

# CO-RTE-LOG

OVER CREEK

SECTIONS XX & XX, XXXXX TOWNSHIP  
XXXXXX COUNTY, OHIO

### Project Description:

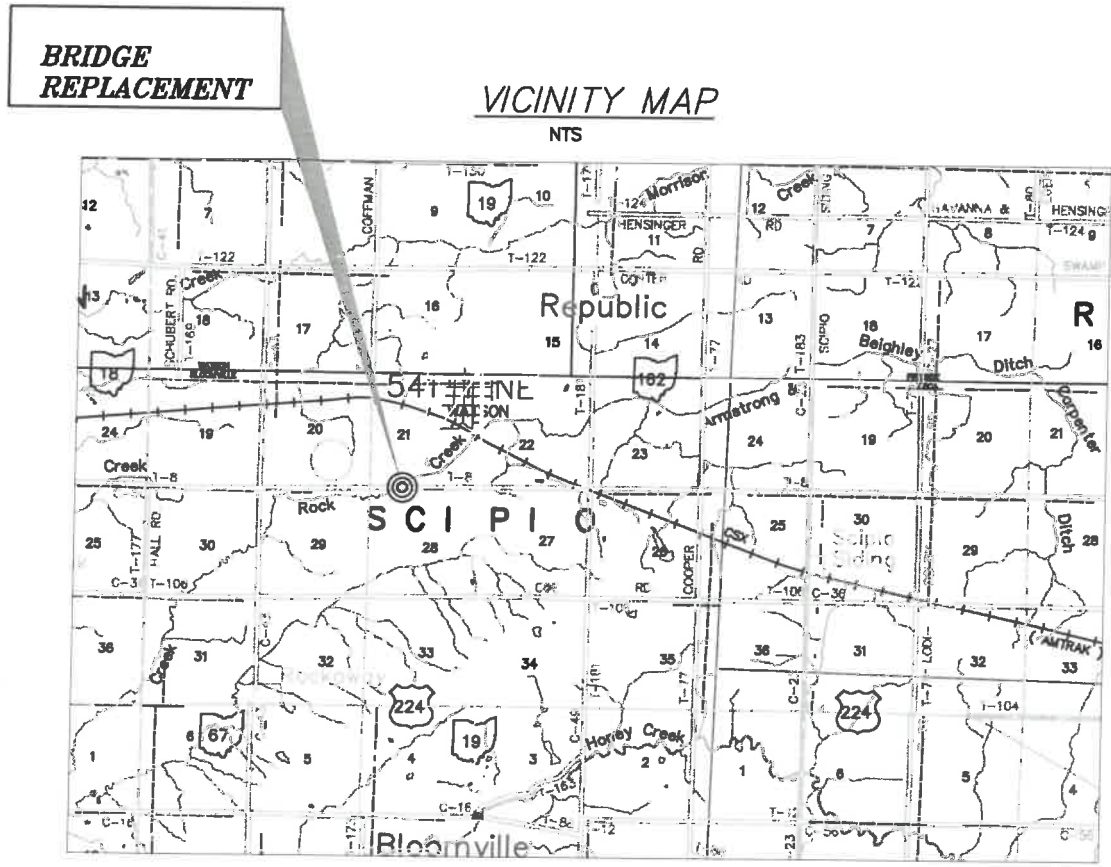
Replacement and Widening of Existing  
Continuous Steel Beam  
Existing Concrete Abutments

### LEGEND

○	MANHOLE	⚡	RAILROAD SIGNAL
○ <sup>ca</sup>	CLEAN OUT	⚡	RAILROAD SIGNAL W/LIGHT
○	SANITARY LIFT STATION	■	MAIL BOX
—SAN—	SANITARY SEWER	—	SIGN
■	CATCH BASIN	⚡	POWER POLE
■	CURB INLET	■	POWER TRANSFORMER
●	YARD DRAIN	⚡	TELEPHONE POLE
—STM—	STORM SEWER	⚡	LIGHT POLE
⚡ <sup>FH</sup>	FIRE HYDRANT	⚡	TELEPHONE PEDESTAL
⚡ <sup>YH</sup>	YARD HYDRANT	—E—	OVERHEAD ELECTRIC LINE
● <sup>WV</sup>	WATER VALVE	—UE—	UNDERGROUND ELECTRIC LINE
■	WATER METER	—T—	OVERHEAD TELEPHONE LINE
■ <sup>WCV</sup>	WATER CURB VALVE	—UT—	UNDERGROUND TELEPHONE LINE
—W—	WATER LINE	—CTV—	OVERHEAD CABLE TV LINE
● <sup>GV</sup>	GAS VALVE	—UCTV—	UNDERGROUND CABLE TV LINE
■	GAS MARKER	—FO—	FIBER OPTIC
■	GAS METER	—UFO—	UNDERGROUND FIBER OPTIC
—GAS—	GAS LINE	—X—	FENCE LINE
○	DECIDUOUS TREE	—	GUARDRAIL
○	PINE TREE	—	EASEMENT LINE
		—	PROPERTY LINE
		—	EDGE OF PAVEMENT
		—	LOW WATER MARK
		—	C/L OF DITCH
		—	DITCH SLOPE
		■	BUILDING
		→	FLOW ARROW

### SURVEY MONUMENTS

SET	FOUND	DESCRIPTION
⊙	⊙	CONC. MONUMENT
⊕	⊕	RAILROAD SPIKE
○	○	NAIL
○	○	IRON ROD
⊙	⊙	DRILL HOLE
▲	▲	STONE
■	■	MONUMENT BOX
●	●	IRON PIPE
■	■	WOOD POST
(D)		DEED
(P)		PLAT
(M)		MEASURED
(S)		SURVEYED
(C)		CALCULATED



PSIBS  
Template

### SITE DATA

Latitude: N41°06'36.1"  
Longitude: W83°01'46.7"  
Township: Scipio Secs. 21 & 28  
Road ROW: 60.0'  
Volume: 1 Page: 75  
Current ADT (2010): 290 (1-Tractor Trailers)  
Rock Creek  
Flow Direction: North to South  
Ditch Maintenance: No  
Drainage Area = 8,320 Ac.(13 Sq. Miles)  
Drainage(cfs)  
Q2 = 450 cfs  
Q10 = 864 cfs  
Q100 = 1460 cfs  
Bedrock Impact: No

### EXISTING STRUCTURE

Type: 38' o/o x 22' Wide Steel Beams  
Span: 33.5'± Clear Span  
Roadway: 18'±  
Skew: 35° Left Forward  
Date Built: 1956  
Condition: Fair  
SFN: 7446888

### PROPOSED STRUCTURE

Type: 37'-2" x 28' wide Precast Beams  
Existing abutments.  
Span: 33'-6" Clear Span  
Dim: (7) B21x48"x37'-2" Prestressed Box Beams  
Roadway: 18'±  
Skew: 30° Left Forward

### MAINTENANCE OF TRAFFIC (MOT)

Type: Full Closure  
Closure Between: SR67 and SR 19  
Detour Length: 3 miles

### PUBLIC NOTIFICATION

Contacts: County EMA/EMS, Sheriff, School, Post Office  
Advance Closure Notice: One Week

Project:

Revisions:

XXXXX County  
Engineer's Dept.  
XXXXXX - County Engineer

Drawn By:  
Date:  
Approved By:  
DWG File:



**GENERAL NOTES-**

1. THIS PROJECT DOES NOT INVOLVE THE ACQUISITION OF TEMPORARY OR PERMANENT RIGHT OF WAY
2. NO WORK IS PLANNED IN THE WATERWAY
3. THIS PROJECT DOES NOT INVOLVE ROADWAY REALIGNMENT

**UTILITY INVOLVEMENT- Coordination by County**

UTILITY	RELOCATION REQUIRED
NORTH CENTRAL ELECTRIC	NO
AT&T	COORDINATION REQUIRED

**RAILROAD INVOLVEMENT**

NO RAILROADS ARE AFFECTED IN THIS PROJECT

**WORK PERFORMED BY COUNTY FORCES**

1. SITE WORK
2. GUARDRAIL REMOVED
3. WEARING SURFACE REMOVED
4. STRUCTURE REMOVED \* SEE ITEM 202
5. PATCHING OF CONCRETE SURFACES
6. BEARING SEAT/BACKWALL
7. CONSTRUCTION LAYOUT
8. DOWLING & GROUTING OF BEAMS
9. WATERPROOFING (TYPE 3)
10. WEARING SURFACE PLACED
11. INSTALLATION OF BRIDGE TERMINAL ASSY AND GUARDRAIL

**ITEM 202- STRUCTURE REMOVED OVER 20' SPAN, AS PER PLAN**  
IT IS NOTED THAT NO WHEELED OR TRACKED EQUIPMENT WILL BE PERMITTED INTO THE STREAM. CARE SHALL BE TAKEN TO PREVENT DEBRIS FROM ENTERING THE STREAM. ANY MATERIAL THAT ENTERS THE STREAM SHALL BE IMMEDIATELY REMOVED BY HAND OR BY MECHANICAL EQUIPMENT LOCATED OUTSIDE THE WATERWAY.

**ITEM 519-PATCHING CONCRETE STRUCTURES**

IT IS NOTED THAT CARE SHALL BE TAKEN TO ENSURE PATCHING OF CONCRETE SURFACES DOES NOT RESULT IN MATERIAL ENTERING THE WATERWAY.

**WORK PERFORMED BY LPA CONTRACT**

1. FABRICATE, DELIVER & ERECT SUPERSTRUCTURE \*ITEM 515
2. FABRICATE, DELIVER & PLACE BEARING PADS \*ITEM 516
3. FABRICATE & INSTALL BRIDGE RAILING \*SEE ITEM 517

**ITEM 515- PRESTRESSED CONCRETE NON-COMPOSITE BOX BEAM MEMBERS LEVEL 1, B21-48 (37'2" O/O)**

PERFORMED EXPANSION JOINT MATERIAL (ODOT CMS705.03) -2"x2" (OR EQUAL TO BEARING THICKNESS) TO FIT UNDER BEAM ENDS (160 SF)  
-6"x6"x2" (OR EQUAL TO BEARING PAD THICKNESS) UNDER DOWEL LOCATIONS (14EA)

3/4" ANCHOR DOWEL BARS (14EA) AND 1" DIAMETER STEEL TIE RODS THREADED AT BOTH ENDS WITH HEX NUTS AND PLATE WASHERS PER ODOT PSBD-2-07

TYPE C ANCHORS PER ODOT DBR-2-73 LOCATION AS PER PLAN

**ITEM 516 - ELASTOMERIC BEARING PAD**

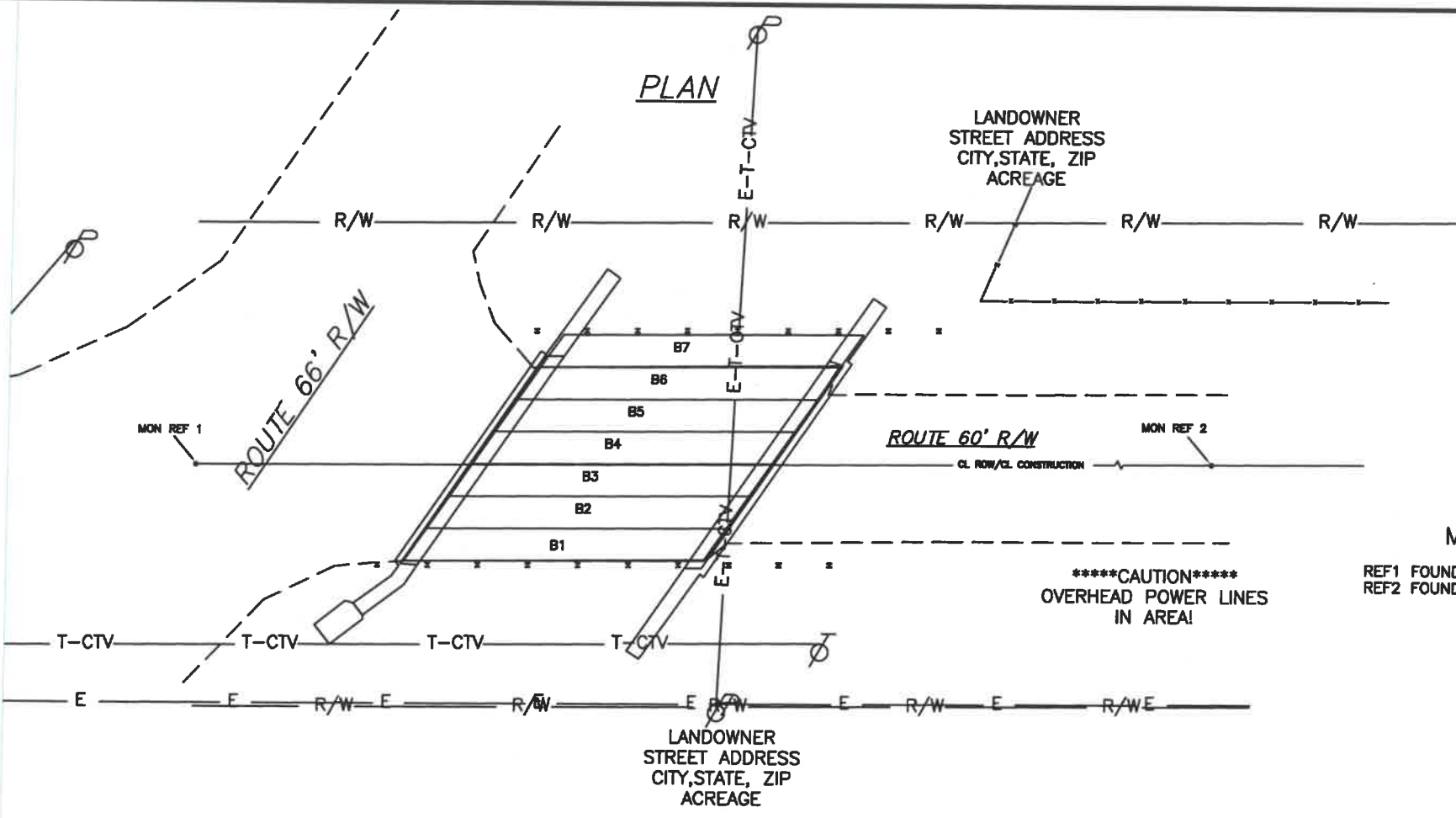
PROVIDE ELASTOMERIC PADS PER DESIGN (28EA) BEARING PAD PLACEMENT LOCATION AND SPECIFICATIONS SHALL BE SHOWN ON SHOP DRAWINGS.

6"x12"x2.1" thick - Duro 50  
Elastomer layers - 5 @ 0.25", 0.375", 0.375", 0.375", 0.25" thick  
Steel Laminates - 4 @ 1/8"

**ITEM 516 - 1/4" ELASTOMERIC BEARING SHIMS**

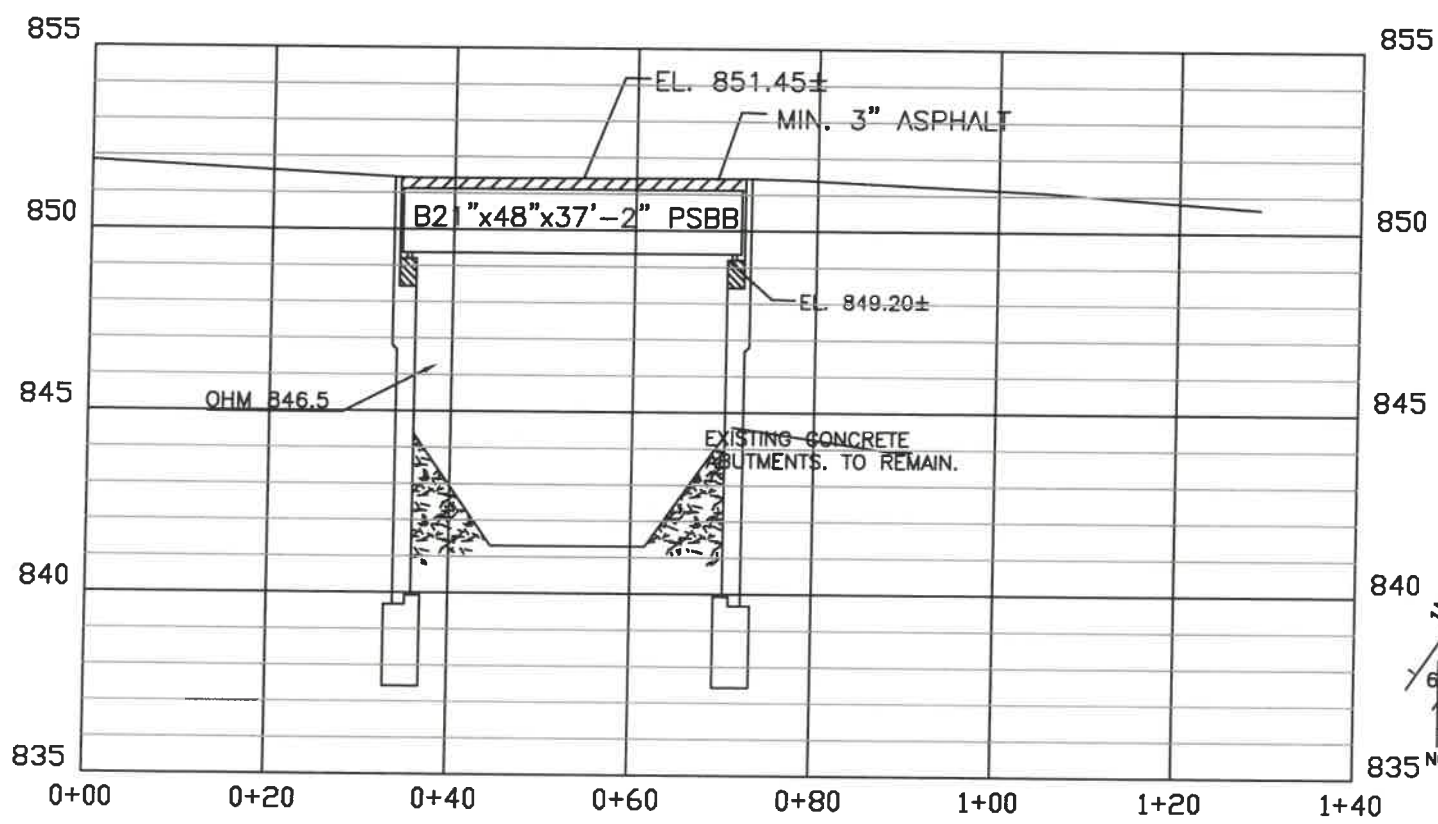
**ITEM 517 - BRIDGE RAILING (DEEP BEAM WITH TUBULAR BACKUP AND TYPE 2 STEEL POSTS)**  
AS PER PLAN (75 LF)

SPECIAL- SS DRIP STRIP (75 LF)

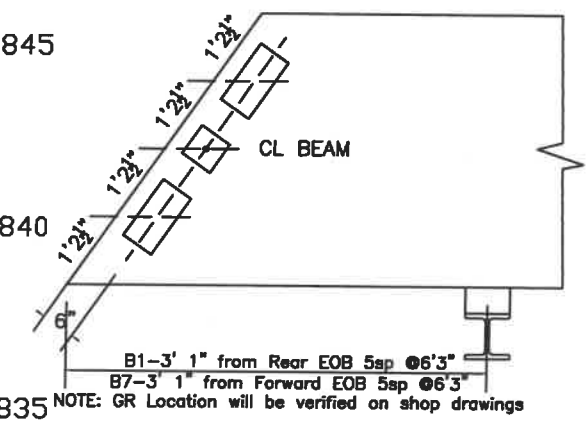


**MONUMENT REFERENCES**

REF1 FOUND RR SPIKE @ INTERSECTION OF SR67 AND TR8  
REF2 FOUND 3/4" IP @ N1/4 POST OF SEC 28, T2N-R16E



**BEARING PAD\GR LOCATON DIAGRAM**



XXXXXX TWP.  
TWP-RTE-LOG  
PLAN/PROFILE

Project: \_\_\_\_\_

Revisions: \_\_\_\_\_

XXXXXX County  
Engineer's Dept.  
XXXXXX - County Engineer

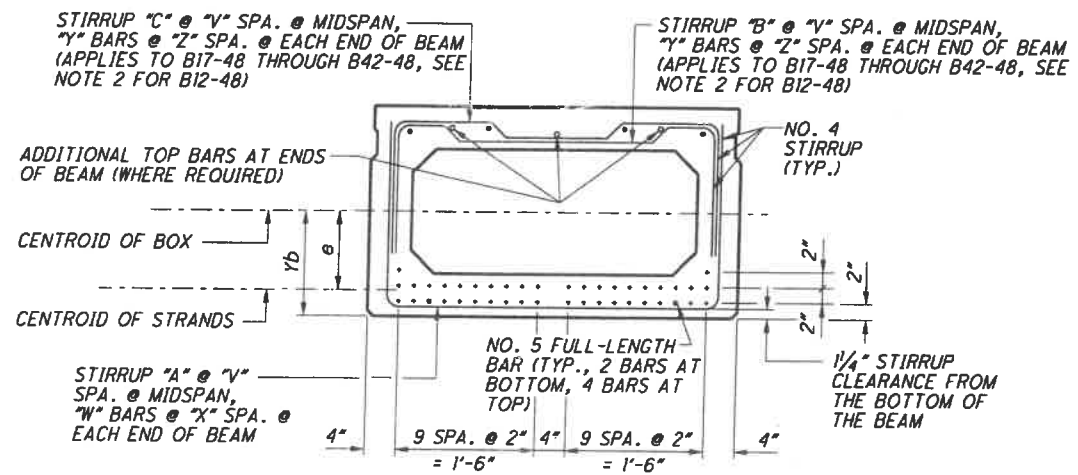
Drawn By: \_\_\_\_\_  
Date: \_\_\_\_\_  
Approved By: \_\_\_\_\_  
DWG File: \_\_\_\_\_



**DESIGN NOTES**

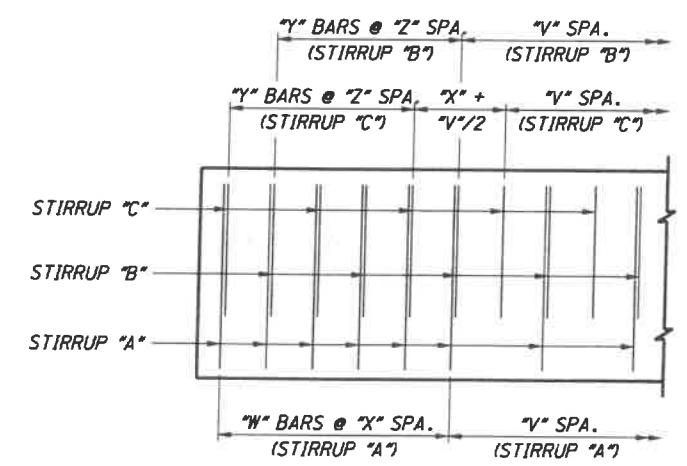
- THIS DRAWING PROVIDES INFORMATION FOR THE DESIGNER AND IS NOT INTENDED FOR USE AS A STANDARD DRAWING. REFERENCE SHALL BE MADE TO STANDARD DRAWING PSBD-2-07 FOR DETAILS OF BEAMS.
- DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2004, INCLUDING THE 2005 AND 2006 INTERIM REVISIONS AND THE ODOT BRIDGE DESIGN MANUAL.
- DESIGN DATA:
  - SKREW - THE DESIGN DATA ARE APPLICABLE TO STRUCTURES WITH SKEW ANGLES OF 30° OR LESS.
  - LIVE LOADING - HL-93
  - LIVE LOAD DISTRIBUTION - THE APPROXIMATE METHODS OF ANALYSIS GIVEN IN AASHTO LRFD ARTICLE 4.6.2.2 HAVE BEEN USED. THE APPLICABLE CROSS SECTION ON TABLE 4.6.2.2.1-1 IS "g". THE DESIGNS ARE FOR BRIDGES WITHOUT TRANSVERSE POST-TENSIONING (i.e. BEAMS ARE CONNECTED ONLY ENOUGH TO PREVENT RELATIVE VERTICAL DISPLACEMENT AT THE INTERFACE). ALL DESIGNS SHOWN HEREIN ARE BASED ON EXTERIOR BEAMS (HIGHER DISTRIBUTION FACTORS). THESE DESIGNS MAY ALSO BE USED FOR INTERIOR BEAMS (LOWER DISTRIBUTION FACTORS).
  - SUPERIMPOSED DEAD LOADS - ASPHALT OVERLAY = 3/4" THICK (AVG.) RAILING WEIGHT = 0.10 KLF PER RAIL (TST-1-99) FWS = 0.060 KSF
  - DEAD LOAD - INTERMEDIATE DIAPHRAGM WEIGHT IS BASED ON 3'-0" LONG DIAPHRAGMS AND NUMBER OF DIAPHRAGMS SHOWN ON STANDARD DRAWING PSBD-2-07.
  - CONCRETE - MIN. COMPRESSIVE STRENGTH AT 28 DAYS  $f'_c = 7$  KSI  
MIN. COMPRESSIVE STRENGTH AT TIME OF INITIAL PRESTRESS  $f'_{ci} = 5$  KSI
  - REINFORCING - GRADE 60 STEEL MINIMUM YIELD STRENGTH = 60 KSI
  - PRESTRESSING - ASTM A416 LOW RELAXATION STRANDS 1/2" DIAMETER  
 $A_{ps} = 0.167$  SQ. IN. PER STRAND  
 $f_{pu} = 270$  KSI  
 $E_p = 28,500$  KSI  
RELATIVE HUMIDITY,  $H = 70\%$   
INITIAL STRESS  $0.75 f_{pu} = 202.5$  KSI  
INITIAL TENSION LOAD = 33.82 KIPS/STRAND
- A SEVERE CORROSIVE ENVIRONMENT WAS ASSUMED IN DETERMINING THE TENSILE STRESS LIMITS AFTER LOSSES (AASHTO LRFD ARTICLE 5.9.4.2.2). LOAD MODIFIERS FOR DUCTILITY, REDUNDANCY, AND OPERATIONAL IMPORTANCE WERE TAKEN AS 1.0 (AASHTO LRFD ARTICLE 1.3). STRAND AREAS WERE NOT TRANSFORMED IN SECTION PROPERTY CALCULATIONS. MILD REINFORCING BARS WERE NOT CONSIDERED IN DETERMINING THE STRENGTH OF THE SECTIONS. ALL DESIGNS MEET THE CRITERIA FOR DEFLECTION GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.2 AND THE CRITERIA FOR SPAN-TO-DEPTH RATIOS GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.3.
- PRESTRESS LOSSES HAVE BEEN COMPUTED IN ACCORDANCE WITH AASHTO LRFD EQUATIONS 5.9.5.1-1, 5.9.5.2.3a-1, AND 5.9.5.3-1 (APPROXIMATE ESTIMATE OF TIME-DEPENDENT LOSSES).
- CAMBER DATA GIVEN IS THE CALCULATED CAMBER AT TIME OF RELEASE (B-C), CAMBER AT TIME OF ERECTION (1.8B-1.85C), AND LONG TERM CAMBER (2.45B-2.4C), WHERE B = CAMBER DUE TO PRESTRESSING AT RELEASE AND C = DEFLECTION DUE TO WEIGHT OF BEAM INCLUDING DIAPHRAGMS. PROVIDE THE CAMBER AT RELEASE, CAMBER AT ERECTION, AND LONG TERM CAMBER IN THE PLANS. D = CALCULATED DEFLECTION AT MIDSPAN DUE TO A 3/4" THICK ASPHALT WEARING SURFACE AND TWO (2) BRIDGE RAILS WEIGHING 0.10 KLF PER RAIL. THE VALUE SHOWN IS THE MAXIMUM INITIAL SUPERIMPOSED DEAD LOAD DEFLECTION FOR THE APPLICABLE ROADWAY WIDTHS (SEE NOTE 6).
- ROADWAY WIDTH: THE BEAMS ON THIS SHEET ARE DESIGNED FOR THE FOLLOWING ROADWAY WIDTHS, MEASURED BETWEEN FACE OF BRIDGE RAILS: 24 FT.  $\leq$  WIDTH  $\leq$  72 FT.  
THESE DESIGNS SHALL NOT BE USED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 72 FT. SPECIAL DESIGN IS REQUIRED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 72 FT.
- INTERPOLATION: FOR BEAM SPANS NOT SPECIFICALLY LISTED IN THE DESIGN DATA TABLE, THE DESIGN DATA MAY BE OBTAINED FROM THE TABLE BY USING STRAIGHT LINE INTERPOLATION BETWEEN GIVEN VALUES. HOWEVER, THE NUMBER OF STRANDS USED SHALL ALWAYS BE ROUNDED UP TO THE NEAREST EVEN NUMBER. DO NOT EXTRAPOLATE BEYOND THE GIVEN DATA.

BOX	SPAN c/c BRG. (FT.)	MIDSPAN e (IN.)	NO. OF STRANDS	STRAND LOC. FROM BOTTOM OF BOX		NUMBER AND LENGTH OF STRANDS DEBONDED			TENSILE BARS AT BOTTOM				TENSILE BARS AT TOP				CAMBER/DEFLECTION DATA (IN) (SEE NOTE 1)					STIRRUP DATA											
				2" 4" 6"		1'-6" 2'-6" 3'-6"			NO. SIZE		NO. SIZE		NO. SIZE		NO. SIZE		B C		B-C		1.8B-1.85C		2.45B-2.4C		D		V W X Y Z						
				2"	4"	6"	1'-6"	2'-6"	3'-6"	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE	NO.	SIZE
B12-48	20	3.97	10	10					2	5	4	5	-	-	-	0.34	0.07	0.27	0.48	0.67	0.02												
	25	3.97	12	12					2	5	4	5	-	-	-	0.63	0.18	0.45	0.80	1.11	0.05	18"	4	6"	*	*							
B17-48	20	6.44	8	8					2	5	4	5	-	-	-	0.16	0.03	0.13	0.23	0.32	0.01												
	25	6.44	12	12					2	5	4	5	-	-	-	0.37	0.07	0.30	0.54	0.74	0.02												
	30	6.44	12	12					2	5	4	5	-	-	-	0.54	0.15	0.39	0.69	0.96	0.04	10.5"	4	6"	2	12"							
	35	6.44	14	14					2	5	4	5	-	-	-	0.84	0.27	0.57	1.01	1.41	0.07												
B21-48	40	6.22	18	16	2				2	5	4	5	-	-	-	1.34	0.46	0.88	1.56	2.18	0.13												
	30	8.42	12	12					2	5	4	5	-	-	-	0.39	0.09	0.30	0.54	0.74	0.02												
	35	8.42	14	14					2	5	4	5	-	-	-	0.61	0.17	0.44	0.78	1.09	0.04												
	40	8.42	14	14					2	5	4	5	-	-	-	0.80	0.29	0.51	0.90	1.26	0.07	12"	6	6"	3	12"							
B27-48	45	8.42	16	16					2	5	4	5	2	4	5'-0"	1.14	0.46	0.68	1.20	1.69	0.11												
	50	8.22	20	18	2				2	5	4	5	2	4	5'-9"	1.70	0.69	1.01	1.78	2.51	0.17												
	40	11.39	14	14					2	5	4	5	2	4	5'-3"	0.55	0.17	0.38	0.68	0.94	0.04												
	45	11.39	16	16					2	5	4	5	2	4	6'-0"	0.79	0.26	0.53	0.94	1.31	0.06												
	50	11.39	16	16					2	5	4	5	2	4	5'-9"	0.98	0.40	0.58	1.02	1.44	0.09	12"	6	6"	3	12"							
B33-48	55	11.39	18	18					2	5	4	5	2	4	6'-6"	1.32	0.60	0.72	1.27	1.79	0.13												
	60	11.03	22	18	4				2	5	4	5	2	5	7'-0"	1.84	0.85	0.99	1.74	2.47	0.18												
	65	10.62	26	16	10				2	5	4	5	2	5	7'-0"	2.43	1.16	1.27	2.23	3.17	0.25												
	50	14.33	16	16					2	5	4	5	2	5	7'-0"	0.73	0.26	0.47	0.83	1.16	0.05												
	55	14.33	18	18					2	5	4	5	3	5	7'-9"	0.99	0.40	0.59	1.04	1.47	0.08												
B42-48	60	14.33	18	18					2	5	4	5	2	5	7'-6"	1.18	0.56	0.62	1.09	1.55	0.11												
	65	14.13	20	18	2				2	5	4	5	3	5	7'-9"	1.50	0.76	0.74	1.29	1.85	0.15	12"	8	6"	4	12"							
	70	13.97	22	18	4		2		2	5	4	5	2	5	7'-6"	1.89	1.02	0.87	1.52	2.18	0.20												
	75	13.72	26	18	8		4		2	5	4	5	2	5	7'-9"	2.49	1.33	1.16	2.02	2.91	0.26												
	80	13.40	30	16	14		4		2	5	4	5	2	5	7'-6"	3.17	1.77	1.40	2.43	3.52	0.34												



**TYPICAL STRAND LOCATION & STIRRUP SPACING**

STRANDS SHALL BE PLACED AS SHOWN AND SHALL BE DISTRIBUTED SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT VERTICAL C OF BEAM. DEBONDED STRANDS SHALL BE IN THE BOTTOM LAYER. EXTERIOR STRANDS SHALL BE FULLY BONDED. LENGTH OF STRANDS TO BE DEBONDED IS MEASURED FROM ENDS OF BEAM. TWO BOTTOM REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AS SHOWN. A LAP OF 3'-3" FOR BOTTOM BARS SHOULD BE PROVIDED WITHIN THE OUTER QUARTER OF THE SPAN, IF NEEDED. FOUR TOP REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AT THE STIRRUP CORNERS AS SHOWN. A LAP OF 3'-8" FOR TOP BARS SHOULD BE PROVIDED WITHIN THE MIDDLE HALF OF THE SPAN, IF NEEDED. ADDITIONAL TOP REINFORCING BARS AT ENDS OF BEAM, WHERE REQUIRED, SHALL BE PLACED SYMMETRICALLY OVER THE BEAM WIDTH AND SHALL BE PLACED MIDWAY BETWEEN FULL LENGTH BARS.



**NOTES:**

- ▲ - LENGTH MEASURED FROM ENDS OF BEAM
- \* - FOR B12-48, PROVIDE A STRAIGHT #4 BAR AT THE TOP OF THE BEAM AT EACH LOCATION WHERE STIRRUP "A" IS PROVIDED.
- FOR B17-48 THROUGH B42-48, STIRRUP "A" AND STIRRUP "B" SHALL BE PLACED AT THE SAME LOCATION AT MIDSPAN.
- FOR B17-48 THROUGH B42-48, STIRRUP "C" SHALL BE PLACED HALF-WAY BETWEEN STIRRUPS "B" AT MIDSPAN.

DESIGN AGENCY: STRUCTURAL ENGINEERING ORIGINAL DESIGN PREPARED BY: BURGESS & NIPLE, INC.  
 STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 DATE: 10-19-07  
 REVIEWED: JHL  
 CHECKED: JHL  
 DESIGNED: BCS  
 DRAWN: AAA  
 PSBD-2-07  
 REVISIONS:  
 PRESTRESSED CONCRETE NON-COMPOSITE ADJACENT BOX BEAMS (48" WIDE) WITH STRAIGHT STRANDS  
 ADMINISTRATOR: Tom Keller  
 DATE: 10-19-07

**DESIGN NOTES**

1. THIS DRAWING PROVIDES INFORMATION FOR THE DESIGNER AND IS NOT INTENDED FOR USE AS A STANDARD DRAWING. REFERENCE SHALL BE MADE TO STANDARD DRAWING PSBD-2-07 FOR DETAILS OF BEAMS.
2. DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2004, INCLUDING THE 2005 AND 2006 INTERIM REVISIONS AND THE ODOT BRIDGE DESIGN MANUAL.

**3. DESIGN DATA:**

SKIEW - THE DESIGN DATA ARE APPLICABLE TO STRUCTURES WITH SKIEW ANGLES OF 30° OR LESS.

LIVE LOADING - HL-93

LIVE LOAD DISTRIBUTION - THE APPROXIMATE METHODS OF ANALYSIS GIVEN IN AASHTO LRFD ARTICLE 4.6.2.2 HAVE BEEN USED. THE APPLICABLE CROSS SECTION ON TABLE 4.6.2.2.1-1 IS "g". THE DESIGNS ARE FOR BRIDGES WITHOUT TRANSVERSE POST-TENSIONING (i.e. BEAMS ARE CONNECTED ONLY ENOUGH TO PREVENT RELATIVE VERTICAL DISPLACEMENT AT THE INTERFACE). ALL DESIGNS SHOWN HEREIN ARE BASED ON EXTERIOR BEAMS (HIGHER DISTRIBUTION FACTORS). THESE DESIGNS MAY ALSO BE USED FOR INTERIOR BEAMS (LOWER DISTRIBUTION FACTORS).

SUPERIMPOSED DEAD LOADS - ASPHALT OVERLAY = 3/2" THICK (AVG.)  
RAILING WEIGHT = 0.10 KLF PER RAIL (TST-I-99)  
FWS = 0.060 KSF

DEAD LOAD - INTERMEDIATE DIAPHRAGM WEIGHT IS BASED ON 3'-0" LONG DIAPHRAGMS AND NUMBER OF DIAPHRAGMS SHOWN ON STANDARD DRAWING PSBD-2-07.

CONCRETE - MIN. COMPRESSIVE STRENGTH AT 28 DAYS  $f'_c = 7$  KSI  
MIN. COMPRESSIVE STRENGTH AT TIME OF INITIAL PRESTRESS  $f'_{ci} = 5$  KSI

REINFORCING - GRADE 60 STEEL  
MINIMUM YIELD STRENGTH = 60 KSI

PRESTRESSING - ASTM A416 LOW RELAXATION STRANDS STEEL  
1/2" DIAMETER  
 $A_{ps} = 0.167$  SQ. IN. PER STRAND  
 $f_{pu} = 270$  KSI  
 $E_p = 28,500$  KSI  
RELATIVE HUMIDITY,  $H = 70\%$

INITIAL STRESS  $0.75 f_{pu} = 202.5$  KSI  
INITIAL TENSION LOAD = 33.82 KIPS/STRAND

A SEVERE CORROSIVE ENVIRONMENT WAS ASSUMED IN DETERMINING THE TENSILE STRESS LIMITS AFTER LOSSES (AASHTO LRFD ARTICLE 5.9.4.2.2).

LOAD MODIFIERS FOR DUCTILITY, REDUNDANCY, AND OPERATIONAL IMPORTANCE WERE TAKEN AS 1.0 (AASHTO LRFD ARTICLE 1.3).

STRAND AREAS WERE NOT TRANSFORMED IN SECTION PROPERTY CALCULATIONS.

MILD REINFORCING BARS WERE NOT CONSIDERED IN DETERMINING THE STRENGTH OF THE SECTIONS.

ALL DESIGNS MEET THE CRITERIA FOR DEFLECTION GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.2 AND THE CRITERIA FOR SPAN-TO-DEPTH RATIOS GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.3.

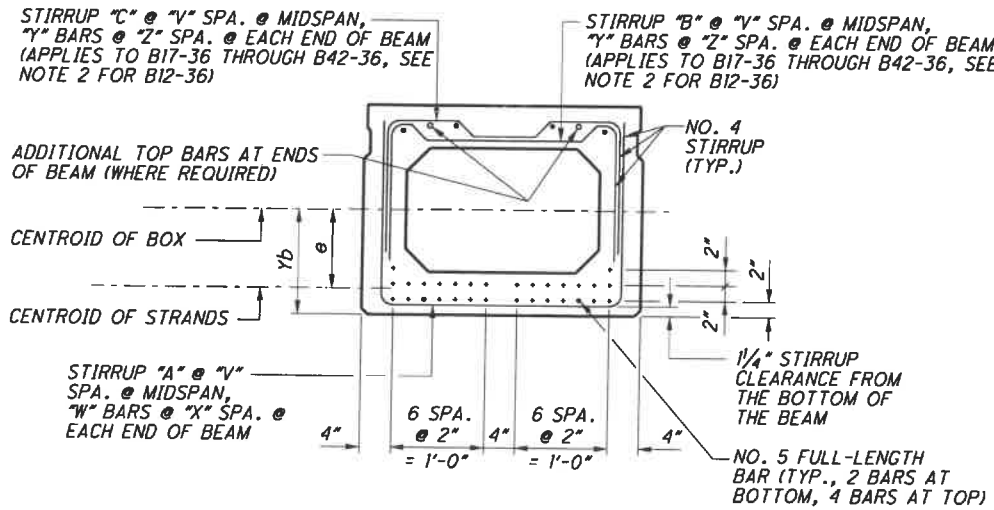
4. PRESTRESS LOSSES HAVE BEEN COMPUTED IN ACCORDANCE WITH AASHTO LRFD EQUATIONS 5.9.5.1-1, 5.9.5.2.3a-1, AND 5.9.5.3-1 (APPROXIMATE ESTIMATE OF TIME-DEPENDENT LOSSES).
5. CAMBER DATA GIVEN IS THE CALCULATED CAMBER AT TIME OF RELEASE (B-C), CAMBER AT TIME OF ERECTION (1.8B-1.85C), AND LONG TERM CAMBER (2.45B-2.4C), WHERE B = CAMBER DUE TO PRESTRESSING AT RELEASE AND C = DEFLECTION DUE TO WEIGHT OF BEAM INCLUDING DIAPHRAGMS. PROVIDE THE CAMBER AT RELEASE, CAMBER AT ERECTION, AND LONG TERM CAMBER IN THE PLANS. D = CALCULATED DEFLECTION AT MIDSPAN DUE TO A 3/2" THICK ASPHALT WEARING SURFACE AND TWO (2) BRIDGE RAILS WEIGHING 0.10 KLF PER RAIL. THE VALUE SHOWN IS THE MAXIMUM INITIAL SUPERIMPOSED DEAD LOAD DEFLECTION FOR THE APPLICABLE ROADWAY WIDTHS (SEE NOTE 6).
6. ROADWAY WIDTH: THE BEAMS ON THIS SHEET ARE DESIGNED FOR THE FOLLOWING ROADWAY WIDTHS, MEASURED BETWEEN FACE OF BRIDGE RAILS:  
24 FT.  $\leq$  WIDTH  $\leq$  60 FT.

THESE DESIGNS SHALL NOT BE USED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 60 FT. SPECIAL DESIGN IS REQUIRED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 60 FT.

7. INTERPOLATION: FOR BEAM SPANS NOT SPECIFICALLY LISTED IN THE DESIGN DATA TABLE, THE DESIGN DATA MAY BE OBTAINED FROM THE TABLE BY USING STRAIGHT LINE INTERPOLATION BETWEEN GIVEN VALUES. HOWEVER, THE NUMBER OF STRANDS USED SHALL ALWAYS BE ROUNDED UP TO THE NEAREST EVEN NUMBER. DO NOT EXTRAPOLATE BEYOND THE GIVEN DATA.

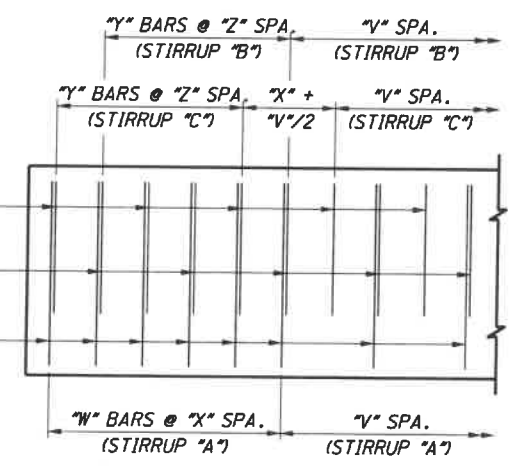
**DESIGN DATA** (SEE NOTE 6)

BOX	SPAN c/c BRG. (FT.)	MIDSPAN e (IN.)	NO. OF STRANDS	STRAND LOC. FROM BOTTOM OF BOX			NUMBER AND LENGTH OF STRANDS DEBONDED			TENSILE BARS AT TOP				CAMBER/DEFLECTION DATA (IN.) (SEE NOTE 5)					STIRRUP DATA									
				2"	4"	6"	1'-6"	2'-6"	3'-6"	TENSILE BARS AT BOTTOM		FULL LENGTH		ADDITIONAL BARS EACH END		B	C	B-C	1.8B-1.85C	2.45B-2.4C	D	V	W	X	Y	Z		
										NO.	SIZE	NO.	SIZE	NO.	SIZE												NO.	SIZE
B12-36	20	3.96	8	8						2	5	4	5	-	-	-	-	0.37	0.07	0.30	0.54	0.74	0.02	18"	4	6"	*	*
	25	3.56	10	8	2					2	5	4	5	-	-	-	-	0.63	0.18	0.45	0.80	1.11	0.05					
B17-36	20	6.42	6	6						2	5	4	5	-	-	-	-	0.16	0.03	0.13	0.23	0.32	0.01	10.5"	4	6"	2	12"
	25	6.42	8	8						2	5	4	5	-	-	-	-	0.33	0.07	0.26	0.46	0.64	0.02					
	30	6.42	10	10						2	5	4	5	-	-	-	-	0.59	0.15	0.44	0.78	1.09	0.04					
	35	6.42	10	10						2	5	4	5	-	-	-	-	0.80	0.28	0.52	0.92	1.29	0.07					
B21-36	40	6.13	14	12	2					2	5	4	5	-	-	-	-	1.37	0.47	0.90	1.60	2.23	0.13	13.5"	6	7.5"	3	15"
	30	8.40	10	10						2	5	4	5	-	-	-	-	0.43	0.10	0.33	0.59	0.81	0.02					
	35	8.40	10	10						2	5	4	5	-	-	-	-	0.58	0.18	0.40	0.71	0.99	0.04					
	40	8.40	10	10						2	5	4	5	-	-	-	-	0.75	0.30	0.45	0.80	1.12	0.07					
B27-36	45	8.40	12	12						2	5	4	5	-	-	-	-	1.13	0.47	0.66	1.16	1.64	0.11	13.5"	8	5.5"	4	11"
	50	7.90	16	12	4					2	5	4	5	-	-	-	-	1.73	0.72	1.01	1.78	2.51	0.17					
	40	11.37	10	10						2	5	4	5	-	-	-	-	0.52	0.18	0.34	0.60	0.84	0.04					
	45	11.37	12	12						2	5	4	5	2	4	5'-6"		0.78	0.28	0.50	0.89	1.24	0.06					
	50	11.37	12	12						2	5	4	5	2	4	5'-0"		0.96	0.42	0.54	0.95	1.34	0.09					
B33-36	55	11.08	14	12	2					2	5	4	5	2	4	5'-6"		2.5	0.63	0.68	1.19	1.70	0.12	15"	10	6"	5	12"
	60	10.87	16	12	4			2		2	5	4	5	-	-	-	-	1.73	0.89	0.84	1.47	2.10	0.18					
	65	10.37	20	10	10			2		2	5	4	5	2	4	5'-0"		2.40	1.21	1.19	2.08	2.98	0.24					
	50	14.30	12	12						2	5	4	5	2	4	6'-3"		0.71	0.28	0.43	0.76	1.07	0.05					
	55	13.73	14	10	4					2	5	4	5	2	4	6'-0"		0.96	0.42	0.54	0.95	1.34	0.07					
	60	14.01	14	12	2					2	5	4	5	2	4	6'-6"		1.16	0.59	0.57	1.00	1.43	0.10					
B42-36	65	13.30	16	8	8					2	5	4	5	2	4	5'-9"		1.47	0.80	0.67	1.17	1.68	0.14	14"	10	6.5"	5	13"
	70	13.41	18	10	8			2		2	5	4	5	2	4	6'-3"		1.92	1.07	0.85	1.48	2.14	0.19					
	75	13.50	20	12	8			4		2	5	4	5	2	4	5'-3"		2.45	1.40	1.05	1.82	2.64	0.25					
	80	13.13	24	12	10	2		4		2	5	4	5	2	4	6'-3"		3.22	1.85	1.37	2.37	3.45	0.33					
	65	17.75	16	8	8			2		2	5	4	5	2	5	8'-3"		1.05	0.50	0.55	0.97	1.37	0.08					
	70	17.75	16	8	8			2		2	5	4	5	2	5	7'-9"		1.22	0.67	0.55	0.96	1.38	0.10					
	75	17.75	16	8	8			2		2	5	4	5	2	5	7'-6"		1.40	0.88	0.52	0.89	1.32	0.14					
	80	17.75	20	10	10			4		2	5	4	5	2	5	8'-6"		1.97	1.17	0.80	1.38	2.02	0.18					



**TYPICAL STRAND LOCATION & STIRRUP SPACING**

STRANDS SHALL BE PLACED AS SHOWN AND SHALL BE DISTRIBUTED SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT VERTICAL C OF BEAM. DEBONDED STRANDS SHALL BE IN THE BOTTOM LAYER. EXTERIOR STRANDS SHALL BE FULLY BONDED. LENGTH OF STRANDS TO BE DEBONDED IS MEASURED FROM ENDS OF BEAM. TWO BOTTOM REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AS SHOWN. A LAP OF 3'-3" FOR BOTTOM BARS SHOULD BE PROVIDED WITHIN THE OUTER QUARTER OF THE SPAN, IF NEEDED. FOUR TOP REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AT THE STIRRUP CORNERS AS SHOWN. A LAP OF 3'-8" FOR TOP BARS SHOULD BE PROVIDED WITHIN THE MIDDLE HALF OF THE SPAN, IF NEEDED. ADDITIONAL TOP REINFORCING BARS AT ENDS OF BEAM, WHERE REQUIRED, SHALL BE PLACED SYMMETRICALLY OVER THE BEAM WIDTH AND SHALL BE PLACED MIDWAY BETWEEN FULL LENGTH BARS.



**PARTIAL ELEVATION AT BEAM END**  
(APPLIES TO B17-36 THROUGH B42-36)  
(SEE NOTE 2 FOR B12-36)

**NOTES:**

1. ▲ - LENGTH MEASURED FROM ENDS OF BEAM
2. \* - FOR B12-36, PROVIDE A STRAIGHT #4 BAR AT THE TOP OF THE BEAM AT EACH LOCATION WHERE STIRRUP "A" IS PROVIDED.
3. FOR B17-36 THROUGH B42-36, STIRRUP "A" AND STIRRUP "B" SHALL BE PLACED AT THE SAME LOCATION AT MIDSPAN.
4. FOR B17-36 THROUGH B42-36, STIRRUP "C" SHALL BE PLACED HALF-WAY BETWEEN STIRRUPS "B" AT MIDSPAN.

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING BY: BURGESS & NIPLE, INC.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

10-19-07 DATE

ADMINISTRATOR

REVIEWED: JHL TAB PSBD-2-07

CHECKED: JHL

DESIGNED: BES

DRAWN: AAA

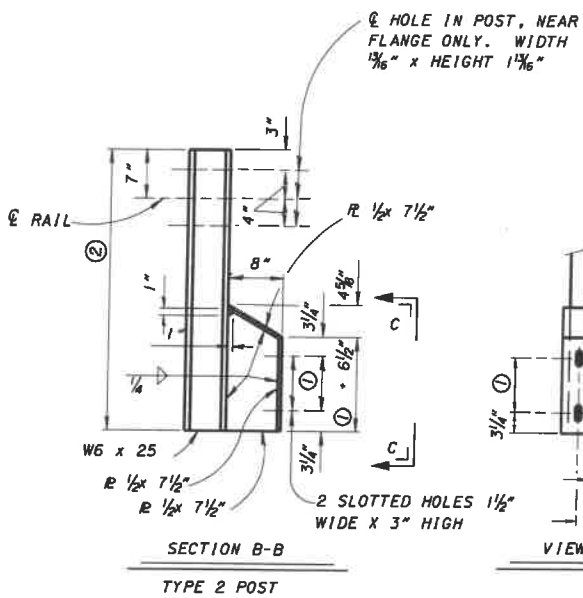
REVISIONS

DESIGN DATA

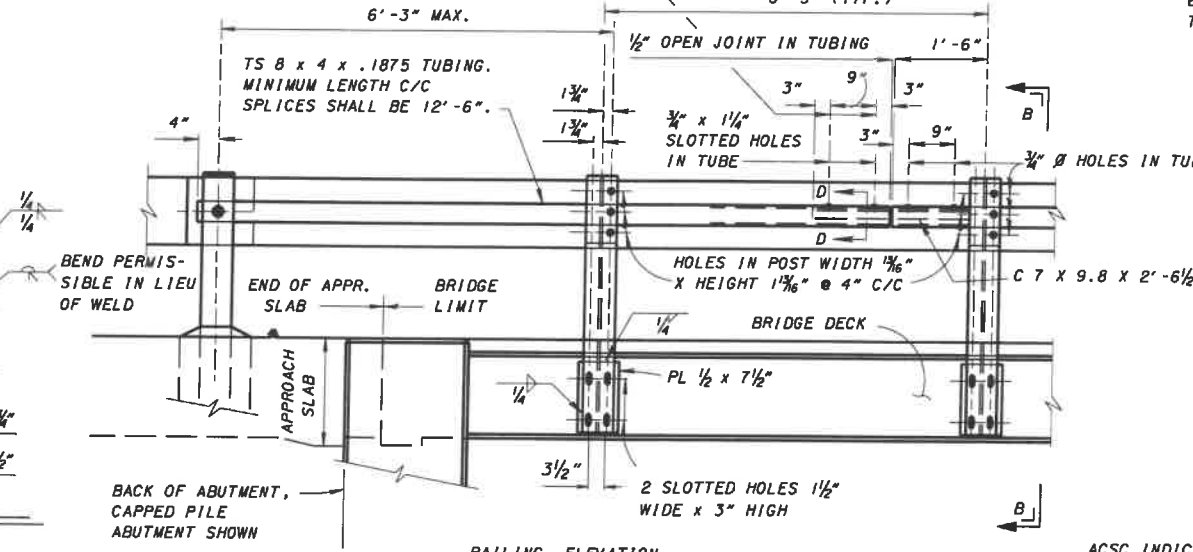
PRESTRESSED CONCRETE NON-COMPOSITE ADJACENT BOX BEAMS (36" WIDE) WITH STRAIGHT STRANDS

2 / 2

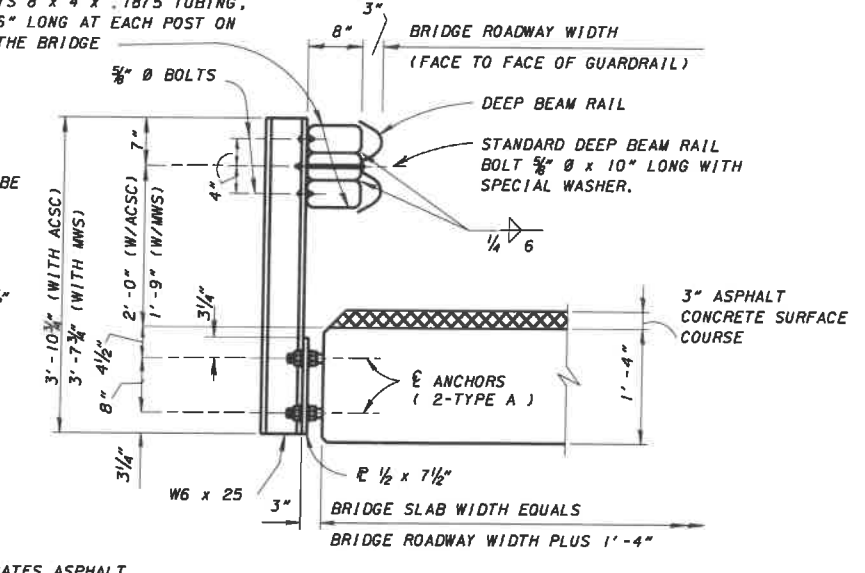




BOLTS IN SLOTTED HOLES SHALL NOT BE DRAWN UP SO TIGHT AS TO PREVENT SLIDING BETWEEN THE TUBE AND CHANNEL.  
6'-3" MAX.

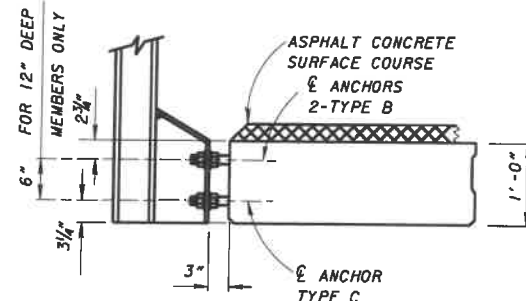
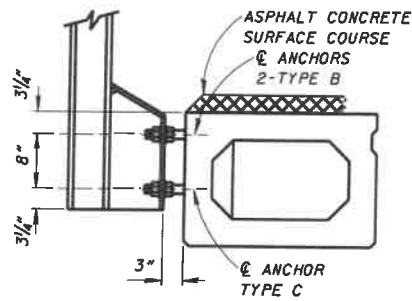


TS 8 x 4 x .1875 TUBING, 6" LONG AT EACH POST ON THE BRIDGE

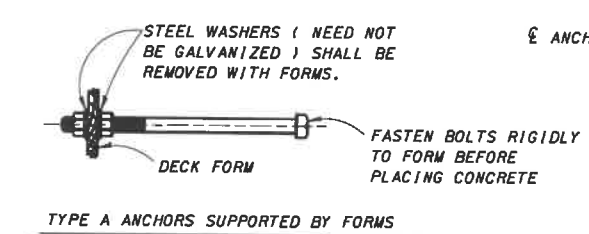
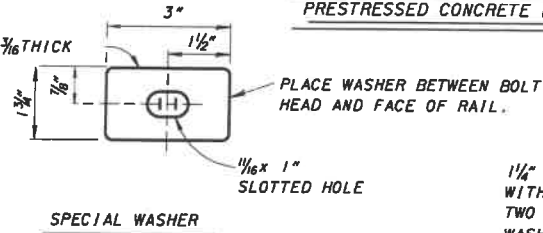


DIMENSION ① IS 6" OR 8" DEPENDING ON BOX BEAM DEPTH. SEE PROJECT PLANS AND POST ANCHORAGE DETAILS, PRESTRESSED CONCRETE BOX BEAMS. FOR DIMENSION ② SEE PROJECT PLANS.

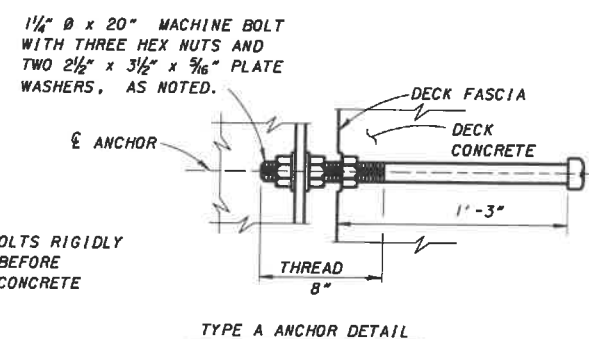
(FOR USE WITH PRESTRESSED CONCRETE BOX BEAMS)



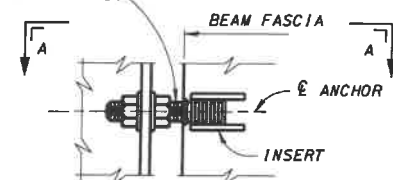
POST ANCHORAGE DETAILS FOR PRESTRESSED CONCRETE BOX BEAMS



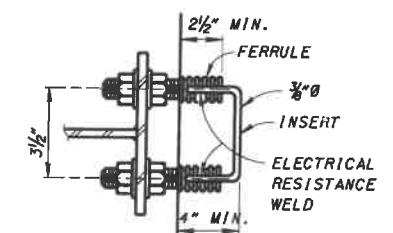
TYPE A ANCHORS SHOULD ONLY BE USED ON PROJECTS WHERE THE ORIGINAL ANCHORS WERE TYPE A AND ALL ANCHORS ON ANY SINGLE STRUCTURE ARE NOT BEING REMOVED OR REPLACED



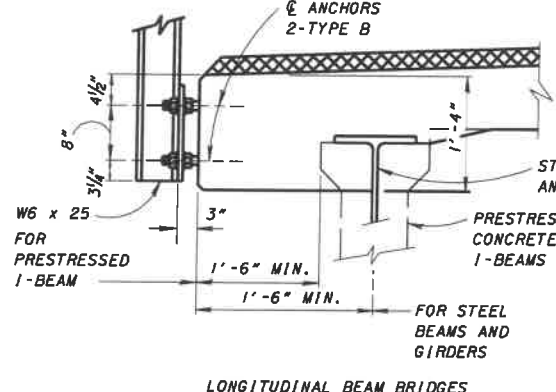
TWO 1 1/4" x 8" STUDS WITH MACHINE THREADS FULL LENGTH AND TWO HEX NUTS AND TWO 2 1/2" x 3 1/2" x 5/16" PLATE WASHERS PER STUD.



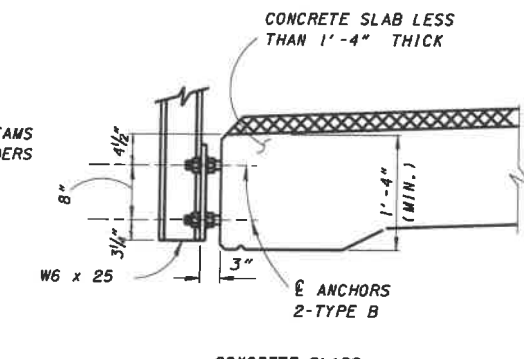
SECTION A-A TYPE C ANCHOR DETAIL



SECTION D-D TYPE B ANCHOR DETAIL



LONGITUDINAL BEAM BRIDGES



CONCRETE SLABS (EDGE BEAM SHOWN)

ACSC INDICATES ASPHALT CONCRETE SURFACE COURSE. MWS INDICATES MONOLITHIC WEARING SURFACE.

POST ANCHORAGE DETAILS (NOT FOR USE WITH PRESTRESSED BOX BEAMS)

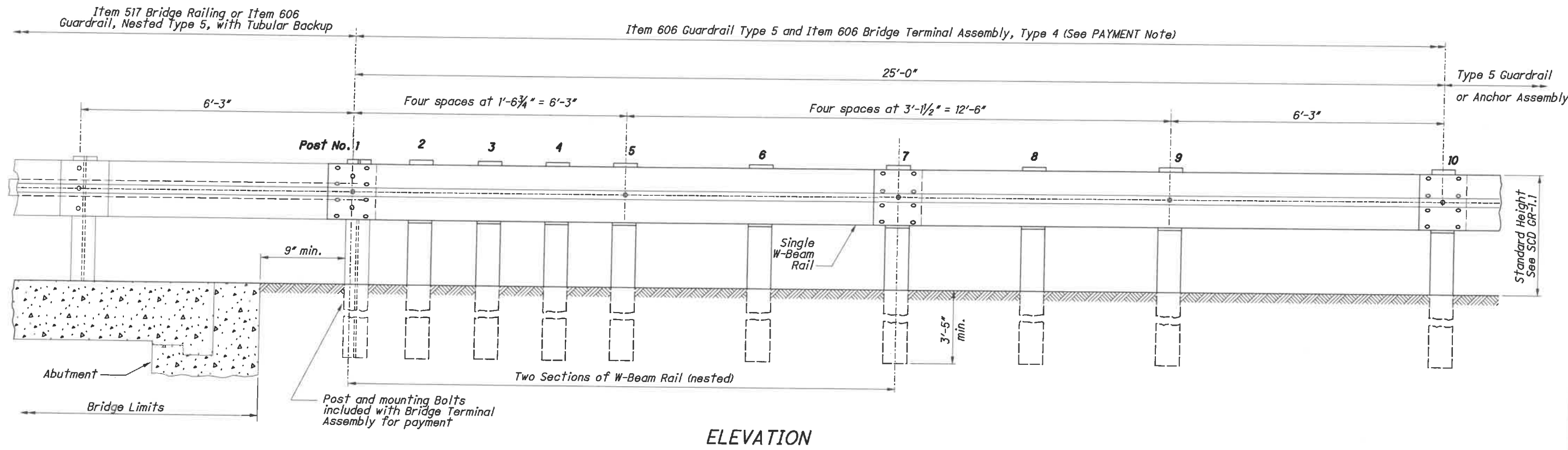
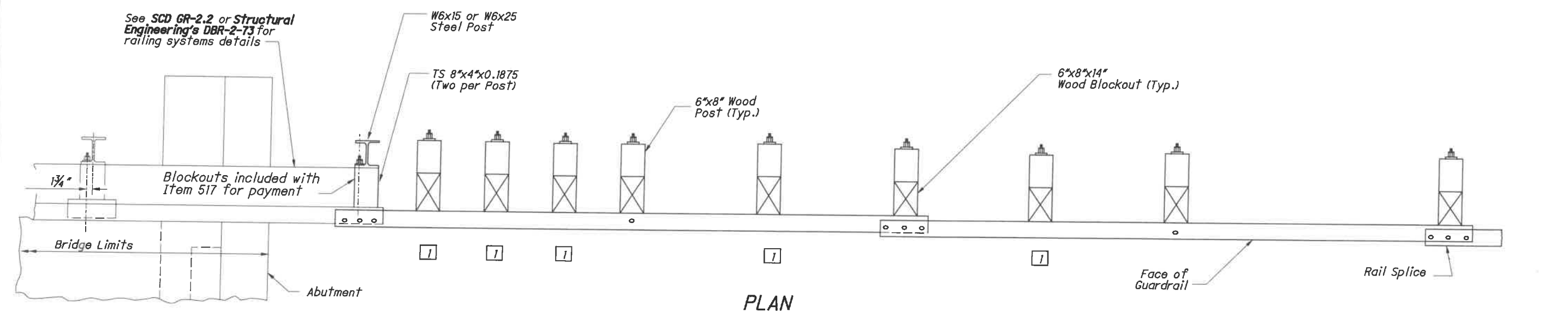
MATERIAL: ALL ANCHOR BOLTS, NUTS AND STUDS SHALL CONFORM TO THE PHYSICAL PROPERTIES OF ASTM-A325 EXCEPT THAT THE ELONGATION SHALL BE 10% AND THE THREAD LENGTH REQUIREMENTS SHALL BE WAIVED. THE CHEMICAL PROPERTIES ARE WAIVED.

STEEL TUBING SHALL BE AS PER ITEM 707.10. ALL GUARDRAIL POSTS AND PLATE WASHERS SHALL BE ASTM A709 GRADE 36 OR 50.

GALVANIZING: ALL GUARDRAIL POSTS, TUBES, HARDWARE AND ACCESSORIES SHALL BE GALVANIZED IN ACCORDANCE WITH 711.02, EXCEPT AS OTHERWISE NOTED.

TYPE C ANCHOR INSERTS OF A DIFFERENT TYPE MAY BE PROVIDED IF APPROVED BY THE DIRECTOR.

DESIGN AGENCY	STATE OF OHIO DEPARTMENT OF TRANSPORTATION	DATE	4-10-73
ENGINEER	Robert B. Pappas	ENGINEER OF BRIDGES	
REVIEWED	L.M.W.	DESIGNED	J.F.F.
CHECKED	J.A.M.	DRAWN	B.E.E.
STANDARD	DEEP BEAM BRIDGE GUARDRAIL	REVISIONS	9-15-94 10-20-00 07-19-02



NOTES

**GENERAL:** For additional details, see SCD GR-1.1.

**APPLICATION:** The Type 4 Bridge Terminal Assembly shall connect Type 5 Guardrail runs to Type 5 Guardrail with Tubular Backup or to Deep Beam Bridge Guardrail (as shown on Structural Engineering SCD DBR-2-73).

**DETAIL INFORMATION:** The first post off the bridge shall be steel (W6x15 or W6x25). All holes in the off-structure end of the approach panel rail section spanning the abutment are slotted 3/4"x2 1/2". Tighten the bolts as specified for expansion joints in Item 606.05.

**POSTS:** Posts may be set in drilled holes or driven to grade. See SCD GR-1.1 for additional Post embedment details. Guardrail is not attached to certain posts (see LEGEND).

**WOOD POSTS -** Use square sawed pressure treated wood as specified in CMS 710.14 and fabricated with square ends. Bore bolt holes and trim the tops of posts, if required after the posts are set.

**STEEL POSTS -** are allowed as an alternate. Use W6x9 or W6x8.5 in lieu of the 6"x8" wood post. Use same post material through-out assembly.

**BLOCKOUTS:** Approved alternate blockouts can be found on the Office of Roadway Engineering website. Steel blockouts are not permitted.

**FLARED GUARDRAIL:** Start Standard Guardrail Flares as shown on SCD GR-5.1 at or beyond Post No. 10; however, the flare may begin at Post No. 7.

**PAYMENT:** Item 606 - Bridge Terminal Assembly, Type 4, Each, includes the cost of extra components in excess of normal guardrail, such as additional posts and other hardware. The TS 8"x4" spacers and tubular backup rail extending to the first post off the bridge is included with Item 517 - Railing, or Item 606 - Guardrail, Nested Type 5 with Tubular Backup, for payment.

LEGEND

1 Guardrail is not attached to posts at Posts 2, 3, 4, 6, and 8. Blockout is fastened to post with standard Post Bolt.