DRAWING SCALE: _____

DRAWING SHOWN: _____

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 & Slab sections are designed for 1.25•HL93 (KYHL93) Live Load.

DESIGN LOAD DISTRIBUTION: Beams are designed according to the AASHTO LRFD Bridge Design Specifications for beam spacings up to 6ft and overhangs up to 3'-0" with a 9" wide barrier.

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, Diaphragms, SIP Forms, and assumed railing dead loads of 533 lbs/ft.
DW (kips): Future wearing surface.
LL+I (kips): LL with Dynamic load allowance.

MATERIAL DESIGN SPECIFICATIONS:

for Beam Steel	FY	=	50000 PSI
for Steel Reinforcement	FY	=	60000 PSI
for Class "AA" Deck Concrete	F'C	=	4000 PSI

MATERIAL STEEL	A.S.T.M	AASHTO
High Strength Low Alloy Structural Steel	A709 GR 50	M270 GR 50
Shear Stud Connectors	UNS G 1018	M-169
Sheet lead and Pig Lead	B29-79	

High strength bolts, nuts, and washers F3125 Grade A325 M-164 Type 1

All steel in longitudinal rolled wide flange beams shall meet the longitudinal Charpy V-Notch toughness test for non-fracture critical components Zone 2 in accordance with the following:

M270 GR 50 (up to 2" thickness) of 15 ft-lbs at 40° F.

Sampling and testing procedures shall be in accordance with AASHTO T243 current edition, utilizing (H) frequency testing. When plate thickness exceeds 1½", frequency of testing shall be (P).

HIGH STRENGTH BOLT CONNECTIONS: Unless otherwise specified on the plans, all bolted connnections shall be ASTM F3125 Grade A325 ¾" diameter high strength bolts, nuts, and washers. Open holes shall be 13/16" diameter. Type 1 galvanized bolts shall be used as described in AASHTO M164. All high strength bolted field connections are to be installed with "direct tension indicators" (DTI's) in accordance with the Standard Specifications and ASTM F959. All DTI's shall be manufactured from a steel conforming to the chemical requirements of ASTM A325 for Type 1 galvanized steel. DTI's shall be installed under the bolt head with the bumps facing the underside of the bolt head. Put a hardened washer under the nut and tension from the nut.

BEVELED EDGES: Bevel all exposed edges ¾".

REINFORCEMENT: Dimensions shown from the face of concrete to reinforcement are to center of bars unless otherwise shown. Spacing of bars is from center to center of bars. Clear distance to face of concrete is 2" unless otherwise noted. Epoxy coat all bars. Use stirrup bend diameters for all bent bars.

CORROSION PROTECTION: These beams and all steel components are to be hot dip galvanized according to ASTM A123. Weathering Steel is not allowed.

SHEAR CONNECTORS: The minimum length of studs is 6". Provide the necessary length to penetrate at least 2" above bottom of slab.

Include all costs for shear connectors with the price of the steel beams. Including shear connectors, welding and welding material, and materials necessary to field weld or shop weld the shear connectors in place according to the plans and specifications.

If the Contractor wishes to use something other than the stud shear connectors shown on the plans, the proposed arrangement shall be submitted for approval with the shop plans.

Studs shall be welded in accordance with AWS Specifications.

MILL TEST REPORTS: Notarized mill test reports shall be furnished in triplicate to the Department, showing that all material used in the structural steel conform to the requirements of the specifications.

PROHIBITED WELDING: No welding of any nature, other than indicated on the plans, is to be performed without the written consent of the designer, and then only in the manner and at the locations designated in the authorization.

SLAB: Ensure the entire superstructure slab and diaphragms are poured continuously, out to out, before allowing any concrete to set.

SHOP DRAWINGS: The fabricator shall submit all required shop plans, by email, to the design engineer for review. These submissions shall depict the shop plans in .pdf format. As either 11"x17" or 22"x36" sheets. Designers will make review comments on these electronic submissions as needed and shall return them to the fabricator. Upon reconciliation of the designers comments, files shall be returned to the designer and plans will be forwarded to the Division of Structural Designs Shop Plan coordinator for distribution. Only plans submitted directly to the shop plan coordinator will be distributed and only plans electronically stamped "Distributed by The Division of Structural Design" are to be used for fabrication. While this process does not require the submission of paper copies, The Division of Structural Design reserves the right to require such copies on a case by case basis.

When any changes to the design plans are proposed by the Fabricator or Supplier, the shop drawings reflecting these changes shall be submitted to the Design Engineer through the contractor.

		DATE
DESIGNED BY	J. Van Zee	5-17
CHECKED		
RECOMMENDED		
APPROVED F.H.W.A.		
REVISED BY	E. Downey	5-17

KENTUCKY
DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES

GENERAL NOTES

STANDARD DRAWING NO. BDE-001-01

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — 12-02-11 DATE

APPROVED _____ STATE HIGHWAY ENGINEER — 12-02-11 DATE

DRAWING SCALE: _____

DRAWING SHOWN: _____

TABLE OF BEAM SIZES AND DESIGN DATA (6 FT. MAX. BEAM SPACING WITH 3 FT. MAX. OVERHANG)

BEAM SPAN	ROLLED BEAM		DEFLECTION IN INCHES		SHEAR CONNECTORS				UNFACTORED BEAM END REACTION			LL DIST. FACT. (LANES)	
	BEAM MEMBER	BEAM DEPTH (IN.)	STEEL ONLY	TOTAL DL	# Per Row	Spa. @ Ea. End of Beam	Middle Spacing	ADTT	DC (kips)	DW (kips)	LL+I (kips)	LLDFM	LLDFV
20′ Max.	W18x55	18.1	0.00	0.11	2	10 Spa. @ 5¼"	5¾" Spa.	300	11.85	0.90	72.65		.877
	W16x77	16.5	0.00	0.09	3	5 Spa. @ 5¾"	6" Spa.	Inf.	12.10		71.61		.865
	W14x82	14.3	0.00	0.11	3	14 Spa. @ 5¼"	6" Spa.	450	12.14		72.36		.874
	W12x106	12.9	0.00	0.11	3	14 Spa. @ 5¼"	6" Spa.	400	12.40		71.78		.867
25′ Max.	W24x62	23.7	0.02	0.17	2	23 Spa. @ 5¼"	6" Spa.	400	14.75	1.13	74.47		.860
	W21x62	21.0	0.03	0.21	2	23 Spa. @ 5¼"	6" Spa.	350	14.75		75.31		.870
	W18x71	18.5	0.03	0.24	2	23 Spa. @ 5¼"	6" Spa.	290	14.86		75.67		.874
	W16x77	16.5	0.04	0.25	3	11 Spa. @ 5½"	6" Spa.	Inf.	14.96		76.05		.878
	W14x82	14.3	0.05	0.31	3	23 Spa. @ 5¼"	6" Spa.	425	15.01		76.89		.888
	W12x106	12.9	0.05	0.31	3	23 Spa. @ 5¼"	6" Spa.	385	15.33		76.25		.880
30′ Max.	W24x76	23.9	0.04	0.28	2	28 Spa. @ 5¼"	6" Spa.	415	17.78	1.35	80.90		.856
	W21x83	21.4	0.05	0.32	2	28 Spa. @ 5¼"	6" Spa.	350	17.89		81.41		.862
	W18x86	18.4	0.06	0.39	3	7 Spa. @ 5¾"	6" Spa.	Inf.	17.94		82.40		.872
	W16x100	17.0	0.06	0.40	3	14 Spa. @ 5½"	6" Spa.	Inf.	18.18		82.26		.871
	W14x120	14.5	0.08	0.45	3	28 Spa. @ 5¼"	6" Spa.	440	18.48		82.48		.873
	W12x120	13.1	0.10	0.57	3	28 Spa. @ 5¼"	6" Spa.	375	18.48		83.41		.883
35′ Max.	W27x84	26.7	0.06	0.39	3	6 Spa. @ 7¾"	8" Spa.	Inf.	20.79	1.58	86.49		.850
	W24x94	24.3	0.06	0.41	2	24 Spa. @ 5¼"	6" Spa.	420	20.97		86.69		.852
	W21x101	21.4	0.07	0.47	3	7 Spa. @ 6½"	7" Spa.	Inf.	21.10		87.33		.858
	W18x119	19.0	0.09	0.52	3	7 Spa. @ 6"	6½" Spa.	Inf.	21.43		87.50		.860
	W14x132	14.7	0.14	0.76	3	24 Spa. @ 5¼"	6" Spa.	425	21.66		89.15		.876
	W12x152	13.7	0.17	0.82	3	24 Spa. @ 5⅜"	6" Spa.	375	22.03		89.00		.874
40′ Max.	W30x99	29.7	0.07	0.48	3	12 Spa. @ 8"	9" Spa.	Inf.	23.97	1.80	90.47		.840
	W27x102	27.1	0.08	0.53	3	20 Spa. @ 7½"	9" Spa.	Inf.	24.03		91.07		.845
	W24x117	24.3	0.09	0.56	3	14 Spa. @ 7"	8" Spa.	Inf.	24.35		91.22		.846
	W21x122	21.7	0.12	0.67	3	16 Spa. @ 6"	7" Spa.	Inf.	24.45		92.04	0.65	.854
	W18x130	19.3	0.15	0.81	3	9 Spa. @ 5½"	6" Spa.	Inf.	24.62		92.79		.861
	W14x176	15.2	0.21	0.98	3	19 Spa. @ 5¼"	6" Spa.	425	25.58		93.11		.864
	W12x190	14.4	0.25	1.12	3	19 Spa. @ 5¼"	6" Spa.	375	25.86		93.25		.865
45′ Max.	W33x118	32.9	0.09	0.54	3	12 Spa. @ 9"	10" Spa.	Inf.	27.33	2.03	93.45		.828
	W30x116	30.0	0.11	0.64	3	21 Spa. @ 8"	10" Spa.	Inf.	27.29		94.36		.836
	W27x129	27.6	0.12	0.68	3	15 Spa. @ 7½"	9" Spa.	Inf.	27.57		94.53		.838
	W24x131	24.5	0.14	0.80	3	16 Spa. @ 7"	8" Spa.	Inf.	27.63		95.48		.846
	W21x147	22.1	0.17	0.91	3	17 Spa. @ 6½"	7" Spa.	Inf.	28.00		95.83		.849
	W18x158	19.7	0.22	1.08	3	10 Spa. @ 5½"	6" Spa.	Inf.	28.25		96.54		.855
50′ Max.	W33x130	33.1	0.13	0.74	3	23 Spa. @ 8"	10" Spa.	Inf.	30.60	2.25	97.11		.828
	W30x132	30.3	0.15	0.86	3	24 Spa. @ 7½"	9" Spa.	Inf.	30.65		97.86		.834
	W27x146	27.4	0.17	0.89	3	18 Spa. @ 7"	8" Spa.	Inf.	31.02		98.11		.836
	W24x162	25.0	0.20	0.99	3	28 Spa. @ 6½"	8" Spa.	Inf.	31.43		98.43		.839
	W21x182	22.7	0.24	1.11	3	20 Spa. @ 6"	7" Spa.	Inf.	31.95		98.70		.841
	W18x192	20.4	0.30	1.36	3	35 Spa. @ 5¼"	7" Spa.	Inf.	32.19		99.51		.848
55′ Max.	W36x135	35.6	0.17	0.93	3	16 Spa. @ 8¼"	10" Spa.	Inf.	33.73	2.48	100.10		.825
	W33x141	33.3	0.18	0.99	3	25 Spa. @ 8"	10" Spa.	Inf.	33.91		100.45		.828
	W30x148	30.7	0.21	1.11	3	28 Spa. @ 7¼"	9" Spa.	Inf.	34.09		100.97		.832
	W27x178	27.8	0.23	1.10	3	19 Spa. @ 7"	8" Spa.	Inf.	34.96		100.75		.830
	W24x192	25.5	0.27	1.25	3	31 Spa. @ 6½"	8" Spa.	Inf.	35.33		101.20		.834
	W21x223	23.4	0.33	1.35	3	33 Spa. @ 6"	8" Spa.	Inf.	36.21		101.10		.833
	W18x258	21.5	0.40	1.51	3	35 Spa. @ 5¾"	7" Spa.	Inf.	37.22		101.21		.834
60′ Max.	W36x150	35.9	0.22	1.17	3	27 Spa. @ 8¼"	10" Spa.	Inf.	37.20	2.70	102.92		.823
	W33x169	33.8	0.24	1.16	3	18 Spa. @ 8"	9" Spa.	Inf.	37.76		102.82		.822
	W30x173	30.4	0.27	1.32	3	30 Spa. @ 7¼"	9" Spa.	Inf.	37.91		103.60		.828
	W27x194	28.1	0.31	1.42	3	21 Spa. @ 7"	8" Spa.	Inf.	38.56		103.72		.829
	W24x229	26.0	0.37	1.51	3	34 Spa. @ 6½"	8" Spa.	Inf.	39.61		103.58		.828

		DATE
DESIGNED BY	J. Van Zee	5-17
CHECKED		
RECOMMENDED		
APPROVED F.H.W.A.		5-17
REVISED BY	E. Downey	

KENTUCKY
DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES

BEAM TABLES

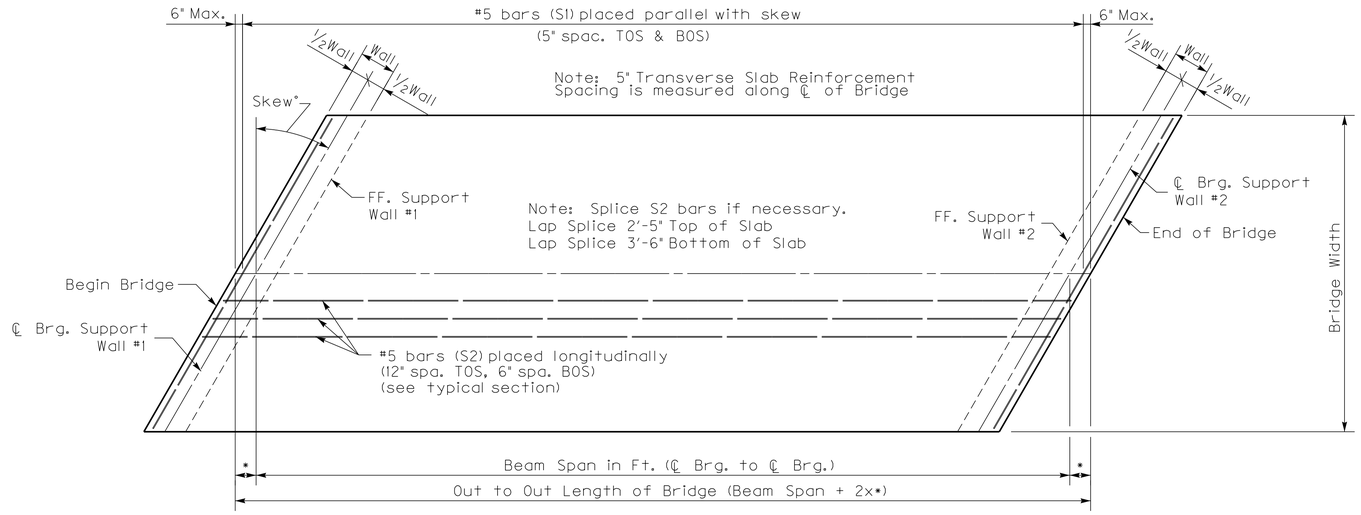
STANDARD DRAWING NO. BDE-001-01

SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — 12-02-11 DATE

APPROVED _____ STATE HIGHWAY ENGINEER — 12-02-11 DATE

DRAWING SCALE: _____

DRAWING SHOWN: _____



PLAN OF SLAB

Note: All reinforcing steel shall be epoxy coated.

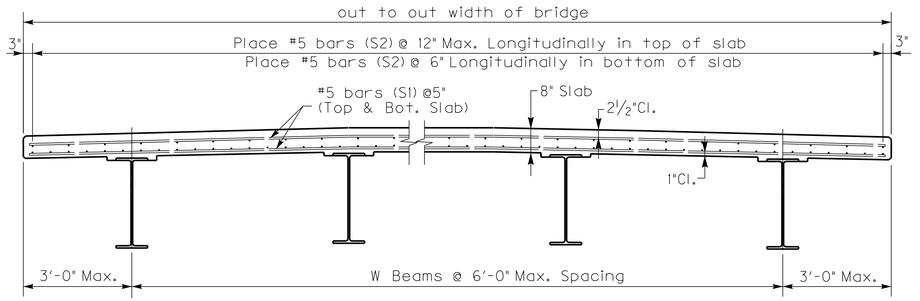
#5 Skewed Transverse Bar (S1) Length = $\frac{\text{Bridge Width} - 4"}{SF}$

* = $\frac{½\text{Wall}}{SF}$

Skew Factors	
Skew	SF
0°	1.000
5°	0.996
10°	0.985
15°	0.966
20°	0.940
25°	0.906
30°	0.866
35°	0.819
40°	0.766
45°	0.707

Estimate of Steel Quantities = (Bridge Length-4in)•(Bridge Width-4in) • (3.129 lb/sq. ft. + $\frac{5.006 \text{ lb/sq. ft.}}{SF}$

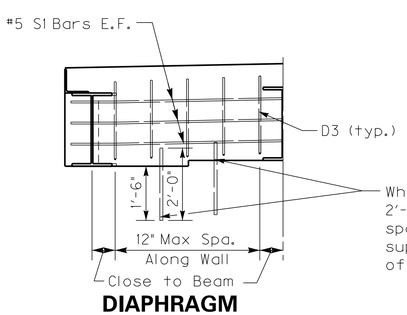
Note: It is recommended a crash tested barrier be attached to the Superstructure to contain all vehicles within the roadway. Recommended barriers include the Type T631 guardrail, Type 3, or 32" Vertical Face railing. See contract documents for required railing and railing drawings for additional reinforcement that may be required to be cast in deck.



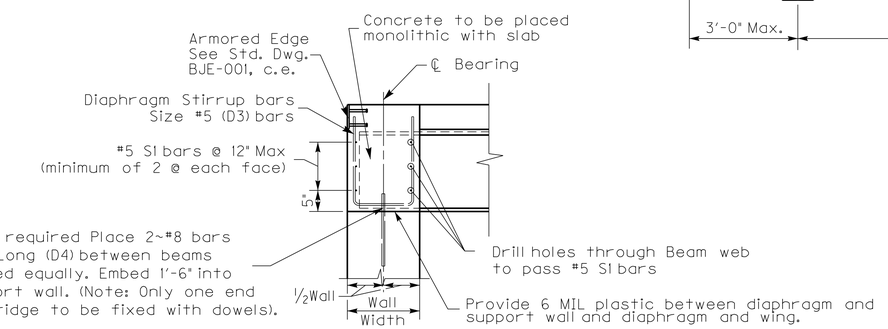
TYPICAL SECTION

Notes: 1.) Diaphragm stirrups are to project into the slab regardless of slab forming method.

2.) Place stirrup bars parallel to face of beams.

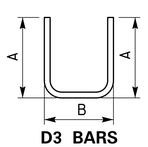


DIAPHRAGM



DIAPHRAGM X-SECTION

(Perpendicular to Diaphragm)



D3 BARS

Dim. "A" = Beam Depth + 4"

Dim. "B" = $\frac{\text{(Wall Width - 4")}}{SF}$

Note: End Diaphragms are required on both ends of Slabs.

DESIGNED BY J. Van Zee DATE 5-17

CHECKED _____

RECOMMENDED _____

APPROVED F.H.W.A. _____ 5-17

REVISED BY E. Downey

KENTUCKY
DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES SLAB DETAILS

STANDARD DRAWING NO. BDE-001-01

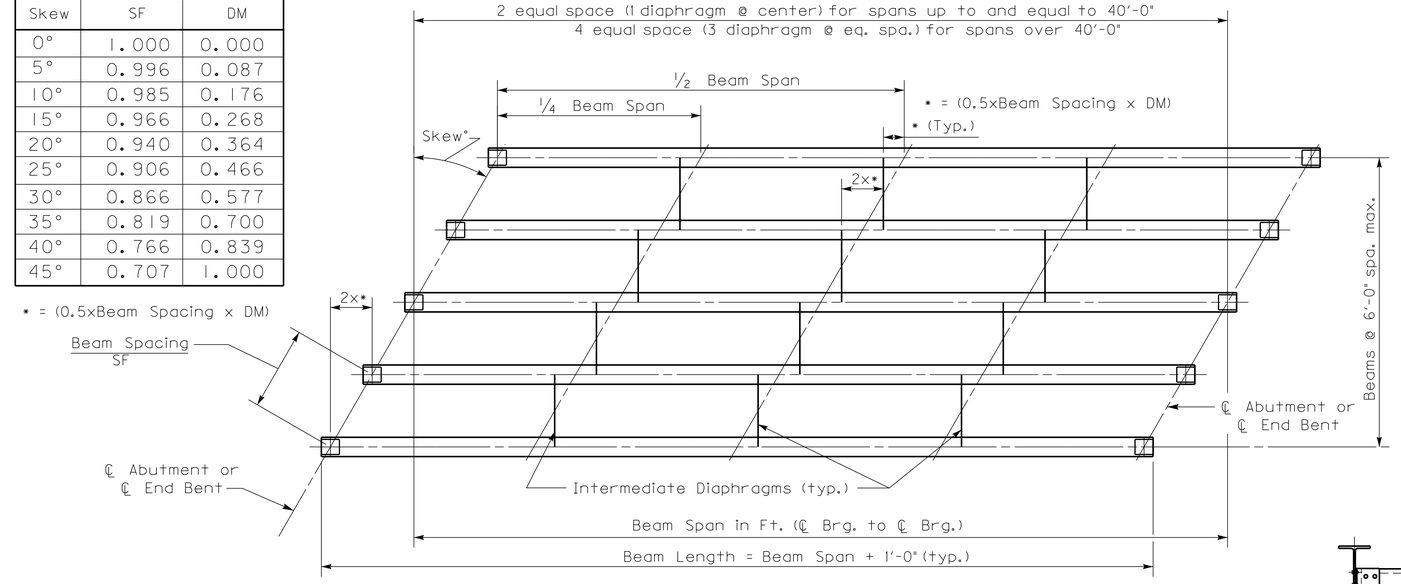
SUBMITTED _____ 12-02-11
DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE

APPROVED _____ 12-02-11
STATE HIGHWAY ENGINEER — DATE

DRAWING SCALE: _____

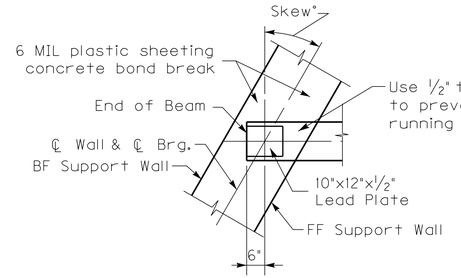
DRAWING SHOWN: _____

Skew Factors		
Skew	SF	DM
0°	1.000	0.000
5°	0.996	0.087
10°	0.985	0.176
15°	0.966	0.268
20°	0.940	0.364
25°	0.906	0.466
30°	0.866	0.577
35°	0.819	0.700
40°	0.766	0.839
45°	0.707	1.000

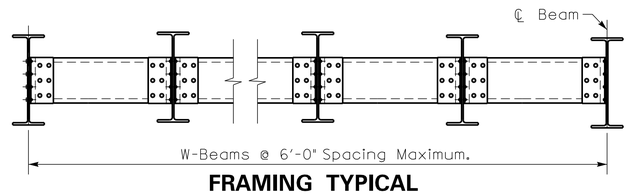


FRAMING PLAN

Note: Place girders with any mill or shop camber bowed up in the middle. Heat cambering is not required.

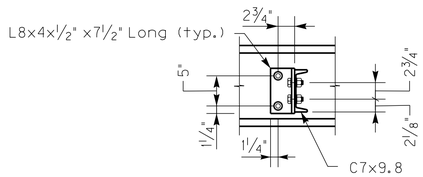


END OF BEAM DETAIL @ SUPPORTS

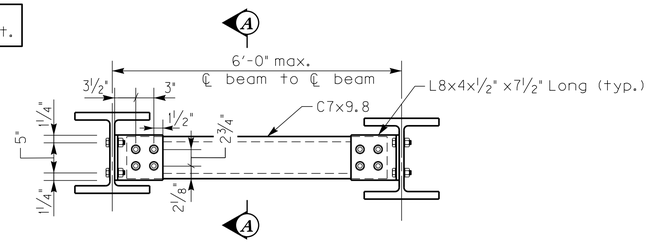


FRAMING TYPICAL

Note: Use 3/4"Ø Bolts with 13/16 "Ø Holes Throughout.

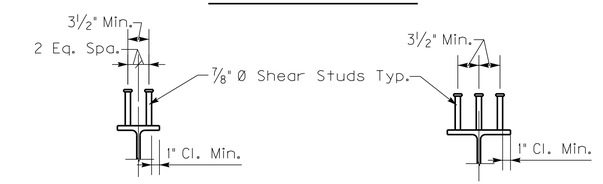


SECTION A–A



INTERMEDIATE DIAPHRAGM

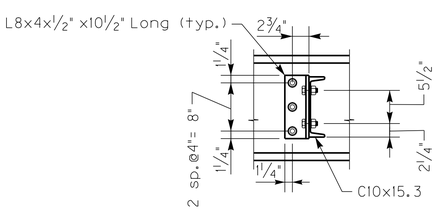
(for up to 14" beam depth)



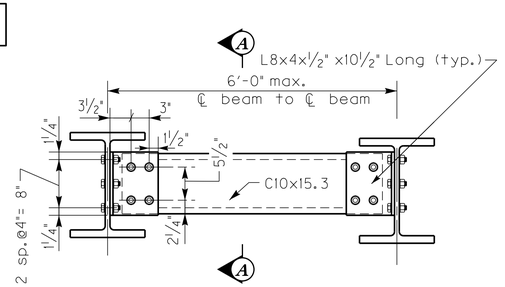
BEAM SECTION – 2 SHEAR STUDS PER ROW

BEAM SECTION – 3 SHEAR STUDS PER ROW

Note: Use 3/4"Ø Bolts with 13/16 "Ø Holes Throughout.

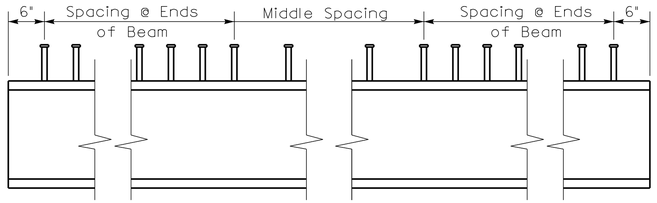


SECTION A–A



INTERMEDIATE DIAPHRAGM

(for up to 20" beam depth)



SHEAR CONNECTOR LAYOUT

(See Beam Tables for Spacings required and number of shear connectors per row)

DESIGNED BY J. Van Zee DATE 5-17

CHECKED _____

RECOMMENDED _____

APPROVED F.H.W.A. _____

REVISED BY E. Downey 5-17

KENTUCKY DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES FRAMING PLAN/DIAPHRAGMS

STANDARD DRAWING NO. BDE-001-01

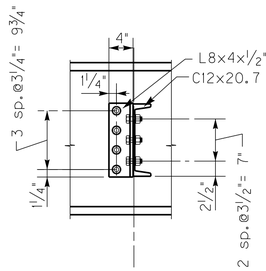
SUBMITTED _____ DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE 12-02-11

APPROVED _____ STATE HIGHWAY ENGINEER — DATE 12-02-11

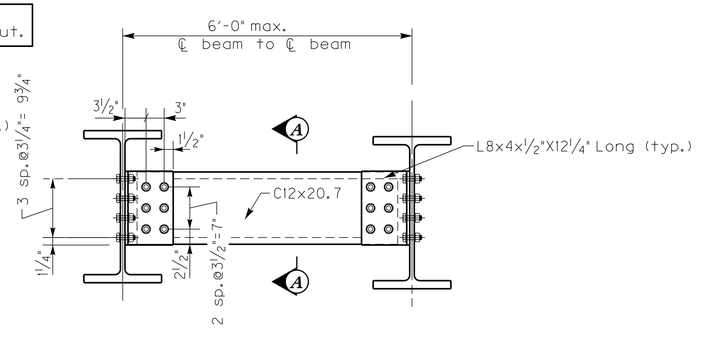
DRAWING SCALE: _____

DRAWING SHOWN: _____

Note: Use $\frac{3}{4}$"Ø Bolts with $\frac{13}{16}$ "Ø Holes Throughout.



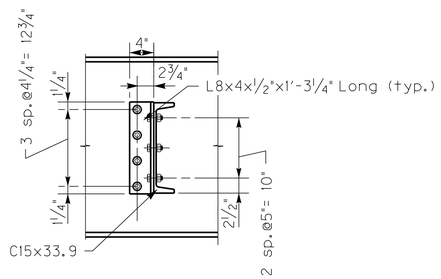
SECTION A–A



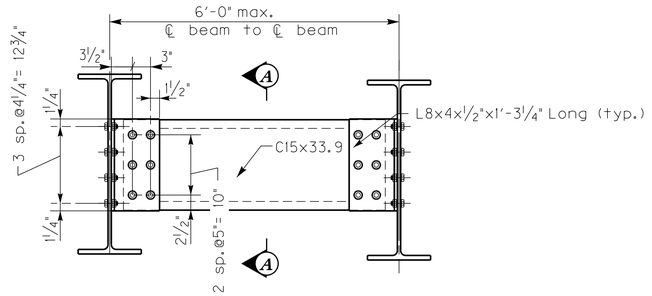
INTERMEDIATE DIAPHRAGM

(for up to 24" beam depth)

Note: Use $\frac{3}{4}$"Ø Bolts with $\frac{13}{16}$ "Ø Holes Throughout.



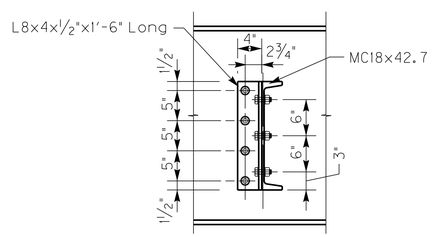
SECTION A–A



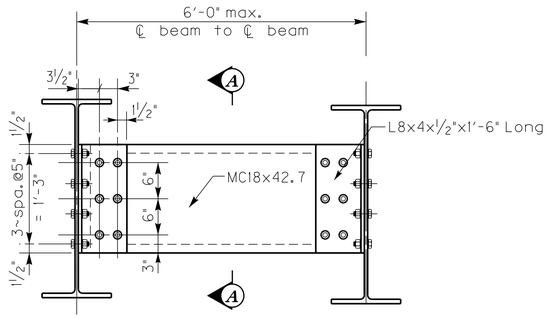
INTERMEDIATE DIAPHRAGM

(for up to 30" beam depth)

Note: Use $\frac{3}{4}$"Ø Bolts with $\frac{13}{16}$ "Ø Holes Throughout.



SECTION A–A



INTERMEDIATE DIAPHRAGM

(for up to 36" beam depth)

DESIGNED BY J. Van Zee DATE 5-17

CHECKED _____

RECOMMENDED _____

APPROVED F.H.W.A. _____

REVISED BY E. Downey 5-17

KENTUCKY
DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES DIAPHRAGMS CONTINUED

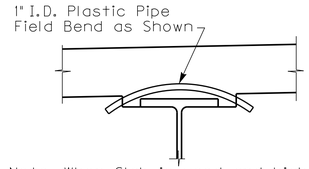
STANDARD DRAWING NO. BDE-001-01

SUBMITTED _____ 12-02-11
DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE

APPROVED _____ 12-02-11
STATE HIGHWAY ENGINEER — DATE

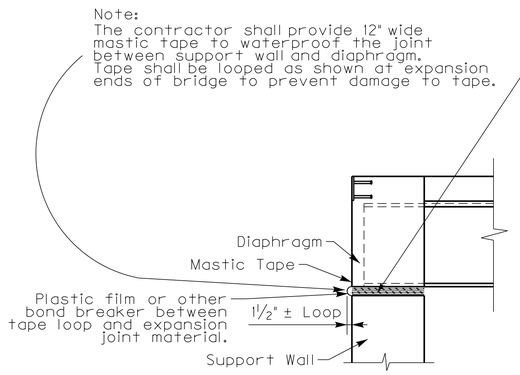
DRAWING SCALE: _____

DRAWING SHOWN: _____

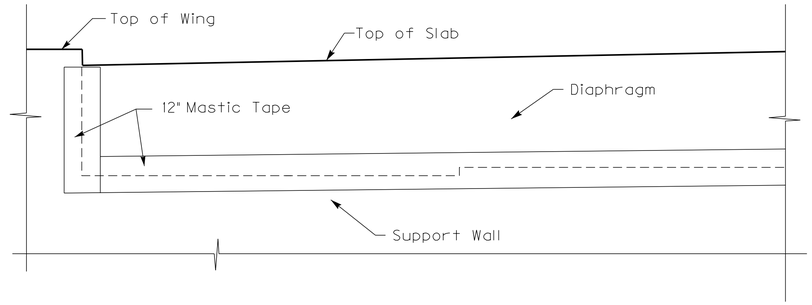


Note: When Slab is used and high water expected over bottom of beam elevation, place 1" plastic pipe above beams 4'-0" from each end. Work and material is incidental to superstructure concrete.

AIR VENT DETAIL



DIAPHRAGM X-SECTION



DIAPHRAGM ELEVATION

GENERAL NOTES

MASTIC TAPE: Mastic Tape used to seal joints is to meet the requirements of ASTM C-877 Type I, II, or III. The joint is to be covered with 12-inch wide mastic tape. Prior to application, the joint surface shall be clean and free of dirt, debris, or deleterious material. Primer, if required by the tape mfgr., shall be applied for a minimum width of nine inches on each side of the joint.

Mastic Tape shall be either:

EZ-WRAP RUBBER by PRESS-SEAL GASKET CORPORATION,
SEAL WRAP by MAR MAC MANUFACTURING CO. INC. ,
CADILLOC by the UP RUBBER CO. INC.
or approved equal.

Mastic Tape shall cover the joint continuously unless otherwise shown in the plans. Mastic Tape shall be spliced by lapping a minimum of six inches and in accordance with the mfgrs. recommendations with the overlap running downhill.

The cost of labor, materials, and incidental items for furnishing and installing Mastic Tape shall be considered incidental to the unit price bid for Concrete Class 'AA' and no separate measurement or payment shall be made.

MASTIC TAPE APPLICATION

		DATE
DESIGNED BY	J. Van Zee	5-17
CHECKED		
RECOMMENDED		
APPROVED F.H.W.A.		
REVISED BY	E. Downey	5-17

KENTUCKY
DEPARTMENT OF HIGHWAYS

COMPOSITE STEEL BEAM SUPERSTRUCTURES MISCELLANEOUS DETAILS

STANDARD DRAWING NO. BDE-001-01

SUBMITTED _____ 12-02-11
DIRECTOR DIVISION OF STRUCTURAL DESIGN — DATE

APPROVED _____ 12-02-11
STATE HIGHWAY ENGINEER — DATE