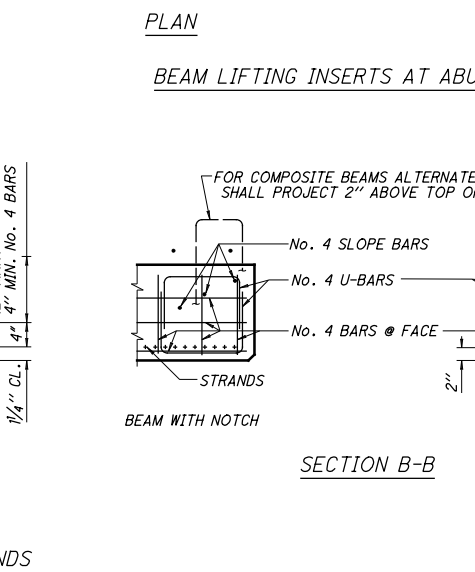
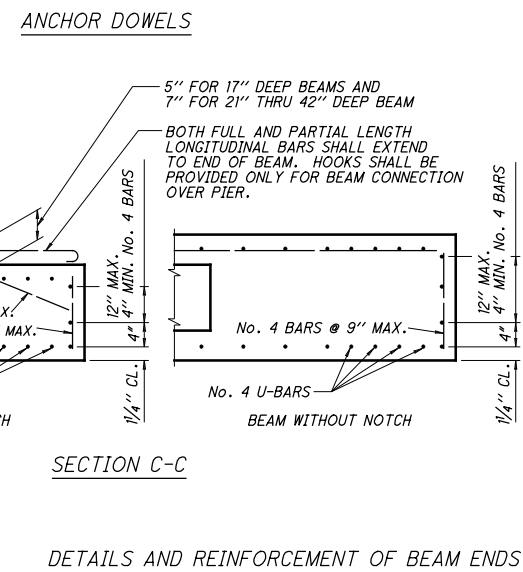
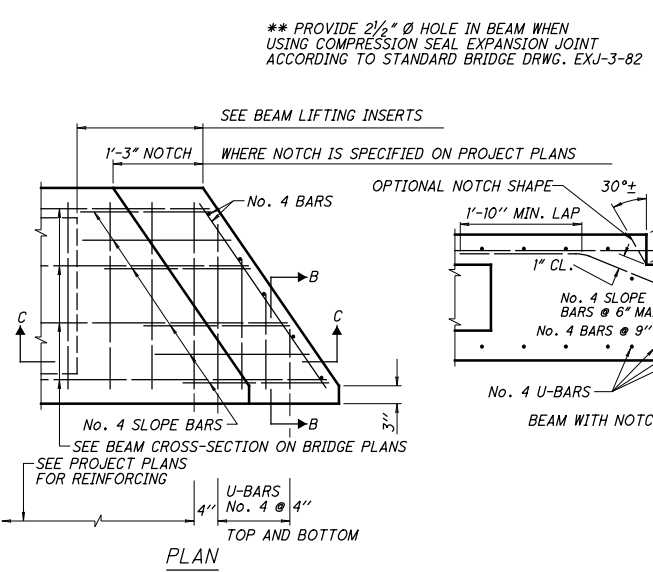
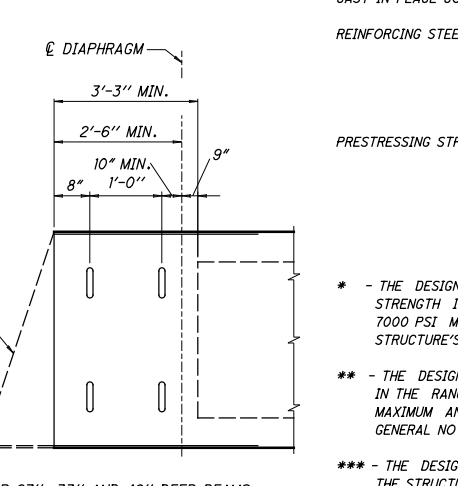
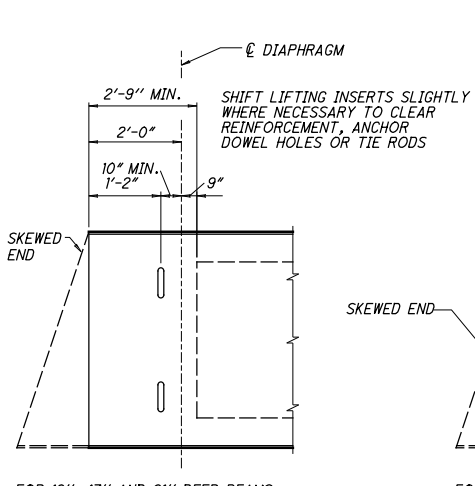
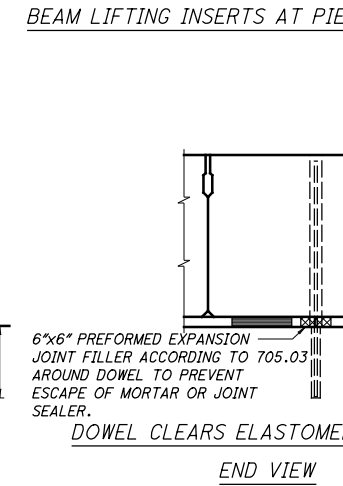
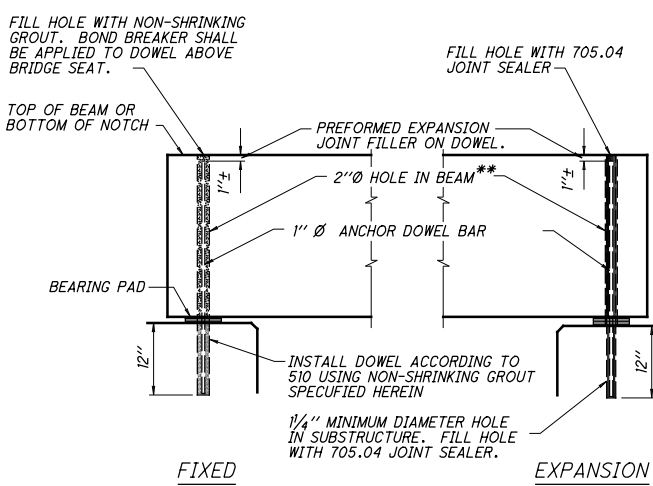
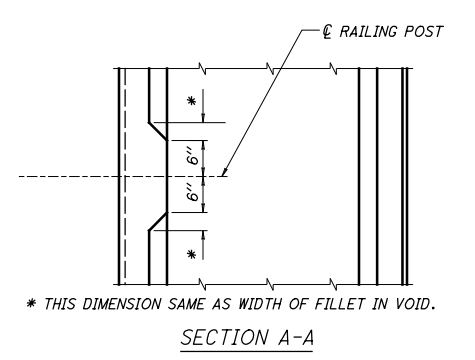
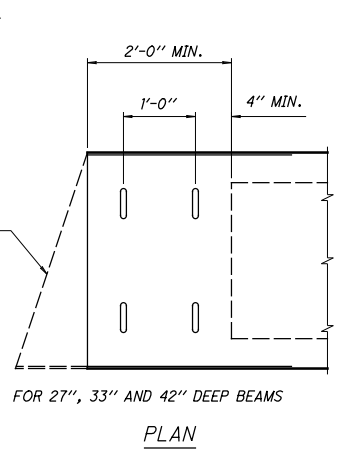
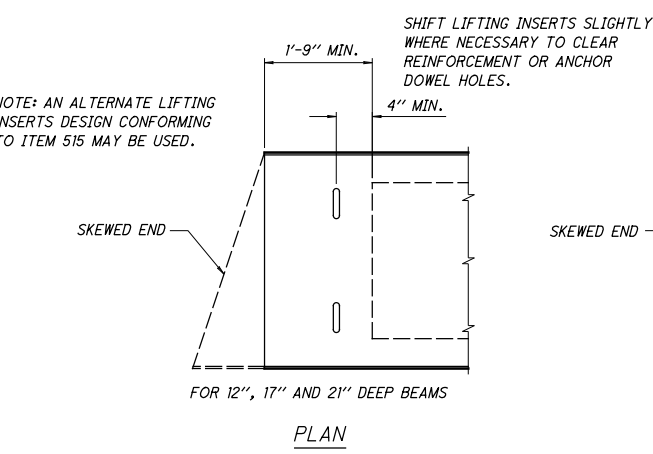
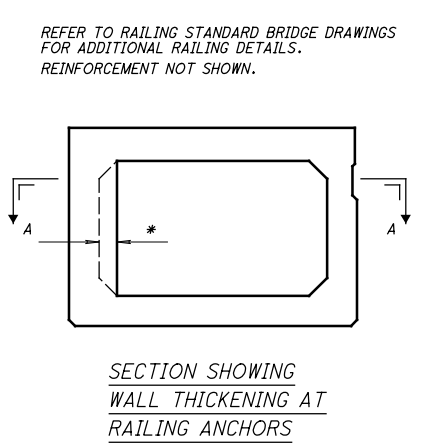
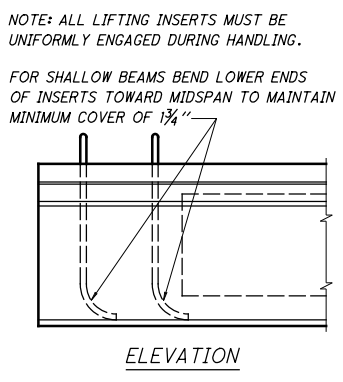
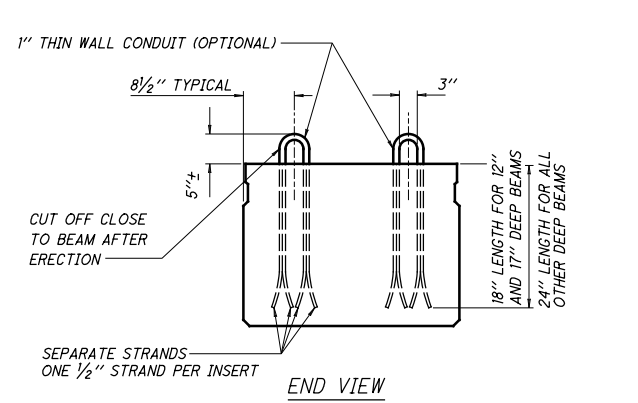


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GENERAL NOTES:

1. THE DESIGNER SHALL CHOOSE A 28-DAY CONCRETE STRENGTH BETWEEN 5500 PSI AND 7000 PSI; A RELEASE STRENGTH BETWEEN 4000 PSI AND 5000 PSI; AND A NOMINAL STRAND AREA OF 0.153 IN² OR 0.167 IN². THE DESIGNER SHALL USE THESE VALUES IN THE DESIGN AND LIST THESE VALUES IN THE STRUCTURE GENERAL NOTES.
2. A BEAM LAYOUT PLAN SHOWING: SPAN LENGTH; BEAM LENGTH; SKEW ANGLE; FIXED AND EXPANSION ENDS OF BEAMS; LOCATION OF ANCHOR DOWELS; SIZE, LOCATION AND HARDNESS OF ELASTOMERIC BEARING PADS; LOCATION OF DIAPHRAGM CENTERLINES; AND LOCATIONS OF RAILING POSTS.
3. A TRANSVERSE CROSS SECTION THROUGH THE DECK.
4. A BEAM ELEVATION/LONGITUDINAL CROSS SECTION SHOWING THE STIRRUP SPACING AND VARIABLE TOPPING THICKNESS IN SUFFICIENT DETAIL.
5. A CROSS SECTION OF THE BEAM SHOWING BEAM TYPE AND AND SIZE; SIZE, NUMBER, STRENGTH AND LOCATION OF STRANDS; DEBONDED STRAND REQUIREMENTS; ALL REINFORCING STEEL DETAILS; AND THE DESIGN DATA.
6. EXPANSION JOINT DETAILS.
7. ALL PLAN QUANTITY PAY ITEMS REQUIRED TO PROPERLY COVER THE COST OF FABRICATION, ERECTION AND CONSTRUCTION OF THE BEAMS.
8. DETAILS OF ABUTMENTS AND PIERS.
9. SEALING OF CONCRETE SURFACE LIMITS AND SEALER TYPE.
10. ALL OTHER DETAILS AND INFORMATION NECESSARY TO COMPLETE THE PLANS.

IT IS NOT INTENDED THAT DETAILS SHOWN ON THIS STANDARD DRAWING BE REPEATED ON THE PROJECT PLANS EXCEPT AS MAY BE REQUIRED FOR CLARITY.

DESIGN STRESSES:

PRESTRESSED CONCRETE - F'C = * (28-DAY)
 F'C = ** (RELEASE)
 CAST-IN-PLACE CONCRETE - F'C = 4500 PSI

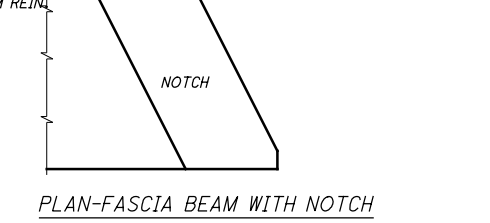
REINFORCING STEEL - MIN. YIELD STRENGTH = 60,000 PSI.
 ALL REINFORCING STEEL IN THE COMPOSITE SLAB AND BARS PROJECTING FROM THE PRESTRESSED BOX BEAMS SHALL CONFORM TO 709.00.
 PRESTRESSING STRAND - FURNISH MATERIAL CONFORMING TO 711.27 (ASTM A416), GRADE 270. LOW RELAXATION, UNCOATED, SEVEN WIRE STRAND. STRANDS SHALL BE 0.5 INCH DIAMETER WITH A TOTAL CROSS-SECTIONAL AREA OF EITHER 0.153 IN² OR 0.167 IN² ***

- * - THE DESIGNER SHALL SPECIFY A 28-DAY COMPRESSIVE STRENGTH IN THE RANGE OF 5500 PSI MINIMUM TO 7000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.
- ** - THE DESIGNER SHALL SPECIFY A RELEASE STRENGTH IN THE RANGE OF 4000 PSI MINIMUM TO 5000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.
- *** - THE DESIGNER SHALL SPECIFY THE STRAND AREA IN THE STRUCTURE'S GENERAL NOTES.

TRANSVERSE TIE RODS SHALL BE 1" DIAMETER STEEL RODS CONFORMING TO ASTM A311, GRADE 1018, AND THREADED AT EACH END. PROVIDE A NUT AND WASHER AT EACH END. THREADS MAY BE CUT OR ROLLED. IF ROLLED THREADS ARE USED, THE MINIMUM DIAMETER AT THE ROOT OF THE THREADS SHALL BE 0.838". INSTALL AND TORQUE RODS TO APPROXIMATELY 250 FT-LBS. AFTER TIGHTENING, FILL THE RECESSES IN THE FASCIA BEAMS WITH NON SHRINK MORTAR OF THE SAME COLOR AS THE BEAM. TIE NO MORE THAN THREE BEAMS TOGETHER WITH ONE TRANSVERSE TIE ROD.

GALVANIZING: GALVANIZE ANCHOR DOWEL BARS, INSERTS, TIE RODS, NUTS AND WASHERS ACCORDING TO 711.02.

COMPOSITE BRIDGES:
 1. SURFACE PREPARATION: THOROUGHLY CLEAN THE TOP SURFACE OF THE BEAMS OF ALL DIRT, DUST AND OTHER FOREIGN MATERIALS WITH WATER, AIR UNDER PRESSURE OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY TO A DAMP CONDITION.
 2. SLAB PLACEMENT: COMPOSITE SLAB POURS ON MULTISPAN SPAN BRIDGES SHALL BE AS LONG AS PRACTICAL. IF NECESSARY, PLACE CONSTRUCTION JOINTS NEAR MIDSPAN, PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY. WHEN STRUCTURAL EXPANSION JOINTS ARE LOCATED AT THE PIERS, PLACE COMPOSITE SLAB BETWEEN THESE JOINTS WITHOUT ADDITIONAL CONSTRUCTION JOINTS EXCEPT AS NOTED IN 511.



ANCHOR DOWELS SHALL BE 1" DIAMETER SMOOTH STEEL RODS CONFORMING TO ASTM A311, GRADE 1018. THE DESIGNER SHALL INDICATE ON THE PLANS WHICH BEAM ENDS ARE TO BE ANCHORED AND IF THE ANCHOR IS FIXED OR EXPANSION. LOCATE THE ANCHOR DOWEL HOLES AND PRESTRESSING STRANDS TO AVOID MUTUAL INTERFERENCE. THE LATERAL SPACING OF THE HOLES IN THE BEAM SHALL BE SUCH THAT THE ANCHOR DOWELS CLEAR THE ELASTOMERIC BEARING AND ARE AS CLOSE TO THE CENTERLINE OF BEAM AS POSSIBLE.

AFTER TENSIONING OF THE TRANSVERSE TIE RODS, DRILL 1/16" MINIMUM DIAMETER DOWEL HOLES FOR FIXED DOWELS OR 1/4" MINIMUM DIAMETER HOLES FOR EXPANSION DOWELS INTO THE ABUTMENT OR PIER SEAT. CLEAN AND DRY DOWEL HOLES AND INSTALL DOWELS.

ELASTOMERIC BEARINGS: FOUR ELASTOMERIC BEARINGS ARE REQUIRED PER BEAM. POSITION AS SHOWN ON SHEET 4 OF 4.

PREFORMED BEARING PADS: WHERE THE ENGINEER DEEMS THAT SHIMS ARE REQUIRED, INSTALL PREFORMED BEARING PADS, 7/16" THICK AND OF THE SAME PLAN DIMENSIONS AS THE ELASTOMERIC BEARINGS.

BEAM ENDS: FIELD APPLY ITEM 512 TYPE B WATERPROOFING TO THE BOX BEAM ENDS THAT ARE NOT COMPLETELY ENCASED IN CONCRETE. SEAL ALL STRANDS WITH A SHOP APPLIED TYPE E WATERPROOFING PER 512.08. WATERPROOFING SHALL EXTEND A MINIMUM OF 2 INCHES SURROUNDING EACH STRAND END.

NOTCHES: PROVIDE NOTCHES IN THE BEAM ENDS AT ABUTMENTS TO ACCOMMODATE EXPANSION JOINT ANCHORAGES AS SHOWN ON STANDARD BRIDGE DRAWINGS EXJ-3-82 AND EXJ-5-93 AND AT PIERS TO ACCOMMODATE CONTINUITY AS SHOWN ON SHEET 4 OF 4.

DRIP GROOVES ON THE UNDERSIDE OF THE FASCIA BEAM ARE NOT PERMITTED.

SURFACE PREPARATION FOR MORTAR: THE FABRICATOR SHALL SANDBLAST THE KEYWAY SURFACES WITHIN FOUR DAYS OF SHIPMENT TO THE PROJECT SITE. THE SANDBLASTING SHALL YIELD A VISUAL APPEARANCE AND TEXTURE EQUAL OR ROUGHER THAN 100 GRIT SANDPAPER OVER THE ENTIRE KEYWAY SURFACE. WHEN STAINS ARE VISIBLE BEFORE BLASTING THE CONCRETE, USE A DEGREASER TO ENSURE REMOVAL OF GREASE, OILS AND OTHER SIMILAR CONTAMINATES. THE DEGREASER SHALL BE WATER SOLUBLE SO IT CAN BE REMOVED BEFORE THE BLASTING BEGINS. BEFORE MORTARING, REMOVE ALL DIRT, DUST, GREASE, OIL AND OTHER FOREIGN MATERIAL FROM THE SURFACES USING A HIGH PRESSURE WASH OF AT LEAST 1000 PSI AT A DELIVERY RATE OF AT LEAST 4 GAL/MIN.

MORTAR: MORTAR OR GROUT FOR TIE ROD RECESSES, ANCHOR DOWEL HOLES AND KEYWAYS BETWEEN PRESTRESSED CONCRETE BOX BEAMS, SHALL BE A NON-SHRINK TYPE AS DESCRIBED IN THE ALTERNATES BELOW. DURING THE GROUTING OPERATION, PREPARE AT LEAST THREE, 3" DIAMETER BY 6" LONG TEST CYLINDERS OF THE GROUTING MATERIAL. SUBMIT THE CYLINDERS TO THE LABORATORY TO DETERMINE THE MINIMUM COMPRESSIVE STRENGTH OF THE GROUT.

ALTERNATE 1 - OPEN TO TRAFFIC LATER THAN 7 DAYS AFTER GROUTING:

FURNISH MORTAR CONFORMING TO 705.22 OR TO PROPOSAL NOTE FOR HIGH EARLY STRENGTH KEYWAY GROUT. AFTER THE TIE RODS ARE TIGHTENED, PREPARE PLACE AND CURE THE MORTAR ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS. PLACE MORTAR IN A MANNER THAT ENSURES COMPLETE AND SOLID FILLING. THE MINIMUM STRENGTH OF THE MORTAR SHALL BE 5000 PSI BEFORE CONSTRUCTION OR VEHICULAR TRAFFIC IS ALLOWED ON THE BEAMS.

ALTERNATE 2 - PART WIDTH CONSTRUCTION OR OPEN TO TRAFFIC WITHIN 7 DAYS AFTER GROUTING:

FURNISH MORTAR CONFORMING TO PROPOSAL NOTE FOR HIGH EARLY STRENGTH GROUT. AFTER THE TIE RODS ARE TIGHTENED, PREPARE, PLACE AND CURE THE MORTAR ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS. PLACE MORTAR IN A MANNER THAT ENSURES COMPLETE AND SOLID FILLING. THE MINIMUM STRENGTH OF THE MORTAR SHALL BE 5000 PSI BEFORE CONSTRUCTION OR VEHICULAR TRAFFIC IS ALLOWED ON THE BEAMS.

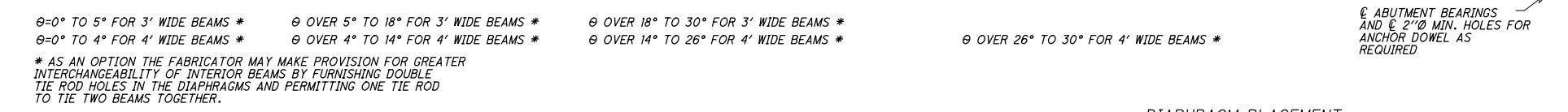
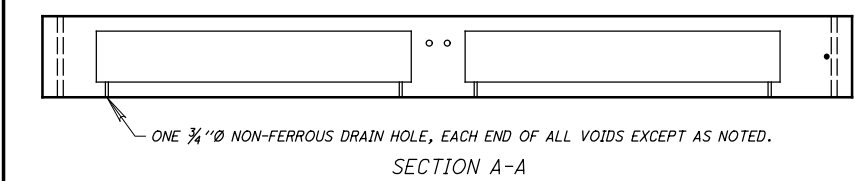
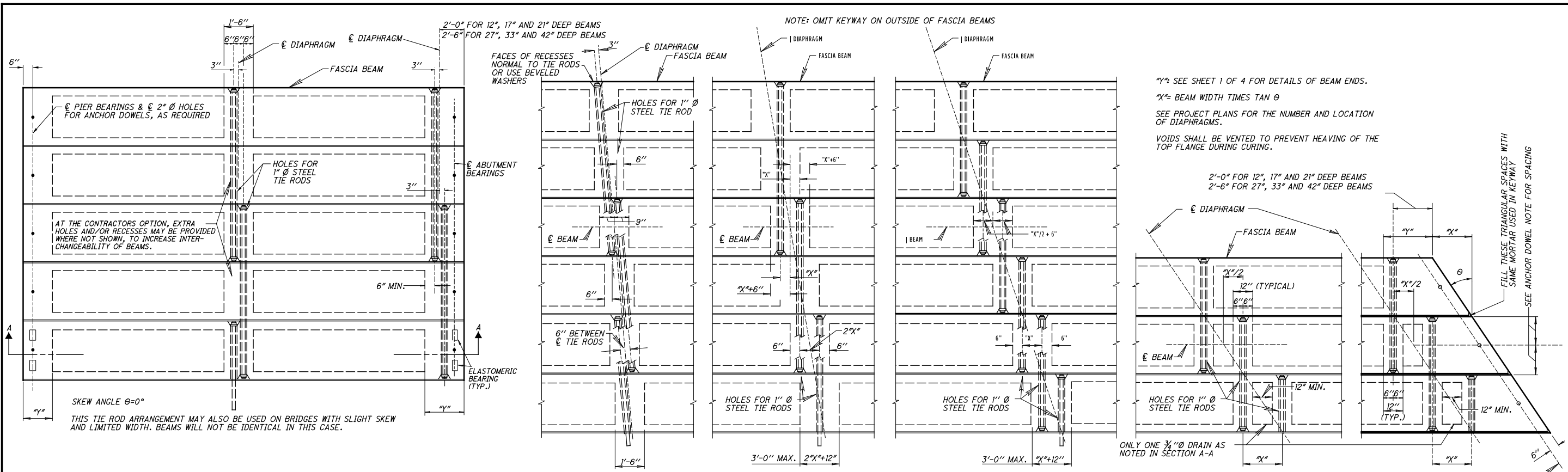
COMPOSITE BRIDGES:
 1. SURFACE PREPARATION: THOROUGHLY CLEAN THE TOP SURFACE OF THE BEAMS OF ALL DIRT, DUST AND OTHER FOREIGN MATERIALS WITH WATER, AIR UNDER PRESSURE OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY TO A DAMP CONDITION.
 2. SLAB PLACEMENT: COMPOSITE SLAB POURS ON MULTISPAN SPAN BRIDGES SHALL BE AS LONG AS PRACTICAL. IF NECESSARY, PLACE CONSTRUCTION JOINTS NEAR MIDSPAN, PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY. WHEN STRUCTURAL EXPANSION JOINTS ARE LOCATED AT THE PIERS, PLACE COMPOSITE SLAB BETWEEN THESE JOINTS WITHOUT ADDITIONAL CONSTRUCTION JOINTS EXCEPT AS NOTED IN 511.

BASIS OF PAYMENT: ALL COSTS ASSOCIATED WITH FURNISHING AND INSTALLING THE KEYWAY GROUT, THE ANCHOR DOWELS AND THE PREFORMED EXPANSION JOINT FILLER BETWEEN THE BEARINGS, IS CONSIDERED INCIDENTAL TO THE BOX BEAMS.

THE DEPARTMENT WILL PAY FOR FURNISHING AND INSTALLING TYPE B WATERPROOFING SEPARATELY.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION	10-19-07	DATE
ADMINISTRATOR		
REVISIONS	01-21-11	07-20-18
CHECKED	MRG/SAM/WLF/SEM	REVIEWER
DESIGNED	LMW	REF
OFFICE OF STRUCTURAL ENGINEERING		
PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS		
SCD NUMBER	PSBD-2-07	
1	4	

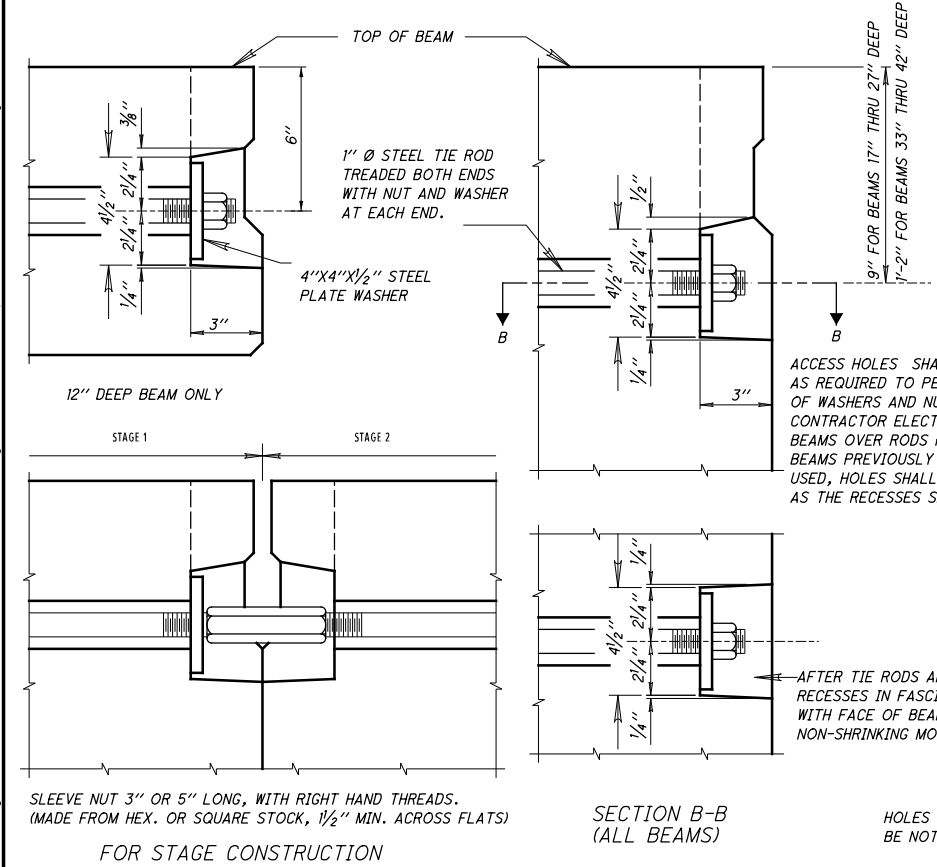
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TYPICAL PLANS OF DIAPHRAGMS AND TRANSVERSE TIE RODS

DIAPHRAGM PLACEMENT

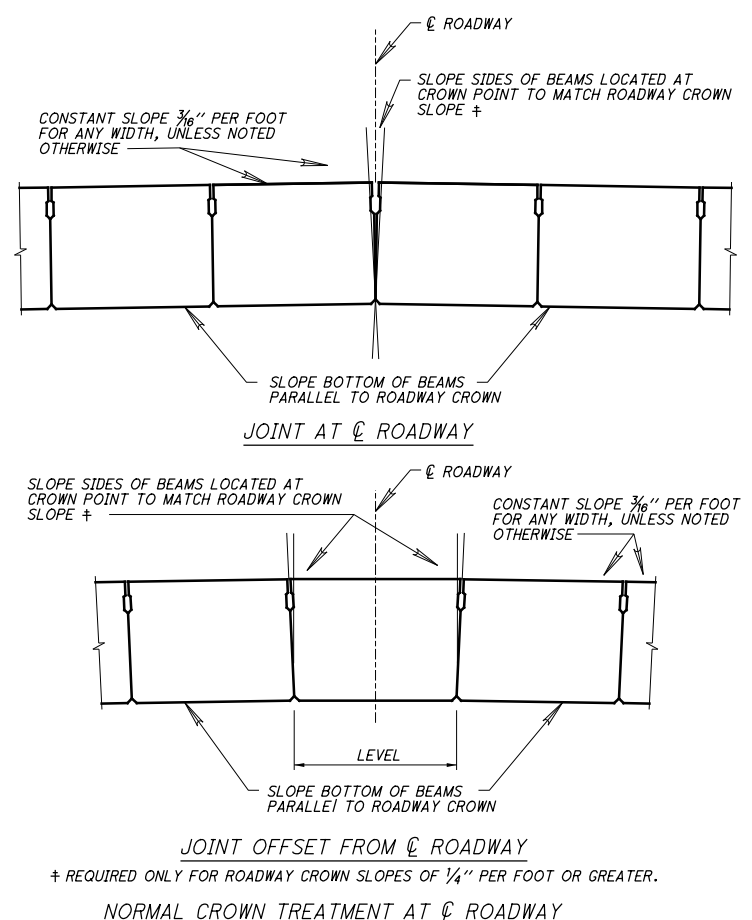
PROVIDE INTERMEDIATE DIAPHRAGMS AS FOLLOWS:
 SPAN $\leq 50'-0"$, ONE DIAPHRAGM
 $50'-0" < \text{SPAN} \leq 75'-0"$, TWO DIAPHRAGMS
 SPAN $> 75'-0"$, THREE DIAPHRAGMS



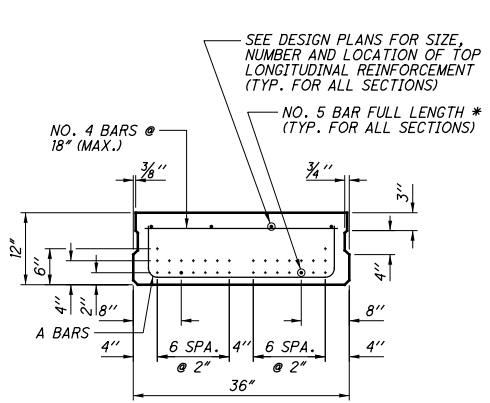
HOLES IN BEAMS FOR TRANSVERSE TIE RODS SHALL BE NOT LESS THAN 2" Ø AND NOT MORE THAN 3" Ø.

DIMENSIONS OF RECESSES IN FASCIA BEAMS AND SHEAR KEYS AND VERTICAL LOCATION OF TRANSVERSE TIE RODS MAY VARY FROM THE DIMENSIONS SHOWN HEREON, SUBJECT TO APPROVAL BY THE DIRECTOR.

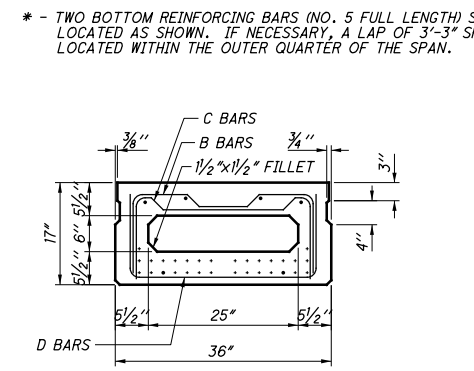
END DETAILS OF TRANSVERSE TIE ROD ANCHORAGE



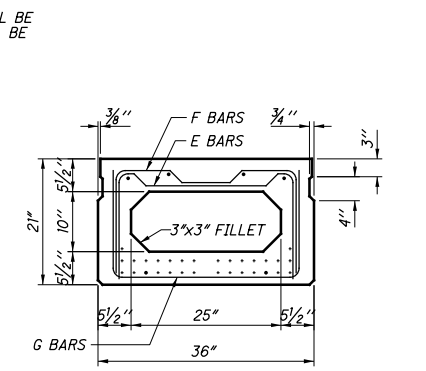
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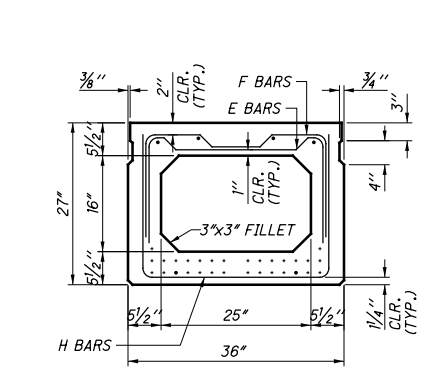
B12-36
(STRAND PATTERN TYPICAL FOR ALL 36" WIDE BEAMS)



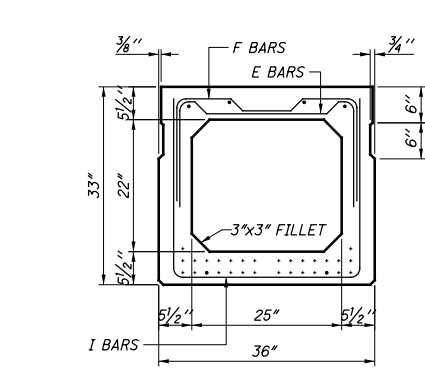
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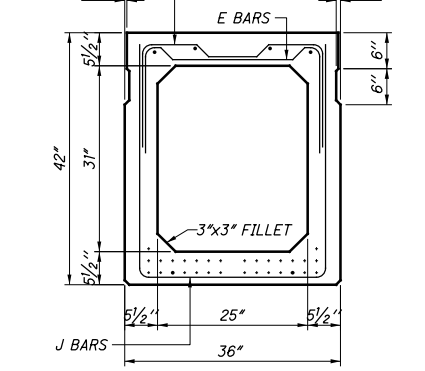
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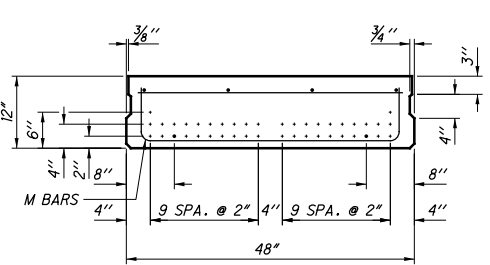
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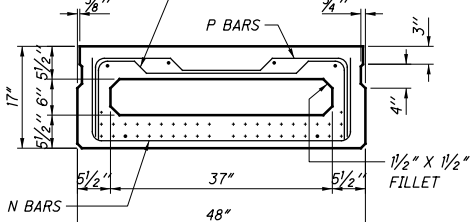
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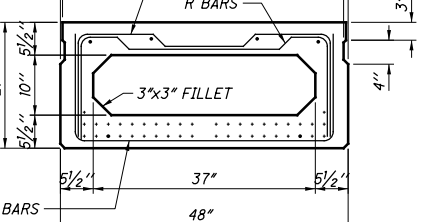
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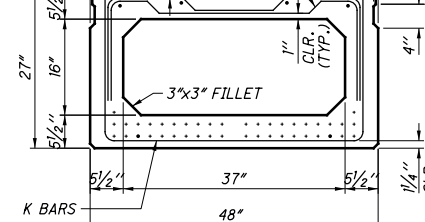
B12-48
(STRAND PATTERN TYPICAL FOR ALL 48" WIDE BEAMS)



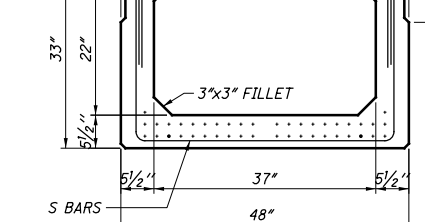
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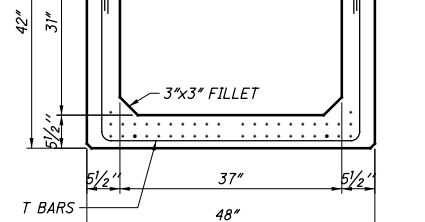
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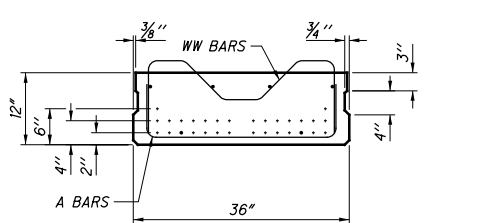
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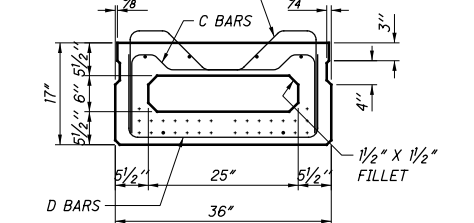
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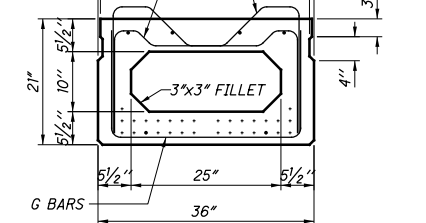
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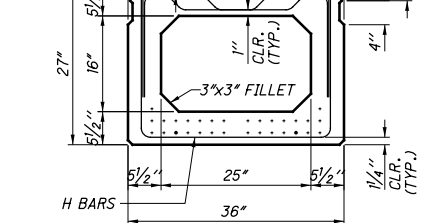
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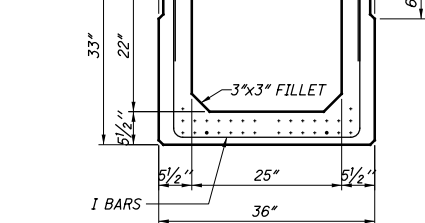
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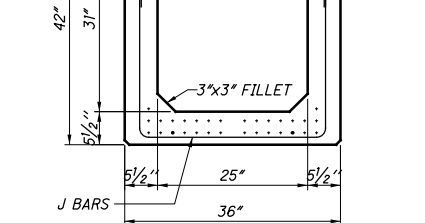
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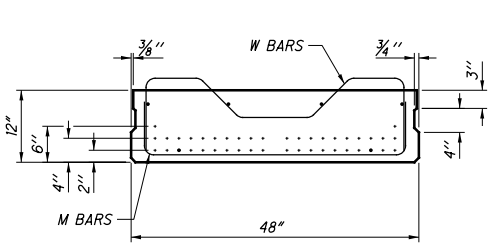
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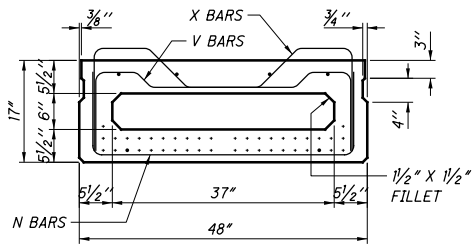
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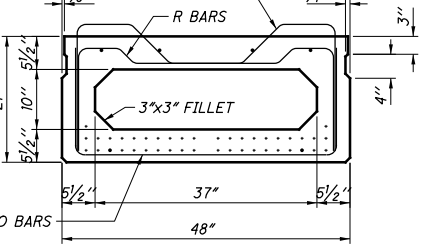
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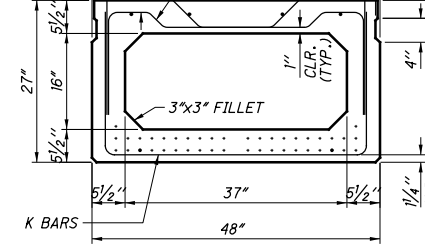
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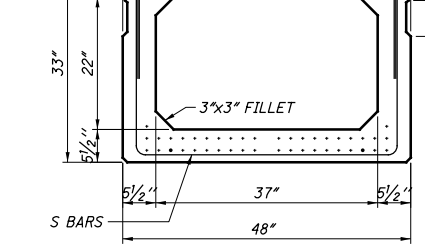
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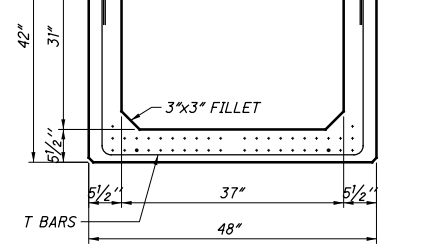
CB21-48



CB27-48



CB33-48



CB42-48

* - TWO BOTTOM REINFORCING BARS (NO. 5 FULL LENGTH) SHALL BE LOCATED AS SHOWN. IF NECESSARY, A LAP OF 3'-3" SHALL BE LOCATED WITHIN THE OUTER QUARTER OF THE SPAN.

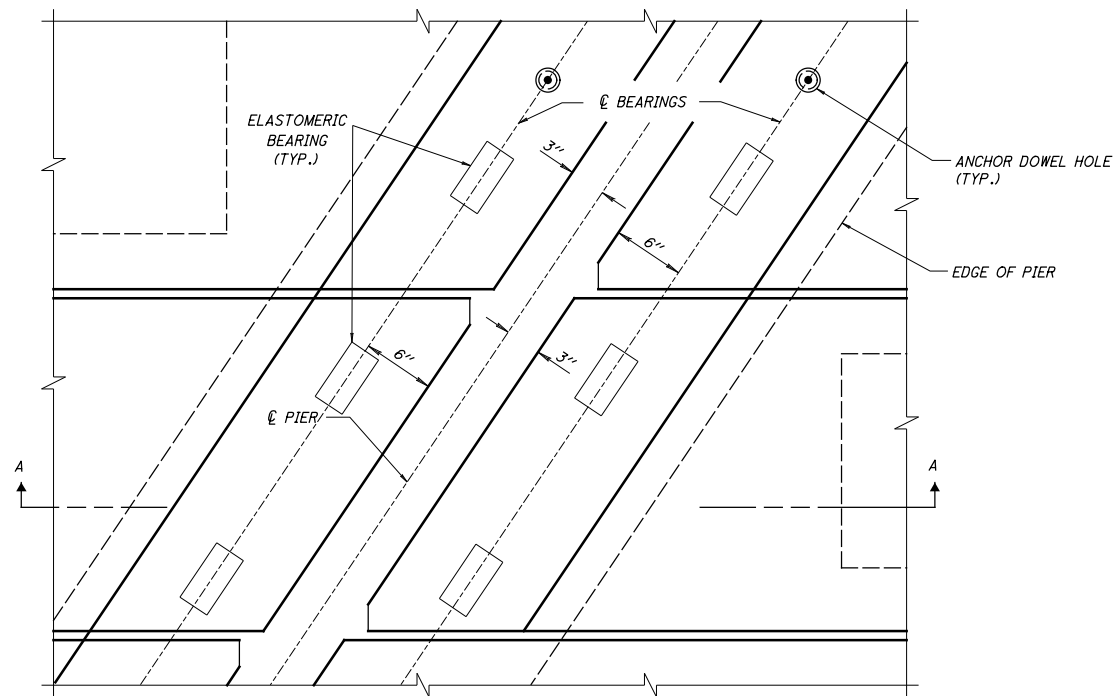
NOTES:

- STRANDS SHALL BE PLACED AS SHOWN AND SHALL BE DISTRIBUTED SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE DEBOND LENGTH SHALL BE SYMMETRICAL ABOUT THE VERTICAL C OF THE BEAM. DEBONDED STRANDS SHALL BE IN THE BOTTOM LAYER.
- ALTERNATE TOP STIRRUPS TO LAP BOTTOM STIRRUPS AT EACH END OF BEAM WHERE TWO TYPES OF TOP STIRRUPS ARE PROVIDED.
- THE MINIMUM TOP LONGITUDINAL REINFORCING STEEL SHALL BE 4-NO. 5 BARS. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS.

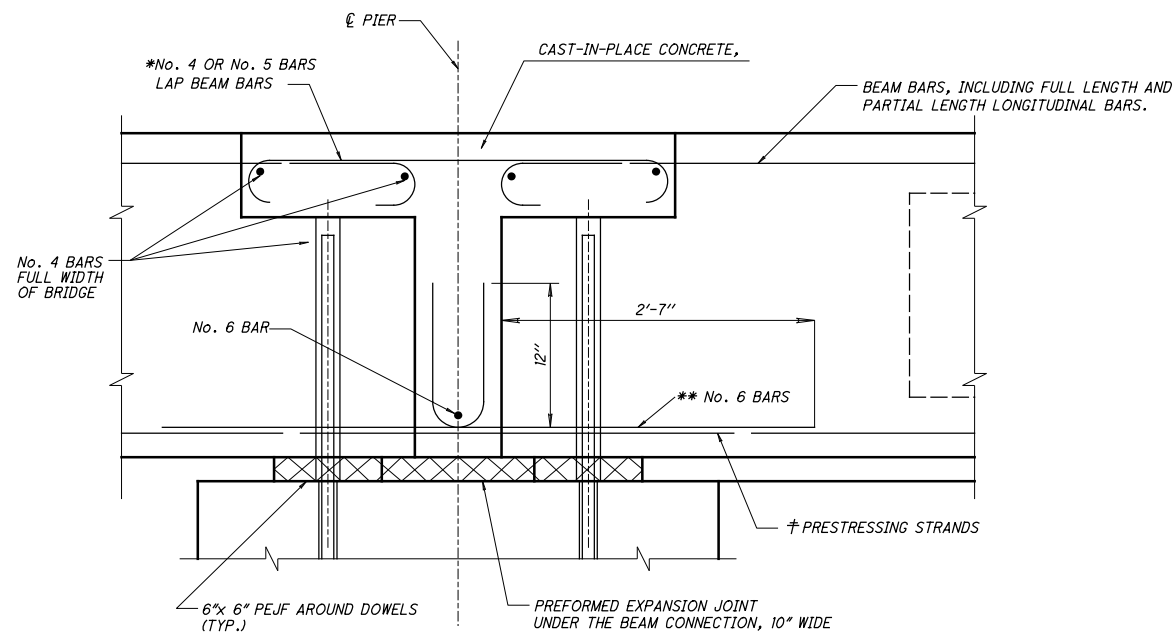
NOTES: (CONTINUED)

- FABRICATOR'S SHOP DRAWINGS SHALL SHOW COMPLETE DETAILS OF BEAM REINFORCING.
- SEE SHEET 4 OF 4 FOR REINFORCEMENT DETAILS, BENDING DIAGRAMS, AND BEAM SECTION PROPERTIES.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION		DATE 10-19-07	
OFFICE OF STRUCTURAL ENGINEERING		ADMINISTRATOR T. Kelly	
DESIGNED	CHECKED	REVISIONS	DATE
MRG/SAM/MLF/SEM	LMW	01-21-11	
DRAWN	REF	07-20-18	
STANDARD BRIDGE DRAWING			
PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS			
SCD NUMBER	PSBD-2-07		
3	4		



PARTIAL PLAN OF BEAM CONNECTION OVER PIER

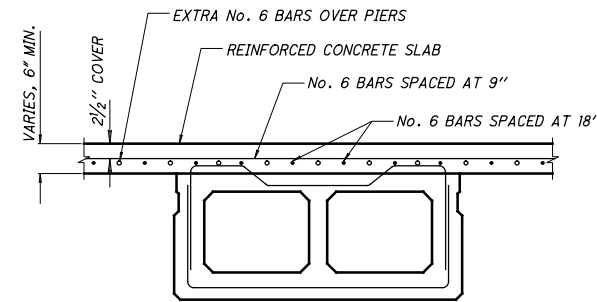


SECTION A-A

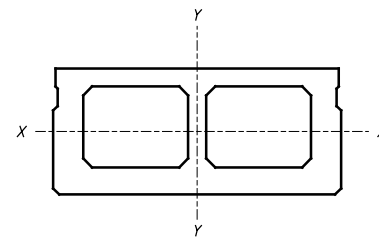
- * LAP BARS SAME SIZE AND NUMBER AS BEAM BARS. HOOKS MAY BE ROTATED FROM THE VERTICAL POSITION TO PROVIDE THE REQUIRED CLEARANCE.
 - ** PROVIDE 6 No. 6 BARS EACH BEAM END IN 48" WIDE BEAMS AND 4 No. 6 BARS EACH BEAM END IN 36" WIDE BEAMS. No. 6 BARS SHALL BE LOCATED ON TOP OF STIRRUPS AND SHALL BE UNIFORMLY SPACED ACROSS THE BEAM.
 - † AT THE FABRICATOR'S OPTION, STRANDS MAY BE EXTENDED AND BENT UP IN LIEU OF No. 6 BARS. 48" WIDE BEAMS WITH A TOTAL OF 12 OR MORE STRANDS SHALL HAVE A MINIMUM OF 6 STRANDS BENT UP. 48" WIDE BEAMS WITH LESS THAN 12 STRANDS TOTAL SHALL HAVE APPROXIMATELY ONE HALF OF THE TOTAL NUMBER OF STRANDS BENT UP. 36" WIDE BEAMS WITH A TOTAL OF 8 OR MORE STRANDS SHALL HAVE A MINIMUM OF 4 STRANDS BENT UP. 36" WIDE BEAMS WITH LESS THAN 8 STRANDS TOTAL SHALL HAVE APPROXIMATELY ONE HALF OF THE TOTAL NUMBER OF STRANDS BENT UP.
- NOTE: THE PRESTRESSING STRANDS WHICH ARE BENT UP SHALL BE STAGGERED IN ABUTTING BEAM ENDS TO AVOID INTERFERENCE.

BENT REINFORCING BARS							BENDING DIAGRAMS	
MARK	TYPE	A	B	C	D	E		
A	1	32"	8"					
B	2	32"	13"	10 1/2"	2"	7"		
C	2	32"	13"	4 1/2"	2"	19"		
D	1	32"	13"					
E	2	32"	17"	4 1/2"	2"	19"		
F	2	32"	17"	10 1/2"	2"	7"		
G	1	32"	17"					
H	1	32"	23"					
I	1	32"	29"					
J	1	32"	38"					
K	1	44"	23"					
M	1	44"	8"					
N	1	44"	13"					
O	1	44"	17"					
P	2	44"	13"	13 1/2"	2"	13"		
Q	2	44"	17"	13 1/2"	2"	13"		
R	2	44"	17"	7 1/2"	2"	25"		
S	1	44"	29"					
T	1	44"	38"					
V	2	44"	13"	7 1/2"	2"	25"		
W	2	44"	12"	9 1/2"	6 1/2"	12"		
X	2	44"	17"	9 1/2"	6 1/2"	12"		
Y	2	44"	21"	9 1/2"	6 1/2"	12"		
WW	2	32"	12"	6 1/2"	6 1/2"	6"		
XX	2	32"	17"	6 1/2"	6 1/2"	6"		
YY	2	32"	21"	6 1/2"	6 1/2"	6"		

NOTE: ALL BARS ARE #4



36" OR 48" WIDE COMPOSITE BEAM WITH SLAB



36" OR 48" WIDE COMPOSITE BEAM

48" WIDE BOX BEAM - SECTION PROPERTIES							
BEAM ONLY	D	12"	17"	21"	27"	33"	42"
	A _b	567.8	590.3	647.8	713.8	774.5	873.5
	I _b	6850	18819	33884	66222	111342	205459
	Y _b	5.97"	8.44"	10.42"	13.39"	16.33"	20.78"
COMPOSITE SECTION	Z _t	1136	2198	3202	4866	6681	9684
	Z _b	1147	2230	3253	4945	6816	9886
	I _c	18681	38620	62057	109704	173831	303315
	Y _b ^c	8.32	11.40	13.69	17.13	20.51	25.49
Z _t ^c	5079	6898	8489	11119	13922	18367	
Z _b ^c	2245	3387	4533	6403	8474	11901	

36" WIDE BOX BEAMS - SECTION PROPERTIES							
BEAM ONLY	D	12"	17"	21"	27"	33"	42"
	A _b	423.8	458.3	515.8	581.8	642.5	741.5
	I _b	5122	14122	25622	50634	86049	161155
	Y _b	5.96"	8.42"	10.40"	13.37"	16.30"	20.75"
COMPOSITE SECTION	Z _t	848	1646	2416	3714	5153	7582
	Z _b	859	1677	2464	3788	5279	7768
	I _c	14003	29153	47126	83956	134078	236517
	Y _b ^c	8.32	11.31	13.53	16.88	20.17	25.00
Z _t ^c	3809	5127	6308	8296	10448	13916	
Z _b ^c	1682	2577	3483	4974	6649	9459	

SECTION PROPERTIES FOR COMPOSITE SECTIONS ARE COMPUTED WITH A SLAB THICKNESS OF 5". TOTAL THICKNESS OF SLAB IS 6" WHICH INCLUDES 1" MONOLITHIC WEARING SURFACE.

$$\frac{E_{slab}}{E_{beam}} = 0.90$$

DEFINITIONS:

- D = TOTAL DEPTH OF THE NON-COMPOSITE BEAM (IN)
- A_b = CROSS-SECTIONAL AREA OF THE NON-COMPOSITE BEAM (IN²)
- I_b = MOMENT OF INERTIA OF THE NON-COMPOSITE BEAM ABOUT THE X-X AXIS (IN⁴)
- Y_b = LOCATION OF THE NEUTRAL AXIS OF THE NON-COMPOSITE SECTION MEASURED FROM THE EXTREME BOTTOM FIBER (IN)
- Z_t = SECTION MODULUS FOR THE EXTREME TOP FIBER OF THE NON-COMPOSITE BEAM (IN³)
- Z_b = SECTION MODULUS FOR THE EXTREME BOTTOM FIBER OF THE NON-COMPOSITE BEAM (IN³)
- I_c = MOMENT OF INERTIA OF THE COMPOSITE BEAM ABOUT THE X-X AXIS (IN⁴)
- Y_b^c = LOCATION OF NEUTRAL AXIS OF COMPOSITE SECTION MEASURED FROM THE EXTREME BOTTOM FIBER (IN)
- Z_t^c = SECTION MODULUS FOR THE EXTREME TOP FIBER OF COMPOSITE SECTION (IN³)
- Z_b^c = SECTION MODULUS FOR THE EXTREME BOTTOM FIBER OF THE COMPOSITE SECTION (IN³)