IOWA DOT

Highway Division

H24–06 THREE SPAN PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE STANDARDS

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STRUCTURAL RESISTANCE LEVEL-1 (SRL-1) REPLACES THE 50 TON STEEL PILE DESIGNATION.

STRUCTURAL RESISTANCE LEVEL-2 (SRL-2) REPLACES THE 75 TON STEEL PILE DESIGNATION.

FOR MORE INFORMATION ON STRUCTURAL RESISTANCE LEVELS (SRL-1 & SRL-2), SEE THE BRIDGE DESIGN MANUAL, LOCATED ON THE IOWA DEPARTMENT OF TRANSPORTATIONS, OFFICE OF BRIDGES AND STRUCTURES, WEBSITE.

REVISED 05-13 - THE GENERAL NOTES AND SPECIFICATIONS MOVED TO STANDARD SHEET H30-01A-06. SRL NOTATION ADDED.

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

INDEX SHEET

H24-01-06

GENERAL NOTES:

THE H24-06 BRIDGE STANDARDS, IF PROPERLY USED, PROVIDE THE STRUCTURAL PLANS NECESSARY TO CONSTRUCT THREE SPAN 24' ROADWAY PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES WITH LENGTHS OF 138'-10, 151'-4, 163'-10, 176'-4, 188'-10, 201'-4, 213'-10, 226'-4 AND 243'-0.

THESE BRIDGES MAY BE BUILT ON A 0°, 15°, 30° OR 45° SKEW. THESE PLANS SHOW THE BRIDGES SKEWED IN ONE DIRECTION, BUT ALL DIMENSIONS AND DETAILS WOULD BE THE SAME FOR THE OPPOSITE SKEW.

THESE BRIDGES ARE DESIGNED FOR HL93 LOADING PLUS 20 LBS. PER SQ. FT. OF ROADWAY FOR FUTURE WEARING SURFACE. CONTROL OF CRACKING BY DISTRIBUTION OF REINFORCEMENT FOR SLAB DESIGN BASED ON PRE LRFD 2005 INTERIMS.

NOTE THAT WHEN APPROACH PAVEMENT IS TO BE PLACED, THE TEMPORARY PAVING BLOCKS SHALL BE REMOVED AND A PROPER JOINT FOR EXPANSION SHALL BE PROVIDED BETWEEN THE BRIDGE AND THE APPROACH PAVING.

THE FLOOR SLAB AS SHOWN INCLUDES ½" INTEGRAL WEARING SURFACE.

THE ABUTMENTS FOR THESE BRIDGES ARE BUILT INTEGRAL WITH THE SUPERSTRUCTURE. THEREFORE, IT IS IMPORTANT THAT A PROPER JOINT FOR EXPANSION BE PROVIDED BETWEEN THE BRIDGE AND APPROACH PAVING, WHEN APPROACH PAVING IS NEEDED.

THE INTEGRAL ABUTMENT DESIGN UTILIZED ON THESE BRIDGES RESTRICTS THEIR USE IN THE FOLLOWING MANNER:

(1) THE 201'-4, 213'-10, 226'-4 AND 243'-0 BRIDGES SHALL USE STEEL PILES AT THE ABUTMENTS.
(2) THESE BRIDGES ARE NOT TO BE USED WHEN POINT BEARING FOR THE ABUTMENT STEEL PILING WOULD BE OBTAINED ON ROCK AT A DISTANCE LESS THAN 15 FEET FROM THE BOTTOM OF FOOTING.
(3) THE ABUTMENT PILING ARE TO BE DRIVEN THROUGH OVERSIZED HOLES PREBORED TO A MINIMUM OF 10 FEET BELOW THE BOTTOM OF FOOTING. THE PREBORED HOLES SHALL BE IN ACCORDANCE WITH SECTION 2501.19 OF THE STANDARD SPECIFICATIONS. THE ELEVATION OF THE BOTTOM OF THE PREBORED HOLE SHALL BE SHOWN ON THE PLANS.

THESE STANDARDS GIVE MOST OF THE INFORMATION NECESSARY TO BUILD THESE BRIDGES ON EITHER A CREST VERTICAL CURVE OR A STRAIGHT GRADE. BECAUSE OF THE INFINITE NUMBER OF GRADE POSSIBILITIES IT WILL BE NECESSARY TO SHOW ON THE PLANS THE ABUTMENT AND PIER STEP DIMENSIONS. TO HELP IN OBTAINING THIS STEP INFORMATION SEE "EXAMPLES OF BRIDGE SEAT AND STEP CALCULATIONS" ON SHEET H24-02-06 .

THE ABUTMENT FOOTING AND PIER CAP CONCRETE QUANTITIES SHOWN IN THESE PLANS ARE CALCULATED BASED ON A 0.3% GRADE. FOR HIGHER GRADES, THESE CONCRETE QUANTITIES FOR BRIDGES SKEWED AT 15°, 30°, AND 45° MAY NEED TO BE INCREASED. IN ADDITION, THE LAYOUT OF THE PIER CAP STEP REINFORCING STEEL IS GRADE DEPENDENT FOR BRIDGES SKEWED AT 15°, 30°, AND 45°. SEE SHEETS H24-17-06, H24-24-06, AND H24-31-06 TO DETERMINE THE ADDITIONAL CONCRETE QUANTITIES REQUIRED AND FOR THE LAYOUT AND QUANTITY OF THE PIER CAP STEP REINFORCING STEEL.

PROVIDE TOP OF SLAB ELEVATIONS AND WING ELEVATIONS A, B AND C AS NOTED ON THE STANDARD SHEETS (LONGITUDINAL SECTION).

VARIOUS TYPES OF PIERS MAY BE USED WITH THESE STANDARDS. IT SHOULD BE NOTED THAT THE DETAILS FOR THE PIER DIAPHRAGM ON THE SUPERSTRUCTURE DEPEND ON THE TYPE OF PIER USED.

THE PIERS AND ABUTMENTS FOR THESE STANDARDS HAVE BEEN DESIGNED FOR THE USE OF BOTH FRICTION AND POINT BEARING PILES. IT IS NECESSARY THAT THE TYPE AND LENGTH FOR BOTH THE ABUTMENT AND PIER PILES BE DESIGNATED ON THE FRONT SHEET OF THE PLANS.

THE INTEGRAL ABUTMENTS, PILE BENTS, AND TEE PIERS FOR THESE H24 STANDARDS HAVE BEEN DESIGNED FOR THE USE OF VARIOUS TYPES OF PILE FOOTINGS OR SPREAD FOOTINGS AS FOLLOWS.

- INTEGRAL ABUTMENTS: TIMBER PILES (LIMITED BY BRIDGE LENGTH) OR HP10x57 PILES AT BRIDGE DESIGN MANUAL (BDM) ARTICLE 6.2.6.1 STRUCTURAL RESISTANCE LEVEL-1 (SRL-1)
- PILE BENTS: STANDARD CONCRETE-FILLED STEEL PIPE PILES (PIOL), STANDARD PRESTRESSED CONCRETE PILES (PIOL), OR STANDARD H-PILES (PIOL AND SRL-1)
- TEE PIERS: HP10x57 PILES AT BRIDGE DESIGN MANUAL (BDM) ARTICLE 6.2.6.1 STRUCTURAL RESISTANCE LEVEL-1 OR 2 (SRL-1 OR SRL-2) OR SPREAD FOOTINGS

STRUCTURAL RESISTANCE LEVEL-1 (SRL-1) REPLACES THE 50 TON STEEL PILE DESIGNATION.

STRUCTURAL RESISTANCE LEVEL 2 (SRL-2) REPLACES THE 75 TON STEEL PILE DESIGNATION.

FOR MORE INFORMATION ON SRL-1 AND SRL-2, SEE THE BRIDGE DESIGN MANUAL, LOCATED ON THE IOWA DEPARTMENT OF TRANSPORTATION, OFFICE OF BRIDGES AND STRUCTURES WEB SITE.

3" WING PVC PIPE IS INCIDENTAL TO STRUCTURAL CONCRETE.

BECAUSE THESE BRIDGE STANDARDS HAVE BEEN REVISED FOR LRFD BASED ON 2012-COMPLETED IOWA STATE UNIVERSITY RESEARCH, FOR PILE FOUNDATIONS THE DESIGNER WILL NEED TO DETERMINE THE CONSTRUCTION CONTROL METHOD, CONTRACT LENGTH, AND DRIVING TARGET AND GIVE THAT INFORMATION ON THE FRONT SHEET OF THE PLANS. BRIDGE DESIGN MANUAL CADD NOTES E17.7, E7.18, E7.19, E8.18, AND E8.19 ARE APPROPRIATE FOR THAT PURPOSE. THE NOTES, AS WELL AS THE BRIDGE DESIGN MANUAL AND DESIGN EXAMPLES, ARE AVAILABLE ON THE OFFICE OF BRIDGES AND STRUCTURES WEB SITE: HTTP://WWW.IOWADOT.GOV/BRIDGE/INDEX.HTM.

THESE STANDARDS ARE FOR USE FOR BRIDGES WITH NON-EPOXY COATED REINFORCING. REINFORCING BAR LAP LENGTHS ARE BASED ON THE USE OF NON-EPOXY COATED REINFORCING.

FOR PIERS SUBJECT TO SCOUR THE DESIGN BEARING SHALL BE OBTAINED BELOW SCOUR ELEVATION. SCOUR ELEVATION SHALL BE SHOWN ON THE FRONT SHEET.

CONCRETE INTERMEDIATE DIAPHRAGMS SHALL BE USED FOR OVERPASS BRIDGES. THE DESIGNER SHALL ADJUST THE CONCRETE AND REINFORCING QUANTITIES ACCORDINGLY.

KEYWAY DIMENSIONS SHOWN ON THE PLANS ARE BASED ON NOMINAL DIMENSIONS UNLESS STATED OTHERWISE. IN ADDITION, THE BEVEL USED ON THE KEYWAY SHALL BE LIMITED TO A MAXIMUM OF 10 DEGREES FROM VERTICAL.

THESE BRIDGE PLANS LABEL ALL REINFORCING STEEL WITH ENGLISH NOTATION (5a1 IS $\frac{5}{8}$ INCH DIAMETER BAR). ENGLISH REINFORCING STEEL RECEIVED IN THE FIELD MAY DISPLAY THE FOLLOWING "BAR DESIGNATION". THE "BAR DESIGNATION" IS THE STAMPED IMPRESSION ON THE REINFORCING BARS, AND IS EQUIVALENT TO THE BAR DIAMETER IN MILLIMETERS.

ENGLISH SIZE	3	4	5	6	7	8	9	10	11
BAR DESIGNATION	10	13	16	19	22	25	29	32	36

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4th Ed, SERIES OF 2007.
REINFORCING STEEL IN ACCORDANCE WITH LRFD AASHTO SECTION 5, GRADE 60.
CONCRETE IN ACCORDANCE WITH LRFD AASHTO SECTION 5, f'c = 3,500 PSI.
FOR STANDARD PRESTRESSED CONCRETE BEAMS, SEE SHEETS H24-32-06 THRU H24-37-06

SPECIFICATIONS:

DESIGN:
AASHTO LRFD 4th Ed, SERIES OF 2007.

CONSTRUCTION:
IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2012, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.

05-13
LATEST REVISION DATE

Marcus K. McCandless
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

GENERAL NOTES | H24-01A-06

REVISED 05-13 - THIS STANDARD RENAMED TO H30-01A-06. INDEX SHEET INFORMATION ON STANDARD H30-01-06.

EXAMPLES OF BRIDGE SEAT AND STEP CALCULATIONS:

THE DESIGNER SHALL SHOW ON THE PLANS THE 4 ELEVATIONS AND THE 3 STEP DIMENSIONS REQUIRED FOR EACH OF THE PIER TOP AND ABUTMENT BRIDGE SEATS.

THE BOXED IN DETAILS IN THE FOLLOWING EXAMPLES SHOW HOW THE INFORMATION SHOULD BE INDICATED ON THE PLANS.

EXAMPLE NO. 1

A STRAIGHT GRADE OF -3.25% WITH THE P.I. STATION OF 103+75.00 AND ELEVATION OF 653.29. THE BRIDGE LENGTH IS 213'-10 ℄ TO ℄ OF ABUTMENT BEARINGS WITH 30° SKEW RIGHT AHEAD.

STATIONS

℄ BRIDGE STA.	=	105+85.00	
± ½ OF L2	±	38.67	
℄ PIER BRGS.	=	105+46.33	106+23.67
± LI		- 68.25	+ 68.25
℄ ABUTMENT BRGS.	=	104+78.08	106+91.92

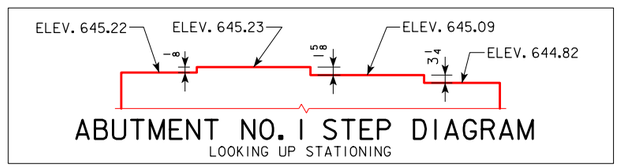
ELEVATIONS ALONG PROFILE GRADE LINE (P.G.L. ELEV.)

℄ ABUT. BRG. = 653.29-[(104+78.08)-(103+75.00)](0.0325) = 649.94
℄ PIER BRG. = 653.29-[(105+46.33)-(103+75.00)](0.0325) = 647.72
℄ PIER BRG. = 653.29-[(106+23.67)-(103+75.00)](0.0325) = 645.21
℄ ABUT. BRG. = 653.29-[(106+91.92)-(103+75.00)](0.0325) = 642.99

ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING
(BEAM SPACING)(TAN. SK.△)(GRADE) = (7.00)TAN 30°(0.0325) = 0.13'

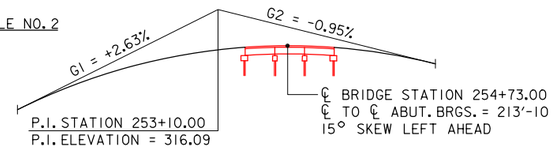
ABUTMENT NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	EXTERIOR
PGL ELEV.	649.94	649.94	649.94	649.94
SK. △CORRECT	+0.20	+0.07	-0.07	-0.20
SLAB CROWN	-0.18	-0.04	-0.04	-0.18
TOP SLAB ELEV.	649.96	649.97	649.83	649.56
-"U" (4'-8⅞)	-4.74	-4.74	-4.74	-4.74
BR. SEAT ELEV.	645.22	645.23	645.09	644.82



ABUTMENT NO. 1 STEP DIAGRAM
LOOKING UP STATIONING

EXAMPLE NO. 2



FROM SHEET H24-03-06 { LENGTH OF VERTICAL CURVE = (20000)(0.0358) = 716 FEET
M.O. = (0.0358)(716)(⅛) = 3.204 FEET

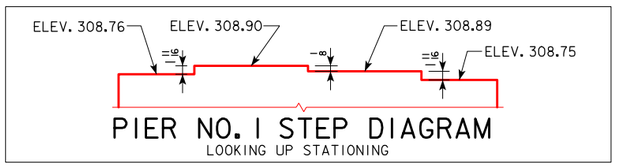
STATIONS

℄ BRIDGE STA.	=	254+73.00	
± ½ OF L2	±	38.67	
℄ PIER BRGS.	=	254+34.33	255+11.67
± LI		- 68.25	+ 68.25
℄ ABUTMENT BRGS.	=	253+66.08	255+79.92

ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING
(BEAM SPACING)(TAN. SK.△) = (7.00')TAN 15° = 1.88'

PIER NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	EXTERIOR
STATION	254+37.15	254+35.27	254+33.39	254+31.51
PGL ELEV.	+313.55	+313.55	313.54	313.54
SLAB CROWN	-0.18	-0.04	-0.04	-0.18
TOP SLAB ELEV.	313.37	313.51	313.50	313.36
-"U" (4'-7 5/16)	-4.61	-4.61	-4.61	-4.61
BR. SEAT ELEV.	308.76	308.90	308.89	308.75



PIER NO. 1 STEP DIAGRAM
LOOKING UP STATIONING

TEE PIER NOTES:

THE TEE PIERS SHOWN IN THESE PLANS ARE DESIGNED FOR USE WITH THE H24-06 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE STANDARDS. THE PIER MAY BE USED FOR EITHER GRADE SEPARATION OR STREAM CROSSING STRUCTURES. THE PIERS WERE DESIGNED FOR THE FOLLOWING STREAM FORCE AND ICE LOADING CONDITIONS, AND SHOULD NOT BE USED WHERE THESE LOADING CONDITIONS ARE EXCEEDED.

ICE FORCE:
ICE FORCES WERE APPLIED AT A HEIGHT OF H/2 + 1'-6 ABOVE THE BOTTOM OF THE PIER FOOTING, WHERE H IS THE OVERALL HEIGHT OF PIER. THE EFFECTIVE ICE STRENGTH WAS 24 KSF FOR 1'-7 OF ICE DEPTH. A PRIMARY ICE FORCE (F) WAS CALCULATED ACCORDING TO THE LRFD SPECIFICATIONS AND APPLIED TO THE PIER STEM AS FOLLOWS:

CASE 1: 100% OF F APPLIED PARALLEL TO THE PIER'S LONG AXIS AND 15% OF F APPLIED PERPENDICULAR TO THE PIER'S LONG AXIS.
CASE 2: 50% OF F APPLIED PARALLEL TO THE PIER'S LONG AXIS AND 34% OF F APPLIED PERPENDICULAR TO THE PIER'S LONG AXIS.

STREAM FLOW:
THE STREAM VELOCITY USED WAS 5 FT/SEC WITH THE C_D COEFFICIENT EQUAL TO 1.4. THE RESULTING STREAM FORCE WAS ASSUMED TO ACT PARALLEL TO THE PIER'S LONG AXIS. IT WAS ASSUMED THAT SUPERSTRUCTURE ELEMENTS WILL CLEAR HIGH WATER BY APPROXIMATELY 3'-0.

FOOTING GEOMETRY:
IT WAS ASSUMED THAT THE PIER FOOTING WILL BE SET APPROXIMATELY 6'-0 BELOW THE ADJACENT STREAMBED OR GROUND SURFACE. IT WAS ALSO ASSUMED THAT THERE ARE NO SIGNIFICANT UNBALANCED EARTH PRESSURES APPLIED TO THE PIER.

ALL BRIDGES WITH TEE PIERS DETAILED ON THESE STANDARDS ARE INTENDED TO HAVE ONE FIXED PIER AND ONE EXPANSION PIER. THE PILE LAYOUT AND REINFORCEMENT SHOWN ARE THE SAME FOR EITHER FIXED OR EXPANSION PIER. THE ONLY DISTINCTION BETWEEN FIXED PIER AND EXPANSION PIER LIES IN THE SELECTION OF BEARINGS AND PRESENCE OF THE KEYWAY IN THE TOP OF THE CAP. EACH BRIDGE SHALL HAVE ONE SET OF FIXED BEARINGS AND ONE SET OF EXPANSION BEARINGS, WHICH MAY BE USED ON EITHER PIER 1 OR PIER 2. THE KEYWAY IN THE TOP OF THE CAP SHOULD BE ELIMINATED FROM THE EXPANSION PIER.

HP10x57 STEEL PILE SHALL BE USED IN THE PILE FOOTINGS OF THE PIERS FOR EITHER FRICTION OR POINT BEARING PILE CONDITIONS. FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK. NOMINAL STRUCTURAL RESISTANCE WAS TAKEN AS 243 KIPS FOR HP10x57 SLR-1 FRICTION BEARING PILES AND 365 KIPS FOR HP10x57 SLR-2 POINT BEARING PILES. A NOMINAL UPLIFT RESISTANCE OF 42 KIPS PER PILE WAS USED IN THE DESIGN OF THE PIER FOOTINGS. THE PIER SHALL NOT BE USED AT SITES WHERE THIS UPLIFT FORCE CANNOT BE ACHIEVED DUE TO SPECIFIC CONDITIONS SUCH AS NEAR SURFACE ROCK LAYERS.

WHEN PIERS ARE USED IN GRADE SEPARATION STRUCTURES, EPOXY COATED REINFORCEMENT MAY BE REQUIRED FOR PIER COLUMNS. CONSULT CURRENT POLICY FOR GUIDANCE ON THE USE OF EPOXY COATED REINFORCEMENT IN SUCH CASES. ADJUST THE dl COLUMN BAR PROJECTION INTO THE CAP AND dl/d2 LAP DISTANCE ACCORDINGLY.

05-13
LATEST REVISION DATE

Norman K. Mc Donald
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

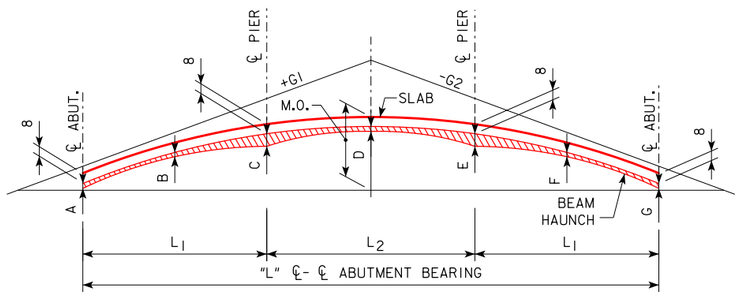
STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

GENERAL INFORMATION | H24-02-06

REVISED 05-13 - TEE PIER NOTES WERE CHANGED TO LRFD SPECS.



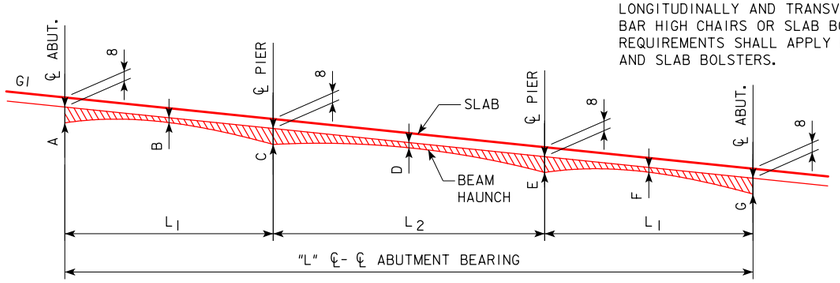
℄-℄ ABUT. BRG. "L"	A ℄ ABUT.	B	C ℄ PIER	D	E ℄ PIER	F	G ℄ ABUT.
138'-10	1	9/16	1 7/16	1/2	1 7/16	9/16	1
151'-4	7/8	5/8	1 11/16	9/16	1 11/16	5/8	7/8
163'-10	7/8	9/16	1 7/16	9/16	1 7/16	9/16	7/8
176'-4	7/8	5/8	1 5/8	1/2	1 5/8	5/8	7/8
188'-10	7/8	5/8	2	9/16	2	5/8	7/8
201'-4	1/2	11/16	1 3/8	1/2	1 3/8	11/16	1/2
213'-10	11/16	5/8	1 3/8	9/16	1 3/8	5/8	11/16
226'-4	1 1/8	9/16	1 5/8	9/16	1 5/8	9/16	1 1/8
243'-0	1 1/2	9/16	1 5/8	9/16	1 5/8	9/16	1 1/2

LENGTH OF VERTICAL CURVE REQUIRED = (20,000)(G1-G2)

M.O. = (G1-G2)(LENGTH OF V.C.) / 8

(G1-G2) IS THE ALGEBRAIC DIFFERENCE OF THE APPROACH GRADES EXPRESSED IN DECIMAL FORM. G1 NEED NOT HAVE THE SAME VALUE AS G2. MAXIMUM VALUE OF G1 OR G2 IS 5%. LENGTH OF CURVE AND M.O. ARE IN FEET.

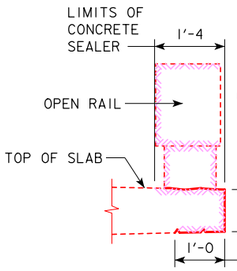
SLAB AND HAUNCH THICKNESS AT BEAMS FOR VERTICAL CURVE



℄-℄ ABUT. BRG. "L"	A ℄ ABUT.	B	C ℄ PIER	D	E ℄ PIER	F	G ℄ ABUT.
138'-10	1 1/16	1/2	1 11/16	9/16	1 11/16	1/2	1 1/16
151'-4	7/8	9/16	1 7/8	1/2	1 7/8	9/16	7/8
163'-10	15/16	1/2	1 11/16	1/2	1 11/16	1/2	15/16
176'-4	15/16	1/2	1 15/16	1/2	1 15/16	1/2	15/16
188'-10	1 1/16	9/16	2 3/8	9/16	2 3/8	9/16	1 1/16
201'-4	3/4	5/8	1 13/16	9/16	1 13/16	5/8	3/4
213'-10	7/8	1/2	1 13/16	9/16	1 13/16	1/2	7/8
226'-4	1 3/8	1/2	2 1/8	9/16	2 1/8	1/2	1 3/8
243'-0	1 15/16	1/2	2 1/8	9/16	2 1/8	1/2	1 15/16

G1 MAY HAVE A + OR - SIGN. THE MINIMUM NUMERICAL VALUE OF THE GRADE IS 0.3% AND THE MAXIMUM VALUE IS 5%.

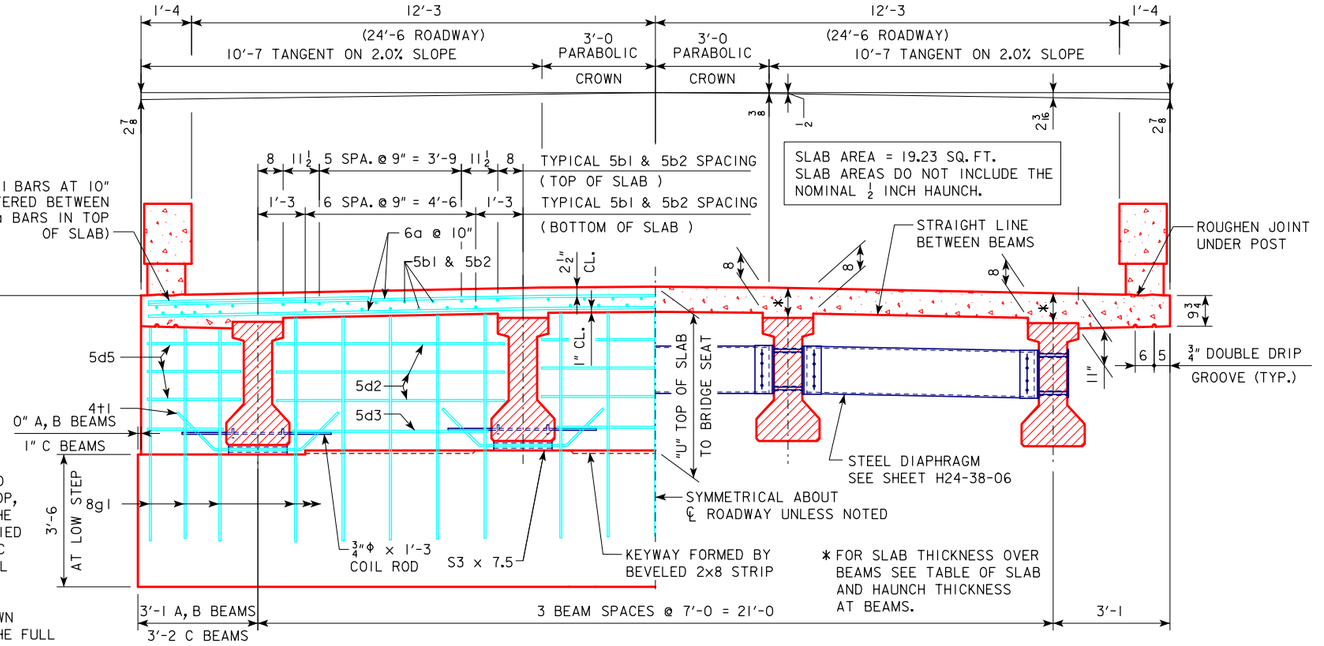
SLAB AND HAUNCH THICKNESS AT BEAMS FOR STRAIGHT GRADE



CONCRETE SEALER LIMITS FOR OPEN RAILS

CONCRETE SEALER SHALL BE APPLIED TO BOTH SIDES OF BRIDGE SLAB ON THE TOP, EDGE OF SLAB AND UNDER THE SLAB. THE CONCRETE SEALER SHALL ALSO BE APPLIED TO THE OPEN RAIL ON THE TOP, TRAFFIC FACE SIDE, BOTTOM OF RAIL, AND ON ALL SIDES OF THE OPEN RAIL POSTS.

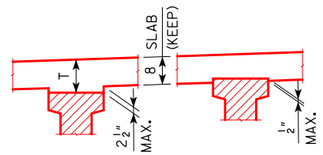
THE CONCRETE SEALER LIMITS ARE SHOWN IN THE DETAIL AND SHALL APPLY TO THE FULL LENGTH OF BRIDGE. CONCRETE SEALER SHALL BE APPLIED IN ACCORDANCE WITH ARTICLE 2403.03, P, 3, OF THE STANDARD SPECIFICATONS.



HALF SECTION NEAR ABUTMENT

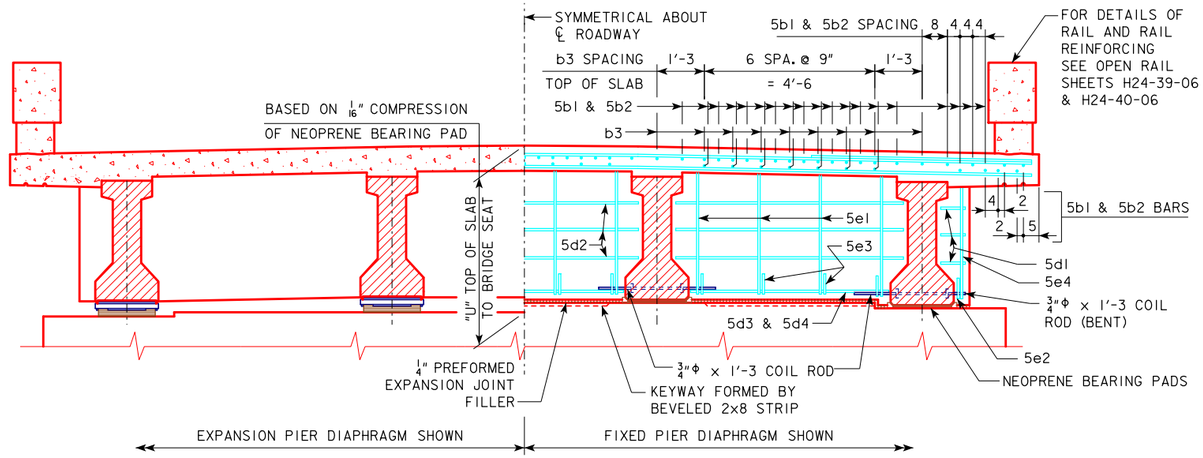
HALF SECTION NEAR MID SPAN

TOP TRANSVERSE REINFORCING STEEL IS TO BE PARALLEL TO AND 2 1/2" CLEAR BELOW TOP OF SLAB. BOTTOM TRANSVERSE REINFORCING STEEL IS TO BE PARALLEL TO AND 1" CLEAR ABOVE BOTTOM OF SLAB. TOP AND BOTTOM REINFORCING STEEL IS TO BE SUPPORTED BY INDIVIDUAL BAR CHAIRS SPACED AT NOT MORE THAN 3'-0 CENTERS LONGITUDINALLY AND TRANSVERSELY, OR BY CONTINUOUS ROWS OF BAR HIGH CHAIRS OR SLAB BOLSTERS SPACED 4'-0 APART. I.M. 451.01 REQUIREMENTS SHALL APPLY FOR BAR CHAIRS, BAR HIGH CHAIRS, AND SLAB BOLSTERS.



SLAB THICKNESS DETAILS

NOTE: THE SLAB THICKNESS (T) AT THE BEAMS, (8" SLAB PLUS HAUNCH) IS BASED ON THE ANTICIPATED BEAM CAMBER REMAINING AFTER PLACING THE SLAB, BUT IS NOT GUARANTEED FOR CONSTRUCTION. IF BEAM IS UNDER CAMBERED INCREASE THE HAUNCH THICKNESS OVER THE BEAM AT THE MIDPOINT OF THE SPANS (POINTS B, D AND F). IF THE BEAM IS OVER CAMBERED DECREASE THE HAUNCH THICKNESS OVER THE BEAM AT THE MIDPOINT OF THE SPANS (POINTS B, D AND F) TO A MAXIMUM OF 1/2" EMBEDMENT IN THE SLAB. IF MORE THAN 1/2" EMBEDMENT IS REQUIRED OR IF THE HAUNCH EXCEEDS 2 1/2" THE GRADE LINE IS TO BE REVISED.



SECTION NEAR PIER

LENGTH OF S3 x 7.5
(ABUTMENT BEAM SEAT)

BEAM BOTTOM FLANGE WIDTH	LENGTH OF S3 x 7.5
1'-5	1'-3 1/2
1'-8	1'-6 1/2

06-12 LATEST REVISION DATE

Approved by Bridge Engineer

IOWA DOT Highway Division

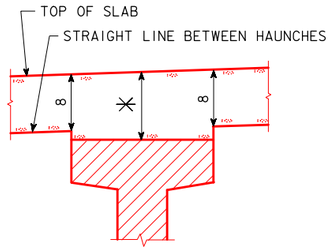
STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

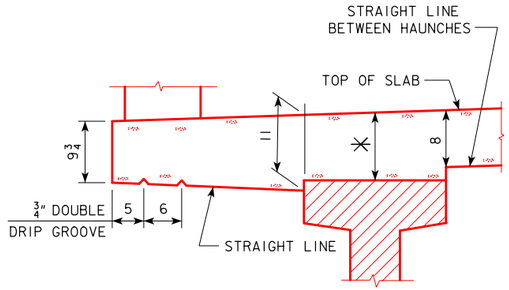
DECEMBER, 2006

SUPERSTRUCTURE DETAILS | H24-03-06

REVISED 06-12 - I.M. REQUIREMENT ADDED TO BAR CHAIR NOTE.



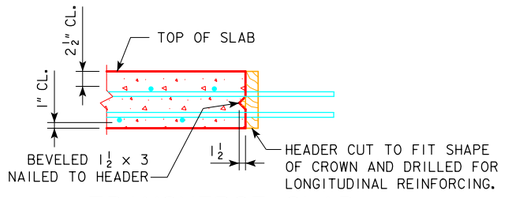
INTERIOR BEAMS



EXTERIOR BEAMS @ OPEN RAIL

TYPICAL SLAB AND
HAUNCH DETAIL

* FOR SLAB THICKNESS OVER BEAMS SEE "SLAB THICKNESS DETAILS" ON SHEET H24-03-06



TRANSVERSE SLAB
CONSTRUCTION JOINT

GENERAL NOTES:

CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2" UNLESS OTHERWISE NOTED OR SHOWN.

ALL REINFORCING BARS ARE TO BE SECURELY WIRED IN PLACE AND ADEQUATELY SUPPORTED ON BAR CHAIRS BEFORE CONCRETE IS PLACED. I.M. 451.01 REQUIREMENTS SHALL APPLY FOR BAR CHAIRS.

ALL PRESTRESSED CONCRETE BEAMS ARE TO BE SET VERTICAL.

FORMS FOR THE SLAB AND RAILS ARE TO BE SUPPORTED BY THE PRESTRESSED CONCRETE BEAMS.

THE PIER AND ABUTMENT DIAPHRAGM CONCRETE IS TO BE PLACED MONOLITHICALLY WITH THE FLOOR SLAB.

ALL REINFORCING STEEL IS TO BE GRADE 60.

COST OF ALL PREFORMED EXPANSION JOINT FILLER MATERIAL IS TO BE INCLUDED IN THE PRICE BID FOR "STRUCTURAL CONCRETE (BRIDGE)".

06-12
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

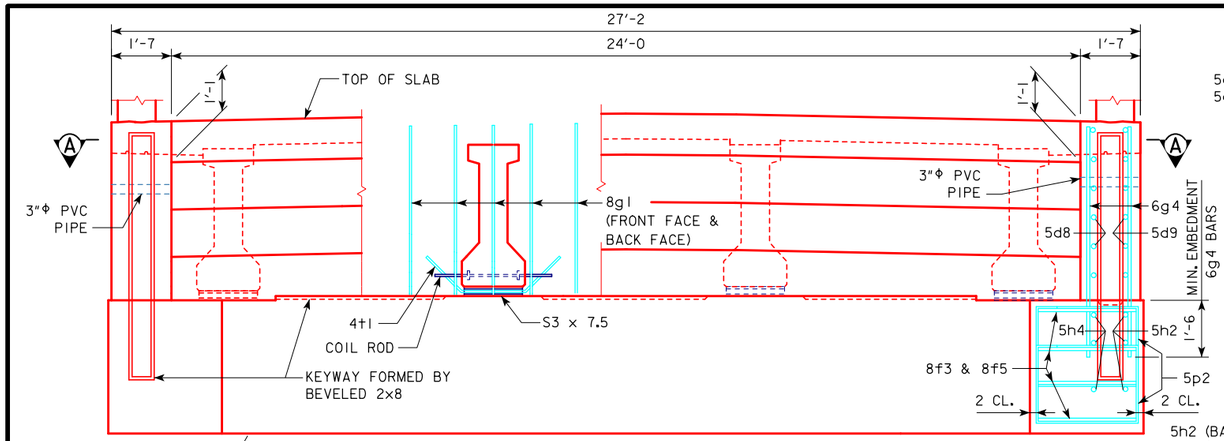
STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

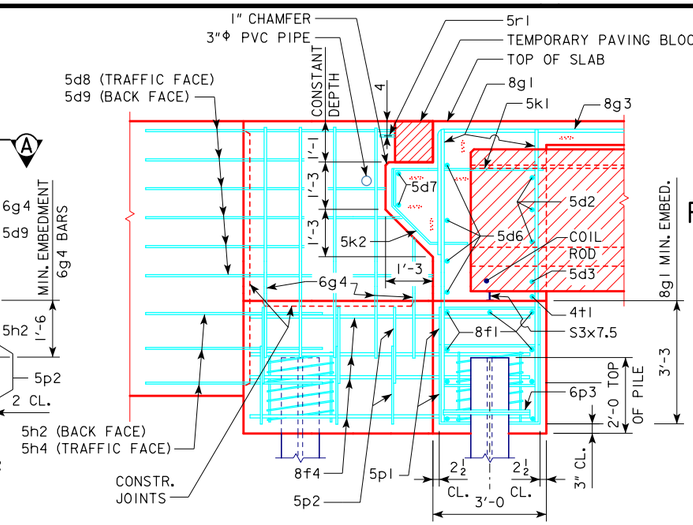
DECEMBER, 2006

SUPERSTRUCTURE DETAILS | H24-04-06

REVISED 06-12 - I.M. REQUIREMENT ADDED TO BAR CHAIR NOTE.



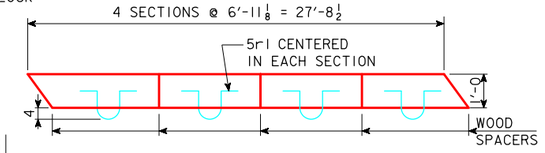
PART REAR ELEVATION AT ABUTMENT



PART SECTION B-B

FIELD BEND 5h4 BAR AS NECESSARY TO AVOID PILE IN ABUTMENT WING.

NOTE:
THE SPIRAL AT THE TOP OF EACH PILE TO BE 7 TURNS OF NO. 2 BAR, 21" DIAMETER, 3" PITCH WITH 3 - $L\ 7/8 \times 7/8 \times 1/8$ SPACERS PUNCHED TO HOLD SPIRAL.



PLAN OF TEMPORARY PAVING BLOCK

NOTE :
LINE PAVING NOTCH WITH TAR PAPER BEFORE PLACING THE TEMPORARY PAVING BLOCK.

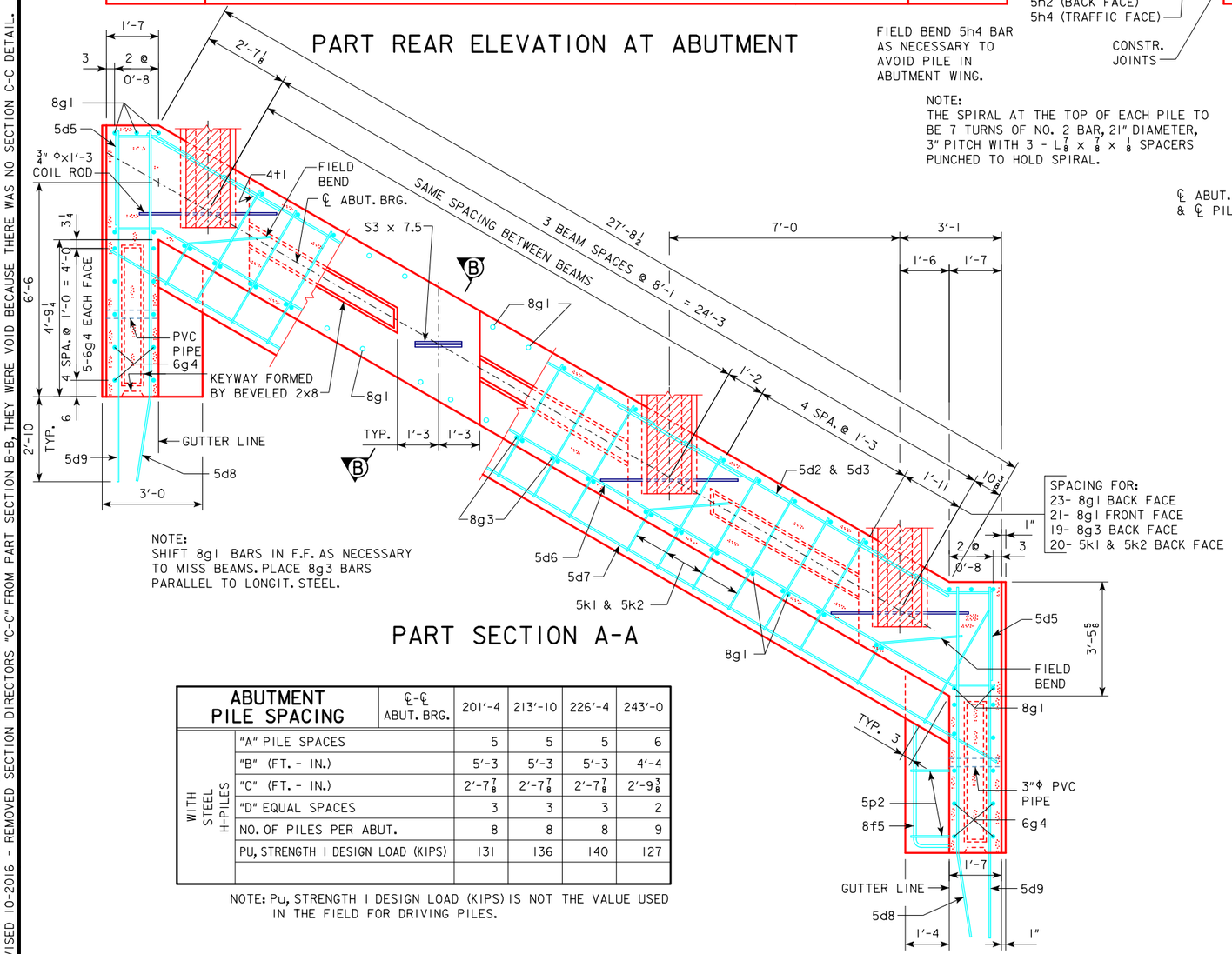
ABUTMENT NOTES:

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN.

ABUTMENT PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

BARRIER RAIL NOT SHOWN IN DETAILS.

IF ROCK IS CLOSER THAN 15' BELOW ABUTMENT FOOTING, SPECIAL ANALYSIS MAY BE REQUIRED.



PART SECTION A-A

NOTE:
SHIFT 8g1 BARS IN F.F. AS NECESSARY TO MISS BEAMS. PLACE 8g3 BARS PARALLEL TO LONGIT. STEEL.

ABUTMENT PILE SPACING		℄-℄ ABUT. BRG.	201'-4	213'-10	226'-4	243'-0
WITH STEEL H-PILES	"A" PILE SPACES		5	5	5	6
	"B" (FT. - IN.)		5'-3	5'-3	5'-3	4'-4
	"C" (FT. - IN.)		2'-7 7/8	2'-7 7/8	2'-7 7/8	2'-9 3/8
	"D" EQUAL SPACES		3	3	3	2
	NO. OF PILES PER ABUT.		8	8	8	9
	PU, STRENGTH I DESIGN LOAD (KIPS)		131	136	140	127

NOTE: Pu, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

ABUTMENT PILE PLAN

10-2016
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

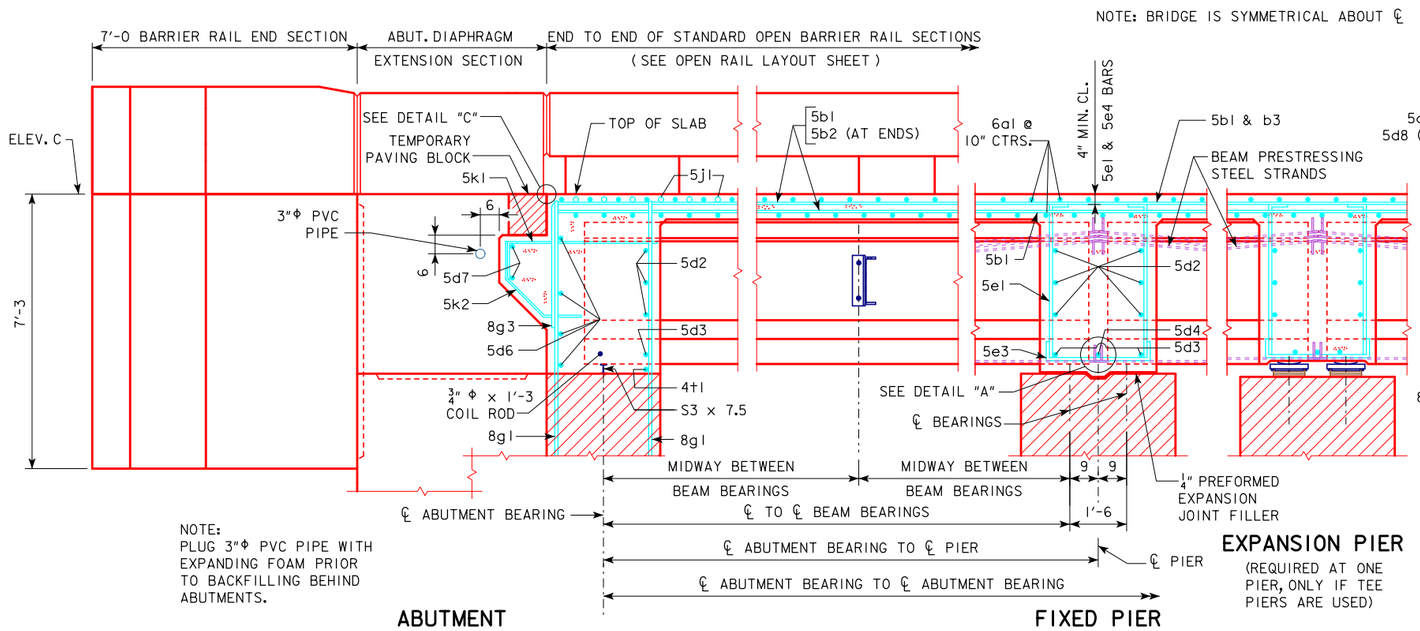
DECEMBER, 2006

ABUTMENT DETAILS

30° SKEW C BEAMS

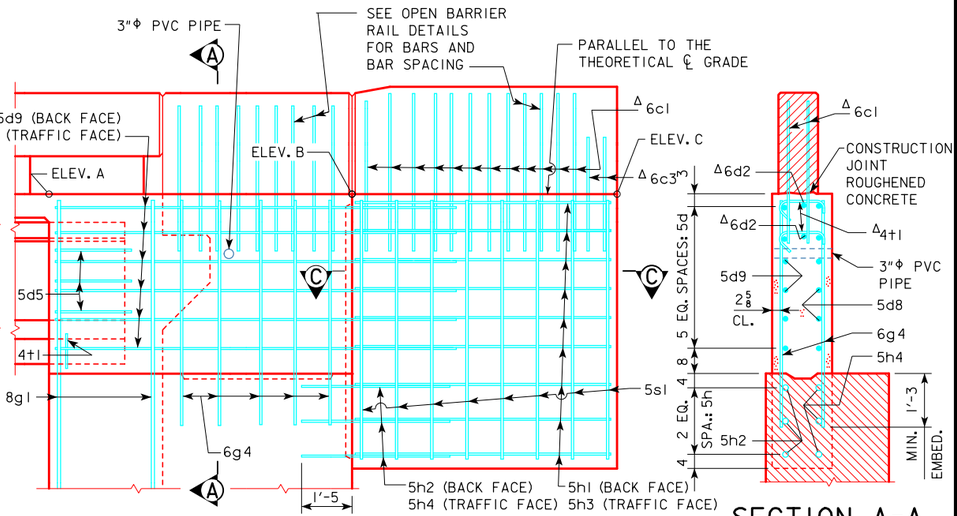
H24-19-06

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.
REVISED 10-2016 - REMOVED SECTION DIRECTORS "C-C" FROM PART SECTION B-B, THEY WERE VOID BECAUSE THERE WAS NO SECTION C-C DETAIL.



PART LONGITUDINAL SECTION NEAR GUTTER

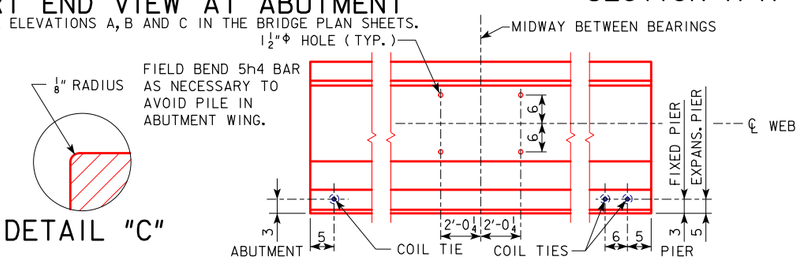
(FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H24-38-06)



PART END VIEW AT ABUTMENT

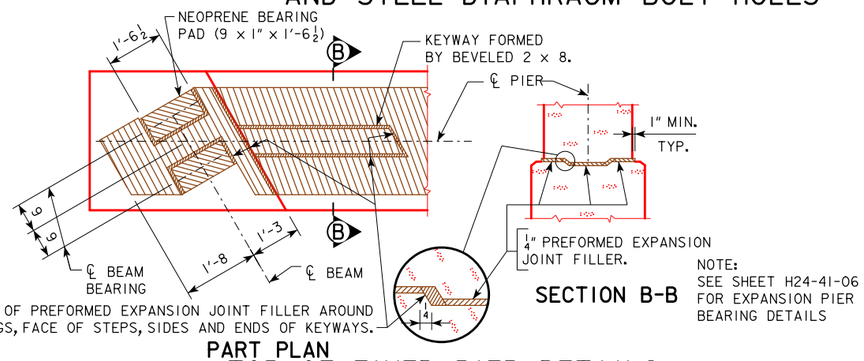
PROVIDE ELEVATIONS A, B AND C IN THE BRIDGE PLAN SHEETS.

SECTION A-A



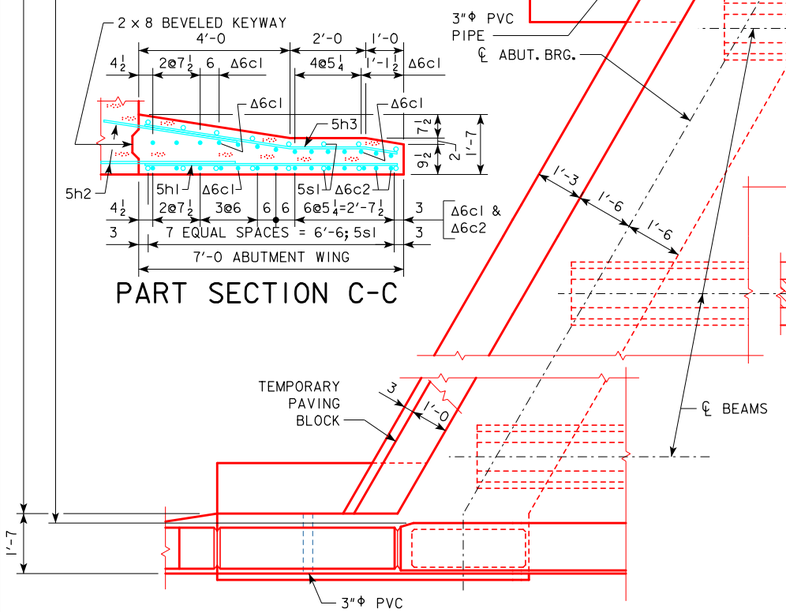
DETAIL "C"

LOCATION OF BEAM COIL TIES AND STEEL DIAPHRAGM BOLT HOLES



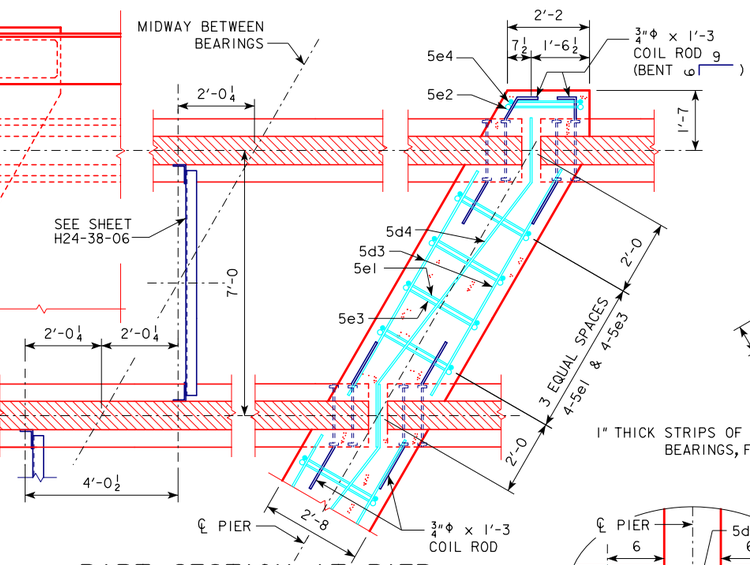
SECTION B-B

PART PLAN TOP OF FIXED PIER DETAILS

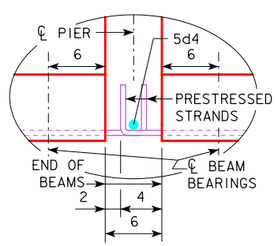


PART SECTION C-C

PART PLAN



PART SECTION AT PIER



DETAIL "A"

REVISED 01-12 - ADDED FIELD BEND 5h4 BAR TO AVOID PILE IN ABUTMENT WING NOTE.

01-12
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

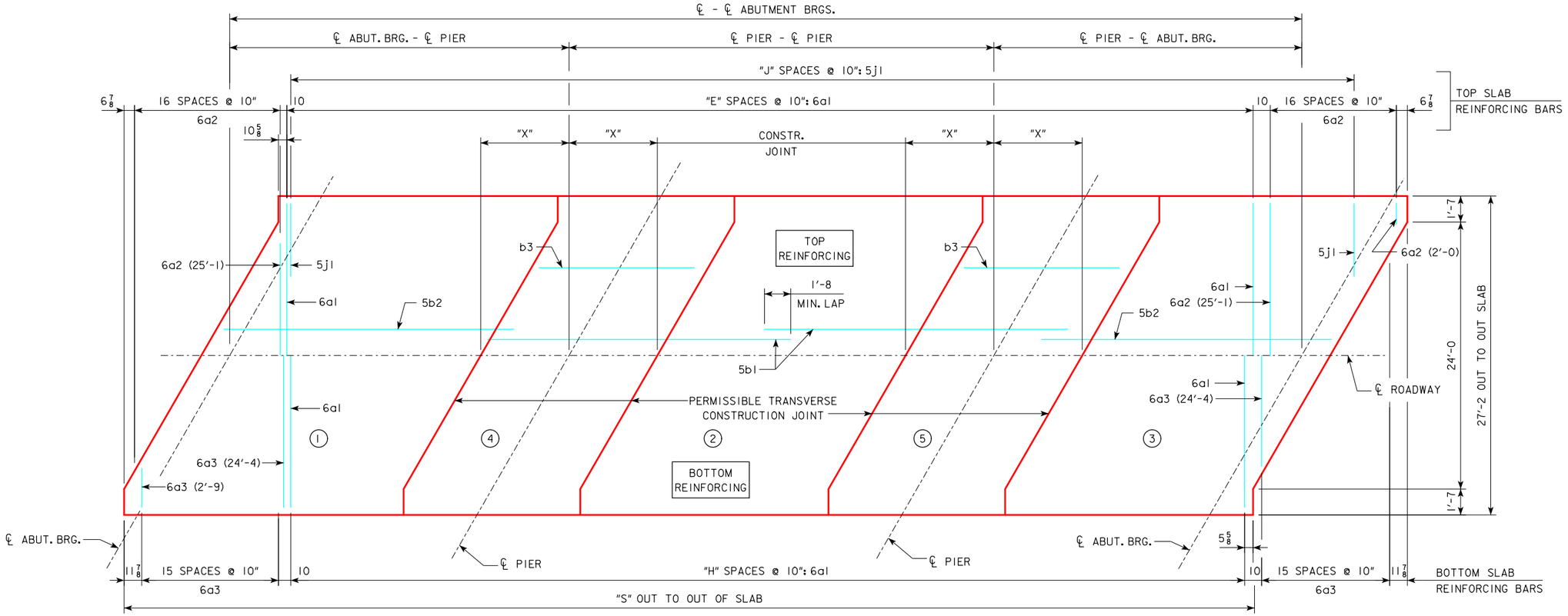
DECEMBER, 2006

LONGITUDINAL SECTION

30° SKEW C BEAMS

H24-21-06

REVISED 07-2015 - CHANGED CONCRETE PLACEMENT NOTE TO ACCOUNT FOR THE POSSIBLE ADDITION OF A RETARDING ADMIXTURE TO THE CONCRETE.



SLAB LAYOUT

(LEFT AHEAD SKEW SHOWN, RIGHT AHEAD SKEW SIMILAR)

GENERAL DATA		℄-℄ ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
VERTICAL	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8	3'-7 7/8	4'-2 7/8	4'-2 7/8	4'-2 7/8	4'-8 1/2	4'-8 11/16	4'-9 1/8	4'-9 1/2
CURVE	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 3/8	3'-6 5/8	4'-1 3/8	4'-1 9/16	4'-1 15/16	4'-7 5/16	4'-7 5/16	4'-7 9/16	4'-7 9/16
STRAIGHT	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8 1/16	3'-7 7/8	4'-2 15/16	4'-2 15/16	4'-3 1/16	4'-8 3/4	4'-8 7/8	4'-9 3/8	4'-9 15/16
GRADE	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 5/8	3'-6 13/16	4'-1 5/8	4'-1 7/8	4'-2 5/16	4'-7 3/4	4'-7 3/4	4'-8 1/16	4'-8 1/16
D.L. PIER REACTION (D.L. + F.W.S.) SERVICE LOADS		KIPS	299.4	323.0	368.5	393.4	418.5	498.6	526.5	554.6	581.9
L.L. PIER REACTION (HL93) NO IMPACT SERVICE LOADS		KIPS	207.6	215.3	222.7	229.9	237.0	244.0	253.2	268.2	284.4
NO. OF SPACES FOR 6a1 BARS (TOP)		"E"	152	167	182	197	212	227	242	257	277
NO. OF SPACES FOR 6a1 BARS (BOTTOM)		"H"	153	168	183	198	213	228	243	258	278
NO. OF SPACES FOR 5j1 BARS (TOP)		"J"	165	180	195	210	225	240	255	270	290
OUT TO OUT OF SLAB		"S"	142'-3 5/8	154'-9 5/8	167'-3 5/8	179'-9 5/8	192'-3 5/8	204'-9 5/8	217'-3 5/8	229'-9 5/8	246'-5 5/8
SLAB TRANSVERSE CONSTR. JT. DISTANCE FROM C.L. PIER		"X"	6'-7	7'-1	7'-7	8'-1	8'-8	9'-2	9'-8	10'-2	10'-2

CONCRETE PLACEMENT QUANT. (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)	℄-℄ ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
SLAB INCL. HAUNCH, ABUT. DIAPHR., & WINGWALLS** , SECT. 1 & 3	C.Y.	79.7	84.8	94.0	99.3	104.6	117.7	123.2	128.9	141.4
SLAB INCLUDING HAUNCH, SECTION 2	C.Y.	28.4	30.7	33.0	35.3	37.5	39.9	42.1	44.5	44.5
SLAB INCLUDING HAUNCH & PIER DIAPHRAGM, SECTIONS 4 & 5	C.Y.	33.1	34.5	38.8	40.2	42.0	45.0	46.5	48.1	48.1
PAVING BLOCKS	C.Y.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
ABUTMENT WINGS	C.Y.	7.2	7.2	7.6	7.6	7.6	8.4	8.4	8.4	8.4
ABUTMENT FOOTINGS (w/ WOOD PILES) ***	C.Y.	21.2	21.1	21.1	21.1	21.1	-----	-----	-----	-----
ABUTMENT FOOTINGS (w/ STEEL H PILES) ***	C.Y.	22.4	22.4	22.4	22.4	22.4	30.2	30.2	30.2	30.2

NOTE: CONCRETE DECK SHALL BE PLACED IN SECTIONS AND SEQUENCES INDICATED. ALTERNATE PROCEDURES FOR PLACING DECK CONCRETE MAY BE SUBMITTED FOR APPROVAL TOGETHER WITH A STATEMENT OF THE PROPOSED METHOD AND EVIDENCE THAT THE CONTRACTOR POSSESSES THE NECESSARY EQUIPMENT AND FACILITIES TO ACCOMPLISH THE REQUIRED RESULTS. FOR APPROVED ALTERNATE PROCEDURES THE ENGINEER SHALL DETERMINE IF A RETARDING ADMIXTURE IS REQUIRED TO MAINTAIN PLASTICITY OF THE CONCRETE DECK DURING PLACEMENT.

ESTIMATED QUANTITIES (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)	℄-℄ ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
STRUCTURAL CONCRETE SUPERSTRUCTURE (INCLUDES ABUT. WINGS)	C.Y.	150.6	159.4	175.6	184.6	193.9	213.2	222.4	232.1	244.6
STRUCTURAL CONCRETE ABUTMENTS (w/ WOOD PILES) ***	C.Y.	23.8	23.7	23.6	23.6	23.6	-----	-----	-----	-----
STRUCTURAL CONCRETE ABUTMENTS (w/ STEEL H PILES) ***	C.Y.	25.0	25.0	25.0	25.0	25.0	32.6	32.6	32.6	32.6
PRETENSIONED PRESTRESSED CONCRETE BEAM, CENTER SPAN	NO.	4-A50	4-A55	4-B59	4-B63	4-B67	4-C71	4-C75	4-C80	4-C80
PRETENSIONED PRESTRESSED CONCRETE BEAM, END SPAN	NO.	8-A42	8-A46	8-B50	8-B55	8-B59	8-C63	8-C67	8-C71	8-C80
CONCRETE RAIL	L.F.	312.6	337.6	362.6	387.6	412.6	456.7	481.7	506.7	540.0
STRUCTURAL STEEL (w/ PILE BENT PIERS)	LB.	2555	2555	2555	2555	2555	2498	2498	2498	2498
STRUCTURAL STEEL (w/ TEE PIERS)	LB.	3272	3272	3272	3272	3272	3344	3344	3344	3344
REINFORCING STEEL (w/ WOOD PILES)	LB.	43,430	46,335	49,734	53,148	55,986	-----	-----	-----	-----
REINFORCING STEEL (w/ STEEL H PILES)	LB.	43,414	46,212	49,503	52,917	55,775	62,370	65,736	68,837	72,650
NO. OF WOOD PILES, TREATED FOR TWO ABUTMENTS	NO.	20	22	24	24	24	-----	-----	-----	-----
NO. OF STEEL H-PILES (HP 10 x 57) FOR TWO ABUTMENTS	NO.	10	10	10	10	12	16	16	16	18
PREBORED HOLES (w/ WOOD PILES)	L.F.	200	220	240	240	240	-----	-----	-----	-----
PREBORED HOLES (w/ STEEL H-PILES)	L.F.	100	100	100	100	120	160	160	160	180

* VALUES SHOWN ARE FOR FIXED PIERS ONLY AND ALLOW FOR 1/16 INCH DEFLECTION OF THE 1 INCH NEOPRENE BEARING PAD. AT EXPANSION PIER LOCATIONS ADD 3 1/16 INCHES TO "U" VALUES SHOWN.

** WINGWALLS APPLY ONLY TO BRIDGES USING "C" BEAMS.

*** SEE SHEET H24-24-06 FOR ADDITIONAL CONCRETE REQUIRED IN ABUTMENT FOOTINGS.

07-15
LATEST REVISION DATE

Marvin K. McCandless
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

SUPERSTRUCTURE DETAILS

30° SKEW

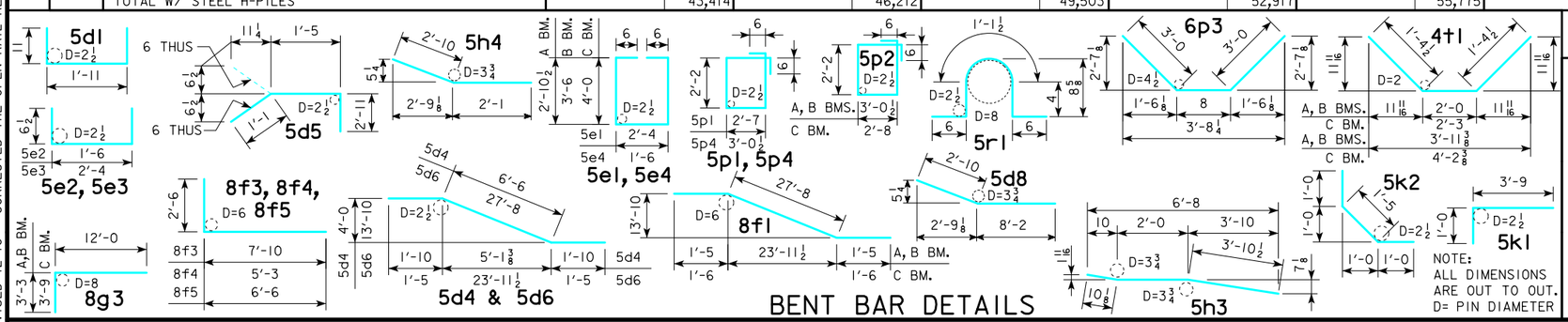
H24-22-06

REINFORCING BAR LIST

ONE SUPERSTRUCTURE AND TWO ABUTMENTS

			138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0		
		℄-℄ ABUT. BRG.	42'-6	50'-10	42'-6	46'-8	55'-0	46'-8	50'-10	59'-2	50'-10	55'-0	63'-4	55'-0	59'-2	67'-6	59'-2	63'-4	71'-8	63'-4	67'-6	75'-10	67'-6	71'-8	80'-0	71'-8	80'-0	80'-0	80'-0
		℄-℄ BEAM BRG.																											
		BEAM SERIES	A BEAM			A BEAM			B BEAM			B BEAM			B BEAM			C BEAM			C BEAM			C BEAM			C BEAM		
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT
6a1	SLAB TRANSV. TOP & BOTT.		307	26'-10	12,373	337	26'-10	13,582	367	26'-10	14,791	397	26'-10	16,001	427	26'-10	17,210	457	26'-10	18,419	487	26'-10	19,628	517	26'-10	20,837	557	26'-10	22,449
6a2	SLAB TRANSV. TOP ENDS		34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692	34	VARIES	692
6a3	SLAB TRANSV. BOTT. ENDS		32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651	32	VARIES	651
5b1	SLAB LONGITUDINAL, TOP & BOTT.		122	40'-0	5,090	122	40'-0	5,090	183	40'-0	7,635	183	40'-0	7,635	183	40'-0	7,635	244	40'-0	10,180	244	40'-0	10,180	244	40'-0	10,180	305	40'-0	12,725
5b2	SLAB LONGITUDINAL, TOP & BOTT., ENDS		122	33'-6	4,263	122	39'-9	5,058	122	26'-10	3,414	122	33'-1	4,210	122	39'-4	5,005	122	26'-5	3,361	122	32'-8	4,157	122	38'-11	4,952	122	28'-1	3,573
6b3	SLAB LONGITUDINAL, TOP ℄ PIERS		50	12'-10	964	50	13'-10	1,039	50	14'-10	1,114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7b3	SLAB LONGITUDINAL, TOP ℄ PIERS		—	—	—	—	—	—	—	—	—	50	15'-10	1,618	50	17'-0	1,737	50	18'-0	1,840	—	—	—	—	—	—	—	—	—
8b3	SLAB LONGITUDINAL, TOP ℄ PIERS		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	50	19'-0	2,537	50	20'-0	2,670	50	20'-0	2,670
5d1	PIER DIAPH. ENDS		12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47	12	3'-9	47
5d2	PIER & ABUT. DIAPH. LONGIT.		54	7'-3	408	54	7'-3	408	54	7'-3	408	54	7'-3	408	54	7'-3	408	54	7'-0	394	54	7'-0	394	54	7'-0	394	54	7'-0	394
5d3	PIER & ABUT. DIAPH. LONGIT.		18	6'-3	117	18	6'-3	117	18	6'-3	117	18	6'-3	117	18	6'-3	117	18	5'-11	111	18	5'-11	111	18	5'-11	111	18	5'-11	111
5d4	PIER DIAPH. LONGIT.		6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64	6	10'-2	64
5d5	ABUT. DIAPH. ENDS		12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68	12	5'-5	68
5d6	ABUT. DIAPH. LONGIT. B.F.		8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254	8	30'-6	254
5d7	PAVING NOTCH LONGIT.		4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129	4	30'-10	129
5d8	ABUT. DIAPH. WING EXT. LONGIT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24	11'-0	275	24	11'-0	275	24	11'-0	275	24	11'-0	275
5d9	ABUT. DIAPH. WING EXT. LONGIT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24	10'-11	273	24	10'-11	273	24	10'-11	273	24	10'-11	273
5e1	PIER DIAPH. HOOPS		24	9'-1	227	24	9'-1	227	24	10'-4	259	24	10'-4	259	24	10'-4	259	24	11'-4	284	24	11'-4	284	24	11'-4	284	24	11'-4	284
5e2	PIER DIAPH. TIES ENDS		4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11	4	2'-7	11
5e3	PIER DIAPH. TIES		24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86	24	3'-5	86
5e4	PIER DIAPH. HOOPS ENDS		4	8'-3	34	4	8'-3	34	4	9'-6	40	4	9'-6	40	4	9'-6	40	4	10'-6	44	4	10'-6	44	4	10'-6	44	4	10'-6	44
8f1	ABUT. FOOTING LONGIT.		18	30'-6	1,466	18	30'-6	1,466	18	30'-6	1,466	18	30'-6	1,466	18	30'-6	1,466	18	30'-8	1,474	18	30'-8	1,474	18	30'-8	1,474	18	30'-8	1,474
8f3	ABUT. EXTENSION LONGIT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16	10'-4	441	16	10'-4	441	16	10'-4	441	16	10'-4	441
8f4	ABUT. EXTENSION LONGIT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	7'-9	166	8	7'-9	166	8	7'-9	166	8	7'-9	166
8f5	ABUT. EXTENSION LONGIT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	9'-0	192	8	9'-0	192	8	9'-0	192	8	9'-0	192
8g1	ABUT. VERT.		92	5'-7	1,371	92	5'-7	1,371	92	6'-2	1,515	92	6'-2	1,515	92	6'-2	1,515	88	6'-8	1,566	88	6'-8	1,566	88	6'-8	1,566	88	6'-9	1,586
8g3	ABUT. DIAPH. VERT. B.F.		38	15'-3	1,547	38	15'-3	1,547	38	15'-3	1,547	38	15'-3	1,547	38	15'-3	1,547	38	15'-9	1,598	38	15'-9	1,598	38	15'-9	1,598	38	15'-9	1,598
6g4	ABUT. DIAPH. WING EXT. VERT.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	6'-0	360	40	6'-0	360	40	6'-1	365	40	6'-1	365
5h1	ABUT. WING HORIZ. B.F.		28	6'-8	195	28	6'-8	195	28	6'-8	195	28	6'-8	195	28	6'-8	195	36	6'-8	250	36	6'-8	250	36	6'-8	250	36	6'-8	250
5h2	ABUT. TO WING ANCHOR		56	4'-11	287	56	4'-11	287	56	4'-11	287	56	4'-11	287	56	4'-11	287	12	4'-11	62	12	4'-11	62	12	4'-11	62	12	4'-11	62
5h3	ABUT. WING HORIZ. TRAFFIC FACE		28	6'-9	197	28	6'-9	197	28	6'-9	197	28	6'-9	197	28	6'-9	197	36	6'-9	253	36	6'-9	253	36	6'-9	253	36	6'-9	253
5h4	ABUT. TO WING ANCHOR		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	4'-11	62	12	4'-11	62	12	4'-11	62	12	4'-11	62
5j1	TOP OF SLAB TRANSV. (AT RAIL)		332	6'-3	2,164	362	6'-3	2,360	392	6'-3	2,555	422	6'-3	2,751	452	6'-3	2,946	482	6'-3	3,142	512	6'-3	3,338	542	6'-3	3,533	582	6'-3	3,794
5k1	PAVING NOTCH		40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198	40	4'-9	198
5k2	PAVING NOTCH		40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143	40	3'-5	143
5p1	ABUTMENT HOOPS (WOOD/STEEL)		72/80	10'-6	789/876	80/80	10'-6	876/876	88/80	10'-6	964/876	88/80	10'-6	964/876	88/80	10'-6	964/876	88	10'-6	964	88	10'-6	964	88	10'-6	964	80	10'-6	876
5p2	ABUTMENT HOOPS		8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267
6p3	ABUT. BOTT. AT PILES		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24	6'-8	240	24	6'-8	240	24	6'-8	240	28	6'-8	280
5p4	ABUT. HOOPS AT ENDS		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95
5r1	PAVING BLOCK LIFTING LOOPS		8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24	8	2'-10	24
5s1	WING VERT.		64	5'-10	389	64	5'-10	389	64	6'-2	412	64	6'-2	412	64	6'-2	412	64	6'-11	462	64	6'-11	462	64	6'-11	462	64	6'-11	462
4t1	UNDER BEAMS AT ABUTMENTS		8	4'-9	25	8	4'-9	25	8	4'-9	25	8	4'-9	25	8	4'-9	25	8	5'-0	27	8	5'-0	27	8	5'-0	27	8	5'-0	27
#2	PILE SPIRAL (WOOD/STEEL)		20/10	38'-6	129/64	22/10	38'-6	141/64	24/10	38'-6	154/64	24/10	38'-6	154/64	24/12	38'-6	154/77	16	38'-6	103	16	38'-6	103	16	38'-6	103	18	38'-6	116
	SPIRAL SPACERS, L 7/8 x 7/8 x 1/8 x 0.70 (WOOD/STL.)		60/30	1'-10	77/39	66/30	1'-10	85/39	72/30	1'-10	92/39	72/30	1'-10	92/39	72/36	1'-10	92/46	48	1'-10	62	48	1'-10	62	48	1'-10	62	54	1'-10	69
	OPEN RAIL				8,856			9,379			10,085			10,793			11,313			13,036			13,504			14,268			15,050
	TOTAL W/ WOOD PILES				43,430			46,335			49,734			53,148			55,986			—			—			—			—
	TOTAL W/ STEEL H-PILES				43,414			46,212			49,503			52,917			55,775			62,370			65,736			68,837			72,650

REVISED 12-10 - CORRECTED THE OPEN RAIL REBAR QUANTITIES FOR THE 201'-4, 213'-10, 226'-4, & 243'-0 BRIDGE LENGTHS.



BENT BAR DETAILS

NOTE:
ALL DIMENSIONS ARE OUT TO OUT.
D= PIN DIAMETER

12-10
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

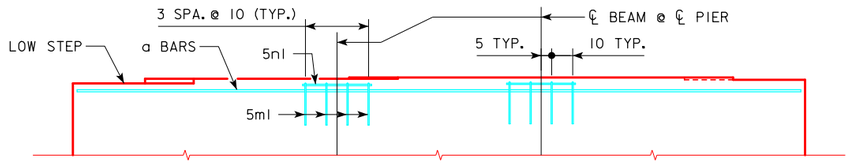
PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

DECK & ABUTMENT REINF.

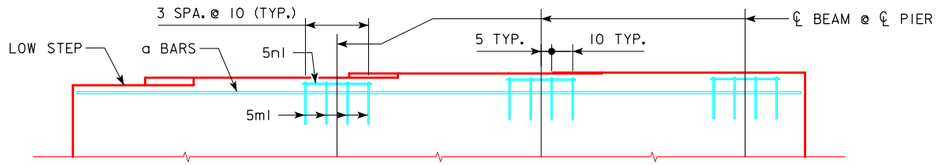
30° SKEW

H24-23-06



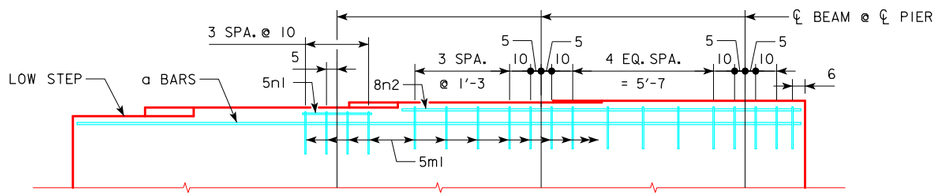
PART ELEVATION VIEW OF PIER CAP

GRADE (G): G <= 1.2%



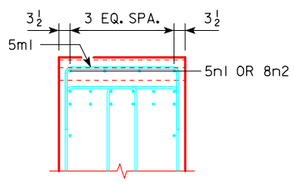
PART ELEVATION VIEW OF PIER CAP

GRADE (G): 1.2% < G <= 4.1%



PART ELEVATION VIEW OF PIER CAP

GRADE (G): 4.1% < G <= 5.0%



TYPICAL SECTION

STEP REINFORCING BAR LIST
ONE TEE PIER

			G <= 1.2%			1.2% < G <= 4.1%			4.1% < G <= 5.0%		
BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	6'-4		8	5	53	12	5	79	19	5	126
5n1	2'-8		8	5	22	12	5	33	4	5	11
*8n2	VARIES		--	--	--	--	--	--	4	8	178
TOTAL (LB.)					75			112			315

G = GRADE (%)

*8n2 BARS VARY FROM 15'-11 TO 17'-6

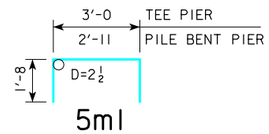
STEP REINFORCING BAR LIST
ONE PILE BENT PIER

			G <= 1.2%			1.2% < G <= 4.1%			4.1% < G <= 5.0%		
BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	6'-3		8	5	52	12	5	78	19	5	124
5n1	2'-8		8	5	22	12	5	33	4	5	11
*8n2	VARIES		--	--	--	--	--	--	4	8	178
TOTAL (LB.)					74			111			313

G = GRADE (%)

*8n2 BARS VARY FROM 15'-11 TO 17'-5

BENT BAR DETAILS



NOTE: ALL DIMENSIONS ARE OUT TO OUT.
D = PIN DIAMETER.

NOTES:

THE TABLE BELOW LISTS THE ADDITIONAL CONCRETE VOLUME REQUIRED IN EACH ABUTMENT FOOTING/PIER CAP BASED ON THE ROADWAY GRADE AT EACH ABUTMENT FOOTING/PIER CAP. ADDITIONAL CONCRETE SHOULD BE ADDED TO THE PLANS FOR EACH ABUTMENT FOOTING/PIER CAP THAT HAS 0.5 CU. YDS. OR MORE OF ADDITIONAL CONCRETE. VALUES IN THE TABLE BELOW HAVE BEEN EXCLUDED FOR SCENARIOS THAT HAVE LESS THAN 0.5 CU. YDS. OF ADDITIONAL CONCRETE PER SUBSTRUCTURE UNIT. VALUES MAY BE INTERPOLATED FOR GRADES BETWEEN THE VALUES SHOWN IN THE TABLE.

ADDITIONAL CONCRETE VOLUME PER SUBSTRUCTURE UNIT (C.Y.)

	ROADWAY GRADE AT SUBSTRUCTURE UNIT				
	1%	2%	3%	4%	5%
EACH ABUTMENT FOOTING					
A, B BEAMS	-----	-----	0.6	0.8	1.0
C BEAMS	-----	-----	0.8	1.0	1.3
EACH TEE PIER CAP - ALL BEAMS	-----	-----	0.6	0.9	1.1
EACH PILE BENT PIER - ALL BEAMS	-----	-----	0.6	0.8	1.1

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

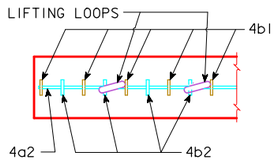
PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

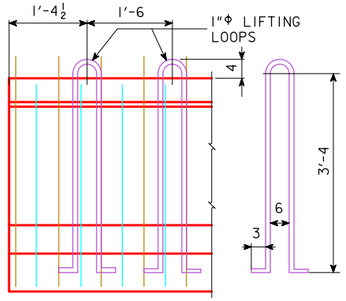
DECEMBER, 2006

ADDITIONAL QUANTITIES

30° SKEW

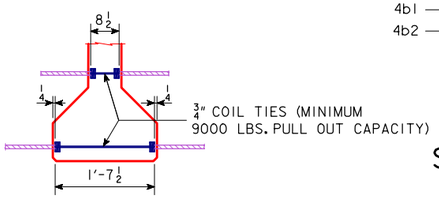
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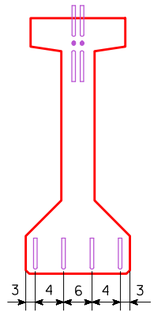
LIFTING LOOP DETAIL

ALTERNATE TYPES MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. LIFTING LOOPS ARE TO BE STRUCTURAL GRADE.

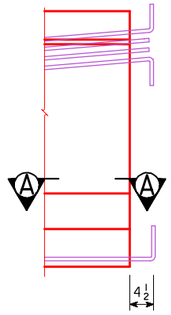


COIL TIE DETAIL

NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.

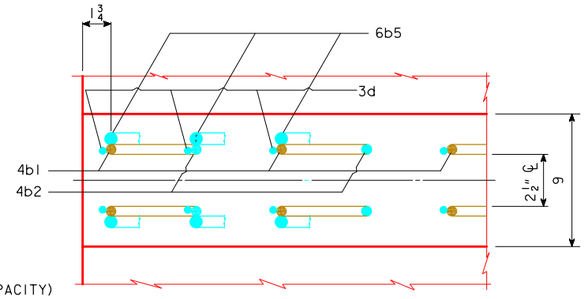


THE TOP STRAIGHT STRANDS OF BEAMS C63 AND C67 ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP. THE TOP AND BOTTOM DEFLECTED STRANDS OF BEAMS C71 THROUGH C80 ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN. THE REMAINING TOP STRANDS ARE TO BE CUT WITH 0'-3 PROJECTIONS.
FOUR BOTTOM STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.



TYPICAL AT BOTH BEAM ENDS

STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS



SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM

C BEAM DATA

BEAM	SPAN LENGTH ℄-℄ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS STRAIGHT	NO. OF STRANDS DEFLECTED	TOTAL INITIAL PRESTRESS KIPS ③	HOLD DOWN FORCE-KIPS	CAMBER (in.) AT RELEASE		CAMBER (in.) AFTER LOSSES		DEFLECTION (in.) Δ_D IMMEDIATE① (ELASTIC) Δ_I CONC. DIAPH.	DEFLECTION (in.) Δ_D IMMEDIATE① (ELASTIC) Δ_I STEEL DIAPH.	DEFLECTION (in.) Δ_D TIME ② (PLASTIC) Δ_T CONC. DIAPH.	DEFLECTION (in.) Δ_D TIME ② (PLASTIC) Δ_T STEEL DIAPH.	PERMISSIBLE SPACING		PERMISSIBLE SPACING HL93 LOADING CONC. DIAPH.	PERMISSIBLE SPACING HL93 LOADING STEEL DIAPH.	WEIGHT (TONS)		CONCRETE (C. Y.)	REINFORCING STEEL -(lb)
C63	63'-4	64'-4	0.60	16	—	681	——	0.70		1.24		0.59	0.54	0.15	0.14			7'-6	7'-6	18.9		9.34	536
C67	67'-6	68'-6	0.60	18	—	766	——	0.92		1.62		0.76	0.71	0.19	0.18			7'-6	7'-6	20.1		9.95	576
*C71	71'-8	72'-8	0.60	14	4	766	16	1.21		2.13		0.88	0.82	0.22	0.20			7'-6	7'-6	21.4		10.55	855
*C75	75'-10	76'-10	0.60	14	6	851	22	1.33		2.34		1.07	0.99	0.27	0.25			7'-6	7'-6	22.6		11.16	925
*C80	80'-0	81'-0	0.60	16	6	937	21	1.64		2.90		1.31	1.24	0.33	0.31			7'-6	7'-6	23.8		11.76	1191

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 757 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (2635 #) OR ONE STEEL DIAPHRAGM (285 #) AT ℄ OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT ℄ OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:
(A) $\Delta_D = \Delta_I + \Delta_T$ FOR SIMPLE SPAN.
(B) $\Delta_D = \Delta_I + \frac{3}{4}\Delta_T$ FOR END SPANS OF CONTINUOUS BRIDGE.
(C) $\Delta_D = \Delta_I + \frac{1}{2}\Delta_T$ FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.664% f's, f's = 270 ksi AND As = 0.217 sq. in.

* MINIMUM CONCRETE f'c (AT 28 DAYS) SHALL BE 6,000 psi. MINIMUM f'ci AT RELEASE SHALL BE 5,000 psi.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2004, WITH MINOR MODIFICATIONS.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2004:

REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

CONCRETE IN ACCORDANCE WITH SECTION 5, f'c = 5000 psi (EXCEPT AS NOTED)

PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f's = 270,000 psi.

NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 lb. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS.

BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.14 OF THE SPECIFICATIONS.

ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

IF THE STEEL DIAPHRAGM OPTION IS ALLOWED AND USED, HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

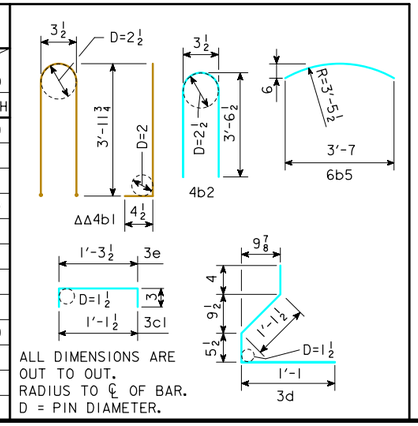
0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE a BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

** WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.

ΔΔ 4b1 BARS TO BE EPOXY COATED.

REINFORCING BAR LIST

	BAR	SHAPE	C63 63'-4 NO.	C63 63'-4 LENGTH	C67 67'-6 NO.	C67 67'-6 LENGTH	C71 71'-8 NO.	C71 71'-8 LENGTH	C75 75'-10 NO.	C75 75'-10 LENGTH	C80 80'-0 NO.	C80 80'-0 LENGTH
	6a1		——	——	——	——	4	37'-8	4	39'-9	4	41'-10
	4a2		2	5'-0	2	5'-0	2	5'-0	2	5'-0	2	5'-0
	8a3		——	——	——	——	——	——	——	——	2	40'-0
ΔΔ	4b1		46	8'-10	48	8'-10	54	8'-10	58	8'-10	60	8'-10
	4b2		12	7'-2	12	7'-2	12	7'-2	12	7'-2	12	7'-2
	6b5		4	3'-9	8	3'-9	8	3'-9	12	3'-9	16	3'-9
	3c1		46	1'-8	48	1'-8	54	1'-8	58	1'-8	60	1'-8
**	3d		116	3'-0	120	3'-0	132	3'-0	140	3'-0	144	3'-0
	3e		26	1'-10	26	1'-10	26	1'-10	26	1'-10	26	1'-10



ALL DIMENSIONS ARE OUT TO OUT.
RADIUS TO ℄ OF BAR.
D = PIN DIAMETER.

12-10
LATEST REVISION DATE

Marcus K. McCandless
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

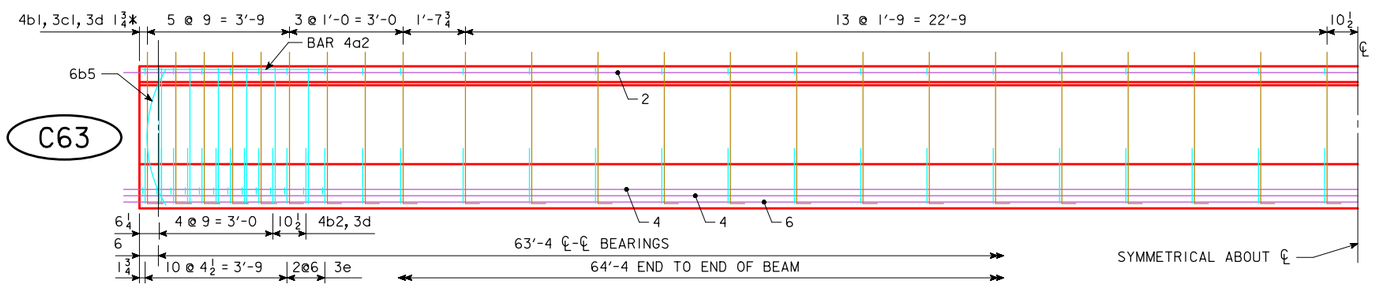
PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

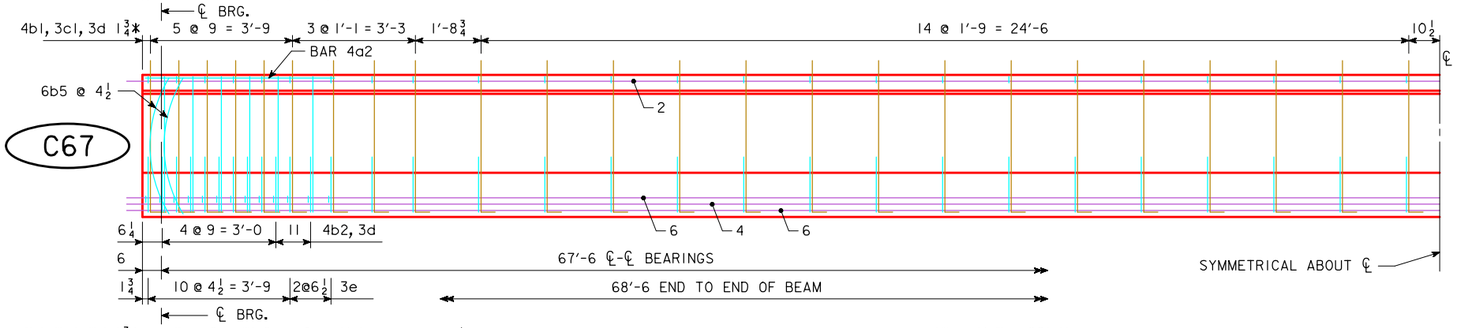
C BEAM DETAILS

H24-36-06

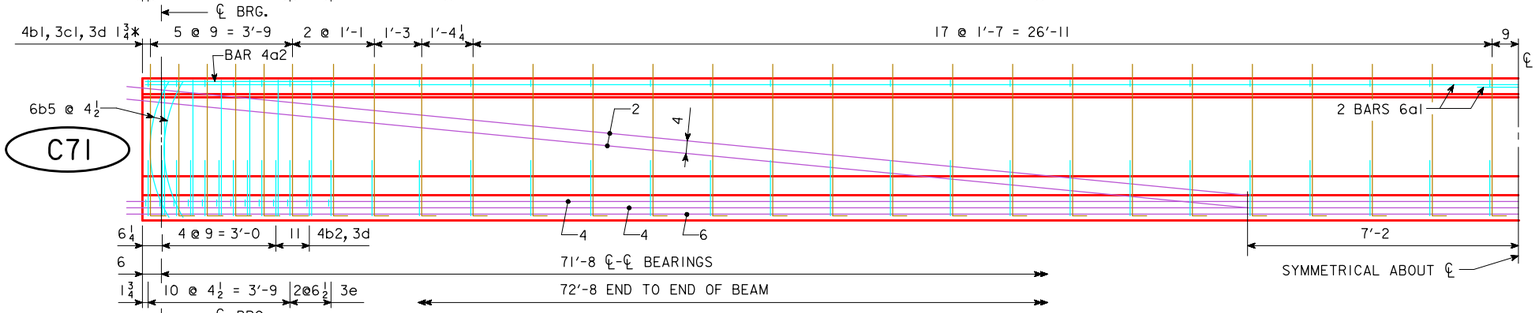
REVISED 12-10 - THE CONCRETE STRENGTH WAS ADDED TO THE DESIGN STRESSES NOTE.



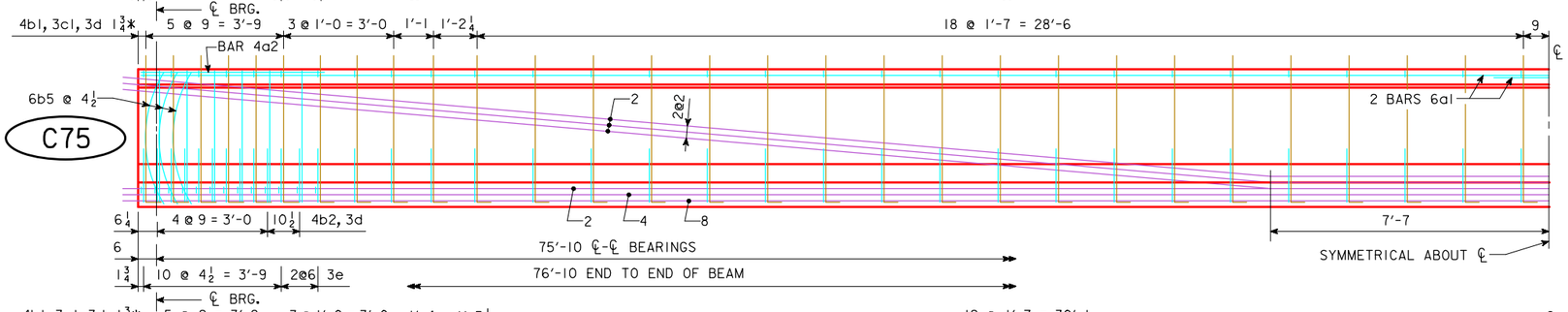
C63



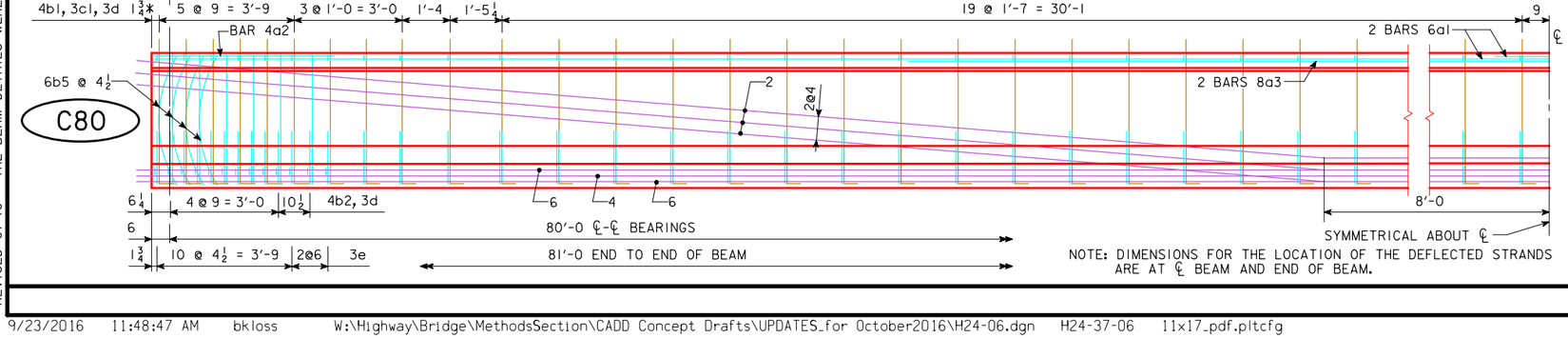
C67



C71

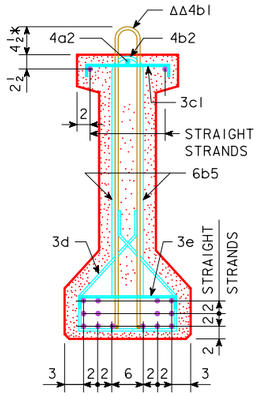


C75

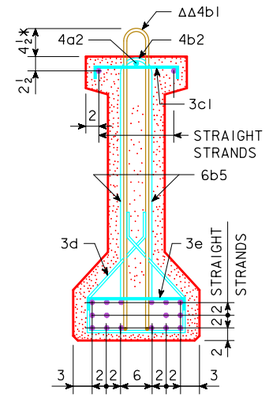


C80

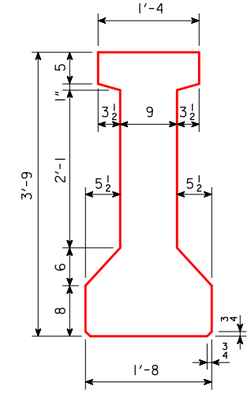
NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT ℄ BEAM AND END OF BEAM.



BEAM C63

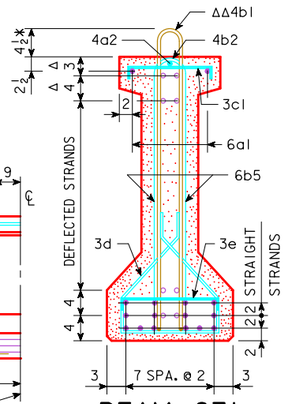


BEAM C67

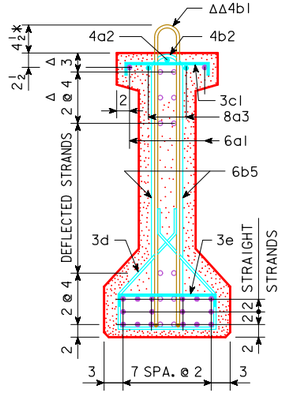


"C" BEAM
CROSS SECTION

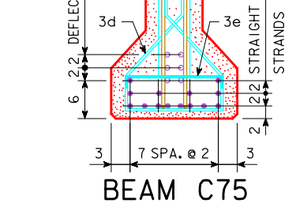
A = 564.5 in²
Yb = 20.23 in
I = 116,354 in⁴



BEAM C71



BEAM C80



BEAM C75

NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.

* KEEP

Δ DIMENSIONS AT END OF BEAM

ΔΔ EPOXY COATED BARS

REVISED 01-10 - THE BEAM DETAILS WERE UPDATED TO THE CURRENT BEAMS.

01-10
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

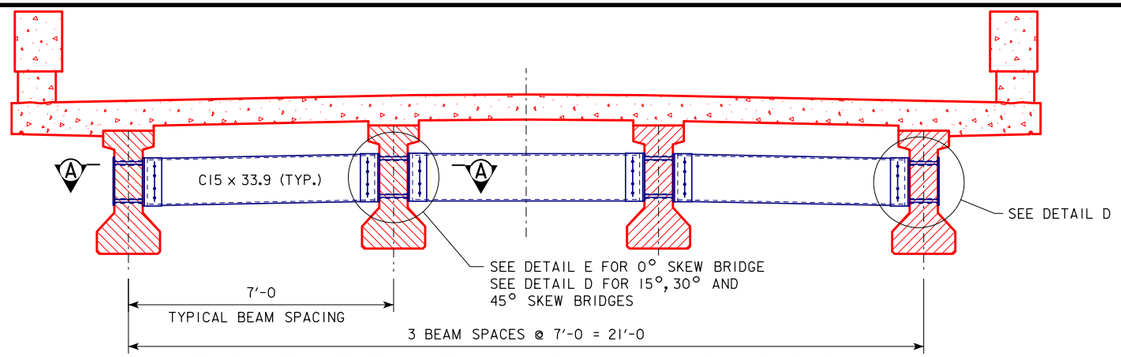
STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

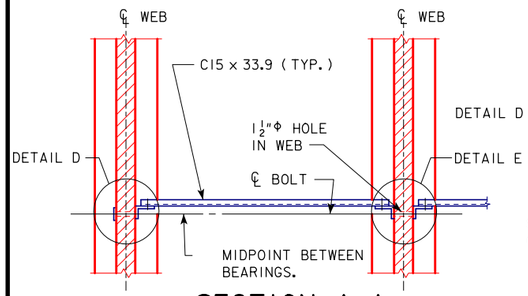
DECEMBER, 2006

C BEAM DETAILS

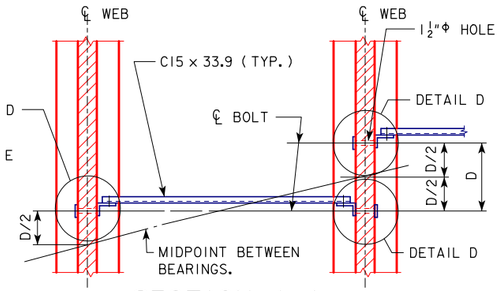
H24-37-06



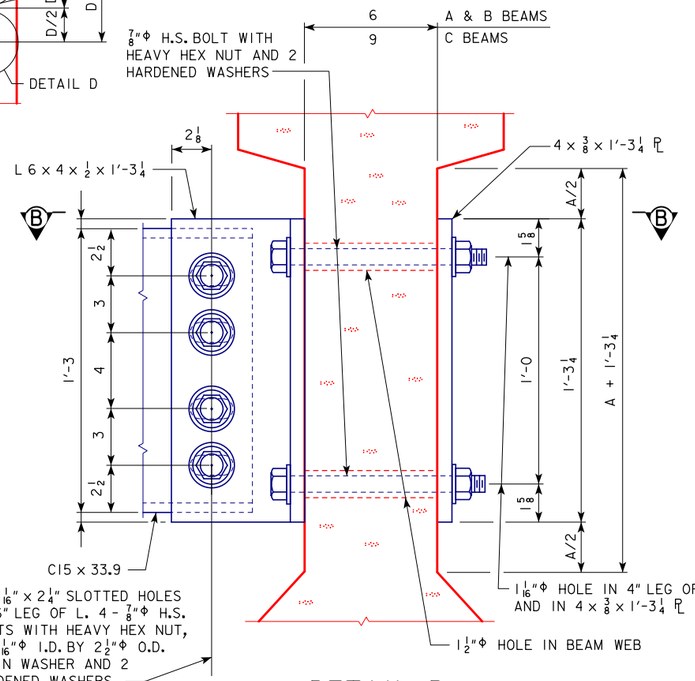
SECTION SHOWING INTERMEDIATE DIAPHRAGM



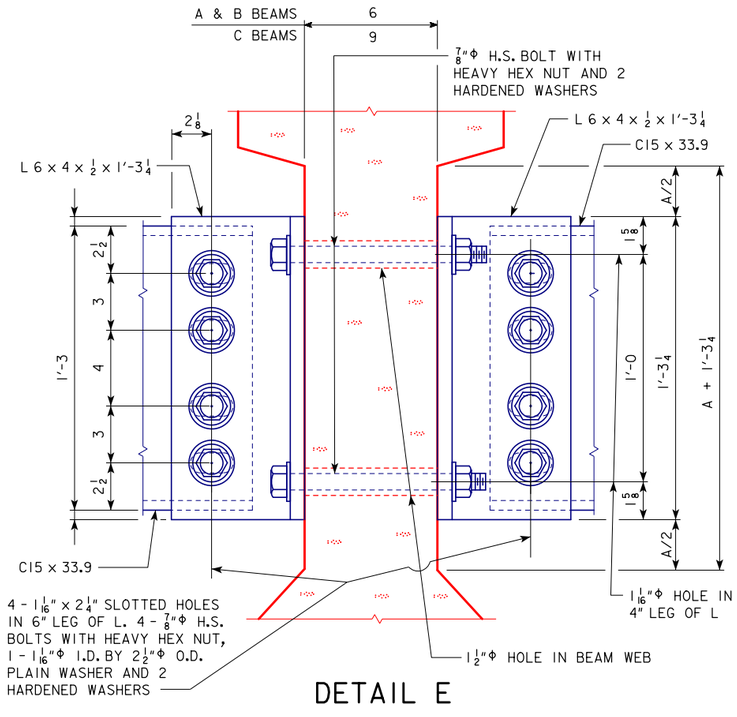
SECTION A-A
FOR 0° SKEW BRIDGES



SECTION A-A
FOR 15°, 30° AND 45° SKEW BRIDGES



DETAIL D



DETAIL E

NOTES:

ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.

SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.

ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.

THE 1 1/2"Φ HOLES FOR THE 7/8"Φ H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.

THE 7/8"Φ H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.

ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE.

CONCRETE DIAPHRAGMS DETAILS SHALL BE PROVIDED IN THE BRIDGE PLANS FOR OVERHEAD BRIDGES. DESIGNER SHALL ADJUST THE CONCRETE, REINFORCING AND STRUCTURAL STEEL QUANTITIES ACCORDINGLY.

INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

ONE CONNECTION DETAIL "E"

2 - 7/8"Φ x LENGTH H.S. BOLTS WITH NUTS AND WASHERS

WEB THICKNESS (IN.)	LENGTH OF H.S. BOLTS (IN.)	WEIGHT PER DETAIL "E" (LB.)	BRIDGE SKEW 0° (NUMBER OF DETAIL "E")	BRIDGE SKEW 15°, 30° & 45° (NUMBER OF DETAIL "E")	BRIDGE SKEW 0° (WEIGHT LB.)	BRIDGE SKEW 15°, 30° & 45° (WEIGHT LB.)
6	9	4.30	6	0	25.8	0.0
9	12	5.34	6	0	32.0	0.0
2 - L6x4 x 1/2 x 1'-3 1/4 = 41.2 LB			6	0	247.2	0.0

ONE CONNECTION DETAIL "D"

2 - 7/8"Φ x LENGTH H.S. BOLTS WITH NUTS AND WASHERS

WEB THICKNESS (IN.)	LENGTH OF H.S. BOLTS (IN.)	WEIGHT PER DETAIL "D" (LB.)	BRIDGE SKEW 0° (NUMBER OF DETAIL "D")	BRIDGE SKEW 15°, 30° & 45° (NUMBER OF DETAIL "D")	BRIDGE SKEW 0° (WEIGHT LB.)	BRIDGE SKEW 15°, 30° & 45° (WEIGHT LB.)
6	9	4.30	6	18	25.8	77.4
9	12	5.34	6	18	32.0	96.1
1 - BACKING PL 4 x 3/8 x 1'-3 1/4 = 6.5 LB			6	18	39.0	117.0
1 - L6 x 4 x 1/2 x 1'-3 1/4 = 20.6 LB			6	18	123.6	370.8

* ONE C15 x 33.9 DIAPHRAGM

WEB THICKNESS (IN.)	BEAM SPACING	LENGTH	NO. OF DIAPH.	UNIT WEIGHT (LB.)	WEIGHT (LB.)
6	7'-0	6'-2 5/8	9	210.8	1897.3
9	7'-0	5'-11 5/8	9	202.3	1821.1

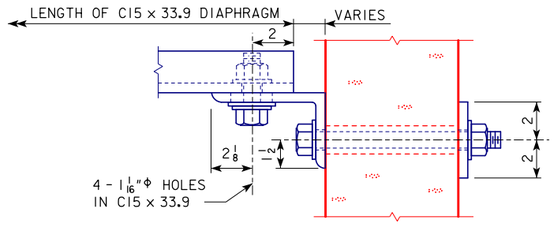
DIAPHRAGM CONNECTION BOLTS

	NO. OF DIAPH.	WEIGHT (LB.)
8 - 7/8"Φ x 0'-2 3/4 H.S. BOLTS WITH NUTS AND WASHERS, PER UNIT DIAPHRAGM = 10.3 LB	9	92.7

* THE LENGTH OF THE C15 x 33.9 IS BASED ON A VARIABLE CLEARANCE OF 1 11/16 TO 2 1/16 BETWEEN THE FACE OF BEAM WEB AND END OF C15 x 33.9.

TOTAL WEIGHT

	WEB THICKNESS (IN.)	BRIDGE SKEW 0°	BRIDGE SKEW 15°, 30° & 45°
INTERMEDIATE DIAPHR. STRUCT. STEEL - TOTAL (LB) =	6	2451	2555
INTERMEDIATE DIAPHR. STRUCT. STEEL - TOTAL (LB) =	9	2388	2498



SECTION B-B

BEAM SERIES	DIMENSIONS A + 1'-3 1/4	DIMENSIONS A/2
A	1'-4	3/8
B	1'-8	2 3/8
C	2'-1	4 3/8

01-10
LATEST REVISION DATE

Kevin K. McDonald
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

INTERMEDIATE STEEL DIAPHRAGMS

H24-38-06

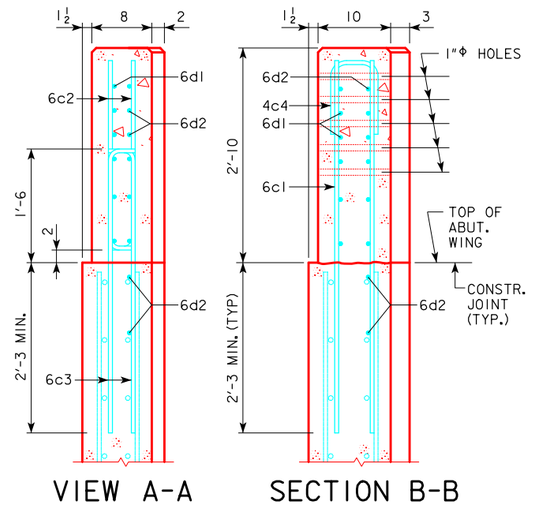
REVISED 01-10 - MINOR CHANGES WERE MADE TO AGREE WITH OFFICE STANDARD.

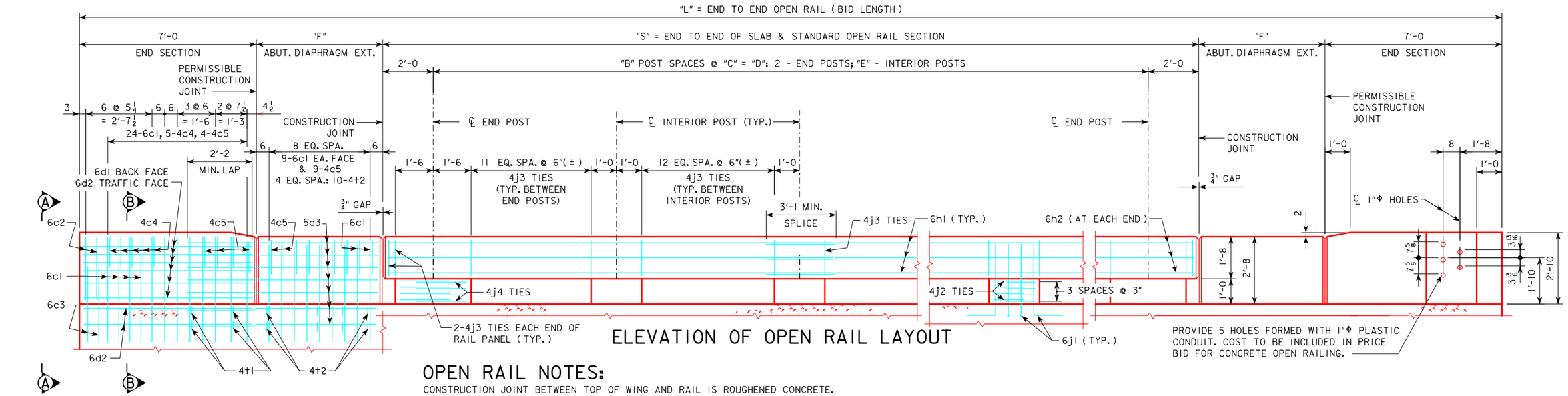
TABLE OF OPEN RAIL DIMENSIONS AND NUMBERS

℄-℄ ABUT. BRG		138′-10				151′-4				163′-10				176′-4				188′-10				℄-℄ ABUT. BRG
SKEW		0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	SKEW
DIMENSION OR NUMBER	L (FT.-IN.)	155′-10	155′-11¼	156′-3⅝	157′-0⅞	168′-4	168′-5¼	168′-9⅝	169′-6⅞	180′-10	180′-11¼	181′-3⅝	182′-0⅞	193′-4	193′-5¼	193′-9⅝	194′-6⅞	205′-10	205′-11¼	206′-3⅝	207′-0⅞	L (FT.-IN.)
	S (FT.-IN.)	141′-10	141′-11¼	142′-3⅝	143′-0⅞	154′-4	154′-5¼	154′-9⅝	155′-6⅞	166′-10	166′-11¼	167′-3⅝	168′-0⅞	179′-4	179′-5¼	179′-9⅝	180′-6⅞	191′-10	191′-11¼	192′-3⅝	193′-0⅞	S (FT.-IN.)
	B	18	18	18	18	19	19	19	19	21	21	21	21	23	23	23	23	24	24	24	24	B
	C (FT.-IN.)	7′-7⅞	7′-8	7′-8¼	7′-8¾	7′-11	7′-11	7′-11¼	7′-11¾	7′-9	7′-9⅛	7′-9⅜	7′-9¾	7′-7½	7′-7½	7′-7¾	7′-8⅛	7′-9⅞	7′-10	7′-10⅛	7′-10½	C (FT.-IN.)
	D (FT.-IN.)	137′-10	137′-11¼	138′-3⅝	139′-0⅞	150′-4	150′-5¼	150′-9⅝	151′-6⅞	162′-10	162′-11¼	163′-3⅝	164′-0⅞	175′-4	175′-5¼	175′-9⅝	176′-6⅞	187′-10	187′-11¼	188′-3⅝	189′-0⅞	D (FT.-IN.)
	E	17	17	17	17	18	18	18	18	20	20	20	20	22	22	22	22	23	23	23	23	E
	F (FT.-IN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F (FT.-IN.)

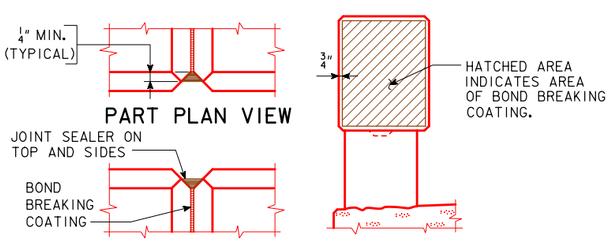
TABLE OF OPEN RAIL DIMENSIONS AND NUMBERS

℄-℄ ABUT. BRG		201′-4				213′-10				226′-4				243′-0				℄-℄ ABUT. BRG
SKEW		0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	SKEW
DIMENSION OR NUMBER	L (FT.-IN.)	228′-4	228′-4	228′-4	228′-4	240′-10	240′-10	240′-10	240′-10	253′-4	253′-4	253′-4	253′-4	270′-0	270′-0	270′-0	270′-0	L (FT.-IN.)
	S (FT.-IN.)	204′-4	204′-5¼	204′-9⅝	205′-6⅞	216′-10	216′-11¼	217′-3⅝	218′-0⅞	229′-4	229′-5¼	229′-9⅝	230′-6⅞	246′-0	246′-1¼	246′-5⅝	247′-2⅞	S (FT.-IN.)
	B	26	26	26	26	27	27	27	27	29	29	29	29	31	31	31	31	B
	C (FT.-IN.)	7′-8½	7′-8½	7′-8⅝	7′-9	7′-10⅝	7′-10⅝	7′-10¾	7′-11⅛	7′-9¼	7′-9¼	7′-9⅜	7′-9¾	7′-9⅝	7′-9¾	7′-9⅞	7′-10⅛	C (FT.-IN.)
	D (FT.-IN.)	200′-4	200′-5¼	200′-9⅝	201′-6⅞	212′-10	212′-11¼	213′-3⅝	214′-0⅞	225′-4	225′-5¼	225′-9⅝	226′-6⅞	242′-0	242′-1¼	242′-5⅝	243′-2⅞	D (FT.-IN.)
	E	25	25	25	25	26	26	26	26	28	28	28	28	30	30	30	30	E
	F (FT.-IN.)	5′-0	4′-11⅜	4′-9¼	4′-4½	5′-0	4′-11⅜	4′-9¼	4′-4½	5′-0	4′-11⅜	4′-9¼	4′-4½	5′-0	4′-11⅜	4′-9¼	4′-4½	F (FT.-IN.)





ELEVATION OF OPEN RAIL LAYOUT



OPEN RAIL JOINT DETAILS

OPEN RAIL NOTES:

CONSTRUCTION JOINT BETWEEN TOP OF WING AND RAIL IS ROUGHENED CONCRETE.

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN.

COST OF THE JOINT SEALER AND BOND BREAKER SHALL BE CONSIDERED INCIDENTAL TO OTHER CONSTRUCTION.

THE CONCRETE OPEN RAIL IS TO BE BID ON A LINEAL FOOT BASIS MEASURED FROM END TO END OF RAIL. THE NUMBER OF LINEAL FEET OF OPEN RAIL INSTALLED WILL BE PAID FOR AT THE CONTRACT PRICE PER LINEAL FOOT. PRICE BID FOR "CONCRETE OPEN RAILING, TL-4" SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIAL, EXCLUDING REINFORCING STEEL, AND ALL OF THE EQUIPMENT AND LABOR REQUIRED TO CONSTRUCT THE RAIL IN ACCORDANCE WITH THESE PLANS AND CURRENT SPECIFICATIONS.

ALL OPEN RAIL REINFORCING STEEL IS TO BE INCLUDED WITH THE SUPERSTRUCTURE REINFORCING STEEL.

THE CAST-IN-PLACE OPEN RAIL SHALL USE CLASS C MIX. CLASS D CONCRETE IS NOT PERMITTED.

TOP OF THE OPEN RAIL IS TO BE PARALLEL TO THEORETICAL ℄ GRADE.

IF CONDUIT IS REQUIRED IN THIS PLAN THE RIGID STEEL CONDUIT, JUNCTION BOXES AND FITTINGS INCLUDING LABOR AND ANY ADDITIONAL WORK TO DO THE INSTALLATION IS CONSIDERED INCIDENTAL TO THE COST OF THE RAILING.

07-10
LATEST REVISION DATE

Marian K. McDonald
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24′ ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

OPEN RAIL, TL-4 DETAILS

SHEET 1 OF 2

H24-39-06

REVISED 07-10 - PROVIDED A ¾" GAP BETWEEN RAIL AND ABUT. DIAPH. EXT.

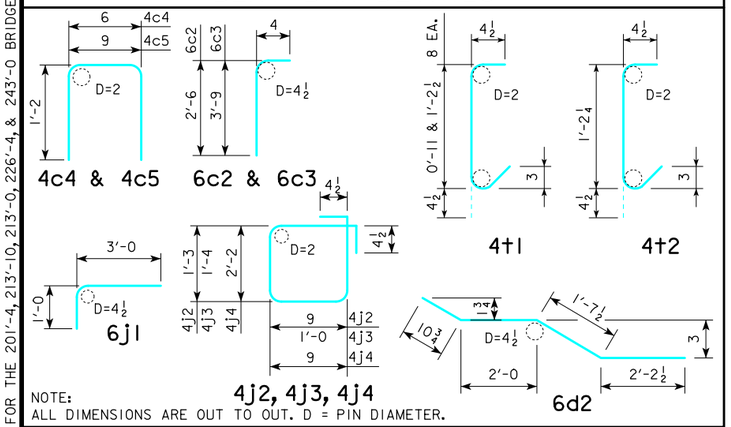
REINFORCING STEEL-TWO OPEN RAILS

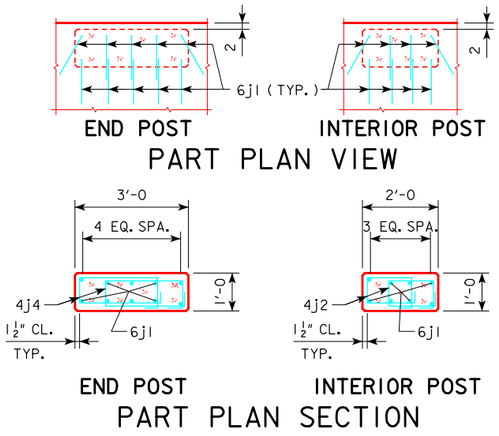
(NOTE: THESE REINFORCING BARS TO BE USED ON ALL SKEWS)

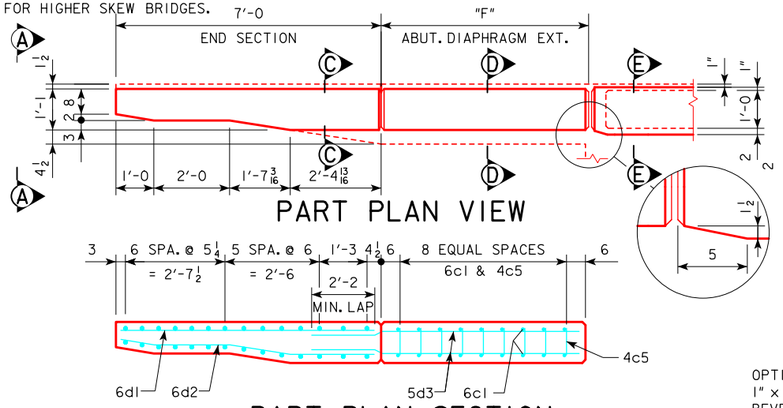
BRIDGE LENGTH			138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0		
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT
6c1	VERTICAL, END SECTION & ABUT. DIAPH. EXT.		96	4'-11	709	96	4'-11	709	96	4'-11	709	96	4'-11	709	96	4'-11	709	168	4'-11	1,241	168	4'-11	1241	168	4'-11	1241	168	4'-11	1241
6c2	VERTICAL, END SECTION		16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68	16	2'-10	68
6c3	VERTICAL, END SECTION		16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98	16	4'-1	98
4c4	VERTICAL HOOPS, END SECTION		20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38	20	2'-10	38
4c5	VERT. HOOPS, END SEC. & ABUT. DIAPH. EXT.		16	3'-1	33	16	3'-1	33	16	3'-1	33	16	3'-1	33	16	3'-1	33	52	3'-1	107	52	3'-1	107	52	3'-1	107	52	3'-1	107
6d1	HORIZONTAL, END SECTION-BACK FACE		24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240	24	6'-8	240
6d2	HORIZONTAL, END SECTION-TRAFFIC FACE		32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324	32	6'-9	324
5d3*	HORIZONTAL, ABUT. DIAPH. EXT.-BOTH FACES		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48	7'-2	359	48	7'-2	359	48	7'-2	359	48	7'-2	359
6h1	LONGITUDINAL, OPEN RAIL		24	40'-0	1,442	36	40'-0	2,163	36	40'-0	2,163	36	40'-0	2,163	48	40'-0	2,884	48	40'-0	2,884	48	40'-0	2,884	60	40'-0	3,605	60	40'-0	3,605
6h2	LONGITUDINAL, OPEN RAIL, ENDS		24	36'-0	1,298	24	23'-10	859	24	30'-1	1,084	24	36'-4	1,310	24	24'-1	868	24	30'-4	1,093	24	36'-7	1,319	24	24'-5	880	24	32'-9	1,181
6j1	VERTICAL DOWELS, OPEN RAIL		312	4'-0	1,875	328	4'-0	1,971	360	4'-0	2,163	392	4'-0	2,355	408	4'-0	2,451	440	4'-0	2,644	456	4'-0	2,740	488	4'-0	2,932	520	4'-0	3,124
4j2	HOOP, INTERIOR POST		272	4'-9	863	288	4'-9	914	320	4'-9	1,015	352	4'-9	1,117	368	4'-9	1,168	400	4'-9	1,269	416	4'-9	1,320	448	4'-9	1,422	480	4'-9	1,523
4j3	HOOP, OPEN RAIL		472	5'-5	1,708	498	5'-5	1,802	550	5'-5	1,990	602	5'-5	2,178	628	5'-5	2,272	680	5'-5	2,460	706	5'-5	2,555	758	5'-5	2,743	810	5'-5	2,931
4j4	HOOP, END POST		32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141	32	6'-7	141
4t1	WING FOOTING TIE BARS		16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19	16	VARIES	19
4t2	WING FOOTING TIE BARS		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	1'-11	51	40	1'-11	51	40	1'-11	51	40	1'-11	51
TOTAL LBS. (INCLUDE WITH SUPERSTRUCTURE REINFORCING)					8,856			9,379			10,085			10,793			11,313			13,036			13,504			14,268			15,050

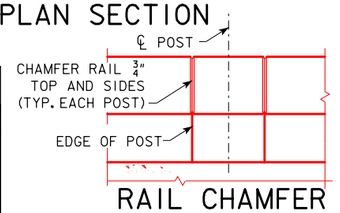
* TRAFFIC FACE 5d3 BARS MAY REQUIRE FIELD CUTTING OR BENDING FOR HIGHER SKEW BRIDGES.

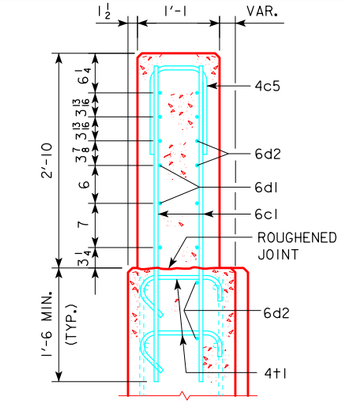
BENT BAR DETAILS

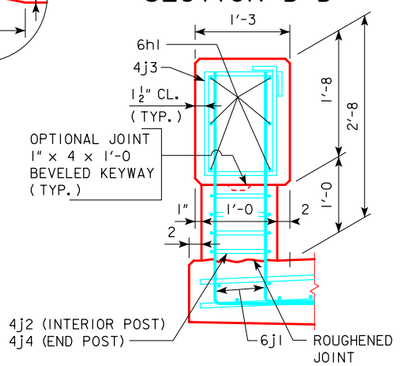












CONCRETE PLACEMENT SUMMARY - C.Y.

BRIDGE LENGTH		138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
OPEN RAIL SECTION	2 @ 0.077 CU. YDS. PER FT.	22.0	24.0	25.9	27.8	29.7	31.7	33.6	35.5	38.1
OPEN RAIL-END SECTION	4 @ 0.687 CU. YDS.	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
OPEN RAIL-ABUT. DIAPH. SECTION	4 @ 0.107 CU. YDS. PER FT.	—	—	—	—	—	1.9	1.9	1.9	1.9
OPEN RAIL-END POSTS	4 @ 0.11 CU. YDS.	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
OPEN RAIL-INTERIOR POSTS	2 x "E" @ 0.07 CU. YDS.	2.4	2.5	2.8	3.1	3.2	3.5	3.6	3.9	4.2
	TOTAL (C.Y.)	27.5	29.6	31.8	34.0	36.0	40.2	42.2	44.4	47.3

CONCRETE QUANTITIES SHOWN ARE BASED ON 45° SKEW. FOR "E" SEE SHEET H24-39-06.

OPEN CONCRETE RAIL, TL-4 QUANTITIES - L.F.

BRIDGE LENGTH		138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
OPEN CONCRETE RAILING, TL-4	0° SKEW	311.7 E	336.7	361.7	386.7	411.7	456.7	481.7	506.7	540.0
OPEN CONCRETE RAILING, TL-4	15° SKEW	311.9	336.9	361.9	386.9	411.9	456.7	481.7	506.7	540.0
OPEN CONCRETE RAILING, TL-4	30° SKEW	312.6	337.6	362.6	387.6	412.6	456.7	481.7	506.7	540.0
OPEN CONCRETE RAILING, TL-4	45° SKEW	314.2	339.2	364.2	389.2	414.2	456.7	481.7	506.7	540.0

REVISED 12-10 - CORRECTED THE OPEN RAIL REBAR QUANTITIES FOR THE 201'-4, 213'-10, 213'-0, 226'-4, & 243'-0 BRIDGE LENGTHS.

12-10
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWA DOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

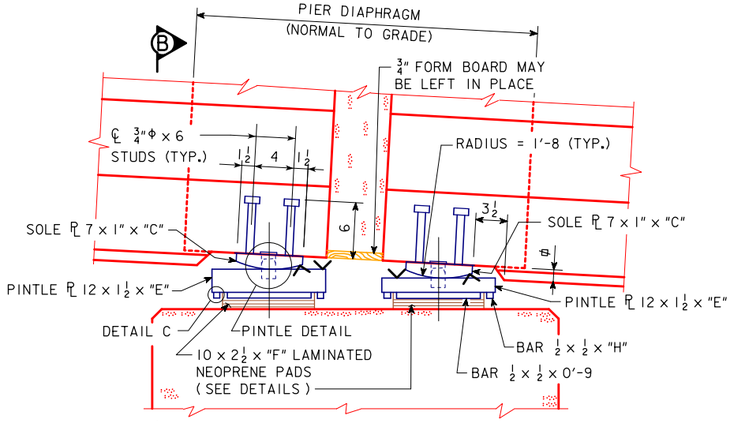
PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

OPEN RAIL, TL-4 DETAILS

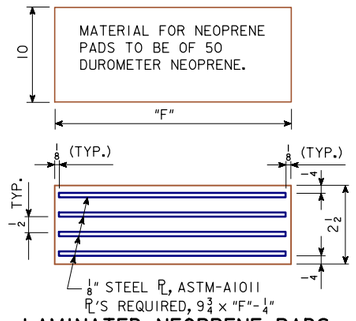
SHEET 2 OF 2

H24-40-06

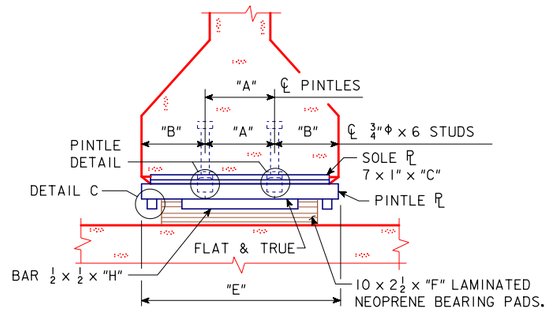


PART ELEVATION

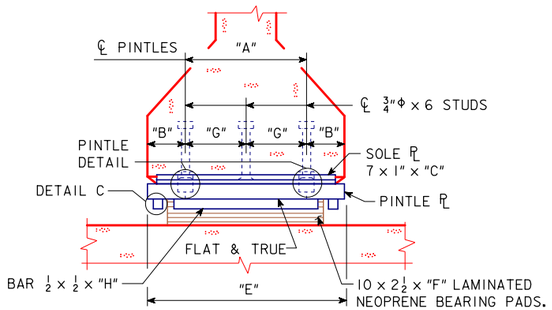
Φ NOTCH BEAM END TO SOLE ℄ THICKNESS MAXIMUM 1"



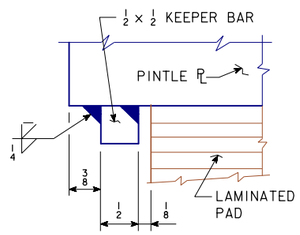
LAMINATED NEOPRENE PADS



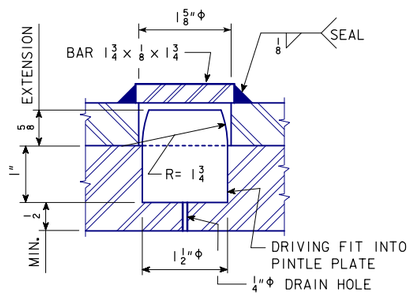
SECTION B-B FOR A & B BEAMS
(DIAPHRAGM CONCRETE NOT SHOWN)



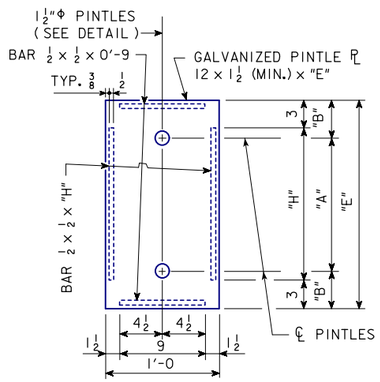
SECTION B-B FOR C BEAMS
(DIAPHRAGM CONCRETE NOT SHOWN)



DETAIL C



PINTLE DETAIL



PLAN OF PINTLE PLATE

EXPANSION PIER BEARING NOTES:

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.

PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE "STRUCTURAL STEEL QUANTITY". COSTS OF ANCHORED CURVED SOLE PLATES AND NEOPRENE PADS ARE TO BE INCLUDED IN THE PRICE BID FOR "PRETENSIONED PRESTRESSED CONCRETE BEAMS".

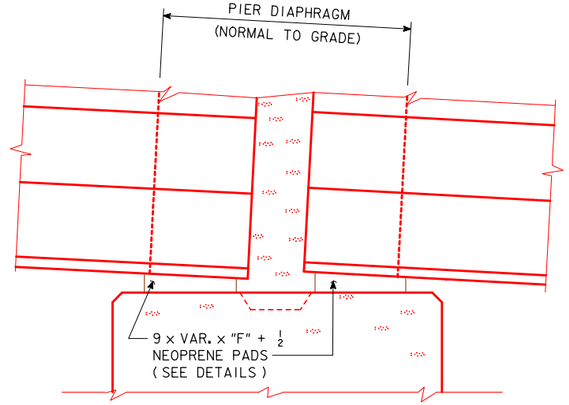
THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING.

SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.

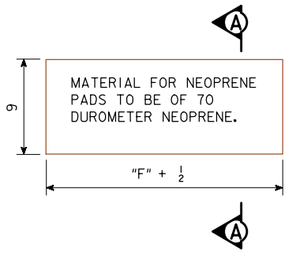
SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING :

- ASTM A 514 GRADE B
- ASTM A 709 GRADE HPS 70W

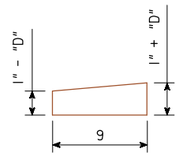
EXPANSION PIER



PART ELEVATION



PLAN OF NEOPRENE PAD



SECTION A-A

SLOPE	"D"
SLOPE ≤ 1.4%	0"
1.4% < SLOPE ≤ 4.2%	⅛"
4.2% < SLOPE ≤ 5.0%	¼"

$$\text{SLOPE}_{\text{SPAN 1}} = 100\% \left| \frac{\text{P/G ELEV. @ NEAR ABUT. - P/G ELEV. @ PIER 1}}{\text{SPAN 1 LENGTH}} \right|$$

$$\text{SLOPE}_{\text{SPAN 2}} = 100\% \left| \frac{\text{P/G ELEV. @ PIER 1 - P/G ELEV. @ PIER 2}}{\text{SPAN 2 LENGTH}} \right|$$

$$\text{SLOPE}_{\text{SPAN 3}} = 100\% \left| \frac{\text{P/G ELEV. @ PIER 2 - P/G ELEV. @ FAR ABUT.}}{\text{SPAN 3 LENGTH}} \right|$$

SLOPE CALCULATION FORMULA

FIXED PIER BEARING NOTES:

IF CALCULATED SLOPE FOR A GIVEN SPAN EXCEEDS 1.4%, THE NEOPRENE BEARING PADS AT THE FIXED PIER FOR THAT SPAN SHALL BE TAPERED. REFER TO TABLE FOR DIMENSIONS OF TAPERED PADS.

COST OF NEOPRENE PADS SHALL BE INCLUDED IN THE PRICE BID FOR "PRETENSIONED PRESTRESSED CONCRETE BEAMS".

FIXED PIER

VARIABLE DIMENSIONS

	BEAM BOTTOM FLANGE WIDTH	
	A & B BEAMS 1'-5	C BEAMS 1'-8
"A"	0'-6	1'-0
"B"	0'-5½	0'-4
"C"	1'-3½	1'-6½
"E"	1'-5	1'-8
"F"	1'-3	1'-6
"G"	———	0'-6
"H"	0'-11	1'-2

09-12
LATEST REVISION DATE

Marian K. McDonald
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

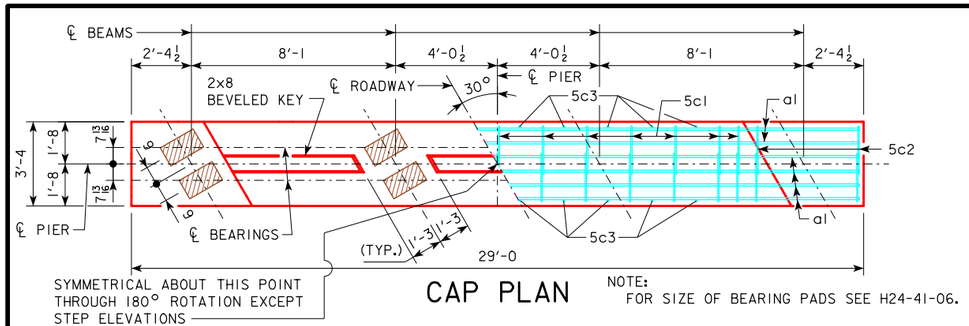
STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

PIER BEARING DETAILS | H24-41-06

CORRECTION 09-12 - REFERENCE TO ASTM A852 WAS DELETED.



CAP PLAN

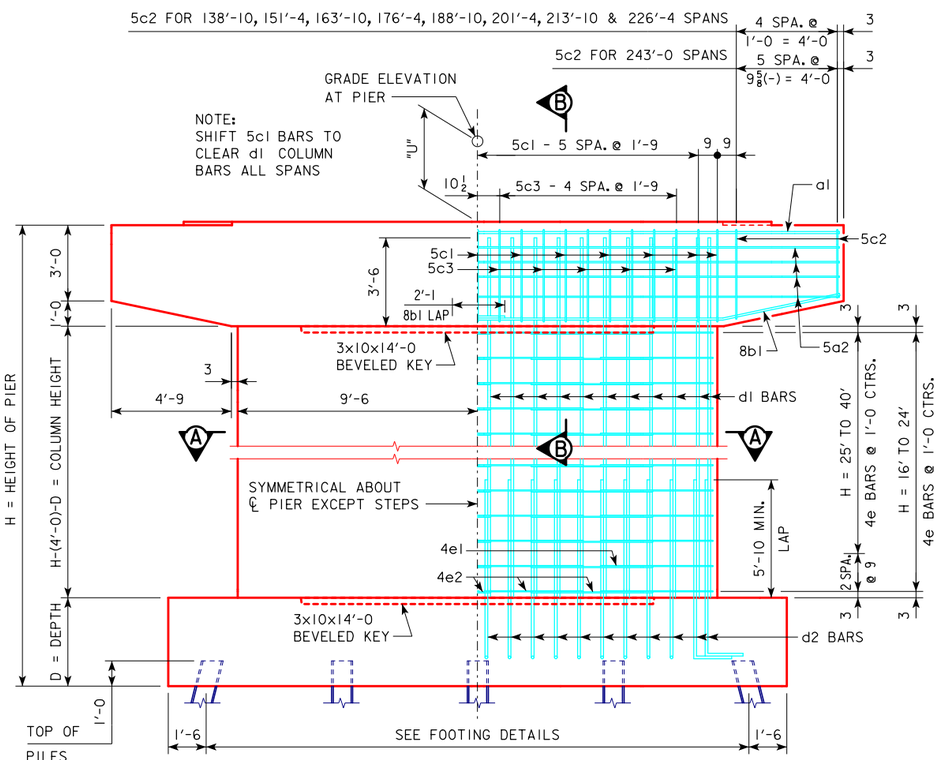
NOTE:
FOR SIZE OF BEARING PADS SEE H24-41-06.

CAP

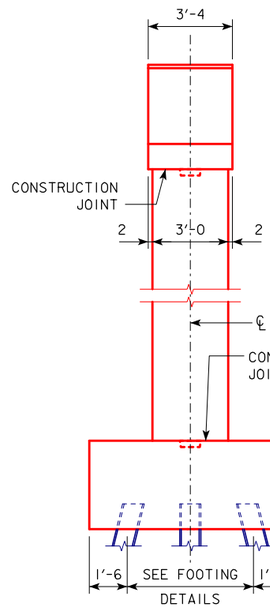
REINFORCING STEEL	℄ - ℄ ABUT. BEARINGS		138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0		
BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	28'-8		6	9	585	6	9	585	6	9	585	6	9	585	6	9	585	6	9	585	6	9	585	6	9	585	6	10	740
5a2	28'-8		8	5	239	8	5	239	8	5	239	8	5	239	8	5	239	8	5	239	8	5	239	8	5	239	8	5	239
8b1	15'-6		8	8	331	8	8	331	8	8	331	8	8	331	8	8	331	8	8	331	8	8	331	8	8	331	8	8	331
5c1	12'-2		26	5	330	26	5	330	26	5	330	26	5	330	26	5	330	26	5	330	26	5	330	26	5	330	26	5	330
5c2	VARIES		20	5	232	20	5	232	20	5	232	20	5	232	20	5	232	20	5	232	20	5	232	20	5	232	24	5	278
5c3	4'-2		20	5	87	20	5	87	20	5	87	20	5	87	20	5	87	20	5	87	20	5	87	20	5	87	20	5	87
① TOTAL (LB.)			1804			1804			1804			1804			1804			1804			1804			1804			2005		
STRUCTURAL CONCRETE (CY)			14.2			14.2			14.2			14.2			14.2			14.2			14.2			14.2			14.2		

COLUMN

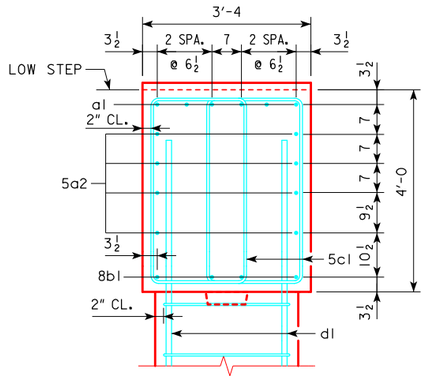
H IN FEET	COLUMN HEIGHT	STRUCTURAL CONCRETE (CY)	REINFORCING STEEL												TOTAL WEIGHT (LB.)
			d1 BAR				4e1 BAR				4e2 BAR				
			NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	
16	8'-6	17.3	44	10	12'-0	2272	18	4	13'-9	165	36	4	15'-9	379	2816
17	9'-6	19.4	44	10	13'-0	2461	20	4	13'-9	184	40	4	15'-9	421	3066
18	10'-6	21.4	44	10	14'-0	2651	22	4	13'-9	202	44	4	15'-9	463	3316
19	11'-6	23.5	44	10	15'-0	2840	24	4	13'-9	220	48	4	15'-9	505	3565
20	12'-6	25.5	44	10	16'-0	3029	26	4	13'-9	239	52	4	15'-9	547	3815
21	13'-6	27.5	44	10	17'-0	3219	28	4	13'-9	257	56	4	15'-9	589	4065
22	14'-6	29.6	44	10	18'-0	3408	30	4	13'-9	276	60	4	15'-9	631	4315
23	15'-6	31.6	44	10	19'-0	3597	32	4	13'-9	294	64	4	15'-9	673	4564
24	16'-6	33.7	44	10	20'-0	3787	34	4	13'-9	312	68	4	15'-9	715	4814
25	17'-0	34.7	44	10	20'-6	3881	36	4	13'-9	331	72	4	15'-9	758	4970
26	18'-0	36.7	44	10	21'-6	4071	38	4	13'-9	349	76	4	15'-9	800	5220
27	19'-0	38.8	44	10	22'-6	4260	40	4	13'-9	367	80	4	15'-9	842	5469
28	20'-0	40.8	44	10	23'-6	4449	42	4	13'-9	386	84	4	15'-9	884	5719
29	21'-0	42.8	44	10	24'-6	4639	44	4	13'-9	404	88	4	15'-9	926	5969
30	22'-0	44.9	44	10	25'-6	4828	46	4	13'-9	423	92	4	15'-9	968	6219
31	23'-0	46.9	44	10	26'-6	5017	48	4	13'-9	441	96	4	15'-9	1010	6468
32	24'-0	48.9	44	10	27'-6	5207	50	4	13'-9	459	100	4	15'-9	1052	6718
33	25'-0	51.0	44	10	28'-6	5396	52	4	13'-9	478	104	4	15'-9	1094	6968
34	26'-0	53.0	44	10	29'-6	5585	54	4	13'-9	496	108	4	15'-9	1136	7217
35	27'-0	55.1	44	10	30'-6	5775	56	4	13'-9	514	112	4	15'-9	1178	7467
36	28'-0	57.1	44	10	31'-6	5964	58	4	13'-9	533	116	4	15'-9	1220	7717
37	29'-0	59.1	44	10	32'-6	6153	60	4	13'-9	551	120	4	15'-9	1263	7967
38	30'-0	61.2	44	10	33'-6	6343	62	4	13'-9	569	124	4	15'-9	1305	8217
39	31'-0	63.2	44	10	34'-6	6532	64	4	13'-9	588	128	4	15'-9	1347	8467
40	32'-0	65.3	44	10	35'-6	6721	66	4	13'-9	606	132	4	15'-9	1389	8716



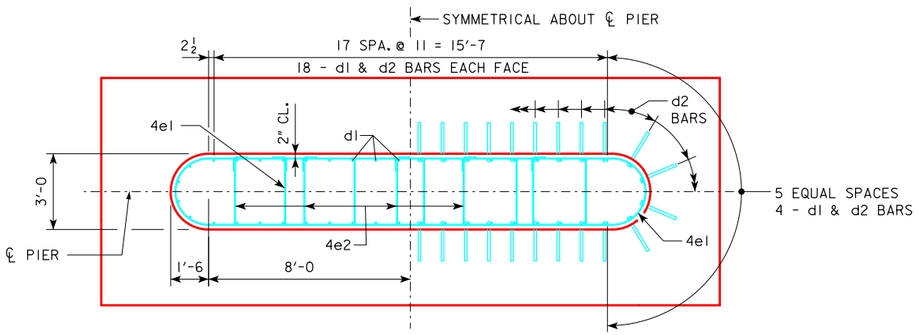
FRONT ELEVATION



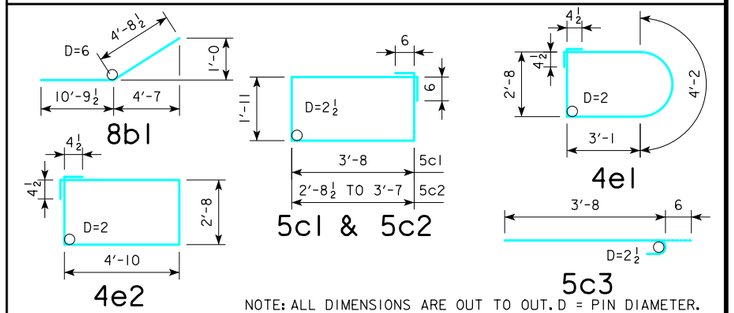
END ELEVATION



SECTION B-B



SECTION A-A



NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

BENT BAR DETAILS

① SEE SHEET H24-24-06 FOR STEP REINFORCING STEEL QUANTITY AND DETAILS.

PIER NOTES:

SEE "TEE PIER NOTES" ON H24-02-06 FOR NOTES REGARDING APPLICATION OF THESE PIER STANDARDS.

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.

ELIMINATE 2x8 BEVELED KEYWAY ON TOP OF CAP FOR EXPANSION PIERS.

SEE SHEET H24-22-06 FOR "U" DIMENSION.

REVISED 01-10- SHEET WAS REVISED TO MEET LRFD SPECIFICATIONS.
REVISED 09-2016 - CHANGED TOP OF FOOTING TO TOP OF REBAR VERTICAL CLEARANCE TO 3" (WAS 2").
REVISED 10-2016 - CHANGED BEVELED KEYWAY LENGTH OF PIER COLUMN CAP AND FOOTING TO BE 5'-0 LESS THAN WIDTH OF PIER COLUMN (WAS 16'-0).

10-2016
LATEST REVISION DATE

Marcus K. McAndrew
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

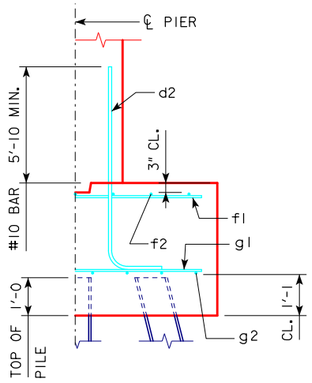
PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

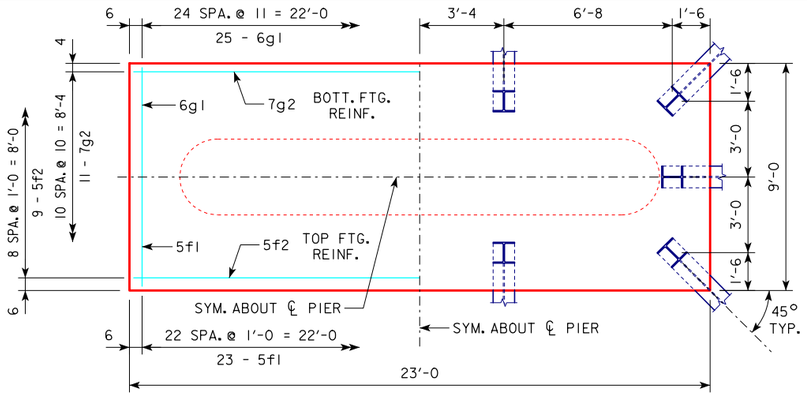
TEE PIER CAP AND COLUMN

30° SKEW

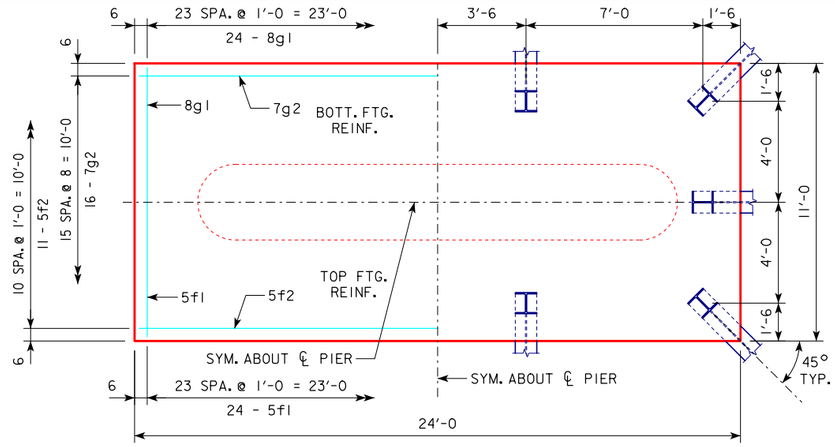
H24-64-06



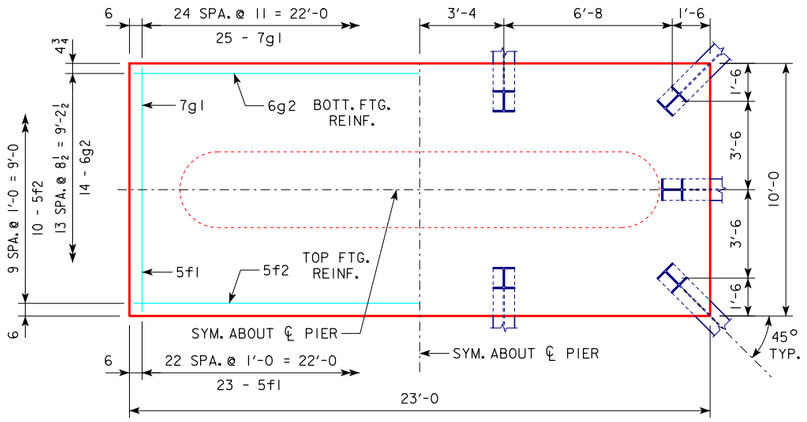
TYPICAL SECTION



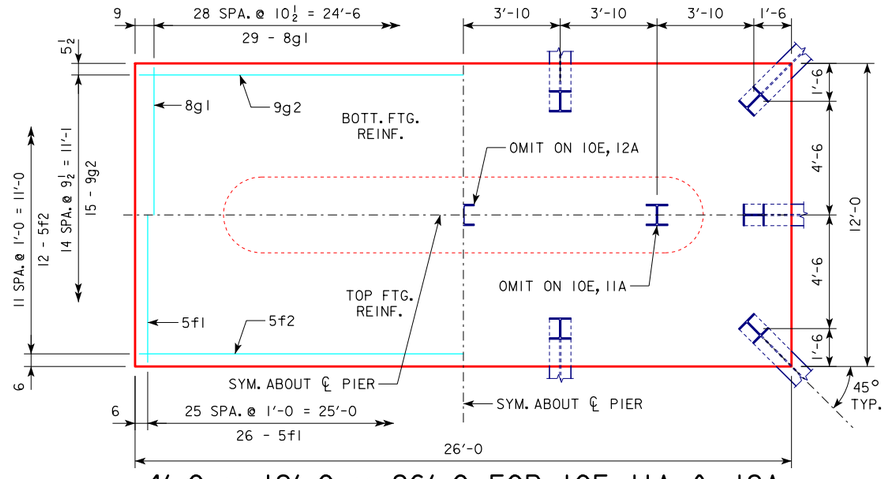
4'-0 x 9'-0 x 23'-0 FOR 10B



4'-0 x 11'-0 x 24'-0 FOR 10D



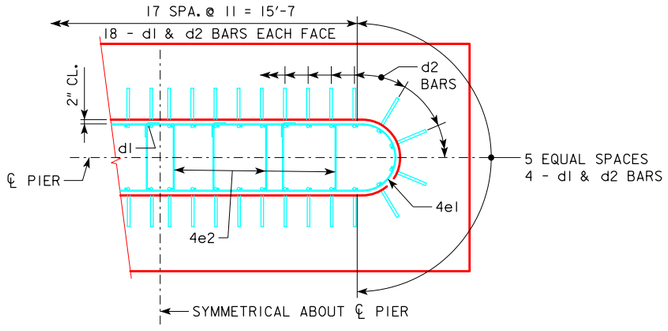
4'-0 x 10'-0 x 23'-0 FOR 10C



4'-0 x 12'-0 x 26'-0 FOR 10E, 11A & 12A

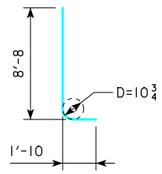
H IN FT.	℄ - ℄ ABUT. BRG.	PILING (HP10x57) NO. & LAYOUT	PILING (HP10x57) ① LRFD Pu, STRENGTH I, DES. LOAD (KIPS)	FOOTING SIZE
25 TO 27	201'-4	10B	193	4' x 9' x 23'
	213'-10	10B	199	
	226'-4	10B	206	
	243'-0	10B	212	
28 TO 30	201'-4	10C	197	4' x 10' x 23'
	213'-10	10C	203	
	226'-4	10C	210	
	243'-0	10C	216	
31 TO 33	201'-4	10D	203	4' x 11' x 24'
	213'-10	10D	209	
	226'-4	10D	215	
	243'-0	10D	220	
34 TO 36	201'-4	10E	208	4' x 12' x 26'
	213'-10	10E	213	
	226'-4	10E	219	
	243'-0	11A	211	
37 TO 40	201'-4	10E	219	4' x 12' x 26'
	213'-10	11A	213	
	226'-4	11A	218	
	243'-0	12A	203	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING) BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
4' x 9' x 23'	d2	44 - #10 AS SHOWN	10'-6	1988	3244	30.7
	f1	23 - #5 @ 1'-0	8'-8	208		
	f2	9 - #5 @ 1'-0	22'-8	213		
	g1	25 - #6 @ 0'-11	8'-8	325		
	g2	11 - #7 @ 0'-10	22'-8	510		
4' x 10' x 23'	d2	44 - #10 AS SHOWN	10'-6	1988	3427	34.1
	f1	23 - #5 @ 1'-0	9'-8	232		
	f2	10 - #5 @ 1'-0	22'-8	236		
	g1	25 - #7 @ 0'-11	9'-8	494		
	g2	14 - #6 @ 0'-8 1/2	22'-8	477		
4' x 11' x 24'	d2	44 - #10 AS SHOWN	10'-6	1988	3985	39.1
	f1	24 - #5 @ 1'-0	10'-8	267		
	f2	11 - #5 @ 1'-0	23'-8	272		
	g1	24 - #8 @ 1'-0	10'-8	684		
	g2	16 - #7 @ 0'-8	23'-8	774		
4' x 12' x 26'	d2	44 - #10 AS SHOWN	10'-6	1988	4837	46.2
	f1	26 - #5 @ 1'-0	11'-8	316		
	f2	12 - #5 @ 1'-0	25'-8	321		
	g1	29 - #8 @ 0'-10 1/2	11'-8	903		
	g2	15 - #9 @ 0'-9 1/2	25'-8	1309		



d2 BAR LAYOUT
(SEE SECTION A-A ON SHEET H24-64-06.)

① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.



d2

NOTE: D = PIN DIAMETER.
DIMENSIONS ARE OUT TO OUT.

FOOTING NOTES:

THESE FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H24-64-06.

BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

STEEL PILING USED AS POINT BEARING SHALL HAVE A MINIMUM DISTANCE OF APPROXIMATELY 10 FEET FROM BOTTOM OF FOOTING TO TOP OF BEARING ROCK. THE PILE LAYOUTS ARE SUCH THAT THE DISTANCE CENTER TO CENTER OF ADJACENT PILING SHALL NOT EXCEED 8'-0.

PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

09-2016
LATEST REVISION DATE

Marcus K. McAndrew
APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

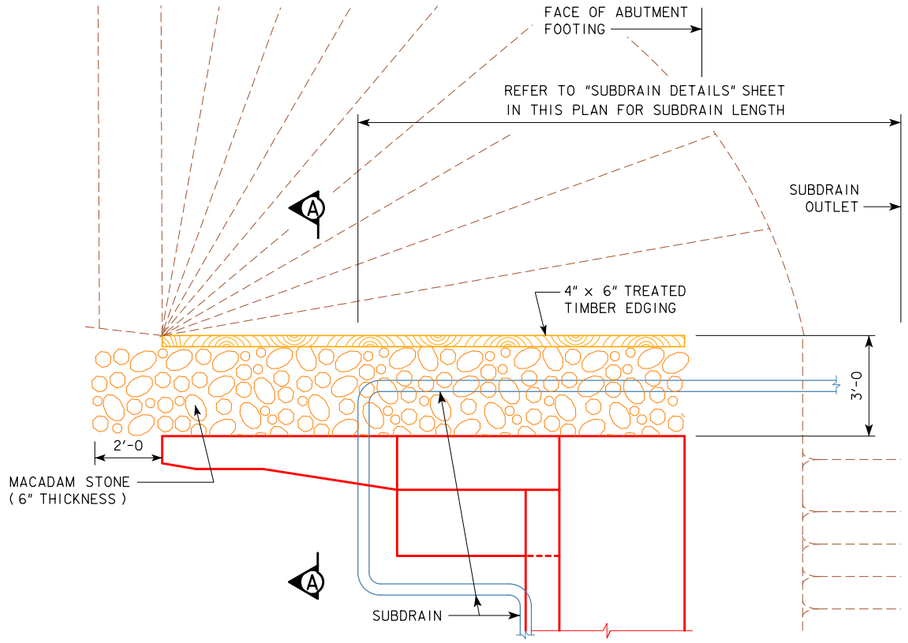
DECEMBER, 2006

TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS

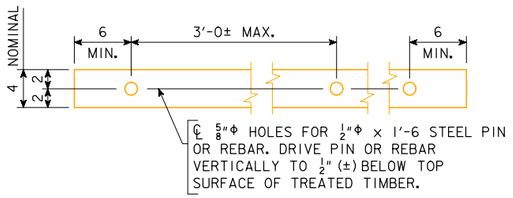
30° SKEW - H=25' TO 40'

H24-68-06

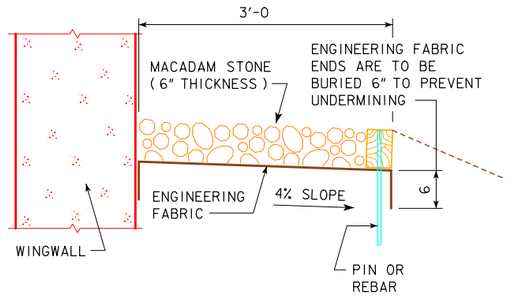
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.
REVISED 09-2016 - CHANGED VERTICAL CLEARANCE OF REBAR "f2" TO TOP OF PIER FOOTING TO 3" (WAS 2").



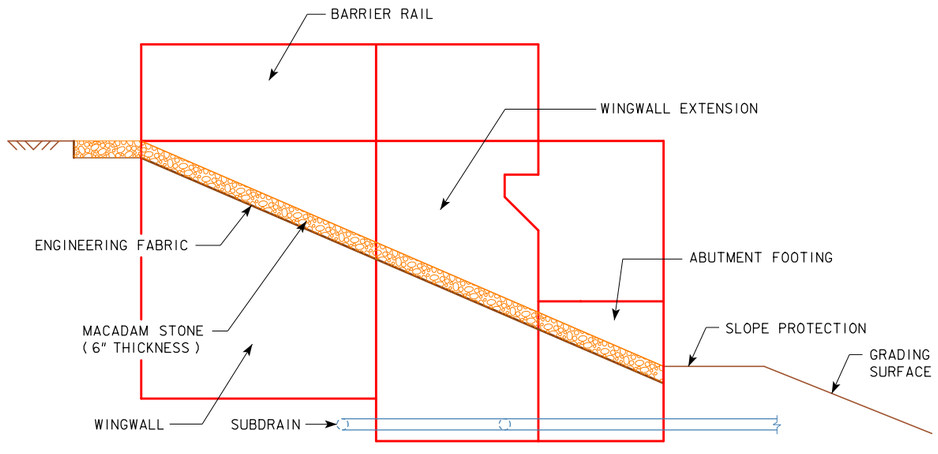
TOP VIEW OF WING ARMORING WITH WING EXTENSION



4" x 6" TREATED TIMBER EDGING DETAILS



SECTION A-A



PROFILE VIEW OF WING ARMORING WITH WING EXTENSION

(SHOWN FOR INTEGRAL ABUTMENT WITH WING EXTENSIONS)

SUBDRAIN NOTES:

SEE H24-78-06 AND "GENERAL ELEVATION DATA" SHEETS FOR DETAILS OF PLACING ALL SUBDRAINS AND SUBDRAIN OUTLETS REQUIRED FOR THIS STRUCTURE.

THE BRIDGE CONTRACTOR IS TO INSTALL SUBDRAINS BEHIND THE ABUTMENT. THE SUBDRAINS SHALL BE 4" IN DIAMETER AND MEET THE REQUIREMENTS OF SECTION 4143.01 B OF THE CURRENT I.D.O.T. STANDARD SPECIFICATION. THE SUBDRAIN OUTLET SHALL CONSIST OF A 6'-0 LENGTH OF PIPE WITH A REMOVABLE RODENT GUARD.

THE DIMENSIONS SHOWN FOR THE PROPOSED SUBDRAINS ARE BASED ON THE PROPOSED GRADING LAYOUT OF BRIDGE BERMS. THE DIMENSIONS SHOWN ARE FOR ESTIMATING ONLY. REQUIRED LENGTHS AND GENERAL LOCATIONS OF SUBDRAINS ARE SUBJECT TO CHANGE DUE TO FIELD ADJUSTMENTS OF THE GRADING LAYOUT.

THE COST OF FURNISHING AND PLACING SUBDRAIN (INCLUDING EXCAVATION), GRANULAR BACKFILL, POROUS BACKFILL, AND SUBDRAIN OUTLET IS TO BE INCLUDED IN THE PRICE BID FOR "STRUCTURAL CONCRETE (BRIDGE)". NO EXTRA PAYMENT WILL BE MADE.

MACADAM STONE WING ARMORING NOTES:

MACADAM STONE SHALL BE PLACED ALONG THE SIDE OF THE WING AND ABUTMENT FOOTING. THIS IS TYPICAL AT EACH CORNER OF THE BRIDGE UNLESS OTHERWISE NOTED IN THE PLANS. THE MACADAM STONE AT THESE LOCATIONS SHALL BE UNDERLAYED WITH ENGINEERING FABRIC MEETING THE REQUIREMENTS OF 4196.01 C.

THE BRIDGE BERM FORESLOPE SHALL BE COMPACTED AND SHAPED AS SHOWN ON THESE PLANS, THE SITUATION PLAN AND AS DIRECTED BY THE ENGINEER. THE BERM FORESLOPE SHALL BE FIRM WHEN THE ENGINEERING FABRIC AND MACADAM STONE ARE PLACED.

THE ENGINEERING FABRIC SHALL MEET THE REQUIREMENTS OF 4196.01 C. IF THE ENGINEERING FABRIC IS LAPPED THE LAPS SHALL BE A MINIMUM OF ONE FOOT IN LENGTH, SHINGLE FASHION WITH UP SLOPE LAP PIECE ON TOP AND STAPLED FOR CONTINUITY.

THE MACADAM STONE SHALL MEET THE REQUIREMENTS OF 4122.02, COARSE MATERIAL (NO CHOKE STONE IS ALLOWED).

WOOD PRESERVATIVE TREATMENT FOR THE TIMBER EDGING SHALL MEET THE REQUIREMENTS FOR GUARDRAIL POSTS, SAWED FOUR SIDES, AS SPECIFIED IN 4161.

THE MACADAM STONE SHALL BE DEPOSITED, SPREAD, CONSOLIDATED AND SHAPED BY MECHANICAL OR HAND METHODS THAT WILL PROVIDE UNIFORM DEPTH AND DENSITY AND PROVIDE UNIFORM SURFACE APPEARANCE.

PAYMENT FOR THE BRIDGE WING ARMORING SHALL BE INCIDENTAL TO THE BID ITEM "STRUCTURAL CONCRETE (BRIDGE)" AND SHALL INCLUDE COSTS OF ALL MATERIAL AND LABOR TO CONSTRUCT THE WING ARMORING AS SHOWN ON THESE PLANS.

09-14
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 24' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

DECEMBER, 2006

WING ARMORING DETAILS

C BEAMS

H24-80-06

REVISED 09-14 - CHANGED THE AREA OF THE MACADAM STONE AREA TO 2'-0 IN FRONT OF THE BRIDGE WING.