19415

Estimated Cost: $4,489,019.20

Contingency: 20.00%

Estimated Total: $5,386,823.04

SCI-823-0681 (Bridge No. SCI-823-0837 L/R)

Letting Date: 01/01/10

Spec Year: 05

Unit System: E

Work Type: BRIDGE REPLACEMENT

Highway Type: 404

Urban/Rural Type: RURAL CLASS

Season: WINTER

County: SCIOTO

Prepared by RBK

Line #	Item Number	Quantity	Units	Unit Price	Extension
	Description				
	Supplemental Description				

Group 9000: Structures over 20' Span (SCI-823-0837 L)

0160	507E00600	810.00	FT	$12.68612	$10,275.76
	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN				
0165	507E00650	900.00	FT	$33.09191	$29,782.72
	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED				
0167	509E10000	305,625.00	LB	$0.84803	$259,179.17
	EPOXY COATED REINFORCING STEEL				
0170	512E10100	1,390.00	SY	$11.54022	$16,040.91
	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)				
0175	513E90000	20,285.00	LB	$3.00000	$60,855.00
	STRUCTURAL STEEL, MISC.:				
	Intermediate Crossframes				
0180	515E15050	20.00	EACH	$25,756.43284	$515,128.66
	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (72")				
0185	516E44100	10.00	EACH	$450.00000	$4,500.00
	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)				
	26"x16"x2.5"				
0190	516E44100	30.00	EACH	$700.00000	$21,000.00
	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)				
	26"x16"x3"				
0195	518E21200	93.00	CY	$54.42440	$5,061.47
	POROUS BACKFILL WITH FILTER FABRIC				
0200	518E40000	140.00	FT	$10.41394	$1,457.95
	6" PERFORATED CORRUGATED PLASTIC PIPE				
0205	518E40012	24.00	FT	$10.53558	$252.85
	6" NON-PERFORATED CORRUGATED PLASTIC PIPE				
0210	898E10200	550.00	CY	$538.09517	$295,952.34
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK)				
0215	898E10708	324.00	SY	$200.00000	$64,800.00
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")				
0216	898E11000	60.00	CY	$346.66218	$20,799.73
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)				
0220	898E11001	79.00	CY	$514.95202	$40,681.21
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN				
0225	898E20100	893.00	CY	$774.96399	$692,042.84
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)				
0230	898E20150	104.00	CY	$479.14116	$49,830.68
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)				
0235	898E20300	504.00	CY	$311.24665	$156,868.31
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)				

Total for Group 9000: $2,244,509.60

Group 9001: Structures over 20' Span (SCI-823-0837 R)

0005	507E00600	810.00	FT	$12.68612	$10,275.76
	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN				
0010	507E00650	900.00	FT	$33.09191	$29,782.72
	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED				
0012	509E10000	305,625.00	LB	$0.84803	$259,179.17
	EPOXY COATED REINFORCING STEEL				
0015	512E10100	1,390.00	SY	$11.54022	$16,040.91
	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)				
0020	513E90000	20,285.00	LB	$3.00000	$60,855.00
	STRUCTURAL STEEL, MISC.:				
	Intermediate Crossframes				
0025	515E15050	20.00	EACH	$25,756.43284	$515,128.66
	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (72")				
0030	516E44100	10.00	EACH	$450.00000	$4,500.00

Line #	Item Number	Quantity	Units	Unit Price	Extension
	Description				
	Supplemental Description				
	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)				
	26"x16"x2.5"				
0032	516E44100	30.00	EACH	$700.00000	$21,000.00
	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)				
	26"x16"x3"				
0035	518E21200	93.00	CY	$54.42440	$5,061.47
	POROUS BACKFILL WITH FILTER FABRIC				
0040	518E40000	140.00	FT	$10.41394	$1,457.95
	6" PERFORATED CORRUGATED PLASTIC PIPE				
0045	518E40012	24.00	FT	$10.53558	$252.85
	6" NON-PERFORATED CORRUGATED PLASTIC PIPE				
0050	898E10200	550.00	CY	$538.09517	$295,952.34
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK)				
0055	898E10708	324.00	SY	$200.00000	$64,800.00
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")				
0060	898E11000	60.00	CY	$346.66218	$20,799.73
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)				
0062	898E11001	79.00	CY	$514.95202	$40,681.21
	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN				
0065	898E20100	893.00	CY	$774.96399	$692,042.84
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)				
0070	898E20150	104.00	CY	$479.14116	$49,830.68
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)				
0075	898E20300	504.00	CY	$311.24665	$156,868.31
	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)				

Total for Group 9001: $2,244,509.60

SUPERSTRUCTURE

DECK: [(95'+95'+95'+95')+(1'-0" x 2) x 48.5'W x .7292'] + = 13,510

HAUNCH: (3'x.25 x 382 x 5 BM's) = 1,425

PIER DIAPHRAM: 45'L x 6' x 2.25 = 608

(BEAM REDUCTION) 6.09 x 5 BEAMS = -30

ABUTMENT: (3'W x 45'L x 6.5)(1.x.6875/2) = 30

(BEAM DEDUCTION) 6.09 x 5 x 2' = -61

14,874 ÷ 27 =

550 CY/BRIDGE

PARAPETS

4.26 CF x (282+30+30) x 2 = 3766/27 =

60 CY/Bridge
~~139.5~~ CY/BRIDGE

Median (30+30+387.75)(½(10⅞)(4.75)+(6⅝)(4.75))/27 = 80 CY/Bridge

APPROACH SLOB (T=17")

17"/12 x 30' x 48.5 x 2 = 4123/27

153 CY/BRIDGE

MODIFIED AASHTO TYPE 4 72" BEAMS

95.5 x 10 + 95.0 x 15 = 2380 LF

2380 LF

INTERMEDIATE CROSSFRAMES

(6x6x⅜) 8.84 - .67 - .17 = 8.00' x (6x6x⅜) 14.9 = 119 #

(15x3.67R) 3.67' x (10x5) 12" x 20# x 2 = 112#

(6x4x7/16) (14.3 x 8.25) x 2 = 118#

(½ x 6x4) 2.0#/1 x .5 = 1#

(BOLTS) (⅞" x 10") 231.9/100 x 8 = 19#

(BOLTS) ⅞ x 1¼" (13) (78.9/100) = 10.6#

PLATE WASHERS ¾ x ¾ x 1½ = 5.95 x .29 x 8 = 14.0#

3 x 3 x 5/16 = 4.47 x .25 x 26 = 29.0#

422.6

422.6 x (3x4) (4) = 20,285 LBS
(SPANS)

SEALING CONCRETE SURFACES

PARAPETS & DECK [(.67 + 2.167 + .67 + 1.06 + 3.833 + .35 + .92 + .33) + (2.06 + .79 + .17 + .83 + .17 + 2177.83 + 3.0 + .75) = 20.76

(.75 x 4.75 + .58 + 4.75)] x .342 = 36.8

(36.8 x 282) + (35.9 x 60) 12,514 / 9 = 1,390

1390 SY

ABUTMENTS

FOOTINGS: 6' x 3' x 70'L = 1260/27 = x 2 = **93 CY/BRIDGE**

BEAM SEAT

3'x3' x 50' = x2 = 900/27 **33 CY/BRIDGE**

BACKWALL 2.5 x 70' x 3.0 = x2 = 1050/27 **39 CY/BRIDGE**

WINGWALLS (2' x 7.5' x 2.5) + $\frac{(14+7)}{2}$ x 45 x 2.5 = 4331.25/27 x2 = 32 CY/BRIDGE

PERFORATED 6" PERFORATED CORRUGATED PLASTIC PIPE

70 LF x 2 = 140 LF **140 LF**

NON-PERFORATED 6" PLASTIC PIPE

12 LF x 2 = 24 LF **24 LF**

POROUS BACKFILL

2' x 70 x 9' x = 1260 x 2 ABUTS = 2520/27 **93 CY**

PIER

PIER: (28' x 22x' x 4.5'T) x 4 PIERS /27 ≈ 411 C.Y

COLUMN $(2.25^2 \times 3.1416) \times \left(\frac{47'+45'+54'+50'}{4\ (AVE)}\right) + (15' \times 51.5' \times 4.5) \times 4/27 =$ 680 CY

CAP (9.75' AVG x 46.5') - (-13.5' x 5.5') x 4 PIERS = 6824/27 253 CY

1304 CY

BEARINGS

ABUTMENT:

ELASTOMERIC PAD W/ LOAD PLATE

5 PER ABUTMENT x2 = 10 BEARING PADS

PIERS: 5 x 3 = 15 BEARINGS

Restep

$550\,cy\left(\frac{300\,lb}{cy}\right) + 153\,cy\left(\frac{50\,lb}{cy}\right) + 893\,cy\left(\frac{75\,lb}{cy}\right) + 104\,cy\left(\frac{150\,lb}{cy}\right) + 504\,cy\left(\frac{100\,lb}{cy}\right)$

= 305,625 lbs

APPENDIX D

Previous Quantities and Cost Analysis for Alternative 2

SCI-823-0.00

PID No. 19415

S.R. 823 over Swauger Valley - Minford Road

Structure Type Study Submittal

Prepared for:

Ohio Department of Transportation
District 9
650 Eastern Ave.
Chillicothe, Ohio 45601

April 7, 2006

Prepared by:

TranSystems Corporation

SCI-823-0.00 - PORTSMOUTH BYPASS

S.R. 823 over Swauger Valley - Minford Road L/R

STRUCTURE TYPE STUDY

By: JRC
Checked: MSL

Date: 4/6/2006
Date: 4/7/2006

ALTERNATIVE COST SUMMARY

Alternative No.	Span Arrangement No. Spans	Span Arrangement 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	2	100' - 100'	200.00	5 Prestressed I-Girders /per BRIDGE	Modified AASHTO Type 4 (72")	$1,519,000	$638,000	$345,100	$500,400	$3,000,000	$966,000	$3,966,000
2	2	100' - 100'	200.00	5 Steel Girders /per BRIDGE	42" Web Grade 50W	$1,382,000	$1,676,000	$489,300	$709,500	$4,260,000	$1,567,000	$5,827,000
2A	2	100' - 100'	200.00	4 Steel Girders /per BRIDGE	51" Web Grade 50W	$1,358,000	$1,572,000	$468,800	$679,800	$4,080,000	$1,562,000	$5,642,000
3	3	128.5'-183.5'-128.5'	440.50	5 Steel Girders /per BRIDGE	60" Web Grade 50W	$3,490,000	$779,000	$683,000	$990,400	$5,940,000	$4,035,000	$9,975,000

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 seperately, if required.

SCI-823-0.00 - PORTSMOUTH BYPASS

S.R. 823 over Swauger Valley - Minford Road L/R

STRUCTURE TYPE STUDY - STEEL PLATE GIRDER ALTERNATIVE 3 - SUPERSTRUCTURE

By: JRC Date: 4/6/2006
Checked: MSL Date: 4/7/2006

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	Structural Steel Weight (Pounds)	Structural Steel Cost	Expansion Joint Cost	Subtotal Superstructure Cost
3	3	128.5'-183.5'-128.5'	440.50	442.00	1461	$861,800	$366,400	$82,500	5 Steel Girders /per BRIDGE	60" Web Grade 50W	1,828,075	$2,128,200	$51,204.68	$3,490,000

COST SUPPORT CALCULATIONS

Deck Cross-Sectional Area:

Parapets:

	No.	Individual Area (sq. ft.)	Parapet Area (sq. ft.)
Parapets	1	4.26	4.26
Parapets	1	4.26	4.26

Slab:

	T (ft.)	W (ft.)	Slab Area	Haunch & Overhang Area	Total Concrete Area (sq. ft.)
Left Bridge	0.73	45.00	32.8	3.3	44.6
Right Bridge	0.73	45.00	32.8	3.3	44.6

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 2004	Annual Escalation	Year 2008
Deck	$491.00	3.5%	$563.00
Parapets	$615.00	3.5%	$706.00
Weighted Average =			$590.00

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 2004	Annual Escalation	Year 2008
Deck Reinforcing	$0.77	3.5%	$0.88

Structural Steel Unit Costs ($/lb.):

	Cost Ratio	Year 2005	Annual Escalation	Year 2008	
Rolled Beams - Grade 50	n/a	$0.74	3.5%	$0.85	
Level 4 Plate Girders - Grade 50W	n/a	$1.05	3.5%	$1.16	Straight Girders
level 5 Plate Girders - Grade 50W	n/a	$1.20	3.5%	$1.38	Curved Girders

Reinforced Concrete Approach Slabs (T=15")
Unit Cost ($/sq. yd.):
Length = 25 ft. Width = 90 ft
Area = 250 sq. yd.

	Year 2004	Annual Escalation	Year 2008
Approach Slabs	$144.00	3.5%	$165.00

Expansion Joints
Unit Costs ($/Lin.Ft.):

	Cost Ratio	Year 2005	Annual Escalation	Year 2008	
Strip Seal Expansion Joints	1.00	$250.00	3.5%	$277.18	2001 Price

Strip Seal Expansion Joints Length 185 ft.

SCI-823-0.00 - PORTSMOUTH BYPASS

S.R. 823 over Swauger Valley - Minford Road L/R

STRUCTURE TYPE STUDY - STEEL PLATE GIRDER ALTERNATIVE 3 - SUBSTRUCTURE

By: JRC
Checked: MSL

Date: 4/6/2006
Date: 4/7/2006

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	Additional Crane Cost	Subtotal Substructure Cost
3	3	128.5'-183.5'-128.5'	5 Steel Girders /per BRIDGE	60" Web Grade 50W	$371,000	$84,500	$182,600	$29,900	$111,100	$0	$779,000

COST SUPPORT CALCULATIONS

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

Component	Volume (cu. yd.)	Year 2004	Annual Escalation	Year 2008	Total Cost
Cap	204	$421.00	3.5%	$483.00	$98,530
Stem	342	$421.00	3.5%	$483.00	$165,190
Footings	222	$421.00	3.5%	$483.00	$107,230
Total Cost	768				$371,000

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

Component	Volume (cu. yd.)	Year 2004	Annual Escalation	Year 2008	Total Cost
Cap	0	$421.00	3.5%	$483.00	$0
Columns	0	$421.00	3.5%	$483.00	$0
Footings	0	$421.00	3.5%	$483.00	$0
Total Cost					$0

Abutment QC/QA Concrete, Class QSC1 Cost:

Component	Volume (cu. yd.)	Year 2004	Annual Escalation	Year 2008	Total Cost
Abutment	284	$421.00	3.5%	$483.00	$137,200
Wingwalls	94	$421.00	3.5%	$483.00	$45,400

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 2004	Annual Escalation	Year 2008
Pier	$0.77	3.5%	$0.88
Abutment	$0.77	3.5%	$0.88

Pile Foundation Unit Cost ($/ft.): *HP 12X53 Piles, Furnished & Driven*

Number of Piles		Total Pile Length
64	SEE QUANTITY CALCULATIONS	3,296

Pile Foundation Unit Cost ($/ft.):

	Year 2004 Unit Cost	Annual Escalation	Year 2008
Furnished	$20.15	3.5%	$23.10
Driven	$9.24	3.5%	$10.60
Total			$33.70

Shaft Foundation Unit Cost ($/ft.): 36" Drilled Shaft

Number of Shafts		Total Shaft Length
0	SEE QUANTITY CALCULATIONS	0

Shaft Foundation Unit Cost ($/ft.):

Unit Cost	Escalation	2008
$300.00	4.5%	$358.00

Cost of Shafts: $ -

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	3.5%	$25.80
Cofferdam	$32.00	3.5%	$36.70

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

	Total Area (sq. ft.)	Year 2004 Unit Cost	Annual Escalation	Year 2008
Alt. 3		$54.00	3.5%	$62.00

Note: MSE wingwall lengths are based on the difference between the maximum bridge length and the length of the alternative being considered.

Additional Crane Cost

$ -

SCI-823-0.00 - PORTSMOUTH BYPASS

S.R. 823 over Swauger Valley - Minford Road L/R

STRUCTURE TYPE STUDY - STEEL PLATE GIRDER ALTERNATIVE 3 - QUANTITY CALCULATIONS

By: JRC
Checked: MSL

Date: 4/6/2006
Date: 4/7/2006

Pier Quantities

Pier Location	Length	Cap				Stem				Footing				Total Volume
		Width	*Depth*	*Area*	*Volume*	*Width*	*Height*	*Length*	*Volume*	*Width*	*Depth*	*Length*	*Volume*	
Pier 1 (Spr Ftg)	43	4	8	32.00	1376	3	47.5	16.00	2280	15	4	25.00	1500	5156
Pier 2 (Spr Ftg)	43	4	8	32.00	1376	3	48.8	16.00	2342	15	4	25.00	1500	5218
Pier 3														
Pier 4														
Pier 5														0
Pier 6														0
Pier 7														0
Total (Cu.Ft.)					2752				4622				3000	10374
Total (Cu.Yd.)					102				171				111	384
			Qty x 2 (L/R)		204				342				222	768

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	46.18	1.75	6.5	11.38	525	3.75	3	11.25	520	6.25	3	18.75	1	866	1911
Fwd. Abut	46.18	1.75	6.5	11.38	525	3.75	3	11.25	520	6.25	3	18.75	1	866	1911
Total (Cu.Ft.)					1051				1039					1732	3821
Total (Cu.Yd.)					39				38					64	142
			Qty x 2 (L/R)		78				76					128	284

Wingwall Quantities

Abut Location	Length (feet)	End Wingwall				Middle Wall					Footing					Total Volume
		Width	*Height*	*Area*	*Volume*	*Width*	*Height*	*Area*	*Length*	*Volume*	*Width*	*Depth*	*Area*	*# Footi*	*Volume*	
Rear Abut	25	2.5	8	20.00	500	2.5	10	25.00	7	175	6.25	3	18.75	1	600	1275
Fwd. Abut	25	2.5	8	20.00	500	2.5	10	25.00	7	175	6.25	3	18.75	1	600	1275
Total (Cu.Ft.)					1000					350					1200	2550
Total (Cu.Yd.)					37					13					44	94

Pile Quantities

Location	Load/girder (Kips)	# Girders	Total Girder Load	Subcl 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	16	699.0	654.0	52.0	832
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	16	687.5	644	51.0	816
TotaL								32				1648
							Qty x 2 (L/R)	64				3296

36" Drilled Shafts for Piers

Location	Load/girder (Kips)	# Girders	Total Load	Subcl Wt (kips)	Pile Cap (Kips	No. Piles	Increase Factor	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
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 Steel Quantities

Location	Wt.of girder (lb)/ft	# Girders	Span Length	Total Weight
Span 1	415	10	129	533275
Span 2	415	10	184	761525
Span 3	415	10	129	533275
Span 4	0	0	0	0
Span 5	0	0	0	0
Span 6	0	0	0	0
Span 7	0	0	0	0
Span 8	0	0	0	0
TotaL				1828075

total steel weight per girder (lb.) = 53327.5
Total Span length (ft.)= 200.00
Weight Per ft. = 267

APPENDIX E

Calculations

OHIO BDM 2004 w/ ALL INTERIM UPDATES TO 2006.

CODE: AASHTO STANDARD SPEC & ODOT.

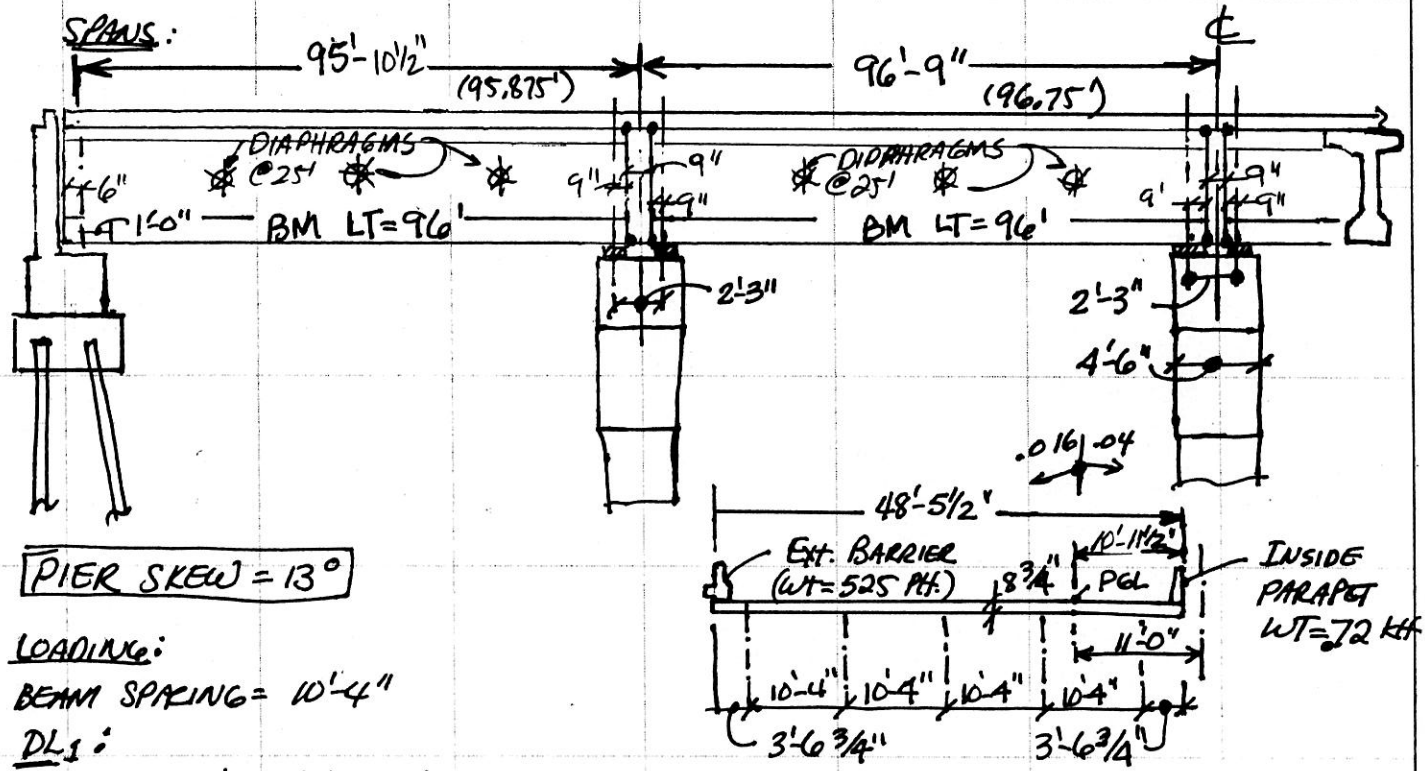
DESIGN: SUPERSTRUCTURE - PRESTRESSED AASHTO BM's

LOADING: HS25 + 60 PSF (F.W.S.)

CONCRETE DECK: DECK SPAN, S = (10.333' - 3' + 1.5') = 8.834' = 8'-10" ⇒

⇒ 8 3/4" THK DECK w/ 1" TOP AS WEARING SURFACE

SPANS:



PIER SKEW = 13°

LOADING:

BEAM SPACING = 10'-4"

DL1:

- SLAB = 0.78'(.15)(10.334') = 1.132 KLF
- HANCH = (USE 2.5" x 36"/144)(.15) = 0.094 KLF
- SIP FORM (OPTIONAL) = 10.334'(25 PSF/1000) = 0.25 KLF
- GIRDER = 996 PLF = 72" MOD. TYPE 4 BM. = 0.996 KLF
- DIAPHRAGMS =

L 6x12x1/2 x 36.7' (#2)	225#
L 6x6x3/8 x 9'-0"	140#
L 6x4x5/16" x 10' (#2)	206#
(12) 7/8"ϕ BOLTS x 3"	15#
(4) 7/8"ϕ x 10" BOLTS	12#
(20) 3x3x5/16" PL WASHERS	16#

= 614# / 25' ≈ 25 PLF = 0.025 KLF

TOTAL DL1 = 1.132 + .094 + 0.25 + 0.996 + .025 = 2.497 ≈ 2.5 KLF

DL2: BARRIERS = (525 + 720)/5 BMS = 249 #/BM = 0.25 KLF.

FWS = 10.334'(.06) = 620 PLF = 0.62 KLF

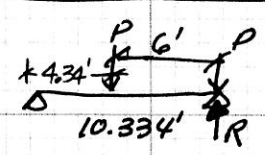
= TOTAL DL2 = 0.87 KLF

LIVE LOADS:

1.) BENDING MOMENT: DISTRIBUTION FACTOR:

- INTERIOR GIRDER:

A) ONE LANE:



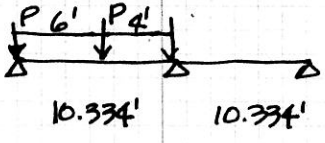
$DF = 1 + 4.334/10.334 = 1.42$

B) TWO LANES: $DF = \frac{S}{5.5} = 10.334/5.5 = \boxed{1.88}$

- EXTERIOR GIRDER

A) ONE LANE: $DF = 1 + 4.334'/10.334' = 1.42$

B) TWO LANES:



$DF = 1 + \frac{4.334}{10.334} + \frac{.334}{10.334} = 1.452$

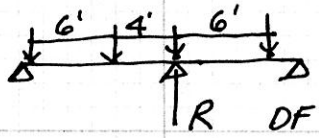
C) $DF_{MIN} = \frac{S}{4 + 0.25(S)} = 10.334/[4 + 0.25(10.334)] = \boxed{1.57}$

2.) SHEAR & REACTIONS:

- INTERIOR GIRDER:

A) ONE LANE = DF = 1.42

B) TWO LANES =



$DF = 1 + \frac{4.334}{10.334} + \frac{6.334}{10.334} + \frac{0.334}{10.334} = \boxed{2.065}$

- EXTERIOR GIRDER

A) ONE LANE: DF = 1.42

B) TWO LANES: DF = $\boxed{1.452}$

3) IMPACT: $I = \frac{50}{(96.75 + 125)} = 0.23 = \boxed{I = 1.23}$

X/ℓ	I
0.0 ℓ	1.23
0.1 ℓ	1.236
0.2 ℓ	1.247
0.3 ℓ	1.26
0.4 ℓ	1.273
0.5 ℓ	1.288
0.6 ℓ	1.273
0.7 ℓ	1.26
0.8 ℓ	1.247
0.9 ℓ	1.236
1.0 ℓ	1.23

4) COMPOSITE DESIGN; be

SLAB: $be = 1/4 = 96.75/4 = 24.19$ FT. $= 290''$

$S = 10.334' = 124''$

$12 t_s = 12 \times 8.75 = \boxed{105''}$

Deck Design SpreadSheet::

Design Code:	AASHTO LFD	
Loading:	HS25 Loading	
Wheel P Loading =	20	kips
Concrete, F'c=	4500	psi
Reinforcement=	60000	psi
phi =	0.9	
Z (top slab) =	130	k/in
Z (bot slab) =	170	k/in
n =	8	
Impact =	1.3	
Fut. Wearing Sur=	60	psf
Beam Spacing=	9.5	feet
Top Flange Width=	24	in
S eff =	8.5	feet
Tmin. =	S+17/36= 0.708333333	feet
	= 8.5	inches-Minimum
T Slab Selected=	8.75	inches

""Summary""
Top Bars::
Use # 5 Bars at 4.75" o.c. =
Bottom Bars::
Use # 5 Bars at 4.75" o.c. =

Top Dist. #4 Long. Bars::
Use #4 Bars Spaced at = 9" o.c.

Bottom Dist. #5 Bars::
Use #5 Bars at 7" o.c. Spacing

Dead Loads:

Slab DL =	0.109375	k/ft
FWS DL =	0.06	k/ft
Total DL =	0.169375	k/ft

Service Design Moments:

DL=0.125xS^2x0.8W=	1.223734375	k-ft
LL+I=1.3x0.8xPx(S+2)/32=	6.825	k-ft
Total Service Mo:DL+(LL+I)=	8.048734375	k-ft

Conc. Slab LFD Moment:

Mu=1.3(DL + 1.67(LL+I)) =	16.40792969	k-ft

Top Reinforcement Design:::

d = T-2.5-0.5-0.375=	5.375	inches	=(T- 2.5"cover-#4 Bar-(1/2)#5)
Ru=Mu/(phi x b x d^2)=	631.0362959	psi	
Reinf., rho =	0.01156657		
Area Steel, As = pbd =	0.746043762	in2/ft	

Required:::::

Spacing# 5 Bar= 0.31x12/As=	4.986302666	in O.C.
Use # 5 Bars at 4.75" o.c. =	4.75	in O.C.
Recalculated #5 Bar As/ft =	0.783157895	in2/ft
Revised rho =As/dxb =	0.012141983	

Reinforcement Cracking and Spacing Control:

dc=2+(0.625/2) =	2.3125	inch
Ac=2x(dc x bar spacing) =	21.96875	in2
fs (All.)=z/(dcAc)^0.333=	35.14657032	Ksi

Maximun fs = 0.60xFy=	36 Ksi		
Reinforce Stress Actual: fs::			
K=(2pn+(pn)^2)^0.5=	0.451339231		
j = 1-k/3 =.....J=	0.84955359		
fs(Act) =Mo/Asjd =	27.00786555 Ksi.....	""OK""	

Bottom Reinforcement Design:::

d = T-1-1.5-0.375=	5.875 inches	=(T-1-1.5"cover-(1/2)#5 Bar)	
Ru=Mu/(phi x b x d^2)=	528.1965193 psi		
Reinf., rho =	0.009513067		
Area Steel, As = pbd =	0.670671227 in2/ft		
Required:::::			
Spacing# 5 Bar= 0.31x12/As=	5.54668197 in O.C.	Required Minimum As	
Use # 5 Bars at 4.75" o.c. =	4.75 in O.C.	BDM 302.2.4.2 T&B Match	
Recalculated #5 Bar As/ft =	0.783157895 in2/ft		
Revised rho =As/dxb =	0.011108623		

Reinforcement Cracking and Spacing Control:

dc=1.5+(0.625/2) =	1.8125 inch	
Ac=2x(dc x bar spacing) =	17.21875 in2	
fs (All.)=z/(dcAc)^0.333=	54.05723185 Ksi	
Maximun fs = 0.60xFy=	36 Ksi....Controls	
Reinforce Stress Actual: fs::		
K=(2pn+(pn)^2)^0.5=	0.430854567	
j = 1-k/3 =.....J=	0.856381811	
fs(Act) =Mo/Asjd =	24.51230802 Ksi.....	""OK"" < 36 ksi

Distribution Reinforcement:::

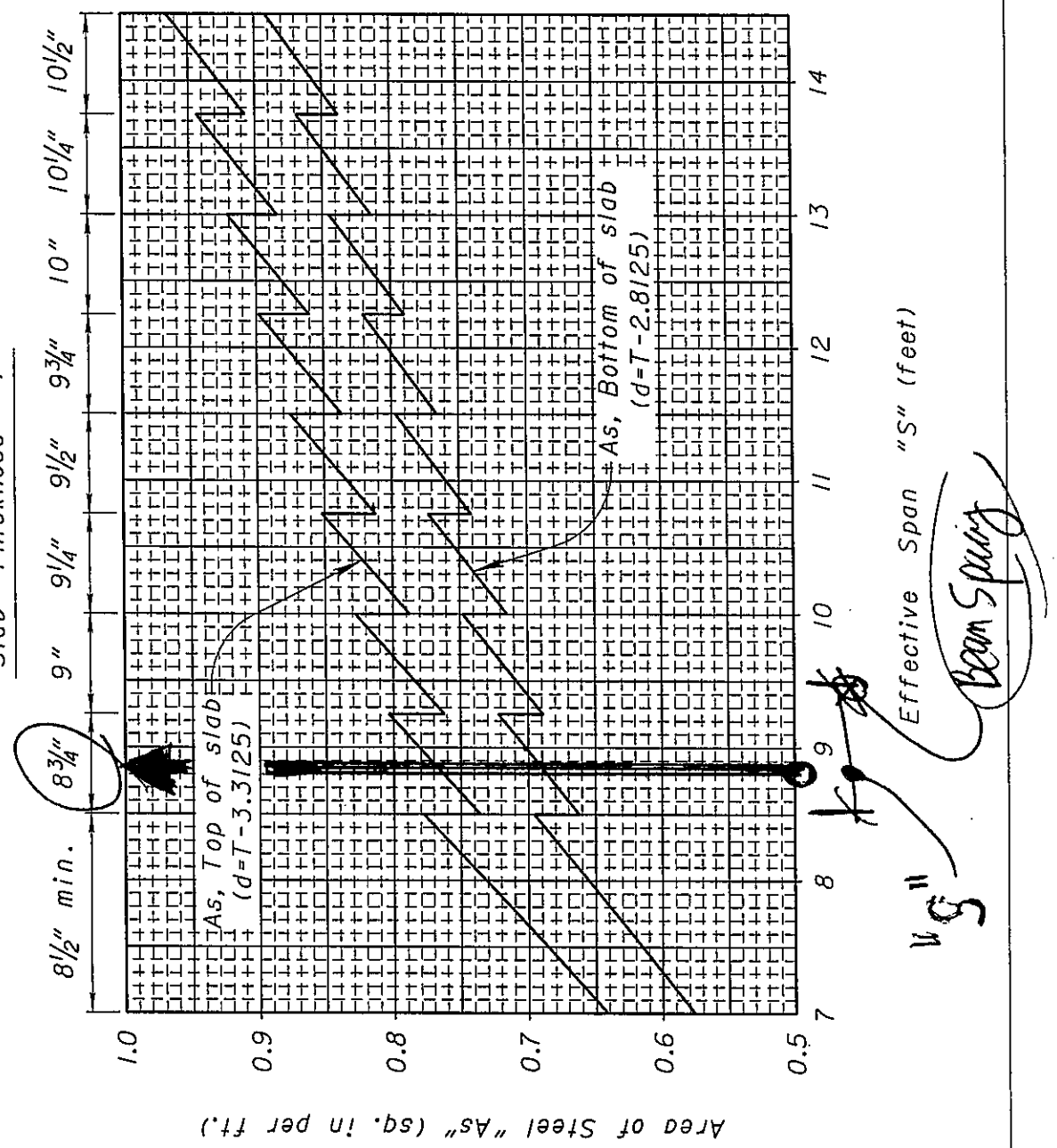
Top Dist. #4 Bars::

As (top)=0.33As =	0.258442105 in2/ft	
Use #4 Bars Spaced at =	9.286412512 in O.C.	
Use #4 Bars Spaced at = 9" o.c.		

Bottom Dist. #5 Bars::

As (bottom) % =220/(s)^0.5 =	75.45937746 Precent	
Maximun Precent =	67 Precent	
Use Precent =	67 Precent	
Middle Half Design Only =	0.524715789 in2/ft	
Spacing #5 Bars =	7.089552239 in O.C.	
Use #5 Bars at 7" o.c. Spacing		

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

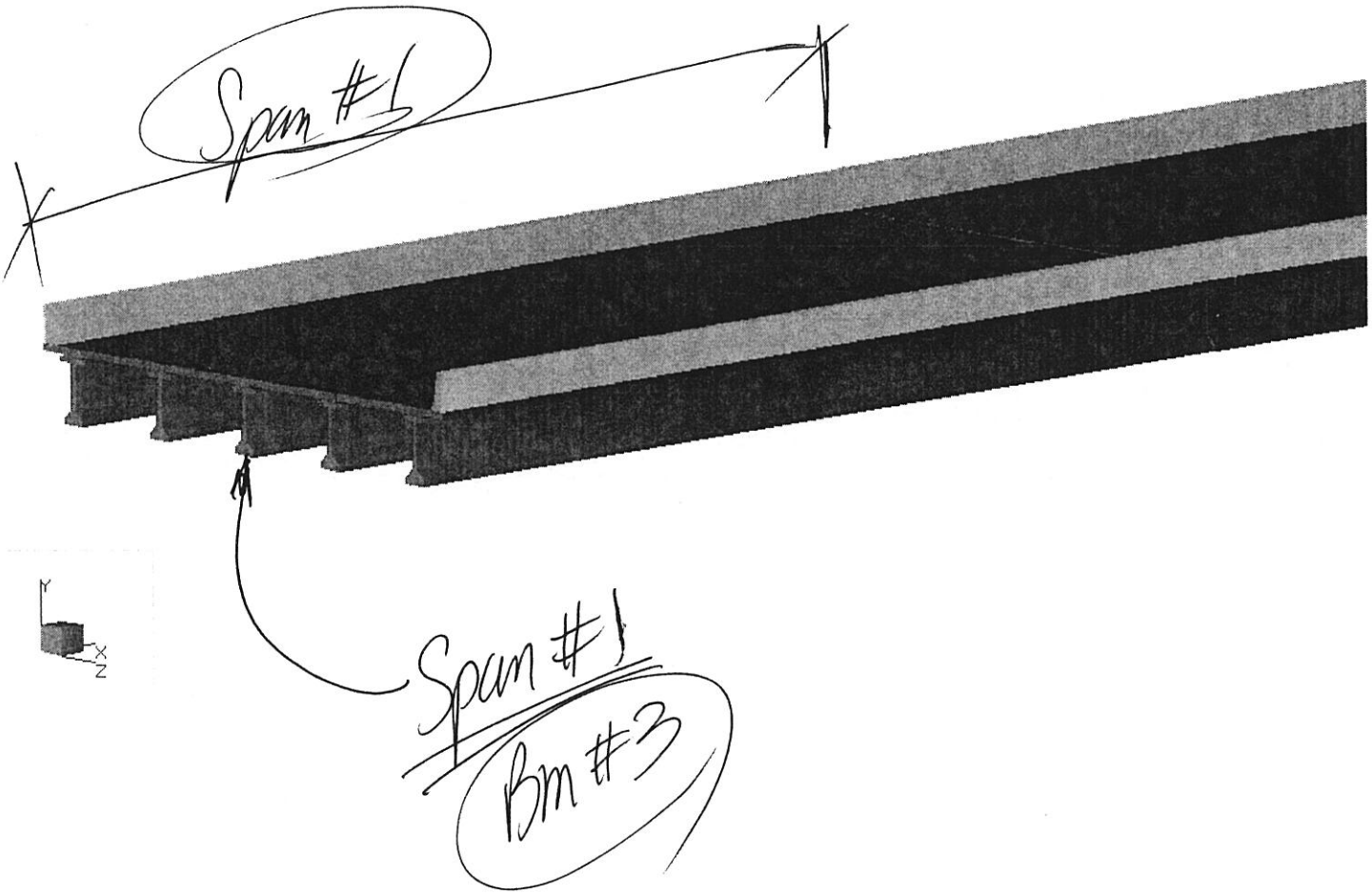


Note: This Figure is for the design of a reinforced concrete deck on new steel beams/girders using HS25.

Figure 314A

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

FULL IMAGE:



CONSPAN® Rating - C:\leap\SLI-823-SwaugerValley-Minford Road.csr - [Main]

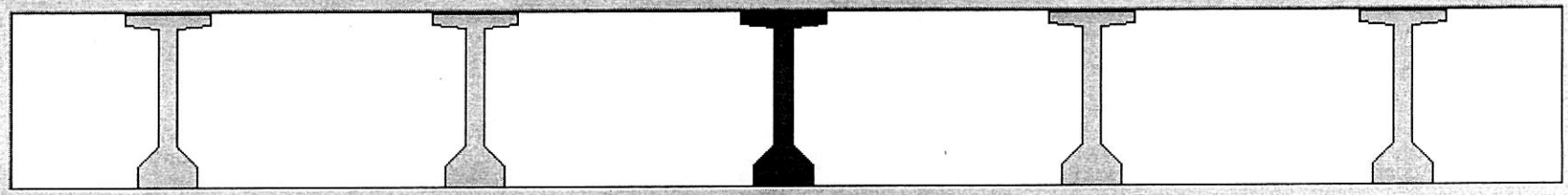
File Show Libraries LEAP Bridge Help

New Open Save Save As Print Image Model Results Diagram DF Contours Beam Section Tendon Rebar Live Load Help LEAP Site About E-mail User Manual

Project | Geometry | Materials | Loads | Analysis | Beam

Span: 01

Beam: 3



Data Modification:

Edit...

Design:

Strand Pattern...

Rebar Pattern...

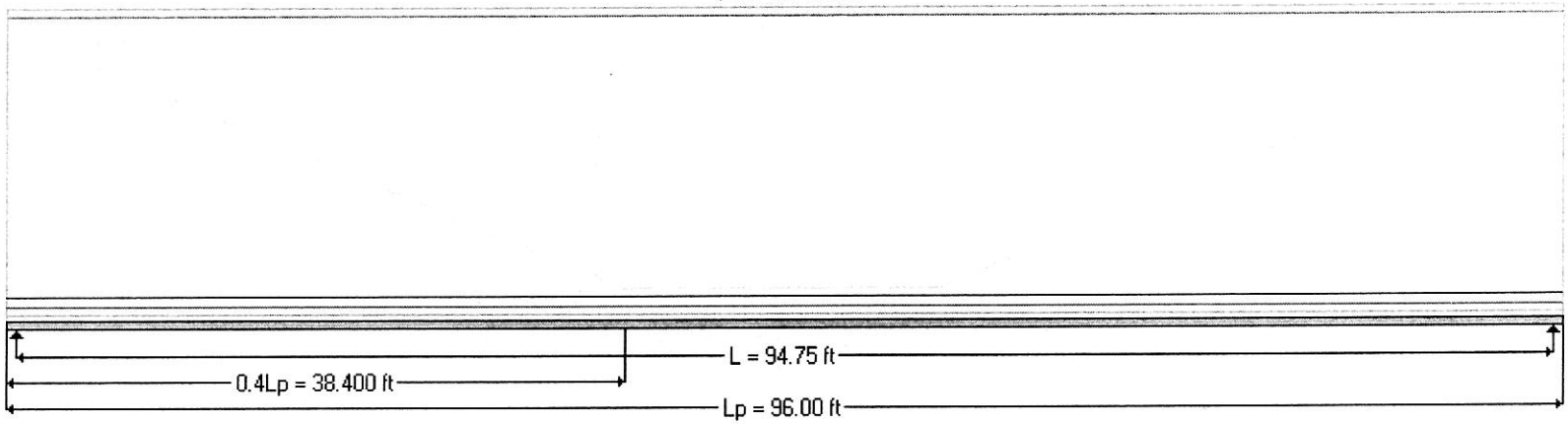
Results...

Rating

Parameters...

Rating Results...

Span: 1, Beam: 3



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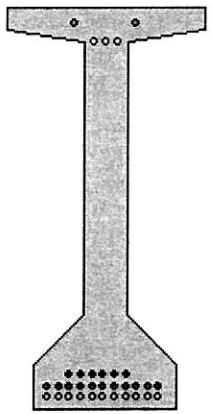
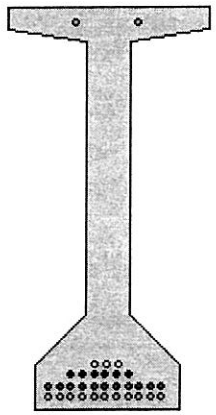


MID-SPAN



Span #1
Beam #3

IBS:Not Connected | IBS:Manual | Code: LFD | NUM

Start | CONSPAN® Rating - C:... | 3:07 PM

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

PROJECT DATA

Project : SCI 823-SR 823 over Swauger Valley/Minford Rd
Designer : def
Date : Jan/15/2008
User job number: 5355.00
State : OH State Job #: PID 19415
Comments : Four Span Type 4-72"-Mod. AASHTO Bm Bridge
(95.88', 96.75, 96.75', 95.88' Spans)
Design Mode : AASHTO Standard (LFD)-US Units [17th Edition, 2003]
Design as: : Multi-Span(Continuous)
Flared Girder: : No
File Name : C:\leap\SCI-823-SwaugerValley-Minford Road.csl

BEAM #3 (CENTER BM) @ SPAN #1

GEOMETRY DATA

BRIDGE LAYOUT

Overall width	, ft	=	48.460
Left curb	, ft	=	1.500
Right curb	, ft	=	1.500
curb-to-curb width	, ft	=	45.460
Number of spans		=	4
Number of lanes		=	3
Lane width	, ft	=	12.000
Topping thickness	, in	=	7.750
Suppl. thickness	, in	=	0.000
Haunch thickness	, in	=	2.500
Haunch width	, in	=	20.000

SPAN DATA

Span	Pier-to-pier ft	Precast Brg-to-brg ft	Brg-to-brg ft	Pier CL ft	Release ft	Bridge c/s M.I. in4
1	96.000	96.000	94.750	0.000	96.000	7234270.00
2	96.750	96.000	94.500	0.375	96.000	7234270.00
3	96.750	96.000	94.500	0.375	96.000	7234270.00
4	96.000	96.000	94.750	0.000	96.000	7234270.00

BEAM DATA

Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 2

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 4

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

MATERIAL DATA

CONCRETE PROPERTIES

		Precast	C.I.P.
f'c ,psi	=	6500.000	4500.000
Wc ,pcf	=	150.000	150.000
Ec ,ksi	=	4887.730	4066.840
f'ci,psi	=	5000.000	
Eci ,ksi	=	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (38.40 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.153 in2
Use transformed strand and rebar: No

REINFORCING STEEL: Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

LOADS DATA:

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft)
(Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
1	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.025	-	Stay-in-Place Deck Forms

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

4	3	DL Line	0.129	-	Sacrificial Wearing Surface
4	3	DL Line	0.025	-	Stay-in-Place Deck Forms
4	4	DL Line	0.129	-	Sacrificial Wearing Surface
4	4	DL Line	0.025	-	Stay-in-Place Deck Forms
4	4	DL Line	0.129	-	Sacrificial Wearing Surface
4	4	DL Line	0.025	-	Stay-in-Place Deck Forms
4	5	DL Line	0.109	-	Sacrificial Wearing Surface
4	5	DL Line	0.025	-	Stay-in-Place Deck Forms
4	5	DL Line	0.109	-	Sacrificial Wearing Surface
4	5	DL Line	0.025	-	Stay-in-Place Deck Forms

DIAPHRAGM LOADS (kips, ft)

Span	Beam	Mag.	Loc
1	1	0.310	24.000
1	1	0.310	48.000
1	1	0.310	72.000
1	2	0.620	24.000
1	2	0.620	48.000
1	2	0.620	72.000
1	3	0.620	24.000
1	3	0.620	48.000
1	3	0.620	72.000
1	4	0.620	24.000
1	4	0.620	48.000
1	4	0.620	72.000
1	5	0.310	24.000
1	5	0.310	48.000
1	5	0.310	72.000
2	1	0.310	24.000
2	1	0.310	48.000
2	1	0.310	72.000
2	2	0.620	24.000
2	2	0.620	48.000
2	2	0.620	72.000
2	3	0.620	24.000
2	3	0.620	48.000
2	3	0.620	72.000
2	4	0.620	24.000
2	4	0.620	48.000
2	4	0.620	72.000
2	5	0.310	24.000
2	5	0.310	48.000
2	5	0.310	72.000
3	1	0.310	24.000
3	1	0.310	48.000
3	1	0.310	72.000
3	2	0.620	24.000
3	2	0.620	48.000
3	2	0.620	72.000
3	3	0.620	24.000
3	3	0.620	48.000
3	3	0.620	72.000
3	4	0.620	24.000
3	4	0.620	48.000
3	4	0.620	72.000
3	5	0.310	24.000
3	5	0.310	48.000
3	5	0.310	72.000
4	1	0.310	24.000
4	1	0.310	48.000
4	1	0.310	72.000
4	2	0.620	24.000
4	2	0.620	48.000
4	2	0.620	72.000
4	3	0.620	24.000
4	3	0.620	48.000
4	3	0.620	72.000
4	4	0.620	24.000

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

4	4	0.620	48.000
4	4	0.620	72.000
4	5	0.310	24.000
4	5	0.310	48.000
4	5	0.310	72.000

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft)
(Line: klf)
(Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc	Description
1	DL	Line	0.525	-	Left Curb Weight
1	DL	Line	0.720	-	Right Curb Weight
1	ADL	Area	0.060	45.46	Future Wearing Surface
2	DL	Line	0.525	-	Left Curb Weight
2	DL	Line	0.720	-	Right Curb Weight
2	DL	Line	0.525	-	Left Curb Weight
2	DL	Line	0.720	-	Right Curb Weight
2	ADL	Area	0.060	45.46	Future Wearing Surface
2	ADL	Area	0.060	45.46	Future Wearing Surface
3	DL	Line	0.525	-	Left Curb Weight
3	DL	Line	0.720	-	Right Curb Weight
3	DL	Line	0.525	-	Left Curb Weight
3	DL	Line	0.720	-	Right Curb Weight
3	ADL	Area	0.060	45.46	Future Wearing Surface
3	ADL	Area	0.060	45.46	Future Wearing Surface
4	DL	Line	0.525	-	Left Curb Weight
4	DL	Line	0.720	-	Right Curb Weight
4	DL	Line	0.525	-	Left Curb Weight
4	DL	Line	0.720	-	Right Curb Weight
4	ADL	Area	0.060	45.46	Future Wearing Surface
4	ADL	Area	0.060	45.46	Future Wearing Surface

LOADS ON SUPPLEMENTAL

UNITS: (Point: kips, Location: ft)
(Line: klf)
(Area: ksf, Width: ft)

LIVE LOADS

ID: H/HS25 Lane (Type: Lane Load)
ID: HS25 Truck (Type: Truck Load)
ID: Military Truck (Type: Truck Load)

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ANALYSIS DATA:

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.228	Calculated (AASHTO 3.8.2.2)
1	2	1.228	Calculated (AASHTO 3.8.2.2)
1	3	1.228	Calculated (AASHTO 3.8.2.2)
1	4	1.228	Calculated (AASHTO 3.8.2.2)
1	5	1.228	Calculated (AASHTO 3.8.2.2)
2	1	1.228	Calculated (AASHTO 3.8.2.2)
2	2	1.228	Calculated (AASHTO 3.8.2.2)
2	3	1.228	Calculated (AASHTO 3.8.2.2)
2	4	1.228	Calculated (AASHTO 3.8.2.2)
2	5	1.228	Calculated (AASHTO 3.8.2.2)
3	1	1.228	Calculated (AASHTO 3.8.2.2)
3	2	1.228	Calculated (AASHTO 3.8.2.2)
3	3	1.228	Calculated (AASHTO 3.8.2.2)
3	4	1.228	Calculated (AASHTO 3.8.2.2)
3	5	1.228	Calculated (AASHTO 3.8.2.2)
4	1	1.228	Calculated (AASHTO 3.8.2.2)
4	2	1.228	Calculated (AASHTO 3.8.2.2)
4	3	1.228	Calculated (AASHTO 3.8.2.2)
4	4	1.228	Calculated (AASHTO 3.8.2.2)
4	5	1.228	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

Service	Factored
Gamma = 1.00	Gamma = 1.30
Beta-D = 1.00	Beta-D = 1.00
Beta-L = 1.00 (Group 1)	Beta-L = 1.67 (Group 1)

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

PROJECT PARAMETERS DATA:

MULTIPLIERS:

Trans len mult:	Bonded	= 1.00
	Debonded	= 1.00
Dev len mult:	Bonded	= 1.60
	Debonded	= 2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

		PRECAST	DECK
Strength	=	6500.00 psi	4500.00 psi
Max Comp,	Top =	3900.00 psi	2700.00 psi
Pos Mom,	Bot =	3900.00 psi	
Neg Mom,	Bot =	3900.00 psi	
Max Tens,	Top =	-483.74 psi	-503.12 psi
Max Tens,	Bot =	-483.74 psi	
Crk Tens,	Bot =	-604.67 psi	
Elasticity	=	4887.7 ksi	4066.8 ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

		PRECAST	DECK
Max Comp,	Top =	2600.00 psi	1800.00 psi
Pos Mom,	Bot =	2600.00 psi	
Neg Mom,	Bot =	2600.00 psi	

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

		PRECAST	DECK
Max Comp,	Top =	2600.00 psi	1800.00 psi
Pos Mom,	Bot =	2600.00 psi	
Neg Mom,	Bot =	2600.00 psi	

AT RELEASE (Art. 9.15.2.1):

		PRECAST
Strength	=	5000.00 psi
Max Comp,	Top =	3000.00 psi
Max Comp,	Bot =	3000.00 psi
Max Tens,	Top =	-200.00 psi
w/reinf	=	-530.33 psi
Max Tens,	Bot =	-0.00 psi
Elasticity	=	4286.8 ksi

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced:	0.90
Flexure Prestressed:	1.00
Shear:	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 1, Beam: 3

PRECAST DATA:

Section Id: AASHTO-4-Mod-72"
Type : I-Girder
Flng width: Top = 36.000 in Bot = 26.000 in
thick: Top = 4.000 in Bot = 8.000 in
Stems : No = 1
Top = 8.000 in
Bot = 8.000 in
Shear width = 8.000 in
Wide top Flange = No

GENERAL BRIDGE DATA:

Bridge Width = 48.46 ft
Curb-to-curb = 45.46 ft
Beam Spac. Lt./Rt. = 10.33/ 10.33 ft
Lane width = 12.00 ft
Number of lanes = 3
Interior/Exterior = Interior

TOPPING DATA:

Deck Thickness = 7.750 in
Suppl. Thickness = 0.000 in
Haunch:
Thickness = 2.500 in
Width = 20.000 in
Effective width = 113.000 in (Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:

UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.129	-
Line	0.025	-

Diaphragm loads: kips, ft

Mag.	Loc.
0.62	24.00
0.62	48.00
0.62	72.00

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length = 96.000 ft
Release length = 96.000 ft
Design length = 94.750 ft

Kern points:

Upper = 53.15 in
Lower = 17.28 in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1) : 0.939 (Calculated)
Live Positive Moment (Group 1) : 0.939 (Calculated)
Live Shear (Group 1) : 0.939 (Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian : 0.200 (Calculated)

Comp. DL : 0.200 (Calculated)
Comp. ADL : 0.200 (Calculated)
Suppl. DL : 0.200 (Calculated)
Suppl. ADL : 0.200 (Calculated)
Suppl : 0.200 (Calculated)

RESISTANCE FACTORS (Art. 9.14):

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Flexure Reinforced : 0.90
Flexure Prestressed : 1.00
Shear : 0.90

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 1, Beam: 3

SECTION PROPERTIES:

		PRECAST	COMPOSITE
Area	=	956.0 in2	1726.3 in2#
Total Height	=	72.00 in	82.25 in
Mom. of Inertia (Ixx)	=	616018 in4	1434156 in4#
Ht. of c.g.	=	34.43 in	53.91 in#
Density	=	150.00 pcf	150.00 pcf
Self-weight	=	995.8 plf	2049.0 plf
Mom. of Inertia (Iyy)	=	36570.0 in4	
Poisson's Ratio	=	0.2	

(#) Of Total Section using Ect/Ec = 0.8321

Use transformed strand and rebar: No

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 1, Beam: 3

STRESS LIMITS (Art. 9.15.2):

	PRECAST	DECK
STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):		
Strength =	6500.00 psi	4500.00 psi
Max Comp, Top =	3900.00 psi	2700.00 psi
Pos Mom, Bot =	3900.00 psi	
Neg Mom, Bot =	3900.00 psi	
Max Tens, Top =	-483.74 psi	-503.12 psi
Max Tens, Bot =	-483.74 psi	
Crk Tens, Bot =	-604.67 psi	
Elasticity =	4887.7 ksi	4066.8 ksi
STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):		
Max Comp, Top =	2600.00 psi	1800.00 psi
Pos Mom, Bot =	2600.00 psi	
Neg Mom, Bot =	2600.00 psi	
STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):		
Max Comp, Top =	2600.00 psi	1800.00 psi
Pos Mom, Bot =	2600.00 psi	
Neg Mom, Bot =	2600.00 psi	
AT RELEASE (Art. 9.15.2.1):		
Strength =	5000.00 psi	
Max Comp, Top =	3000.00 psi	
Max Comp, Bot =	3000.00 psi	
Max Tens, Top =	-200.00 psi	
w/reinf =	-530.33 psi	
Max Tens, Bot =	-0.00 psi	
Elasticity =	4286.8 ksi	

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 1, Beam: 3

PRESTRESSED STEEL: 33 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (38.40 ft from member end)

END PATTERN (Ycg = 13.29 in):
11 @ 2.000 in 11 @ 4.000 in 6 @ 6.000 in 3 @ 66.000 in
2 @ 69.250 in

MID PATTERN (Ycg = 8.02 in):
(A) Draped:
3 @ 8.000 in
(B) Straight:
11 @ 2.000 in 11 @ 4.000 in 6 @ 6.000 in 2 @ 69.250 in

Strand Diameter	=	0.500 in	Ult. Strength(f's)	=	270.0 ksi
Strand Area	=	0.153 in2	Initial Prestress	=	0.75 f's = 202.5 ksi
Total Strand Area	=	5.049 in2	Initial Pull	=	1022.4 kips
Trans. Len,bonded	=	2.083 ft	Dev. Len, bonded	=	10.161 ft
Trans. Len,debonded	=	2.083 ft	Dev. Len, debonded	=	12.702 ft
Holddown Force	=	11.608 kips	Beam Shrtng (PL/AE)	=	0.271 in

REINFORCING STEEL: Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

Midspan: Str. area = 5.0490 in2 Ycg = 8.02 in
P_init = 1022.4 kips Ecc = 26.41 in
Hours to release = 18.00 Rel. Humid.(RH) = 75.0 % Es = 28500.0 ksi Eci = 4287 ksi

AASHTO LOSSES:	Release		Final (Art. 9.16.2)
Steel relaxation*	1600.47 psi	CRs (Eq 9-10A)	3102.72 psi
Elastic Shortening	10033.97 psi	ES (Eq 9-6)	10033.97 psi(Fcir=1509.26 psi)
Concrete shrinkage	0.00 psi	SH (Eq 9-4)	5750.00 psi
Concrete creep	0.00 psi	CRc (Eq 9-9)	12127.75 psi(Fcds=-854.77 psi)
Total	11634.44 psi (5.75 %)		31014.43 psi (15.32 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.46	3.43	8.98	18.58	28.18	37.78	47.38
Self wt.	: M	0.0	67.7	155.8	383.3	704.5	934.0	1071.6	1117.5
	V	47.2	45.7	43.8	38.2	28.7	19.1	9.6	0.0
Prec.	: M	-0.0	10.5	24.1	59.3	109.1	144.6	165.9	173.0
DL+ADL	V	7.3	7.1	6.8	5.9	4.4	3.0	1.5	0.0
Deck	: M	0.0	71.6	164.8	405.4	745.1	987.8	1133.4	1181.9
+ Haunch	V	49.9	48.4	46.3	40.4	30.3	20.2	10.1	0.0
Diaphragm	: M	0.0	1.3	3.1	8.2	17.0	23.3	26.1	29.0
	V	0.9	0.9	0.9	0.9	0.9	0.3	0.3	0.3
Comp.	: M	16.6	54.1	102.1	220.7	368.3	442.6	443.6	371.5
DL+ADL	V	26.3	25.2	23.6	19.2	11.6	3.9	3.7	11.3
LL + I	: M+	56.2	183.5	346.4	751.1	1261.1	1548.8	1668.0	1627.0
	V	90.3	88.5	85.9	78.9	66.8	49.2	37.5	47.2
LL + I	: M-	-4.9	-16.5	-32.1	-76.0	-151.9	-227.9	-303.8	-379.8
	V	85.7	73.2	56.2	8.0	8.0	8.1	8.2	8.3
LL + I	: Vmx	90.3	88.5	85.9	78.9	66.8	55.1	43.8	53.4
	M	56.2	183.5	346.4	751.1	1261.1	1544.2	1621.2	1572.5
Total	: M+	72.8	388.8	796.4	1828.1	3205.1	4081.0	4508.7	4500.0
	V	221.9	215.7	207.3	183.6	142.7	95.7	62.6	58.8
Total	: M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	: Vmx	221.1	215.1	206.8	183.6	142.7	101.6	69.0	65.1
	M	72.8	388.8	796.4	1828.1	3205.1	4076.4	4461.8	4445.4

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	56.98	66.57	76.18	85.77	91.32	93.29	94.75
Self wt.	: M	1071.6	934.0	704.5	383.3	155.8	67.7	0.0
	V	9.6	19.1	28.7	38.2	43.8	45.7	47.2
Prec.	: M	165.9	144.6	109.1	59.3	24.1	10.5	0.0
DL+ADL	V	1.5	3.0	4.4	5.9	6.8	7.1	7.3
Deck	: M	1133.4	987.8	745.1	405.4	164.8	71.6	0.0
+ Haunch	V	10.1	20.2	30.3	40.4	46.3	48.4	49.9
Diaphragm	: M	26.3	23.2	17.5	8.5	3.2	1.4	0.0
	V	0.3	0.3	0.9	0.9	0.9	0.9	0.9
Comp.	: M	226.1	7.5	-284.3	-649.3	-893.7	-986.2	-1056.8
DL+ADL	V	19.0	26.6	34.2	41.8	46.2	47.8	49.0
LL + I	: M+	1449.5	1122.8	686.2	270.6	188.7	175.3	189.1
	V	58.0	67.7	76.2	31.4	14.2	8.2	2.1
LL + I	: M-	-455.8	-531.7	-607.7	-870.1	-1190.2	-1327.1	-1436.3
	V	8.2	8.1	8.0	53.5	66.1	70.6	73.9
LL + I	: Vmx	64.6	74.7	83.7	91.3	94.7	95.9	96.7
	M	1426.4	1118.4	685.2	170.1	-125.6	-230.2	-307.5
Total	: M+	4072.8	3219.9	1978.1	477.8	0.0	0.0	0.0
	V	98.5	136.9	174.8	158.8	0.0	0.0	0.0
Total	: M-	0.0	0.0	0.0	-663.0	-1735.8	-2162.0	-2493.1
	V	0.0	0.0	0.0	180.9	210.1	220.5	228.1
Total	: Vmx	105.0	143.9	182.3	218.7	238.7	245.8	251.0
	M	4049.7	3215.4	1977.1	377.3	-671.2	-1065.2	-1364.3

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	47.2	47.2
Deck+Haunch	49.9	49.9
Diaphragm	0.9	0.9
Prec. DL+ADL	7.3	7.3
Comp. DL+ADL	134.0	625.8
Supplemental	0.0	0.0
Supp. DL+ADL	-0.0	-0.0
Live (Max)	79.0	126.7
Live (Min)	-6.9	-11.1
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, FACTORED 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.46	3.43	8.98	18.58	28.18	37.78	47.38
Self wt.	: M	0.0	88.1	202.6	498.3	915.9	1214.2	1393.1	1452.8
	V	61.3	59.4	56.9	49.7	37.3	24.9	12.4	0.0
Prec.	: M	-0.0	13.6	31.4	77.1	141.8	188.0	215.7	224.9
DL+ADL	V	9.5	9.2	8.8	7.7	5.8	3.8	1.9	0.0
Deck	: M	0.0	93.1	214.3	527.0	968.6	1284.1	1473.4	1536.4
+ Haunch	V	64.9	62.9	60.2	52.6	39.4	26.3	13.1	0.0
Diaphragm	: M	0.0	1.7	4.1	10.7	22.2	30.2	34.0	37.7
	V	1.2	1.2	1.2	1.2	1.2	0.4	0.4	0.4
Comp.	: M	21.6	70.4	132.7	287.0	478.8	575.3	576.7	483.0
DL+ADL	V	34.2	32.7	30.7	24.9	15.0	5.1	4.8	14.7
LL + I	: M+	122.1	398.3	752.1	1630.6	2737.8	3362.5	3621.2	3532.3
	V	196.0	192.1	186.6	171.2	145.0	106.7	81.4	102.5
LL + I	: M-	-10.7	-35.8	-69.6	-164.9	-329.8	-494.7	-659.6	-824.6
	V	186.1	158.9	121.9	17.3	17.5	17.6	17.8	18.1
LL + I	: Vmx	196.0	192.1	186.6	171.2	145.0	119.6	95.2	116.0
	M	122.1	398.3	752.1	1630.6	2737.8	3352.5	3519.6	3413.9
Total	: M+	143.7	665.3	1337.1	3030.7	5265.0	6654.3	7314.1	7267.1
	V	367.1	357.5	344.3	307.3	243.7	167.2	114.1	117.6
Total	: M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	: Vmx	365.4	356.1	343.2	307.3	243.7	180.1	127.9	131.1
	M	143.7	665.3	1337.1	3030.7	5265.0	6644.3	7212.4	7148.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	56.98	66.57	76.18	85.77	91.32	93.29	94.75
Self wt.	: M	1393.1	1214.2	915.9	498.3	202.6	88.1	0.0
	V	12.4	24.9	37.3	49.7	56.9	59.4	61.3
Prec.	: M	215.7	188.0	141.8	77.1	31.4	13.6	0.0
DL+ADL	V	1.9	3.8	5.8	7.7	8.8	9.2	9.5
Deck	: M	1473.4	1284.1	968.6	527.0	214.3	93.1	0.0
+ Haunch	V	13.1	26.3	39.4	52.6	60.2	62.9	64.9
Diaphragm	: M	34.2	30.1	22.8	11.0	4.2	1.8	0.0
	V	0.4	0.4	1.2	1.2	1.2	1.2	1.2
Comp.	: M	294.0	9.8	-369.6	-844.1	-1161.8	-1282.1	-1373.9
DL+ADL	V	24.6	34.6	44.5	54.4	60.1	62.2	63.7
LL + I	: M+	3146.8	2437.6	1489.7	587.6	409.7	380.6	410.5
	V	126.0	147.1	165.4	68.2	30.9	17.7	4.7
LL + I	: M-	-989.5	-1154.4	-1319.3	-1889.1	-2583.9	-2881.0	-3118.2
	V	17.8	17.6	17.5	116.2	143.6	153.3	160.3
LL + I	: Vmx	140.2	162.2	181.6	198.3	205.5	208.2	210.0
	M	3096.7	2428.0	1487.6	369.4	-272.6	-499.7	-667.7
Total	: M+	6557.1	5163.8	3169.2	856.9	0.0	0.0	0.0
	V	178.5	237.0	293.6	233.8	0.0	0.0	0.0
Total	: M-	0.0	0.0	0.0	-1619.7	-3293.2	-3966.5	-4492.1
	V	0.0	0.0	0.0	281.8	330.8	348.2	360.9
Total	: Vmx	192.8	252.2	309.8	363.9	392.8	403.1	410.6
	M	6507.0	5154.1	3167.1	638.7	-982.0	-1585.2	-2041.5

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	61.3	61.3
Deck+Haunch	64.9	64.9
Diaphragm	1.2	1.2
Prec. DL+ADL	9.5	9.5
Comp. DL+ADL	174.3	813.5
Supplemental	0.0	0.0
Supp. DL+ADL	-0.0	-0.0
Live (Max)	171.5	275.1
Live (Min)	-14.9	-24.1
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 1, Beam : 3, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 5.75%)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.60	19.20	28.80	38.40	48.00
Self Wt.						
Precast-top	71.3	302.3	537.3	705.3	806.0	839.6
Bottom	-65.3	-277.0	-492.4	-646.3	-738.6	-769.4
Prestress						
Precast-top	-251.4	-312.0	-389.5	-467.0	-544.5	-544.5
Bottom	2162.2	2217.8	2288.8	2359.8	2430.8	2430.8
Total						
Precast-top	-180.1	-9.8	147.8	238.3	261.6	295.1
Bottom	2096.8	1940.8	1796.3	1713.5	1692.1	1661.3
As_top (in2)	0.000	0.000	0.000	0.000	0.000	0.000

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 1, Beam : 3, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 15.32%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.46	3.43	8.98	18.58	28.18	37.78	47.38
Prestress								
Precast-top	-64.6	-225.8	-240.1	-280.4	-350.0	-419.6	-489.2	-489.2
Bottom	579.9	1942.6	1955.7	1992.6	2056.4	2120.2	2184.0	2184.0
Self wt.								
Precast-top	0.0	49.6	114.0	280.5	515.6	683.5	784.3	817.9
Bottom	-0.0	-45.4	-104.5	-257.1	-472.5	-626.4	-718.7	-749.5
Prec. DL+ADL								
Precast-top	-0.0	7.7	17.7	43.4	79.8	105.8	121.4	126.6
Bottom	0.0	-7.0	-16.2	-39.8	-73.2	-97.0	-111.3	-116.0
Diaphragm								
Precast-top	-0.0	1.0	2.3	6.0	12.5	17.0	19.1	21.2
Bottom	-0.0	-0.9	-2.1	-5.5	-11.4	-15.6	-17.5	-19.4
Deck + Haunch								
Precast-top	-0.0	52.4	120.6	296.7	545.3	722.9	829.5	865.0
Bottom	-0.0	-48.1	-110.5	-271.9	-499.7	-662.5	-760.1	-792.7
Comp. DL+ADL								
Topping-top	3.3	10.7	20.1	43.5	72.6	87.3	87.5	73.3
Precast-top	2.5	8.2	15.5	33.4	55.7	67.0	67.1	56.2
Bottom	-7.5	-24.4	-46.1	-99.6	-166.1	-199.7	-200.1	-167.6
LL+I(+)								
Topping-top	11.1	36.2	68.3	148.2	248.8	305.5	329.0	321.0
Precast-top	8.5	27.8	52.4	113.7	190.8	234.4	252.4	246.2
Bottom	-25.4	-82.8	-156.3	-338.8	-568.9	-698.7	-752.5	-734.0
Final 1 (P/S + DL + LL)								
Topping-top	14.4	46.9	88.5	191.7	321.4	392.8	416.6	394.3
Precast-top	-53.6	-79.2	82.4	493.4	1049.8	1411.1	1584.7	1643.9
Bottom	547.0	1734.0	1520.0	979.9	264.5	-179.7	-376.3	-395.3
Final 2 (P/S + DL)								
Topping-top	3.3	10.7	20.1	43.5	72.6	87.3	87.5	73.3
Precast-top	-62.1	-107.0	30.0	379.7	859.0	1176.7	1332.2	1397.7
Bottom	572.4	1816.8	1676.3	1318.7	833.4	519.0	376.1	338.7
Final 3 ((50% P/S + 50% DL + LL)								
Topping-top	12.7	41.5	78.4	169.9	285.1	349.2	372.8	357.6
Precast-top	-22.5	-25.7	67.4	303.5	620.3	822.7	918.5	945.1
Bottom	260.8	825.6	681.9	320.5	-152.2	-439.2	-564.4	-564.7

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 3, FACTORED 1

End Shear Design: Prestressed.

Location (ft)	Vd (kips)	Md (k.ft)	Ml (k.ft)	Vu (kips)	Mu (k.ft)	Vmu (kips)	Mmax (k.ft)	Vi (kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	Vn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.63	131.6	16.6	56.2	344.3	143.7	367.1	127.1	235.5
579.9	-7.5	2341.1	69.05	4497.0	75.7	4497.0	97.3	2.9	174.9
174.9	207.6	356.3	0.60	0.08	0.60	0.00	0.457*	12.0	178.1
Transfer:	2.08	127.2	205.3	183.5	344.3	665.3	357.5	459.9	230.3
1942.6	-125.8	5099.6	69.25	2707.2	75.9	2707.2	376.2	9.8	228.7
228.7	153.9	357.3	0.44	0.08	0.44	0.00	0.598*	24.0	178.7
H/2 :	4.05	121.3	450.0	346.4	344.3	1337.1	344.3	887.1	223.0
1955.7	-279.4	4788.2	69.52	1351.7	76.2	1351.7	443.5	9.8	240.8
240.8	141.8	358.7	0.41	0.08	0.41	0.00	0.629*	24.0	179.4
0.1L :	9.60	104.7	1077.0	751.1	307.3	3030.7	307.3	1953.7	202.6
1992.6	-673.9	3995.4	70.28	546.2	77.1	546.2	615.6	9.8	272.3
272.3	69.1	362.6	0.20	0.08	0.20	0.00	0.798*	24.0	181.3
0.2L :	19.20	75.9	1944.0	1261.1	243.7	5265.0	243.7	3321.0	167.8
2056.4	-1223.0	2919.7	71.60	251.2	78.5	251.2	852.6	9.8	318.0
251.2	19.7	369.4	0.05	0.08	0.08	0.00	0.927*	24.0	184.7
0.3L :	28.80	46.5	2532.2	1548.8	180.1	6654.3	167.2	4122.2	120.7
2120.2	-1601.1	2222.8	72.92	139.8	80.0	139.8	1011.5	9.8	351.4
139.8	60.3	376.2	0.17	0.08	0.17	0.00	0.699*	24.0	188.1
0.4L :	38.40	25.1	2840.7	1668.0	127.9	7314.1	114.1	4473.4	89.0
2184.0	-1807.8	1906.1	74.23	91.8	81.4	91.8	1092.1	0.0	362.2
91.8	50.3	383.0	0.14	0.08	0.14	0.00	0.646*	24.0	191.5
0.5L :	48.00	11.6	2872.9	1627.0	131.1	7267.1	117.6	4394.2	105.9
2184.0	-1845.3	1823.1	74.23	84.3	81.4	84.3	1131.7	0.0	369.2
84.3	61.4	383.0	0.17	0.08	0.17	0.00	0.579*	24.0	191.5
0.6L :	57.60	40.4	2623.3	1449.5	192.8	6557.1	178.5	3933.8	138.1
2184.0	-1709.8	2123.4	74.23	143.7	81.4	143.7	1092.2	0.0	362.2
143.7	70.5	383.0	0.19	0.08	0.19	0.00	0.671*	24.0	191.5
0.7L :	67.20	69.2	2097.1	1122.8	252.2	5163.8	237.0	3066.7	167.8
2120.2	-1404.8	2658.0	72.92	242.9	80.0	242.9	1011.5	9.8	351.4
242.9	37.3	376.2	0.10	0.08	0.10	0.00	0.867*	24.0	188.1
0.8L :	76.80	98.6	1291.9	686.2	309.8	3169.2	293.6	1877.3	195.0
2056.4	-928.9	3571.5	71.60	497.3	78.5	497.3	852.7	9.8	318.0
318.0	26.2	369.4	0.07	0.08	0.08	0.00	0.924*	24.0	184.7
0.9L :	86.40	127.4	207.2	-870.1	363.9	-1619.7	281.8	-1826.9	154.5
0.0	-128.1	-1391.0	77.13	274.8	84.6	274.8	615.7	9.8	297.9
274.8	129.5	398.0	0.34	0.08	0.34	0.00	0.680*	24.0	199.0
H/2 :	91.95	144.0	-545.7	-1190.2	392.8	-3293.2	330.8	-2747.6	186.8
0.0	-176.3	-1146.7	77.13	251.8	84.6	251.8	443.5	9.8	266.0
251.8	184.6	398.0	0.48	0.08	0.48	0.00	0.577*	24.0	199.0
Transfer:	93.92	149.9	-835.0	-1327.1	392.8	-3966.5	348.2	-3131.5	198.3
0.0	-194.6	-1054.1	77.13	246.5	84.6	246.5	376.2	9.8	253.6
246.5	189.9	398.0	0.49	0.08	0.49	0.00	0.565*	24.0	199.0
Bearing :	95.38	154.3	-1056.8	-1436.3	392.8	-4492.1	360.9	-3435.3	206.6
0.0	-208.5	-983.5	77.13	243.3	84.6	243.3	97.3	2.9	195.1
195.1	241.3	398.0	0.63	0.08	0.63	0.00	0.447*	12.0	199.0

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 3
Fpi, kips = 1022.42
fs, ksi = 20.00
d/4, in = 14.68
Abrst_rqrd, in2 = 2.04

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 3
(Beam and Slab effects are INCLUDED in Vu).
Location (ft)

bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00								
36.00	60.00	367.1	295.36	69.05	432.00	24.00	0.200	2.354	0.200
Transfer:	1.46								
36.00	60.00	357.5	286.81	69.25	432.00	24.00	0.200	2.268	0.200
H/2 :	3.43								
36.00	60.00	344.3	275.14	69.52	432.00	24.00	0.200	2.151	0.200
0.1L :	8.98								
36.00	60.00	307.3	242.92	70.28	432.00	24.00	0.200	1.829	0.200
0.2L :	18.58								
36.00	60.00	243.7	189.12	71.60	432.00	24.00	0.200	1.291	0.200
0.3L :	28.18								
36.00	60.00	180.1	137.19	72.92	432.00	24.00	0.200	0.772	0.200
0.4L :	37.78								
36.00	60.00	127.9	95.70	74.23	432.00	24.00	0.200	0.357	0.200
0.5L :	47.38								
36.00	60.00	131.1	98.13	74.23	432.00	24.00	0.200	0.381	0.200
0.6L :	56.98								
36.00	60.00	192.8	144.29	74.23	432.00	24.00	0.200	0.843	0.200
0.7L :	66.58								
36.00	60.00	252.2	192.13	72.92	432.00	24.00	0.200	1.321	0.200
0.8L :	76.18								
36.00	60.00	309.8	240.40	71.60	432.00	24.00	0.200	1.804	0.200
0.9L :	85.78								
36.00	60.00	363.9	257.92	78.38	432.00	24.00	0.200	1.979	0.200
H/2 :	91.32								
36.00	60.00	392.8	278.41	78.38	432.00	24.00	0.200	2.184	0.200
Transfer:	93.29								
36.00	60.00	403.1	285.75	78.38	432.00	24.00	0.200	2.258	0.200
Bearing :	94.75								
36.00	60.00	410.6	291.05	78.38	432.00	24.00	0.200	2.311	0.200

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 1, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L = 8.98 ft					
Prestress	0.535	1.80	0.963	2.20	1.177
Self Wt.	-0.226	1.85	-0.419	2.40	-0.543
Deck + Haunch			-0.189	2.30	-0.435
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.028	3.00	-0.083
Diaphragm			-0.004	3.00	-0.013
Comp. DL+ADL			-0.027	3.00	-0.081
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.104
Total	0.309		0.297		-0.082
At 0.2 x L = 18.58 ft					
Prestress	0.962	1.80	1.732	2.20	2.117
Self Wt.	-0.428	1.85	-0.792	2.40	-1.027
Deck + Haunch			-0.370	2.30	-0.852
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.054	3.00	-0.163
Diaphragm			-0.009	3.00	-0.026
Comp. DL+ADL			-0.049	3.00	-0.147
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.197
Total	0.534		0.458		-0.294
At 0.3 x L = 28.17 ft					
Prestress	1.275	1.80	2.294	2.20	2.804
Self Wt.	-0.586	1.85	-1.084	2.40	-1.406
Deck + Haunch			-0.513	2.30	-1.179
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.075	3.00	-0.225
Diaphragm			-0.012	3.00	-0.036
Comp. DL+ADL			-0.063	3.00	-0.189
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.266
Total	0.689		0.547		-0.498
At 0.4 x L = 37.78 ft					
Prestress	1.465	1.80	2.638	2.20	3.224
Self Wt.	-0.686	1.85	-1.270	2.40	-1.647
Deck + Haunch			-0.603	2.30	-1.388
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.088	3.00	-0.265
Diaphragm			-0.014	3.00	-0.042
Comp. DL+ADL			-0.067	3.00	-0.202
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.307
Total	0.779		0.595		-0.626
At 0.5 x L = 47.38 ft					
Prestress	1.529	1.80	2.753	2.20	3.365
Self Wt.	-0.721	1.85	-1.333	2.40	-1.730
Deck + Haunch			-0.634	2.30	-1.459
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.093	3.00	-0.279
Diaphragm			-0.015	3.00	-0.045
Comp. DL+ADL			-0.062	3.00	-0.185
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.311
Total	0.809		0.616		-0.643
At 0.6 x L = 56.97 ft					
Prestress	1.465	1.80	2.638	2.20	3.224
Self Wt.	-0.686	1.85	-1.270	2.40	-1.647
Deck + Haunch			-0.603	2.30	-1.388
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.088	3.00	-0.265

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Diaphragm	:			-0.014	3.00	-0.042
Comp. DL+ADL	:			-0.048	3.00	-0.143
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.285
Total	:	0.779		0.615		-0.546
At 0.7 x L = 66.57 ft						
Prestress	:	1.275	1.80	2.294	2.20	2.804
Self Wt.	:	-0.586	1.85	-1.084	2.40	-1.406
Deck + Haunch	:			-0.513	2.30	-1.179
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.075	3.00	-0.225
Diaphragm	:			-0.012	3.00	-0.036
Comp. DL+ADL	:			-0.029	3.00	-0.087
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.229
Total	:	0.689		0.582		-0.358
At 0.8 x L = 76.18 ft						
Prestress	:	0.962	1.80	1.732	2.20	2.117
Self Wt.	:	-0.428	1.85	-0.792	2.40	-1.027
Deck + Haunch	:			-0.370	2.30	-0.852
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.054	3.00	-0.163
Diaphragm	:			-0.009	3.00	-0.026
Comp. DL+ADL	:			-0.010	3.00	-0.030
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.155
Total	:	0.534		0.497		-0.135
At 0.9 x L = 85.78 ft						
Prestress	:	0.535	1.80	0.963	2.20	1.177
Self Wt.	:	-0.226	1.85	-0.419	2.40	-0.543
Deck + Haunch	:			-0.189	2.30	-0.435
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.028	3.00	-0.083
Diaphragm	:			-0.004	3.00	-0.013
Comp. DL+ADL	:			0.002	3.00	0.007
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.073
Total	:	0.309		0.326		0.037

Positive values indicate upward deflection.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ULTIMATE - Span : 1, Beam : 3, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)
(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer:		1.46								
	1.035	13.00	0.00013	269.3	0.64	1600.9	665.3	5573.0	0.29	2.41
H/2 :		3.43								
	2.013	12.73	0.00026	268.6	1.25	3104.1	1337.1	5506.3	0.56	2.32
0.1L :		8.98								
	4.770	11.97	0.00060	266.7	2.94	7291.5	3030.7	5340.6	1.37	-
0.2L :		18.58								
	5.049	10.65	0.00062	266.6	3.11	7852.3	5265.0	5131.8	1.53	-
0.3L :		28.18								
	5.049	9.33	0.00061	266.6	3.11	8002.0	6654.3	5023.1	1.59	-
0.4L :		37.78								
	5.049	8.02	0.00060	266.7	3.12	8151.6	7314.1	5014.8	1.63	-
0.5L :		47.38								
	5.049	8.02	0.00060	266.7	3.12	8151.6	7267.1	4964.0	1.64	-
0.6L :		56.98								
	5.049	8.02	0.00060	266.7	3.12	8151.6	6557.1	5014.8	1.63	-
0.7L :		66.58								
	5.049	9.33	0.00061	266.6	3.11	8002.0	5163.8	5023.1	1.59	-
0.8L :		76.18								
	5.049	10.65	0.00062	266.6	3.11	7852.3	3169.2	5131.5	1.53	-
0.9L :		85.78								
	4.770	11.97	0.00060	266.7	2.94	7291.5	856.9	5340.4	1.37	-
H/2 :		91.32								
	2.013	12.73	0.00026	268.6	1.25	3104.1	-299.6	5506.2	0.56	10.36
Transfer:		93.29								
	1.035	13.00	0.00013	269.3	0.64	1600.9	-704.9	5573.0	0.29	2.27

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

DETENSIONING (Span : 1, Beam : 3; Groups 1-18; Units: psi)

Grp	Str		Ys,in	2.08ft
1	2	E	2.00 Ft	16.964
		M	2.00 Fb	101.534
2	2	E	66.00 Ft	179.301
		M	8.00 Fb	69.844
3	1	E	66.00 Ft	260.470
		M	8.00 Fb	53.999
4	2	E	69.25 Ft	445.592
		M	69.25 Fb	1.429
5	2	E	6.00 Ft	405.417
		M	6.00 Fb	155.326
6	2	E	6.00 Ft	365.241
		M	6.00 Fb	309.224
7	2	E	6.00 Ft	325.066
		M	6.00 Fb	463.121
8	2	E	4.00 Ft	277.767
		M	4.00 Fb	623.548
9	2	E	4.00 Ft	230.467
		M	4.00 Fb	783.974
10	2	E	4.00 Ft	183.168
		M	4.00 Fb	944.400
11	2	E	4.00 Ft	135.868
		M	4.00 Fb	1104.826
12	2	E	4.00 Ft	88.569
		M	4.00 Fb	1265.252
13	1	E	4.00 Ft	64.919
		M	4.00 Fb	1345.465
14	2	E	2.00 Ft	10.496
		M	2.00 Fb	1512.420
15	2	E	2.00 Ft	-43.928
		M	2.00 Fb	1679.375
16	2	E	2.00 Ft	-98.351
		M	2.00 Fb	1846.330
17	2	E	2.00 Ft	-152.775
		M	2.00 Fb	2013.285
18	1	E	2.00 Ft	-179.986
		M	2.00 Fb	2096.762

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 1, Beam : 3, SERVICE 1

NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 15.32%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.46	3.43	8.98	18.58	28.18	37.78	47.38
Prestress								
Precast-top	-64.6	-225.8	-240.1	-280.4	-350.0	-419.6	-489.2	-489.2
Bottom	579.9	1942.6	1955.7	1992.6	2056.4	2120.2	2184.0	2184.0
Self wt.								
Precast-top	0.0	49.6	114.0	280.5	515.6	683.5	784.3	817.9
Bottom	-0.0	-45.4	-104.5	-257.1	-472.5	-626.4	-718.7	-749.5
Prec. DL+ADL								
Precast-top	0.0	7.7	17.7	43.4	79.8	105.8	121.4	126.6
Bottom	-0.0	-7.0	-16.2	-39.8	-73.2	-97.0	-111.3	-116.0
Diaphragm								
Precast-top	-0.0	1.0	2.4	6.2	12.8	17.0	19.2	21.2
Bottom	-0.0	-0.9	-2.2	-5.7	-11.7	-15.6	-17.6	-19.4
Deck + Haunch								
Precast-top	-0.0	52.4	120.6	296.7	545.3	722.9	829.5	865.0
Bottom	-0.0	-48.1	-110.5	-271.9	-499.7	-662.5	-760.1	-792.7
Comp. DL+ADL								
Topping-top	-208.5	-194.6	-176.3	-128.1	-56.1	1.5	44.6	73.3
Precast-top	-159.9	-149.2	-135.2	-98.3	-43.0	1.1	34.2	56.2
Bottom	476.8	444.9	403.1	292.9	128.2	-3.4	-102.0	-167.6
LL+I(-)								
Topping-top	-283.3	-261.8	-234.8	-171.7	-119.9	-104.9	-89.9	-74.9
Precast-top	-217.3	-200.8	-180.1	-131.7	-92.0	-80.5	-69.0	-57.5
Bottom	648.0	598.7	536.9	392.5	274.1	239.9	205.6	171.3
Final 1 (P/S + DL + LL)								
Topping-top	-491.8	-456.3	-411.1	-299.7	-176.0	-103.4	-45.3	-1.6
Precast-top	-441.8	-465.2	-300.8	116.6	668.6	1030.3	1230.5	1340.3
Bottom	1704.6	2884.8	2662.4	2103.6	1401.6	955.2	679.8	510.0
Final 2 (P/S + DL)								
Topping-top	-208.5	-194.6	-176.3	-128.1	-56.1	1.5	44.6	73.3
Precast-top	-224.5	-264.4	-120.7	248.2	760.6	1110.8	1299.4	1397.7
Bottom	1056.6	2286.1	2125.5	1711.1	1127.5	715.3	474.2	338.7
Final 3 ((50% P/S + 50% DL + LL)								
Topping-top	-387.6	-359.1	-322.9	-235.7	-147.9	-104.1	-67.6	-38.3
Precast-top	-329.6	-333.0	-240.4	-7.6	288.3	474.9	580.8	641.4
Bottom	1176.3	1741.7	1599.7	1248.1	837.9	597.5	442.7	340.7

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REINFORCED DESIGN - Span : 1, Beam : 3, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c, (psi) = 6500.00 (Art. 9.7.2.3.2); b, (in) = 26.00; bw, (in) = 8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
2	9.60	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
3	19.20	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
4	28.80	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
5	38.40	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
6	48.00	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
7	57.60	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
8	67.20	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
9	76.80	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
10	86.40	-1619.7	8.00	78.37	2.00	-3060.5	0.00	6.21	0.00*	-0.0
11	96.00	-4638.2	8.00	78.37	2.00	-3060.5	0.00	13.65	0.00*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

DESIGN SUMMARY

Span: 1, Beam: 3, Interior beam
Beam type: I-Girder , AASHTO-4-Mod-72"
Precast Length, ft: 96.00 Release Length, ft: 96.00
Strand Pattern: Straight/Draped Depress Point: 0.40 L
Strand: 1/2-270K-LL
Strand Type: Low Relaxation
Strand Es, ksi: 28500.0 No. of strands: 33
No. of strands, Draped: 3 No. of strands, Straight: 30
Concrete Strength, f'ci: 5000.0 psi f'c: 6500.0 psi f'ct 4500.0 psi
Initial losses: 5.75 % Final losses: 15.32 %

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.0	-180.1	
Precast Top w/ reinf.	-530.3		
Precast Bot (compression)	3000.0	2096.8	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	8151.6	7314.1	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

	Final 1		Final 2		Final 3	
Specification	Allow.	Comp.	Allow.	Comp.	Allow.	Comp.
Positive Moment Envelope Stresses (psi)						
Service 1						
Top. Top	2700.0/-503.1	416.6 / 14.4	1800.0	87.5	1800.0	372.8
Pre. Top	3900.0/-483.7	1643.9 / -79.2	2600.0	1397.7	2600.0	945.1
Pre. Bot	3900.0/-483.7	1734.0 /-395.3	2600.0	1816.8	2600.0	825.6
Negative Moment Envelope Stresses (psi)						
Service 1						
Top. Top	2700.0/-503.1	-1.6 /-491.8	1800.0	73.3	1800.0	-38.3
Pre. Top	3900.0/-483.7	1340.3 /-465.2	2600.0	1397.7	2600.0	641.4
Pre. Bot	3900.0/-483.7	2884.8 / 510.0	2600.0	2286.1	2600.0	1741.7

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed. - Table 4.6.2)
0.5 x L = 47.38 ft

	Release	Mult	Erection	Mult	Final
Prestress	1.529	1.80	2.753	2.20	3.365
Self Wt.	-0.721	1.85	-1.333	2.40	-1.730
Deck + Haunch			-0.634	2.30	-1.459
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.093	3.00	-0.279
Diaphragm			-0.015	3.00	-0.045
Comp. DL+ADL			-0.062	3.00	-0.185
Supp. DL+ADL			0.000	3.00	0.000
Live Load					-0.311
Total	0.809		0.616		-0.643

Positive values indicate upward deflection.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

LIVE LOAD LIBRARY: Default.cs4

1 ID : H/HS25 Lane
Description: H25/HS25 as in AASHTO-STANDARD
Type : Lane Load
Lane Load : Intensity = 0.80 klf, Width = 10.00 ft
Conc. Loads: Moment = 22.50 k, Shear = 32.50 k

2 ID : HS25 Truck
Description: HS25 Truck as in AASHTO-STANDARD
Type : Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID : Military Truck
Description: Military Truck as in AASHTO-STANDARD
Type : Truck Load

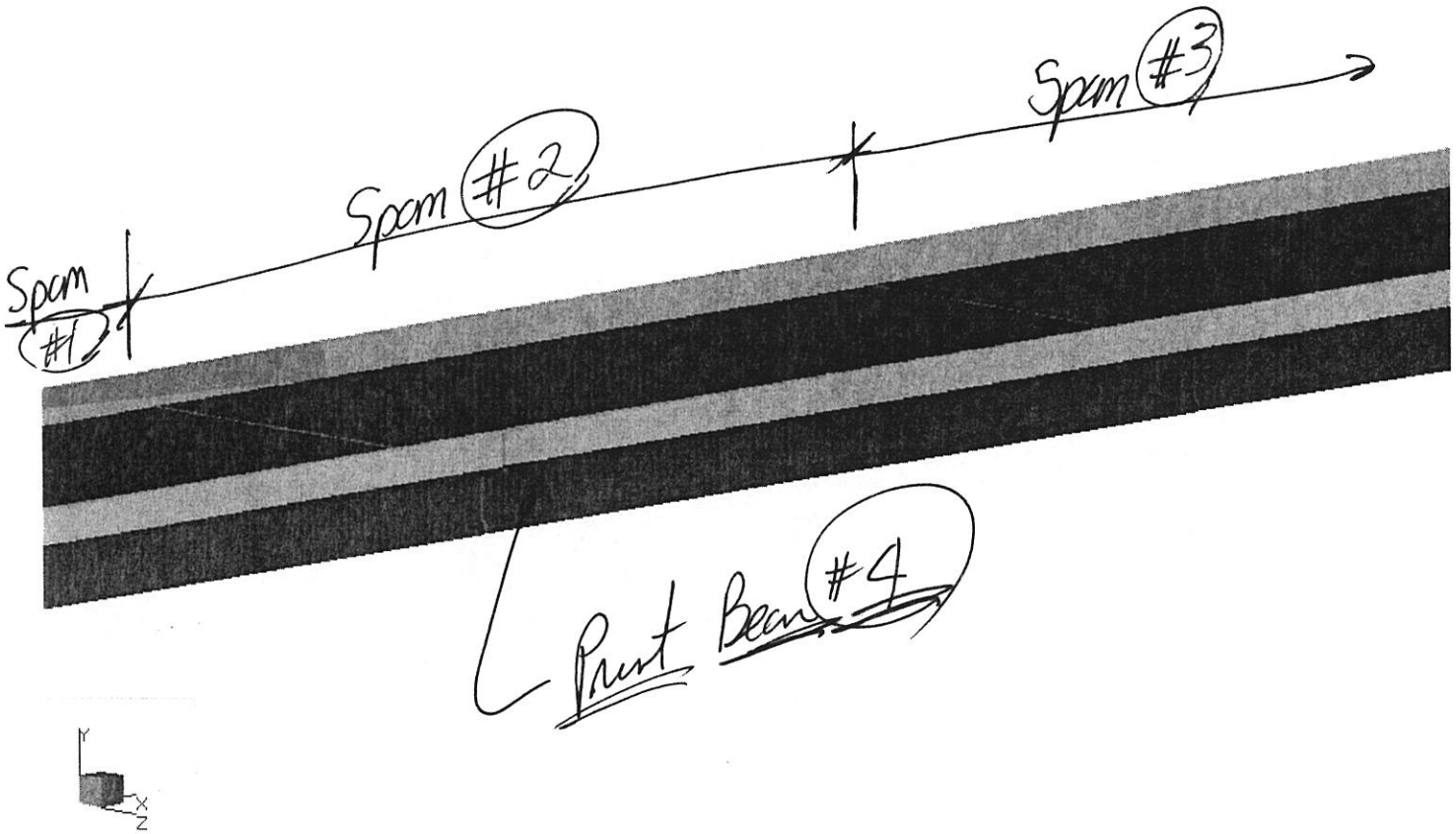
Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

FULL IMAGE:



CONSPAN® Rating - C:\leap\SCI-823-SwaugerValley-Minford Road.csl * - [Main]

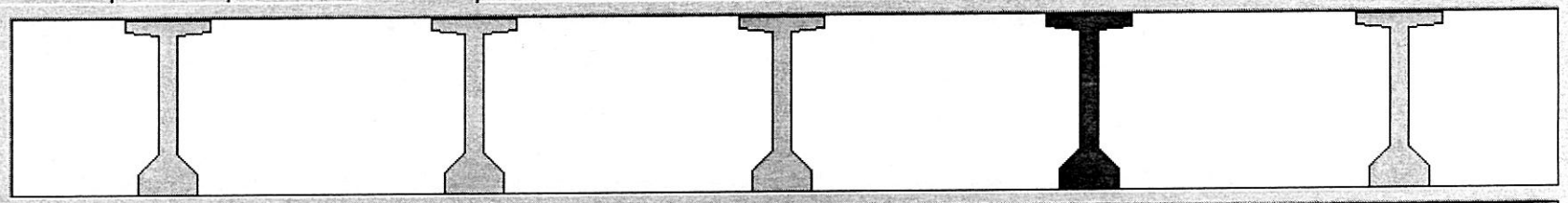
File Show Libraries LEAP Bridge Help

New Open Save Save As Print Image Model Results Diagram DF Contours Beam Section Tendon Rebar Live Load Help LEAP Site About E-mail User Manual

Project Geometry Materials Loads Analysis Beam

Span: 02

Beam: 4



Data Modification:

Edit...

Design:

Strand Pattern...

Rebar Pattern...

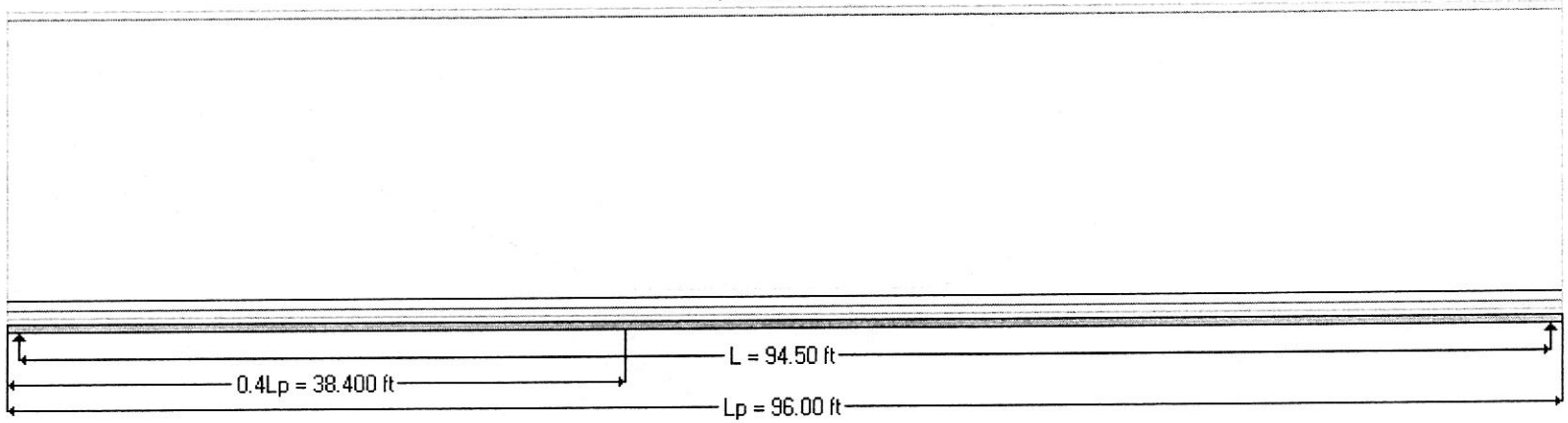
Results...

Rating

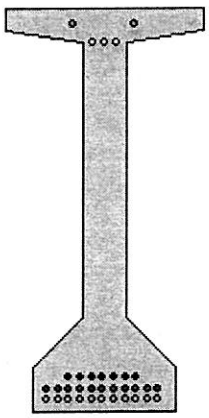
Parameters...

Rating Results...

Span: 2, Beam: 4

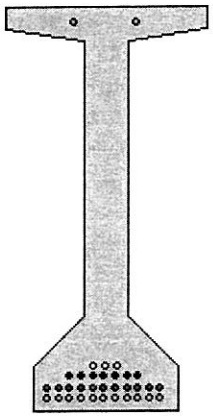


END



Span #2
Beam #4

MID-SPAN



IBS:Not Connected | IBS:Manual | Code: LFD | NUM

Start | CONSPAN® Rating - C:... | 3:01 PM

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

PROJECT DATA

Project : SCI 823-SR 823 over Swauger Valley/Minford Rd
Designer : def
Date : Jan/15/2008
User job number: 5355.00
State : OH State Job #: PID 19415
Comments : Four Span Type 4-72"-Mod. AASHTO Bm Bridge
(95.88', 96.75, 96.75', 95.88' Spans)
Design Mode : AASHTO Standard (LFD)-US Units [17th Edition, 2003]
Design as: : Multi-Span(Continuous)
Flared Girder: : No
File Name : C:\leap\SCI-823-SwaugerValley-Minford Road.csl

GEOMETRY DATA

BRIDGE LAYOUT

Overall width	, ft	=	48.460
Left curb	, ft	=	1.500
Right curb	, ft	=	1.500
curb-to-curb width	, ft	=	45.460
Number of spans		=	4
Number of lanes		=	3
Lane width	, ft	=	12.000
Topping thickness	, in	=	7.750
Suppl. thickness	, in	=	0.000
Haunch thickness	, in	=	2.500
Haunch width	, in	=	20.000

SPAN DATA

Span	Pier-to-pier ft	Precast ft	Brg-to-brg ft	Pier CL ft	Release ft	Bridge c/s M.I. in4
1	96.000	96.000	94.750	0.000	96.000	7234270.00
2	96.750	96.000	94.500	0.375	96.000	7234270.00
3	96.750	96.000	94.500	0.375	96.000	7234270.00
4	96.000	96.000	94.750	0.000	96.000	7234270.00

BEAM DATA

Span: 1

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 2

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 3

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

Span: 4

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-Trib ft
1	AASHTO-4-Mod-72"	3.563	956.0	616018.0	72.00	34.43	36.00	8.730
2	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
3	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
4	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	10.334
5	AASHTO-4-Mod-72"	10.334	956.0	616018.0	72.00	34.43	36.00	8.728

MATERIAL DATA

CONCRETE PROPERTIES

		Precast	C.I.P.
f'c ,psi	=	6500.000	4500.000
Wc ,pcf	=	150.000	150.000
Ec ,ksi	=	4887.730	4066.840
f'ci,psi	=	5000.000	
Eci ,ksi	=	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (38.40 ft from member end)
Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.153 in2
Use transformed strand and rebar: No

REINFORCING STEEL: Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

LOADS DATA:

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft)
(Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc	Description
1	1	DL	Line	0.109	-	Sacrificial Wearing Surface
1	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	2	DL	Line	0.129	-	Sacrificial Wearing Surface
1	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	3	DL	Line	0.129	-	Sacrificial Wearing Surface
1	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	4	DL	Line	0.129	-	Sacrificial Wearing Surface
1	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
1	5	DL	Line	0.109	-	Sacrificial Wearing Surface
1	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	1	DL	Line	0.109	-	Sacrificial Wearing Surface
2	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	2	DL	Line	0.129	-	Sacrificial Wearing Surface
2	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	3	DL	Line	0.129	-	Sacrificial Wearing Surface
2	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	4	DL	Line	0.129	-	Sacrificial Wearing Surface
2	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
2	5	DL	Line	0.109	-	Sacrificial Wearing Surface
2	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	1	DL	Line	0.109	-	Sacrificial Wearing Surface
3	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	2	DL	Line	0.129	-	Sacrificial Wearing Surface
3	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	3	DL	Line	0.129	-	Sacrificial Wearing Surface
3	3	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	4	DL	Line	0.129	-	Sacrificial Wearing Surface
3	4	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
3	5	DL	Line	0.109	-	Sacrificial Wearing Surface
3	5	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	1	DL	Line	0.109	-	Sacrificial Wearing Surface
4	1	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	2	DL	Line	0.129	-	Sacrificial Wearing Surface
4	2	DL	Line	0.025	-	Stay-in-Place Deck Forms
4	3	DL	Line	0.129	-	Sacrificial Wearing Surface
4	3	DL	Line	0.025	-	Stay-in-Place Deck Forms

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

4	3	DL Line	0.129	-	Sacrificial Wearing Surface
4	3	DL Line	0.025	-	Stay-in-Place Deck Forms
4	4	DL Line	0.129	-	Sacrificial Wearing Surface
4	4	DL Line	0.025	-	Stay-in-Place Deck Forms
4	4	DL Line	0.129	-	Sacrificial Wearing Surface
4	4	DL Line	0.025	-	Stay-in-Place Deck Forms
4	5	DL Line	0.109	-	Sacrificial Wearing Surface
4	5	DL Line	0.025	-	Stay-in-Place Deck Forms
4	5	DL Line	0.109	-	Sacrificial Wearing Surface
4	5	DL Line	0.025	-	Stay-in-Place Deck Forms

DIAPHRAGM LOADS (kips, ft)

Span	Beam	Mag.	Loc
1	1	0.310	24.000
1	1	0.310	48.000
1	1	0.310	72.000
1	2	0.620	24.000
1	2	0.620	48.000
1	2	0.620	72.000
1	3	0.620	24.000
1	3	0.620	48.000
1	3	0.620	72.000
1	4	0.620	24.000
1	4	0.620	48.000
1	4	0.620	72.000
1	5	0.310	24.000
1	5	0.310	48.000
1	5	0.310	72.000
2	1	0.310	24.000
2	1	0.310	48.000
2	1	0.310	72.000
2	2	0.620	24.000
2	2	0.620	48.000
2	2	0.620	72.000
2	3	0.620	24.000
2	3	0.620	48.000
2	3	0.620	72.000
2	4	0.620	24.000
2	4	0.620	48.000
2	4	0.620	72.000
2	5	0.310	24.000
2	5	0.310	48.000
2	5	0.310	72.000
3	1	0.310	24.000
3	1	0.310	48.000
3	1	0.310	72.000
3	2	0.620	24.000
3	2	0.620	48.000
3	2	0.620	72.000
3	3	0.620	24.000
3	3	0.620	48.000
3	3	0.620	72.000
3	4	0.620	24.000
3	4	0.620	48.000
3	4	0.620	72.000
3	5	0.310	24.000
3	5	0.310	48.000
3	5	0.310	72.000
4	1	0.310	24.000
4	1	0.310	48.000
4	1	0.310	72.000
4	2	0.620	24.000
4	2	0.620	48.000
4	2	0.620	72.000
4	3	0.620	24.000
4	3	0.620	48.000
4	3	0.620	72.000
4	4	0.620	24.000

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

4	4	0.620	48.000
4	4	0.620	72.000
4	5	0.310	24.000
4	5	0.310	48.000
4	5	0.310	72.000

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft)
(Line: klf)
(Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc	Description
1	DL	Line	0.525	-	Left Curb Weight
1	DL	Line	0.720	-	Right Curb Weight
1	ADL	Area	0.060	45.46	Future Wearing Surface
2	DL	Line	0.525	-	Left Curb Weight
2	DL	Line	0.720	-	Right Curb Weight
2	DL	Line	0.525	-	Left Curb Weight
2	DL	Line	0.720	-	Right Curb Weight
2	ADL	Area	0.060	45.46	Future Wearing Surface
2	ADL	Area	0.060	45.46	Future Wearing Surface
3	DL	Line	0.525	-	Left Curb Weight
3	DL	Line	0.720	-	Right Curb Weight
3	DL	Line	0.525	-	Left Curb Weight
3	DL	Line	0.720	-	Right Curb Weight
3	ADL	Area	0.060	45.46	Future Wearing Surface
3	ADL	Area	0.060	45.46	Future Wearing Surface
4	DL	Line	0.525	-	Left Curb Weight
4	DL	Line	0.720	-	Right Curb Weight
4	DL	Line	0.525	-	Left Curb Weight
4	DL	Line	0.720	-	Right Curb Weight
4	ADL	Area	0.060	45.46	Future Wearing Surface
4	ADL	Area	0.060	45.46	Future Wearing Surface

LOADS ON SUPPLEMENTAL

UNITS: (Point: kips, Location: ft)
(Line: klf)
(Area: ksf, Width: ft)

LIVE LOADS

ID: H/HS25 Lane (Type: Lane Load)
ID: HS25 Truck (Type: Truck Load)
ID: Military Truck (Type: Truck Load)

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ANALYSIS DATA:

ANALYSIS PARAMETERS DATA

Span#	Beam#	Moment impact	Shear impact
1	1	1.228	Calculated (AASHTO 3.8.2.2)
1	2	1.228	Calculated (AASHTO 3.8.2.2)
1	3	1.228	Calculated (AASHTO 3.8.2.2)
1	4	1.228	Calculated (AASHTO 3.8.2.2)
1	5	1.228	Calculated (AASHTO 3.8.2.2)
2	1	1.228	Calculated (AASHTO 3.8.2.2)
2	2	1.228	Calculated (AASHTO 3.8.2.2)
2	3	1.228	Calculated (AASHTO 3.8.2.2)
2	4	1.228	Calculated (AASHTO 3.8.2.2)
2	5	1.228	Calculated (AASHTO 3.8.2.2)
3	1	1.228	Calculated (AASHTO 3.8.2.2)
3	2	1.228	Calculated (AASHTO 3.8.2.2)
3	3	1.228	Calculated (AASHTO 3.8.2.2)
3	4	1.228	Calculated (AASHTO 3.8.2.2)
3	5	1.228	Calculated (AASHTO 3.8.2.2)
4	1	1.228	Calculated (AASHTO 3.8.2.2)
4	2	1.228	Calculated (AASHTO 3.8.2.2)
4	3	1.228	Calculated (AASHTO 3.8.2.2)
4	4	1.228	Calculated (AASHTO 3.8.2.2)
4	5	1.228	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

Service	Factored
Gamma = 1.00	Gamma = 1.30
Beta-D = 1.00	Beta-D = 1.00
Beta-L = 1.00 (Group 1)	Beta-L = 1.67 (Group 1)

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

PROJECT PARAMETERS DATA:

MULTIPLIERS:

Trans len mult:	Bonded	= 1.00
	Debonded	= 1.00
Dev len mult:	Bonded	= 1.60
	Debonded	= 2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
Prec.DL+ADL:		3.00
Comp.DL+ADL:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

		PRECAST	DECK
Strength	=	6500.00 psi	4500.00 psi
Max Comp,	Top =	3900.00 psi	2700.00 psi
Pos Mom,	Bot =	3900.00 psi	
Neg Mom,	Bot =	3900.00 psi	
Max Tens,	Top =	-483.74 psi	-503.12 psi
Max Tens,	Bot =	-483.74 psi	
Crk Tens,	Bot =	-604.67 psi	
Elasticity	=	4887.7 ksi	4066.8 ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

		PRECAST	DECK
Max Comp,	Top =	2600.00 psi	1800.00 psi
Pos Mom,	Bot =	2600.00 psi	
Neg Mom,	Bot =	2600.00 psi	

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

		PRECAST	DECK
Max Comp,	Top =	2600.00 psi	1800.00 psi
Pos Mom,	Bot =	2600.00 psi	
Neg Mom,	Bot =	2600.00 psi	

AT RELEASE (Art. 9.15.2.1):

		PRECAST
Strength	=	5000.00 psi
Max Comp,	Top =	3000.00 psi
Max Comp,	Bot =	3000.00 psi
Max Tens,	Top =	-200.00 psi
w/reinf	=	-530.33 psi
Max Tens,	Bot =	-0.00 psi
Elasticity	=	4286.8 ksi

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced:	0.90
Flexure Prestressed:	1.00
Shear:	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 2, Beam: 4

PRECAST DATA:

Section Id: AASHTO-4-Mod-72"
Type : I-Girder
Flng width: Top = 36.000 in Bot = 26.000 in
thick: Top = 4.000 in Bot = 8.000 in
Stems : No = 1
Top = 8.000 in
Bot = 8.000 in
Shear width = 8.000 in
Wide top Flange = No

GENERAL BRIDGE DATA:

Bridge Width = 48.46 ft
Curb-to-curb = 45.46 ft
Beam Spac. Lt./Rt. = 10.33/ 10.33 ft
Lane width = 12.00 ft
Number of lanes = 3
Interior/Exterior = Interior

TOPPING DATA:

Deck Thickness = 7.750 in
Suppl. Thickness = 0.000 in
Haunch:
Thickness = 2.500 in
Width = 20.000 in
Effective width = 113.000 in (Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:

UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.129	-
Line	0.025	-
Line	0.129	-
Line	0.025	-

Diaphragm loads: kips, ft

Mag.	Loc.
0.62	24.00
0.62	48.00
0.62	72.00

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length = 96.000 ft
Release length = 96.000 ft
Design length = 94.500 ft

Kern points:

Upper = 53.15 in
Lower = 17.28 in

DISTRIBUTION FACTORS (Art. 3.23):

Live Negative Moment (Group 1) : 0.939 (Calculated)
Live Positive Moment (Group 1) : 0.939 (Calculated)
Live Shear (Group 1) : 0.939 (Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian : 0.200 (Calculated)

Comp. DL : 0.200 (Calculated)
Comp. ADL : 0.200 (Calculated)
Suppl. DL : 0.200 (Calculated)
Suppl. ADL : 0.200 (Calculated)
Suppl : 0.200 (Calculated)

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	: 0.90
Flexure Prestressed	: 1.00
Shear	: 0.90

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 2, Beam: 4

SECTION PROPERTIES:

		PRECAST	COMPOSITE
Area	=	956.0 in2	1726.3 in2#
Total Height	=	72.00 in	82.25 in
Mom. of Inertia (Ixx)	=	616018 in4	1434156 in4#
Ht. of c.g.	=	34.43 in	53.91 in#
Density	=	150.00 pcf	150.00 pcf
Self-weight	=	995.8 plf	2049.0 plf
Mom. of Inertia (Iyy)	=	36570.0 in4	
Poisson's Ratio	=	0.2	

(#) Of Total Section using Ect/Ec = 0.8321

Use transformed strand and rebar: No

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 2, Beam: 4

STRESS LIMITS (Art. 9.15.2):

	PRECAST	DECK
STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):		
Strength =	6500.00 psi	4500.00 psi
Max Comp, Top =	3900.00 psi	2700.00 psi
Pos Mom, Bot =	3900.00 psi	
Neg Mom, Bot =	3900.00 psi	
Max Tens, Top =	-483.74 psi	-503.12 psi
Max Tens, Bot =	-483.74 psi	
Crk Tens, Bot =	-604.67 psi	
Elasticity =	4887.7 ksi	4066.8 ksi
STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):		
Max Comp, Top =	2600.00 psi	1800.00 psi
Pos Mom, Bot =	2600.00 psi	
Neg Mom, Bot =	2600.00 psi	
STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):		
Max Comp, Top =	2600.00 psi	1800.00 psi
Pos Mom, Bot =	2600.00 psi	
Neg Mom, Bot =	2600.00 psi	
AT RELEASE (Art. 9.15.2.1):		
Strength =	5000.00 psi	
Max Comp, Top =	3000.00 psi	
Max Comp, Bot =	3000.00 psi	
Max Tens, Top =	-200.00 psi	
w/reinf =	-530.33 psi	
Max Tens, Bot =	-0.00 psi	
Elasticity =	4286.8 ksi	

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span: 2, Beam: 4

PRESTRESSED STEEL: 34 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (38.40 ft from member end)

END PATTERN (Ycg = 13.07 in):
11 @ 2.000 in 11 @ 4.000 in 7 @ 6.000 in 3 @ 66.000 in
2 @ 69.250 in

MID PATTERN (Ycg = 7.96 in):
(A) Draped:
3 @ 8.000 in
(B) Straight:
11 @ 2.000 in 11 @ 4.000 in 7 @ 6.000 in 2 @ 69.250 in

Strand Diameter	=	0.500 in	Ult. Strength(f's)	=	270.0 ksi
Strand Area	=	0.153 in2	Initial Prestress	=	0.75 f's = 202.5 ksi
Total Strand Area	=	5.202 in2	Initial Pull	=	1053.4 kips
Trans. Len,bonded	=	2.083 ft	Dev. Len, bonded	=	10.139 ft
Trans. Len,debonded	=	2.083 ft	Dev. Len, debonded	=	12.673 ft
Holddown Force	=	11.608 kips	Beam Shrtng (PL/AE)	=	0.278 in

REINFORCING STEEL: Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

Midspan: Str. area = 5.2020 in2 Ycg = 7.96 in
P_init = 1053.4 kips Ecc = 26.47 in
Hours to release = 18.00 Rel. Humid.(RH) = 75.0 % Es = 28500.0 ksi Eci = 4287 ksi

AASHTO LOSSES:	Release		Final (Art. 9.16.2)
Steel relaxation*	1600.47 psi	CRs (Eq 9-10A)	3100.08 psi
Elastic Shortening	10450.29 psi	ES (Eq 9-6)	10450.29 psi(Fcir=1571.88 psi)
Concrete shrinkage	0.00 psi	SH (Eq 9-4)	5750.00 psi
Concrete creep	0.00 psi	CRc (Eq 9-9)	11347.84 psi(Fcds=-1073.54 psi)
Total	12050.77 psi (5.95 %)		30648.21 psi (15.13 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 4, SERVICE 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.33	3.43	8.85	18.45	28.05	37.65	47.25
Self wt.	: M	0.0	61.9	155.4	377.4	698.6	928.1	1065.7	1111.6
	V	47.1	45.7	43.6	38.2	28.7	19.1	9.6	0.0
Prec.	: M	0.0	19.2	48.1	116.9	216.3	287.4	330.0	344.2
DL+ADL	V	14.6	14.2	13.5	11.8	8.9	5.9	3.0	0.0
Deck	: M	0.0	65.4	164.4	399.2	738.9	981.5	1127.1	1175.7
+ Haunch	V	49.8	48.4	46.2	40.4	30.3	20.2	10.1	0.0
Diaphragm	: M	0.0	1.2	3.1	8.1	16.9	23.2	26.0	28.8
	V	0.9	0.9	0.9	0.9	0.9	0.3	0.3	0.3
Comp.	: M	-998.7	-897.5	-747.7	-411.6	89.7	444.5	652.8	714.7
DL+ADL	V	73.9	71.8	68.5	59.8	44.6	29.3	14.1	1.2
LL + I	: M+	190.6	179.5	184.0	265.2	742.2	1101.3	1316.7	1369.2
	V	13.9	17.8	9.5	40.1	29.6	11.9	0.2	37.0
LL + I	: M-	-1401.7	-1308.0	-1172.4	-886.8	-728.6	-605.4	-574.6	-555.3
	V	69.5	65.7	59.6	43.7	13.0	13.2	2.1	2.1
LL + I	: Vmx	93.1	92.0	90.2	85.5	75.3	64.1	52.4	43.1
	M	-191.5	-125.1	-21.0	247.8	720.6	1061.7	1245.0	1310.9
Total	: M+	0.0	0.0	0.0	755.1	2502.6	3765.9	4518.4	4744.3
	V	0.0	0.0	0.0	191.4	143.0	86.8	37.2	38.5
Total	: M-	-2400.3	-2057.8	-1549.1	-396.9	0.0	0.0	0.0	0.0
	V	255.7	246.6	232.2	195.0	0.0	0.0	0.0	0.0
Total	: Vmx	279.3	273.0	262.9	236.8	188.7	139.0	89.4	44.6
	M	-196.2	13.7	338.3	737.8	2480.9	3726.3	4446.7	4686.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	56.85	66.45	76.05	85.65	91.07	93.17	94.50
Self wt.	: M	1065.7	928.1	698.6	377.4	155.4	61.9	0.0
	V	9.6	19.1	28.7	38.2	43.6	45.7	47.1
Prec.	: M	330.0	287.4	216.3	116.9	48.1	19.2	0.0
DL+ADL	V	3.0	5.9	8.9	11.8	13.5	14.2	14.6
Deck	: M	1127.1	981.5	738.9	399.2	164.4	65.4	0.0
+ Haunch	V	10.1	20.2	30.3	40.4	46.2	48.4	49.8
Diaphragm	: M	26.2	23.1	17.4	8.4	3.2	1.3	0.0
	V	0.3	0.3	0.9	0.9	0.9	0.9	0.9
Comp.	: M	630.2	399.2	21.8	-502.1	-859.9	-1012.3	-1113.6
DL+ADL	V	16.4	31.7	46.9	62.2	70.8	74.1	76.3
LL + I	: M+	1302.9	1074.2	705.7	392.8	355.0	356.9	362.8
	V	1.1	13.1	30.6	6.9	10.1	11.3	12.1
LL + I	: M-	-536.0	-516.7	-613.9	-775.7	-1052.5	-1183.6	-1274.1
	V	2.1	2.1	10.8	40.9	56.7	62.8	66.7
LL + I	: Vmx	53.7	65.4	76.4	86.3	90.8	92.6	93.6
	M	1233.1	1034.9	683.6	209.7	-54.3	-155.6	-219.8
Total	: M+	4482.1	3693.5	2398.8	792.5	0.0	0.0	0.0
	V	40.5	90.3	146.4	160.6	0.0	0.0	0.0
Total	: M-	0.0	0.0	0.0	-376.0	-1541.3	-2048.3	-2387.7
	V	0.0	0.0	0.0	194.5	231.8	246.2	255.2
Total	: Vmx	93.1	142.6	192.1	240.0	265.9	275.9	282.2
	M	4412.3	3654.1	2376.7	609.4	313.9	-10.0	-221.0

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	47.1	47.1
Deck+Haunch	49.8	49.8
Diaphragm	0.9	0.9
Prec. DL+ADL	14.6	14.6
Comp. DL+ADL	625.8	756.9
Supplemental	0.0	0.0
Supp. DL+ADL	-0.0	-0.0
Live (Max)	126.7	120.9
Live (Min)	-11.1	-21.6
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 4, FACTORED 1

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.33	3.43	8.85	18.45	28.05	37.65	47.25
Self wt.	: M	0.0	80.4	202.0	490.6	908.2	1206.5	1385.5	1445.1
	V	61.2	59.4	56.7	49.7	37.3	24.9	12.4	0.0
Prec.	: M	0.0	24.9	62.6	151.9	281.2	373.6	429.0	447.5
DL+ADL	V	18.9	18.4	17.6	15.4	11.5	7.7	3.8	0.0
Deck	: M	0.0	85.0	213.7	518.9	960.5	1276.0	1465.3	1528.4
+ Haunch	V	64.7	62.9	60.0	52.6	39.4	26.3	13.1	0.0
Diaphragm	: M	0.0	1.6	4.1	10.5	22.0	30.1	33.8	37.5
	V	1.2	1.2	1.2	1.2	1.2	0.4	0.4	0.4
Comp.	: M	-1298.3	-1166.7	-972.0	-535.1	116.5	577.8	848.7	929.2
DL+ADL	V	96.1	93.3	89.0	77.8	58.0	38.1	18.3	1.5
LL + I	: M+	413.9	389.6	399.4	575.7	1611.3	2390.8	2858.6	2972.6
	V	30.2	38.7	20.5	87.0	64.2	25.8	0.5	80.3
LL + I	: M-	-3043.0	-2839.6	-2545.3	-1925.2	-1581.7	-1314.4	-1247.5	-1205.5
	V	150.9	142.6	129.3	94.9	28.3	28.6	4.5	4.6
LL + I	: Vmx	202.2	199.8	195.8	185.6	163.4	139.2	113.8	93.6
	M	-415.7	-271.6	-45.5	538.0	1564.3	2305.0	2702.9	2846.0
Total	: M+	0.0	0.0	0.0	1212.6	3899.8	5854.8	7020.8	7360.2
	V	0.0	0.0	0.0	283.7	211.6	123.2	48.6	82.2
Total	: M-	-4341.3	-3814.4	-3035.0	-1288.3	0.0	0.0	0.0	0.0
	V	392.9	377.8	353.8	291.6	0.0	0.0	0.0	0.0
Total	: Vmx	444.2	435.0	420.3	382.3	310.8	236.5	161.9	95.6
	M	-421.9	-91.1	421.5	1174.9	3852.8	5769.0	6865.1	7233.5

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	56.85	66.45	76.05	85.65	91.07	93.17	94.50
Self wt.	: M	1385.5	1206.5	908.2	490.6	202.0	80.4	0.0
	V	12.4	24.9	37.3	49.7	56.7	59.4	61.2
Prec.	: M	429.0	373.6	281.2	151.9	62.6	24.9	0.0
DL+ADL	V	3.8	7.7	11.5	15.4	17.6	18.4	18.9
Deck	: M	1465.3	1276.0	960.5	518.9	213.7	85.0	0.0
+ Haunch	V	13.1	26.3	39.4	52.6	60.0	62.9	64.7
Diaphragm	: M	34.0	30.0	22.7	10.9	4.2	1.6	0.0
	V	0.4	0.4	1.2	1.2	1.2	1.2	1.2
Comp.	: M	819.3	519.0	28.3	-652.7	-1117.8	-1316.0	-1447.7
DL+ADL	V	21.4	41.2	61.0	80.9	92.1	96.4	99.1
LL + I	: M+	2828.5	2332.1	1532.0	852.8	770.8	774.8	787.7
	V	2.3	28.4	66.5	15.0	21.9	24.5	26.2
LL + I	: M-	-1163.6	-1121.7	-1332.8	-1684.1	-2285.1	-2569.6	-2766.1
	V	4.5	4.5	23.5	88.7	123.1	136.4	144.7
LL + I	: Vmx	116.6	141.9	165.8	187.4	197.1	201.0	203.2
	M	2677.0	2246.7	1484.1	455.2	-118.0	-337.7	-477.2
Total	: M+	6961.5	5737.2	3733.0	1372.4	135.4	0.0	0.0
	V	53.5	128.8	217.0	214.8	249.5	0.0	0.0
Total	: M-	0.0	0.0	0.0	-1164.5	-2920.4	-3693.7	-4213.7
	V	0.0	0.0	0.0	288.5	350.7	374.7	389.9
Total	: Vmx	167.8	242.4	316.3	387.2	424.7	439.3	448.4
	M	6810.0	5651.7	3685.1	974.9	360.8	-148.5	-478.7

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	61.2	61.2
Deck+Haunch	64.7	64.7
Diaphragm	1.2	1.2
Prec. DL+ADL	18.9	18.9
Comp. DL+ADL	813.5	984.0
Supplemental	0.0	0.0
Supp. DL+ADL	-0.0	-0.0
Live (Max)	275.1	262.5
Live (Min)	-24.1	-46.8
Pedestrian (Max)	-0.0	-0.0
Pedestrian (Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 2, Beam : 4, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 5.95%)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.60	19.20	28.80	38.40	48.00
Self Wt.						
Precast-top	71.3	302.3	537.3	705.3	806.0	839.6
Bottom	-65.3	-277.0	-492.4	-646.3	-738.6	-769.4
Prestress						
Precast-top	-270.9	-331.4	-408.7	-486.0	-563.3	-563.3
Bottom	2234.2	2289.7	2360.6	2431.4	2502.2	2502.2
Total						
Precast-top	-199.6	-29.1	128.6	219.2	242.7	276.3
Bottom	2168.9	2012.7	1868.1	1785.1	1763.6	1732.8
As_top (in2)	0.000	0.000	0.000	0.000	0.000	0.000

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 2, Beam : 4, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 15.13%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.33	3.43	8.85	18.45	28.05	37.65	47.25
Prestress								
Precast-top	-84.5	-244.4	-259.6	-299.0	-368.8	-438.5	-508.3	-508.3
Bottom	722.6	2016.1	2030.0	2066.1	2130.1	2194.0	2257.9	2257.9
Self wt.								
Precast-top	0.0	45.3	113.7	276.2	511.3	679.2	780.0	813.6
Bottom	-0.0	-41.5	-104.2	-253.1	-468.6	-622.5	-714.8	-745.6
Prec. DL+ADL								
Precast-top	0.0	14.0	35.2	85.5	158.3	210.3	241.5	251.9
Bottom	-0.0	-12.8	-32.3	-78.4	-145.1	-192.7	-221.3	-230.9
Diaphragm								
Precast-top	-0.0	0.9	2.4	6.1	12.4	17.0	19.0	21.1
Bottom	-0.0	-0.8	-2.2	-5.6	-11.3	-15.5	-17.4	-19.3
Deck + Haunch								
Precast-top	0.0	47.9	120.3	292.1	540.8	718.3	824.9	860.4
Bottom	-0.0	-43.9	-110.2	-267.7	-495.6	-658.3	-756.0	-788.5
Comp. DL+ADL								
Topping-top	-219.7	-199.7	-169.6	-99.0	17.7	87.7	128.8	141.0
Precast-top	-168.5	-153.2	-130.1	-76.0	13.6	67.3	98.8	108.2
Bottom	502.4	456.7	387.9	226.5	-40.4	-200.5	-294.5	-322.4
LL+I(+)								
Topping-top	71.6	70.4	70.0	77.5	146.4	217.2	259.7	270.1
Precast-top	54.9	54.0	53.7	59.4	112.3	166.6	199.3	207.2
Bottom	-163.7	-161.0	-160.2	-177.2	-334.8	-496.8	-594.0	-617.7
Final 1 (P/S + DL + LL)								
Topping-top	-148.1	-129.3	-99.6	-21.6	164.1	304.9	388.5	411.1
Precast-top	-198.1	-235.5	-64.4	344.4	979.8	1420.2	1655.1	1754.0
Bottom	1061.3	2212.7	2008.8	1510.6	634.2	7.6	-340.1	-466.5
Final 2 (P/S + DL)								
Topping-top	-219.7	-199.7	-169.6	-99.0	17.7	87.7	128.8	141.0
Precast-top	-253.0	-289.5	-118.1	285.0	867.5	1253.5	1455.9	1546.8
Bottom	1225.0	2373.7	2169.0	1687.8	969.1	504.4	253.9	151.2
Final 3 ((50% P/S + 50% DL + LL)								
Topping-top	-38.3	-29.4	-14.8	28.0	155.3	261.1	324.1	340.6
Precast-top	-71.6	-90.8	-5.3	201.9	546.1	793.4	927.2	980.6
Bottom	448.8	1025.9	924.3	666.7	149.7	-244.6	-467.1	-542.1

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

VERTICAL SHEAR (Art. 9.20) - Span : 2, Beam : 4, FACTORED 1

End Shear Design: Prestressed.

Location (ft)	Vd (kips)	Md (k.ft)	Ml (k.ft)	Vu (kips)	Mu (k.ft)	Vmu (kips)	Mmax (k.ft)	Vi (kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	Vn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.75	186.2	-998.7	-1401.7	420.3	-4341.3	392.9	-3342.6	206.7
0.0	-197.0	-1041.7	77.13	280.5	84.6	280.5	118.2	3.5	199.5
199.5	267.4	398.0	0.69	0.08	0.69	0.00	0.427*	12.0	199.0
Transfer:	2.08	180.9	-749.8	-1308.0	420.3	-3814.4	377.8	-3064.6	196.9
0.0	-177.0	-1142.8	77.13	284.2	84.6	284.2	379.4	9.9	254.2
254.2	212.8	398.0	0.55	0.08	0.55	0.00	0.544*	12.0	199.0
H/2 :	4.18	172.7	-376.7	-1172.4	420.3	-3035.0	353.8	-2658.3	181.1
0.0	-147.5	-1292.6	77.13	290.6	84.6	290.6	456.3	9.9	268.4
268.4	198.5	398.0	0.51	0.08	0.51	0.00	0.575*	24.0	199.0
0.1L :	9.60	151.3	489.9	-886.8	382.3	-1288.3	291.6	-1778.3	140.3
0.0	-81.2	-1628.7	77.13	309.6	84.6	309.6	637.2	9.9	301.9
301.9	122.8	398.0	0.32	0.08	0.32	0.00	0.711*	24.0	199.0
0.2L :	19.20	113.4	1760.4	742.2	310.8	3899.8	211.6	2139.4	98.2
2130.1	-1161.0	3220.4	71.74	289.0	78.7	289.0	893.0	9.9	325.5
289.0	56.4	370.1	0.16	0.08	0.16	0.00	0.837*	24.0	185.1
0.3L :	28.80	74.9	2664.6	1101.3	236.5	5854.8	123.2	3190.2	48.3
2194.0	-1689.5	2190.5	73.01	136.3	80.1	136.3	1065.4	9.9	361.4
136.3	126.5	376.7	0.35	0.08	0.35	0.00	0.519*	24.0	188.4
0.4L :	38.40	37.0	3201.7	1316.7	161.9	7020.8	48.6	3819.1	11.6
2257.9	-2004.0	1635.1	74.29	70.7	81.5	81.5	1154.0	0.0	373.5
81.5	98.4	383.3	0.26	0.08	0.26	0.00	0.453*	24.0	191.7
0.5L :	48.00	1.5	3375.1	1369.2	95.6	7360.2	82.2	3985.1	80.7
2257.9	-2106.7	1407.5	74.29	58.7	81.5	81.5	1196.3	0.0	381.0
81.5	24.7	383.3	0.07	0.08	0.08	0.00	0.767*	24.0	191.7
0.6L :	57.60	39.4	3179.2	1302.9	167.8	6961.5	53.5	3782.3	14.1
2257.9	-1993.9	1657.5	74.29	74.3	81.5	81.5	1154.0	0.0	373.5
81.5	105.0	383.3	0.28	0.08	0.28	0.00	0.437*	24.0	191.7
0.7L :	67.20	77.3	2619.3	1074.2	242.4	5737.2	128.8	3117.9	51.5
2194.0	-1669.1	2235.9	73.01	142.5	80.1	142.5	1065.3	9.9	361.4
142.5	126.8	376.7	0.35	0.08	0.35	0.00	0.529*	24.0	188.4
0.8L :	76.80	115.8	1693.1	705.7	316.3	3733.0	217.0	2040.0	101.2
2130.1	-1130.7	3287.4	71.74	306.7	78.7	306.7	893.2	9.9	325.6
306.7	44.8	370.1	0.12	0.08	0.12	0.00	0.873*	24.0	185.1
0.9L :	86.40	153.7	399.7	392.8	387.2	1372.4	214.8	972.7	61.1
2066.1	-378.3	4813.6	70.46	483.2	77.3	483.2	637.3	9.9	276.7
276.7	153.5	363.5	0.44	0.08	0.44	0.00	0.643*	24.0	181.8
H/2 :	91.82	175.1	-488.7	-1052.5	424.7	-2920.4	350.7	-2431.7	175.6
0.0	-169.6	-1180.5	77.13	290.2	84.6	290.2	456.3	9.9	268.4
268.4	203.5	398.0	0.53	0.08	0.53	0.00	0.569*	12.0	199.0
Transfer:	93.92	183.3	-864.6	-1183.6	424.7	-3693.7	374.7	-2829.0	191.4
0.0	-199.7	-1028.0	77.13	282.7	84.6	282.7	379.4	9.9	254.2
254.2	217.7	398.0	0.56	0.08	0.56	0.00	0.539*	12.0	199.0
Bearing :	95.25	188.6	-1113.6	-1274.1	424.7	-4213.7	389.9	-3100.1	201.3
0.0	-219.7	-926.7	77.13	278.6	84.6	278.6	118.2	3.5	199.5
199.5	272.4	398.0	0.71	0.08	0.71	0.00	0.423*	12.0	199.0

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 2, Beam : 4
Fpi, kips = 1053.40
fs, ksi = 20.00
d/4, in = 14.73
Abrst_rqrd, in2 = 2.11

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 2, Beam : 4
(Beam and Slab effects are INCLUDED in Vu).

Location (ft)	bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :		0.00								
	36.00	60.00	444.2	314.89	78.38	432.00	24.00	0.200	2.549	0.200
Transfer:		1.33								
	36.00	60.00	435.0	308.37	78.38	432.00	24.00	0.200	2.484	0.200
H/2 :		3.43								
	36.00	60.00	420.3	297.89	78.38	432.00	24.00	0.200	2.379	0.200
0.1L :		8.85								
	36.00	60.00	382.3	270.97	78.38	432.00	24.00	0.200	2.110	0.200
0.2L :		18.45								
	36.00	60.00	310.8	240.73	71.74	432.00	24.00	0.200	1.807	0.200
0.3L :		28.05								
	36.00	60.00	236.5	179.98	73.01	432.00	24.00	0.200	1.200	0.200
0.4L :		37.65								
	36.00	60.00	161.9	121.03	74.29	432.00	24.00	0.200	0.610	0.200
0.5L :		47.25								
	36.00	60.00	95.6	71.46	74.29	432.00	24.00	0.200	0.200	0.000
0.6L :		56.85								
	36.00	60.00	167.8	125.49	74.29	432.00	24.00	0.200	0.655	0.200
0.7L :		66.45								
	36.00	60.00	242.4	184.41	73.01	432.00	24.00	0.200	1.244	0.200
0.8L :		76.05								
	36.00	60.00	316.3	244.96	71.74	432.00	24.00	0.200	1.850	0.200
0.9L :		85.65								
	36.00	60.00	387.2	274.43	78.38	432.00	24.00	0.200	2.144	0.200
H/2 :		91.07								
	36.00	60.00	424.7	301.05	78.38	432.00	24.00	0.200	2.410	0.200
Transfer:		93.17								
	36.00	60.00	439.3	311.40	78.38	432.00	24.00	0.200	2.514	0.200
Bearing :		94.50								
	36.00	60.00	448.4	317.85	78.38	432.00	24.00	0.200	2.578	0.200

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

CAMBER AND DEFLECTIONS: SERVICE 1 (Span : 2, Beam : 4; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L = 8.85 ft					
Prestress	0.553	1.80	0.995	2.20	1.216
Self Wt.	-0.226	1.85	-0.419	2.40	-0.543
Deck + Haunch			-0.185	2.30	-0.425
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.054	3.00	-0.162
Diaphragm			-0.004	3.00	-0.013
Comp. DL+ADL			-0.024	3.00	-0.071
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.066
Total	0.326		0.309		-0.066
At 0.2 x L = 18.45 ft					
Prestress	0.994	1.80	1.788	2.20	2.186
Self Wt.	-0.428	1.85	-0.792	2.40	-1.027
Deck + Haunch			-0.365	2.30	-0.840
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.107	3.00	-0.321
Diaphragm			-0.009	3.00	-0.026
Comp. DL+ADL			-0.057	3.00	-0.170
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.134
Total	0.565		0.459		-0.331
At 0.3 x L = 28.05 ft					
Prestress	1.316	1.80	2.368	2.20	2.894
Self Wt.	-0.586	1.85	-1.084	2.40	-1.406
Deck + Haunch			-0.507	2.30	-1.165
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.148	3.00	-0.445
Diaphragm			-0.012	3.00	-0.036
Comp. DL+ADL			-0.088	3.00	-0.263
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.192
Total	0.730		0.529		-0.613
At 0.4 x L = 37.65 ft					
Prestress	1.512	1.80	2.722	2.20	3.327
Self Wt.	-0.686	1.85	-1.270	2.40	-1.647
Deck + Haunch			-0.597	2.30	-1.373
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.175	3.00	-0.524
Diaphragm			-0.014	3.00	-0.042
Comp. DL+ADL			-0.109	3.00	-0.327
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.230
Total	0.826		0.558		-0.816
At 0.5 x L = 47.25 ft					
Prestress	1.578	1.80	2.841	2.20	3.472
Self Wt.	-0.721	1.85	-1.333	2.40	-1.730
Deck + Haunch			-0.628	2.30	-1.444
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.184	3.00	-0.551
Diaphragm			-0.015	3.00	-0.044
Comp. DL+ADL			-0.116	3.00	-0.347
Supp. DL+ADL			0.000	3.00	0.000
Live Load(+I)					-0.243
Total	0.857		0.565		-0.887
At 0.6 x L = 56.85 ft					
Prestress	1.512	1.80	2.722	2.20	3.327
Self Wt.	-0.686	1.85	-1.270	2.40	-1.647
Deck + Haunch			-0.597	2.30	-1.373
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.175	3.00	-0.524

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Diaphragm	:			-0.014	3.00	-0.042
Comp. DL+ADL	:			-0.107	3.00	-0.320
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.228
Total	:	0.826		0.560		-0.808
At 0.7 x L = 66.45 ft						
Prestress	:	1.316	1.80	2.368	2.20	2.894
Self Wt.	:	-0.586	1.85	-1.084	2.40	-1.406
Deck + Haunch	:			-0.507	2.30	-1.165
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.148	3.00	-0.445
Diaphragm	:			-0.012	3.00	-0.036
Comp. DL+ADL	:			-0.084	3.00	-0.252
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.189
Total	:	0.730		0.533		-0.599
At 0.8 x L = 76.05 ft						
Prestress	:	0.994	1.80	1.788	2.20	2.186
Self Wt.	:	-0.428	1.85	-0.792	2.40	-1.027
Deck + Haunch	:			-0.365	2.30	-0.840
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.107	3.00	-0.321
Diaphragm	:			-0.009	3.00	-0.026
Comp. DL+ADL	:			-0.052	3.00	-0.157
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.131
Total	:	0.565		0.464		-0.316
At 0.9 x L = 85.65 ft						
Prestress	:	0.553	1.80	0.995	2.20	1.216
Self Wt.	:	-0.226	1.85	-0.419	2.40	-0.543
Deck + Haunch	:			-0.185	2.30	-0.425
Supplemental	:			0.000	3.00	0.000
Prec. DL+ADL	:			-0.054	3.00	-0.162
Diaphragm	:			-0.004	3.00	-0.013
Comp. DL+ADL	:			-0.021	3.00	-0.062
Supp. DL+ADL	:			0.000	3.00	0.000
Live Load(+I)	:					-0.064
Total	:	0.326		0.312		-0.054

Positive values indicate upward deflection.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

ULTIMATE - Span : 2, Beam : 4, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)
(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer:		1.33								
	1.069	12.80	0.00014	269.3	0.67	1657.7	-585.2	5737.5	0.29	2.83
H/2 :		3.43								
	2.143	12.52	0.00027	268.5	1.33	3311.5	-90.3	5659.7	0.59	36.68
0.1L :		8.85								
	4.926	11.79	0.00062	266.6	3.04	7540.5	1212.6	5481.5	1.38	-
0.2L :		18.45								
	5.202	10.51	0.00064	266.5	3.21	8097.6	3899.8	5248.9	1.54	-
0.3L :		28.05								
	5.202	9.24	0.00063	266.5	3.21	8247.3	5854.8	5123.1	1.61	-
0.4L :		37.65								
	5.202	7.96	0.00062	266.6	3.21	8396.9	7020.8	5104.9	1.64	-
0.5L :		47.25								
	5.202	7.96	0.00062	266.6	3.21	8396.9	7360.2	5050.6	1.66	-
0.6L :		56.85								
	5.202	7.96	0.00062	266.6	3.21	8396.9	6961.5	5104.8	1.64	-
0.7L :		66.45								
	5.202	9.24	0.00063	266.5	3.21	8247.3	5737.2	5123.2	1.61	-
0.8L :		76.05								
	5.202	10.51	0.00064	266.5	3.21	8097.6	3733.0	5248.6	1.54	-
0.9L :		85.65								
	4.926	11.79	0.00062	266.6	3.04	7540.5	1372.4	5481.4	1.38	-
H/2 :		91.07								
	2.143	12.52	0.00027	268.5	1.33	3311.5	135.4	5659.7	0.59	24.46
Transfer:		93.17								
	1.069	12.80	0.00014	269.3	0.67	1657.7	-349.3	5737.5	0.29	4.75

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

DETENSIONING (Span : 2, Beam : 4; Groups 1-19; Units: psi)

Grp	Str		Ys,in	2.08ft
1	2	E	2.00 Ft	17.082
		M	2.00 Fb	101.170
2	2	E	66.00 Ft	179.066
		M	8.00 Fb	69.549
3	1	E	66.00 Ft	260.057
		M	8.00 Fb	53.739
4	2	E	69.25 Ft	444.776
		M	69.25 Fb	1.283
5	2	E	6.00 Ft	404.688
		M	6.00 Fb	154.845
6	2	E	6.00 Ft	364.600
		M	6.00 Fb	308.407
7	2	E	6.00 Ft	324.513
		M	6.00 Fb	461.969
8	1	E	6.00 Ft	304.469
		M	6.00 Fb	538.750
9	2	E	4.00 Ft	257.273
		M	4.00 Fb	698.826
10	2	E	4.00 Ft	210.076
		M	4.00 Fb	858.902
11	2	E	4.00 Ft	162.880
		M	4.00 Fb	1018.978
12	2	E	4.00 Ft	115.684
		M	4.00 Fb	1179.054
13	2	E	4.00 Ft	68.488
		M	4.00 Fb	1339.131
14	1	E	4.00 Ft	44.889
		M	4.00 Fb	1419.169
15	2	E	2.00 Ft	-9.415
		M	2.00 Fb	1585.759
16	2	E	2.00 Ft	-63.720
		M	2.00 Fb	1752.350
17	2	E	2.00 Ft	-118.025
		M	2.00 Fb	1918.941
18	2	E	2.00 Ft	-172.330
		M	2.00 Fb	2085.531
19	1	E	2.00 Ft	-199.482
		M	2.00 Fb	2168.827

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

Span : 2, Beam : 4, SERVICE 1

NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 15.13%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.33	3.43	8.85	18.45	28.05	37.65	47.25
Prestress								
Precast-top	-84.5	-244.4	-259.6	-299.0	-368.8	-438.5	-508.3	-508.3
Bottom	722.6	2016.1	2030.0	2066.1	2130.1	2194.0	2257.9	2257.9
Self wt.								
Precast-top	0.0	45.3	113.7	276.2	511.3	679.2	780.0	813.6
Bottom	-0.0	-41.5	-104.2	-253.1	-468.6	-622.5	-714.8	-745.6
Prec. DL+ADL								
Precast-top	0.0	14.0	35.2	85.5	158.3	210.3	241.5	251.9
Bottom	-0.0	-12.8	-32.3	-78.4	-145.1	-192.7	-221.3	-230.9
Diaphragm								
Precast-top	0.0	0.9	2.3	5.9	12.4	17.0	19.0	21.1
Bottom	-0.0	-0.8	-2.1	-5.4	-11.3	-15.5	-17.4	-19.3
Deck + Haunch								
Precast-top	0.0	47.9	120.3	292.1	540.8	718.3	824.9	860.4
Bottom	-0.0	-43.9	-110.2	-267.7	-495.6	-658.3	-756.0	-788.5
Comp. DL+ADL								
Topping-top	-197.9	-178.8	-149.8	-81.2	17.7	87.7	128.8	141.0
Precast-top	-151.8	-137.1	-114.9	-62.3	13.6	67.3	98.8	108.2
Bottom	452.7	408.9	342.6	185.7	-40.4	-200.5	-294.5	-322.4
LL+I(-)								
Topping-top	-276.5	-258.0	-231.3	-174.9	-143.7	-119.4	-113.4	-109.5
Precast-top	-212.1	-197.9	-177.4	-134.2	-110.3	-91.6	-87.0	-84.0
Bottom	632.3	590.1	528.9	400.1	328.7	273.1	259.2	250.5
Final 1 (P/S + DL + LL)								
Topping-top	-474.5	-436.8	-381.1	-256.1	-126.0	-31.8	15.4	31.5
Precast-top	-448.4	-471.4	-280.4	164.3	757.3	1161.9	1368.9	1462.8
Bottom	1807.6	2916.0	2652.7	2047.2	1297.7	777.6	513.1	401.7
Final 2 (P/S + DL)								
Topping-top	-197.9	-178.8	-149.8	-81.2	17.7	87.7	128.8	141.0
Precast-top	-236.3	-273.5	-103.0	298.5	867.5	1253.5	1455.9	1546.8
Bottom	1175.3	2325.9	2123.8	1647.1	969.1	504.4	253.9	151.2
Final 3 ((50% P/S + 50% DL + LL)								
Topping-top	-375.5	-347.4	-306.2	-215.5	-134.9	-75.6	-49.0	-39.0
Precast-top	-330.3	-334.7	-228.9	15.1	323.5	535.2	641.0	689.4
Bottom	1220.0	1753.0	1590.8	1223.6	813.2	525.3	386.2	326.1

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

REINFORCED DESIGN - Span : 2, Beam : 4, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

f'c, (psi) = 6500.00 (Art. 9.7.2.3.2); b, (in) = 26.00; bw, (in) = 8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-4638.2	8.00	78.37	2.00	-3060.5	0.00	13.65	0.00*	-0.0
2	9.98	-1288.3	8.00	78.37	2.00	-3060.5	0.00	4.92	0.00*	-0.0
3	19.58	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
4	29.18	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
5	38.78	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
6	48.38	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
7	57.98	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
8	67.58	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
9	77.18	0.0	11.75	80.25	3.87	-0.0	0.00	0.00	0.00	-0.0
10	86.78	-1164.5	8.00	78.37	2.00	-3060.5	0.00	4.44	0.00*	-0.0
11	96.75	-4503.0	8.00	78.37	2.00	-3060.5	0.00	13.23	0.00*	-0.0

(b) POSITIVE MOMENTS AT PIERS

NONE

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

DESIGN SUMMARY

Span: 2, Beam: 4, Interior beam
Beam type: I-Girder , AASHTO-4-Mod-72"
Precast Length, ft: 96.00 Release Length, ft: 96.00
Strand Pattern: Straight/Draped Depress Point: 0.40 L
Strand: 1/2-270K-LL
Strand Type: Low Relaxation
Strand Es, ksi: 28500.0 No. of strands: 34
No. of strands, Draped: 3 No. of strands, Straight: 31
Concrete Strength, f'ci: 5000.0 psi f'c: 6500.0 psi f'ct 4500.0 psi
Initial losses: 5.95 % Final losses: 15.13 %

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.0	-199.6	
Precast Top w/ reinf.	-530.3		
Precast Bot (compression)	3000.0	2168.9	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	8396.9	7360.2	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Specification	Final 1 Allow.	Final 1 Comp.	Final 2 Allow.	Final 2 Comp.	Final 3 Allow.	Final 3 Comp.
Positive Moment Envelope Stresses (psi)						
Service 1						
Top. Top	2700.0/-503.1	411.1 /-148.1	1800.0	141.0	1800.0	340.6
Pre. Top	3900.0/-483.7	1754.0 /-235.5	2600.0	1546.8	2600.0	980.6
Pre. Bot	3900.0/-483.7	2212.7 /-466.5	2600.0	2373.7	2600.0	1025.9
Negative Moment Envelope Stresses (psi)						
Service 1						
Top. Top	2700.0/-503.1	31.5 /-474.5	1800.0	141.0	1800.0	-39.0
Pre. Top	3900.0/-483.7	1462.8 /-471.4	2600.0	1546.8	2600.0	689.4
Pre. Bot	3900.0/-483.7	2916.0 / 401.7	2600.0	2325.9	2600.0	1753.0

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed. - Table 4.6.2)
0.5 x L = 47.25 ft

	Release	Mult	Erection	Mult	Final
Prestress	1.578	1.80	2.841	2.20	3.472
Self Wt.	-0.721	1.85	-1.333	2.40	-1.730
Deck + Haunch			-0.628	2.30	-1.444
Supplemental			0.000	3.00	0.000
Prec. DL+ADL			-0.184	3.00	-0.551
Diaphragm			-0.015	3.00	-0.044
Comp. DL+ADL			-0.116	3.00	-0.347
Supp. DL+ADL			0.000	3.00	0.000
Live Load					-0.243
Total	0.857		0.565		-0.887

Positive values indicate upward deflection.

PROJECT: SCI 823-SR 823 over Swauger Valley/Minford Rd

LIVE LOAD LIBRARY: Default.cs4

1 ID : H/HS25 Lane
Description: H25/HS25 as in AASHTO-STANDARD
Type : Lane Load
Lane Load : Intensity = 0.80 klf, Width = 10.00 ft
Conc. Loads: Moment = 22.50 k, Shear = 32.50 k

2 ID : HS25 Truck
Description: HS25 Truck as in AASHTO-STANDARD
Type : Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID : Military Truck
Description: Military Truck as in AASHTO-STANDARD
Type : Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

REACTIONS: HAND CALC CHECK

- ABUTMENT

$w_{DL} = (2.5\ k/ft + 0.87) = 3.37\ k/ft$

$R_{DL} = (3.37^{k/ft})(95.54) \times 0.5 = \underline{161^{k}}$ ✓ (REVISED TO 95.875 FT)

$R_{LL+I} = DF_{INT.\ GIRDER} = (0.5)(1.23)(2.065) = 1.27$ ✓

$DF_{EXT.\ GIRDER} = (0.5)(1.23)(1.452) = 0.9$ ✓

DON'S CALCS:

	ABUTMENT	
①	100.3^{k}	1 TRUCK
②	106.4^{k}	(2) TRUCKS @ 50'
③	79.4^{k}	LANE 0.8 k/ft + (1) 32.5^{k} LOAD
④	94.9^{k}	LANE 0.8 k/ft + (2) 32.5^{k} LOAD @ 50'
⑤	75.4^{k}	(EXT. GIRDER ONLY)

$R_{ABUT\ SERVICE\ MAX}$ DL+LL+I = 161 + 106.4^{k} = 267.4^{k} (+15%)

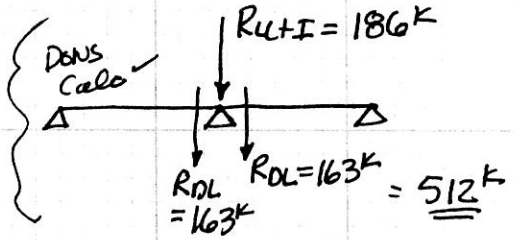
∴ COMPUTER BM DGN $R_y = \left[47^{k} + 49.9^{k} + 0.9^{k} + 7.3^{k} + \frac{134.8^{k}}{5}\right] + \underbrace{1.27(79.1)}_{100.5^{k}} = 233^{k}$

- PIER:

$R_{DL} = 96.75(3.37)(0.5) = 163^{k}$

DON'S CALCS: R_{LL+I}:

① 113.2
② 171.4
③ 152.9
④ 185.4 ←
⑤ 131.4 --> EXT. GIRDER ONLY

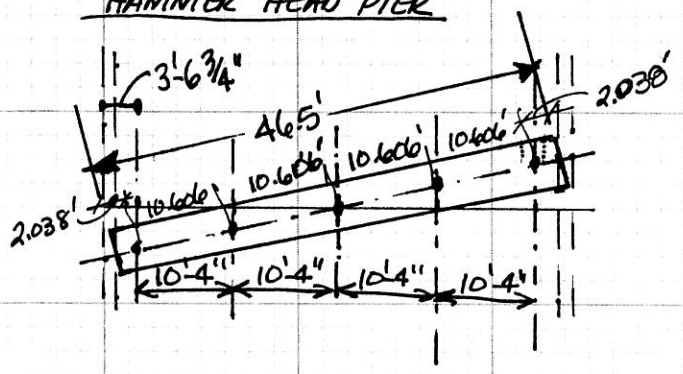


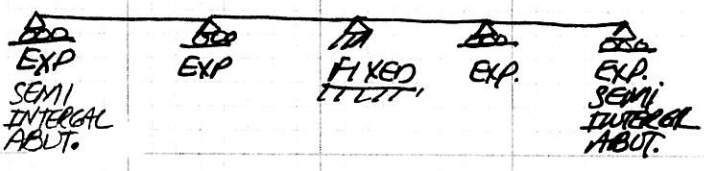
$R_{SERVICE}$ DL+LL+I = 163 + 185.4 = 348.4^{k} ... (349^{k}) ✓

∴ COMPUTER BM PGM $R_{DL} = 47.1 + 49.8 + 0.9 + 146 + 756/5 \times 2 = 188^{k}$

$R_{LL+I} = 127(1.27) = \underline{161.3^{k}}$ ⟶ $R_{TOTAL} = 349.3^{k}$ (ok)

HAMMER HEAD PIER





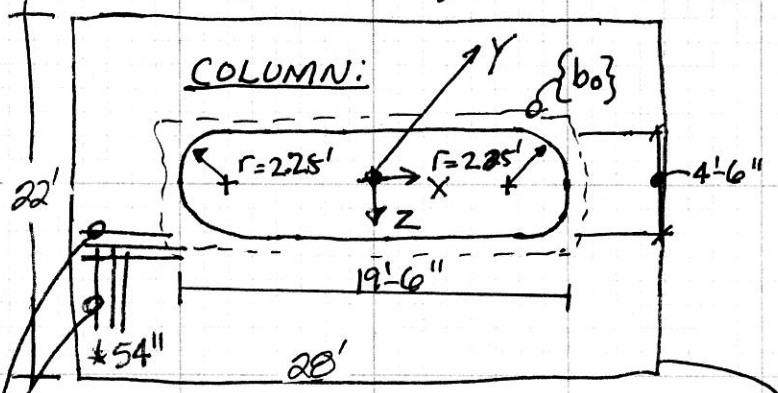
→ USE EXPANSION DESIGN MOVEMENT
= 2/3 TOTAL LENGTH.
= 2/3(400) = 267'

SEISMIC BEARING SEAT.

$N = (8 + .02L + .08H)(1 + .000125S^2)$
$= [8 + .02(100) + .08(60)](1 + 0.000125(13)^2)$
$= (14.8")(1.022) = 15.12"$ ⇒ Use 16"

→ Use MIN BRG PADS = 16" x 26"

COLUMN:



AREA = $15' \times 4.5' + \pi(2.25)^2$
= 83.4 ft²

EQUIV = $\frac{83.4}{4.5} = 18.53 \simeq$ Use 18.53×4.5

EQUIV. SQUARE AREA = 4.5×18.53 ft

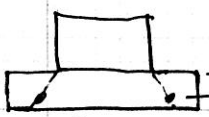
MAX LOAD DESIGN = P = 2648.7 k
M_{xx} = 8933.4 k
M_{zz} = 6001.2 k

FTG 30' x 25' x 54" Deep.

#11 BARS @ 10.5" O.C.

#11 BARS @ 12" O.C.

TWO WAY SHEAR @ 4'-6"

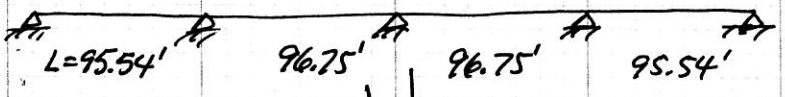


$b_o = 4 + d2(234" + 48") + 2(54" + 48") = 282" \times 2$ sides $+ 102" \times 2$ sides $= 768"$ ⇒ [23.5' x 8.5']
A = 200 ft²

$V_u = \phi 4 \sqrt{f'c}\, b_o d = (85)(4)\sqrt{4000}\,(768)(48)/1000 = 7927$ kips.

q = 13.25 ksf. "UNDER b_o"

HAMMER HEAD PIER:



DL = 163k

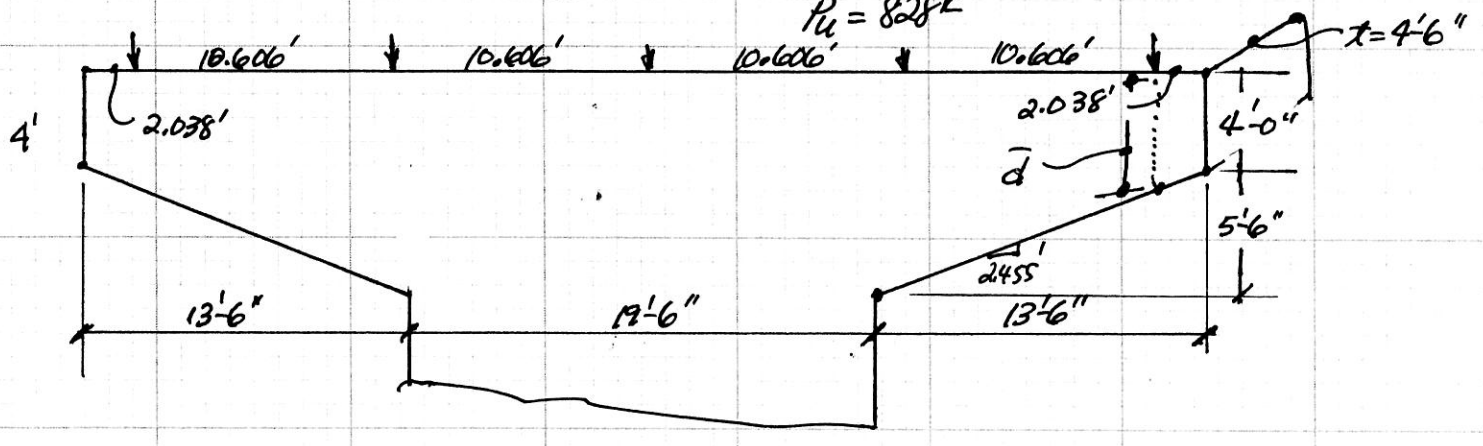
MAX. DL = 163k

LL+I = 186k

$P_u = 1.3[DL + 1.67(LL+I)]$

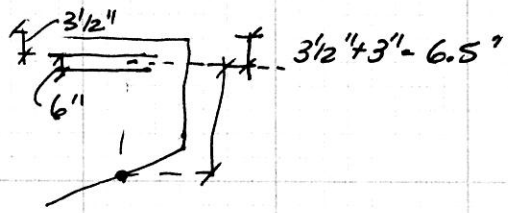
$P_u = 1.3[326 + 1.67(186)] = 828^k$

$P_u = 828^k$



$\bar{d} = 4' + \frac{2.038}{2.45} = 4.83 \simeq 4'-10"$

$d = 58" - 6\frac{1}{2}" = \underline{51.5"}$



CONC. SHEAR

$\phi V_c = \phi(2\sqrt{f'_c})bd = (.85)(2)\sqrt{4000}(54)(51.5) = 299^k$

$V_s = \frac{V_u - \phi V_c}{0.85} = \frac{828 - 299}{.85} = 622.4^k$

$S = \frac{A_v f_y d}{V_s} = \frac{(4(0.31))(60)(51.5)}{622.4} = 6.15" =$ Use Double #5's Cage @ 6"

$V_{s\,MAX} = \phi 8\sqrt{f'_c}\,bd = 1196^k$ (ok) $> 620.4^k$

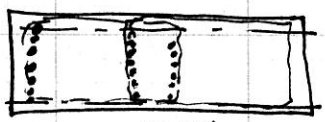
S=6" Controls. (4) #5's

project name: SCI-823 | sheet # | of | project # 5355.02

subject: PIER Column | date 2/08 | designed by DEF | checked by DAT

APPROXIMATE ANALYSIS:

COLUMN:



PROPERTIES: { ROUNDED CORNERS WILL BE A LITTLE LESS.

$A = 17,636\ in^2$

$\bar{x} = 117"$, $\bar{y} = 27"$

$I_{xx} = 3,020,548.0\ in^4$

$I_{yy} = 57,658,068.0\ in^4$

$r_x = 15.0"$

$r_y = 67.55"$

$S_x = 492,804\ in^3$

$S_y = 113,724$

As @ 1% Steel = (234)(54)(.01) = $126\ in^2$

10 BARS = 126/1.27 = 100 BARS

{ This is to MEET 1% Steel AREA.

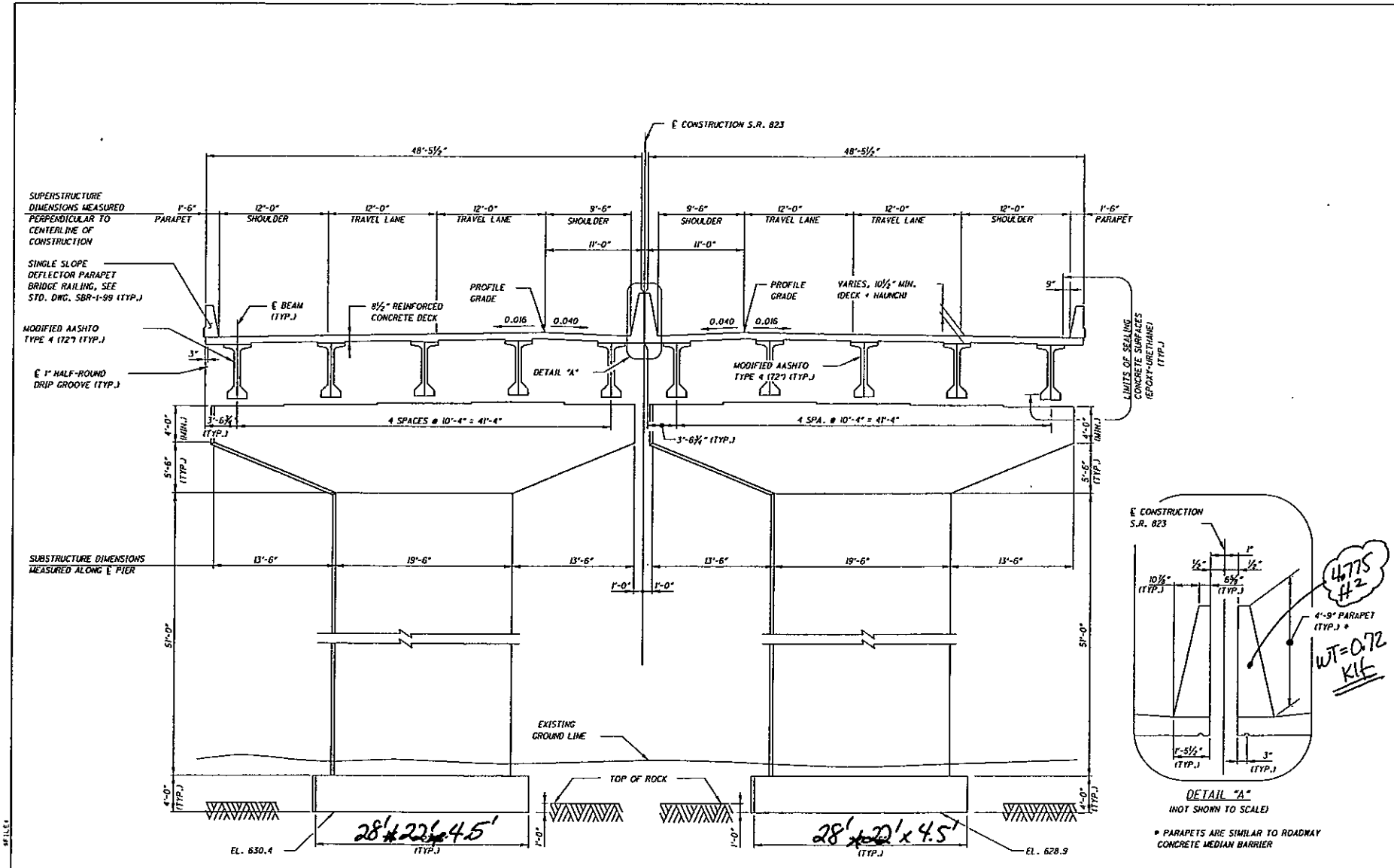
#10 Bars: 38 @ 6" (= 6" O.C.)
(4) @ 12, 18, 24, 30, 36, & 42.
38 @ 48". (= 6" O.C.)

{ Column ONLY } $K\ell/r = 51'(12)(2)/r = 1224/r_x = 81.6$

$1224/r_y = 18.2$

{ COL + CAP } $K\ell/r = 261^{FT}(12)/r = 1464/r_x = 97.6$ (OK)

$1464/r_y = 21.7$



TYPICAL TRANSVERSE SECTION

DETAIL "A"
(NOT SHOWN TO SCALE)

* PARAPETS ARE SIMILAR TO ROADWAY CONCRETE MEDIAN BARRIER

TYPICAL TRANSVERSE SECTION
BRIDGE NO. SCI-823-0837 L&R
S.R. 823 OVER SHAUGER VALLEY-WINFORD ROAD (CR-31)

SCI-823-6.81
PID 19415

4 / 7

557
571

...\sheets\823_0837CTS001.dgn 02/07/2008 06:22:39 PM

SEMI-INTEGRAL/INTEGRAL ABUTMENT TYPE

SKEW VS. BRIDGE LENGTH LIMITATIONS (FT)

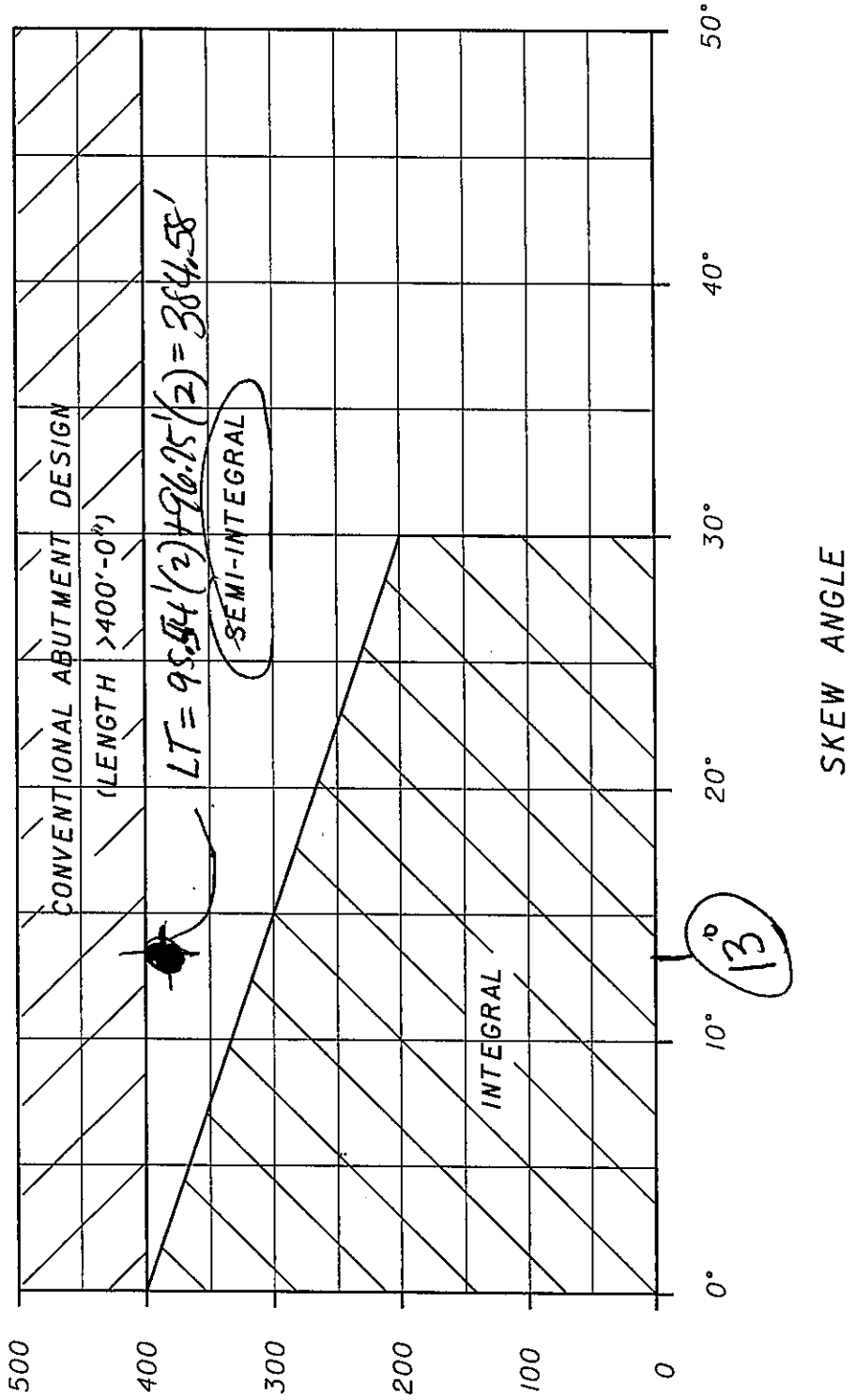


Figure 203

PIER ANALYSIS / LOADS:

Loading = DL, LL+I, Wind, WL wind on live, EQ seismic, E earth,
SF stream force, CF cen force, LF braking, and RST temp and shrinkage.

		Service Ry, KIPS
1.) DL:	P/S BEAM, Ry DL =	**163.00**
	(Includes Beam Wt., Diaphragm, Deck, Haunch, Barrer, FWS)	
	PIER WEIGHT =	**847.00**
	DL: = ALL 10 BMS =	**2477.00**
2.) LL:	P/S BEAM,Ry LL+I=	**183.02**
	(Live Load + Impact)	
	LL: = ALL 3 LANES =	**823.61**
	LL: =TWO (2) LANES	**549.07**

Three (3) Lane Factor = 0.9

3.) W: Struct **1** Abut loading factor

		Length	super	Ht (ft) =
beam ht =	**6**			
haunch ht	**0.25**			
deck ht =	**0.73**			
parapet ht=	**3.5**			
super El ht	**0.6**	**37.5**	**0.016**	0.6
bearing ht	**0.29**			
Total HT=	11.37 ft			

Wind =	**50** psf			
Tot. Br LT=	**386** ft			
Bridge LT=	**96.75** ft			
Deck W=	**48.42** ft			
Beam Spa	**10.334** ft			
# of Bms	**10** beams			
# of Lanes	**3**			
			Moment Arm =	**Moment**
F tranv=	**55.00 KIPS**		**63.935 ft**	3516.577 k-ft
			F / per Beam	
Flong 12=	**6.61** KIPS		**1.321285 kips**	
Wtran 60=	17 psf transverse			
	19 psf longitudinal			
F 60 tran=	**18.70 KIPS**		**63.935 ft**	1195.636 k-ft
F 60 long=	**10.46 KIPS**		**63.935 ft**	668.7711 k-ft

3.1) Wind Overturning:

W-OT = 20 psf **Point A**

		Moment Arm =	Moment
Fv (up) =	93.6927 KIPS	12.105 ft	1134.15 k-ft
1/4 Dk Pt.=	12.105 feet		

3.2) Wind on Substructure:

	pressure	area	Force	
Pwind =	50	270	13.5	kips

Pier LT=	42 ft
Pier Ht.=	60 ft
Pier Width	4.5 ft
A side =	270 ft 2

Arm Ht = 30 ft

Ftg Ht = 4.5 ft

Moment Transverse = 405.00 kip-FT

Wtran 60= 35 psf transverse
20 psf longitudinal

			Moment Arm =	Moment
F 60 tran=	9.45	KIPS	30 ft	283.50 k-ft
F 60 long=	50.40	KIPS	30 ft	1512.00 k-ft

4.) WL (wind on Live):

WL = 100 plf on live load
F transv = 9.675 Kips
Dist. = 17.37 feet above Pier Cap
(Applied at 6' above deck)
Moment = 748.5548 k-Ft

WL transv (60deg) 34 plf on live load
WL longit (60 deg) 38 plf on live load
3 lanes x 12' x 38 plf

			Point A Moment Arm =	Moment
F transv (60deg) =	3.29	Kips	17.37 ft	254.5086 k-ft
F longit (60deg) =	1.37	Kips	17.37 ft	105.8422 k-ft

5.) Seismic:

A = 0.09
IC = 1
SPC = A

kc=12EI/H^2
kc Long= 2405754 k/ft
= 200479.5 Kips/inch
W DL = 1630 kips

S (Use) = 1
0.5*E = 57000*(f'c^0.5)*144 = 259559.8
H = 60 ft
I=bh^3/12= b = 4.5 ft
h = 19.5 ft
I Long= 2780.578 ft^4

T=0.32((W/kc)^0.5) = 0.0288542 seconds
CS =1.2AS/T"0.667= 1.1493822
CS=2.5A= 0.225 maximun ...governs
Response 3

Point A Moment Arm =	Moment/R

V=W*CS=	366.75 kip...USE	63.935 ft	7816.054 k-ft	
V=0.2DL=	326 kips....Minimum = Seismic Shear Key.			

6.) Stream Force: Abutment = 0

Pave = K(Vave)^2	where K=	1			
Q100 =	0 cfs				
Area =	3488 ft 2				
Vave =Q/A=	0		Point A		
P Ave =	0		Moment Arm =	Moment/R	
Stream Force = Pave*Area =		0	30 ft	0 k-ft	

7.) CF; Centrifical Force:

Live Load=	72	kips/Lane
HS25 =	1.25	
factor =	6.68	
S =	0	mph design speed
		degree of curvature
R =	10000	curve radus
C=6.68xSxS/R =	0.00	precent of LL

Shared Loading per Piers =		0.5		
Design Lanes =		2		
			Point A	
			Moment Arm =	Moment
F transv=	0 KIPS - (2) LANES		17.37 ft	0 k-ft

Dist. = 17.37 feet above Pier Cap (Applied at 6' above deck)

8.) Braking Force:

AASHTO Code = 5% (LiveLoads + Pt Load) x All Lanes

Lane Load=	0.64 k/ft				
LT =	386 ft				
# Lanes=	2 lanes				
Point Load	18 kips				
HS25 Load	1.25				
Lane Red	0.9 (AASHTO 3.12)				
Factor =	0.334				
			Point A		
			Moment Arm =	Moment	
BR Force=	33.13 kips		17.37 ft	2563.268 k-ft	=2 LANES
Force/Bm=	6.626 k/Beam				
Force/LF=	0.684221 k/lf of Pier				
Dist. =	17.37 feet above Pier Cap				
	(Applied at 6' above deck)				
Lanes =	3				
BR Force=	49.695 kips		17.37 ft	3844.902 k-ft	=3 LANES
Force/Bm=	3.319626 k/Beam				

9.) RST; Shrinkage and Temperature:

Delta Brg= **1.5** in
Brg force= **6.626** Kips
k Brg = Force/delta * # Beams= 265.04 K/FT

Pier Ht = **60** ft

deltaTop=F*L^3/3EI=

kabut=3EI/L^3 = 10023.97

Keff = (1/kabut + 1/kbrg)^-1 = 258.2127

Temp Diff= **70**
Coef conc **0.000006**
Max LT= Bridge Lt= **200** ft

detla t = 0.084 **concrete temp deflection**

F hor=delta TxKeff = 21.68987 **kips**
F/Bm = 4.337973 **Kips/Bm**
Moment Arm= **63.935**
Moment = 1386.742 **Kip-Ft**

10.) Earth Surcharge:

	Depth	Pressure	Max P	
Soil P = 30 X d =	**0**	**30**	0 psf	
Force = Pmax*H/2 =	0 **LBS/LF**	**Point A**		
PIER Lt =	**0 ft**	**Moment Arm =**	**Moment**	
Total Force =	**0 KIPS**	**0 ft**	0 k-ft	

Moment Arm = H/3 = 0 ft

SUMMARY

CASE	LOADS Flong KIPS	M Long K-FT	Fv Transv KIPS	M transv K-FT
1.) DEAD LOAD =	2477.00	0.00	2477.00	
- ADDED DL SURCHARGE =				
2.) LIVE LOAD (3 LANES)=	823.61		823.61	
LIVE LOAD (2 LANES)=	549.07		---------	
3.) WIND AT 0 deg =			55.00	3516.58
WIND AT 60 deg=	10.46	668.77	18.70	1195.64
WIND @ SUBSTRUCTURE = (O degrees)			13.50	405.00
WIND @ SUBSTRUCTURE = (60 degrees)	50.40	1512.00	9.45	283.50
3.1) WIND OT =			93.69	1134.15
4.) WIND ON LL 0deg =			9.68	748.55
WIND ON LL 60deg=	1.37	105.84	3.29	254.51
5.) EQ: = SEISMIC =	366.75	7816.05	366.75	7816.05
6.) STREAM FLOW FORCE =			0.00	0.00
7.) CENTRIFUGAL FORCE=			0.00	0.00
8.) LF: = Breaking Force =	33.13	2563.27		
9.) R+S+T =	21.69	1386.74		
10.) EARTH PRESSURE =	0.00	0.00		

	(Calculated)		Number	W total	
P Ext Bm	**163**	kips	**2**	326	
Int. Beam =	**163**	kips	**3**	489	
Total =	326	kips	5	815	kips
95.84'/96.75'=	1	factor			
Average Ry =	163	kips			

Lane Loading

Span #1	**96**	ft
Span #2	**96.75**	ft
Lane Load	0.64	k/ft
Pt Load	56.4	Kips
HS25	1.25	
Impact =	1.24	
Ry Lane=	183.024	

PIER LOADING: (TRANSVERSE LOADING ONLY)

1) DL BM = Use 162 K/BM * 10 = 1630 KIPS + 847 = 2477 K

2) LL + I = 132 K + 186 + 186 + 186 * 132 K = 822 KIPS.

3) WIND: WIND SUPER = 55 KIPS @ 66.5 FT. (TRANSVERSE)

WIND LONGITUDINAL = 6.61 K @ 66.5' [LONG]

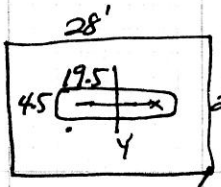
WIND OVERTURNING = 1134 K' (TRANS.)

WIND ON SUBSTRUCTURE/COLUMN = 13.5 K @ 34.5 FT (TRANSV.)

WIND ON LINE = 9.675 K @ 67.37' (TRANSV.)

4) SEISMIC (TRANS) 326 K @ 64.0 FT.

386.75 K @ 64.'

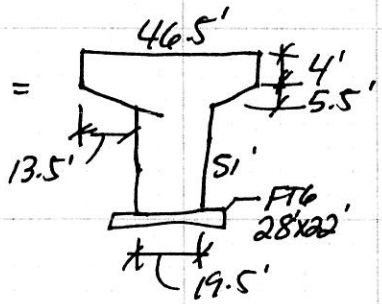


$I_y = \frac{bh^3}{12} = 40,245$

$S_y = \frac{I}{C} = 14' = 2875$

t = 54", d = 48"

COL/CAP WT. =



AREA = 46.5(4) + 13.5(5.5) + 51(19.5) = 1254.75 ft²

VOLUMN = A * 4.5' = 5646.38

WT = V * 0.15 kcf = 847 K

P_o = 824 + 2477 = 3301 K

M_o = SEISMIC = 386.75 K @ 64' w/ R = 3 M = 7816 K'

$\sigma = \frac{P}{A} + \frac{M}{S} = \frac{3301}{616} + \frac{7816}{2875} = 8.08$ ksf (OK)

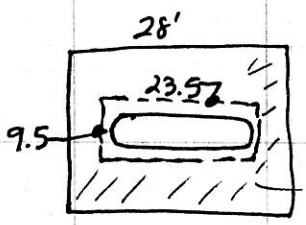
Software Analysis = 8 ksf (OK)

A) Punching Shear

$P_u = 1.3[1.0\,DL + 1.67\,LL] = 5010^K$

$\phi V_c = .85 f'_c (4) b_o d = .085(4)\sqrt{4000}(768")(48")/1000 = 7920^K > 5010^K$ (OK)

PUNCHING SHEAR (Cont'd)



AREA REMAINING = 393 ft²

B) PRESSURE FORCE:

$$f_u = \frac{P_u}{A} + \frac{M_u}{S}$$

$$q_u = \frac{5010}{\text{[illegible]}6} + \frac{2816(1.3)}{2875} = 8.14 + 3.54 = \underline{11.68 \text{ ksf}}$$

$$F_u = 11.68(393) = 4{,}590 \text{ kips} < \underline{7920^k} \text{ (ok)}$$

$P_{WIND} = 55^k + 13.5^k + 94^k + 10^k = 172.5^k$ < Seismic (ok) Seismic Controls

$M_{WIND} = 3517 + 405 + 1134 + 749 = 5805 \text{ k-ft}$ < Seismic (ok)

SCI - 823 : By-Pass:
Hammer Head Pier Cap ""Back Calculation Check"":
Moment Reinforcement:

End Beam Load, Pu =	828	kips
Haunch Slope	0.407	ft/ft
Start d =	51.5	inches
base dist., b=	54	
concrete, F'c=	4000	PSI
Reinforcement=	60000	PSI

"e"dist.Moment-Arm (ft)	Mu (K-FT)	d bar (in)	Ru = Mu*12000/(0.9xbxd^2)		Calculated rho (in2)	rho (min)
1	828	56.39	64.30	psi	0.0010819	0.003333
2	1656	61.28	108.89	psi	0.0018449	0.003333
3	2484	66.17	140.09	psi	0.0023851	0.003333
4	3312	71.06	161.97	psi	0.0027671	0.003333
5	4140	75.94	177.24	psi	0.0030352	0.003333
6	4968	80.83	187.74	psi	0.0032204	0.003333
7	5796	85.72	194.75	psi	0.0033446	0.003333
8	6624	90.61	199.21	psi	0.0034235	0.003333
9	7452	95.50	201.75	psi	0.0034686	0.003333
10	8280	100.39	202.86	psi	0.0034884	0.003333
10.5	8694	102.83	203.00	psi	0.0034909	0.003333

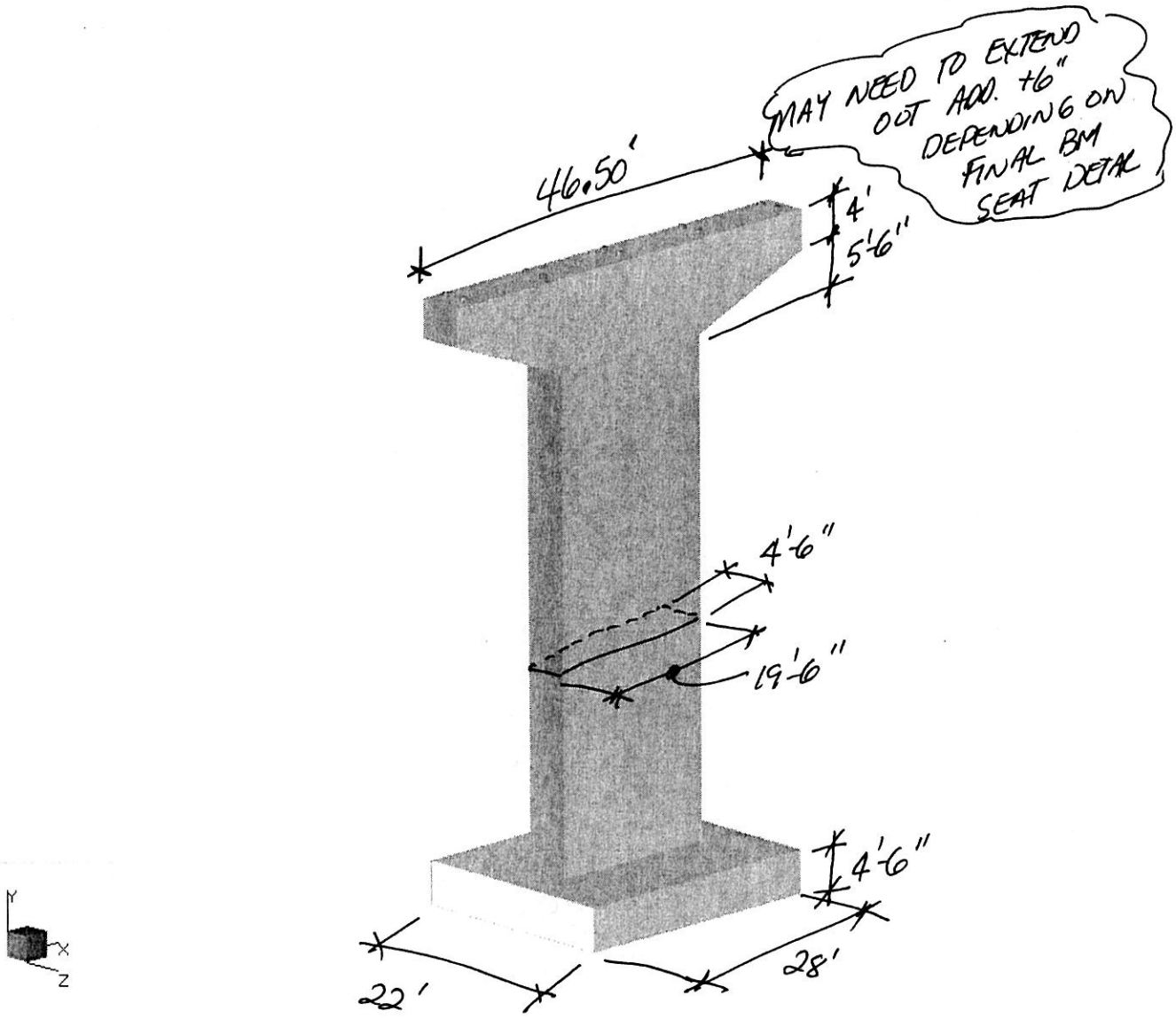
""Section Area Cut""	rho (design)	Min As, Steel	--N"Exact"--	"N" (#10 Bars)
1	0.003333333	10.15	7.99	**9 - #10 Bars**
2	0.003333333	11.03	8.69	**10 - #10 Bars**
3	0.003333333	11.91	9.38	**10 - #10 Bars**
4	0.003333333	12.79	10.07	**11 - #10 Bars**
5	0.003333333	13.67	10.76	**12 - #10 Bars**
6	0.003333333	14.55	11.46	**12 - #10 Bars**
7	0.003344604	15.48217317	12.19	**13 - #10 Bars**
8	0.003423516	16.7512619	13.19	**14 - #10 Bars**
9	0.003468641	17.88778141	14.08	**15 - #10 Bars**
10	0.003488434	18.91080183	14.89	**16 - #10 Bars**
10.5	0.003490864	19.38476688	15.26	**16 - #10 Bars**

KZF Design Inc
655 Eden Park Dr
PHONE: 513-621-6211
Cincinnati, OH 45202

PROGRAM: RC-PIER® v7.1.0 LEAP Software Inc., Tampa, Florida
PHONE : TOLL-FREE 1-800-451-5327 TAMPA AREA: 813-985-9170

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

FULL IMAGE:



PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

PROJECT DATA

Project : Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road
User Job No.: #5355.02
State : Ohio State Job No. : PID 19415
Pier View : Upstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments :

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

PIER GEOMETRY

Pier Type: Hammer Head

Pier View : Upstation.
Length(X) = 46.50 ft Height max(Y) = 9.50 ft Height min(Y) = 4.00 ft
Bottom length(X) = 18.53 ft Depth(Z) = 4.50 ft Skew angle = 13.00 Reduction of I = 1.0(

Column Shape: Rectangular Non Tapered
Bottom width(X) = 18.53 ft Top width(X) = 18.53 ft Depth(Z) = 4.50 ft Height(Y) = 51.00 ft
Column Bottom has Diagonal Spring Matrix Defined
Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

STRUCTURE MODEL

FRAME Model:

	Member	Node	Hinge	Check Pt Dist(ft)	Memb length(ft)
Column No. 1					
	1	1	-	0.00	
		2	-	58.50	58.50
Cap					
	2	3	-	0.00	
		4	-	2.04	2.04
	3	4	-	2.04	
		5	-	12.64	10.61
	4	5	-	12.64	
		6	-	13.98	1.34
	5	6	-	13.98	
		2	-	23.25	9.27
	6	2	-	23.25	
		7	-	32.51	9.26
	7	7	-	32.51	
		8	-	33.85	1.34
	8	8	-	33.85	
		9	-	44.46	10.61
	9	9	-	44.46	
		10	-	46.50	2.04

Node coordinates:

Number	X(ft)	Y(ft)	Node type
1	23.25	0.00	fixed at ground
2	23.25	58.50	column-cap bearing
3	0.00	58.50	
4	2.04	58.50	bearing
5	12.64	58.50	bearing
6	13.98	58.50	
7	32.51	58.50	

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

8	33.85	58.50	bearing
9	44.46	58.50	bearing
10	46.50	58.50	

SUPERSTRUCTURE INFO

Total number of spans: 2 Span number rear to current pier: 1
Number of traffic lanes: 3

Beam: height : 72.00 in section area : 996.00 in^2
Beam Inertia (Ixx): 616018.00 in^4 Beam inertia (Iyy): 28000.00 in^4
Beam CG:34.43 in Barrier height : 42.00 in Depth of slab : 8.75 in
Curb to curb distance: 43.000 ft

Span #	Span length	Bridge Width
1	96.750 ft	48.500 ft
2	96.750 ft	48.500 ft
		48.500 ft

BEARING POINTS

Number of bearing lines: 2

First bearing line Eccentricity = 1.13 ft

Point	Distance ft
1	2.04
2	12.64
3	23.25
4	33.85
5	44.46

Second bearing line Eccentricity = -1.13 ft

Point	Distance ft
1	2.04
2	12.64
3	23.25
4	33.85
5	44.46

MATERIAL PROPERTIES

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.85
(lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load:

1	Lane	1.00
2	Lanes	1.00
3	Lanes	0.90
more than 3	Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	2.00	1.23
Column	170.00	2.00		1.23
Footing	130.00	3.00	3.00	1.00

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:

Flexure and tension	:	0.90
Shear and torsion (normal)	:	0.85
(lightweight)	:	0.85
Axial compression (ties)	:	0.70
Axial compression (spiral)	:	0.75

Seismic Overstrength

Flexure and tension	:	1.30
Axial compression (ties)	:	1.30
Axial compression (spiral)	:	1.30

Response Modification Factor : 3.00

Use core area for plastic hinging calculations.

Design Factors

Cap Design Factor	:	1.20
Footing Design Factor	:	1.20

Plastic Hinge Moment

Use actual computed Plastic Hinging Moment for each column in all combinations.

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

LOADS

Pier View : Upstation.
Load Cases: 52

Loadcase ID: D1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-163.00
1	2	Y	-163.00
1	3	Y	-163.00
1	4	Y	-163.00
1	5	Y	-163.00
2	1	Y	-163.00
2	2	Y	-163.00
2	3	Y	-163.00
2	4	Y	-163.00
2	5	Y	-163.00

Auto generation details

Generated Dead Load

Slab weight	=	150.00	pcf	Girder weight	=	150.00	pcf
Wearing weight	=	2730.00	plf	Barrier load	=	525.00	plf

Loadcase ID: (L+In)1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-132.00
1	2	Y	-186.00
1	3	Y	-186.00
1	4	Y	-186.00
1	5	Y	-132.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-43.65
2	2	Y	-54.31
2	3	Y	-50.78
2	4	Y	-51.94
2	5	Y	-18.88

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-32.18
1	4	Y	-73.43
1	5	Y	-36.79
2	1	Y	0.00
2	2	Y	0.00

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

2	3	Y	-17.49
2	4	Y	-39.91
2	5	Y	-20.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-43.65
1	2	Y	-54.31
1	3	Y	-50.78
1	4	Y	-51.94
1	5	Y	-18.88
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)5 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-42.93
1	2	Y	-72.57
1	3	Y	-26.90
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-23.34
2	2	Y	-39.44
2	3	Y	-14.62
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)6 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-48.50
2	2	Y	-32.82
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)7 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-48.50
1	2	Y	-32.82
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)8 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-48.50
2	2	Y	-60.34
2	3	Y	-53.79
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)9 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-48.50
1	2	Y	-60.34
1	3	Y	-53.79
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)10 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-30.16
1	4	Y	-83.95
1	5	Y	-48.53
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)11 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-30.16

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

2	4	Y	-83.95
2	5	Y	-48.53

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)12 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-42.47
1	2	Y	-28.73
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-23.08
2	2	Y	-15.62
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

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Loadcase ID: (L+In)13 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-32.78
1	5	Y	-48.53
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: (L+In)14 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	-32.78
2	5	Y	-48.53

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

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Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 15
Total number of Possible Combination = 1054

Loadcase ID: W1 Name: Angle: -75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.51	0.50	----	----
UDL	Z	----	0.32	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.57
1	1	Y	0.34
1	1	Z	2.37
1	2	X	0.57
1	2	Y	-0.00
1	2	Z	2.37
1	3	X	0.57
1	3	Y	-0.00
1	3	Z	2.37
1	4	X	0.57
1	4	Y	-0.00
1	4	Z	2.37
1	5	X	0.57
1	5	Y	-0.34
1	5	Z	2.37
2	1	X	0.57
2	1	Y	0.34
2	1	Z	2.37
2	2	X	0.57
2	2	Y	-0.00
2	2	Z	2.37
2	3	X	0.57
2	3	Y	-0.00
2	3	Z	2.37
2	4	X	0.57
2	4	Y	-0.00
2	4	Z	2.37
2	5	X	0.57
2	5	Y	-0.34
2	5	Z	2.37

Auto generation details

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Generated Wind Load on Structure
Angle of wind = -75.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	11.000 psf	Cap	40.000 psf
Longitudinal	22.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W2 Name: Angle: -60
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	4.26	0.50	----	----
UDL	Z	----	0.30	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.22
1	1	Y	0.73
1	1	Z	2.21
1	2	X	1.22
1	2	Y	-0.00
1	2	Z	2.21
1	3	X	1.22
1	3	Y	-0.00
1	3	Z	2.21
1	4	X	1.22
1	4	Y	-0.00
1	4	Z	2.21
1	5	X	1.22
1	5	Y	-0.73
1	5	Z	2.21
2	1	X	1.22
2	1	Y	0.73
2	1	Z	2.21
2	2	X	1.22
2	2	Y	-0.00
2	2	Z	2.21
2	3	X	1.22
2	3	Y	-0.00
2	3	Z	2.21
2	4	X	1.22
2	4	Y	-0.00
2	4	Z	2.21
2	5	X	1.22
2	5	Y	-0.73
2	5	Z	2.21

Auto generation details
Generated Wind Load on Structure
Angle of wind = -60.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	17.000 psf	Cap	40.000 psf
Longitudinal	19.000 psf	Column	40.000 psf
Overturning	not considered		

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Loadcase ID: W3 Name: Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	7.09	0.50	----	----
UDL	Z	----	0.24	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.83
1	1	Y	1.70
1	1	Z	2.28
1	2	X	2.83
1	2	Y	-0.00
1	2	Z	2.28
1	3	X	2.83
1	3	Y	-0.00
1	3	Z	2.28
1	4	X	2.83
1	4	Y	-0.00
1	4	Z	2.28
1	5	X	2.83
1	5	Y	-1.70
1	5	Z	2.28
2	1	X	2.83
2	1	Y	1.70
2	1	Z	2.28
2	2	X	2.83
2	2	Y	-0.00
2	2	Z	2.28
2	3	X	2.83
2	3	Y	-0.00
2	3	Z	2.28
2	4	X	2.83
2	4	Y	-0.00
2	4	Z	2.28
2	5	X	2.83
2	5	Y	-1.70
2	5	Z	2.28

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	33.000 psf	Cap	40.000 psf
Longitudinal	16.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W4 Name: Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm	Mag1	x1/L	Mag2	x2/L

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		ft	kips, klf,k-ft	kips, klf,k-ft		
Force	X	0.00	8.25	0.50	----	----
UDL	Z	----	0.16	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	3.69
1	1	Y	2.22
1	1	Z	2.07
1	2	X	3.69
1	2	Y	-0.00
1	2	Z	2.07
1	3	X	3.69
1	3	Y	-0.00
1	3	Z	2.07
1	4	X	3.69
1	4	Y	-0.00
1	4	Z	2.07
1	5	X	3.69
1	5	Y	-2.22
1	5	Z	2.07
2	1	X	3.69
2	1	Y	2.22
2	1	Z	2.07
2	2	X	3.69
2	2	Y	-0.00
2	2	Z	2.07
2	3	X	3.69
2	3	Y	-0.00
2	3	Z	2.07
2	4	X	3.69
2	4	Y	-0.00
2	4	Z	2.07
2	5	X	3.69
2	5	Y	-2.22
2	5	Z	2.07

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	41.000 psf	Cap	40.000 psf
Longitudinal	12.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W5 Name: Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	7.43	0.50	----	----
UDL	Z	----	0.08	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips

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1	1	X	4.11
1	1	Y	2.48
1	1	Z	1.56
1	2	X	4.11
1	2	Y	-0.00
1	2	Z	1.56
1	3	X	4.11
1	3	Y	-0.00
1	3	Z	1.56
1	4	X	4.11
1	4	Y	-0.00
1	4	Z	1.56
1	5	X	4.11
1	5	Y	-2.48
1	5	Z	1.56
2	1	X	4.11
2	1	Y	2.48
2	1	Z	1.56
2	2	X	4.11
2	2	Y	-0.00
2	2	Z	1.56
2	3	X	4.11
2	3	Y	-0.00
2	3	Z	1.56
2	4	X	4.11
2	4	Y	-0.00
2	4	Z	1.56
2	5	X	4.11
2	5	Y	-2.48
2	5	Z	1.56

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	44.000 psf	Cap	40.000 psf
Longitudinal	6.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W6 Name: Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	4.85	0.50	----	----
UDL	Z	----	0.02	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.82
1	1	Y	25.70
1	1	Z	1.11
1	2	X	4.82
1	2	Y	9.38
1	2	Z	1.11

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1	3	X	4.82
1	3	Y	9.38
1	3	Z	1.11
1	4	X	4.82
1	4	Y	9.38
1	4	Z	1.11
1	5	X	4.82
1	5	Y	-6.93
1	5	Z	1.11
2	1	X	4.82
2	1	Y	25.70
2	1	Z	1.11
2	2	X	4.82
2	2	Y	9.38
2	2	Z	1.11
2	3	X	4.82
2	3	Y	9.38
2	3	Z	1.11
2	4	X	4.82
2	4	Y	9.38
2	4	Z	1.11
2	5	X	4.82
2	5	Y	-6.93
2	5	Z	1.11

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	50.000 psf
Longitudinal	0.000 psf
Overturning	20.000 psf

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W7 Name: Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.22	0.50	----	----
UDL	Z	----	-0.00	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.38
1	1	Y	2.64
1	1	Z	0.40
1	2	X	4.38
1	2	Y	-0.00
1	2	Z	0.40
1	3	X	4.38
1	3	Y	-0.00
1	3	Z	0.40
1	4	X	4.38
1	4	Y	-0.00
1	4	Z	0.40
1	5	X	4.38

1	5	Y	-2.64
1	5	Z	0.40
2	1	X	4.38
2	1	Y	2.64
2	1	Z	0.40
2	2	X	4.38
2	2	Y	-0.00
2	2	Z	0.40
2	3	X	4.38
2	3	Y	-0.00
2	3	Z	0.40
2	4	X	4.38
2	4	Y	-0.00
2	4	Z	0.40
2	5	X	4.38
2	5	Y	-2.64
2	5	Z	0.40

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	44.000 psf	Cap	40.000 psf
Longitudinal	6.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W8 Name: Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	5.67	0.50	----	----
UDL	Z	----	-0.04	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.22
1	1	Y	2.54
1	1	Z	-0.24
1	2	X	4.22
1	2	Y	-0.00
1	2	Z	-0.24
1	3	X	4.22
1	3	Y	-0.00
1	3	Z	-0.24
1	4	X	4.22
1	4	Y	-0.00
1	4	Z	-0.24
1	5	X	4.22
1	5	Y	-2.54
1	5	Z	-0.24
2	1	X	4.22
2	1	Y	2.54
2	1	Z	-0.24
2	2	X	4.22
2	2	Y	-0.00

2	2	Z	-0.24
2	3	X	4.22
2	3	Y	-0.00
2	3	Z	-0.24
2	4	X	4.22
2	4	Y	-0.00
2	4	Z	-0.24
2	5	X	4.22
2	5	Y	-2.54
2	5	Z	-0.24

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	41.000 psf	Cap	40.000 psf
Longitudinal	12.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W9 Name: Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	7.84	0.50	----	----
UDL	Z	----	-0.10	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	3.54
1	1	Y	2.13
1	1	Z	-0.81
1	2	X	3.54
1	2	Y	-0.00
1	2	Z	-0.81
1	3	X	3.54
1	3	Y	-0.00
1	3	Z	-0.81
1	4	X	3.54
1	4	Y	-0.00
1	4	Z	-0.81
1	5	X	3.54
1	5	Y	-2.13
1	5	Z	-0.81
2	1	X	3.54
2	1	Y	2.13
2	1	Z	-0.81
2	2	X	3.54
2	2	Y	-0.00
2	2	Z	-0.81
2	3	X	3.54
2	3	Y	-0.00
2	3	Z	-0.81
2	4	X	3.54
2	4	Y	-0.00
2	4	Z	-0.81

2	5	X	3.54
2	5	Y	-2.13
2	5	Z	-0.81

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	33.000 psf	Cap	40.000 psf
Longitudinal	16.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W10 Name: Angle: 60
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	8.13	0.50	----	----
UDL	Z	----	-0.18	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.06
1	1	Y	1.24
1	1	Z	-1.45
1	2	X	2.06
1	2	Y	-0.00
1	2	Z	-1.45
1	3	X	2.06
1	3	Y	-0.00
1	3	Z	-1.45
1	4	X	2.06
1	4	Y	-0.00
1	4	Z	-1.45
1	5	X	2.06
1	5	Y	-1.24
1	5	Z	-1.45
2	1	X	2.06
2	1	Y	1.24
2	1	Z	-1.45
2	2	X	2.06
2	2	Y	-0.00
2	2	Z	-1.45
2	3	X	2.06
2	3	Y	-0.00
2	3	Z	-1.45
2	4	X	2.06
2	4	Y	-0.00
2	4	Z	-1.45
2	5	X	2.06
2	5	Y	-1.24
2	5	Z	-1.45

Auto generation details
Generated Wind Load on Structure
Angle of wind = 60.00 deg Elevation above which wind load acts = 65.00 ft

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Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	17.000 psf	Cap	40.000 psf
Longitudinal	19.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W11 Name: Angle: 75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	6.47	0.50	----	----
UDL	Z	----	-0.26	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.55
1	1	Y	0.93
1	1	Z	-1.88
1	2	X	1.55
1	2	Y	-0.00
1	2	Z	-1.88
1	3	X	1.55
1	3	Y	-0.00
1	3	Z	-1.88
1	4	X	1.55
1	4	Y	-0.00
1	4	Z	-1.88
1	5	X	1.55
1	5	Y	-0.93
1	5	Z	-1.88
2	1	X	1.55
2	1	Y	0.93
2	1	Z	-1.88
2	2	X	1.55
2	2	Y	-0.00
2	2	Z	-1.88
2	3	X	1.55
2	3	Y	-0.00
2	3	Z	-1.88
2	4	X	1.55
2	4	Y	-0.00
2	4	Z	-1.88
2	5	X	1.55
2	5	Y	-0.93
2	5	Z	-1.88

Auto generation details
Generated Wind Load on Structure
Angle of wind = 75.00 deg Elevation above which wind load acts = 65.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	11.000 psf	Cap	40.000 psf
Longitudinal	22.000 psf	Column	40.000 psf
Overturning	not considered		

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Loadcase ID: WL1 Name: Angle: -60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.24
1	1	Y	0.36
1	1	Z	0.43
1	2	X	0.24
1	2	Y	-0.00
1	2	Z	0.43
1	3	X	0.24
1	3	Y	-0.00
1	3	Z	0.43
1	4	X	0.24
1	4	Y	-0.00
1	4	Z	0.43
1	5	X	0.24
1	5	Y	-0.36
1	5	Z	0.43
2	1	X	0.24
2	1	Y	0.36
2	1	Z	0.43
2	2	X	0.24
2	2	Y	-0.00
2	2	Z	0.43
2	3	X	0.24
2	3	Y	-0.00
2	3	Z	0.43
2	4	X	0.24
2	4	Y	-0.00
2	4	Z	0.43
2	5	X	0.24
2	5	Y	-0.36
2	5	Z	0.43

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -60.00 deg Live load length = 96.75 ft

Loadcase ID: WL2 Name: Angle: -45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.55
1	1	Y	0.83
1	1	Z	0.45
1	2	X	0.55
1	2	Y	-0.00
1	2	Z	0.45
1	3	X	0.55
1	3	Y	-0.00
1	3	Z	0.45
1	4	X	0.55
1	4	Y	-0.00
1	4	Z	0.45
1	5	X	0.55

1	5	Y	-0.83
1	5	Z	0.45
2	1	X	0.55
2	1	Y	0.83
2	1	Z	0.45
2	2	X	0.55
2	2	Y	-0.00
2	2	Z	0.45
2	3	X	0.55
2	3	Y	-0.00
2	3	Z	0.45
2	4	X	0.55
2	4	Y	-0.00
2	4	Z	0.45
2	5	X	0.55
2	5	Y	-0.83
2	5	Z	0.45

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -45.00 deg Live load length = 96.75 ft

Loadcase ID: WL3 Name: Angle: -30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.72
1	1	Y	1.08
1	1	Z	0.40
1	2	X	0.72
1	2	Y	-0.00
1	2	Z	0.40
1	3	X	0.72
1	3	Y	-0.00
1	3	Z	0.40
1	4	X	0.72
1	4	Y	-0.00
1	4	Z	0.40
1	5	X	0.72
1	5	Y	-1.08
1	5	Z	0.40
2	1	X	0.72
2	1	Y	1.08
2	1	Z	0.40
2	2	X	0.72
2	2	Y	-0.00
2	2	Z	0.40
2	3	X	0.72
2	3	Y	-0.00
2	3	Z	0.40
2	4	X	0.72
2	4	Y	-0.00
2	4	Z	0.40
2	5	X	0.72
2	5	Y	-1.08
2	5	Z	0.40

Auto generation details

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Generated Wind Load on Live Load
Angle of wind = -30.00 deg Live load length = 96.75 ft

Loadcase ID: WL4 Name: Angle: -15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.80
1	1	Y	1.21
1	1	Z	0.30
1	2	X	0.80
1	2	Y	-0.00
1	2	Z	0.30
1	3	X	0.80
1	3	Y	-0.00
1	3	Z	0.30
1	4	X	0.80
1	4	Y	-0.00
1	4	Z	0.30
1	5	X	0.80
1	5	Y	-1.21
1	5	Z	0.30
2	1	X	0.80
2	1	Y	1.21
2	1	Z	0.30
2	2	X	0.80
2	2	Y	-0.00
2	2	Z	0.30
2	3	X	0.80
2	3	Y	-0.00
2	3	Z	0.30
2	4	X	0.80
2	4	Y	-0.00
2	4	Z	0.30
2	5	X	0.80
2	5	Y	-1.21
2	5	Z	0.30

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -15.00 deg Live load length = 96.75 ft

Loadcase ID: WL5 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.94
1	1	Y	1.41
1	1	Z	0.22
1	2	X	0.94
1	2	Y	-0.00
1	2	Z	0.22
1	3	X	0.94
1	3	Y	-0.00
1	3	Z	0.22

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1	4	X	0.94
1	4	Y	-0.00
1	4	Z	0.22
1	5	X	0.94
1	5	Y	-1.41
1	5	Z	0.22
2	1	X	0.94
2	1	Y	1.41
2	1	Z	0.22
2	2	X	0.94
2	2	Y	-0.00
2	2	Z	0.22
2	3	X	0.94
2	3	Y	-0.00
2	3	Z	0.22
2	4	X	0.94
2	4	Y	-0.00
2	4	Z	0.22
2	5	X	0.94
2	5	Y	-1.41
2	5	Z	0.22

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 96.75 ft

Loadcase ID: WL6 Name: Angle: 15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.86
1	1	Y	1.28
1	1	Z	0.08
1	2	X	0.86
1	2	Y	-0.00
1	2	Z	0.08
1	3	X	0.86
1	3	Y	-0.00
1	3	Z	0.08
1	4	X	0.86
1	4	Y	-0.00
1	4	Z	0.08
1	5	X	0.86
1	5	Y	-1.28
1	5	Z	0.08
2	1	X	0.86
2	1	Y	1.28
2	1	Z	0.08
2	2	X	0.86
2	2	Y	-0.00
2	2	Z	0.08
2	3	X	0.86
2	3	Y	-0.00
2	3	Z	0.08
2	4	X	0.86
2	4	Y	-0.00
2	4	Z	0.08
2	5	X	0.86

2	5	Y	-1.28
2	5	Z	0.08

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 15.00 deg Live load length = 96.75 ft

Loadcase ID: WL7 Name: Angle: 30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.83
1	1	Y	1.24
1	1	Z	-0.05
1	2	X	0.83
1	2	Y	-0.00
1	2	Z	-0.05
1	3	X	0.83
1	3	Y	-0.00
1	3	Z	-0.05
1	4	X	0.83
1	4	Y	-0.00
1	4	Z	-0.05
1	5	X	0.83
1	5	Y	-1.24
1	5	Z	-0.05
2	1	X	0.83
2	1	Y	1.24
2	1	Z	-0.05
2	2	X	0.83
2	2	Y	-0.00
2	2	Z	-0.05
2	3	X	0.83
2	3	Y	-0.00
2	3	Z	-0.05
2	4	X	0.83
2	4	Y	-0.00
2	4	Z	-0.05
2	5	X	0.83
2	5	Y	-1.24
2	5	Z	-0.05

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 30.00 deg Live load length = 96.75 ft

Loadcase ID: WL8 Name: Angle: 45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.69
1	1	Y	1.04
1	1	Z	-0.16
1	2	X	0.69
1	2	Y	-0.00

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1	2	Z	-0.16
1	3	X	0.69
1	3	Y	-0.00
1	3	Z	-0.16
1	4	X	0.69
1	4	Y	-0.00
1	4	Z	-0.16
1	5	X	0.69
1	5	Y	-1.04
1	5	Z	-0.16
2	1	X	0.69
2	1	Y	1.04
2	1	Z	-0.16
2	2	X	0.69
2	2	Y	-0.00
2	2	Z	-0.16
2	3	X	0.69
2	3	Y	-0.00
2	3	Z	-0.16
2	4	X	0.69
2	4	Y	-0.00
2	4	Z	-0.16
2	5	X	0.69
2	5	Y	-1.04
2	5	Z	-0.16

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 45.00 deg Live load length = 96.75 ft

Loadcase ID: WL9 Name: Angle: 60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.40
1	1	Y	0.60
1	1	Z	-0.28
1	2	X	0.40
1	2	Y	-0.00
1	2	Z	-0.28
1	3	X	0.40
1	3	Y	-0.00
1	3	Z	-0.28
1	4	X	0.40
1	4	Y	-0.00
1	4	Z	-0.28
1	5	X	0.40
1	5	Y	-0.60
1	5	Z	-0.28
2	1	X	0.40
2	1	Y	0.60
2	1	Z	-0.28
2	2	X	0.40
2	2	Y	-0.00
2	2	Z	-0.28
2	3	X	0.40
2	3	Y	-0.00
2	3	Z	-0.28

2	4	X	0.40
2	4	Y	-0.00
2	4	Z	-0.28
2	5	X	0.40
2	5	Y	-0.60
2	5	Z	-0.28

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 60.00 deg Live load length = 96.75 ft

Loadcase ID: WL10 Name: Angle: 75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.22
1	1	Y	0.34
1	1	Z	-0.37
1	2	X	0.22
1	2	Y	-0.00
1	2	Z	-0.37
1	3	X	0.22
1	3	Y	-0.00
1	3	Z	-0.37
1	4	X	0.22
1	4	Y	-0.00
1	4	Z	-0.37
1	5	X	0.22
1	5	Y	-0.34
1	5	Z	-0.37
2	1	X	0.22
2	1	Y	0.34
2	1	Z	-0.37
2	2	X	0.22
2	2	Y	-0.00
2	2	Z	-0.37
2	3	X	0.22
2	3	Y	-0.00
2	3	Z	-0.37
2	4	X	0.22
2	4	Y	-0.00
2	4	Z	-0.37
2	5	X	0.22
2	5	Y	-0.34
2	5	Z	-0.37

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 75.00 deg Live load length = 96.75 ft

Loadcase ID: WL11 Name: Angle: -75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.04

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1	1	Y	-0.06
1	1	Z	-0.43
1	2	X	-0.04
1	2	Y	-0.00
1	2	Z	-0.43
1	3	X	-0.04
1	3	Y	-0.00
1	3	Z	-0.43
1	4	X	-0.04
1	4	Y	-0.00
1	4	Z	-0.43
1	5	X	-0.04
1	5	Y	0.06
1	5	Z	-0.43
2	1	X	-0.04
2	1	Y	-0.06
2	1	Z	-0.43
2	2	X	-0.04
2	2	Y	-0.00
2	2	Z	-0.43
2	3	X	-0.04
2	3	Y	-0.00
2	3	Z	-0.43
2	4	X	-0.04
2	4	Y	-0.00
2	4	Z	-0.43
2	5	X	-0.04
2	5	Y	0.06
2	5	Z	-0.43

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -75.00 deg Live load length = 96.75 ft

Loadcase ID: LF1 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32

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2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load
Number of loaded lanes = 3
Contributing longitudinal length = 192.00 ft

Loadcase ID: LF2 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	-----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

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Loadcase ID: LF3 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF4 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80

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1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF5 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53

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2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF6 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF7 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm	Mag1	x1/L	Mag2	x2/L

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		ft	kips, klf,k-ft		kips, klf,k-ft	
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF8 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm	Mag1	x1/L	Mag2	x2/L
		ft	kips, klf,k-ft		kips, klf,k-ft	
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53

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1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF9 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF10 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF11 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips

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1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF12 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32

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2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF13 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF14 Name:
Multiplier = 1.000

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Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-294.86	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.53
1	1	Z	-2.32
1	1	Y	0.80
1	2	X	0.53
1	2	Z	-2.32
1	3	X	0.53
1	3	Z	-2.32
1	4	X	0.53
1	4	Z	-2.32
1	5	X	0.53
1	5	Z	-2.32
1	5	Y	-0.80
2	1	X	0.53
2	1	Z	-2.32
2	1	Y	0.80
2	2	X	0.53
2	2	Z	-2.32
2	3	X	0.53
2	3	Z	-2.32
2	4	X	0.53
2	4	Z	-2.32
2	5	X	0.53
2	5	Z	-2.32
2	5	Y	-0.80

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: T1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.79
1	1	Z	-12.10
1	2	X	2.79
1	2	Z	-12.10
1	3	X	2.79
1	3	Z	-12.10
1	4	X	2.79
1	4	Z	-12.10
1	5	X	2.79
1	5	Z	-12.10
2	1	X	2.79
2	1	Z	-12.10
2	2	X	2.79

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2	2	Z	-12.10
2	3	X	2.79
2	3	Z	-12.10
2	4	X	2.79
2	4	Z	-12.10
2	5	X	2.79
2	5	Z	-12.10

Auto generation details
Bearing type: Fixed Bearings.
Direction of thermal force: +(Z)
Length of Superstructure Contributing, L: 267.000 ft
Change in temperature: 70.000 °F
Coefficient of thermal expansion: 6.0e-006 ft/°F

Selected load groups:

SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
SERVICE GROUP V
SERVICE GROUP VI
SERVICE GROUP VII
SERVICE GROUP VIII
SERVICE GROUP IX
SERVICE GROUP X
LOAD FACTOR GROUP I
LOAD FACTOR GROUP II
LOAD FACTOR GROUP III
LOAD FACTOR GROUP IV
LOAD FACTOR GROUP V
LOAD FACTOR GROUP VI
LOAD FACTOR GROUP VII
LOAD FACTOR GROUP VIII
LOAD FACTOR GROUP IX
LOAD FACTOR GROUP X

PROJECT: Hammer Head Pier - SCI-823 Over Swauger/Minford Valley Road

CAP DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Upstation.

DESIGN PARAMETERS:

f'c = 4000.0 psi
Fy flex = 60000.0 psi Fy shear = 60000.0 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
crack control factor z = 170.00 kips / in
Concrete Type : Normal Weight.
Design : face of column.

CAP GEOMETRY:

Hammer Head Cap : Length(X) = 46.50 ft Depth(Z) = 54.00 in

MAIN REINFORCEMENT:

Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP						
# 10	15	3.26	19.050	0.00	46.50	Both
# 10	4	6.43	5.080	0.00	46.50	Both
BOTTOM						
# 10	2	3.26	2.540	0.00	19.45	Left
# 10	2	3.26	2.540	15.43	31.07	None
# 10	2	3.26	2.540	27.05	46.50	Right

STIRRUPS:

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	2.04	# 5	4	18.00	0.83
2.04	13.98	# 5	4	3.00	4.96
13.98	32.52	# 5	4	12.00	1.24
32.52	44.46	# 5	4	3.00	4.96
44.46	46.50	# 5	4	18.00	0.83

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN:

Span 1: From 0.00 ft To 23.25 ft

Loc ft	AbsLoc ft	H in	Mmax / Mmin kips-ft	pMn / pMn kips-ft	Comb / Comb	Asb-req / Asb-req in^2	Asb-prv / Asb-prv in^2	Asb-eff / Asb-eff in^2	Ast-req / Ast-req in^2	Ast-prv / Ast-prv in^2	Ast-eff / Ast-eff in^2
2.0	2.0	58	30.4	675.5	2027	0.17	2.54	2.54	0.00	24.13	24.13
			-33.1	-5441.6	1386	0.00	2.54	2.54	0.18	24.13	24.13
12.6	12.6	108	0.0	1247.7	0	0.00	2.54	2.54	0.00	24.13	24.13

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			-8650.8	-10876.6	1356	0.00	2.54	2.54	19.11	24.13	24.13
14.0	14.0	114	0.0	1320.1	0	0.00	2.54	2.54	0.00	24.13	24.13
			-11029.3	-11564.8	1356	0.00	2.54	2.54	23.06	24.13	24.13

Span 2: From 23.25 ft To 46.50 ft

Loc	AbsLoc	H	Mmax Mmin	pMn pMn	Comb Comb	Asb-req Asb-req	Asb-prv Asb-prv	Asb-eff Asb-eff	Ast-req Ast-req	Ast-prv Ast-prv	Ast-eff Ast-eff
ft	ft	in	kips-ft	kips-ft		in^2	in^2	in^2	in^2	in^2	in^2
9.3	32.5	114	0.0	1320.1	0	0.00	2.54	2.54	0.00	24.13	24.13
			-11022.5	-11564.8	1356	0.00	2.54	2.54	23.04	24.13	24.13
10.6	33.9	108	0.0	1247.9	0	0.00	2.54	2.54	0.00	24.13	24.13
			-8651.1	-10878.7	1356	0.00	2.54	2.54	19.10	24.13	24.13
21.2	44.5	58	17.0	675.8	1386	0.09	2.54	2.54	0.00	24.13	24.13
			-45.8	-5443.6	2027	0.00	2.54	2.54	0.25	24.13	24.13

SHEAR AND TORSION DESIGN:

Span 1: From 0.00 ft To 23.25 ft

Loc	AbsLoc	Pos	Vu	Comb	Tu	Comb	phi*Vc	T-lim	Avs/s	2Ats/s	Av/s	Aprv/s	Alt
ft	ft		kips		kips-ft		kips	kips-ft	<---------	in^2/ft		-------->	in^2
2.04	2.04	L	7.9	1356	0.0	0	311.7	194.2	0.00	0.00	0.00	0.83	0.00
		R	782.8	1356	395.1	1356	311.7	194.2	2.07	0.50	2.57	4.96	11.96
12.64	12.64	L	846.9	1356	395.1	1356	602.3	468.3	0.55	0.00	0.55	4.96	0.00
		R	1765.6	1356	951.8	1356	602.3	468.3	2.64	0.62	3.26	4.96	22.94
13.98	13.98	L	1776.5	1356	951.8	1356	639.1	505.3	2.43	0.59	3.02	4.96	24.88

Span 2: From 23.25 ft To 46.50 ft

Loc	AbsLoc	Pos	Vu	Comb	Tu	Comb	phi*Vc	T-lim	Avs/s	2Ats/s	Av/s	Aprv/s	Alt
ft	ft		kips		kips-ft		kips	kips-ft	<---------	in^2/ft		-------->	in^2
9.27	32.52	R	1776.5	1356	951.8	1356	639.1	505.3	2.43	0.59	3.02	4.96	24.88
10.60	33.85	L	1765.6	1356	951.8	1356	602.4	468.4	2.64	0.62	3.26	4.96	22.95
		R	847.0	1356	395.1	1356	602.4	468.4	0.55	0.00	0.55	4.96	0.00
21.21	44.46	L	782.9	1356	395.1	1356	311.8	194.3	2.06	0.50	2.57	4.96	11.96
		R	7.9	1356	0.0	0	311.8	194.3	0.00	0.00	0.00	0.83	0.00

Note:

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

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CRACKING/FATIGUE CHECK:

Span 1: From 0.00 ft To 23.25 ft

Loc	AbsLoc	H	<------ Cracking ------> fs-t / fs-b	ratio fs-t / ratio fs-b	Comb	<------ Fatigue ------> fs-t / fs-b	ratio fs-t / ratio fs-b
ft	ft	in	ksi			ksi	
2.04	2.0	57.6	0.3	0.01	31	0.0	0.00
			2.2	0.09	672	0.0	0.00
12.64	12.6	107.7	29.6	0.82	569	8.9	0.50
			0.0	0.00	0	0.0	0.00
13.98	14.0	114.0	35.2	0.98	569	10.9	0.66
			0.0	0.00	0	0.0	0.00

Span 2: From 23.25 ft To 46.50 ft

Loc	AbsLoc	H	<------ Cracking ------> fs-t / fs-b	ratio fs-t / ratio fs-b	Comb	<------ Fatigue ------> fs-t / fs-b	ratio fs-t / ratio fs-b
ft	ft	in	ksi			ksi	
9.27	32.5	114.0	34.6	0.96	759	10.9	0.66
			0.0	0.00	0	0.0	0.00
10.60	33.9	107.7	29.1	0.81	759	8.9	0.50
			0.0	0.00	0	0.0	0.00
21.21	44.5	57.6	0.4	0.01	672	0.0	0.00
			1.2	0.05	31	0.0	0.00

* Cracking / fatigue checking failed.

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COLUMN DESIGN

COLUMN DESIGN - Column: 1

Column Type: Rectangular 222.36 x 54.00 in

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design
Units: US
Pier View : Upstation.
Design/Analysis Method: No Slenderness Considered.

DESIGN PARAMETERS:

f'c = 4000.0 psi fy = 60000.0 psi
phi flex = 0.90 phi axial = 0.70
Ec = 3834.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:

Rebar Pattern: Rectangular
Rebar Orientation: Face Parallel

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	10	40	3.13
1	Z	10	10	3.13

Main bars summary: 96 # 10 bars Ties size: # 4

Total number of bars in the column: 96

Design values used - (e-min effect included).

(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	2C	-0.0	4638.2	0.0	-2460.3	0.0	-2810.3
58.50	2C	-0.0	4016.3	0.0	2460.3	0.0	2433.5
0.00	1706C	-36.3	2606.2	200.0	12740.2	0.3	5171.1
58.50	1706C	36.3	2008.1	-200.0	-1037.9	0.3	-3047.3

Column Design

Loc ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	1706C	2606.2	12740.2	5171.1	16911.6	22.09	1.00	1.23
58.50	2C	4016.3	2460.3	2433.5	22037.2	44.69	1.00	6.37

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ISOLATED FOOTING DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Upstation.

Geometry:

Name : SpreadFooting
Shape : Rectangular, Type : Spread

Bf(X) = 28.00 ft, Hf(Z) = 22.00 ft, Thickness(Y) = 54.00 in

Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 222.36 in x 54.00 in

Ag = 616.00 ft^2, Ix = 24845.34 ft^4, Iz = 40245.34 ft^4

Surcharge = 0.24 ksf

Design Parameters:

f'c = 4000.00 psi fy = 60000.00 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in
Concrete Type : Normal Weight.

Max Soil Pressures, Service (Without the reduction of overstress allowance):

Corner	X ft	Z ft	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	14.00	-11.00	789	1.400	-2733.96	-9114.24	-5922.73	11.45
			601	1.250	-2733.96	1938.41	4425.37	2.96
2	-14.00	-11.00	917	1.400	-2762.11	-9213.24	2516.82	10.35
			20	1.250	-2420.31	735.21	-4582.53	2.92
3	-14.00	11.00	569	1.250	-3364.31	2353.05	2397.66	8.25
			769	1.400	-2648.64	-8933.35	-6001.18	-0.83*
4	14.00	11.00	387	1.250	-3336.16	3313.50	-1063.26	8.17
			889	1.400	-2733.96	-9637.70	1973.42	0.40

Max Soil Pressures, Factored:

Corner	X ft	Z ft	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	14.00	-11.00	2144	---	-3417.45	-11392.81	-7403.41	14.31
			1956	---	-3554.14	2519.94	5752.98	3.84
2	-14.00	-11.00	2272	---	-3452.64	-11516.55	3146.02	12.94
			2680	---	-2904.37	882.25	-5499.04	3.51
3	-14.00	11.00	1924	---	-4373.60	3058.97	3116.96	10.73
			2124	---	-3310.80	-11166.68	-7501.47	-1.04*
4	14.00	11.00	1742	---	-4337.00	4307.55	-1382.24	10.62
			2244	---	-3417.45	-12047.13	2466.78	0.50

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Max Soil Pressures, Service (After the reduction of overstress allowance):

Corner	X ft	Z ft	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	14.00	-11.00	789	1.400	-2733.96	-9114.24	-5922.73	8.18
			601	1.250	-2733.96	1938.41	4425.37	2.36
2	-14.00	-11.00	917	1.400	-2762.11	-9213.24	2516.82	7.40
			1325	1.500	-2420.31	735.21	-4582.53	1.95
3	-14.00	11.00	1	1.000	-3336.16	924.75	3.88	6.74
			769	1.400	-2648.64	-8933.35	-6001.18	-0.59*
4	14.00	11.00	1	1.000	-3336.16	924.75	3.88	6.74
			889	1.400	-2733.96	-9637.70	1973.42	0.29

Note:
* Negative pressure.
Only max. positive pressure is considered for design.

Max. Soil Pressure Used in Design: (User specified values)

Factored soil pressure = 0.00 ksf

Service soil pressure = 80.00 ksf

Reinforcement Schedule:

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	46	# 8	5.25	36.34	5.71	Both
Z	83	# 11	4.00	129.48	4.01	Both

Flexure:

Dir	Loc ft	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-9.27	48.75	0.0	U	0.00	36.34	36.34	0.00	0.00	0.00
X	9.27	48.75	0.0	U	0.00	36.34	36.34	0.00	0.00	0.00
Z	-2.25	50.00	0.0	U	0.00	129.48	129.48	0.00	0.00	0.00
Z	2.25	50.00	0.0	U	0.00	129.48	129.48	0.00	0.00	0.00

Note:
*** U: User specified values of soil pressure/pile reaction used.

Cracking/Fatigue

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Dir	Loc ft	d in	<-- Cracking --> Mmax kft	Comb	fs ksi	ratio fs	<-- Fatigue --> Mmax kft	Comb	fs ksi	ratio fs
X	-9.27	48.75	19729.8	U	142.50	4.55 *	0.0	U	0.00	0.00
X	9.27	48.75	19729.8	U	142.50	4.55 *	0.0	U	0.00	0.00
Z	-2.25	50.00	85750.0	U	175.83	5.27 *	0.0	U	0.00	0.00
Z	2.25	50.00	85750.0	U	175.83	5.27 *	0.0	U	0.00	0.00

Note:
* Cracking / fatigue ratio exceeds allowable.

U: User specified values of soil pressure/pile reaction used.

One Way Shear :

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-13.33	U	48.75	0.0	1383.7
	X	13.33	U	48.75	0.0	1383.7
	Z	-6.42	U	50.00	0.0	1806.3
	Z	6.42	U	50.00	0.0	1806.3

Note:
U: User specified values of soil pressure/pile reaction used.

Two Way Shear:

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns:						
1	------	------	---	No Two Way Shear		

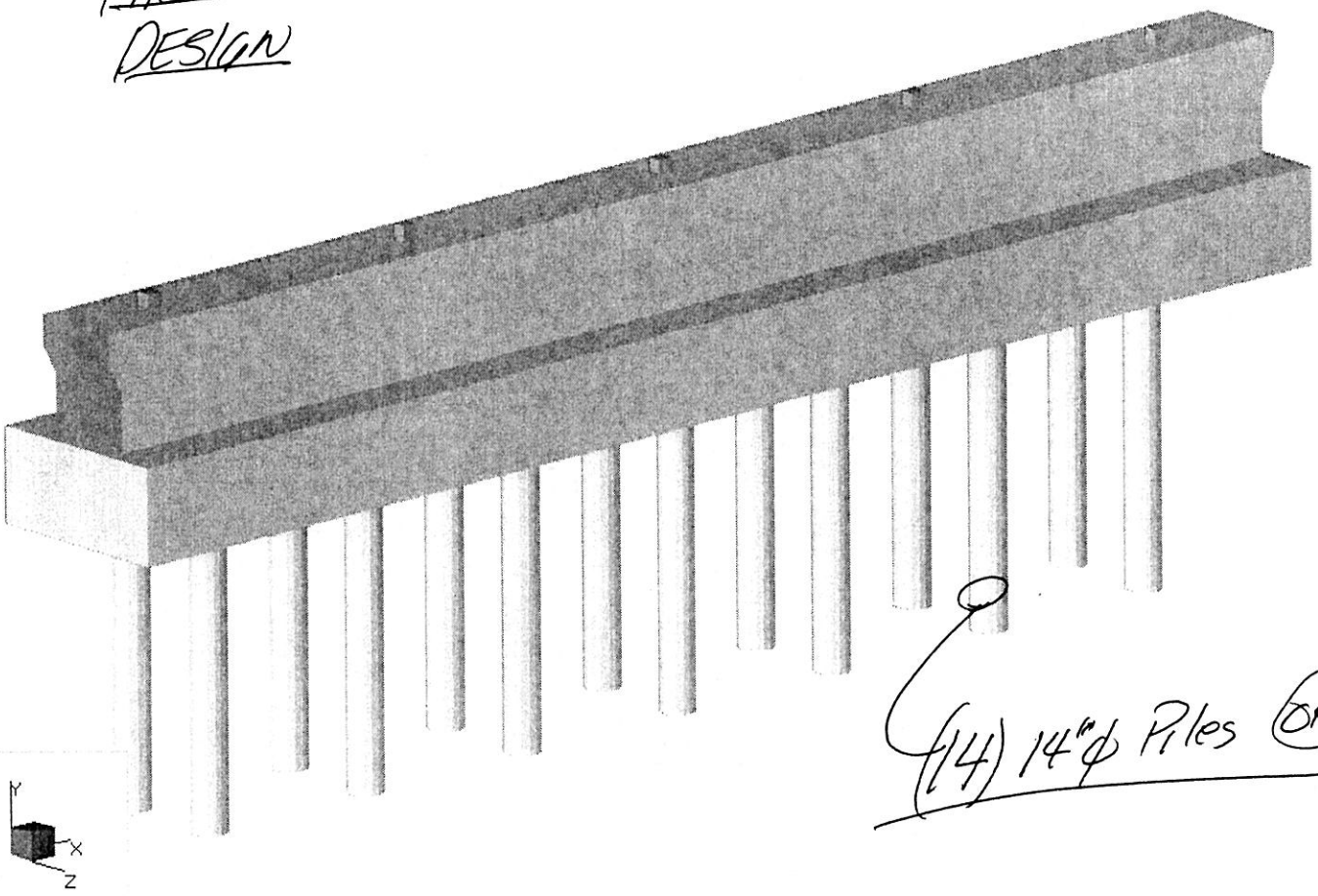
Note:
TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

KZF Design Inc | PHONE: 513-621-6211 | SHEET 1 OF 1
655 Eden Park Dr | Cincinnati, OH 45202 | JOB NO. #5355.02
PROGRAM: RC-PIER® v7.1.0 LEAP Software Inc., Tampa, Florida | BY def DATE Feb, 2008
PHONE : TOLL-FREE 1-800-451-5327 TAMPA AREA: 813-985-9170 | CKD. DATE

PROJECT: SCCI 823 over SwaugerValley/Minford Road

FULL IMAGE:

• Abutment
- PRELIMINARY DESIGN



(14) 14"φ Piles OK

Report of:

Subsurface Exploration
Bridge and MSE Retaining Walls
SR 823 Over Swauger Valley-Minford Road
SCI-823-0.00 Portsmouth Bypass
Scioto County, Ohio

Prepared for:

TranSystems Corporation
5747 Perimeter Drive, Suite 240
Dublin, Ohio 43017

Ohio Department of Transportation
District 9

DLZ Ohio, Inc.
6121 Huntley Road
Columbus, OH 43229
Phone: (614) 888-0040
Fax: (614) 436-0161

DLZ Job No. 0121-3370.03

September 26, 2006

Prepared by

DLZ

REPORT

OF

SUBSURFACE EXPLORATION

FOR

BRIDGE AND MSE RETAINING WALLS

SR 823 OVER SWAUGER VALLEY – MINFORD ROAD

SCI-823-0.00 PORTSMOUTH BYPASS

SCIOTO COUNTY, OHIO

For:

TranSystems Corporation
5747 Perimeter Drive, Suite 240
Dublin, Ohio 43017

By:

DLZ OHIO, INC.
6121 Huntley Road
Columbus, OH 43229

DLZ Job. No. 0121-3070.03

September 26, 2006

The approximate bearing elevations presented below indicate the elevations at the boring locations only. Variations in the elevation at which competent bedrock is encountered should be anticipated.

Table 2-Summary of Foundation Recommendation

Structural Element	Structure / Boring	Existing Ground Surface Elevation (Feet)	Foundation Type	Approximate Bearing Elevation (Feet)	Allowable Bearing Capacity
Rear Abutment	Left / B-9	647.5 +	Pipe Piles	636.5 *	Pile Capacity ++
			Drilled Shafts	636.5 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
	Right / TR-22	636.2	Pipe Piles	625.2 *	Pile Capacity ++
			Drilled Shafts	625.2 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
Pier	Left / B-8	638.4	Spread Footings	627.9	80 ksf
			Drilled Shafts	622.9 *	80 ksf +++
	Right / B-6	635.9	Spread Footings	627.4	80 ksf
			Drilled Shafts	622.4 *	80 ksf +++
Forward Abutment	Left / B-7	658.0 +	Pipe Piles	647.0 *	Pile Capacity ++
			Drilled Shafts	647.0 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf
	Right / B-5	644.0 +	Pipe Piles	635.5 *	Pile Capacity ++
			Drilled Shafts	635.5 *	80 ksf +++
			Spread Footings	MSE Fill**	4 ksf

* Includes 5-foot socket into competent rock.

** Bearing elevation should be determined by a qualified engineer as the foundation alternative is selected.

+ Ground surface elevation was estimated from the established topographic mapping in lieu of as-drilled survey information.

++ Pile capacity should conform to ODOT BDM 202.2.3.2.

+++ End bearing capacity only.

5.2 Mechanically Stabilized Earth (MSE) Retaining Wall Recommendations

It is understood that MSE walls would be used to construct the embankments and contain the abutments. Recommendations for the MSE wall are presented in the following sections. The MSE wall should be constructed per the recommendations presented in this report and in conformance with the manufacturer's specifications.

5.2.1 MSE Walls: General Information

An MSE retaining wall essentially consists of good quality backfill material with layers of metal or plastic reinforcing that are attached to concrete facing panels. The MSE wall and associated backfill should be constructed in accordance with the specifications of the manufacturer of the MSE wall.

Pipe Pile Diameter	Design Load	Ultimate Bearing Value
12 inch	50 tons	100 tons
14 inch	70 tons	140 tons
16 inch	90 tons	180 tons

Pipe Pile Diameter	Design Load	Ultimate Bearing Value
300 mm	450 kN	900 kN
350 mm	650 kN	1300 kN
400 mm	800 kN	1600 kN

Ultimate Bearing load is equal to the actual unfactored design load multiplied by a safety factor of two (2). The design values for pipe piles are based on a maximum allowable service load stress on the pile wall thickness of roughly 10 ksi [69 MPa] for ASTM A 252 Grade 2 steel, Fy = 35 ksi [Fy = 240 MPa].

The actual value listed in the structure general notes should not be the Ultimate Bearing Value of the Pipe pile size selected but the calculated Ultimate Bearing Value load of the substructure unit or units.

For capped-pile piers with cast-in-place piles, 16 inch [400 mm] diameter piles shall be used. 16 inch [400 mm] diameter piles with additional reinforcing steel are preferred because the need for pile encasement is eliminated. Additional reinforcing steel which consists of 8 - #6 [19M] epoxy coated reinforcing bars with #4 [13M] spiral at 12 inch [300 mm] pitch should be provided for 16 inch [400 mm] diameter piles. Reinforcing steel shall be detailed on the plans, included in the reinforcing steel list, and be paid for under Item 507, 16 Inch [400 mm] Cast-In-Place Piles Furnished, As Per Plan. The reinforcing steel cage should extend 15 feet [5 meters] below the flow line and into the pier cap. Pile encasement is not used when additional reinforcement is provided. Painting of the cast-in-place reinforced concrete pile is not required.

For capped-pile piers where the exposed length of the piles is more than 20 feet [6 meters], 18 inch [450 mm] diameter piles can be used. Consult the Office of Structural Engineering before recommending the use of 18 inch [450 mm] diameter piles.

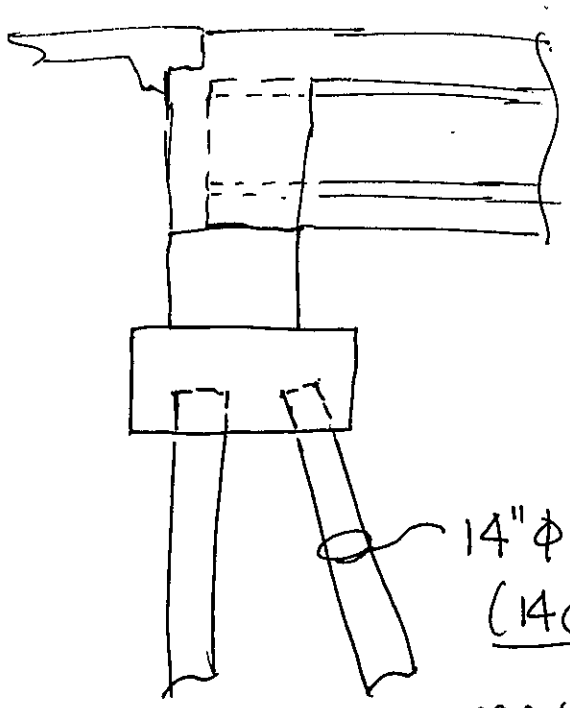
202.2.3.2.c DOWN DRAG FORCES ON PILES

When a significant height of new embankment is constructed over a compressible layer of soil and long term settlement is anticipated, the possibility of down drag forces on the piles should be considered. The extra load that the pile receives due to the down drag force should be computed and accounted for by driving the piles to a higher design load capacity. For example, the total design load for the piles should be equal to Dead Load + Live Load + Down Drag Force. See Section 600 of this Manual for note.

PROJECT: SCCI 823 over SwaugerValley/Minford Road

PROJECT DATA

Project : SCCI 823 over SwaugerValley/Minford Road
User Job No.: #5355.02
State : OH State Job No. : SCI-823-6.81; PID19415
Pier View : Upstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments :



14"ϕ Pipe Piles

14"ϕ Pipe Piles
(14@ Abutment)

MAX LOAD
= 151.07 KIPS

ok

PROJECT: SCCI 823 over SwaugerValley/Minford Road

PIER GEOMETRY

Pier Type: Hammer Head

Pier View : Upstation.
Length(X) = 48.50 ft Height max(Y) = 2.00 ft Height min(Y) = 1.00 ft
Bottom length(X) = 47.50 ft Depth(Z) = 3.00 ft Skew angle = 13.00 Reduction of I = 1.0(

Column Shape: Rectangular Non Tapered
Bottom width(X) = 47.50 ft Top width(X) = 47.50 ft Depth(Z) = 3.00 ft Height(Y) = 2.00 ft
Column Bottom has Diagonal Spring Matrix Defined
Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

STRUCTURE MODEL

FRAME Model:

	Member	Node	Hinge	Check Pt Dist(ft)	Memb length(ft)
Column No. 1					
	1	1	-	0.00	
		2	-	3.50	3.50
Cap					
	2	3	-	0.00	
		4	-	0.50	0.50
	3	4	-	0.50	
		5	-	3.00	2.50
	4	5	-	3.00	
		6	-	13.61	10.61
	5	6	-	13.61	
		7	-	24.21	10.61
	6	7	-	24.21	
		2	-	24.25	0.04
	7	2	-	24.25	
		8	-	34.82	10.57
	8	8	-	34.82	
		9	-	44.94	10.12
	9	9	-	44.94	
		10	-	48.00	3.06
	10	10	-	48.00	
		11	-	48.50	0.50

Node coordinates:

Number	X(ft)	Y(ft)	Node type
1	24.25	0.00	fixed at ground
2	24.25	3.50	column-cap
3	0.00	3.50	
4	0.50	3.50	
5	3.00	3.50	bearing

PROJECT: SCCI 823 over SwaugerValley/Minford Road

6	13.61	3.50	bearing
7	24.21	3.50	bearing
8	34.82	3.50	bearing
9	44.94	3.50	bearing
10	48.00	3.50	
11	48.50	3.50	

SUPERSTRUCTURE INFO

Total number of spans: 1 Span number rear to current pier: 1
Number of traffic lanes: 3

Beam: height : 72.00 in section area : 956.00 in^2
Beam Inertia (Ixx): 616018.00 in^4 Beam inertia (Iyy): 36570.00 in^4
Beam CG:34.50 in Barrier height : 42.00 in Depth of slab : 8.75 in
Curb to curb distance: 45.500 ft

Span #	Span length	Bridge Width
1	96.000 ft	48.500 ft
		48.500 ft

BEARING POINTS

Number of bearing lines: 1
First bearing line Eccentricity = 0.00 ft

Point	Distance ft
1	3.00
2	13.61
3	24.21
4	34.82
5	44.94

MATERIAL PROPERTIES

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.85
(lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load:

1	Lane	1.00
2	Lanes	1.00
3	Lanes	0.90
more than 3	Lanes	0.75

PROJECT: SCCI 823 over SwaugerValley/Minford Road

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	2.00	1.29
Column	170.00	2.00		1.29
Footing	130.00	3.00	3.00	1.00

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:
- Flexure and tension : 0.90
- Shear and torsion (normal) : 0.85
- (lightweight) : 0.85
- Axial compression (ties): 0.70
- Axial compression (spiral): 0.75

Seismic Overstrength
- Flexure and tension : 1.30
- Axial compression (ties): 1.30
- Axial compression (spiral): 1.30

Response Modification Factor : 3.00

Use core area for plastic hinging calculations.

Design Factors
- Cap Design Factor : 1.20
- Footing Design Factor : 1.20

Plastic Hinge Moment
- Use actual computed Plastic Hinging Moment for each column in all combinations.

PROJECT: SCCI 823 over SwaugerValley/Minford Road

LOADS

Pier View : Upstation.
Load Cases: 36

Loadcase ID: D1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-161.00
1	2	Y	-161.00
1	3	Y	-161.00
1	4	Y	-161.00
1	5	Y	-161.00

Auto generation details

Generated Dead Load
Slab weight = 150.00 pcf Girder weight = 150.00 pcf
Wearing weight = 2.73 plf Barrier load = 1200.00 plf

Loadcase ID: (L+In)1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-107.00
1	2	Y	-107.00
1	3	Y	-107.00
1	4	Y	-107.00
1	5	Y	-107.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 19
Total number of Possible Combination = 289

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Loadcase ID: (L+In)2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-58.98
1	2	Y	-81.25
1	3	Y	-22.27
1	4	Y	0.00
1	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 19
Total number of Possible Combination = 289

Loadcase ID: (L+In)3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-21.81
1	4	Y	-77.45
1	5	Y	-63.24

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Total number of Considered Truck Positions = 19
Total number of Possible Combination = 289

Loadcase ID: (L+In)4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-53.08
1	2	Y	-75.49
1	3	Y	-71.94
1	4	Y	-18.86
1	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: Simple Span Distribution

Selected Vehicles:
HS25 truck
H25/HS25 Lane Load
Military
Transverse Positioning
Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft
Generate Braking/Longitudinal Force = Not Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 19
Total number of Possible Combination = 289

Loadcase ID: W1 Name: Angle: 75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.65	0.50	----	----
UDL	Z	----	0.06	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-1.54
1	1	Y	-0.94
1	1	Z	1.86
1	2	X	-1.54
1	2	Y	-0.00
1	2	Z	1.86
1	3	X	-1.54
1	3	Y	-0.00
1	3	Z	1.86
1	4	X	-1.54

1	4	Y	-0.00
1	4	Z	1.86
1	5	X	-1.54
1	5	Y	0.94
1	5	Z	1.86

Auto generation details
Generated Wind Load on Structure
Angle of wind = 75.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	11.000 psf
Longitudinal	22.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W2 Name: Angle: 60
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-2.04	0.50	----	----
UDL	Z	----	0.05	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-2.05
1	1	Y	-1.25
1	1	Z	1.44
1	2	X	-2.05
1	2	Y	-0.00
1	2	Z	1.44
1	3	X	-2.05
1	3	Y	-0.00
1	3	Z	1.44
1	4	X	-2.05
1	4	Y	-0.00
1	4	Z	1.44
1	5	X	-2.05
1	5	Y	1.25
1	5	Z	1.44

Auto generation details
Generated Wind Load on Structure
Angle of wind = 60.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	17.000 psf
Longitudinal	19.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W3 Name: Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L

Force	X	0.00	-1.91	0.50	----	----
UDL	Z	----	0.02	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-3.51
1	1	Y	-2.14
1	1	Z	0.80
1	2	X	-3.51
1	2	Y	-0.00
1	2	Z	0.80
1	3	X	-3.51
1	3	Y	-0.00
1	3	Z	0.80
1	4	X	-3.51
1	4	Y	-0.00
1	4	Z	0.80
1	5	X	-3.51
1	5	Y	2.14
1	5	Z	0.80

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:
Transverse 33.000 psf
Longitudinal 16.000 psf
Overturning not considered
Wind pressure for substructure:
Cap 40.000 psf
Column 40.000 psf

Loadcase ID: W4 Name: Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.30	0.50	----	----
UDL	Z	----	0.01	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-4.19
1	1	Y	-2.55
1	1	Z	0.24
1	2	X	-4.19
1	2	Y	-0.00
1	2	Z	0.24
1	3	X	-4.19
1	3	Y	-0.00
1	3	Z	0.24
1	4	X	-4.19
1	4	Y	-0.00
1	4	Z	0.24
1	5	X	-4.19
1	5	Y	2.55
1	5	Z	0.24

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	41.000 psf
Longitudinal	12.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W5 Name: Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-0.37	0.50	----	----
UDL	Z	----	0.00	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-4.34
1	1	Y	-2.65
1	1	Z	-0.40
1	2	X	-4.34
1	2	Y	-0.00
1	2	Z	-0.40
1	3	X	-4.34
1	3	Y	-0.00
1	3	Z	-0.40
1	4	X	-4.34
1	4	Y	-0.00
1	4	Z	-0.40
1	5	X	-4.34
1	5	Y	2.65
1	5	Z	-0.40

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	44.000 psf
Longitudinal	6.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W6 Name: Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.07	0.50	----	----
UDL	Z	----	-0.01	0.00	----	1.00

Bearing loads:

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Line #	Bearing #	Dir.	Load, kips
1	1	X	-4.78
1	1	Y	-7.06
1	1	Z	-1.10
1	2	X	-4.78
1	2	Y	9.31
1	2	Z	-1.10
1	3	X	-4.78
1	3	Y	9.31
1	3	Z	-1.10
1	4	X	-4.78
1	4	Y	9.31
1	4	Z	-1.10
1	5	X	-4.78
1	5	Y	25.69
1	5	Z	-1.10

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	50.000 psf	Cap	40.000 psf
Longitudinal	0.000 psf	Column	40.000 psf
Overturning	20.000 psf		

Loadcase ID: W7 Name: Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.79	0.50	----	----
UDL	Z	----	-0.02	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-4.08
1	1	Y	-2.49
1	1	Z	-1.55
1	2	X	-4.08
1	2	Y	-0.00
1	2	Z	-1.55
1	3	X	-4.08
1	3	Y	-0.00
1	3	Z	-1.55
1	4	X	-4.08
1	4	Y	-0.00
1	4	Z	-1.55
1	5	X	-4.08
1	5	Y	2.49
1	5	Z	-1.55

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Wind pressure for superstructure:

Transverse	44.000 psf
Longitudinal	6.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W8 Name: Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-2.05	0.50	----	----
UDL	Z	----	-0.04	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-3.66
1	1	Y	-2.23
1	1	Z	-2.05
1	2	X	-3.66
1	2	Y	-0.00
1	2	Z	-2.05
1	3	X	-3.66
1	3	Y	-0.00
1	3	Z	-2.05
1	4	X	-3.66
1	4	Y	-0.00
1	4	Z	-2.05
1	5	X	-3.66
1	5	Y	2.23
1	5	Z	-2.05

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure
Wind pressure for superstructure:

Transverse	41.000 psf
Longitudinal	12.000 psf
Overturning	not considered

Wind pressure for substructure:

Cap	40.000 psf
Column	40.000 psf

Loadcase ID: W9 Name: Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.80	0.50	----	----
UDL	Z	----	-0.06	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-2.80
1	1	Y	-1.71
1	1	Z	-2.26

1	2	X	-2.80
1	2	Y	-0.00
1	2	Z	-2.26
1	3	X	-2.80
1	3	Y	-0.00
1	3	Z	-2.26
1	4	X	-2.80
1	4	Y	-0.00
1	4	Z	-2.26
1	5	X	-2.80
1	5	Y	1.71
1	5	Z	-2.26

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	33.000 psf	Cap	40.000 psf
Longitudinal	16.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: W10 Name: Angle: -60
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-1.10	0.50	----	----
UDL	Z	----	-0.07	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-1.21
1	1	Y	-0.74
1	1	Z	-2.19
1	2	X	-1.21
1	2	Y	-0.00
1	2	Z	-2.19
1	3	X	-1.21
1	3	Y	-0.00
1	3	Z	-2.19
1	4	X	-1.21
1	4	Y	-0.00
1	4	Z	-2.19
1	5	X	-1.21
1	5	Y	0.74
1	5	Z	-2.19

Auto generation details
Generated Wind Load on Structure
Angle of wind = -60.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	17.000 psf	Cap	40.000 psf
Longitudinal	19.000 psf	Column	40.000 psf
Overturning	not considered		

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Loadcase ID: W11 Name: Angle: -75
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	-0.13	0.50	----	----
UDL	Z	----	-0.08	0.00	----	1.00

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.57
1	1	Y	-0.35
1	1	Z	-2.35
1	2	X	-0.57
1	2	Y	-0.00
1	2	Z	-2.35
1	3	X	-0.57
1	3	Y	-0.00
1	3	Z	-2.35
1	4	X	-0.57
1	4	Y	-0.00
1	4	Z	-2.35
1	5	X	-0.57
1	5	Y	0.35
1	5	Z	-2.35

Auto generation details
Generated Wind Load on Structure
Angle of wind = -75.00 deg Elevation above which wind load acts = 5.00 ft
Default wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	11.000 psf	Cap	40.000 psf
Longitudinal	22.000 psf	Column	40.000 psf
Overturning	not considered		

Loadcase ID: WL1 Name: Angle: -75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.04
1	1	Y	-0.06
1	1	Z	-0.42
1	2	X	-0.04
1	2	Y	-0.00
1	2	Z	-0.42
1	3	X	-0.04
1	3	Y	-0.00
1	3	Z	-0.42
1	4	X	-0.04
1	4	Y	-0.00
1	4	Z	-0.42
1	5	X	-0.04
1	5	Y	0.06
1	5	Z	-0.42

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -75.00 deg Live load length = 48.00 ft

Loadcase ID: WL2 Name: Angle: -60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.24
1	1	Y	-0.36
1	1	Z	-0.43
1	2	X	-0.24
1	2	Y	-0.00
1	2	Z	-0.43
1	3	X	-0.24
1	3	Y	-0.00
1	3	Z	-0.43
1	4	X	-0.24
1	4	Y	-0.00
1	4	Z	-0.43
1	5	X	-0.24
1	5	Y	0.36
1	5	Z	-0.43

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -60.00 deg Live load length = 48.00 ft

Loadcase ID: WL3 Name: Angle: -45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.55
1	1	Y	-0.83
1	1	Z	-0.44
1	2	X	-0.55
1	2	Y	-0.00
1	2	Z	-0.44
1	3	X	-0.55
1	3	Y	-0.00
1	3	Z	-0.44
1	4	X	-0.55
1	4	Y	-0.00
1	4	Z	-0.44
1	5	X	-0.55
1	5	Y	0.83
1	5	Z	-0.44

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -45.00 deg Live load length = 48.00 ft

Loadcase ID: WL4 Name: Angle: -30

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.72
1	1	Y	-1.09
1	1	Z	-0.40
1	2	X	-0.72
1	2	Y	-0.00
1	2	Z	-0.40
1	3	X	-0.72
1	3	Y	-0.00
1	3	Z	-0.40
1	4	X	-0.72
1	4	Y	-0.00
1	4	Z	-0.40
1	5	X	-0.72
1	5	Y	1.09
1	5	Z	-0.40

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -30.00 deg Live load length = 48.00 ft

Loadcase ID: WL5 Name: Angle: -15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.80
1	1	Y	-1.21
1	1	Z	-0.30
1	2	X	-0.80
1	2	Y	-0.00
1	2	Z	-0.30
1	3	X	-0.80
1	3	Y	-0.00
1	3	Z	-0.30
1	4	X	-0.80
1	4	Y	-0.00
1	4	Z	-0.30
1	5	X	-0.80
1	5	Y	1.21
1	5	Z	-0.30

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -15.00 deg Live load length = 48.00 ft

Loadcase ID: WL6 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.94
1	1	Y	-1.42

1	1	Z	-0.22
1	2	X	-0.94
1	2	Y	-0.00
1	2	Z	-0.22
1	3	X	-0.94
1	3	Y	-0.00
1	3	Z	-0.22
1	4	X	-0.94
1	4	Y	-0.00
1	4	Z	-0.22
1	5	X	-0.94
1	5	Y	1.42
1	5	Z	-0.22

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 48.00 ft

Loadcase ID: WL7 Name: Angle: 15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.85
1	1	Y	-1.29
1	1	Z	-0.08
1	2	X	-0.85
1	2	Y	-0.00
1	2	Z	-0.08
1	3	X	-0.85
1	3	Y	-0.00
1	3	Z	-0.08
1	4	X	-0.85
1	4	Y	-0.00
1	4	Z	-0.08
1	5	X	-0.85
1	5	Y	1.29
1	5	Z	-0.08

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 15.00 deg Live load length = 48.00 ft

Loadcase ID: WL8 Name: Angle: 30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.82
1	1	Y	-1.24
1	1	Z	0.05
1	2	X	-0.82
1	2	Y	-0.00
1	2	Z	0.05
1	3	X	-0.82
1	3	Y	-0.00
1	3	Z	0.05

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1	4	X	-0.82
1	4	Y	-0.00
1	4	Z	0.05
1	5	X	-0.82
1	5	Y	1.24
1	5	Z	0.05

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 30.00 deg Live load length = 48.00 ft

Loadcase ID: WL9 Name: Angle: 45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.69
1	1	Y	-1.04
1	1	Z	0.16
1	2	X	-0.69
1	2	Y	-0.00
1	2	Z	0.16
1	3	X	-0.69
1	3	Y	-0.00
1	3	Z	0.16
1	4	X	-0.69
1	4	Y	-0.00
1	4	Z	0.16
1	5	X	-0.69
1	5	Y	1.04
1	5	Z	0.16

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 45.00 deg Live load length = 48.00 ft

Loadcase ID: WL10 Name: Angle: 60
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.40
1	1	Y	-0.61
1	1	Z	0.28
1	2	X	-0.40
1	2	Y	-0.00
1	2	Z	0.28
1	3	X	-0.40
1	3	Y	-0.00
1	3	Z	0.28
1	4	X	-0.40
1	4	Y	-0.00
1	4	Z	0.28
1	5	X	-0.40
1	5	Y	0.61
1	5	Z	0.28

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Auto generation details
Generated Wind Load on Live Load
Angle of wind = 60.00 deg Live load length = 48.00 ft

Loadcase ID: WL11 Name: Angle: 75
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.22
1	1	Y	-0.34
1	1	Z	0.36
1	2	X	-0.22
1	2	Y	-0.00
1	2	Z	0.36
1	3	X	-0.22
1	3	Y	-0.00
1	3	Z	0.36
1	4	X	-0.22
1	4	Y	-0.00
1	4	Z	0.36
1	5	X	-0.22
1	5	Y	0.34
1	5	Z	0.36

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 75.00 deg Live load length = 48.00 ft

Loadcase ID: LF1 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-166.27	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.60
1	1	Z	-2.61
1	1	Y	0.92
1	2	X	0.60
1	2	Z	-2.61
1	3	X	0.60
1	3	Z	-2.61
1	4	X	0.60
1	4	Z	-2.61
1	5	X	0.60
1	5	Z	-2.61
1	5	Y	-0.92

Auto generation details

Selected Live Load for LF generation
Load: H25/HS25 Lane Load

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Number of loaded lanes = 3
Contributing longitudinal length = 96.00 ft

Loadcase ID: LF2 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-166.27	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.60
1	1	Z	-2.61
1	1	Y	0.92
1	2	X	0.60
1	2	Z	-2.61
1	3	X	0.60
1	3	Z	-2.61
1	4	X	0.60
1	4	Z	-2.61
1	5	X	0.60
1	5	Z	-2.61
1	5	Y	-0.92

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF3 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-166.27	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.60
1	1	Z	-2.61
1	1	Y	0.92
1	2	X	0.60
1	2	Z	-2.61
1	3	X	0.60
1	3	Z	-2.61
1	4	X	0.60
1	4	Z	-2.61
1	5	X	0.60
1	5	Z	-2.61
1	5	Y	-0.92

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Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: LF4 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	-166.27	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.60
1	1	Z	-2.61
1	1	Y	0.92
1	2	X	0.60
1	2	Z	-2.61
1	3	X	0.60
1	3	Z	-2.61
1	4	X	0.60
1	4	Z	-2.61
1	5	X	0.60
1	5	Z	-2.61
1	5	Y	-0.92

Auto generation details

Selected Live Load for LF generation
Number of loaded lanes = all combinations
Contributing longitudinal length = 0.00 ft

Loadcase ID: T1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.41
1	1	Z	1.79
1	2	X	-0.41
1	2	Z	1.79
1	3	X	-0.41
1	3	Z	1.79
1	4	X	-0.41
1	4	Z	1.79
1	5	X	-0.41
1	5	Z	1.79

Auto generation details
Bearing type: Fixed Bearings.
Direction of thermal force: +(Z)
Length of Superstructure Contributing, L: 96.000 ft
Change in temperature: 70.000 °F

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Coefficient of thermal expansion: 6.0e-006 ft/°F

Loadcase ID: EQ1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-9.07
1	1	Z	-1.00
1	2	X	-9.07
1	2	Z	-1.00
1	3	X	-9.07
1	3	Z	-1.00
1	4	X	-9.07
1	4	Z	-1.00
1	5	X	-9.07
1	5	Z	-1.00

Auto generation details
Generated Earthquake Load
Bridge information
Importance classification: Essential Regular
Unit weight of superstructure = 13.17 kips/ft
Cross section area = 68.56 ft^2
Superstructure: Iy = 13500.00 ft^4 Ix = 345.00 ft^4
Total number of spans = 1 Span number rear to current pier = 1

Span data:

Span number	Length ft
1	96.00

Pier - column data

Pier #	Ix ft^4	Iz ft^4	Area ft^2	Avg. height ft
1	106.88	26792.97	142.50	-92.00
2	106.88	26792.97	142.50	-92.00

Acceleration coeff. = 0.09 Soil Type = I
Seismic forces - default

	X dir	Z dir
Case 1	1.00	0.30
Case 2	0.30	1.00

Loadcase ID: EQ2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	9.07
1	1	Z	-1.00
1	2	X	9.07
1	2	Z	-1.00
1	3	X	9.07
1	3	Z	-1.00
1	4	X	9.07
1	4	Z	-1.00
1	5	X	9.07
1	5	Z	-1.00

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Auto generation details
Generated Earthquake Load
Bridge information
Importance classification: Essential Regular
Unit weight of superstructure = 13.17 kips/ft
Cross section area = 68.56 ft^2
Superstructure: Iy = 13500.00 ft^4 Ix = 345.00 ft^4
Total number of spans = 1 Span number rear to current pier = 1

Span data:	Span number	Length ft
	1	96.00

Pier - column data

Pier #	Ix ft^4	Iz ft^4	Area ft^2	Avg. height ft
1	106.88	26792.97	142.50	-92.00
2	106.88	26792.97	142.50	-92.00

Acceleration coeff. = 0.09 Soil Type = I
Seismic forces - default

	X dir	Z dir
Case 1	1.00	0.30
Case 2	0.30	1.00

Loadcase ID: EQ3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.72
1	1	Z	-1.00
1	2	X	2.72
1	2	Z	-1.00
1	3	X	2.72
1	3	Z	-1.00
1	4	X	2.72
1	4	Z	-1.00
1	5	X	2.72
1	5	Z	-1.00

Auto generation details
Generated Earthquake Load
Bridge information
Importance classification: Essential Regular
Unit weight of superstructure = 13.17 kips/ft
Cross section area = 68.56 ft^2
Superstructure: Iy = 13500.00 ft^4 Ix = 345.00 ft^4
Total number of spans = 1 Span number rear to current pier = 1

Span data:	Span number	Length ft
	1	96.00

Pier - column data

Pier #	Ix ft^4	Iz ft^4	Area ft^2	Avg. height ft
1	106.88	26792.97	142.50	-92.00
2	106.88	26792.97	142.50	-92.00

Acceleration coeff. = 0.09 Soil Type = I
Seismic forces - default

PROJECT: SCCI 823 over SwaugerValley/Minford Road

	X dir	Z dir
Case 1	1.00	0.30
Case 2	0.30	1.00

Loadcase ID: EQ4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.72
1	1	Z	-1.#J
1	2	X	2.72
1	2	Z	-1.#J
1	3	X	2.72
1	3	Z	-1.#J
1	4	X	2.72
1	4	Z	-1.#J
1	5	X	2.72
1	5	Z	-1.#J

Auto generation details
Generated Earthquake Load
Bridge information
Importance classification: Essential Regular
Unit weight of superstructure = 13.17 kips/ft
Cross section area = 68.56 ft^2
Superstructure: Iy = 13500.00 ft^4 Ix = 345.00 ft^4
Total number of spans = 1 Span number rear to current pier = 1

Span data:

Span number	Length ft
1	96.00

Pier - column data

Pier #	Ix ft^4	Iz ft^4	Area ft^2	Avg. height ft
1	106.88	26792.97	142.50	-92.00
2	106.88	26792.97	142.50	-92.00

Acceleration coeff. = 0.09 Soil Type = I
Seismic forces - default

	X dir	Z dir
Case 1	1.00	0.30
Case 2	0.30	1.00

Selected load groups:

SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
SERVICE GROUP V
SERVICE GROUP VI
SERVICE GROUP VII
SERVICE GROUP VIII
SERVICE GROUP IX
SERVICE GROUP X
LOAD FACTOR GROUP I
LOAD FACTOR GROUP II
LOAD FACTOR GROUP III

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LOAD FACTOR GROUP IV
LOAD FACTOR GROUP V
LOAD FACTOR GROUP VII
SEISMIC GROUP VII
LOAD FACTOR GROUP X
LOAD FACTOR GROUP IX
LOAD FACTOR GROUP VIII
LOAD FACTOR GROUP VI

PROJECT: SCCI 823 over SwaugerValley/Minford Road

CAP DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Upstation.

DESIGN PARAMETERS:

f'c = 4000.0 psi
Fy flex = 60000.0 psi Fy shear = 60000.0 psi
phi flex = 0.90 phi shear = 0.85
phi flex (seismic) = 0.90 phi shear (seismic) = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
crack control factor z = 170.00 kips / in
Concrete Type : Normal Weight.
Design : face of column.

CAP GEOMETRY:

Hammer Head Cap : Length(X) = 48.50 ft Depth(Z) = 36.00 in

MAIN REINFORCEMENT:

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 8	2	3.00	1.580	0.00	48.50	Both
BOTTOM							
	# 8	2	3.00	1.580	0.00	19.44	Left
	# 8	2	3.00	1.580	16.94	31.56	None
	# 8	2	3.00	1.580	29.06	48.50	Right

STIRRUPS:

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.00	0.50	# 4	4	0.00	0.00
0.50	3.00	# 4	4	6.00	1.60
3.00	44.94	# 4	4	0.00	0.00
44.94	48.00	# 4	4	6.00	1.60
48.00	48.50	# 4	4	0.00	0.00

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN:

Span 1: From 0.00 ft To 24.25 ft

Loc ft	AbsLoc ft	H in	Mmax / Mmin kips-ft	pMn / pMn kips-ft	Comb / Comb	Asb-req / Asb-req in^2	Asb-prv / Asb-prv in^2	Asb-eff / Asb-eff in^2	Ast-req / Ast-req in^2	Ast-prv / Ast-prv in^2	Ast-eff / Ast-eff in^2
0.5	0.5	24	0.0	61.6	0	0.00	1.58	0.50	0.00	1.58	0.50
			-0.1	-61.6	444	0.00	1.58	0.50	0.00	1.58	0.50

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Span 2: From 24.25 ft To 48.50 ft

Loc ft	AbsLoc ft	H in	Mmax / Mmin kips-ft	pMn / pMn kips-ft	Comb / Comb	Asb-req / Asb-req in^2	Asb-prv / Asb-prv in^2	Asb-eff / Asb-eff in^2	Ast-req / Ast-req in^2	Ast-prv / Ast-prv in^2	Ast-eff / Ast-eff in^2
23.8	48.0	24	0.0	61.6	0	0.00	1.58	0.50	0.00	1.58	0.50
			-0.1	-61.6	443	0.00	1.58	0.50	0.00	1.58	0.50

SHEAR AND TORSION DESIGN:

Span 1: From 0.00 ft To 24.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s <----------	2Ats/s in^2/ft	Av/s	Aprv/s -------->	Alt in^2
0.50	0.50	L	0.4	444	0.0	0	81.3	27.9	0.00	0.00	0.00	0.00	0.00

Span 2: From 24.25 ft To 48.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s <----------	2Ats/s in^2/ft	Av/s	Aprv/s -------->	Alt in^2
23.75	48.00	R	0.4	443	0.0	0	81.3	27.9	0.00	0.00	0.00	0.00	0.00

Note:

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

FLEXURE DESIGN : SEISMIC:

Span 1: From 0.00 ft To 24.25 ft

Loc ft	AbsLoc ft	H in	Mmax / Mmin kips-ft	pMn / pMn kips-ft	Comb / Comb	Asb-req / Asb-req in^2	Asb-prv / Asb-prv in^2	Asb-eff / Asb-eff in^2	Ast-req / Ast-req in^2	Ast-prv / Ast-prv in^2	Ast-eff / Ast-eff in^2
0.5	0.5	24	0.0	61.6	0	0.00	1.58	0.50	0.00	1.58	0.50
			-0.1	-61.6	679	0.00	1.58	0.50	0.00	1.58	0.50

Span 2: From 24.25 ft To 48.50 ft

PROJECT: SCCI 823 over SwaugerValley/Minford Road

Loc	AbsLoc	H	Mmax Mmin	pMn pMn	Comb Comb	Asb-req Asb-req	Asb-prv Asb-prv	Asb-eff Asb-eff	Ast-req Ast-req	Ast-prv Ast-prv	Ast-eff Ast-eff
ft	ft	in	kips-ft	kips-ft		in^2	in^2	in^2	in^2	in^2	in^2
23.8	48.0	24	0.0	61.6	0	0.00	1.58	0.50	0.00	1.58	0.50
			-0.1	-61.6	679	0.00	1.58	0.50	0.00	1.58	0.50

SHEAR DESIGN : SEISMIC

Span 1: From 0.00 ft To 24.25 ft

Loc	AbsLoc	Pos	Vu	Comb	Tu	Comb	phi*Vc	T-lim	Avs/s	2Ats/s	Av/s	Aprv/s	Alt
ft	ft		kips		kips-ft		kips	kips-ft	<---------	in^2/ft		-------->	in^2
0.50	0.50	L	0.3	679	0.0	0	81.3	27.9	0.00	0.00	0.00	0.00	0.00

Span 2: From 24.25 ft To 48.50 ft

Loc	AbsLoc	Pos	Vu	Comb	Tu	Comb	phi*Vc	T-lim	Avs/s	2Ats/s	Av/s	Aprv/s	Alt
ft	ft		kips		kips-ft		kips	kips-ft	<---------	in^2/ft		-------->	in^2
23.75	48.00	R	0.3	679	0.0	0	81.3	27.9	0.00	0.00	0.00	0.00	0.00

Note:

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK:

Span 1: From 0.00 ft To 24.25 ft

Loc	AbsLoc	H	<------ Cracking ------> fs-t	ratio fs-t	Comb	<------ Fatigue ------> fs-t	ratio fs-t
			fs-b	ratio fs-b	Comb	fs-b	ratio fs-b
ft	ft	in	ksi			ksi	
0.50	0.5	24.0	0.1	0.00	1	0.0	0.00
			0.0	0.00	0	0.0	0.00

Span 2: From 24.25 ft To 48.50 ft

Loc	AbsLoc	H	<------ Cracking ------> fs-t	ratio fs-t	Comb	<------ Fatigue ------> fs-t	ratio fs-t

PROJECT: SCCI 823 over SwaugerValley/Minford Road

ft	ft	in	fs-b ksi	ratio fs-b	Comb	fs-b ksi	ratio fs-b
23.75	48.0	24.0	0.1	0.00	1	0.0	0.00
			0.0	0.00	0	0.0	0.00

* Cracking / fatigue checking failed.

PROJECT: SCCI 823 over SwaugerValley/Minford Road

PROJECT: SCCI 823 over SwaugerValley/Minford Road

COLUMN DESIGN

COLUMN DESIGN - Column: 1

Column Type: Rectangular 570.00 x 36.00 in

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design
Units: US
Pier View : Upstation.
Design/Analysis Method: No Slenderness Considered.

DESIGN PARAMETERS:

f'c = 4000.0 psi fy = 60000.0 psi
phi flex = 0.90 phi axial = 0.70
phi flex (seismic) = 0.90 phi axial (seismic) = 0.70
phi flex (overstrength) = 1.30 phi axial (overstrength) = 1.30
Ec = 3834.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:

Rebar Pattern: Rectangular
Rebar Orientation: Face Parallel

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	8	124	3.00
1	Z	8	8	3.00

Main bars summary: Ties size: # 4
260 # 8 bars

Total number of bars in the column: 260

Design values used - (e-min effect included).

(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	1C	-0.0	2655.7	0.0	-371.8	0.0	-3917.2
3.50	1C	-0.0	2600.1	0.0	-364.0	-0.0	3835.2

NON-SEISMIC DESIGN

For full section at each location.

Column Design

Loc ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	1C	2655.7	371.8	3917.2	117952.6	84.58	1.00	29.98
3.50	1C	2600.1	364.0	3835.2	117769.1	84.58	1.00	30.57

SEISMIC DESIGN

PROJECT: SCCI 823 over SwaugerValley/Minford Road

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Design values used - (e-min effect included).

(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	473C	15.1	297.1	1.7	41.6	0.2	-438.2
3.50	473C	-15.1	282.8	-1.7	-39.6	0.2	417.1

For core section at each location.

Column Design

Loc ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	473C	297.1	41.6	438.2	109304.2	84.58	1.00	248.35
3.50	473C	282.8	39.6	417.1	109249.5	84.58	1.00	260.73

PROJECT: SCCI 823 over SwaugerValley/Minford Road

ISOLATED FOOTING DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Upstation.

Geometry:

Name : Ftg 1
Shape : Rectangular, Type : Pile/Shaft Cap

Bf(X) = 48.50 ft, Hf(Z) = 6.50 ft, Thickness(Y) = 39.00 in

Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 570.00 in x 36.00 in

Ag = 315.25 ft^2, Ix = 42.88 ft^2, Iz = 2366.00 ft^2

Surcharge = 0.48 ksf

Piles: Circular Size: 14.00 in Capacity: 140.00 kips

Design Parameters:

f'c = 4000.00 psi fy = 60000.00 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in
Concrete Type : Normal Weight.

Pile Reactions, Service (Without the reduction of overstress allowance):

Pile	Loc(X) ft	X in	Z in	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Pile Reac. kips
1	-20.55	45.0	21.0	337	1.400	-1412.21	243.04	550.79	122.38
				93	1.250	-1067.64	-207.31	-2381.06	58.21
2	-20.55	45.0	-21.0	47	1.250	-1412.21	-229.72	441.65	120.94
				383	1.400	-1067.64	265.45	-2271.91	56.73
3	-14.05	123.0	21.0	325	1.400	-1426.18	251.47	334.39	125.85
				81	1.250	-1053.68	-215.74	-2164.65	68.59
4	-14.05	123.0	-21.0	47	1.250	-1412.21	-229.72	441.65	124.64
				383	1.400	-1067.64	265.45	-2271.91	66.89
5	-7.55	201.0	21.0	381	1.400	-1440.14	265.45	-73.74	130.29
				49	1.250	-1039.71	-229.72	-1756.53	78.01
6	-7.55	201.0	-21.0	55	1.250	-1426.18	-231.90	250.04	128.86
				391	1.400	-1053.68	267.63	-2080.31	76.53
7	-1.05	279.0	21.0	381	1.400	-1440.14	265.45	-73.74	135.49
				10	1.250	-844.62	-22.96	888.11	81.18
8	-1.05	279.0	-21.0	59	1.250	-1426.18	-231.97	227.03	133.12
				228	1.400	-891.18	96.21	89.99	81.51
9	5.45	357.0	21.0	381	1.400	-1440.14	265.45	-73.74	140.68*
				10	1.250	-844.62	-22.96	888.11	82.01
10	5.45	357.0	-21.0	91	1.250	-1440.14	-207.31	-182.89	138.61
				212	1.400	-844.62	12.77	896.36	82.41
11	11.95	435.0	21.0	381	1.400	-1440.14	265.45	-73.74	145.88*
				48	1.250	-1039.71	-229.72	2488.78	80.67

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12	11.95	435.0	-21.0	91	1.250	-1440.14	-207.31	-182.89	144.10*
				338	1.400	-1039.71	243.04	2597.92	79.53
13	18.45	513.0	21.0	381	1.400	-1440.14	265.45	-73.74	151.07*
				48	1.250	-1039.71	-229.72	2488.78	77.67
14	18.45	513.0	-21.0	91	1.250	-1440.14	-207.31	-182.89	149.60*
				338	1.400	-1039.71	243.04	2597.92	76.23

Pile Reactions, Factored:

Pile	Loc(X) ft	X in	Z in	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Pile Reac. kips
1	-20.55	45.0	21.0	443	---	-2320.01	0.00	296.31	173.13
				783	---	-1334.55	-214.48	-2966.01	74.67
2	-20.55	45.0	-21.0	443	---	-2320.01	0.00	296.31	173.13
				871	---	-1334.55	331.81	-2839.89	70.92
3	-14.05	123.0	21.0	443	---	-2320.01	0.00	296.31	180.10
				771	---	-1317.09	-225.02	-2695.51	87.62
4	-14.05	123.0	-21.0	443	---	-2320.01	0.00	296.31	180.10
				871	---	-1334.55	331.81	-2839.89	83.62
5	-7.55	201.0	21.0	443	---	-2320.01	0.00	296.31	187.07
				701	---	-1069.41	-72.58	161.19	95.92
6	-7.55	201.0	-21.0	443	---	-2320.01	0.00	296.31	187.07
				710	---	-1069.41	66.35	-31.28	95.65
7	-1.05	279.0	21.0	443	---	-2320.01	0.00	296.31	194.04
				696	---	-1013.54	-27.55	1065.73	97.41
8	-1.05	279.0	-21.0	443	---	-2320.01	0.00	296.31	194.04
				712	---	-1069.41	72.58	98.09	99.57
9	5.45	357.0	21.0	443	---	-2320.01	0.00	296.31	201.00
				696	---	-1013.54	-27.55	1065.73	98.42
10	5.45	357.0	-21.0	443	---	-2320.01	0.00	296.31	201.00
				696	---	-1013.54	-27.55	1065.73	100.66
11	11.95	435.0	21.0	443	---	-2320.01	0.00	296.31	207.97
				696	---	-1013.54	-27.55	1065.73	99.42
12	11.95	435.0	-21.0	443	---	-2320.01	0.00	296.31	207.97
				826	---	-1299.63	303.79	3247.40	99.41
13	18.45	513.0	21.0	443	---	-2320.01	0.00	296.31	214.94
				738	---	-1299.63	-242.49	3121.28	98.83
14	18.45	513.0	-21.0	443	---	-2320.01	0.00	296.31	214.94
				826	---	-1299.63	303.79	3247.40	95.29

Pile Reactions, Service (After the reduction of overstress allowance):

Pile	Loc(X) ft	X in	Z in	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Pile Reac. kips
1	-20.55	45.0	21.0	1	1.000	-1426.18	0.00	179.83	110.28
				295	1.400	-1067.64	-171.58	-2372.81	42.67
2	-20.55	45.0	-21.0	1	1.000	-1426.18	0.00	179.83	110.28
				383	1.400	-1067.64	265.45	-2271.91	40.52
3	-14.05	123.0	21.0	1	1.000	-1426.18	0.00	179.83	114.74
				283	1.400	-1053.68	-180.01	-2156.41	50.07
4	-14.05	123.0	-21.0	1	1.000	-1426.18	0.00	179.83	114.74
				383	1.400	-1067.64	265.45	-2271.91	47.78
5	-7.55	201.0	21.0	1	1.000	-1426.18	0.00	179.83	119.20
				427	1.500	-891.18	-60.48	134.32	53.29
6	-7.55	201.0	-21.0	1	1.000	-1426.18	0.00	179.83	119.20

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				436	1.500	-891.18	55.29	-26.07	53.14
7	-1.05	279.0	21.0	1	1.000	-1426.18	0.00	179.83	123.66
				422	1.500	-844.62	-22.96	888.11	54.12
8	-1.05	279.0	-21.0	1	1.000	-1426.18	0.00	179.83	123.66
				438	1.500	-891.18	60.48	81.74	55.32
9	5.45	357.0	21.0	1	1.000	-1426.18	0.00	179.83	128.11
				422	1.500	-844.62	-22.96	888.11	54.68
10	5.45	357.0	-21.0	1	1.000	-1426.18	0.00	179.83	128.11
				422	1.500	-844.62	-22.96	888.11	55.92
11	11.95	435.0	21.0	1	1.000	-1426.18	0.00	179.83	132.57
				422	1.500	-844.62	-22.96	888.11	55.23
12	11.95	435.0	-21.0	1	1.000	-1426.18	0.00	179.83	132.57
				422	1.500	-844.62	-22.96	888.11	56.48
13	18.45	513.0	21.0	1	1.000	-1426.18	0.00	179.83	137.03
				422	1.500	-844.62	-22.96	888.11	55.79
14	18.45	513.0	-21.0	1	1.000	-1426.18	0.00	179.83	137.03
				338	1.400	-1039.71	243.04	2597.92	54.45

Note:
* Force in pile is greater than pile capacity.

Only max. force in piles is considered for design.
Pile coordinates X and Z are from the most left edge of the footing.

Pile Reactions, Factored(Seismic):

Pile	Loc(X) ft	X in	Z in	Column Loads comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Pile Reac. kips
1	-20.55	45.0	21.0	684	---	-891.18	0.00	0.00	78.42
				680	---	-891.18	-0.00	-0.00	73.79
2	-20.55	45.0	-21.0	679	---	-891.18	-0.00	0.00	78.42
				683	---	-891.18	0.00	-0.00	73.79
3	-14.05	123.0	21.0	684	---	-891.18	0.00	0.00	81.03
				680	---	-891.18	-0.00	-0.00	77.40
4	-14.05	123.0	-21.0	679	---	-891.18	-0.00	0.00	81.03
				683	---	-891.18	0.00	-0.00	77.40
5	-7.55	201.0	21.0	684	---	-891.18	0.00	0.00	83.64
				680	---	-891.18	-0.00	-0.00	81.01
6	-7.55	201.0	-21.0	679	---	-891.18	-0.00	0.00	83.64
				683	---	-891.18	0.00	-0.00	81.01
7	-1.05	279.0	21.0	683	---	-891.18	0.00	-0.00	86.26
				679	---	-891.18	-0.00	0.00	84.63
8	-1.05	279.0	-21.0	679	---	-891.18	-0.00	0.00	86.26
				683	---	-891.18	0.00	-0.00	84.63
9	5.45	357.0	21.0	683	---	-891.18	0.00	-0.00	89.87
				679	---	-891.18	-0.00	0.00	87.24
10	5.45	357.0	-21.0	680	---	-891.18	-0.00	-0.00	89.87
				684	---	-891.18	0.00	0.00	87.24
11	11.95	435.0	21.0	683	---	-891.18	0.00	-0.00	93.48
				679	---	-891.18	-0.00	0.00	89.85
12	11.95	435.0	-21.0	680	---	-891.18	-0.00	-0.00	93.48
				684	---	-891.18	0.00	0.00	89.85
13	18.45	513.0	21.0	683	---	-891.18	0.00	-0.00	97.09
				679	---	-891.18	-0.00	0.00	92.47
14	18.45	513.0	-21.0	680	---	-891.18	-0.00	-0.00	97.09
				684	---	-891.18	0.00	0.00	92.47

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Note:

Only max. force in piles is considered for design.
Pile coordinates X and Z are from the most left edge of the footing.

Max. Pile Reaction Used in Design: (without selfweight and surcharge)

Factored pile reaction = 183.35 kips

Service pile reaction = 126.77 kips

Fatigue pile reaction = 42.25 kips

Max. Pile Reaction Used in Design: (without selfweight and surcharge) (SEISMIC)

Factored pile reaction = 72.79 kips

Reinforcement Schedule:

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	8	# 8	4.50	6.32	10.14	None
Z	60	# 5	4.50	18.60	9.75	None

Flexure:

Dir	Loc ft	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-23.75	34.50	0.0	443	0.00	6.32	1.39	0.00	0.00	0.00
X	23.75	34.50	0.0	443	0.00	6.32	1.14	0.00	0.00	0.00
Z	-1.50	34.50	320.9	443	2.75	18.60	18.60	0.00	0.00	0.00
Z	1.50	34.50	320.9	443	2.75	18.60	18.60	0.00	0.00	0.00

Flexure (Seismic) :

Dir	Loc ft	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-23.75	34.50	0.0	680	0.00	6.32	1.39	0.00	0.00	0.00
X	23.75	34.50	0.0	680	0.00	6.32	1.14	0.00	0.00	0.00
Z	-1.50	34.50	127.4	680	1.09	18.60	18.60	0.00	0.00	0.00
Z	1.50	34.50	127.4	680	1.09	18.60	18.60	0.00	0.00	0.00

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Cracking/Fatigue

Dir	Loc ft	d in	<-------- Cracking ----------> Mmax kft	Comb	fs ksi	ratio fs	<---------- Fatigue ---------> Mmax kft	Comb	fs ksi	ratio fs
X	-23.75	34.50	0.0	1	0.00	0.00	0.0	1	0.00	0.00
X	23.75	34.50	0.0	1	0.00	0.00	0.0	1	0.00	0.00
Z	-1.50	34.50	221.9	381	4.31	0.16	73.9	1	1.44	0.06
Z	1.50	34.50	221.9	381	4.31	0.16	73.9	1	1.44	0.06

One Way Shear (non-Seismic):

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-26.63	----	------	Outside of Footing	
	X	26.63	----	------	Outside of Footing	
	Z	-4.38	----	------	Outside of Footing	
	Z	4.38	----	------	Outside of Footing	

One Way Shear (Seismic):

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-26.63	----	------	Outside of Footing	
	X	26.63	----	------	Outside of Footing	
	Z	-4.38	----	------	Outside of Footing	
	Z	4.38	----	------	Outside of Footing	

Two Way Shear:

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns:						
1	------	------	---	No Two Way Shear		
Piles - max:						
1	9.35	12.48	443	34.50	183.4	832.3
Piles - min:						
1	9.35	12.48	443	34.50	183.4	832.3

Note:
TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

Two Way Shear (Seismic):

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#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns:						
1	------	------	---	No Two Way Shear		
Piles - max:						
1	9.35	12.48	680	34.50	183.4	832.3
Piles - min:						
1	9.35	12.48	680	34.50	72.8	832.3

Note:
TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

APPENDIX F

Correspondence

ATTACHMENT A

Scope of Services
SCI-823-0.00/6.81

The Consultant shall prepare construction contract and right-of-way plans to construct a new 4 lane limited access freeway to bypass Portsmouth.

The consultant shall prepare plans for two separate construction phases. The first set of plans, Phase 1, to be completed is project SCI-823-6.81. This is from Station 352+00 to Station 536+50, and will be completed as per the schedule shown on Attachment B. Right-of-Way plans for Phase 1 will also be completed as per the schedule shown on Attachment B.

Project SCI-823-0.00, Phase 3, will be completed next, which is from Station 0+00 to Station 352+00. The work for this project phase shall be completed as per the schedule shown on Attachment C.

Coordination will be done with the consultant completing plans for the SCI-823-10.13, Phase 2, construction project, which is adjacent to SCI-823-6.81, Phase 1.

The Consultant shall prepare the plans using Microstation and GEOPAK software in accordance with the CADD Engineering Standards Manual. Electronic files shall be supplied to ODOT along with the Final Tracings for the project. Provide all files required per Section 1503, "CADD File Requirements for Design and Construction", of the Location & Design Manual-Volume 3.

The Consultant shall reassess the current Structure Types for the following structures by using the guidelines given.

SCI-823-0837 L/R (Bridge No. 10)

1. Investigate a 3 and 4 span bridge with bridge limits of approximately 360-365 feet.

SCI-823-0917 L/R (Bridge No. 11)

1. Structure to consist of a 4-span prestressed concrete I-beam composite with the reinforced concrete deck superstructure on semi-integral abutments, T-type piers.
2. The rear abutment be supported on piles and the forward abutment supported on spread footing.
3. The rear abutment location can be determined by placing the toe of the rear abutment 2:1 slope at the edge of the Long Run Creek embankment and extending the slope up to the appropriate elevation. Rough bridge limits of 380' will result.
4. By adjusting the pier location, the rest of span length could approximately be the same length, which is between 90-95 feet long.

The consultant shall incorporate the additional items discussed in the Scope Meeting held on February 26, 2007. See Attachment E for the Meeting Minutes.

Phase	Bridge No.	Bridge Description	Structure Type	Estimated Cost
3	1	S.R. 823 Ramp B (SB) over Ohio River Road (C.R. 503)	Combined with Below ▼	
3	2	S.R. 823 Ramp B (SB) over U.S. 52	5 Span, 828', 4 Steel Girder	$6,460,000
3	3	S.R. 823 Ramp A (NB) over Ohio River Road (C.R. 503)	1 Span, 233', 4 Steel Girder	$5,730,000
3	4	S.R. 823 over Webster Street (S.R. 140), VC=23.66'	1 Span, 114', 4 Conc. Girder	$1,870,000
3	5	S.R. 823 over CSXT Railroad, VC=42.0'	3 Span, 475', 5 Steel Girder	$6,110,000
3	6	S.R. 823 over Slocum Avenue, VC=42.0'	3 Span, 322', 5 Conc. Girder	$5,970,000
3	7	S.R. 823 over S.R. 335and Little Scioto River, VC=52.0' & VC=107.0' over river	5 Span, 950', 5 Steel Girder	$19,030,000
				$45,170,000

Phase	Bridge No.	Bridge Description	Structure Type	Estimated Cost
1	8	S.R. 823 over Shumway Hollow Road (T.R. 234)	1 Span, 107', 5 Conc. Girder	$2,310,000
1	9	Shumway Hollow Road (T.R. 234) over CSXT Railroad, VC=23.83'	1 Span, 120', 9 Conc. Girder	$1,700,000
1	10*	S.R. 823 over Swauger Valley-Minford Road (C.R. 31) L/R, VC=40.0'	2 Span, 200', 5 Conc. Girder	$3,000,000
1	11*	S.R. 823 over Portsmouth-Minford Road (S.R. 139), VC=40.0'	2 Span, 230', 5 Conc. Girder	$5,320,000
				$12,330,000

*See Attachment A for addition guidance on the reassessment of the submitted Structure Type Studies. Concern about the proposed MSE Walls heights were introduced recently and the district wishes to reevaluate the Structure Type Study.