

DIMENSIONS FOR BOX-BEAM PADS						
PAD	A	B	C	D	*MAXIMUM REACTION	MAXIMUM MOVEMENT (One Direction)
A1	1'-10"	7"	3-0.12" x 21.630" x 6.630"	1.290"	173k	0.500"
A2	1'-10"	7"	5-0.12" x 21.630" x 6.630"	2.090"	173k	0.750"
B1	11"	7"	3-0.12" x 10.630" x 6.630"	1.290"	69k	0.500"
B2	11"	7"	5-0.12" x 10.630" x 6.630"	2.090"	69k	0.750"

* These reactions are based on service loads, use actual reactions to determine anchorage requirements for pads.

GENERAL NOTES

SPECIFICATIONS: Fabricate the Elastomeric Bearing Pads to the design and dimensions as shown on these drawings and to AASHTO LRFD Bridge Construction Specifications, Section 18.
 Ensure bearings are low temperature Grade 3 with durometer hardness of 50 and subjected to the load testing requirements corresponding to Design Method A.

Include the price of bearing pads in the bid for the beams.

KENTUCKY DEPARTMENT OF HIGHWAYS
ELASTOMERIC BEARING PADS FOR BOX BEAMS
STANDARD DRAWING NO. BBP-003-02 SUBMITTED BY: <i>[Signature]</i> DIRECTOR DIVISION OF BRIDGE & STRUCTURAL DESIGN APPROVED BY: <i>[Signature]</i> STATE ENGINEER
02-26-20 PAGE

PRECAST PRESTRESSED BOX BEAMS

General Notes

SPECIFICATIONS: All references to the standard Specifications are to the current edition of the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, with current supplemental specifications. All references to the AASHTO Specifications are to the current edition of the AASHTO LRFD Bridge Design Specifications, with interims.

DESIGN LOADS: Beam sections are designed for 1.25*HL93 (KYHL93) Live Load.

DESIGN LOAD DISTRIBUTION: Contrary to AASHTO LRFD Bridge Design Specifications, the design moment and shear distribution for all beams is 0.5 lanes.

FUTURE WEARING SURFACE: These beams are designed for a 15 PSF future wearing surface load.

SUBSTRUCTURE DESIGN LOADS: Unfactored design reaction forces per beam end.

DC (klps): Beam, Slab (if applicable), and Type II railing dead loads.
 DW (klps): Future wearing surface.
 LL (klps): Beam Live Load reaction per lane x Design load distribution.
 LL+I (klps): LL with Dynamic load allowance.

DESIGN DEFLECTIONS:

Δ_d (in.): Sum of the downwards deflections caused by the design 5" deck, railing, and future wearing surface. (Positive Downwards)
 Δ_c (in.): Upward's midspan camber of the beam caused by prestressing minus the downward deflection of the beam due to self weight. (Positive Upwards)

MATERIAL DESIGN SPECIFICATIONS:

for Steel Reinforcement (Typ. U.N.O.)
 FY = 60000 PSI
 F'c = 7000 PSI
 F'CI = 5500 PSI
 F'c = 4000 PSI
 F'S = 270000 PSI

DESIGN LENGTH: Beam lengths shown in the Standards represent total beam length. Use the next greater designed section for non-Standard lengths.

CONSTRUCTION METHOD: Transferring bond stress to the concrete will not be allowed, nor releasing of end anchors until the concrete has attained a minimum compressive strength of F'CI as shown by standard cylinders made and cured identically with the girders; attain F'CI at or prior to 28 days. Apply an initial prestress force of 33817 lbs. per low relaxation strand. Beams with honeycomb of such extent as to affect the strength of resistance to deterioration will not be accepted. The allowance of .0005L (length) is made for shortening of beams due to shrinkage and elastic change. Furnish shop plans showing a shortening plan by numbering, in sequence, the strand pattern.

PRESTRESSING STRANDS: Ensure prestressing strands to be 1/2" oversize (0.167 sq. in.) uncoated seven-wire stress relieved, low-relaxation strands conforming to AASHTO M 203, Grade 270. If an alternate strand arrangement or strand type is preferred by the Contractor, the designer that developed the original plans will provide the design and also revise the original plans to reflect the changes. These design and plan modifications will be done at the Contractor's expense.

CORROSION INHIBITOR: Provide a corrosion inhibitor for B-type (non-composite) beams from the list of approved materials.

BEVELED EDGES: Bevel all exposed edges 3/4".

BEAM SEALER: For composite box beams (CB Beams), seal the full length of the exterior face of all exterior beams with the extent from the top of the beam to 1'-0" underneath the beam. For non-composite box beams (B-beams), seal all faces of all beams, except take care to ensure the grout pockets are not sealed. Use an approved silane sealer as specified by the Division of Structural Design.

REINFORCEMENT: Dimensions shown from the face of concrete to reinforcement are clear distances. Spacing of reinforcement is from center to center of reinforcement. All steel reinforcement is to be epoxy coated in accordance with Section 811.10 of the Specifications. Consider bars marked "C" to be a stirrup for purposes of bend diameters. Non-epoxy reinforcement may be used for fabrication purposes, only, provided that the steel is not used in the top 5 1/2" of the beam and the location of the steel is indicated on the shop drawings.

FABRICATION: Beams shall not be fabricated more than 120 days before the deck is to be poured.

GROUT: Provide non-shrink grout for anchor dowels, shear keys, and tensioning rod blocks conforming with Section 601.03.03 of the Specifications. When side by side superstructure is utilized, grouting will be completed after lateral tension rods have been fully tightened and before leveling devices have been removed. Include the cost of furnishing and placing grout in the price of beam.

RAILING SYSTEM TYPE II: Furnish this material per these specifications.

ITEM	DESCRIPTION	MATERIAL SPECIFICATION	COATING SPECIFICATION
Post	W6x25	ASTM A36 or A572	A123
Chanel	C7x9.8	ASTM A36 or A572	A123
Plate	1/2"x 7"	ASTM A36 or A572	A123
Tubing	8x4x0.1875	ASTM A500 or A501	A123
Bolts	3/8"	ASTM A307	A153
Nuts	For 3/8"	ASTM A563, Grade A or better	A153
Washers	For 3/8"	ASTM A563, Grade A or better	A153
Stud	1 1/4"	ASTM A108 (1045 C.D. Bar)	B633, Type II, Class 25
Ferrule	2 1/2" x 5"	ASTM A108 (11L17 Steel)	B633, Type II, Class 25
Wire	3/8"	ASTM A510 (1018 Steel)	B633, Type II, Class 25
Nut	For 1 1/4" Bolt	ASTM A108 (12L14 Steel)	B633, Type II, Class 25
Nut	For 1 1/4" Stud	ASTM A325M	B633, Type II, Class 25
Washers	For 1 1/4" Stud	ASTM A325M	B633, Type II, Class 25

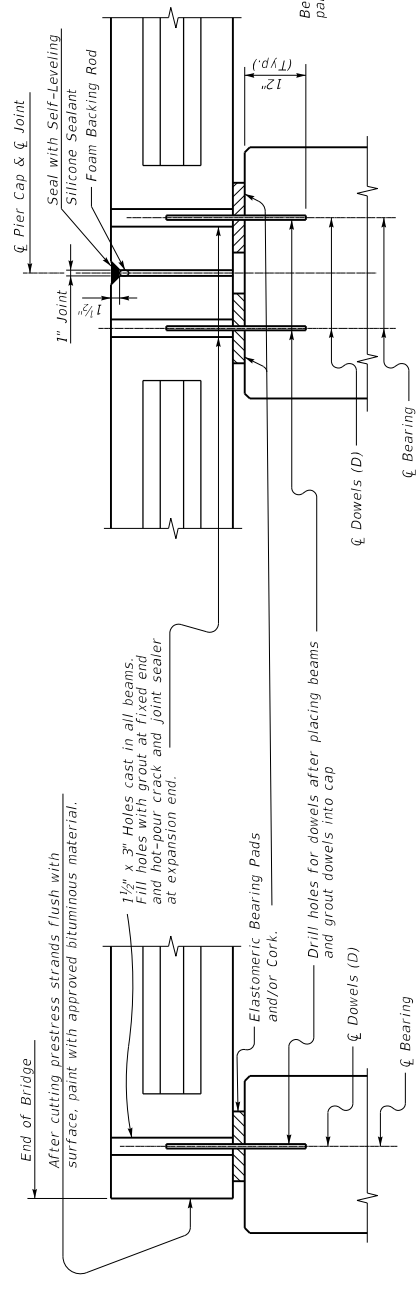
STANDARD DRAWINGS	
BBP-003	Elastomeric Bearing Pads
BHS-007	Railing System Type II
BJE-001	Armored Edge & Neoprene Joints
RBR-001	Steel Beam Guardrail
RBR-005	Guardrail Components
SPECIAL NOTES	
For Corrosion Inhibitors	

Use the current edition of the references listed below with these standards.

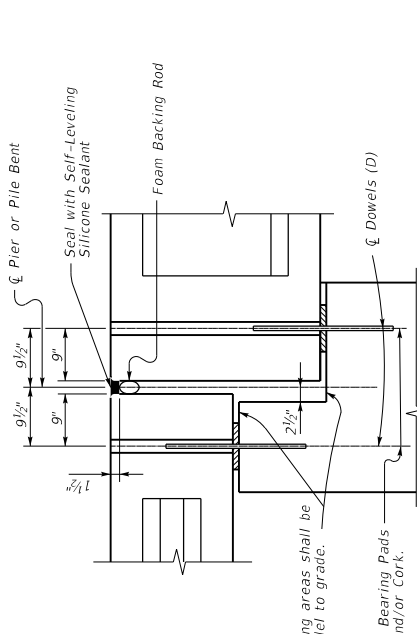
KENTUCKY
 DEPARTMENT OF HIGHWAYS

BOX BEAM
 GENERAL NOTES
 AND REFERENCES

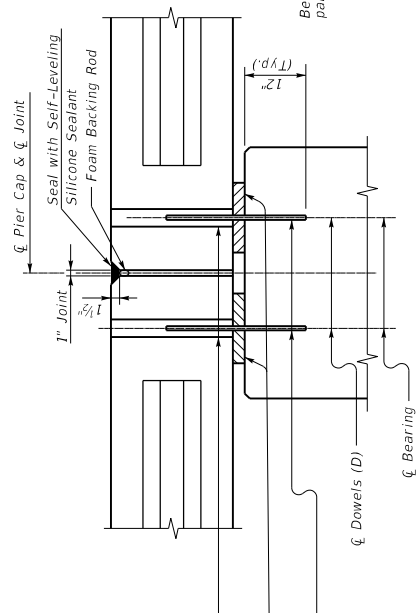
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 SUBMITTED BY: [Signature]
 APPROVED BY: [Signature]
 02-26-20
 02-26-20



ABUTMENT OR END BENT

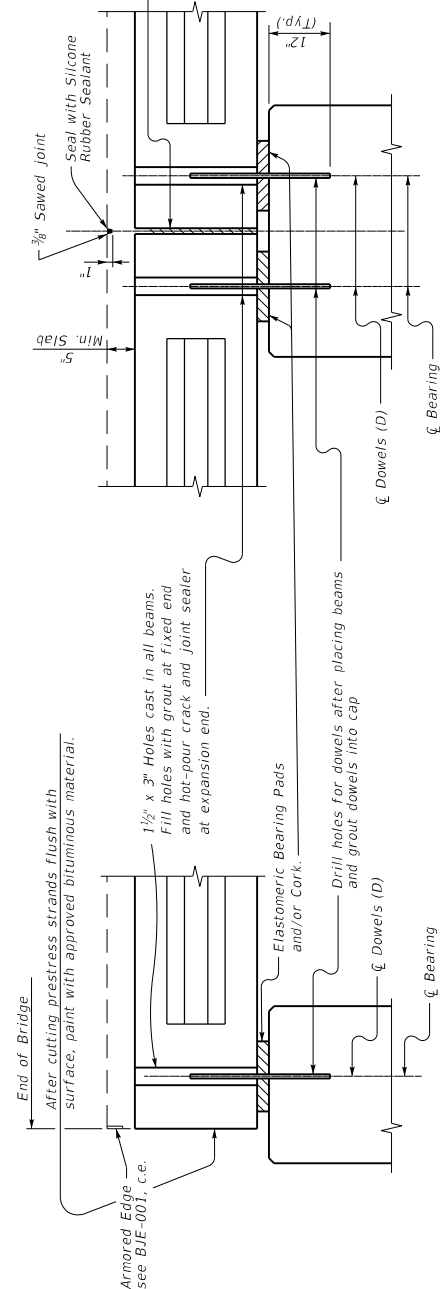


PIER OR PILE BENT
(Showing Location & Placement of Box Beams)



STEPPED PIER OR PILE BENT
(Showing Location & Placement of Box Beams)

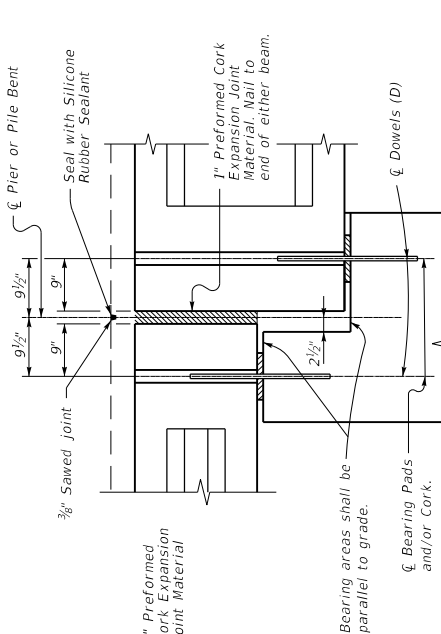
TYPICAL BEARING DETAILS (NON-COMPOSITE)



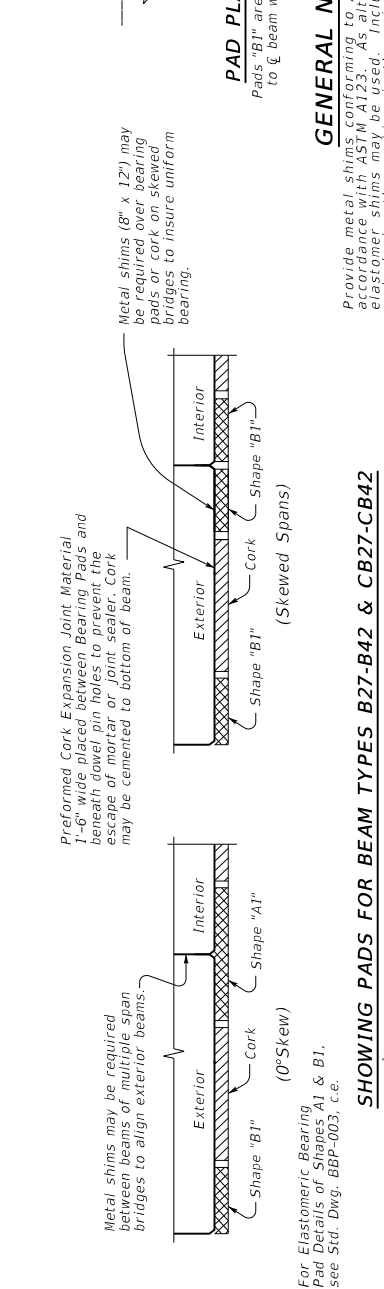
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PIER OR PILE BENT

TYPICAL BEARING DETAILS (COMPOSITE)



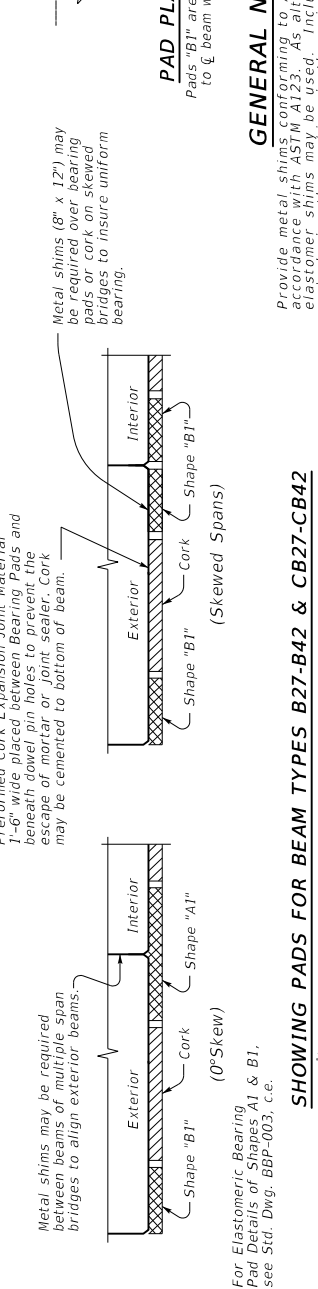
STEPPED PIER OR PILE BENT
(Showing Location & Placement of Box Beams)



ABUTMENT OR END BENT

PIER OR PILE BENT

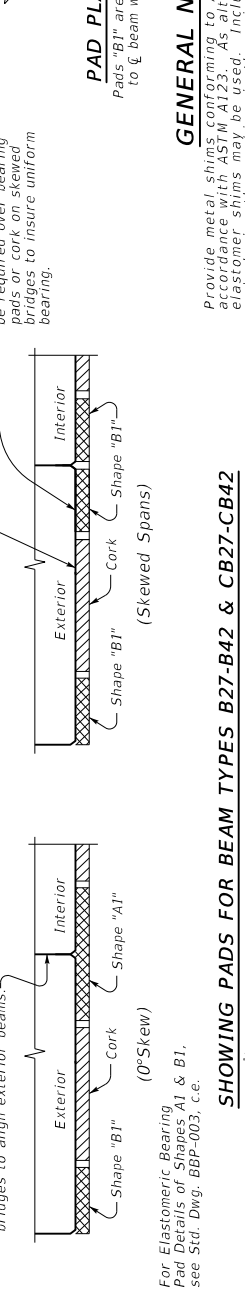
TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

PIER OR PILE BENT

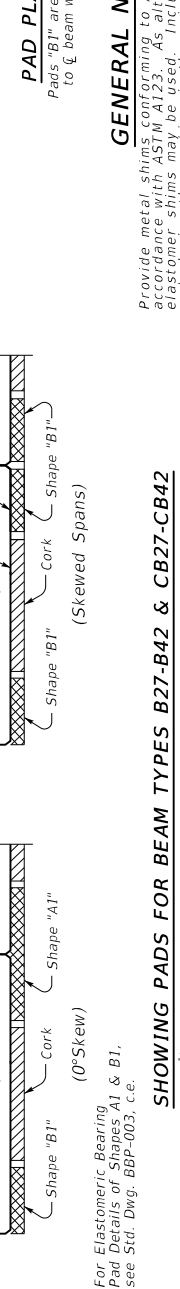
TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

PIER OR PILE BENT

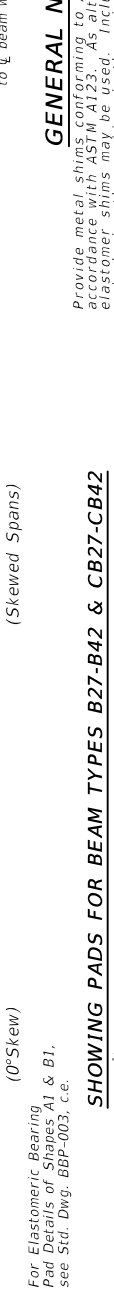
TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

PIER OR PILE BENT

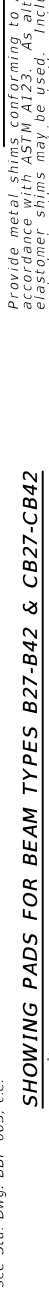
TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

PIER OR PILE BENT

TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

PIER OR PILE BENT

TYPICAL BEARING DETAILS (COMPOSITE)



ABUTMENT OR END BENT

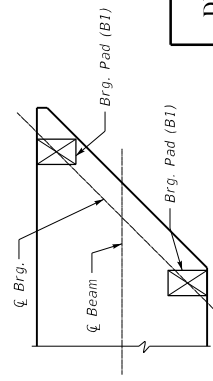
PIER OR PILE BENT

TYPICAL BEARING DETAILS (COMPOSITE)

KENTUCKY
DEPARTMENT OF HIGHWAYS
BOX BEAM
BEARING
DETAILS

STANDARD DRAWING NO. BDP-002-03
SUBMITTED BY: [Signature]
APPROVED BY: [Signature]
DATE: 02-26-20

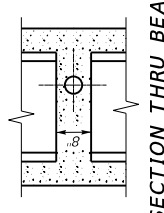
PAD PLACEMENT FOR SKEWS
Pads "B1" are to always be placed perpendicular to ϕ beam with center of pad over ϕ bearing.



GENERAL NOTES
Provide metal shims conforming to ASTM A36 and galvanize in accordance with ASTM A123. As alternates, cork, polymer, or elastomer shims may be used. Include the cost of furnishing and placing these shims in the price per beam.

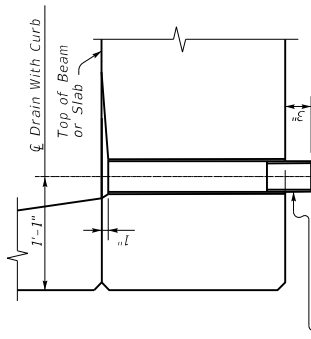
SHOWING PADS FOR BEAM TYPES B27-B42 & CB27-CB42
Use 1/2" x 1-6" preformed cork for beam types B12-B21 & CB12-CB21 for bearing.

For Elastomeric Bearing Pad Details of Shapes A1 & B1, see Std. Dwg. BBP-003, c.e.

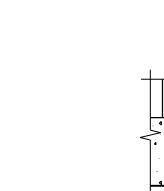


Diaphragms may be omitted if void is cut to allow drain to be encased with a minimum 2" of concrete.

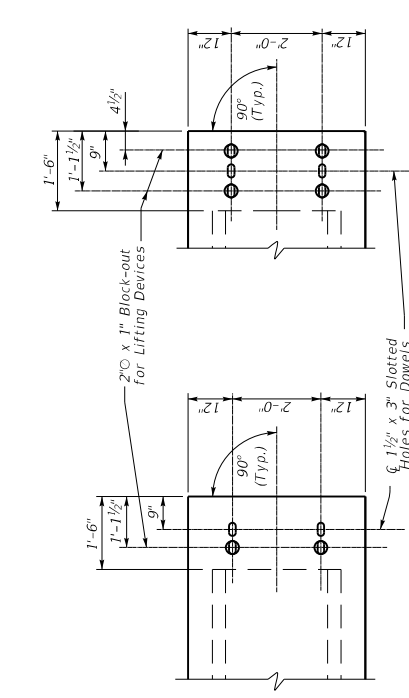
Provide drains on both sides of bridge with normal crown and on low side only for super-elevated bridges. Space drains at maximum 12'-6" on centers with a minimum of one placed each gutter line per span. Omit drains when span crosses over a highway or road. Include the cost of pipe and fittings in the price of beam.



TOP VIEW OF DRAIN
DRAIN DETAILS
(For Spans With Curbs)

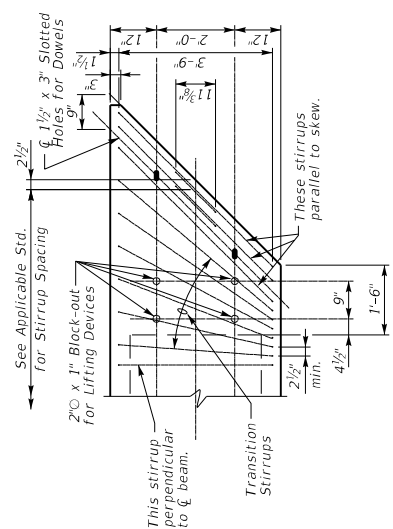


VOID DRAIN DETAIL
Locate two drains at each end of each void. Provide 1/2" drains or a type approved by the Division of Materials.

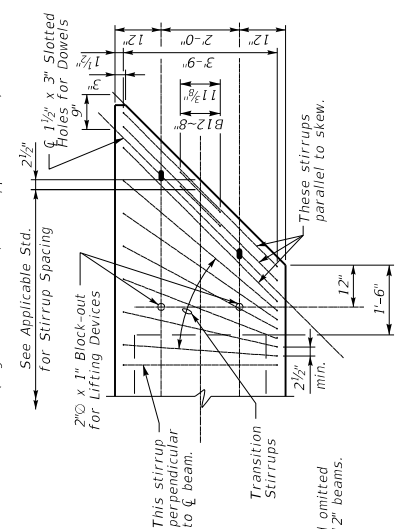


TYPICAL STRAIGHT END

NOTE: Void omitted on 12' beams.

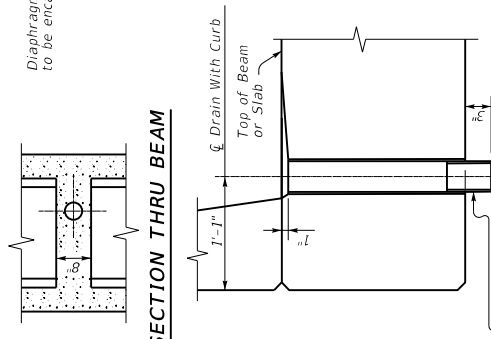


TYPICAL SKEWED END FOR BEAMS OVER 50 FEET
(Right Skew Shown, Left Opposite Hand)



TYPICAL SKEWED END FOR BEAMS 50 FEET OR LESS
(Right Skew Shown, Left Opposite Hand)

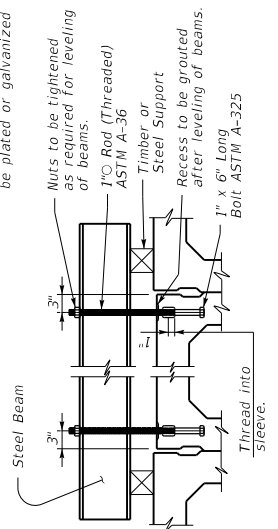
NOTE: Void omitted on 12' beams.



SECTION THRU DRAIN
EXTERIOR BOX BEAM
(Showing coupling in barrier)

NPS Designation 4 Standard coupling and nipple in accordance with ASTM A53. Nipple to be installed in field.

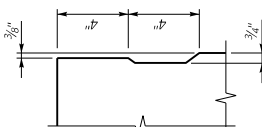
NOTE: Inserts are to be plated or galvanized



LEVELING DEVICE DETAILS

Locate inserts at the center of beams up to 50 ft. and at diaphragm locations of beams over 50 ft. Include the cost of materials and labor involved in leveling beams in the price for beams. Submit alternate leveling devices to the Division of Bridge Design for approval.

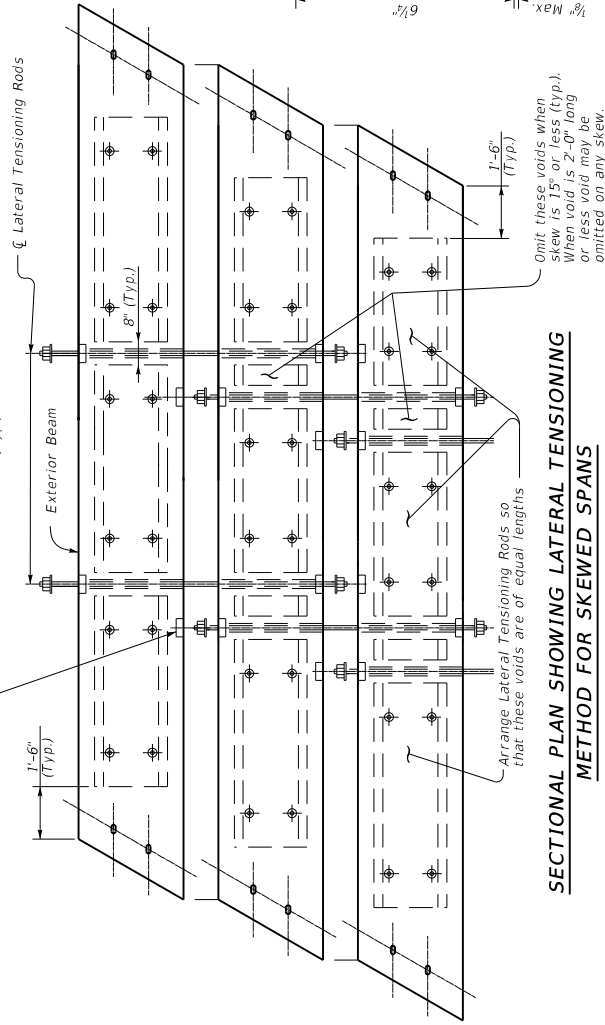
NOTE: Omit shear key on exterior face of exterior beam.



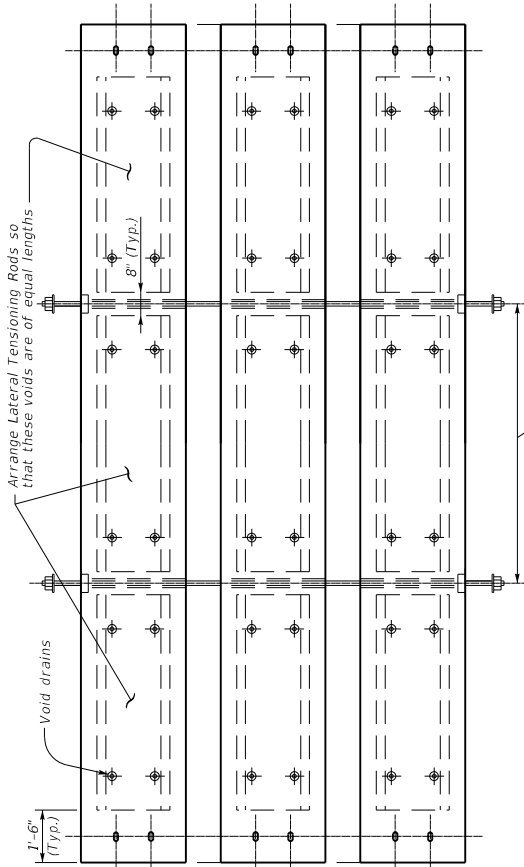
SHEAR KEY DETAIL

GENERAL NOTES

LATERAL TENSIONING RODS: After the deck units are in place, apply a preliminary tension to the lateral tensioning rods. Perform final tensioning that yields 20,000 psi as developed by a torque of 200 ft.-lbs. Provide lateral tensioning rods and plates conforming to ASTM A36 with heavy hex nuts conforming to ASTM A307. All tension rods, plates, and nuts to be galvanized in accordance with ASTM A123 or A153 as applicable.

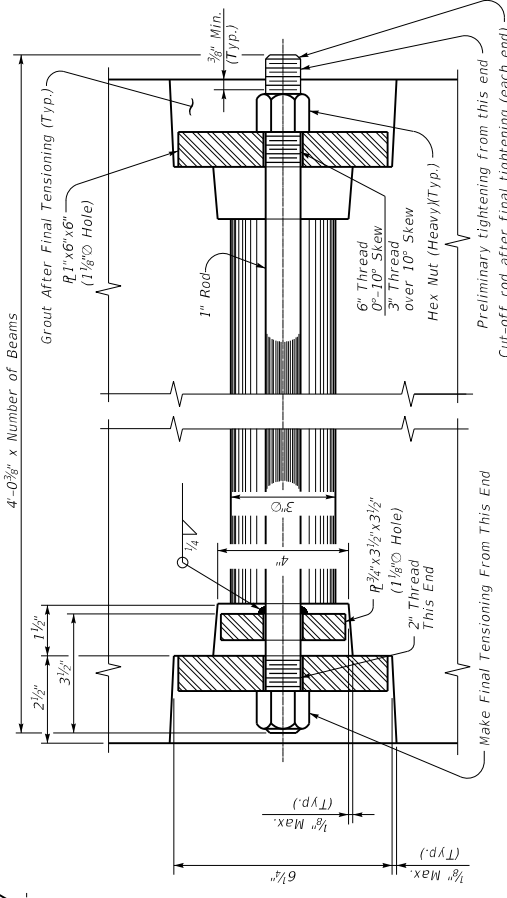


SECTIONAL PLAN SHOWING LATERAL TENSIONING METHOD FOR SKEWED SPANS

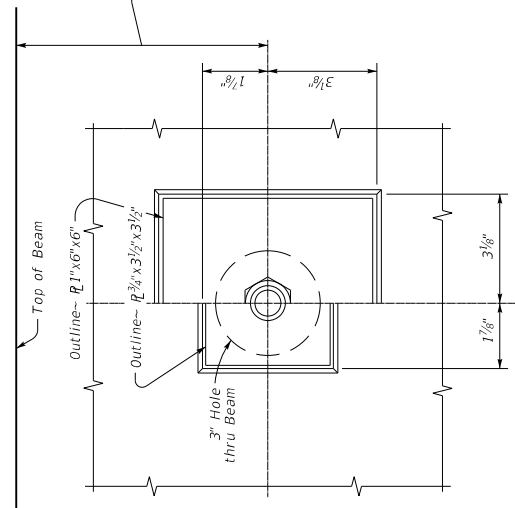


SECTIONAL PLAN SHOWING LATERAL TENSIONING METHOD FOR STRAIGHT SPANS

(The above arrangement is applicable from 0° skew to and including 10° skew)



SECTION THRU LATERAL TENSIONING ROD



SECTIONAL END PLAN
(Lateral Tension Rod Details)

KENTUCKY DEPARTMENT OF HIGHWAYS
BOX BEAM TENSION ROD DETAILS
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02-26-20 02-26-20

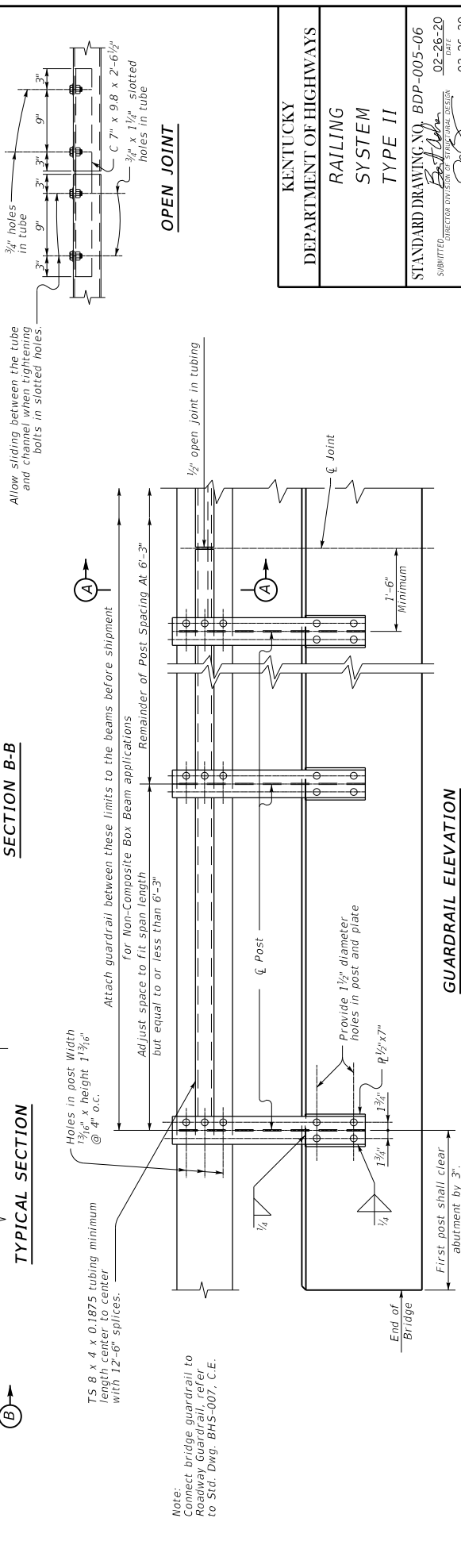
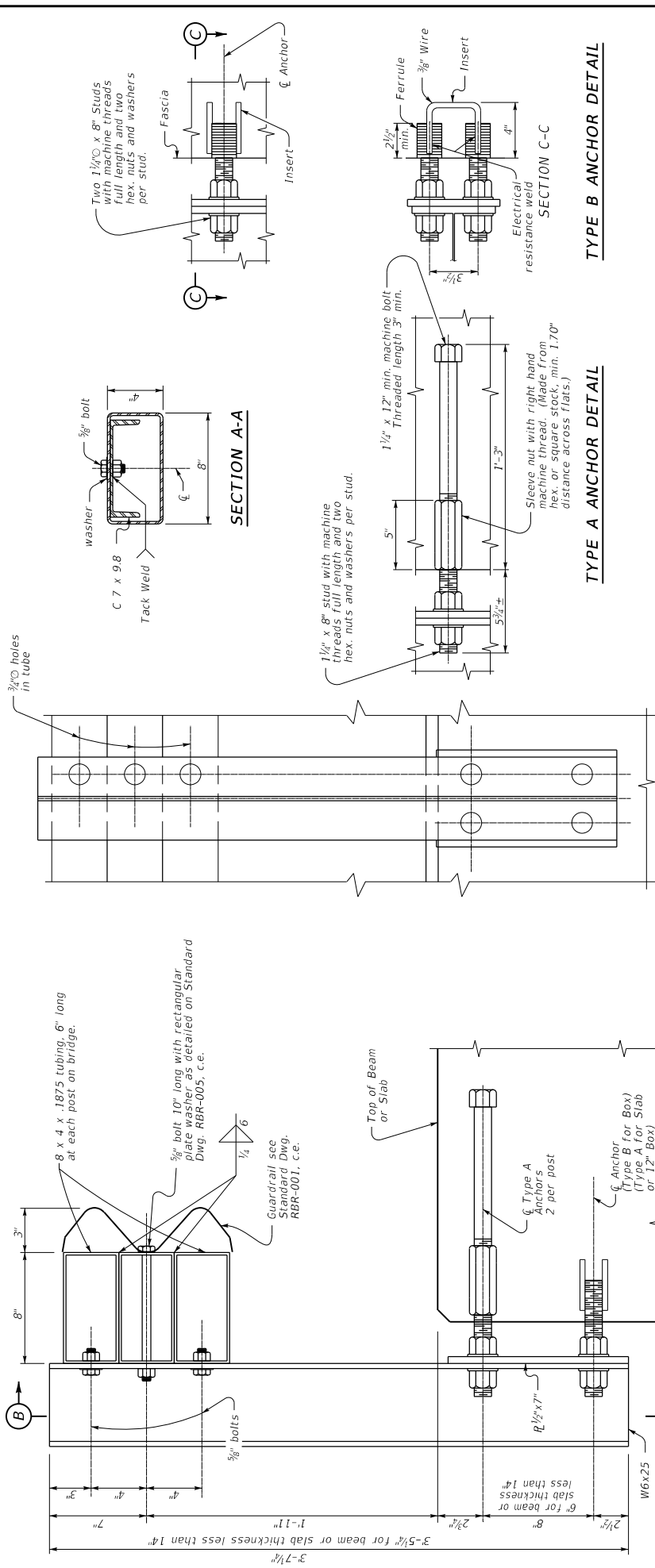
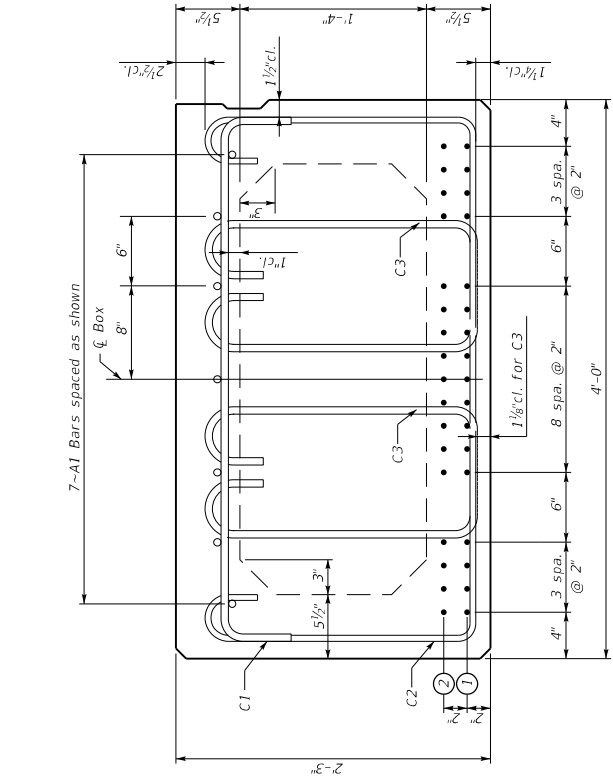
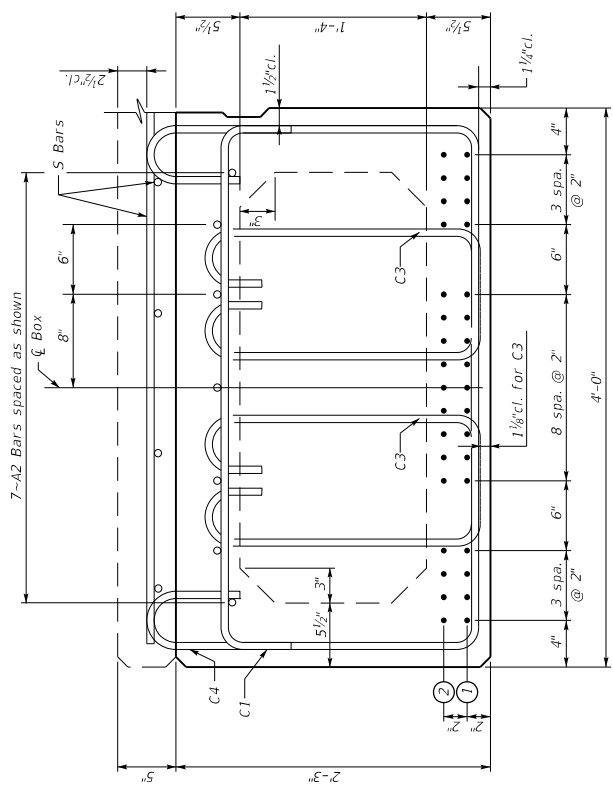


TABLE OF STRAND DATA			
Beam Type	Beam Length (feet)	Number of Strands Required	
		Row ①	Row ②
B27	52	17	1
	54	17	2
	56	17	3
	58	17	5
	60	17	6
	62	17	8
CB27	58	17	3
	60	17	4
	62	17	6
	64	17	7
	66	17	9
	68	17	10
70	17	12	

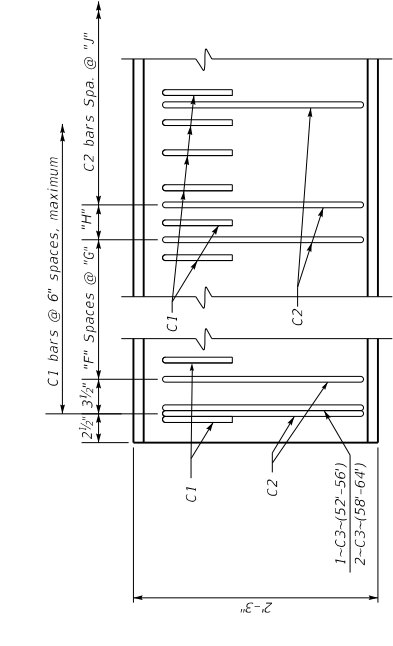
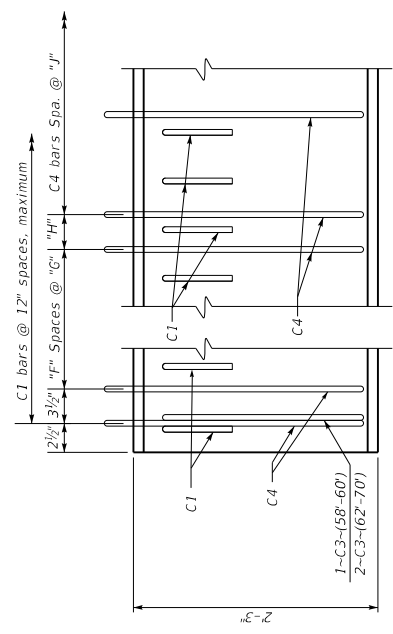
TABLE OF DIMENSION DATA					
Beam Type	Beam Length (feet)	"F"	"G"	"H"	"J"
	54	5	13"	10"	18"
	56	5	13"	13"	18"
	58	5	13"	16"	18"
	60	6	12"	12"	18"
	62	6	12"	13 1/2"	17"
	64	6	12"	8 1/2"	17"
	58	6	12"	18"	21"
	60	6	12"	19 1/2"	21"
	62	6	12"	14"	20"
	64	7	11"	11"	20"
	66	7	11"	13"	20"
	68	7	11"	15"	20"
	70	8	10"	14"	20"

BAR QUANTITIES TABLE							DESIGN DATA					
Beam Type	Beam Length (feet)	C1	C2	C3	C4	DC	DW	LL	LL+H	LL	LL+H	Δc
						kips	kips	kips	kips	(in.)	(in.)	(in.)
B27	52	105	40	2	20.6	1.5	47.0	39.1				
	54	109	42	2	21.4	1.5	47.7	60.0				
	56	113	43	2	22.2	1.6	48.4	60.7				
	58	117	44	4	23.0	1.7	49.1	61.5				
	60	121	47	4	23.7	1.7	49.7	62.2				
	62	125	50	4	24.5	1.8	50.4	62.9				
CB27	58	129	52	4	25.3	1.8	51.0	63.6				
	60	133	54	4	26.1	1.9	51.7	64.3				
	62	137	56	4	26.9	1.9	52.4	65.0				
	64	141	58	4	27.7	2.0	53.1	65.7				
	66	145	60	4	28.5	2.0	53.8	66.4				
	68	149	62	4	29.3	2.1	54.5	67.1				



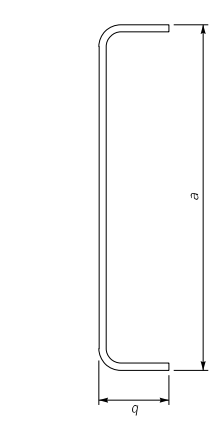
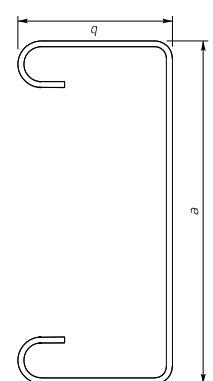
B27 BEAM

CB27 BEAM



B27 ELEVATION OF 0° SKEW
(Refer to BDP-003.c.e. for skewed details)

CB27 ELEVATION OF 0° SKEW
(Refer to BDP-003.c.e. for skewed details)



C2(e)-C4(e) Bars

C1(e) Bar

Straight Reinforcement		
Mark	Size	Length
A1(E)	#5	Beam Length Minus 3"
A2(E)	#4	Beam Length Minus 3"
D1(E)	#8	2'-0"

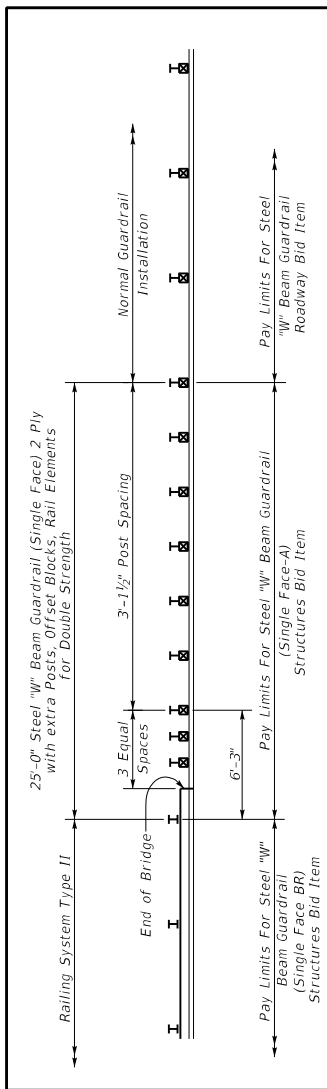
NOTE: A1 and A2 bars are to be lapped 2'-2" when necessary.

Bent Reinforcement		
Mark	Size	a b
C1(e)	#5	3'-9" 6"
C2(e)	#4	3'-9" 1'-11 1/4"
C3(e)	#5	11 3/8" 1'-11 3/8"
C4(e)	#4	3'-9" 2'-4 1/4"

KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B27 & CB27
DETAILS

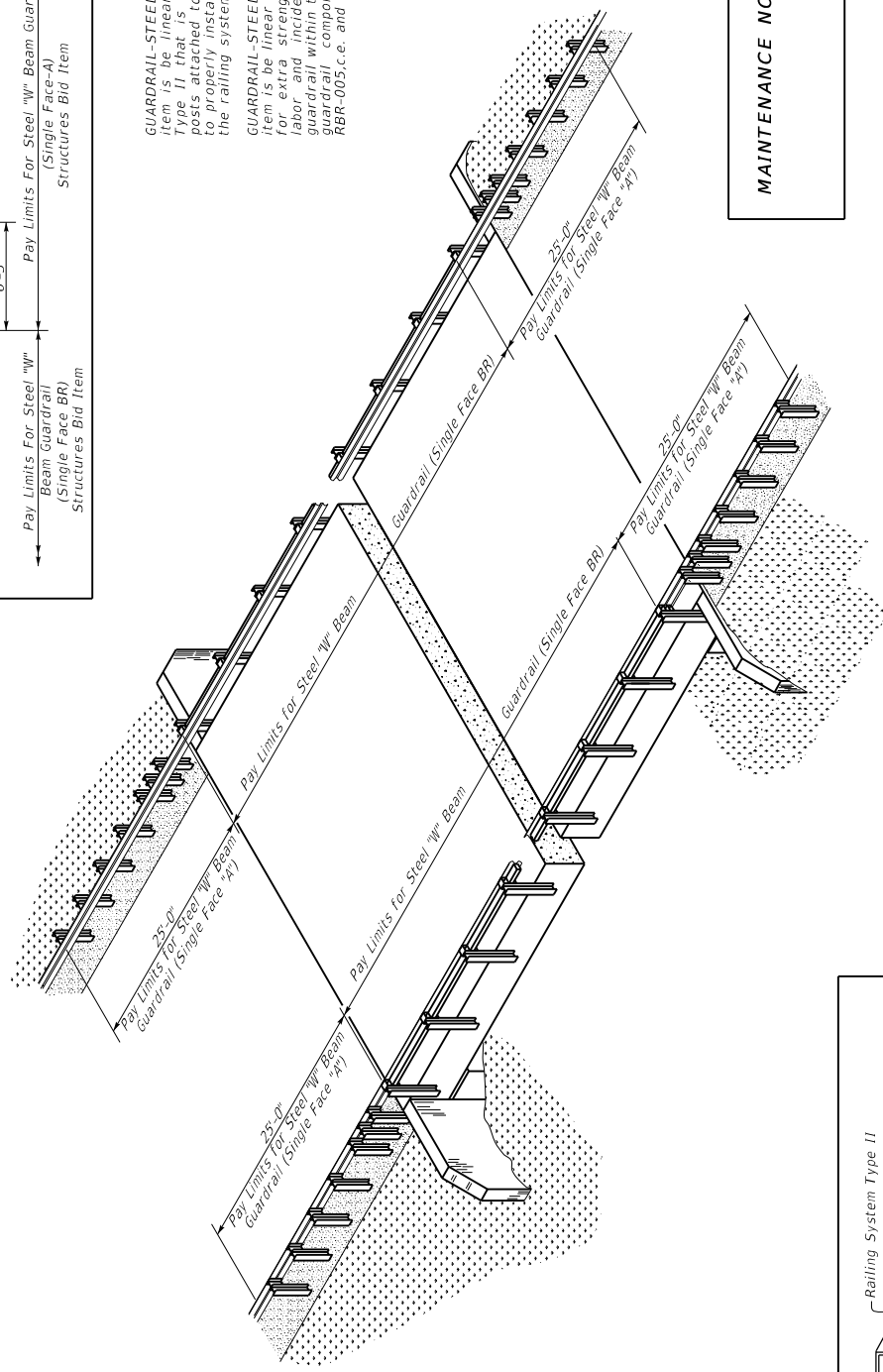
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SUBMITTED BY: [Signature]
DATE: 02-26-20
APPROVED BY: [Signature]
DATE: 02-26-20



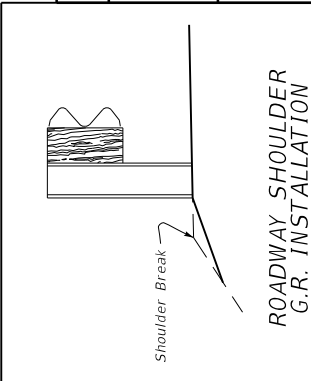
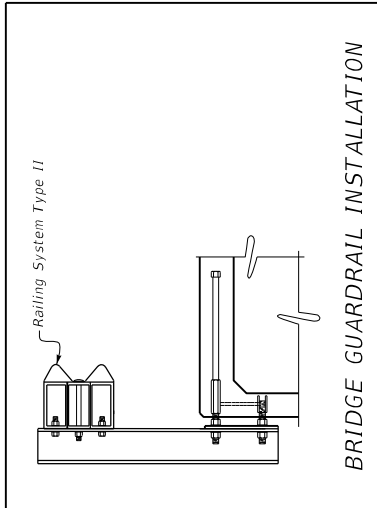
BID ITEM NOTES

GUARDRAIL-STEEL W BEAM (SINGLE FACE BR): The bid unit for this item is the linear feet. This item shall include the Railing System Type II that is to be installed on the bridge between the endmost posts attached to the bridge and all labor and incidentals necessary to properly install the railing system. For non-composite box beams, the railing system is attached to the beam prior to shipment.

GUARDRAIL-STEEL W BEAM (SINGLE FACE A): The bid unit for this item is the linear feet. This item includes the W-Beam Guardrail (2 ply for extra strength), guardrail posts, offset blocks, hardware, and labor and incidentals necessary to properly install the approach guardrail with components. Limits at each corner of the structure. Refer to Standard Drawings RBR-001.c.e., RBR-005.c.e. and RBR-015.c.e.



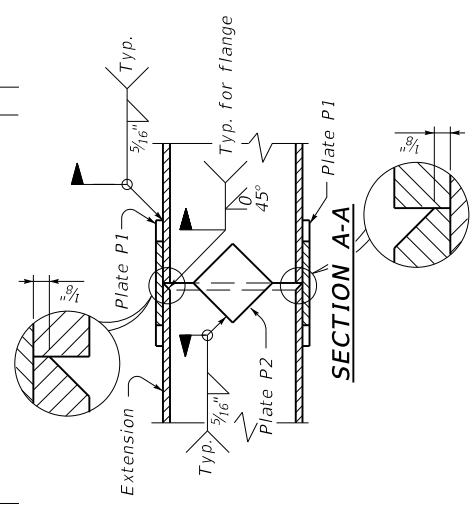
MAINTENANCE NOTES:



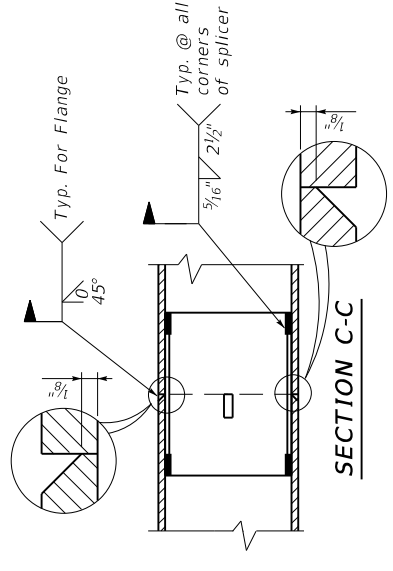
KENTUCKY DEPARTMENT OF HIGHWAYS
RAILING SYSTEM TYPE II
GUARDRAIL TREATMENT
STANDARD DRAWING NO. BHS-007-08
SUBMITTED BY: <i>[Signature]</i> 02-26-20
APPROVED BY: <i>[Signature]</i> 02-26-20



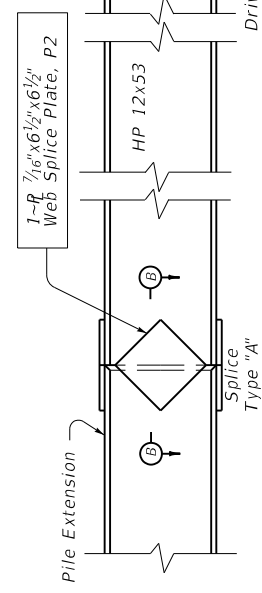
NOTE:
Bevel flanges and web of pile extension on 1:1 bevel as shown and employ conventional butt weld.



SECTION A-A
(Flange Not Shown)



SECTION B-B
(Flange Not Shown)



SECTION C-C

GENERAL NOTES

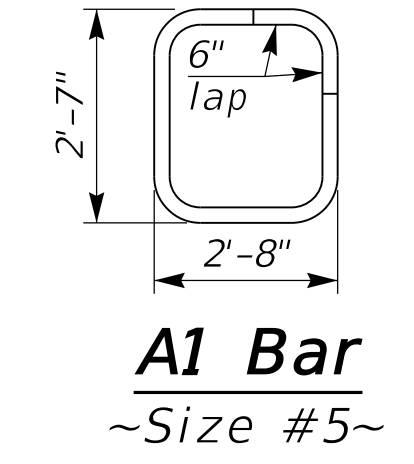
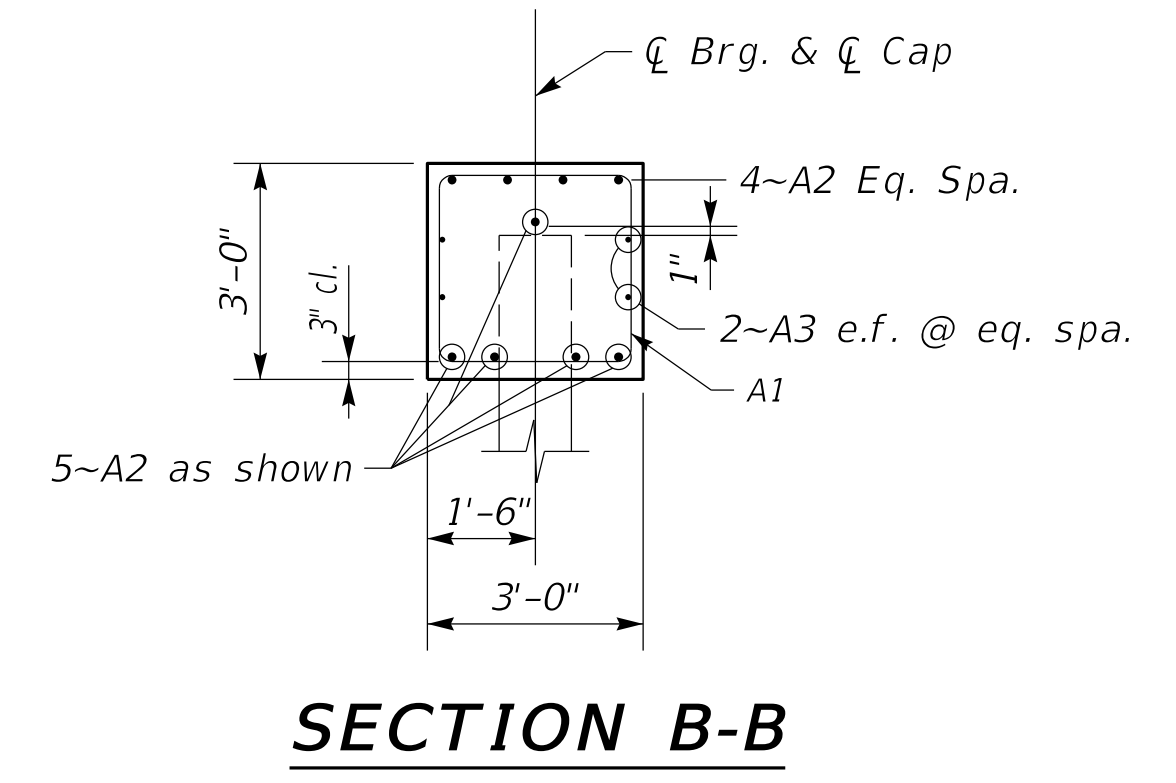
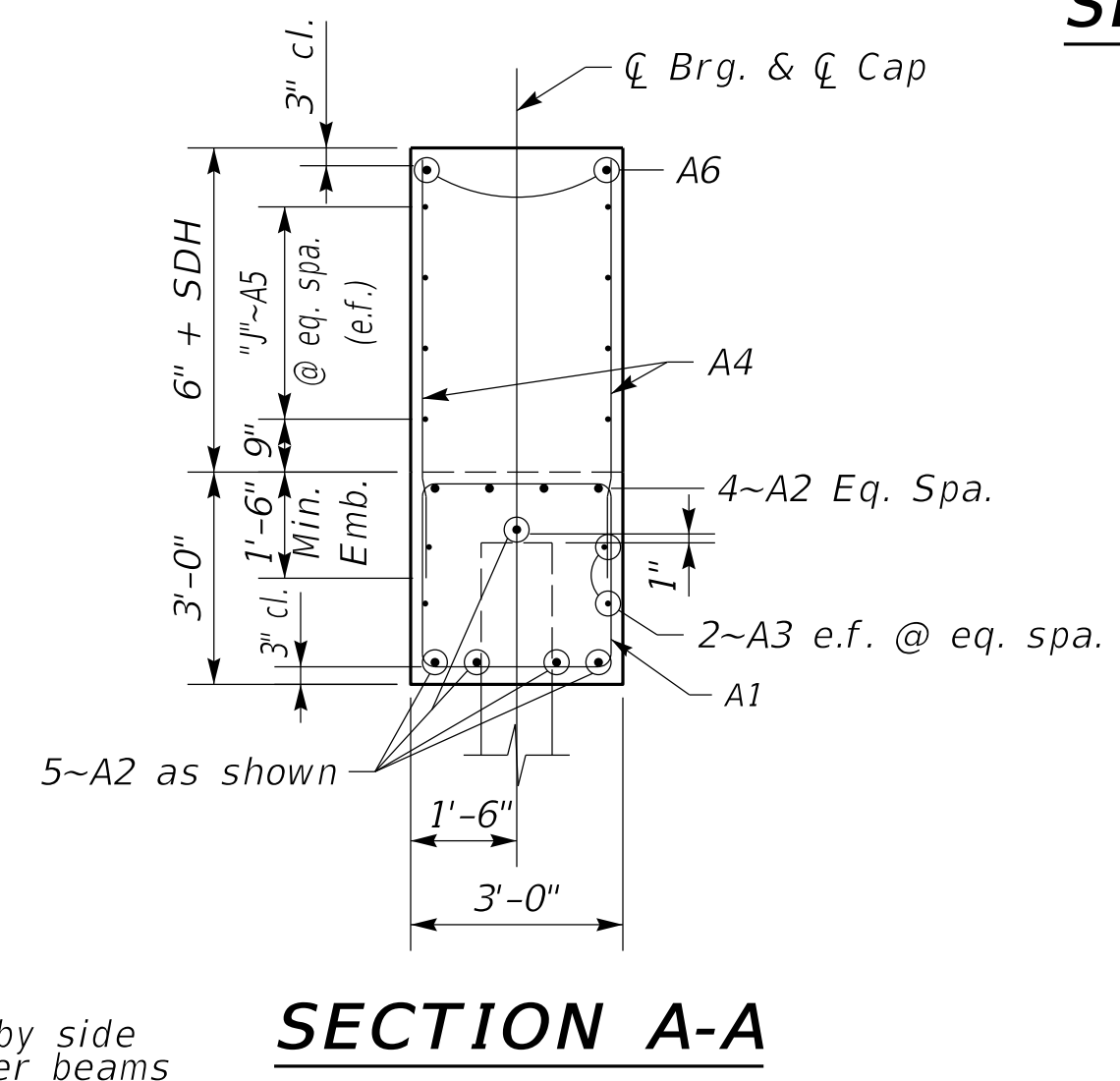
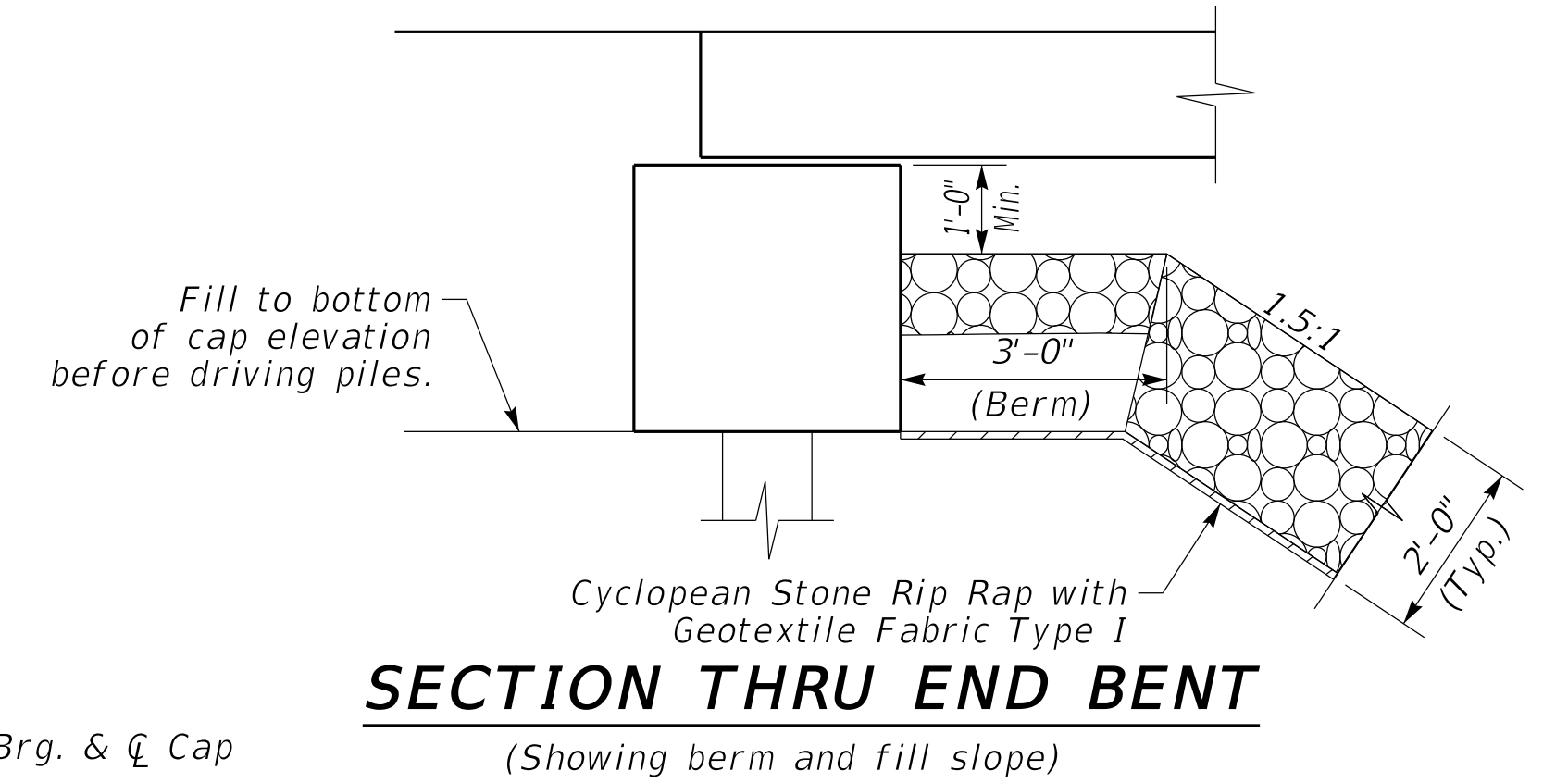
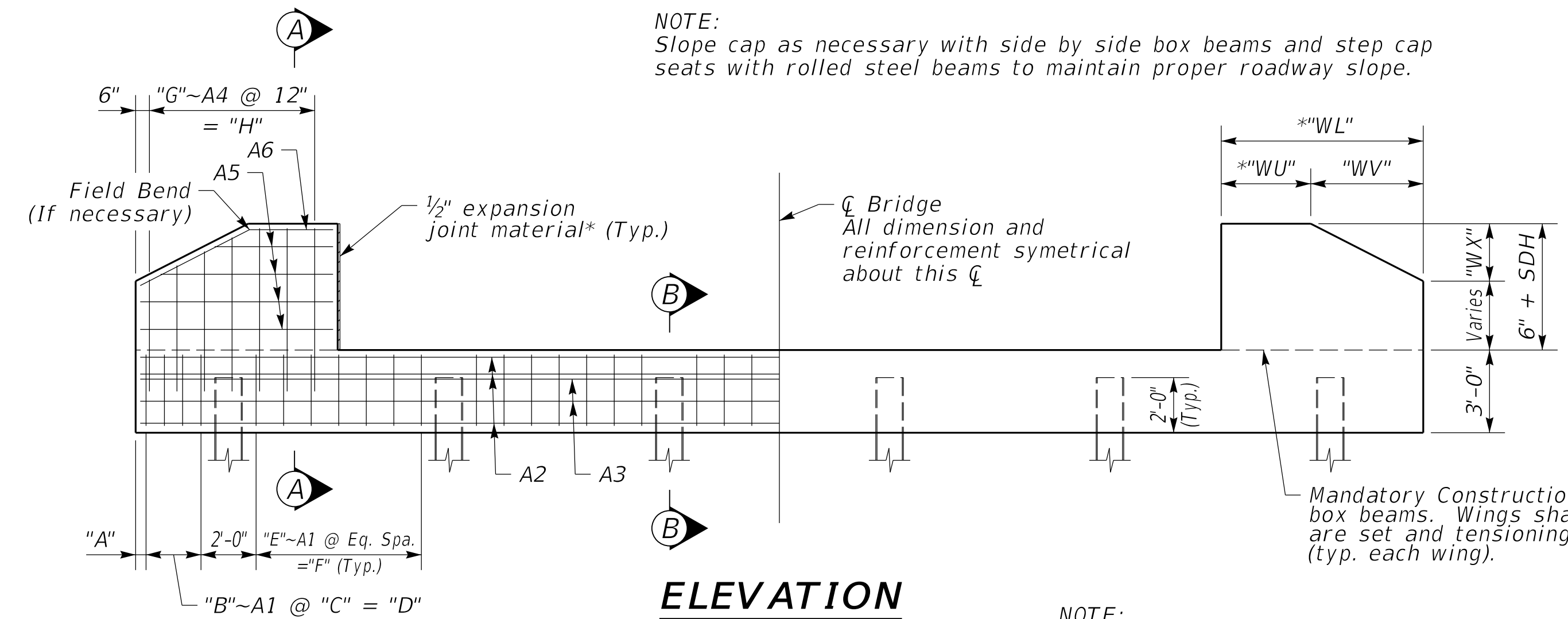
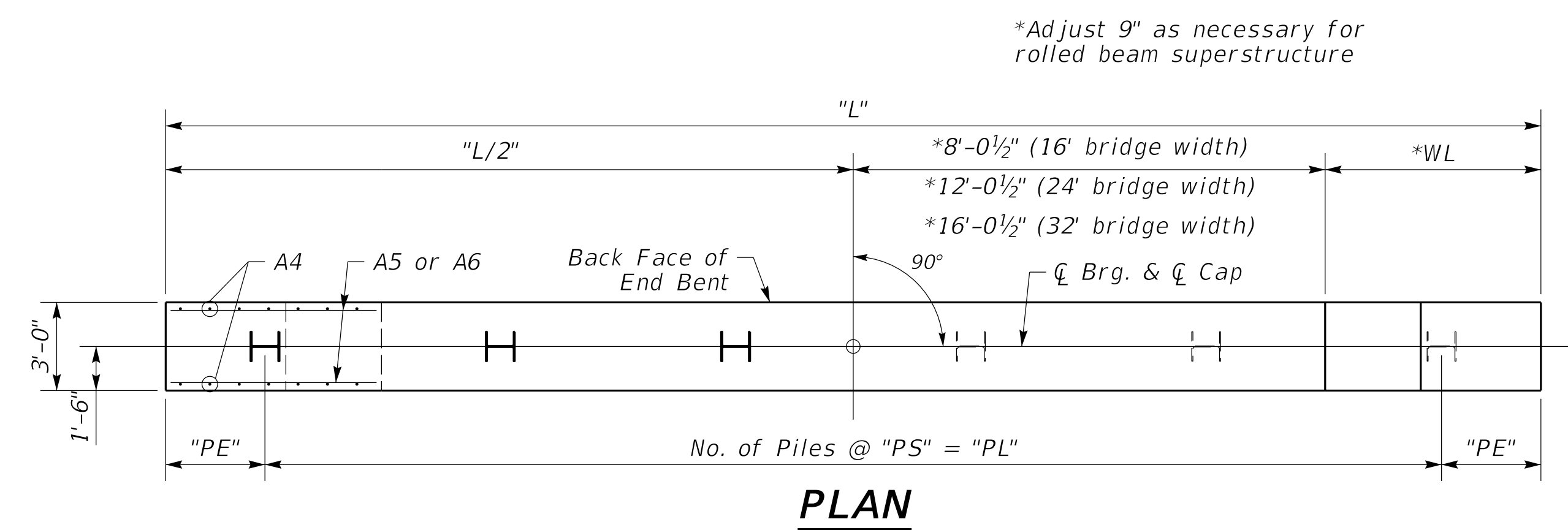
- SPECIFICATIONS:** Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, current edition.
- MATERIALS:** Ensure structural steel piles conform to A.S.T.M. A709 Grade 50, current Specifications.
- SPLICE PLATES:** Ensure all pile splicing options conform to A.S.T.M. A709 Grade 50, current Specifications. In lieu of Splice Option "A" or Splice Option "B", splice plates may be flame cut from HP12x53 sections. If flange sections are used, the portion cut at the web must be turned outside in order to obtain a tight fit. Grind the edges smooth prior to welding.
- SPLICE OPTION "B":** The pile splicer shown in the details for Splice Option "B" may be Champion H-Pile Splicer, Model HP 30000, or an approved equal. Ensure the splicer is in accordance to the manufacturer's recommendations and subject to the Engineer's approval.
- FIELD WELDS:** Ensure field welding material and workmanship for all piling conforms to the current Joint Specifications ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Splice piles as indicated above only when driven below cut-off elevation.
- PAYMENT:** Payment for the piles in accordance with plans and specifications will be made at the contract price per linear foot.
- PAINT:** No painting is required on steel piles.
- MILL TEST REPORTS:** Furnish mill test reports in triplicate to the Department showing that all materials furnished conform to the Specifications.

KENTUCKY DEPARTMENT OF HIGHWAYS	
HP12x53 Steel Pile	
STANDARD DRAWING NO. BPS-003-09	DATE 02-26-20
SUBMITTED BY: [Signature]	APPROVED BY: [Signature]
SUPERVISOR OF STRUCTURAL DESIGN STATE HIGHWAY ENGINEER	

SUPERSTRUCTURE HEIGHT SDH = Beam+Pad Height +(haunch+slab) [if applicable]		CAP BILL OF REINFORCEMENT					WING BILL OF REINFORCEMENT														
		24'-0" BRIDGE WIDTH																			
MARK	TYPE	NO.	SIZE	LENGTH	MARK	TYPE	NO.	SIZE	LENGTH												
H1	12" \leq SDH \leq 27"	A1e	14s	28	5	11-0	A4e	Str.	12	5	4-0										
		A2e	Str.	9	8	30-9	A5e	Str.	8	5	3-2										
		A3e	Str.	4	5	30-9	A6e	Str.	4	6	3-2										
H2	27" $<$ SDH \leq 35"	A1e	14s	26	5	11-0	A4e	Str.	20	5	4-8										
		A2e	Str.	9	8	33-5	A5e	Str.	12	5	4-6										
		A3e	Str.	4	5	33-5	A6e	Str.	4	6	4-6										
H3	35" $<$ SDH \leq 50"	A1e	14s	33	5	11-0	A4e	Str.	28	5	5-11										
		A2e	Str.	9	8	38-5	A5e	Str.	16	5	7-0										
		A3e	Str.	4	5	38-5	A6e	Str.	4	6	7-5										

BRIDGE WIDTH	PILE LOAD		PILES							DIMENSIONS										QUANTITIES		
	SIZE	TONS	NO.	PE	PS	PL	A	B	C	D	E	F	G	H	J	L	WL	WU	WV	WX	CONCRETE (C.Y.)	STEEL (LBS.)
24	H1	79	5	3'-6 1/2"	6'-0"	24'-0"	3 1/2"	4	9"	2'-3"	5	4'-0"	3	2'-0"	2	31'-1"	3'-6"	3'-6"	0	0	12.4	1284
	H2	83	6	2'-10 1/2"	5'-7"	28'-0"	2 1/2"	3	10"	1'-8"	4	3'-7"	5	4'-0"	3	33'-9"	4'-10"	4'-10"	0	0	14.8	1422
	H3	102	6	3'-4 1/2"	6'-5"	32'-0"	4 1/2"	4	8"	2'-0"	5	4'-5"	7	6'-0"	4	38'-9"	7'-4"	3'-3"	4'-1"	2'-1"	19.4	1799

- NOTES:**
- 1) Conform to KYTC, Standard Specifications, Current Edition.
 - 2) Concrete to be Class "A", 3500 psi.
 - 3) Rebar to be epoxy coated A615, Grade 60.
 - 4) Maintain 2" clear cover to reinforcement unless otherwise noted.
 - 5) End Bents are designed for the maximum span of the following steel and concrete beams as shown in the current standards:
H1 - B12, CB12, B17, CB17, B21 or rolled steel beams up to 16" nominal depth.
H2 - CB21, B27, CB27, B33 or rolled steel beams up to 24" nominal depth.
H3 - CB33, B42, CB42 or rolled steel beams up to 36" nominal depth.
 - 6) Piles may be HP12x53 or 16" Steel Pipes with 1/2" wall thickness.
 - 7) Piles driven to rock must be driven to Refusal. Friction Piles must be driven to (Pile Load/0.4) using the Gates Method.
 - 8) Pile load given is Factored Strength Load.
 - 9) Piles must be driven a minimum of 20' into existing ground or to refusal on bedrock. Piles at wet crossings must be driven to 20' below stream bed or to refusal on bedrock. A minimum pile length of 30' is required in all circumstances.
 - 10) Contractor shall provide a hammer capable of driving the piling to refusal or capacity without encountering excessive blow counts or damaging the pile. Contractor shall be responsible for all damaged piling.



*Expansion Joint Material:
AASHTO M153
Type-I Sponge Rubber
Type-II Cork permitted with contractor provided documentation that the Build America Buy America requirements are satisfied.

NOTE:
Trim A4-A6 bars as necessary.

SUBMITTED _____ DIVISION DIRECTOR _____ DATE 10/25/2024