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

DESIGN DEFLECTIONS:
Δd (in.): Sum of the downwards deflections caused by the design 5" deck, railing, and future wearing surface. (Positive Downwards)
Δc (in.): Upwards 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	FY = 60000 PSI
for Prestressed Girder Concrete (Typ. U.N.O.)	F'C = 7000 PSI
	F'CI = 5500 PSI
for Class "AA" Concrete	F'C = 4000 PSI
for Prestressing Steel	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'C 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 detensioning plan by numbering, in sequence, the strand pattern.

PRESTRESSING STRANDS: Ensure prestressing strands to be ½" 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 ¾".

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 5½" 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 block-outs 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
Channel	C7x9.8	ASTM A36 or A572	A123
Plate	½"x 7"	ASTM A36 or A572	A123
Tubing	8x4x0.1875	ASTM A500 or A501	A123
Bolts	⅝"	ASTM A307	A153
Nuts	for ⅝"	ASTM A563, Grade A or better	A153
Washers	for ⅝"	ASTM A563, Grade A or better	A153
Stud	1¼"	ASTM A108 (1045 C.D. Bar)	B633, Type II, Class 25
Ferrule	2½"x 5"	ASTM A108 (11L17 Steel)	B633, Type II, Class 25
Wire	⅜"	ASTM A510 (1018 Steel)	B633, Type II, Class 25
Nut	for 1¼" Bolt	ASTM A108 (12L14 Steel)	B633, Type II, Class 25
Nut	for 1¼" Stud	ASTM A325M	B633, Type II, Class 25
Washers	for 1¼" Stud	ASTM A325M	B633, Type II, Class 25

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

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

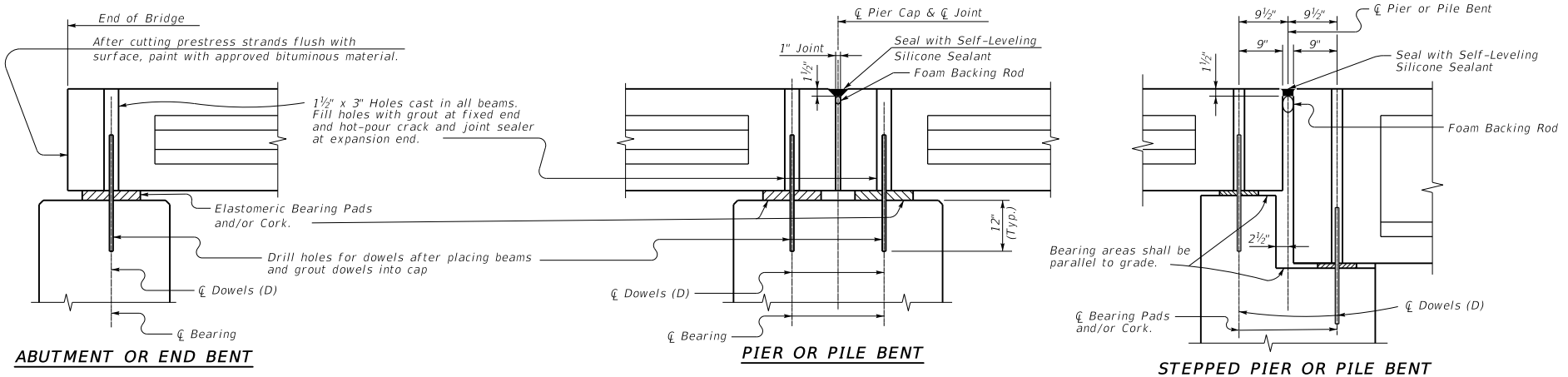
KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
GENERAL NOTES
AND REFERENCES

STANDARD DRAWING NO. BDP-001-06

SUBMITTED _____ 02-26-20
DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE

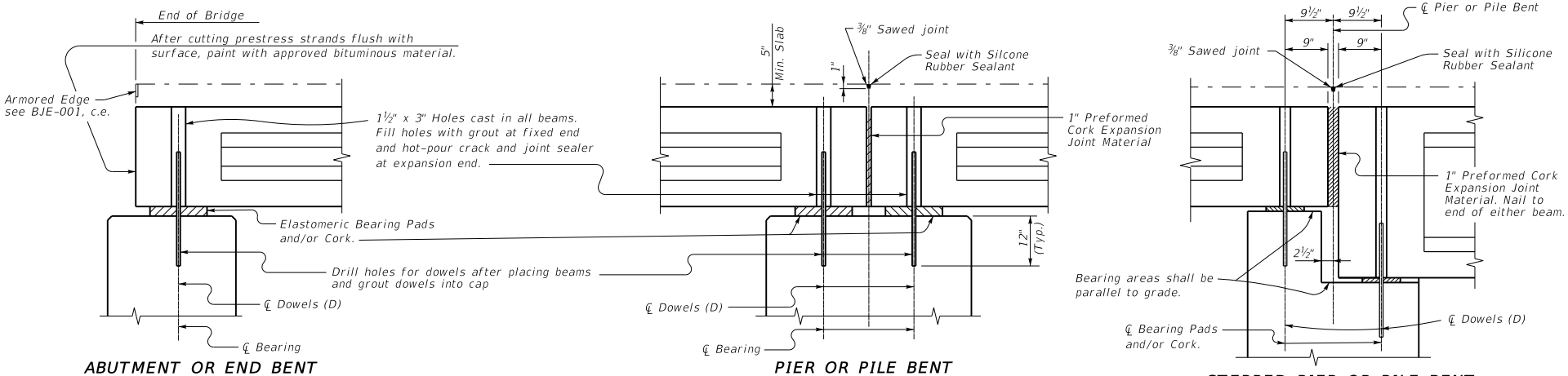
APPROVED _____ 02-26-20
STATE HIGHWAY ENGINEER — DATE



ABUTMENT OR END BENT | **PIER OR PILE BENT** | **STEPPED PIER OR PILE BENT**

(Showing Location & Placement of Box Beams)

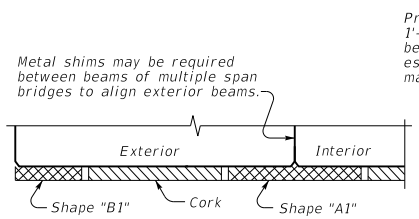
TYPICAL BEARING DETAILS (NON-COMPOSITE)



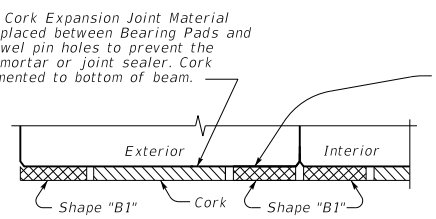
ABUTMENT OR END BENT | **PIER OR PILE BENT** | **STEPPED PIER OR PILE BENT**

(Showing Location & Placement of Box Beams)

TYPICAL BEARING DETAILS (COMPOSITE)



(0°Skew)

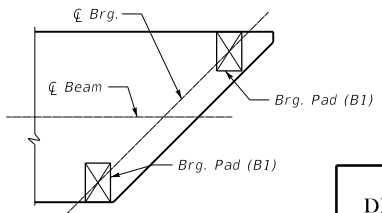


(Skewed Spans)

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

SHOWING PADS FOR BEAM TYPES B27-B42 & CB27-CB42

Use ½" x 1'-6" preformed cork for beam types B12-B21 & CB12-CB21 for bearing.



PAD PLACEMENT FOR SKEWS

Pads "B1" are to always be placed perpendicular to ℄ beam with center of pad over ℄ 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.

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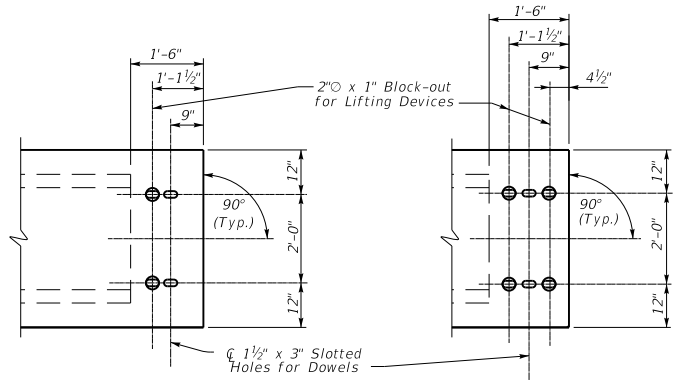
BOX BEAM BEARING DETAILS

STANDARD DRAWING NO. BDP-002-03

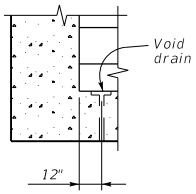
SUBMITTED — DIRECTOR DIVISION OF STRUCTURAL DESIGN — 02-26-20 DATE

APPROVED — STATE HIGHWAY ENGINEER — 02-26-20 DATE



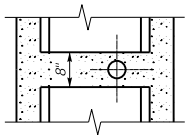
NOTE: Void omitted on 12" beams.

TYPICAL STRAIGHT END



VOID DRAIN DETAIL

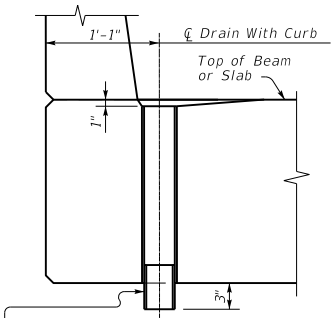
Locate two drains at each end of each void. Provide 1"∅ drains of a type approved by the Division of Materials.



SECTION THRU BEAM

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

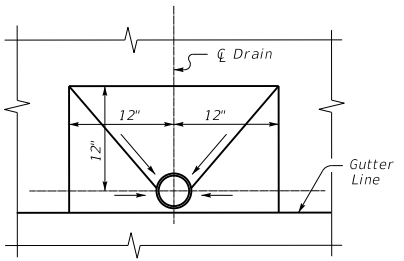
Provide drains on both sides of bridge with normal crown and on low side only for superelevated bridges. Space drains at maximum 12'-6" on centers with a minimum of one placed each gutter line per span. Omit drains when span crosses over a highway or railroad. Include the cost of pipe and fittings in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



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

SECTION THRU DRAIN EXTERIOR BOX BEAM

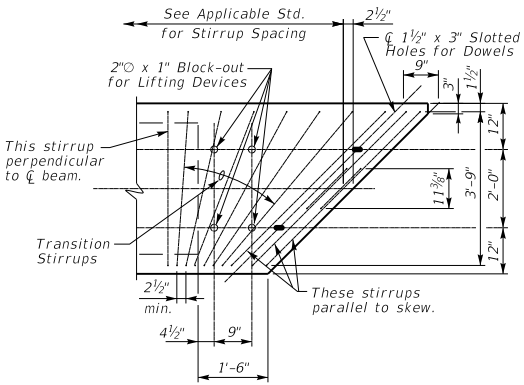
(Showing coupling in barrier)



TOP VIEW OF DRAIN

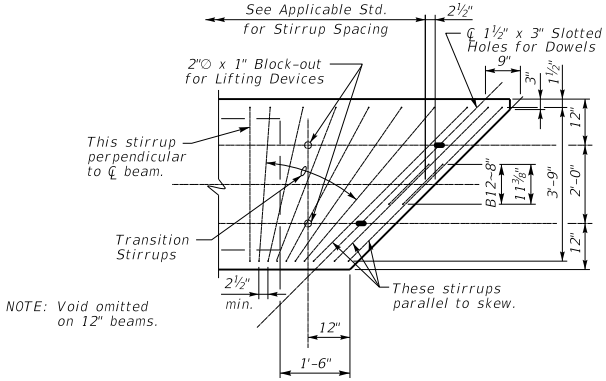
DRAIN DETAILS

(For Spans With Curbs)



TYPICAL SKEWED END FOR BEAMS OVER 50 FEET

(Right Skew Shown, Left Opposite Hand)

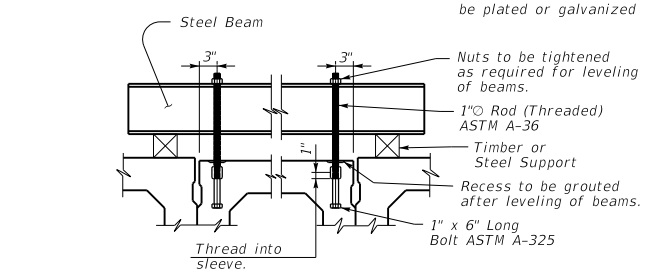


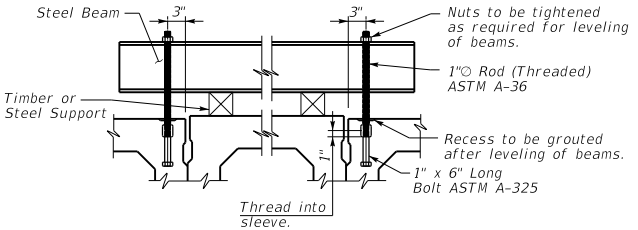
NOTE: Void omitted on 12" beams.

TYPICAL SKEWED END FOR BEAMS 50 FEET OR LESS

(Right Skew Shown, Left Opposite Hand)

NOTE: Inserts are to be plated or galvanized

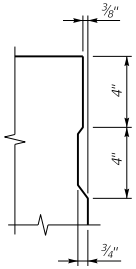




LEVELING DEVICE DETAILS

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

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BOX BEAM MISCELLANEOUS DETAILS

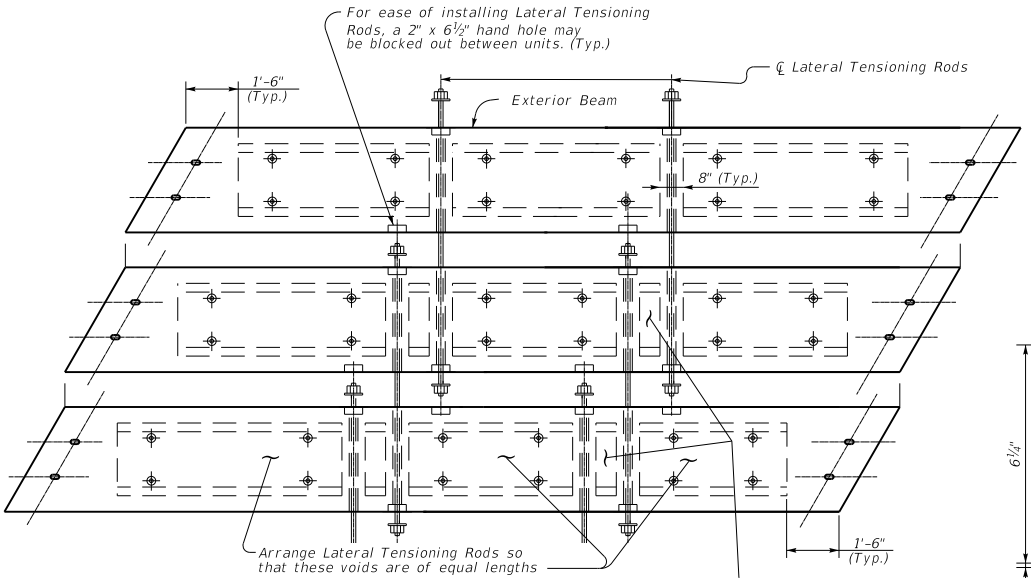
STANDARD DRAWING NO. BDP-003-03

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 02-26-20

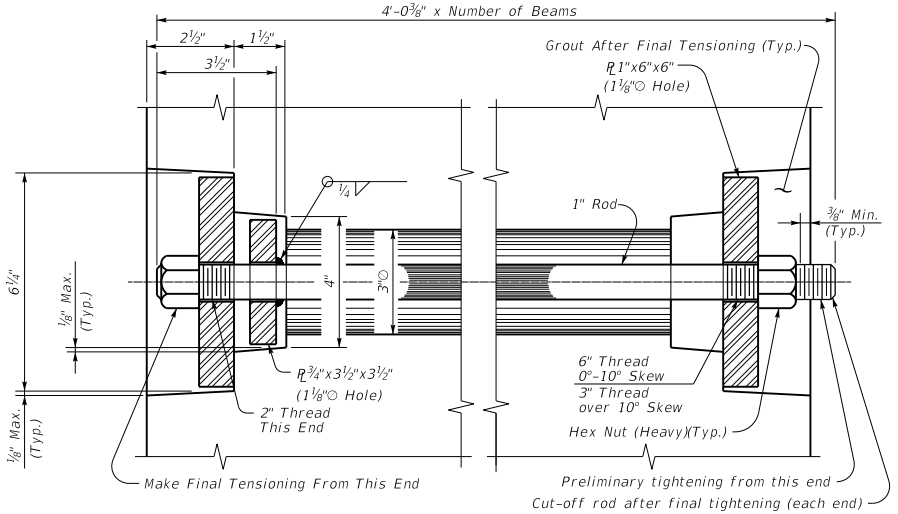
APPROVED _____ STATE HIGHWAY ENGINEER — DATE 02-26-20

GENERAL NOTES

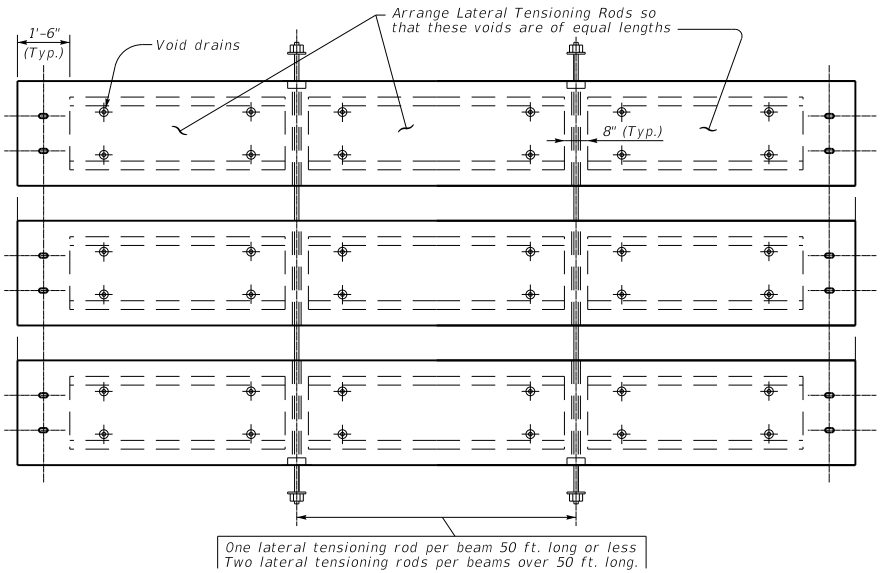
LATERAL TENSIONING RODS: After the deck units are in place, apply a preliminary tension to the lateral tensioning rods. Perform final tensioning that yields 20,000 psi as developed by a torque of 200 ft./lbs. Provide lateral tensioning rods and plates conforming to ASTM A36 with heavy hex nuts conforming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

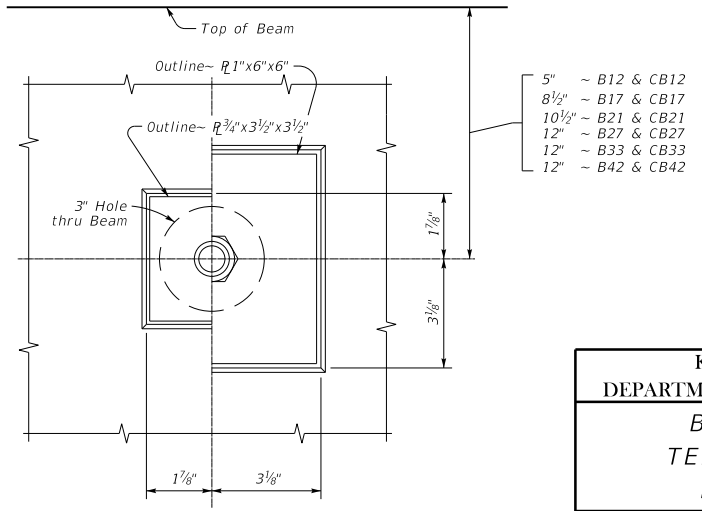


SECTION THRU LATERAL TENSIONING ROD



SECTIONAL PLAN SHOWING LATERAL TENSIONING METHOD FOR STRAIGHT SPANS

(The above arrangement is applicable from 0° skews to and Including 10° skews)



SECTIONAL END PLAN

(Lateral Tension Rod Details)

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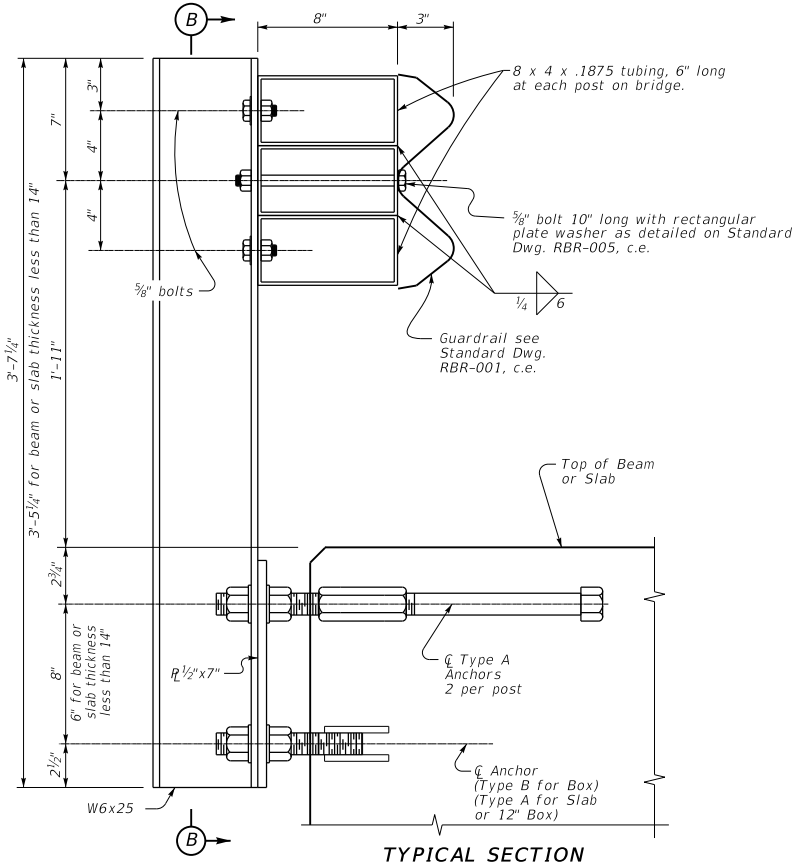
BOX BEAM TENSION ROD DETAILS

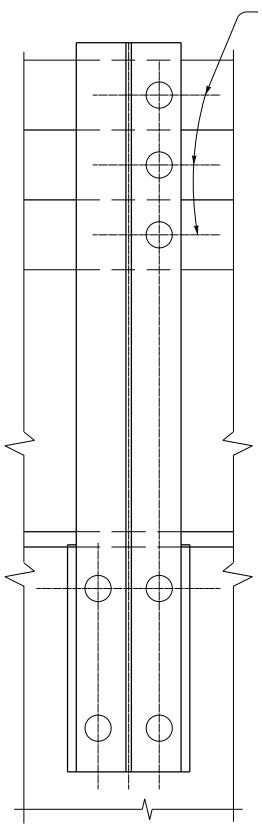
STANDARD DRAWING NO. BDP-004-04

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — 02-26-20 DATE

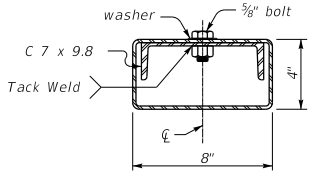
APPROVED _____ STATE HIGHWAY ENGINEER — 02-26-20 DATE



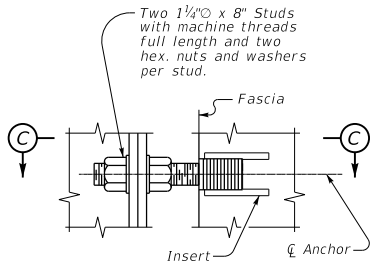
TYPICAL SECTION

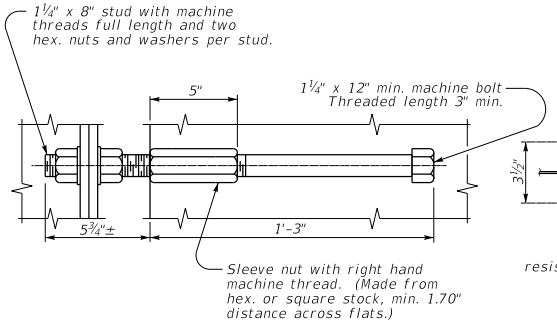


SECTION B-B

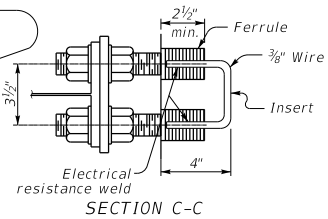


SECTION A-A



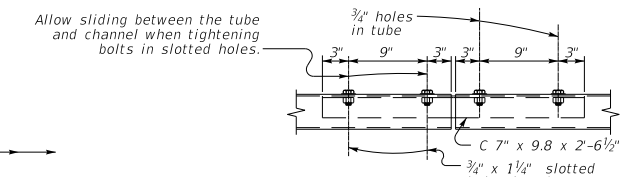


TYPE A ANCHOR DETAIL

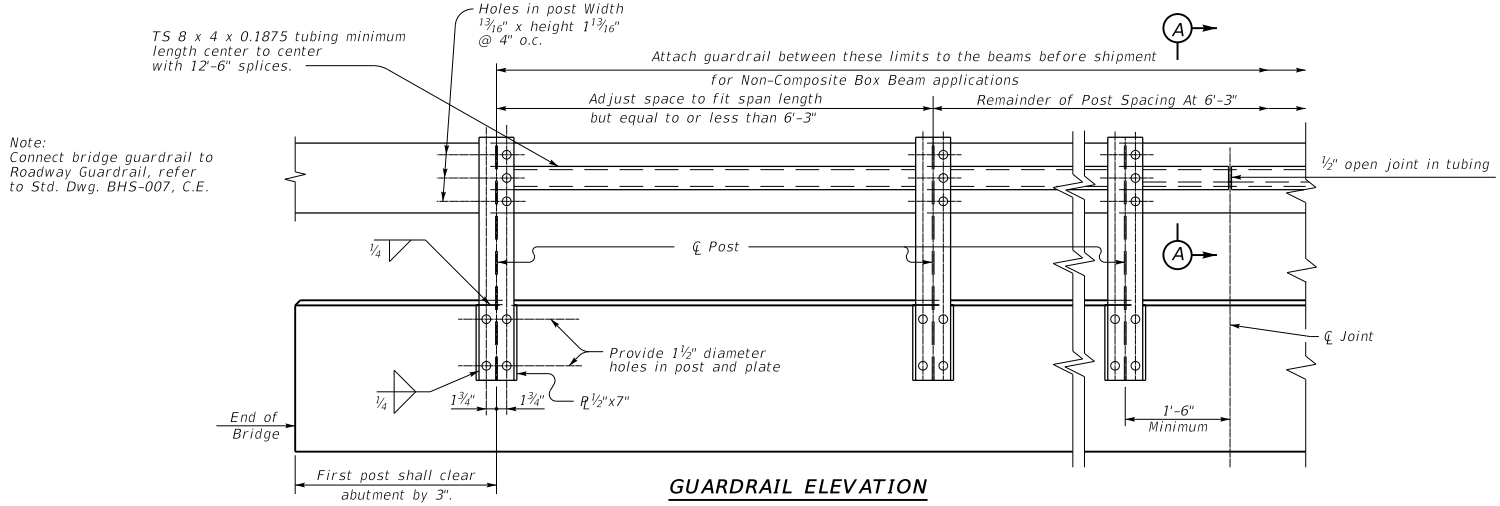


SECTION C-C

TYPE B ANCHOR DETAIL



OPEN JOINT



GUARDRAIL ELEVATION

Post Spacing

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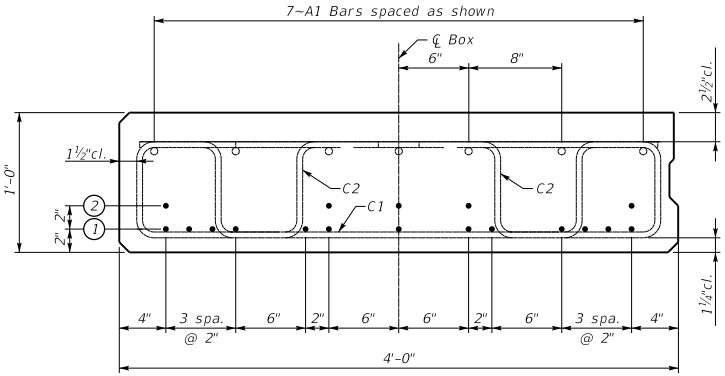
DEPARTMENT OF HIGHWAYS

RAILING SYSTEM TYPE II

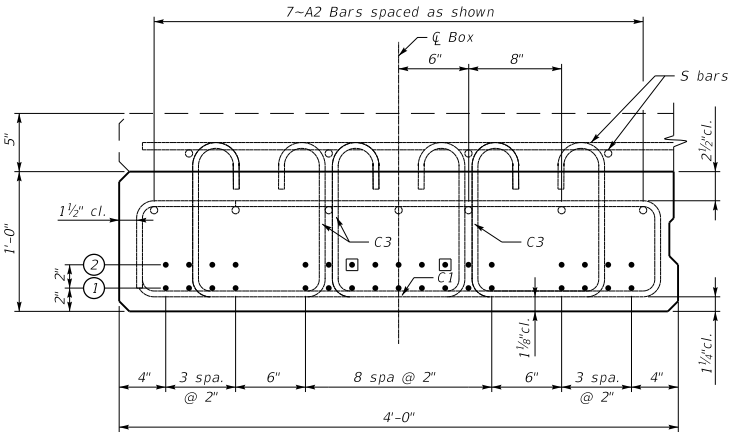
STANDARD DRAWING NO. BDP-005-06

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — 02-26-20 DATE

APPROVED _____ STATE HIGHWAY ENGINEER — 02-26-20 DATE

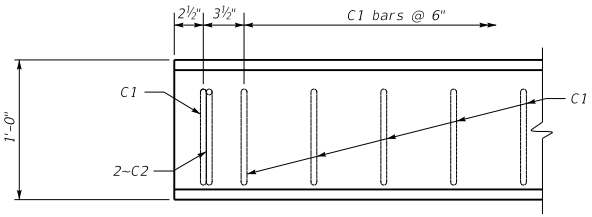


B12 BEAM



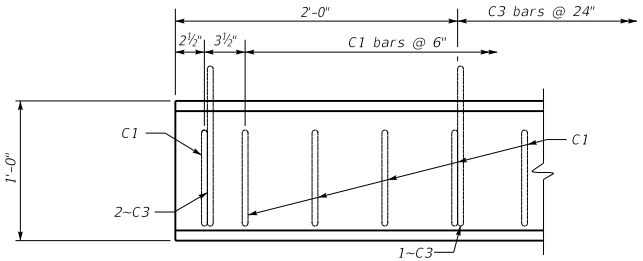
CB12 BEAM

☐ Debond these strands 4'-0" at each end of beam ~CB12-34 Only



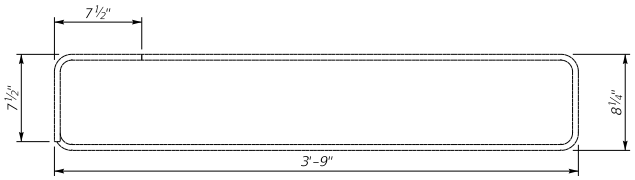
B12 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)



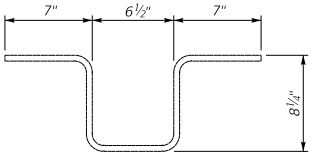
CB12 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)



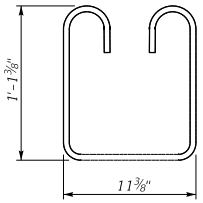
C1(e) Bar

#4 Stirrup



C2(e) Bar

#4 Stirrup



C3(e) Bar

#5 Stirrup

TABLE OF STRAND DATA

Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Number of Strands Required Row ②	Concrete Strength F'CI (psi)	Concrete Strength F'C (psi)
B12	12	9	1		
	14	10	1		
	16	11	1		
	18	12	1		
	20	12	1		
	22	12	2		
	24	13	2		
	26	13	5		
CB12	12	7			
	14	8			
	16	8			
	18	9			
	20	10			
	22	10			
	24	10			
	26	12			
	28	13			
	30	14	9		
	32	14	13	6000	7100
	34	15	17	7000	8000

BAR QUANTITIES					DESIGN DATA					
Beam Type	Beam Length (feet)	C1	C2	C3	DC (Kips)	DW (Kips)	LL (Kips)	LL+I (Kips)	Δd (in.)	Δc (in.)
B12	12	25	2		3.9	0.4	27.8	36.3		
	14	29	2		4.6	0.4	29.1	37.8		
	16	33	2		5.2	0.5	30.1	39.1		
	18	37	2		5.8	0.5	31.0	40.1		
	20	41	2		6.5	0.6	31.8	41.0		
	22	45	2		7.1	0.6	32.5	41.9		
	24	49	2		7.8	0.7	33.2	42.6		
	26	53	2		8.4	0.7	33.8	43.4		
CB12	12	25		9	5.4	0.4	27.8	36.3	0.1	0.1
	14	29		10	6.3	0.4	29.1	37.8	0.1	0.1
	16	33		11	7.2	0.5	30.1	39.1	0.1	0.2
	18	37		12	8.1	0.5	31.0	40.1	0.1	0.2
	20	41		13	9.0	0.6	31.8	41.0	0.1	0.3
	22	45		14	9.9	0.6	32.5	41.9	0.1	0.3
	24	49		15	10.8	0.7	33.2	42.6	0.1	0.3
	26	53		16	11.6	0.8	33.8	43.4	0.1	0.5
	28	57		17	12.5	0.8	35.1	44.9	0.2	0.5
	30	61		18	13.4	0.9	36.4	46.4	0.2	0.9
	32	65		19	14.3	0.9	37.7	48.1	0.2	1.0
	34	69		20	15.2	1.0	38.9	49.6	0.3	1.3

Straight Reinforcement		
MARK	SIZE	LENGTH
A1(E)	#5	Beam Length Minus 3"
A2(E)	#4	Beam Length Minus 3"
D(E)	#8	2'-0"

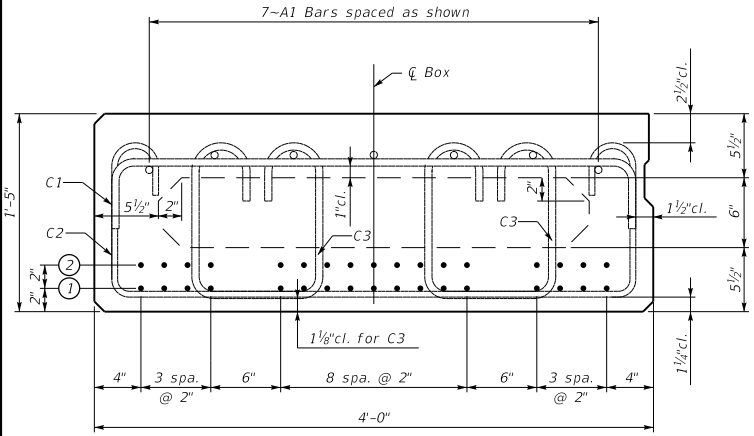
KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B12 & CB12
DETAILS

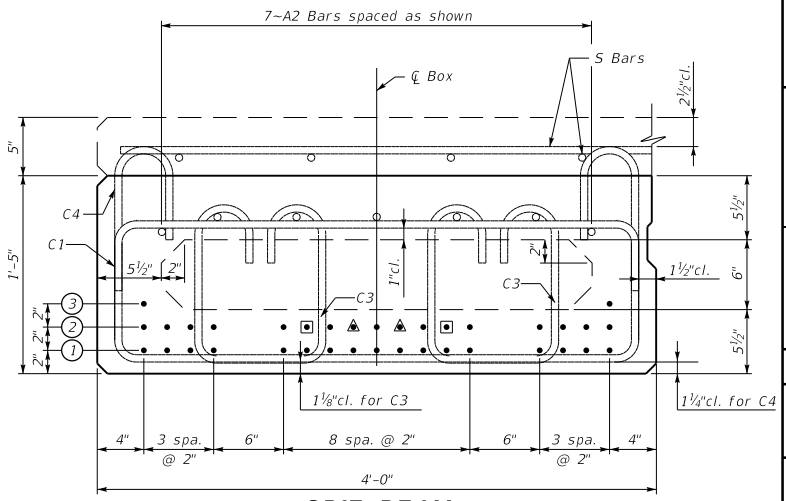
STANDARD DRAWING NO. BDP-006-05

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 02-26-20

APPROVED _____ STATE HIGHWAY ENGINEER — DATE 02-26-20

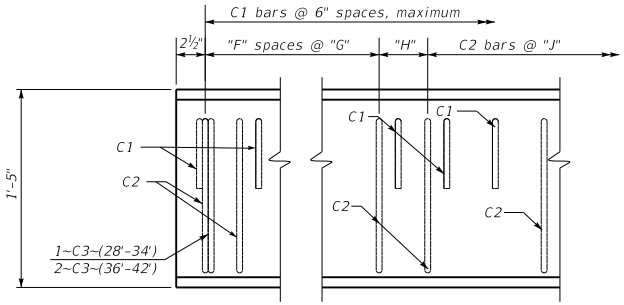


B17 BEAM

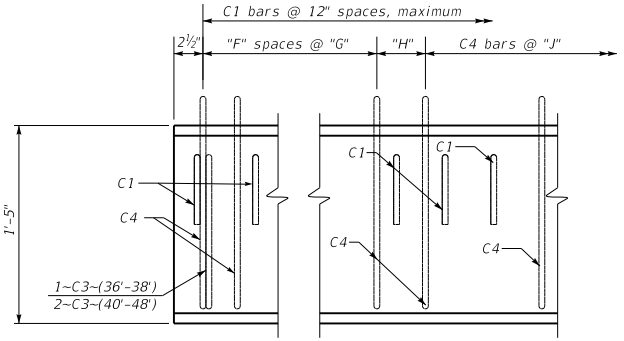


CB17 BEAM

□ Debond these strands 4' each end of beam
△ Debond these strands 6' each end of beam
— CB17-48 Beam Only



B17 ELEVATION OF O° SKEW
(Refer to BDP-003,c.e. for skewed details)



CB17 ELEVATION OF O° SKEW
(Refer to BDP-003,c.e. for skewed details)

TABLE OF STRAND DATA

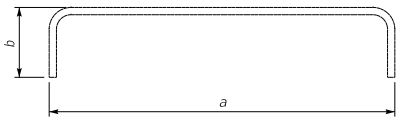
Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Row ②	Row ③	Conc. Strength F'CI (psi)	F'C (psi)
B17	28	12				
	30	13				
	32	14				
	34	15				
	36	16				
	38	17	1			
	40	17	3			
	42	17	5			
CB17	36	14				
	38	15				
	40	16				
	42	17	1			
	44	17	2			
	46	17	9		6000	7000
	48	17	17	2	7000	8000

TABLE OF DIMENSION DATA

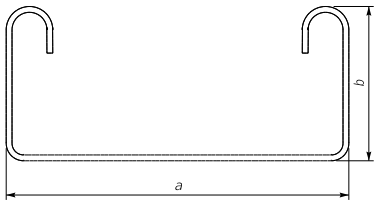
Beam Type	Beam Length (feet)	"F"	"G"	"H"	"J"				
B17	28	4	9"	8½"	11"				
	30	4	9"	9½"	11"				
	32	4	9"	10½"	11"				
	34	5	8"	7½"	11"				
	36	6	8"	6"	11"				
	38	7	7"	6½"	10"				
	40	7	7"	8½"	10"				
	42	7	7"	5½"	10"				
CB17	36	6	8"	11½"	14"				
	38	6	8"	9½"	14"				
	40	6	8"	7½"	14"				
	42	7	7"	8½"	12"				
	44	8	7"	7½"	12"				
	46	8	7"	7½"	12"				
	48	10	6"	9½"	12"				

TABLE OF BAR QUANTITIES — DESIGN DATA

Beam Type	Beam Length (feet)	C1	C2	C3	C4	DC (kips)	DW (kips)	LL (kips)	LL+I (kips)	Δd (in.)	Δc (in.)
B17	28	57	33	2		9.4	0.8	35.1	44.9		
	30	61	35	2		10.1	0.9	36.4	46.4		
	32	65	37	2		10.7	0.9	37.7	48.1		
	34	69	41	2		11.4	1.0	38.9	49.6		
	36	73	44	4		12.1	1.0	40.0	50.9		
	38	77	51	4		12.7	1.1	41.1	52.2		
	40	81	53	4		13.4	1.1	42.1	53.4		
	42	85	56	4		14.1	1.2	43.0	54.5		
CB17	36	37		2	37	16.6	1.0	40.0	50.9	0.2	0.6
	38	39		2	39	17.5	1.1	41.1	52.2	0.2	0.7
	40	41		4	41	18.4	1.1	42.1	53.4	0.2	0.8
	42	43		4	49	19.3	1.2	43.0	54.5	0.3	0.9
	44	45		4	52	20.2	1.3	43.9	55.5	0.3	1.0
	46	47		4	54	21.1	1.3	44.7	56.5	0.3	1.3
	48	49		4	56	22.0	1.4	45.5	57.4	0.4	1.8



C1(e) Bar



C2(e)-C4(e) Bars

Straight Reinforcement

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

Bent Reinforcement

Mark	Size	a	b	
C1(e)	#5	3'-9"	6"	
C2(e)	#4	3'-9"	1'-1¼"	
C3(e)	#5	11⅜"	1'-1⅜"	
C4(e)	#4	3'-9"	1'-6¼"	

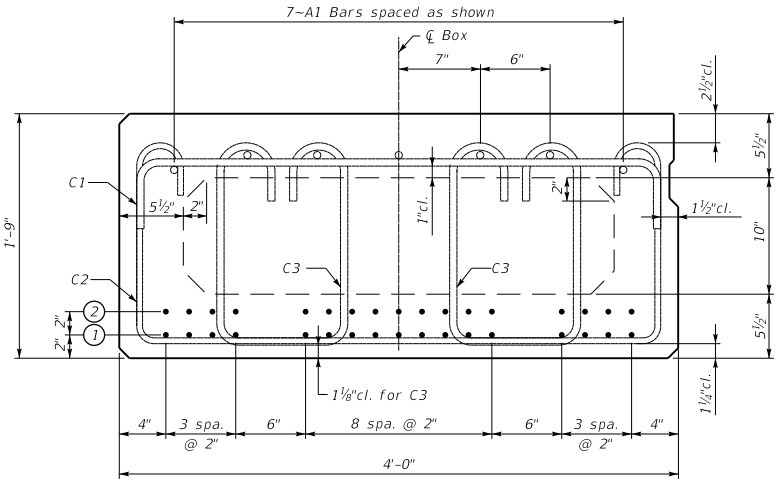
KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B17 & CB17
DETAILS

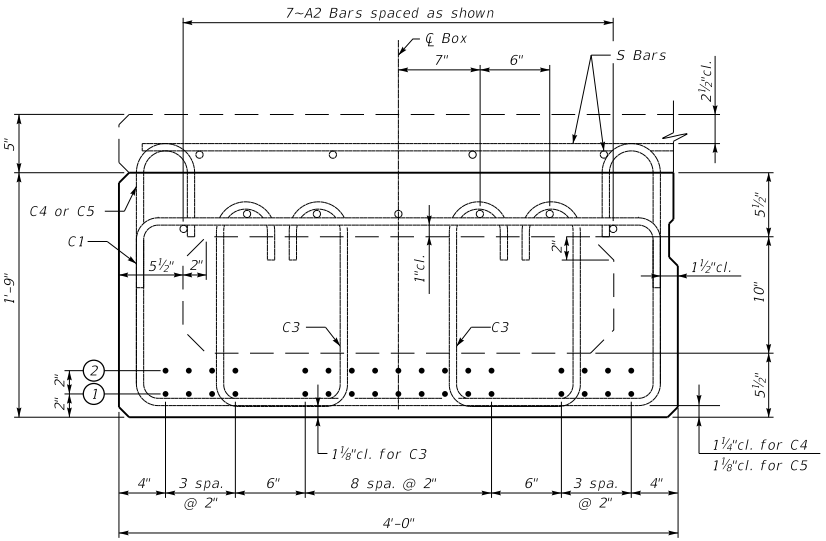
STANDARD DRAWING NO. BDP-007-05

SUBMITTED — DIRECTOR DIVISION OF STRUCTURAL DESIGN — 02-26-20 DATE

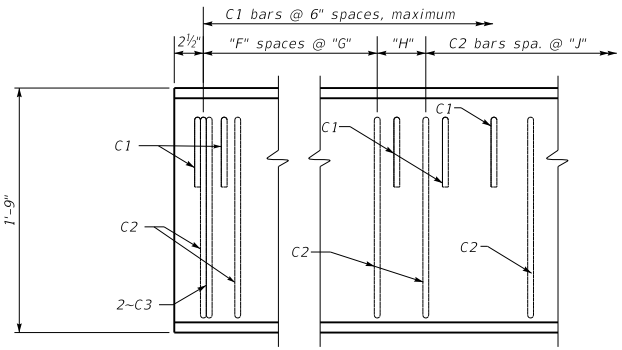
APPROVED — STATE HIGHWAY ENGINEER — 02-26-20 DATE



B21 BEAM

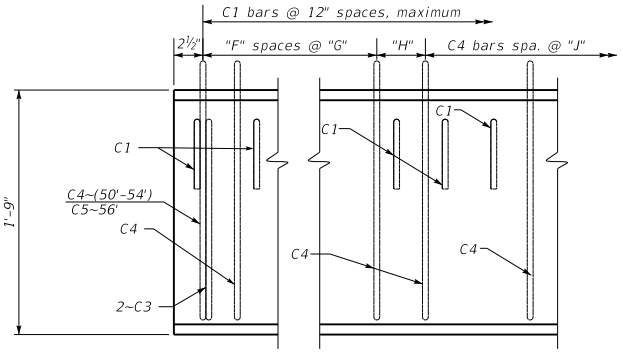


CB21 BEAM



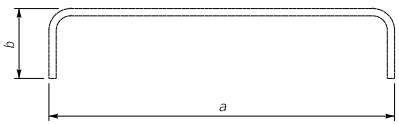
B21 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)

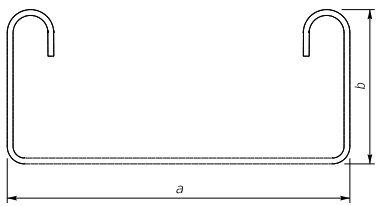


CB21 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)



C1(e) Bar



C2(e)-C5(e) Bars

TABLE OF STRAND DATA

Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Row ②
B21	44	17	
	46	17	2
	48	17	4
	50	17	6
CB21	50	17	3
	52	17	4
	54	17	6
	56	17	8

TABLE OF DIMENSION DATA

Beam Type	Beam Length (feet)	"F"	"G"	"H"	"J"		
B21	44	6	10"	12½"	14"		
	46	6	9"	11½"	13"		
	48	7	9"	8"	13"		
	50	7	9"	7"	13"		
CB21	50	7	9"	10½"	16"		
	52	7	9"	14½"	16"		
	54	7	9"	10½"	16"		
	56	9	8"	13½"	16"		

TABLE OF BAR QUANTITIES

Beam Type	Beam Length (feet)	C1	C2	C3	C4	C5	
B21	44	89	42	4			
	46	93	47	4			
	48	97	50	4			
	50	101	52	4			
CB21	50	51		4	45		
	52	53		4	46		
	54	55		4	48		
	56	57		4	50	2	

DESIGN DATA

Beam Type	Beam Length (feet)	DC kips	DW kips	LL kips	LL+I kips	Δd (in.)	Δc (in.)
B21	44	15.7	1.3	43.9	55.5		
	46	16.4	1.3	44.7	56.5		
	48	17.1	1.4	45.5	57.4		
	50	17.9	1.4	46.3	58.3		
CB21	50	24.1	1.4	46.3	58.3	0.3	1.0
	52	25.0	1.5	47.0	59.1	0.3	1.1
	54	26.0	1.5	47.7	60.0	0.4	1.2
	56	27.0	1.6	48.4	60.7	0.4	1.4

Straight Reinforcement

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

Bent Reinforcement

Mark	Size	a	b	
C1(e)	#5	3'-9"	6"	
C2(e)	#4	3'-9"	1'-5¼"	
C3(e)	#5	11⅜"	1'-5⅜"	
C4(e)	#4	3'-9"	1'-10¼"	
C5(e)	#5	3'-9"	1'-10⅜"	

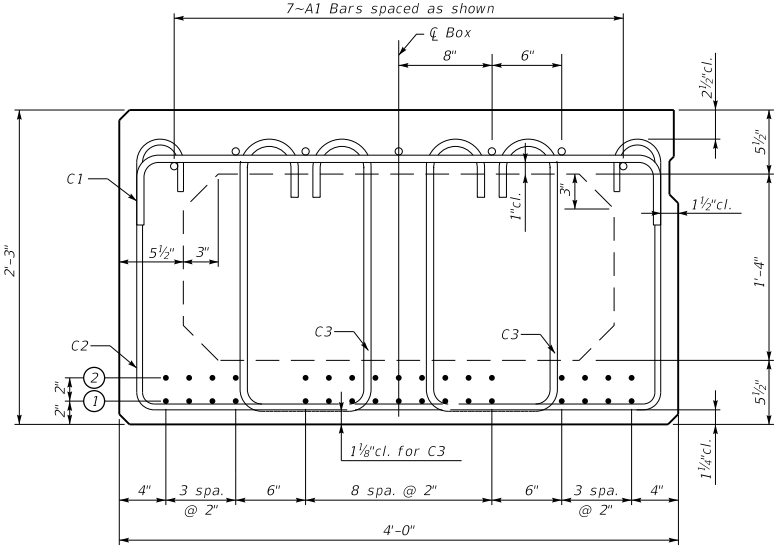
KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B21 & CB21
DETAILS

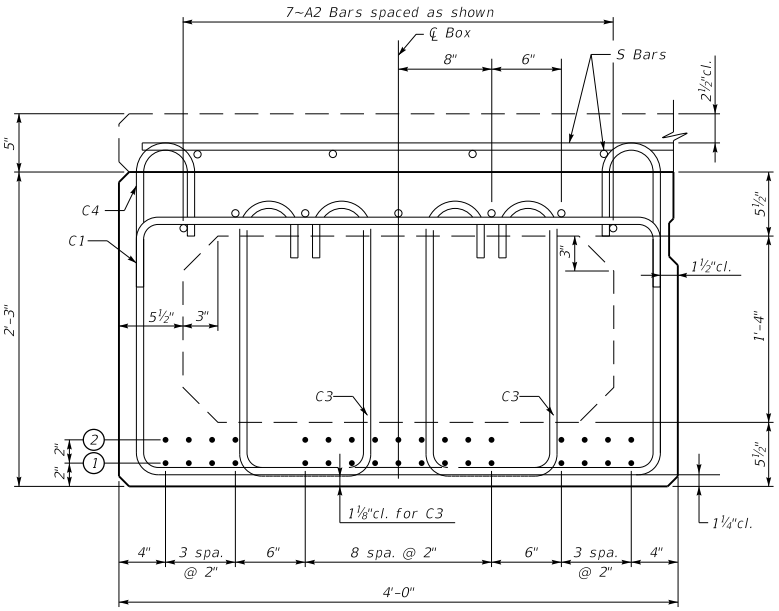
STANDARD DRAWING NO. BDP-008-04

SUBMITTED — DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 02-26-20

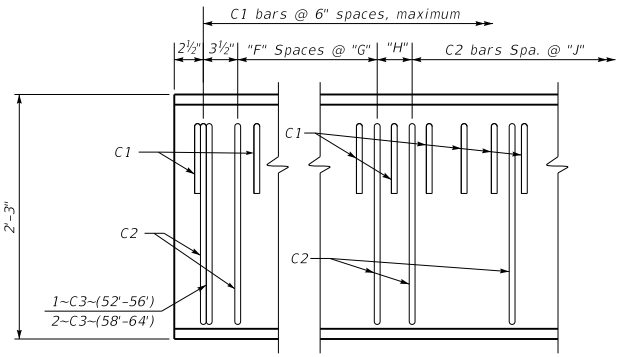
APPROVED — STATE HIGHWAY ENGINEER — DATE 02-26-20



B27 BEAM

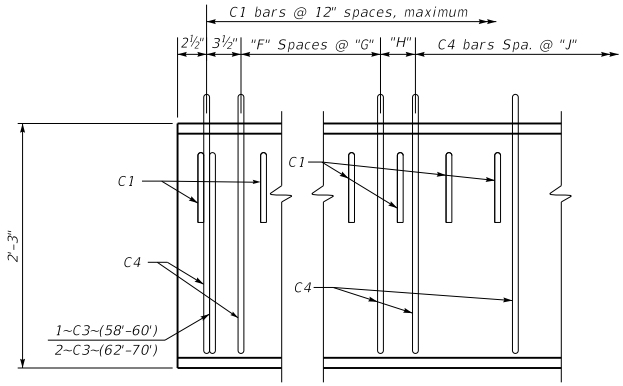


CB27 BEAM



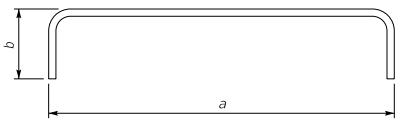
B27 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)

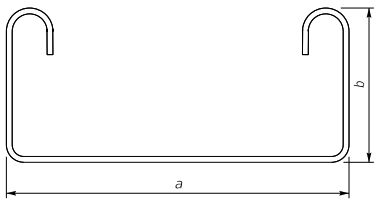


CB27 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)



C1(e) Bar



C2(e)-C4(e) Bars

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
	64	17	9
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"		
B27	52	5	14"	11"	18"		
	54	5	13"	10"	18"		
	56	5	13"	13"	18"		
	58	5	13"	16"	18"		
	60	6	12"	12"	18"		
	62	6	12"	13½"	17"		
	64	6	12"	8½"	17"		
CB27	58	6	12"	18"	21"		
	60	6	12"	19½"	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 kips	DW kips	LL kips	LL+I kips	Δd (in.)	Δc (in.)
B27	52	105	40	2		20.6	1.5	47.0	59.1		
	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		
	64	129	52	4		25.3	1.8	51.0	63.6		
CB27	58	59		2	41	30.2	1.7	49.1	61.5	0.3	0.9
	60	61		2	42	31.2	1.7	49.7	62.2	0.3	0.9
	62	63		4	45	32.3	1.8	50.4	62.9	0.3	1.1
	64	65		4	48	33.3	1.8	51.0	63.6	0.4	1.2
	66	67		4	49	34.3	1.9	51.6	64.3	0.4	1.3
	68	69		4	50	35.4	1.9	52.2	65.0	0.5	1.4
	70	71		4	53	36.4	2.0	52.8	65.6	0.5	1.6

Straight Reinforcement

Mark	Size	Length
A1(E)	#5	Beam Length Minus 3"
A2(E)	#4	Beam Length Minus 3"
D(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'-11¼"	
C3(e)	#5	11⅜"	1'-11⅜"	
C4(e)	#4	3'-9"	2'-4¼"	

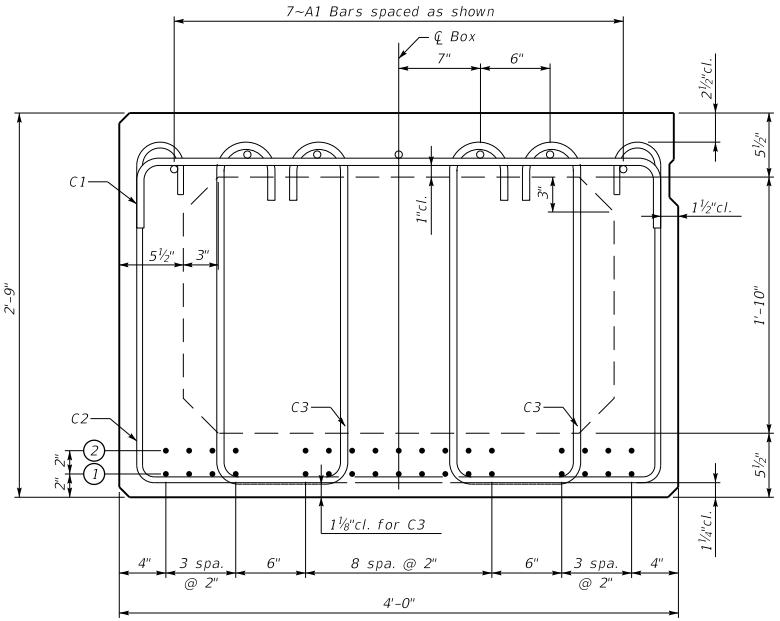
KENTUCKY DEPARTMENT OF HIGHWAYS

BOX BEAM B27 & CB27 DETAILS

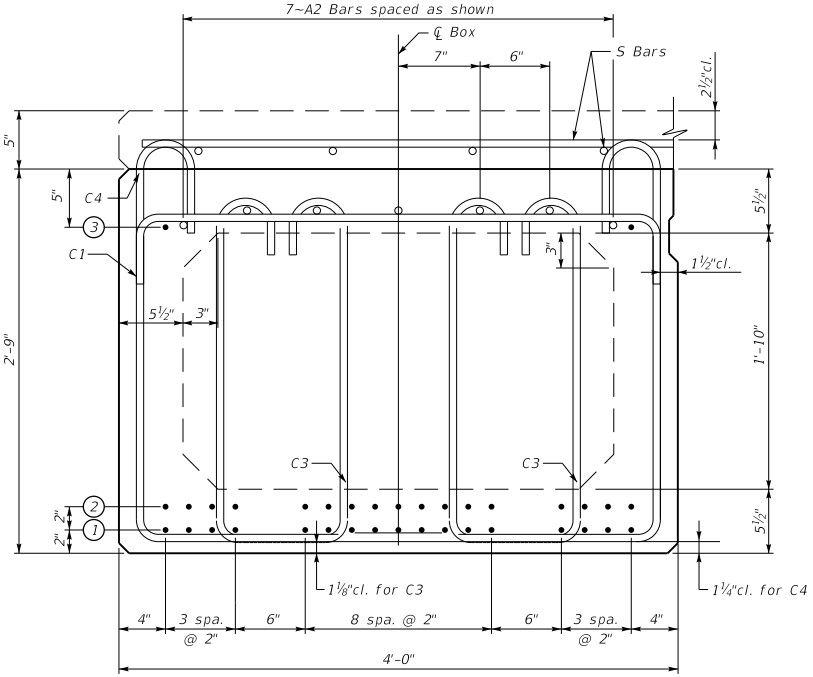
STANDARD DRAWING NO. BDP-009-04

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 02-26-20

APPROVED _____ STATE HIGHWAY ENGINEER — DATE 02-26-20



B33 BEAM



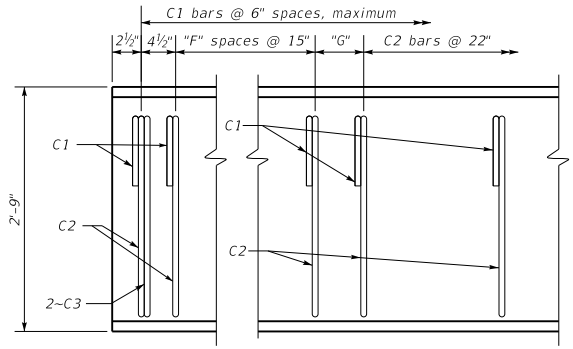
CB33 BEAM

TABLE OF STRAND DATA

Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Row ②	Row ③
B33	66	17	5	
	68	17	6	
	70	17	7	
	72	17	8	
	74	17	10	
	76	17	11	
	78	17	12	
CB33	72	17	7	
	74	17	9	
	76	17	10	
	78	17	11	
	80	17	13	
	82	17	14	2
	84	17	15	2

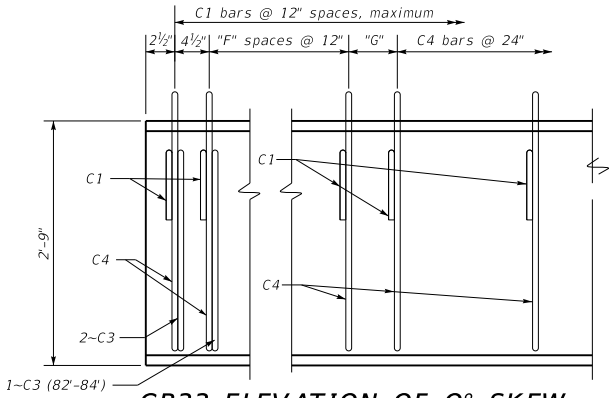
TABLE OF DIMENSION DATA

Beam Type	Beam Length (feet)	"F"	"G"
B33	66	5	17"
	68	5	18"
	70	6	15"
	72	6	16"
	74	6	17"
	76	6	18"
	78	6	19"
CB33	72	7	17"
	74	7	17"
	76	8	17"
	78	8	17"
	80	8	17"
	82	8	17"
	84	8	17"



B33 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)



CB33 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)

BAR QUANTITIES TABLE — DESIGN DATA

Beam Type	Beam Length (feet)	C1	C2	C3	C4	DC kips	DW kips	LL kips	LL+I kips	Δd (in.)	Δc (in.)
B33	66	133	42	4		28.4	1.9	51.6	64.3		
	68	137	43	4		29.3	1.9	52.2	65.0		
	70	141	45	4		30.2	2.0	52.8	65.6		
	72	145	46	4		31.0	2.0	53.3	66.2		
	74	149	47	4		31.9	2.1	53.9	66.8		
	76	153	48	4		32.7	2.2	54.4	67.5		
	78	157	49	4		33.6	2.2	55.0	68.0		
CB33	72	73		4	46	40.0	2.0	53.3	66.2	0.4	1.1
	74	75		4	47	41.1	2.1	53.9	66.8	0.4	1.2
	76	77		4	49	42.2	2.2	54.4	67.5	0.5	1.3
	78	79		4	50	43.3	2.2	55.0	68.0	0.5	1.4
	80	81		4	51	44.4	2.3	55.5	68.6	0.6	1.5
	82	83		6	52	45.5	2.3	56.1	69.2	0.6	1.4
	84	85		6	53	46.6	2.4	56.6	69.8	0.7	1.5

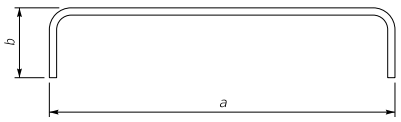
Straight Reinforcement

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

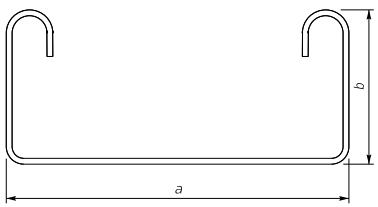
NOTE: A1 and A2 bars are to be lapped 2'-2" when necessary.

Bent Reinforcement

Mark	Size	a	b
C1(e)	#5	3'-9"	6"
C2(e)	#4	3'-9"	2'-5¼"
C3(e)	#5	11⅜"	2'-5⅜"
C4(e)	#4	3'-9"	2'-10¼"



C1(e) Bar



C2(e)-C4(e) Bars

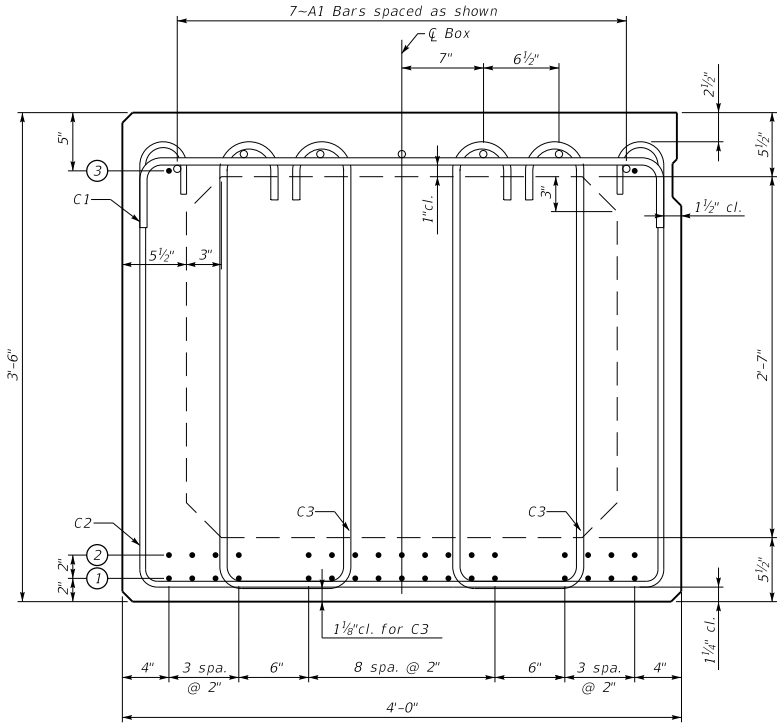
KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B33 & CB33
DETAILS

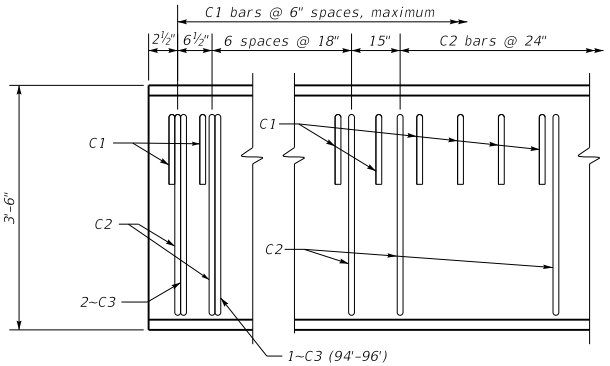
STANDARD DRAWING NO. BDP-010-04

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 02-26-20

APPROVED _____ STATE HIGHWAY ENGINEER — DATE 02-26-20



B42 BEAM



B42 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)

TABLE OF STRAND DATA

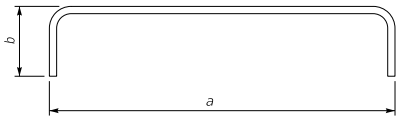
Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Row ②	Row ③
B42	80	17	6	
	82	17	7	
	84	17	8	
	86	17	10	
	88	17	11	
	90	17	12	
	92	17	13	
	94	17	14	2
	96	17	15	2

BAR QUANTITIES TABLE

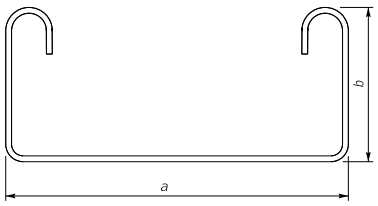
Beam Type	Beam Length (feet)	C1	C2	C3			
B42	80	161	46	4			
	82	165	47	4			
	84	169	48	4			
	86	173	49	4			
	88	177	50	4			
	90	181	51	4			
	92	185	52	4			
	94	189	53	6			
	96	193	54	6			

DESIGN DATA

Beam Type	Beam Length (feet)	DC kips	DW kips	LL kips	LL+I kips		
B42	80	38.5	2.3	55.5	68.6		
	82	39.5	2.3	56.1	69.2		
	84	40.4	2.4	56.6	69.8		
	86	41.4	2.4	57.1	70.3		
	88	42.4	2.5	57.6	70.9		
	90	43.3	2.6	58.1	71.4		
	92	44.3	2.6	58.6	72.0		
	94	45.3	2.7	59.1	72.5		
	96	46.2	2.7	59.6	73.0		



C1(e) Bar



C2(e)-C3(e) Bars

Straight Reinforcement

Mark	Size	Length
A1(E)	#5	Beam Length Minus 3"
D(E)	#8	2'-0"

NOTE: A1 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"	3'-2¼"	
C3(e)	#5	11⅜"	3'-2⅜"	

KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
B42
DETAILS

STANDARD DRAWING NO. BDP-011-04

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — 02-26-20 DATE

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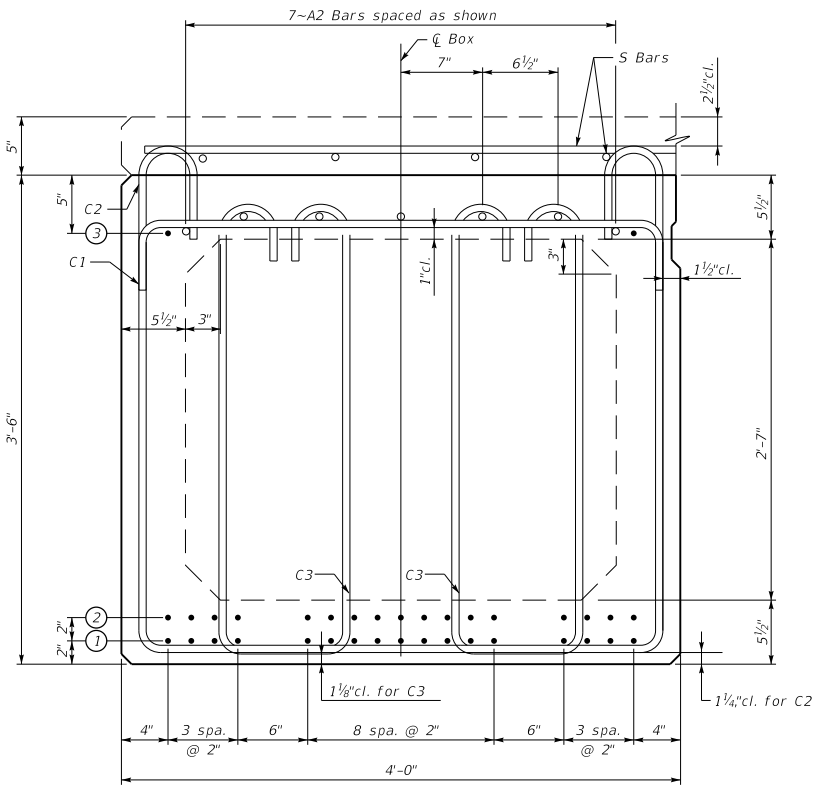
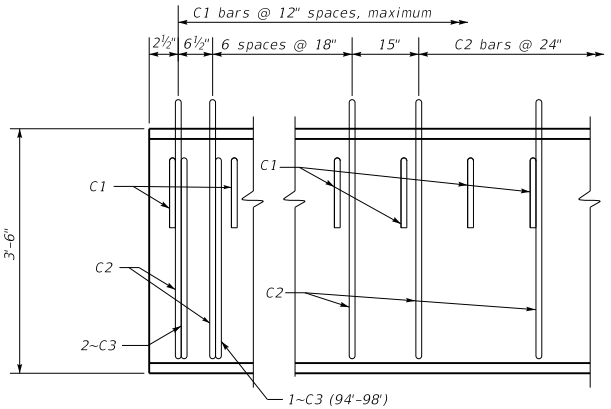


CB42 BEAM



CB42 ELEVATION OF O° SKEW

(Refer to BDP-003,c.e. for skewed details)

TABLE OF STRAND DATA

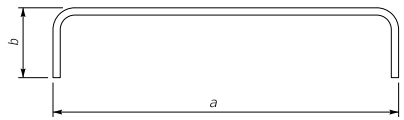
Beam Type	Beam Length (feet)	Number of Strands Required Row ①	Row ②	Row ③
CB42	86	17	9	
	88	17	10	
	90	17	12	
	92	17	13	
	94	17	14	2
	96	17	15	2
	98	17	16	2

BAR QUANTITIES TABLE

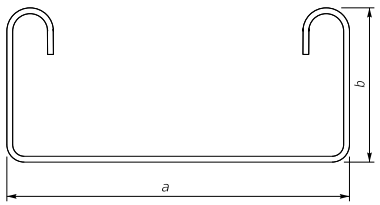
Beam Type	Beam Length (feet)	C1	C2	C3			
CB42	86	87	49	4			
	88	89	50	4			
	90	91	51	4			
	92	93	52	4			
	94	95	53	6			
	96	97	54	6			
	98	99	55	6			

DESIGN DATA

Beam Type	Beam Length (feet)	DC kips	DW kips	LL kips	LL+I kips	Δd (in.)	Δc (in.)
CB42	86	52.1	2.4	57.1	70.3	0.4	1.0
	88	53.3	2.5	57.6	70.9	0.5	1.1
	90	54.6	2.6	58.1	71.4	0.5	1.2
	92	55.8	2.6	58.6	72.0	0.5	1.3
	94	57.0	2.7	59.1	72.5	0.6	1.2
	96	58.2	2.7	59.6	73.0	0.6	1.3
	98	59.4	2.8	60.1	73.5	0.7	1.3



C1(e) Bar



C2(e)-C3(e) Bars

Bent Reinforcement

Mark	Size	a	b	
C1(e)	#5	3'-9"	6"	
C2(e)	#4	3'-9"	3'-7¼"	
C3(e)	#5	11⅜"	3'-2⅜"	

Straight Reinforcement

Mark	Size	Length
A2(E)	#4	Beam Length Minus 3"
D(E)	#8	2'-0"

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

KENTUCKY
DEPARTMENT OF HIGHWAYS

BOX BEAM
CB42
DETAILS

STANDARD DRAWING NO. BDP-012-04

SUBMITTED _____ 02-26-20
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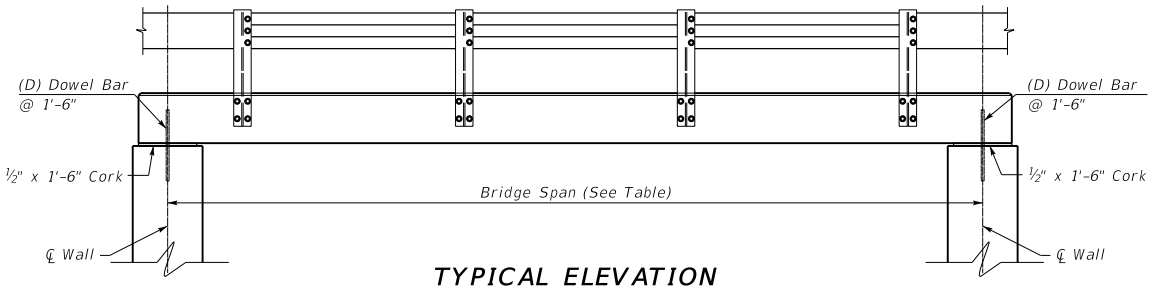
STATE HIGHWAY ENGINEER — DATE

General Notes



TYPICAL ELEVATION

SLAB BRIDGE SPAN DATA

BRIDGE SPAN (Max. Span)	SLAB THICK.	REINFORCEMENT				DEFLECTION IN INCHES	UNFACTORED BEAM END REACTION (PER UNSKEWED FT. OF BRIDGE WIDTH)		
	"TH"	"A"	"B"	"C"	"D"	SLAB + BARRIER DL DEFL.	DC (kips)	DW (kips)	LL+I (kips)
12'	1'-2"	#8	5"	#6	9"	0.01	1.78	0.10	9.75
14'	1'-4"	#9	5"	#6	8"	0.02	2.24	0.12	9.49
16'	1'-4"	#9	5"	#6	8"	0.03	2.53	0.13	9.25
18'	1'-4"	#9	5"	#6	9"	0.05	2.82	0.14	9.02
20'	1'-5"	#9	5"	#6	9"	0.06	3.24	0.16	8.99
22'	1'-5"	#10	5"	#6	8"	0.08	3.54	0.17	8.99
24'	1'-5"	#10	5"	#6	8"	0.12	3.84	0.19	8.98
26'	1'-6"	#10	5"	#6	8"	0.15	4.32	0.20	9.07
28'	1'-7"	#10	5"	#6	9"	0.17	4.81	0.22	11.76
30'	1'-7"	#11	5"	#6	7"	0.23	5.14	0.23	11.98
32'	1'-7"	#11	5"	#6	7"	0.29	5.47	0.25	12.16
34'	1'-8"	#11	5"	#6	8"	0.33	6.01	0.26	12.31
36'	1'-9"	#11	5"	#6	8"	0.37	6.59	0.28	12.43
38'	1'-10"	#11	5"	#6	8"	0.42	7.19	0.29	12.53
40'	2'-0"	#11	5"	#6	8"	0.42	8.07	0.31	12.61

SLAB OPTION: The superstructure option shown on this Standard Drawing may be used in lieu of composite or non-composite adjacent box beams. Notify the Director of the Division of Structural Design when this option is used. Slabs are designed for a minimum out to out width of 12'.

CLASS "AA" REINFORCED CONCRETE: All falsework is to remain in place until the Class "AA" Concrete compressive strength is 4000 PSI. Class "AA" Concrete is to be used throughout the superstructure.

ELEVATIONS: Determine final elevations using the elevations, slopes, and grades shown on the detailed plans.

STEEL REINFORCEMENT: Ensure steel reinforcement is ASTM A 615 Grade 60 and epoxy coated. "A" bars to be hooked on each end.

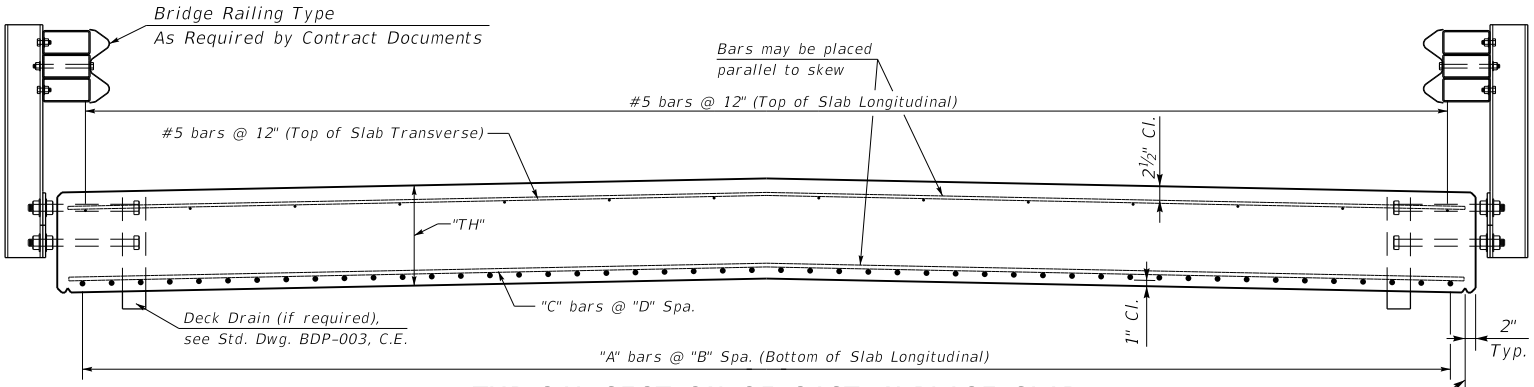
SURFACE FINISH: The top of the slab surface may be finished with a floated surface finish in accordance with Section 601.03.18 and textured in accordance with Section 609.03.10.

FWS: Slabs are designed for 15 psf future wearing surface.

FORMWORK: All formwork shall be designed by a Professional Engineer licensed to practice in Kentucky. The Engineer shall be responsible for accounting for all deflections of the slab after formwork is removed and deflections in formwork to ensure proper grade is maintained across the bridge. Submit formwork design and calculated deflections to the Divsion of Construction for approval prior to beginning work.

BOTTOM OF SLAB: Bottom of Slab may be poured flat instead of sloped as shown. See structure plans and elevations.

DOWEL BAR (D): Dowel bar shall be an epoxy coated #8 bar, 2'-0" in length. Dowel bar may be deformed or smooth. Dowel bar shall be embedded into wall a minimum of 1'-0".



TYPICAL SECTION OF CAST-IN-PLACE SLAB

KENTUCKY
DEPARTMENT OF HIGHWAYS

SLAB BRIDGE
DETAILS

STANDARD DRAWING NO. BDP-013-04

SUBMITTED _____ 02-26-20
DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE

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