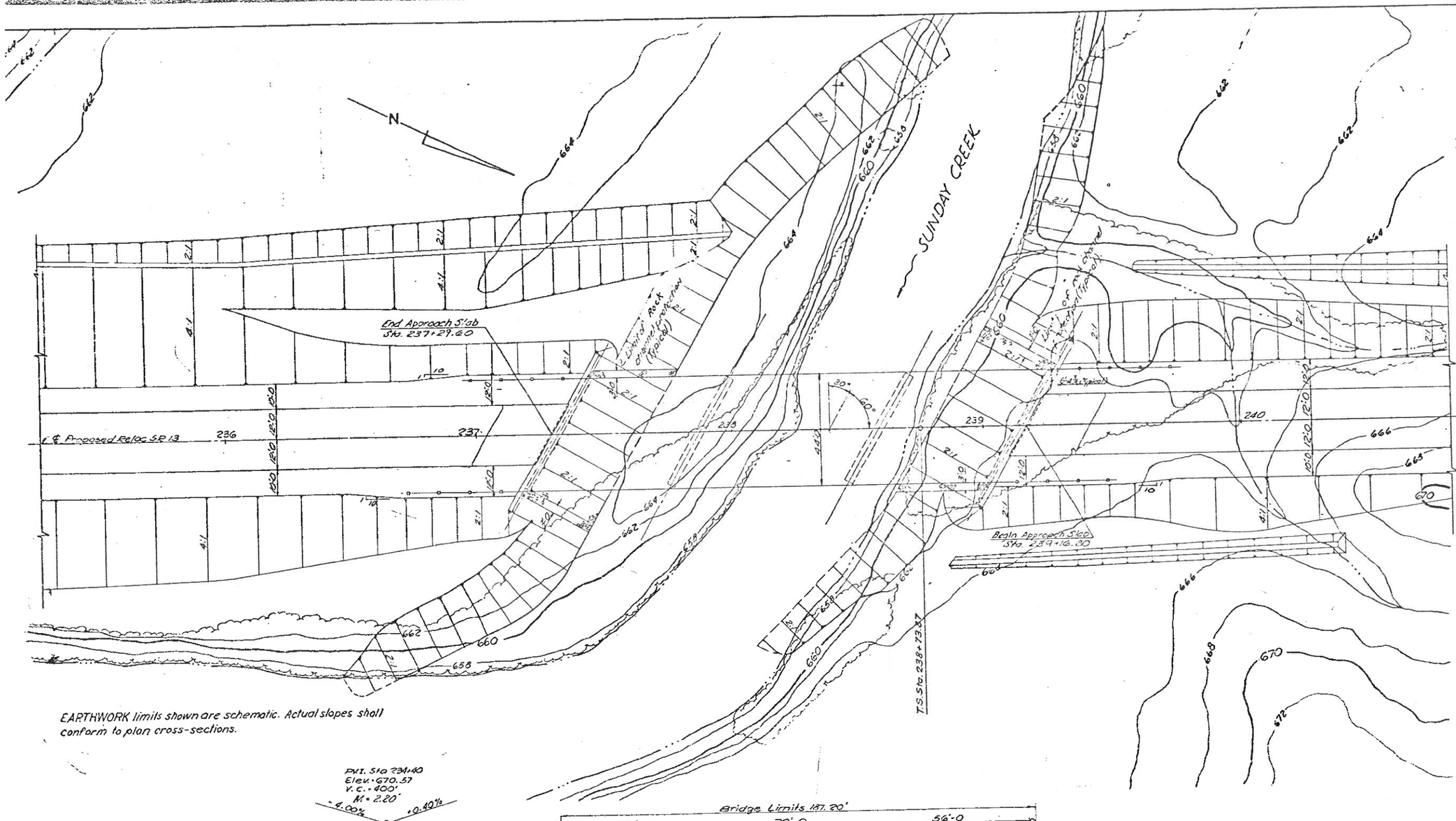
FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

112
138

ATHENS COUNTY
ATH-13-3.87
3.5 MI. NORTH OF CHAUNCEY



R1 Sta. 237+15.40
Δ = 51°27'42" Rt.
Dc = 4°00'
R = 1432.39'
Ls = 300'
θs = 6°00'
Δc = 39°27'42"
Lc = 986.54'
Ts = 841.53'
O = 9.62'
Lα = 1186.95'
X = 299.67'
Y = 10.45'
Es = 160.78'

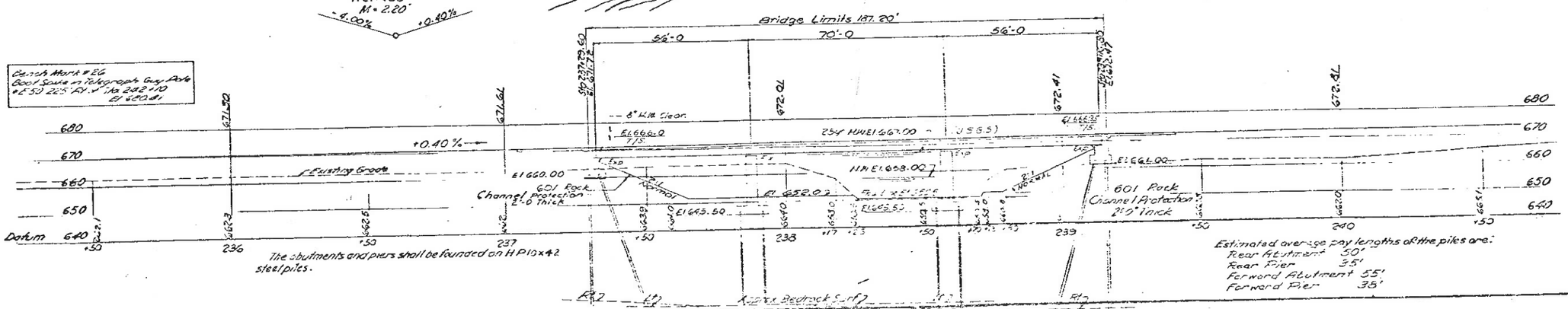
Existing Bridge Data
Sta. 231+00 300' Rt.
New York Central R.R.
(Kanawha & Michigan R.R.)
Type: Thru Steel Plate Girder 6'-0 Deep
Substructure: Concrete Abutments, Piers, 14" I Beam
Spans: 41'-0 81'-8 41'-0

STATE OF OHIO
JAROSLAW SHADIEVSKYJ
REGISTERED
PROFESSIONAL ENGINEER

May 25th, 1964

EARTHWORK limits shown are schematic. Actual slopes shall conform to plan cross-sections.

PVI. Sta 234+40
Elev. = 670.57
V.C. = 400'
K = 2.20'
-4.00% +0.40%



The abutments and piers shall be founded on H P 10x42 steel piles.

Estimated average pay lengths of the piles are:
Rear Abutment 50'
Rear Pier 35'
Forward Abutment 55'
Forward Pier 35'

PROPOSED STRUCTURE
Type: Continuous steel beam bridge reinf. conc. deck and superstructure.
Spans: 56'-0, 70'-0, 56'-0 c/c brgs.
Roadway: 44'-0" W/guard rails
Load Frequency: Cf = 400 (57)
Skew: 30°00' Left Forward
Wearing Surface: 1" Monolithic
Approach Slabs: 45'-1" GT (25' Long)
Alignment: 4° Curve Rt.
Superelevation: Varies
A.D.T.: 3620 (1980)
pH = 7.65 Sulfates: 1917 ppm
Latitude: 39°26.6' Longitude: 82°06.2'
Drainage Area: 121.0 Sq. Mile

ROBERT W. LOWRY
CONSULTING ENGINEER
227 PINE STREET HARRISBURG, PENNA.

SITE PLAN
BRIDGE NO. ATH-13-0449
OVER SUNDAY CREEK

ATHENS CO.
RELOC. SR. 13
STA 237+29.60
STA 239+16.80

SCALE: 1"=20'

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
J.H.	MS			J.H.	4-23-64	

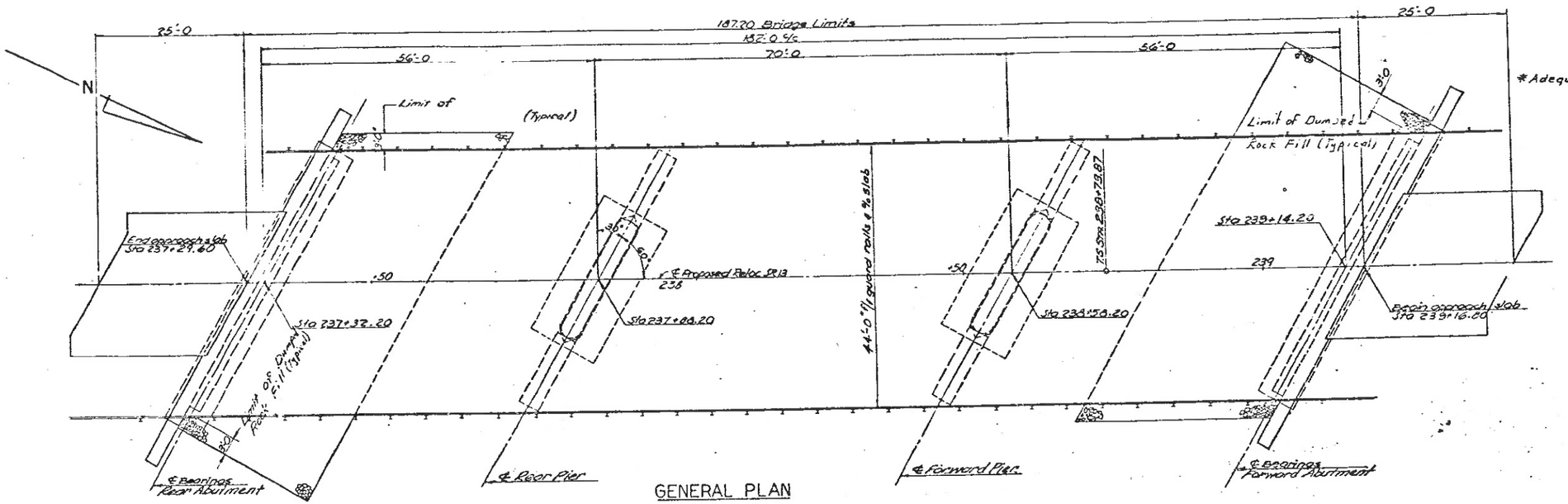
R.W.L.

1 OF 1

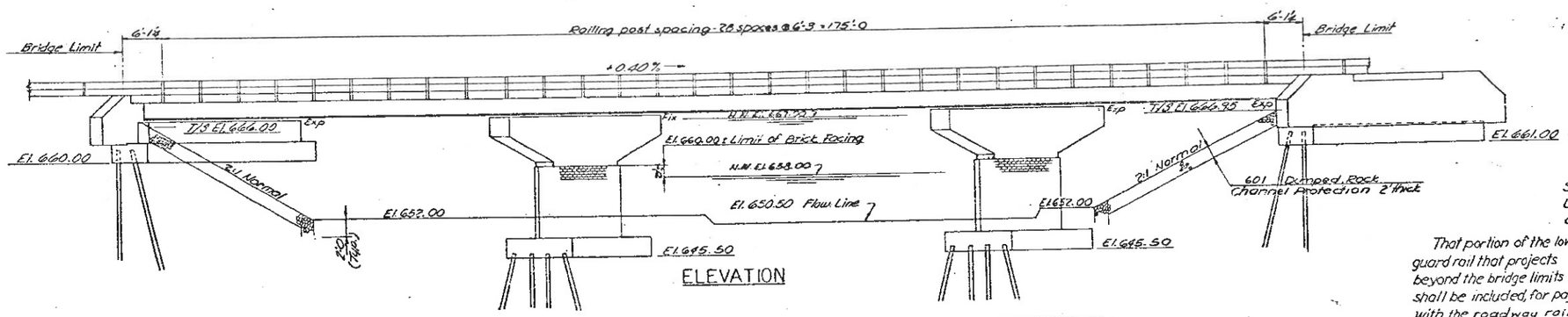
FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

113/138

ATHENS COUNTY
ATH-13-3.87
3.5 MI. NORTH OF CHAUNCEY

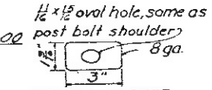


GENERAL PLAN



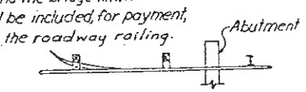
ELEVATION

$\frac{11}{16} \times 1\frac{3}{8}$ oval hole, same as post bolt shoulder

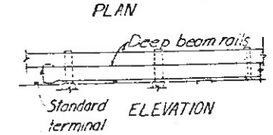


SPECIAL WASHER
Use under head of all post bolts.

That portion of the lower guard rail that projects beyond the bridge limits shall be included, for payment, with the roadway railing.



PLAN



ELEVATION

TWO DEEP BEAM BRIDGE RAILING
DETAIL A

GENERAL NOTES

DESIGN SPECIFICATIONS: This structure conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio Department of Highways, dated 3-1-57, together with current revisions thereof.

REFERENCE shall be made to Std. Dwgs SD-1-69 sheets 1, 2 & 4 dated 6-12-69 CSB-1-63 sheet 1 of 5 revised 12-8-65, FSB-1-62 revised 1-15-63, AS-1-67 revised 6-12-69 and supplemental specifications 808 dated 1-1-71 & 836 dated 1-1-71 & 927 dated 1-1-71.

DESIGN LOADING - CF 600 (57) *

CONCRETE CLASS C - Superstructure 1,333 p.s.i.

CONCRETE CLASS C - Substructure 1,133 p.s.i.

STRUCTURAL STEEL - (except piling) ASTM A36 - basic unit stress 20,000 p.s.i.

REINFORCING STEEL - ASTM A615 A616 A617

Basic unit stress 20,000 p.s.i.

DUMPED ROCK FILL, TYPE A 601, 2'0 thick shall be provided as indicated on the General Plan.

MACHINE FINISH: The concrete bridge deck shall be finished by the use of a finishing machine.

BAR SIZE is indicated in the bar mark. The first digit where three digits are used, and the first two digits where four are used, indicate the bar size number. For example, A700 is a No 7 size bar and A1014 is a No 10 size bar.

PILES shall be driven with a hammer of not less than 11,000 ft. lbs per blow, to firm contact with the rock. If the length of penetration is approximately equal to the depth of rock according to the bridge foundation investigation report, the firm contact shall be considered as attained when the capacity according to the formula in Sec. 507.05 is not less than the following value for a pile hammer of the indicated energy rating:

	11,000 ft. lbs	15,000 ft. lbs
Rear Abutment	45 Tons/Pile	40 Tons/Pile
Forward Abutment	45 Tons/Pile	40 Tons/Pile
Rear Pier	50 Tons/Pile	45 Tons/Pile
Forward Pier	50 Tons/Pile	45 Tons/Pile

If the energy rating of the hammer is between the ratings as shown, the required formula capacity shall be determined by interpolation. The design load is 35 Tons/Pile for the abutment and pier piles.

* If reinforcing bars in accordance with ASTM A616 are provided the shall be subject to bend tests as per AASHO Designation M42-70.

PVI Sta 234+40.00
Elev. 670.57
V.C. 400
M = 2.20'
-4.90% +0.40%

VERTICAL CURVE DATA

P.I. Sta. 247+15.40
Δ = 51°27'42" Rt.
Dc = 4°00'
R = 1432.39'
Ls = 300'
θs = 6°00'
Δc = 39°27'42"
Lc = 986.54'
Ts = 891.53'
θ = 2.62'
Xo = 149.95'
X = 299.67'
Y = 10.46'
Es = 160.78'

HORIZONTAL CURVE DATA

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION	SUPERSTR.	ABUTS.	PIERS	GENERAL
503	420	Cu. Yds.	Unclassified Excavation		253	167	
503	Lump	Sum	Cofferdams, Cribs, and Shoring				Lump
601	320	Cu. Yds.	Dumped Rock Fill, 2' Thick Type A				320
511	221	Cu. Yds.	Class C Concrete Superstructure	221			
511	123	Cu. Yds.	Class C Concrete Piers above Footings			123	
511	105	Cu. Yds.	Class C Concrete Abutments above Footings		105		
511	147	Cu. Yds.	Class C Concrete Footings		78	69	
509	89,721	Lbs.	Reinforcing Steel	62,853	11,010	15,798	
513	221,226	Lbs.	Structural Steel	221,226			
514	221,226	Lbs.	Field Painting of Structural Steel	221,226			
517	374.40	Lin. Ft.	Railing (2 deep beam rails with Steel Rehand Bolts)	374.40			
505	Lump	Sum	Test Pile				Lump
507	2,907	Lin. Ft.	Steel Piles HP14x42		1,155	1,752	
518	44	Cu. Yds.	Porous Back-Fill		44		
Special	1,070	Sq. Ft.	Brick Facing			1,070	
808	221	Units	Chemical Admixture for concrete Type R, B, or O	221			

REPLACEMENT BARS

MARK	NO	SIZE	LENGTH	TYPE
RE500	1	5	6'-7"	Str.
RE600	2	6	6'-11"	Str.
RE700	2	7	7'-2	Str.
RE800	1	8	7'-6"	Str.
RE900	1	1	7'-10"	Str.
RE1100	1	1	8'-6"	Str.

Rev. 1-14-72

ROBERT W. LOWRY
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GENERAL PLAN
BRIDGE NO ATH-13-0449
OVER SUNDAY CREEK
ATHENS CO.
RELOC. SR 13
STA 237+29.60
STA 239+16.60

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
JD	MS		W.C.	J.H.	4-30-64	

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

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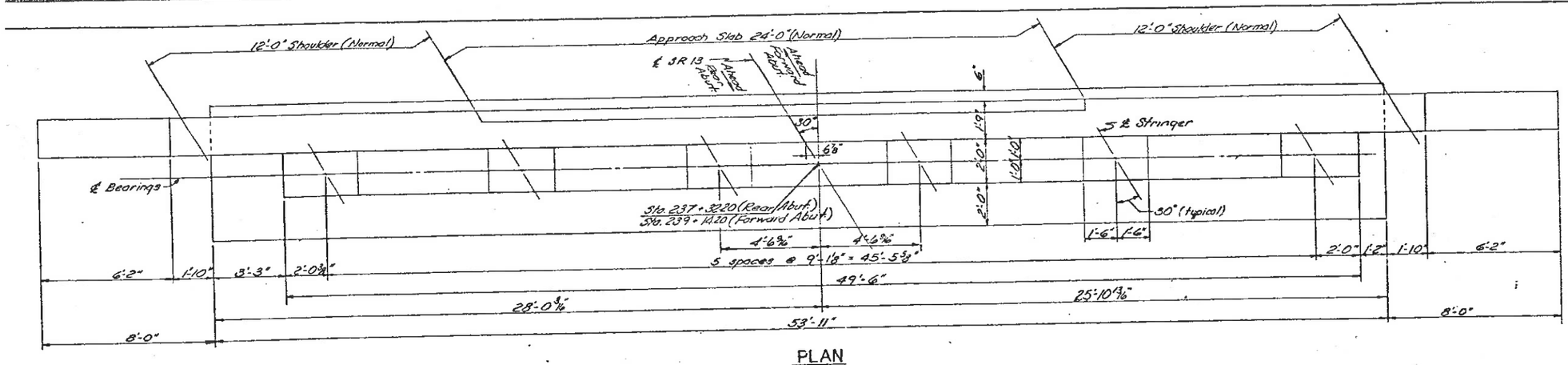
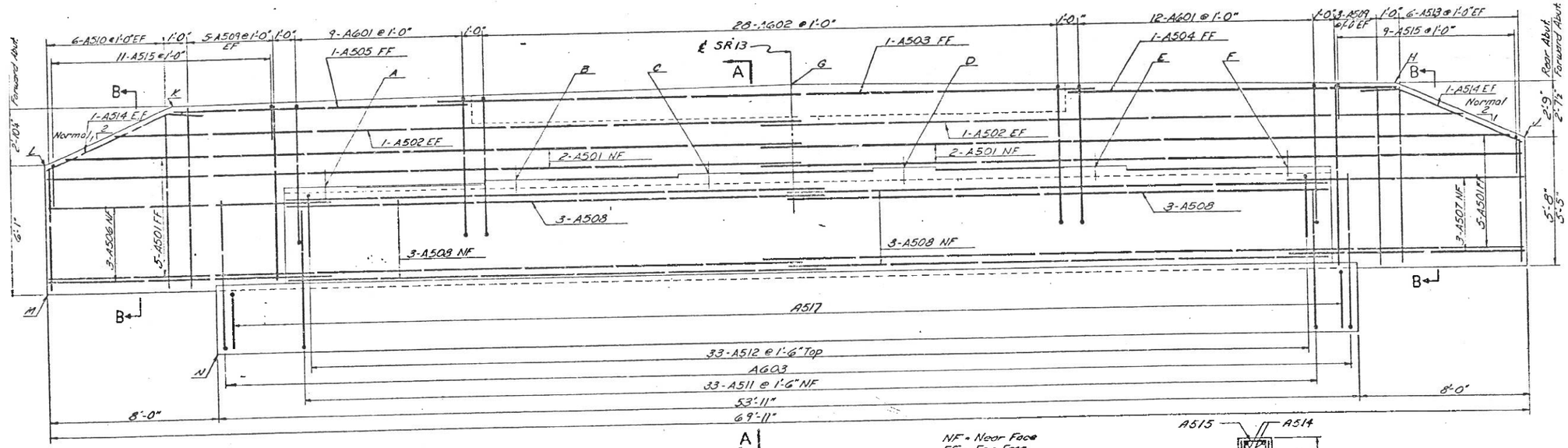
ATHENS COUNTY
ATH-13-3.87

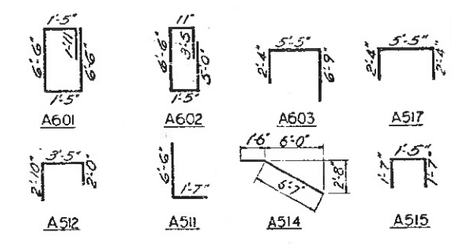


PLAN



ELEVATION

NF = Near Face
FF = For Face
EF = Each Face



NOTES

POROUS BACKFILL shall extend upward to the approach slab and to the surface of the earth shoulders and outward to the surface of the embankment slopes. Excavation therefore in excess of that required for the abutment shall be considered as included in the bid price per cu. yd. paid for porous backfill.

ALL ABUTMENT CONCRETE shall be Class "C".

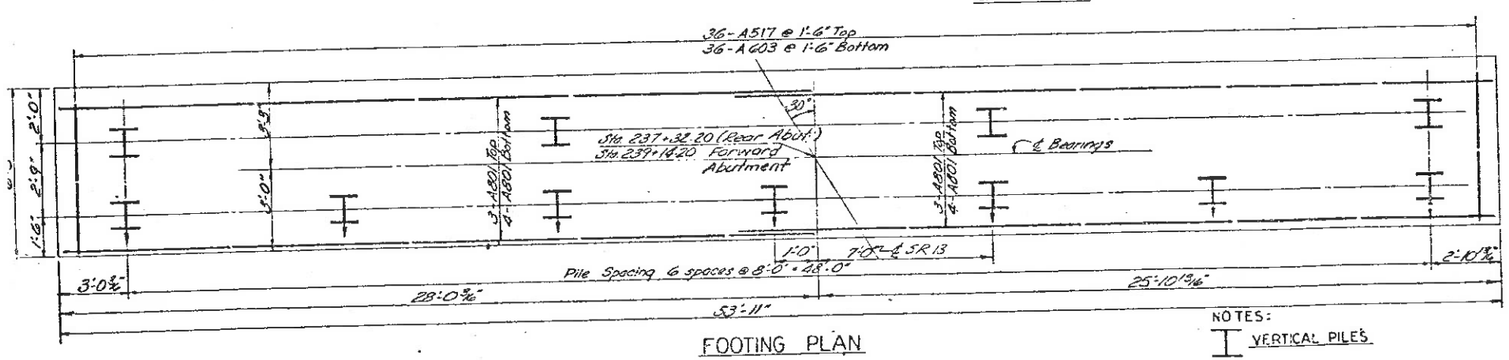
EXCAVATION QUANTITY: Includes the removal of fill material required for construction of the abutments.

PROCEDURE: The embankment shall be placed and compacted up to the finished spill thru slope and to the level of the subgrade after which excavation shall be made for the abutments and piles driven.

POROUS BACKFILL shall extend upward to the plane of the subgrade and laterally to the surface of the embankment slopes.

BAR SCHEDULE (ONE ABUTMENT)

MARK	NO.	LENGTH	TYPE	REMARKS	WEIGHT
A801	14	27'-11"	Str.		1043
A601	21	17'-4"	Bent		547
A602	28	16'-10"	Bent		707
A603	36	14'-4"	Bent		775
A501	14	35'-7"	Str.		520
A502	4	33'-0"	Str.		138
A503	1	31'-0"	Str.		32
A504	1	15'-6"	Str.		17
A505	1	14'-0"	Str.		15
A506	3	13'-6"	Str.		42
A507	3	10'-9"	Str.		33
A508	12	25'-4"	Str.		317
A509	16	8'-0"	Str.		194
A510	12	5'-4" to 8'-0"	Str.	2 Sets vary ea. by 6⅜"	83
A511	33	8'-0"	Bent		275
A512	33	8'-1"	Bent		278
A513	12	5'-1" to 8'-0"	Str.	2 Sets vary ea. by 7"	81
A514	4	8'-1"	Bent		34
A515	20	4'-5"	Bent		92
A517	36	9'-11"	Bent		372
				Total weight	5535
Total weight for two Abutments					11,070 lbs.



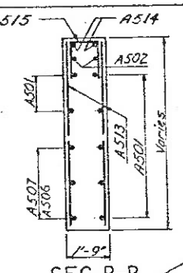
FOOTING PLAN

NOTES:

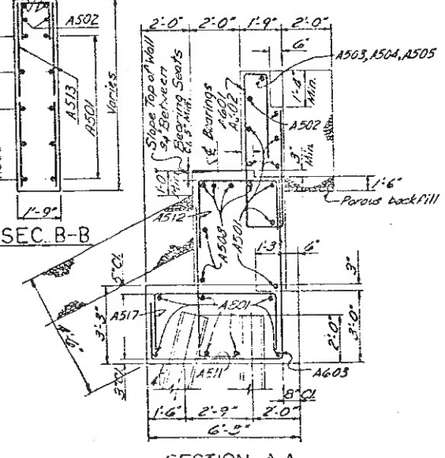
VERTICAL PILES

BATTERED PILES

All piles shall be HP10x42



SEC. B-B



SECTION A-A

ELEVATIONS													
LOCATION	A	B	C	D	E	F	G	H	J	K	L	M	N
REAR ABUTMENT	667.32	667.47	667.61	667.63	667.53	667.41	671.73	671.41	668.66	671.28	668.66	663.00	660.00
FORWARD ABUTMENT	668.73	663.58	668.46	663.34	666.20	668.05	672.47	672.03	669.41	672.93	670.08	664.00	661.00

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CONSULTING ENGINEER
227 PINE STREET HARRISBURG, PENNA.

ABUTMENTS
BRIDGE NO. ATH-13-0449
OVER SUNDAY CREEK

ATHENS CO.

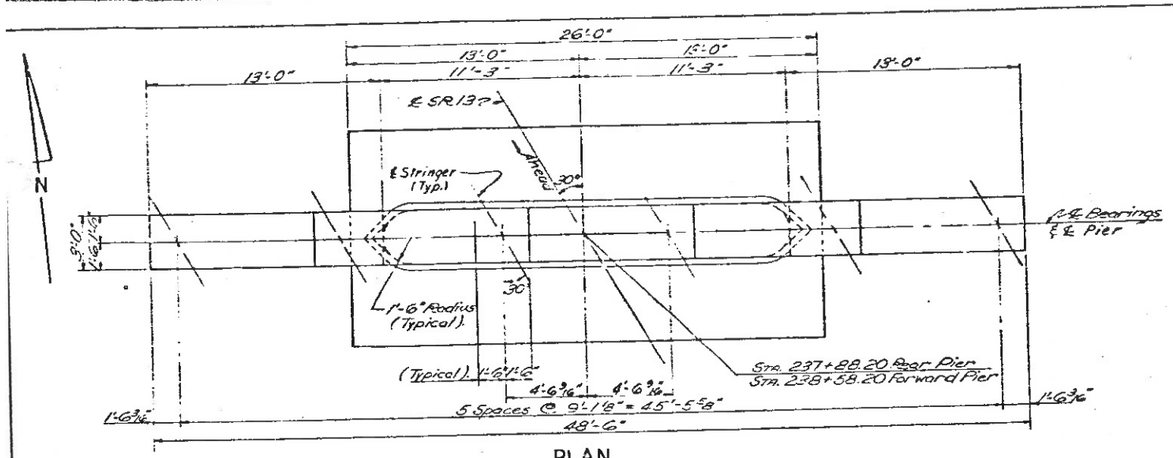
RELOC. SR 13
STA. 237+29.60
STA. 259+16.80

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
JMP.	T.A.B.		MAC	J.H.	4-30-59	

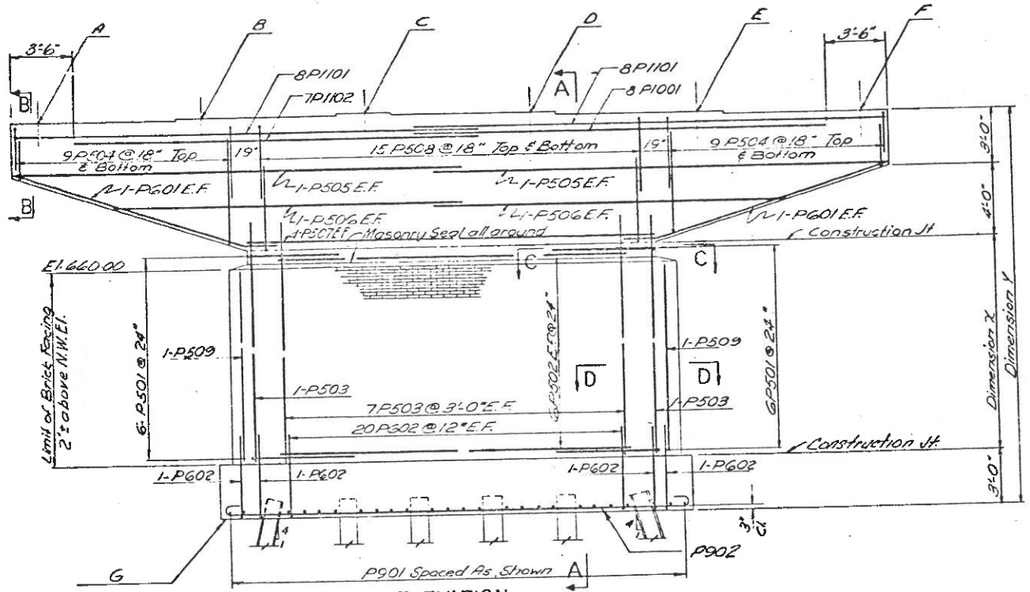
FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

115/138

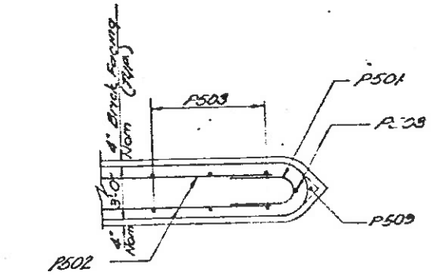
ATHENS COUNTY
ATH-13-3.87



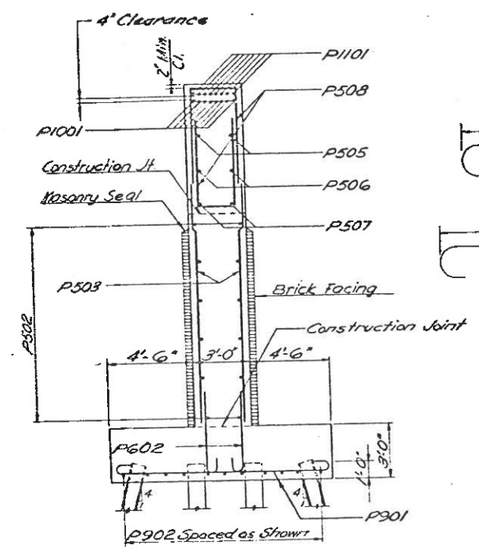
PLAN



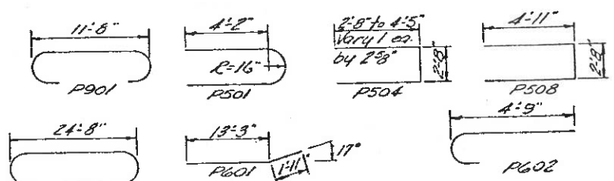
ELEVATION



SECTION C-C



SECTION A-A



BAR SCHEDULE

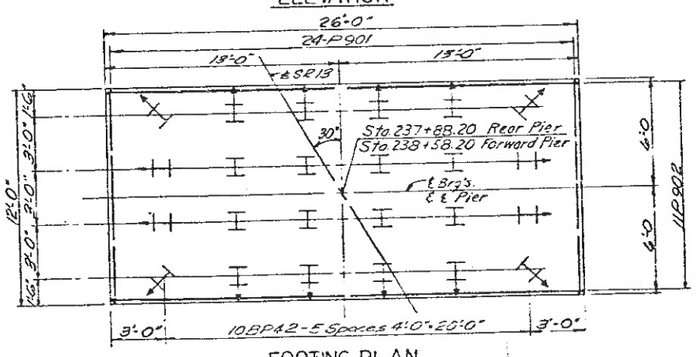
MARK	NUMBER R. PIER	NUMBER FWD PIER	LENGTH	TYPE	REMARKS	WEIGHT R. PIER	WEIGHT FWD PIER
P1101	16	16	25'-10"	Str.		2196	2196
P1001	16	16	22'-4"	Str.		1537	1537
P901	24	24	14'-2"	Bent		1156	1156
P902	11	11	23'-2"	Bent		1053	1053
P601	4	4	15'-2"	Bent		91	91
P602	44	44	4'-6"	Bent		297	297
P501	12	12	11'-6"	Bent		144	144
P502	12	12	14'-8"	Str.		184	184
P503	16	16	13'-11"	Str.		232	232
P504	36	36	8'-0" 11'-6"	Bent	4 Sets of 9 bars	366	366
P505	4	4	26'-11"	Str.		104	104
P506	4	4	19'-0"	Str.		79	79
P507	2	2	22'-6"	Str.		47	47
P508	30	30	12'-6"	Bent		391	391
P509	2	2	10'-5"	Str.		22	22
					Total Weight	7899 Lbs.	7899 Lbs.

BRICK TIE NOTES

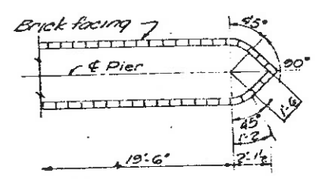
Dovetail anchor slots 2" wide at the base and 3/16" thick dovetail anchors shall be used to anchor the brick facing to the piers. The anchor slots shall be felt filled and placed vertical on 18" centers. They shall be fastened with nails to the inside of the forms. The anchors shall be placed every fourth course of brick. These anchors and anchor slots shall be included with the price for brick facing for payment. They shall be of the type manufactured by Hohmann & Barnard Inc. or Dayton Sure-Grip & Snore Co. or approved equal.
The contractor shall furnish plans showing location of dovetail anchor slots and dovetail anchors to the Engineer for approval.

GENERAL NOTES

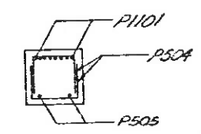
- Reinforcement steel in pier caps shall be placed so that it will not interfere with anchor bolts.
- All Reinforcing Steel shall be 2" clear from face of concrete unless otherwise noted.
- Facing bricks for Piers shall be made from clay & burned grade SA. They shall meet the Specifications of Section 704.01 The mortar used shall be acid and caustic resistant, Alkor Resin Cement, Aluminate Cement or approved equal.
- All concrete in stem to be placed in one pour.
- Top of brick to be sealed with mortar and sloped to drain water.



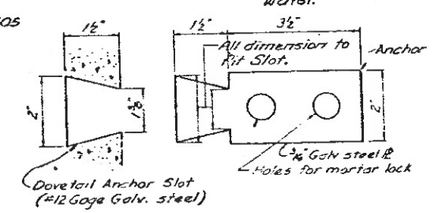
FOOTING PLAN



SECTION D-D



SECTION B-B



BRICK TIE DETAIL

NOTE
All piles shall be HP 10 x 42 steel piles
— denotes Vertical Pile
— denotes Battered Pile

ELEVATIONS								
LOCATION	A	B	C	D	E	F	G	DIMENSION X	DIMENSION Y
REAR PIER	667.30	667.41	667.51	667.49	667.35	667.21	645.50	11.71'	21.71'
FORWARD PIER	668.17	668.15	668.14	668.07	667.94	667.79	645.50	13.29'	22.29'

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227 PINE STREET HARRISBURG, PENNA.

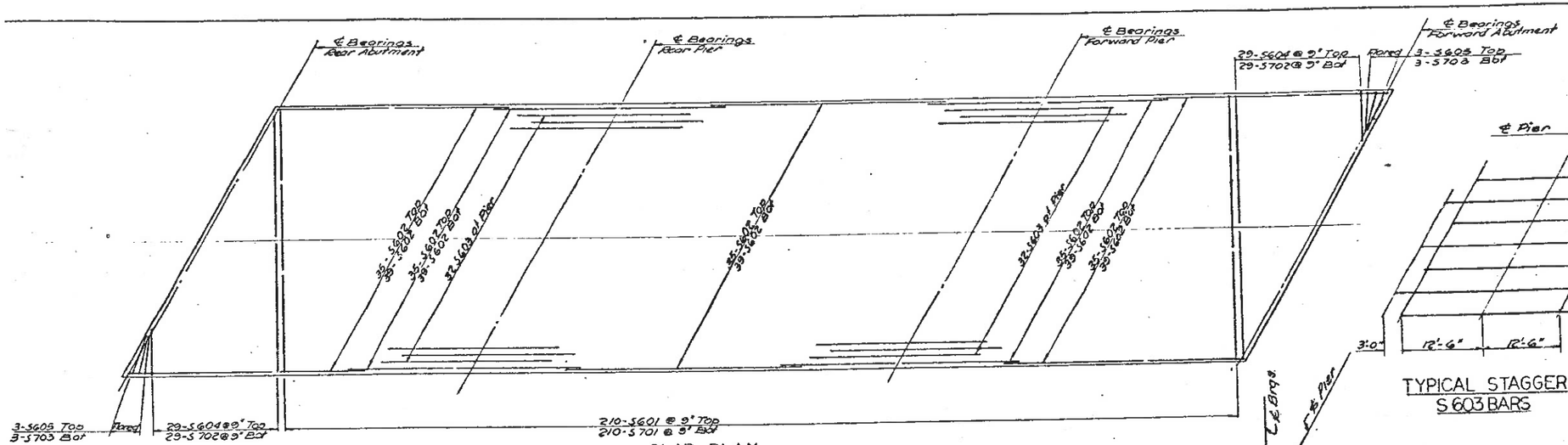
PIERS
BRIDGE NO ATH-13-0449
OVER SUNDAY CREEK
ATHENS COUNTY
RELOC. SR. 13
STA. 237+29.60
STA. 239+6.80

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
S.H.F.	D.E. M.S.		R.A.L.	J.H.	4-29-68	

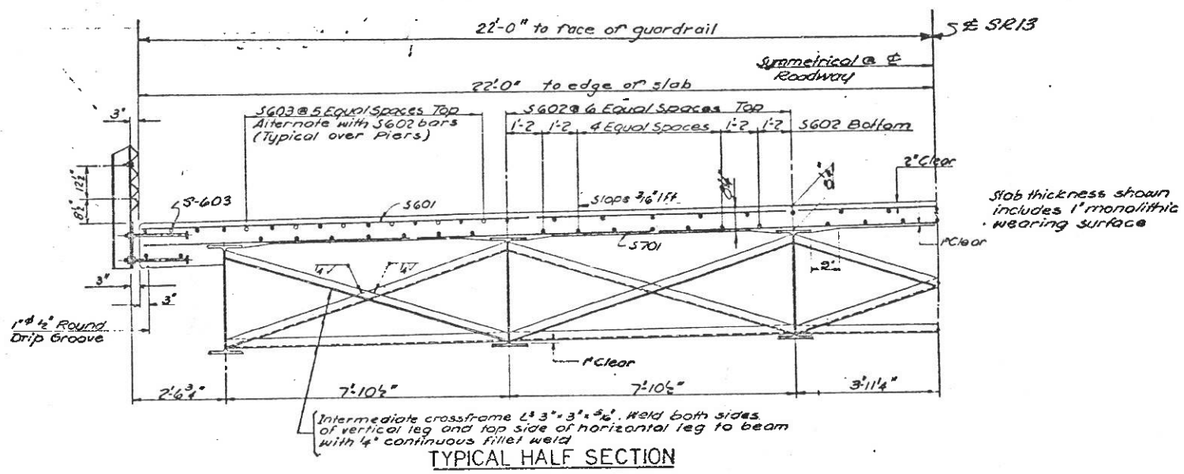
FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

116
138

ATHENS COUNTY
ATH-13-3.87

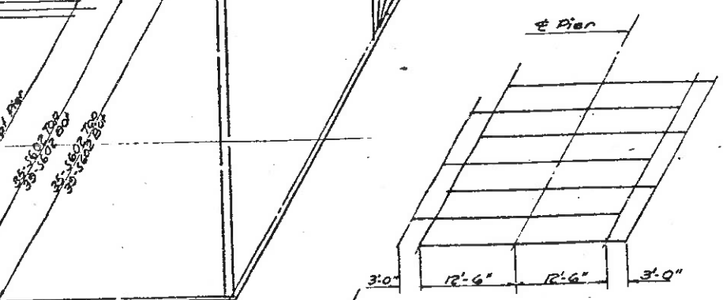


SLAB PLAN

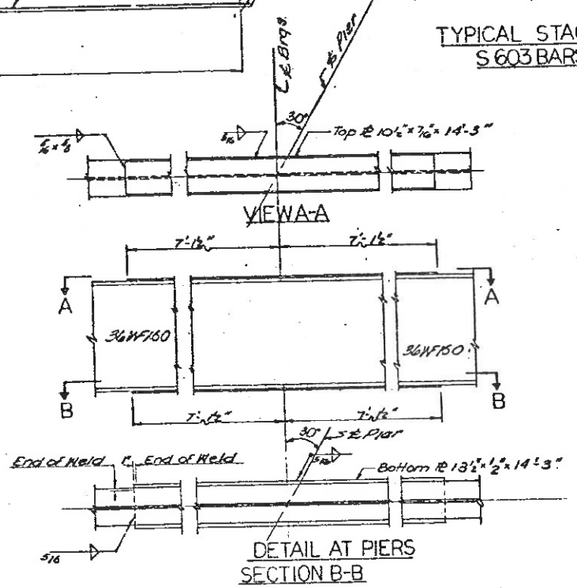


TYPICAL HALF SECTION

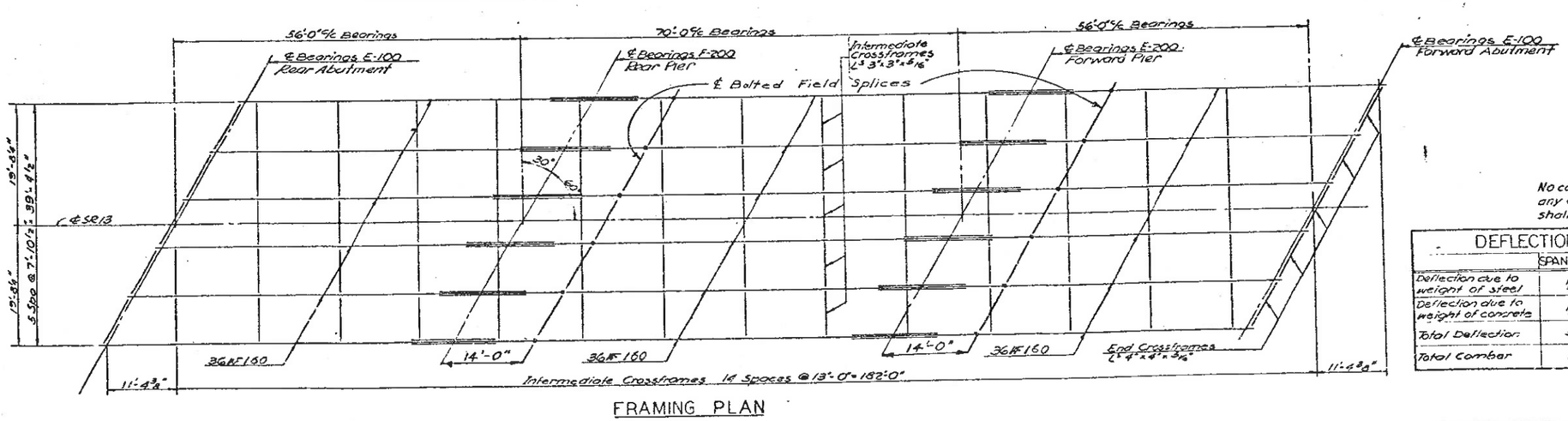
Slab thickness shown includes 1" monolithic wearing surface



TYPICAL STAGGER S603 BARS



DETAIL AT PIERS
SECTION B-B



FRAMING PLAN

BAR SCHEDULE

MARK	NO	LENGTH	TYPE	REMARKS	WEIGHT
S601	210	43'-8"	Str		13,692
S602	370	38'-3"	Str		21,257
S603	64	28'-0"	Str		2,692
S604	58	7'-6" to 43'-2"	Str	2 sets of 29 bars vary each bar by 15"	2,206
S605	6	7'-0"	Str		31
S701	210	43'-8"	Str		18,564
S702	58	7'-6" to 43'-2"	Str	2 sets of 29 bars vary each bar by 15"	3,003
S703	6	7'-0"	Str		858
				Total weight	62,853 Lbs.

NOTES

- Reference shall be made to Standard Drawing SD-1-63 sheets 1, 2 & 4 dated 11-8-65 for details of end dams, beam splice details and end crossframes.
- Reference shall be made to Std Dwg CSB-1-63 sheet 1 of 5 revised 12-8-65 for railing details, also Detail A.
- Reference shall be made to Standard Drawing FSB-1-62 revised 1-15-63 for details of fixed & sliding bearings. For specifications see Supplemental Specification 927 dated 1-1-71.
- All concrete shall be Class "C"

NON-stress carrying welds are shown thus: N

- Deck Slab Depth: The distance shown from the top of deck to top of steel beam is the nominal dimension. The quantity of deck concrete to be paid for shall be based on this dimension, even though deviation from it may be necessary because the top flange of the beam may not have the exact camber or conformation required to place it parallel to the finished grade.

Deck Slab Haunch: The haunch in the deck slab adjacent to the top of steel beams, which is shown as 9" wide, may vary from this dimension between the limits of 6" and 12" except that the maximum slope shall not exceed 3" per foot. Payment for deck slab concrete shall be based on the 9" width.

- Deck Placing Procedure: In placing the deck concrete, construction joints will be permitted parallel to the transverse reinforcing steel and near the middle of any span because of the flow of curing water from the surface of previously placed deck concrete, the sequence of pours shall be upgrade.

On Std. Dwg. FSB-1-62, specification reference M-7.11 shall be considered to read 711.17.

*WELDED ATTACHMENTS: No attachments shall be made by welding to the top flanges of the beams within a distance of 0.10 of the span length on either side of the interior supports. Welding for attachments to the top flanges at other parts of the spans shall be kept at least 2" from edge of flange.

No camber required but any convexity of beams shall be placed upward.

DEFLECTION & CAMBER

	SPAN NO. 1	SPAN NO. 2	SPAN NO. 3
Deflection due to weight of steel	1/4"	3/8"	1/4"
Deflection due to weight of concrete	1/16"	1/16"	1/16"
Total Deflection	5/16"	7/16"	5/16"
Total Camber	0"	0"	0"

Rev. 1-14-72

ROBERT W. LOWRY
CONSULTING ENGINEER
727 PINE STREET HARRISBURG, PENNA.

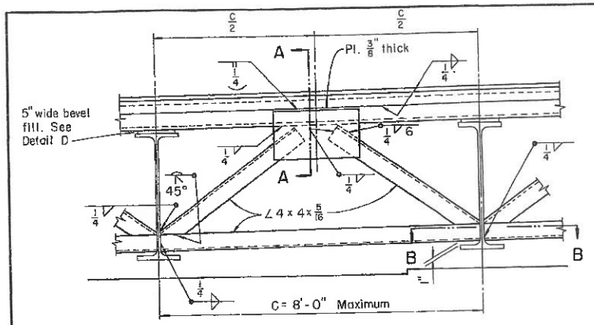
FRAMING PLAN
BRIDGE NO. ATH-13-0449
OVER SUNDAY CREEK

ATHENS CO.

RELOC. SR. 13
STA. 237+29.60
STA. 233+16.80

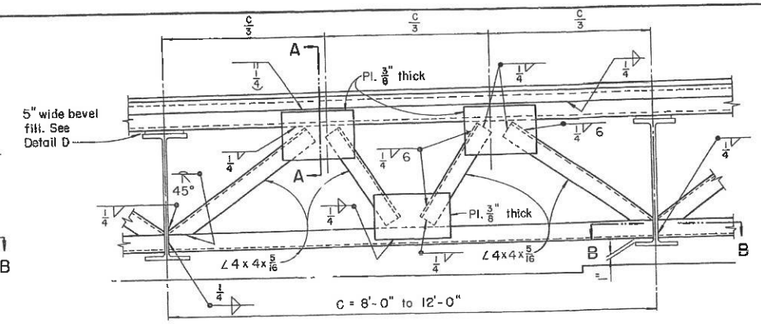
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
JMP	MS		H.C.	J.H.	4-30-64	

R.H.M.



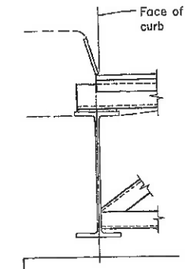
END CROSSFRAME

For beam spacing of 8'-0" or less measured parallel to end dam.

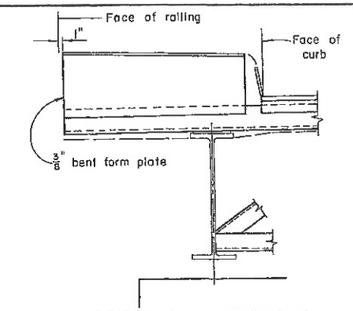


END CROSSFRAME

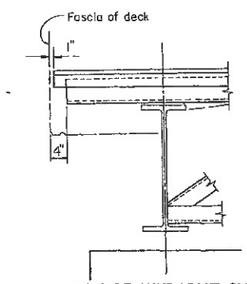
For beam spacing of 8'-0" to 12'-0" measured parallel to end dam.



BRIDGE WITH CURBS



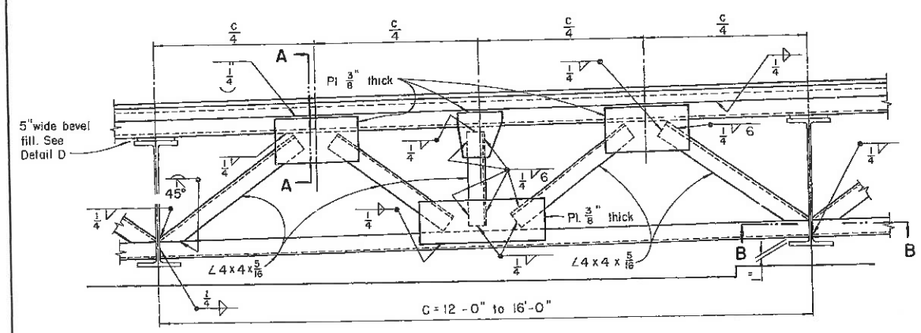
BRIDGE WITH SIDEWALK



BRIDGE WITHOUT CURBS

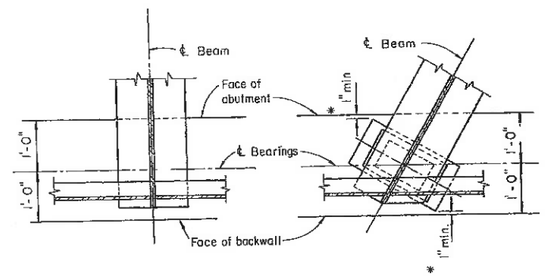
END DAM DETAILS AT FASCIA BEAM

(For additional details see Sheet No 2)



END CROSSFRAME

For beam spacing of 12'-0" to 16'-0" measured parallel to end dam.

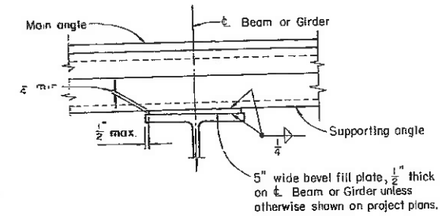


FOR SQUARE BRIDGES

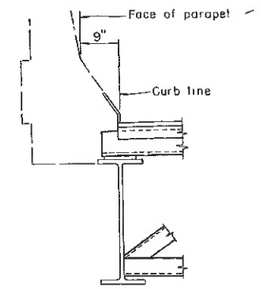
FOR SKEWED BRIDGES

SECTION B-B

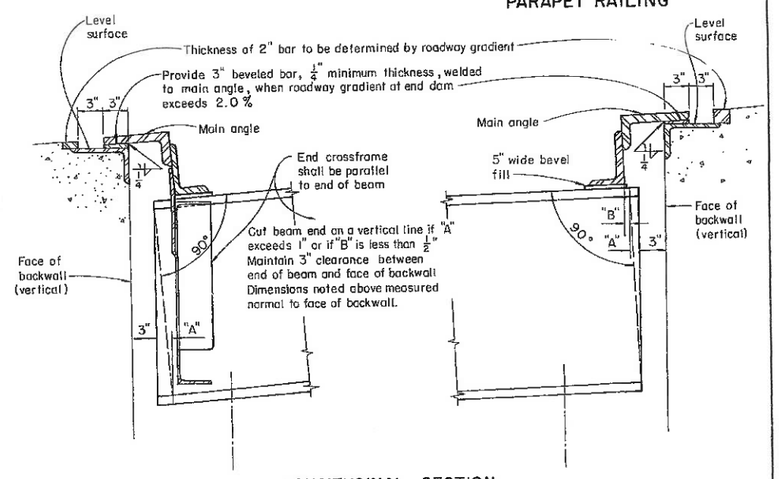
* Where necessary, cope corner of masonry plate in order to maintain 1" clearance.



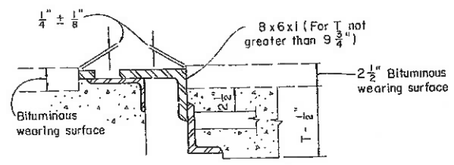
DETAIL D



BRIDGE WITH ROADWAY PARAPET RAILING



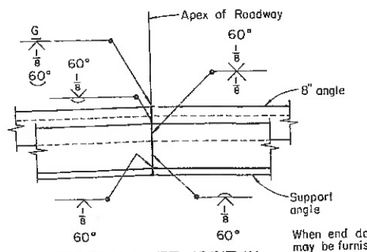
LONGITUDINAL SECTION
BRIDGE ON GRADE



SECTION A-A

SHOWING ROADWAY END DAM FOR BITUMINOUS WEARING SURFACE

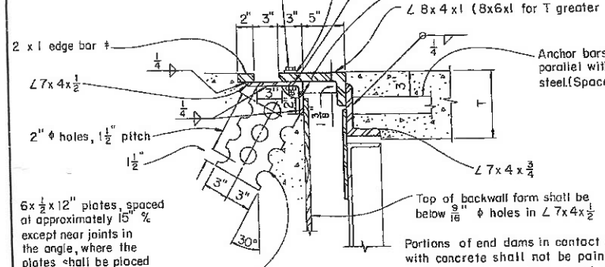
Same as SECTION A-A for monolithic wearing surface except as shown.



WELDED BUTT JOINT IN SUPERSTRUCTURE END DAM

When end dam contains no apex, a butt joint may be furnished near the centerline of the deck, if necessary to facilitate handling and shipping.

A welded butt joint in the end dam, at the apex of roadway, will be required for that portion of the end dam attached to the superstructure. The portion attached to the backwall shall be placed in segments not less than 6'-0" in length, with a joint at each joint in the backwall and with one of the joints at the apex of roadway. These shall be closely butted but shall not be welded.



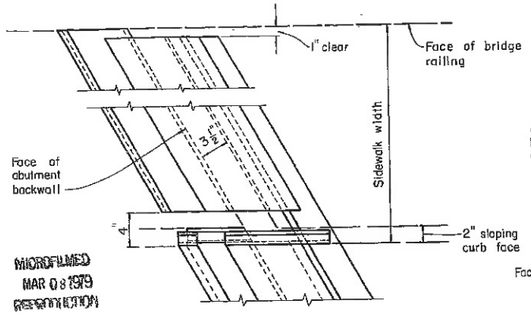
SECTION A-A

SHOWING ROADWAY END DAM FOR MONOLITHIC WEARING SURFACE

‡ Furnish different thickness if required to compensate for grades in excess of 2%.

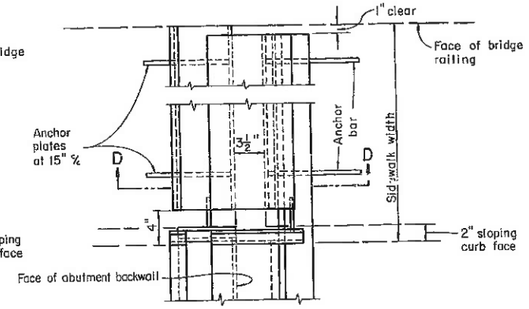
REVISIONS	STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES				
	STANDARD SUPERSTRUCTURE DETAILS FOR STEEL BEAM AND GIRDER BRIDGES				
	APPROVED: C. H. Altwater DATE 6-12-69 ENGINEER OF BRIDGES				DRAWING NUMBER SD-1-69
	PREPARED FFE	TRACED NRB	CHECKED WJJ FFE	REVIEWED CDB RVH BFG	SHEET NO. 1 OF 4 SHEETS

MICROFILMED FEB 21 1969

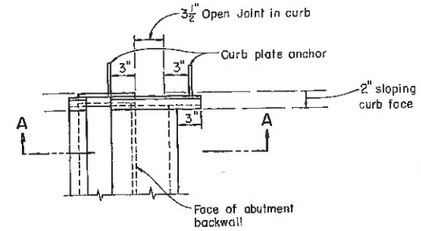


PART DECK PLAN
SKEWED BRIDGES

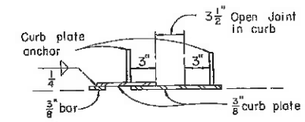
MICROFILMED
MAR 08 1979
RECEIVED



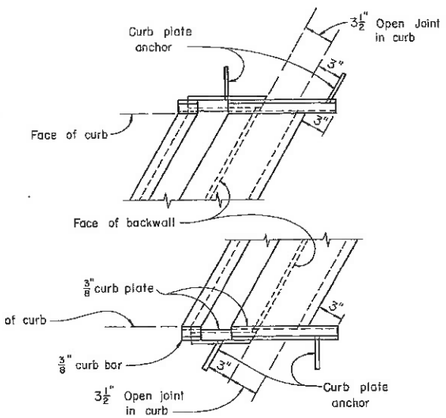
PART DECK PLAN
SQUARE BRIDGES



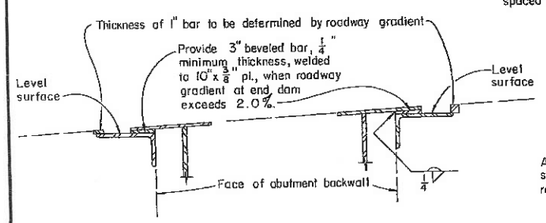
PART DECK PLAN
SQUARE BRIDGES



SECTION C-C

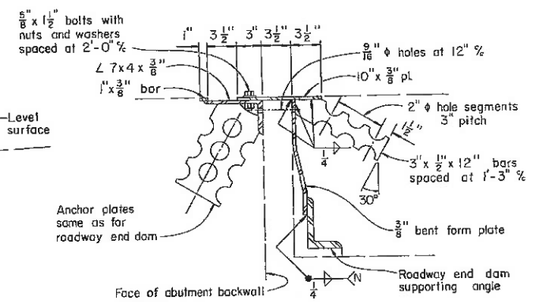


PART DECK PLAN
SKEWED BRIDGES



SIDEWALK END DAMS
FOR BRIDGE ON GRADE

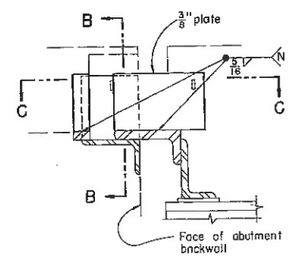
For additional details see Section D-D



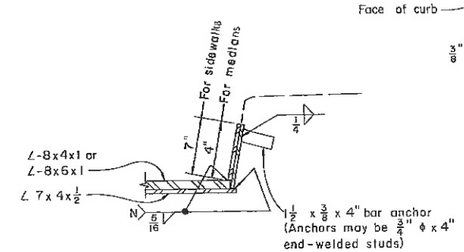
SECTION D-D

For additional notes and details see Section A-A on Sheet No. 1

SIDEWALK END DAM DETAILS

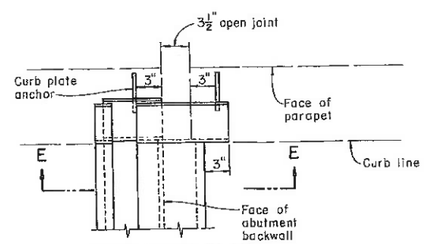


SECTION A-A

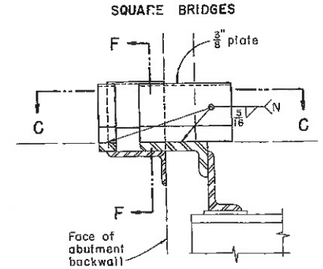


SECTION B-B

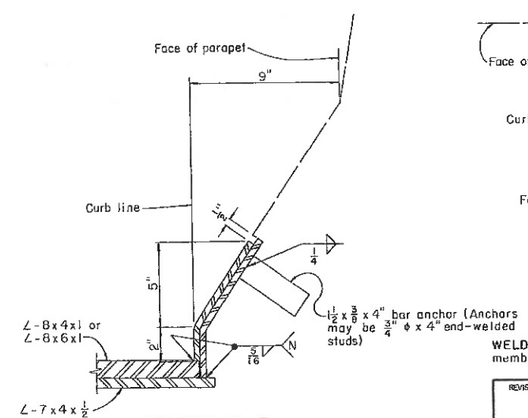
CURB PLATE DETAILS
SIDEWALKS, SAFETY CURBS
AND RAISED MEDIANS



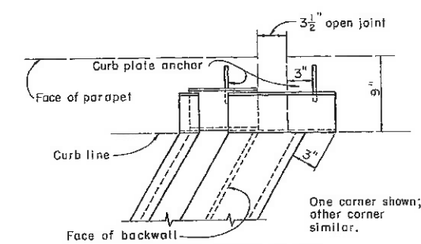
PART DECK PLAN
SQUARE BRIDGES



SECTION E-E



SECTION F-F



PART DECK PLAN
SKEWED BRIDGES

WELDS on non-stress-carrying members are shown thus: N 5/16

CURB PLATE DETAILS
ROADWAY PARAPET
RAILINGS AND BARRIER MEDIANS

REVISIONS	STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES				
	STANDARD SUPERSTRUCTURE DETAILS FOR STEEL BEAM AND GIRDER BRIDGES				
	APPROVED: DATE: 6-12-69 C. A. Altvater ENGINEER OF BRIDGES				DRAWING NUMBER SD-1-69
	PREPARED FFE JFS	TRACED NRB	CHECKED MPB CDB	REVIEWED CDB RVH BFG	SHEET NO. 2 OF 4 SHEETS

GENERAL: This drawing provides design and construction details. The Project plans shall show the location of splices plus a reference to this drawing for pertinent details and notes. For splicing beams of different sizes or where splices are located at beam bend points, the project plans shall include sufficient details supplementing this drawing to completely describe the splice.

DESIGN SPECIFICATIONS: This drawing conforms to "Standard Specifications for Highway Bridges" adopted by the American Association of State Highway Officials, 1965, including the Ohio "Supplement" to these specifications.

BASIC UNIT STRESSES:

Structural Steel	ASTM	A-36	20,000 psi bending 12,000 psi shear
High Strength Bolts	ASTM	A-325	13,500 psi shear

FATIGUE UNIT STRESSES: Where the ratio of the minimum to the maximum moment R is <0 the splice design shall be based on the allowable fatigue unit stresses as required by Section 1.7.3 instead of on the basic unit stresses noted above. The effect of this change in the allowable unit stresses may be conveniently implemented in the design by increasing the calculated maximum stresses (moment and shear) by the ratio of the basic unit stress to the fatigue unit stress. These modified maximum stresses may then be used as specified in the DESIGN note to verify the adequacy of the splice design shown hereon, or to establish modified strength requirements for special designs using basic unit stresses.

DESIGN: For each structure the designer shall choose a splice location and determine the maximum total stresses (moment and shear) at that point. The splice shall be designed for not less than (1) the average of the calculated maximum stress and the static strength of the beam, (2) the modified maximum stress specified in the FATIGUE UNIT STRESSES note, or (3) 75 % of the static strength of the beam. The splice designs shown hereon are designed for (3). If stresses (1) or (2) are more critical, this design shall not be used and such splices should be designed to meet the established requirements. The static beam strength at the splice is based on the net section for bending and the gross section for shear using the basic unit stresses. When splicing beams of different sizes, the splice design shall be based on the lighter weight beam.

FASTENERS: 1" diameter High Strength Bolts.

SPLICE MATERIAL WEIGHT plus the weight of fills, where required, shall be included with the structural steel quantity for payment.

FABRICATION AND ASSEMBLY: Beam ends at splices shall be cut and fit as per plan. The opening between beam ends after assembly shall not exceed $\frac{1}{4}$".

FILLS shown on the project plans and shop drawings shall be dimensioned to the nearest $\frac{1}{16}$ inch in thickness, but not less than $\frac{1}{8}$ inch thick, based on the dimensions for detailing and intended relative position of the abutting flanges and webs, to be spliced. However, in the final shop assembly, fills shall be furnished with thicknesses sufficient to compensate for any misalignment of abutting flanges and webs due to standard rolling mill tolerances. The actual fills used in the splice shall be such as to compensate for differences in total thickness or relative positions of $\frac{1}{16}$ inch or more

VERTICAL CLEARANCE: For grade separation structures an allowance of $\frac{3}{4}$ inches plus the thickness of the outside flange splice plate shall be used in computing the actual vertical clearance under a beam splice.

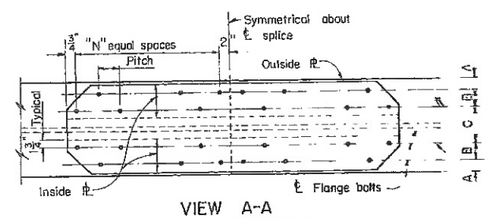
FEB 21 1969

BEAM SPLICE DATA

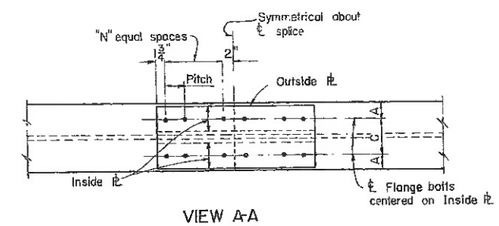
Beam		Flange Splice: TYPE	Flange Plates: Outside, 2 required	Flange Plates: Inside, 4 required	Flange Bolts: Number	Flange Bolts: N Spa.	Flange Bolts: Dimensions (inches) Pitch	A	B	C	Web Splice: TYPE	Web Plates, 2 required	Web Bolts No	Weight of splice material ≠ lbs.	DESIGN: Beam Strength: Moment ft-kips	Shear kips
36 WF	280	B	16 x 11/16 x 6'-3"	6 1/2 x 13/16 x 6'-3"	80	9	3 3/4	2 1/16	3	6 1/2	B	19 1/2 x 7/16 x 2'-7"	60	1210	1455	354
	260	B	16 x 9/16 x 5'-0"	6 1/2 x 3/4 x 5'-0"	64	7	3 3/4	2	3	6 1/2	B	19 1/2 x 7/16 x 2'-7"	60	950	1338	338
	245	B	16 x 9/16 x 5'-0"	6 1/2 x 11/16 x 5'-0"	64	7	3 3/4	2	3	6 1/2	B	19 1/2 x 7/16 x 2'-7"	54	880	1261	321
	230	B	16 x 9/16 x 5'-0"	6 1/2 x 5/8 x 5'-0"	64	7	3 3/4	2	3	6 1/2	B	19 1/2 x 3/8 x 2'-7"	54	840	1180	306
	194	A	11 x 5/8 x 2'-11 1/2"	4 1/2 x 3/4 x 2'-11 1/2"	40	4	3 1/2	2 9/16	–	7	B	19 1/2 x 7/16 x 2'-7"	54	540	891	314
	182	A	11 x 9/16 x 2'-11 1/2"	4 1/2 x 11/16 x 2'-11 1/2"	40	4	3 1/2	2 9/16	–	7	B	19 1/2 x 5/8 x 2'-7"	48	490	838	295
	170	A	11 x 1/2 x 2'-11 1/2"	4 1/2 x 5/8 x 2'-11 1/2"	40	4	3 1/2	2 1/2	–	7	B	19 1/2 x 3/8 x 2'-7"	48	460	782	277
	160	A	11 x 1/2 x 2'-4 1/2"	4 1/2 x 9/16 x 2'-4 1/2"	32	3	3 1/2	2 1/2	–	7	B	19 1/2 x 3/8 x 2'-7"	48	400	729	266
	150	A	11 x 7/16 x 2'-4 1/2"	4 1/2 x 9/16 x 2'-4 1/2"	32	3	3 1/2	2 1/2	–	7	A	13 1/2 x 3/8 x 2'-7"	40	340	670	255
	135	A	11 x 3/8 x 2'-4 1/2"	4 1/2 x 1/2 x 2'-4 1/2"	32	3	3 1/2	2 1/2	–	7	A	13 1/2 x 3/8 x 2'-7"	40	320	583	244
33 WF	240	B	15 x 9/16 x 4'-8 1/2"	6 x 13/16 x 4'-8 1/2"	64	7	3 1/2	2 5/16	2 1/2	6 1/4	B	19 1/2 x 7/16 x 2'-4"	54	870	1140	306
	220	B	15 x 9/16 x 4'-8 1/2"	6 x 11/16 x 4'-8 1/2"	64	7	3 1/2	2 1/4	2 1/2	6 1/4	B	19 1/2 x 7/16 x 2'-4"	54	790	1040	286
	200	B	15 x 1/2 x 3'-6 1/2"	6 x 5/8 x 3'-6 1/2"	48	5	3 1/2	2 1/4	2 1/2	6 1/4	B	19 1/2 x 3/8 x 2'-4"	48	580	943	264
	152	A	10 x 1/2 x 2'-4 1/2"	4 x 11/16 x 2'-4 1/2"	32	3	3 1/2	2 11/16	–	6 1/4	B	19 1/2 x 3/8 x 2'-4"	42	380	655	239
	141	A	10 x 7/16 x 2'-4 1/2"	4 x 5/8 x 2'-4 1/2"	32	3	3 1/2	2 5/8	–	6 1/4	A	13 1/2 x 3/8 x 2'-4"	36	320	595	228
	130	A	10 x 7/16 x 2'-4 1/2"	4 x 9/16 x 2'-4 1/2"	32	3	3 1/2	2 5/8	–	6 1/4	A	13 1/2 x 3/8 x 2'-4"	36	310	539	218
	118	A	10 x 3/8 x 1'-9 1/2"	4 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2 5/8	–	6 1/4	A	13 1/2 x 3/8 x 2'-4"	36	250	476	208
30 WF	132	A	10 x 7/16 x 2'-4 1/2"	4 x 5/8 x 2'-4 1/2"	32	3	3 1/2	2 1/4	–	6	B	19 1/2 x 3/8 x 2'-1"	42	350	501	209
	124	A	10 x 7/16 x 2'-4 1/2"	4 x 9/16 x 2'-4 1/2"	32	3	3 1/2	2 1/4	–	6	A	13 1/2 x 3/8 x 2'-1"	32	300	464	199
	116	A	10 x 3/8 x 1'-9 1/2"	4 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2 1/4	–	6	A	13 1/2 x 3/8 x 2'-1"	32	240	430	192
	108	A	10 x 3/8 x 1'-9 1/2"	4 x 7/16 x 1'-9 1/2"	24	2	3 1/2	2 1/4	–	6	A	13 1/2 x 3/8 x 2'-1"	32	230	392	186
	99	A	10 x 3/8 x 1'-9 1/2"	4 x 3/8 x 1'-9 1/2"	24	2	3 1/2	2 1/4	–	6	A	13 1/2 x 3/8 x 2'-1"	32	220	353	177
27 WF	114	A	9 1/2 x 7/16 x 1'-9 1/2"	4 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2 1/16	–	6	B	19 1/2 x 3/8 x 1'-11"	36	270	390	174
	102	A	9 1/2 x 3/8 x 1'-9 1/2"	4 x 7/16 x 1'-9 1/2"	24	2	3 1/2	2	–	6	A	13 1/2 x 3/8 x 1'-11"	28	220	345	158
	94	A	9 1/2 x 3/8 x 1'-9 1/2"	4 x 7/16 x 1'-9 1/2"	24	2	3 1/2	2	–	6	A	13 1/2 x 3/8 x 1'-11"	28	220	315	150
	84	A	9 1/2 x 3/8 x 1'-9 1/2"	4 x 3/8 x 1'-9 1/2"	24	2	3 1/2	2	–	6	A	13 1/2 x 3/8 x 1'-11"	28	210	273	141
24 WF	110	A	10 x 7/16 x 2'-4 1/2"	4 1/2 x 1/2 x 2'-4 1/2"	32	3	3 1/2	2 3/4	–	6 1/2	B	19 1/2 x 3/8 x 1'-8"	30	300	373	138
	100	A	10 x 7/16 x 2'-4 1/2"	4 1/2 x 1/2 x 2'-4 1/2"	32	3	3 1/2	2 3/4	–	6 1/2	B	19 1/2 x 3/8 x 1'-8"	30	300	338	126
	94	A	8 1/2 x 3/8 x 1'-9 1/2"	3 1/2 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2	–	5	B	19 1/2 x 3/8 x 1'-8"	30	230	262	140
	84	A	8 1/2 x 3/8 x 1'-9 1/2"	3 1/2 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2	–	5	B	19 1/2 x 3/8 x 1'-8"	30	230	250	127
	76	A	8 1/2 x 3/8 x 1'-9 1/2"	3 1/2 x 1/2 x 1'-9 1/2"	24	2	3 1/2	2	–	5	B	19 1/2 x 3/8 x 1'-8"	30	230	223	119
	68	A	8 1/2 x 3/8 x 1'-9 1/2"	3 1/2 x 7/16 x 1'-9 1/2"	24	2	3 1/2	2	–	5	A	13 1/2 x 3/8 x 1'-8"	24	200	195	112
21 WF	68	A	8 1/2 x 3/8 x 1'-9 1/2"	*3 1/2 x 3/8 x 1'-9 1/2"	24	2	3 1/2	1 3/4	–	4 3/4	B	19 1/2 x 3/8 x 1'-5"	24	190	175	102

* Trim plates as required to fit beam fillets.

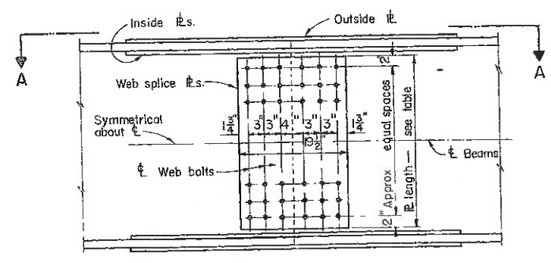
≠ Tabulated weights are approximate and are for estimating purposes only. They include an allowance for weight of bolts and washers.



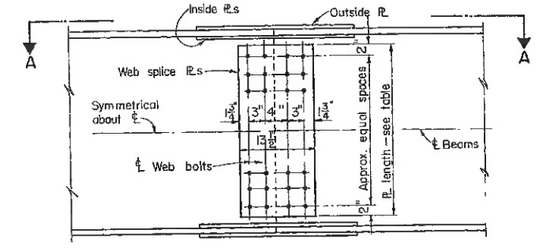
VIEW A-A
Flange Splice-TYPE B



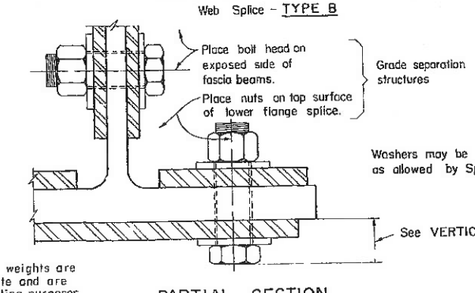
VIEW A-A
Flange Splice- TYPE A



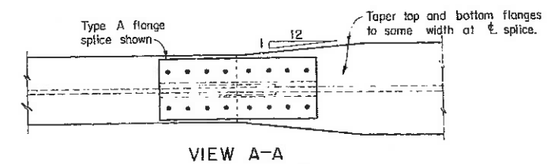
BEAM SPLICE DETAIL
Web Splice - TYPE B



BEAM SPLICE DETAIL
Web Splice - TYPE A



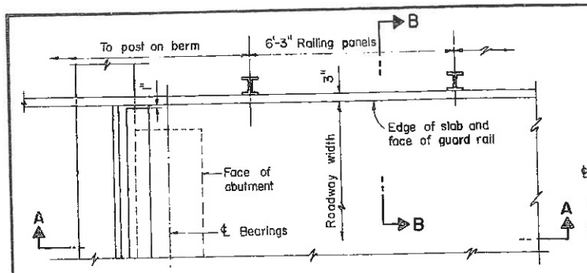
PARTIAL SECTION
(at ℄ of beam splice)



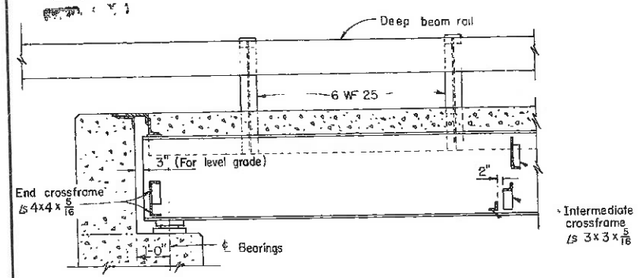
VIEW A-A
Splice detail for beams having different flange widths

REVISIONS	STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES
	STANDARD **BOLTED BEAM SPLICE DETAILS** FOR STEEL BEAM BRIDGES

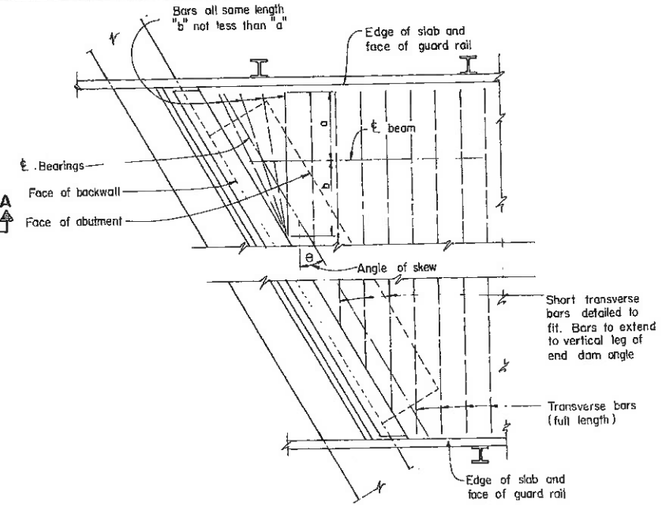
APPROVED				DRAWING NUMBER
DATE 6-12-69	C. H. Abbrecht ENGINEER OF BRIDGES			SD-1-69
PREPARED	TRACED	CHECKED	REVIEWED	SHEET NO 4
NPB	CAM	CPO	HHH BFG RVH CDB	OF 4 SHEETS



PART PLAN AT ABUTMENT



SECTION A-A



PART PLAN OF SKEWED BRIDGE

For skew greater than 15°, transverse bars shall be placed as shown. For skew of 15° or less, transverse bars shall be placed parallel to abutments and shall be made longer than tabulated length.

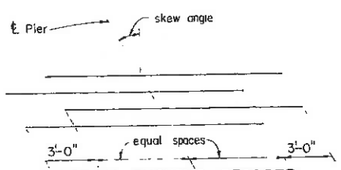
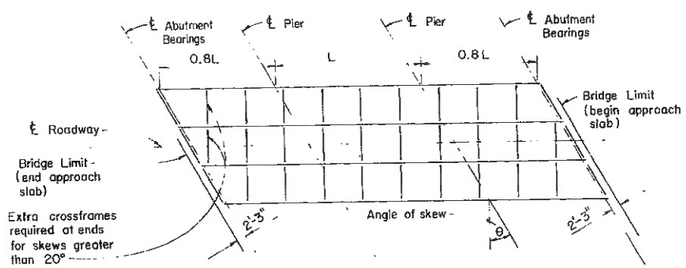
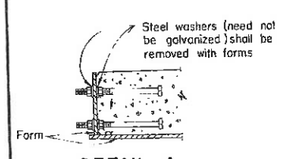


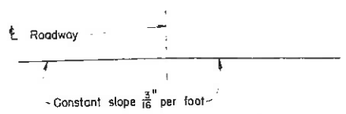
DIAGRAM SHOWING STAGGER OF S603 BARS OVER PIERS



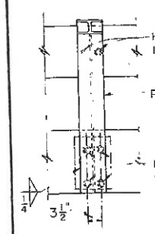
PLAN OF SKEWED STEEL FRAMING



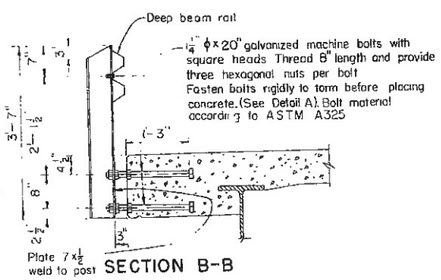
DETAIL A



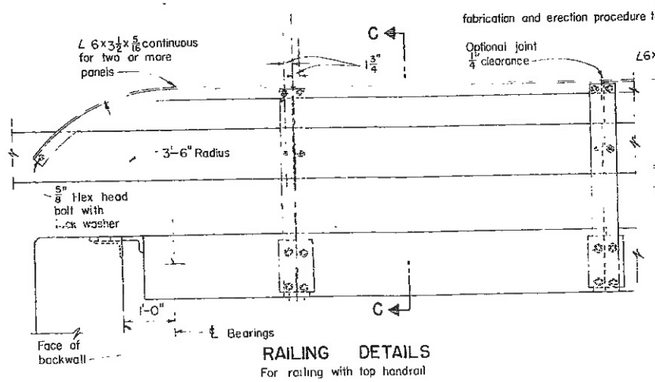
BRIDGE ROADWAY CROWN



ELEVATION OF RAILING POST

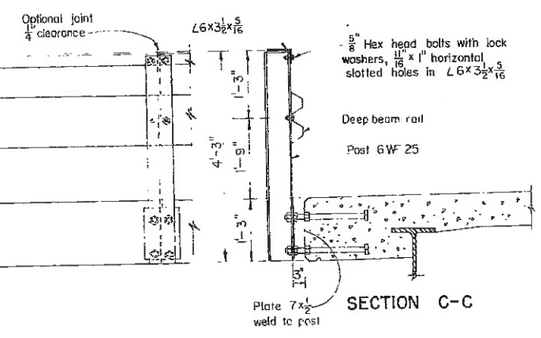


SECTION B-B



RAILING DETAILS

For railing with top handrail



SECTION C-C

GENERAL: This set of drawings (sheets No. 1 thru 5) provides design and construction details. The project plans for each structure shall indicate span lengths, roadway width, load frequency, skew, curve and superelevation (if any), elevations, wearing surface, substructure details, estimated quantities, reinforcing steel list, and other necessary information including special notes and details.

REFERENCE shall be made on the project plans to sheet 1 of this set of drawings and to that one of sheets 2 thru 5 which applies to the specified roadway width. Reference shall be made also to Standard Drawing SD-1-65 and to RB-1-55

DESIGN SPECIFICATIONS: These standard drawings conform to the requirements of "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated September 1, 1957, together with revisions of February 21, 1958 and May 1, 1962, except that beam sections are designed for the 20,000 lb unit stress of ASTM A-36 steel.

ADDITIONAL INTERIOR SPANS, similar to the middle span, may be incorporated in the structure without change in size of beams in case of added spans, the project plans shall show revised details and estimated quantities.

SKEW: These drawings may be used for skewed bridges with the following modifications:

A special list of reinforcing bars shall be provided.

Additional intermediate crossframes shall be provided if the skew exceeds 20°.

Tabulated quantities shall be increased approximately as follows:

Structural Steel: Add 6700 lbs. x (sec θ−1) for 32' roadway
Add 7800 lbs. x (sec θ−1) for 36' roadway
Add 9800 lbs. x (sec θ−1) for 40' roadway
Add 10500 lbs. x (sec θ−1) for 44' roadway

Railing: Add 2.25' x 4 x (sec θ−1) to total linear feet.

Class "C" concrete: No adjustment required.

SUPERELEVATION: For a two-directional bridge on a curve the concrete slab shall be superelevated for the full width of the deck at the same rate as the approach pavement. For one-directional bridges on a curve the concrete slab shall be superelevated as shown on Sheet 4.

MONOLITHIC WEARING SURFACE shall be 1" for all load frequencies. Concrete quantities have been computed on this basis. Tabulated values of "T" include the monolithic wearing surface.

SPLICE ELIMINATION: At the Contractor's option, and where not precluded by camber requirements or shipping length limitations, beams may be fabricated and erected in longer lengths, eliminating some field splices for these beams.

The Contractor shall submit his proposed fabrication and erection procedure to the Director for approval

DECK SLAB DEPTH: The distance shown from top of deck slab to top of steel beam is the nominal dimension. The quantity of deck concrete to be paid for shall be based on this dimension, even though deviation from it may be necessary because the top flange of the beam may not have the exact camber or conformation required to place it parallel to the finished grade.

BEARING DEVICES: Fixed and expansion bearings shown on Standard Drawing RB-1-55, or some other acceptable type of bearing shall be used. For spans under 50 ft, use flat plate bearings

Tabulated bearing capacities required are based on stresses modified according to Sec. 76 of the Design Specifications.

CAMBER: The dead load deflection, plus or minus any curvature caused by the road grade, shall be tabulated on the project plans for the center of span, quarter and three quarter points of span and for all field splice points. The totals of these values, added algebraically, shall be the required shop camber. The dead load deflection tabulated on this Standard Drawing is the total deflection at the mid-point of the center span. The deflection at the mid-point of the end span is 75% of this value. Of the total deflection 20% may be assumed to be due to the weight of the steel.

CONCRETE shall be Class "C", f_c = 1333 psi.

DECK PLACING PROCEDURE: In placing the deck concrete, construction joints will be permitted, parallel to the transverse reinforcing steel and near the middle of any span. Because of the flow of curing water from the surface of previously-placed concrete, the sequence of pours shall be upgrade, starting at the lowest point or points in the grade line.

RAILING: The transition between the guard rail height on the bridge and on the approaches shall be made in a distance of 100 feet from each end of the bridge.

An upper handrail and longer posts shall be provided if called for on the project plans.

The tabulated railing quantity is for the length of railing between the bridge limits. This quantity includes deep beam rail, handrail (if called for), posts, anchors, connections, galvanizing. It also includes those curved portions of the handrail which project beyond the stated limits.

REINFORCING STEEL: ASTM A15, A16, A160 deformed, intermediate or hard grade. fs=20,000 psi. Bar size for reinforcing steel is indicated in the bar mark. The first digit indicates the bar size number. For example, 9601 is a No 6 size bar

CROSS FRAMES may be shifted, if necessary, to avoid beam web splices

REVISIONS 12-8-65	STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES	
	STANDARD CONTINUOUS STEEL BEAM BRIDGE WITHOUT CURBS AND WITH HIGHWAY GUARD RAIL MIDDLE SPAN 35 FEET TO 80 FEET ROADWAY WIDTHS: 32', 36', 40', and 44'	
APPROVED 12-16-68 — Engineer of Bridges		DRAWING NUMBER CSB-1-63
PREPARED WJJ NAA FFE	TRACED CAM	CHECKED NAA WJJ	REVIEWED BFS GDE MPB WGK NHM	SHEET NO. OF SHEETS

MICROFILMED
MAR 12 1979
GENERAL FILM

SPECIFICATION FOR SELF-LUBRICATING BRONZE BEARING PLATES

Self-Lubricating bronze bearing plates shall be made by an established manufacturer of these products and shall conform to the following requirements:

(a) Cast phosphor bronze shall conform to Sec. M-7.11 of the Construction and Material Specifications, ASTM Designation B22, Alloy B, and shall have an allowable unit stress of 2,500 psi in compression.

(b) The lubricant shall be of the solid type and shall consist of graphite, metallic substances having lubricating properties and a lubricating binder. Materials which do not have lubricating qualities or which promote chemical or electrolytic reactions, will not be acceptable. The lubricant shall be compressed into the lubrication recesses with hydraulic pressure of at least five times the design unit loading to form a dense, non-plastic lubricant.

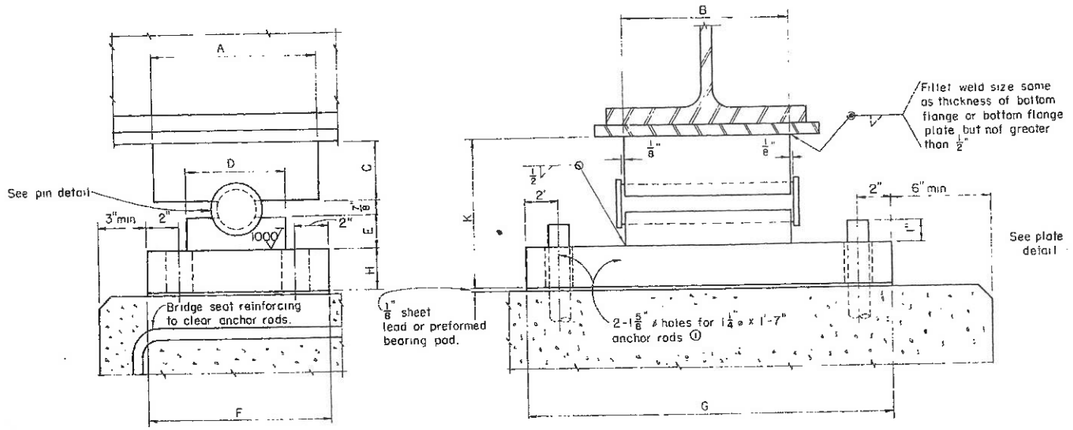
(c) The recesses for the lubricant shall consist either (1) of annular rings with or without central circular recess with a depth at least equal to the width of the ring or diameter of hole or (2) of circular recesses approximately $\frac{3}{16}$" in diameter and $\frac{3}{16}$ to $\frac{1}{4}$" deep.

(d) The recesses shall be arranged in a geometric pattern such that successive rows shall overlap in the direction of motion and the distance between extremities of recesses shall be closer in the direction of motion than that perpendicular to motion. The entire bearing area of all surfaces which have provision for motion shall be lubricated by means of these lubricant filled recesses. The total area of these recesses shall comprise not less than 25 per cent nor more than 35 per cent of the total bearing area of the plate.

(e) Bearing surfaces of the bronze bearing plates and opposing steel plates shall be machine finished to the surface roughness shown on this Standard Drawing. The lay of the tool marks shall be in the direction of motion. All machine surfaces shall be flat within 0.005 inch per inch of length and width.

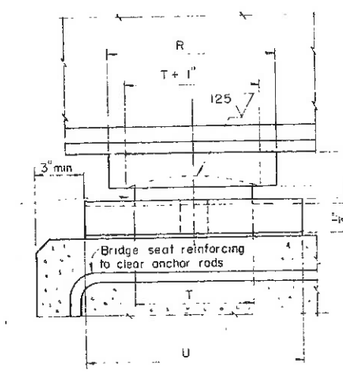
(f) For mating curved surfaces of steel and bronze, the concave surface shall have a positive tolerance not exceeding .010 inch and the convex surface a negative tolerance of .010 inch.

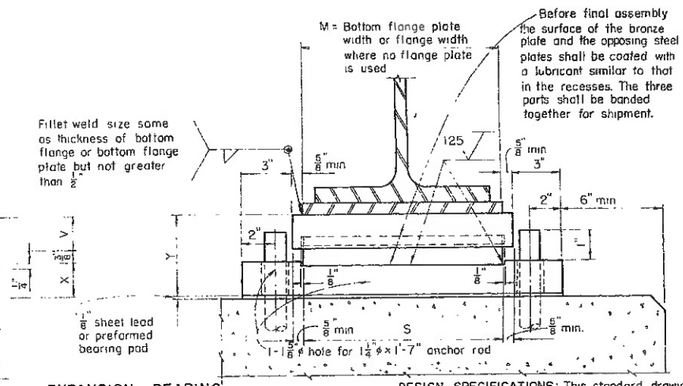
(g) The coefficient of friction between the bronze self-lubricating plates and the steel plates in contact with them shall not exceed 0.10 when subjected to the design loading.



FIXED BEARING

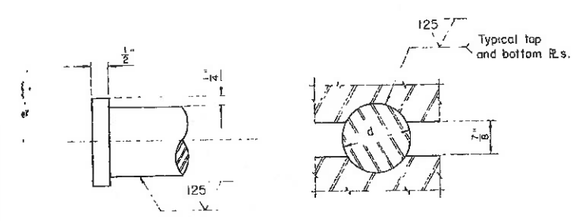
See table for additional dimensions



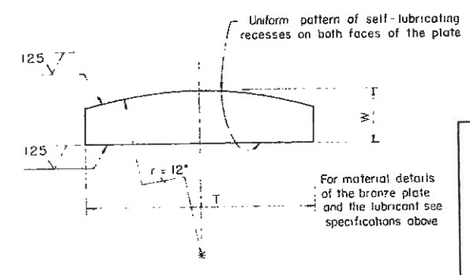


EXPANSION BEARING

See table for additional dimensions



BEARING PIN DETAIL



SELF-LUBRICATING BRONZE PLATE DETAIL

Fixed Bearing No.	Expansion Bearing No.	Fixed Bearings Dimensions (inches) A	B	C	D	E	F	G	H	K	d	Weight ea. (lb.)	Expansion Bearings Dimensions (inches) R	S	T	U	V	W	X	Y	Weight ea. (lb.)	Maximum Load (lb.)
① F-50	E-50	6	6	1 1/2	3	1 1/4	8	16	1 1/2	5 1/8	2	100	10	6	6	12	2	1 1/8	2	4 3/8	152 + 13.10 (M-S)	50,000
① F-100	E-100	7	9	1 3/4	4	1 1/2	9	18	1 1/2	5 5/8	2	143	10	8	6	12	2	1 1/8	2	4 3/8	180 + 13.10 (M-S)	100,000
F-150	E-150	9	9	2 1/2	5	1 1/2	11	20	2	6 1/8	2 1/2	244	10	9	7	13	2	1 5/16	2	4 3/8	205 + 13.72 (M-S)	150,000
F-200	E-200	10	10	3	6	2	11	22	2	7 7/8	2 1/2	300	10	12	7	13	2	1 5/16	2	4 3/8	250 + 13.72 (M-S)	200,000
F-250	E-250	11	10	3 1/2	7	2	12	24	2 1/2	8 7/8	3	400	12	13	8	14	2 1/2	1 1/2	2 1/4	5 1/8	337 + 18.16 (M-S)	250,000
F-300	E-300	12	11	3 3/4	8	2 1/2	14	25	2 1/2	9 5/8	3	502	12	15	8	15	2 1/2	1 1/2	2 1/4	5 1/8	389 + 18.85 (M-S)	300,000
② F-350	② E-350	12	11	3 3/4	8	2 1/2	16	25	2 1/2	9 5/8	3	540	12	16	9	17	2 1/2	1 3/4	2 1/4	5 1/8	443 + 20.23 (M-S)	350,000
② F-400	② E-400	12	12	3 3/4	8	2 1/2	18	26	2 1/2	9 5/8	3	610	12	17	10	18	2 1/2	1 15/16	2 1/4	5 1/8	484 + 20.92 (M-S)	400,000

① Only 2 anchor rods required, placed in diagonally opposite corners

② Bearing stiffeners are required.

Weights given are for one complete bearing (including sheet lead, anchor rods and self-lubricating bronze plate for the expansion bearing).

DESIGN SPECIFICATIONS: This standard drawing conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated September 1, 1957, together with revisions thereof dated February 21, 1958, and February 15, 1961, except that the masonary plates for the fixed bearings are designed on the basis of a 50% increase in allowable bending stress assuming uniform distribution of bearing on the concrete

STEEL: Plates and rods shall conform to ASTM Designation A 36-62 T, and pins to ASTM A-108.

LIMITATIONS: The expansion bearings shall not be used where the anticipated total movement (expansion plus contraction) exceeds 3 inches.

When the roadway gradient at a bearing is over 4.0%, the top of the upper steel plate shall be beveled to match the roadway gradient

COEFFICIENT OF FRICTION: For design purposes a value of 0.10 shall be used

LATERAL EXPANSION: All bearings must be accurately placed in order that proper clearance will be provided at all bearings for lateral expansion of the superstructure.

REVISIONS
1-15-63

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

STANDARD

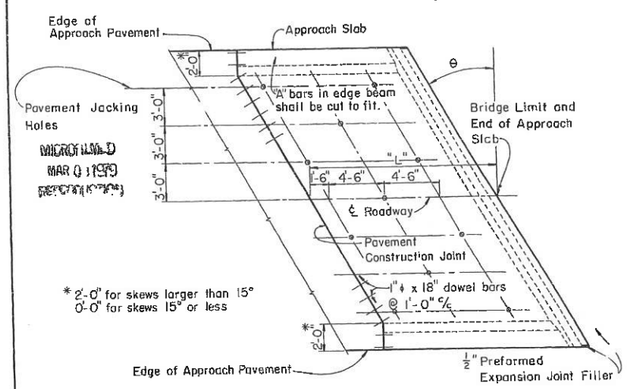
FIXED AND SLIDING BEARINGS

FOR STEEL BEAM AND GIRDER BRIDGES

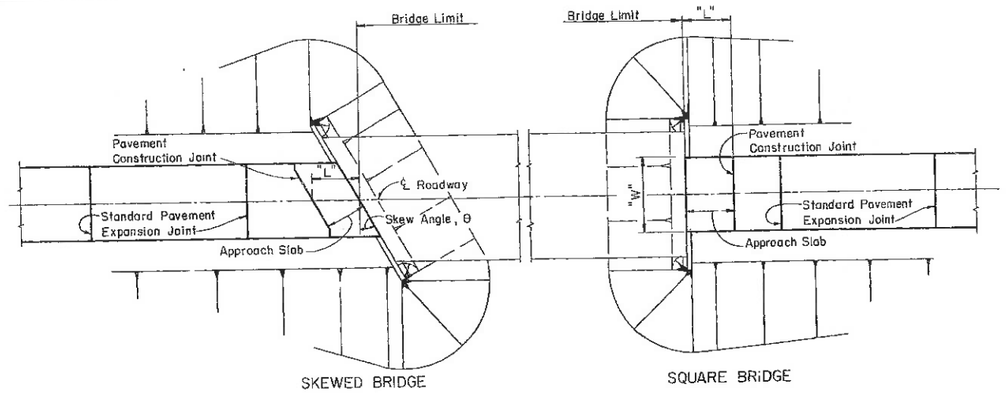
REACTIONS 50,000 lb. TO 400,000 lb.

APPROVED: L.H. Berman, ENGINEER OF BRIDGES
DATE: 4-19-62

PREPARED	TRACED	CHECKED	REVIEWED	DRAWING NO
JM	MKH	WCK	HHH	FSB-1-62

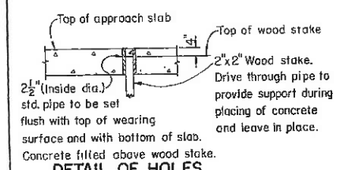


APPROACH SLAB FOR SKEWED BRIDGES



GENERAL PLAN

Showing Skewed and Square Approach Slabs

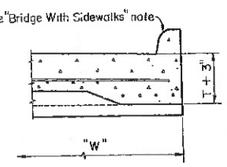


DETAIL OF HOLES FOR PAVEMENT JACKING

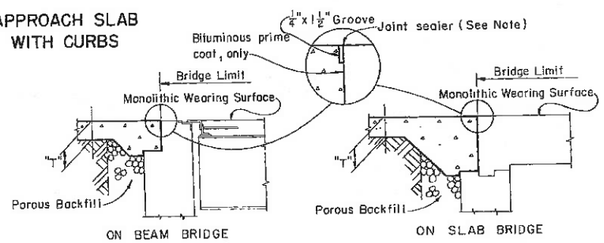
REINFORCING STEEL (FOR ONE APPROACH SLAB)									
Length "L"	Thickness "T"	"A" BARS						B501	
		Spcg "S"	Mark	Length	Dimension "A"	No. reqd		Length	No. reqd
15'-0"	10"	8"	A801	15'-7"	14'-6"	* (W+7)/S		* (W-0.5)(sec θ)	14
20'-0"	12"	7"	A802	20'-7"	19'-6"				17
25'-0"	13"	6"	A803	25'-7"	24'-6"				20
30'-0"	13"	6"	A804	30'-7"	29'-6"				23

*W = Approach Slab Width, out-to-out, in feet
θ = Angle of Skew
S = "A" bar spacing in inches

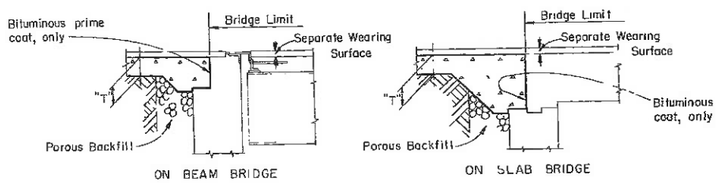
"A" bar "A" %



APPROACH SLAB WITH CURBS

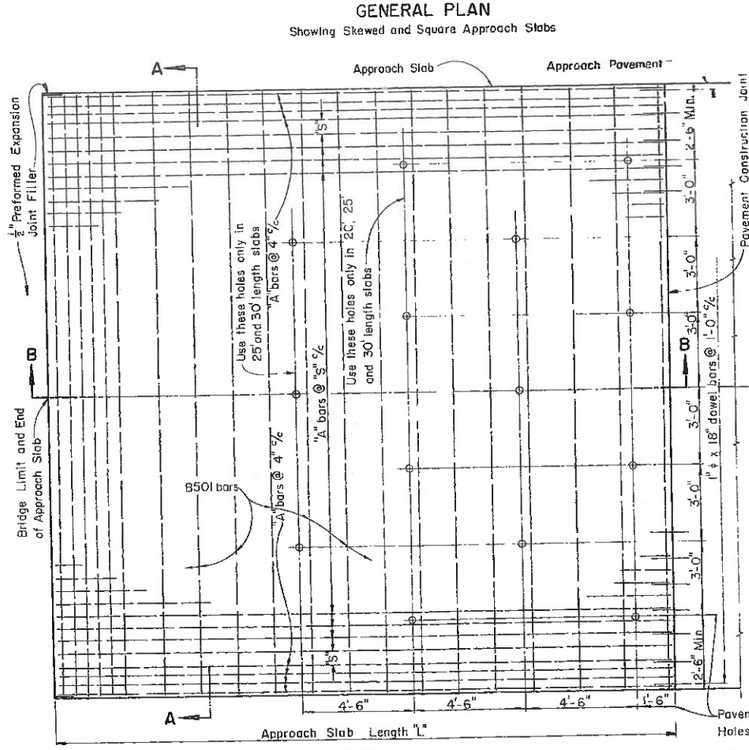


WITH MONOLITHIC WEARING SURFACE

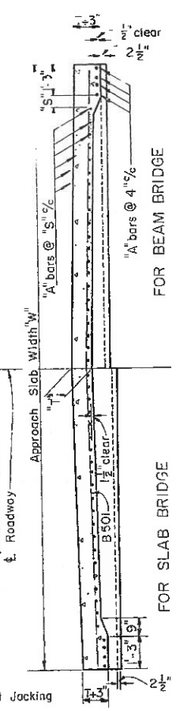


WITH SEPARATE WEARING SURFACE

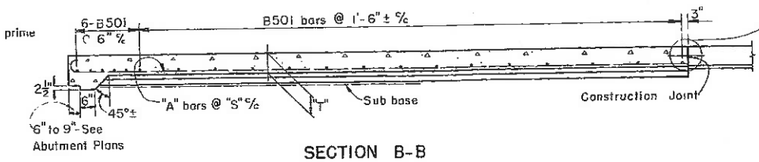
TYPICAL SECTIONS SHOWING JUNCTION OF APPROACH SLAB WITH BRIDGE



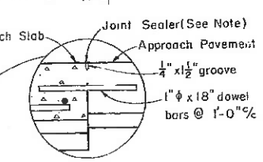
PLAN



SECTION A-A



SECTION B-B



GENERAL: This drawing provides design and general construction details. The project plans will show length, skew, curbs (if any), estimated quantity (sq. yds.), and special notes and details where necessary. For conditions other than those indicated hereon, the approach slab shall be adapted to fit the ends of the bridge and the approach pavement.

WIDTH of approach slabs shall be the same as the width of the approach pavement unless otherwise indicated on the project plans.

CROWN shall conform to the rate of crown of the approach pavement and bridge deck. If the rate of crown of the bridge deck differs from that of approach pavement, a smooth transition shall be provided within the limits of the approach slab.

CONCRETE shall be Class C.

REINFORCING STEEL: For skewed bridges the "A" bars shall be placed parallel to the centerline of roadway and the "B" bars shall be placed parallel to the abutments

BAR SIZE is indicated in the bar mark The first digit indicates the bar size number. For example, A801 is a No. 8 size bar.

PREFORMED EXPANSION JOINT FILLER at the edges of the approach slab shall be included with the approach slab for payment.

BRIDGE WITH SIDEWALKS shall be provided with curbed approach slabs for the full bridge roadway width. The curbs on the approach slabs shall transition from the bridge curb height to the approach curb height.

CONSTRUCTION JOINT details shown hereon (at the approach pavement end of the approach slab) apply only in case of concrete approach pavement or concrete base course. Payment for the construction joints, including dowel bars, is included in the price per sq. yd. bid for the approach pavement.

WEARING SURFACE: If a bituminous wearing surface is specified for the bridge, it also shall be used on the approach slab

LENGTH of approach slabs shall be as shown on project plans.

JOINTS: Longitudinal joints in accordance with Standard Construction Drawing No. BP-3 shall be provided at edges of all traffic lane elements. If joints are sawed the depth of sawed groove shall be 3". Approach-pavement type joint sealer shall be used in all transverse and longitudinal joints.

PAVEMENT JACKING HOLES shown are those required for a two-lane approach slab. If a wider approach slab is used, additional jacking holes shall be provided following the same pattern and spacing as shown. Holes shown on centerline of roadway may be offset 6" to avoid a longitudinal pavement joint.

REVISIONS
1-11-68
6-12-69

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

STANDARD

REINFORCED CONCRETE APPROACH SLABS

LENGTHS-15'-0", 20'-0", 25'-0" AND 30'-0"

APPROVED: C. H. Altwater
ENGINEER OF BRIDGES
DATE: 11-6-67

PREPARED BY	TRACED	CHECKED	REVIEWED	DRAWING NUMBER
CFS	NRB	CSD CDB	HHH BFG	AS-1-67