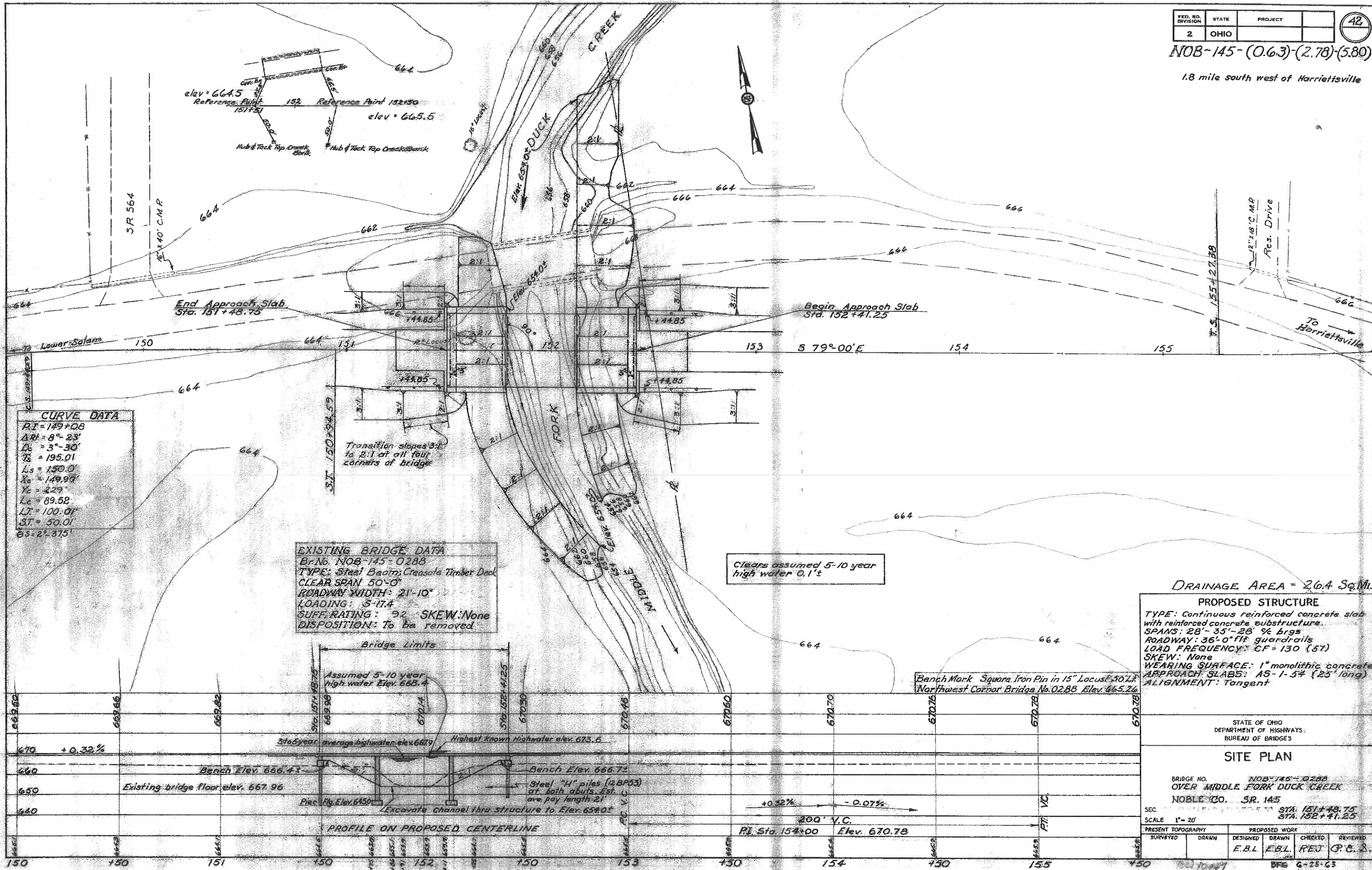


NOB-145-(0.63)-(2.78)-(5.80)

1.8 mile south west of Harriettsville



CURVE DATA
 P.I. = 149+08
 ΔR = 8°-23'
 D = 3°-30'
 T_s = 195.01
 L_s = 150.0
 X₀ = 149.97
 Y₀ = 2.29
 L_c = 89.52
 L_T = 100.07
 S_T = 50.01
 OS = 2°-37.5'

EXISTING BRIDGE DATA
 Br. No. NOB-145-0288
 TYPE: Steel Beam-Creasole Timber Deck
 CLEAR SPAN 50'-0"
 ROADWAY WIDTH: 21'-10"
 LOADING: S-17.4
 SUFF. RATING: 92 SKEW: None
 DISPOSITION: To be removed

Clears assumed 5-10 year high water 0.1±

DRAINAGE AREA = 26.4 Sq. Mi.

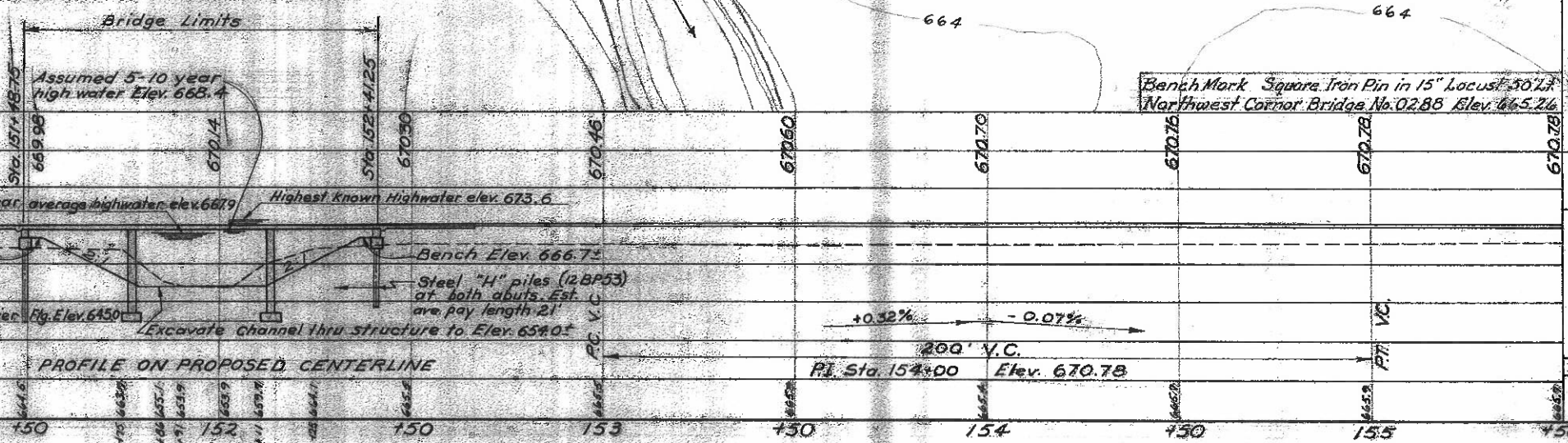
PROPOSED STRUCTURE
 TYPE: Continuous reinforced concrete slab with reinforced concrete substructure.
 SPANS: 28'-35'-28' ¾ brgs
 ROADWAY: 36'-0" flt guardrails
 LOAD FREQUENCY: CF = 130 (57)
 SKEW: None
 WEARING SURFACE: 1" monolithic concrete
 APPROACH SLABS: AS-1-54 (25' long)
 ALIGNMENT: Tangent

STATE OF OHIO
 DEPARTMENT OF HIGHWAYS
 BUREAU OF BRIDGES

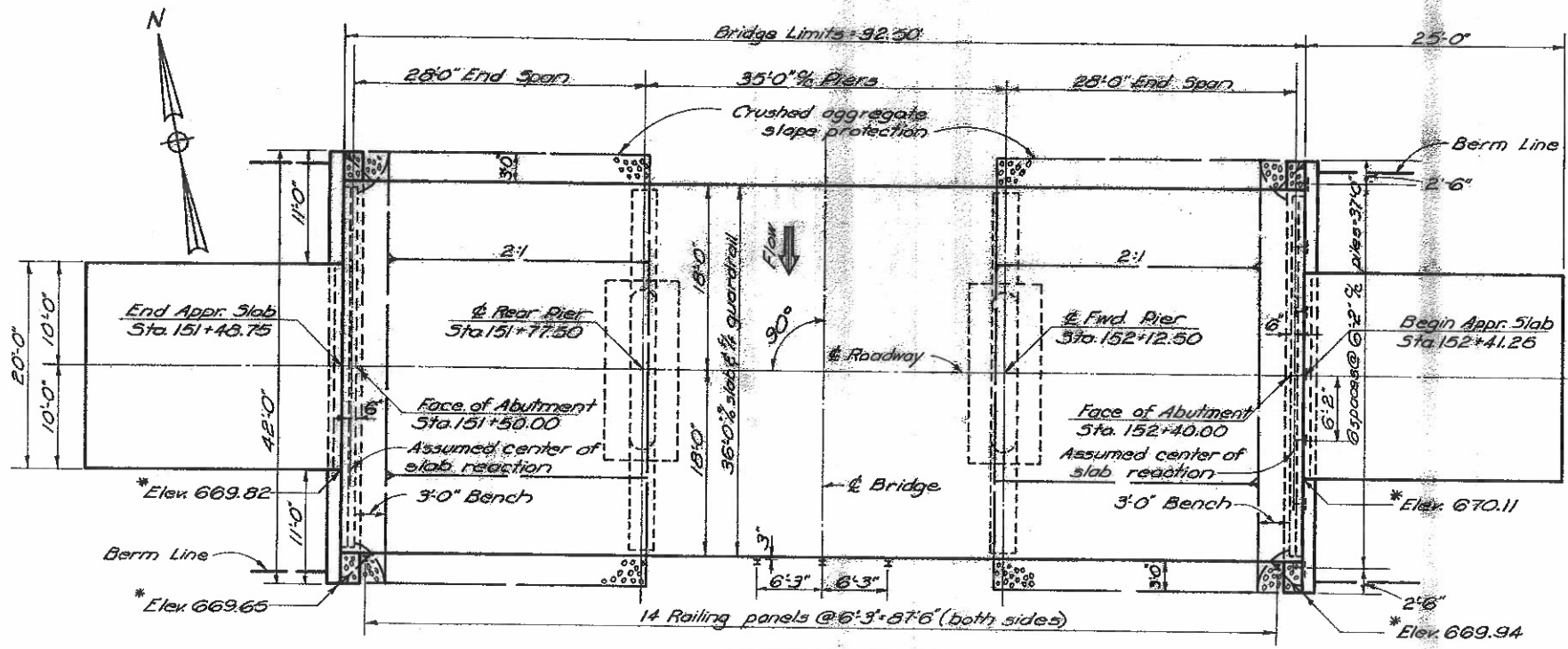
SITE PLAN

BRIDGE NO. NOB-145-0288
 OVER MIDDLE FORK DUCK CREEK
 NOBLE CO. SR. 145
 STA. 151+48.75
 STA. 152+41.25

SCALE 1" = 20'		PRESENT TOPOGRAPHY		PROPOSED WORK	
SURVEYED	DRAWN	DESIGNED	DRAWN	CHECKED	REVIEWED
		E.B.L.	E.B.L.	REJ	P.C.S.



PROFILE ON PROPOSED CENTERLINE



GENERAL PLAN & ABUTMENT DETAILS

* Elevations given at top of backwall

GENERAL NOTES

REFERENCE shall be made to Standard Drawings A-1-54, revised 12-1-54, and C-5-1-54, revised 4-1-63, and to Supplemental Specification 5-101, dated 7-12-62.

DESIGN SPECIFICATIONS: This structure conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated 9-1-57, together with current revisions thereof.

EXISTING STRUCTURE: When no longer needed to maintain traffic the existing structure shall be removed.

PILES shall be driven with a hammer of not less than 11,000 ft. lbs. per blow to firm contact with rock. If the length of penetration is approximately equal to the depth to 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. 5-18.05 is not less than the following value for a pile hammer of the indicated energy rating:

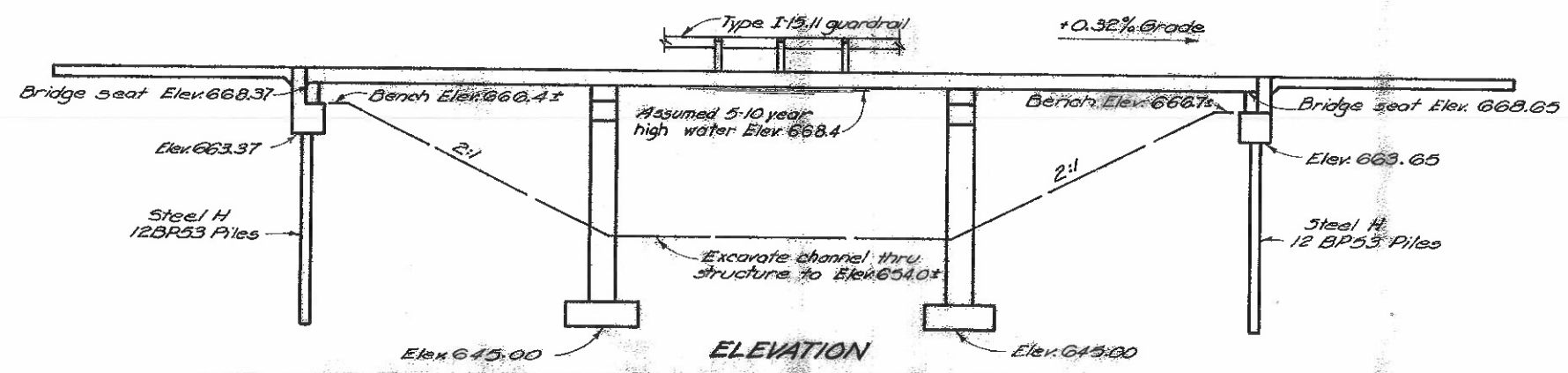
For the abutment piles
 50 tons per pile using an 11,000 ft. lb. hammer
 40 tons per pile using a 15,000 ft. lb. or greater hammer.

If the energy rating of the hammer is between the ratings as shown above, the required formula capacity shall be determined by interpolation. The design load is 25 tons per pile.

FOUNDATION BEARING PRESSURE: Pier footings are designed for a maximum bearing pressure of 3 tons per sq. ft.

SUPERSTRUCTURE REINFORCING STEEL CLEARANCE from surface of concrete shall be 2 1/4" for top bars and 1 1/2" for bottom bars.

DESIGN DATA: See Sheet 41.



ELEVATION

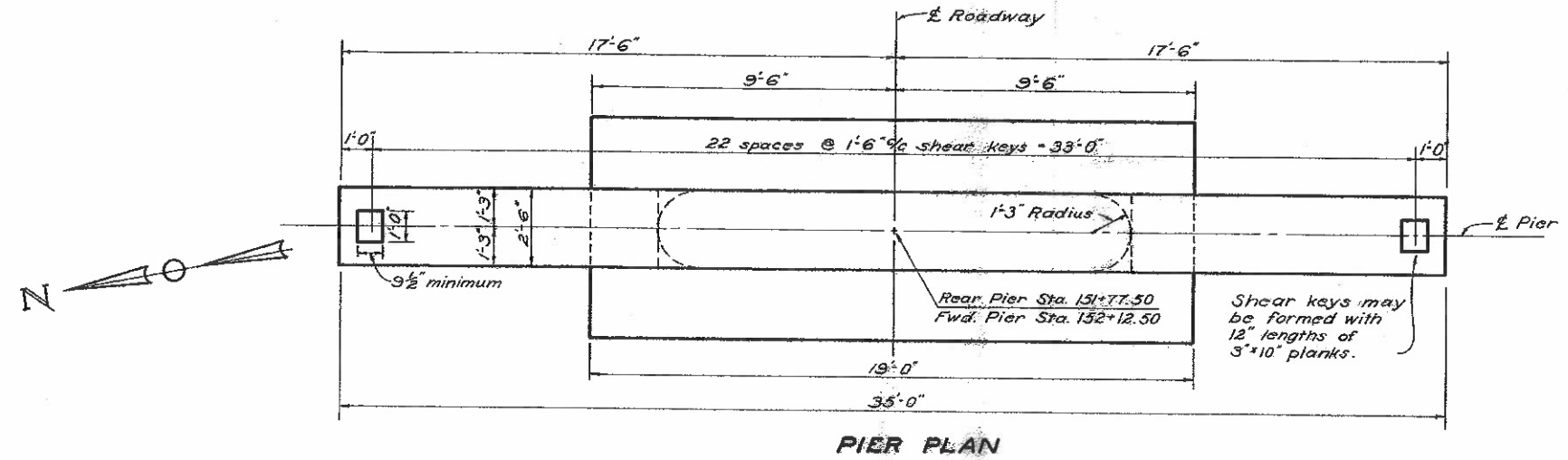
ESTIMATED QUANTITIES							
Item	Total	Unit	Description	Super	Piers	Abuts	Gen'l
E-2	Lump	Sum	Cofferdams, cribs, and sheeting				Lump
E-2	186	Cu. Yds.	Unclassified excavation		137	49	
E-3	1978	Cu. Yds.	Channel excavation				1978
S-1	158	Cu. Yds.	Class "C" concrete, superstructure	158			
S-1	66	Cu. Yds.	Class "C" concrete, piers above footings		66		
S-1	25	Cu. Yds.	Class "E" concrete, pier footings		25		
S-1	43	Cu. Yds.	Class "E" concrete, abutments			43	
S-4	48,946	Lbs.	Reinforcing steel	34,947	9,192	4,807	
S-14	185.00	Lin. Ft.	Railing (Type I-15.11 with galvanized steel posts and bolts)	185.00			
S-16	Lump	Sum	First test pile				Lump
S-18	290	Lin. Ft.	Steel piles, 12BP53			290	
S-24	Lump	Sum	Removal of existing structure				Lump
S-29	13	Cu. Yds.	Porous backfill			13	
S-40	158	Each	Water-reducing, set-retarding admixture	158			
I-10	293	Sq. Yds.	Crushed aggregate slope protection				293

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

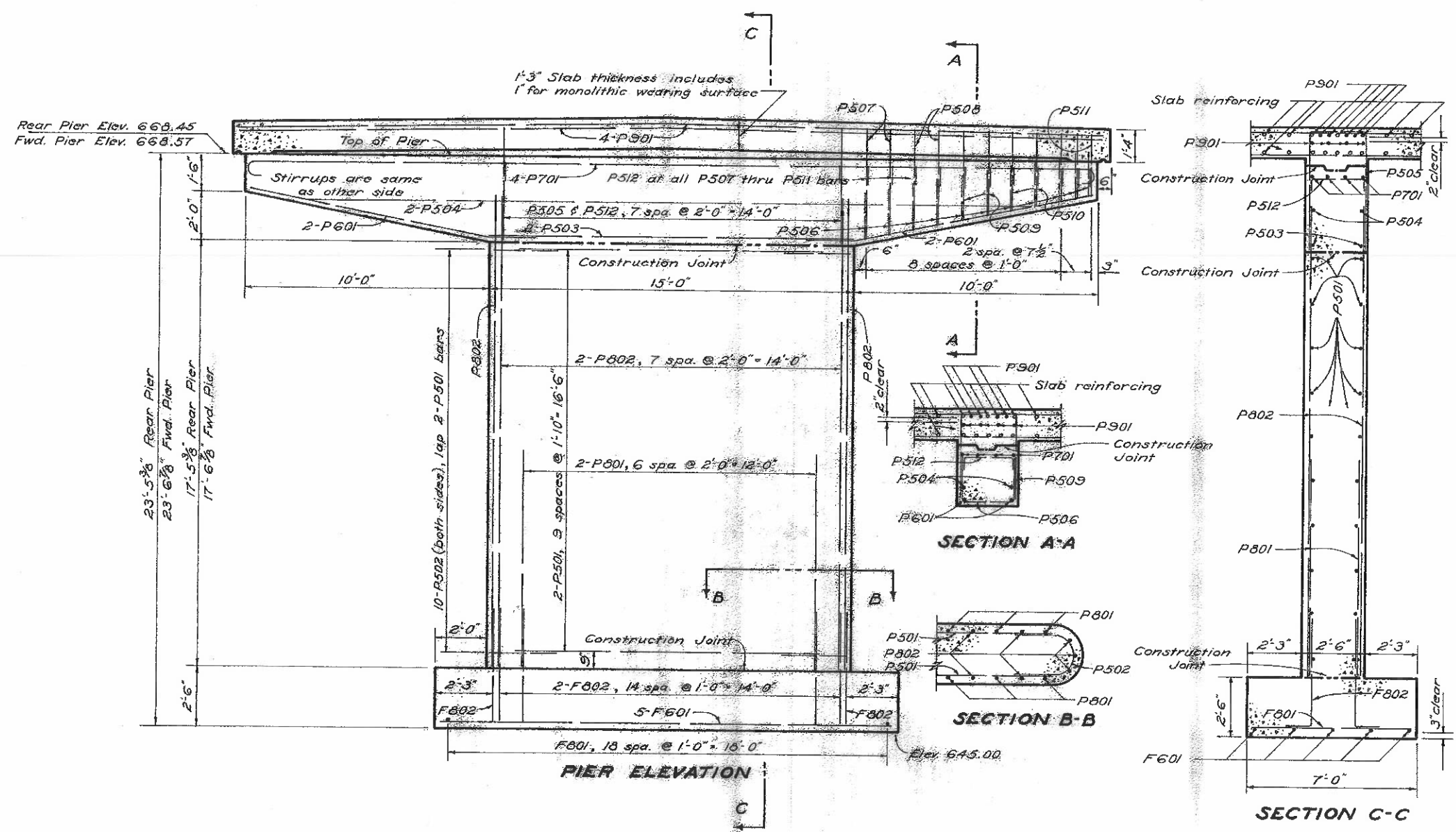
**GENERAL PLAN & ELEVATION,
 ESTIMATED QUANTITIES, GENERAL
 NOTES AND ABUTMENT DETAILS**
 BRIDGE NO. NOB-145-02.83
 OVER MIDDLE FORK DUCK CREEK
 STA. 151+48.75
 STA. 152+41.25

NOBLE COUNTY

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
R.L.D.	R.L.D.	CAM	NJB	BFG	6-25-63	



PIER PLAN



PIER ELEVATION

SECTION A-A

SECTION B-B

SECTION C-C

REINFORCING STEEL LIST					BENDING DIAGRAMS	
MARK	No.	LENGTH	WEIGHT	SHA		
Superstructure						
A926	93	32'-8"	10,329	S	22'-5" %	
B926	30	23'-8"	2,414	B	19'-8" %	
C926	30	20'-11"	2,134	B		
D926	15	22'-0"	1,122	S		
E926	15	16'-4"	833	S		
F926	72	23'-10"	5,834	S	P601 2'-2" %	
G926	34	11'-7"	1,339	S	10'-0" %	
H926	36	8'-2"	1,000	S		
Piers						
P901	16	35'-6"	1,931	S	Inside 3" R-11" %	
P801	28	9'-0"	673	S	P502 2'-0" %	
P802	36	20'-0"	1,922	S	1'-7" %	
P701	8	36'-2"	591	B		
P601	8	12'-0"	144	B	2'-2" %	
P501	40	12'-6"	522	S	4'-9" %	
P502	40	6'-3"	261	B	1'-10" %	
P503	4	15'-0"	63	S	4'-3" %	
P504	4	23'-6"	123	S	3'-10" %	
P505	16	11'-5"	191	B	3'-3" %	
P506	44	5'-7"	256	B	3'-0" %	
P507	8	10'-5"	87	B	2'-6" %	
P508	8	9'-7"	80	B		
P509	8	8'-9"	73	B	2'-2" %	
P510	8	7'-11"	66	B	P512	
P511	12	6'-11"	87	B	4'-9" %	
P512	60	3'-2"	198	B	P701 34'-6" %	
F801	38	6'-8"	676	S		
F802	64	5'-8"	968	B		
F601	10	18'-8"	280	S		
Abutments						
R1001	16	18'-11"	1,302	S	1'-11" %	
R801	16	22'-1"	943	S	2'-11" %	
R501	16	21'-7"	360	S	3'-3" %	
R502	136	6'-7"	934	B	3'-3" %	
R503	8	18'-1"	151	S	1'-9" %	
R504	24	5'-4"	134	S	2'-8" %	
R505	28	7'-11"	231	B	1'-8" %	
R506	8	10'-8"	89	S	0'-11" %	
R507	16	4'-11"	82	S	2'-2" %	
R508	24	6'-8"	167	B		
R509	24	8'-5"	211	B		
R401	56	5'-5"	203	B		
Replacement Bars						
RE1001	1	7'-2"	-	S		
RE901	2	6'-10"	-	S		
RE801	1	6'-6"	-	S		
RE601	1	5'-11"	-	S		
RE501	1	5'-7"	-	S		
RE401	1	5'-5"	-	B		

FOOTINGS shall extend a minimum of 3' into undisturbed indurated clay or to the elevation shown, whichever is lower.

SLAB FALSEWORK shall not be supported by pier cantilevers.

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

PIER DETAILS AND REINFORCING STEEL LIST
BRIDGE NO. NOB-145-0288
over MIDDLE FORK DUCK CREEK

NOBLE COUNTY STA. 151+48.75
STA. 152+41.25

DESIGNED	DRAWN	CHECKED	REVIEWED	DATE
R.L.D.	R.L.D.	V.L.	NJB	BFG 6-25-63

7.2
7.1
7.1
5.8
8.5
11
17
22

7.2
7.1
7.1
5.8
8.5
11
17
22

SLAB DATA

LOAD FREQUENCY	SPANS	A, B, C, D, and E bars																								F, G, and H bars				J-bars		K-bars		M-bars		N-bars				
		A - bars		B - bars		C - bars		D - bars		E - bars		F - bars		G - bars		H - bars		J-60I		K-60I		M-60I		N-60I																
		Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	Spccg	Lgth.	Mark	No.	Sp. m.	Lgth.	No.	Lgth.												
CF = 30	16'-20" - 16'	A 700	14 1/2	19-3	B 700	29	15-0	14-2	C 700	29	13-4	12-6	D 700	29	10-8	E 700	29	10-8	F 700	12 1/2	12-6	6-6	G 700	25	8-0	4-0	H 700	25	7-0	3-6	J-60I	25	12-0	25	11-10	M-60I	48	16	41	

LOAD FREQUENCY	SPANS	QUANTITIES PER FOOT OF WIDTH										GUARD RAIL	
		Concrete (Cu. Yd.)		Bitum. Wearing Surface (Cu. Yd.)		Type 'C' Waterproofing (Sq. Yds.)		Reinf. Steel (Lbs)		No of Full Panels Ea Side		Lin. Ft Both Sides	
		Mono Wearing Surface	Separate Wearing Surface	2 1/2" Thick	1 1/2" Av. Thick	1 1/2" Av. Thick	1 1/2" Av. Thick	Sq. Yds.	Lbs	No	Lin. Ft	No	Lin. Ft
CF = 30	16'-20" - 16'	1.71	1.54	0.41	0.31	5.9	404	8	107	10	120	10	133

Length = (R - 6") x secant of skew angle

Length = (R - 6") x secant of skew angle

* Dimension "T" does not include monolithic wearing surface.

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.

GENERAL: This drawing provides design and general construction details. The project plans for each structure will show span lengths, roadway width, load frequency, skew, curve and super-elevation (if any), elevations, wearing surface, substructure details, estimated quantities, reinforcing steel list and other necessary details and special notes.

DESIGN SPECIFICATIONS: This standard drawing conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated October 1, 1951, together with revisions thereof dated July 15, 1952, April 1, 1954 and February 1, 1955.

ADDITIONAL INTERIOR SPANS, similar to middle span, may be incorporated into the structure without change in slab thickness or area of reinforcing steel. In case of added spans, the project plans will show revised details and estimated quantities.

EXPANSION: Where the greatest distance between diagonally opposite corners of the superstructure, taking into account the sum of the spans, the width and the skew (if any), exceeds 175 feet, provision shall be made for expansion of the deck.

SKREW: For bridges with skew, longitudinal bars shall be placed parallel to centerline of roadway and transverse bars parallel to piers and abutments. For skews of less than 10°, longitudinal reinforcement as shown for non-skewed bridges may be used. For skews from 10° to 30°, "F", "G", and "H" bars shall be lengthened and "K" bars shortened an amount equal to 1/50 x R x S x tan θ. "F", "G", and "H" bars shall be placed as shown in Placement Diagram. (For skew greater than 30° another type of bridge should be used.)

"R" = Width of slab in feet.
 "S" = Length of middle span in feet.
 "θ" = Skew angle.

SUPERELEVATION: For bridges on curves the concrete slab shall be super-elevated for full width of deck at the same rate as the approach pavement. The bituminous wearing surface shall be of uniform thickness for the full width of the slab.

MONOLITHIC WEARING SURFACE shall be 1" concrete quantities have been computed on this basis.

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

An upper hand rail and tanger posts shall be provided if called for on the project plans.
 Guard rail and hand rail shall be painted white in accordance with section I-15.07 of the Construction and Material Specifications.

Galvanized posts and anchor bolts shall not be painted. Tabulated ralling quantity is for the length of railing within the overall length of slab. The price per lineal foot of railing includes payment for guard rail, hand rail (if called for), posts, anchors, connections, galvanizing and painting.

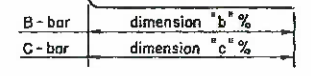
CONCRETE shall be 'class "C".'

CONSTRUCTION JOINTS: One construction joint in bridge slab shall be placed on transverse centerline of middle span or 1'-0" ± off transverse centerline if necessary to miss railing posts and transverse reinforcing bars. One longitudinal joint will be permitted, on centerline of roadway.

REINFORCING STEEL CLEARANCE from face of concrete shall be 1 1/2" for #11 bars, 1 1/4" for #9 and #10 bars and 1" for all smaller bars. (The above clearances do not include monolithic wearing surface) Where two bars of different size are lapped, the clearance requirement for the larger bar shall also apply to the smaller bar.

REINFORCING STEEL: The "M" bars and "N" bars may be furnished in pairs of equal length, lapped thirty diameters at the centerline of roadway, or they may be furnished in pairs of different length in order to place the lap beyond a longitudinal construction joint at the centerline of roadway, at the option of the contractor. Determination of the pay quantity will be according to the number and length of bars as shown hereon unless otherwise called for on the project plans.

CAMBER of 1/800 of the span shall be provided in each span (in addition to that required for conformance with the profile of the highway) to allow for dead load deflection. This is the amount of camber required before falsework is released. To obtain this, proper allowance shall be made for the deflection of falsework members.



TYPE "C" WATERPROOFING QUANTITY as determined from the table shall have added to it the number of sq. yds on fascia of slab

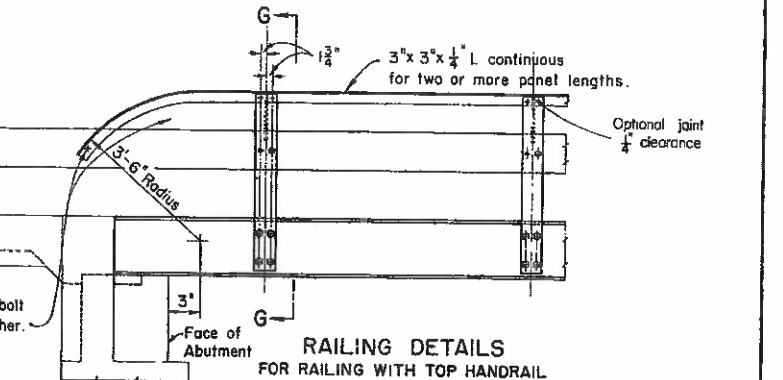
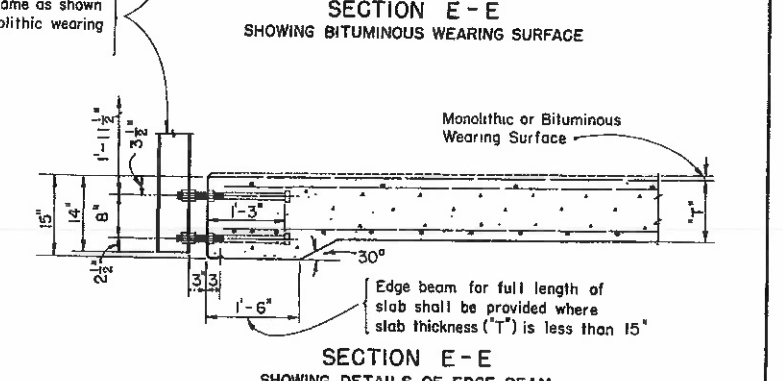
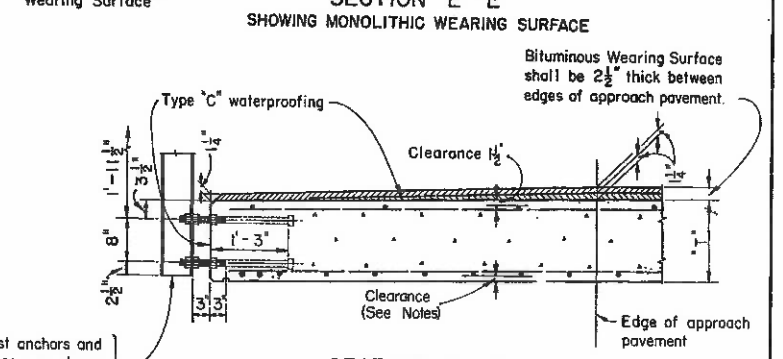
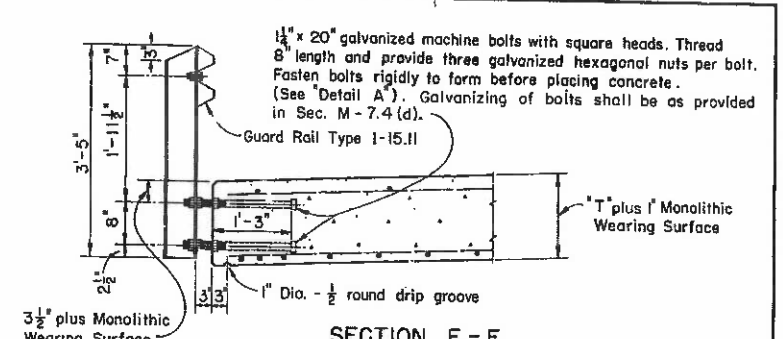
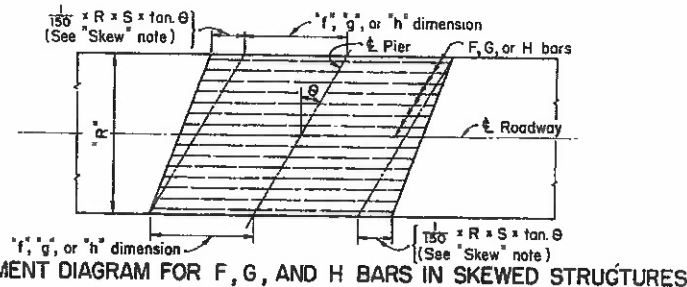
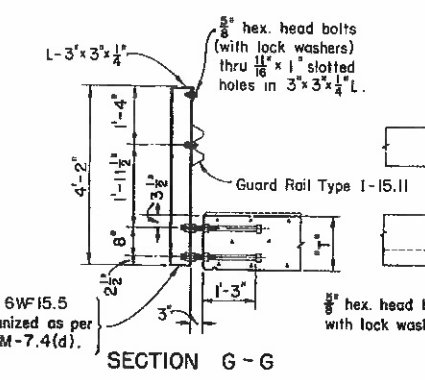
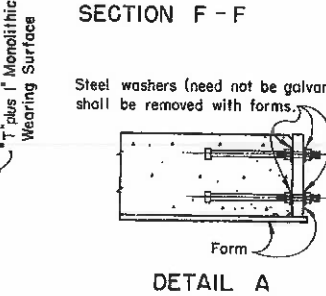
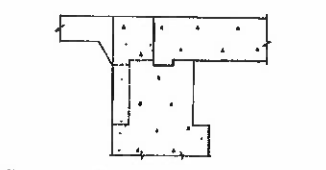
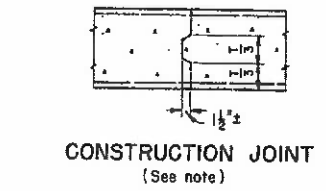
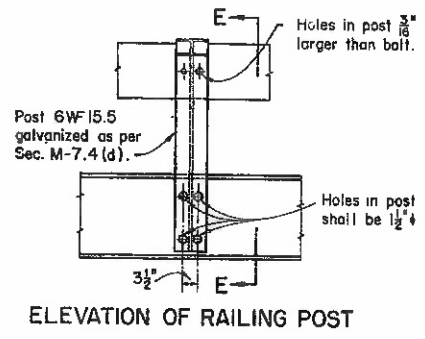
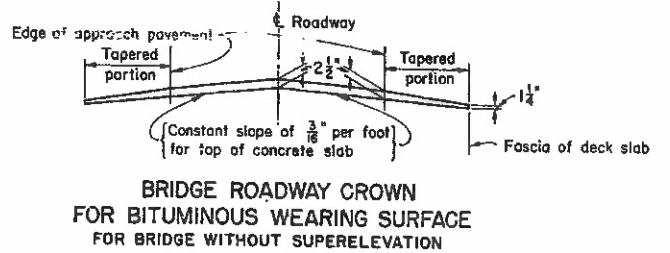
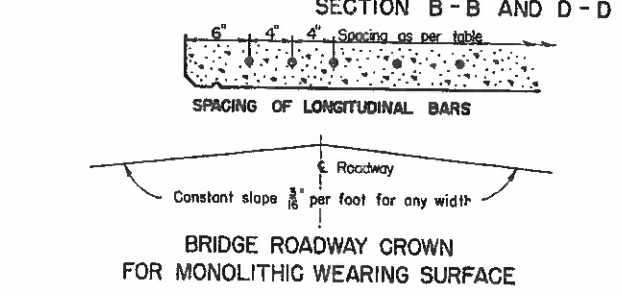
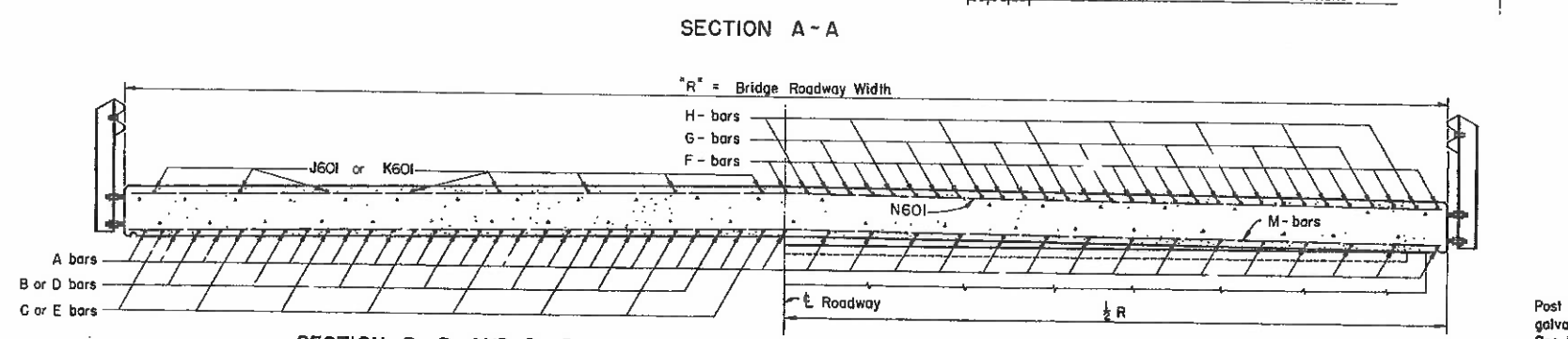
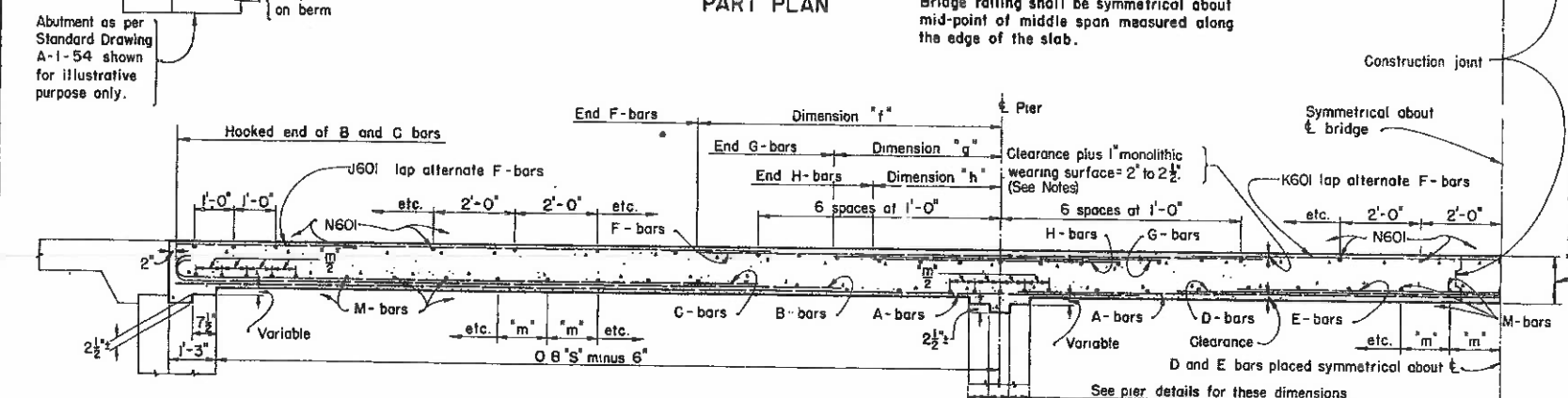
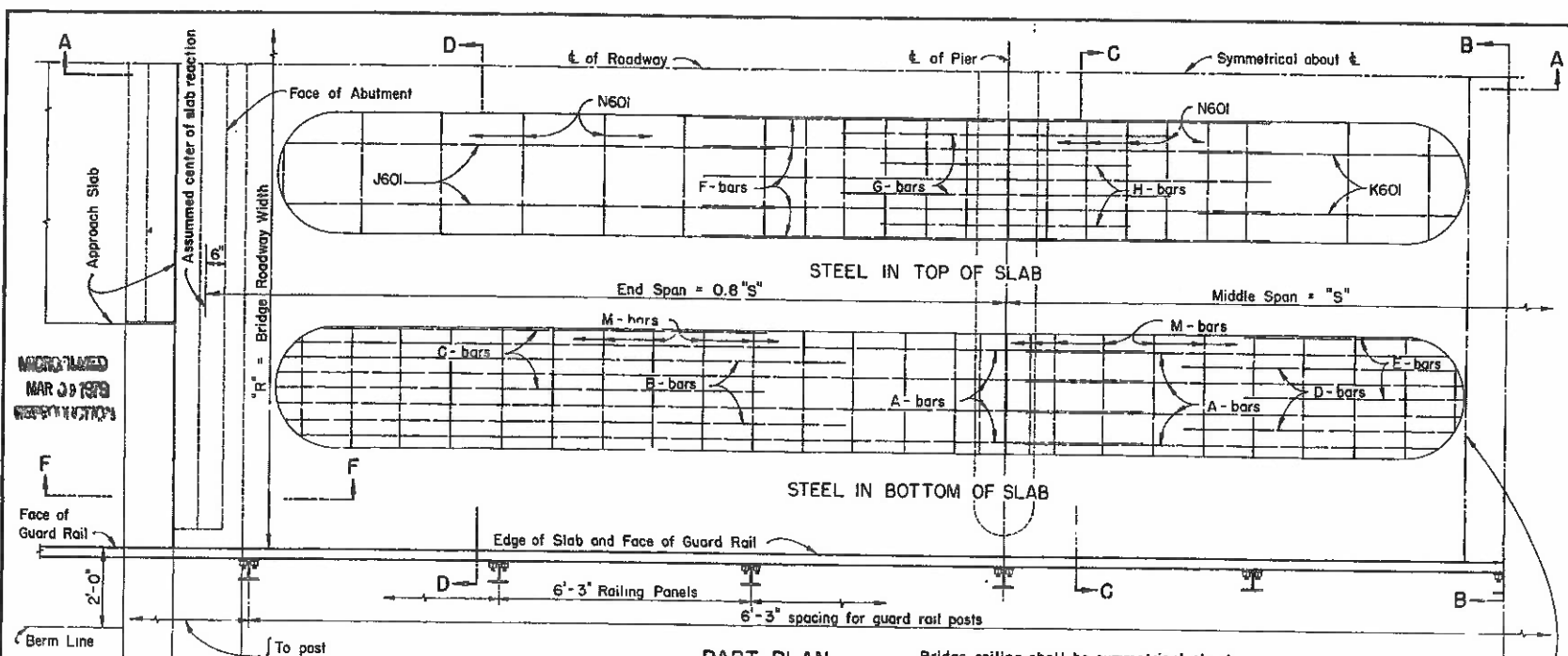
REVISIONS 12-1-54 7-16-56 4-1-63	STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES STANDARD CONTINUOUS SLAB BRIDGE WITHOUT CURBS AND WITH HIGHWAY GUARD RAIL MIDDLE SPAN 20 FEET TO 55 FEET LOAD FREQUENCY: CF = 30, CF = 130, CF = 400, CF = 2000	DRAWING NUMBER CS-1-54
APPROVED: DATE: 7-1-54 PREPARED: RNL GEL GFB JCM WBR	ENGINEER OF BRIDGES TRACED CHECKED SW HPS PWR REVIEWED GSD RFS OHA AJT DKO	SHEET NO. 2 OF 2 SHEETS

22

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11

9.8



REVISIONS 12-1-54 7-16-56 4-1-63 Supersede CS-1-54 2/1/65		STATE OF OHIO DEPARTMENT OF HIGHWAYS DIVISION OF DESIGN AND CONSTRUCTION BUREAU OF BRIDGES STANDARD CONTINUOUS SLAB BRIDGE WITHOUT CURBS AND WITH HIGHWAY GUARD RAIL MIDDLE SPAN 20 FEET TO 55 FEET LOAD FREQUENCY: CF = 30, CF = 130, CF = 400, CF = 2000	
APPROVED: DATE: 7-1-54 PREPARED: RHL GEJ CFB JOM WNR		DRAWING NUMBER CS-1-54 SHEET NO. 1 OF 2 SHEETS	

22

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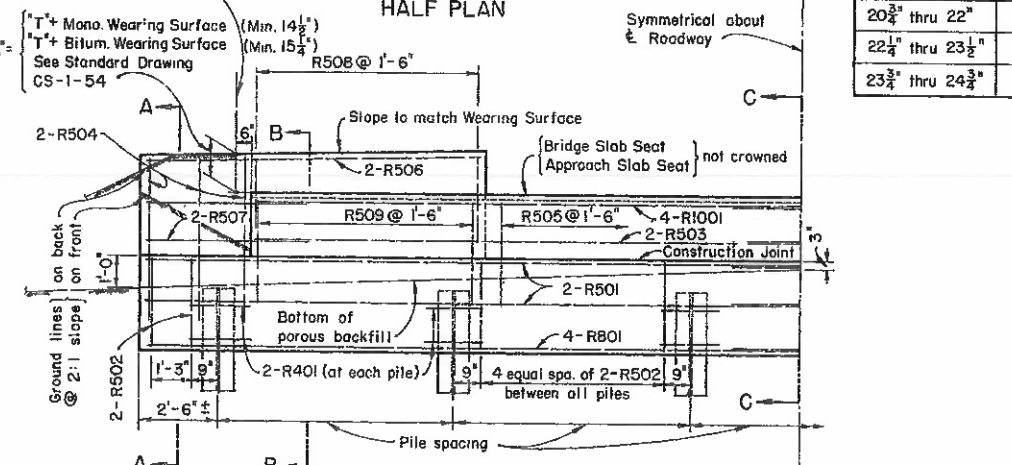
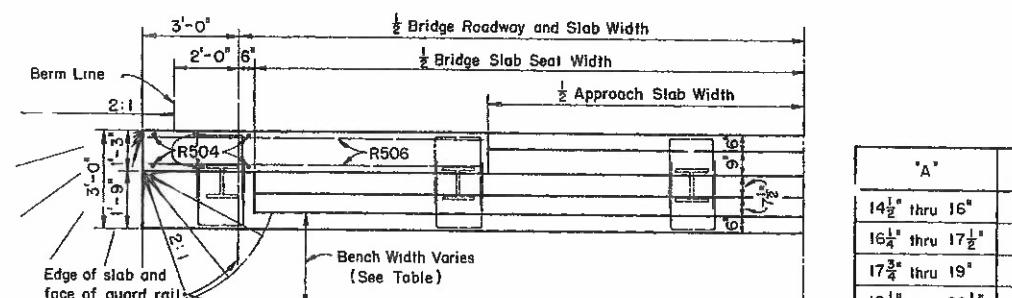
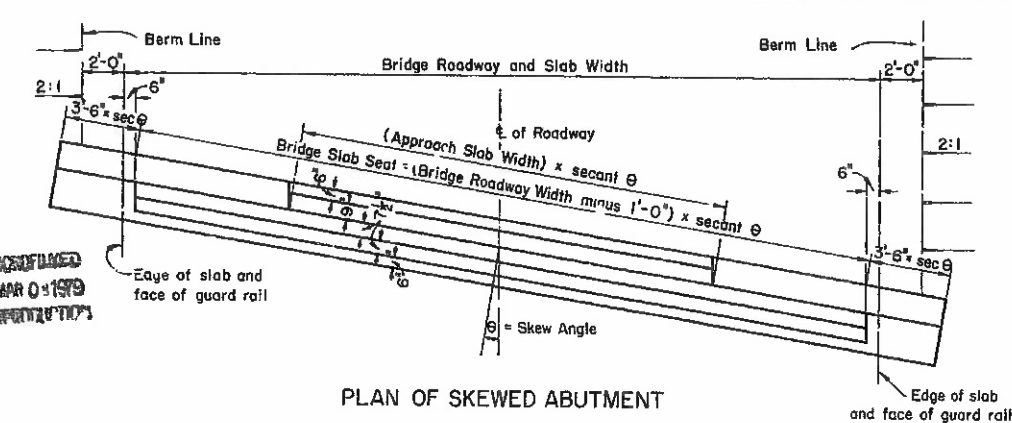
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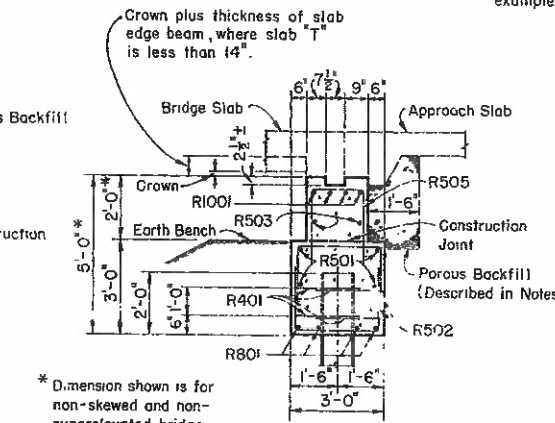
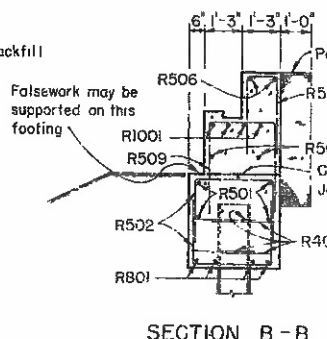
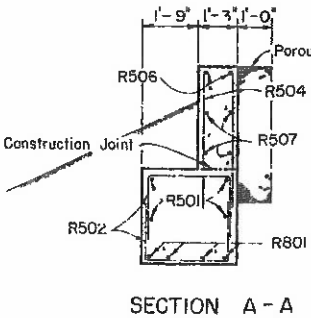
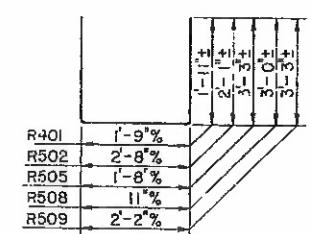
LOAD FREQUENCY	SPANS	NUMBER, SPACING, AND DESIGN LOAD (IN TONS) OF PILES FOR ONE NON-SKEWED ABUTMENT						CONCRETE AND REINFORCING STEEL IN TWO NON-SKEWED ABUTMENTS											
		24' R'dwy. 5 Piles @ 6'-3"		28' R'dwy. 6 Piles @ 5'-10"		32' R'dwy. 6 Piles @ 6'-7"		36' R'dwy. 7 Piles @ 6'-2"		40' R'dwy. 7 Piles @ 6'-5"		44' R'dwy. 8 Piles @ 6'-5"		24' R'dwy.	28' R'dwy.	32' R'dwy.	36' R'dwy.	40' R'dwy.	44' R'dwy.
		Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.	Reinf. Steel Lbs.
CF = 30	16-20-16	19	17	19	18	20	19	29	32	37	41	44	49	49	49	49	49	49	49
	18-22.5-18	19	18	20	19	21	20	29	32	37	41	44	49	49	49	49	49	49	49
	20-25-20	20	19	21	20	22	21	29	32	37	41	44	49	49	49	49	49	49	49
	22-27.5-22	21	20	22	21	23	22	29	32	37	41	44	49	49	49	49	49	49	49
	24-30-24	22	21	23	22	24	23	29	32	37	41	44	49	49	49	49	49	49	49
	26-32.5-26	23	22	24	23	25	24	29	32	37	41	44	49	49	49	49	49	49	49
	28-35-28	24	23	25	24	26	25	29	32	37	41	44	49	49	49	49	49	49	49
	30-37.5-30	25	24	26	25	27	26	29	32	37	41	44	49	49	49	49	49	49	49
CF = 130	16-20-16	19	18	20	19	21	20	29	32	37	41	44	49	49	49	49	49	49	49
	18-22.5-18	20	19	21	20	22	21	29	32	37	41	44	49	49	49	49	49	49	49
	20-25-20	21	20	22	21	23	22	29	32	37	41	44	49	49	49	49	49	49	49
	22-27.5-22	22	21	23	22	24	23	29	32	37	41	44	49	49	49	49	49	49	49
	24-30-24	23	22	24	23	25	24	29	32	37	41	44	49	49	49	49	49	49	49
	26-32.5-26	24	23	25	24	26	25	29	32	37	41	44	49	49	49	49	49	49	49
	28-35-28	25	24	26	25	27	26	29	32	37	41	44	49	49	49	49	49	49	49
	30-37.5-30	26	25	27	26	28	27	29	32	37	41	44	49	49	49	49	49	49	49
CF = 400	16-20-16	19	18	20	19	21	20	29	32	37	41	44	49	49	49	49	49	49	49
	18-22.5-18	20	19	21	20	22	21	29	32	37	41	44	49	49	49	49	49	49	49
	20-25-20	21	20	22	21	23	22	29	32	37	41	44	49	49	49	49	49	49	49
	22-27.5-22	22	21	23	22	24	23	29	32	37	41	44	49	49	49	49	49	49	49
	24-30-24	23	22	24	23	25	24	29	32	37	41	44	49	49	49	49	49	49	49
	26-32.5-26	24	23	25	24	26	25	29	32	37	41	44	49	49	49	49	49	49	49
	28-35-28	25	24	26	25	27	26	29	32	37	41	44	49	49	49	49	49	49	49
	30-37.5-30	26	25	27	26	28	27	29	32	37	41	44	49	49	49	49	49	49	49
CF = 2000	16-20-16	19	18	20	19	21	20	29	32	37	41	44	49	49	49	49	49	49	49
	18-22.5-18	20	19	21	20	22	21	29	32	37	41	44	49	49	49	49	49	49	49
	20-25-20	21	20	22	21	23	22	29	32	37	41	44	49	49	49	49	49	49	49
	22-27.5-22	22	21	23	22	24	23	29	32	37	41	44	49	49	49	49	49	49	49
	24-30-24	23	22	24	23	25	24	29	32	37	41	44	49	49	49	49	49	49	49
	26-32.5-26	24	23	25	24	26	25	29	32	37	41	44	49	49	49	49	49	49	49
	28-35-28	25	24	26	25	27	26	29	32	37	41	44	49	49	49	49	49	49	49
	30-37.5-30	26	25	27	26	28	27	29	32	37	41	44	49	49	49	49	49	49	49



"A"	BENCH WIDTH
14 1/2" thru 16"	3'-0"
16 1/4" thru 17 1/2"	3'-3"
17 3/4" thru 19"	3'-6"
19 1/4" thru 20 1/2"	3'-9"
20 3/4" thru 22"	4'-0"
22 1/4" thru 23 1/2"	4'-3"
23 3/4" thru 24 3/4"	4'-6"

BRIDGE ROADWAY WIDTH	R1001	R801	R501	R502	R503	R504	R505	R506	R507	R508	R509	R401
	Straight 16 Required Length	Straight 16 Required Length	Straight 16 Required Length	Bent 6'-11" Long	Straight 8 Required Length	Straight 5'-4" Long	Bent 7'-11" Long	Straight 8 Required Length	Straight 16 Required Length	Bent 6'-8" Long	Bent 8'-5" Long	Bent 5'-5" Long
24'	12-11"	16-11"	15-7"	96	12-11"	24	#	#	4-11"	#	#	40
28'	14-11"	18-11"	17-7"	116	14-11"	24	#	#	4-11"	#	#	48
32'	16-11"	20-11"	19-7"	116	16-11"	24	#	#	4-11"	#	#	48
36'	18-11"	22-11"	21-7"	136	18-11"	24	#	#	4-11"	#	#	56
40'	20-11"	24-11"	23-7"	136	20-11"	24	#	#	4-11"	#	#	56
44'	22-11"	26-11"	25-7"	156	22-11"	24	#	#	4-11"	#	#	64

See Notes for explanation of length or number.



GENERAL: This drawing provides design and general construction details and is intended to be used with Standard Drawing GS-1-54. The project plans for each structure will show span lengths; roadway width; skew; elevations; type, size and required capacity of piles; estimated quantities; reinforcing steel list; and other necessary notes and details.

DESIGN SPECIFICATIONS: This standard drawing conforms to the "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated October 1, 1951, together with revisions dated July 15, 1952 and April 1, 1954.

EXPANSION: Where provision for expansion is required, this drawing should not be used.

PILE TYPE AND SIZE: The piles usually will be specified on the project plans as cast-in-place reinforced concrete or steel H. The type and size generally will be the same as for the pier piles if the piers are of the type shown on Standard Drawing P-1-54. If the type of pier is different from that shown on Standard Drawing P-1-54, the abutment piles, if of the steel H type, generally will be specified as I2BP53, and if of the cast-in-place concrete type, as 12" diameter if the sum of the spans is less than 100 feet, and as 14" diameter if more than 100 feet.

PILE SPACING: In case of skew, the number of piles shall be the same as shown but the tabulated spacing dimension shall be multiplied by the secant of θ (the angle of skew).

PILE CAPACITY shall be as specified on the project plans. The required capacity according to the formula in Sec. 5-18.05 of the Construction and Material Specifications, generally will be the same as the design load listed in the table, except for steel H piles that are to be driven to firm contact with rock or other hard material, in which case the required formula capacity generally will be greater than the design load and will be dependent upon the relative magnitude of the design load and size of hammer, and upon the kind and relative depth of the penetrated soil.

EARTH EMBANKMENT shall be placed up to the elevation of the earth bench, after which the excavation shall be made for the abutment and the piles driven.

CONCRETE shall be Class "E" and payment will be made on this basis, but Class "C" concrete may be used for any or all parts of the abutments.

REINFORCING STEEL: For a skewed abutment the tabulated length of the R1001, R801, R501, R503, R506 and R507 bars will be multiplied by the secant of θ (the angle of skew). The number of the R505, R508 and R509 bars and the length of the R506 bars will be determined for each individual bridge. The R1001, R801, R501 and R503 bars, at the option of the Contractor, may be furnished in two lengths as indicated herein, with a 30" diameter lap, or as single bars of equal net length, except where such length would be greater than 52'-0", and the determination of pay quantity shall be based on two lapped lengths unless otherwise called for on the project plans. The clearance from the face of the concrete to the reinforcing steel shall be 2".

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 therefor, in excess of that required for construction of the footing, shall be considered as paid for in the bid price per cu. yd. paid for porous backfill.

EXCAVATION QUANTITY includes the removal of embankment material between the bottom of the abutment footing and the top of the earth bench.

CONCRETE QUANTITY: For skewed bridges the concrete quantity as tabulated will be multiplied by the secant of θ (the angle of skew).

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, R801 is a No 8 size bar and R1001 is a No 10 size.

REVISIONS
12-1-54

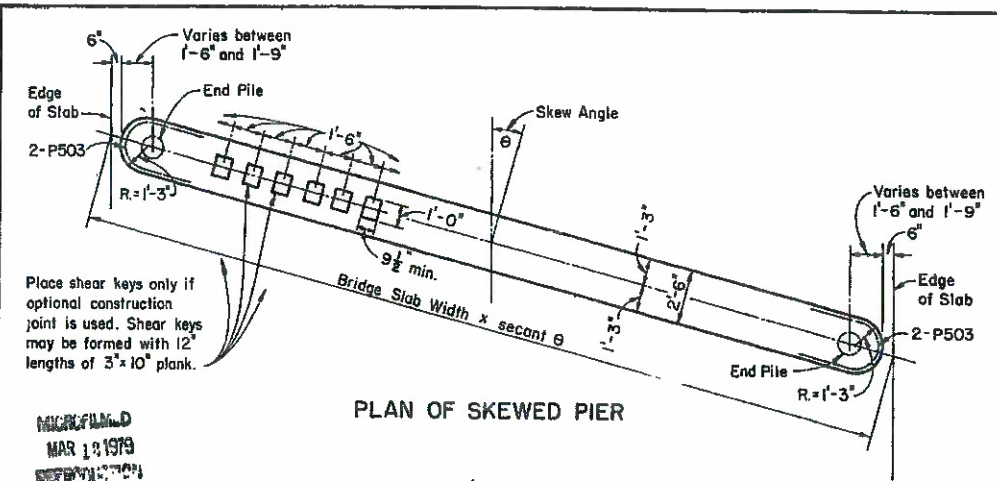
STATE OF OHIO
DEPARTMENT OF HIGHWAYS
DIVISION OF DESIGN AND CONSTRUCTION
BUREAU OF BRIDGES

STANDARD
CAPPED PILE ABUTMENTS
FOR CONTINUOUS SLAB BRIDGES
WITHOUT CURBS
MIDDLE SPAN 20 FEET TO 55 FEET
LOAD FREQUENCY
CF = 30, CF = 130, CF = 400, CF = 2000

APPROVED: *Richard O. A.*
DATE: 7-1-54
ENGINEER OF BRIDGES

PREPARED BY: CEJ LJE RAG GFB JCS WHE
TRACED BY: CEJ
CHECKED BY: FHR
REVIEWED BY: OSD BFB CHA AJF DHO

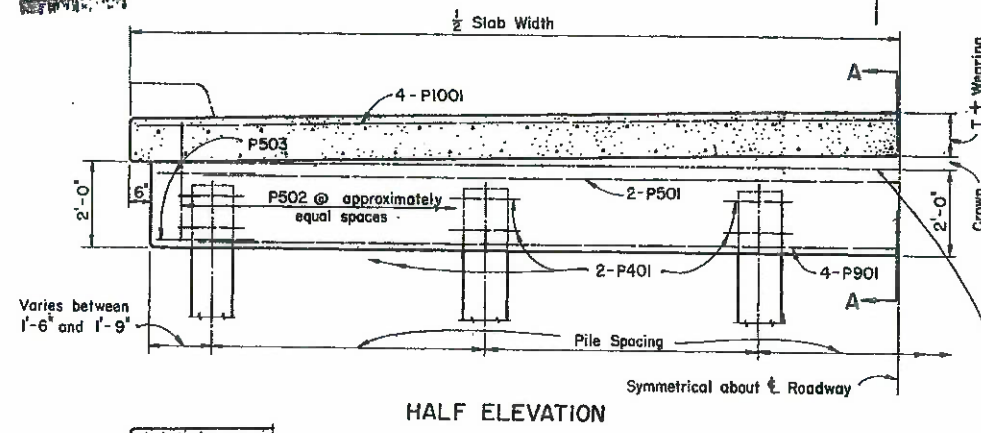
DRAWING NUMBER
A-1-54



Place shear keys only if optional construction joint is used. Shear keys may be formed with 12" lengths of 3" x 10" plank.

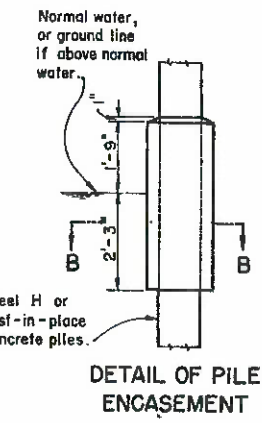
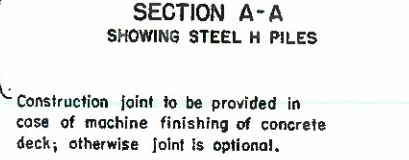
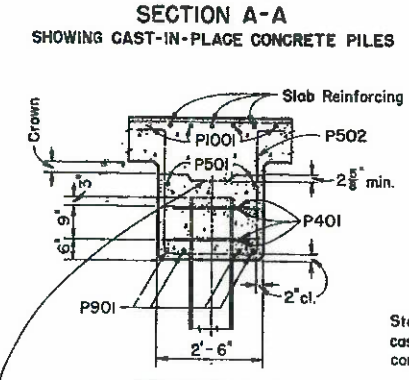
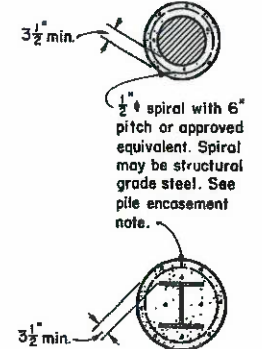
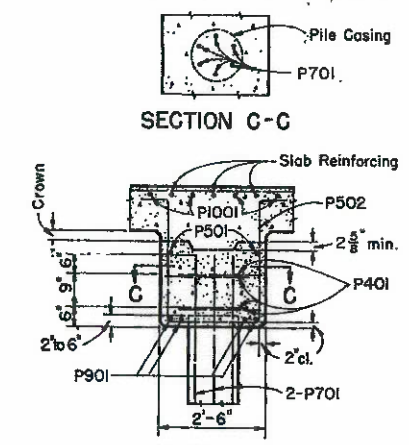
MICROFILMED MAR 19 1979

PLAN OF SKEWED PIER



HALF ELEVATION

SLAB EDGE BEAM FOR "T" LESS THAN 14"



Construction joint to be provided in case of machine finishing of concrete deck; otherwise joint is optional.

GENERAL: This drawing provides design and general construction details and is intended to be used with Standard Drawings CS-1-54 and CS-2-54. The project plans for each structure will show spans; roadway width; skew; elevations; type, size and capacity of piles; estimated quantities; reinforcing steel list; and other necessary notes and details.

The pier design shown on this drawing should not be used if:

a. Sloped embankment would cause appreciable horizontal force against the pile bent. In such case, a pier of different type, in which battered piles may be incorporated, should be used.

b. Rock or other firm material would prevent driving piles at least ten feet below stream bed.

c. The length of piles, from ground to bottom of cap, would exceed fifteen feet.

DESIGN SPECIFICATIONS: This standard drawing conforms to the Design Specifications for Highway Structures of the State of Ohio, Department of Highways, dated October 1, 1951, together with revisions dated July 15, 1952 and April 1, 1954.

PILE SIZE: Cast-in-place reinforced concrete piles shall be 14" diameter if the piles are exposed above the concrete encasement, and 12" diameter if the encasement extends to the bottom of the pier cap. Steel H piles shall be I2BP53.

PILE SPACING: In case of skew, the number of piles shall be the same as shown but the tabulated spacing dimension shall be multiplied by the secant of θ (the angle of skew).

PILE CAPACITY shall be as specified on the project plans. The required capacity according to the formula in Sec. S-18.05 of the "Construction and Material Specifications", generally will be the same as the design load listed in the table, except for steel H piles that are to be driven to firm contact with rock or other hard material, in which case the required formula capacity generally will be greater than the design load and will be dependent upon the relative magnitude of the design load and size of hammer, and upon the kind and relative depth of the penetrated soil.

PILE CASINGS: The casings of cast-in-place concrete piles shall be of the type that is left in place and is designed to resist both direct compression and bending. The portion above the circular concrete encasement shall be of uniform diameter (not tapered) and shall have a thickness of metal not less than No. 7 gauge.

PILE ENCASEMENT, as shown hereon, shall be provided for each pier pile. If the distance from the bottom of the pier cap to normal water elevation, or ground line if above normal water, is less than approximately 6 feet, the encasement shall be extended to the bottom

of the concrete cap for all the piles in that pier, if so specified on the project plans. It shall consist of Class "C" or "E" concrete and may be placed in water as per Sec. S-1.18, care being taken to remove all dirt between the piles and the forms. Metal forms, if used, may be left in place if the exposed portion is painted or galvanized. Corrugated metal may be used. Metal forms with irregular deformations, such as all drums, will not be permitted. If metal forms meeting the requirements of Sec. M-6.4(a) are left in place, no spiral reinforcement in the concrete will be required.

PILE PAINTING: The exposed portion of the piles, above the encasement, shall be painted in accordance with Item S-B, applying two coats as per Secs. M-9.9, M-9.20 or M-9.21 and two coats as per Sec. M-9.12. Metal forms, left in place on the encasement, unless galvanized, shall be similarly painted.

PAYMENT FOR PILES, per lin. ft., includes payment for the encasement (concrete, reinforcement, forms, painting, galvanizing and excavating) and the pile painting. The elevation of cut-off, as per Sec. S-18.13, shall be considered as 4" above the bottom of the concrete cap for cast-in-place concrete piles and 1'-6" for steel H piles.

FALSEWORK SUPPORT: The pier cap shall not be used to support falsework for the deck slab.

REINFORCING STEEL: The P1001, P901, and P501 bars, at the option of the Contractor, may be furnished in one length as shown, or in pairs lapped 30 diameters at or near the centerline of the roadway. Determination of the pay quantity will be according to the number and length of bars as shown hereon, unless otherwise called for on the project plans.

HORIZONTAL CONSTRUCTION JOINT between the top of pier cap and bottom of slab will be permitted if keys, as shown, are provided at the top of the cap. If such a joint is not provided, the concrete in the slab and cap shall be placed in a continuous operation.

CONCRETE shall be Class "C".

PIER CAP CONCRETE QUANTITY will be added to the quantity of superstructure concrete when listed on the project plans.

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 P901 is a No. 9 size bar and P1001 is a No. 10 size.

LOAD FREQUENCY	SLAB WIDTH	NUMBER, SPACING AND DESIGN LOAD (IN TONS) OF PILES FOR ONE NON-SKEWED PIER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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		16-20-16				18-22.5-18				20-25-20				22-27.5-22				24-30-24				26-32.5-26				28-35-28				30-37.5-30				32-40-32				34-42.5-34				36-45-36				38-47.5-38				40-50-40				42-52.5-42				44-55-44																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
24'	5	5'-0"	18	5	5'-0"	20	5	5'-0"	22	5	5'-0"	24	5	5'-0"	26	5	5'-0"	28	5	5'-0"	30	5	5'-0"	33	5	5'-0"	35	5	5'-0"	38	5	4'-0"	33	6	4'-0"	36	6	4'-0"	39	6	4'-0"	43	6	4'-0"	46	6	4'-0"	49	6	4'-0"	51	6	4'-0"	54	6	4'-0"	57	6	4'-0"	60	6	4'-0"	63	6	4'-0"	66	6	4'-0"	69	6	4'-0"	72	6	4'-0"	75	6	4'-0"	78	6	4'-0"	81	6	4'-0"	84	6	4'-0"	87	6	4'-0"	90	6	4'-0"	93	6	4'-0"	96	6	4'-0"	99	6	4'-0"	102	6	4'-0"	105	6	4'-0"	108	6	4'-0"	111	6	4'-0"	114	6	4'-0"	117	6	4'-0"	120	6	4'-0"	123	6	4'-0"	126	6	4'-0"	129	6	4'-0"	132	6	4'-0"	135	6	4'-0"	138	6	4'-0"	141	6	4'-0"	144	6	4'-0"	147	6	4'-0"	150	6	4'-0"	153	6	4'-0"	156	6	4'-0"	159	6	4'-0"	162	6	4'-0"	165	6	4'-0"	168	6	4'-0"	171	6	4'-0"	174	6	4'-0"	177	6	4'-0"	180	6	4'-0"	183	6	4'-0"	186	6	4'-0"	189	6	4'-0"	192	6	4'-0"	195	6	4'-0"	198	6	4'-0"	201	6	4'-0"	204	6	4'-0"	207	6	4'-0"	210	6	4'-0"	213	6	4'-0"	216	6	4'-0"	219	6	4'-0"	222	6	4'-0"	225	6	4'-0"	228	6	4'-0"	231	6	4'-0"	234	6	4'-0"	237	6	4'-0"	240	6	4'-0"	243	6	4'-0"	246	6	4'-0"	249	6	4'-0"	252	6	4'-0"	255	6	4'-0"	258	6	4'-0"	261	6	4'-0"	264	6	4'-0"	267	6	4'-0"	270	6	4'-0"	273	6	4'-0"	276	6	4'-0"	279	6	4'-0"	282	6	4'-0"	285	6	4'-0"	288	6	4'-0"	291	6	4'-0"	294	6	4'-0"	297	6	4'-0"	300	6	4'-0"	303	6	4'-0"	306	6	4'-0"	309	6	4'-0"	312	6	4'-0"	315	6	4'-0"	318	6	4'-0"	321	6	4'-0"	324	6	4'-0"	327	6	4'-0"	330	6	4'-0"	333	6	4'-0"	336	6	4'-0"	339	6	4'-0"	342	6	4'-0"	345	6	4'-0"	348	6	4'-0"	351	6	4'-0"	354	6	4'-0"	357	6	4'-0"	360	6	4'-0"	363	6	4'-0"	366	6	4'-0"	369	6	4'-0"	372	6	4'-0"	375	6	4'-0"	378	6	4'-0"	381	6	4'-0"	384	6	4'-0"	387	6	4'-0"	390	6	4'-0"	393	6	4'-0"	396	6	4'-0"	399	6	4'-0"	402	6	4'-0"	405	6	4'-0"	408	6	4'-0"	411	6	4'-0"	414	6	4'-0"	417	6	4'-0"	420	6	4'-0"	423	6	4'-0"	426	6	4'-0"	429	6	4'-0"	432	6	4'-0"	435	6	4'-0"	438	6	4'-0"	441	6	4'-0"	444	6	4'-0"	447	6	4'-0"	450	6	4'-0"	453	6	4'-0"	456	6	4'-0"	459	6	4'-0"	462	6	4'-0"	465	6	4'-0"	468	6	4'-0"	471	6	4'-0"	474	6	4'-0"	477	6	4'-0"	480	6	4'-0"	483	6	4'-0"	486	6	4'-0"	489	6	4'-0"	492	6	4'-0"	495	6	4'-0"	498	6	4'-0"	501	6	4'-0"	504	6	4'-0"	507	6	4'-0"	510	6	4'-0"	513	6	4'-0"	516	6	4'-0"	519	6	4'-0"	522	6	4'-0"	525	6	4'-0"	528	6	4'-0"	531	6	4'-0"	534	6	4'-0"	537	6	4'-0"	540	6	4'-0"	543	6	4'-0"	546	6	4'-0"	549	6	4'-0"	552	6	4'-0"	555	6	4'-0"	558	6	4'-0"	561	6	4'-0"	564	6	4'-0"	567	6	4'-0"	570	6	4'-0"	573	6	4'-0"	576	6	4'-0"	579	6	4'-0"	582	6	4'-0"	585	6	4'-0"	588	6	4'-0"	591	6	4'-0"	594	6	4'-0"	597	6	4'-0"	600	6	4'-0"	603	6	4'-0"	606	6	4'-0"	609	6	4'-0"	612	6	4'-0"	615	6	4'-0"	618	6	4'-0"	621	6	4'-0"	624	6	4'-0"	627	6	4'-0"	630	6	4'-0"	633	6	4'-0"	636	6	4'-0"	639	6	4'-0"	642	6	4'-0"	645	6	4'-0"	648	6	4'-0"	651	6	4'-0"	654	6	4'-0"	657	6	4'-0"	660	6	4'-0"	663	6	4'-0"	666	6	4'-0"	669	6	4'-0"	672	6	4'-0"	675	6	4'-0"	678	6	4'-0"	681	6	4'-0"	684	6	4'-0"	687	6	4'-0"	690	6	4'-0"	693	6	4'-0"	696	6	4'-0"	699	6	4'-0"	702	6	4'-0"	705	6	4'-0"	708	6	4'-0"	711	6	4'-0"	714	6	4'-0"	717	6	4'-0"	720	6	4'-0"	723	6	4'-0"	726	6	4'-0"	729	6	4'-0"	732	6	4'-0"	735	6	4'-0"	738	6	4'-0"	741	6	4'-0"	744	6	4'-0"	747	6	4'-0"	750	6	4'-0"	753	6	4'-0"	756	6	4'-0"	759	6	4'-0"	762	6	4'-0"	765	6	4'-0"	768	6	4'-0"	771	6	4'-0"	774	6	4'-0"	777	6	4'-0"	780	6	4'-0"	783	6	4'-0"	786	6	4'-0"	789	6	4'-0"	792	6	4'-0"	795	6	4'-0"	798	6	4'-0"	801	6	4'-0"	804	6	4'-0"	807	6	4'-0"	810	6	4'-0"	813	6	4'-0"	816	6	4'-0"	819	6	4'-0"	822	6	4'-0"	825	6	4'-0"	828	6	4'-0"	831	6	4'-0"	834	6	4'-0"	837	6	4'-0"	840	6	4'-0"	843	6	4'-0"	846	6	4'-0"	849	6	4'-0"	852	6	4'-0"	855	6	4'-0"	858	6	4'-0"	861	6	4'-0"	864	6	4'-0"	867	6	4'-0"	870	6	4'-0"	873	6	4'-0"	876	6	4'-0"	879	6	4'-0"	882	6	4'-0"	885	6	4'-0"	888	6	4'-0"	891	6	4'-0"	894	6	4'-0"	897	6	4'-0"	900	6	4'-0"	903	6	4'-0"	906	6	4'-0"	909	6	4'-0"	912	6	4'-0"	915	6	4'-0"	918	6	4'-0"	921	6	4'-0"	924	6	4'-0"	927	6	4'-0"	930	6	4'-0"	933	6	4'-0"	936	6	4'-0"	939	6	4'-0"	942	6	4'-0"	945	6	4'-0"	948	6	4'-0"	951	6	4'-0"	954	6	4'-0"	957	6	4'-0"	960	6	4'-0"	963	6	4'-0"	966	6	4'-0"	969	6	4'-0"	972	6	4'-0"	975	6	4'-0"	978	6	4'-0"	981	6	4'-0"	984	6	4'-0"	987	6	4'-0"	990	6	4'-0"	993	6	4'-0"	996	6	4'-0"	999	6	4'-0"	1002	6	4'-0"	1005	6	4'-0"	1008	6	4'-0"	1011	6	4'-0"	1014	6	4'-0"	1017	6	4'-0"	1020	6	4'-0"	1023	6	4'-0"	1026	6	4'-0"	1029	6	4'-0"	1032	6	4