



**H40-06 THREE SPAN  
PRETENSIONED PRESTRESSED  
CONCRETE BEAM BRIDGE STANDARDS**

REVISED 05-13 - THE GENERAL NOTES AND SPECIFICATIONS MOVED TO STANDARD SHEET H40-01A-06. SRL NOTATION ADDED.

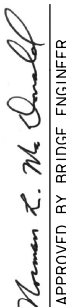

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STRUCTURAL RESISTANCE LEVEL-1 (SRL-1) REPLACES THE 50 TON STEEL PILE DESIGNATION.  
 STRUCTURAL RESISTANCE LEVEL-2 (SRL-2) REPLACES THE 75 TON STEEL PILE DESIGNATION.  
 FOR MORE INFORMATION ON STRUCTURAL RESISTANCE LEVELS (SRL-1 & SRL-2), SEE THE BRIDGE DESIGN MANUAL, LOCATED ON THE IOWA DEPARTMENT OF TRANSPORTATIONS, OFFICE OF BRIDGES AND STRUCTURES, WEBSITE.

05-13 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		INDEX SHEET	H40-01-06

## GENERAL NOTES:

THE H40-06 BRIDGE STANDARDS, IF PROPERLY USED, PROVIDE THE STRUCTURAL PLANS NECESSARY TO CONSTRUCT THREE SPAN 40' 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.

FOR CLARITY, MOST SECTIONS SHOWN ON THE FOLLOWING SHEETS ARE DRAWN WITH BARRIER RAIL ONLY. THESE SECTIONS WILL BE IDENTICAL FOR OPEN RAIL DESIGN WITH ANY MODIFICATIONS SHOWN ON SHEET H40-42-06 AND H40-43-06.

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.

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 ARTICLE 2501.03, Q 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 H40-02-06.

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 H40-17-06, H40-24-06, AND H40-31-06 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 INTEGRAL ABUTMENTS, PILE BENTS, AND TEE PIERS FOR THESE H40 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.

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 E177, E718, E719, E818, AND E819 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](http://www.iowadot.gov/bridge/index.htm).

THESE STANDARDS ARE TO BE USED FOR BRIDGES WITH 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.

3" WING PVC PIPE IS INCIDENTAL TO STRUCTURAL CONCRETE.

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 (5g1 IS ⅝ 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 H40-32-06 THRU H40-37-06

## SPECIFICATIONS:

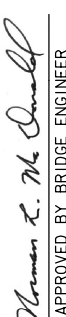

DESIGN:

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.

REVISED 05-13 - THIS STANDARD RENAMED TO H40-01A-06. INDEX SHEET INFORMATION ON STANDARD H40-01-06.

05-13 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		GENERAL NOTES	H40-01A-06

# EXAMPLES OF BRIDGE SEAT AND STEP CALCULATIONS:

THE DESIGNER SHALL SHOW ON THE PLANS THE 6 ELEVATIONS AND THE 5 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"  $\bar{C}$  TO  $\bar{C}$  OF ABUTMENT BEARINGS WITH 30° SKEW RIGHT AHEAD.

#### STATIONS

$\bar{C}$ BRIDGE STA.	=	105+85.00	
$\pm \frac{1}{2}$ OF L2	$\pm$	38.67	
$\bar{C}$ PIER BRGS.	=	105+46.33	106+23.67
$\pm$ LI		- 68.25	+ 68.25
$\bar{C}$ ABUTMENT BRGS.		104+78.08	106+91.92

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

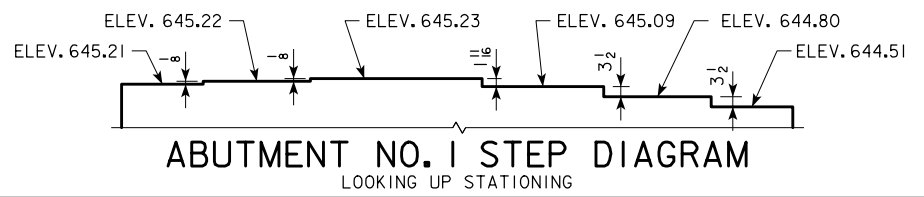
$\bar{C}$ ABUT. BRG. =	$653.29 - [(104+78.08) - (103+75.00)](0.0325)$	=	649.94
$\bar{C}$ PIER BRG. =	$653.29 - [(105+46.33) - (103+75.00)](0.0325)$	=	647.72
$\bar{C}$ PIER BRG. =	$653.29 - [(106+23.67) - (103+75.00)](0.0325)$	=	645.21
$\bar{C}$ ABUT. BRG. =	$653.29 - [(106+91.92) - (103+75.00)](0.0325)$	=	642.99

#### ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING

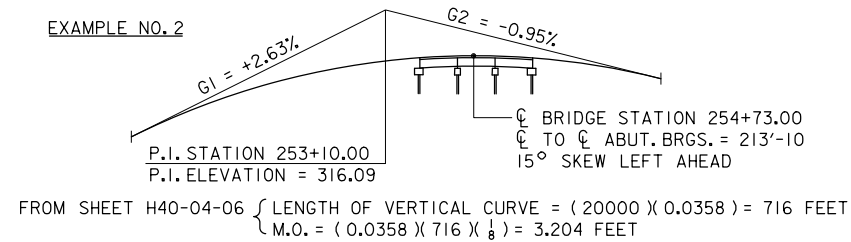
(BEAM SPACING X TAN. SK.  $\Delta$ ) X GRADE = (7.401) TAN 30° (0.0325) = 0.14'

#### ABUTMENT NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	INTERIOR	INTERIOR	EXTERIOR
PGL ELEV.	649.94	649.94	649.94	649.94	649.94	649.94
SK. $\Delta$ CORRECT	+0.35	+0.21	+0.07	-0.07	-0.21	-0.35
SLAB CROWN	-0.34	-0.19	-0.04	-0.04	-0.19	-0.34
TOP SLAB ELEV.	649.95	649.96	649.97	649.83	649.54	649.25
"-U" (4'-8")	-4.74	-4.74	-4.74	-4.74	-4.74	-4.74
BR. SEAT ELEV.	645.21	645.22	645.23	645.09	644.80	644.51



### EXAMPLE NO. 2



#### STATIONS

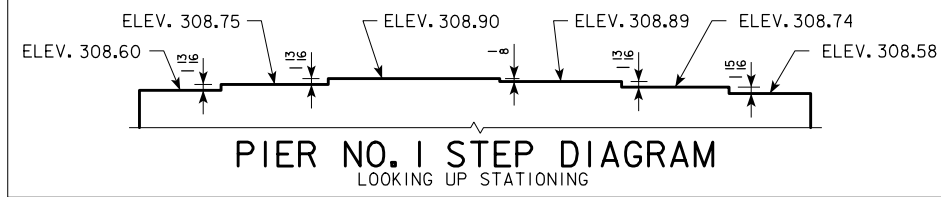
$\bar{C}$ BRIDGE STA.	=	254+73.00	
$\pm \frac{1}{2}$ OF L2	$\pm$	38.67	
$\bar{C}$ PIER BRGS.	=	254+34.33	255+11.67
$\pm$ LI		- 68.25	+ 68.25
$\bar{C}$ ABUTMENT BRGS.	=	253+66.08	255+79.92

#### ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING

(BEAM SPACING X TAN. SK.  $\Delta$ ) = (7.401') TAN 15° = 1.98'

#### PIER NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	INTERIOR	INTERIOR	EXTERIOR
STATION	254+39.28	254+37.30	254+35.32	254+33.34	254+31.36	254+29.38
PGL ELEV.	+313.55	+313.55	+313.55	313.54	313.54	313.53
SLAB CROWN	-0.34	-0.19	-0.04	-0.04	-0.19	-0.34
TOP SLAB ELEV.	313.21	313.36	313.51	313.50	313.35	313.19
"-U" (4'-7 5/8")	-4.61	-4.61	-4.61	-4.61	-4.61	-4.61
BR. SEAT ELEV.	308.60	308.75	308.90	308.89	308.74	308.58



## TEE PIER NOTES:

THE TEE PIERS SHOWN IN THESE PLANS ARE DESIGNED FOR USE WITH THE H40-06 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.

HPI0x57 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 HPI0x57 SRL-1 FRICTION BEARING PILES AND 365 KIPS FOR HPI0x57 SRL-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  $d_1$  COLUMN BAR PROJECTION INTO THE CAP AND  $d_1/d_2$  LAP DISTANCE ACCORDINGLY.

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

05-13 LATEST REVISION DATE   APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	GENERAL INFORMATION      H40-02-06

**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.

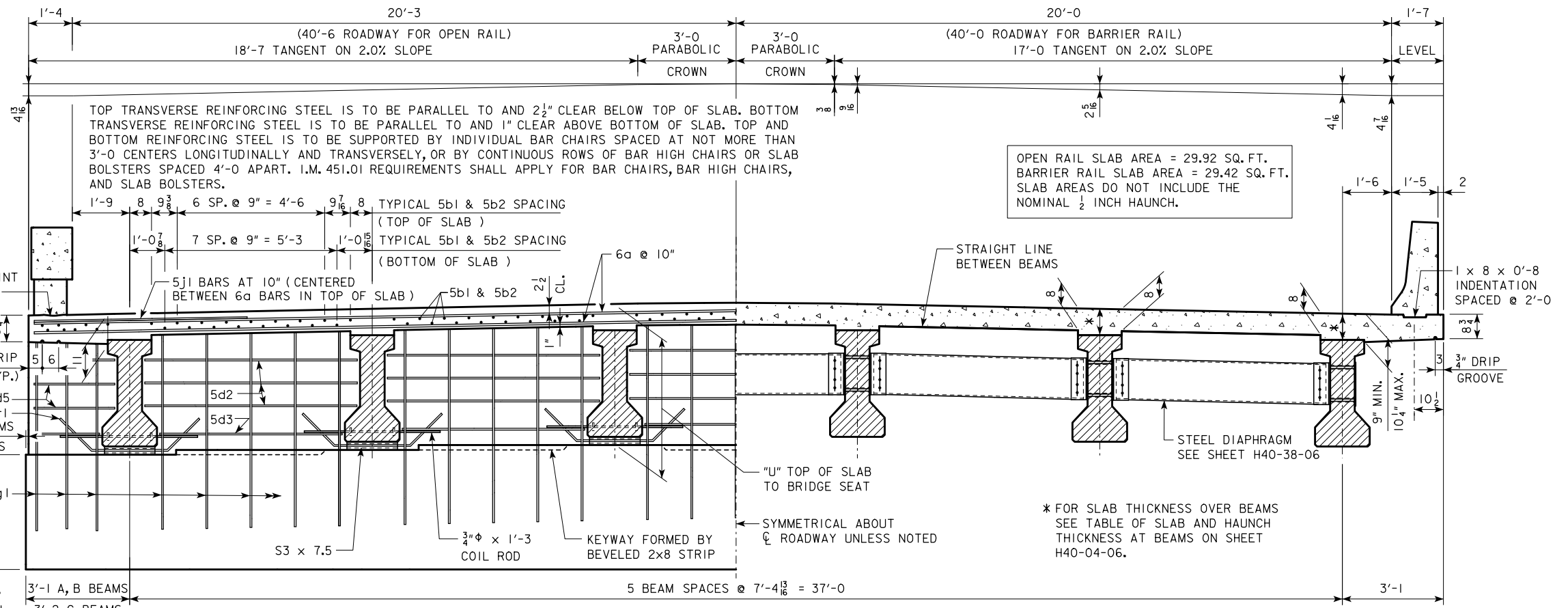
FORMS FOR THE SLAB AND RAILS ARE TO BE SUPPORTED BY THE PRESTRESSED CONCRETE BEAMS.

WEIGHT OF DRAINS IS INCLUDED IN THE STRUCTURAL STEEL QUANTITY.

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

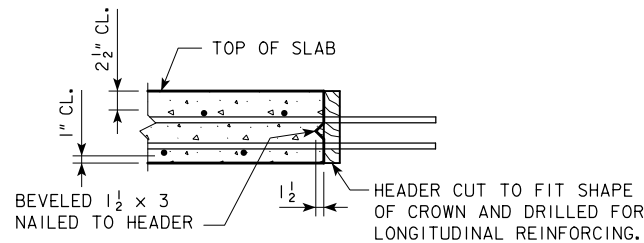
ALL REINFORCING STEEL IS TO BE GRADE 60.

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

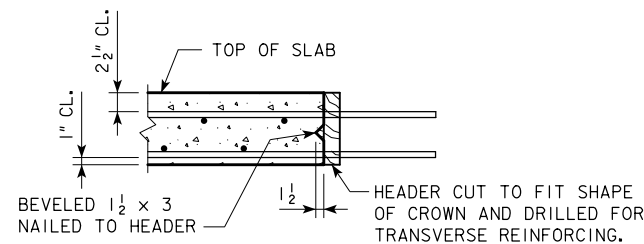


**HALF SECTION NEAR ABUTMENT**  
(OPEN RAIL SHOWN)

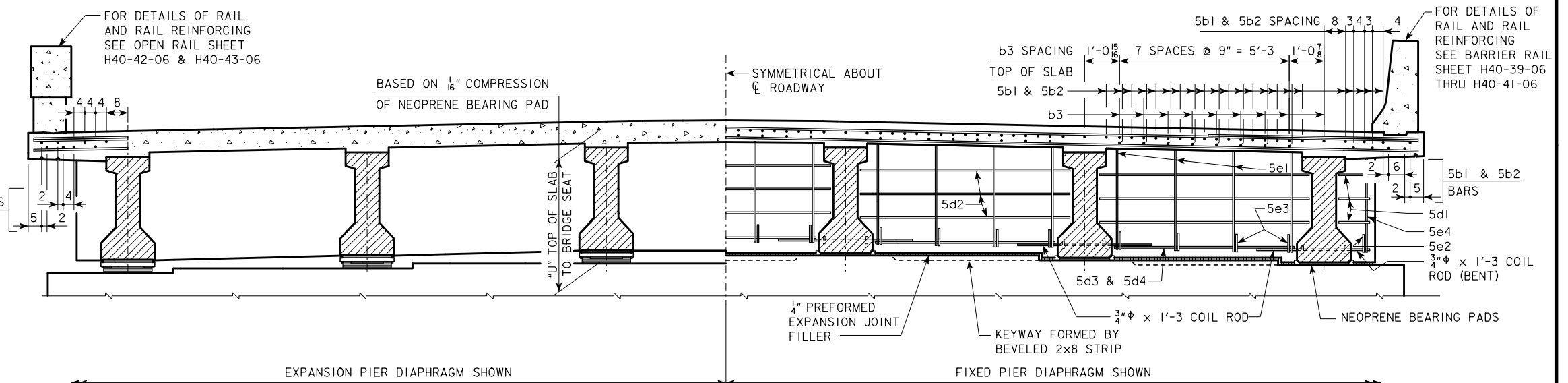
**HALF SECTION NEAR MID SPAN**  
(BARRIER RAIL SHOWN)



**TRANSVERSE SLAB CONSTRUCTION JOINT**



**LONGITUDINAL SLAB CONSTRUCTION JOINT**



**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

*Norman L. Mc Donald*  
APPROVED BY BRIDGE ENGINEER

**IOWADOT** Highway Division

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

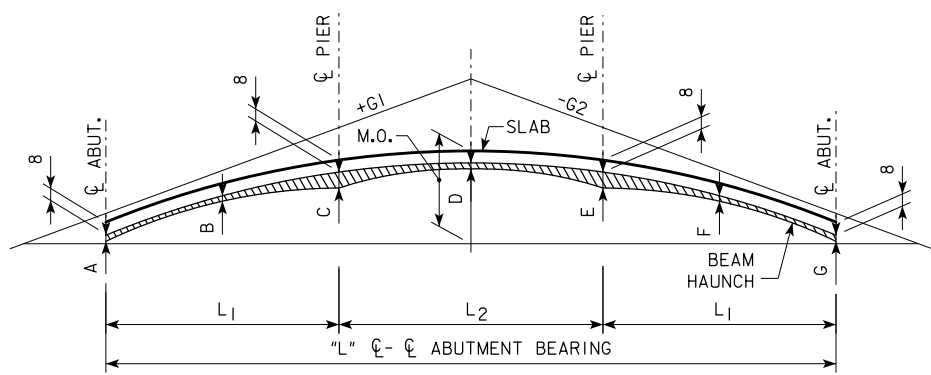
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

AUGUST, 2009

**SUPERSTRUCTURE DETAILS**      **H40-03-06**

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

REVISED 10-11 - THE DRAIN EXTENSION BELOW THE BEAM WAS EXTENDED TO A 1'-0" DISTANCE. THE DATA FOR ONE DRAIN QUANTITIES WERE ADJUSTED FOR THE ADDITIONAL DRAIN LENGTH.

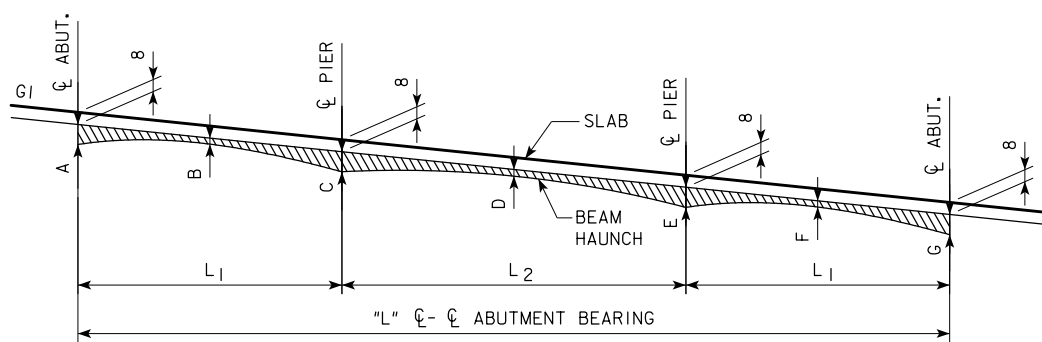


℄-℄ ABUT. BRG. "L"	A ℄ ABUT.	B	℄ PIER	D	℄ PIER	F	G ℄ ABUT.
138'-10	1	9/16	1 7/16	9/16	1 7/16	9/16	1
151'-4	5/8	5/8	1 5/8	9/16	1 5/8	5/8	13/16
163'-10	7/8	1/2	1 3/8	1/2	1 3/8	9/16	7/8
176'-4	1	1/2	1 9/16	1/2	1 9/16	9/16	13/16
188'-10	1 1/8	5/8	1 15/16	1/2	1 15/16	5/8	7/8
201'-4	1 1/4	11/16	1 13/16	9/16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

LENGTH OF VERTICAL CURVE REQUIRED =  $(20,000)(G1-G2)$   
M.O. =  $(G1-G2) \times \text{LENGTH OF V.C.}$

(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.

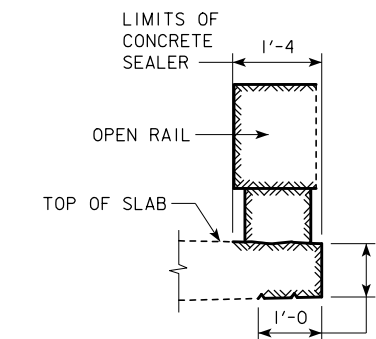
### SLAB AND HAUNCH THICKNESS AT BEAMS FOR VERTICAL CURVE



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

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

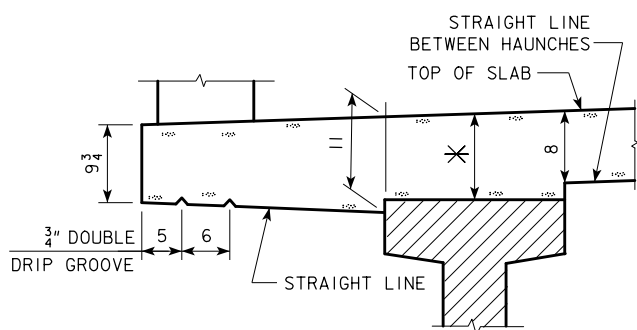
### SLAB AND HAUNCH THICKNESS AT BEAMS FOR STRAIGHT GRADE



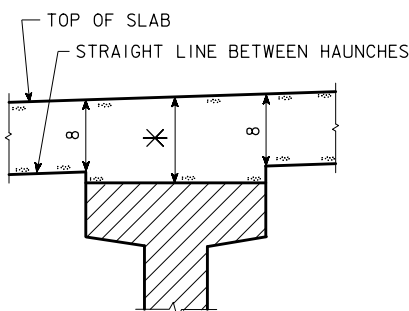
### CONCRETE SEALER LIMITS FOR OPEN RAILS

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.

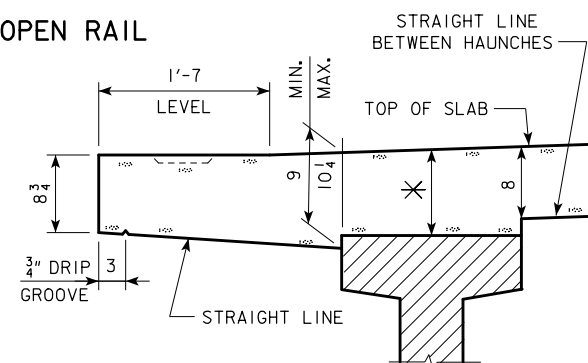
THE CONCRETE SEALER LIMITS ARE SHOWN IN THE DETAIL AND SHALL APPLY TO THE FULL LENGTH OF BRIDGE. CONCRETE SEALER SHALL BE APPLIED IN ACCORDANCE WITH ARTICLE 2403.03, P, 3, OF THE STANDARD SPECIFICATIONS.



### EXTERIOR BEAMS @ OPEN RAIL



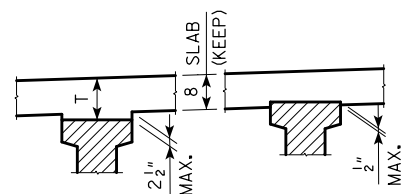
### INTERIOR BEAMS



### EXTERIOR BEAMS @ BARRIER RAIL

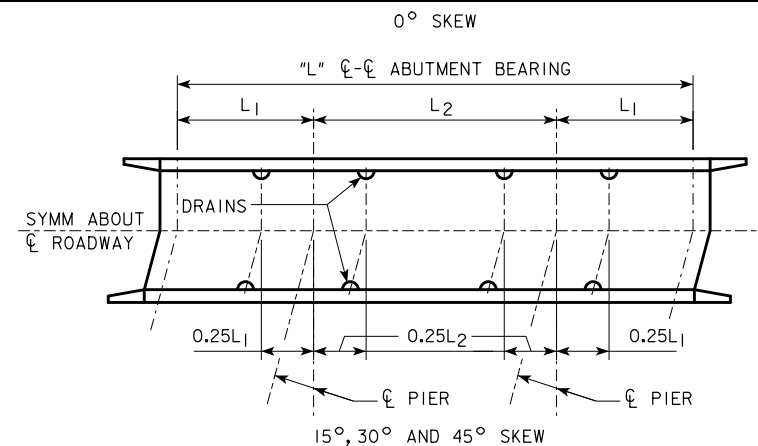
### TYPICAL SLAB AND HAUNCH DETAIL

\* FOR SLAB THICKNESS OVER BEAMS SEE "SLAB THICKNESS DETAILS" ON THIS SHEET.

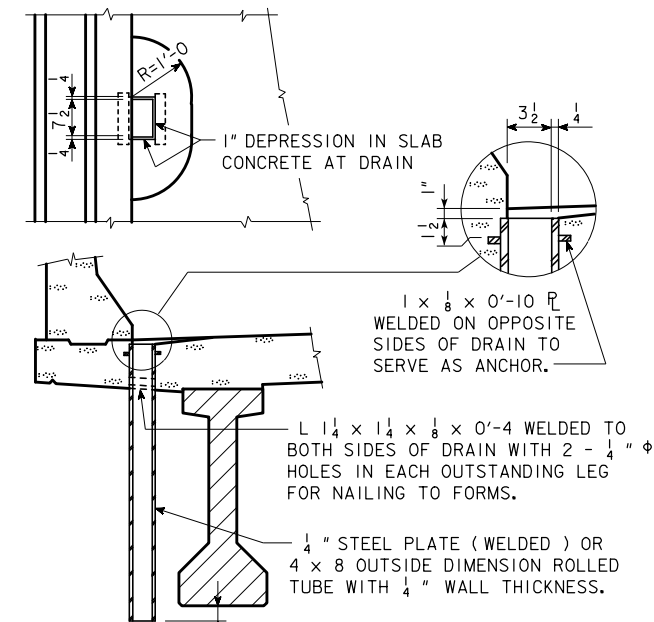


### SLAB THICKNESS DETAILS

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.



### SITUATION SKETCH (SHOWING DRAIN LOCATIONS)



### DRAIN DETAILS

USE FOR BARRIER RAIL ONLY. NOT REQUIRED FOR OPEN RAIL.

NOTE: DRAINS ARE TO BE GALVANIZED AFTER FABRICATION. SEE "SITUATION SKETCH" FOR LOCATION OF DRAINS. WEIGHT OF DRAINS IS INCLUDED IN THE QUANTITY FOR "STRUCTURAL STEEL". WEIGHT IS BASED ON ROLLED TUBE.

### DATA FOR ONE DRAIN

BEAM SIZE	A	B	C
WT. LBS.	85	96	106
LENGTH FT.	4'-4 3/4	4'-11 3/4	5'-5 3/4

LATEST REVISION DATE 10-11

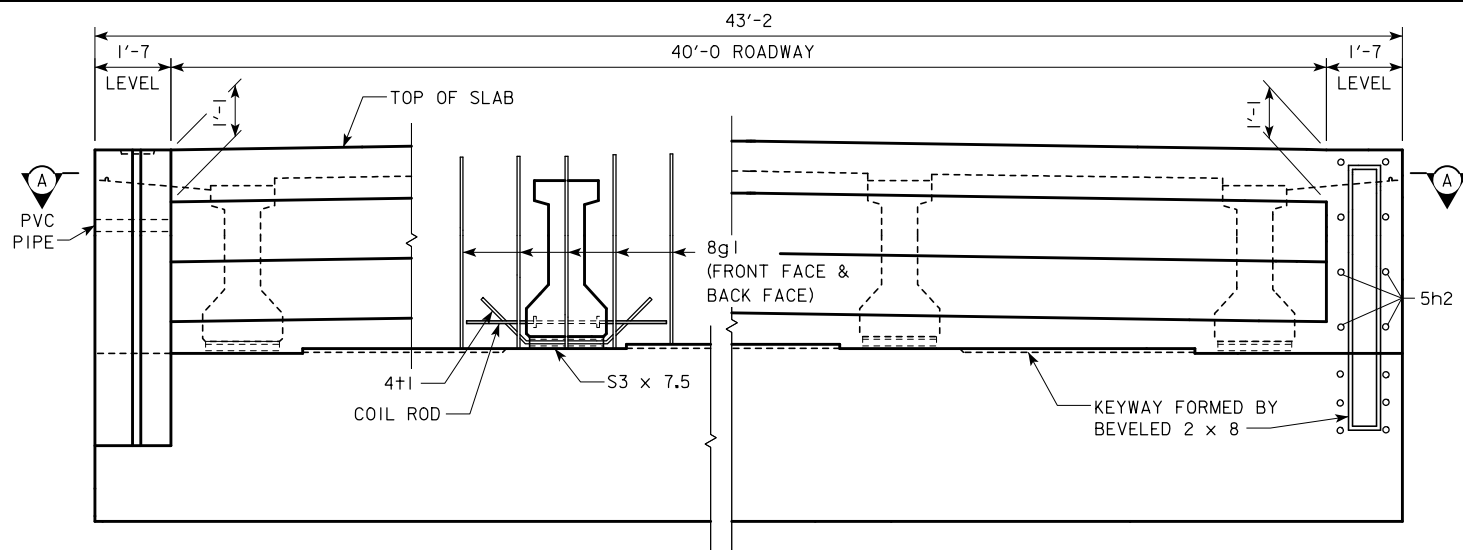
APPROVED BY BRIDGE ENGINEER  
*Norman L. Mc Donald*

**IOWADOT** Highway Division

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE  
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**  
AUGUST, 2009

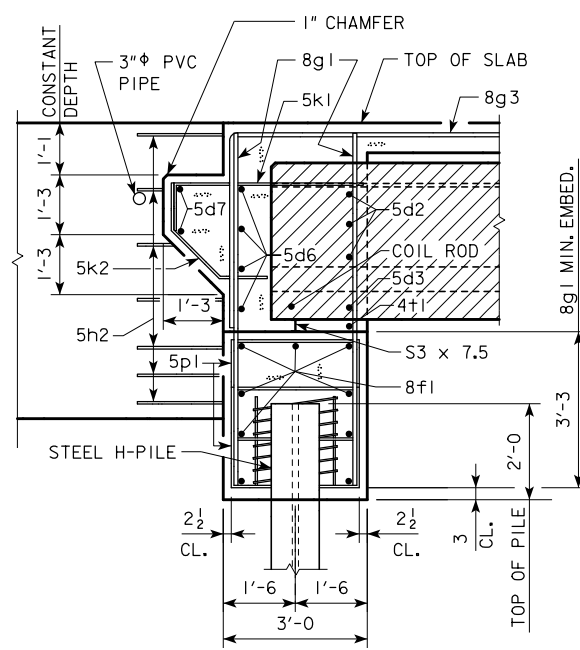
SUPERSTRUCTURE DETAILS

H40-04-06



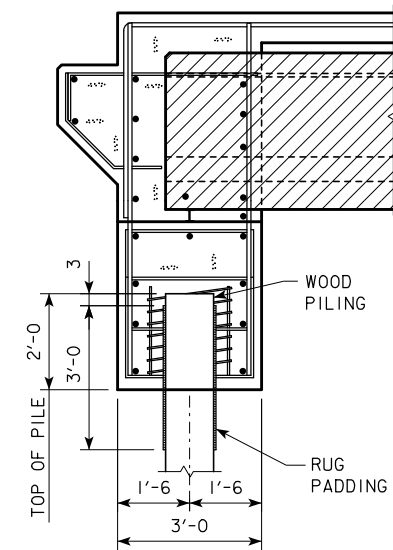
**PART REAR ELEVATION AT ABUTMENT**

NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



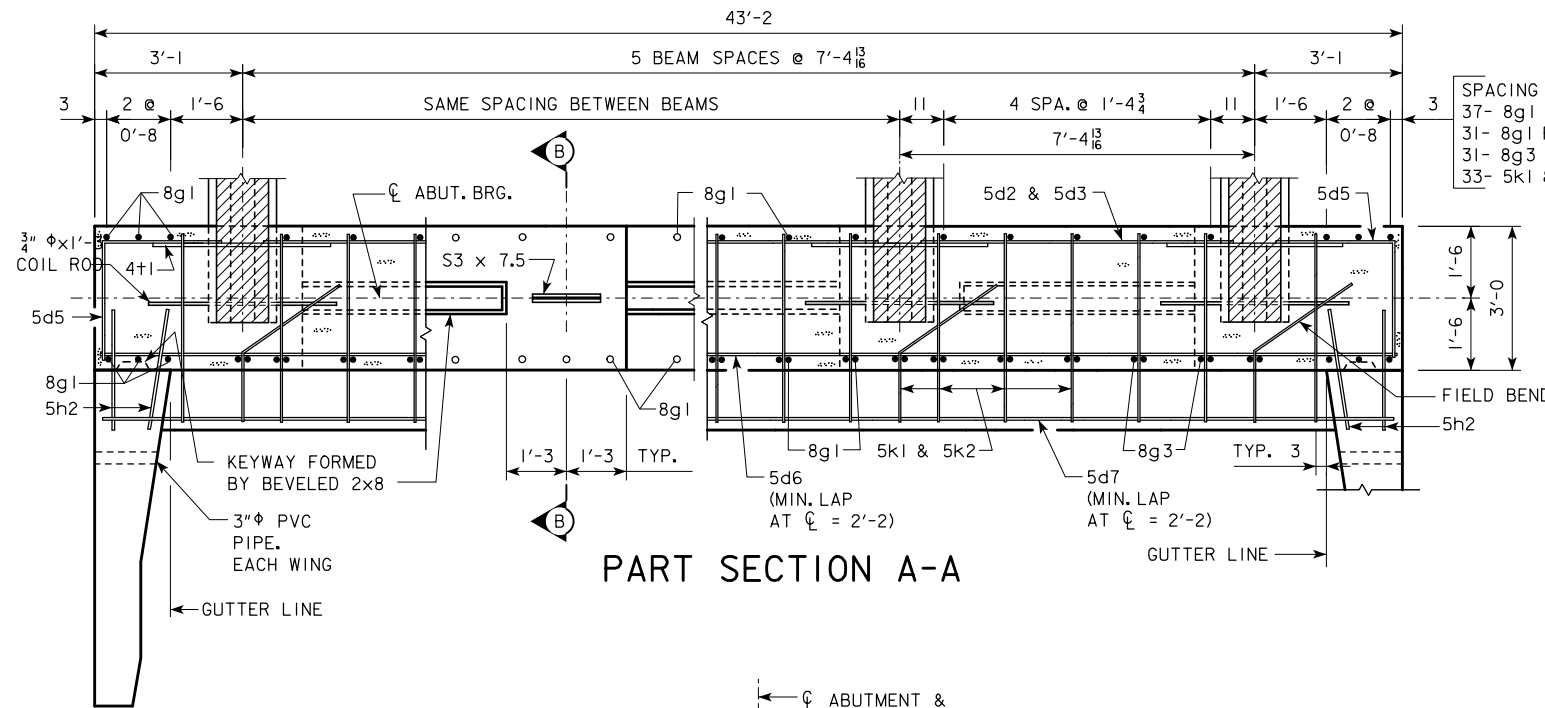
**PART SECTION B-B  
(FOR STEEL H-PILING)**

NOTE:  
THE SPIRAL AT THE TOP OF EACH PILE TO  
BE 7 TURNS OF NO. 2 BAR, 21\"/>



**PART SECTION B-B  
(FOR WOOD PILING)**

**WOOD PILING NOTE:**  
AFTER PILES ARE CUT OFF, THE UPPER 3',  
EXCEPT AS SHOWN, IS TO BE WRAPPED  
WITH A DOUBLE THICKNESS OF RUG  
PADDING HELD IN PLACE BY TACKING  
WITH GALVANIZED ROOFING NAILS AND  
WRAPPED WITH #14 GAUGE GALVANIZED  
WIRE AT A 4\"/>



**PART SECTION A-A**

SPACING FOR:  
37- 8g1 BACK FACE  
31- 8g1 FRONT FACE  
31- 8g3 BACK FACE  
33- 5k1 & 5k2 BACK FACE

**ABUTMENT NOTES:**

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE  
TO NEAR REINFORCING BAR IS TO BE 2\"/>

IF NECESSARY TO PREVENT DAMAGE TO THE END OF  
THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION  
EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION  
APPROVED BY THE ENGINEER SHALL BE PROVIDED BY  
THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE  
COUNTY OR STATE.

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

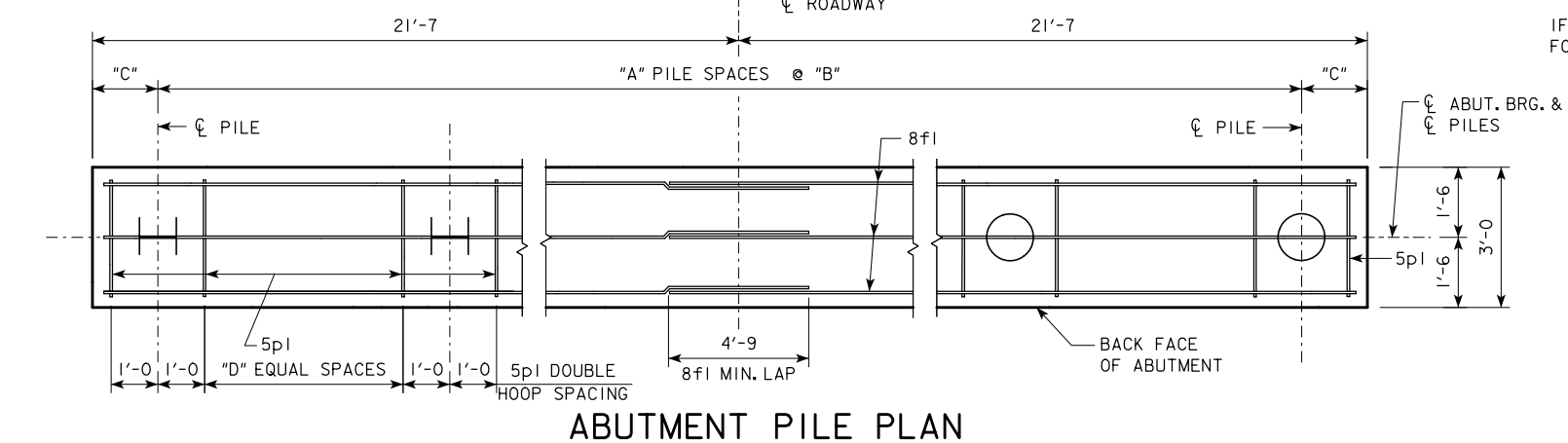
PLACE 5h2 BAR AT 1:6 SLOPE TO MATCH TRAFFIC SIDE  
OF ABUTMENT WING FACE. (BOTH SIDES TYPICAL)

BARRIER RAIL NOT SHOWN IN DETAILS.

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

ABUTMENT PILE SPACING		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10
WITH WOOD PILES	"A" PILE SPACES		13	14	15	15	16
	"B" (FT. - IN.)		2'-11	2'-9	2'-6	2'-6	2'-6
	"C" (FT. - IN.)		2'-7 1/2	2'-4	2'-10	2'-10	1'-7
	"D" EQUAL SPACES		1	1	1	1	1
	NO. OF PILES PER ABUT.		14	15	16	16	17
PU, STRENGTH I DESIGN LOAD (KIPS)			56	55	55	57	56
WITH STEEL H-PILES	"A" PILE SPACES		5	6	6	6	7
	"B" (FT. - IN.)		7'-8	6'-5	6'-5	6'-5	5'-6
	"C" (FT. - IN.)		2'-5	2'-4	2'-4	2'-4	2'-4
	"D" EQUAL SPACES		5	4	4	4	3
	NO. OF PILES PER ABUT.		6	7	7	7	8
PU, STRENGTH I DESIGN LOAD (KIPS)			144	128	137	142	128

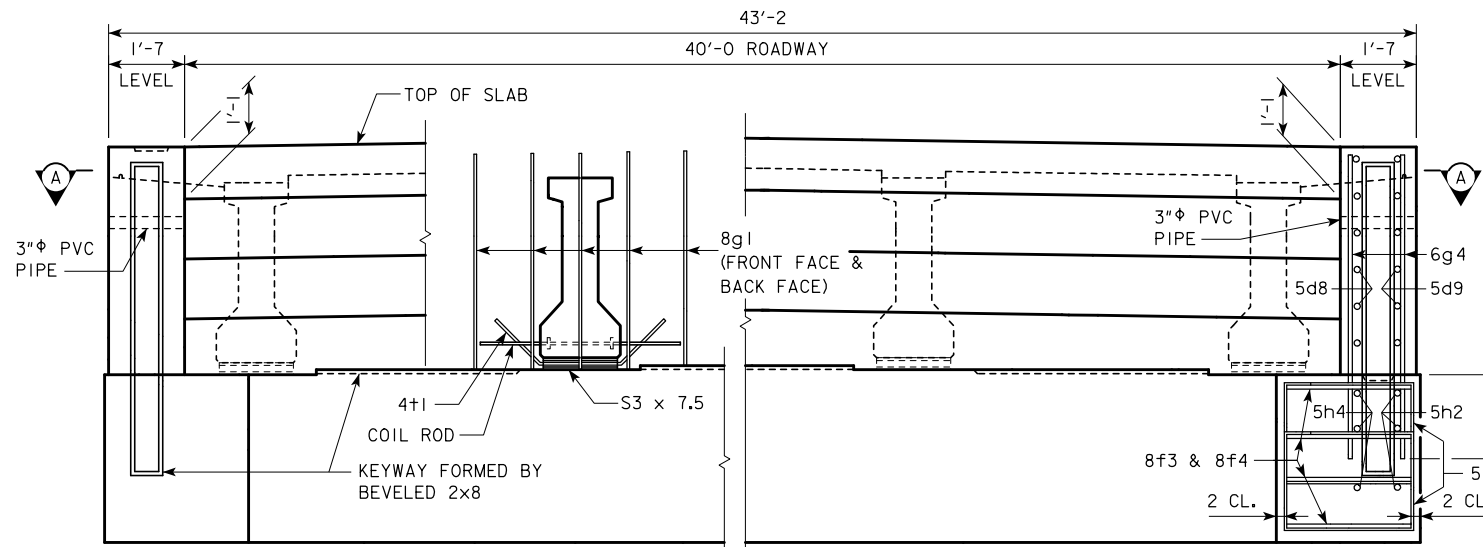
NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED  
IN THE FIELD FOR DRIVING PILES.



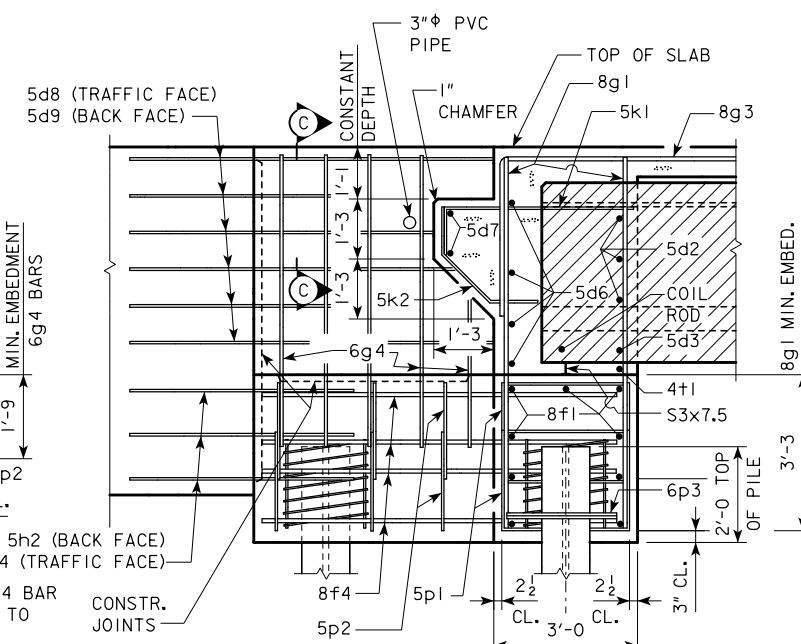
**ABUTMENT PILE PLAN**

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>ABUTMENT DETAILS</b> 0° SKEW A & B BEAMS	<b>H40-05-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



**PART REAR ELEVATION AT ABUTMENT**  
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



**PART SECTION B-B**

**ABUTMENT NOTES:**

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

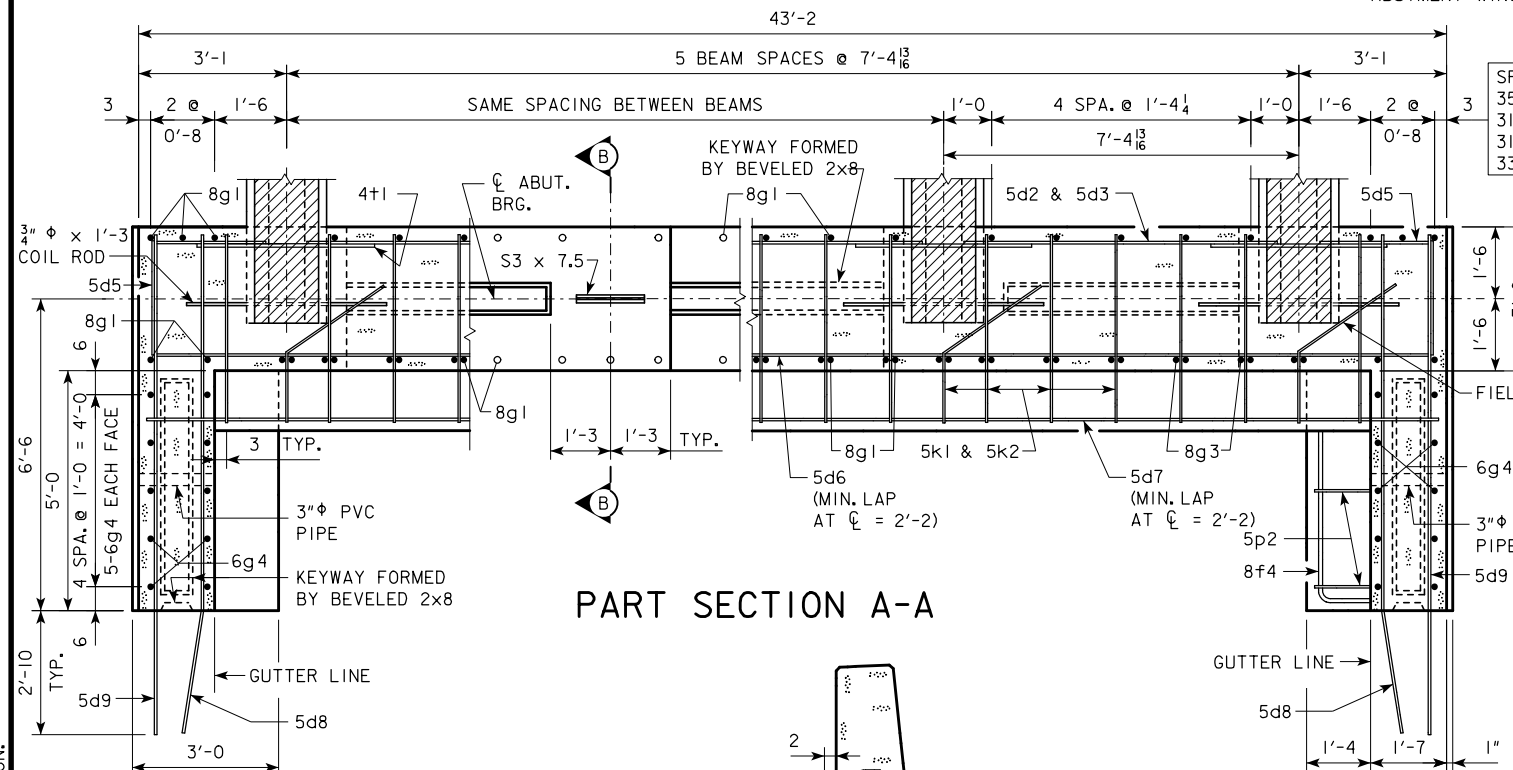
IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

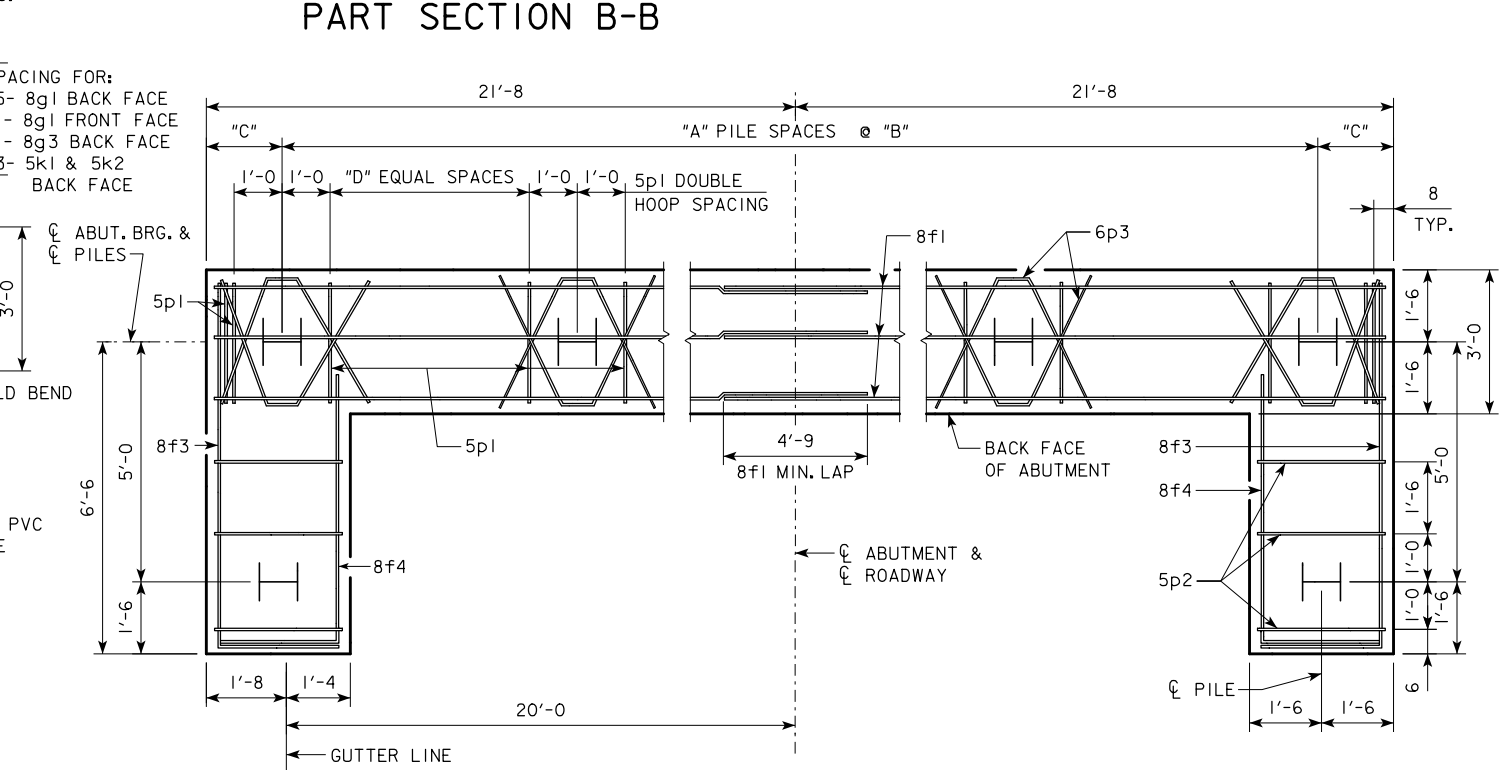
BARRIER RAIL NOT SHOWN IN DETAILS.

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

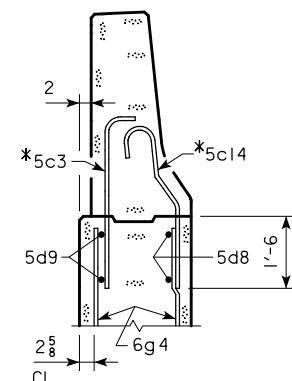
NOTE:  
THE SPIRAL AT THE TOP OF EACH PILE TO BE 7 TURNS OF NO. 2 BAR, 21" DIAMETER, 3" PITCH WITH 3 - L<sub>7</sub> x 7/8 x 3/8 SPACERS PUNCHED TO HOLD SPIRAL.



**PART SECTION A-A**



**ABUTMENT PILE PLAN**



**PART SECTION C-C**

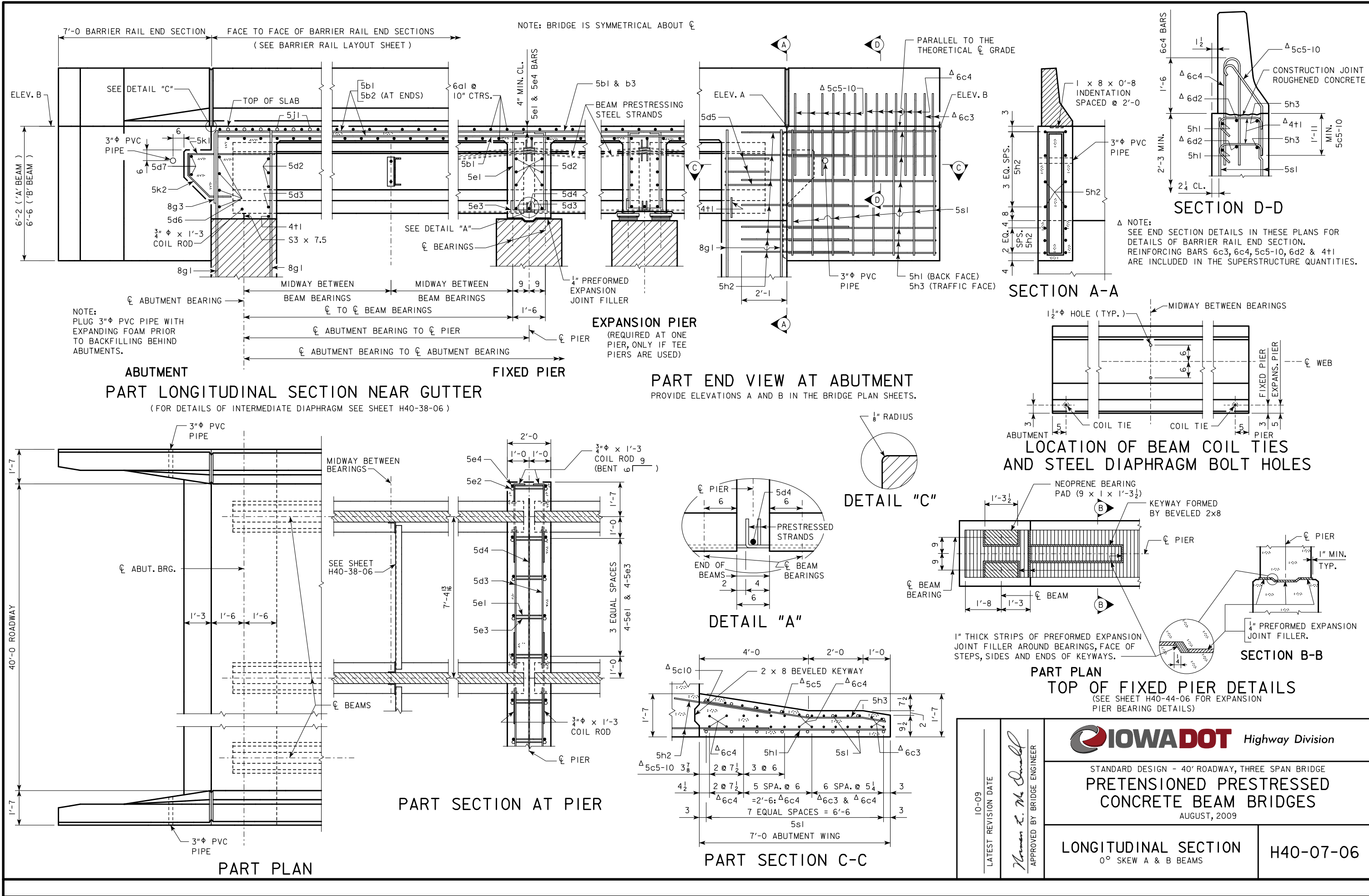
\* NOTE: SEE BARRIER RAIL SHEET FOR DETAILS. REINFORCING BARS 5c3 AND 5c14 ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.

ABUTMENT PILE SPACING		201'-4	213'-10	226'-4	243'-0
WITH STEEL H-PILES	"A" PILE SPACES	7	7	7	8
	"B" (FT. - IN.)	5'-6	5'-6	5'-6	4'-10
	"C" (FT. - IN.)	2'-5	2'-5	2'-5	2'-4
	"D" EQUAL SPACES	3	3	3	3
	NO. OF PILES PER ABUT.	10	10	10	11
PU, STRENGTH I DESIGN LOAD (KIPS)		136	140	145	136

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

05-13 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWA DOT</b> Highway Division	
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE	
<b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b>			
AUGUST, 2009			
<b>ABUTMENT DETAILS</b> 0° SKEW C BEAMS		<b>H40-06-06</b>	

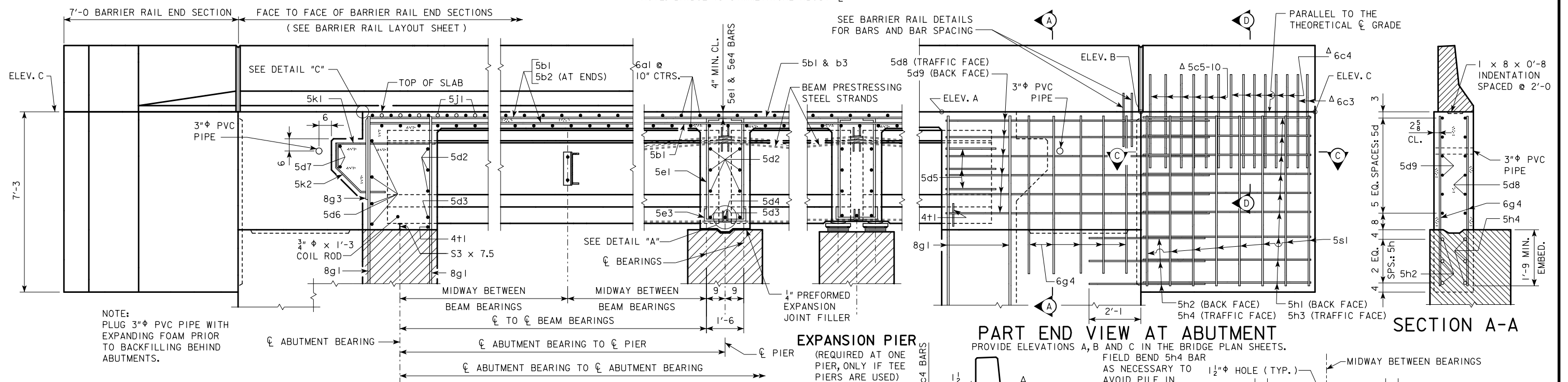
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



REVISED 10-09 - ABUT. WINGS SHAPE CHANGED.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<span>LONGITUDINAL SECTION 0° SKEW A &amp; B BEAMS</span> <span>H40-07-06</span>

NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\phi$

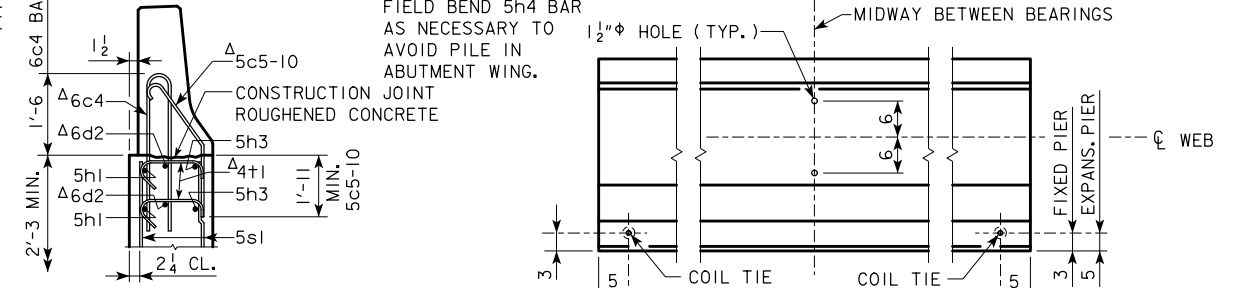


NOTE: PLUG 3"  $\phi$  PVC PIPE WITH EXPANDING FOAM PRIOR TO BACKFILLING BEHIND ABUTMENTS.

**ABUTMENT PART LONGITUDINAL SECTION NEAR GUTTER**  
(FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H40-38-06)

**EXPANSION PIER**  
(REQUIRED AT ONE PIER, ONLY IF TEE PIERS ARE USED)

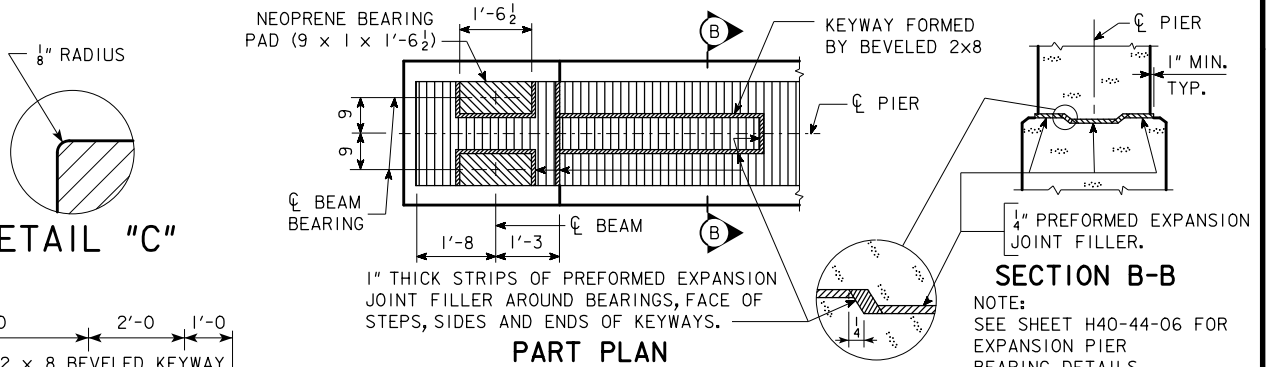
**PART END VIEW AT ABUTMENT**  
PROVIDE ELEVATIONS A, B AND C IN THE BRIDGE PLAN SHEETS.



**SECTION A-A**

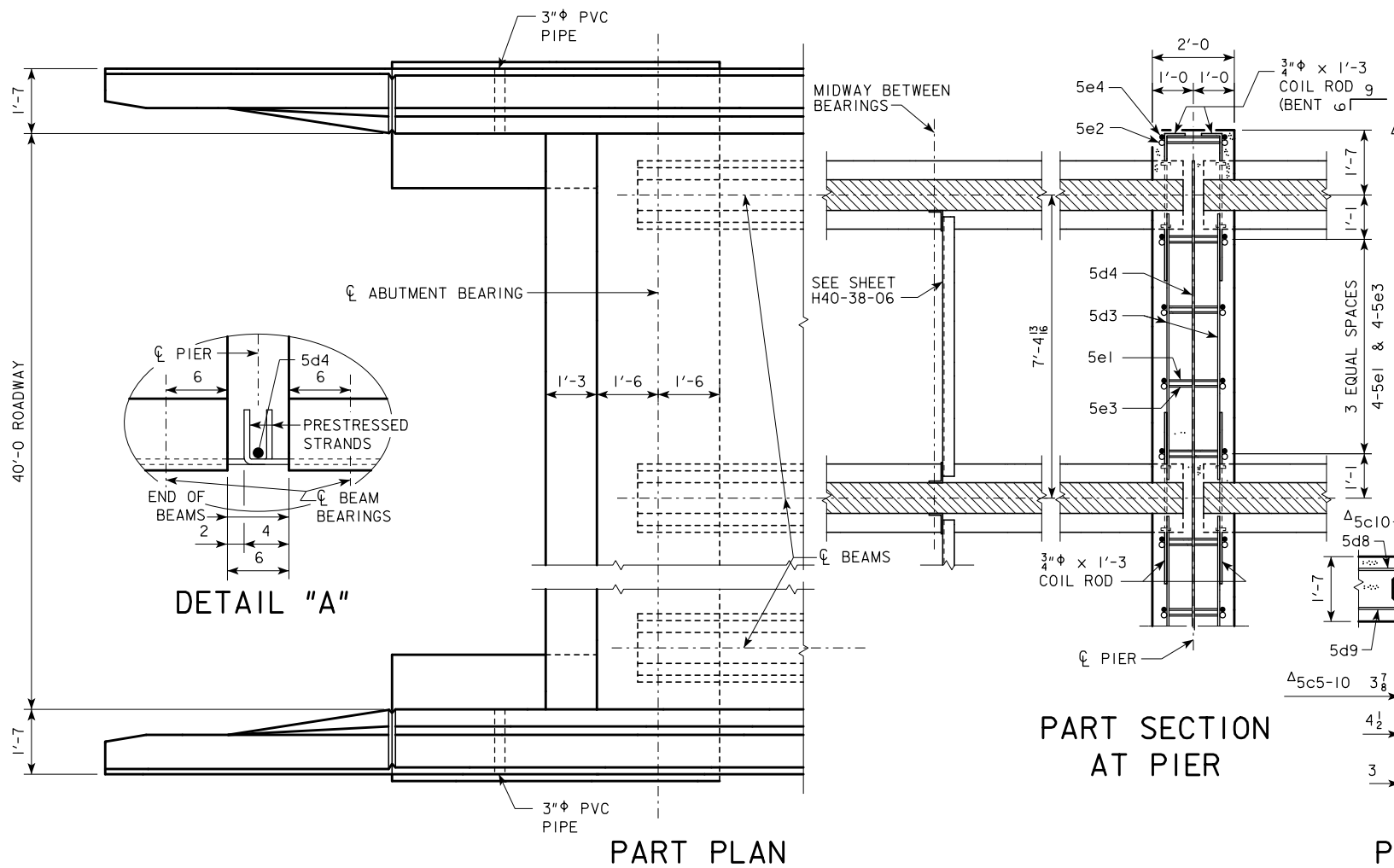
**SECTION D-D**

NOTE: SEE END SECTION DETAILS IN THESE PLANS FOR DETAILS OF BARRIER RAIL END SECTION. REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.



**LOCATION OF BEAM COIL TIES AND STEEL DIAPHRAGM BOLT HOLES**

**PART PLAN TOP OF FIXED PIER DETAILS**



**DETAIL "A"**

**DETAIL "C"**

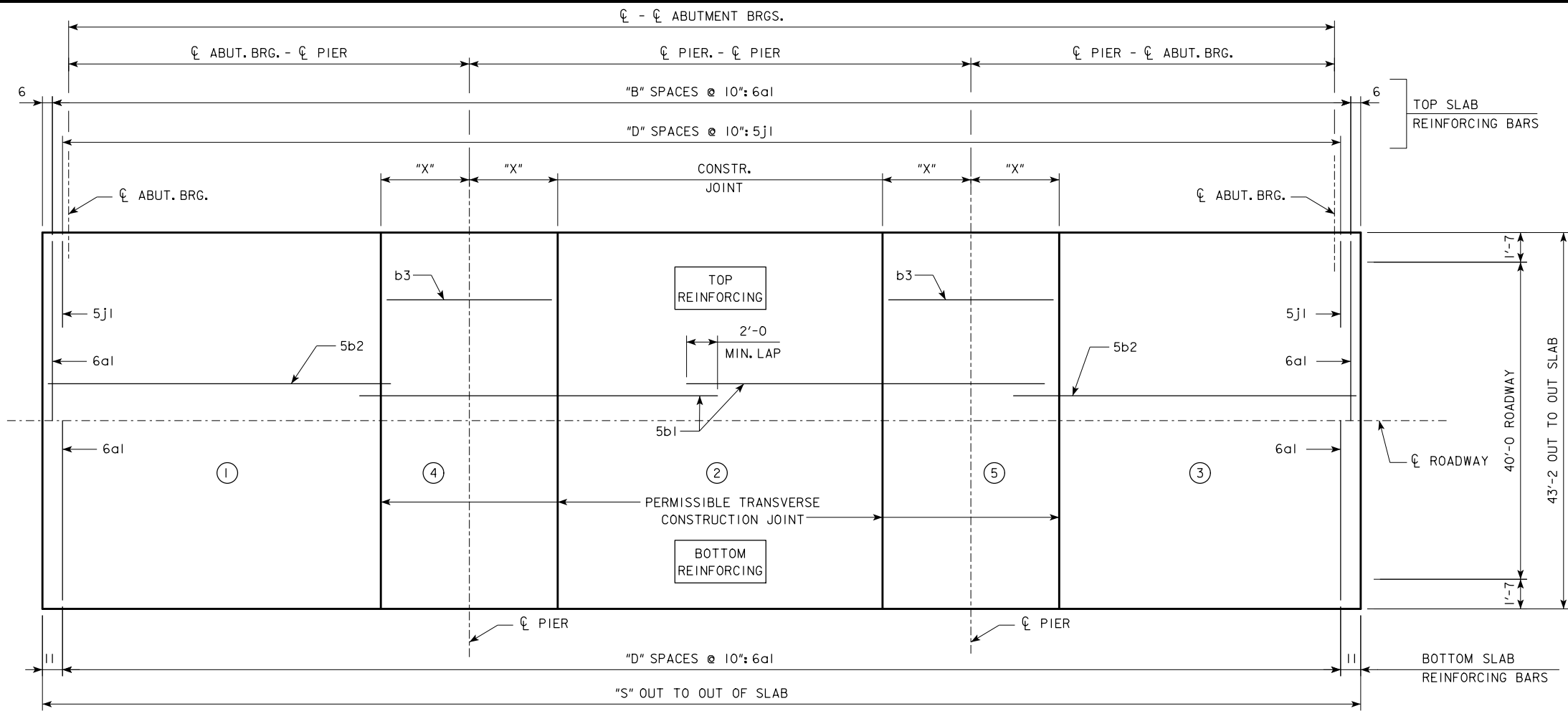
**PART SECTION AT PIER**

**PART SECTION C-C**

LATEST REVISION DATE 01-12 APPROVED BY BRIDGE ENGINEER <i>Norman L. Mc Donald</i>	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>LONGITUDINAL SECTION</b> 0° SKEW C BEAMS
<b>H40-08-06</b>	

REVISED 01-12 - ADDED FIELD BEND 5#4 BAR TO AVOID PILE IN ABUTMENT WING NOTE.

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



**SLAB LAYOUT**

ESTIMATED QUANTITIES (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
STRUCTURAL CONCRETE SUPERSTRUCTURE (INCLUDES ABUTMENT WINGS)	WITH BARRIER RAIL	C.Y.	213.7	227.6	250.1	264.2	278.3	304.5	318.6	333.1	352.1
	WITH OPEN RAIL	C.Y.	216.2	230.3	253.1	267.4	281.8	308.0	322.3	337.1	356.3
STRUCTURAL CONCRETE ABUTMENTS (w/ WOOD PILES)		C.Y.	33.4	33.3	33.1	33.1	33.0	-----	-----	-----	-----
STRUCTURAL CONCRETE ABUTMENTS (w/ STEEL H PILES)		C.Y.	35.0	35.0	35.0	35.0	35.0	43.0	43.0	43.0	43.0
PRETENSIONED PRESTRESSED CONCRETE BEAM, CENTER SPAN		NO.	6-A50	6-A55	6-B59	6-B63	6-B67	6-C71	6-C75	6-C80	6-C80
PRETENSIONED PRESTRESSED CONCRETE BEAM, END SPAN		NO.	12-A42	12-A46	12-B50	12-B55	12-B59	12-C63	12-C67	12-C71	12-C80
CONCRETE RAIL (BARRIER OR OPEN)		L.F.	311.7	336.7	361.7	386.7	411.7	456.7	481.7	506.7	540.0
STRUCTURAL STEEL (w/ PILE BENT PIERS & DRAINS)		LB.	4935	4935	5023	5023	5023	4995	4995	4995	4995
STRUCTURAL STEEL (w/ PILE BENT PIERS & NO DRAINS)		LB.	4255	4255	4255	4255	4255	4147	4147	4147	4147
STRUCTURAL STEEL (w/ TEE PIERS & DRAINS)		LB.	6010	6010	6098	6098	6098	6265	6265	6265	6265
STRUCTURAL STEEL (w/ TEE PIERS & NO DRAINS)		LB.	5330	5330	5330	5330	5330	5417	5417	5417	5417
EPOXY COATED REINF. STEEL (w/ WOOD PILES & BARRIER RAIL)		LB.	62,023	66,285	71,036	75,938	80,308	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ WOOD PILES & OPEN RAIL)		LB.	62,688	66,906	71,804	76,882	81,182	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & BARRIER RAIL)		LB.	62,033	66,208	70,851	75,753	79,948	87,396	92,678	96,944	102,747
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & OPEN RAIL)		LB.	62,698	66,829	71,619	76,697	80,822	89,240	94,431	98,894	104,743
NO. OF WOOD PILES, TREATED FOR TWO ABUTMENTS		NO.	28	30	32	32	34	-----	-----	-----	-----
NO. OF STEEL H-PILES FOR TWO ABUTMENTS (HP 10 x 57)		NO.	12	14	14	14	16	20	20	20	22
PREBORED HOLES (w/ WOOD PILES)		L.F.	280	300	320	320	340	-----	-----	-----	-----
PREBORED HOLES (w/ STEEL H-PILES)		L.F.	120	140	140	140	160	200	200	200	220

CONCRETE PLACEMENT QUANT. (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
SLAB INCLUDING HAUNCH, ABUT. DIAPHRAGM, & WINGWALLS**, SECTIONS 1 & 3	WITH BARRIER RAIL	C.Y.	118.2	126.2	139.6	147.8	155.8	173.2	181.6	190.2	209.2
	WITH OPEN RAIL	C.Y.	119.5	127.6	141.2	149.5	157.7	175.1	183.6	192.4	211.6
SLAB INCLUDING HAUNCH, SECTION 2	WITH BARRIER RAIL	C.Y.	43.5	47.0	50.5	54.0	57.3	61.1	64.6	68.1	68.1
	WITH OPEN RAIL	C.Y.	44.2	47.8	51.3	54.9	58.3	62.1	65.6	69.2	69.2
SLAB INCLUDING HAUNCH & PIER DIAPHRAGM, SECTIONS 4 & 5	WITH BARRIER RAIL	C.Y.	44.8	47.2	52.4	54.8	57.6	61.8	64.0	66.4	66.4
	WITH OPEN RAIL	C.Y.	45.3	47.7	53.0	55.4	58.2	62.4	64.7	67.1	67.1
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.	33.4	33.3	33.1	33.1	33.0	-----	-----	-----	-----
ABUTMENT FOOTINGS (w/ STEEL H PILES)		C.Y.	35.0	35.0	35.0	35.0	35.0	43.0	43.0	43.0	43.0

GENERAL DATA		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
VERTICAL CURVE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8	3'-7 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-8 <sup>9</sup> / <sub>16</sub>	4'-8 <sup>11</sup> / <sub>16</sub>	4'-9 <sup>1</sup> / <sub>8</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>3</sup> / <sub>8</sub>	3'-6 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>5</sup> / <sub>16</sub>	4'-1 <sup>1</sup> / <sub>2</sub>	4'-1 <sup>7</sup> / <sub>8</sub>	4'-7 <sup>5</sup> / <sub>16</sub>	4'-7 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>1</sup> / <sub>2</sub>	4'-7 <sup>1</sup> / <sub>2</sub>
STRAIGHT GRADE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8 <sup>1</sup> / <sub>16</sub>	3'-7 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-3	4'-8 <sup>3</sup> / <sub>4</sub>	4'-8 <sup>7</sup> / <sub>8</sub>	4'-9 <sup>5</sup> / <sub>16</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>9</sup> / <sub>16</sub>	3'-6 <sup>3</sup> / <sub>8</sub>	4'-1 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>1</sup> / <sub>16</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-8	4'-8
D.L. PIER REACTION (D.L. + F.W.S.) SERVICE LOADS		KIPS	430.0	464.6	530.0	566.5	603.2	722.1	763.1	804.5	844.8
L.L. PIER REACTION (HL93) NO IMPACT SERVICE LOADS		KIPS	264.7	274.5	283.9	293.1	302.2	311.0	322.9	341.9	362.6
NO. OF SPACES FOR 6a1 BARS (TOP)		"B"	169	184	199	214	229	244	259	274	294
NO. OF SPACES FOR 6a1 BARS (BOTTOM) AND 5j1 BARS (TOP)		"D"	168	183	198	213	228	243	258	273	293
OUT TO OUT OF SLAB		"S"	141'-10	154'-4	166'-10	179'-4	191'-10	204'-4	216'-10	229'-4	246'-0
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

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.

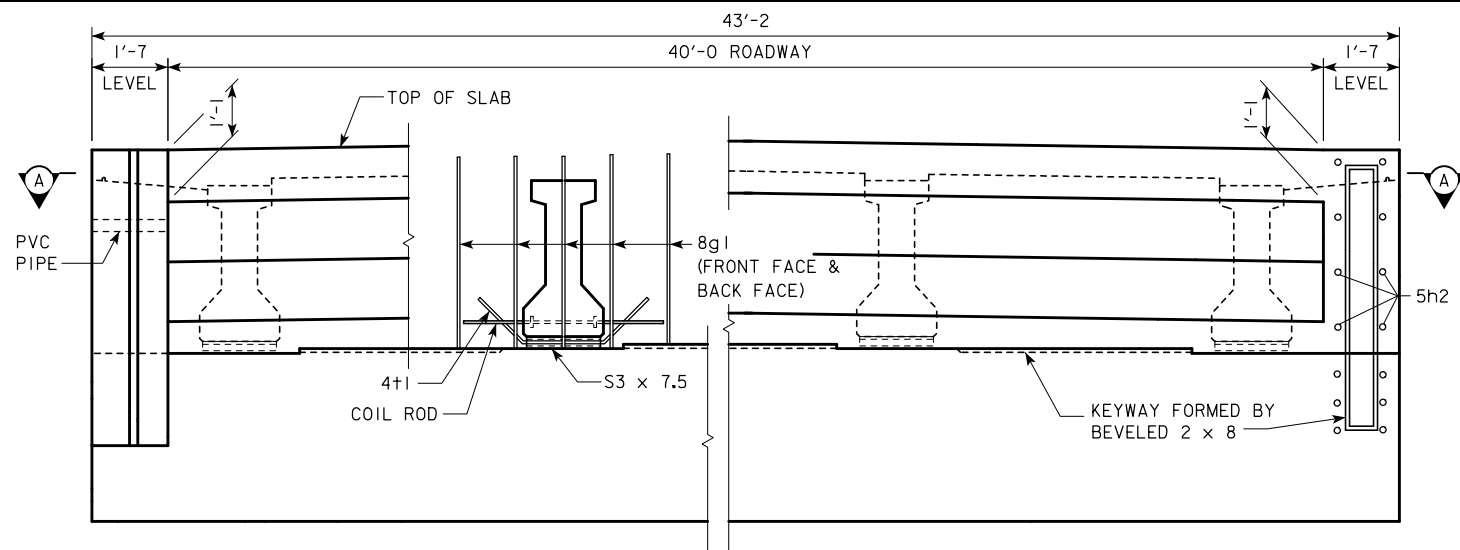
\* VALUES SHOWN ARE FOR FIXED PIERS ONLY AND ALLOW FOR 1/16 INCH DEFLECTION OF THE 1 INCH NEOPRENE BEARING PAD. AT EXPANSION PIER LOCATIONS ADD 3/16 INCHES TO "U" VALUES SHOWN.

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

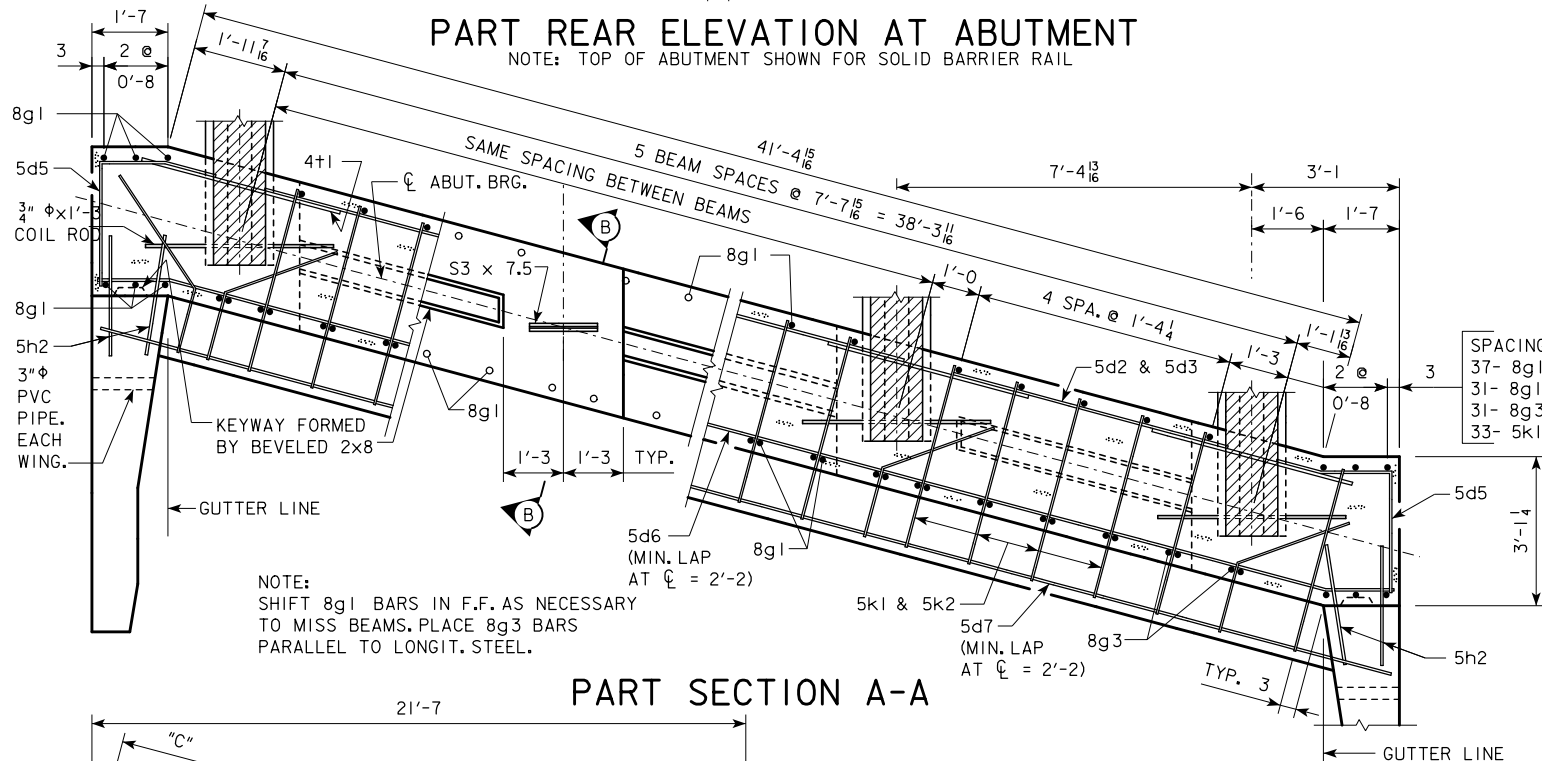
LATEST REVISION DATE 07-15	APPROVED BY BRIDGE ENGINEER <i>Norman L. Mc Donald</i>	<b>IOWA DOT</b> Highway Division	
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE	
		<b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
<b>SUPERSTRUCTURE DETAILS</b>		<b>H40-09-06</b>	
0° SKEW			

REVISED 07-10 - THE OPEN RAIL QUANTITIES WERE CHANGED.

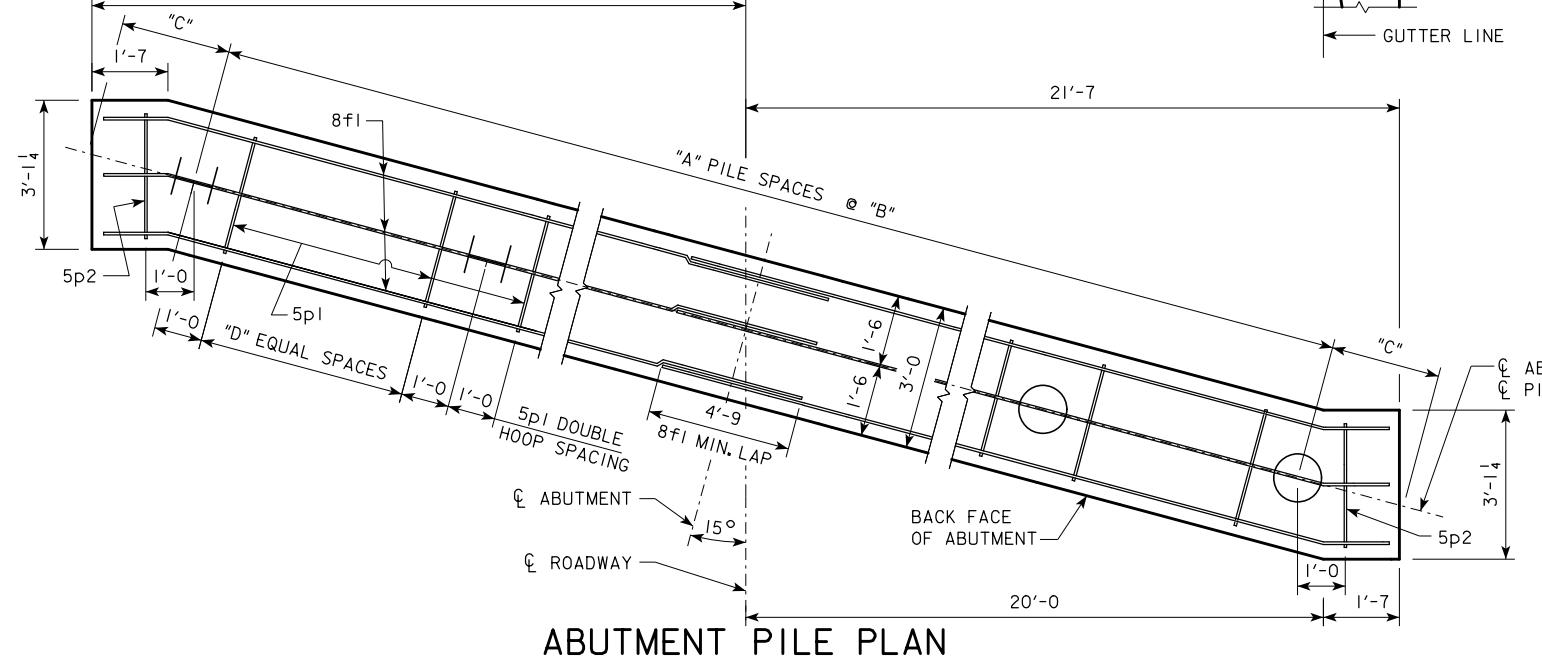
REINFORCING BAR LIST			138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0		
ONE SUPERSTRUCTURE AND TWO ABUTMENTS			42'-6			46'-8			50'-10			55'-0			59'-2			63'-4			67'-6			71'-8			80'-0		
			A BEAM			A BEAM			B BEAM			B BEAM			B BEAM			C BEAM			C BEAM			C BEAM			C BEAM		
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.	—	339	42'-10	21,810	369	42'-10	23,740	399	42'-10	25,670	429	42'-10	27,600	459	42'-10	29,530	489	42'-10	31,460	519	42'-10	33,390	549	42'-10	35,320	589	42'-10	37,894
5b1	SLAB LONGITUDINAL, TOP & BOTT.	—	202	40'-0	8,427	202	40'-0	8,427	303	40'-0	12,641	303	40'-0	12,641	303	40'-0	12,641	404	40'-0	16,855	404	40'-0	16,855	404	40'-0	16,855	505	40'-0	21,069
5b2	SLAB LONGITUDINAL, TOP & BOTT., ENDS	—	202	33'-9	7,111	202	40'-0	8,427	202	27'-3	5,741	202	33'-6	7,058	202	39'-9	8,375	202	27'-0	5,689	202	33'-3	7,005	202	39'-6	8,322	202	28'-10	6,075
6b3	SLAB LONGITUDINAL, TOP @ PIERS	—	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,189	92	17'-0	2,328	92	18'-0	2,467	92	19'-0	2,606	92	20'-0	2,745	92	21'-0	2,884
7b3	SLAB LONGITUDINAL, TOP @ PIERS	—	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,189	92	17'-0	2,328	92	18'-0	2,467	92	19'-0	2,606	92	20'-0	2,745	92	21'-0	2,884
8b3	SLAB LONGITUDINAL, TOP @ PIERS	—	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,189	92	17'-0	2,328	92	18'-0	2,467	92	19'-0	2,606	92	20'-0	2,745	92	21'-0	2,884
5d1	PIER DIAPH. ENDS	—	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44	12	3'-6	44
5d2	PIER & ABUT. DIAPH. LONGIT.	—	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626	90	6'-8	626
5d3	PIER & ABUT. DIAPH. LONGIT.	—	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180	30	5'-9	180
5d4	PIER DIAPH. LONGIT.	—	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83	2	39'-9	83
5d5	ABUT. DIAPH. ENDS	—	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63	12	5'-0	63
5d6	ABUT. DIAPH. LONGIT. B.F.	—	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375	16	22'-6	375
5d7	PAVING NOTCH LONGIT.	—	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185	8	22'-2	185
5d8	ABUT. DIAPH. WING EXT. LONGIT.	—	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269	24	10'-9	269
5d9	ABUT. DIAPH. WING EXT. LONGIT.	—	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267
5e1	PIER DIAPH. HOOPS	—	40	8'-5	351	40	8'-5	351	40	9'-8	403	40	9'-8	403	40	9'-8	403	40	10'-8	445	40	10'-8	445	40	10'-8	445	40	10'-8	445
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	—	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115	40	2'-9	115
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.	—	36	23'-10	2,291	36	23'-10	2,291	36	23'-10	2,291	36	23'-10	2,291	36	23'-10	2,291	36	23'-11	2,299	36	23'-11	2,299	36	23'-11	2,299	36	23'-11	2,299
8f3	ABUT. EXTENSION LONGIT.	—	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431	16	10'-1	431
8f4	ABUT. EXTENSION LONGIT.	—	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363	16	8'-6	363
8g1	ABUT. VERT.	—	136	6'-8	2,421	136	6'-8	2,421	136	7'-3	2,633	136	7'-3	2,633	136	7'-3	2,633	132	7'-9	2,731	132	7'-9	2,731	132	7'-9	2,731	132	7'-9	2,731
8g3	ABUT. DIAPH. VERT. B.F.	—	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-9	2,607	62	15'-9	2,607	62	15'-9	2,607	62	15'-9	2,607
6g4	ABUT. DIAPH. WING EXT. VERT.	—	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391
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	12	4'-11	62	12	4'-11	62	12	4'-11	62	12	4'-11	62	12	4'-11	62
5j1	TOP OF SLAB TRANSV. (AT RAIL)	—	338	6'-3	2,203	368	6'-3	2,399	398	6'-3	2,594	428	6'-3	2,790	458	6'-3	2,986	488	6'-3	3,181	518	6'-3	3,377	548	6'-3	3,572	588	6'-3	3,833
5k1	PAVING NOTCH	—	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327	66	4'-9	327
5k2	PAVING NOTCH	—	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235	66	3'-5	235
5p1	ABUTMENT HOOPS (WOOD/STEEL)	—	112/128	10'-6	1227/1402	120/128	10'-6	1314/1402	128/128	10'-6	1402/1402	128/128	10'-6	1402/1402	136/120	10'-6	1489/1314	128	10'-6	1,402	128	10'-6	1,402	128	10'-6	1,402	144	10'-6	1,577
5p2	ABUTMENT HOOPS	—	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267	24	10'-8	267
6p3	ABUT. BOTT. AT PILES	—	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	36	6'-8	360
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	—	12	4'-6	36	12	4'-6	36	12	4'-6	36	12	4'-6	36	12	4'-6	36	12	4'-9	38	12	4'-9	38	12	4'-9	38	12	4'-9	38
#2	PILE SPIRAL (WOOD/STEEL)*	—	28/12	38'-6	180/77	30/14	38'-6	193/90	32/14	38'-6	206/90	32/14	38'-6	206/90	34/16	38'-6	219/103	20	38'-6	129	20	38'-6	129	20	38'-6	129	22	38'-6	141
	SPIRAL SPACERS, L 7/8 x 7/8 x 1/8 x 0.70 (WOOD/STL)*	—	84/36	1'-10	108/46	90/42	1'-10	116/54	96/42	1'-10	123/54	96/42	1'-10	123/54	102/48	1'-10	131/62	60	1'-10	77	60	1'-10	77	60	1'-10	77	66	1'-10	85
	*EPOXY COATING NOT REQUIRED																												
	SUB TOTAL W/ WOOD PILES**				53,808			57,497			61,689			66,059			69,830												
	SUB TOTAL W/ STEEL H-PILES**				53,818			57,420			61,504			65,874			69,470</												



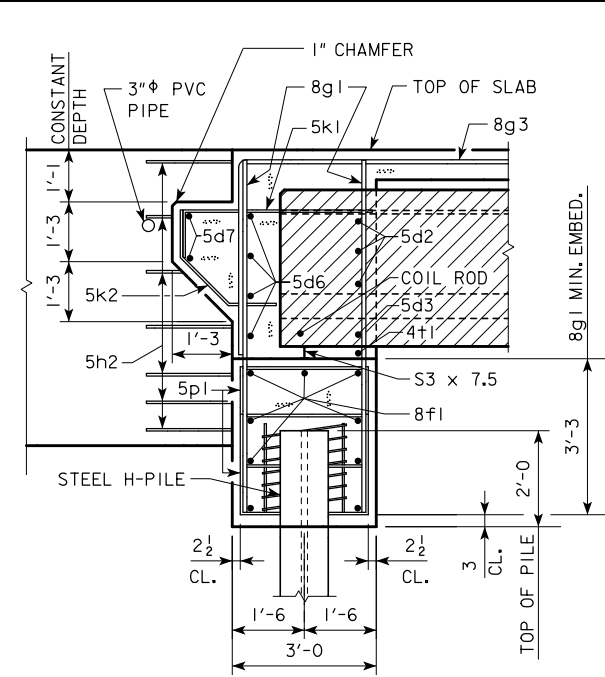
**PART REAR ELEVATION AT ABUTMENT**  
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



**PART SECTION A-A**



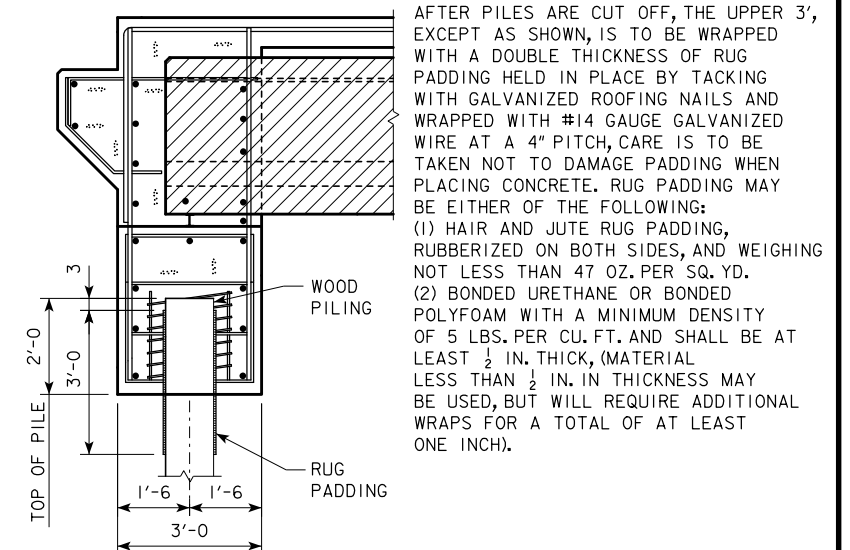
**ABUTMENT PILE PLAN**



**PART SECTION B-B (FOR STEEL H-PILING)**

NOTE: THE SPIRAL AT THE TOP OF EACH PILE TO BE 7 TURNS OF NO. 2 BAR, 21\"/>

**PART SECTION B-B (FOR WOOD PILING)**



SPACING FOR:  
37- 8g1 BACK FACE  
31- 8g1 FRONT FACE  
31- 8g3 BACK FACE  
33- 5k1 & 5k2 BACK FACE

**ABUTMENT NOTES:**

MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2\"/>

IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

PLACE 5h2 BAR AT 1:6 SLOPE TO MATCH TRAFFIC SIDE OF ABUTMENT WING FACE. (BOTH SIDES TYPICAL)

BARRIER RAIL NOT SHOWN IN DETAILS.

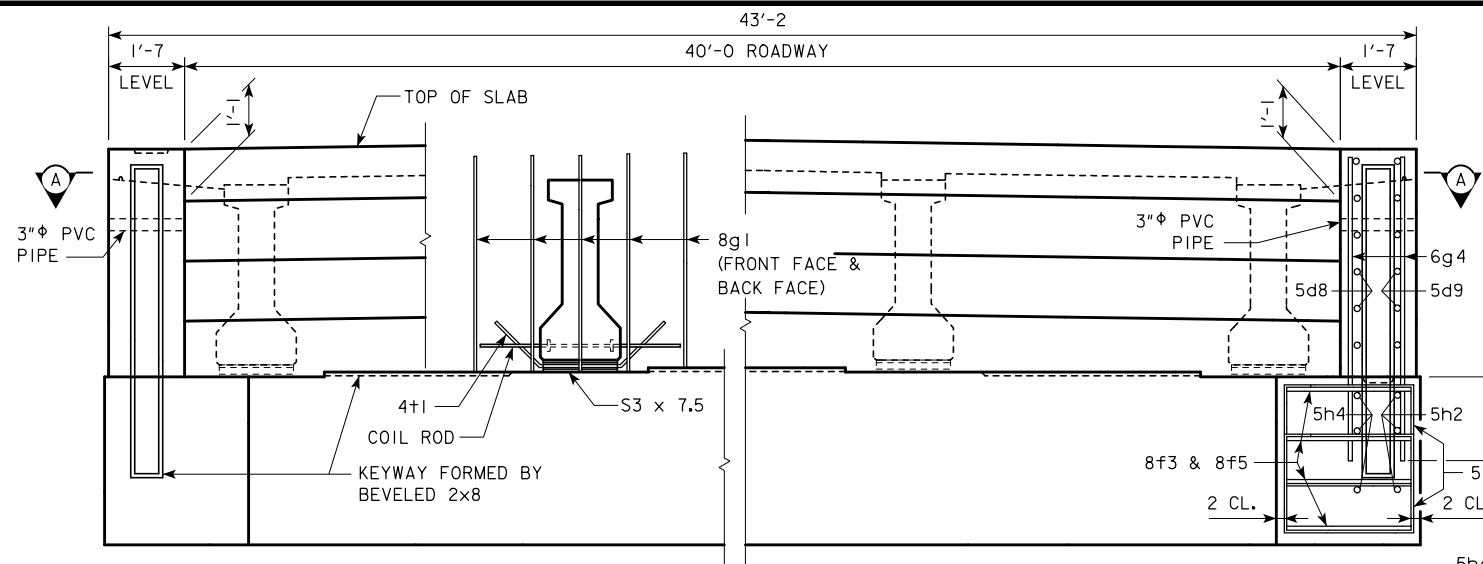
IF ROCK IS CLOSER THAN 15' BELOW ABUTMENT FOOTING, SPECIAL ANALYSIS MAY BE REQUIRED.

ABUTMENT PILE SPACING		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10
WITH WOOD PILES	"A" PILE SPACES		13	14	15	15	16
	"B" (FT. - IN.)		3'-0	2'-10	2'-8	2'-8	2'-6
	"C" (FT. - IN.)		2'-10 1/8	2'-6 1/8	2'-4 1/8	2'-4 1/8	2'-4 1/8
	"D" EQUAL SPACES		1	1	1	1	1
	NO. OF PILES PER ABUT.		14	15	16	16	17
	PU, STRENGTH I DESIGN LOAD (KIPS)		57	55	55	57	56
WITH STEEL H-PILES	"A" PILE SPACES		6	6	6	6	7
	"B" (FT. - IN.)		6'-8	6'-8	6'-8	6'-8	5'-8
	"C" (FT. - IN.)		2'-4 1/8	2'-4 1/8	2'-4 1/8	2'-4 1/8	2'-6 1/8
	"D" EQUAL SPACES		4	4	4	4	3
	NO. OF PILES PER ABUT.		7	7	7	7	8
	PU, STRENGTH I DESIGN LOAD (KIPS)		124	129	138	143	129

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

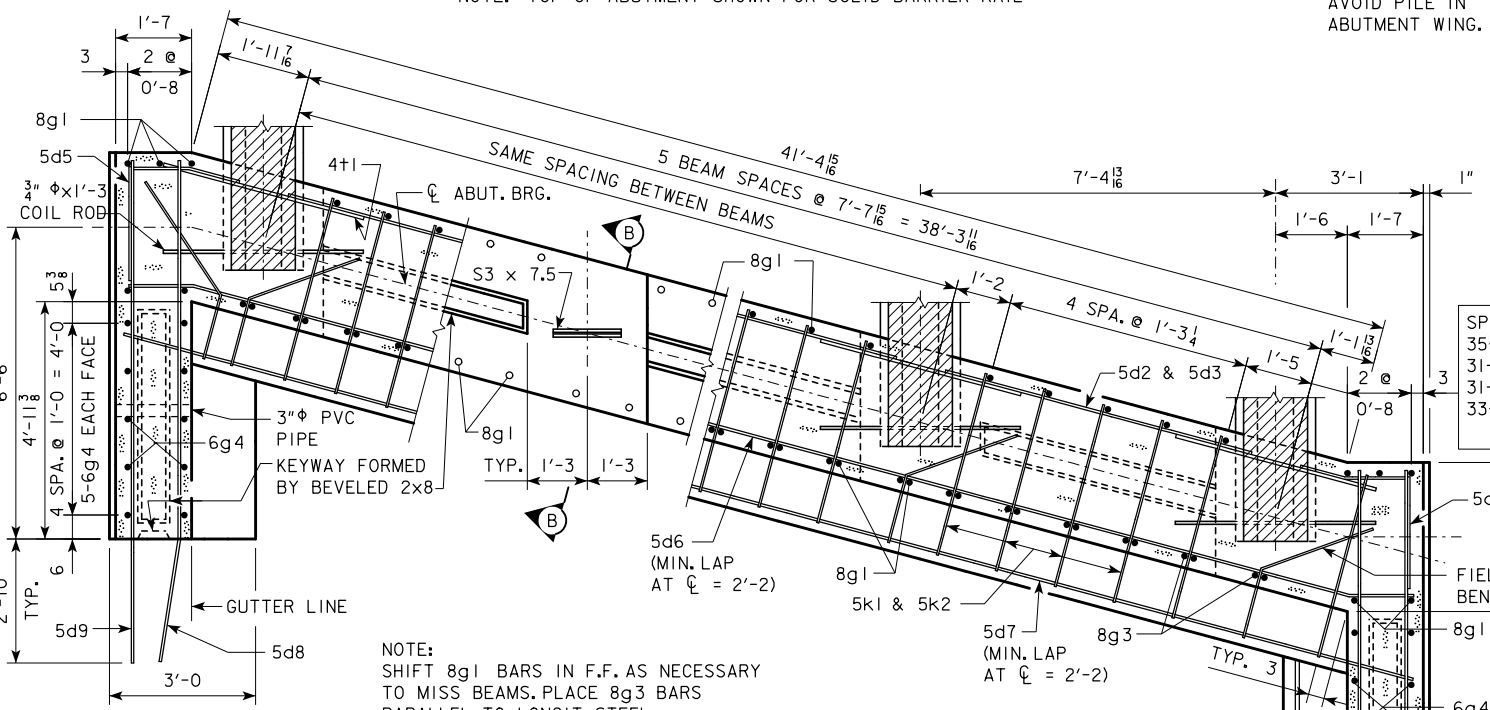
REVISED 05-13 - REVISION FOR LRED PILE DESIGN.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>ABUTMENT DETAILS</b> 15° SKEW A & B BEAMS	<b>H40-11-06</b>



**PART REAR ELEVATION AT ABUTMENT**

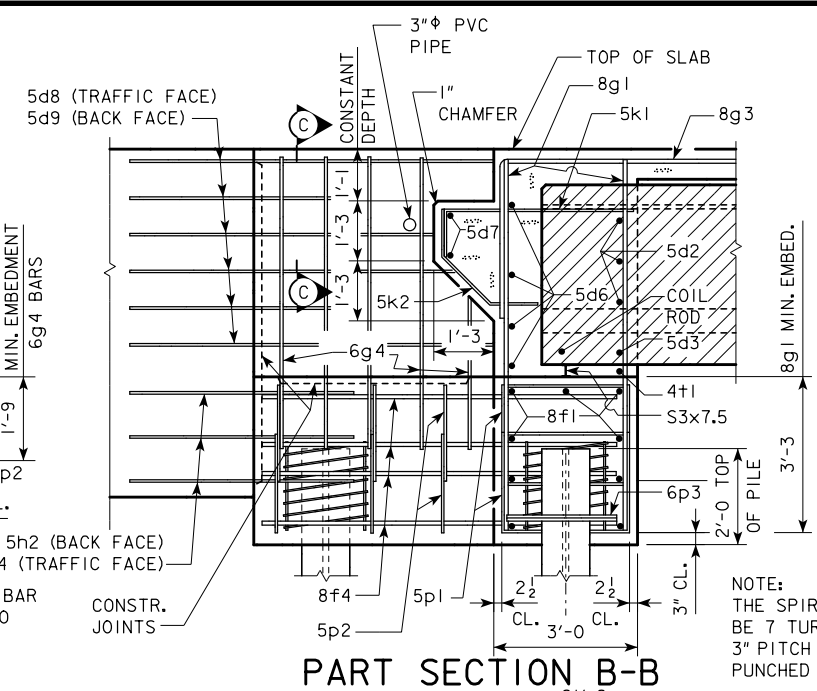
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



**PART SECTION A-A**

ABUTMENT PILE SPACING		CL-CL ABUT. BRG.	201'-4	213'-10	226'-4	243'-0
WITH STEEL H-PILES	"A" PILE SPACES		7	7	7	8
	"B" (FT. - IN.)		5'-8	5'-8	5'-8	5'-0
	"C" (FT. - IN.)		2'-7 <sup>3</sup> / <sub>16</sub>	2'-7 <sup>3</sup> / <sub>16</sub>	2'-7 <sup>3</sup> / <sub>16</sub>	2'-5 <sup>3</sup> / <sub>16</sub>
	"D" EQUAL SPACES		3	3	3	3
	NO. OF PILES PER ABUT.		10	10	10	11
PU, STRENGTH I DESIGN LOAD (KIPS)			137	141	146	137

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



**PART SECTION B-B**

**ABUTMENT NOTES:**

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

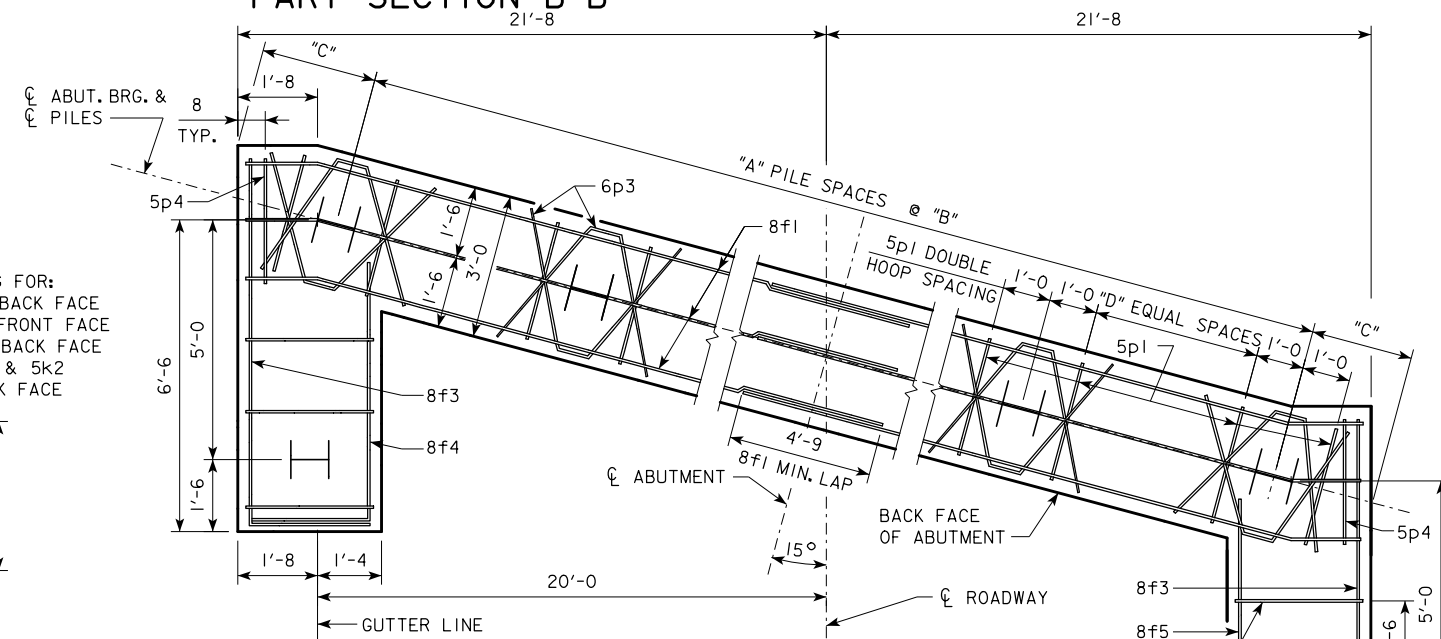
IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

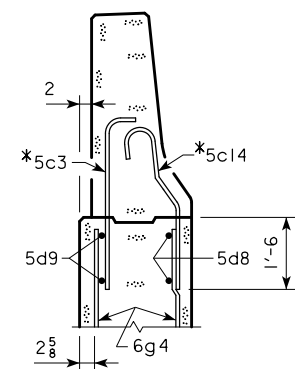
BARRIER RAIL NOT SHOWN IN DETAILS.

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

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



**ABUTMENT PILE PLAN**



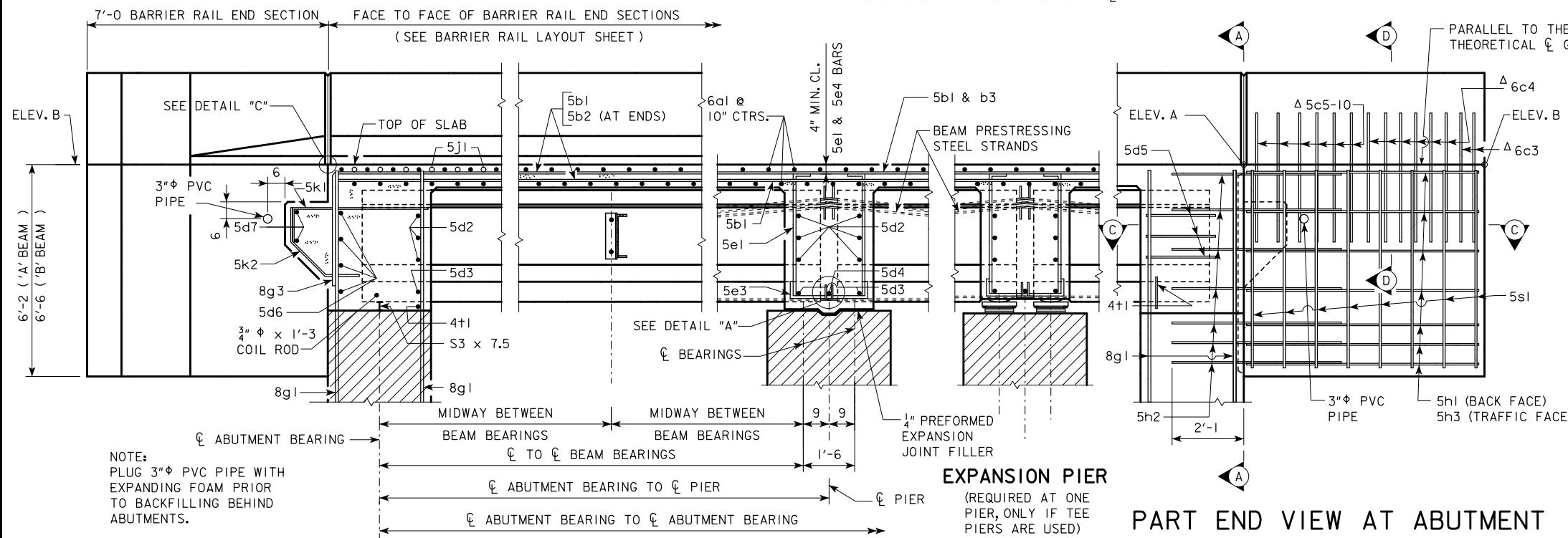
**PART SECTION C-C**

\* NOTE: SEE BARRIER RAIL SHEET FOR DETAILS. REINFORCING BARS 5c3 AND 5c14 ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.

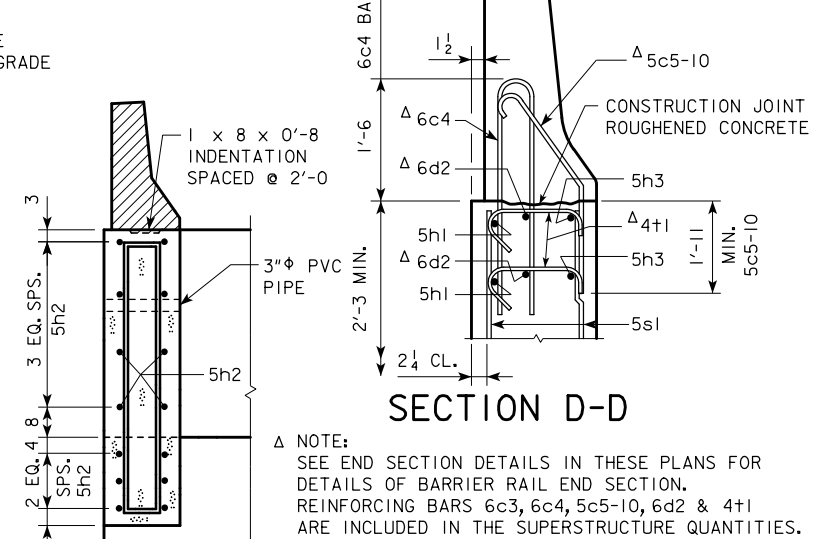
05-13 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>ABUTMENT DETAILS</b> 15° SKEW C BEAMS	<b>H40-12-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

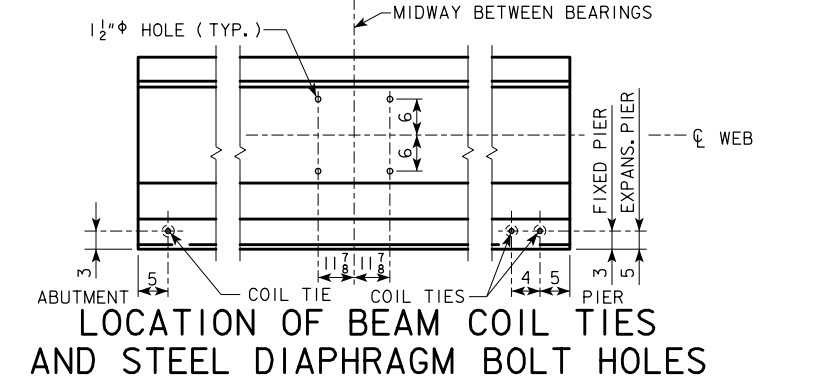
NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\bar{C}$



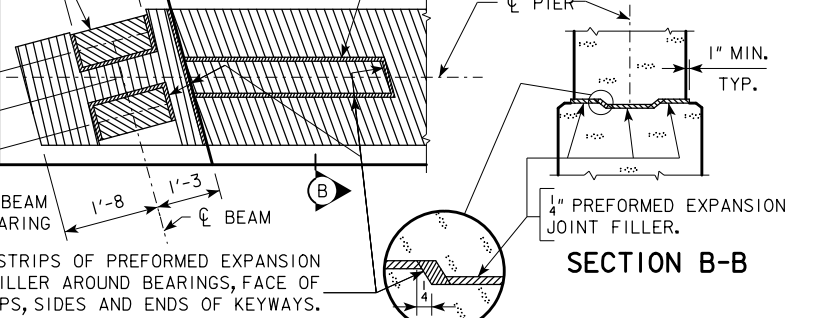
**ABUTMENT**  
**PART LONGITUDINAL SECTION NEAR GUTTER**  
 (FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H40-38-06)



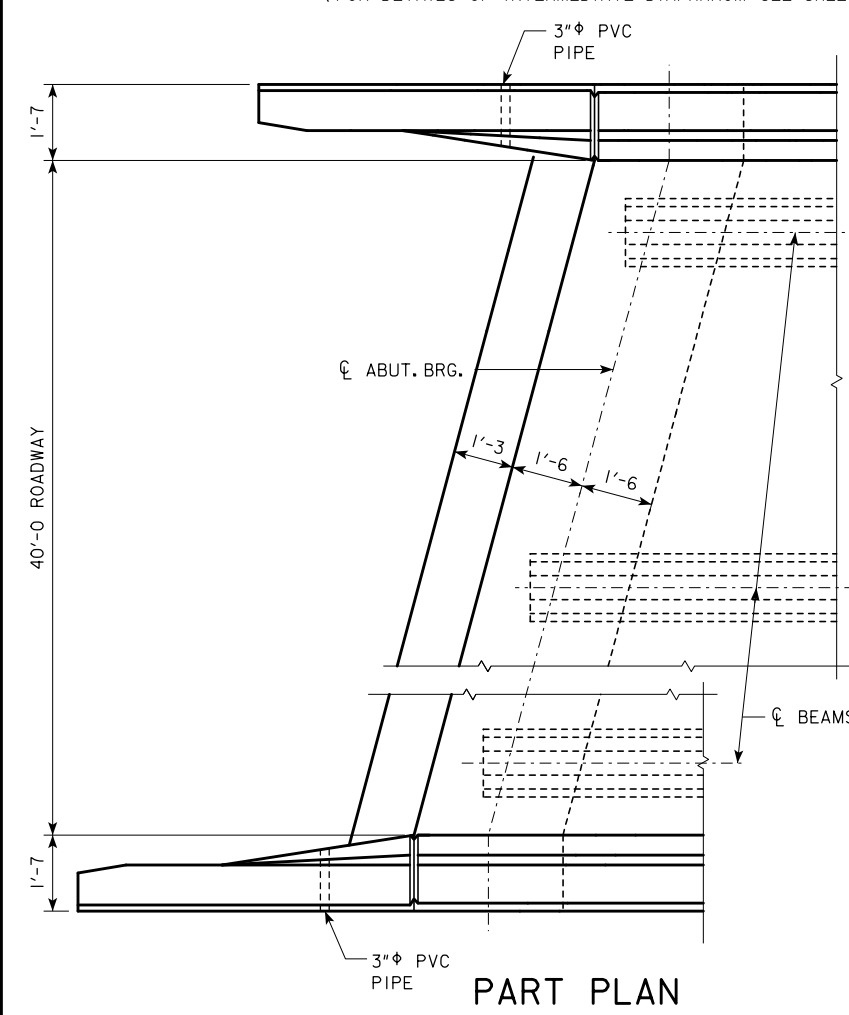
**SECTION D-D**  
 NOTE: SEE END SECTION DETAILS IN THESE PLANS FOR DETAILS OF BARRIER RAIL END SECTION. REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.



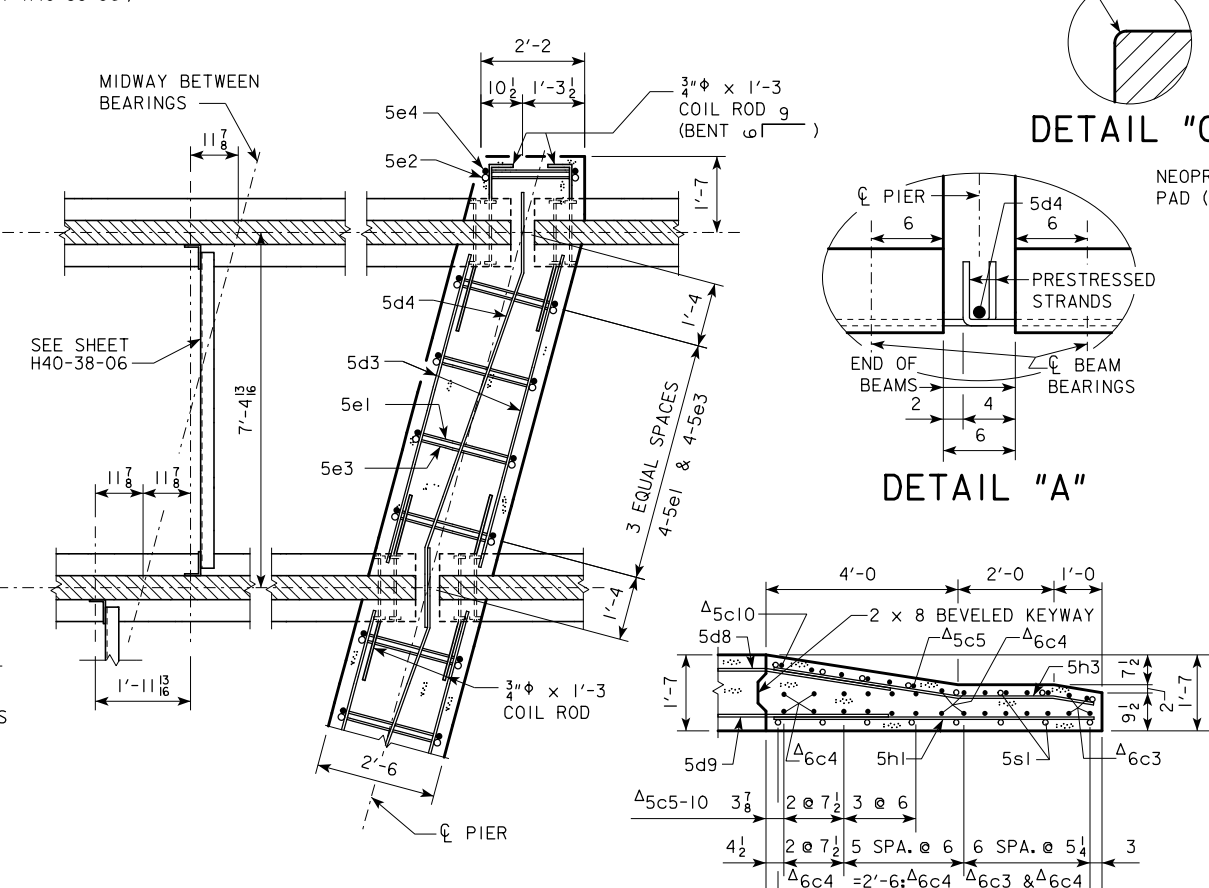
**SECTION A-A**



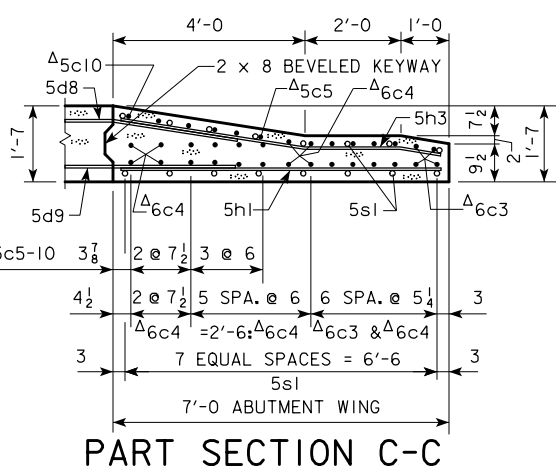
**LOCATION OF BEAM COIL TIES AND STEEL DIAPHRAGM BOLT HOLES**



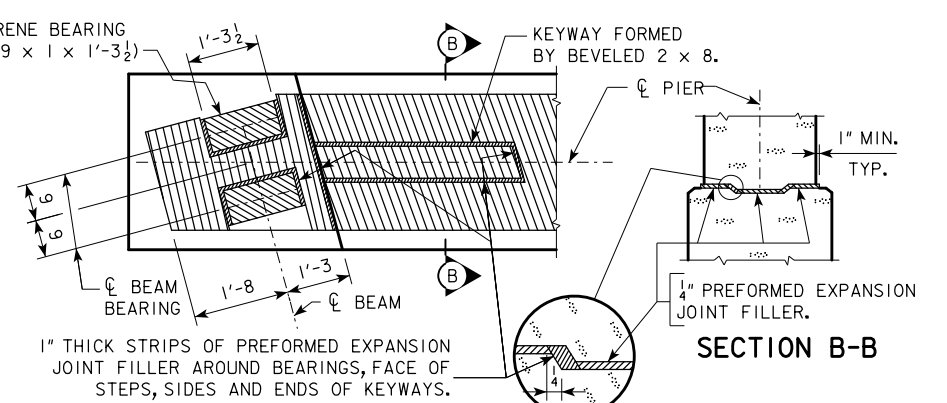
**PART PLAN**



**PART SECTION AT PIER**



**PART SECTION C-C**

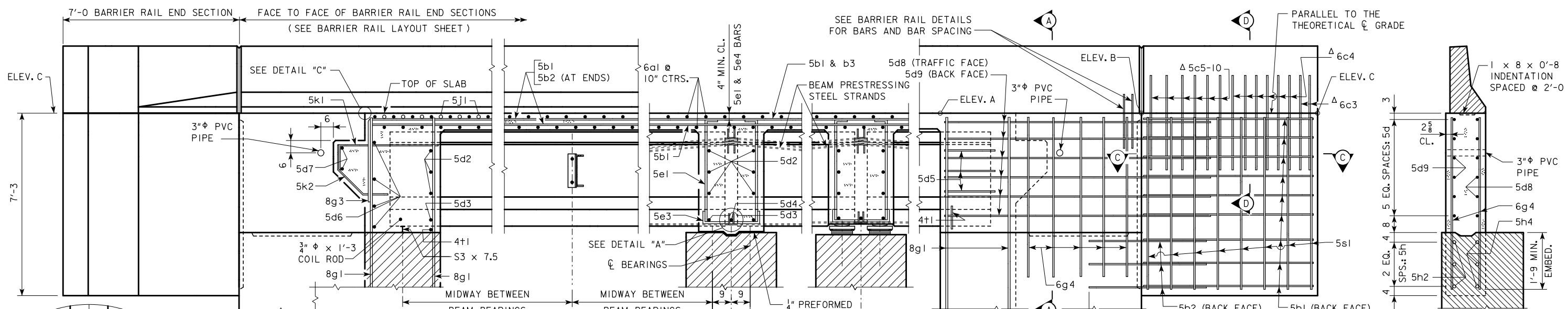


**TOP OF FIXED PIER DETAILS**  
 (SEE SHEET H40-44-06 FOR EXPANSION PIER BEARING DETAILS)

10-09 LATEST REVISION DATE Approved by <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
LONGITUDINAL SECTION 15° SKEW A & B BEAMS	<b>H40-13-06</b>	

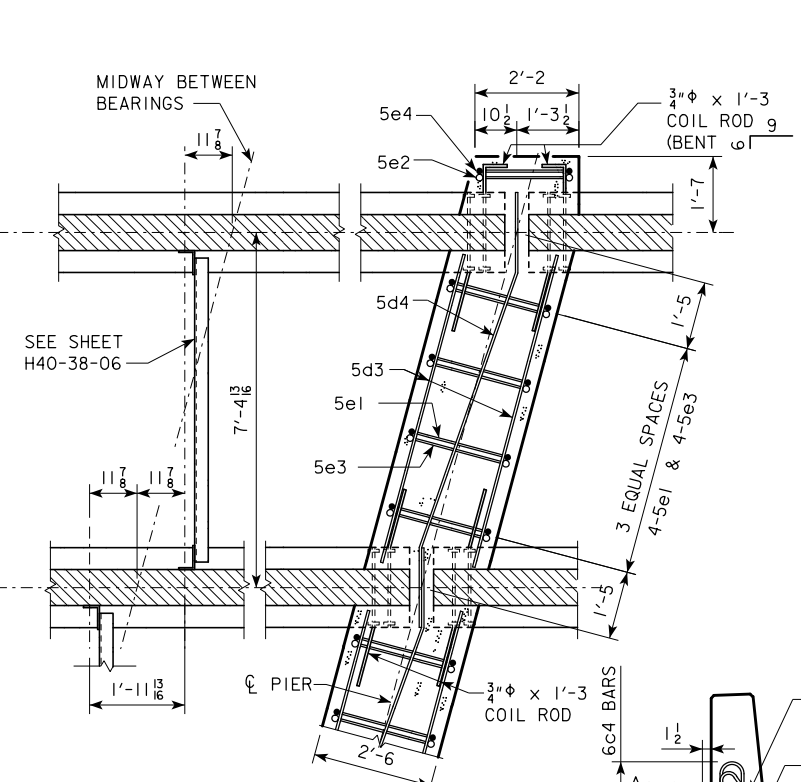
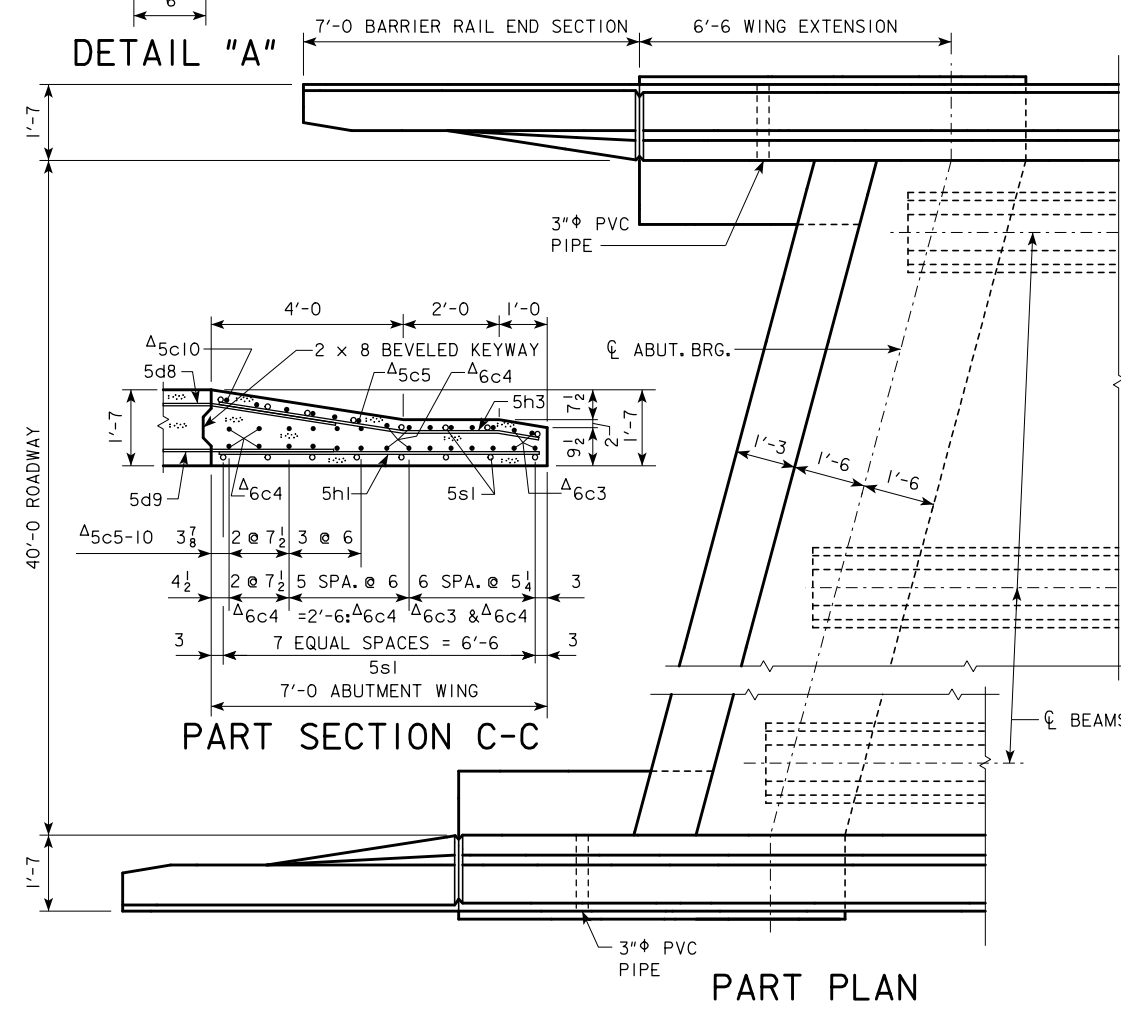
REVISED 10-09 - ABUT. WINGS SHAPE CHANGED.

NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\bar{C}$



NOTE: PLUG 3"  $\phi$  PVC PIPE WITH EXPANDING FOAM PRIOR TO BACKFILLING BEHIND ABUTMENTS.

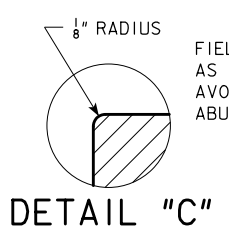
**ABUTMENT PART LONGITUDINAL SECTION NEAR GUTTER**  
(FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H40-38-06)



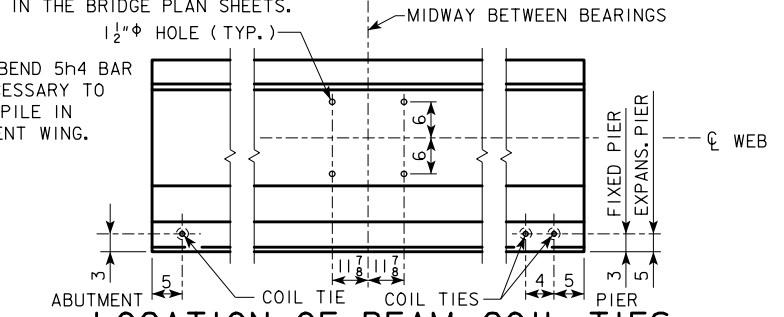
**PART SECTION AT PIER**

$\Delta$  NOTE: SEE END SECTION DETAILS IN THESE PLANS FOR DETAILS OF BARRIER RAIL END SECTION. REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.

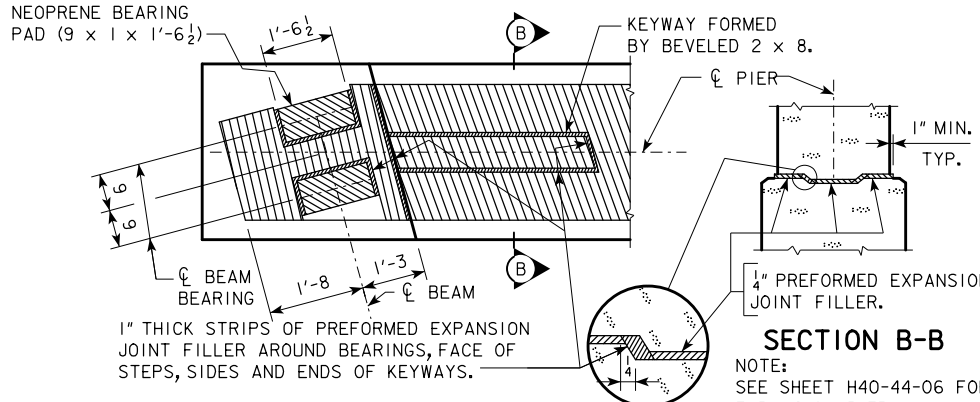
**PART END VIEW AT ABUTMENT**  
PROVIDE ELEVATIONS A, B AND C IN THE BRIDGE PLAN SHEETS.



**DETAIL "C"**

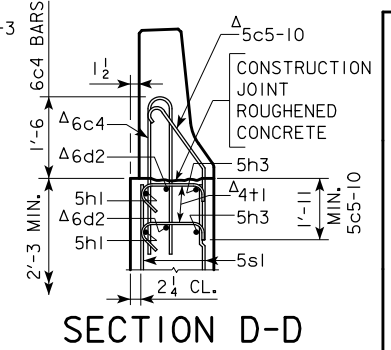


**LOCATION OF BEAM COIL TIES AND STEEL DIAPHRAGM BOLT HOLES**



**SECTION B-B**

**PART PLAN TOP OF FIXED PIER DETAILS**



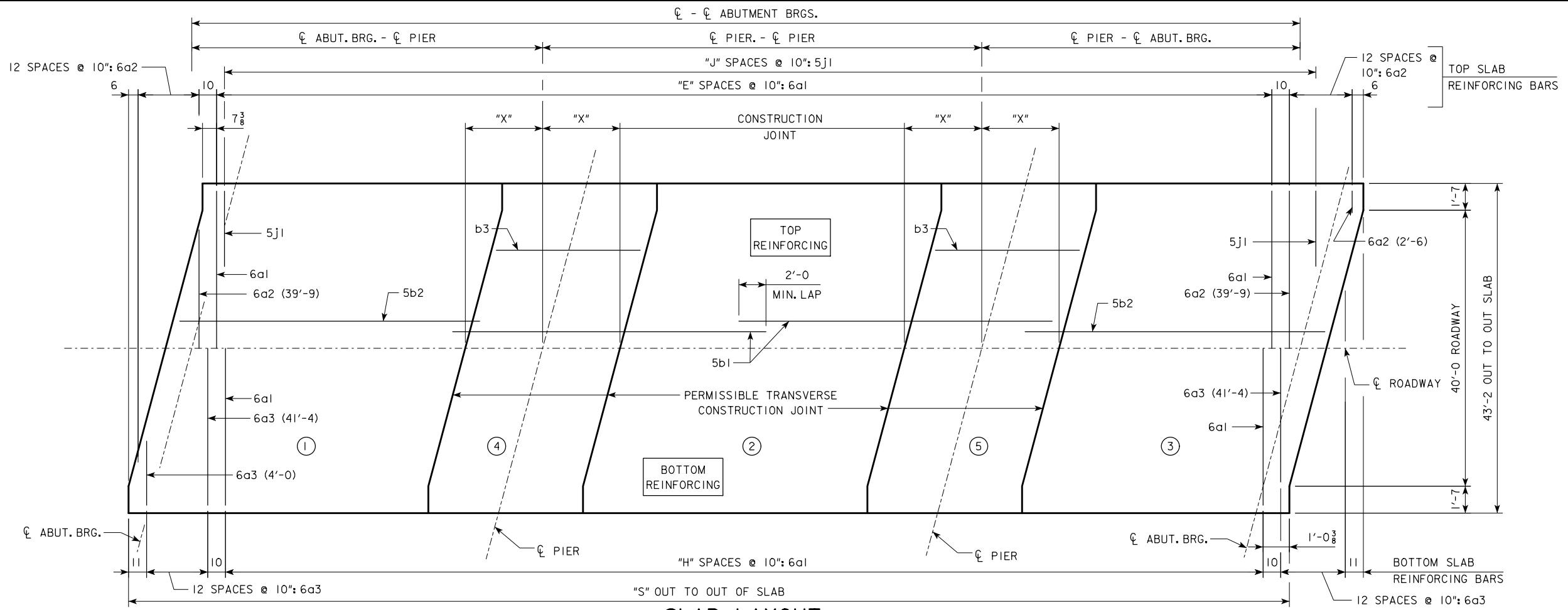
**SECTION D-D**

01-12 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>LONGITUDINAL SECTION</b> 15° SKEW C BEAMS

**H40-14-06**

REVISED 01-12 - ADDED FIELD BEND 5H4 BAR TO AVOID PILE IN ABUTMENT WING NOTE.

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)

ESTIMATED QUANTITIES (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
STRUCTURAL CONCRETE SUPERSTRUCTURE (INCLUDES ABUTMENT WINGS)	WITH BARRIER RAIL	C.Y.	219.5	233.4	256.9	270.8	284.9	311.9	326.0	340.5	359.5
	WITH OPEN RAIL	C.Y.	222.0	236.1	259.9	274.0	288.4	315.4	329.7	344.5	363.7
STRUCTURAL CONCRETE ABUTMENTS (w/ WOOD PILES) ***		C.Y.	34.8	34.7	34.5	34.5	34.4	-----	-----	-----	-----
STRUCTURAL CONCRETE ABUTMENTS (w/ STEEL H PILES) ***		C.Y.	36.4	36.4	36.4	36.4	36.4	44.2	44.2	44.2	44.2
PRETENSIONED PRESTRESSED CONCRETE BEAM, CENTER SPAN		NO.	6-A50	6-A55	6-B59	6-B63	6-B67	6-C71	6-C75	6-C80	6-C80
PRETENSIONED PRESTRESSED CONCRETE BEAM, END SPAN		NO.	12-A42	12-A46	12-B50	12-B55	12-B59	12-C63	12-C67	12-C71	12-C80
CONCRETE RAIL (BARRIER OR OPEN)		L.F.	311.9	336.9	361.9	386.9	411.9	456.7	481.7	506.7	540.0
STRUCTURAL STEEL (w/ PILE BENT PIERS & DRAINS)		LB.	5143	5143	5231	5231	5231	5215	5215	5215	5215
STRUCTURAL STEEL (w/ PILE BENT PIERS & NO DRAINS)		LB.	4463	4463	4463	4463	4463	4367	4367	4367	4367
STRUCTURAL STEEL (w/ TEE PIERS & DRAINS)		LB.	6218	6218	6306	6306	6306	6485	6485	6485	6485
STRUCTURAL STEEL (w/ TEE PIERS & NO DRAINS)		LB.	5538	5538	5538	5538	5538	5637	5637	5637	5637
EPOXY COATED REINF. STEEL (w/ WOOD PILES & BARRIER RAIL)		LB.	62,243	66,718	71,256	76,158	80,528	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ WOOD PILES & OPEN RAIL)		LB.	62,908	67,339	72,024	77,102	81,402	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & BARRIER RAIL)		LB.	62,274	66,640	71,071	75,973	80,168	87,621	92,904	97,171	102,972
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & OPEN RAIL)		LB.	62,939	67,261	71,839	76,917	81,042	89,465	94,657	99,121	104,968
NO. OF WOOD PILES, TREATED FOR TWO ABUTMENTS		NO.	28	30	32	32	34	-----	-----	-----	-----
NO. OF STEEL H-PILES FOR TWO ABUTMENTS (HP 10 x 57)		NO.	14	14	14	14	16	20	20	20	22
PREBORED HOLES (w/ WOOD PILES)		L.F.	280	300	320	320	340	-----	-----	-----	-----
PREBORED HOLES (w/ STEEL H-PILES)		L.F.	140	140	140	140	160	200	200	200	220

CONCRETE PLACEMENT QUANT. (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
SLAB INCLUDING HAUNCH, ABUT. DIAPHRAGM, & WINGWALLS**, SECTIONS 1 & 3	WITH BARRIER RAIL	C.Y.	119.6	127.6	141.2	149.2	157.2	174.8	183.2	191.8	210.8
	WITH OPEN RAIL	C.Y.	120.9	129.0	142.8	150.9	159.1	176.7	185.2	194.0	213.2
SLAB INCLUDING HAUNCH, SECTION 2	WITH BARRIER RAIL	C.Y.	43.5	47.0	50.5	54.0	57.3	61.1	64.6	68.1	68.1
	WITH OPEN RAIL	C.Y.	44.2	47.8	51.3	54.9	58.3	62.1	65.6	69.2	69.2
SLAB INCLUDING HAUNCH & PIER DIAPHRAGM, SECTIONS 4 & 5	WITH BARRIER RAIL	C.Y.	49.2	51.6	57.6	60.0	62.8	67.6	69.8	72.2	72.2
	WITH OPEN RAIL	C.Y.	49.7	52.1	58.2	60.6	63.4	68.2	70.5	72.9	72.9
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.	34.8	34.7	34.5	34.5	34.4	-----	-----	-----	-----
ABUTMENT FOOTINGS (w/ STEEL H PILES) ***		C.Y.	36.4	36.4	36.4	36.4	36.4	44.2	44.2	44.2	44.2

GENERAL DATA		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
VERTICAL CURVE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8	3'-7 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-8 <sup>9</sup> / <sub>16</sub>	4'-8 <sup>11</sup> / <sub>16</sub>	4'-9 <sup>1</sup> / <sub>8</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>3</sup> / <sub>8</sub>	3'-6 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>5</sup> / <sub>16</sub>	4'-1 <sup>1</sup> / <sub>2</sub>	4'-1 <sup>7</sup> / <sub>8</sub>	4'-7 <sup>5</sup> / <sub>16</sub>	4'-7 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>1</sup> / <sub>2</sub>	4'-7 <sup>1</sup> / <sub>2</sub>
STRAIGHT GRADE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8 <sup>1</sup> / <sub>16</sub>	3'-7 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-3	4'-8 <sup>3</sup> / <sub>4</sub>	4'-8 <sup>7</sup> / <sub>8</sub>	4'-9 <sup>5</sup> / <sub>8</sub>	4'-9 <sup>7</sup> / <sub>8</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>9</sup> / <sub>16</sub>	3'-6 <sup>3</sup> / <sub>4</sub>	4'-1 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-8	4'-8
D.L. PIER REACTION (D.L. + F.W.S.) SERVICE LOADS	KIPS		438.8	473.4	540.5	577.1	613.9	733.7	774.7	816.2	856.5
L.L. PIER REACTION (HL93) NO IMPACT SERVICE LOADS	KIPS		264.7	274.5	283.9	293.1	302.2	311.0	322.9	341.9	362.6
NO. OF SPACES FOR 6a1 BARS (TOP)	"E"		156	171	186	201	216	231	246	261	281
NO. OF SPACES FOR 6a1 BARS (BOTTOM)	"H"		155	170	185	200	215	230	245	260	280
NO. OF SPACES FOR 5j1 BARS (TOP)	"J"		167	182	197	212	227	242	257	272	292
OUT TO OUT OF SLAB	"S"		141'-11 <sup>1</sup> / <sub>4</sub>	154'-5 <sup>1</sup> / <sub>4</sub>	166'-11 <sup>1</sup> / <sub>4</sub>	179'-5 <sup>1</sup> / <sub>4</sub>	191'-11 <sup>1</sup> / <sub>4</sub>	204'-5 <sup>1</sup> / <sub>4</sub>	216'-11 <sup>1</sup> / <sub>4</sub>	229'-5 <sup>1</sup> / <sub>4</sub>	246'-1 <sup>1</sup> / <sub>4</sub>
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

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.

\* 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 3/16 INCHES TO "U" VALUES SHOWN.

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

\*\*\* SEE SHEET H40-17-06 FOR ADDITIONAL CONCRETE REQUIRED IN ABUTMENT FOOTINGS.

LATEST REVISION DATE

07-15

*Norman L. Mc Donald*

APPROVED BY BRIDGE ENGINEER

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

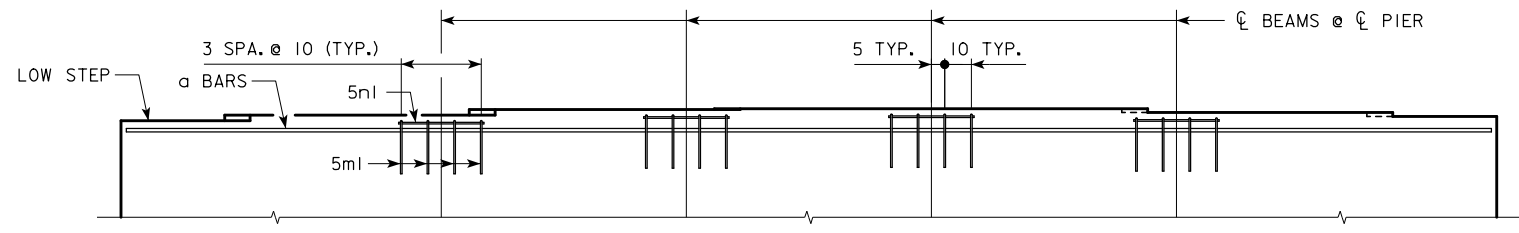
AUGUST, 2009

SUPERSTRUCTURE DETAILS

15° SKEW

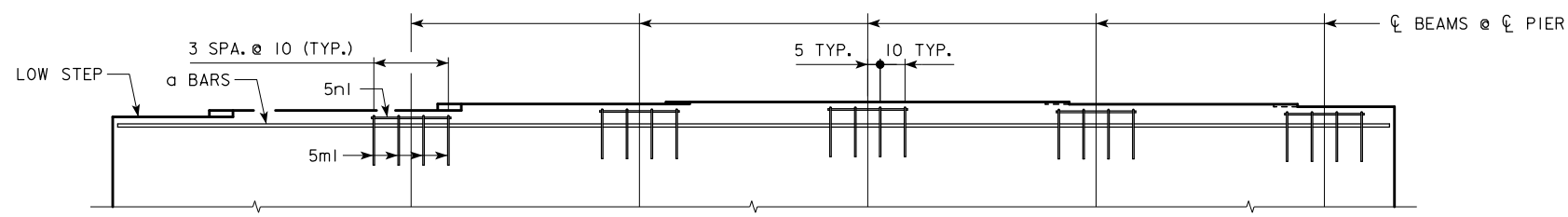
H40-15-06





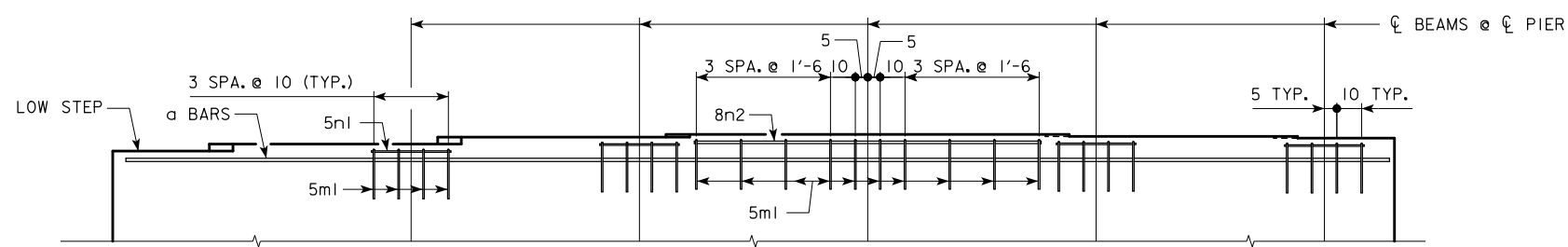
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $G \leq 1.4\%$



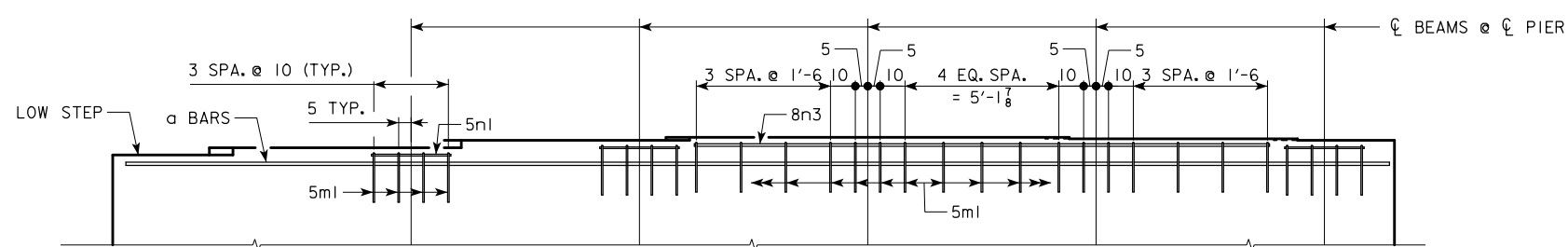
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $1.4\% < G \leq 3.4\%$



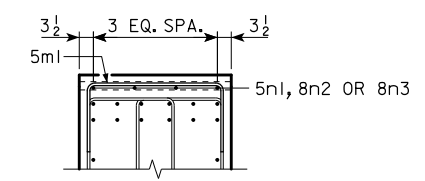
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $3.4\% < G \leq 4.4\%$



PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $4.4\% < G \leq 5.0\%$



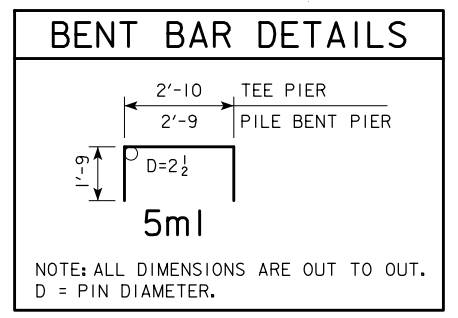
TYPICAL SECTION

STEP REINFORCING BAR LIST ONE TEE PIER														
BAR	LENGTH	SHAPE	G ≤ 1.4%			1.4% < G ≤ 3.4%			3.4% < G ≤ 4.4%			4.4% < G ≤ 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	6'-4		16	5	106	20	5	132	26	5	172	29	5	192
5n1	2'-8		16	5	45	20	5	56	16	5	45	12	5	33
8n2	12'-4		--	--	--	--	--	--	4	8	132	--	--	--
8n3	20'-0		--	--	--	--	--	--	--	--	--	4	8	214
TOTAL (LB.)			151			188			349			439		

G = GRADE (%)

STEP REINFORCING BAR LIST ONE PILE BENT PIER														
BAR	LENGTH	SHAPE	G ≤ 1.4%			1.4% < G ≤ 3.4%			3.4% < G ≤ 4.4%			4.4% < G ≤ 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	6'-3		16	5	104	20	5	130	26	5	169	29	5	189
5n1	2'-8		16	5	45	20	5	56	16	5	45	12	5	33
8n2	12'-4		--	--	--	--	--	--	4	8	132	--	--	--
8n3	20'-0		--	--	--	--	--	--	--	--	--	4	8	214
TOTAL (LB.)			149			186			346			436		

G = GRADE (%)

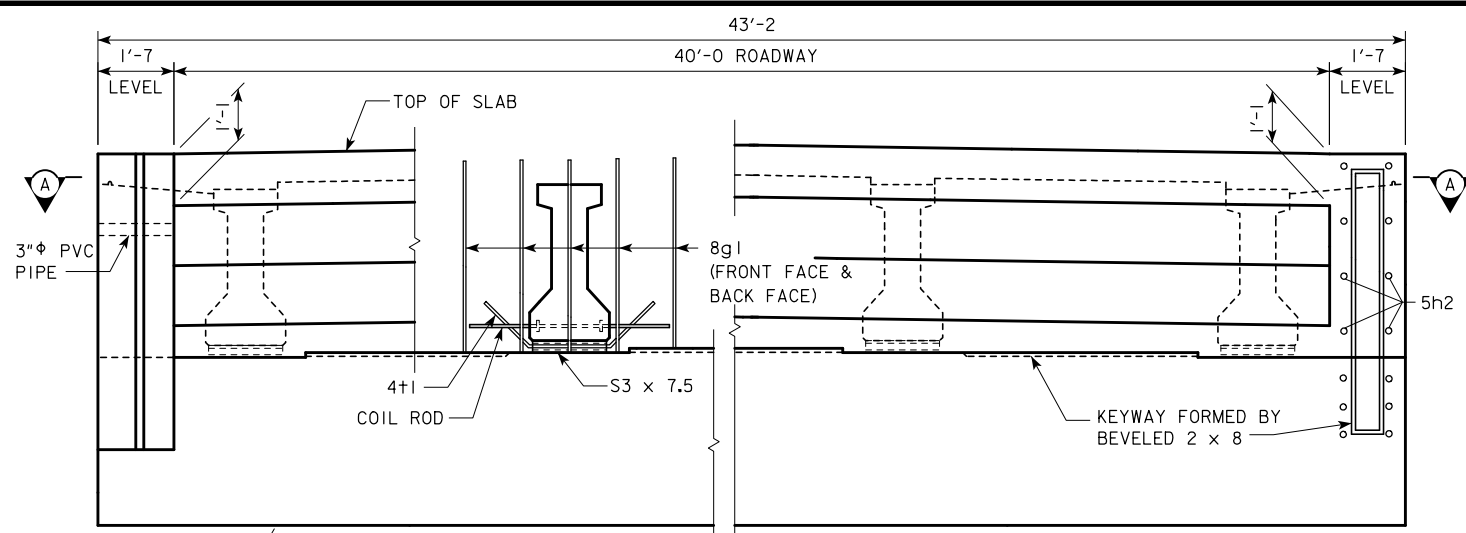


NOTES:

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 SHOULD BE 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.

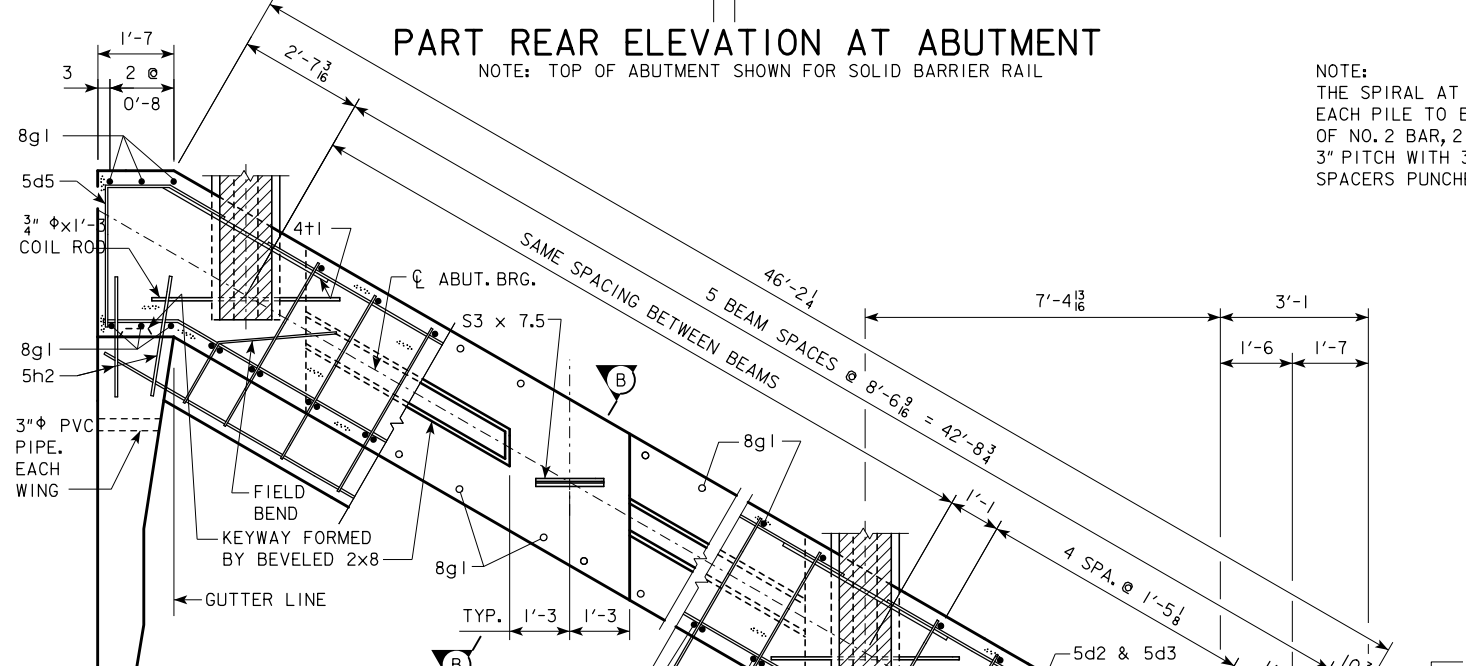
	ADDITIONAL CONCRETE VOLUME PER SUBSTRUCTURE UNIT (C.Y.)				
	ROADWAY GRADE AT SUBSTRUCTURE UNIT				
	1%	2%	3%	4%	5%
EACH ABUTMENT FOOTING					
A, B BEAMS	----	----	0.7	0.9	1.1
C BEAMS	----	0.5	0.8	1.1	1.4
EACH TEE PIER CAP - ALL BEAMS	--	--	0.7	0.9	1.2
EACH PILE BENT PIER - ALL BEAMS	--	--	0.7	0.9	1.2

LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
		<b>ADDITIONAL QUANTITIES</b> 15° SKEW
		<b>H40-17-06</b>



**PART REAR ELEVATION AT ABUTMENT**

NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



**PART SECTION A-A**

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

SPACING FOR:  
 37- 8g1 BACK FACE  
 31- 8g1 FRONT FACE  
 31- 8g3 BACK FACE  
 32- 5k1 & 5k2 BACK FACE

**ABUTMENT NOTES:**

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

IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

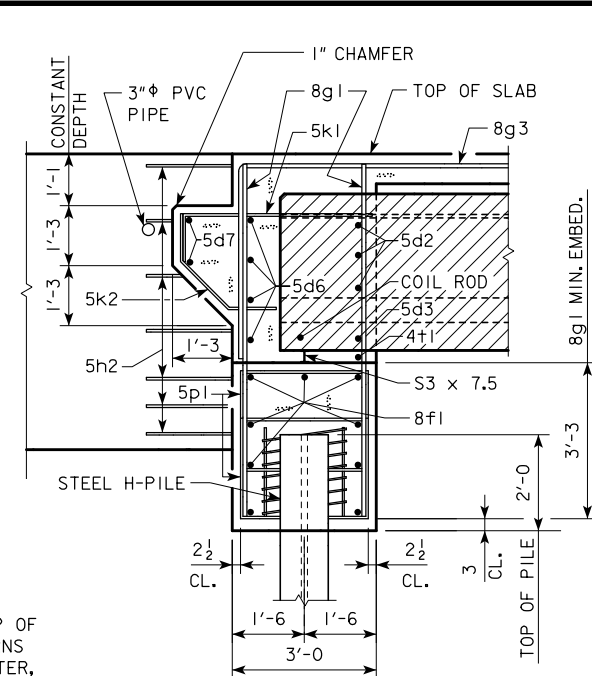
PLACE 5h2 BAR AT 1:6 SLOPE TO MATCH TRAFFIC SIDE OF ABUTMENT WING FACE. (BOTH SIDES TYPICAL)

BARRIER RAIL NOT SHOWN IN DETAILS.

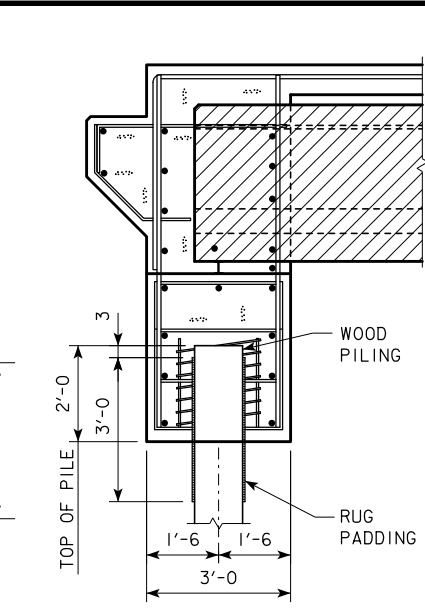
IF ROCK IS CLOSER THAN 15' BELOW ABUTMENT FOOTING, SPECIAL ANALYSIS MAY BE REQUIRED.

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

**PART SECTION B-B (FOR STEEL H-PILING)**



**PART SECTION B-B (FOR WOOD PILING)**

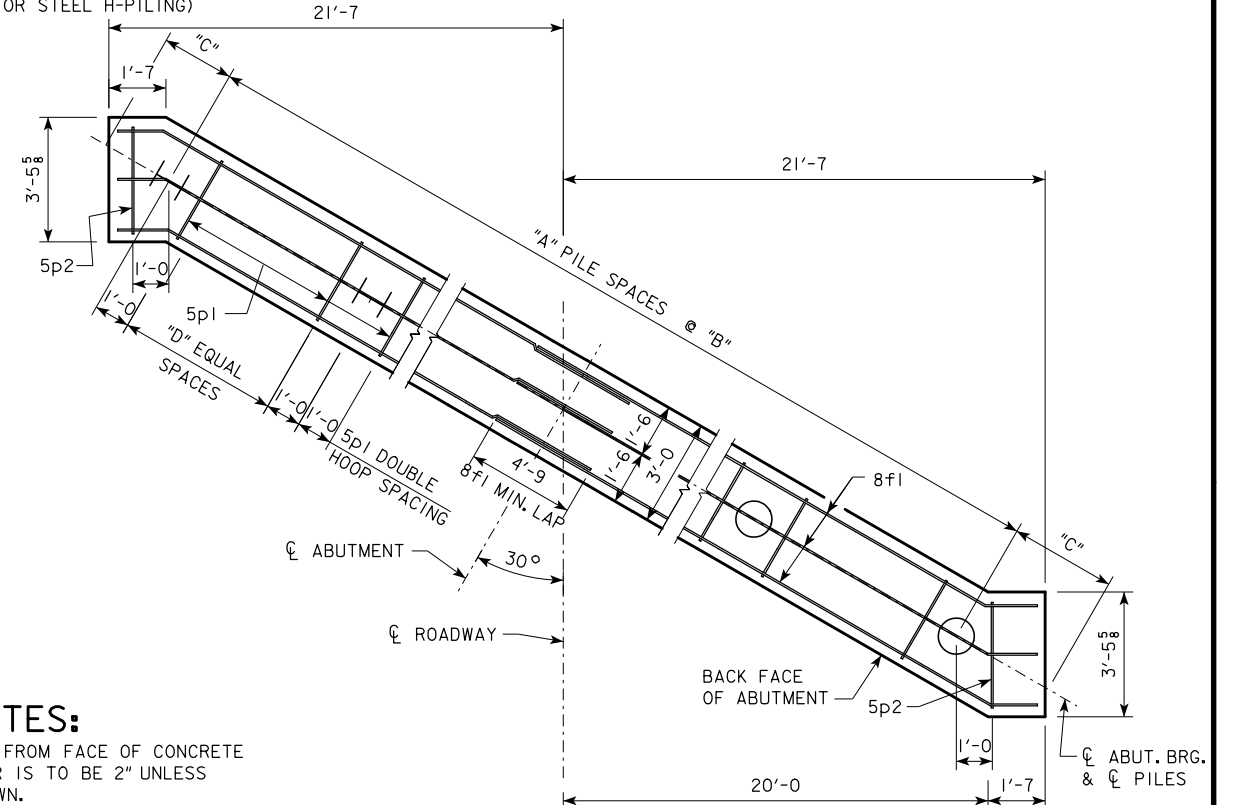


**WOOD PILING NOTE:**

AFTER PILES ARE CUT OFF, THE UPPER 3', EXCEPT AS SHOWN, IS TO BE WRAPPED WITH A DOUBLE THICKNESS OF RUG PADDING HELD IN PLACE BY TACKING WITH GALVANIZED ROOFING NAILS AND WRAPPED WITH #14 GAUGE GALVANIZED WIRE AT A 4" PITCH, CARE IS TO BE TAKEN NOT TO DAMAGE PADDING WHEN PLACING CONCRETE. RUG PADDING MAY BE EITHER OF THE FOLLOWING:  
 (1) HAIR AND JUTE RUG PADDING, RUBBERIZED ON BOTH SIDES, AND WEIGHING NOT LESS THAN 47 OZ. PER SQ. YD.  
 (2) BONDED URETHANE OR BONDED POLYFOAM WITH A MINIMUM DENSITY OF 5 LBS. PER CU. FT. AND SHALL BE AT LEAST 1/2 IN. THICK, (MATERIAL LESS THAN 1/2 IN. IN THICKNESS MAY BE USED, BUT WILL REQUIRE ADDITIONAL WRAPS FOR A TOTAL OF AT LEAST ONE INCH).

ABUTMENT PILE SPACING		138'-10	151'-4	163'-10	176'-4	188'-10
WITH WOOD PILES	"A" PILE SPACES	14	14	15	16	16
	"B" (FT. - IN.)	3'-2	3'-2	2'-11	2'-9	2'-9
	"C" (FT. - IN.)	2'-9 1/16	2'-9 1/16	3'-0 3/16	2'-11 1/16	2'-11 1/16
	"D" EQUAL SPACES	1	1	1	1	1
	NO. OF PILES PER ABUT.	15	15	16	17	17
	PU, STRENGTH I DESIGN LOAD (KIPS)	54	57	57	56	57
WITH STEEL H-PILES	"A" PILE SPACES	6	6	6	6	7
	"B" (FT. - IN.)	7'-5	7'-5	7'-5	7'-5	6'-4
	"C" (FT. - IN.)	2'-8 1/16	2'-8 1/16	2'-8 1/16	2'-8 1/16	2'-9 1/16
	"D" EQUAL SPACES	5	5	5	5	4
	NO. OF PILES PER ABUT.	7	7	7	7	8
	PU, STRENGTH I DESIGN LOAD (KIPS)	127	132	141	146	132

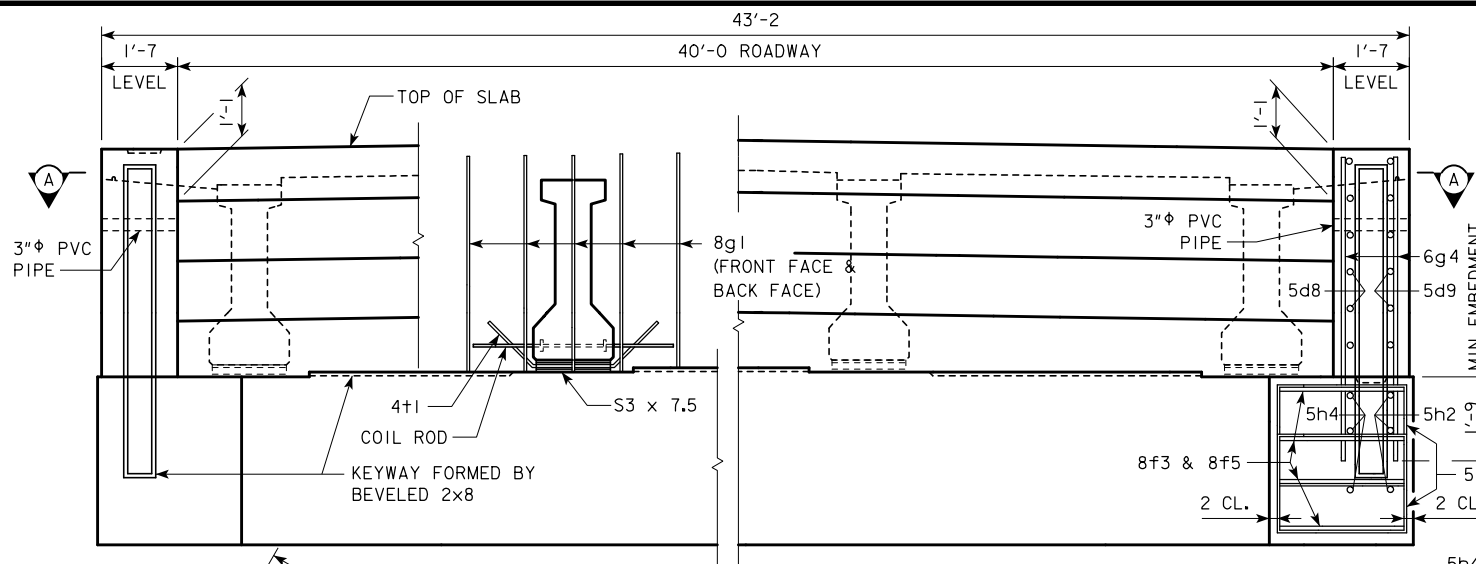
NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.



**ABUTMENT PILE PLAN**

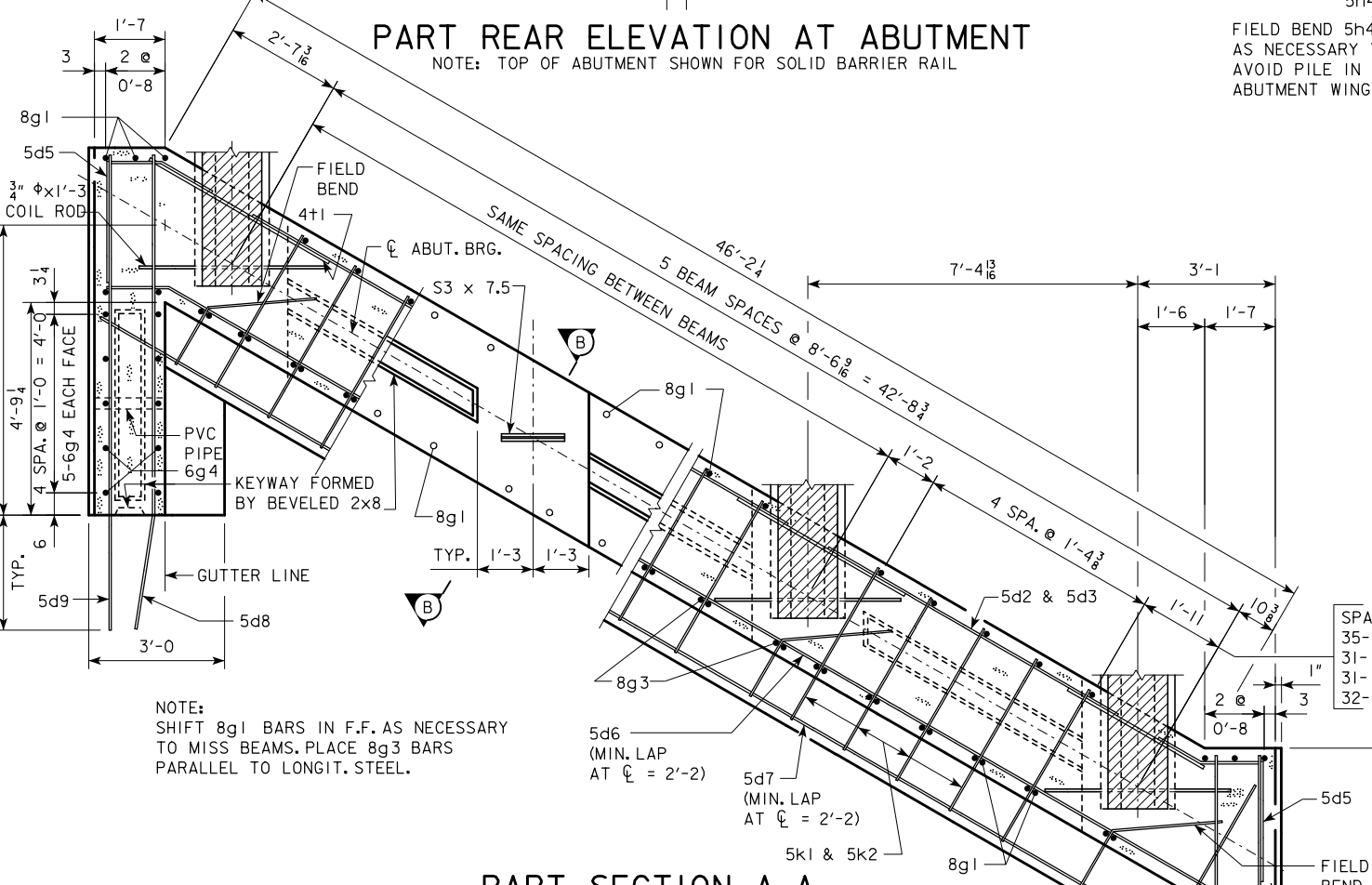
05-13 LATEST REVISION DATE  APPROVED BY BRIDGE ENGINEER <i>Thomas L. Mc Donald</i>		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>ABUTMENT DETAILS</b> 30° SKEW A & B BEAMS	<b>H40-18-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



**PART REAR ELEVATION AT ABUTMENT**

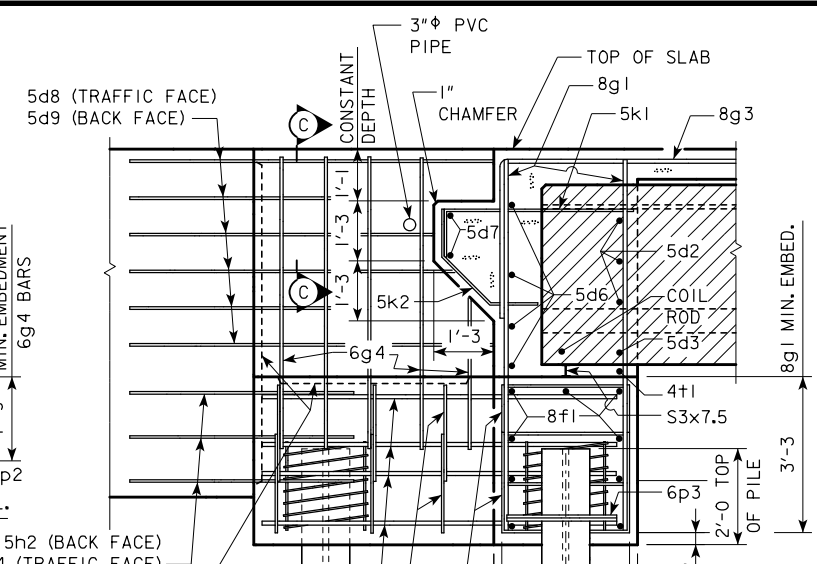
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL



**PART SECTION A-A**

ABUTMENT PILE SPACING		201'-4	213'-10	226'-4	243'-0
WITH STEEL H-PILES	"A" PILE SPACES	7	7	8	8
	"B" (FT. - IN.)	6'-4	6'-4	5'-7	5'-7
	"C" (FT. - IN.)	2'-10 1/4	2'-10 1/4	2'-8 1/4	2'-8 1/4
	"D" EQUAL SPACES	4	4	3	3
	NO. OF PILES PER ABUT.	10	10	11	11
P <sub>u</sub> STRENGTH I DESIGN LOAD (KIPS)		140	144	132	140

NOTE: P<sub>u</sub> STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.



**PART SECTION B-B**

**ABUTMENT NOTES:**

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

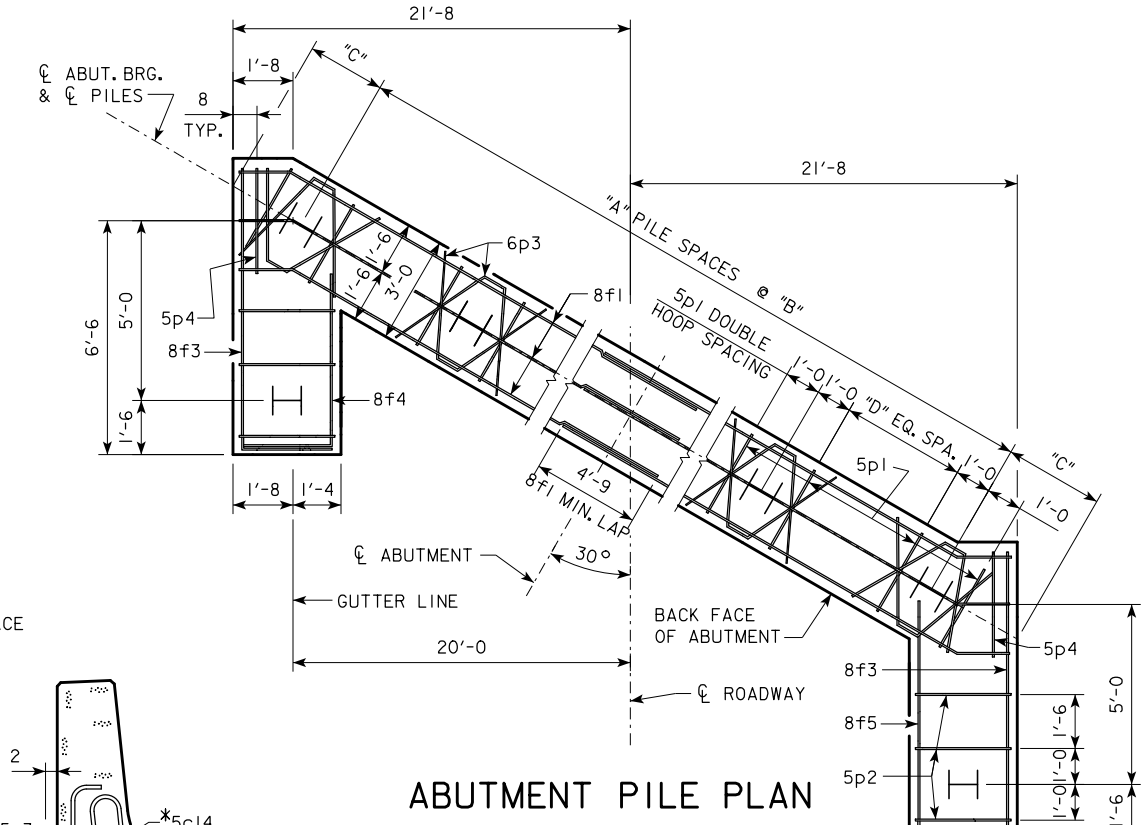
IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

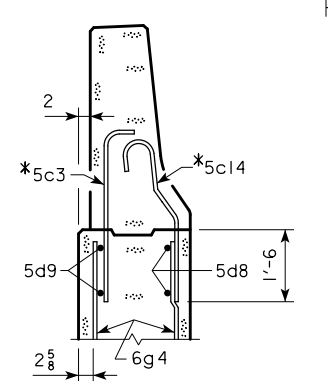
BARRIER RAIL NOT SHOWN IN DETAILS.

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

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 x 7/8 x 1/8 SPACERS PUNCHED TO HOLD SPIRAL.



**ABUTMENT PILE PLAN**



**PART SECTION C-C**

\* NOTE: SEE BARRIER RAIL SHEET FOR DETAILS. REINFORCING BARS 5c3 AND 5c14 ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13  
LATEST REVISION DATE

*Norman L. Mc Donald*  
APPROVED BY BRIDGE ENGINEER

**IOWADOT Highway Division**

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

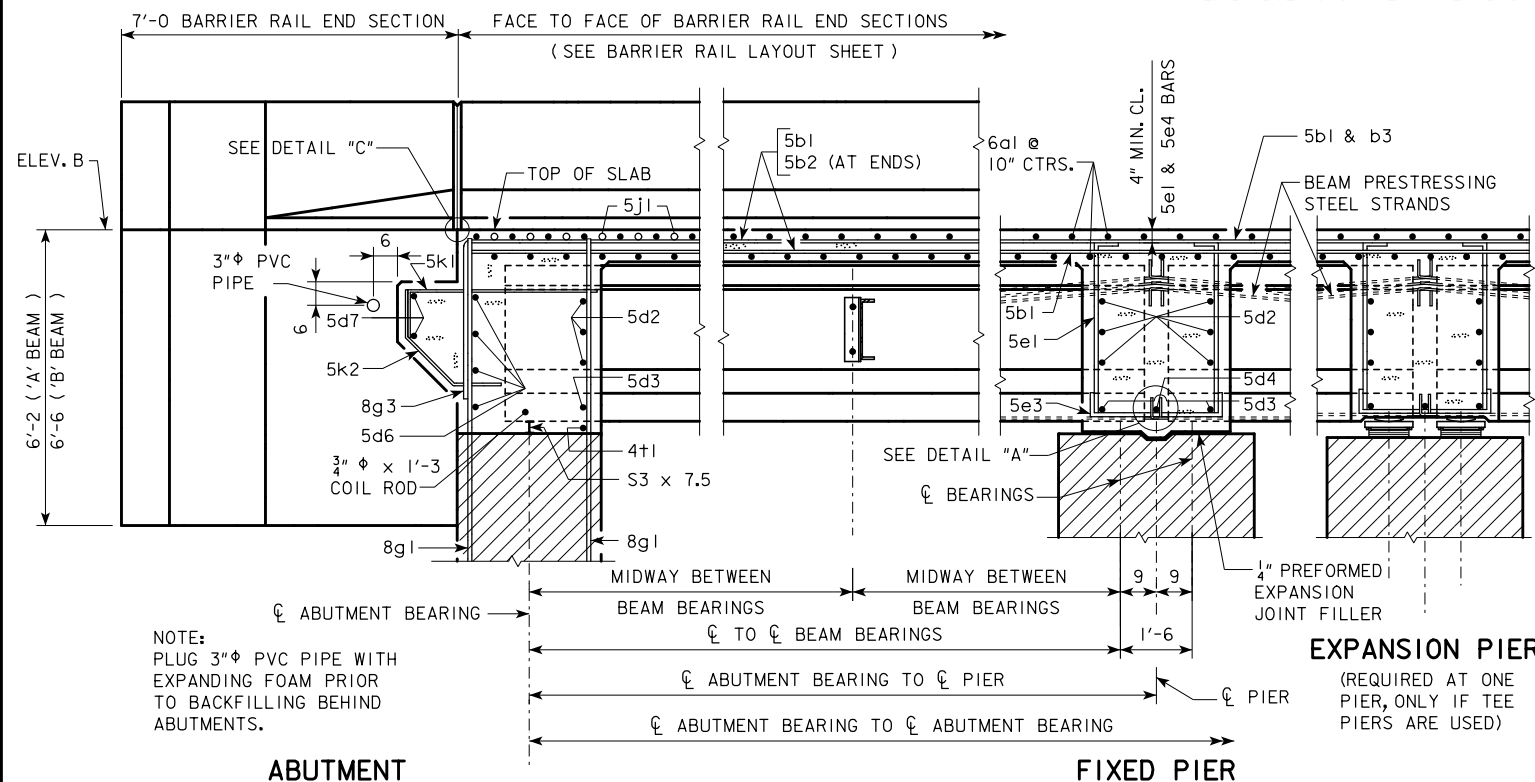
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

AUGUST, 2009

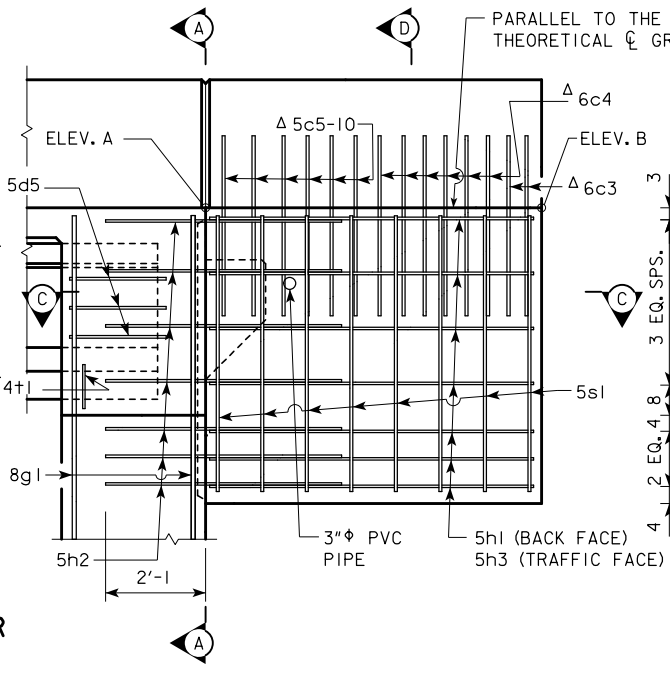
**ABUTMENT DETAILS**  
30° SKEW C BEAMS

**H40-19-06**

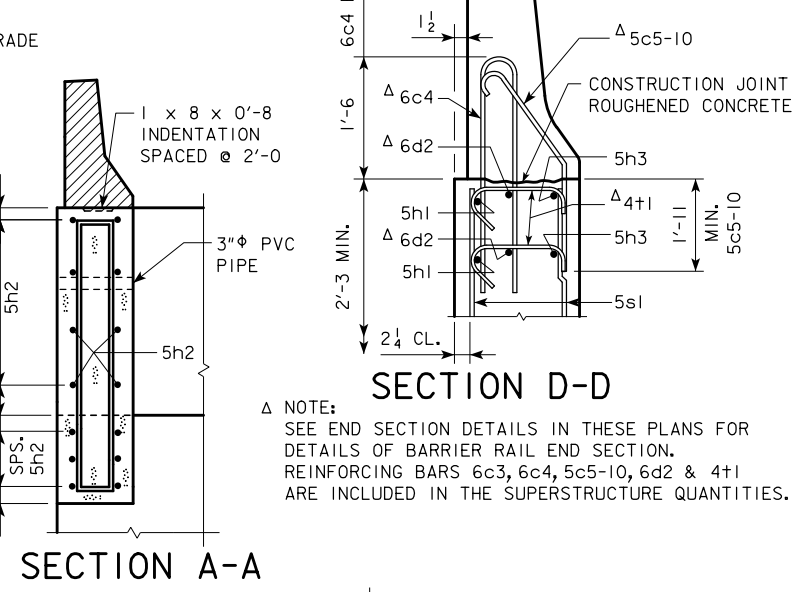
NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\bar{C}$



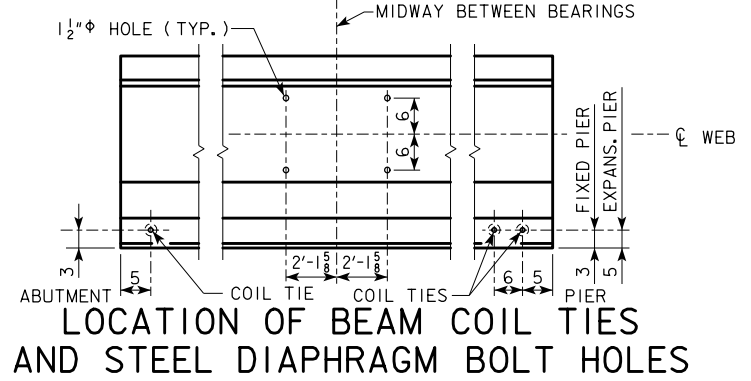
**ABUTMENT**  
**PART LONGITUDINAL SECTION NEAR GUTTER**  
 (FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H40-38-06)



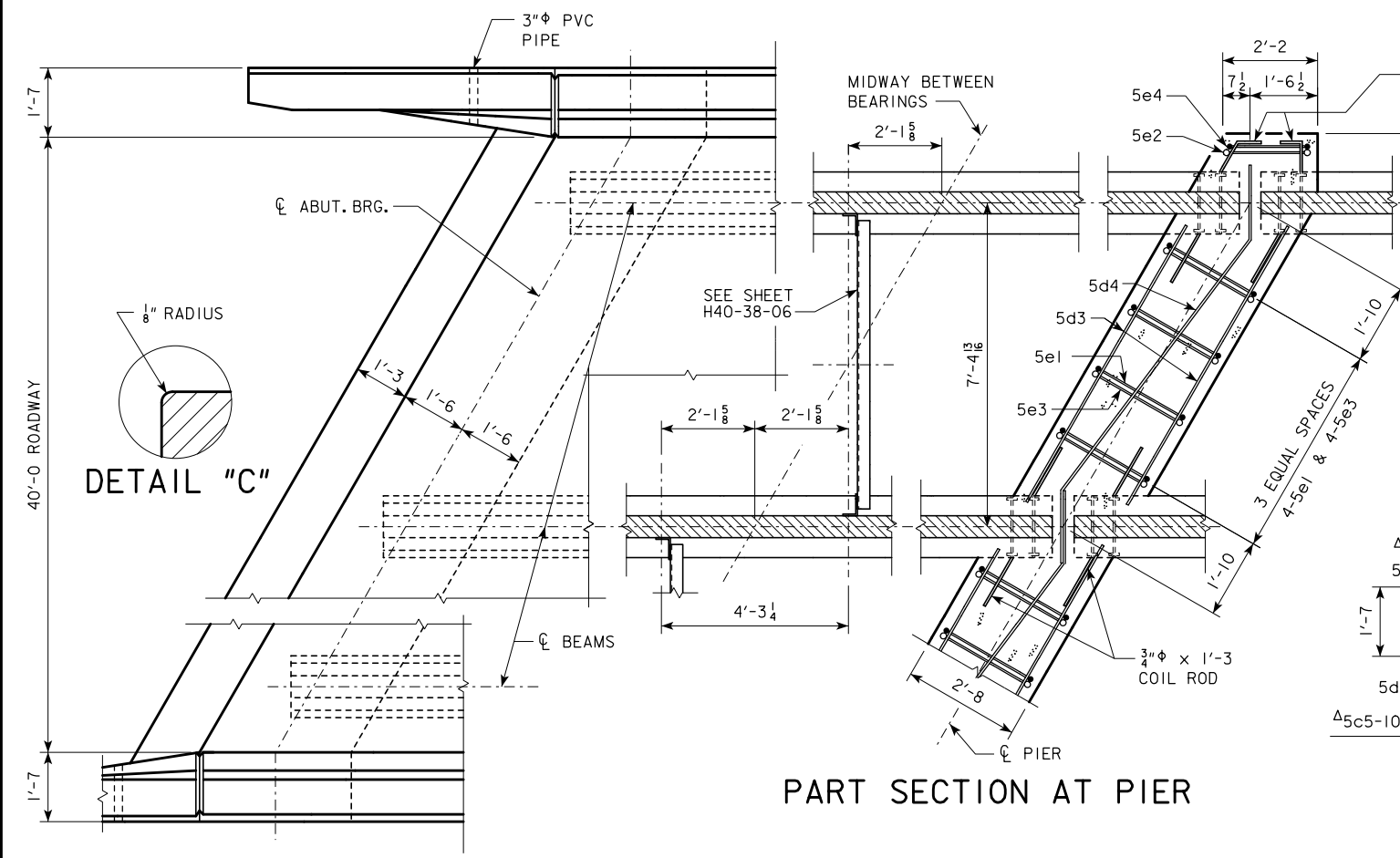
**PART END VIEW AT ABUTMENT**  
 PROVIDE ELEVATIONS A AND B IN THE BRIDGE PLAN SHEETS.



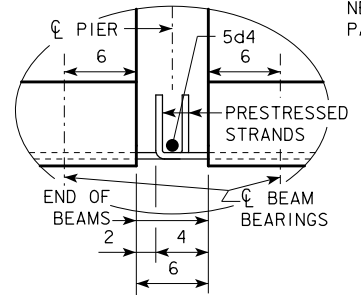
**SECTION D-D**  
 NOTE:  
 SEE END SECTION DETAILS IN THESE PLANS FOR  
 DETAILS OF BARRIER RAIL END SECTION.  
 REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1  
 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.



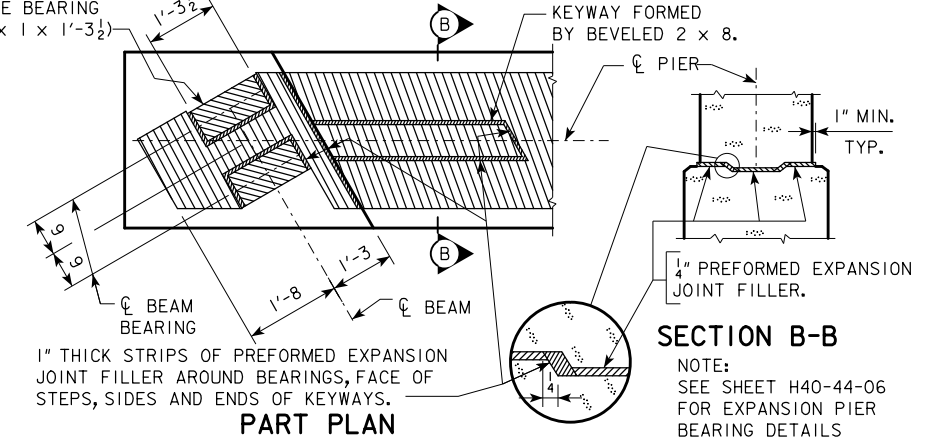
**LOCATION OF BEAM COIL TIES  
 AND STEEL DIAPHRAGM BOLT HOLES**



**PART SECTION AT PIER**



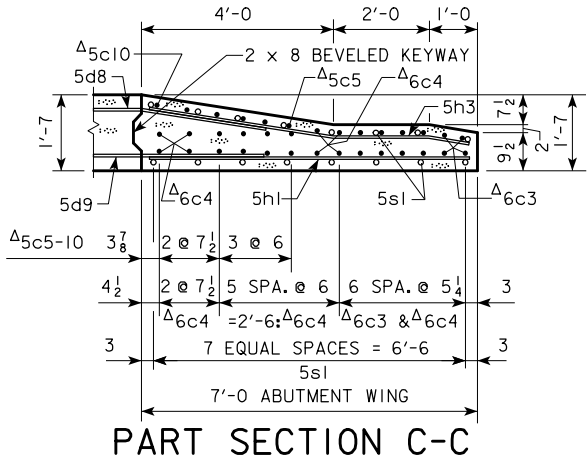
**DETAIL "A"**



**PART PLAN  
 TOP OF FIXED PIER DETAILS**



**DETAIL "C"**

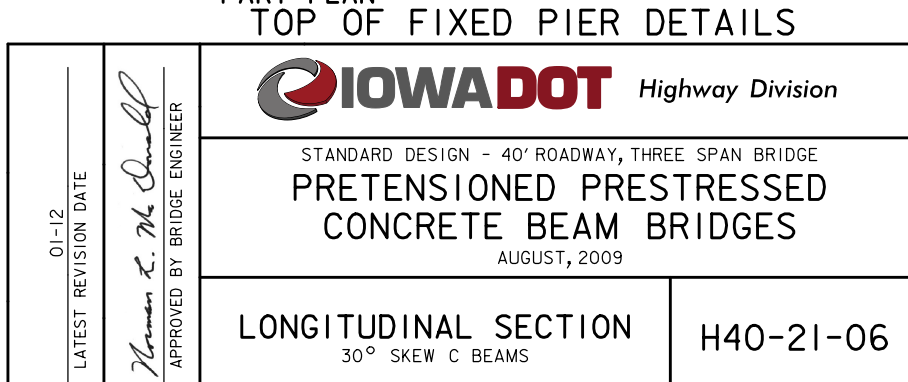
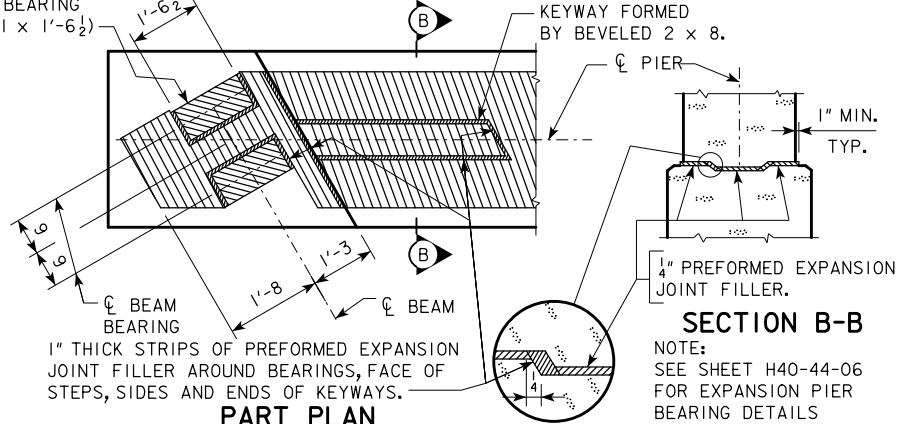
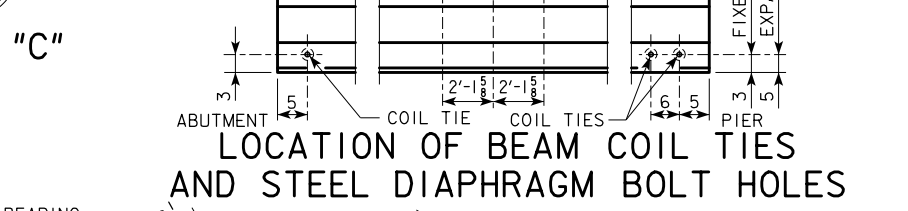
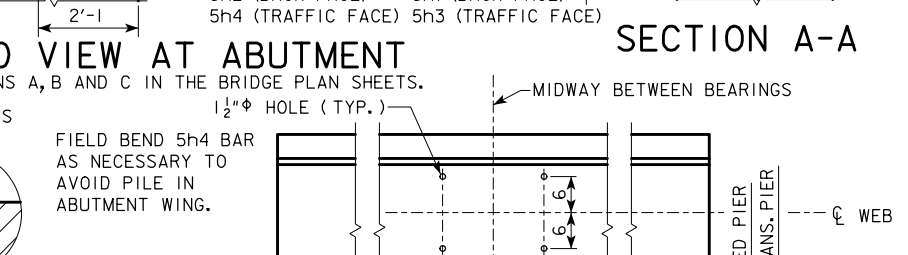
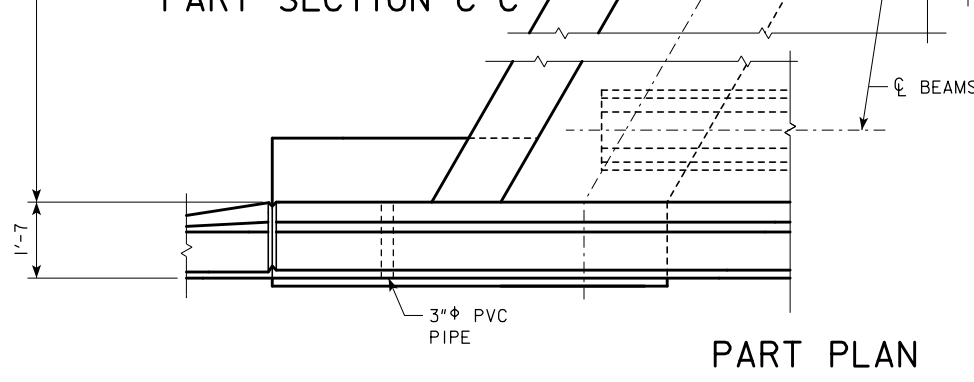
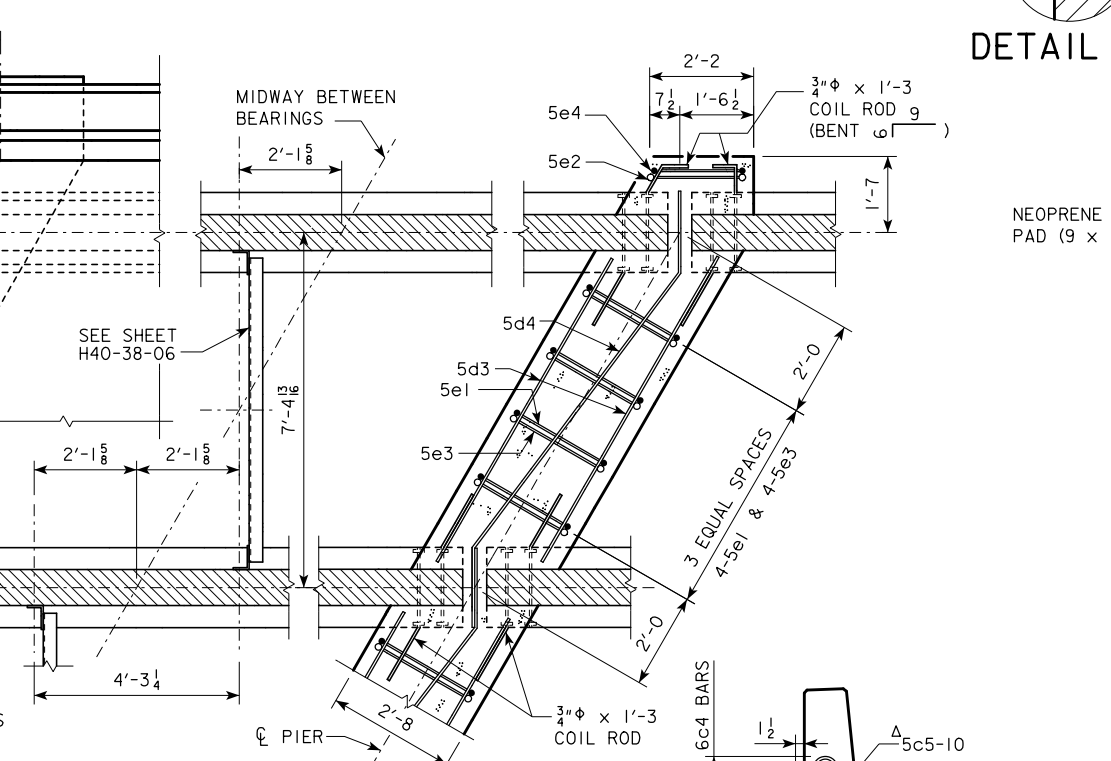
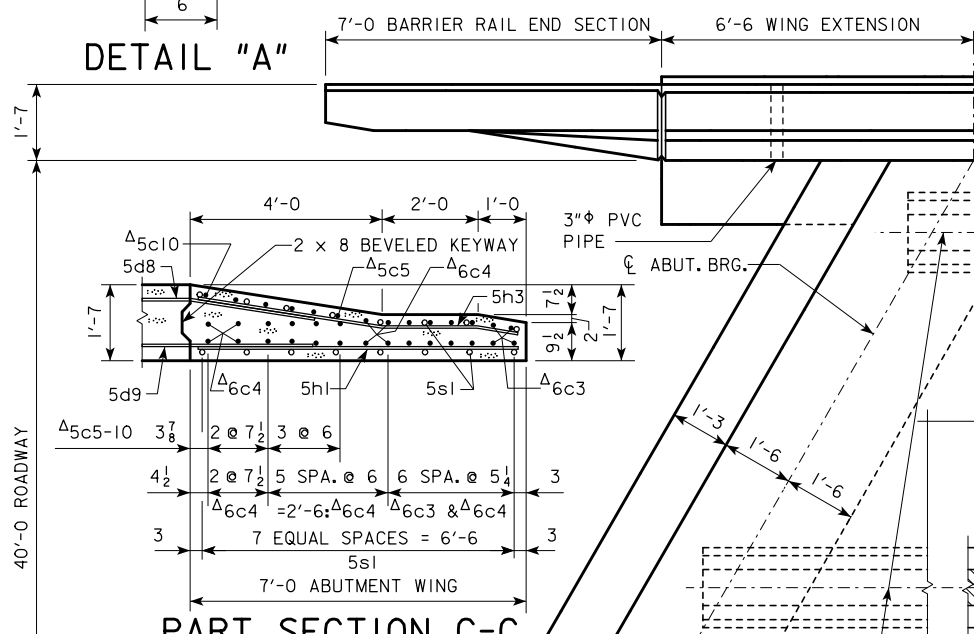
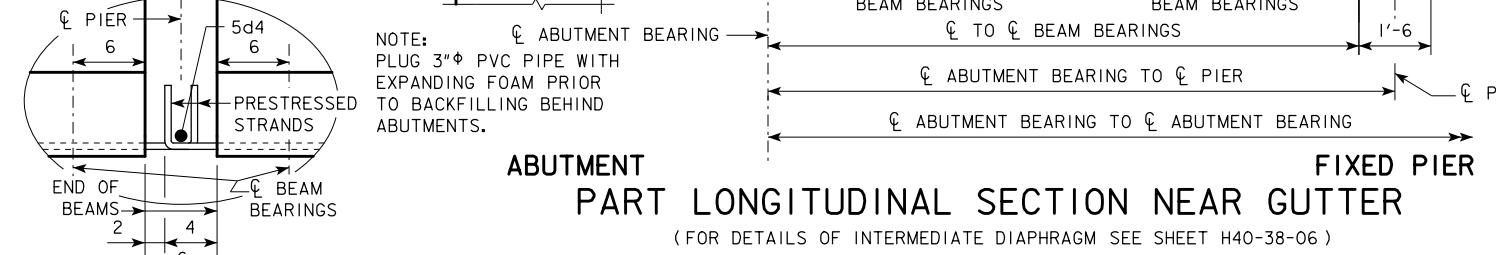
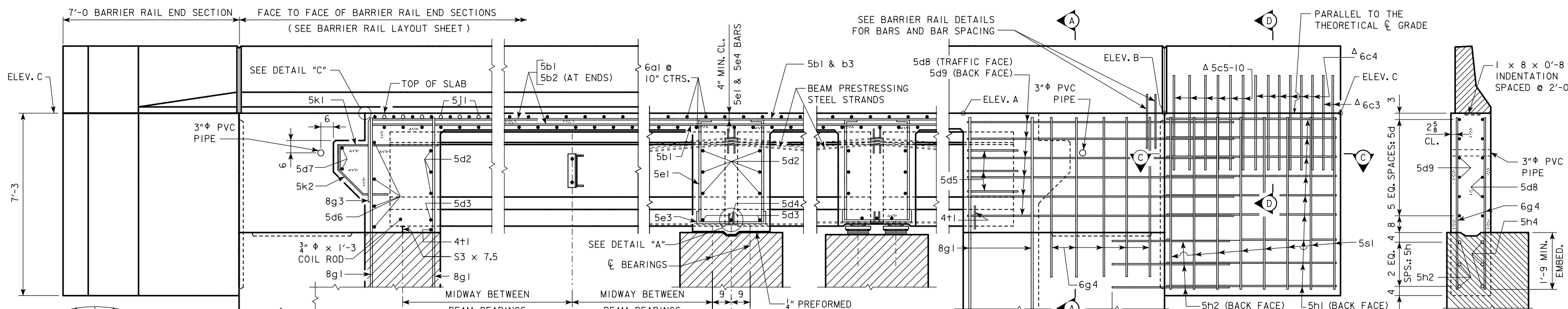


**PART SECTION C-C**

REVISED 10-09 - ABUT. WINGS SHAPE CHANGED.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED                  CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<span>LONGITUDINAL SECTION 30° SKEW A &amp; B BEAMS</span> <span>H40-20-06</span>

NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\bar{C}$



PART SECTION AT PIER

NOTE: SEE END SECTION DETAILS IN THESE PLANS FOR DETAILS OF BARRIER RAIL END SECTION. REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.

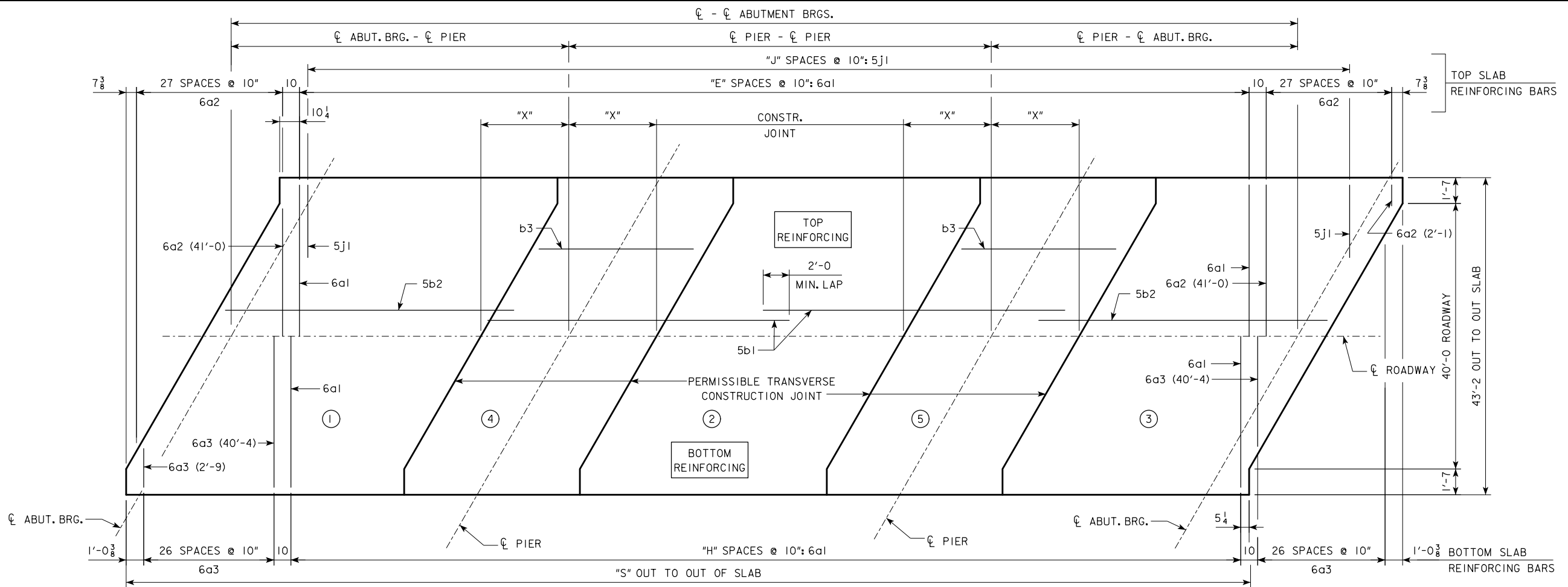
SECTION D-D

LATEST REVISION DATE 01-12 APPROVED BY BRIDGE ENGINEER <i>Norman L. Mc Donald</i>	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>LONGITUDINAL SECTION</b> 30° SKEW C BEAMS

H40-21-06

REVISED 01-12 - ADDED FIELD BEND 5H4 BAR TO AVOID PILE IN ABUTMENT WING NOTE.

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)

ESTIMATED QUANTITIES (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
STRUCTURAL CONCRETE SUPERSTRUCTURE (INCLUDES ABUTMENT WINGS)	WITH BARRIER RAIL	C.Y.	227.5	241.4	266.3	280.4	294.5	321.9	335.8	350.3	369.5
	WITH OPEN RAIL	C.Y.	230.0	244.1	269.3	283.6	297.9	325.4	339.5	354.2	373.7
STRUCTURAL CONCRETE ABUTMENTS (w/ WOOD PILES) ***		C.Y.	39.1	39.1	38.9	38.8	38.8	---	---	---	---
STRUCTURAL CONCRETE ABUTMENTS (w/ STEEL H PILES) ***		C.Y.	40.8	40.8	40.8	40.8	40.8	48.4	48.4	48.4	48.4
PRETENSIONED PRESTRESSED CONCRETE BEAM, CENTER SPAN		NO.	6-A50	6-A55	6-B59	6-B63	6-B67	6-C71	6-C75	6-C80	6-C80
PRETENSIONED PRESTRESSED CONCRETE BEAM, END SPAN		NO.	12-A42	12-A46	12-B50	12-B55	12-B59	12-C63	12-C67	12-C71	12-C80
CONCRETE RAIL (BARRIER OR OPEN)		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 & DRAINS)		LB.	5143	5143	5231	5231	5231	5215	5215	5215	5215
STRUCTURAL STEEL (w/ PILE BENT PIERS & NO DRAINS)		LB.	4463	4463	4463	4463	4463	4367	4367	4367	4367
STRUCTURAL STEEL (w/ TEE PIERS & DRAINS)		LB.	6218	6218	6306	6306	6306	6485	6485	6485	6485
STRUCTURAL STEEL (w/ TEE PIERS & NO DRAINS)		LB.	5538	5538	5538	5538	5538	5637	5637	5637	5637
EPOXY COATED REINF. STEEL (w/ WOOD PILES & BARRIER RAIL)		LB.	62,821	67,187	71,726	76,737	80,997	---	---	---	---
EPOXY COATED REINF. STEEL (w/ WOOD PILES & OPEN RAIL)		LB.	63,486	67,808	72,494	77,681	81,871	---	---	---	---
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & BARRIER RAIL)		LB.	63,006	67,372	71,804	76,706	80,943	88,402	93,685	97,879	103,446
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & OPEN RAIL)		LB.	63,671	67,993	72,572	77,650	81,817	90,246	95,438	99,829	105,442
NO. OF WOOD PILES, TREATED FOR TWO ABUTMENTS		NO.	30	30	32	34	34	---	---	---	---
NO. OF STEEL H-PILES FOR TWO ABUTMENTS (HP 10 x 57)		NO.	14	14	14	14	16	20	20	22	22
PREBORED HOLES (w/ WOOD PILES)		L.F.	300	300	320	340	340	---	---	---	---
PREBORED HOLES (w/ STEEL H-PILES)		L.F.	140	140	140	140	160	200	200	220	220

CONCRETE PLACEMENT QUANT. (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
SLAB INCLUDING HAUNCH, ABUT. DIAPHRAGM, & WINGWALLS**, SECTIONS 1 & 3	WITH BARRIER RAIL	C.Y.	124.0	132.0	146.2	154.4	162.4	180.2	188.4	197.0	216.2
	WITH OPEN RAIL	C.Y.	125.3	133.4	147.8	156.1	164.2	182.1	190.4	199.1	218.6
SLAB INCLUDING HAUNCH, SECTION 2	WITH BARRIER RAIL	C.Y.	43.5	47.0	50.5	54.0	57.3	61.1	64.6	68.1	68.1
	WITH OPEN RAIL	C.Y.	44.2	47.8	51.3	54.9	58.3	62.1	65.6	69.2	69.2
SLAB INCLUDING HAUNCH & PIER DIAPHRAGM, SECTIONS 4 & 5	WITH BARRIER RAIL	C.Y.	52.8	55.2	62.0	64.4	67.2	72.2	74.4	76.8	76.8
	WITH OPEN RAIL	C.Y.	53.3	55.7	62.6	65.0	67.8	72.8	75.1	77.5	77.5
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.	39.1	39.1	38.9	38.8	38.8	---	---	---	---
ABUTMENT FOOTINGS (w/ STEEL H PILES) ***		C.Y.	40.8	40.8	40.8	40.8	40.8	48.4	48.4	48.4	48.4

GENERAL DATA		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
VERTICAL CURVE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8	3'-7 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-8 <sup>9</sup> / <sub>16</sub>	4'-8 <sup>11</sup> / <sub>16</sub>	4'-9 <sup>8</sup> / <sub>16</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>3</sup> / <sub>8</sub>	3'-6 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>5</sup> / <sub>16</sub>	4'-1 <sup>1</sup> / <sub>2</sub>	4'-1 <sup>7</sup> / <sub>8</sub>	4'-7 <sup>5</sup> / <sub>16</sub>	4'-7 <sup>4</sup> / <sub>16</sub>	4'-7 <sup>1</sup> / <sub>2</sub>	4'-7 <sup>1</sup> / <sub>2</sub>
STRAIGHT GRADE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8 <sup>1</sup> / <sub>16</sub>	3'-7 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-3	4'-8 <sup>3</sup> / <sub>4</sub>	4'-8 <sup>7</sup> / <sub>8</sub>	4'-9 <sup>5</sup> / <sub>16</sub>	4'-9 <sup>7</sup> / <sub>8</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>9</sup> / <sub>16</sub>	3'-6 <sup>3</sup> / <sub>4</sub>	4'-1 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-8	4'-8
D.L. PIER REACTION (D.L. + F.W.S.) SERVICE LOADS	KIPS		446.0	480.7	549.2	585.8	622.7	743.2	784.2	825.8	866.1
L.L. PIER REACTION (HL93) NO IMPACT SERVICE LOADS	KIPS		264.7	274.5	283.9	293.1	302.2	311.0	322.9	341.9	362.6
NO. OF SPACES FOR 6a1 BARS (TOP)	"E"		141	156	171	186	201	216	231	246	266
NO. OF SPACES FOR 6a1 BARS (BOTTOM)	"H"		142	157	172	187	202	217	232	247	267
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 <sup>5</sup> / <sub>8</sub>	154'-9 <sup>5</sup> / <sub>8</sub>	167'-3 <sup>5</sup> / <sub>8</sub>	179'-9 <sup>5</sup> / <sub>8</sub>	192'-3 <sup>5</sup> / <sub>8</sub>	204'-9 <sup>5</sup> / <sub>8</sub>	217'-3 <sup>5</sup> / <sub>8</sub>	229'-9 <sup>5</sup> / <sub>8</sub>	246'-5 <sup>5</sup> / <sub>8</sub>
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

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.

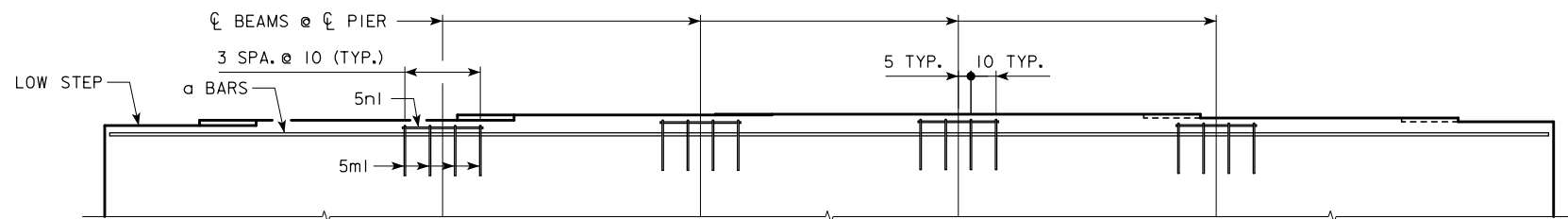
\* VALUES SHOWN ARE FOR FIXED PIERS ONLY AND ALLOW FOR 1/16 INCH DEFLECTION OF THE 1 INCH NEOPRENE BEARING PAD. AT EXPANSION PIER LOCATIONS ADD 3/16 INCHES TO "U" VALUES SHOWN.

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

\*\*\* SEE SHEET H40-24-06 FOR ADDITIONAL CONCRETE REQUIRED IN ABUTMENT FOOTINGS.

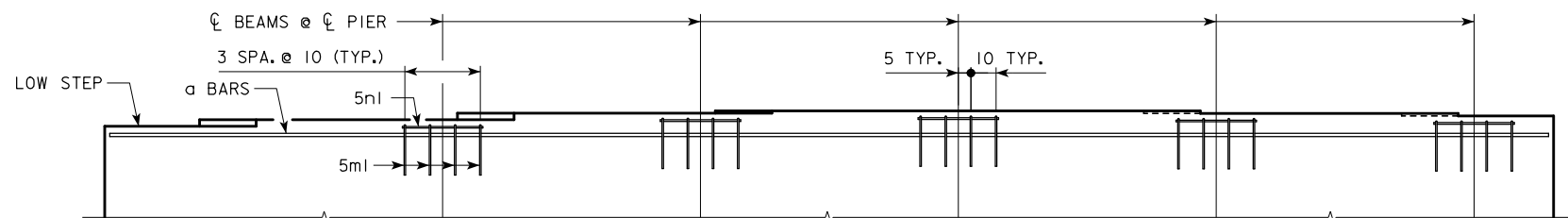
LATEST REVISION DATE 07-15 <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>SUPERSTRUCTURE DETAILS</b> <b>H40-22-06</b> 30° SKEW

REINFORCING BAR LIST			138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0		
ONE SUPERSTRUCTURE AND TWO ABUTMENTS			42'-6			46'-8			50'-10			55'-0			59'-2			63'-4			67'-6			71'-8			80'-0		
			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.	▬	285	42'-10	18,336	315	42'-10	20,266	345	42'-10	22,196	375	42'-10	24,126	405	42'-10	26,056	435	42'-10	27,986	465	42'-10	29,916	495	42'-10	31,846	535	42'-10	34,420
6a2	SLAB TRANSV. TOP ENDS	▬	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812	56	VARIES	1,812
6a3	SLAB TRANSV. BOTT. ENDS	▬	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747	54	VARIES	1,747
5b1	SLAB LONGITUDINAL, TOP & BOTT.	▬	202	40'-0	8,427	303	40'-0	12,641	303	40'-0	12,641	303	40'-0	12,641	303	40'-0	12,641	404	40'-0	16,855	404	40'-0	16,855	404	40'-0	16,855	505	40'-0	21,069
5b2	SLAB LONGITUDINAL, TOP & BOTT., ENDS	▬	202	34'-0	7,163	202	21'-3	4,477	202	27'-6	5,794	202	33'-9	7,111	202	40'-0	8,427	202	27'-3	5,741	202	33'-6	7,058	202	39'-9	8,375	202	29'-1	6,127
6b3	SLAB LONGITUDINAL, TOP @ PIERS	▬	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,188	92	17'-0	2,327	92	18'-0	2,465	92	19'-0	2,604	92	20'-0	2,742	92	21'-0	2,881
7b3	SLAB LONGITUDINAL, TOP @ PIERS	▬	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,188	92	17'-0	2,327	92	18'-0	2,465	92	19'-0	2,604	92	20'-0	2,742	92	21'-0	2,881
8b3	SLAB LONGITUDINAL, TOP @ PIERS	▬	92	12'-10	1,773	92	13'-10	1,912	92	14'-10	2,050	92	15'-10	2,188	92	17'-0	2,327	92	18'-0	2,465	92	19'-0	2,604	92	20'-0	2,742	92	21'-0	2,881
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.	▬	90	7'-9	727	90	7'-9	727	90	7'-9	727	90	7'-9	727	90	7'-9	727	90	7'-5	696	90	7'-5	696	90	7'-5	696	90	7'-5	696
5d3	PIER & ABUT. DIAPH. LONGIT.	▬	30	6'-8	209	30	6'-8	209	30	6'-8	209	30	6'-8	209	30	6'-8	209	30	6'-5	201	30	6'-5	201	30	6'-5	201	30	6'-5	201
5d4	PIER DIAPH. LONGIT.	▬	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111	10	10'-8	111
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.	▬	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428	16	25'-8	428
5d7	PAVING NOTCH LONGIT.	▬	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213	8	25'-6	213
5d8	ABUT. DIAPH. WING EXT. LONGIT.	▬	24	11'-0	275	24	11'-0	275	24	11'-0	275	24	11'-0	275	24	11'-0	275	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	24	10'-11	273	24	10'-11	273	24	10'-11	273	24	10'-11	273	24	10'-11	273
5e1	PIER DIAPH. HOOPS	▬	40	9'-1	379	40	9'-1	379	40	10'-4	431	40	10'-4	431	40	11'-4	473	40	11'-4	473	40	11'-4	473	40	11'-4	473	40	11'-4	473
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	▬	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
5e4	PIER DIAPH. HOOPS ENDS	▬	4	8'-3	34	4	8'-3	34	4	9'-6	40	4	9'-6	40	4	10'-6	44	4	10'-6	44	4	10'-6	44	4	10'-6	44	4	10'-6	44
8f1	ABUT. FOOTING LONGIT.	▬	36	26'-11	2,587	36	26'-11	2,587	36	26'-11	2,587	36	26'-11	2,587	36	26'-11	2,587	36	27'-0	2,595	36	27'-0	2,595	36	27'-0	2,595	36	27'-0	2,595
8f3	ABUT. EXTENSION LONGIT.	▬	16	10'-4	441	16	10'-4	441	16	10'-4	441	16	10'-4	441	16	10'-4	441	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	8	7'-9	166	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	8	9'-0	192	8	9'-0	192	8	9'-0	192	8	9'-0	192	8	9'-0	192
8g1	ABUT. VERT.	▬	136	6'-8	2,421	136	6'-8	2,421	136	7'-3	2,633	136	7'-3	2,633	136	7'-3	2,633	132	7'-9	2,731	132	7'-9	2,731	132	7'-9	2,731	132	7'-10	2,761
8g3	ABUT. DIAPH. VERT. B.F.	▬	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-3	2,524	62	15'-9	2,607	62	15'-9	2,607	62	15'-9	2,607	62	15'-9	2,607
6g4	ABUT. DIAPH. WING EXT. VERT.	▬	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391	40	6'-6	391
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	12	4'-11	62	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	▬	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317	64	4'-9	317
5k2	PAVING NOTCH	▬	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228	64	3'-5	228
5p1	ABUTMENT HOOPS (WOOD/STEEL)	▬	112/144	10'-6	1227/1577	112/144	10'-6	1227/1577	120/144	10'-6	1314/1577	128/144	10'-6	1402/1577	128/140	10'-6	1402/1533	148	10'-6	1,621	148	10'-6	1,621	136	10'-6	1,489	136	10'-6	1,489
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	▬	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	32	6'-8	320	36	6'-8	360	36	6'-8	360
5p4	ABUT. HOOPS AT ENDS	▬	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95	8	11'-5	95
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
4+1	UNDER BEAMS AT ABUTMENTS	▬	12	4'-9	38	12	4'-9	38	12	4'-9	38	12	4'-9	38	12	4'-9	38	12	5'-0	40	12	5'-0	40	12	5'-0	40	12	5'-0	40
#2	PILE SPIRAL (WOOD/STEEL)*	▬	30/14	38'-6	193/90	30/14																							



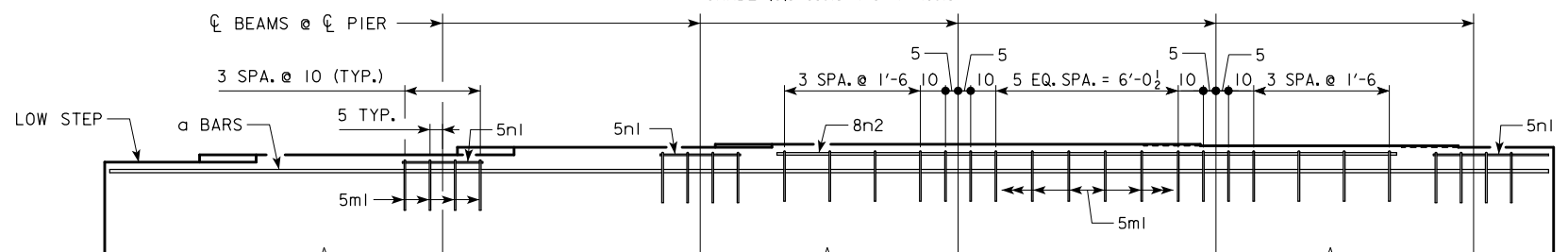
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $G \leq 0.6\%$



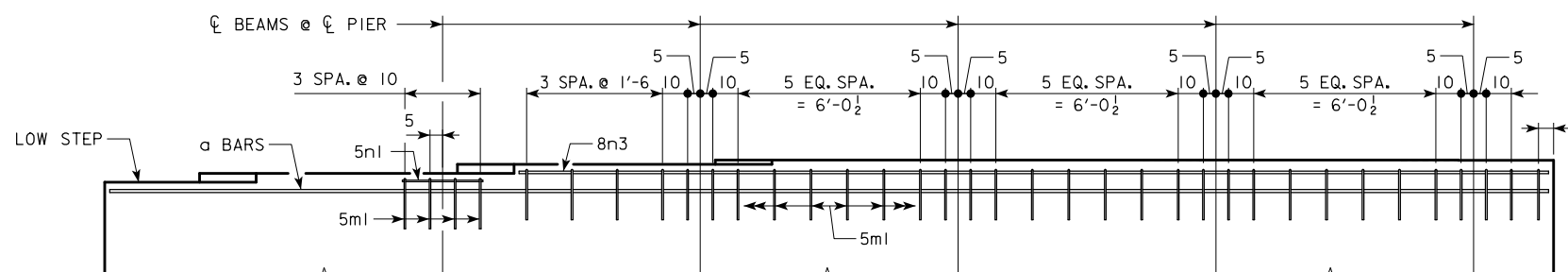
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $0.6\% < G \leq 1.6\%$



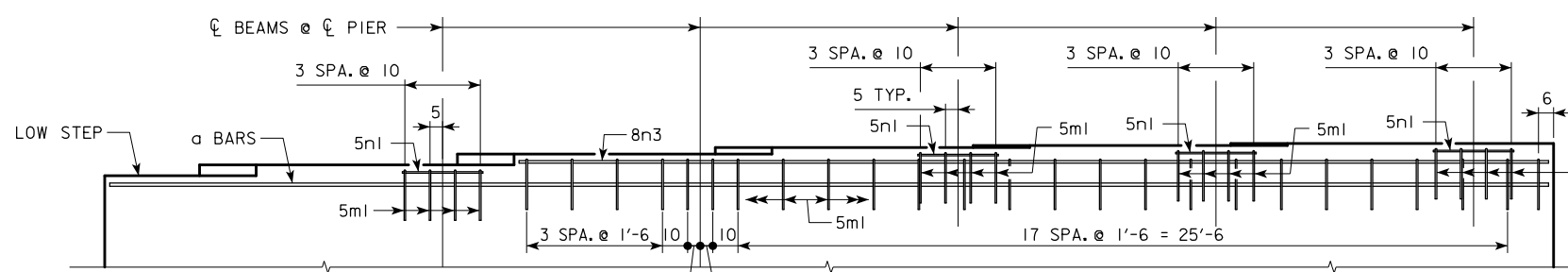
PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $1.6\% < G \leq 2.3\%$



PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $2.3\% < G \leq 3.4\%$



PART ELEVATION VIEW OF PIER CAP

GRADE (G):  $3.4\% < G \leq 5.0\%$

STEP REINFORCING BAR LIST  
ONE TEE PIER

BAR	LENGTH	SHAPE	G ≤ 0.6%			0.6% < G ≤ 1.6%			1.6% < G ≤ 2.3%			2.3% < G ≤ 3.4%			3.4% < G ≤ 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5n1	6'-10		16	5	114	20	5	143	30	5	214	36	5	257	41	5	292
5n1	2'-8		16	5	45	20	5	56	12	5	33	4	5	11	16	5	45
8n2	22'-4		--	--	--	--	--	--	4	8	239	--	--	--	--	--	--
*8n3	VARIES		--	--	--	--	--	--	--	--	--	4	8	373	4	8	373
TOTAL (LB.)			159			199			486			641			710		

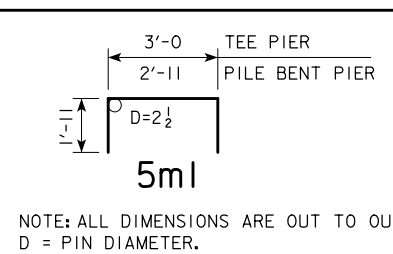
G = GRADE (%)  
\*8n3 BARS VARY FROM 34'-2 TO 35'-9

STEP REINFORCING BAR LIST  
ONE PILE BENT PIER

BAR	LENGTH	SHAPE	G ≤ 0.6%			0.6% < G ≤ 1.6%			1.6% < G ≤ 2.3%			2.3% < G ≤ 3.4%			3.4% < G ≤ 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5n1	6'-9		16	5	113	20	5	141	30	5	211	36	5	253	41	5	289
5n1	2'-8		16	5	45	20	5	56	12	5	33	4	5	11	16	5	45
8n2	22'-4		--	--	--	--	--	--	4	8	239	--	--	--	--	--	--
*8n3	VARIES		--	--	--	--	--	--	--	--	--	4	8	373	4	8	373
TOTAL (LB.)			158			197			483			637			707		

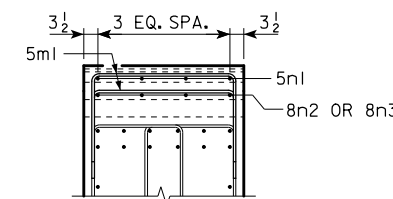
G = GRADE (%)  
\*8n3 BARS VARY FROM 34'-2 TO 35'-9

BENT BAR DETAILS



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 SHOULD BE 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.



TYPICAL SECTION

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

	ROADWAY GRADE AT SUBSTRUCTURE UNIT				
	1%	2%	3%	4%	5%
EACH ABUTMENT FOOTING					
A, B BEAMS	----	1.0	1.6	2.2	2.8
C BEAMS	----	1.2	1.9	2.6	3.3
EACH TEE PIER CAP - ALL BEAMS					
EACH PILE BENT PIER - ALL BEAMS	0.5	1.1	1.7	2.4	3.1

LATEST REVISION DATE

*Norman L. Mc Donald*  
APPROVED BY BRIDGE ENGINEER

**IOWADOT** Highway Division

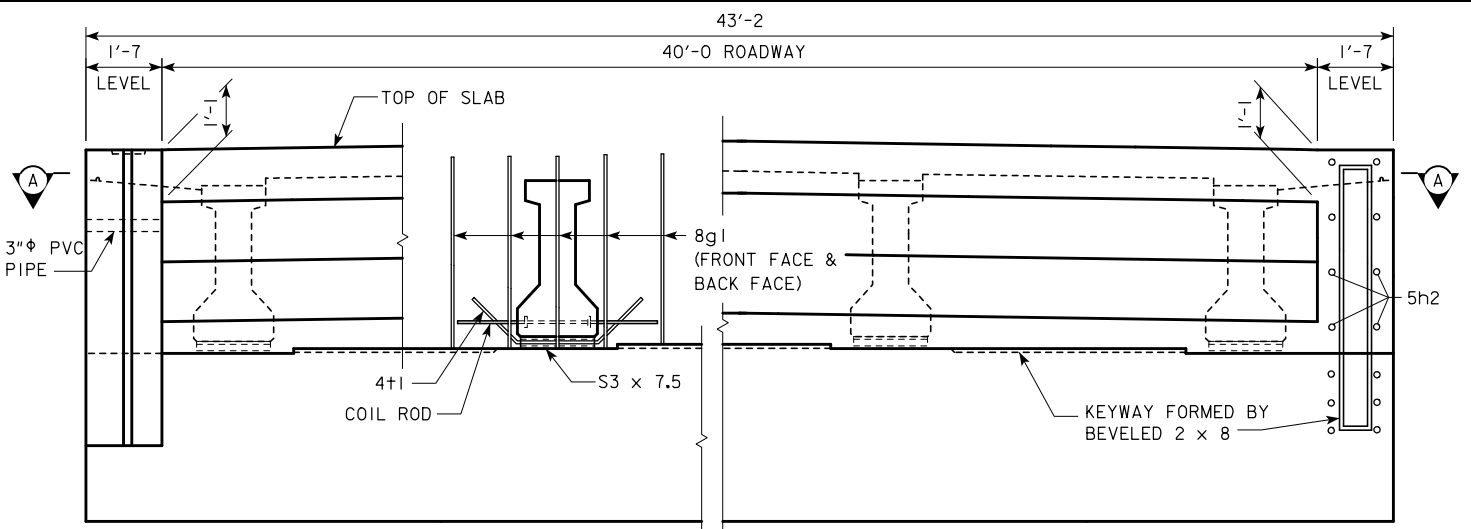
STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

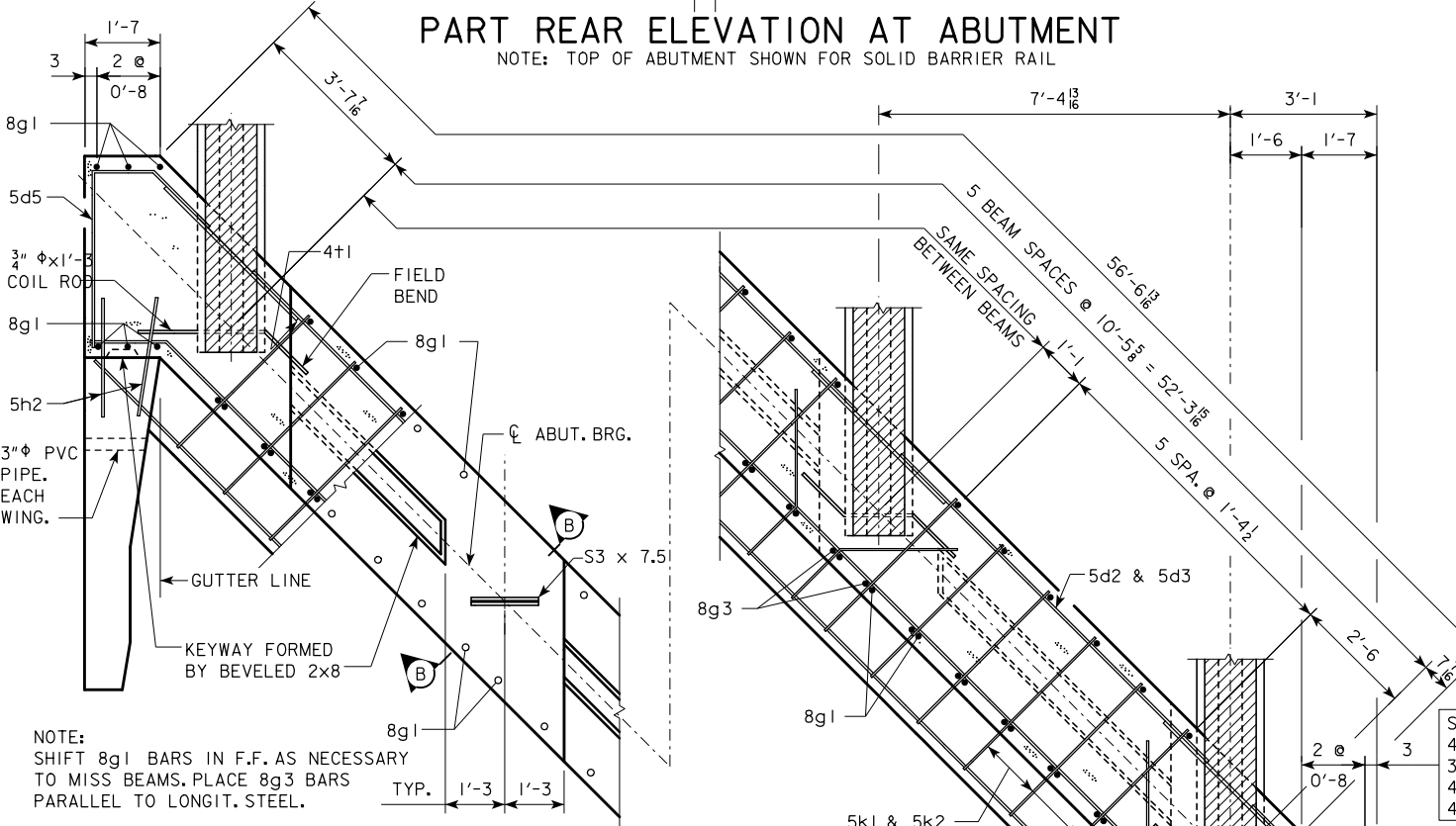
AUGUST, 2009

ADDITIONAL QUANTITIES  
30° SKEW

H40-24-06



**PART REAR ELEVATION AT ABUTMENT**  
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL

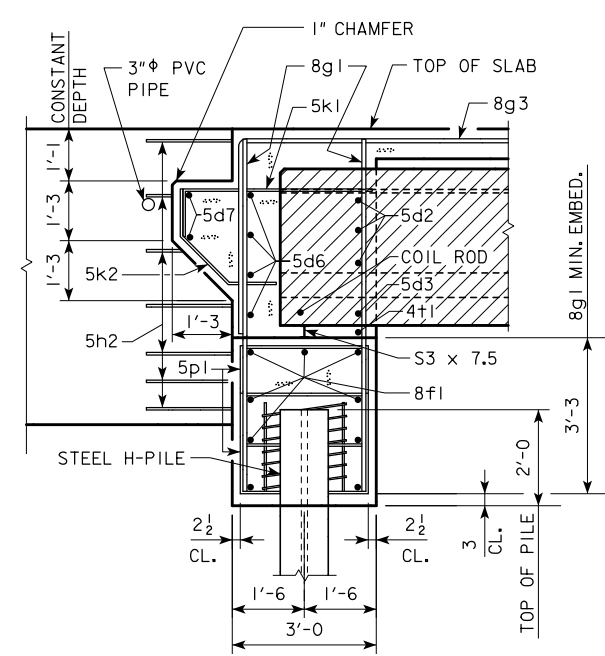


**PART SECTION A-A**

ABUTMENT PILE SPACING		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10
WITH WOOD PILES	"A" PILE SPACES		14	15	16	17	17
	"B" (FT. - IN.)		3'-10	3'-7	3'-5	3'-2	3'-2
	"C" (FT. - IN.)		3'-8 5/16	3'-7 13/16	3'-2 5/16	3'-7 5/16	3'-7 5/16
	"D" EQUAL SPACES		2	2	2	1	1
	NO. OF PILES PER ABUT.		15	16	17	18	18
PU, STRENGTH I DESIGN LOAD (KIPS)			58	56	57	55	57
WITH STEEL H-PILES	"A" PILE SPACES		7	7	7	7	7
	"B" (FT. - IN.)		7'-9	7'-9	7'-9	7'-9	7'-9
	"C" (FT. - IN.)		3'-4 13/16	3'-4 13/16	3'-4 13/16	3'-4 13/16	3'-4 13/16
	"D" EQUAL SPACES		5	5	5	5	5
	NO. OF PILES PER ABUT.		8	8	8	8	8
PU, STRENGTH I DESIGN LOAD (KIPS)			118	122	130	135	139

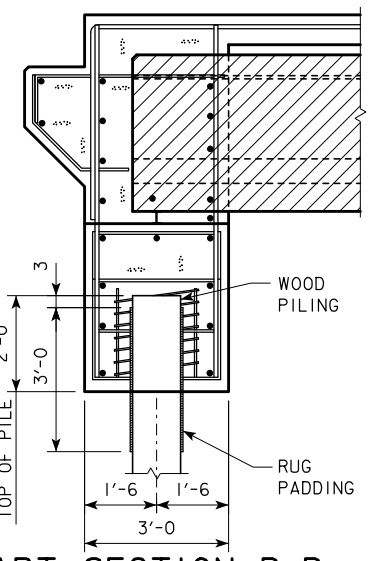
NOTE: SHIFT 8g1 BARS IN F.F. AS NECESSARY TO MISS BEAMS. PLACE 8g3 BARS PARALLEL TO LONGIT. STEEL.

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



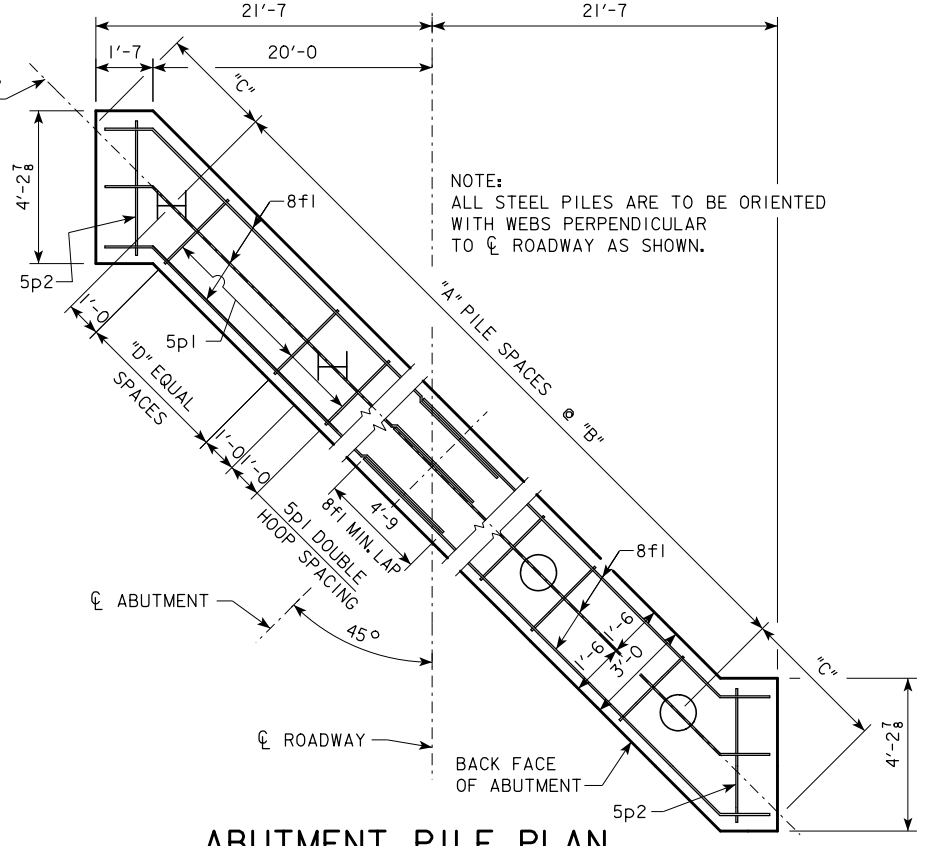
**PART SECTION B-B (FOR STEEL H-PILING)**

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



**PART SECTION B-B (FOR WOOD PILING)**

**WOOD PILING NOTE:**  
AFTER PILES ARE CUT OFF, THE UPPER 3', EXCEPT AS SHOWN, IS TO BE WRAPPED WITH A DOUBLE THICKNESS OF RUG PADDING HELD IN PLACE BY TACKING WITH GALVANIZED ROOFING NAILS AND WRAPPED WITH #14 GAUGE GALVANIZED WIRE AT A 4" PITCH, CARE IS TO BE TAKEN NOT TO DAMAGE PADDING WHEN PLACING CONCRETE. RUG PADDING MAY BE EITHER OF THE FOLLOWING:  
(1) HAIR AND JUTE RUG PADDING, RUBBERIZED ON BOTH SIDES, AND WEIGHING NOT LESS THAN 47 OZ. PER SQ. YD.  
(2) BONDED URETHANE OR BONDED POLYFOAM WITH A MINIMUM DENSITY OF 5 LBS. PER CU. FT. AND SHALL BE AT LEAST 1/2 IN. THICK, (MATERIAL LESS THAN 1/2 IN. IN THICKNESS MAY BE USED, BUT WILL REQUIRE ADDITIONAL WRAPS FOR A TOTAL OF AT LEAST ONE INCH).



**ABUTMENT PILE PLAN**

NOTE: ALL STEEL PILES ARE TO BE ORIENTED WITH WEBS PERPENDICULAR TO CL ROADWAY AS SHOWN.

**ABUTMENT NOTES:**

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

IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.

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

PLACE 5h2 BAR AT 1:6 SLOPE TO MATCH TRAFFIC SIDE OF ABUTMENT WING FACE. (BOTH SIDES TYPICAL)

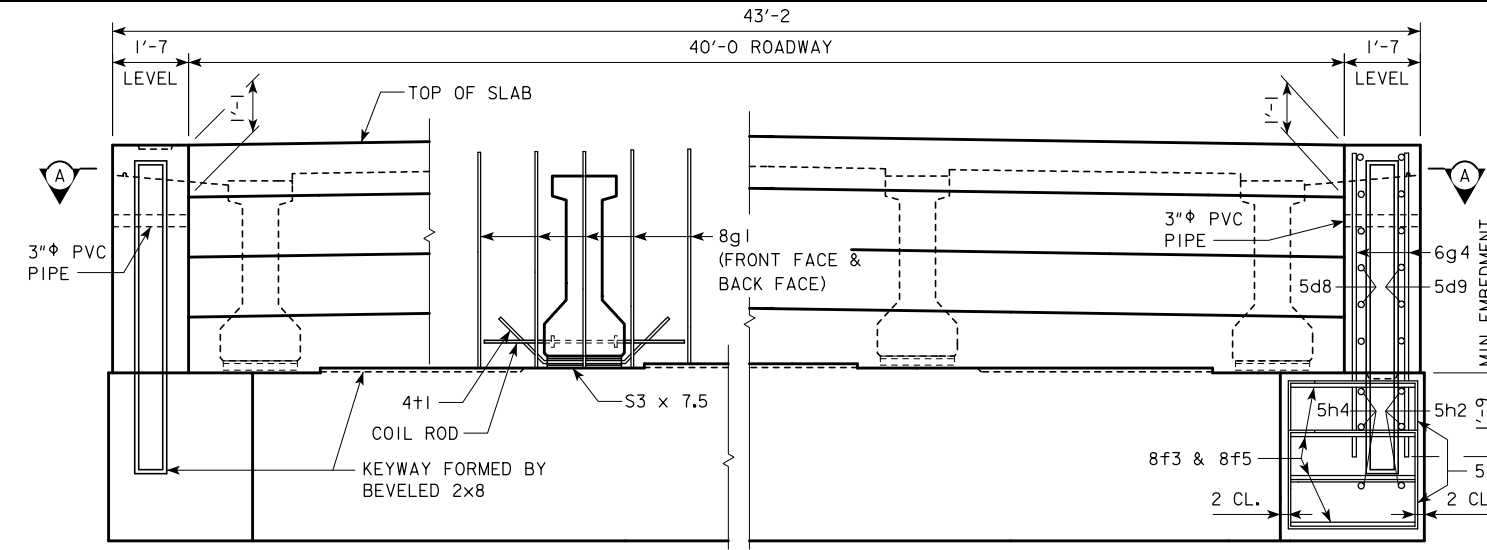
BARRIER RAIL NOT SHOWN IN DETAILS.

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

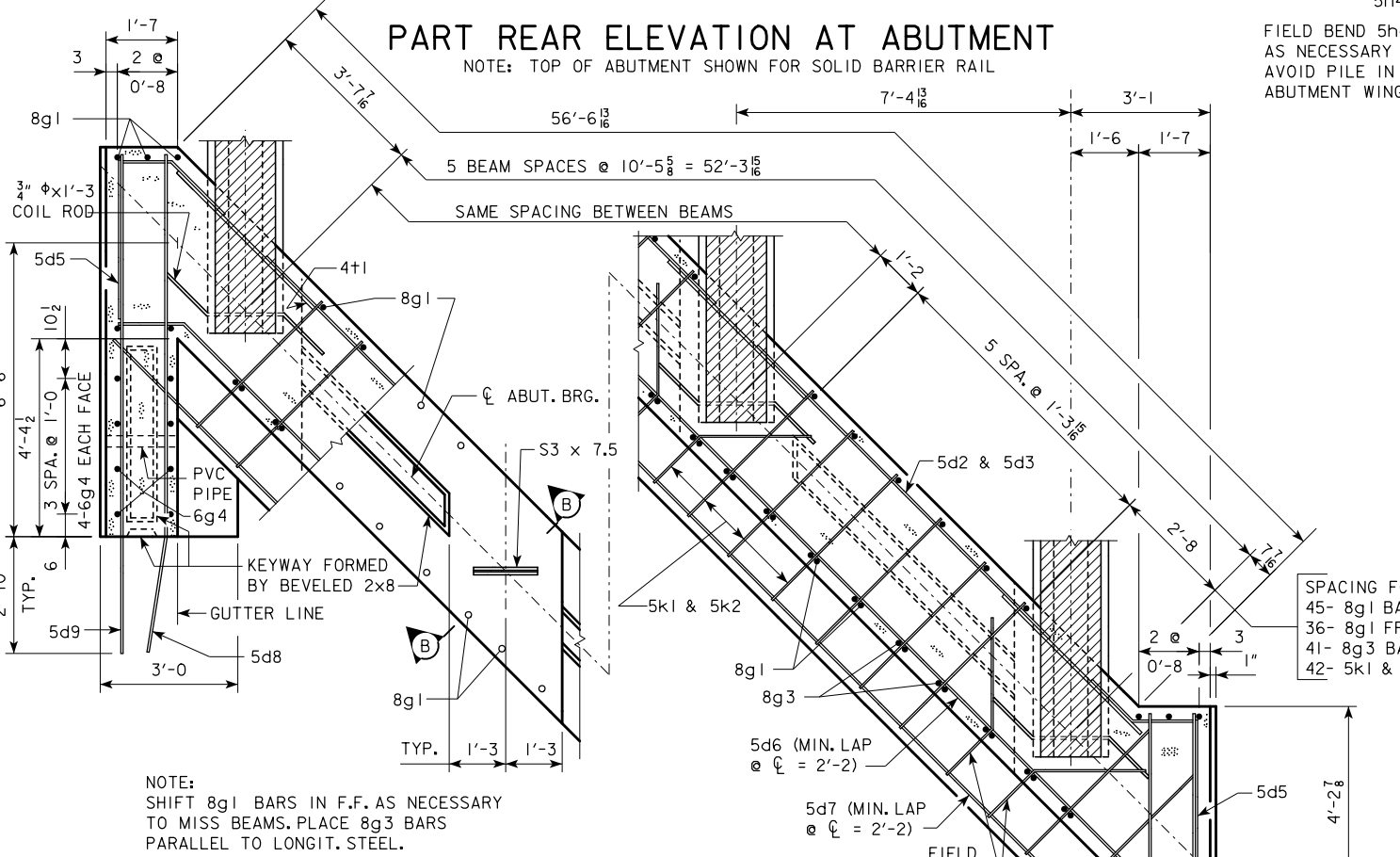
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>ABUTMENT DETAILS</b> 45° SKEW A & B BEAMS	<b>H40-25-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



**PART REAR ELEVATION AT ABUTMENT**  
NOTE: TOP OF ABUTMENT SHOWN FOR SOLID BARRIER RAIL

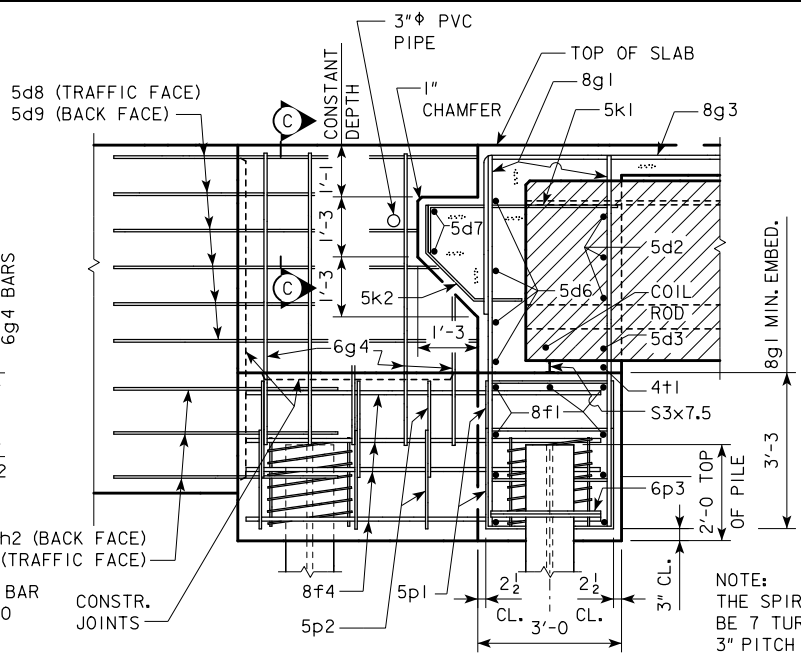


**PART SECTION A-A**

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

ABUTMENT PILE SPACING		CL-CL ABUT. BRG.	201'-4	213'-10	226'-4	243'-0
WITH STEEL H-PILES	"A" PILE SPACES		8	8	8	8
	"B" (FT. - IN.)		6'-10	6'-10	6'-10	6'-10
	"C" (FT. - IN.)		3'-3 <sup>11</sup> / <sub>16</sub>	3'-3 <sup>11</sup> / <sub>16</sub>	3'-3 <sup>11</sup> / <sub>16</sub>	3'-3 <sup>11</sup> / <sub>16</sub>
	"D" EQUAL SPACES		4	4	4	4
	NO. OF PILES PER ABUT.		11	11	11	11
P <sub>u</sub> , STRENGTH I DESIGN LOAD (KIPS)			131	135	138	146

NOTE: P<sub>u</sub>, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

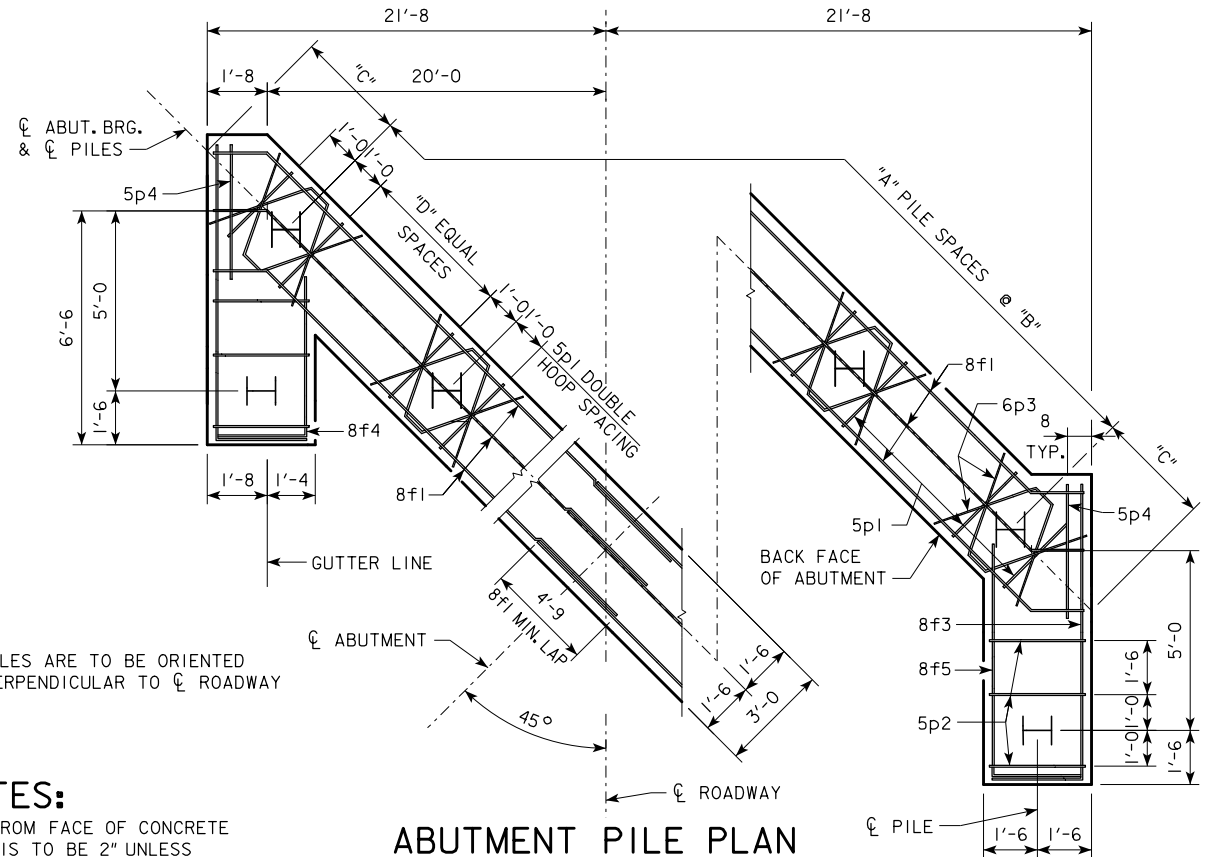


**PART SECTION B-B**

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

**PART SECTION C-C**

\* NOTE: SEE BARRIER RAIL SHEET FOR DETAILS. REINFORCING BARS 5c3 AND 5c14 ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES.

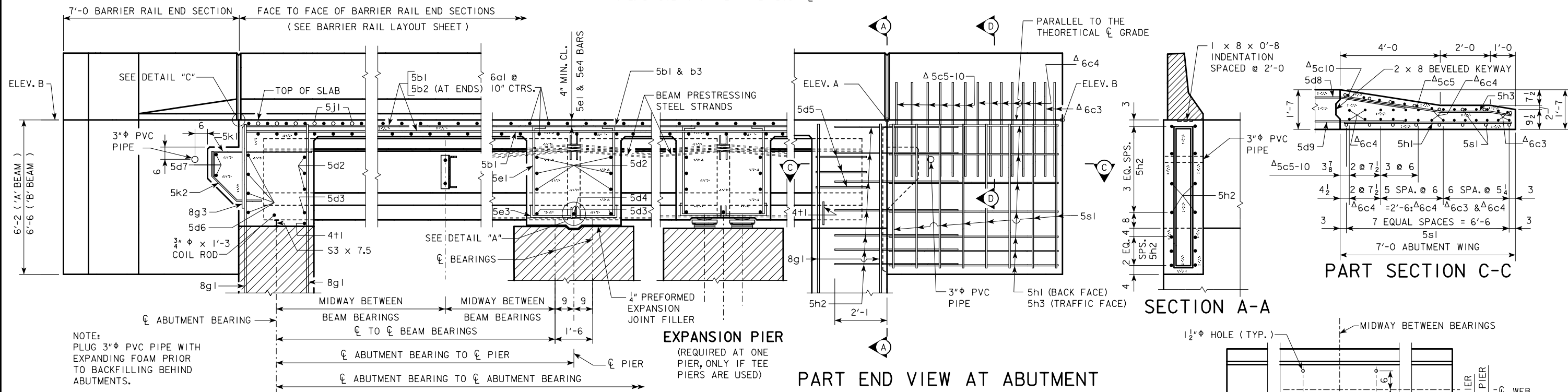


**ABUTMENT NOTES:**

- MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN.
- IF NECESSARY TO PREVENT DAMAGE TO THE END OF THE BRIDGE DECK OR BACKWALL FROM CONSTRUCTION EQUIPMENT, AN APPROPRIATE METHOD OF PROTECTION APPROVED BY THE ENGINEER SHALL BE PROVIDED BY THE BRIDGE CONTRACTOR AT NO EXTRA COST TO THE COUNTY OR STATE.
- ABUTMENT PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN FILES.
- BARRIER RAIL NOT SHOWN IN DETAILS.
- IF ROCK IS CLOSER THAN 15' BELOW ABUTMENT FOOTING, SPECIAL ANALYSIS MAY BE REQUIRED.

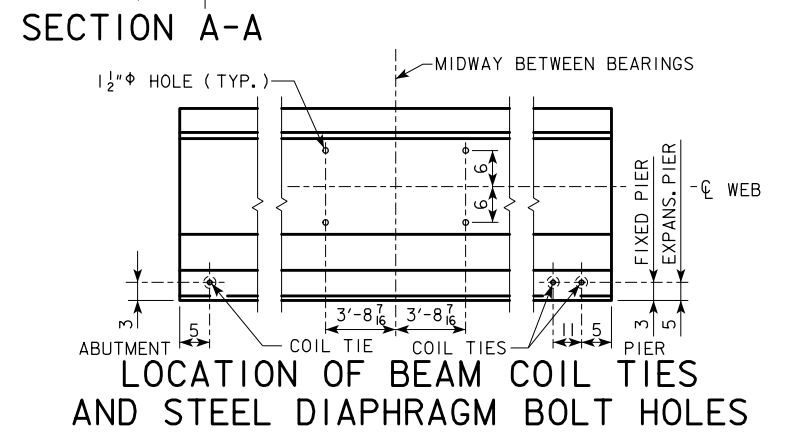
05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>ABUTMENT DETAILS</b> 45° SKEW C BEAMS	<b>H40-26-06</b>

NOTE: BRIDGE IS SYMMETRICAL ABOUT  $\bar{C}$

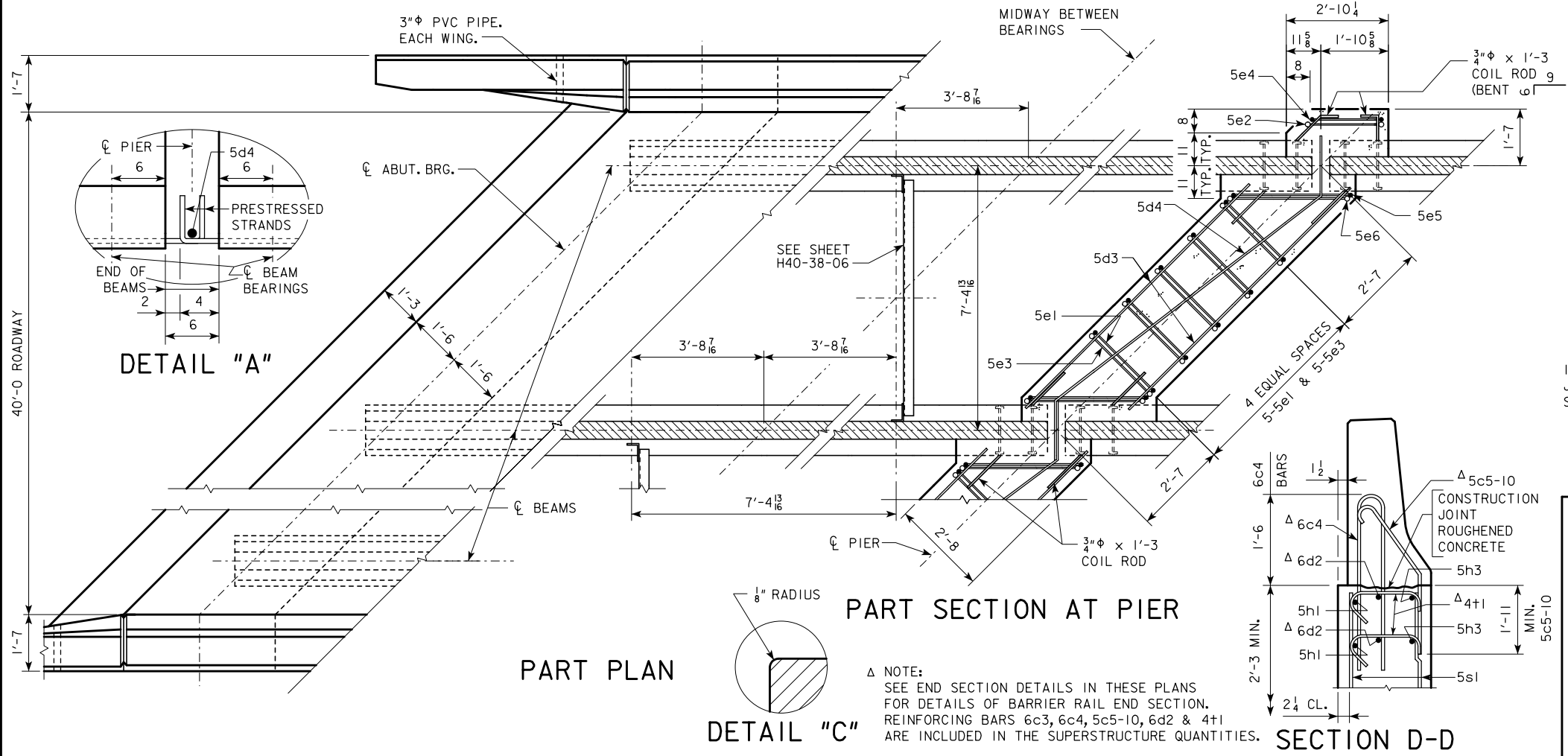


**ABUTMENT**  
**PART LONGITUDINAL SECTION NEAR GUTTER**  
 (FOR DETAILS OF INTERMEDIATE DIAPHRAGM SEE SHEET H40-38-06)

**PART END VIEW AT ABUTMENT**  
 PROVIDE ELEVATIONS A AND B IN THE BRIDGE PLAN SHEETS.

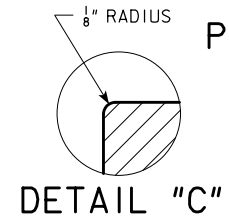


**LOCATION OF BEAM COIL TIES AND STEEL DIAPHRAGM BOLT HOLES**

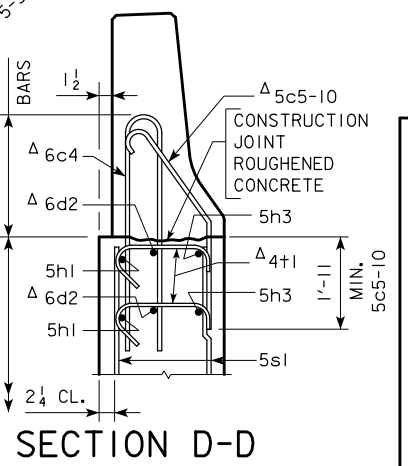


**PART PLAN**

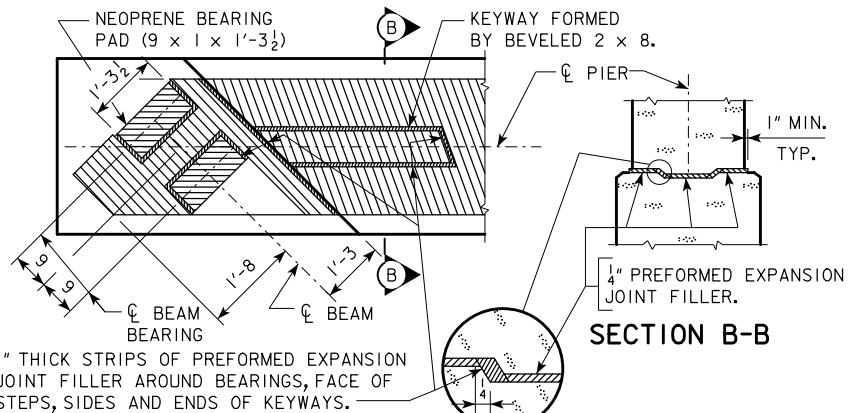
**PART SECTION AT PIER**



NOTE:  
 SEE END SECTION DETAILS IN THESE PLANS FOR DETAILS OF BARRIER RAIL END SECTION. REINFORCING BARS 6c3, 6c4, 5c5-10, 6d2 & 4+1 ARE INCLUDED IN THE SUPERSTRUCTURE QUANTITIES.



**SECTION D-D**



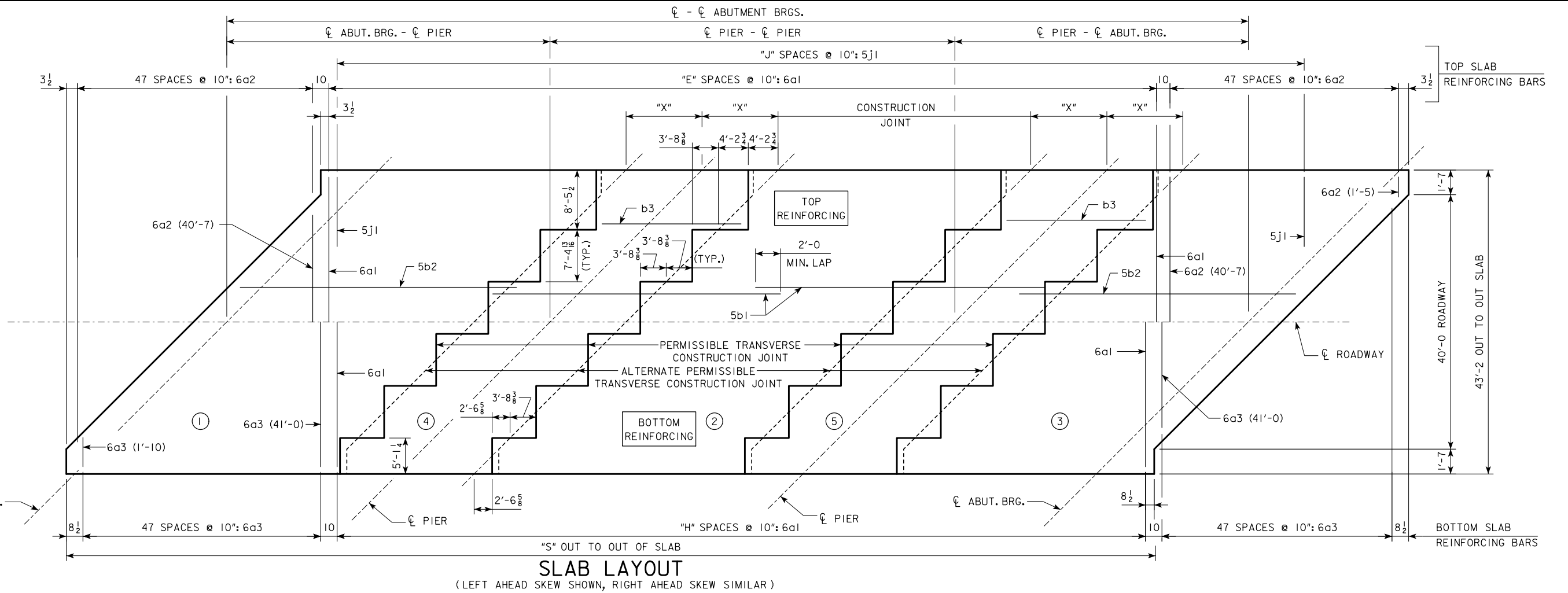
**PART PLAN TOP OF FIXED PIER DETAILS**  
 (SEE SHEET H40-44-06 FOR EXPANSION PIER BEARING DETAILS)

10-09 LATEST REVISION DATE  APPROVED BY BRIDGE ENGINEER [Signature]	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<span>LONGITUDINAL SECTION 45° SKEW A &amp; B BEAMS</span> <span>H40-27-06</span>

REVISED 10-09 - ABUT. WINGS SHAPE CHANGED.



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)

ESTIMATED QUANTITIES (SUPERSTRUCTURE PLUS INTEGRAL ABUTMENTS)		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
STRUCTURAL CONCRETE SUPERSTRUCTURE (INCLUDES ABUTMENT WINGS)	WITH BARRIER RAIL	C.Y.	242.3	256.2	283.3	297.4	311.7	340.1	354.2	368.9	388.1
	WITH OPEN RAIL	C.Y.	244.8	258.9	286.3	300.6	315.1	343.6	357.9	372.8	392.3
STRUCTURAL CONCRETE ABUTMENTS (w/ WOOD PILES) ***		C.Y.	48.5	48.3	48.2	48.1	48.1	-----	-----	-----	-----
STRUCTURAL CONCRETE ABUTMENTS (w/ STEEL H PILES) ***		C.Y.	50.2	50.2	50.2	50.2	50.2	57.4	57.4	57.4	57.4
PRETENSIONED PRESTRESSED CONCRETE BEAM, CENTER SPAN		NO.	6-A50	6-A55	6-B59	6-B63	6-B67	6-C71	6-C75	6-C80	6-C80
PRETENSIONED PRESTRESSED CONCRETE BEAM, END SPAN		NO.	12-A42	12-A46	12-B50	12-B55	12-B59	12-C63	12-C67	12-C71	12-C80
CONCRETE RAIL (BARRIER OR OPEN)		L.F.	314.2	339.2	364.2	389.2	414.2	456.7	481.7	506.7	540.0
STRUCTURAL STEEL (w/ PILE BENT PIERS & DRAINS)		LB.	5143	5143	5231	5231	5231	5215	5215	5215	5215
STRUCTURAL STEEL (w/ PILE BENT PIERS & NO DRAINS)		LB.	4463	4463	4463	4463	4463	4367	4367	4367	4367
STRUCTURAL STEEL (w/ TEE PIERS & DRAINS)		LB.	6218	6218	6306	6306	6306	6485	6485	6485	6485
STRUCTURAL STEEL (w/ TEE PIERS & NO DRAINS)		LB.	5538	5538	5538	5538	5538	5637	5637	5637	5637
EPOXY COATED REINF. STEEL (w/ WOOD PILES & BARRIER RAIL)		LB.	66,428	70,945	75,614	79,921	84,393	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ WOOD PILES & OPEN RAIL)		LB.	67,093	71,566	76,382	80,865	85,267	-----	-----	-----	-----
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & BARRIER RAIL)		LB.	66,284	70,650	75,166	80,067	84,539	91,813	97,096	101,572	106,934
EPOXY COATED REINF. STEEL (w/ STEEL H PILES & OPEN RAIL)		LB.	66,949	71,271	75,934	81,011	85,413	93,657	98,849	103,522	108,930
NO. OF WOOD PILES, TREATED FOR TWO ABUTMENTS		NO.	30	32	34	36	36	-----	-----	-----	-----
NO. OF STEEL H-PILES FOR TWO ABUTMENTS (HP 10 x 57)		NO.	16	16	16	16	16	22	22	22	22
PREBORED HOLES (w/ WOOD PILES)		L.F.	300	320	340	360	360	-----	-----	-----	-----
PREBORED HOLES (w/ STEEL H-PILES)		L.F.	160	160	160	160	160	220	220	220	220

CONCRETE PLACEMENT QUANT.		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
SLAB INCLUDING HAUNCH, ABUT. DIAPHRAGM, & WINGWALLS** , SECTIONS 1 & 3	WITH BARRIER RAIL	C.Y.	133.8	141.8	157.2	165.4	173.4	191.8	200.2	208.8	228.0
	WITH OPEN RAIL	C.Y.	135.1	143.2	158.8	167.1	175.2	193.7	202.2	210.9	230.4
SLAB INCLUDING HAUNCH, SECTION 2	WITH BARRIER RAIL	C.Y.	43.5	47.0	50.5	54.0	57.3	61.1	64.6	68.1	68.1
	WITH OPEN RAIL	C.Y.	44.2	47.8	51.3	54.9	58.3	62.1	65.6	69.2	69.2
SLAB INCLUDING HAUNCH & PIER DIAPHRAGM, SECTIONS 4 & 5	WITH BARRIER RAIL	C.Y.	57.8	60.2	68.0	70.4	73.4	78.8	81.0	83.6	83.6
	WITH OPEN RAIL	C.Y.	58.3	60.7	68.6	71.0	74.0	79.4	81.7	84.3	84.3
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.	48.5	48.3	48.2	48.1	48.1	-----	-----	-----	-----
ABUTMENT FOOTINGS (w/ STEEL H PILES) ***		C.Y.	50.2	50.2	50.2	50.2	50.2	57.4	57.4	57.4	57.4

GENERAL DATA		CL-CL ABUT. BRG.	138'-10	151'-4	163'-10	176'-4	188'-10	201'-4	213'-10	226'-4	243'-0
VERTICAL CURVE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8	3'-7 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-2 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>7</sup> / <sub>8</sub>	4'-8 <sup>9</sup> / <sub>16</sub>	4'-8 <sup>11</sup> / <sub>16</sub>	4'-9 <sup>1</sup> / <sub>8</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>3</sup> / <sub>8</sub>	3'-6 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>5</sup> / <sub>16</sub>	4'-1 <sup>1</sup> / <sub>2</sub>	4'-1 <sup>7</sup> / <sub>8</sub>	4'-7 <sup>5</sup> / <sub>16</sub>	4'-7 <sup>4</sup> / <sub>16</sub>	4'-7 <sup>1</sup> / <sub>2</sub>	4'-7 <sup>1</sup> / <sub>2</sub>
STRAIGHT GRADE	TOP OF SLAB TO ABUT. CONSTR. JT. AT C.L. ABUT. BRG.	"U"	3'-8 <sup>1</sup> / <sub>16</sub>	3'-7 <sup>7</sup> / <sub>16</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-2 <sup>15</sup> / <sub>16</sub>	4'-3	4'-8 <sup>3</sup> / <sub>16</sub>	4'-8 <sup>7</sup> / <sub>16</sub>	4'-9 <sup>5</sup> / <sub>16</sub>	4'-9 <sup>7</sup> / <sub>16</sub>
	TOP OF SLAB TO PIER TOP AT C.L. PIER*	"U"	3'-6 <sup>9</sup> / <sub>16</sub>	3'-6 <sup>3</sup> / <sub>8</sub>	4'-1 <sup>9</sup> / <sub>16</sub>	4'-1 <sup>13</sup> / <sub>16</sub>	4'-2 <sup>1</sup> / <sub>4</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-7 <sup>11</sup> / <sub>16</sub>	4'-8	4'-8
D.L. PIER REACTION (D.L. + F.W.S.) SERVICE LOADS	KIPS		456.2	490.9	561.4	598.1	635.1	756.6	797.7	839.3	879.7
L.L. PIER REACTION (HL93) NO IMPACT SERVICE LOADS	KIPS		264.7	274.5	283.9	293.1	302.2	311.0	322.9	341.9	362.6
NO. OF SPACES FOR 6a1 BARS (TOP)	"E"		123	138	153	168	183	198	213	228	248
NO. OF SPACES FOR 6a1 BARS (BOTTOM)	"H"		122	137	152	167	182	197	212	227	247
NO. OF SPACES FOR 5j1 BARS (TOP)	"J"		164	179	194	209	224	239	254	269	289
OUT TO OUT OF SLAB	"S"		143'-0 <sup>7</sup> / <sub>8</sub>	155'-6 <sup>7</sup> / <sub>8</sub>	168'-0 <sup>7</sup> / <sub>8</sub>	180'-6 <sup>7</sup> / <sub>8</sub>	193'-0 <sup>7</sup> / <sub>8</sub>	205'-6 <sup>7</sup> / <sub>8</sub>	218'-0 <sup>7</sup> / <sub>8</sub>	230'-6 <sup>7</sup> / <sub>8</sub>	247'-2 <sup>7</sup> / <sub>8</sub>
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

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.

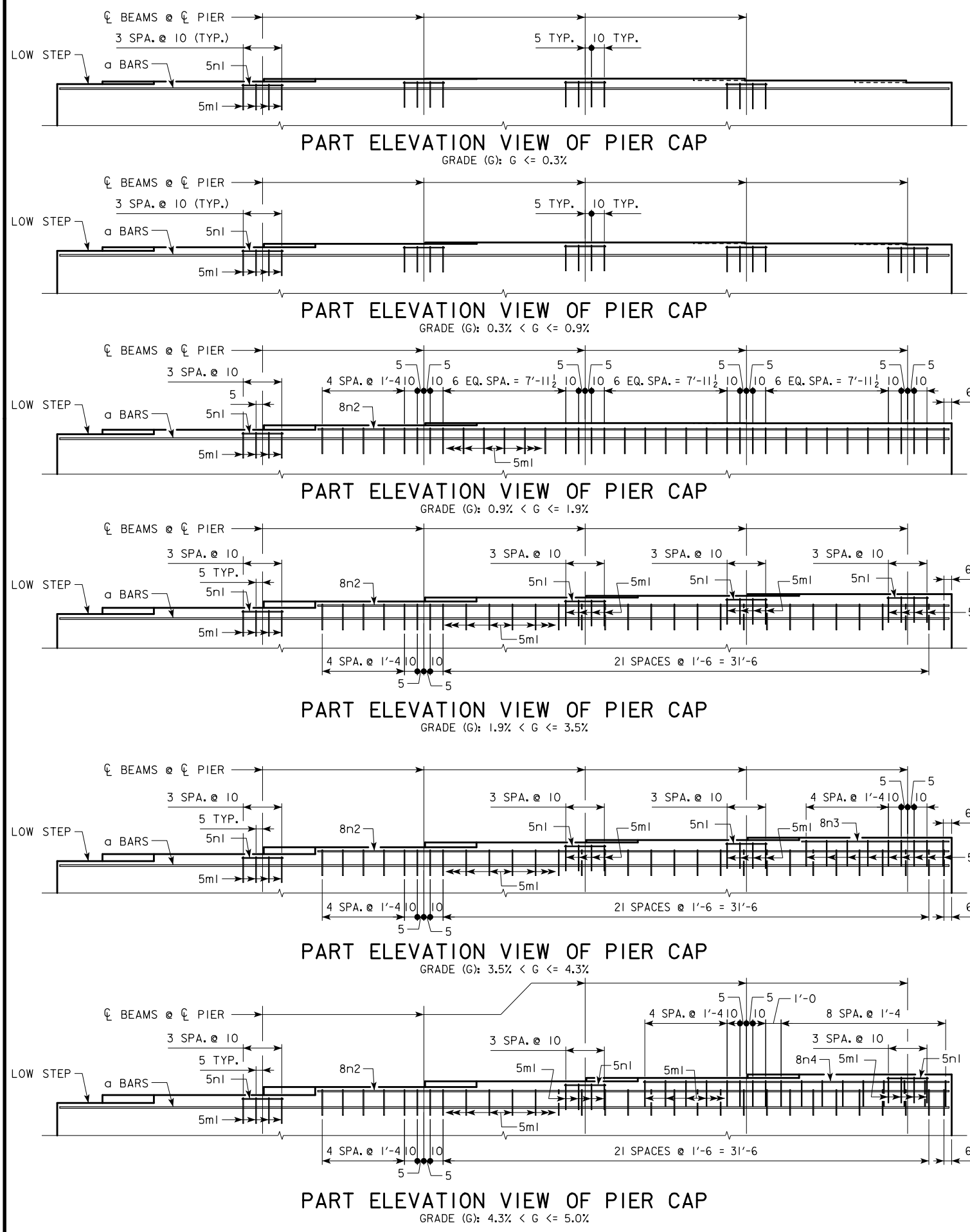
\* VALUES SHOWN ARE FOR FIXED PIERS ONLY AND ALLOW FOR 1/16 INCH DEFLECTION OF THE 1 INCH NEOPRENE BEARING PAD. AT EXPANSION PIER LOCATIONS ADD 3/16 INCHES TO "U" VALUES SHOWN.

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

\*\*\* SEE SHEET H40-31-06 FOR ADDITIONAL CONCRETE REQUIRED IN ABUTMENT FOOTINGS.

LATEST REVISION DATE 07-15 <i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>SUPERSTRUCTURE DETAILS</b> <b>H40-29-06</b> 45° SKEW





### STEP REINFORCING BAR LIST ONE TEE PIER

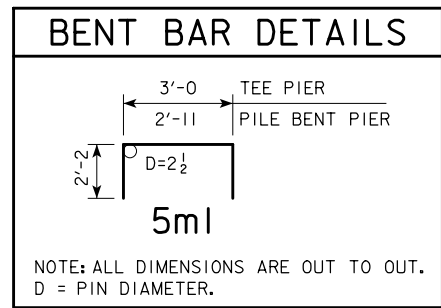
BAR	LENGTH	SHAPE	G <= 0.3%			0.3% < G <= 0.9%			0.9% < G <= 1.9%			1.9% < G <= 3.5%			3.5% < G <= 4.3%			4.3% < G <= 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	7'-4		16	5	122	20	5	153	40	5	306	46	5	352	51	5	390	59	5	451
5n1	2'-8		16	5	45	20	5	56	4	5	11	16	5	45	12	5	33	12	5	33
*8n2	VARIABLES		--	--	--	--	--	--	4	8	453	4	8	453	4	8	453	4	8	453
*8n3	VARIABLES		--	--	--	--	--	--	--	--	--	--	--	--	4	8	118	--	--	--
*8n4	VARIABLES		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	8	230
TOTAL (LB.)			167			209			770			850			994			1167		

### STEP REINFORCING BAR LIST ONE PILE BENT PIER

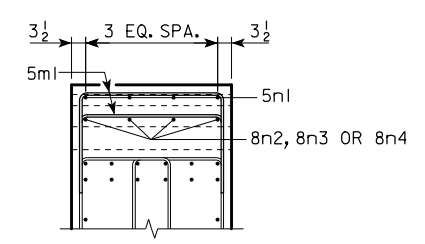
BAR	LENGTH	SHAPE	G <= 0.3%			0.3% < G <= 0.9%			0.9% < G <= 1.9%			1.9% < G <= 3.5%			3.5% < G <= 4.3%			4.3% < G <= 5.0%		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
5m1	7'-3		16	5	121	20	5	151	40	5	302	46	5	348	51	5	386	59	5	446
5n1	2'-8		16	5	45	20	5	56	4	5	11	16	5	45	12	5	33	12	5	33
*8n2	VARIABLES		--	--	--	--	--	--	4	8	453	4	8	453	4	8	453	4	8	453
*8n3	VARIABLES		--	--	--	--	--	--	--	--	--	--	--	--	4	8	118	--	--	--
*8n4	VARIABLES		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	8	230
TOTAL (LB.)			166			207			766			846			990			1162		

G = GRADE (%)

\*8n2 BARS VARY FROM 41'-1 TO 43'-9  
 \*8n3 BARS VARY FROM 9'-8 TO 12'-5  
 \*8n4 BARS VARY FROM 20'-2 TO 22'-10



**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 SHOULD BE 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.



TYPICAL SECTION

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

	ROADWAY GRADE AT SUBSTRUCTURE UNIT				
	1%	2%	3%	4%	5%
<b>EACH ABUTMENT FOOTING</b>					
A, B BEAMS	0.9	2.1	3.4	4.7	5.9
C BEAMS	1.0	2.5	3.9	5.4	6.8
<b>EACH TEE PIER CAP - ALL BEAMS</b>					
	0.9	2.3	3.8	5.3	6.8
<b>EACH PILE BENT PIER - ALL BEAMS</b>					
	0.9	2.2	3.7	5.1	6.6

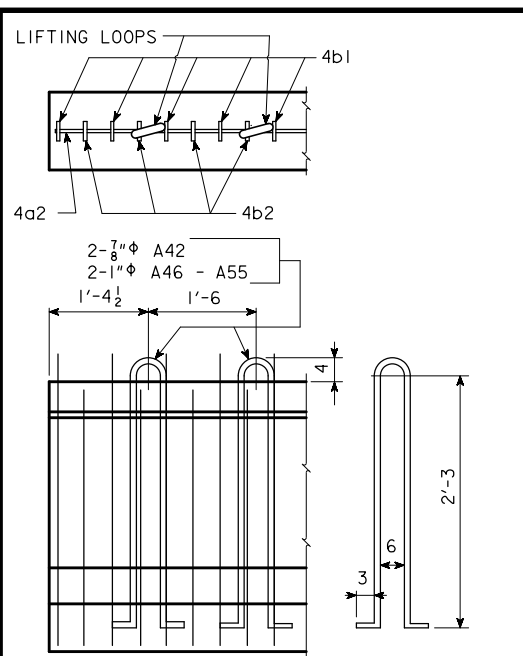
LATEST REVISION DATE  
  
 APPROVED BY BRIDGE ENGINEER  
*Norman L. Mc Donald*

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE  
**PRETENSIONED PRESTRESSED  
 CONCRETE BEAM BRIDGES**  
 AUGUST, 2009

**ADDITIONAL QUANTITIES**  
45° SKEW

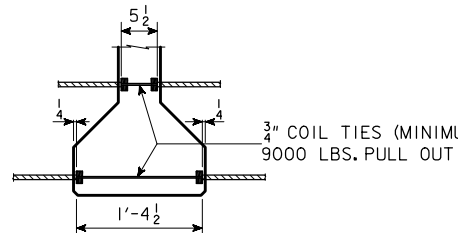
**H40-31-06**

REVISED 10-09 - THE SPECIFICATION REFERENCES WERE CHANGED. THE BEAM DATA WAS UPDATED TO THE CURRENT BEAMS.



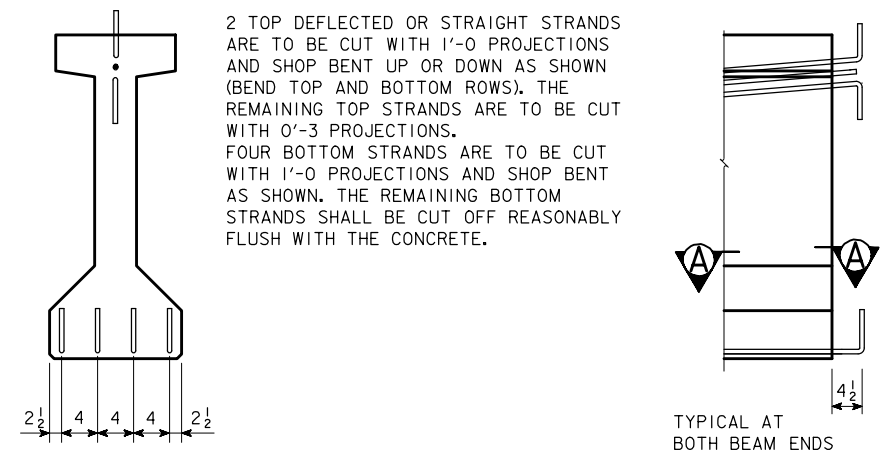
**LIFTING LOOP DETAIL**

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



**COIL TIE DETAIL**

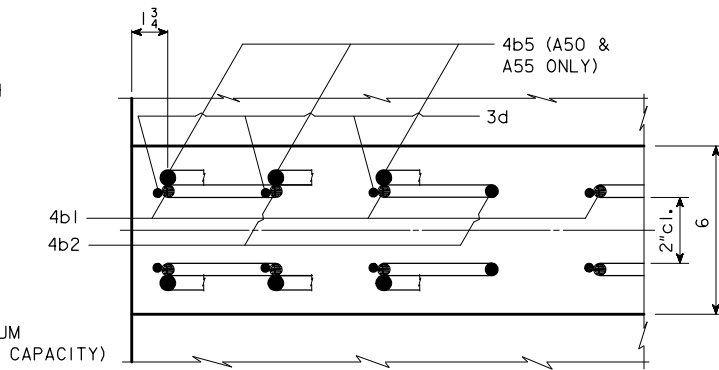
NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.



**STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS**

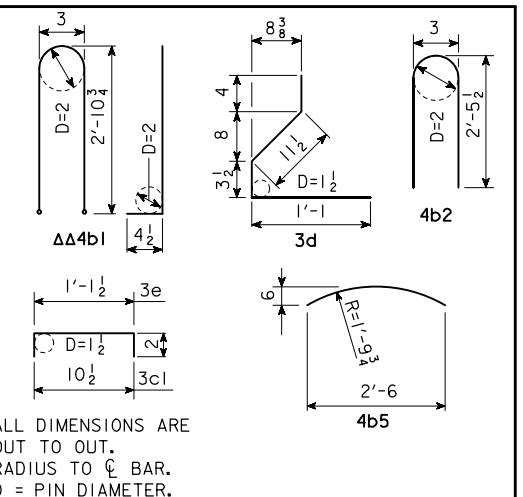
2 TOP DEFLECTED OR STRAIGHT STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN (BEND TOP AND BOTTOM ROWS). THE REMAINING TOP STRANDS ARE TO BE CUT WITH 0'-3 PROJECTIONS. FOUR BOTTOM STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

TYPICAL AT BOTH BEAM ENDS



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

REINFORCING BAR LIST									
BEAM	SPAN	A42		A46		A50		A55	
		NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
5a1		4	22'-10	4	24'-11	4	27'-0	4	29'-1
4a2		2	3'-3	2	3'-3	2	3'-3	2	3'-3
4b1		40	6'-8	44	6'-8	46	6'-8	50	6'-8
4b2		12	5'-0	12	5'-0	8	5'-0	8	5'-0
4b5						8	2'-9	12	2'-9
3c1		40	1'-3	44	1'-3	46	1'-3	50	1'-3
3d		104	2'-8	112	2'-8	108	2'-8	116	2'-8
3e		20	1'-6	20	1'-6	18	1'-6	18	1'-6



ALL DIMENSIONS ARE OUT TO OUT. RADIUS TO  $\phi$  BAR. D = PIN DIAMETER.

ΔΔ 4b1 BARS TO BE EPOXY COATED.  
 \*\* WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.

**A BEAM DATA**

BEAM	SPAN LENGTH $\phi$ - $\phi$ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) $\Delta_D$				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(LB)				
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) $\Delta_I$		TIME (PLASTIC) $\Delta_T$		HL93 LOADING								
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.							
A42	42'-6	43'-6	0.6"	7	2	383	9.3	0.70		1.24		0.38	0.35	0.09	0.09		7'-6	7'-6	7.1		3.49	452
*A46	46'-8	47'-8	0.6"	8	2	426	8.5	0.76		1.35		0.50	0.47	0.13	0.12		7'-6	7'-6	7.7		3.82	488
*A50	50'-10	51'-10	0.6"	9	3	510.9	11.7	1.02		1.82		0.69	0.65	0.17	0.16		7'-6	7'-6	8.4		4.15	503
*A55	55'-0	56'-0	0.6"	10	3	553.4	10.8	1.29		2.30		0.94	0.88	0.23	0.22		7'-6	7'-6	9.1		4.49	547

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 (1912 #) OR ONE STEEL DIAPHRAGM (285 #) AT  $\phi$  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  $\phi$  OF SPAN,  $\Delta_D$ , 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 72.6%  $f'_s$ ,  $f'_s = 270$  ksi AND  $A_s = 0.217$  sq. in.

\* MINIMUM CONCRETE  $f'_c$  (AT 28 DAYS) SHALL BE 7,000 psi. MINIMUM  $f'_c$  AT RELEASE SHALL BE 6,000 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 2007, 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 2007:  
 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.

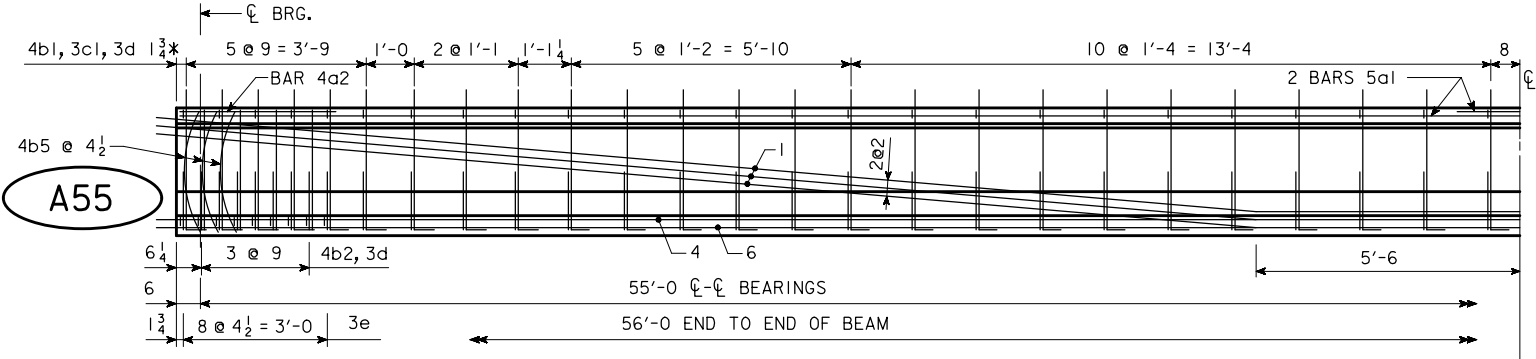
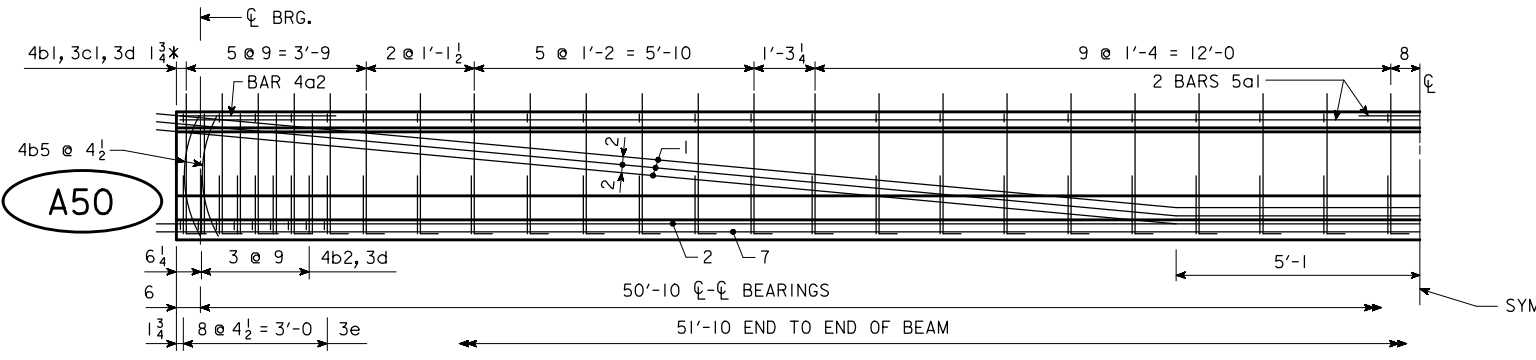
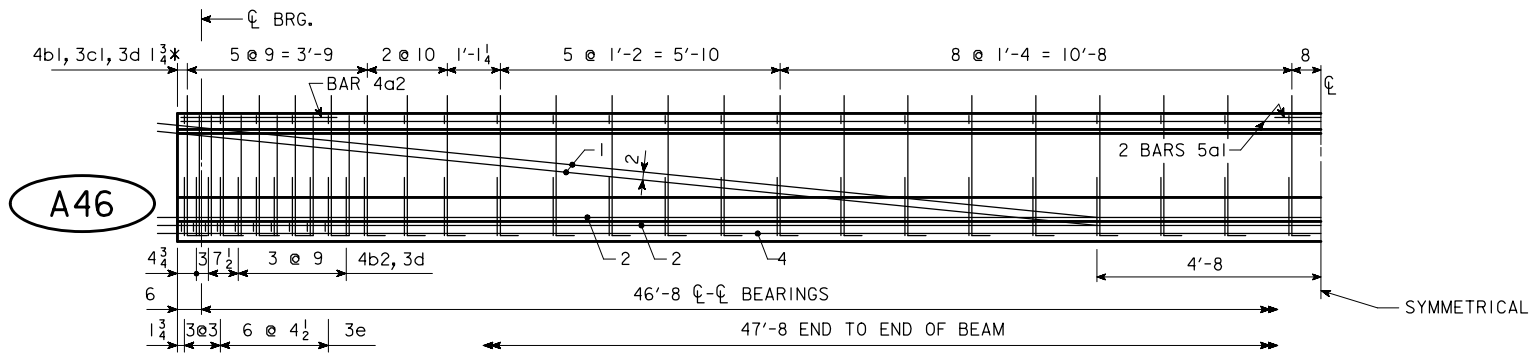
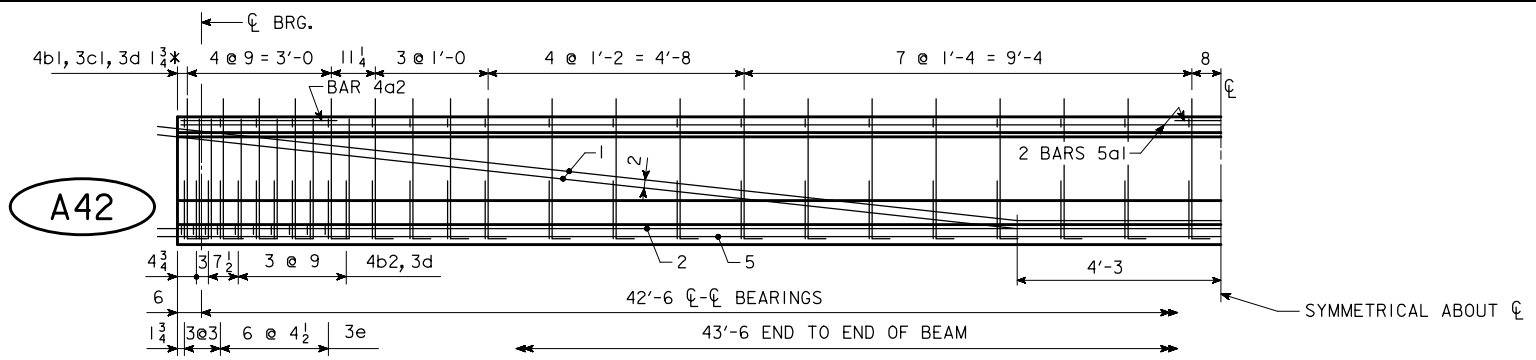
**NOTES:**

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 2403.03, I, OF THE STANDARD 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  $\alpha$  BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

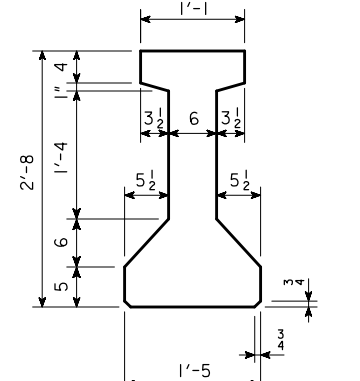
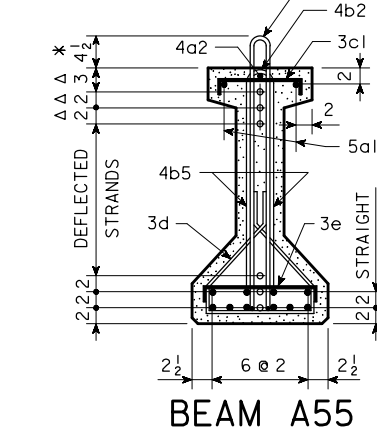
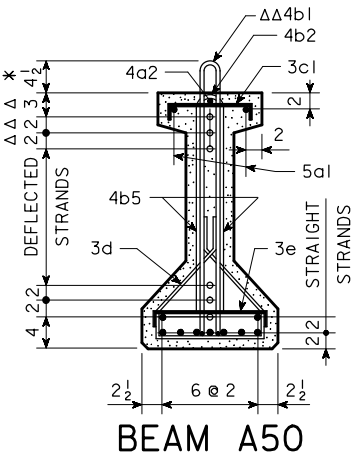
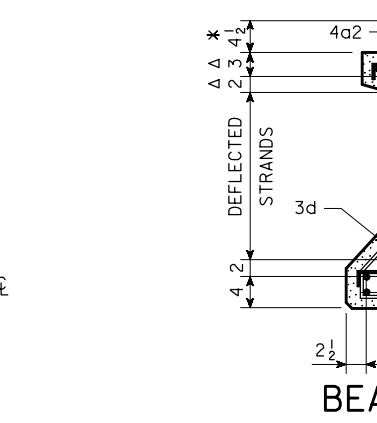
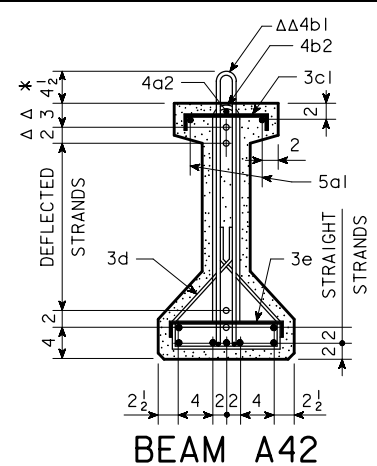
10-09  
 LATEST REVISION DATE  
 APPROVED BY BRIDGE ENGINEER  
 Norman L. Mc Donald

**IOWADOT Highway Division**  
 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE  
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**  
 AUGUST, 2009  
**A BEAM DETAILS**      **H40-32-06**

REVISED 10-09 - THE BEAM DETAILS WERE UPDATED TO THE CURRENT BEAMS.



NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT  $\bar{C}$  BEAM AND END OF BEAM.

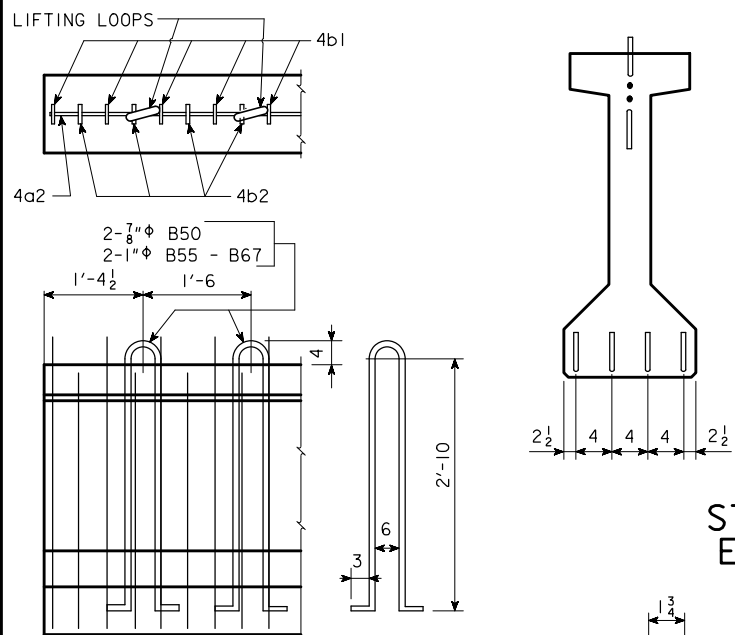


**"A" BEAM CROSS SECTION**  
 $A = 311.5 \text{ in}^2$   
 $Y_b = 14.05 \text{ in.}$   
 $I = 34,082 \text{ in.}^4$

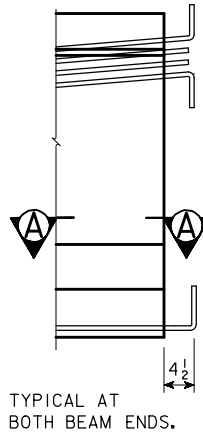
NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.  
 ○ DEFLECTED STRANDS  
 \* KEEP  
 Δ DIMENSIONS AT END OF BEAM  
 ΔΔ EPOXY COATED BARS

10-09 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWA DOT Highway Division</b>	
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
<b>A BEAM DETAILS</b>		<b>H40-33-06</b>	

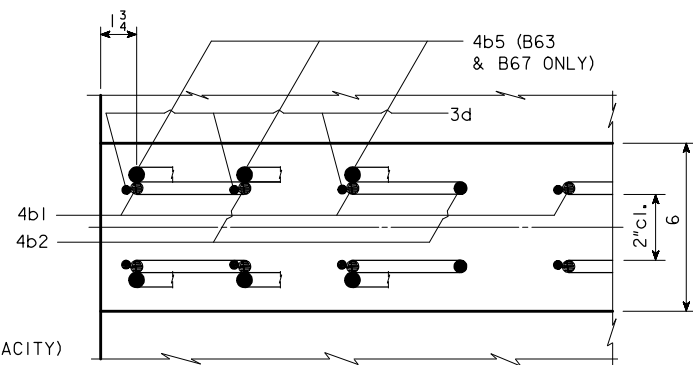
REVISED 10-09 - THE SPECIFICATION REFERENCES WERE CHANGED. THE BEAM DATA WAS UPDATED TO THE CURRENT BEAMS.



2 TOP DEFLECTED OR STRAIGHT STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN (BEND TOP AND BOTTOM ROWS). 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.



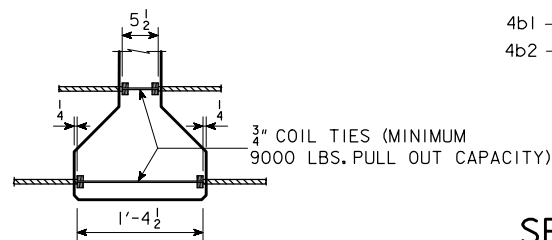
**STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS**



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

**LIFTING LOOP DETAIL**

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



**COIL TIE DETAIL**

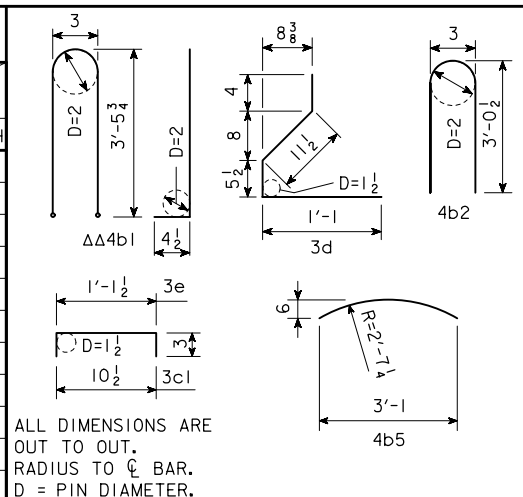
NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.

ΔΔ4b1 BARS TO BE EPOXY COATED.

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

**REINFORCING BAR LIST**

BEAM	SPAN	B50		B55		B59		B63		B67	
		NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	50'-10"	4	27'-3"	4	29'-4"	4	31'-5"	4	33'-6"	4	35'-7"
	55'-0"	2	4'-2"	2	4'-2"	2	4'-2"	2	4'-2"	2	4'-2"
ΔΔ	4b1	44	7'-10"	46	7'-10"	50	7'-10"	52	7'-10"	56	7'-10"
	4b2	12	6'-2"	12	6'-2"	12	6'-2"	12	6'-2"	12	6'-2"
	4b5							12	3'-3"	12	3'-3"
**	3c1	44	1'-5"	46	1'-5"	50	1'-5"	52	1'-5"	56	1'-5"
	3d	112	2'-10"	116	2'-10"	124	2'-10"	128	2'-10"	136	2'-10"
	3e	24	1'-8"	24	1'-8"	24	1'-8"	24	1'-8"	24	1'-8"



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

**B BEAM DATA**

BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ <sub>D</sub>				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(lb)					
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ <sub>T</sub>		TIME (PLASTIC) Δ <sub>T</sub>		HL93 LOADING									
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.								
B50	50'-10"	51'-10"	0.60	8	2	425	10.8	0.67		1.24		0.43	0.39	0.11	0.10			7'-6"	7'-6"	10.3		5.10	607
*B55	55'-0"	56'-0"	0.60	8	3	468	14.1	0.85		1.51		0.58	0.54	0.14	0.13			7'-6"	7'-6"	11.2		5.51	635
*B59	59'-2"	60'-2"	0.60	10	3	554	13.2	1.12		1.99		0.82	0.77	0.21	0.19			7'-6"	7'-6"	12.0		5.92	680
*B63	63'-4"	64'-4"	0.60	12	3	639	12.3	1.30		2.32		0.91	0.84	0.23	0.21			7'-6"	7'-6"	12.8		6.33	733
*B67	67'-6"	68'-6"	0.60	14	3	724	11.6	1.69		2.98		1.16	1.09	0.29	0.27			7'-6"	7'-6"	13.6		6.74	778

- 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 (2270 #) OR ONE STEEL DIAPHRAGM (285 #) AT C. 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 C. OF SPAN, Δ<sub>D</sub>, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:  
 (A) Δ<sub>D</sub> = Δ<sub>1</sub> + Δ<sub>T</sub> FOR SIMPLE SPAN.  
 (B) Δ<sub>D</sub> = Δ<sub>1</sub> + 3/4 Δ<sub>T</sub> FOR END SPANS OF CONTINUOUS BRIDGE.  
 (C) Δ<sub>D</sub> = Δ<sub>1</sub> + 1/2 Δ<sub>T</sub> FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f'<sub>s</sub>, f'<sub>s</sub> = 270 ksi AND A<sub>s</sub> = 0.217 sq. in.

\* MINIMUM CONCRETE f'<sub>c</sub> (AT 28 DAYS) SHALL BE 7,000 psi. MINIMUM f'<sub>ci</sub> AT RELEASE SHALL BE 6,000 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 2007, 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 2007:

REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

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

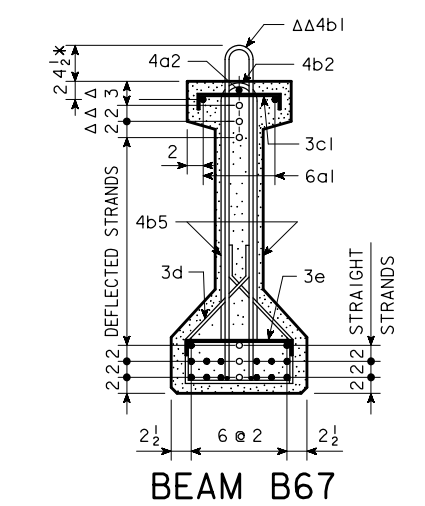
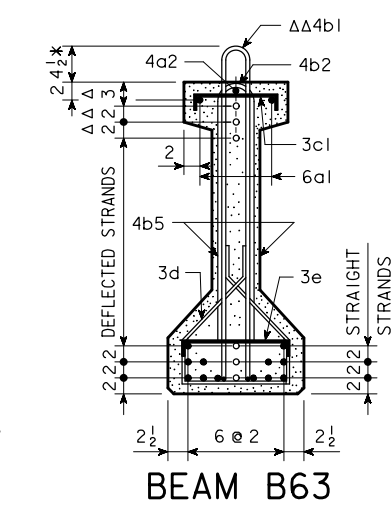
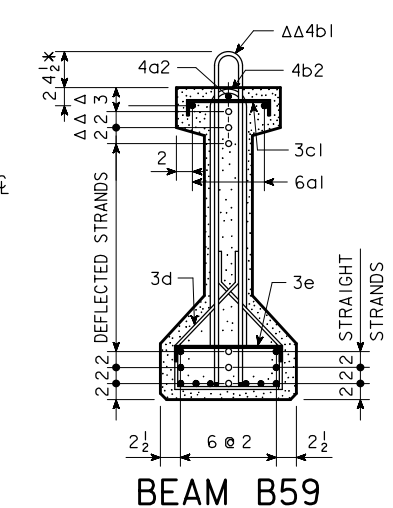
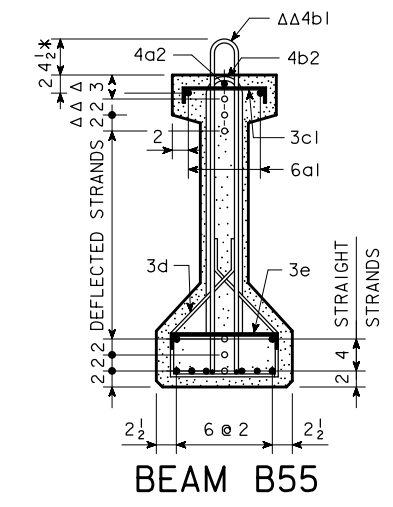
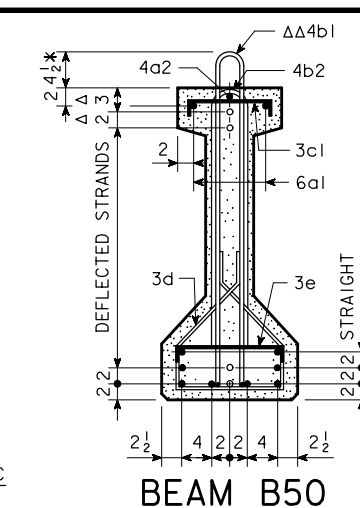
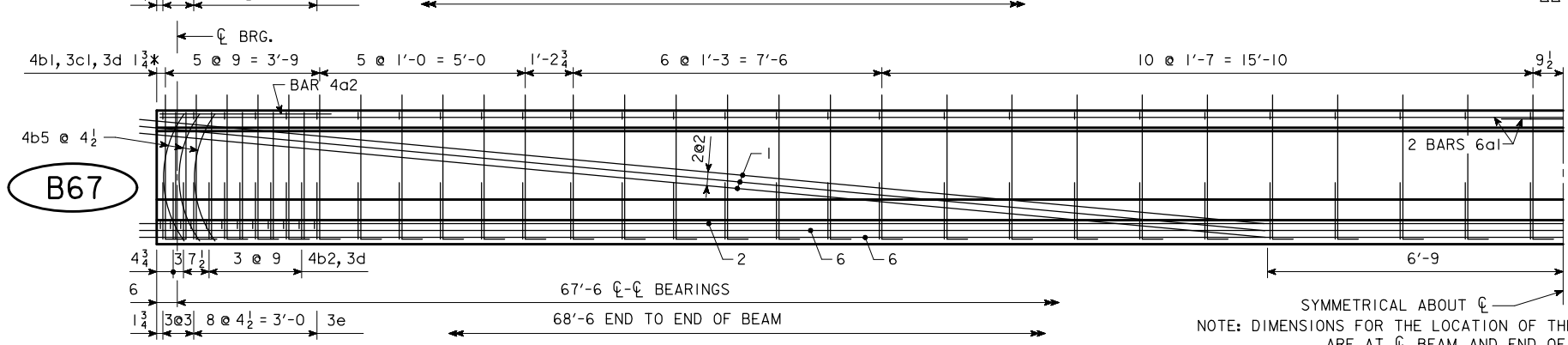
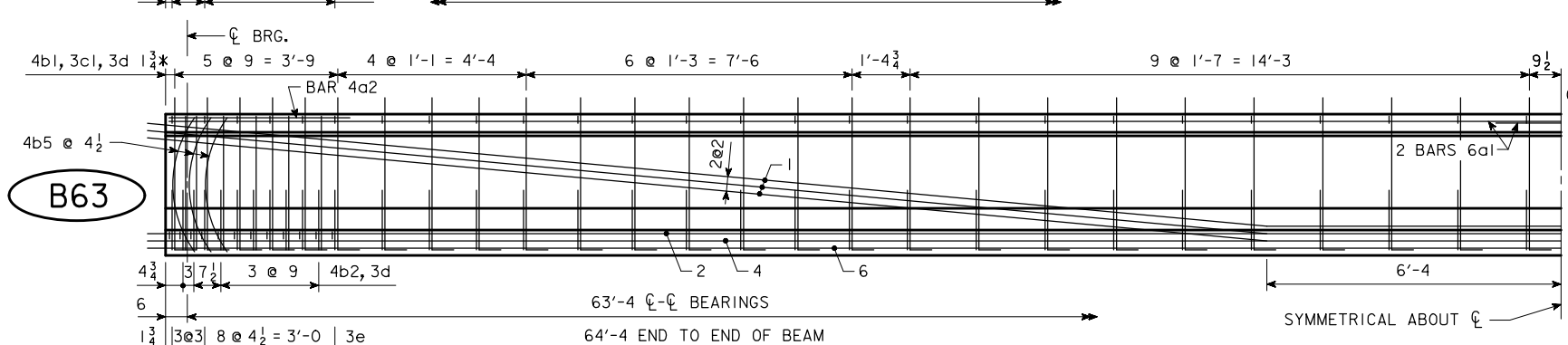
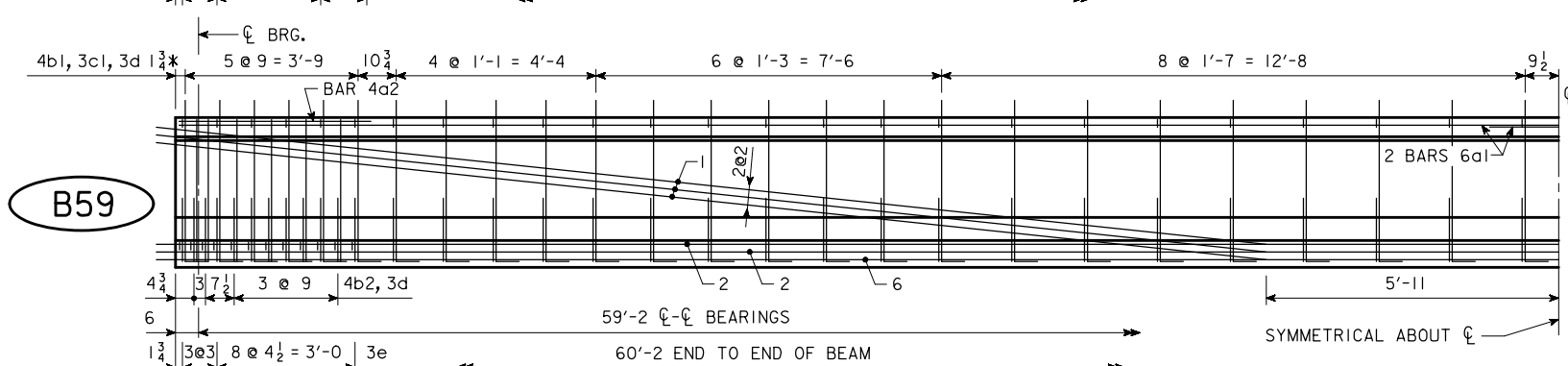
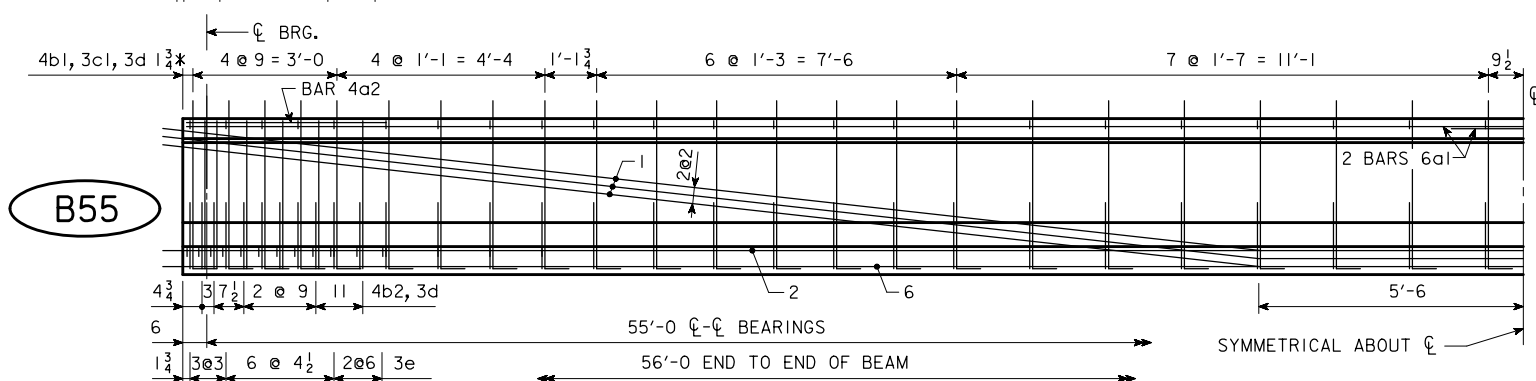
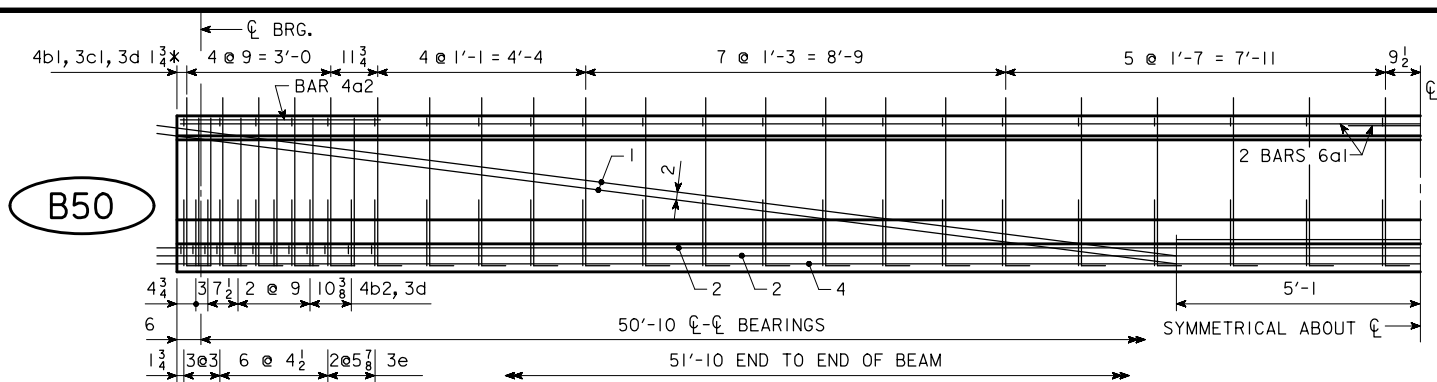
PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f'<sub>s</sub> = 270,000 psi.

**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 2403.03, I, OF THE STANDARD 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 α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<span><b>B BEAM DETAILS</b></span> <span><b>H40-34-06</b></span>

REVISED 10-09 - THE BEAM DETAILS WERE UPDATED TO THE CURRENT BEAMS.



**"B" BEAM CROSS SECTION**

A = 382.5 in.<sup>2</sup>  
 Y<sub>b</sub> = 17.06 in.<sup>4</sup>  
 I = 62,000 in.<sup>4</sup>

- NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.
- DEFLECTED STRANDS
  - \* KEEP
  - △ DIMENSIONS AT END OF BEAM
  - △△ EPOXY COATED BARS

10-09  
 LATEST REVISION DATE

*Norman L. McDaniel*  
 APPROVED BY BRIDGE ENGINEER

**IOWADOT** Highway Division

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

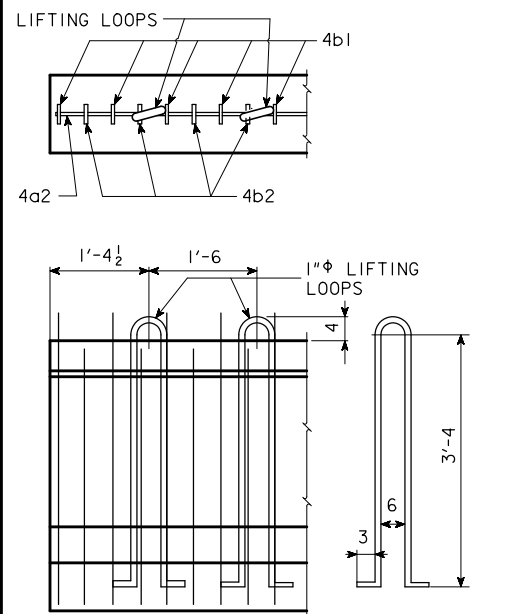
AUGUST, 2009

**B BEAM DETAILS**

**H40-35-06**

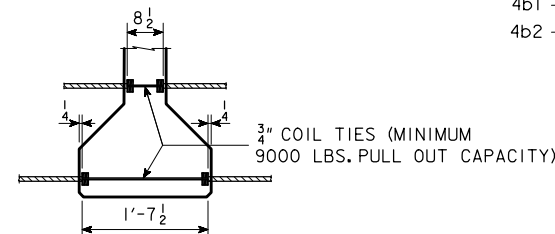
NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT  $\bar{C}$  BEAM AND END OF BEAM.

REVISED 10-09 - THE SPECIFICATION REFERENCES WERE CHANGED. THE BEAM DATA WAS UPDATED TO THE CURRENT BEAMS.



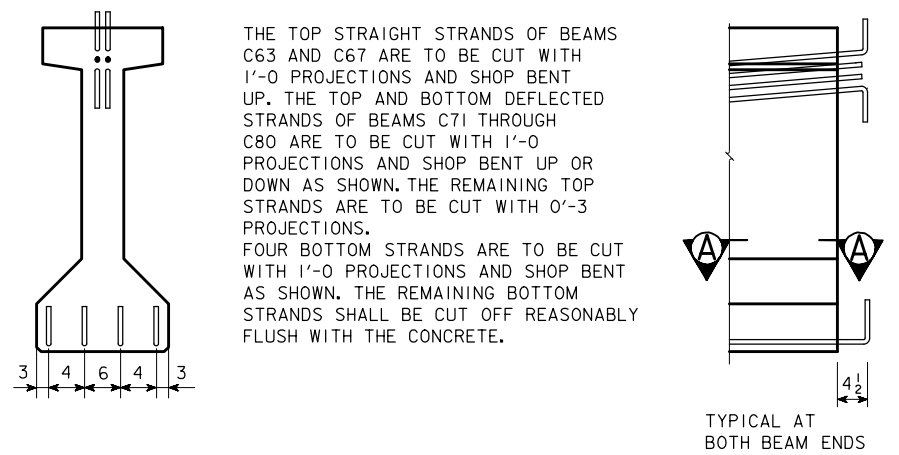
**LIFTING LOOP DETAIL**

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



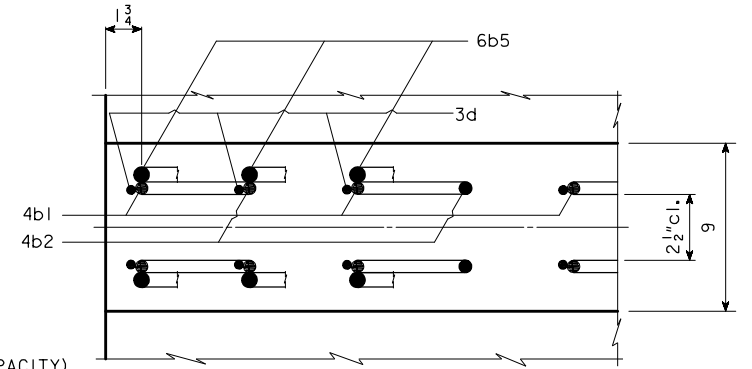
**COIL TIE DETAIL**

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



**STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS**

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.



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

\*\* WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.  
 ΔΔ 4b1 BARS TO BE EPOXY COATED.

**C BEAM DATA**

BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS (3) KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ <sub>D</sub>				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(lb)
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (1) (ELASTIC) Δ <sub>T</sub>		TIME (2) (PLASTIC) Δ <sub>T</sub>		HL93 LOADING				
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.			
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 1/2 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 1/2 OF SPAN, Δ<sub>D</sub>, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:  
 (A) Δ<sub>D</sub> = Δ<sub>1</sub> + Δ<sub>T</sub> FOR SIMPLE SPAN.  
 (B) Δ<sub>D</sub> = Δ<sub>1</sub> + 3/4 Δ<sub>T</sub> FOR END SPANS OF CONTINUOUS BRIDGE.  
 (C) Δ<sub>D</sub> = Δ<sub>1</sub> + 1/2 Δ<sub>T</sub> FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f'<sub>s</sub>, f'<sub>s</sub> = 270 ksi AND A<sub>s</sub> = 0.217 sq. in.
- \* MINIMUM CONCRETE f'<sub>c</sub> (AT 28 DAYS) SHALL BE 6,000 psi. MINIMUM f'<sub>ci</sub> AT RELEASE SHALL BE 5,000 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 2403.03, I, OF THE STANDARD 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 α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

**SPECIFICATIONS:**

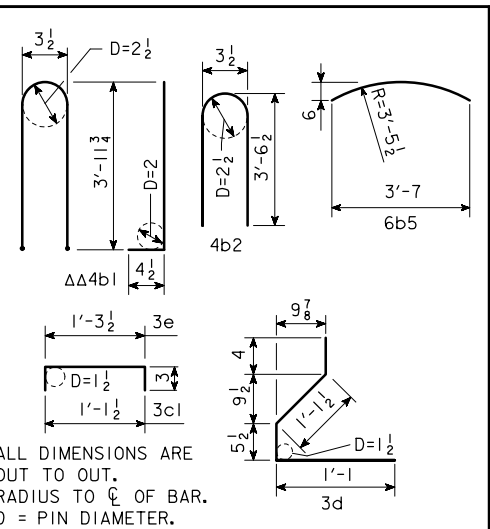
CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, 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 2007:  
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.  
 CONCRETE IN ACCORDANCE WITH SECTION 5, f'<sub>c</sub> = 5000 psi (EXCEPT AS NOTED)  
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f'<sub>s</sub> = 270,000 psi.

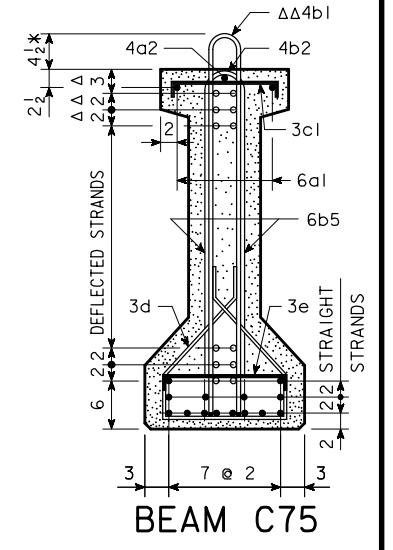
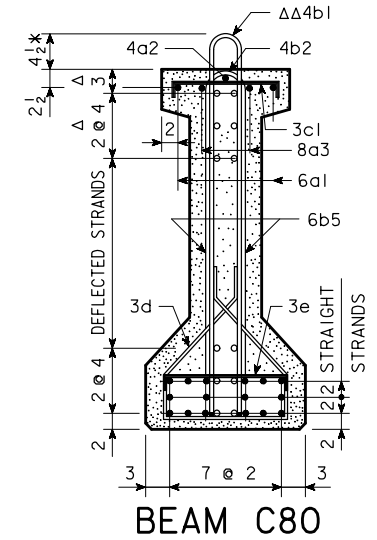
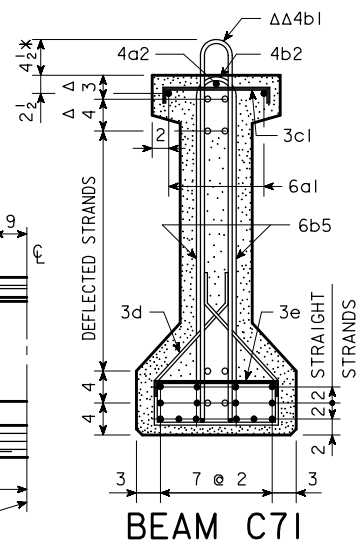
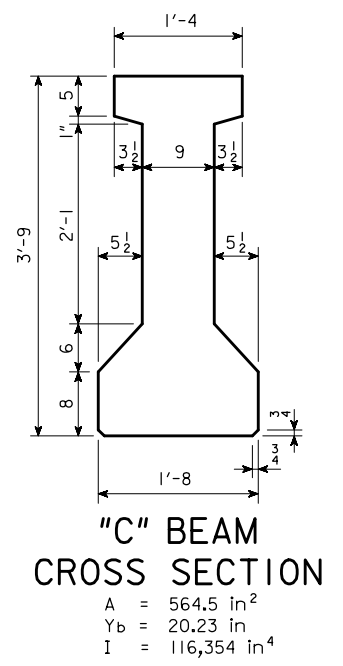
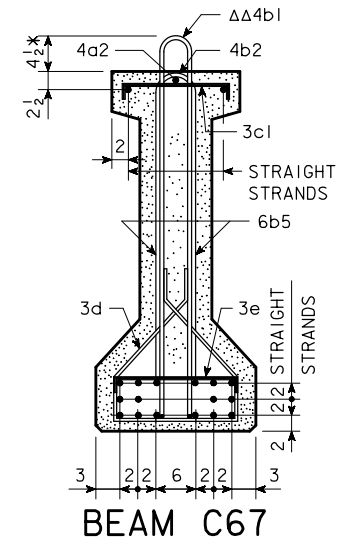
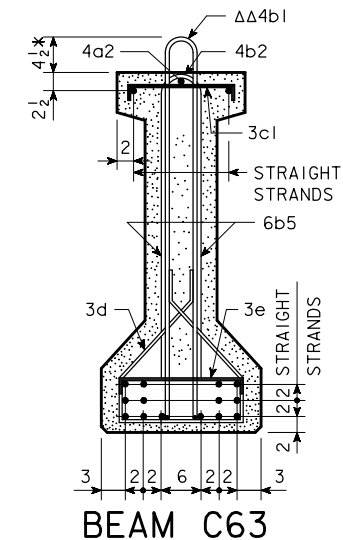
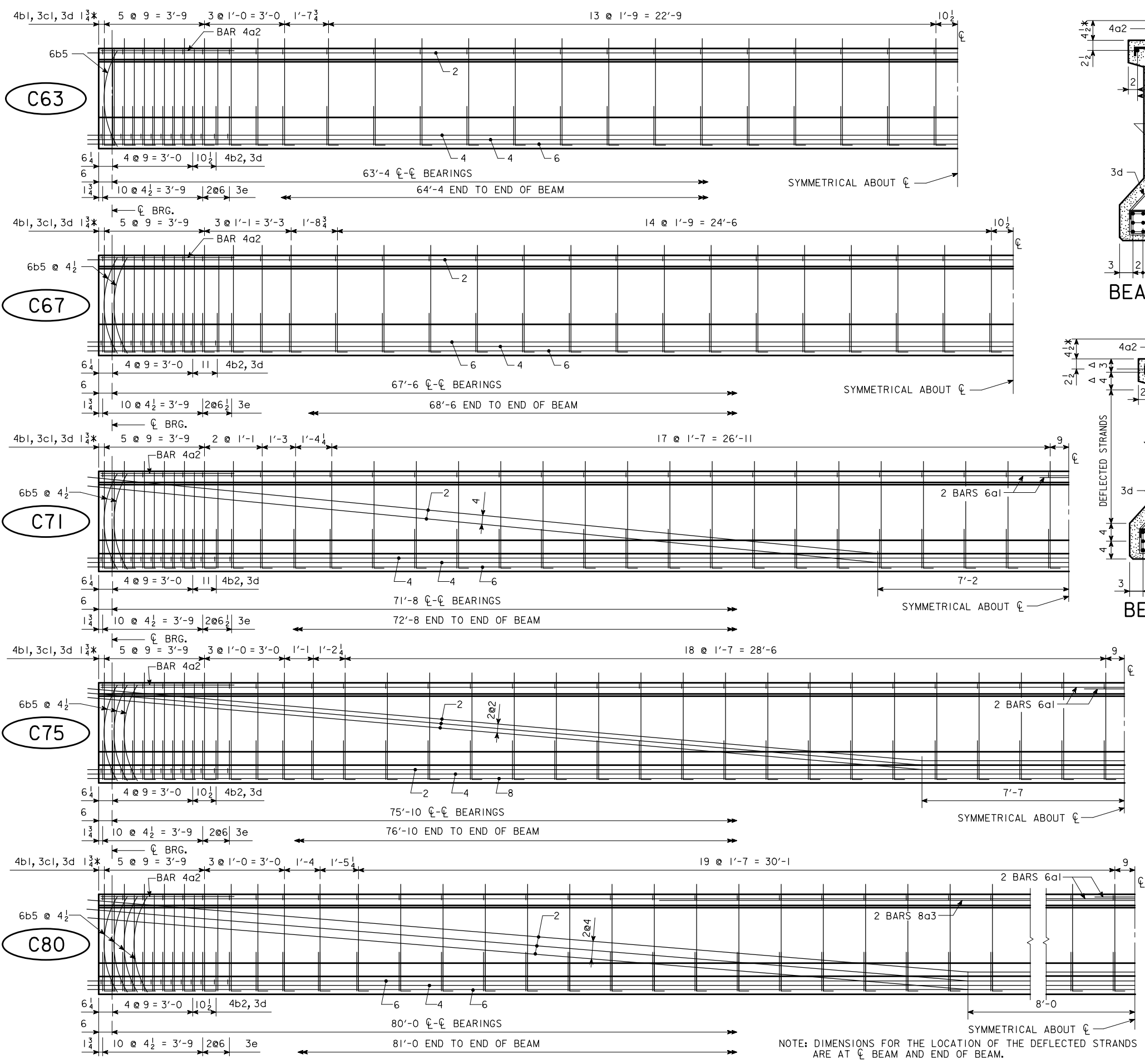
REINFORCING BAR LIST										
BEAM	SPAN	C63	C67	C71	C75	C80				
BAR SHAPE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
6a1	—	—	—	4	37'-8	4	39'-9	4	41'-10	
4a2	2	5'-0	2	5'-0	2	5'-0	2	5'-0	2	5'-0
8a3	—	—	—	—	—	—	—	—	2	40'-0
ΔΔ 4b1	46	8'-10	48	8'-10	54	8'-10	58	8'-10	60	8'-10
4b2	12	7'-2	12	7'-2	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 1/2 OF BAR. D = PIN DIAMETER.

10-09 LATEST REVISION DATE  Approved by <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<span>C BEAM DETAILS</span> <span>H40-36-06</span>

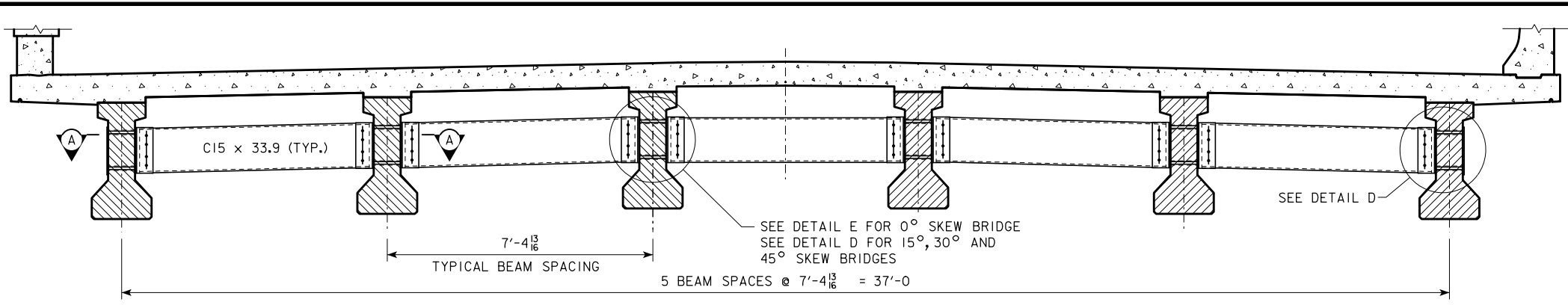
REVISED 10-09 - THE BEAM DETAILS WERE UPDATED TO THE CURRENT BEAMS.



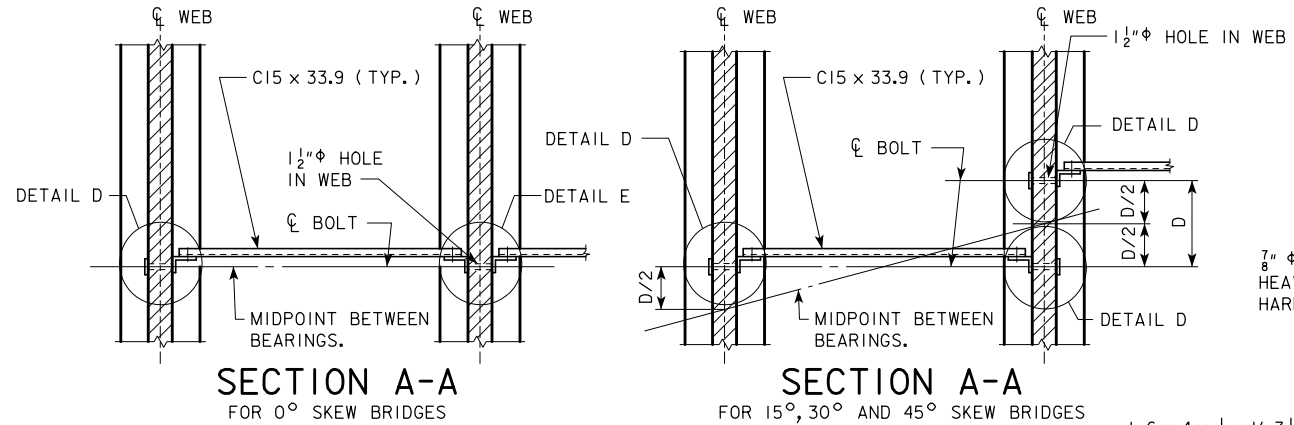
NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.  
 \* KEEP  
 Δ DIMENSIONS AT END OF BEAM  
 ΔΔ EPOXY COATED BARS

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

10-09 LATEST REVISION DATE  Approved by <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWADOT</b> Highway Division STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>C BEAM DETAILS</b>	<b>H40-37-06</b>



SECTION SHOWING INTERMEDIATE DIAPHRAGM



SECTION A-A FOR 0° SKEW BRIDGES

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

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		WEIGHT (LB.)
			0°	15°, 30° & 45°	
6	9	4.30	12	0	51.6
9	12	5.34	12	0	64.1
2 - L6 x 4 x 1/2 x 1'-3 1/4 = 41.2 LB			12	0	494.4

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		WEIGHT (LB.)
			0°	15°, 30° & 45°	
6	9	4.30	6	30	25.8
9	12	5.34	6	30	32.0
1 - BACKING PL 4 x 3/8 x 1'-3 1/4 = 6.5 LB			6	30	39.0
1 - L 6 x 4 x 1/2 x 1'-3 1/4 = 20.6 LB			6	30	123.6

\* ONE C15 x 33.9 DIAPHRAGM

WEB THICKNESS (IN.)	BEAM SPACING	LENGTH	NO. OF DIAPHR.	UNIT WEIGHT (LB.)	WEIGHT (LB.)
6	7'-4 13/16"	6'-7 7/16"	15	224.4	3366.2
9	7'-4 13/16"	6'-4 4/16"	15	215.9	3239.0

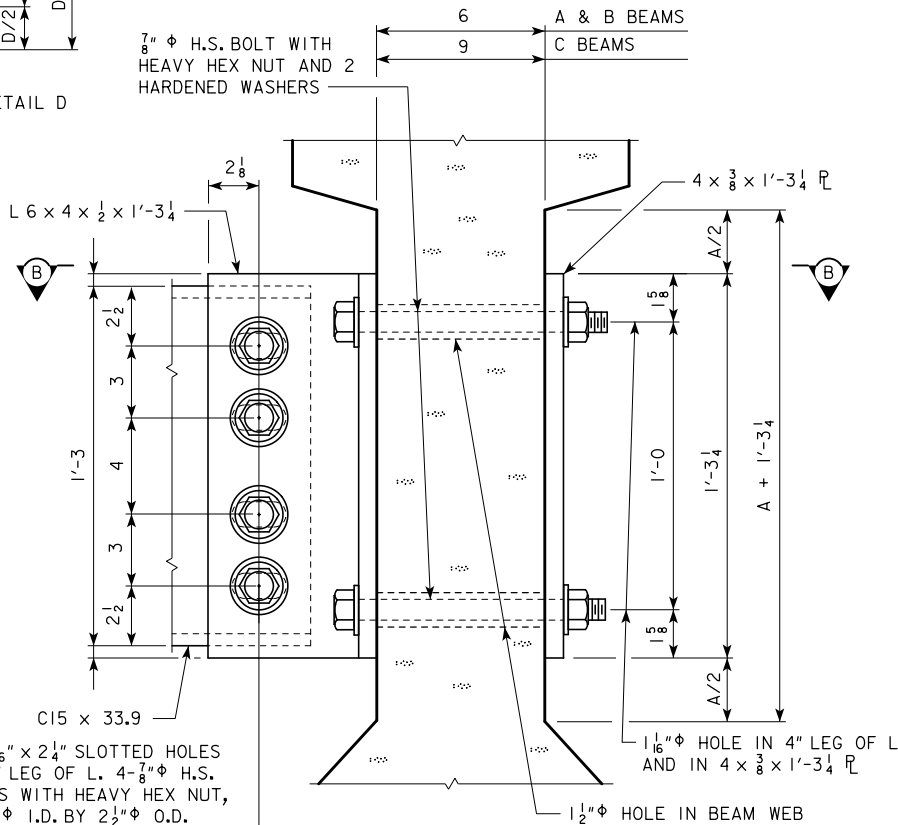
DIAPHRAGM CONNECTION BOLTS

8 - 7/8" φ x 0'-2 3/4" H.S. BOLTS WITH NUTS AND WASHERS, PER UNIT DIAPHRAGM = 10.3 LB	NO. OF DIAPHR.	WEIGHT (LB.)
	15	154.5

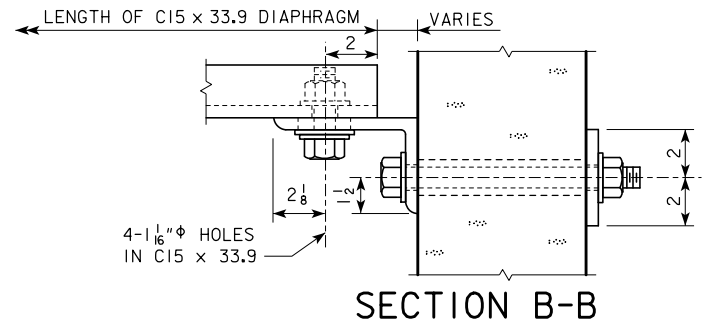
\* THE LENGTH OF THE C15 x 33.9 IS BASED ON A VARIABLE CLEARANCE OF 1/16" TO 2/16" BETWEEN THE FACE OF BEAM WEB AND END OF C15 x 33.9.

TOTAL WEIGHT

INTERMEDIATE DIAPHR. STRUCT. STEEL - TOTAL (LB.) =	WEB THICKNESS (IN.)	BRIDGE SKEW	
		0°	15°, 30° & 45°
4255	6	4255	4463
4147	9	4147	4367

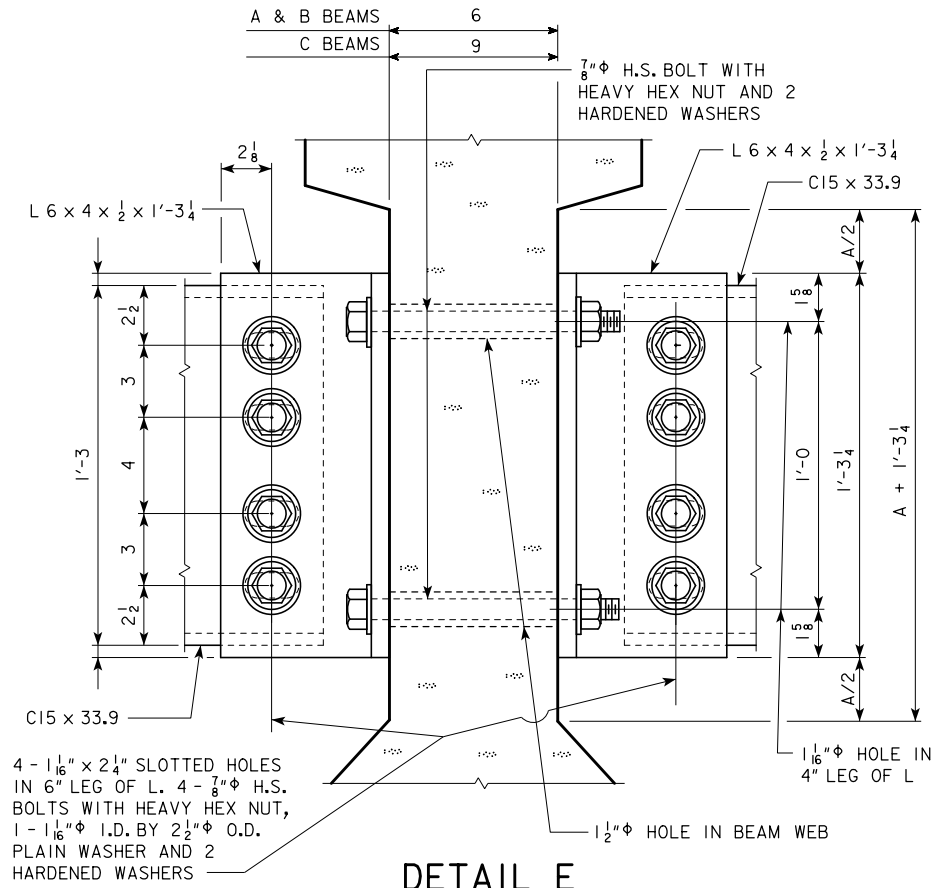


DETAIL D



SECTION B-B

BEAM SERIES	DIMENSIONS	
	A + 1'-3 1/4"	A/2
A	1'-4"	2 3/8"
B	1'-8"	4 3/8"
C	2'-1"	1'-0"



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.

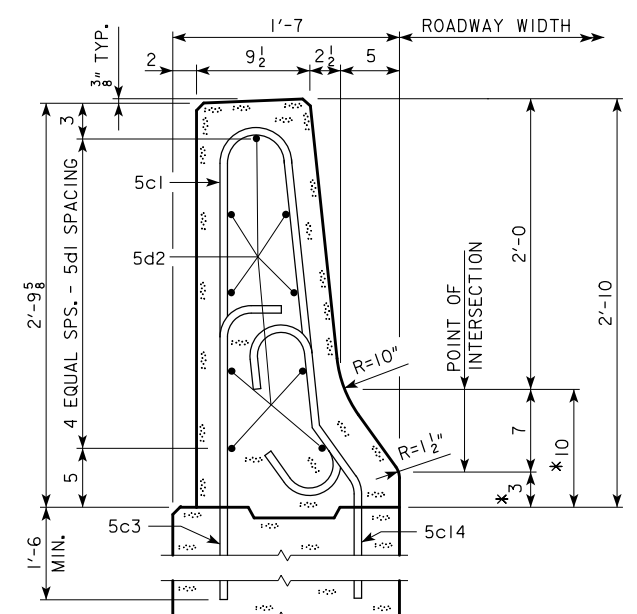
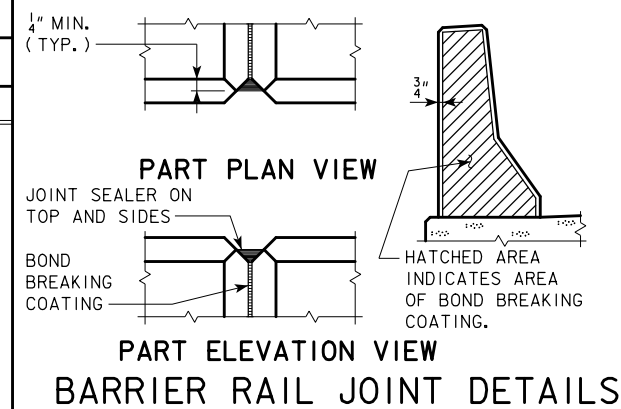
CONCRETE DIAPHRAGM DETAILS SHALL BE PROVIDED IN THE BRIDGE PLANS FOR OVERHEAD BRIDGES. DESIGNER SHALL ADJUST THE CONCRETE, REINFORCING AND STRUCTURAL STEEL QUANTITIES ACCORDINGLY.

REVISED 10-09 - MINOR CHANGES WERE MADE TO AGREE WITH OFFICE STANDARD.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<div style="text-align: center;"> <b>INTERMEDIATE STEEL DIAPHRAGMS</b> </div> <div style="text-align: center;"> <b>H40-38-06</b> </div>

**TABLE OF BARRIER RAIL DIMENSIONS AND NUMBERS**

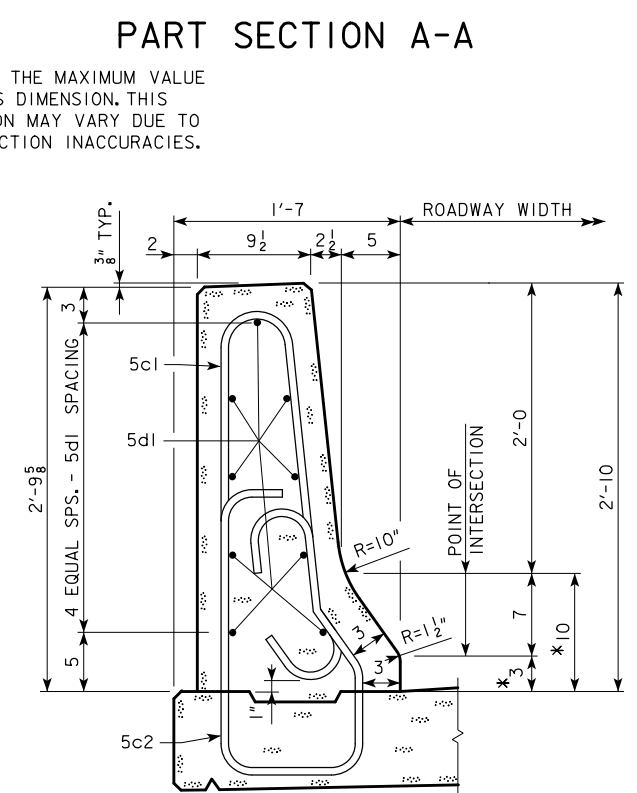
CL-CL ABUT. BRG	138'-10				151'-4				163'-10				176'-4				CL-CL ABUT. BRG
SKEW	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	SKEW
L (FT.-IN.)	155'-10	155'-11 1/4	156'-3 5/8	157'-0 7/8	168'-4	168'-5 1/4	168'-9 5/8	169'-6 7/8	180'-10	180'-11 1/4	181'-3 5/8	182'-0 7/8	193'-4	193'-5 1/4	193'-9 5/8	194'-6 7/8	L (FT.-IN.)
B (FT.-IN.)	141'-10	141'-11 1/4	142'-3 5/8	143'-0 7/8	154'-4	154'-5 1/4	154'-9 5/8	155'-6 7/8	166'-10	166'-11 1/4	167'-3 5/8	168'-0 7/8	179'-4	179'-5 1/4	179'-9 5/8	180'-6 7/8	B (FT.-IN.)
S (FT.-IN.)	141'-10	141'-11 1/4	142'-3 5/8	143'-0 7/8	154'-4	154'-5 1/4	154'-9 5/8	155'-6 7/8	166'-10	166'-11 1/4	167'-3 5/8	168'-0 7/8	179'-4	179'-5 1/4	179'-9 5/8	180'-6 7/8	S (FT.-IN.)
C	133	133	133	133	145	145	145	145	158	158	158	158	170	170	170	170	C
D (FT.-IN.)	133'-0	133'-0	133'-0	133'-0	145'-0	145'-0	145'-0	145'-0	158'-0	158'-0	158'-0	158'-0	170'-0	170'-0	170'-0	170'-0	D (FT.-IN.)
E	134	134	134	134	146	146	146	146	159	159	159	159	171	171	171	171	E
F (FT.-IN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F (FT.-IN.)
W (FT.-IN.)	3'-11	3'-11 5/8	4'-1 3/4	4'-6 1/2	4'-2	4'-2 5/8	4'-4 3/4	4'-9 1/2	3'-11	3'-11 5/8	4'-1 3/4	4'-6 1/2	4'-2	4'-2 5/8	4'-4 3/4	4'-9 1/2	W (FT.-IN.)
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	a



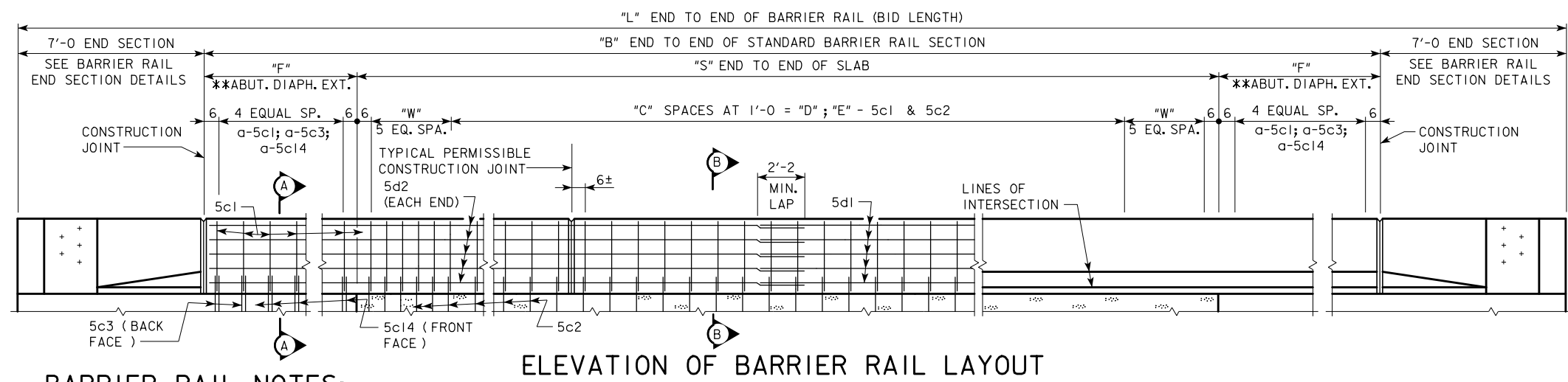
\* DENOTES THE MAXIMUM VALUE FOR THIS DIMENSION. THIS DIMENSION MAY VARY DUE TO CONSTRUCTION INACCURACIES.

**TABLE OF BARRIER RAIL DIMENSIONS AND NUMBERS**

CL-CL ABUT. BRG	188'-10				201'-4				213'-10				226'-4				243'-0				CL-CL ABUT. BRG
SKEW	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	SKEW
L (FT.-IN.)	205'-10	205'-11 1/4	206'-3 5/8	207'-0 7/8	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.)
B (FT.-IN.)	191'-10	191'-11 1/4	192'-3 5/8	193'-0 7/8	214'-4	214'-4	214'-4	214'-4	226'-10	226'-10	226'-10	226'-10	239'-4	239'-4	239'-4	239'-4	256'-0	256'-0	256'-0	256'-0	B (FT.-IN.)
S (FT.-IN.)	191'-10	191'-11 1/4	192'-3 5/8	193'-0 7/8	204'-4	204'-5 1/4	204'-9 5/8	205'-6 7/8	216'-10	216'-11 1/4	217'-3 5/8	218'-0 7/8	229'-4	229'-5 1/4	229'-9 5/8	230'-6 7/8	246'-0	246'-1 1/4	246'-5 5/8	247'-2 7/8	S (FT.-IN.)
C	183	183	183	183	195	195	195	195	208	208	208	208	220	220	220	220	237	237	237	237	C
D (FT.-IN.)	183'-0	183'-0	183'-0	183'-0	195'-0	195'-0	195'-0	195'-0	208'-0	208'-0	208'-0	208'-0	220'-0	220'-0	220'-0	220'-0	237'-0	237'-0	237'-0	237'-0	D (FT.-IN.)
E	184	184	184	184	196	196	196	196	209	209	209	209	221	221	221	221	238	238	238	238	E
F (FT.-IN.)	0	0	0	0	5'-0	4'-11 3/8	4'-9 1/4	4'-4 1/2	5'-0	4'-11 3/8	4'-9 1/4	4'-4 1/2	5'-0	4'-11 3/8	4'-9 1/4	4'-4 1/2	5'-0	4'-11 3/8	4'-9 1/4	4'-4 1/2	F (FT.-IN.)
W (FT.-IN.)	3'-11	3'-11 5/8	4'-1 3/4	4'-6 1/2	4'-2	4'-2 5/8	4'-4 3/4	4'-9 1/2	3'-11	3'-11 5/8	4'-1 3/4	4'-6 1/2	4'-2	4'-2 5/8	4'-4 3/4	4'-9 1/2	4'-0	4'-0 5/8	4'-2 3/4	4'-7 1/2	W (FT.-IN.)
a	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	a



**PART SECTION B-B**



**ELEVATION OF BARRIER RAIL LAYOUT**

**BARRIER RAIL NOTES:**

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

THE PERMISSIBLE CONSTRUCTION JOINTS ARE TO BE PLACED BETWEEN VERTICAL BARS AT A MINIMUM SPACING OF 20 FEET. CONSTRUCTION JOINT CONTACT SURFACES ARE TO BE COATED WITH AN APPROVED BOND BREAKER.

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

THE CONCRETE BARRIER RAIL IS TO BE BID ON A LINEAL FOOT BASIS. THE NUMBER OF LINEAL FEET OF BARRIER RAIL INSTALLED WILL BE PAID FOR AT THE CONTRACT PRICE PER LINEAL FOOT BASED ON PLAN QUANTITIES. PRICE BID FOR CONCRETE BARRIER RAILING SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIAL, EXCLUDING REINFORCING STEEL, AND ALL OF THE EQUIPMENT AND LABOR REQUIRED TO ERECT THE RAIL IN ACCORDANCE WITH THESE PLANS AND CURRENT SPECIFICATIONS.

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.

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

THE JOINT SEALER SHALL BE LIGHT GRAY NONSAG LATEX CAULKING SEALER MARKETED FOR OUTDOOR USE. NO TESTING OR CERTIFICATION IS REQUIRED.

TOP OF THE BARRIER RAIL IS TO BE PARALLEL TO THE THEORETICAL CL GRADE.

CROSS SECTIONAL AREA OF THE STANDARD SECTION OF THE BARRIER RAIL = 2.84 SQUARE FEET.

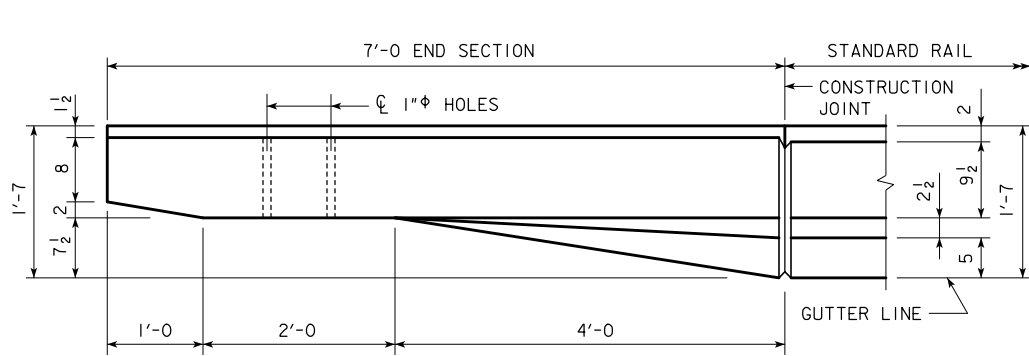
CONCRETE BARRIER RAILS PLACED USING THE SLIPFORM METHOD WILL REQUIRE THE USE OF A CLASS BR CONCRETE IN ACCORDANCE WITH ARTICLE 2513.03, A, 2, OF THE STANDARD SPECIFICATIONS. CAST-IN-PLACE BARRIER RAILS SHALL USE CLASS C MIX. CLASS D CONCRETE IS NOT PERMITTED FOR CONCRETE BARRIER RAILS (CAST-IN-PLACE OR SLIPFORMED METHOD).

\*\* APPLIES TO 201'-4, 213'-10, 226'-4 & 243'-0 BRIDGES ONLY.

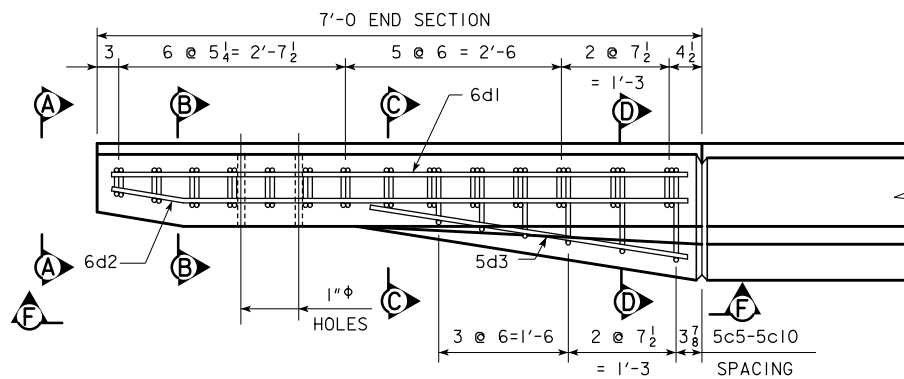
REVISED 10-09 - THE SPECIFICATION REFERENCES WERE CHANGED.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
<b>BARRIER RAIL DETAILS</b> SHEET 1 OF 3	<b>H40-39-06</b>

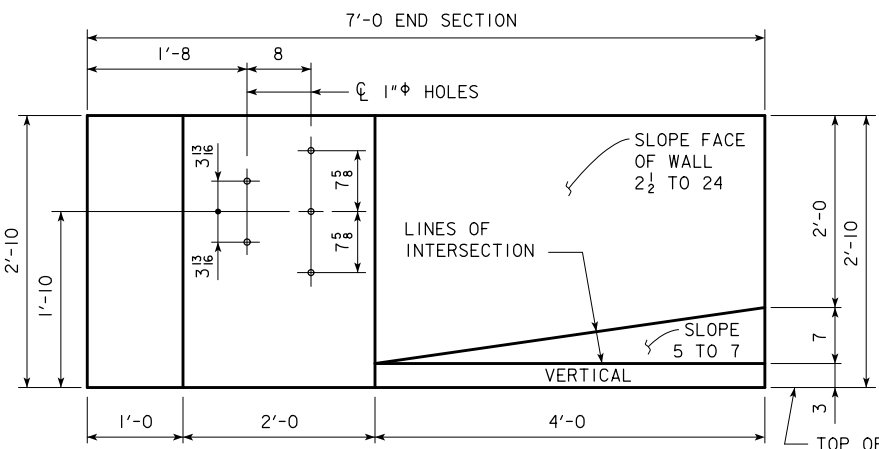
REVISED 10-09 - THE END SECTION STEEL WAS CHANGED TO AGREE WITH THE OFFICE STANDARD.



PART PLAN VIEW

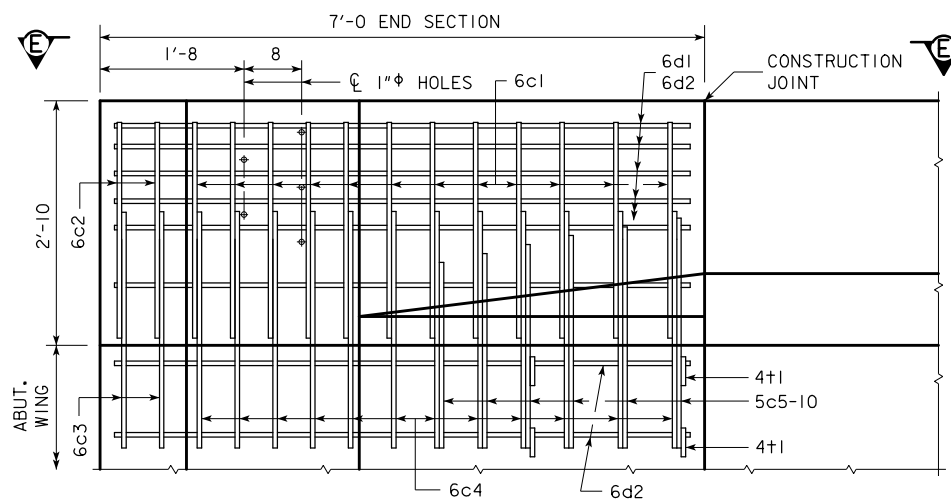


PART VIEW E-E



PART ELEVATION VIEW

PROVIDE 5 HOLES FORMED WITH 1" PLASTIC CONDUIT. COST TO BE INCLUDED IN PRICE BID FOR CONCRETE BARRIER RAILING.



PART VIEW F-F

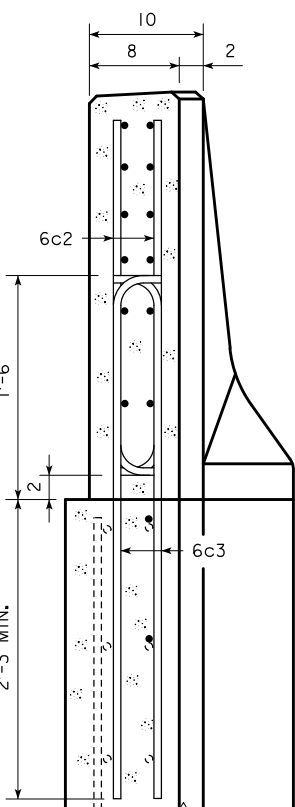
NOTE:  
4+1 PLACEMENT- 2 BARS EACH LEVEL OF 6d2 IN WING FOOTING.

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

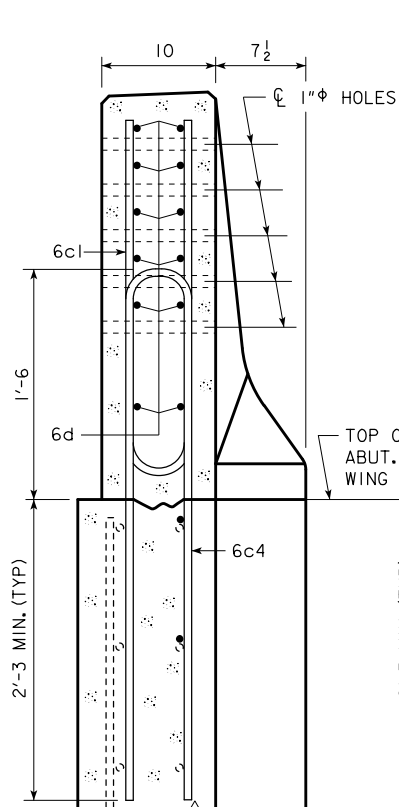
NOTE:  
THE 10" RADIUS AND 1 1/2" RADIUS ARE TYPICAL AND SHALL BE USED WHEN CONSTRUCTING THE CORNERS FOR VIEW A-A, SECTION B-B, SECTION C-C AND SECTION D-D.

NOTE:  
THE 6c4, 6c3, 5c5-10, 2 - 6d2 AND 4+1 BARS ARE TO BE PLACED WITH THE ABUTMENT WING. THE DETAILS FOR PLACEMENT ARE SHOWN ON THE WING ABUTMENT SHEET.

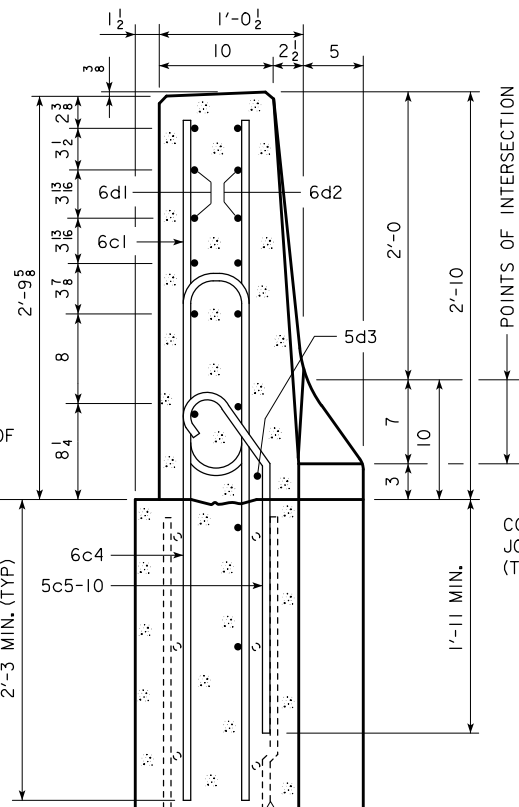
NOTE:  
DASHED LINES BELOW THE TOP OF WING ARE THE ABUTMENT WING REINFORCING STEEL. SEE WING ABUTMENT SHEET FOR PLACEMENT.



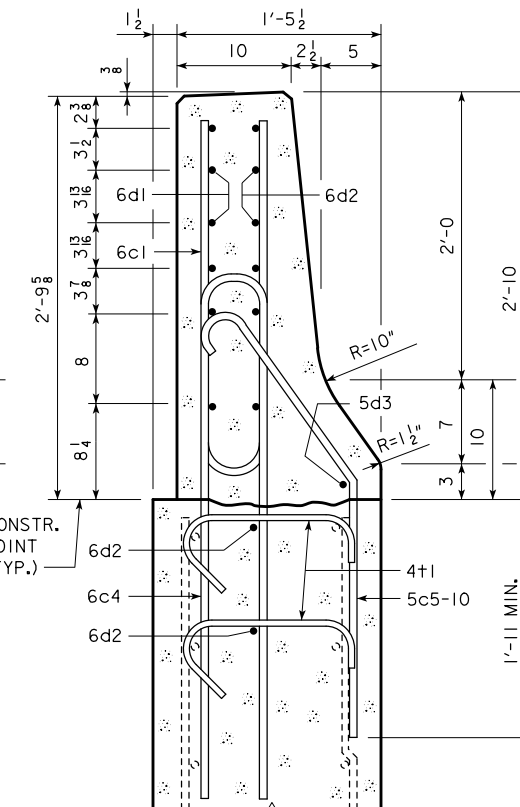
VIEW A-A



SECTION B-B



SECTION C-C



SECTION D-D

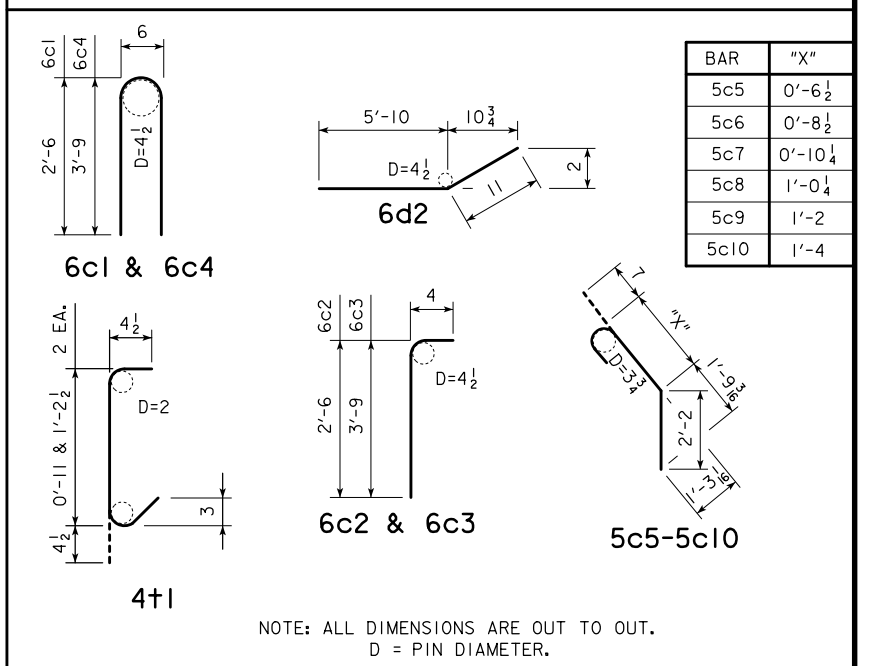
EPOXY REINFORCING STEEL - ONE END SECTION

BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT	
6c1	VERTICAL	U	12	5'-6	99	
6c2	VERTICAL	U	4	2'-10	17	
6c3	VERTICAL	U	4	4'-1	25	
6c4	VERTICAL	U	12	8'-0	144	
5c5-10	VERTICAL	U	6	VARIES	23	
6d1	HORIZONTAL	—	6	6'-8	60	
6d2	HORIZONTAL	—	8	6'-9	81	
5d3	HORIZONTAL	—	1	3'-9	4	
4+1	ABUTMENT WING TIE BARS	U	4	VARIES	5	
(INCLUDE WITH BARRIER RAIL REINFORCING)					TOTAL WEIGHT (LBS.)	458

CONCRETE PLACEMENT SUMMARY

SECTION	TOTAL
BARRIER RAIL ONE END SECTION	0.65 CU. YD.

BENT BAR DETAILS



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

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>BARRIER RAIL END SECTION DETAILS</b> SHEET 2 OF 3



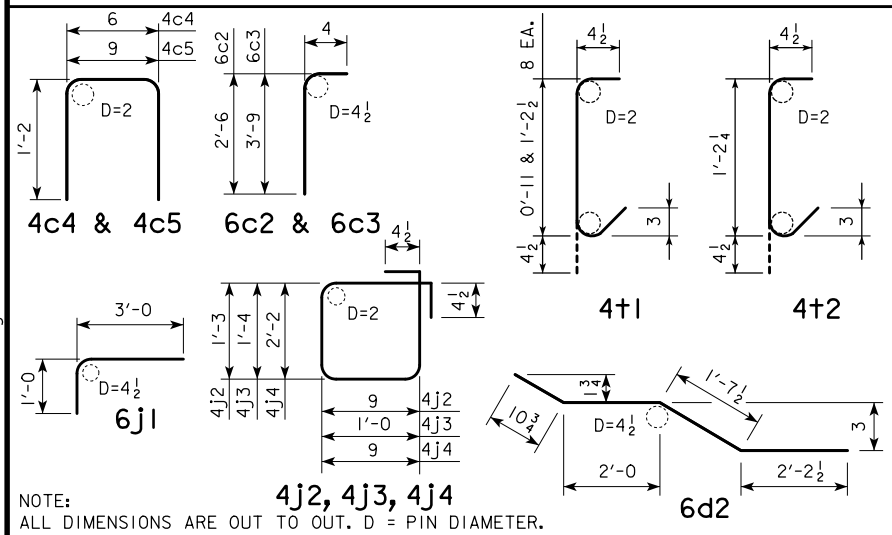


# EPOXY COATED REINFORCING STEEL-TWO OPEN RAILS

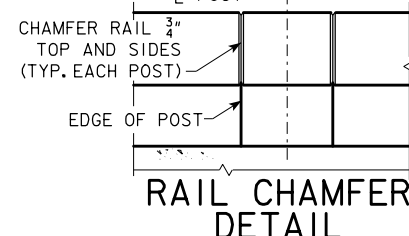
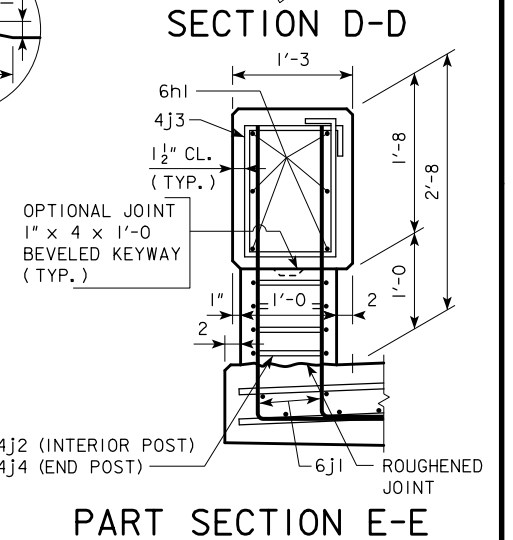
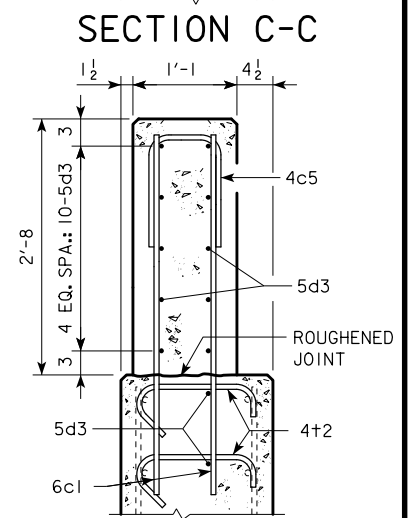
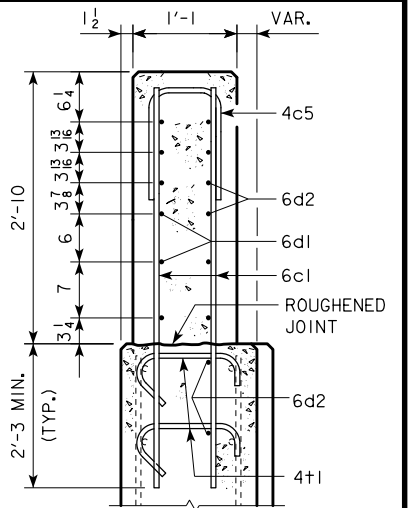
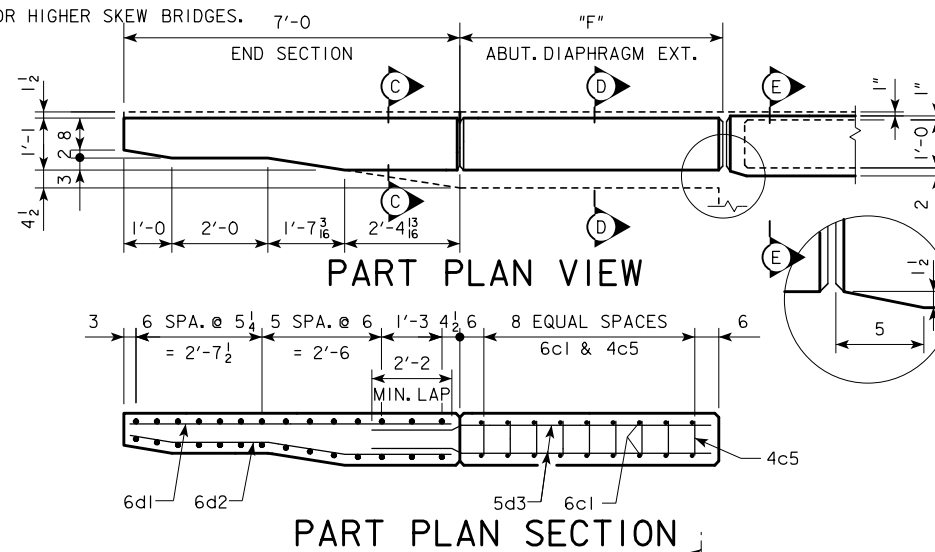
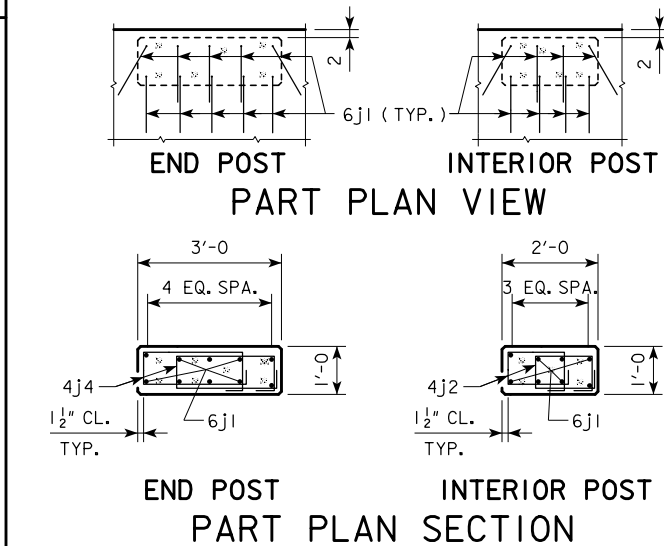
(NOTE: THESE REINFORCING BARS TO BE USED ON ALL SKEWS)

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	1,241	168	4'-11	1,241	168	4'-11	1,241
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	11'-2	537	32	11'-2	537	32	11'-2	537	32	11'-2	537
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'-8	1,322	24	24'-8	889	24	30'-11	1,114	24	37'-2	1,340	24	25'-2	907	24	31'-5	1,133	24	37'-8	1,358	24	25'-8	925	24	34'-0	1,226
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	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	19	16	VARIABLE	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)					8,880	9,409	10,115	10,823	11,352	13,289	13,756	14,526	15,308																

## BENT BAR DETAILS



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



## 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 H40-42-06.

## 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	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

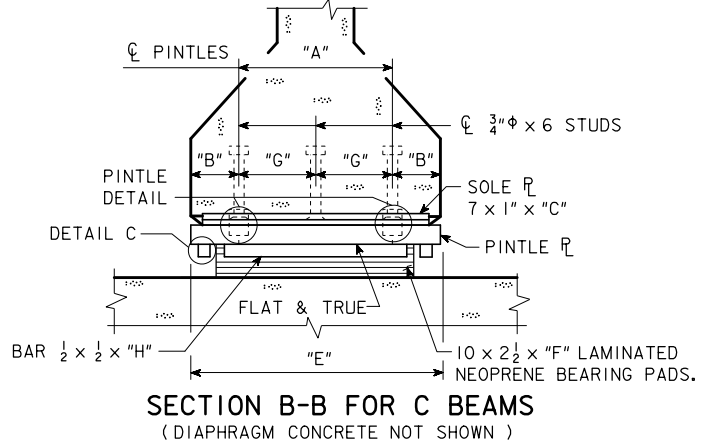
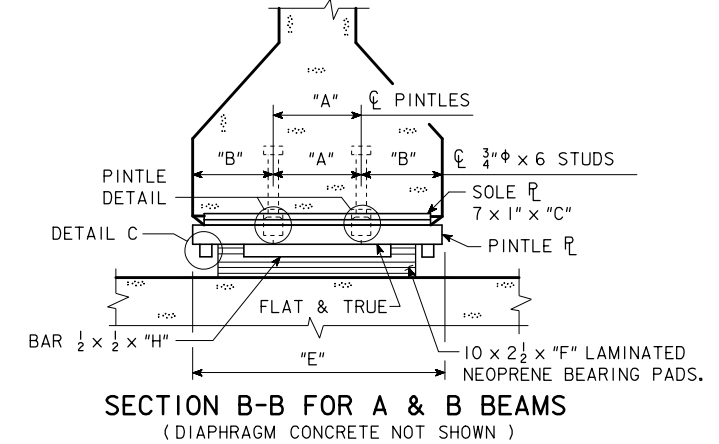
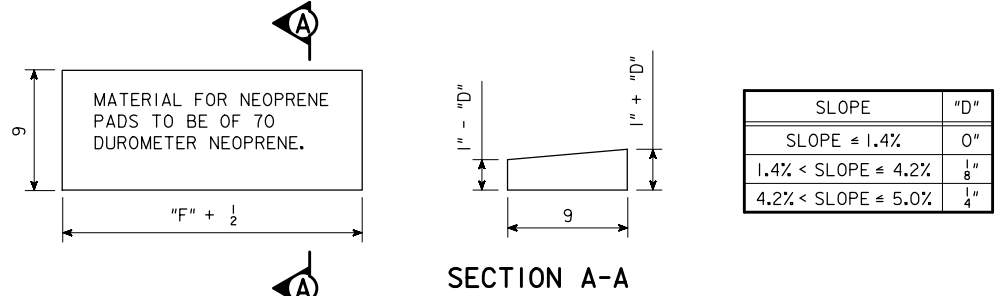
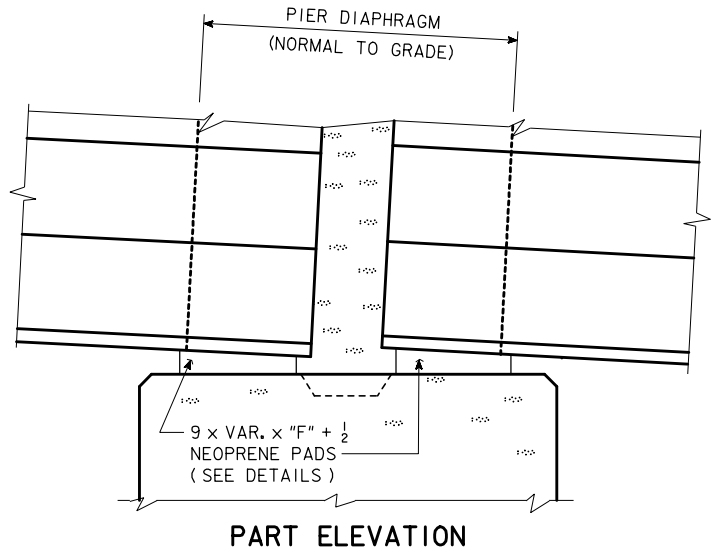
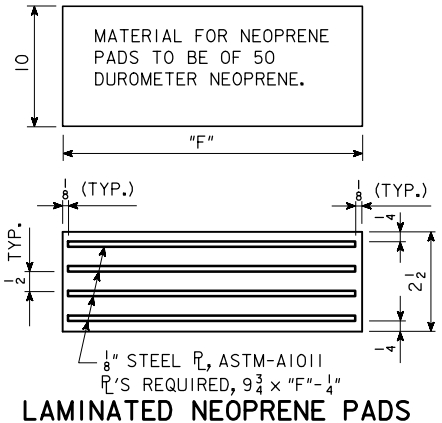
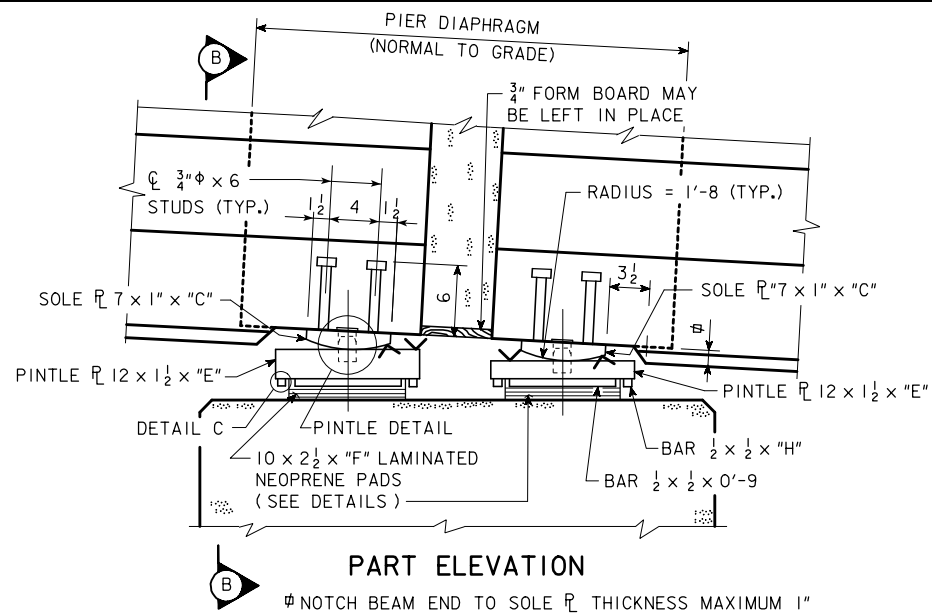
07-10  
LATEST REVISION DATE

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE  
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**  
AUGUST, 2009

**OPEN RAIL, TL-4 DETAILS**     **H40-43-06**  
SHEET 2 OF 2

APPROVED BY BRIDGE ENGINEER  
*Norman L. Mc Donald*

REVISED 07-10 - PROVIDED A 3/8" GAP BETWEEN RAIL AND ABUT. DIAPH. EXT. CHANGED 6j1 BAR LENGTH.



**PLAN OF NEOPRENE PAD**

SLOPE<sub>SPAN 1</sub> = 100%  $\frac{P/G \text{ ELEV. @ NEAR ABUT.} - P/G \text{ ELEV. @ PIER 1}}{\text{SPAN 1 LENGTH}}$

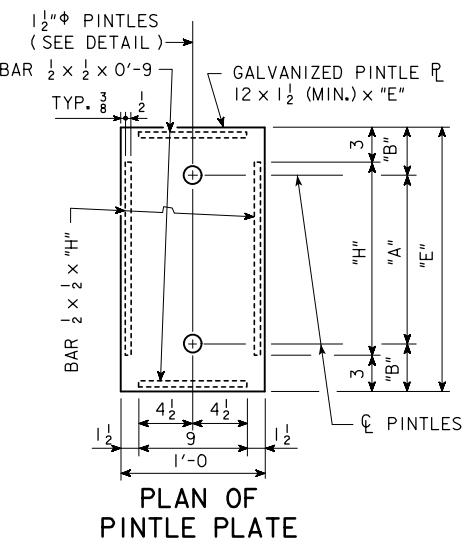
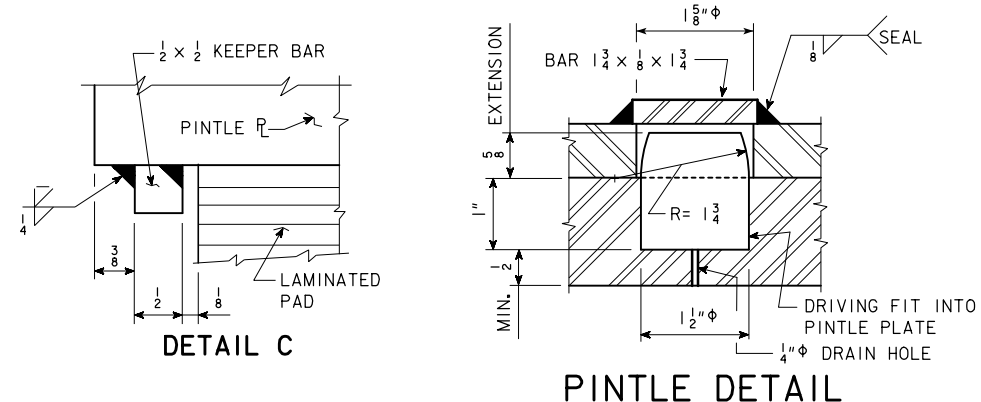
SLOPE<sub>SPAN 2</sub> = 100%  $\frac{P/G \text{ ELEV. @ PIER 1} - P/G \text{ ELEV. @ PIER 2}}{\text{SPAN 2 LENGTH}}$

SLOPE<sub>SPAN 3</sub> = 100%  $\frac{P/G \text{ ELEV. @ PIER 2} - P/G \text{ ELEV. @ FAR ABUT.}}{\text{SPAN 3 LENGTH}}$

**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".

**SLOPE CALCULATION FORMULA**

**FIXED PIER**



**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**

VARIABLE DIMENSIONS		
	BEAM BOTTOM FLANGE WIDTH	
	A & B BEAMS	C BEAMS
"A"	0'-6"	1'-0"
"B"	0'-5 1/2"	0'-4"
"C"	1'-3 1/2"	1'-6 1/2"
"E"	1'-5"	1'-8"
"F"	1'-3"	1'-6"
"G"		0'-6"
"H"	0'-11"	1'-2"

09-12  
LATEST REVISION DATE

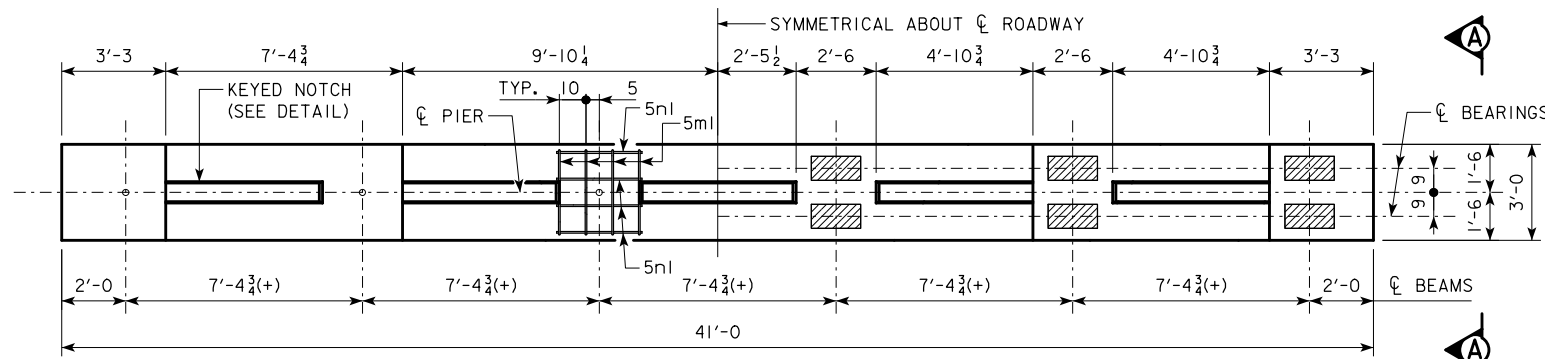
*Norman L. Mc Donald*  
APPROVED BY BRIDGE ENGINEER



STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE  
**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**  
AUGUST, 2009

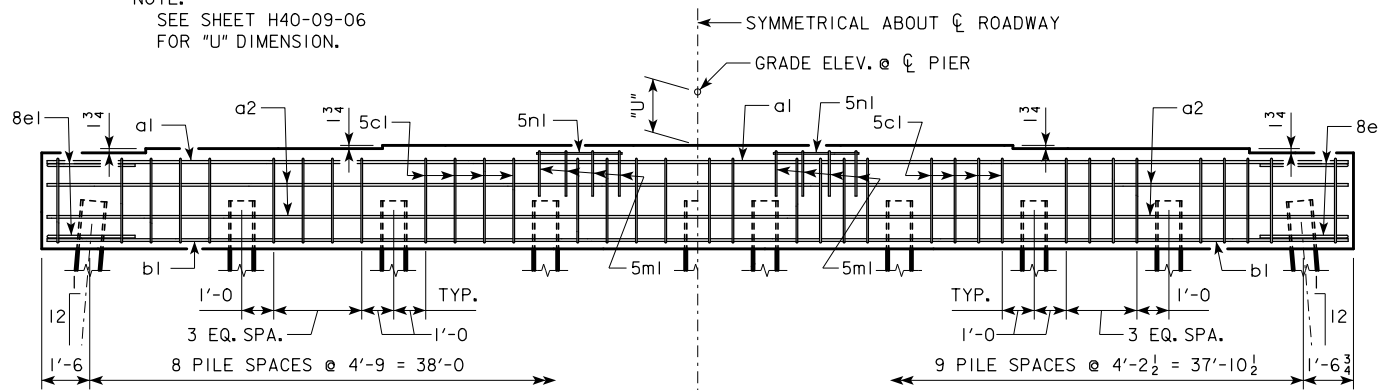
PIER BEARING DETAILS H40-44-06

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



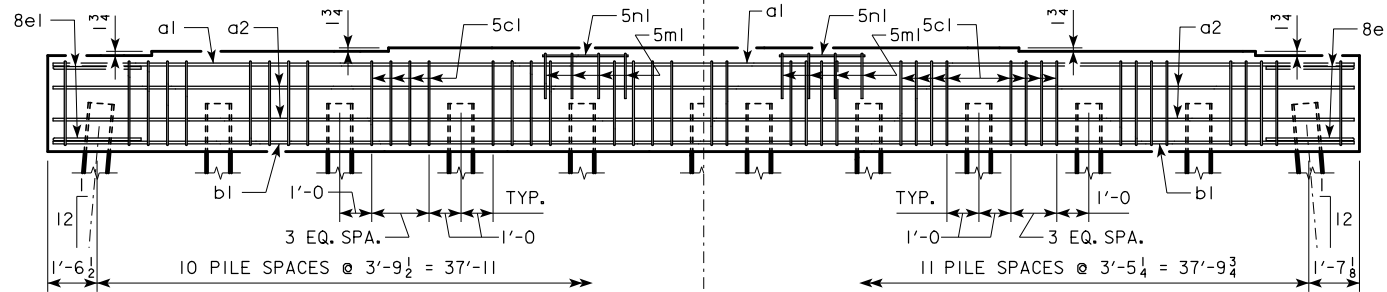
TYPICAL PLAN

NOTE:  
SEE SHEET H40-09-06  
FOR "U" DIMENSION.



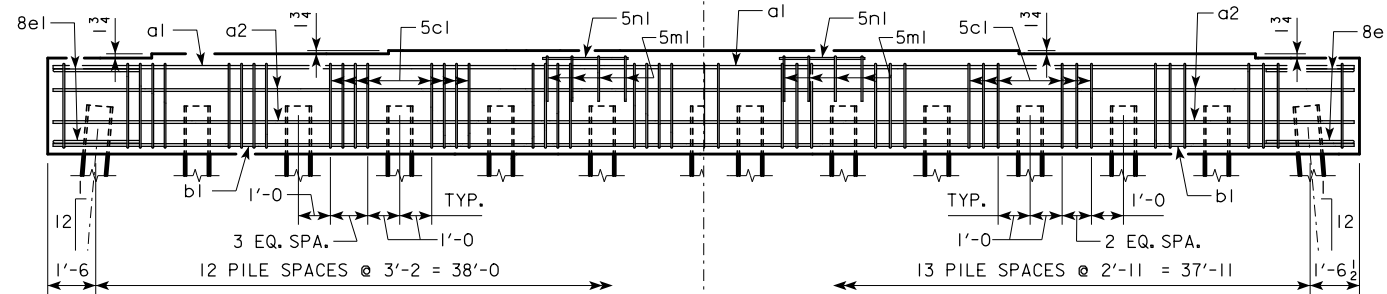
9 PILE BENT

10 PILE BENT



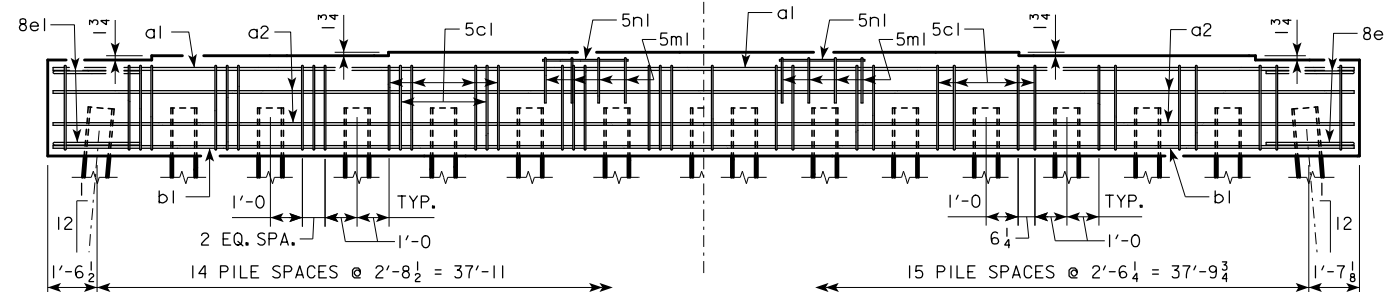
11 PILE BENT

12 PILE BENT



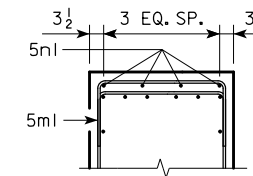
13 PILE BENT

14 PILE BENT

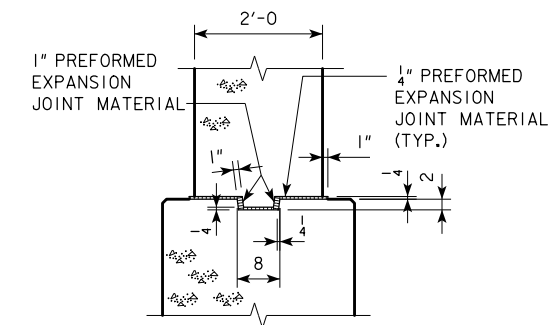


15 PILE BENT

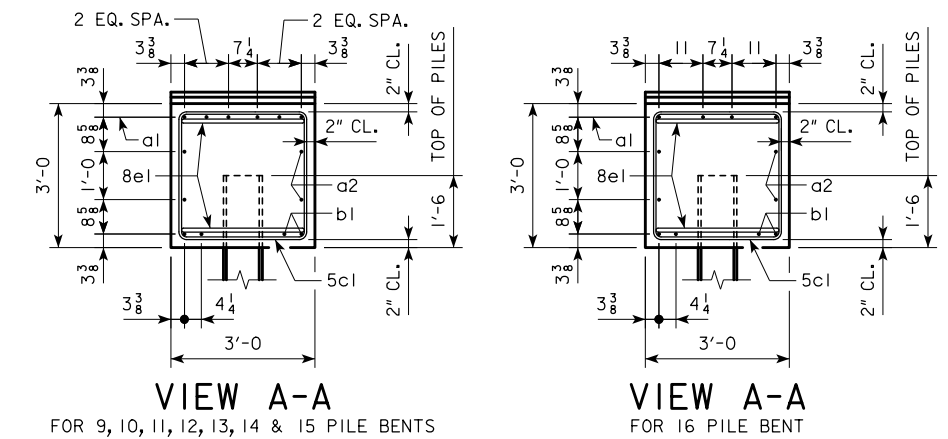
16 PILE BENT



5ml & 5nl  
BAR LAYOUT



KEYED NOTCH DETAIL



VIEW A-A

FOR 9, 10, 11, 12, 13, 14 & 15 PILE BENTS

VIEW A-A

FOR 16 PILE BENT

REVISED 10-09 - SHEET WAS REVISED TO MEET LRFD SPECIFICATIONS.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>PILE BENT PIERS</b> 0° SKEW	<b>H40-45-06</b>

## REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT

BAR	LENGTH	SHAPE	9 PILE BENT			10 PILE BENT			11 PILE BENT			12 PILE BENT			13 PILE BENT			14 PILE BENT			15 PILE BENT			16 PILE BENT		
			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	40'-8	————	6	9	830	6	9	830	6	9	830	6	9	830	6	9	830	6	9	830	6	9	830	4	9	553
a2	40'-8	————	4	8	434	4	8	434	4	8	434	4	8	434	4	8	434	4	8	434	4	8	434	4	8	434
b1	40'-8	————	4	9	553	4	9	553	4	9	553	4	9	553	4	9	553	4	9	553	4	8	434	4	8	434
5c1	11'-8	□	34	5	414	38	5	462	42	5	511	46	5	560	50	5	608	41	5	499	44	5	535	32	5	389
8e1	8'-1	□	4	8	86	4	8	86	4	8	86	4	8	86	4	8	86	4	8	86	4	8	86	4	8	86
5m1	5'-6	□	8	5	46	8	5	46	8	5	46	8	5	46	8	5	46	8	5	46	8	5	46	8	5	46
5n1	2'-8	□	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22
REINFORCING STEEL (LB.)			2385			2433			2482			2531			2579			2470			2387			1964		
STRUCTURAL CONCRETE (CY)	① PILE TYPE																									
	1, 2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	3	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5

### PILE BENT NOTES:

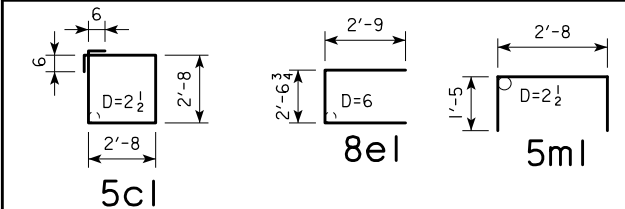
THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

FOR DETAILS OF TRESTLE PILES, TYPES 1, 2 AND 3, SEE STANDARD PIOL.

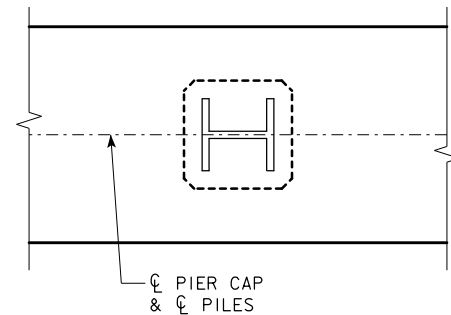
MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.

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

### BENT BAR DETAILS



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



PILE ORIENTATION DETAIL FOR  
TYPE 3 TRESTLE BENT PILES

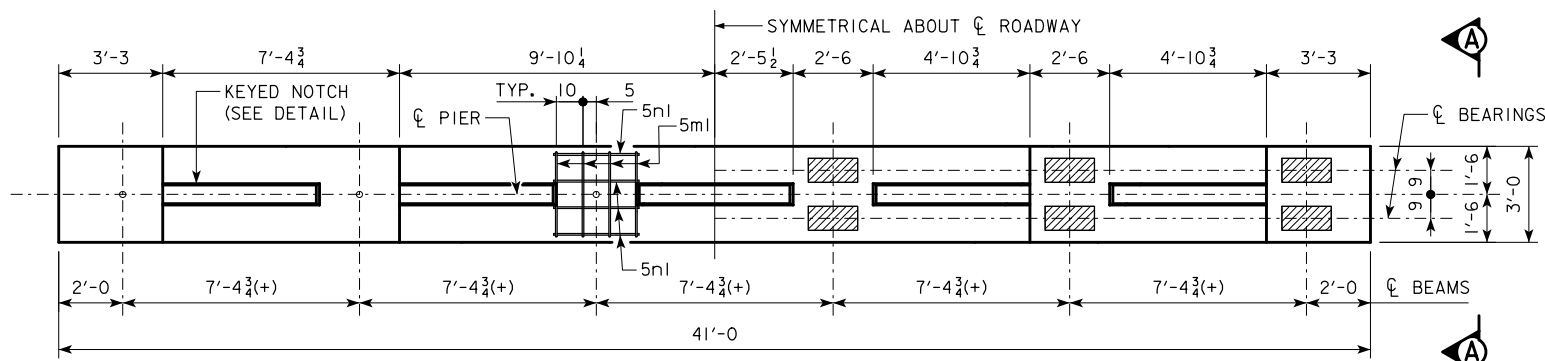
℄-℄ ABUTMENT BEARING	FRICTION BEARING PILING			FRICTION OR POINT BEARING PILING		
	PIOL TYPE 1 OR 2			PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	② "K" (INCHES)	③ LRFD PU, STRENGTH I DES. LOAD (KIPS)	NUMBER OF TRESTLE PILES	PILE SIZE	③ LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	13	14	91	9	HP10x57	131
	11	16	107	9	HP12x53	131
151'-4	14	14	89	9	HP10x57	138
	12	16	104	10	HP12x53	124
163'-10	-----	--	--	10	HP10x57	134
	-----	--	--	10	HP12x53	134
176'-4	-----	--	--	10	HP10x57	141
	-----	--	--	11	HP12x53	128
188'-10	-----	--	--	11	HP10x57	133
	-----	--	--	11	HP12x53	133
201'-4	-----	--	--	12	HP10x57	136
	-----	--	--	13	HP12x53	126
213'-10	-----	--	--	12	HP10x57	143
	-----	--	--	13	HP12x53	132
226'-4	-----	--	--	13	HP10x57	139
	-----	--	--	14	HP12x53	129
243'-0	-----	--	--	14	HP10x57	136
	-----	--	--	15	HP12x53	127

- ① CONCRETE QUANTITIES SHOWN HAVE HAD THE VOLUME OF EMBEDDED PILES DEDUCTED FOR TYPES 1 AND 2 BASED ON 0.8 FT<sup>3</sup> PER FOOT OF EMBEDMENT. THE CONCRETE QUANTITIES FOR TYPE 3 PILES DO NOT REQUIRE REDUCTION FOR PILE EMBEDMENT.
- ② SEE STANDARD PIOL FOR "K" DIMENSION.
- ③ NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

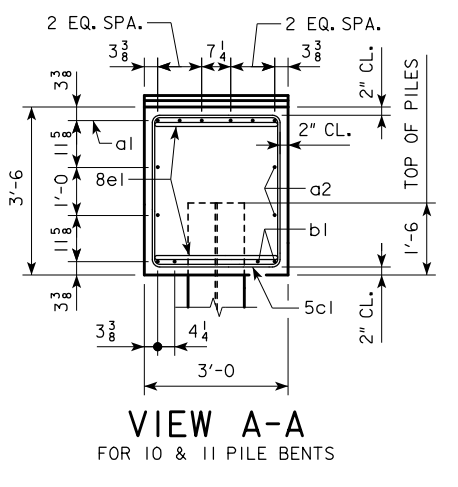
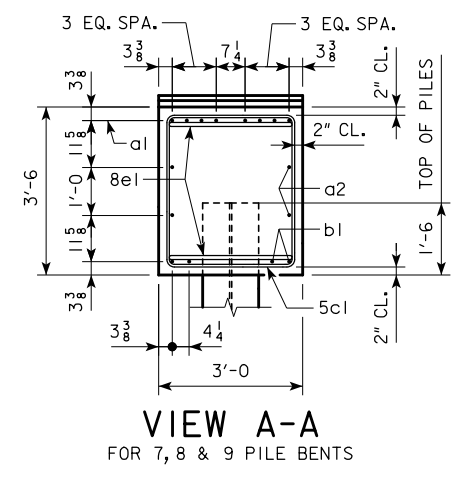
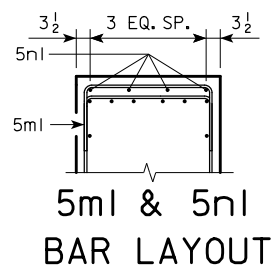
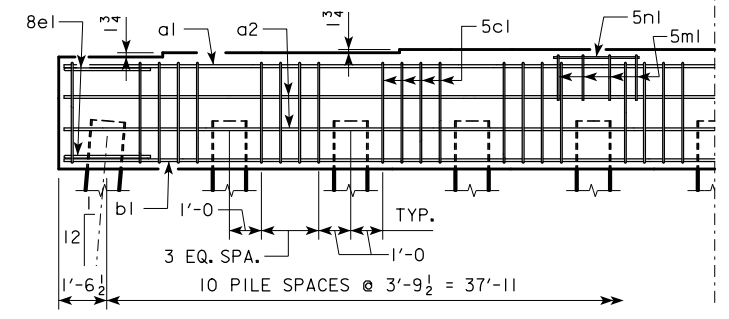
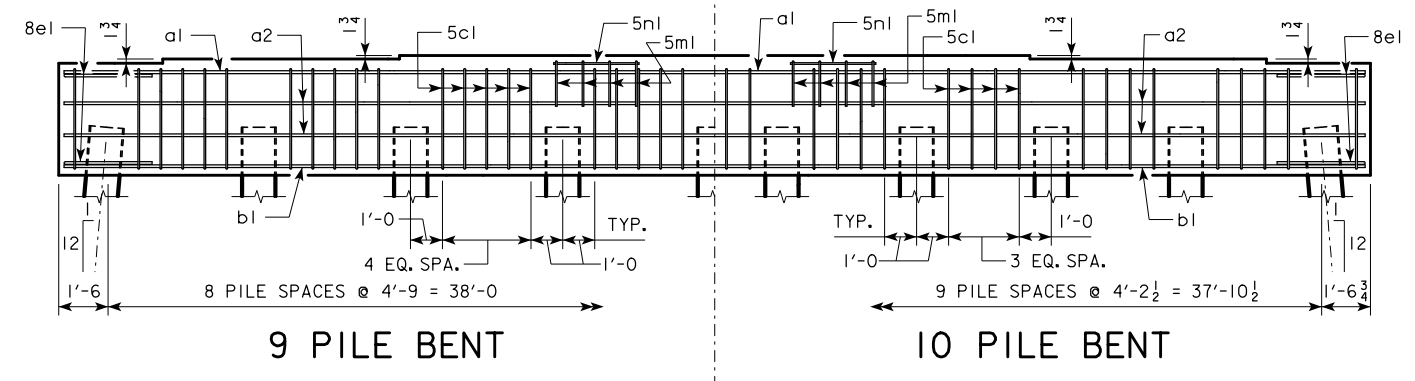
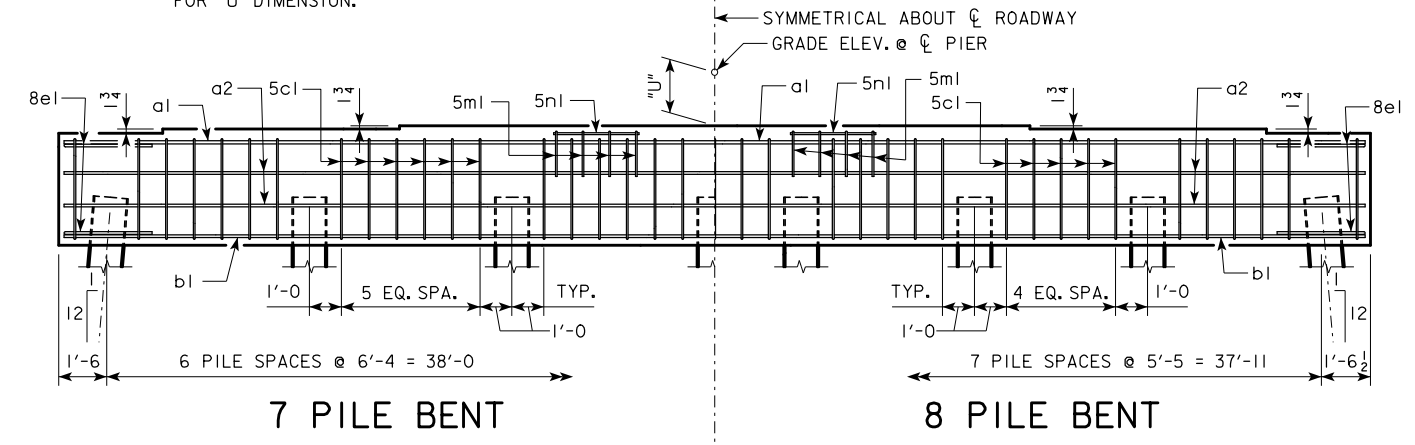
NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL.  
POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
PILE BENT PIERS 0° SKEW		<b>H40-46-06</b>



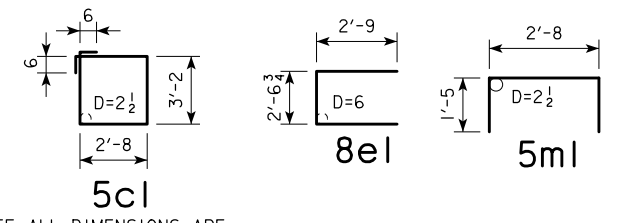
TYPICAL PLAN



### REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT

BAR	LENGTH	SHAPE	7 PILE BENT			8 PILE BENT			9 PILE BENT			10 PILE BENT			11 PILE BENT		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	40'-8"	—	8	9	1106	8	9	1106	8	9	1106	6	9	830	6	9	830
a2	40'-8"	—	4	8	434	4	8	434	4	8	434	4	8	434	4	8	434
b1	40'-8"	—	4	9	553	4	9	553	4	9	553	4	9	553	4	9	553
5c1	12'-8"	□	38	5	502	37	5	489	42	5	555	38	5	502	42	5	555
8e1	8'-1"	—	4	8	86	4	8	86	4	8	86	4	8	86	4	8	86
5m1	5'-6"	—	8	5	46	8	5	46	8	5	46	8	5	46	8	5	46
5n1	2'-8"	—	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22
REINFORCING STEEL (LB.)			2749			2736			2802			2473			2526		
STRUCTURAL CONCRETE (CY)			16.8			16.8			16.8			16.8			16.8		

BENT BAR DETAILS



PILE BENT NOTES:

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

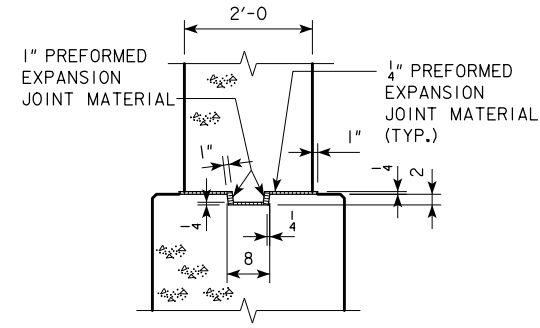
FOR DETAILS OF TRESTLE PILES, SEE STANDARD PIOL.

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

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

FRICION OR POINT BEARING PILING

CL-CL ABUTMENT BEARING	PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	PILE SIZE	LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10"	7	HP14x73	170
	7	HP14x89	170
151'-4"	7	HP14x73	179
	7	HP14x89	179
163'-10"	8	HP14x73	169
	7	HP14x89	194
176'-4"	8	HP14x73	177
	7	HP14x89	202
188'-10"	8	HP14x73	185
	7	HP14x89	211
201'-4"	9	HP14x73	183
	8	HP14x89	206
213'-10"	10	HP14x73	173
	8	HP14x89	216
226'-4"	10	HP14x73	182
	9	HP14x89	202
243'-0"	11	HP14x73	174
	9	HP14x89	213



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

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

LATEST REVISION DATE 05-13

APPROVED BY BRIDGE ENGINEER  
*Norman L. Mc Donald*

**IOWADOT** Highway Division

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

**PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES**

AUGUST, 2009

**PILE BENT PIERS**  
HPI4 PILES  
0° SKEW

**H40-47-06**

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



**REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT**

BAR	LENGTH	SHAPE	9 PILE BENT			10 PILE BENT			11 PILE BENT			12 PILE BENT			13 PILE BENT			14 PILE BENT			15 PILE BENT			16 PILE BENT					
			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	42'-8"	————	6	9	870	6	9	870	6	9	870	6	9	870	6	9	870	6	9	870	4	9	580	4	9	580			
a2	42'-8"	————	4	8	456	4	8	456	4	8	456	4	8	456	4	8	456	4	8	456	4	8	456	4	8	456			
b1	42'-8"	————	4	9	580	4	9	580	4	9	580	4	9	580	4	9	580	4	9	580	4	8	456	4	8	456			
5c1	11'-10"	□	34	5	420	38	5	469	42	5	518	46	5	568	50	5	617	54	5	666	30	5	370	47	5	580			
8e1	8'-2"	□	4	8	87	4	8	87	4	8	87	4	8	87	4	8	87	4	8	87	4	8	87	4	8	87			
① REINFORCING STEEL (LB.)			2413			2462			2511			2561			2610			2659			1949			2159					
STRUCTURAL			PILE TYPE																										
② CONCRETE (CY)			1, 2			-----			-----			15.2			15.2			15.2			15.1			15.1			15.0		
			3			15.7			15.7			15.7			15.7			15.7			15.7			-----					

**PILE BENT NOTES:**

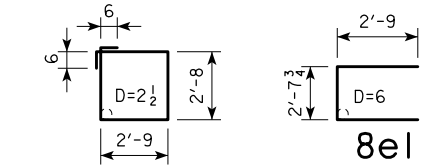
THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

FOR DETAILS OF TRESTLE PILES, TYPES 1, 2 AND 3, SEE STANDARD PIOL.

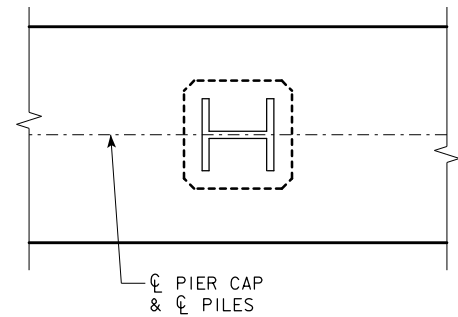
MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.

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

**BENT BAR DETAILS**



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



**PILE ORIENTATION DETAIL FOR TYPE 3 TRESTLE BENT PILES**

℄-℄ ABUTMENT BEARING	FRICTION BEARING PILING			FRICTION OR POINT BEARING PILING		
	PIOL TYPE 1 OR 2			PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	③ "K" (INCHES)	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)	NUMBER OF TRESTLE PILES	PILE SIZE	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	13	14	92	9	HP10x57	133
	11	16	109	9	HP12x53	133
151'-4	14	14	90	9	HP10x57	140
	12	16	105	10	HP12x53	126
163'-10	-----	--	--	10	HP10x57	136
	13	16	105	11	HP12x53	124
176'-4	-----	--	--	10	HP10x57	143
	-----	--	--	11	HP12x53	130
188'-10	-----	--	--	11	HP10x57	135
	-----	--	--	12	HP12x53	124
201'-4	-----	--	--	12	HP10x57	138
	-----	--	--	13	HP12x53	127
213'-10	-----	--	--	12	HP10x57	145
	-----	--	--	13	HP12x53	134
226'-4	-----	--	--	13	HP10x57	141
	-----	--	--	14	HP12x53	131
243'-0	-----	--	--	14	HP10x57	137
	-----	--	--	15	HP12x53	128

- ① SEE SHEET H40-17-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.
- ② CONCRETE QUANTITIES SHOWN HAVE HAD THE VOLUME OF EMBEDDED PILES DEDUCTED FOR TYPES 1 AND 2 BASED ON 0.8 FT<sup>3</sup> PER FOOT OF EMBEDMENT. THE CONCRETE QUANTITIES FOR TYPE 3 PILES DO NOT REQUIRE REDUCTION FOR PILE EMBEDMENT.
- ③ SEE STANDARD PIOL FOR "K" DIMENSION.
- ④ NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

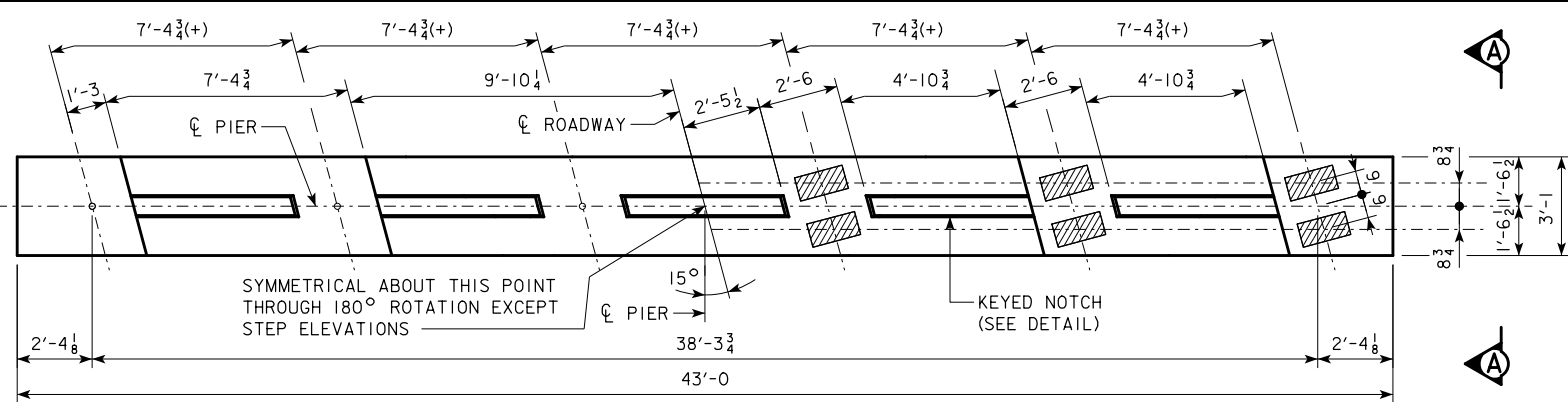
NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

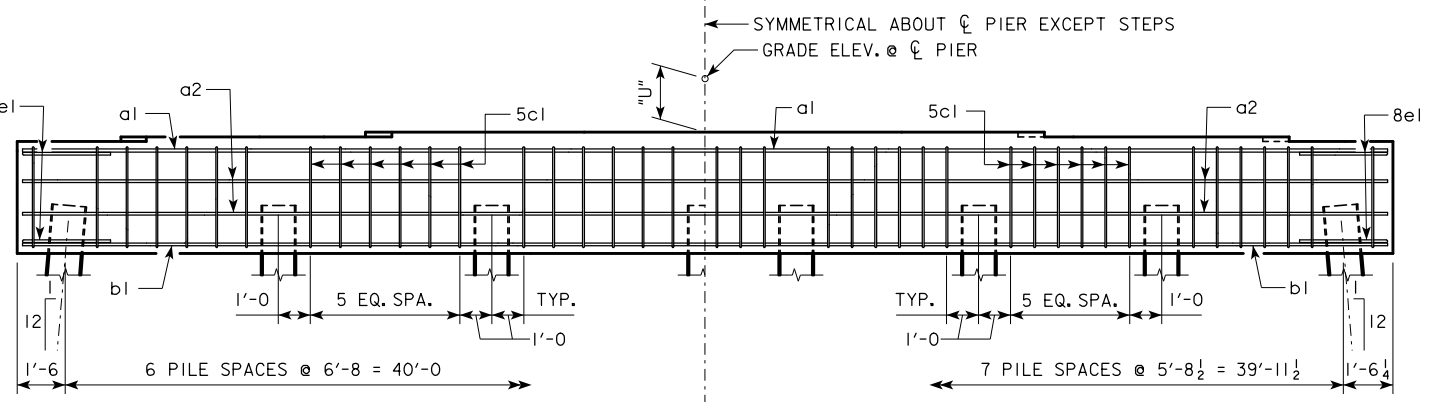
05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>PILE BENT PIERS</b>

H40-49-06

15° SKEW

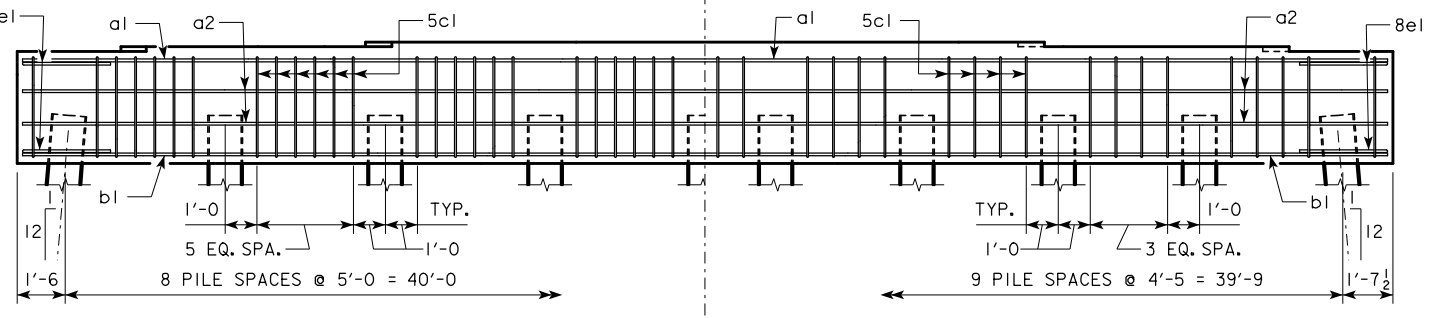


TYPICAL PLAN



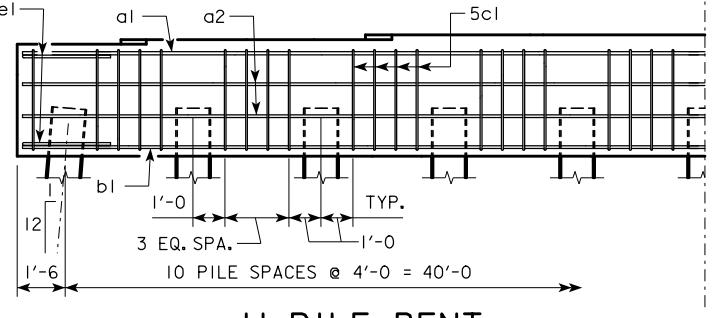
7 PILE BENT

8 PILE BENT

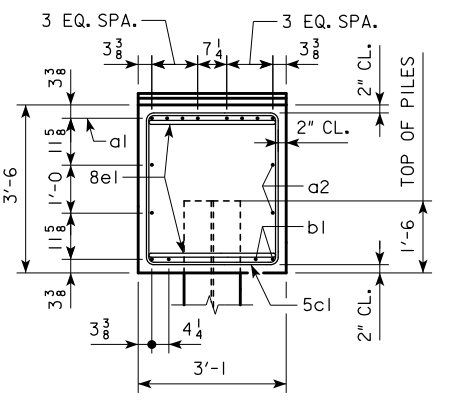


9 PILE BENT

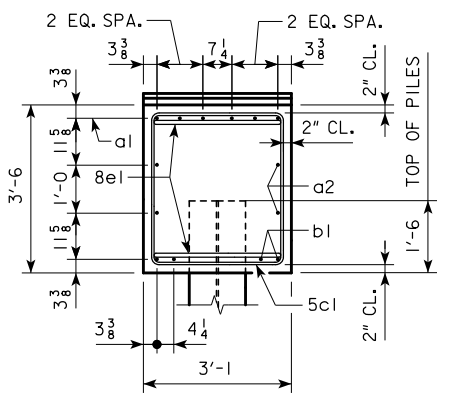
10 PILE BENT



11 PILE BENT



VIEW A-A FOR 7, 8 & 9 PILE BENTS

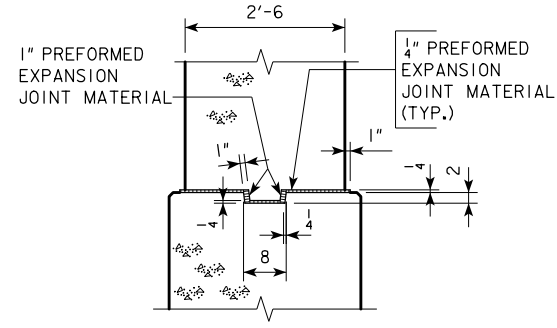


VIEW A-A FOR 10 & 11 PILE BENTS

NOTE:  
THE HEIGHT OF THE STEPS ON THE BRIDGE SEAT IS EQUAL TO THE DIFFERENCE IN ELEVATIONS OF THE TOP OF SLAB AT ADJACENT BEAMS ALONG CL PIER.  
SEE SHEET H40-15-06 FOR "U" DIMENSION.

PILE BENT NOTES:

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.  
FOR DETAILS OF TRESTLE PILES, SEE STANDARD PI0L.  
MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.  
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

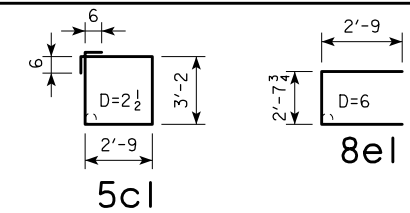


KEYED NOTCH DETAIL

REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT

BAR	LENGTH	SHAPE	7 PILE BENT			8 PILE BENT			9 PILE BENT			10 PILE BENT			11 PILE BENT		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	42'-8	—	8	9	1161	8	9	1161	8	9	1161	6	9	870	6	9	870
a2	42'-8	—	4	8	456	4	8	456	4	8	456	4	8	456	4	8	456
b1	42'-8	—	4	9	580	4	9	580	4	9	580	4	9	580	4	9	580
5c1	12'-10	—	38	5	509	44	5	589	50	5	669	38	5	509	42	5	562
8e1	8'-2	—	4	8	87	4	8	87	4	8	87	4	8	87	4	8	87
REINFORCING STEEL (LB.)			2793			2873			2953			2502			2555		
STRUCTURAL CONCRETE (CY)			3			3			3			3			3		
PILE TYPE			18.2			18.2			18.2			18.2			18.2		

BENT BAR DETAILS



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

FRICITION OR POINT BEARING PILING

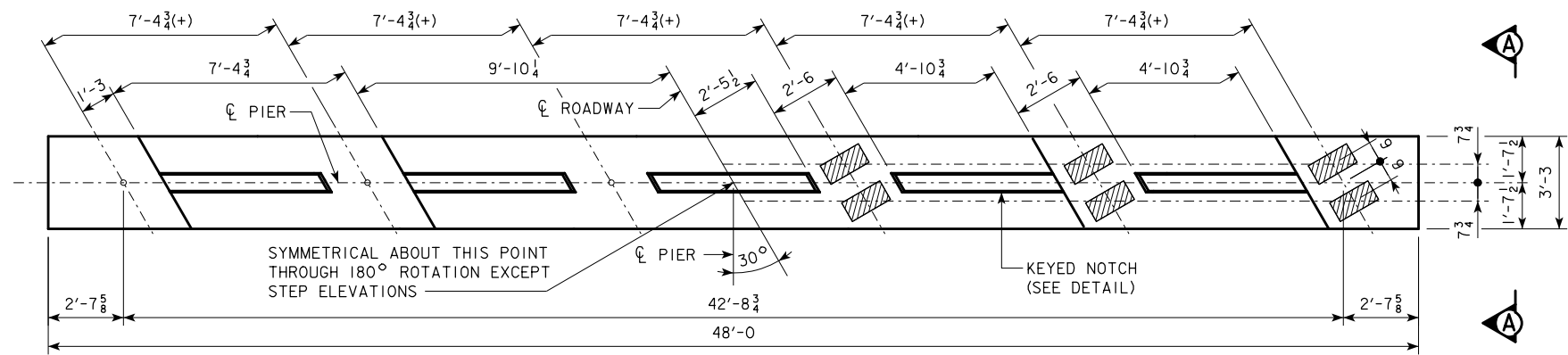
CL-CL ABUTMENT BEARING	PI0L TYPE 3		
	NUMBER OF TRESTLE PILES	PILE	LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	7	HP14x73	173
	7	HP14x89	173
151'-4	7	HP14x73	182
	7	HP14x89	182
163'-10	8	HP14x73	172
	7	HP14x89	196
176'-4	8	HP14x73	180
	7	HP14x89	205
188'-10	9	HP14x73	167
	7	HP14x89	214
201'-4	9	HP14x73	185
	8	HP14x89	208
213'-10	10	HP14x73	175
	8	HP14x89	219
226'-4	10	HP14x73	184
	9	HP14x89	205
243'-0	11	HP14x73	176
	9	HP14x89	215

- ① SEE SHEET H40-17-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.
- ② FOR DETERMINING ACTUAL PILE LENGTHS IN FIELD.
- ③ FOR ESTIMATING PILE LENGTHS USING AASHTO LRFD SPECIFICATIONS.

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

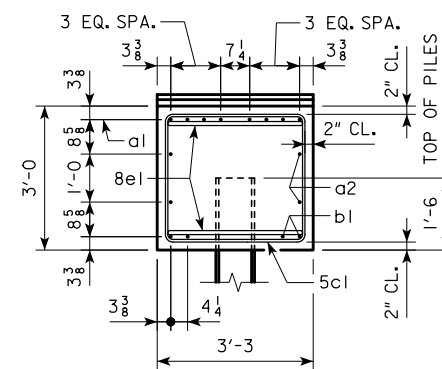
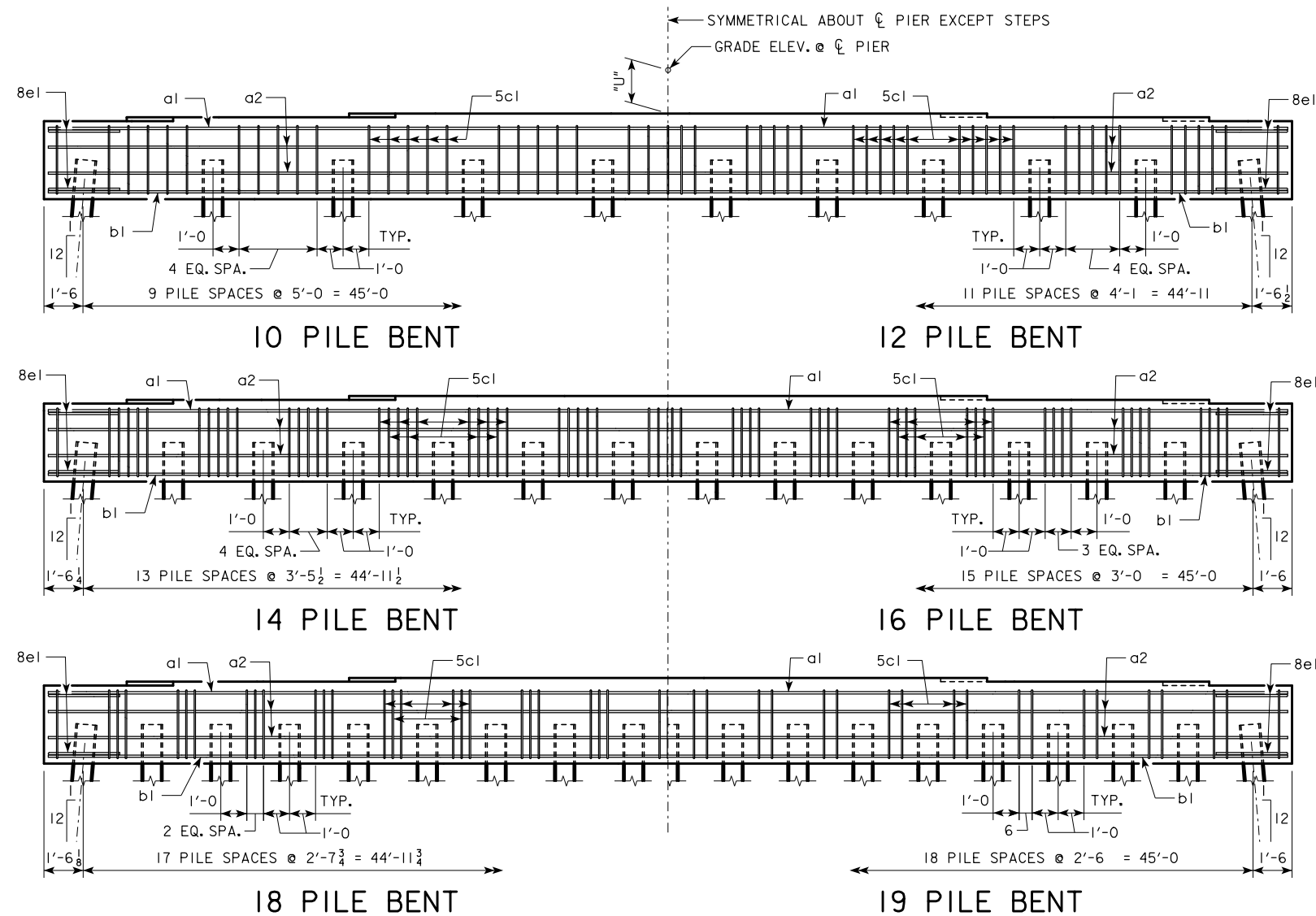
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		PILE BENT PIERS HP14 PILES 15° SKEW	<b>H40-50-06</b>

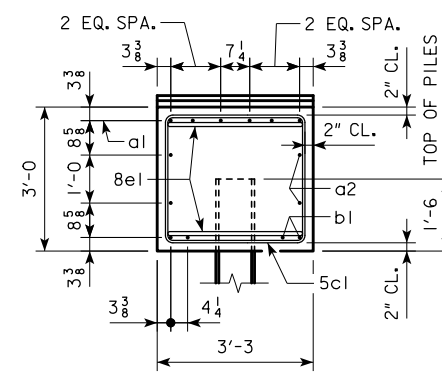


TYPICAL PLAN

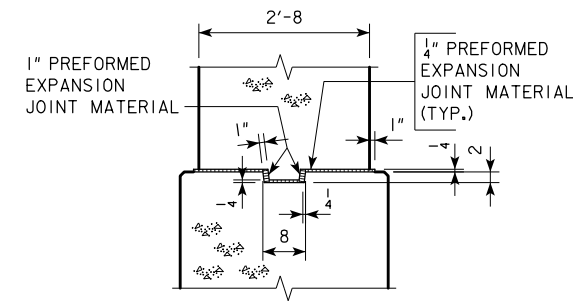
NOTE:  
 THE HEIGHT OF THE STEPS ON THE BRIDGE SEAT IS EQUAL TO THE DIFFERENCE IN ELEVATIONS OF THE TOP OF SLAB AT ADJACENT BEAMS ALONG  $\phi$  PIER.  
 SEE SHEET H40-22-06 FOR "U" DIMENSION.



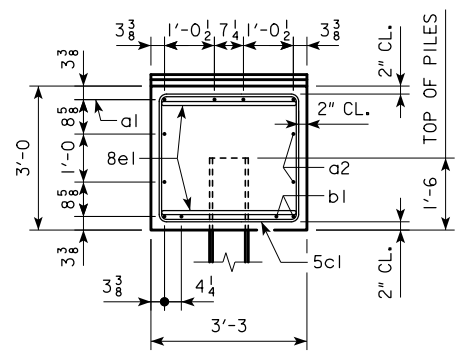
VIEW A-A FOR 10 PILE BENT



VIEW A-A FOR 12, 14, 16 & 18 PILE BENTS



KEYED NOTCH DETAIL



VIEW A-A FOR 19 PILE BENT

REVISED 10-09 - SHEET WAS REVISED TO MEET LRFD SPECIFICATIONS.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>PILE BENT PIERS</b> 30° SKEW	<b>H40-51-06</b>

**PILE BENT NOTES:**

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

FOR DETAILS OF TRESTLE PILES, TYPES 1, 2 AND 3, SEE STANDARD PIOL.

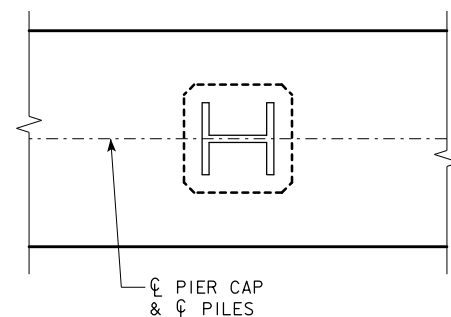
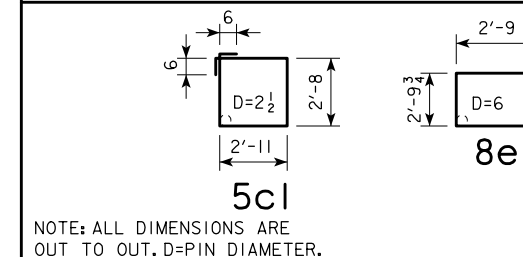
MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.

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

**REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT**

BAR	LENGTH	SHAPE	10 PILE BENT			12 PILE BENT			14 PILE BENT			16 PILE BENT			18 PILE BENT			19 PILE BENT		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	47'-8"	————	8	9	1297	6	9	972	6	9	972	6	9	972	6	9	972	4	9	648
a2	47'-8"	————	4	8	509	4	8	509	4	8	509	4	8	509	4	8	509	4	8	509
b1	47'-8"	————	4	9	648	4	9	648	4	9	648	4	9	648	4	8	509	4	8	509
5c1	12'-2"	▭	47	5	596	57	5	723	67	5	850	62	5	787	53	5	673	38	5	482
8e1	8'-4"	▭	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89
① REINFORCING STEEL (LB.)			3139			2941			3068			3005			2752			2237		
② STRUCTURAL CONCRETE (CY)			PILE TYPE																	
			1, 2			-----			18.1			18.0			17.9			17.8		
			3			18.6			18.6			18.6			-----			-----		

**BENT BAR DETAILS**



**PILE ORIENTATION DETAIL FOR TYPE 3 TRESTLE BENT PILES**

℄-℄ ABUTMENT BEARING	FRICTION BEARING PILING			FRICTION OR POINT BEARING PILING		
	PIOL TYPE 1 OR 2			PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	③ "K" (INCHES)	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)	NUMBER OF TRESTLE PILES	PILE SIZE	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	14	14	87	10	HP10x57	122
	12	16	102	10	HP12x53	122
151'-4	14	14	92	10	HP10x57	128
	12	16	107	10	HP12x53	128
163'-10	16	14	87	10	HP10x57	139
	14	16	99	12	HP12x53	116
176'-4	16	14	91	10	HP10x57	145
	14	16	104	12	HP12x53	121
188'-10	16	14	95	12	HP10x57	126
	14	16	108	12	HP12x53	126
201'-4	-----	--	--	12	HP10x57	140
	-----	--	--	14	HP12x53	120
213'-10	-----	--	--	14	HP10x57	126
	-----	--	--	14	HP12x53	126
226'-4	----	--	--	14	HP10x57	133
	----	--	--	14	HP12x53	133
243'-0	-----	--	--	14	HP10x57	139
	-----	--	--	16	HP12x53	122

- ① SEE SHEET H40-24-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.
- ② CONCRETE QUANTITIES SHOWN HAVE HAD THE VOLUME OF EMBEDDED PILES DEDUCTED FOR TYPES 1 AND 2 BASED ON 0.8 FT<sup>3</sup> PER FOOT OF EMBEDMENT. THE CONCRETE QUANTITIES FOR TYPE 3 PILES DO NOT REQUIRE REDUCTION FOR PILE EMBEDMENT.
- ③ SEE STANDARD PIOL FOR "K" DIMENSION.
- ④ NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

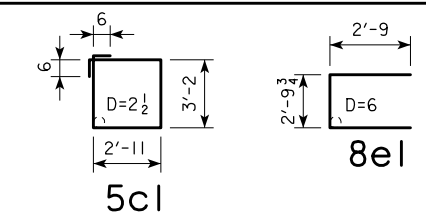
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWADOT</b> Highway Division STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>PILE BENT PIERS</b> 30° SKEW	<b>H40-52-06</b>

## REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT

BAR	LENGTH	SHAPE	7 PILE BENT			8 PILE BENT			9 PILE BENT			10 PILE BENT			11 PILE BENT		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	47'-8"	—	8	9	1297	8	9	1297	8	9	1297	6	9	972	6	9	972
a2	47'-8"	—	4	8	509	4	8	509	4	8	509	4	8	509	4	8	509
b1	47'-8"	—	4	10	820	4	10	820	4	9	648	4	9	648	4	9	648
5c1	13'-2"	□	42	5	577	42	5	577	50	5	687	38	5	522	52	5	714
8e1	8'-4"	□	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89
① REINFORCING STEEL (LB.)			3292			3292			3230			2740			2932		
STRUCTURAL CONCRETE (CY)			21.5			21.5			21.5			21.5			21.5		

### BENT BAR DETAILS



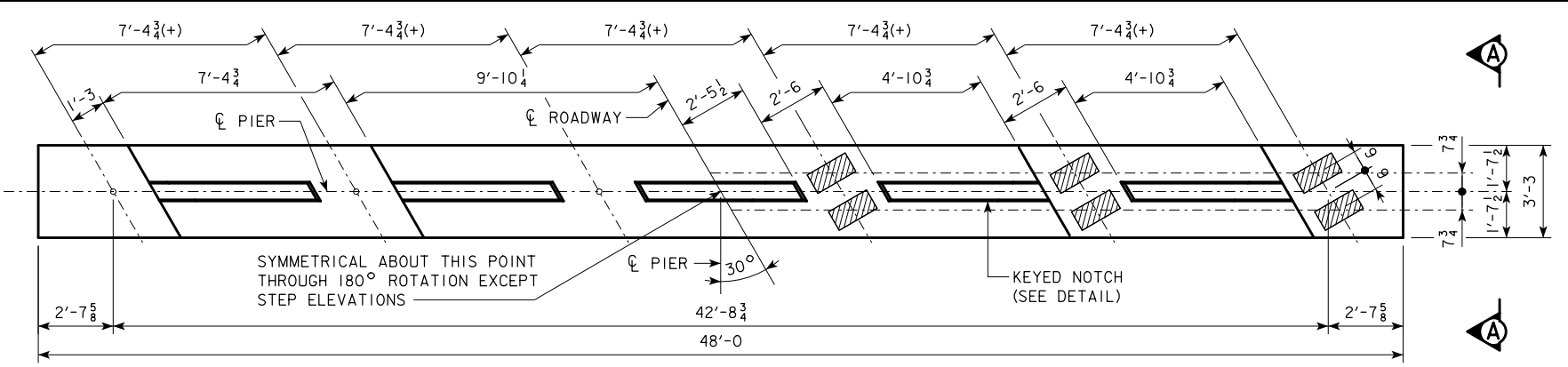
NOTE: ALL DIMENSIONS ARE OUT TO OUT. D=PIN DIAMETER.

### FRICTION OR POINT BEARING PILING

℄-℄ ABUTMENT BEARING	PILOT TYPE 3		
	NUMBER OF TRESTLE PILES	PILE SIZE	② LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10"	7	HP14x73	177
	7	HP14x89	177
151'-4"	8	HP14x73	162
	7	HP14x89	186
163'-10"	8	HP14x73	175
	7	HP14x89	200
176'-4"	8	HP14x73	183
	7	HP14x89	209
188'-10"	9	HP14x73	170
	7	HP14x89	218
201'-4"	10	HP14x73	170
	8	HP14x89	212
213'-10"	10	HP14x73	178
	8	HP14x89	222
226'-4"	11	HP14x73	170
	9	HP14x89	208
243'-0"	11	HP14x73	179
	9	HP14x89	219

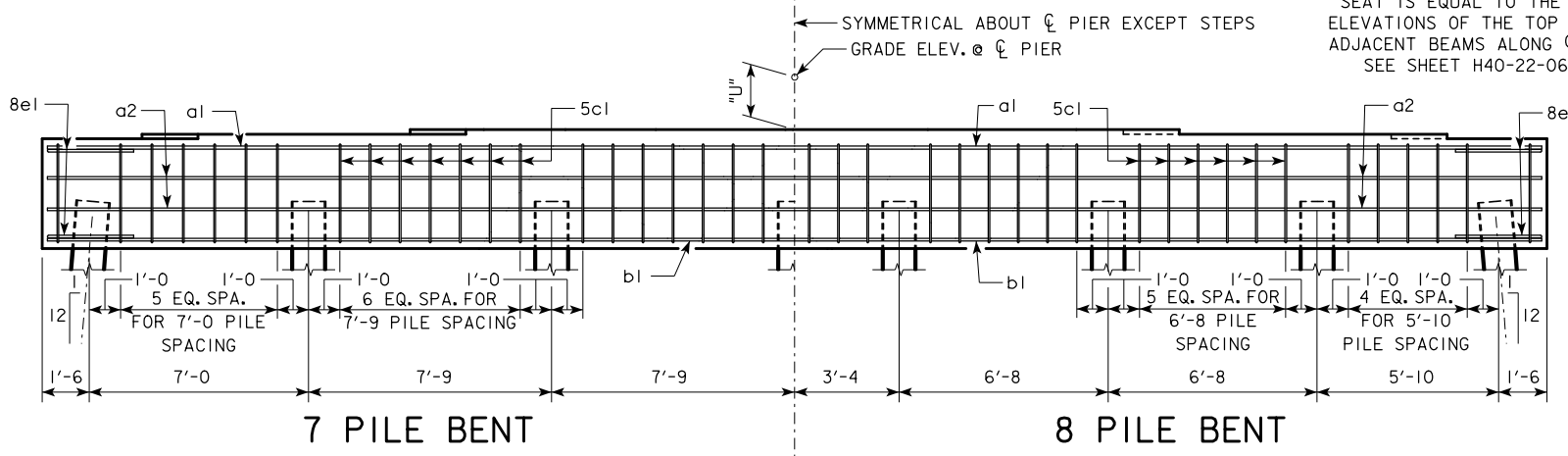
- ① SEE SHEET H40-24-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.
- ② FOR DETERMINING ACTUAL PILE LENGTHS IN FIELD.
- ③ NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.



### TYPICAL PLAN

NOTE: THE HEIGHT OF THE STEPS ON THE BRIDGE SEAT IS EQUAL TO THE DIFFERENCE IN ELEVATIONS OF THE TOP OF SLAB AT ADJACENT BEAMS ALONG ℄ PIER. SEE SHEET H40-22-06 FOR "U" DIMENSION.



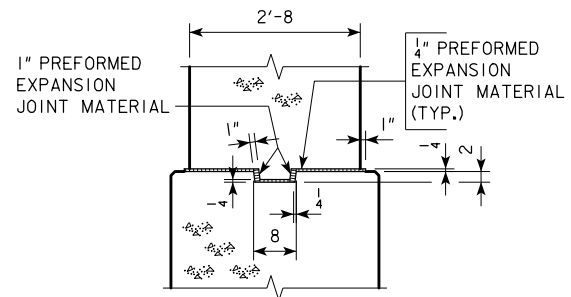
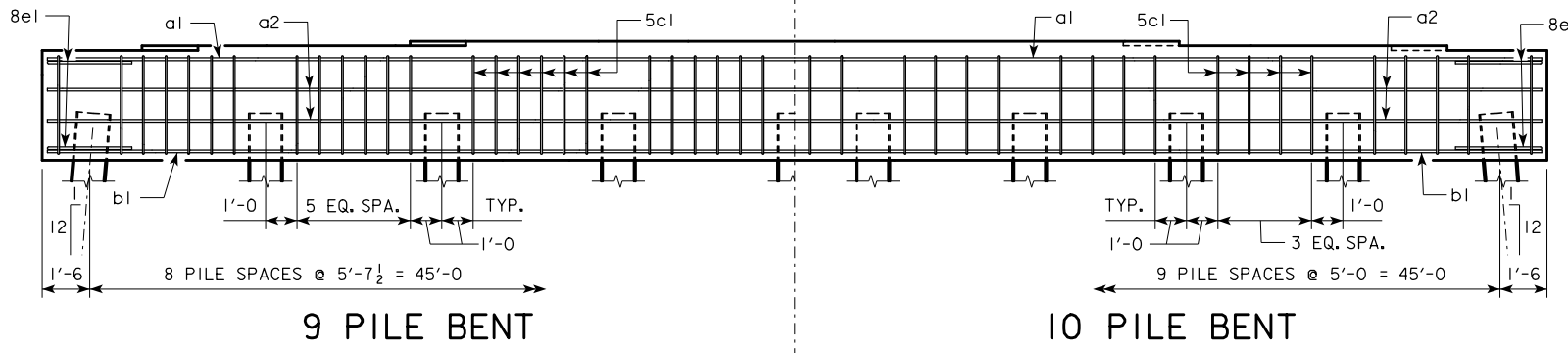
### PILE BENT NOTES:

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

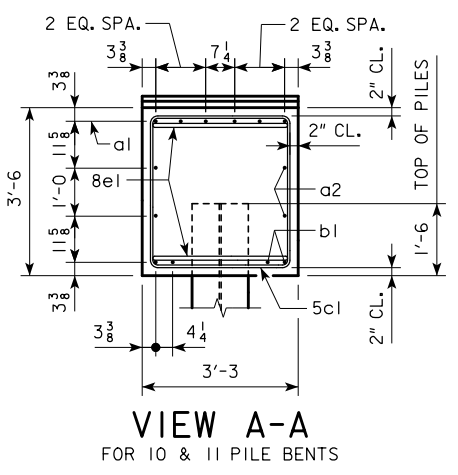
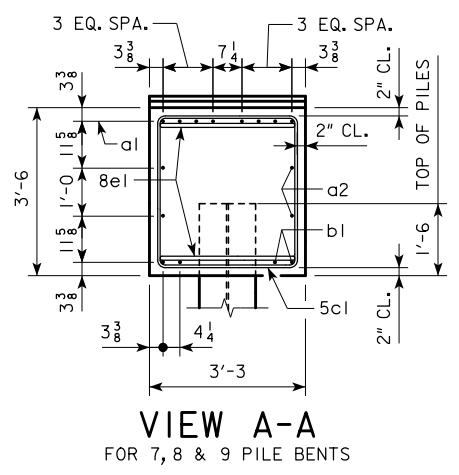
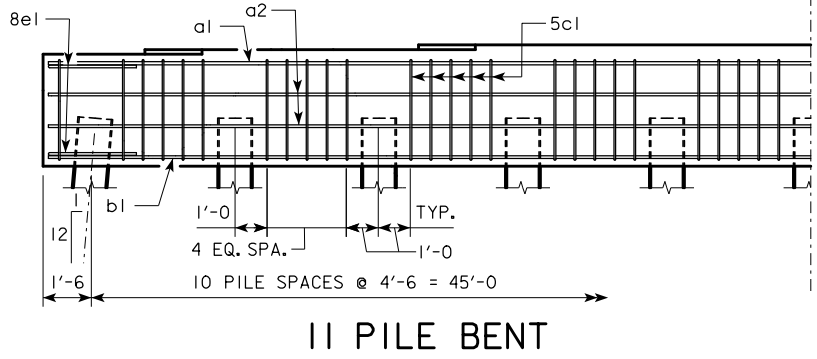
FOR DETAILS OF TRESTLE PILES, SEE STANDARD PIOL.

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

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



### KEYED NOTCH DETAIL



REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

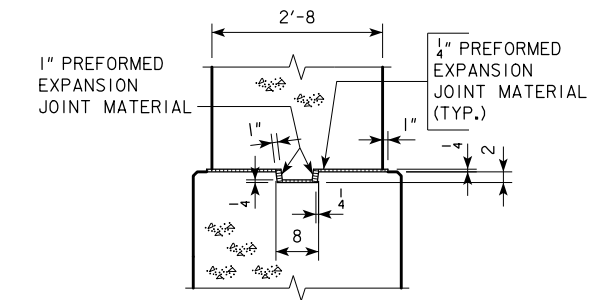
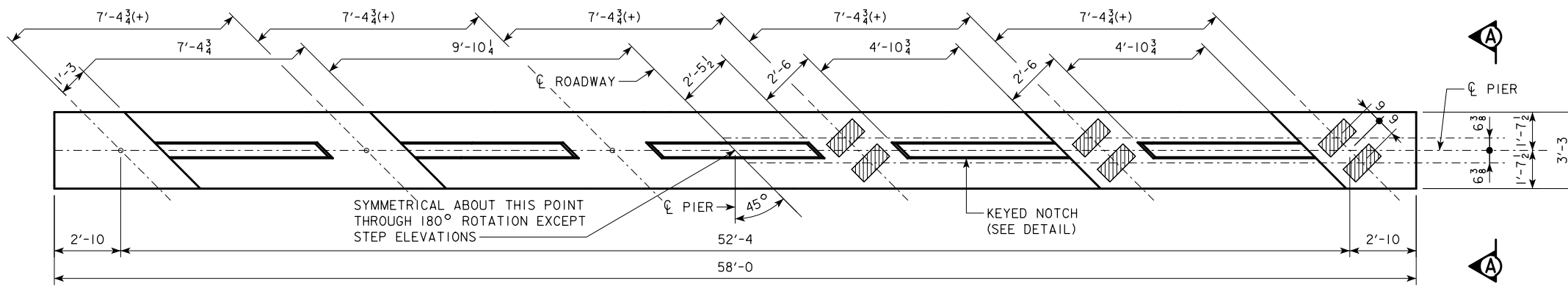
05-13  
LATEST REVISION DATE  
*Norman L. Mc Donald*  
APPROVED BY BRIDGE ENGINEER

STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE

## PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

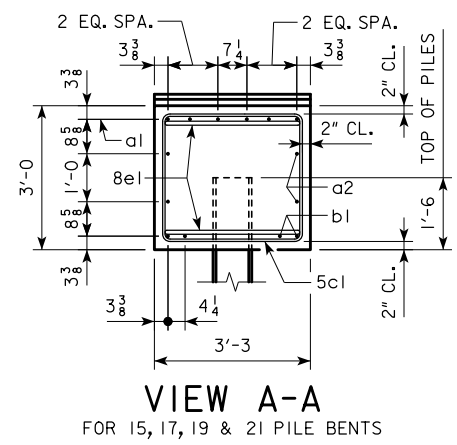
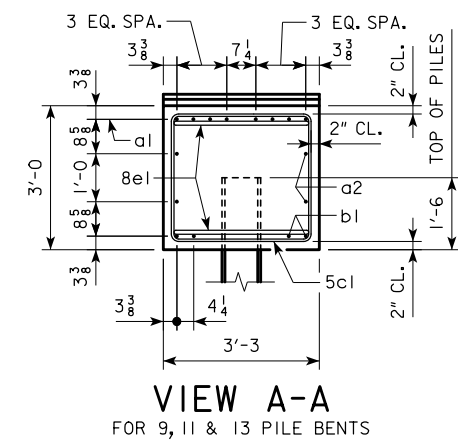
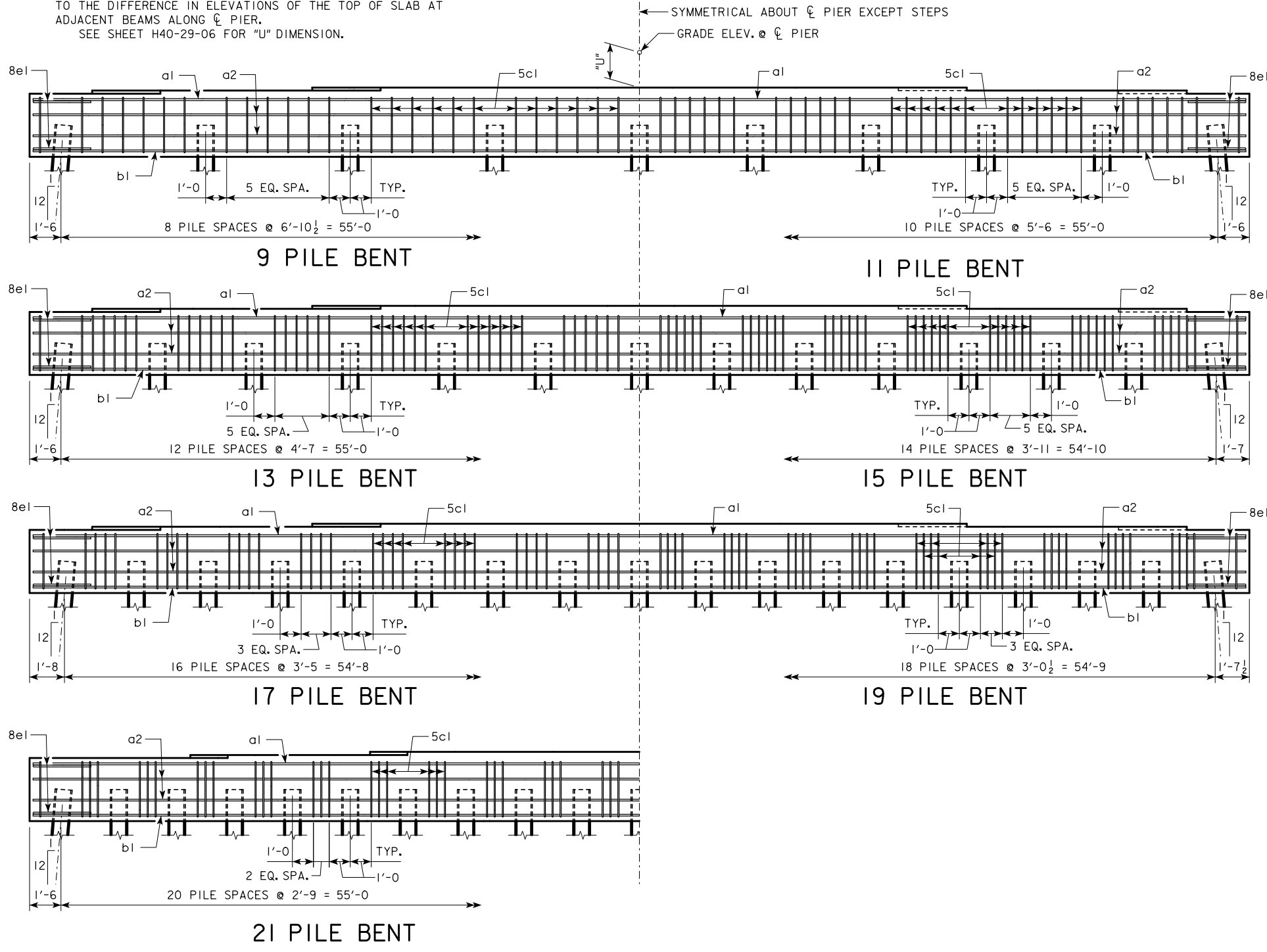
AUGUST, 2009

<b>PILE BENT PIERS</b> HPI4 PILES 30° SKEW	H40-53-06
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NOTE:  
 THE HEIGHT OF THE STEPS ON THE BRIDGE SEAT IS EQUAL TO THE DIFFERENCE IN ELEVATIONS OF THE TOP OF SLAB AT ADJACENT BEAMS ALONG CL PIER.  
 SEE SHEET H40-29-06 FOR "U" DIMENSION.

TYPICAL PLAN



REVISED 10-09 - SHEET WAS REVISED TO MEET LRFD SPECIFICATIONS.

10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>PILE BENT PIERS</b>	<b>H40-54-06</b>

45° SKEW

**PILE BENT NOTES:**

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

FOR DETAILS OF TRESTLE PILES, TYPES 1, 2 AND 3, SEE STANDARD PIOL.

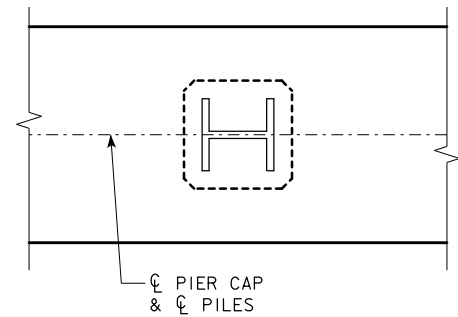
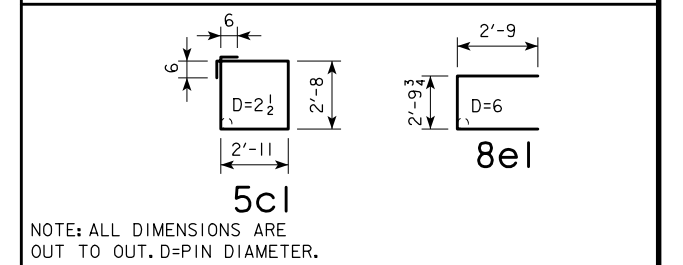
MINIMUM CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR SHALL BE 2 INCHES UNLESS OTHERWISE NOTED OR SHOWN.

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

**REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT**

BAR	LENGTH	SHAPE	9 PILE BENT			11 PILE BENT			13 PILE BENT			15 PILE BENT			17 PILE BENT			19 PILE BENT			21 PILE BENT					
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT			
a1	57'-8	—	8	9	1569	8	9	1569	8	9	1569	6	9	1176	6	9	1176	6	9	1176	6	9	1176			
a2	57'-8	—	4	8	616	4	8	616	4	8	616	4	8	616	4	8	616	4	8	616	4	8	616			
b1	57'-8	—	4	10	993	4	10	993	4	10	993	4	10	993	4	9	784	4	9	784	4	9	784			
5c1	12'-2	□	50	5	634	62	5	787	74	5	939	86	5	1091	66	5	838	74	5	939	62	5	787			
8e1	8'-4	—	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89	4	8	89			
① REINFORCING STEEL (LB.)			3901			4054			4206			3965			3503			3604			3452					
② STRUCTURAL CONCRETE (CY)			PILE TYPE																							
			1, 2			-----			-----			22.1			22.0			21.9			21.8			21.8		
			3			22.7			22.7			22.7			22.7			-----			-----			-----		

**BENT BAR DETAILS**



**PILE ORIENTATION DETAIL FOR TYPE 3 TRESTLE BENT PILES**

℄-℄ ABUTMENT BEARING	FRICTION BEARING PILING			FRICTION OR POINT BEARING PILING		
	PIOL TYPE 1 OR 2			PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	③ "K" (INCHES)	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)	NUMBER OF TRESTLE PILES	PILE SIZE	④ LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	15	14	84	9	HP10x57	140
	13	16	97	11	HP12x53	114
151'-4	15	14	88	11	HP10x57	120
	13	16	101	11	HP12x53	120
163'-10	15	14	95	11	HP10x57	130
	15	16	95	11	HP12x53	130
176'-4	17	14	88	11	HP10x57	135
	15	16	99	13	HP12x53	114
188'-10	17	14	91	11	HP10x57	141
	15	16	103	13	HP12x53	119
201'-4	19	14	91	13	HP10x57	132
	17	16	101	13	HP12x53	132
213'-10	19	14	95	13	HP10x57	139
	17	16	106	15	HP12x53	120
226'-4	-----	--	--	15	HP10x57	126
	-----	--	--	15	HP12x53	126
243'-0	-----	--	--	15	HP10x57	133
	-----	--	--	15	HP12x53	133

- ① SEE SHEET H40-31-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.
- ② CONCRETE QUANTITIES SHOWN HAVE HAD THE VOLUME OF EMBEDDED PILES DEDUCTED FOR TYPES 1 AND 2 BASED ON 0.8 FT<sup>3</sup> PER FOOT OF EMBEDMENT. THE CONCRETE QUANTITIES FOR TYPE 3 PILES DO NOT REQUIRE REDUCTION FOR PILE EMBEDMENT.
- ③ SEE STANDARD PIOL FOR "K" DIMENSION.
- ④ NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>PILE BENT PIERS</b> 45° SKEW	<b>H40-55-06</b>

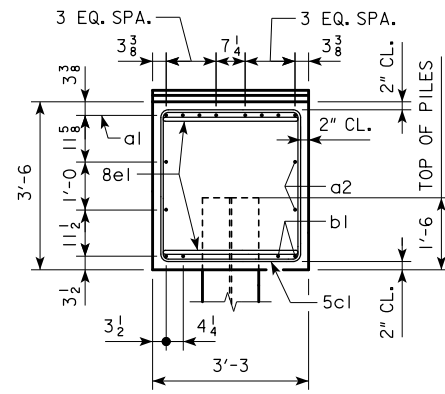
**PILE BENT NOTES:**

THESE PIER BENTS ARE DESIGNED FOR USE IN LOCATIONS WHERE ICE AND DRIFT CONDITIONS ARE NOT SEVERE.

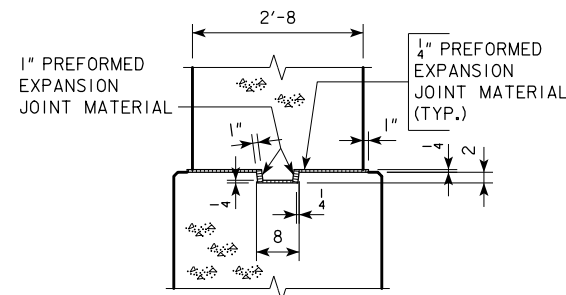
FOR DETAILS OF TRESTLE PILES, SEE STANDARD PIOL.

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

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



**VIEW A-A**  
FOR 8, 9, 10 & 11 PILE BENTS

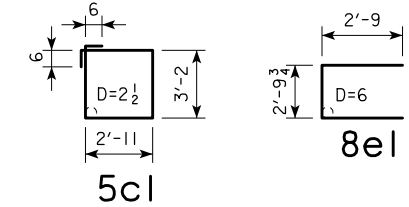


**KEYED NOTCH DETAIL**

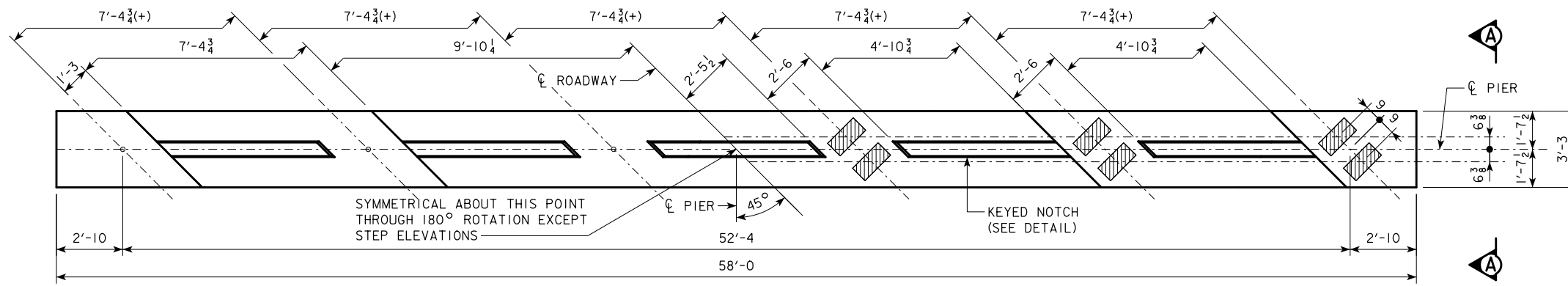
**REINFORCING BAR LIST AND ESTIMATED QUANTITIES - PER PILE BENT**

BAR	LENGTH	SHAPE	8 PILE BENT			9 PILE BENT			10 PILE BENT			11 PILE BENT		
			NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	57'-8		8	9	1569	8	9	1569	8	9	1569	8	9	1569
a2	57'-8		4	8	616	4	8	616	4	8	616	4	8	616
b1	57'-8		4	10	993	4	10	993	4	10	993	4	10	993
5c1	13'-2		54	5	742	62	5	851	56	5	769	62	5	851
8e1	8'-4		4	8	89	4	8	89	4	8	89	4	8	89
REINFORCING STEEL (LB.)			4009			4118			4036			4118		
STRUCTURAL CONCRETE (CY)			3			3			3			3		

**BENT BAR DETAILS**



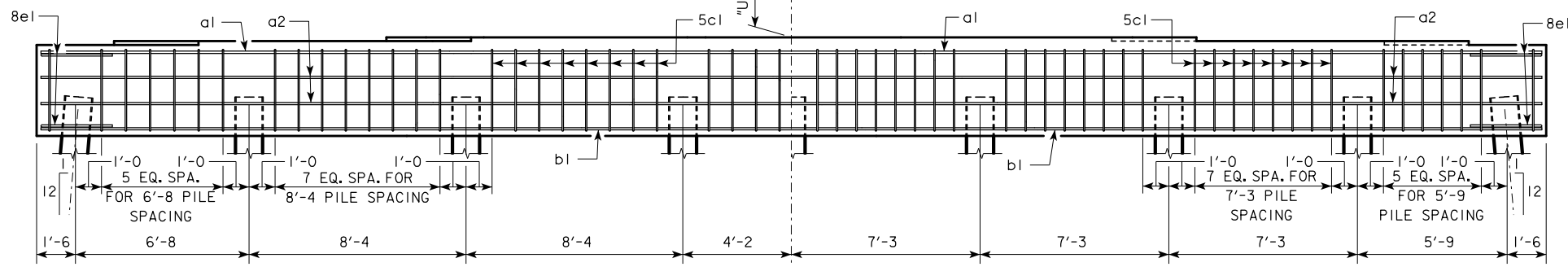
NOTE: ALL DIMENSIONS ARE OUT TO OUT. D=PIN DIAMETER.



**TYPICAL PLAN**

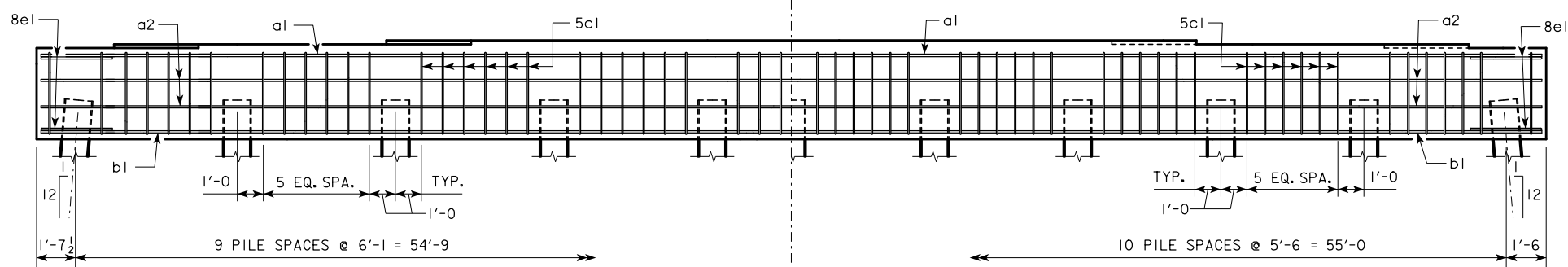
NOTE: THE HEIGHT OF THE STEPS ON THE BRIDGE SEAT IS EQUAL TO THE DIFFERENCE IN ELEVATIONS OF THE TOP OF SLAB AT ADJACENT BEAMS ALONG  $\phi$  PIER. SEE SHEET H40-29-06 FOR "U" DIMENSION.

SYMMETRICAL ABOUT  $\phi$  PIER EXCEPT STEPS  
GRADE ELEV. @  $\phi$  PIER



**8 PILE BENT**

**9 PILE BENT**



**10 PILE BENT**

**11 PILE BENT**

**FRICION OR POINT BEARING PILING**

PIOL TYPE 3

$\phi$ - $\phi$ ABUTMENT BEARING	PIOL TYPE 3		
	NUMBER OF TRESTLE PILES	PILE SIZE	② LRFD PU, STRENGTH I DES. LOAD (KIPS)
138'-10	8	HP14x73	159
	8	HP14x89	159
151'-4	8	HP14x73	167
	8	HP14x89	167
163'-10	8	HP14x73	180
	8	HP14x89	180
176'-4	9	HP14x73	167
	8	HP14x89	188
188'-10	9	HP14x73	174
	8	HP14x89	196
201'-4	10	HP14x73	174
	8	HP14x89	217
213'-10	9	HP14x73	182
	9	HP14x89	202
226'-4	11	HP14x73	174
	9	HP14x89	213
243'-0	11	HP14x73	183
	9	HP14x89	223

① SEE SHEET H40-31-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.

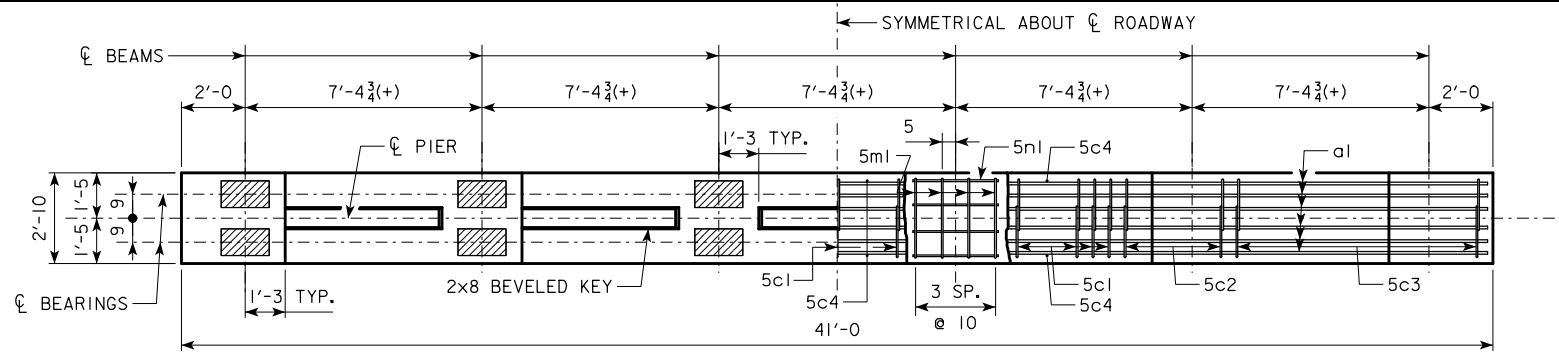
② NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

NOTE: FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK.

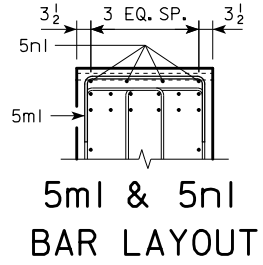
05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>PILE BENT PIERS</b> <b>HPI4 PILES</b> 45° SKEW

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

REVISED 01-10 - ADDED PIER NOTES FROM H40-58-06 STANDARD.



**CAP PLAN**

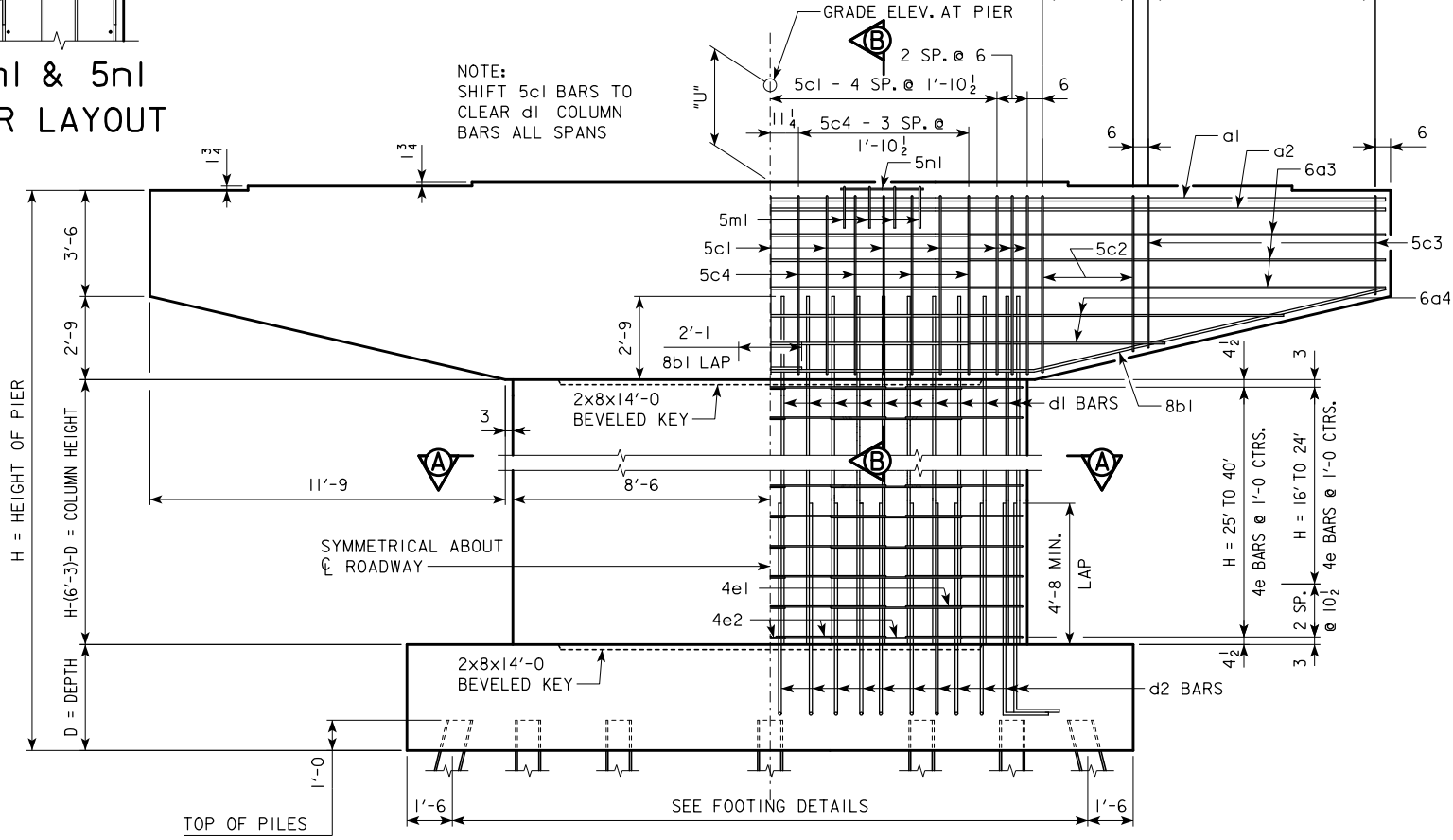


**5m1 & 5m2  
BAR LAYOUT**

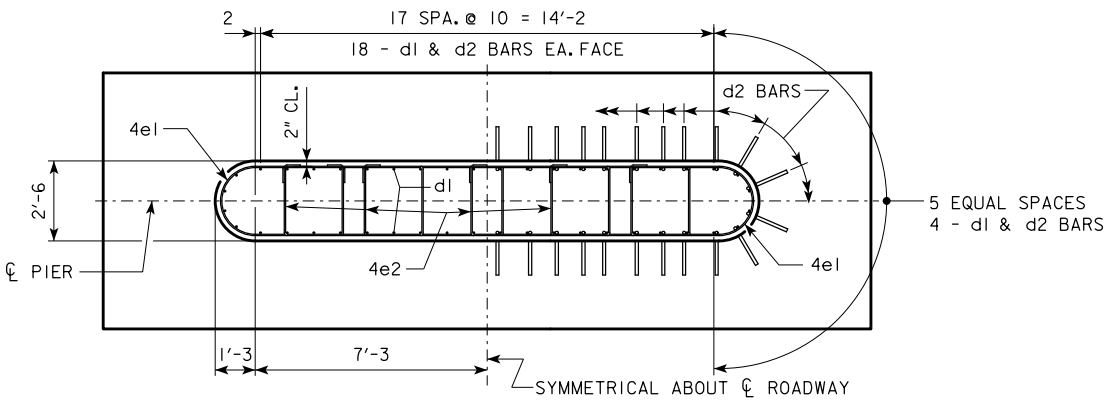
5c2 - 3 SP. @ 1'-0" = 3'-0" - 138'-10, 151'-4, 163'-10  
 5c2 - 4 SP. @ 9" = 3'-0" - 176'-4, 188'-10, 201'-4  
 5c2 - 6 SP. @ 6" = 3'-0" - 213'-10, 226'-4, 243'-0

8 SP. @ 11 1/4" = 7'-6" - 138'-10, 151'-4, 163'-10, 176'-4, 188'-10, 201'-4, 213'-10, 226'-4 - 5c3  
 9 SP. @ 10" = 7'-6" - 243'-0 - 5c3

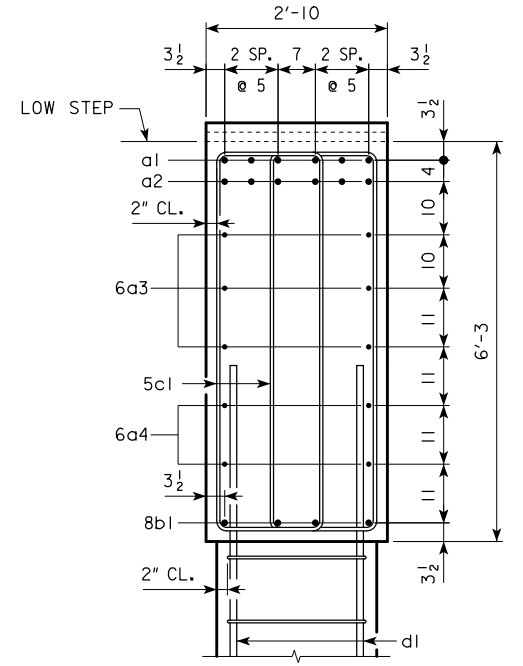
NOTE:  
SHIFT 5c1 BARS TO CLEAR d1 COLUMN BARS ALL SPANS



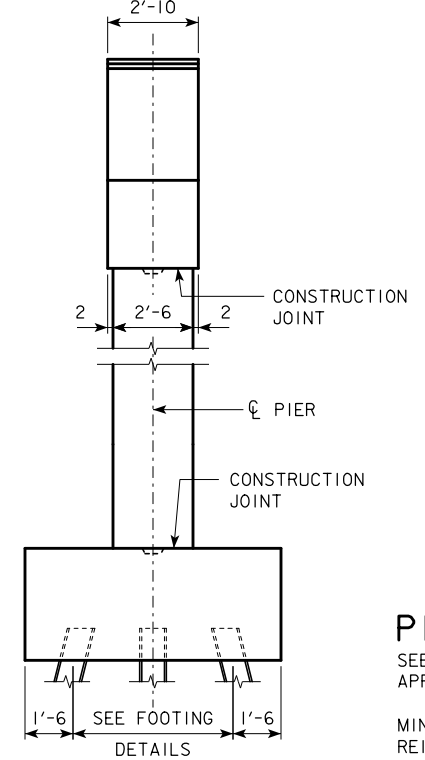
**FRONT ELEVATION**



**SECTION A-A**



**SECTION B-B**

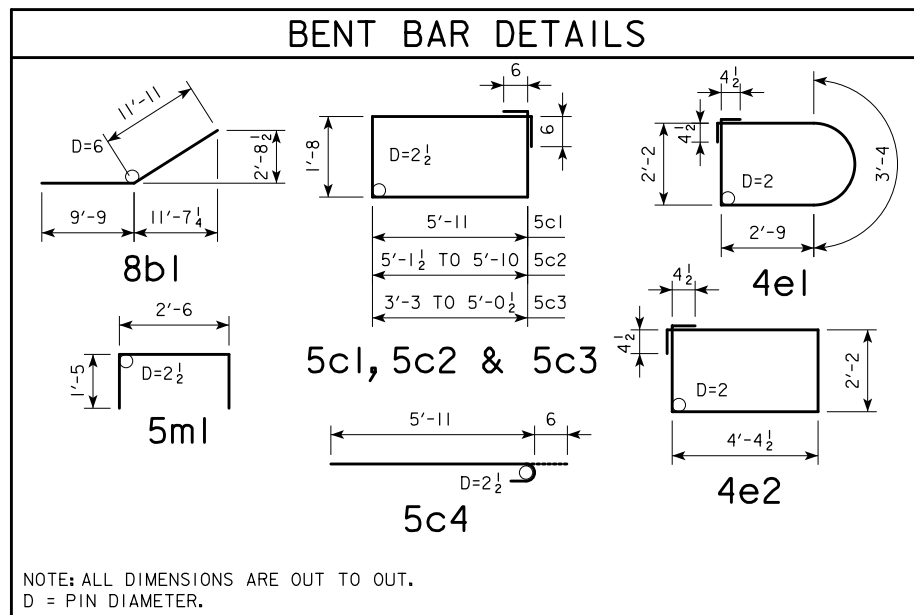


**END ELEVATION**

**PIER NOTES:**  
 SEE "TEE PIER NOTES" ON H40-02-06 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.  
 FOR SIZE OF BEARING PADS, SEE H40-44-06.  
 SEE SHEET H40-09-06 FOR "U" DIMENSION.

01-10 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED                  CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER                  CAP AND COLUMN</b> 0° SKEW	<b>H40-57-06</b>

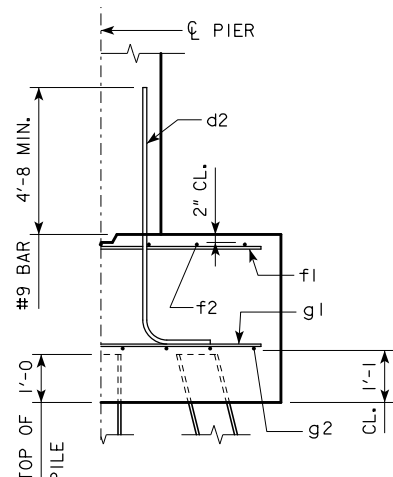
REVISED 01-10 - MOVED PIER NOTES TO H40-57-06 STANDARD.



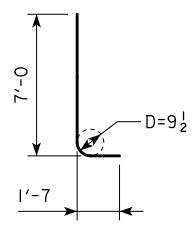
		CAP																											
CL - CL ABUT. BEARINGS		138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0			
BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	40'-8		6	9	830	6	9	830	6	10	1050	6	10	1050	6	11	1296	6	11	1296	6	11	1296	6	11	1296	6	11	1296
a2	40'-8		6	9	830	6	9	830	6	9	830	6	9	830	6	10	1050	6	10	1050	6	10	1050	6	10	1050	6	10	1050
6a3	40'-8		6	6	366	6	6	366	6	6	366	6	6	366	6	6	366	6	6	366	6	6	366	6	6	366	6	6	366
6a4	VARIES		4	6	182	4	6	182	4	6	182	4	6	182	4	6	182	4	6	182	4	6	182	4	6	182	4	6	182
8b1	21'-8		8	8	463	8	8	463	8	8	463	8	8	463	8	8	463	8	8	463	8	8	463	8	8	463	8	8	463
5c1	16'-2		26	5	438	26	5	438	26	5	438	26	5	438	26	5	438	26	5	438	26	5	438	26	5	438	26	5	438
5c2	VARIES		16	5	255	16	5	255	16	5	255	20	5	319	20	5	319	20	5	319	28	5	447	28	5	447	28	5	447
5c3	VARIES		36	5	474	36	5	474	36	5	474	36	5	474	36	5	474	36	5	474	36	5	474	36	5	474	40	5	527
5c4	6'-5		16	5	107	16	5	107	16	5	107	16	5	107	16	5	107	16	5	107	16	5	107	16	5	107	16	5	107
5ml	5'-4		8	5	45	8	5	45	8	5	45	8	5	45	8	5	45	8	5	45	8	5	45	8	5	45	8	5	45
5nl	2'-8		8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22	8	5	22
TOTAL (LB.)			4012			4012			4232			4296			4516			4762			4890			5136			5189		
STRUCTURAL CONCRETE (CY)			24.3			24.3			24.3			24.3			24.3			24.3			24.3			24.3			24.3		

		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	6'-3	9.5	44	9	9'-0	1346	14	4	11'-9	110	28	4	13'-10	259	1715
17	7'-3	11.1	44	9	10'-0	1496	16	4	11'-9	126	32	4	13'-10	296	1918
18	8'-3	12.6	44	9	11'-0	1646	18	4	11'-9	141	36	4	13'-10	333	2120
19	9'-3	14.1	44	9	12'-0	1795	20	4	11'-9	157	40	4	13'-10	370	2322
20	10'-3	15.6	44	9	13'-0	1945	22	4	11'-9	173	44	4	13'-10	407	2525
21	11'-3	17.1	44	9	14'-0	2094	24	4	11'-9	188	48	4	13'-10	444	2726
22	12'-3	18.7	44	9	15'-0	2244	26	4	11'-9	204	52	4	13'-10	481	2929
23	13'-3	20.2	44	9	16'-0	2394	28	4	11'-9	220	56	4	13'-10	517	3131
24	14'-3	21.7	44	9	17'-0	2543	30	4	11'-9	235	60	4	13'-10	554	3332
25	14'-9	22.5	44	9	17'-6	2618	30	4	11'-9	235	60	4	13'-10	554	3407
26	15'-9	24.0	44	9	18'-6	2768	32	4	11'-9	251	64	4	13'-10	591	3610
27	16'-9	25.5	44	9	19'-6	2917	34	4	11'-9	267	68	4	13'-10	628	3812
28	17'-9	27.1	44	9	20'-6	3067	36	4	11'-9	283	72	4	13'-10	665	4015
29	18'-9	28.6	44	9	21'-6	3216	38	4	11'-9	298	76	4	13'-10	702	4216
30	19'-9	30.1	44	9	22'-6	3366	40	4	11'-9	314	80	4	13'-10	739	4419
31	20'-9	31.6	44	9	23'-6	3516	42	4	11'-9	330	84	4	13'-10	776	4622
32	21'-9	33.2	44	9	24'-6	3665	44	4	11'-9	345	88	4	13'-10	813	4823
33	22'-9	34.7	44	9	25'-6	3815	46	4	11'-9	361	92	4	13'-10	850	5026
34	23'-9	36.2	44	9	26'-6	3964	48	4	11'-9	377	96	4	13'-10	887	5228
35	24'-9	37.7	44	9	27'-6	4114	50	4	11'-9	392	100	4	13'-10	924	5430
36	25'-9	39.3	44	9	28'-6	4264	52	4	11'-9	408	104	4	13'-10	961	5633
37	26'-9	40.8	44	9	29'-6	4413	54	4	11'-9	424	108	4	13'-10	998	5835
38	27'-9	42.3	44	9	30'-6	4563	56	4	11'-9	440	112	4	13'-10	1035	6038
39	28'-9	43.8	44	9	31'-6	4712	58	4	11'-9	455	116	4	13'-10	1072	6239
40	29'-9	45.4	44	9	32'-6	4862	60	4	11'-9	471	120	4	13'-10	1109	6442

01-10 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>TEE PIER CAP AND COLUMN</b> 0° SKEW

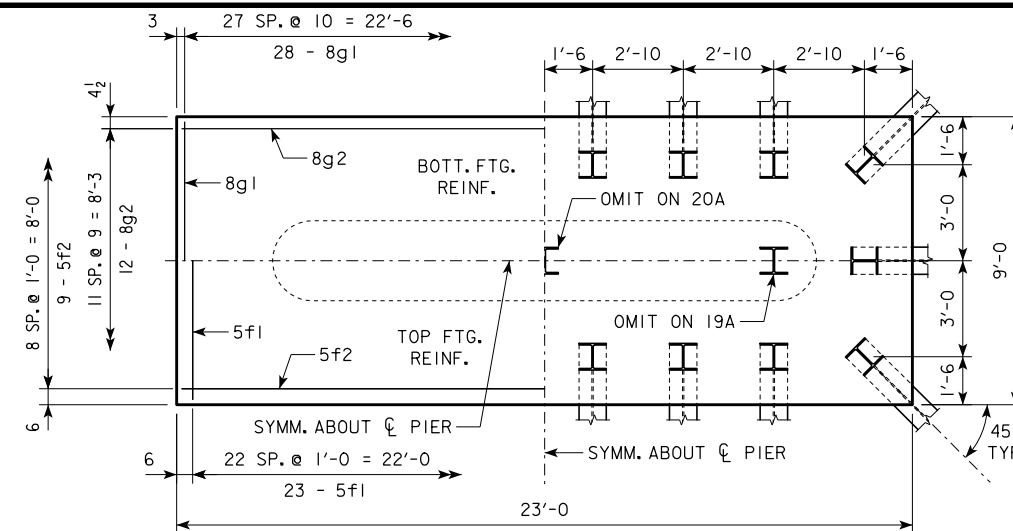


TYPICAL SECTION

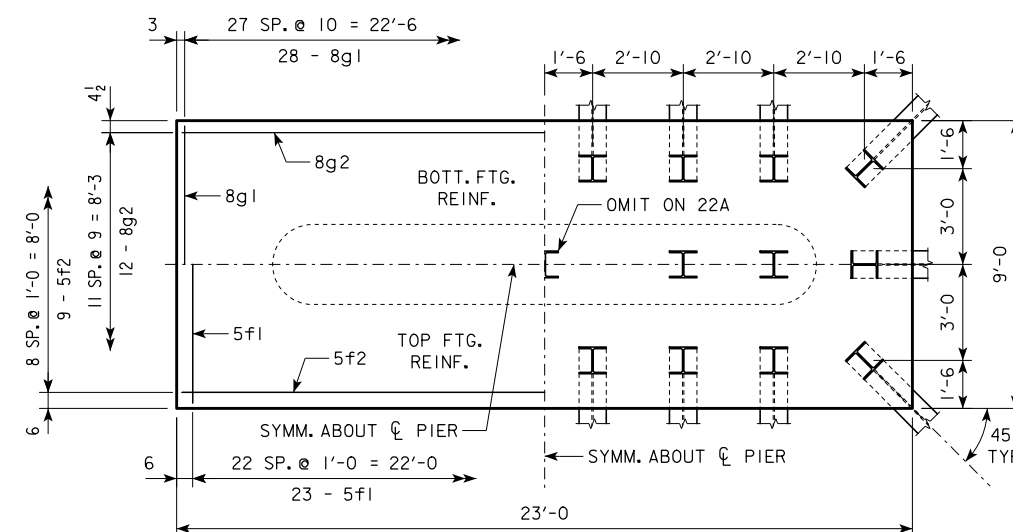


d2

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



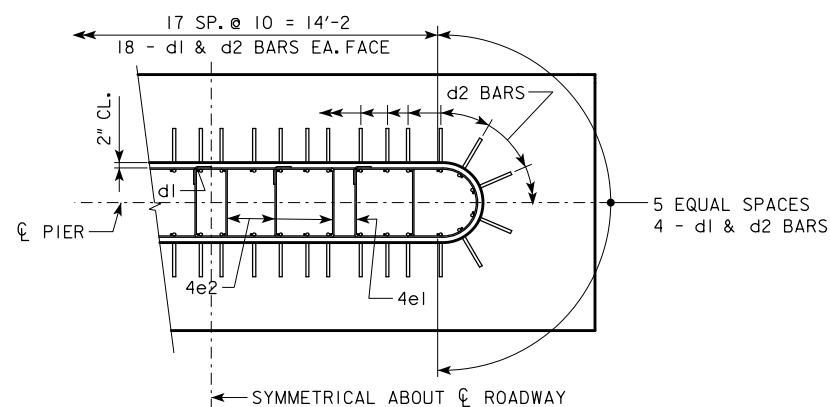
3'-6 x 9'-0 x 23'-0 FOR 19A, 20A & 21A



3'-6 x 9'-0 x 23'-0 FOR 22A & 23A

H IN FT.	PILING (HP10x57)			FOOTING SIZE
	CL - CL ABUT. BRG.	NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18 TO 21	201'-4	19A	145	3'-6 x 9' x 23'
	213'-10	20A	141	
	226'-4	21A	144	
	243'-0	22A	144	
19 TO 22	201'-4	20A	139	3'-6 x 9' x 23'
	213'-10	20A	144	
	226'-4	21A	146	
	243'-0	23A	143	
22 TO 24	201'-4	20A	141	3'-6 x 9' x 23'
	213'-10	20A	146	
	226'-4	22A	143	
	243'-0	23A	145	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
3'-6 x 9' x 23'	d2	44 - #9 AS SHOWN	8'-7	1284	3079	26.8
	f1	23 - #5 @ 1'-0	8'-8	208		
	f2	9 - #5 @ 1'-0	22'-8	213		
	g1	28 - #8 @ 0'-10	8'-8	648		
	g2	12 - #8 @ 0'-9	22'-8	726		



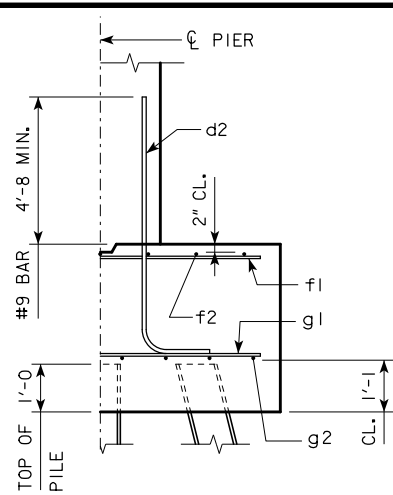
d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-57-06.)

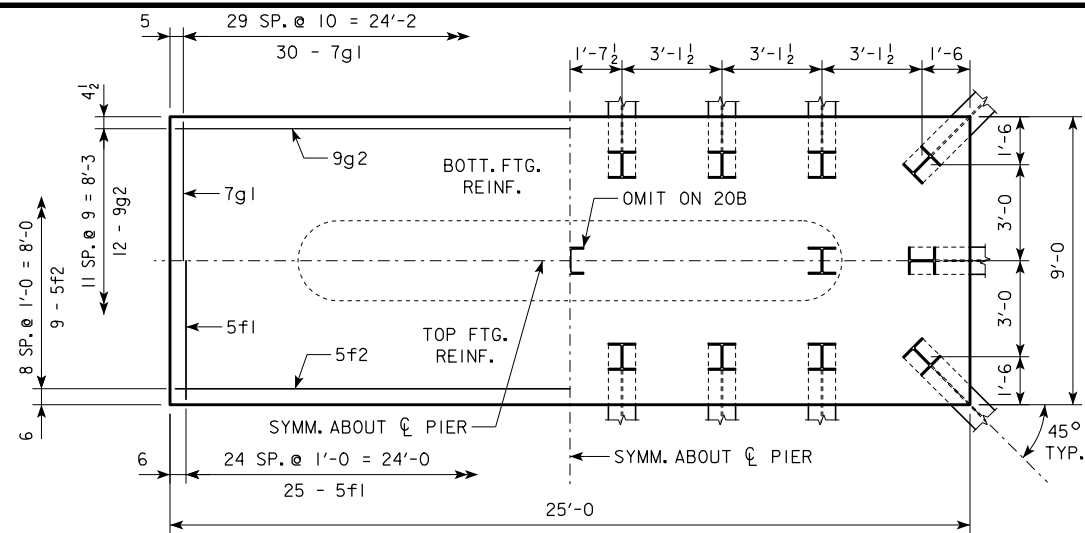
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

05-13 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 0° SKEW - H=16' TO 24'	<b>H40-59-06</b>

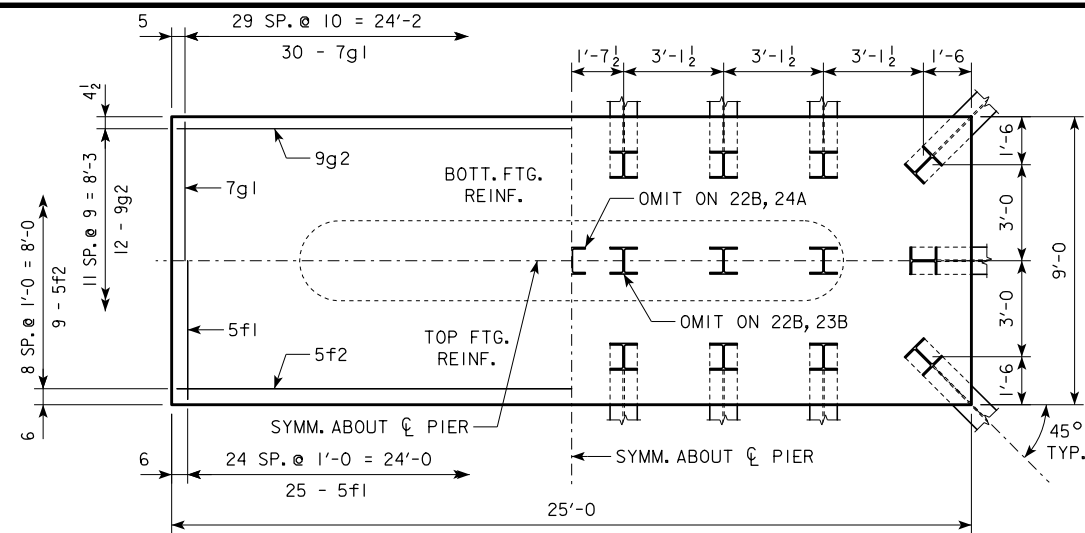
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



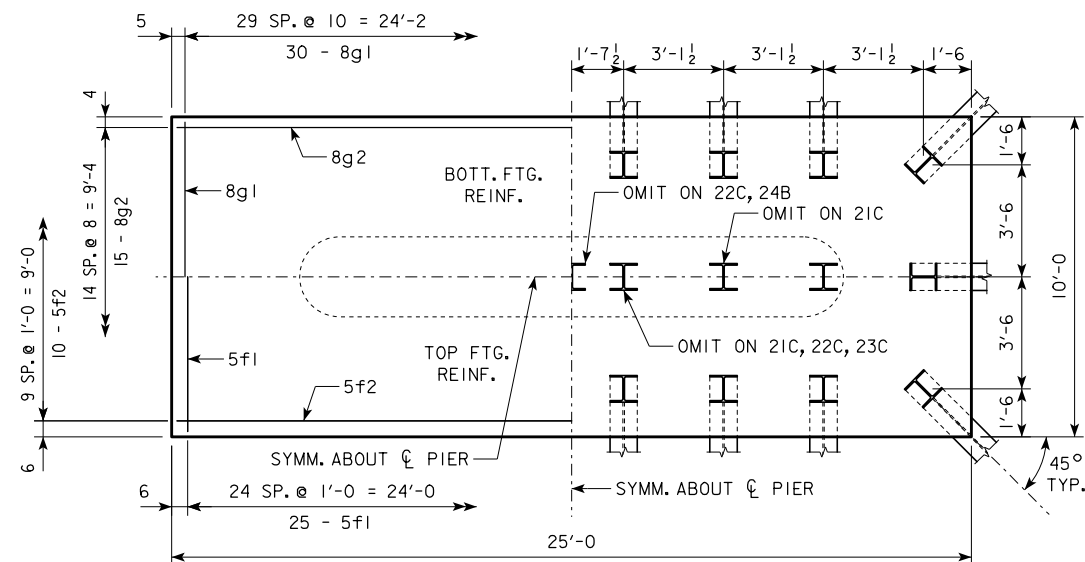
TYPICAL SECTION



4'-0 x 9'-0 x 25'-0 FOR 20B & 21B



4'-0 x 9'-0 x 25'-0 FOR 22B, 23B & 24A



4'-0 x 10'-0 x 25'-0 FOR 21C, 22C, 23C & 24B

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 H40-57-06.

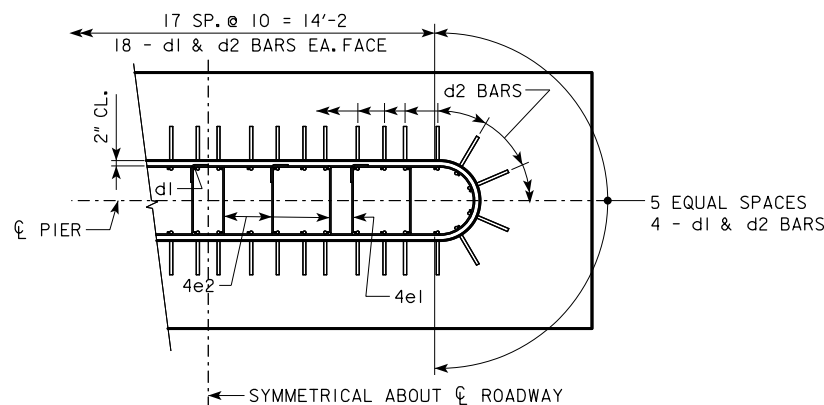
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

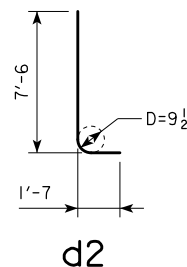
H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4	20B	141	4' x 9' x 25'	
213'-10	20B	146		
226'-4	22B	142		
243'-0	23B	144		
201'-4	20B	143	4' x 9' x 25'	
213'-10	21B	144		
226'-4	22B	144		
243'-0	23B	146		
201'-4	20B	145	4' x 9' x 25'	
213'-10	21B	146		
226'-4	22B	146		
243'-0	24A	144		
201'-4	21B	143	4' x 9' x 25'	
213'-10	22B	142		
226'-4	23B	144		
243'-0	24A	146		
201'-4	21C	143	4' x 10' x 25'	
213'-10	22C	143		
226'-4	23C	145		
243'-0	24B	147		

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
4' x 9' x 25'	d2	44 - #9 AS SHOWN	9'-1	1359	3354	33.3
	f1	25 - #5 @ 1'-0	8'-8	226		
	f2	9 - #5 @ 1'-0	24'-8	232		
	g1	30 - #7 @ 0'-10	8'-8	531		
	g2	12 - #9 @ 0'-9	24'-8	1006		
4' x 10' x 25'	d2	44 - #9 AS SHOWN	9'-1	1359	3630	37.0
	f1	25 - #5 @ 1'-0	9'-8	252		
	f2	10 - #5 @ 1'-0	24'-8	257		
	g1	30 - #8 @ 0'-10	9'-8	774		
	g2	15 - #8 @ 0'-8	24'-8	988		



d2 BAR LAYOUT (SEE SECTION A-A ON SHEET H40-57-06.)

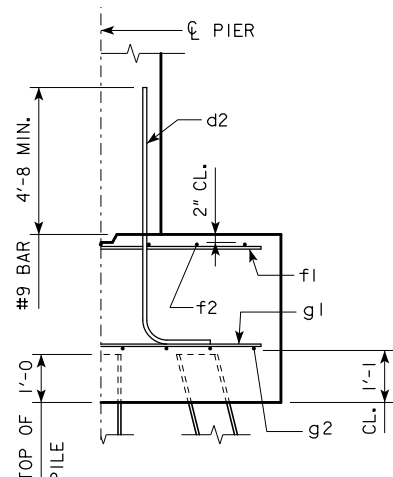
NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.



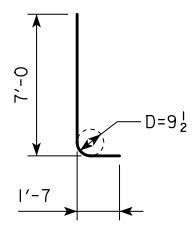
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER-HP10x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 0° SKEW - H=25' TO 40'	<b>H40-60-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

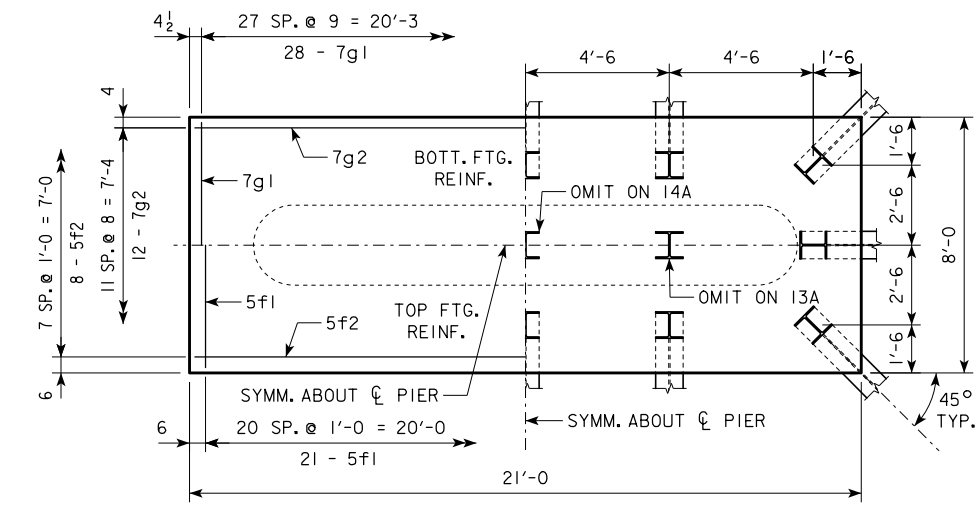


TYPICAL SECTION

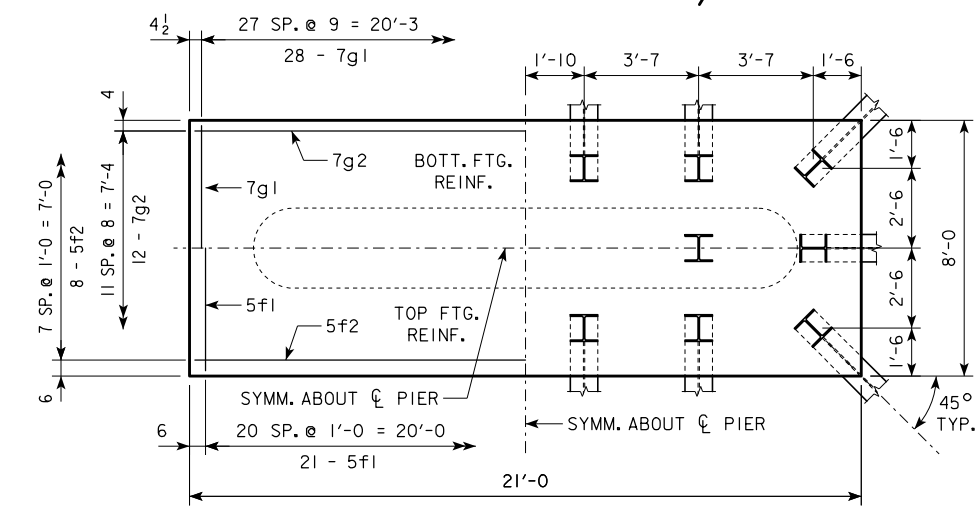


d2

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



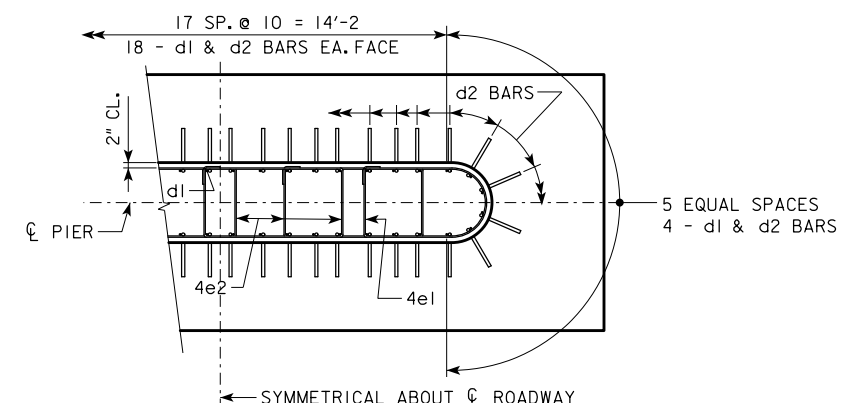
3'-6 x 8'-0 x 21'-0 FOR 13A, 14A & 15A



3'-6 x 8'-0 x 21'-0 FOR 16A

H IN FT.	PILING (HP10x57)			FOOTING SIZE
	CL - CL ABUT. BRG.	NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18	201'-4	13A	213	3'-6 x 8' x 21'
	213'-10	14A	207	
	226'-4	14A	217	
	243'-0	15A	217	
21	201'-4	13A	217	3'-6 x 8' x 21'
	213'-10	14A	212	
	226'-4	15A	213	
	243'-0	16A	202	
24	201'-4	14A	208	3'-6 x 8' x 21'
	213'-10	14A	216	
	226'-4	15A	217	
	243'-0	16A	206	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
3'-6 x 8' x 21'	d2	44 - #9 AS SHOWN	8'-7	1284	2570	21.8
	f1	21 - #5 @ 1'-0	7'-8	168		
	f2	8 - #5 @ 1'-0	20'-8	172		
	g1	28 - #7 @ 0'-9	7'-8	439		
	g2	12 - #7 @ 0'-8	20'-8	507		



d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-57-06.)

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

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 H40-57-06.

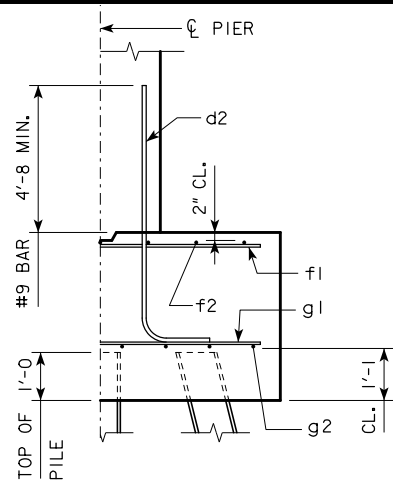
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

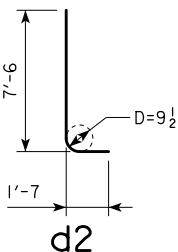
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b> 0° SKEW - H=16' TO 24'	<b>H40-61-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



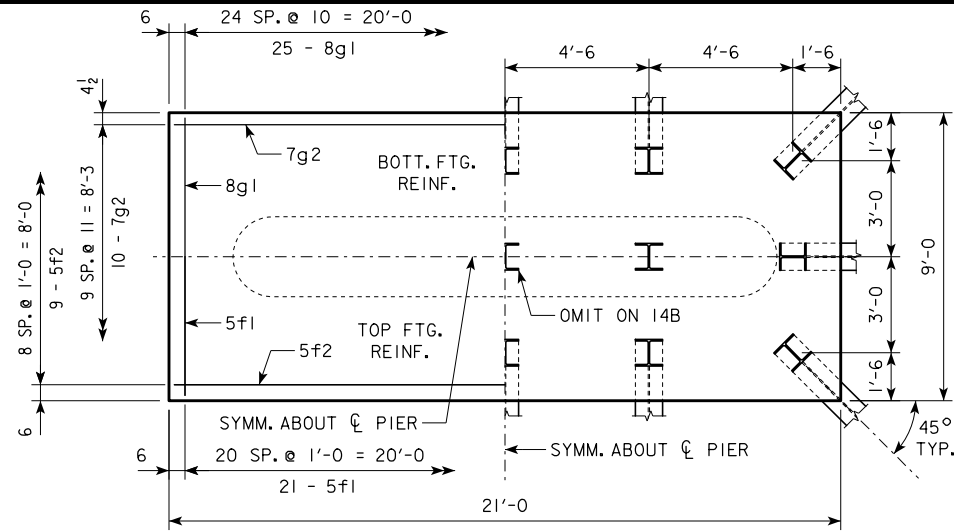
TYPICAL SECTION



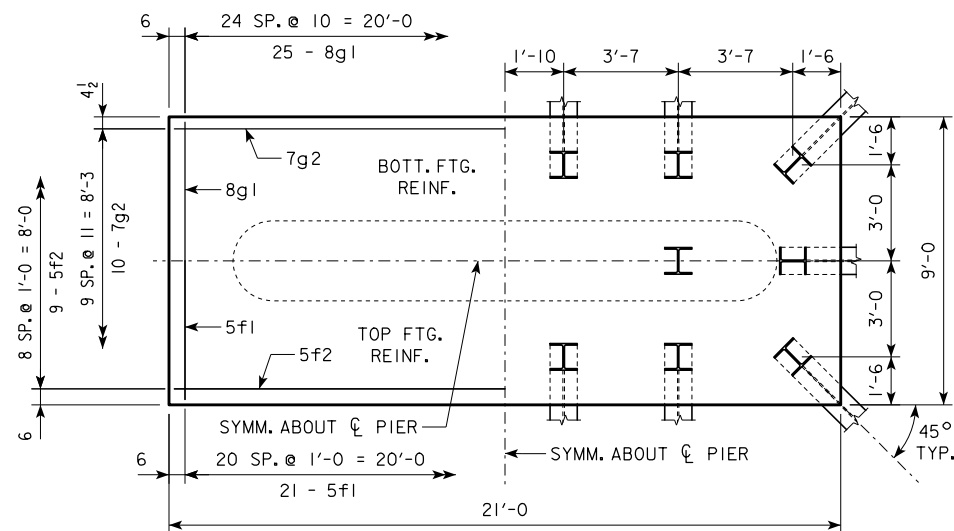
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4	14B	208	4' x 9' x 21'	
213'-10	14B	216		
226'-4	15B	216		
243'-0	16B	206		
201'-4	14C	203	4' x 9' x 23'	
213'-10	14C	210		
226'-4	15C	210		
243'-0	16C	206		
201'-4	14C	206	4' x 9' x 23'	
213'-10	14C	213		
226'-4	15C	213		
243'-0	16C	209		
201'-4	14D	204	4' x 10' x 24'	
213'-10	14D	211		
226'-4	15D	210		
243'-0	16D	206		
201'-4	14D	208	4' x 10' x 24'	
213'-10	14D	216		
226'-4	15D	215		
243'-0	16D	212		

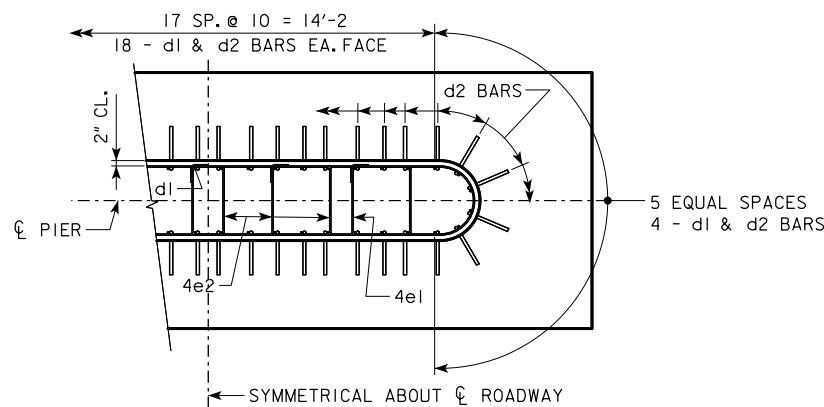
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)	
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 9' x 21'	d2	44 - #9 AS SHOWN	9'-1	1359	2744	28.0
	f1	21 - #5 @ 1'-0	8'-8	190		
	f2	9 - #5 @ 1'-0	20'-8	194		
	g1	25 - #8 @ 0'-10	8'-8	579		
	g2	10 - #7 @ 0'-11	20'-8	422		
4' x 9' x 23'	d2	44 - #9 AS SHOWN	9'-1	1359	3123	30.7
	f1	23 - #5 @ 1'-0	8'-8	208		
	f2	9 - #5 @ 1'-0	22'-8	213		
	g1	28 - #7 @ 0'-10	8'-8	496		
	g2	14 - #8 @ 0'-7 1/2	22'-8	847		
4' x 10' x 24'	d2	44 - #9 AS SHOWN	9'-1	1359	3591	35.6
	f1	24 - #5 @ 1'-0	9'-8	242		
	f2	10 - #5 @ 1'-0	23'-8	247		
	g1	27 - #8 @ 0'-10 1/2	9'-8	697		
	g2	13 - #9 @ 0'-9 1/2	23'-8	1046		



4'-0 x 9'-0 x 21'-0 FOR 14B & 15B

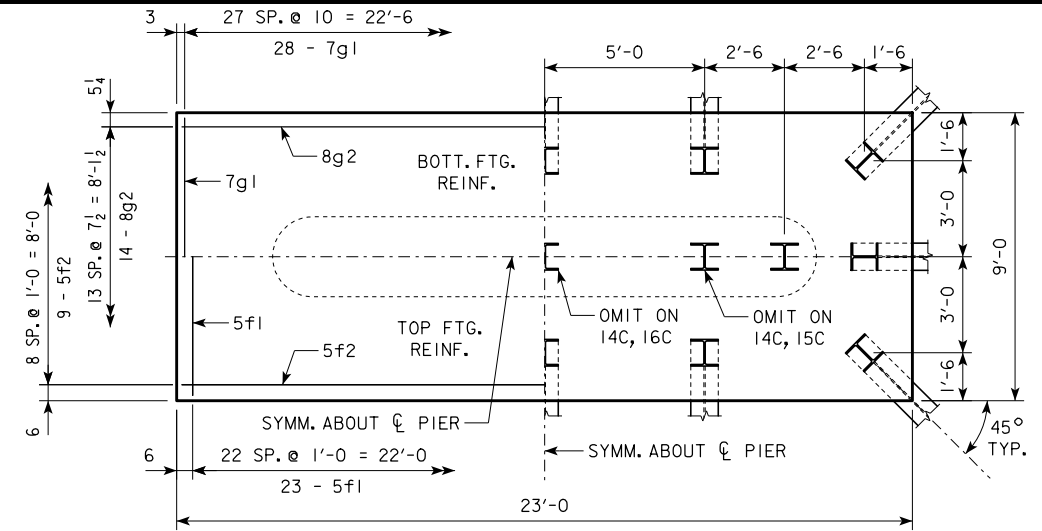


4'-0 x 9'-0 x 21'-0 FOR 16B

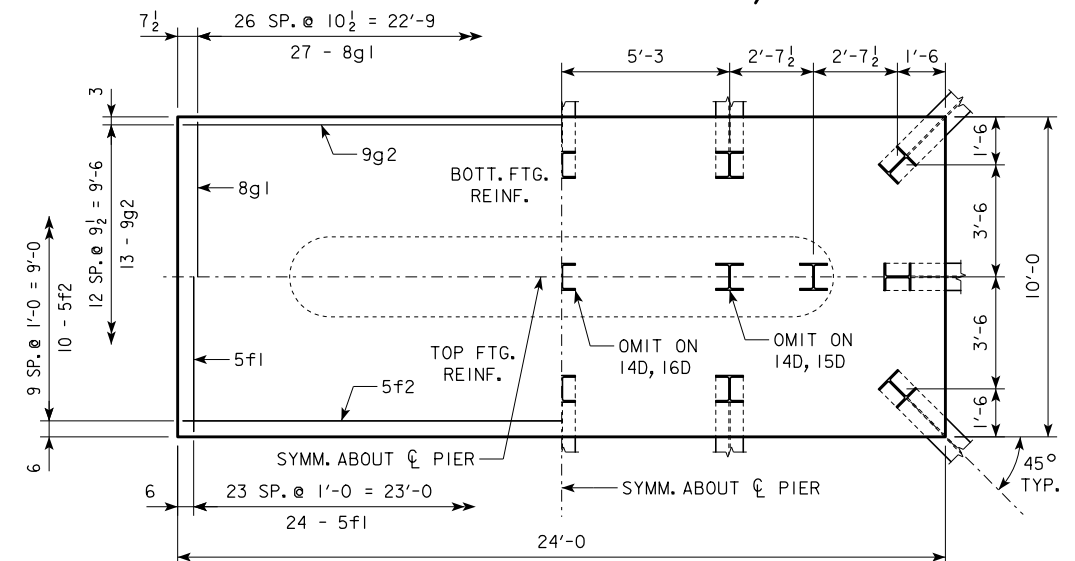


d2 BAR LAYOUT (SEE SECTION A-A ON SHEET H40-57-06.)

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



4'-0 x 9'-0 x 23'-0 FOR 14C, 15C & 16C



4'-0 x 10'-0 x 24'-0 FOR 14D, 15D & 16D

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 H40-57-06.

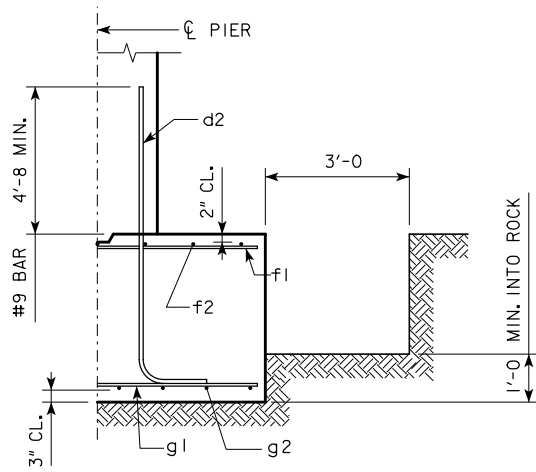
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

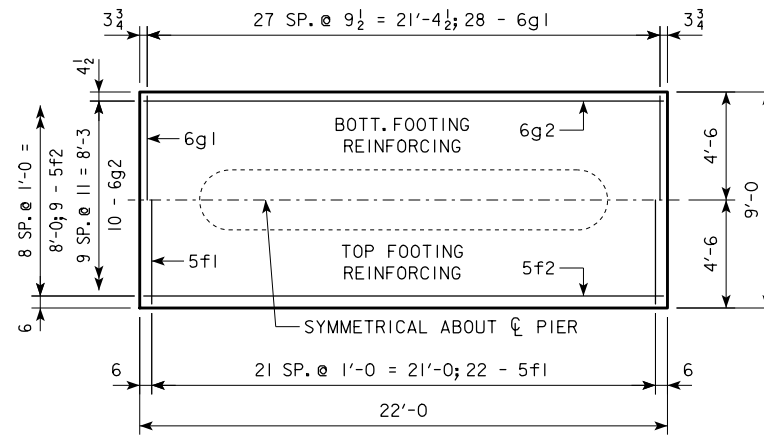
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
<b>TEE PIER-HPI0x57 SRL-2 STEEL PILE FOOTINGS</b>		<b>H40-62-06</b> 0° SKEW - H=25' TO 40'	

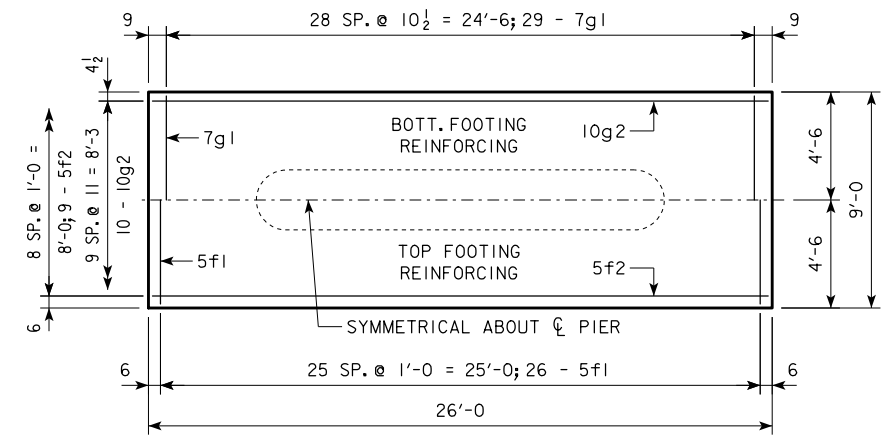
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



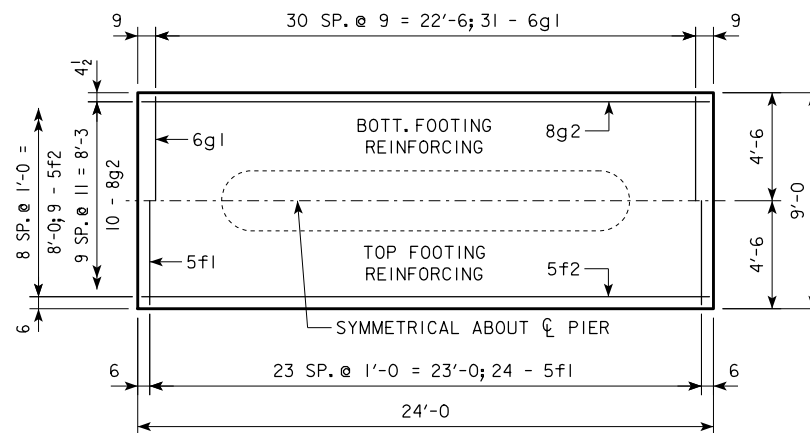
TYPICAL SECTION



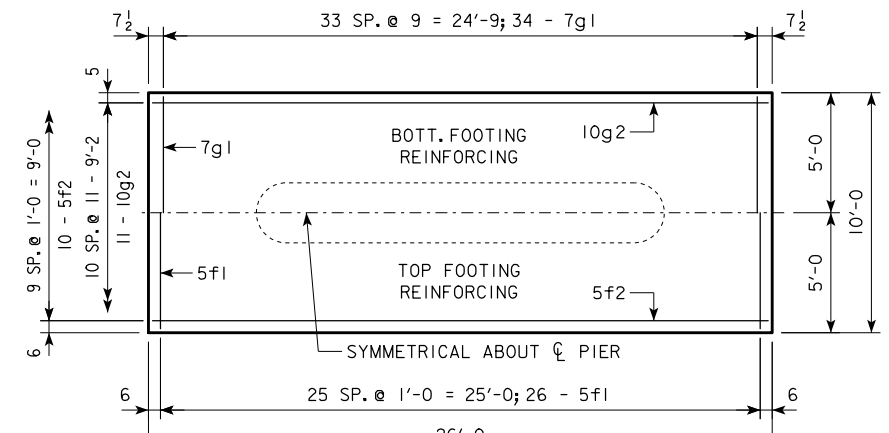
3'-6 x 9'-0 x 22'-0



3'-6 x 9'-0 x 26'-0

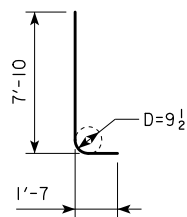


3'-6 x 9'-0 x 24'-0



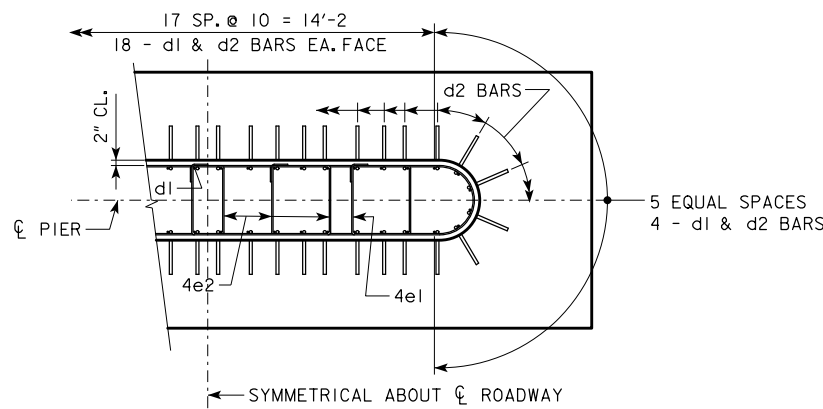
3'-6 x 10'-0 x 26'-0

H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
16 TO 18	138'-10	3'-6 x 9' x 22'
	151'-4	3'-6 x 9' x 24'
	163'-10	3'-6 x 9' x 26'
	176'-4	3'-6 x 10' x 26'
	188'-10	3'-6 x 10' x 26'
19 TO 21	201'-4	3'-6 x 9' x 22'
	213'-10	3'-6 x 9' x 24'
	226'-4	3'-6 x 9' x 26'
	239'-0	3'-6 x 10' x 26'
	251'-6	3'-6 x 10' x 26'
22 TO 24	264'-0	3'-6 x 9' x 22'
	276'-6	3'-6 x 9' x 24'
	289'-0	3'-6 x 9' x 26'
	301'-6	3'-6 x 10' x 26'
	314'-0	3'-6 x 10' x 26'



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

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
3'-6 x 9' x 22'	d2	44 - #9 AS SHOWN	9'-5	1409	2500	25.7
	f1	22 - #5 @ 1'-0	8'-8	199		
	f2	9 - #5 @ 1'-0	21'-8	203		
	g1	28 - #6 @ 0'-9 1/2	8'-8	364		
3'-6 x 9' x 24'	d2	44 - #9 AS SHOWN	9'-5	1409	2884	28.0
	f1	24 - #5 @ 1'-0	8'-8	217		
	f2	9 - #5 @ 1'-0	23'-8	222		
	g1	31 - #6 @ 0'-9	8'-8	404		
3'-6 x 9' x 26'	d2	44 - #9 AS SHOWN	9'-5	1409	3503	30.3
	f1	26 - #5 @ 1'-0	8'-8	235		
	f2	9 - #5 @ 1'-0	25'-8	241		
	g1	29 - #7 @ 0'-10 1/2	8'-8	514		
3'-6 x 10' x 26'	d2	44 - #9 AS SHOWN	9'-5	1409	3826	33.7
	f1	26 - #5 @ 1'-0	9'-8	262		
	f2	10 - #5 @ 1'-0	25'-8	268		
	g1	34 - #7 @ 0'-9	9'-8	672		



d2 BAR LAYOUT (SEE SECTION A-A ON SHEET H40-57-06.)

FOOTING NOTES:

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-57-06.

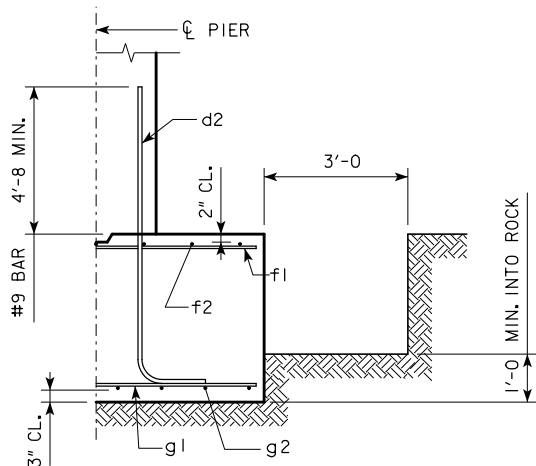
THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

04-12 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER - SPREAD FOOTINGS</b> 0° SKEW - H=16' TO 24'	<b>H40-63-06</b>

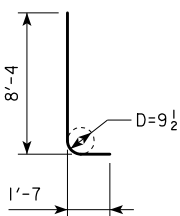
REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0".

REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0".

H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
25 TO 27	138'-10	4' x 8' x 25'
	151'-4	4' x 8' x 27'
	163'-10	4' x 8' x 27'
	176'-4	4' x 9' x 27'
	188'-10	4' x 9' x 27'
28 TO 30	201'-4	4' x 9' x 29'
	213'-10	4' x 9' x 29'
	226'-4	4' x 10' x 29'
	243'-0	4' x 10' x 29'
	138'-10	4' x 8' x 27'
31 TO 33	151'-4	4' x 8' x 27'
	163'-10	4' x 9' x 27'
	176'-4	4' x 9' x 27'
	188'-10	4' x 9' x 29'
	201'-4	4' x 9' x 29'
34 TO 36	213'-10	4' x 9' x 29'
	226'-4	4' x 10' x 29'
	243'-0	4' x 10' x 29'
	138'-10	4' x 8' x 27'
	37 TO 40	151'-4
163'-10		4' x 9' x 27'
176'-4		4' x 9' x 27'
188'-10		4' x 9' x 29'
201'-4		4' x 9' x 29'
213'-10	4' x 9' x 29'	
226'-4	4' x 10' x 29'	
243'-0	4' x 10' x 29'	



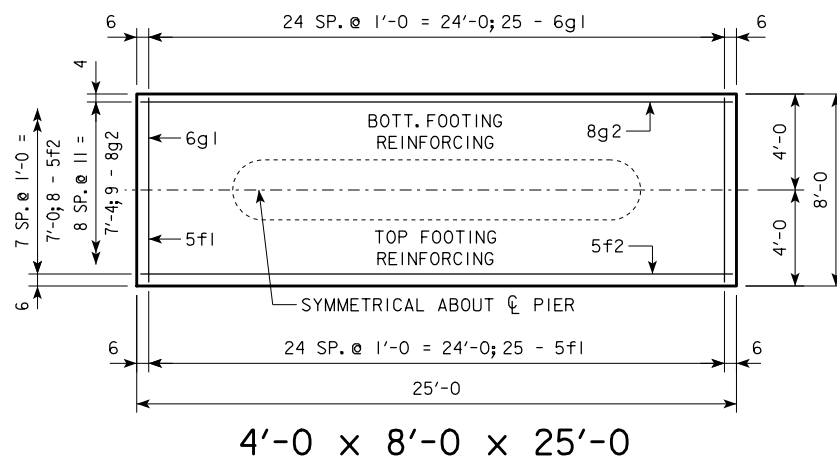
TYPICAL SECTION



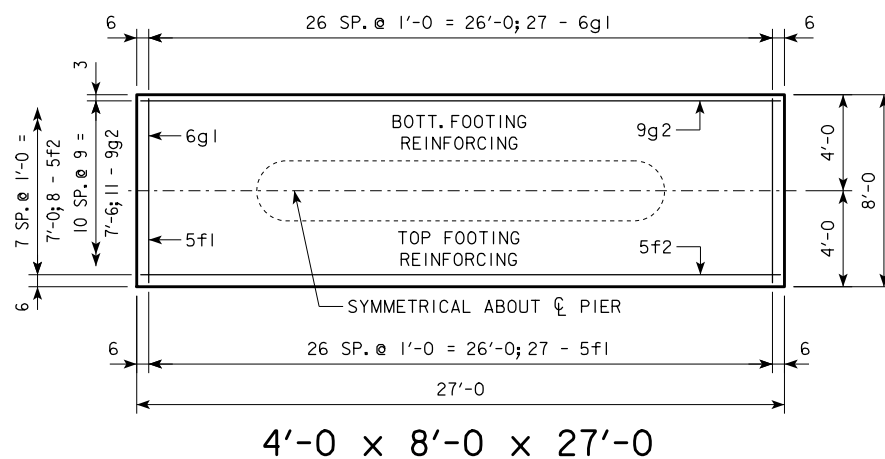
d2

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

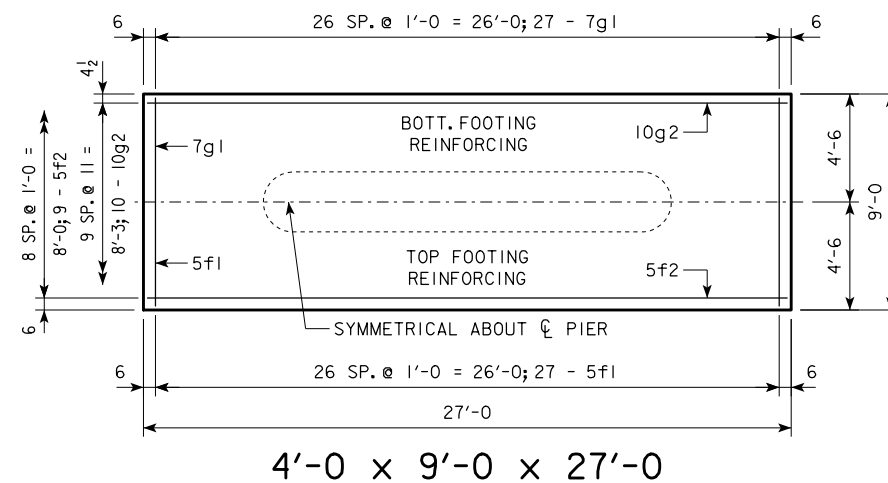
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 8' x 25'	d2	44 - #9 AS SHOWN	9'-11	1484	2771	29.6
	f1	25 - #5 @ 1'-0	7'-8	200		
	f2	8 - #5 @ 1'-0	24'-8	206		
	g1	25 - #6 @ 1'-0	7'-8	288		
	g2	9 - #8 @ 0'-11	24'-8	593		
4' x 8' x 27'	d2	44 - #9 AS SHOWN	9'-11	1484	3231	32.0
	f1	27 - #5 @ 1'-0	7'-8	216		
	f2	8 - #5 @ 1'-0	26'-8	223		
	g1	27 - #6 @ 1'-0	7'-8	311		
	g2	11 - #9 @ 0'-9	26'-8	997		
4' x 9' x 27'	d2	44 - #9 AS SHOWN	9'-11	1484	3603	36.0
	f1	27 - #5 @ 1'-0	8'-8	244		
	f2	9 - #5 @ 1'-0	26'-8	250		
	g1	27 - #7 @ 1'-0	8'-8	478		
	g2	10 - #10 @ 0'-11	26'-8	1147		
4' x 9' x 29'	d2	44 - #9 AS SHOWN	9'-11	1484	4133	38.7
	f1	29 - #5 @ 1'-0	8'-8	262		
	f2	9 - #5 @ 1'-0	28'-8	269		
	g1	29 - #7 @ 1'-0	8'-8	514		
	g2	13 - #10 @ 0'-8 1/2	28'-8	1604		
4' x 10' x 29'	d2	44 - #9 AS SHOWN	9'-11	1484	4331	43.0
	f1	29 - #5 @ 1'-0	9'-8	292		
	f2	10 - #5 @ 1'-0	28'-8	299		
	g1	33 - #7 @ 0'-10 1/2	9'-8	652		
	g2	13 - #10 @ 0'-9 1/2	28'-8	1604		



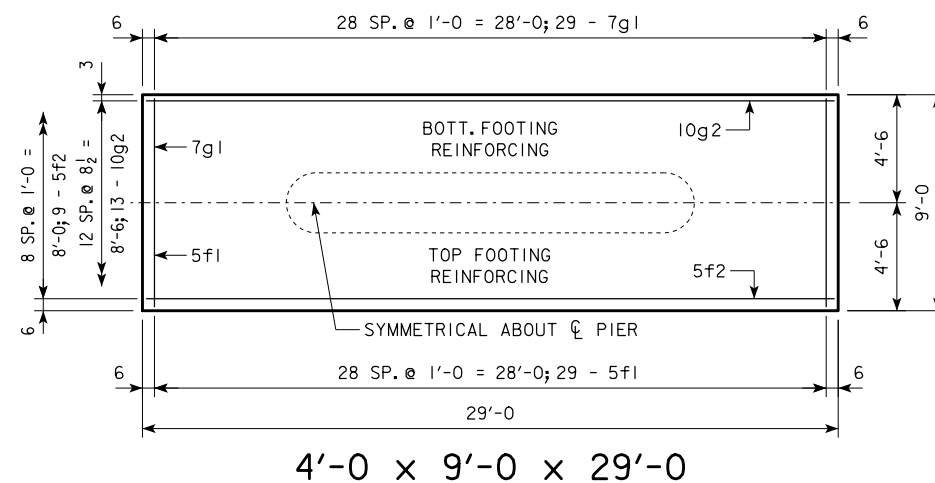
4'-0 x 8'-0 x 25'-0



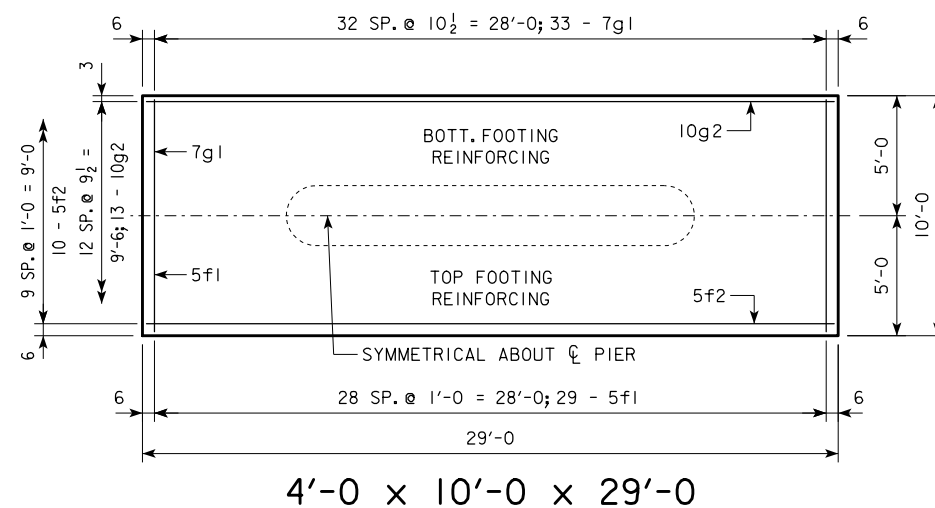
4'-0 x 8'-0 x 27'-0



4'-0 x 9'-0 x 27'-0



4'-0 x 9'-0 x 29'-0

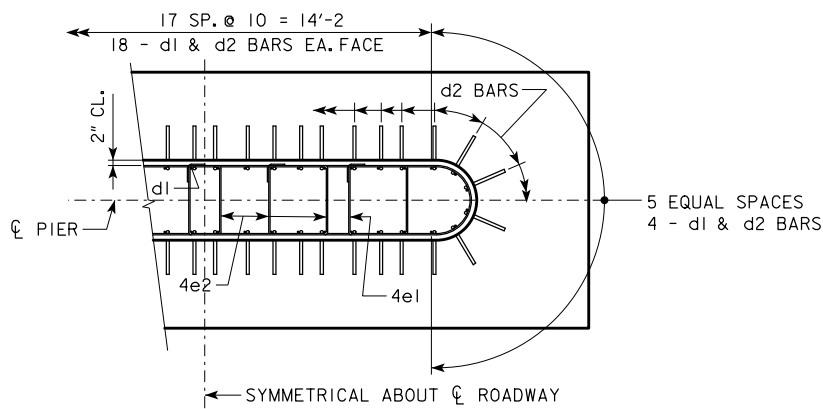


4'-0 x 10'-0 x 29'-0

**FOOTING NOTES:**

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-57-06.

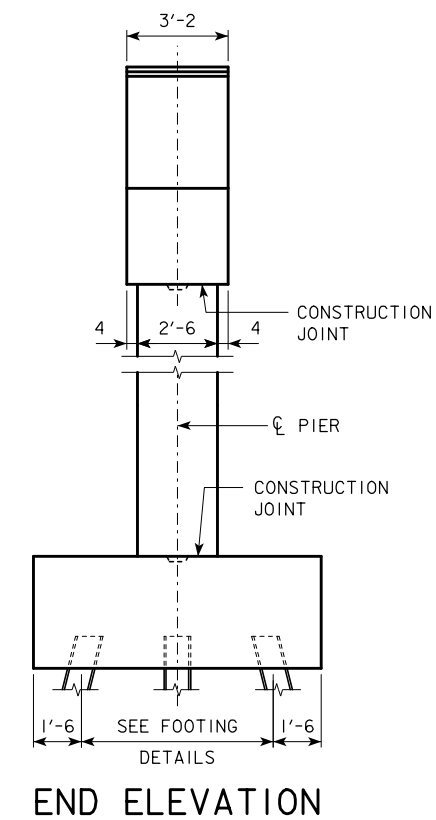
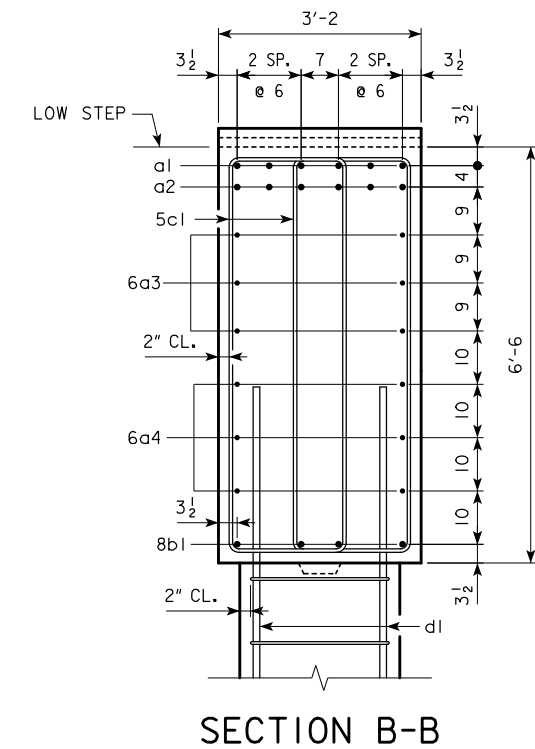
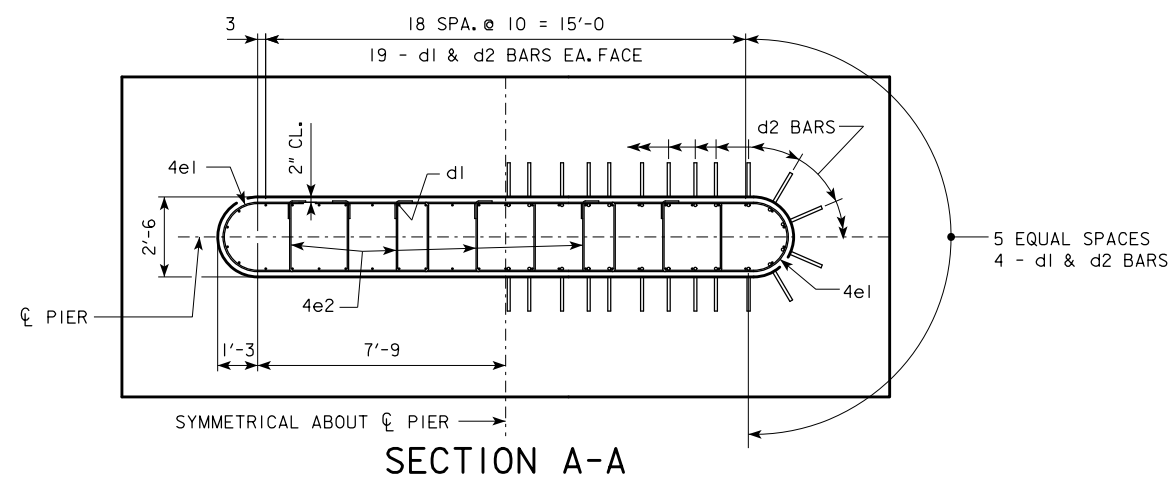
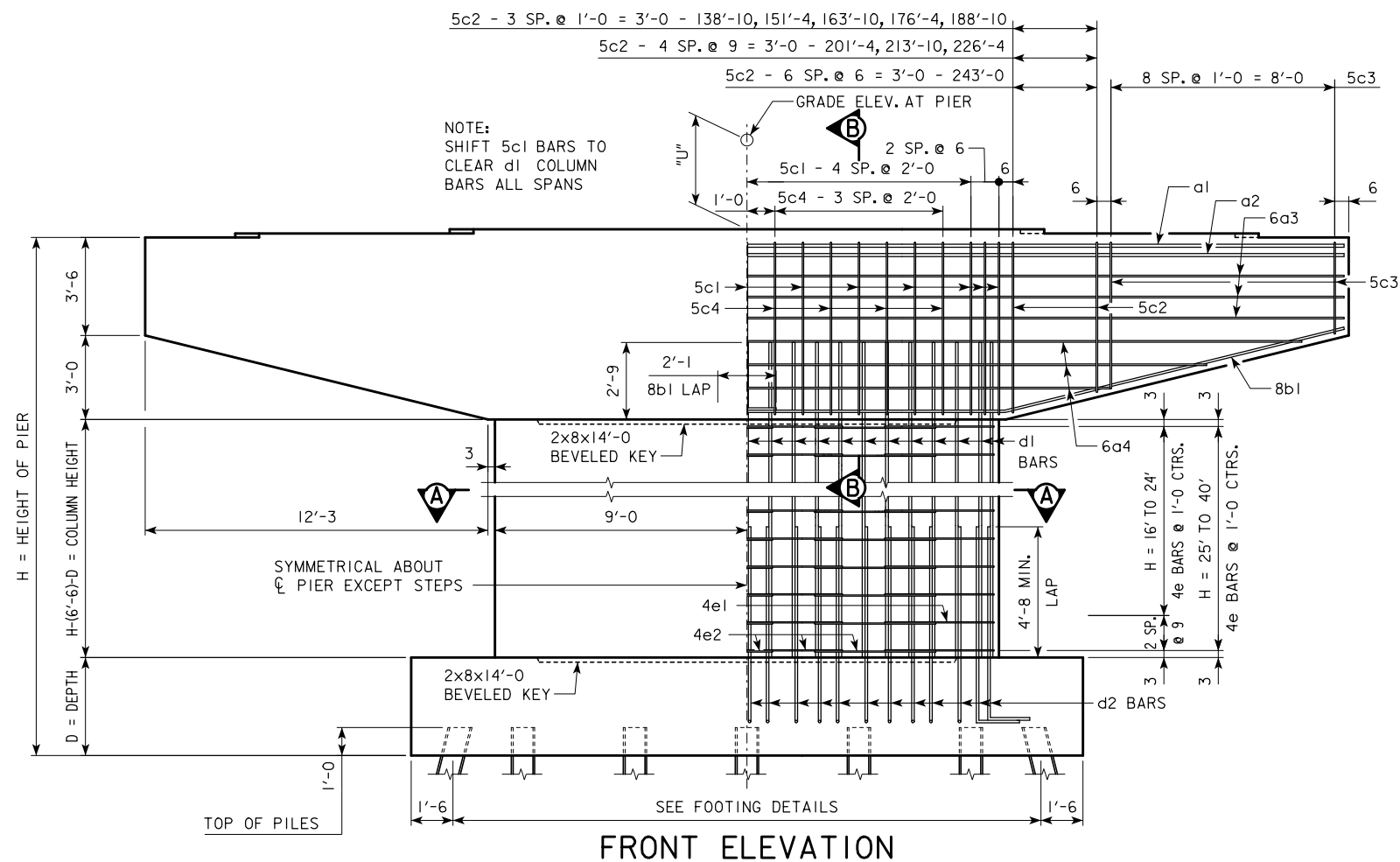
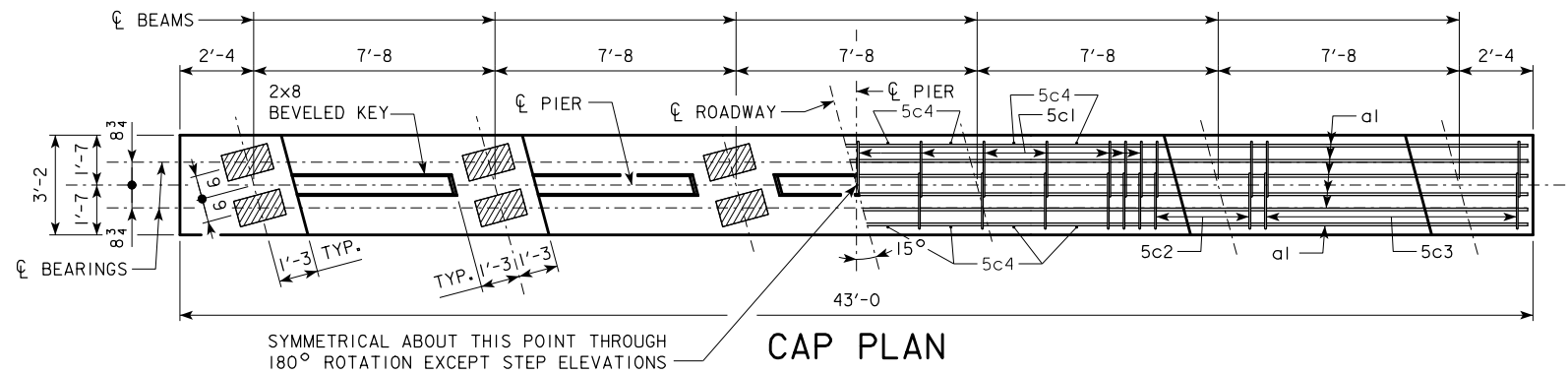
THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).



d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-57-06.)

04-12 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER - SPREAD FOOTINGS</b> 0° SKEW - H=25' TO 40'	<b>H40-64-06</b>



**PIER NOTES:**

SEE "TEE PIER NOTES" ON H40-02-06 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.

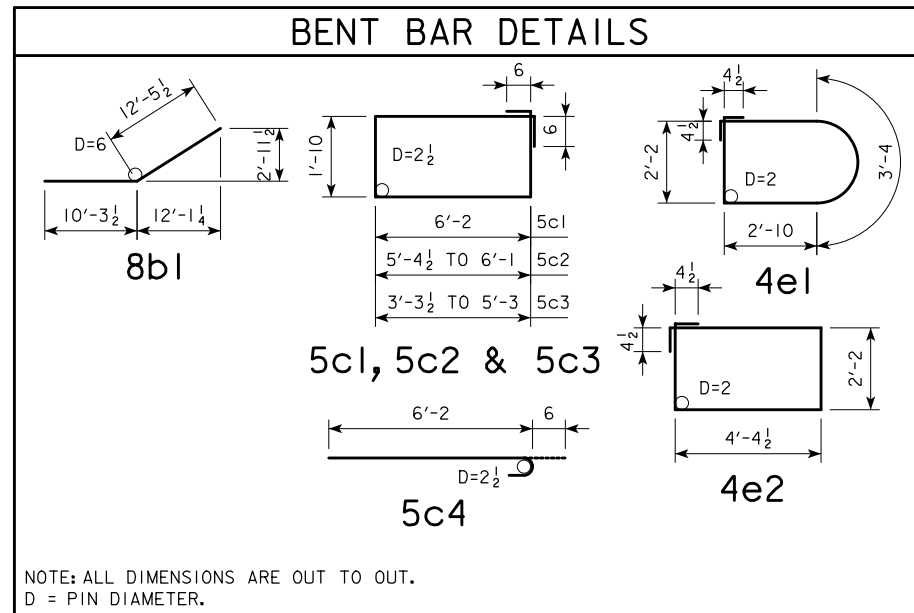
FOR SIZE OF BEARING PADS, SEE H40-44-06.

SEE SHEET H40-15-06 FOR "U" DIMENSION.

REVISED 01-10 - ADDED PIER NOTES FROM H40-66-06 STANDARD.

01-10 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER CAP AND COLUMN</b> 15° SKEW	<b>H40-65-06</b>

REVISED 01-10 - MOVED PIER NOTES TO H40-65-06 STANDARD.



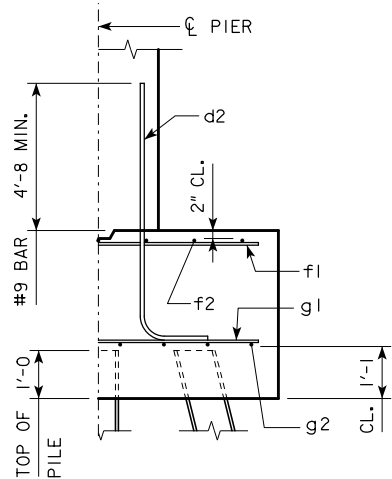
		CAP																											
REINFORCING STEEL		138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0			
BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT
a1	42'-8	—	6	9	870	6	9	870	6	10	1102	6	10	1102	6	10	1102	6	10	1102	6	11	1360	6	11	1360	6	11	1360
a2	42'-8	—	6	9	870	6	9	870	6	9	870	6	9	870	6	10	1102	6	10	1102	6	10	1102	6	10	1102	6	10	1102
6a3	42'-8	—	6	6	385	6	6	385	6	6	385	6	6	385	6	6	385	6	6	385	6	6	385	6	6	385	6	6	385
6a4	VARIES	—	6	6	298	6	6	298	6	6	298	6	6	298	6	6	298	6	6	298	6	6	298	6	6	298	6	6	298
8b1	22'-9	—	8	8	486	8	8	486	8	8	486	8	8	486	8	8	486	8	8	486	8	8	486	8	8	486	8	8	486
5c1	17'-0	□	26	5	461	26	5	461	26	5	461	26	5	461	26	5	461	26	5	461	26	5	461	26	5	461	26	5	461
5c2	VARIES	□	16	5	269	16	5	269	16	5	269	16	5	269	16	5	269	20	5	336	20	5	336	20	5	336	20	5	336
5c3	VARIES	□	36	5	496	36	5	496	36	5	496	36	5	496	36	5	496	36	5	496	36	5	496	36	5	496	36	5	496
5c4	6'-8	—	16	5	111	16	5	111	16	5	111	16	5	111	16	5	111	16	5	111	16	5	111	16	5	111	16	5	111
① TOTAL (LB.)			4246			4246			4478			4478			4478			4777			5035			5035			5428		
STRUCTURAL CONCRETE (CY)			29.5			29.5			29.5			29.5			29.5			29.5			29.5			29.5			29.5		

### COLUMN

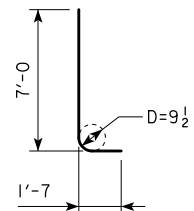
H IN FEET	COLUMN HEIGHT	STRUCTURAL CONCRETE (CY)	REINFORCING STEEL												TOTAL WEIGHT (LB.)
			d1 BAR —				4e1 BAR □				4e2 BAR □				
			NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	
16	6'-0	9.7	46	9	8'-9	1369	14	4	11'-11	111	28	4	13'-10	259	1739
17	7'-0	11.3	46	9	9'-9	1525	16	4	11'-11	127	32	4	13'-10	296	1948
18	8'-0	12.9	46	9	10'-9	1681	18	4	11'-11	143	36	4	13'-10	333	2157
19	9'-0	14.6	46	9	11'-9	1838	20	4	11'-11	159	40	4	13'-10	370	2367
20	10'-0	16.2	46	9	12'-9	1994	22	4	11'-11	175	44	4	13'-10	407	2576
21	11'-0	17.8	46	9	13'-9	2151	24	4	11'-11	191	48	4	13'-10	444	2786
22	12'-0	19.4	46	9	14'-9	2307	26	4	11'-11	207	52	4	13'-10	481	2995
23	13'-0	21.0	46	9	15'-9	2463	28	4	11'-11	223	56	4	13'-10	517	3203
24	14'-0	22.6	46	9	16'-9	2620	30	4	11'-11	239	60	4	13'-10	554	3413
25	14'-6	23.4	46	9	17'-3	2698	30	4	11'-11	239	60	4	13'-10	554	3491
26	15'-6	25.1	46	9	18'-3	2854	32	4	11'-11	255	64	4	13'-10	591	3700
27	16'-6	26.7	46	9	19'-3	3011	34	4	11'-11	271	68	4	13'-10	628	3910
28	17'-6	28.3	46	9	20'-3	3167	36	4	11'-11	287	72	4	13'-10	665	4119
29	18'-6	29.9	46	9	21'-3	3324	38	4	11'-11	302	76	4	13'-10	702	4328
30	19'-6	31.5	46	9	22'-3	3480	40	4	11'-11	318	80	4	13'-10	739	4537
31	20'-6	33.1	46	9	23'-3	3636	42	4	11'-11	334	84	4	13'-10	776	4746
32	21'-6	34.8	46	9	24'-3	3793	44	4	11'-11	350	88	4	13'-10	813	4956
33	22'-6	36.4	46	9	25'-3	3949	46	4	11'-11	366	92	4	13'-10	850	5165
34	23'-6	38.0	46	9	26'-3	4106	48	4	11'-11	382	96	4	13'-10	887	5375
35	24'-6	39.6	46	9	27'-3	4262	50	4	11'-11	398	100	4	13'-10	924	5584
36	25'-6	41.2	46	9	28'-3	4418	52	4	11'-11	414	104	4	13'-10	961	5793
37	26'-6	42.9	46	9	29'-3	4575	54	4	11'-11	430	108	4	13'-10	998	6003
38	27'-6	44.5	46	9	30'-3	4731	56	4	11'-11	446	112	4	13'-10	1035	6212
39	28'-6	46.1	46	9	31'-3	4888	58	4	11'-11	462	116	4	13'-10	1072	6422
40	29'-6	47.7	46	9	32'-3	5044	60	4	11'-11	478	120	4	13'-10	1109	6631

① SEE SHEET H40-17-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.

01-10 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009 <b>TEE PIER CAP AND COLUMN</b> 15° SKEW	<b>H40-66-06</b>
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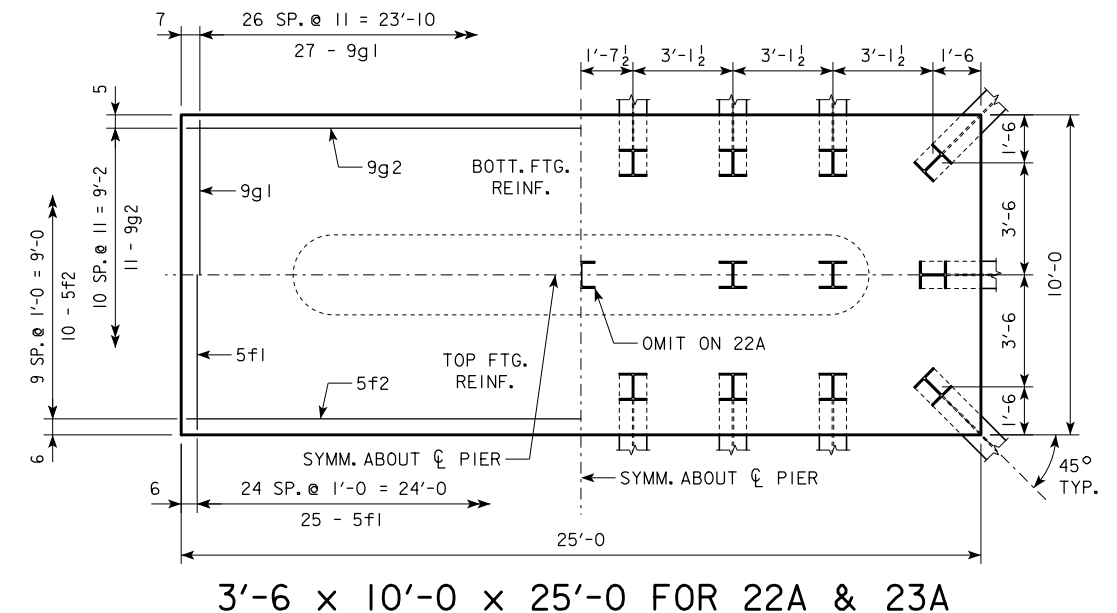
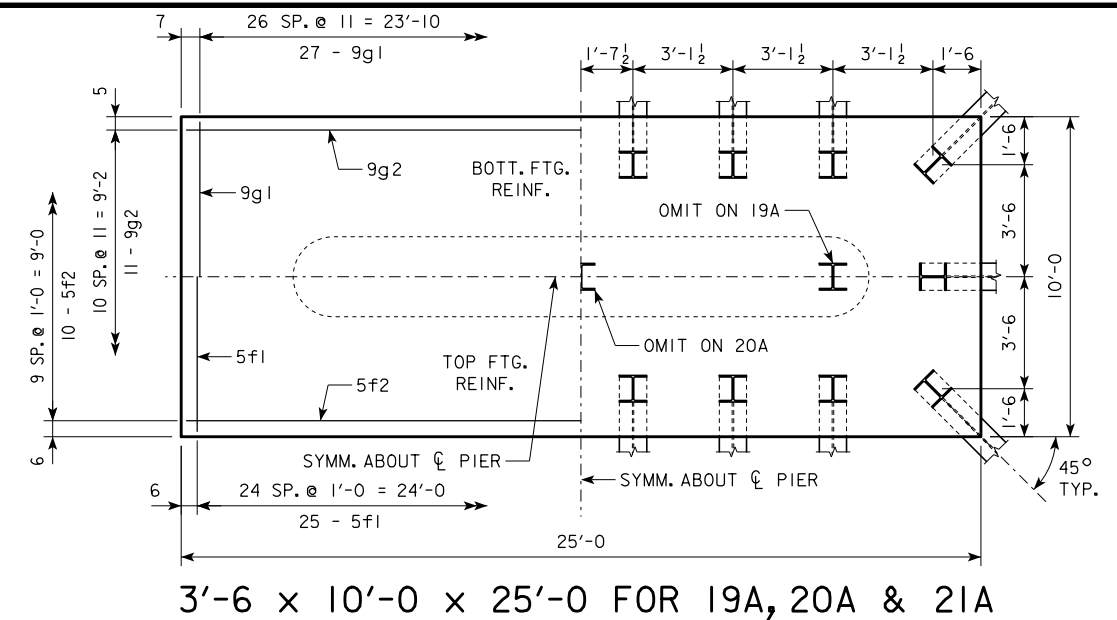


TYPICAL SECTION



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 H40-65-06.

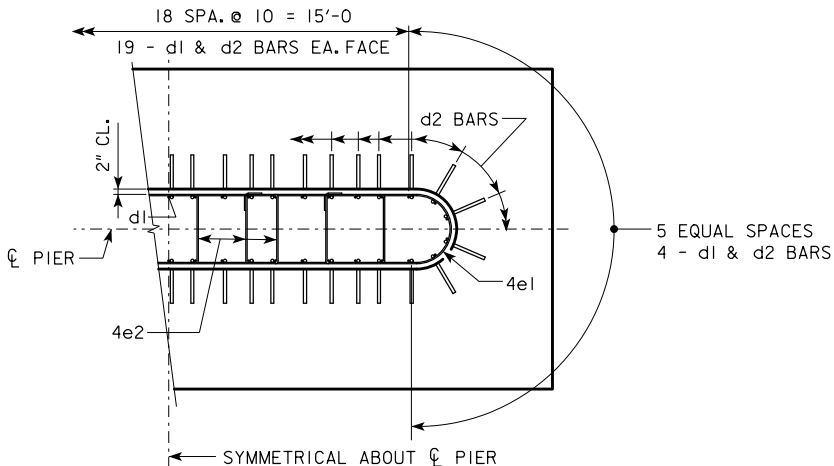
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18	201'-4	19A	146	3'-6 x 10' x 25'
TO	213'-10	20A	142	
16	226'-4	21A	144	
14	243'-0	22A	145	
21	201'-4	20A	140	3'-6 x 10' x 25'
TO	213'-10	20A	145	
19	226'-4	22A	142	
17	243'-0	23A	143	
24	201'-4	20A	143	3'-6 x 10' x 25'
TO	213'-10	21A	144	
22	226'-4	22A	144	
20	243'-0	23A	146	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
3'-6 x 10' x 25'	d2	46 - #9 AS SHOWN	8'-7	1342	3661	32.4
	f1	25 - #5 @ 1'-0	9'-8	252		
	f2	10 - #5 @ 1'-0	24'-8	257		
	g1	27 - #9 @ 0'-11	9'-8	887		
	g2	11 - #9 @ 0'-11	24'-8	923		

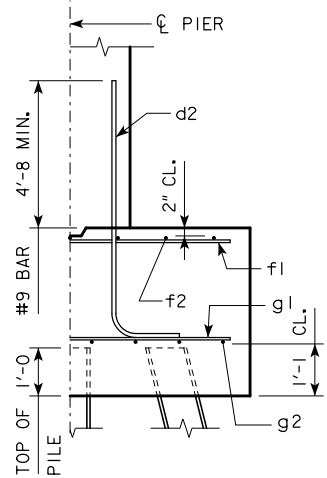


d2 BAR LAYOUT  
(SEE SECTION A-A ON SHEET H40-65-06.)

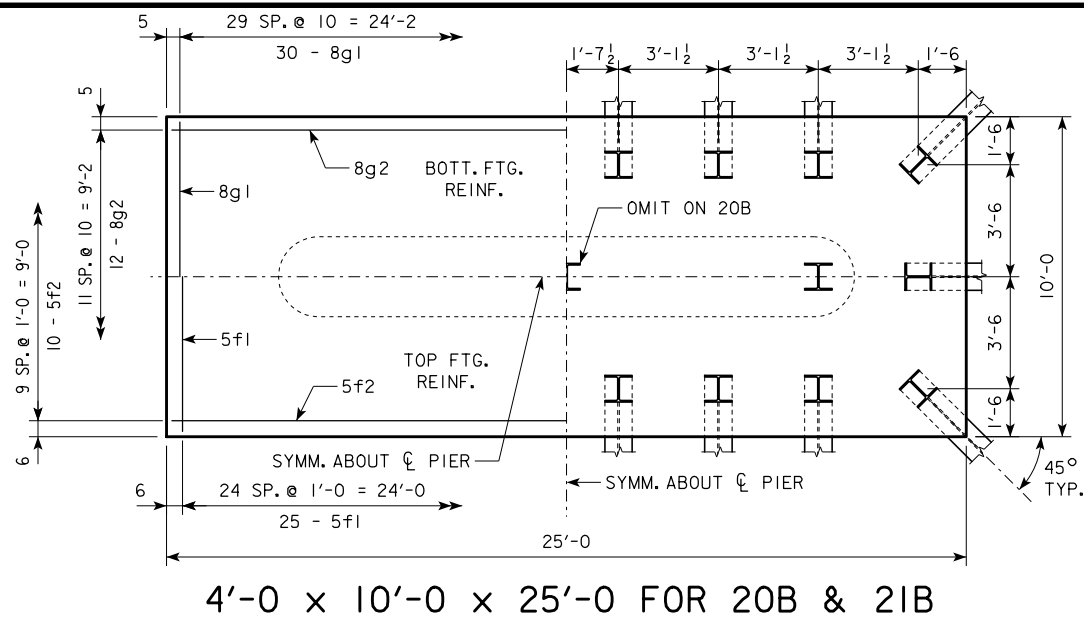
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

05-13 LATEST REVISION DATE  <i>Norman E. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>TEE PIER-HP10x57 SRL-1 STEEL PILE FOOTINGS</b> 15° SKEW - H=16' TO 24' <b>H40-67-06</b>

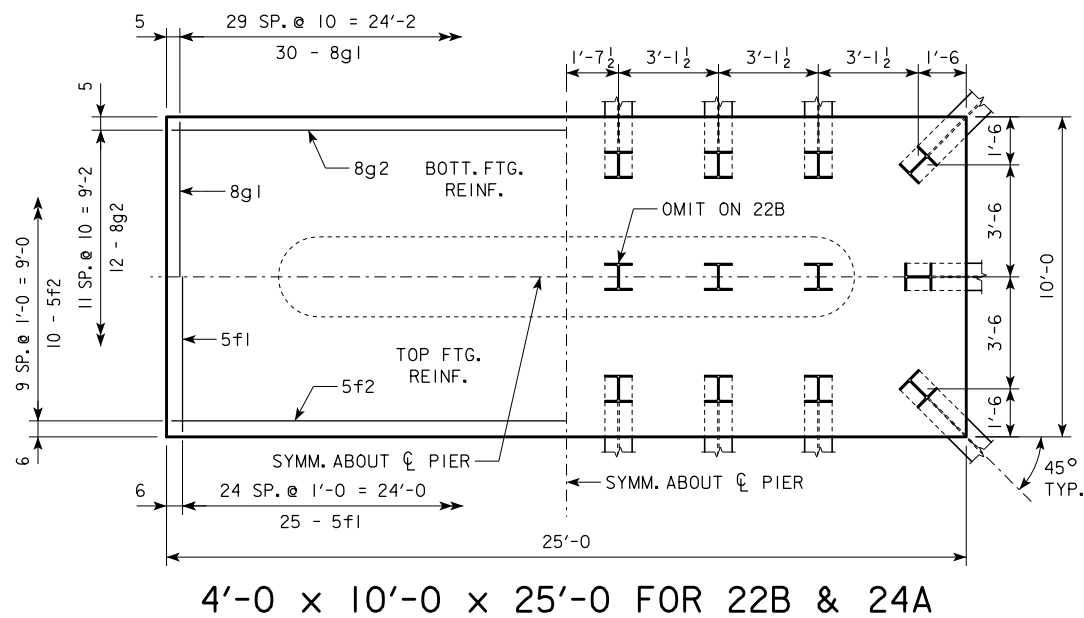
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



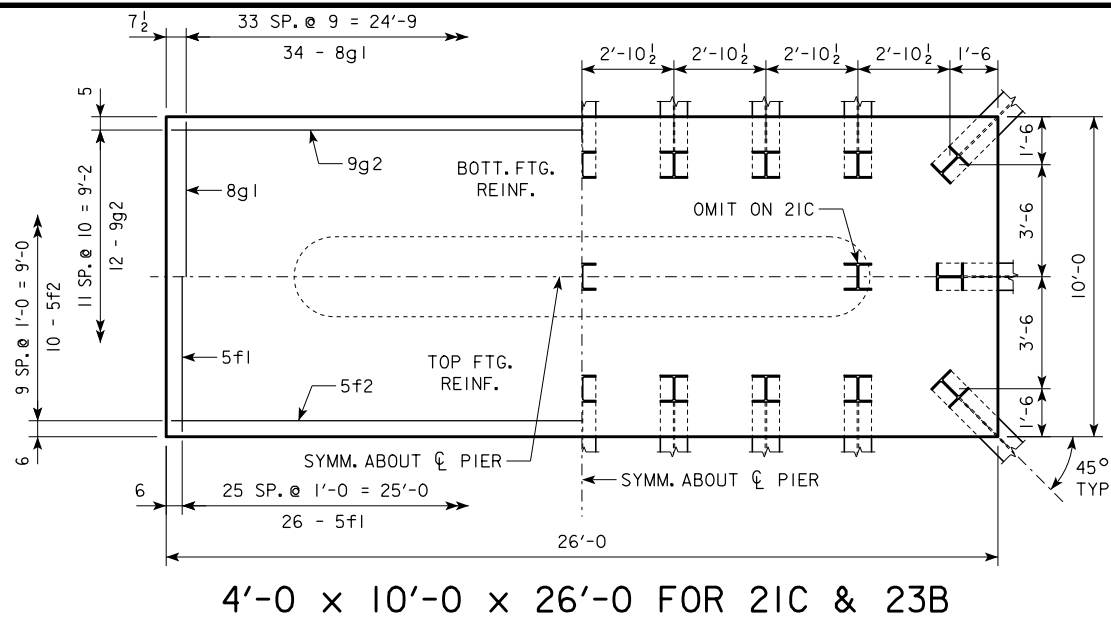
TYPICAL SECTION



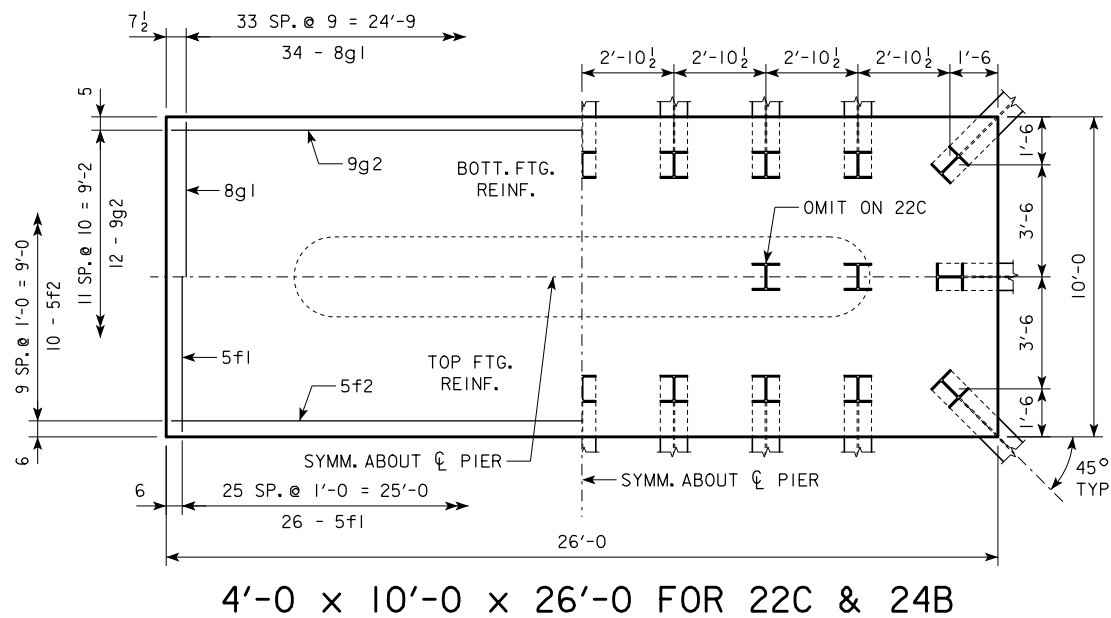
4'-0 x 10'-0 x 25'-0 FOR 20B & 21B



4'-0 x 10'-0 x 25'-0 FOR 22B & 24A



4'-0 x 10'-0 x 26'-0 FOR 21C & 23B



4'-0 x 10'-0 x 26'-0 FOR 22C & 24B

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 H40-65-06.

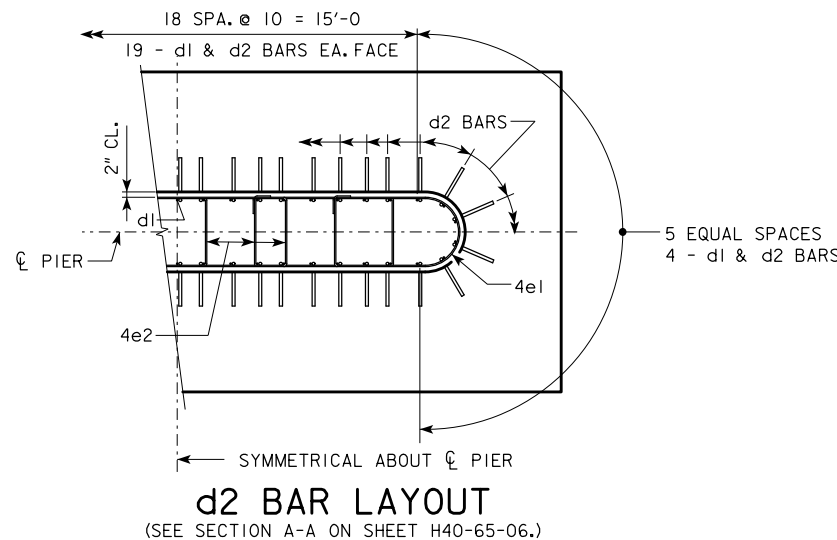
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	LRFD PU, STRENGTH I DES. LOAD (KIPS)	
20' TO 27'	201'-4	20B	145	4' x 10' x 25'
	213'-10	21B	146	
	226'-4	22B	147	
28' TO 30'	243'-0	24A	144	4' x 10' x 26'
	201'-4	21C	142	
	213'-10	21C	147	
31' TO 33'	226'-4	22C	144	4' x 10' x 26'
	243'-0	24B	140	
	201'-4	21C	144	
34' TO 36'	213'-10	22C	140	4' x 10' x 26'
	226'-4	22C	146	
	243'-0	24B	144	
37' TO 40'	201'-4	22C	140	4' x 10' x 26'
	213'-10	22C	145	
	226'-4	23B	147	
41' TO 43'	243'-0	24B	146	4' x 10' x 26'
	201'-4	24B	144	

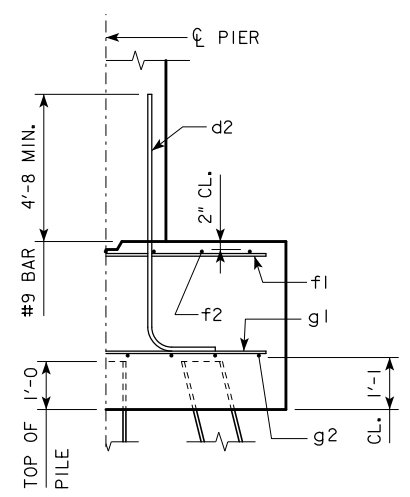
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 10' x 25'	d2	46 - #9 AS SHOWN	9'-1	1421	3494	37.0
	f1	25 - #5 @ 1'-0	9'-8	252		
	f2	10 - #5 @ 1'-0	24'-8	257		
	g1	30 - #8 @ 0'-10	9'-8	774		
	g2	12 - #8 @ 0'-10	24'-8	790		
4' x 10' x 26'	d2	46 - #9 AS SHOWN	9'-1	1421	3876	38.5
	f1	26 - #5 @ 1'-0	9'-8	262		
	f2	10 - #5 @ 1'-0	25'-8	268		
	g1	34 - #8 @ 0'-9	9'-8	878		
	g2	12 - #9 @ 0'-10	25'-8	1047		



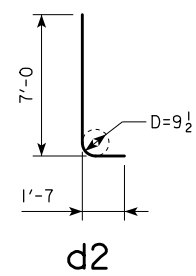
NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

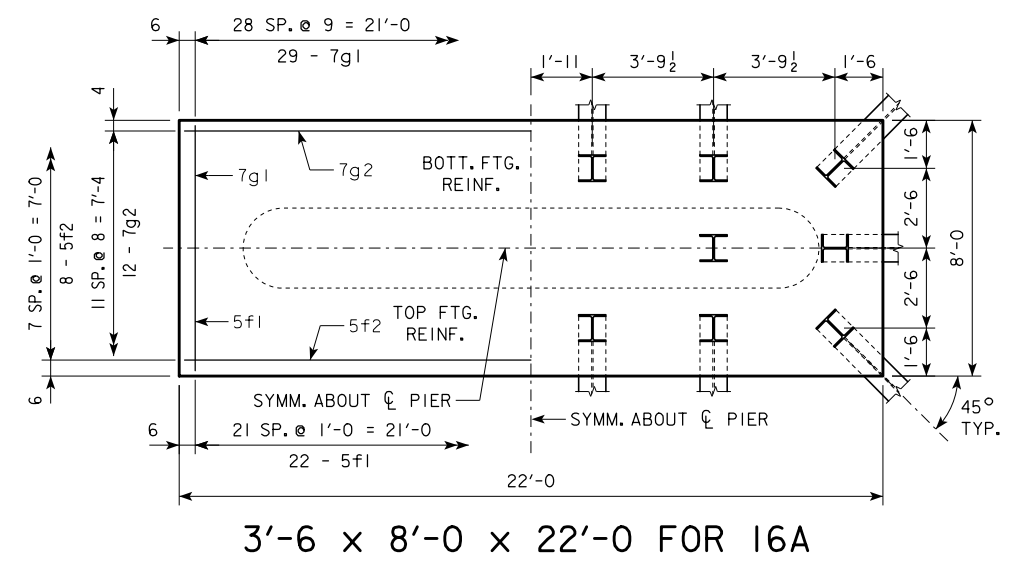
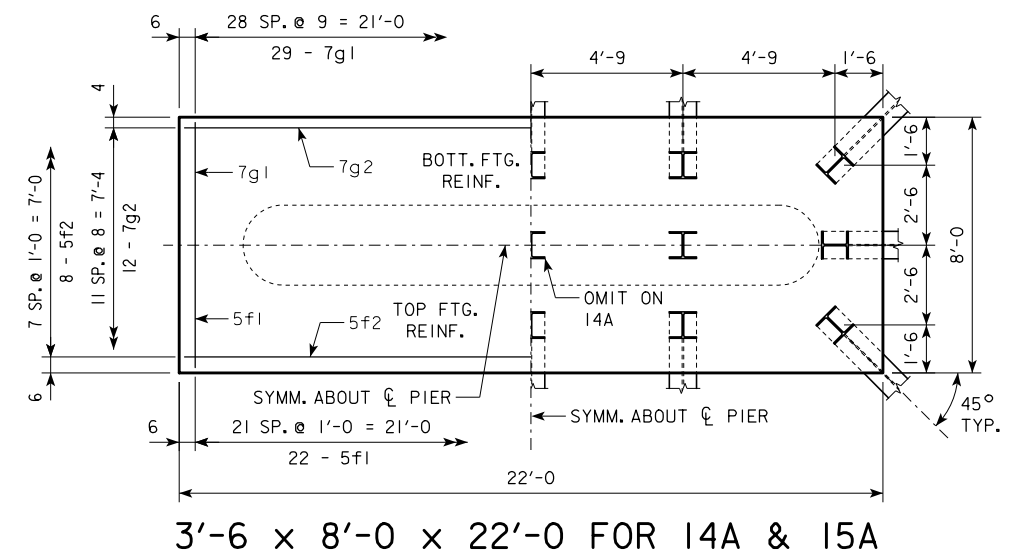
05-13 LATEST REVISION DATE  <i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER-HPI0x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 15° SKEW - H=25' TO 40'	<b>H40-68-06</b>



TYPICAL SECTION



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 H40-65-06.

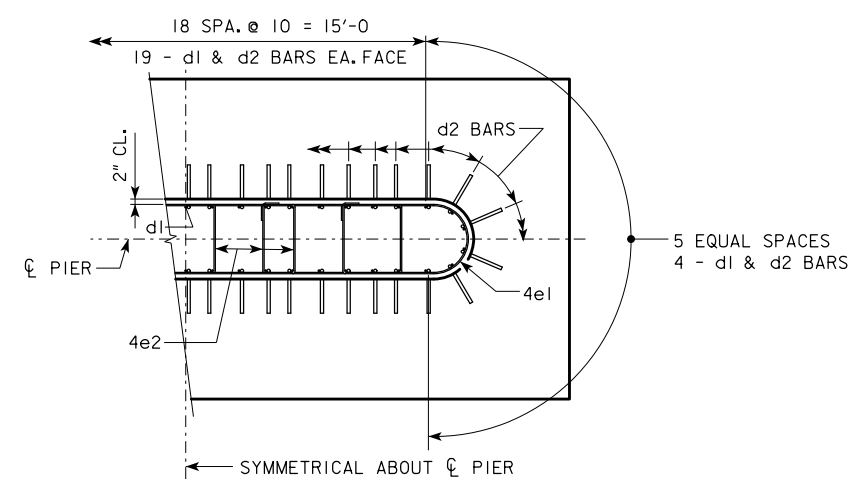
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18 TO 21	201'-4	14A	205	3'-6 x 8' x 22'
	213'-10	14A	212	
	226'-4	15A	213	
	243'-0	16A	203	
19 TO 22	201'-4	14A	209	3'-6 x 8' x 22'
	213'-10	14A	217	
	226'-4	15A	218	
	243'-0	16A	207	
22 TO 24	201'-4	14A	214	3'-6 x 8' x 22'
	213'-10	15A	213	
	226'-4	16A	203	
	243'-0	16A	211	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	
3'-6 x 8' x 22'	d2	46 - #9 AS SHOWN	8'-7	1342	2684
	f1	22 - #5 @ 1'-0	7'-8	176	
	f2	8 - #5 @ 1'-0	21'-8	181	
	g1	29 - #7 @ 0'-9	7'-8	454	
	g2	12 - #7 @ 0'-8	21'-8	531	

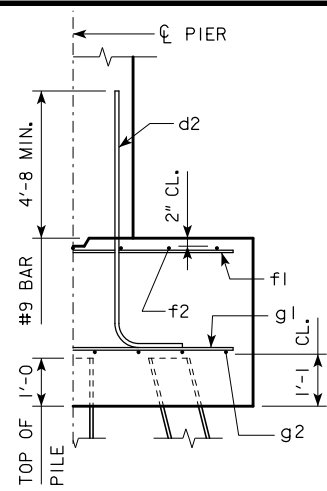


d2 BAR LAYOUT  
(SEE SECTION A-A ON SHEET H40-65-06.)

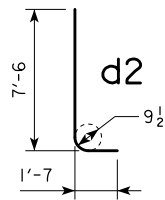
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

LATEST REVISION DATE 05-13	APPROVED BY BRIDGE ENGINEER <i>Norman L. Mc Donald</i>		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b> 15° SKEW - H=16' TO 24'	<b>H40-69-06</b>

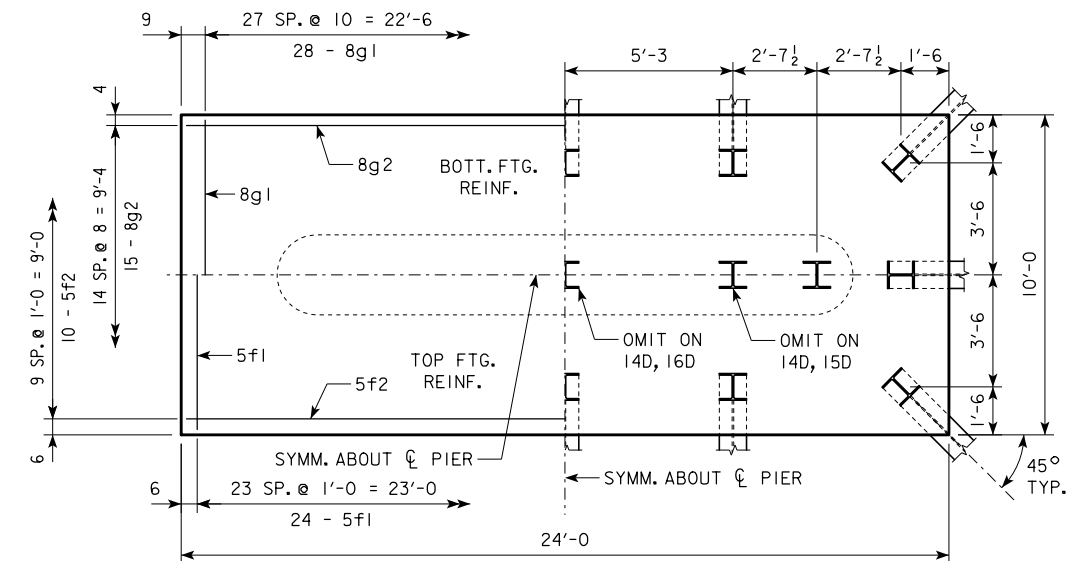
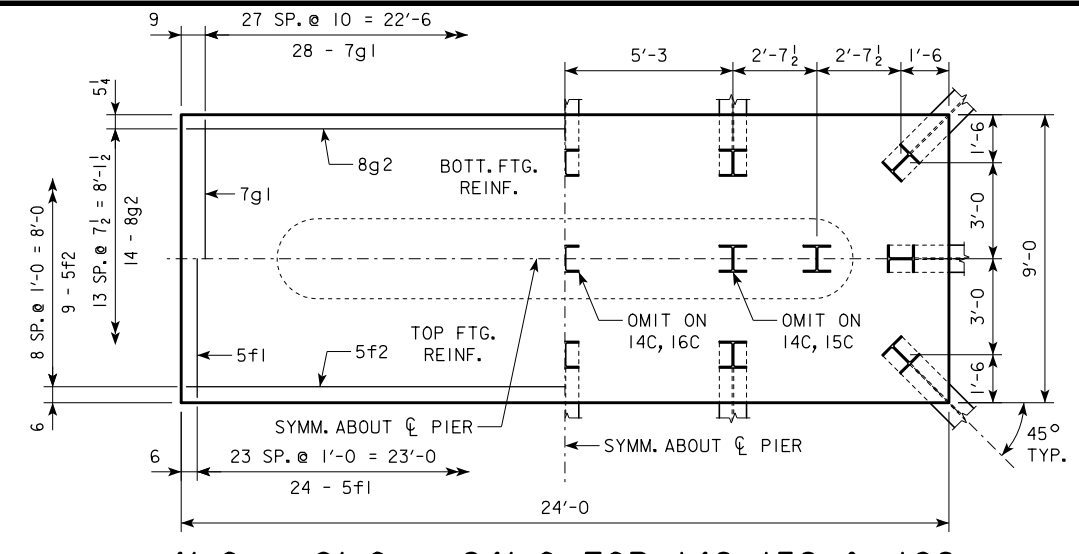
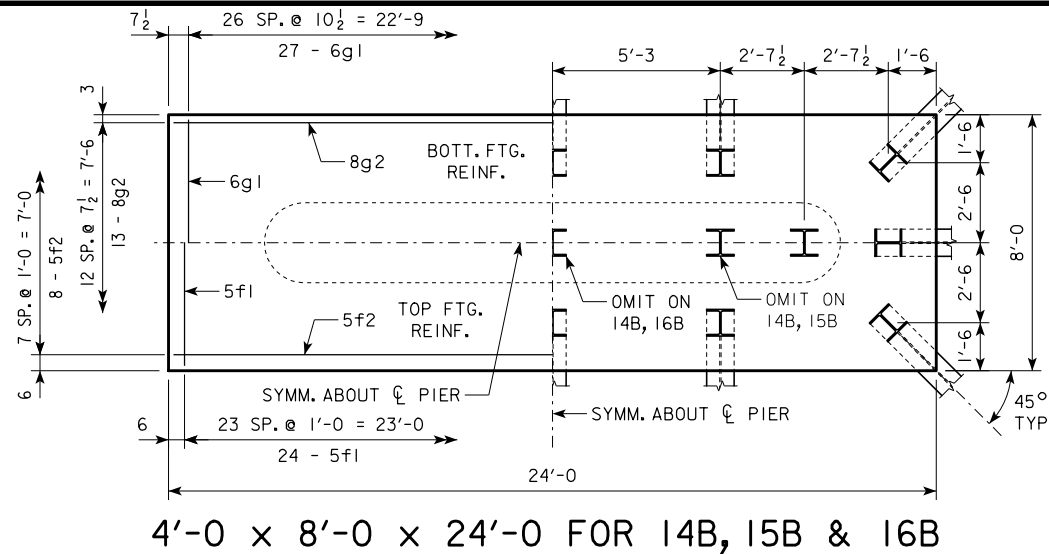
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



TYPICAL SECTION

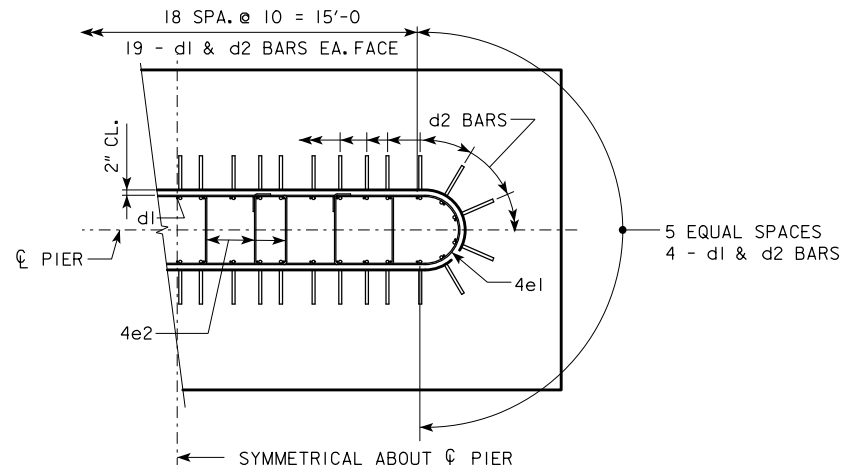


NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4	14B	209	4' x 8' x 24'	
213'-10	14B	217		
226'-4	15B	217		
243'-0	16B	213		
201'-4	14B	213	4' x 8' x 24'	
213'-10	15B	212		
226'-4	16B	209		
243'-0	16B	216		
201'-4	14C	213	4' x 9' x 24'	
213'-10	15C	211		
226'-4	16C	208		
243'-0	16C	215		
201'-4	14D	213	4' x 10' x 24'	
213'-10	15D	211		
226'-4	16D	208		
243'-0	16D	215		
201'-4	14D	217	4' x 10' x 24'	
213'-10	15D	215		
226'-4	16D	212		
243'-0	16D	219		

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)	
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 8' x 24'	d2	46 - #9 AS SHOWN	9'-1	1421	2942	28.4
	f1	24 - #5 @ 1'-0	7'-8	192		
	f2	8 - #5 @ 1'-0	23'-8	197		
	g1	27 - #6 @ 0'-10 1/2	7'-8	311		
	g2	13 - #8 @ 0'-7 1/2	23'-8	821		
4' x 9' x 24'	d2	46 - #9 AS SHOWN	9'-1	1421	3241	32.0
	f1	24 - #5 @ 1'-0	8'-8	217		
	f2	9 - #5 @ 1'-0	23'-8	222		
	g1	28 - #7 @ 0'-10	8'-8	496		
	g2	14 - #8 @ 0'-7 1/2	23'-8	885		
4' x 10' x 24'	d2	46 - #9 AS SHOWN	9'-1	1421	3581	35.6
	f1	24 - #5 @ 1'-0	9'-8	242		
	f2	10 - #5 @ 1'-0	23'-8	247		
	g1	28 - #8 @ 0'-10	9'-8	723		
	g2	15 - #8 @ 0'-8	23'-8	948		



d2 BAR LAYOUT (SEE SECTION A-A ON SHEET H40-65-06.)

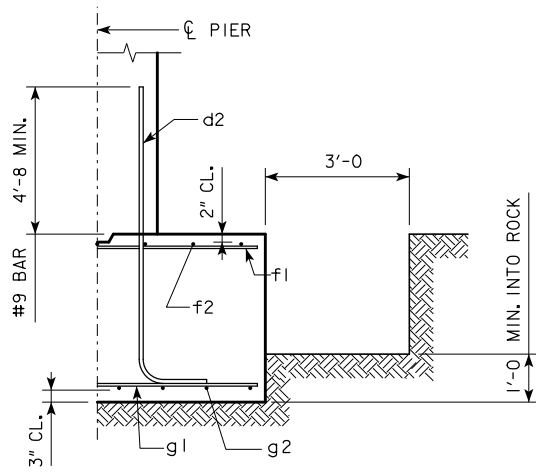
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

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 H40-65-06.
- 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.

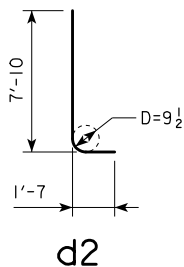
05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b> 15° SKEW - H=25' TO 40'	<b>H40-70-06</b>

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

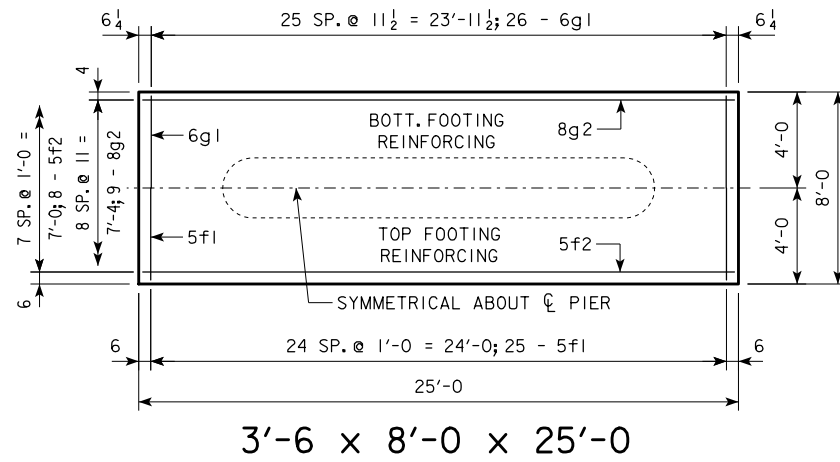


TYPICAL SECTION

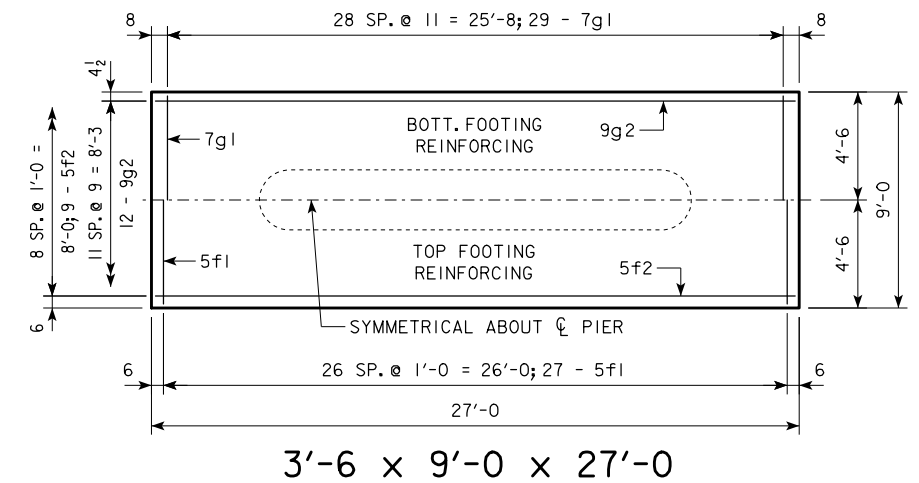
H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
16 TO 18	138'-10	3'-6 x 8' x 25'
	151'-4	
	163'-10	3'-6 x 9' x 25'
	176'-4	
	188'-10	
19 TO 21	201'-4	3'-6 x 9' x 27'
	213'-10	
	226'-4	3'-6 x 10' x 27'
	243'-0	
22 TO 24	138'-10	3'-6 x 8' x 25'
	151'-4	
	163'-10	3'-6 x 9' x 25'
	176'-4	
	188'-10	
201'-4	3'-6 x 9' x 27'	
213'-10		
226'-4	3'-6 x 10' x 27'	
243'-0		



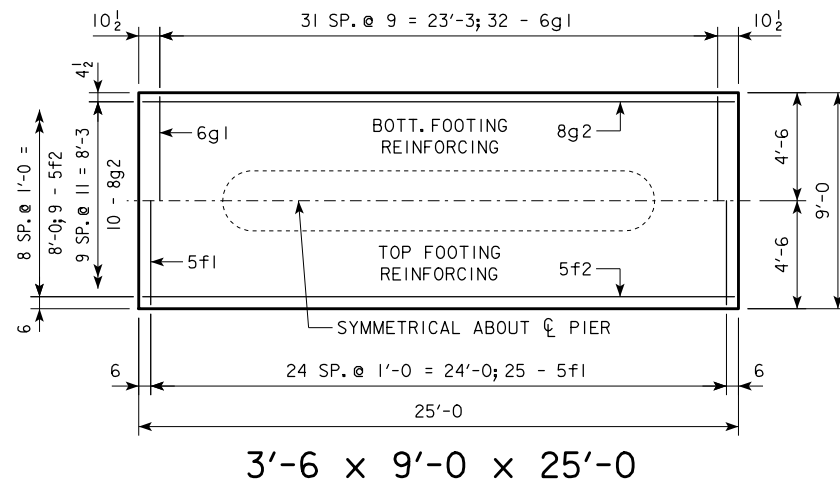
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



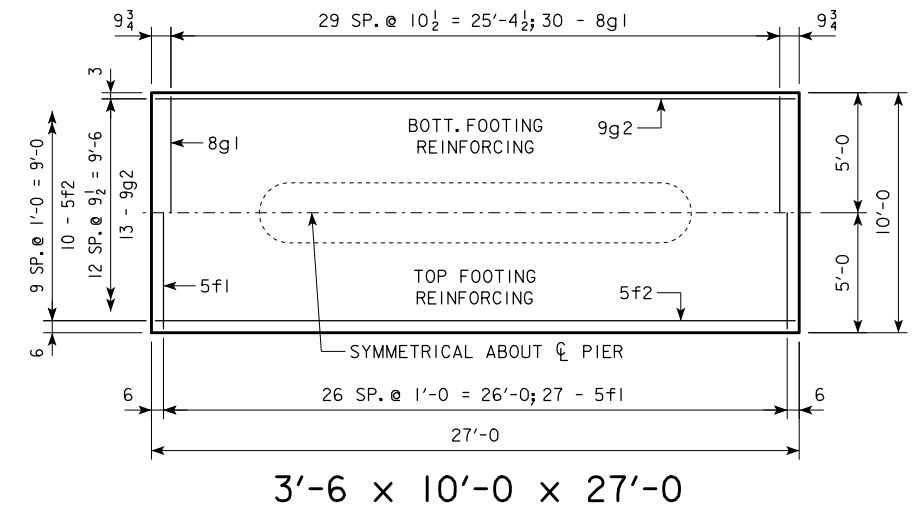
3'-6 x 8'-0 x 25'-0



3'-6 x 9'-0 x 27'-0

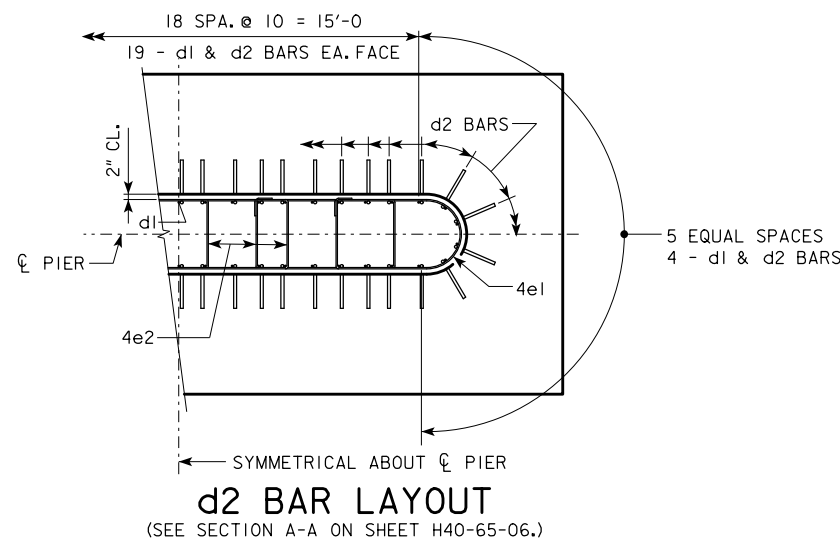


3'-6 x 9'-0 x 25'-0



3'-6 x 10'-0 x 27'-0

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
3'-6 x 8' x 25'	d2	46 - #9 AS SHOWN	9'-5	1473	2771	25.9
	f1	25 - #5 @ 1'-0	7'-8	200		
	f2	8 - #5 @ 1'-0	24'-8	206		
	g1	26 - #6 @ 0'-11 1/2	7'-8	299		
	g2	9 - #8 @ 0'-11	24'-8	593		
3'-6 x 9' x 25'	d2	46 - #9 AS SHOWN	9'-5	1473	3007	29.2
	f1	25 - #5 @ 1'-0	8'-8	226		
	f2	9 - #5 @ 1'-0	24'-8	232		
	g1	32 - #6 @ 0'-9	8'-8	417		
	g2	10 - #8 @ 0'-11	24'-8	659		
3'-6 x 9' x 27'	d2	46 - #9 AS SHOWN	9'-5	1473	3569	31.5
	f1	27 - #5 @ 1'-0	8'-8	244		
	f2	9 - #5 @ 1'-0	26'-8	250		
	g1	29 - #7 @ 0'-11	8'-8	514		
	g2	12 - #9 @ 0'-9	26'-8	1088		
3'-6 x 10' x 27'	d2	46 - #9 AS SHOWN	9'-5	1473	3976	35.0
	f1	27 - #5 @ 1'-0	9'-8	272		
	f2	10 - #5 @ 1'-0	26'-8	278		
	g1	30 - #8 @ 0'-10 1/2	9'-8	774		
	g2	13 - #9 @ 0'-9 1/2	26'-8	1179		



(SEE SECTION A-A ON SHEET H40-65-06.)

FOOTING NOTES:

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-65-06.

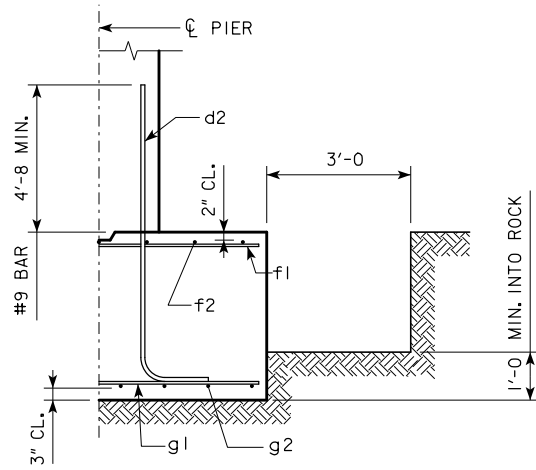
THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

04-12 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER - SPREAD FOOTINGS</b> 15° SKEW - H=16' TO 24'	<b>H40-71-06</b>

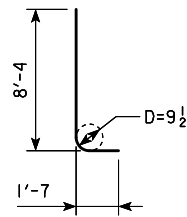
REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0.

REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0".

H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
25 TO 27	138'-10	4' x 8' x 26'
	151'-4	4' x 9' x 26'
	163'-10	4' x 9' x 26'
	176'-4	4' x 9' x 28'
	188'-10	4' x 9' x 30'
28 TO 30	138'-10	4' x 9' x 26'
	151'-4	4' x 9' x 26'
	163'-10	4' x 9' x 28'
	176'-4	4' x 9' x 28'
	188'-10	4' x 9' x 30'
31 TO 33	138'-10	4' x 9' x 26'
	151'-4	4' x 9' x 28'
	163'-10	4' x 9' x 28'
	176'-4	4' x 9' x 30'
	188'-10	4' x 10' x 30'
34 TO 36	138'-10	4' x 9' x 26'
	151'-4	4' x 9' x 26'
	163'-10	4' x 9' x 28'
	176'-4	4' x 9' x 28'
	188'-10	4' x 9' x 30'
37 TO 40	138'-10	4' x 9' x 26'
	151'-4	4' x 9' x 28'
	163'-10	4' x 9' x 28'
	176'-4	4' x 9' x 30'
	188'-10	4' x 10' x 30'

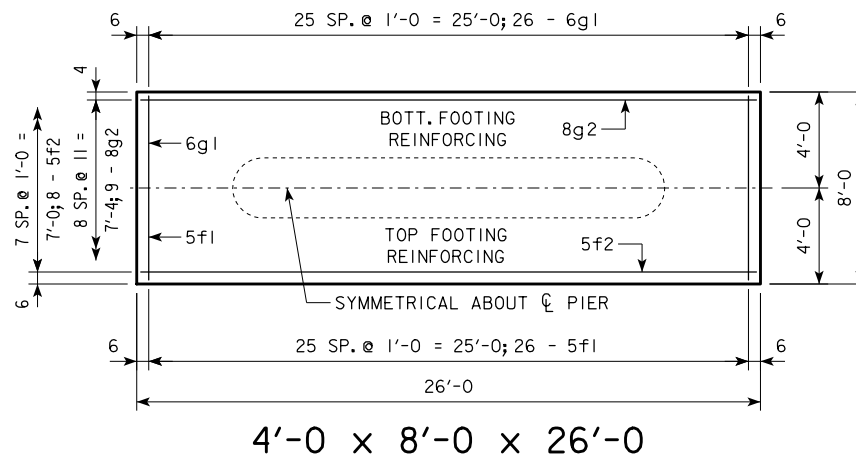


TYPICAL SECTION

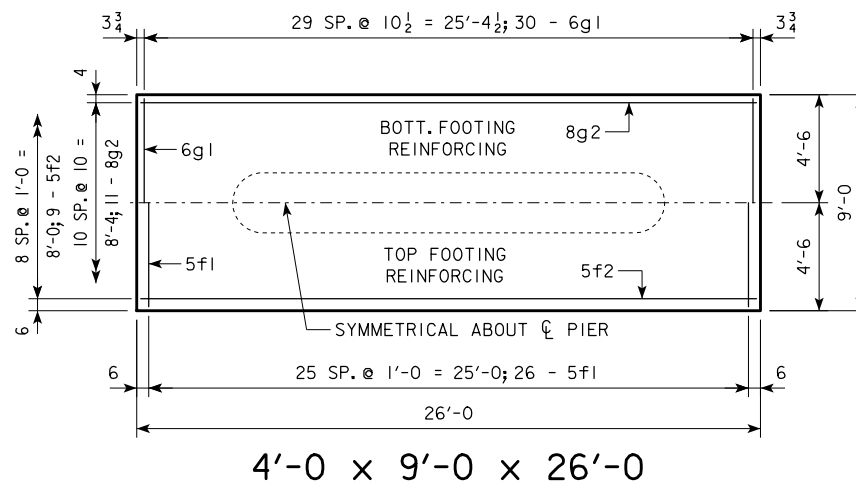


d2

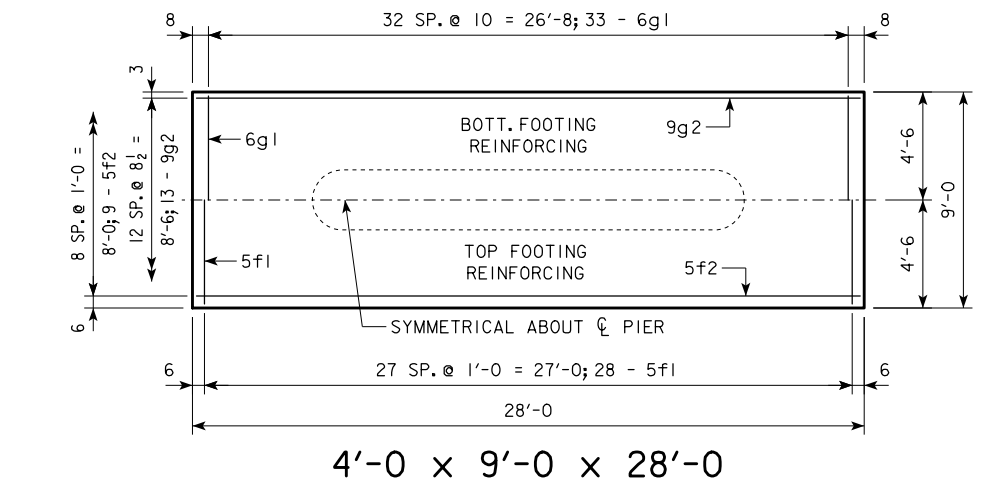
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



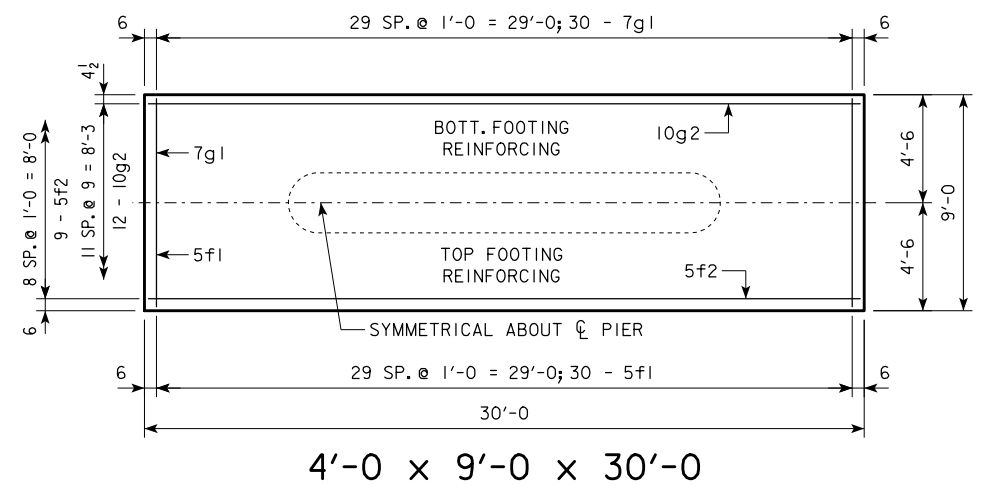
4'-0 x 8'-0 x 26'-0



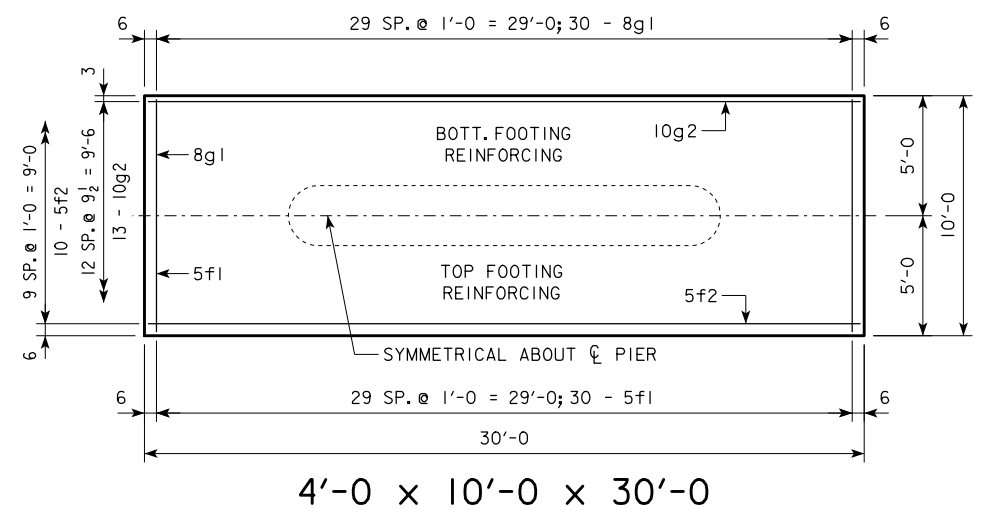
4'-0 x 9'-0 x 26'-0



4'-0 x 9'-0 x 28'-0



4'-0 x 9'-0 x 30'-0

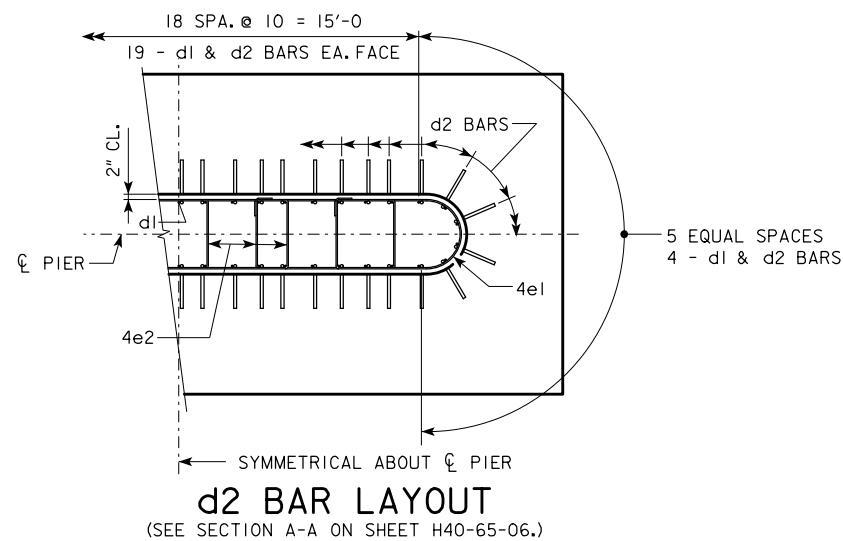


4'-0 x 10'-0 x 30'-0

**FOOTING NOTES:**

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-65-06.

THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

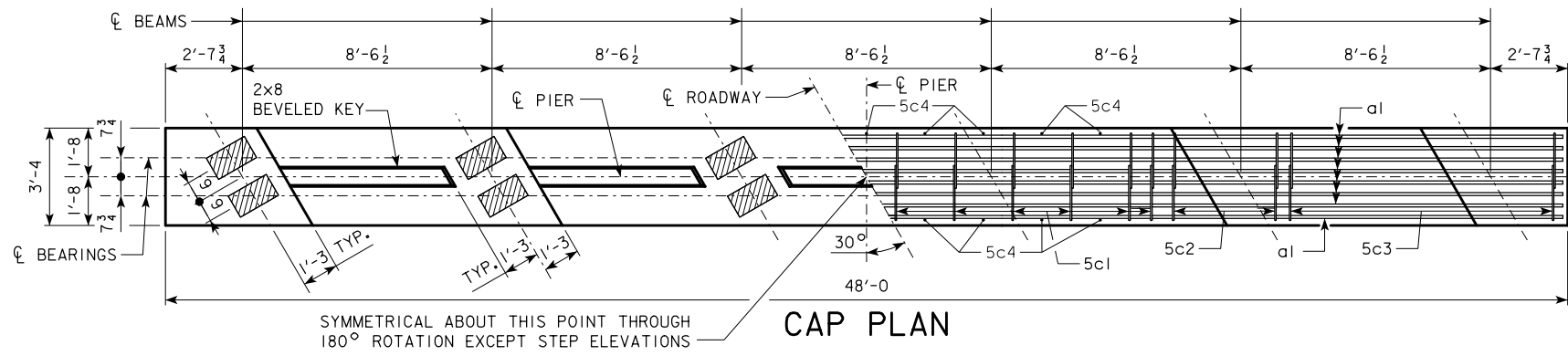


d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-65-06.)

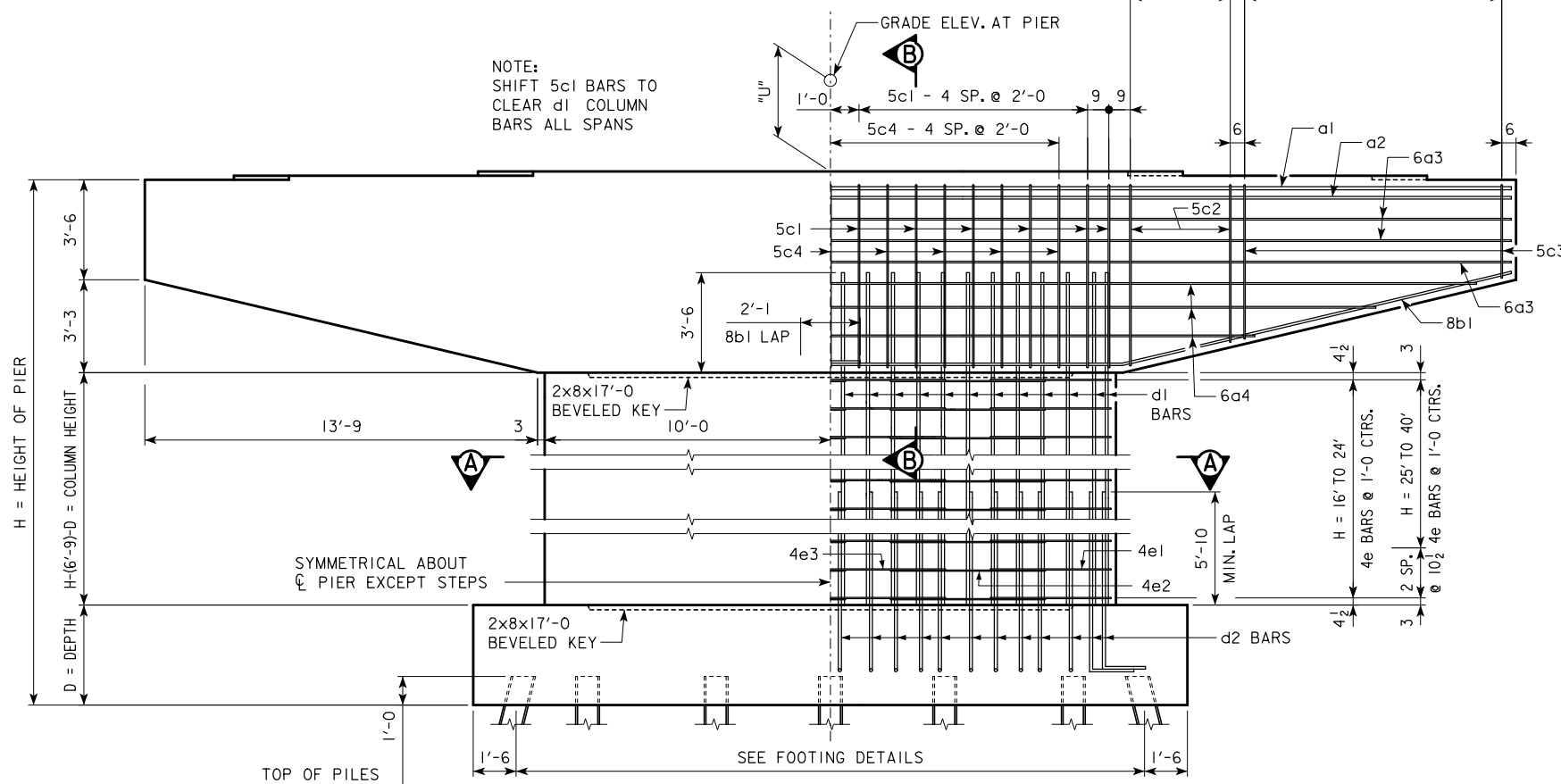
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 8' x 26'	d2	46 - #9 AS SHOWN	9'-11	1551	2889	30.8
	f1	26 - #5 @ 1'-0	7'-8	208		
	f2	8 - #5 @ 1'-0	25'-8	214		
	g1	26 - #6 @ 1'-0	7'-8	299		
	g2	9 - #8 @ 0'-11	25'-8	617		
4' x 9' x 26'	d2	46 - #9 AS SHOWN	9'-11	1551	3172	34.7
	f1	26 - #5 @ 1'-0	8'-8	235		
	f2	9 - #5 @ 1'-0	25'-8	241		
	g1	30 - #6 @ 0'-10 1/2	8'-8	391		
	g2	11 - #8 @ 0'-10	25'-8	754		
4' x 9' x 28'	d2	46 - #9 AS SHOWN	9'-11	1551	3717	37.3
	f1	28 - #5 @ 1'-0	8'-8	253		
	f2	9 - #5 @ 1'-0	27'-8	260		
	g1	33 - #6 @ 0'-10	8'-8	430		
	g2	13 - #9 @ 0'-8 1/2	27'-8	1223		
4' x 9' x 30'	d2	46 - #9 AS SHOWN	9'-11	1551	4163	40.0
	f1	30 - #5 @ 1'-0	8'-8	271		
	f2	9 - #5 @ 1'-0	29'-8	278		
	g1	30 - #7 @ 1'-0	8'-8	531		
	g2	12 - #10 @ 0'-9	29'-8	1532		
4' x 10' x 30'	d2	46 - #9 AS SHOWN	9'-11	1551	4596	44.4
	f1	30 - #5 @ 1'-0	9'-8	302		
	f2	10 - #5 @ 1'-0	29'-8	309		
	g1	30 - #8 @ 1'-0	9'-8	774		
	g2	13 - #10 @ 0'-9 1/2	29'-8	1660		

04-12 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER - SPREAD FOOTINGS</b> 15° SKEW - H=25' TO 40'	<b>H40-72-06</b>

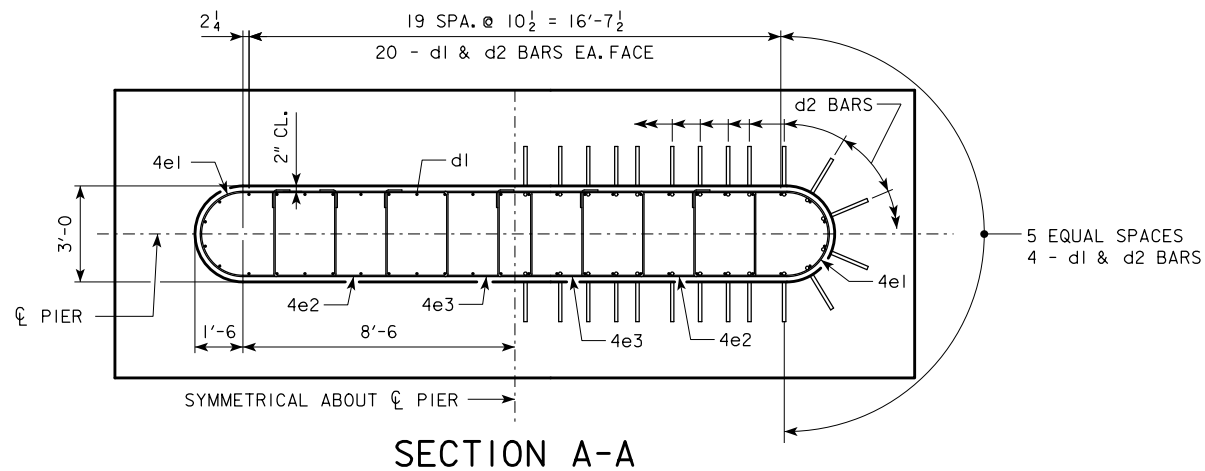


5c2 - 4 SP. @ 10 1/2" = 3'-6" - 138'-10", 151'-4", 163'-10", 176'-4", 188'-10", 201'-4"  
 5c2 - 5 SP. @ 8 3/8" (+) = 3'-6" - 213'-10", 226'-4", 243'-0"

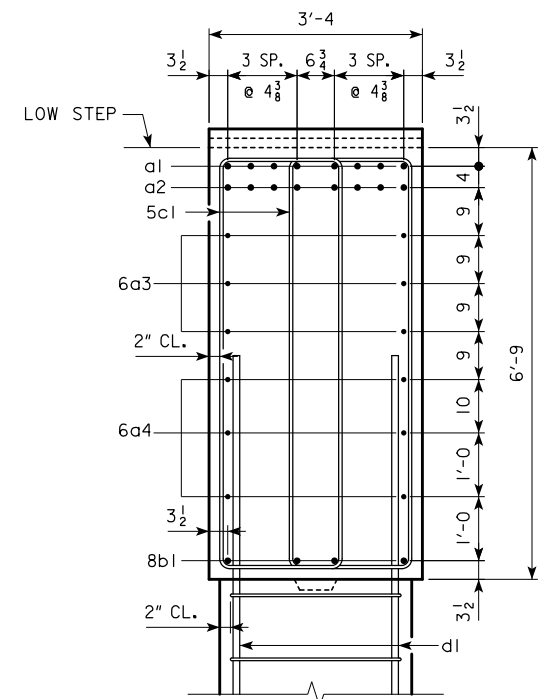
NOTE:  
 SHIFT 5c1 BARS TO  
 CLEAR d1 COLUMN  
 BARS ALL SPANS



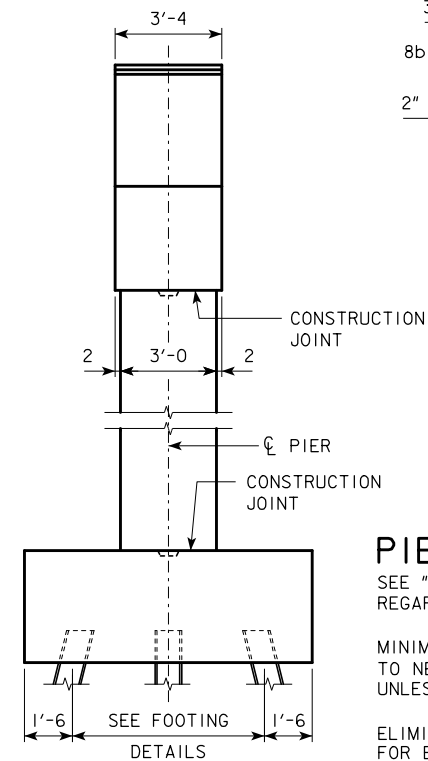
FRONT ELEVATION



SECTION A-A



SECTION B-B



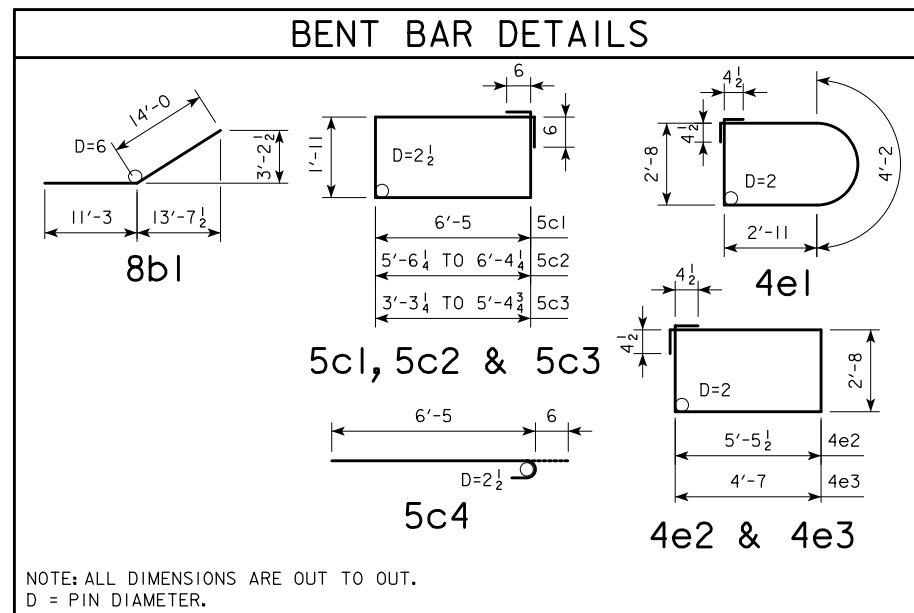
END ELEVATION

**PIER NOTES:**  
 SEE "TEE PIER NOTES" ON H40-02-06 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.  
 FOR SIZE OF BEARING PADS, SEE H40-44-06.  
 SEE SHEET H40-22-06 FOR "U" DIMENSION.

01-10 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWADOT</b> Highway Division STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED          CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER          CAP AND COLUMN</b> 30° SKEW	<b>H40-73-06</b>

REVISED 01-10 - ADDED PIER NOTES FROM H40-74-06 STANDARD.

REVISED 01-10 - MOVED PIER NOTES TO H40-73-06 STANDARD.



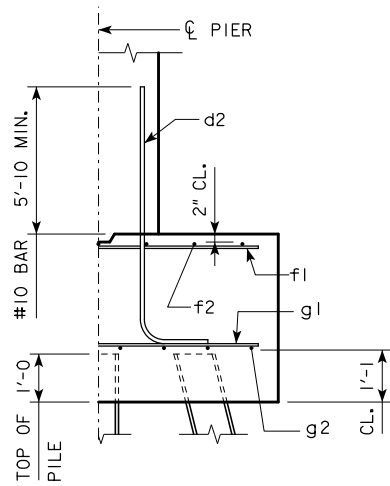
		CAP																												
C - C ABUT. BEARINGS		138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0				
REINFORCING STEEL	BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT			
	a1	47'-8		8	8	1018	8	8	1018	8	9	1297	8	9	1297	8	10	1641	8	10	1641	8	10	1641	8	10	1641			
	a2	47'-8		8	8	1018	8	8	1018	8	8	1018	8	8	1018	8	9	1297	8	9	1297	8	9	1297	8	10	1641			
	6a3	47'-8		6	6	430	6	6	430	6	6	430	6	6	430	6	6	430	6	6	430	6	6	430	6	6	430			
	6a4	VARIES		6	6	342	6	6	342	6	6	342	6	6	342	6	6	342	6	6	342	6	6	342	6	6	342			
	8b1	25'-3		8	8	539	8	8	539	8	8	539	8	8	539	8	8	539	8	8	539	8	8	539	8	8	539			
	5c1	17'-8		24	5	442	24	5	442	24	5	442	24	5	442	24	5	442	24	5	442	24	5	442	24	5	442			
	5c2	VARIES		20	5	349	20	5	349	20	5	349	20	5	349	20	5	349	20	5	349	20	5	349	20	5	349			
	5c3	VARIES		40	5	563	40	5	563	40	5	563	40	5	563	40	5	563	40	5	563	40	5	563	40	5	563			
	5c4	6'-11		18	5	130	18	5	130	18	5	130	18	5	130	18	5	130	18	5	130	18	5	130	18	5	130			
	TOTAL (LB.)			4831			4831			5110			5110			5389			5733			5802			6146			6146		
	STRUCTURAL CONCRETE (CY)			35.8			35.8			35.8			35.8			35.8			35.8			35.8			35.8			35.8		

		COLUMN																						
H IN FEET		COLUMN HEIGHT	STRUCTURAL CONCRETE (CY)	REINFORCING STEEL												TOTAL WEIGHT (LB.)								
				d1 BAR	4e1 BAR			4e2 BAR			4e3 BAR													
				NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	
16	5'-9	12.4	48	10	9'-3	1911	12	4	13'-5	108	12	4	17'-0	136	12	4	15'-3	122	2277					
17	6'-9	14.5	48	10	10'-3	2117	14	4	13'-5	125	14	4	17'-0	159	14	4	15'-3	143	2544					
18	7'-9	16.7	48	10	11'-3	2324	16	4	13'-5	143	16	4	17'-0	182	16	4	15'-3	163	2812					
19	8'-9	18.8	48	10	12'-3	2530	18	4	13'-5	161	18	4	17'-0	204	18	4	15'-3	183	3078					
20	9'-9	21.0	48	10	13'-3	2737	20	4	13'-5	179	20	4	17'-0	227	20	4	15'-3	204	3347					
21	10'-9	23.1	48	10	14'-3	2943	22	4	13'-5	197	22	4	17'-0	250	22	4	15'-3	224	3614					
22	11'-9	25.3	48	10	15'-3	3150	24	4	13'-5	215	24	4	17'-0	273	24	4	15'-3	244	3882					
23	12'-9	27.4	48	10	16'-3	3356	26	4	13'-5	233	26	4	17'-0	295	26	4	15'-3	265	4149					
24	13'-9	29.6	48	10	17'-3	3563	28	4	13'-5	251	28	4	17'-0	318	28	4	15'-3	285	4417					
25	14'-3	30.6	48	10	17'-9	3666	30	4	13'-5	269	30	4	17'-0	341	30	4	15'-3	306	4582					
26	15'-3	32.8	48	10	18'-9	3873	32	4	13'-5	287	32	4	17'-0	363	32	4	15'-3	326	4849					
27	16'-3	34.9	48	10	19'-9	4079	34	4	13'-5	305	34	4	17'-0	386	34	4	15'-3	346	5116					
28	17'-3	37.1	48	10	20'-9	4286	36	4	13'-5	323	36	4	17'-0	409	36	4	15'-3	367	5385					
29	18'-3	39.3	48	10	21'-9	4492	38	4	13'-5	341	38	4	17'-0	432	38	4	15'-3	387	5652					
30	19'-3	41.4	48	10	22'-9	4699	40	4	13'-5	358	40	4	17'-0	454	40	4	15'-3	407	5918					
31	20'-3	43.6	48	10	23'-9	4905	42	4	13'-5	376	42	4	17'-0	477	42	4	15'-3	428	6186					
32	21'-3	45.7	48	10	24'-9	5112	44	4	13'-5	394	44	4	17'-0	500	44	4	15'-3	448	6454					
33	22'-3	47.9	48	10	25'-9	5319	46	4	13'-5	412	46	4	17'-0	522	46	4	15'-3	469	6722					
34	23'-3	50.0	48	10	26'-9	5525	48	4	13'-5	430	48	4	17'-0	545	48	4	15'-3	489	6989					
35	24'-3	52.2	48	10	27'-9	5732	50	4	13'-5	448	50	4	17'-0	568	50	4	15'-3	509	7257					
36	25'-3	54.3	48	10	28'-9	5938	52	4	13'-5	466	52	4	17'-0	591	52	4	15'-3	530	7525					
37	26'-3	56.5	48	10	29'-9	6145	54	4	13'-5	484	54	4	17'-0	613	54	4	15'-3	550	7792					
38	27'-3	58.6	48	10	30'-9	6351	56	4	13'-5	502	56	4	17'-0	636	56	4	15'-3	570	8059					
39	28'-3	60.8	48	10	31'-9	6558	58	4	13'-5	520	58	4	17'-0	659	58	4	15'-3	591	8328					
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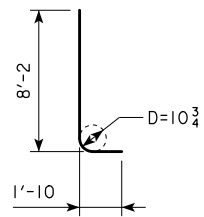
① SEE SHEET H40-24-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.

LATEST REVISION DATE  01-10  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>TEE PIER CAP AND COLUMN</b> 30° SKEW

**H40-74-06**

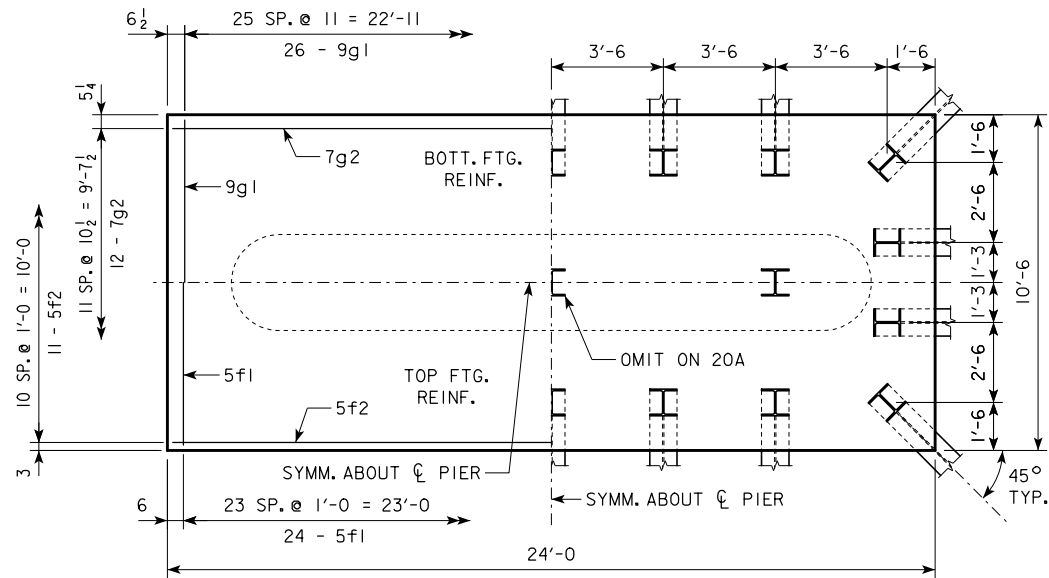


TYPICAL SECTION

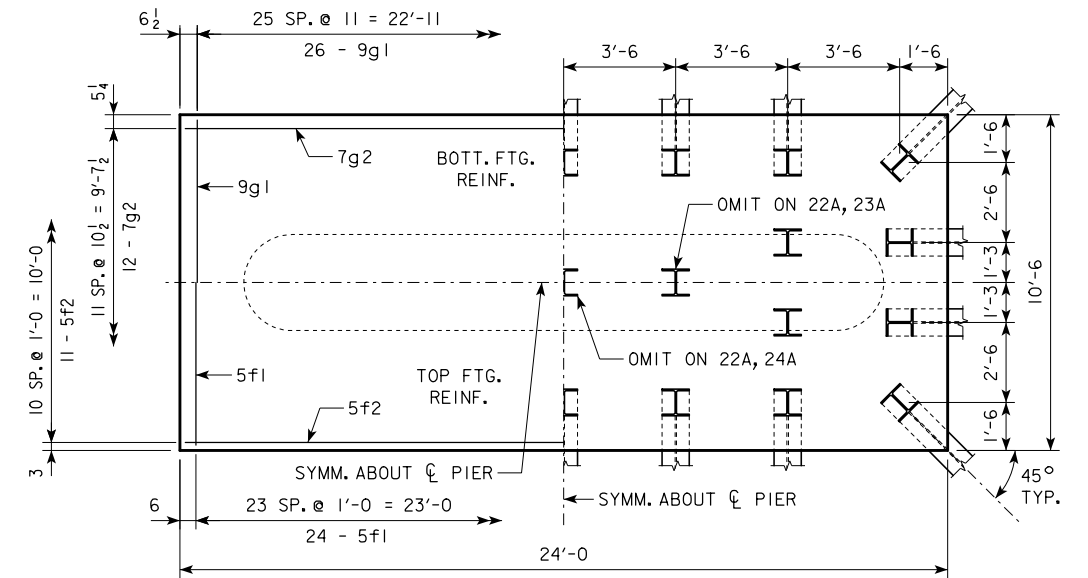


d2

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



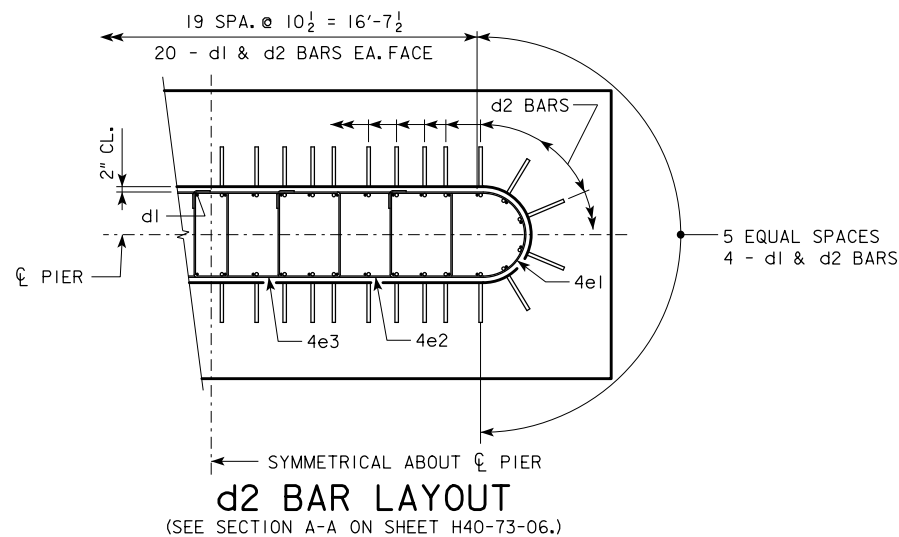
3'-6 x 10'-6 x 24'-0 FOR 20A & 21A



3'-6 x 10'-6 x 24'-0 FOR 22A, 23A & 24A

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18	201'-4	20A	143	3'-6 x 10'-6 x 24'
	213'-10	21A	144	
	226'-4	22A	142	
	243'-0	23A	144	
21	201'-4	20A	146	3'-6 x 10'-6 x 24'
	213'-10	22A	139	
	226'-4	22A	145	
	243'-0	24A	143	
24	201'-4	21A	145	3'-6 x 10'-6 x 24'
	213'-10	22A	143	
	226'-4	23A	145	
	243'-0	24A	146	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
3'-6 x 10'-6 x 24'	d2	48 - #10 AS SHOWN	10'-0	2065	4070	32.7
	f1	24 - #5 @ 1'-0	10'-2	254		
	f2	11 - #5 @ 1'-0	23'-8	272		
	g1	26 - #9 @ 0'-11	10'-2	899		
	g2	12 - #7 @ 0'-10 1/2	23'-8	580		



d2 BAR LAYOUT  
(SEE SECTION A-A ON SHEET H40-73-06.)

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

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 H40-73-06.

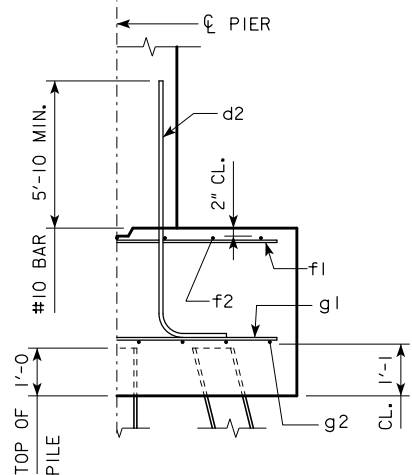
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

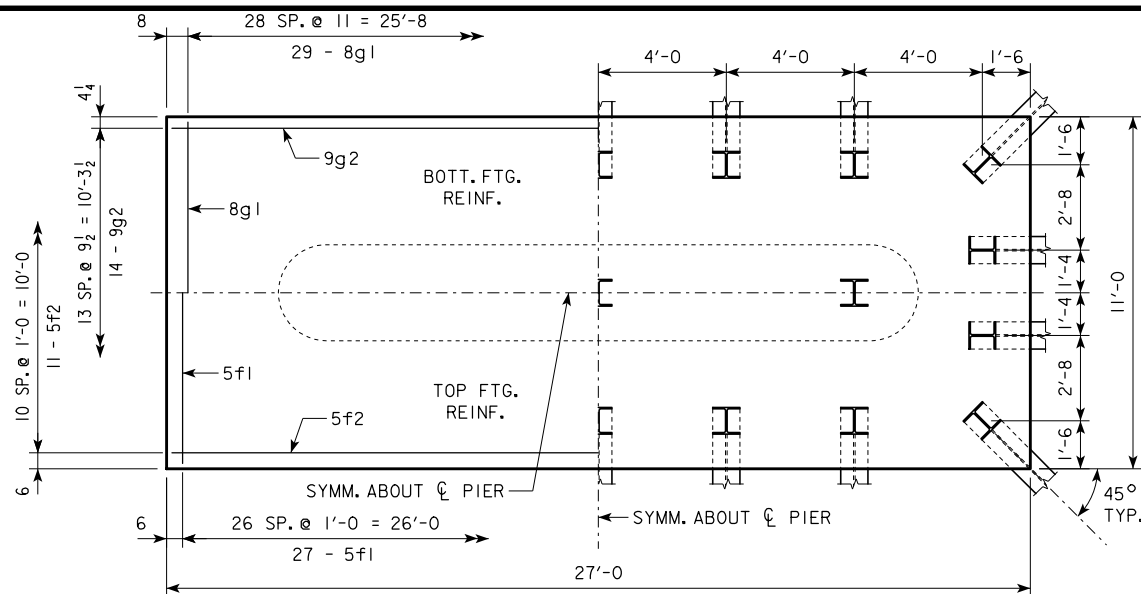
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

05-13 LATEST REVISION DATE  <i>Harmon L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER-HP10x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 30° SKEW - H=16' TO 24'	<b>H40-75-06</b>

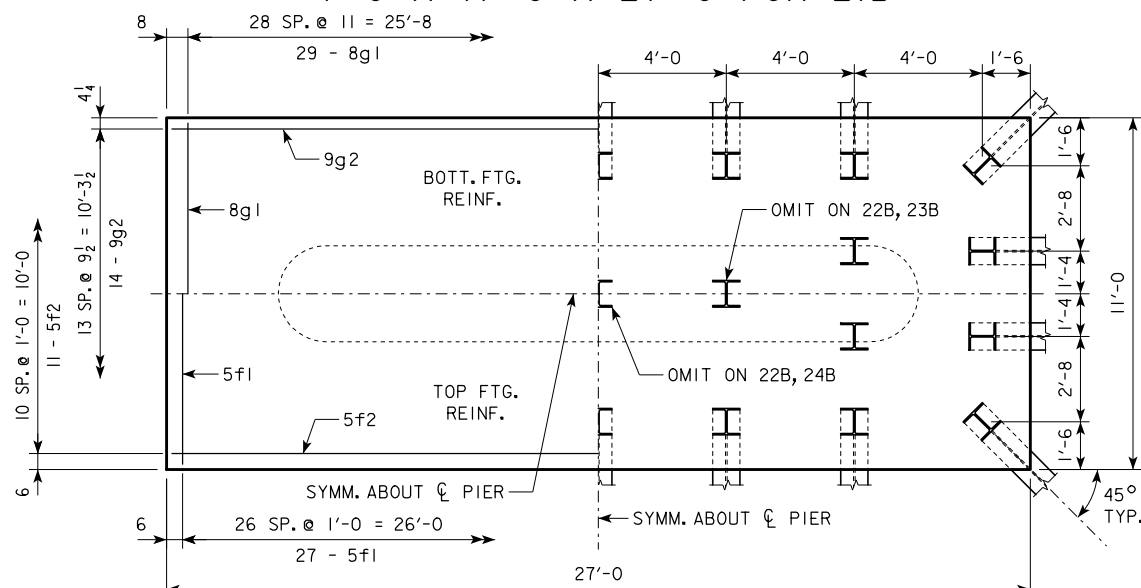
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



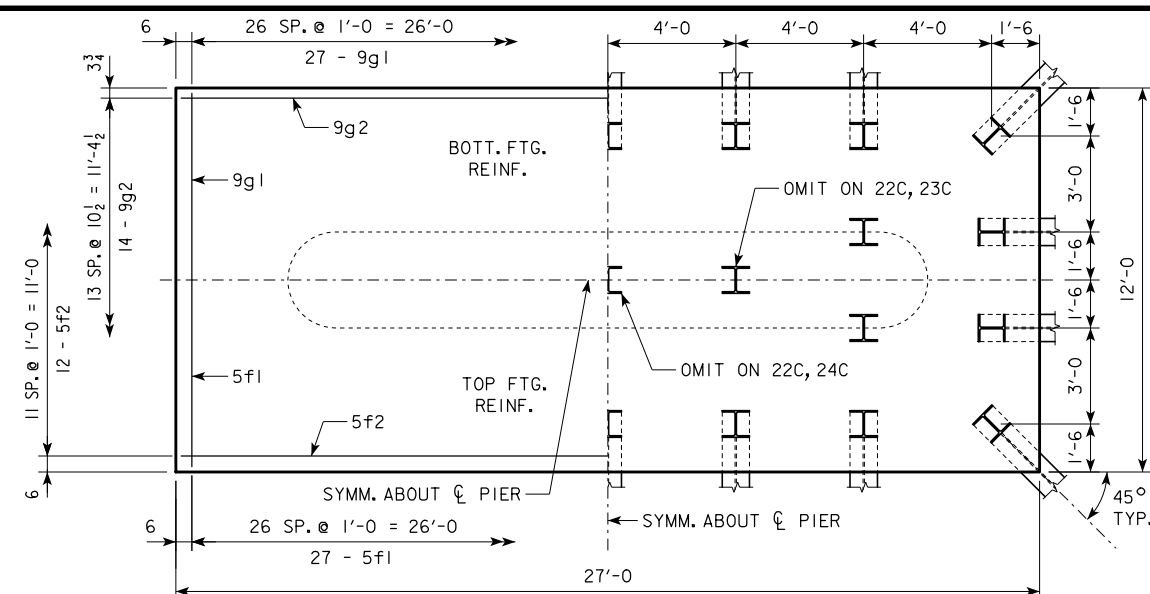
TYPICAL SECTION



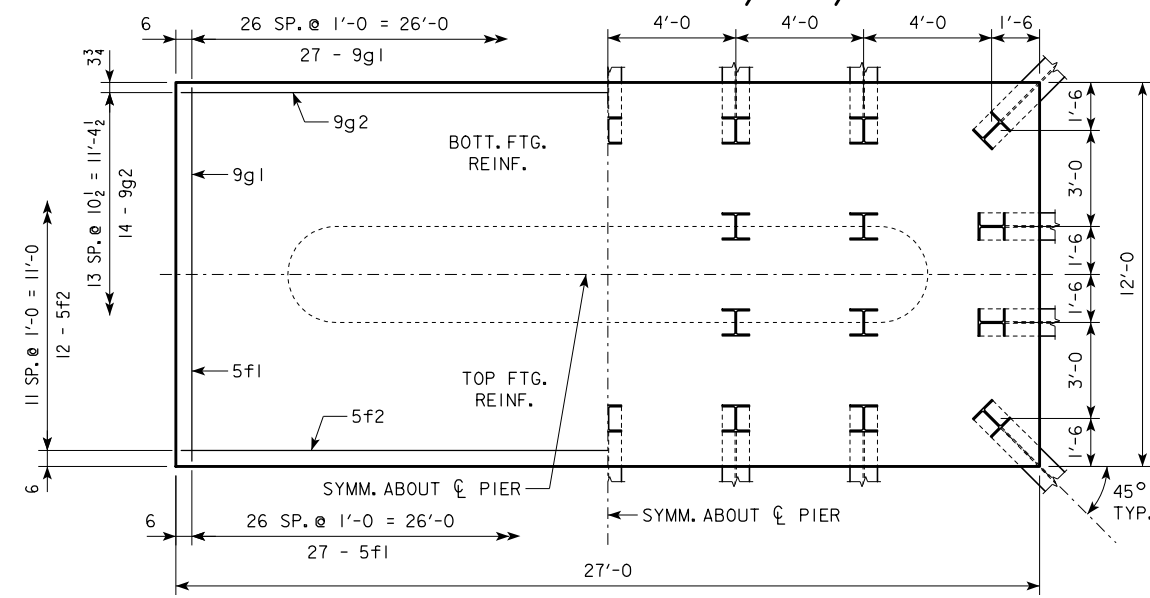
4'-0 x 11'-0 x 27'-0 FOR 21B



4'-0 x 11'-0 x 27'-0 FOR 22B, 23B, 24B & 25A



4'-0 x 12'-0 x 27'-0 FOR 22C, 23C, 24C & 25B



4'-0 x 12'-0 x 27'-0 FOR 26A

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 H40-73-06.

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

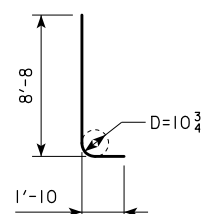
STEEL PILING USED AS POINT BEARING SHALL HAVE A MINIMUM DISTANCE OF APPROXIMATELY 10 FEET FROM BOTTOM OF FOOTING TO TOP OF BEARING ROCK. THE PILE LAYOUTS ARE SUCH THAT THE DISTANCE CENTER TO CENTER OF ADJACENT PILING SHALL NOT EXCEED 8'-0.

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

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4	21B	144	4' x 11' x 27'	
213'-10	22B	141		
226'-4	23B	143		
243'-0	24B	144	4' x 11' x 27'	
201'-4	22B	139		
213'-10	22B	144		
226'-4	23B	146		
243'-0	24B	146	4' x 11' x 27'	
201'-4	22B	142		
213'-10	22B	147		
226'-4	24B	144	4' x 12' x 27'	
243'-0	25A	145		
201'-4	22C	144		
213'-10	23C	144	4' x 12' x 27'	
226'-4	24C	145		
243'-0	25B	147		
201'-4	23C	143	4' x 12' x 27'	
213'-10	24C	143		
226'-4	25B	145		
243'-0	26A	145		

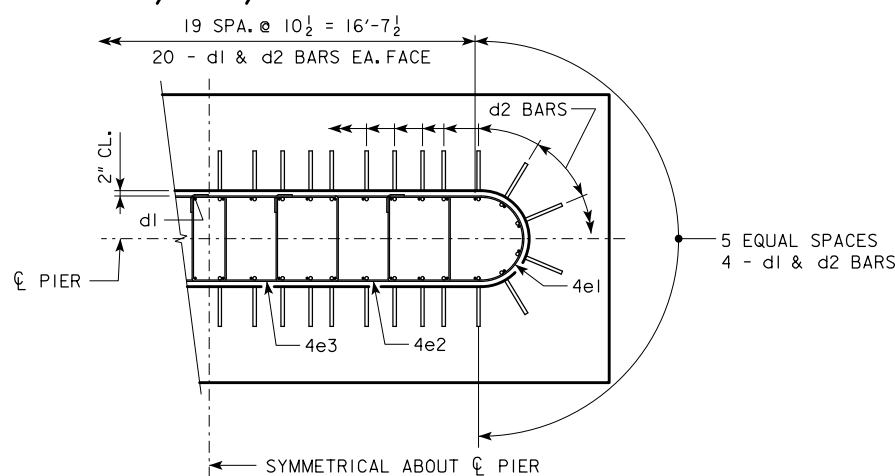
NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 11' x 27'	d2	48 - #10 AS SHOWN	10'-6	2169	4870	44.0
	f1	27 - #5 @ 1'-0	10'-8	300		
	f2	11 - #5 @ 1'-0	26'-8	306		
	g1	29 - #8 @ 0'-11	10'-8	826		
	g2	14 - #9 @ 0'-9 1/2	26'-8	1269		
4' x 12' x 27'	d2	48 - #10 AS SHOWN	10'-6	2169	5172	48.0
	f1	27 - #5 @ 1'-0	11'-8	329		
	f2	12 - #5 @ 1'-0	26'-8	334		
	g1	27 - #9 @ 1'-0	11'-8	1071		
	g2	14 - #9 @ 0'-10 1/2	26'-8	1269		



d2

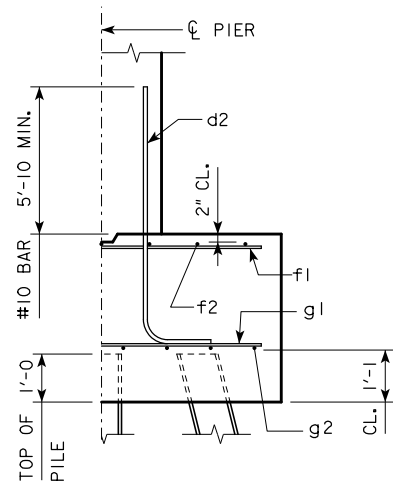
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



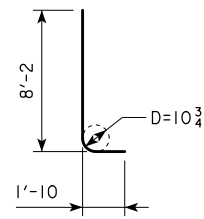
d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-73-06.)

05-13 LATEST REVISION DATE  <i>Harmon L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER-HP10x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 30° SKEW - H=25' TO 40'	<b>H40-76-06</b>



TYPICAL SECTION

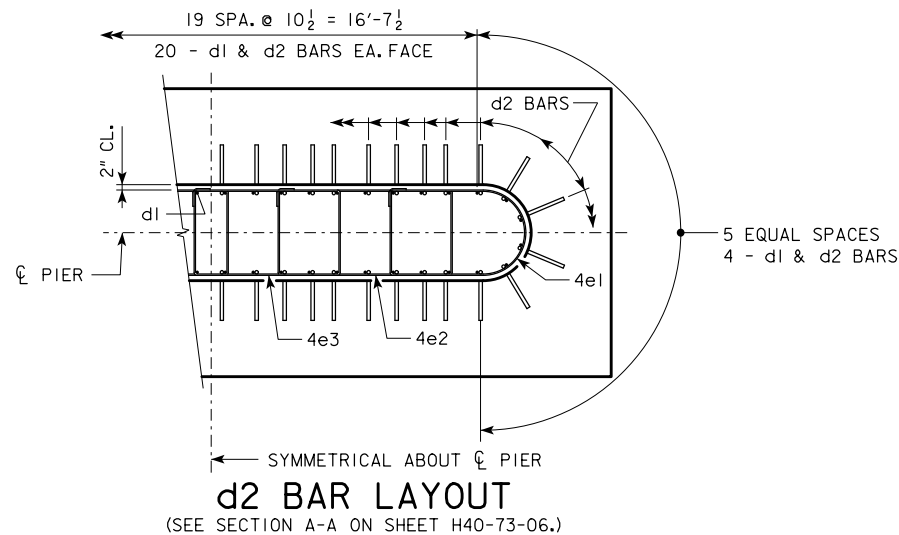


d2

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

H IN FT.	PILING (HP10x57)			FOOTING SIZE
	CL - CL ABUT. BRG.	NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18 TO 16	201'-4	14A	206	3'-6 x 8' x 24'
	213'-10	14A	213	
	226'-4	15A	213	
	243'-0	16A	210	
21 TO 19	201'-4	14A	211	3'-6 x 8' x 24'
	213'-10	14A	219	
	226'-4	15A	219	
	243'-0	16A	215	
24 TO 22	201'-4	14B	214	3'-6 x 9' x 24'
	213'-10	15B	212	
	226'-4	16B	209	
	243'-0	16B	217	

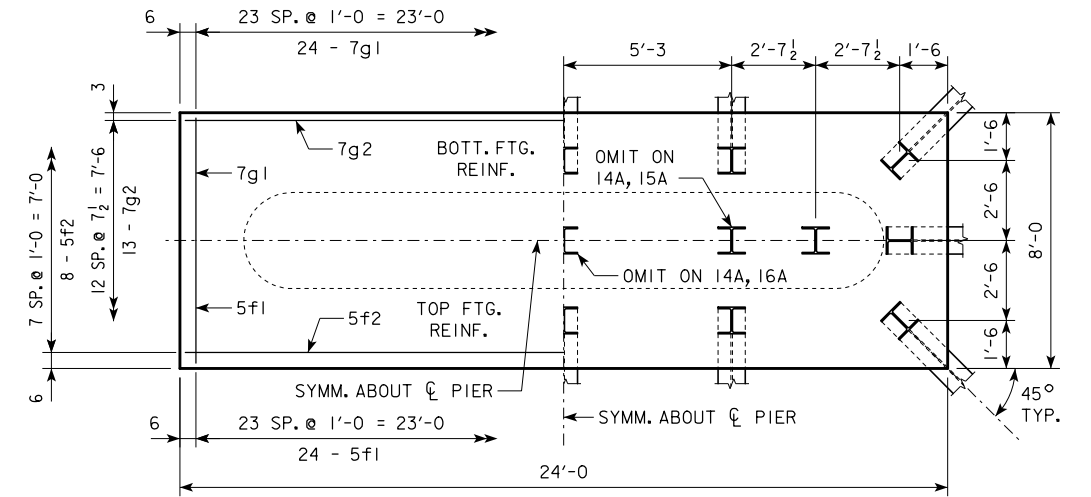
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
3'-6 x 8' x 24'	d2	48 - #10 AS SHOWN	10'-0	2065	3459	24.9
	f1	24 - #5 @ 1'-0	7'-8	192		
	f2	8 - #5 @ 1'-0	23'-8	197		
	g1	24 - #7 @ 1'-0	7'-8	376		
	g2	13 - #7 @ 0'-7 1/2	23'-8	629		
3'-6 x 9' x 24'	d2	48 - #10 AS SHOWN	10'-0	2065	3647	28.0
	f1	24 - #5 @ 1'-0	8'-8	217		
	f2	9 - #5 @ 1'-0	23'-8	222		
	g1	29 - #7 @ 0'-10	8'-8	514		
	g2	13 - #7 @ 0'-8 1/2	23'-8	629		



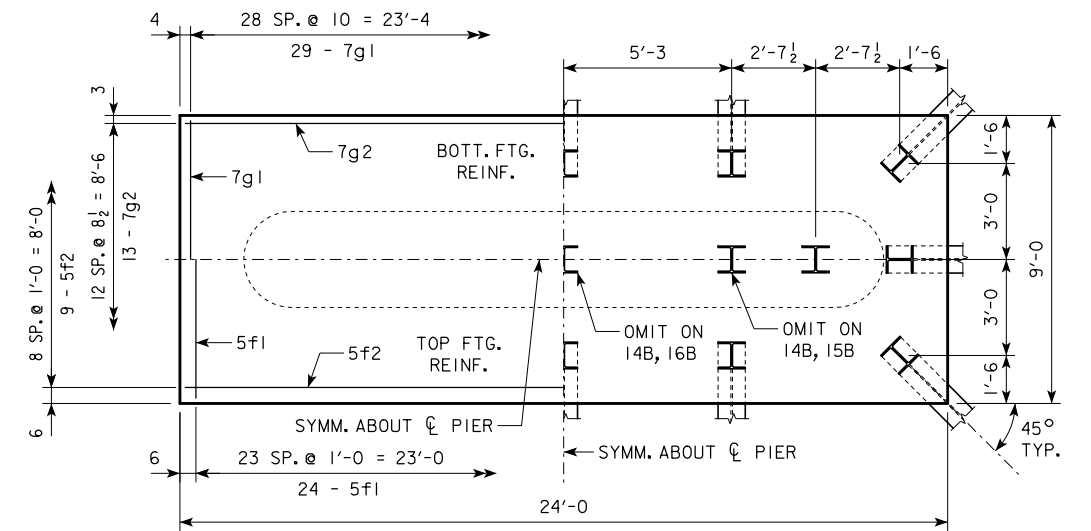
d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-73-06.)

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



3'-6 x 8'-0 x 24'-0 FOR 14A, 15A & 16A



3'-6 x 9'-0 x 24'-0 FOR 14B, 15B & 16B

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 H40-73-06.

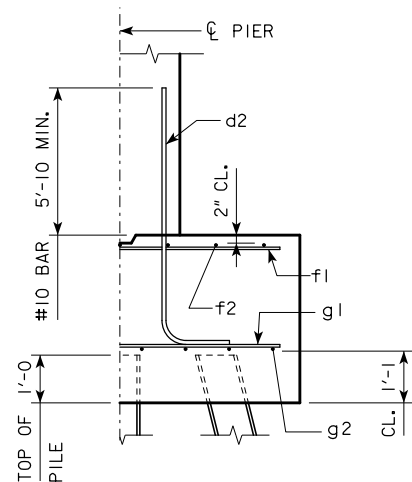
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b> 30° SKEW - H=16' TO 24'		<b>H40-77-06</b>	

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

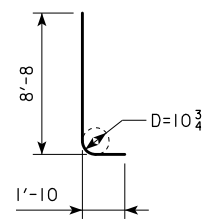


TYPICAL SECTION

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4	15C	205	4' x 9' x 26'	
213'-10	15C	212		
226'-4	16C	207		
243'-0	16C	215		
201'-4	15C	210	4' x 9' x 26'	
213'-10	15C	217		
226'-4	16C	212		
243'-0	16C	219		
201'-4	15C	214	4' x 9' x 26'	
213'-10	16C	207		
226'-4	16C	215		
243'-0	17A	215		
201'-4	15D	213	4' x 10' x 27'	
213'-10	16D	207		
226'-4	16D	215		
243'-0	17B	214		
201'-4	15D	218	4' x 10' x 27'	
213'-10	16D	211		
226'-4	16D	219		
243'-0	17B	219		

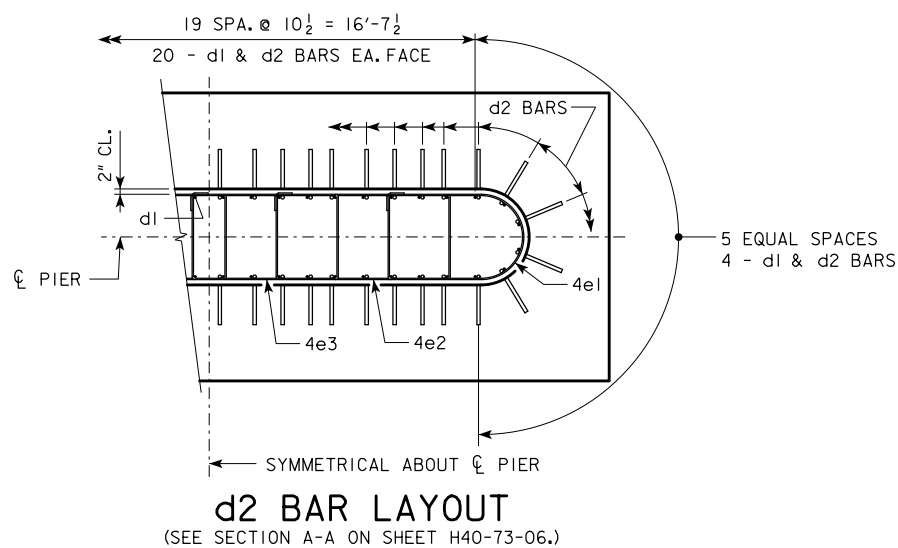
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
4' x 9' x 26'	d2	48 - #10 AS SHOWN	10'-6	2169	4118	34.7
	f1	26 - #5 @ 1'-0	8'-8	235		
	f2	9 - #5 @ 1'-0	25'-8	241		
	g1	29 - #7 @ 0'-10 1/2	8'-8	514		
	g2	14 - #8 @ 0'-7 1/2	25'-8	959		
4' x 10' x 27'	d2	48 - #10 AS SHOWN	10'-6	2169	4672	40.0
	f1	27 - #5 @ 1'-0	9'-8	272		
	f2	10 - #5 @ 1'-0	26'-8	278		
	g1	30 - #8 @ 0'-10 1/2	9'-8	774		
	g2	13 - #9 @ 0'-9 1/2	26'-8	1179		



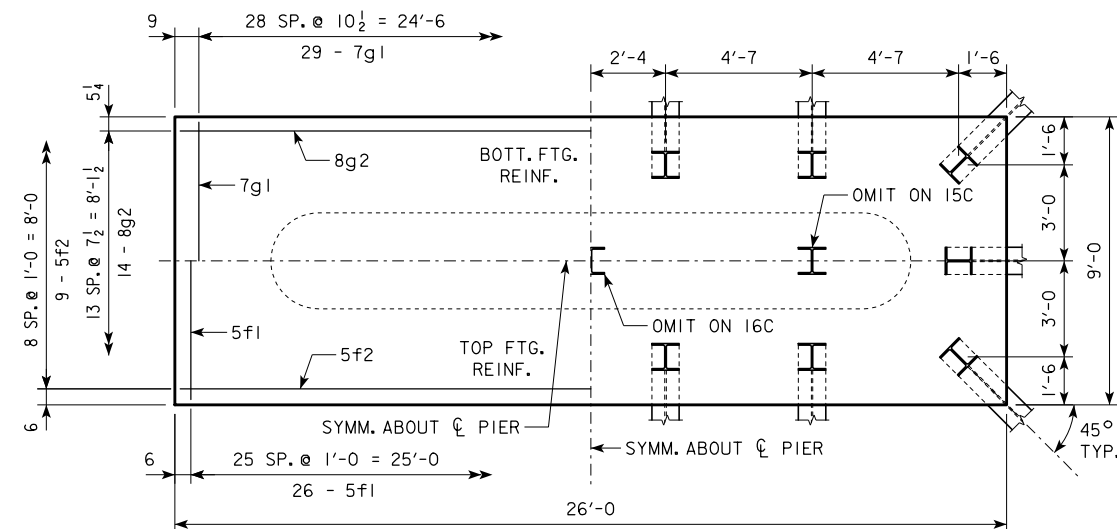
d2

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

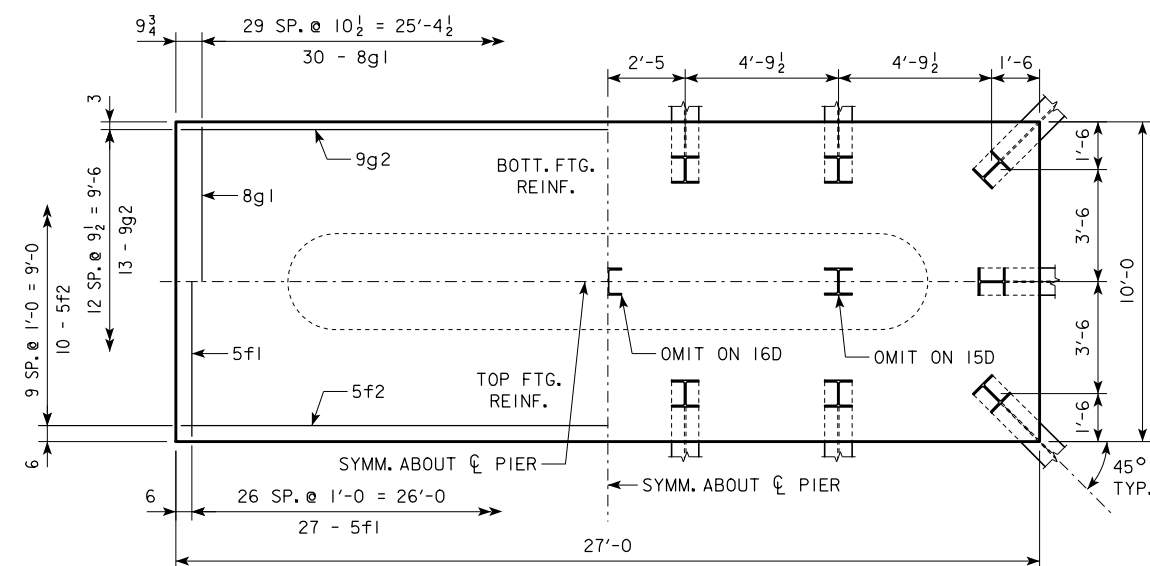


d2 BAR LAYOUT

(SEE SECTION A-A ON SHEET H40-73-06.)



4'-0 x 9'-0 x 26'-0 FOR 15C, 16C & 17A



4'-0 x 10'-0 x 27'-0 FOR 15D, 16D & 17B

FOOTING NOTES:

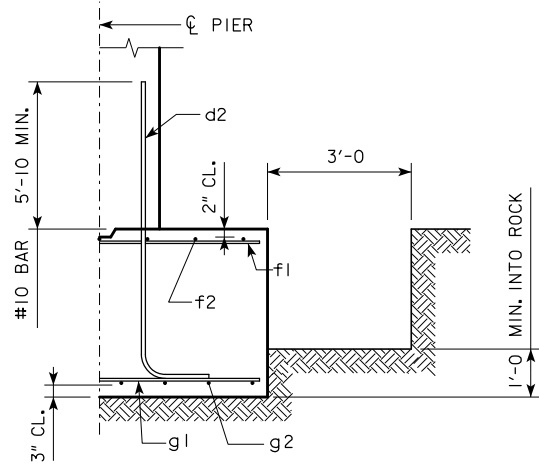
THESE FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-73-06.

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.

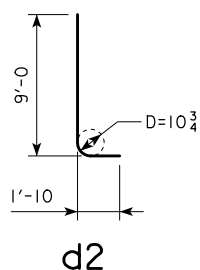
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

05-13 LATEST REVISION DATE	<i>Thomas L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b> 30° SKEW - H=25' TO 40'	<b>H40-78-06</b>



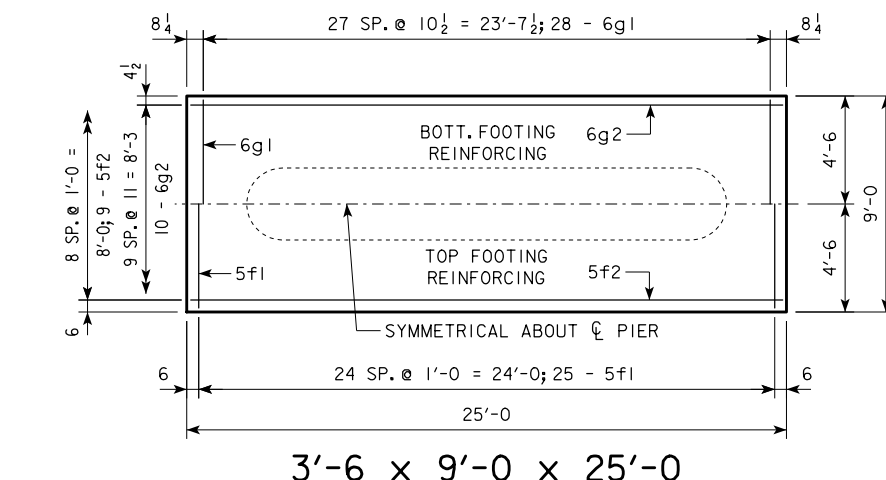
TYPICAL SECTION

H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
16 TO 18	138'-10	3'-6 x 9' x 25'
	151'-4	
	163'-10	
	176'-4	
	188'-10	
19 TO 21	201'-4	3'-6 x 9' x 27'
	213'-10	
	226'-4	
	243'-0	
	255'-4	
22 TO 24	267'-10	3'-6 x 9' x 29'
	280'-4	
	292'-10	
	305'-4	
	317'-10	

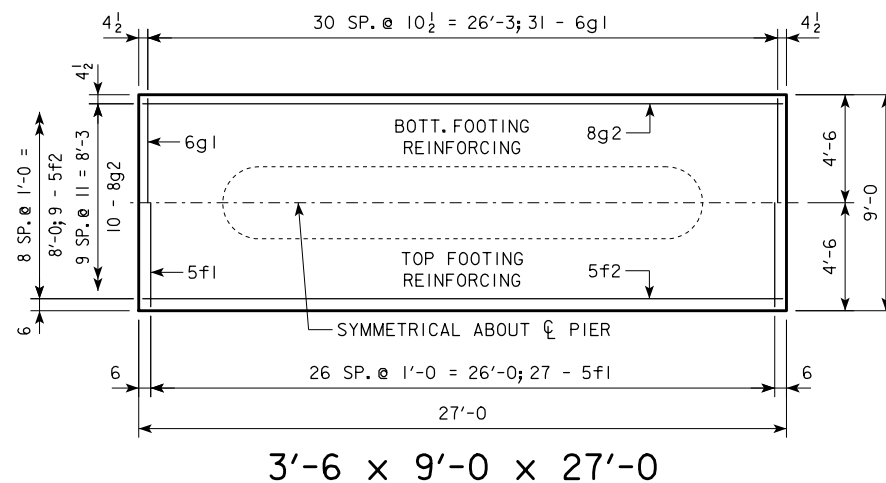


NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.

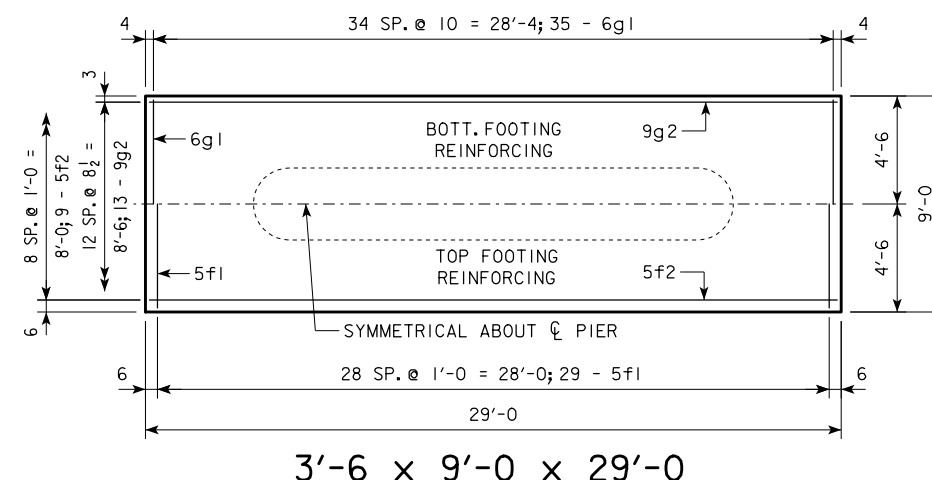
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
3'-6 x 9' x 25'	d2	48 - #10 AS SHOWN	10'-10	2238	3430	29.2
	f1	25 - #5 @ 1'-0	8'-8	226		
	f2	9 - #5 @ 1'-0	24'-8	232		
	g1	28 - #6 @ 0'-10 1/2	8'-8	364		
	g2	10 - #6 @ 0'-11	24'-8	370		
3'-6 x 9' x 27'	d2	48 - #10 AS SHOWN	10'-10	2238	3848	31.5
	f1	27 - #5 @ 1'-0	8'-8	244		
	f2	9 - #5 @ 1'-0	26'-8	250		
	g1	31 - #6 @ 0'-10 1/2	8'-8	404		
	g2	10 - #8 @ 0'-11	26'-8	712		
3'-6 x 9' x 29'	d2	48 - #10 AS SHOWN	10'-10	2238	4492	33.8
	f1	29 - #5 @ 1'-0	8'-8	262		
	f2	9 - #5 @ 1'-0	28'-8	269		
	g1	35 - #6 @ 0'-10	8'-8	456		
	g2	13 - #9 @ 0'-8 1/2	28'-8	1267		
3'-6 x 9' x 31'	d2	48 - #10 AS SHOWN	10'-10	2238	4919	36.2
	f1	31 - #5 @ 1'-0	8'-8	280		
	f2	9 - #5 @ 1'-0	30'-8	288		
	g1	31 - #7 @ 1'-0	8'-8	549		
	g2	15 - #9 @ 0'-7	30'-8	1564		



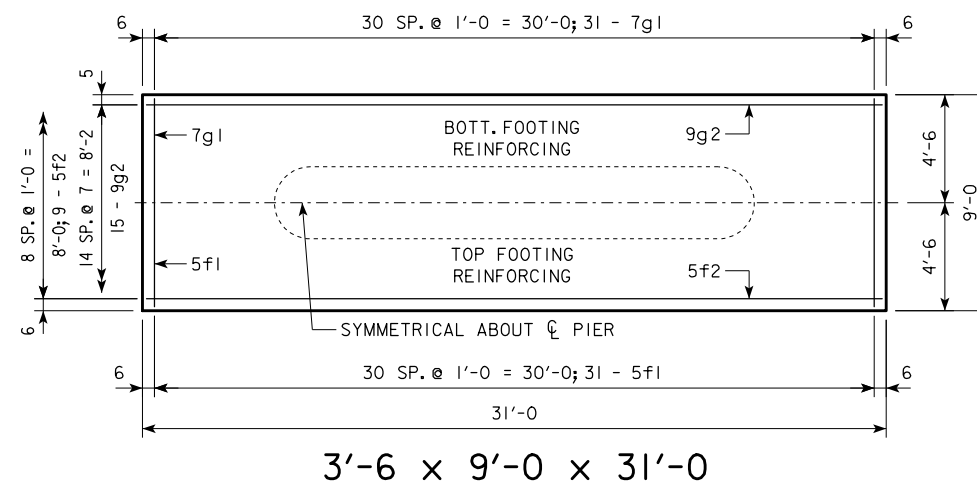
3'-6 x 9'-0 x 25'-0



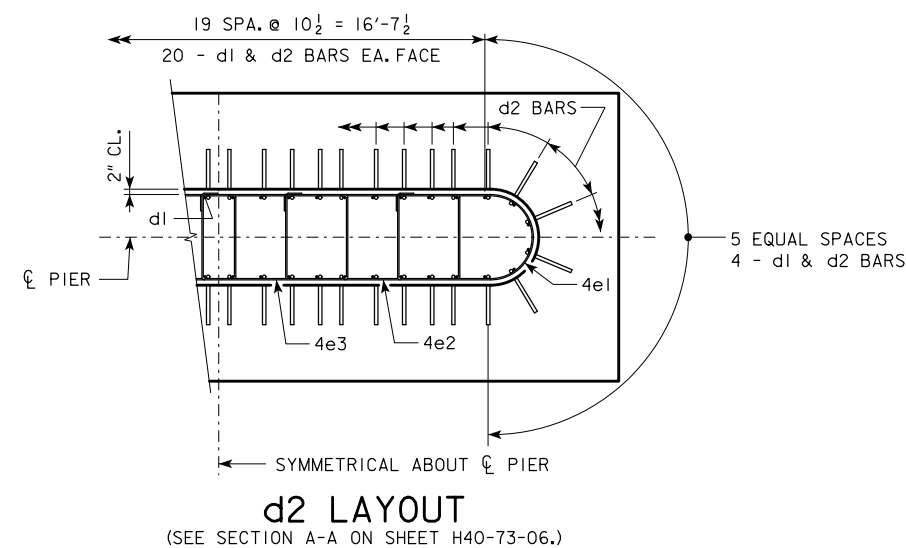
3'-6 x 9'-0 x 27'-0



3'-6 x 9'-0 x 29'-0



3'-6 x 9'-0 x 31'-0



d2 LAYOUT

(SEE SECTION A-A ON SHEET H40-73-06.)

FOOTING NOTES:

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-73-06.

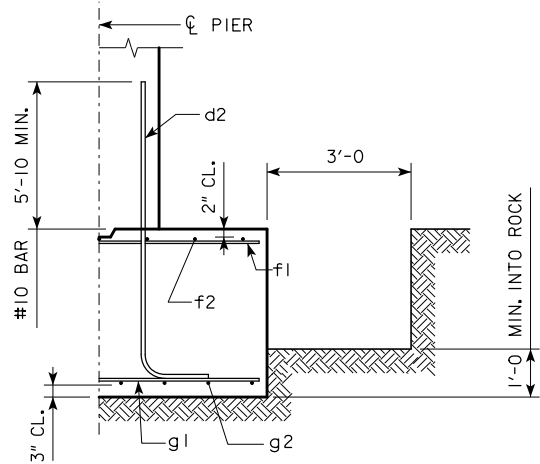
THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0.

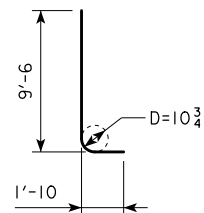
04-12 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER - SPREAD FOOTINGS</b>	<b>H40-79-06</b>
		30° SKEW - H=16' TO 24'	

REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0".

H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
25 TO 27	138'-10 151'-4 163'-10	4' x 9' x 26'
	176'-4 188'-10	4' x 9' x 28'
	201'-4 213'-10	4' x 9' x 30'
	226'-4 243'-0	4' x 9' x 32'
28 TO 30	138'-10 151'-4 163'-10	4' x 9' x 26'
	176'-4 188'-10	4' x 9' x 28'
	201'-4 213'-10	4' x 9' x 30'
	226'-4 243'-0	4' x 9' x 32'
31 TO 33	138'-10 151'-4 163'-10	4' x 9' x 26'
	176'-4 188'-10	4' x 9' x 28'
	201'-4 213'-10	4' x 9' x 30'
	226'-4 243'-0	4' x 10' x 32'
34 TO 36	138'-10 151'-4 163'-10	4' x 9' x 26'
	176'-4 188'-10	4' x 9' x 28'
	201'-4 213'-10	4' x 9' x 30'
	226'-4 243'-0	4' x 10' x 32'
37 TO 40	138'-10 151'-4 163'-10	4' x 9' x 28'
	176'-4 188'-10	4' x 9' x 30'
	201'-4 213'-10	4' x 9' x 32'
	226'-4 243'-0	4' x 10' x 32'

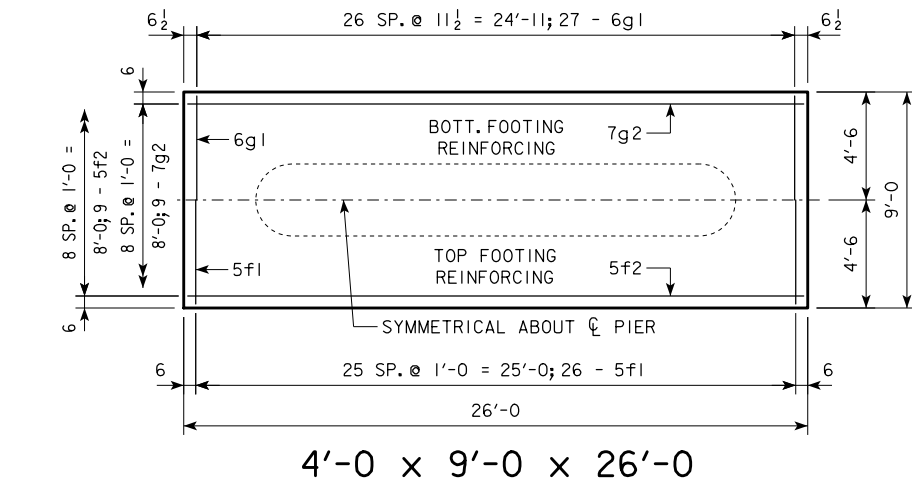


TYPICAL SECTION

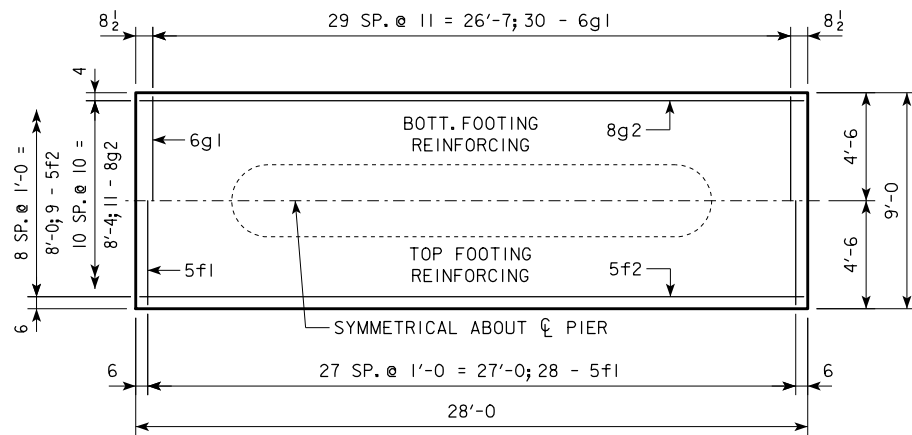


d2

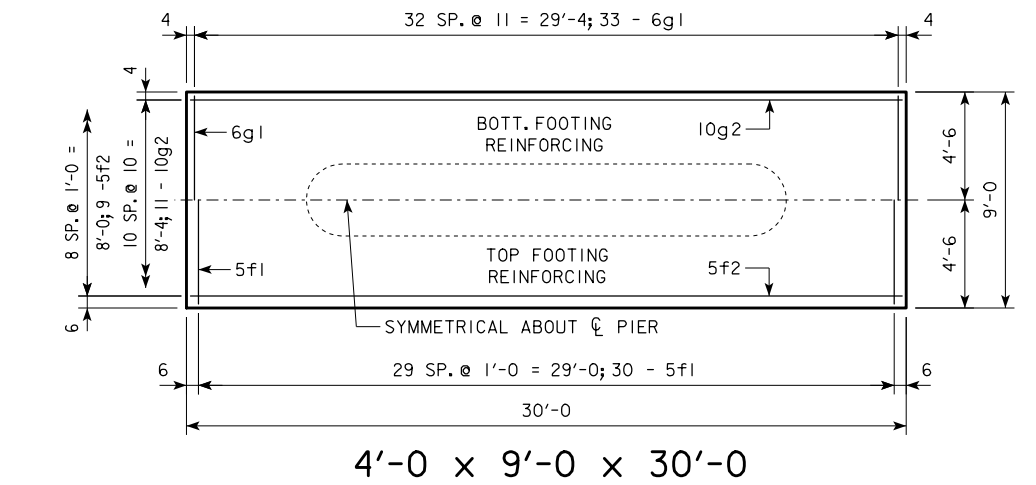
NOTE: D = PIN DIAMETER.  
DIMENSIONS ARE OUT TO OUT.



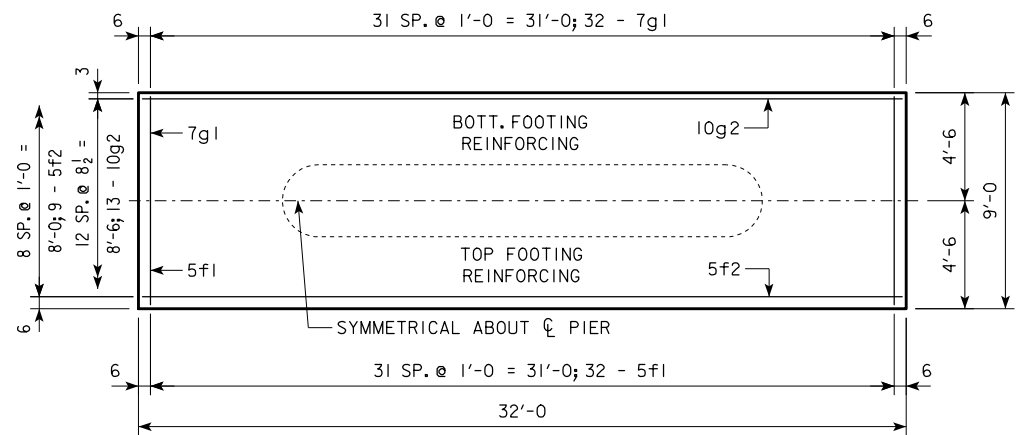
4'-0 x 9'-0 x 26'-0



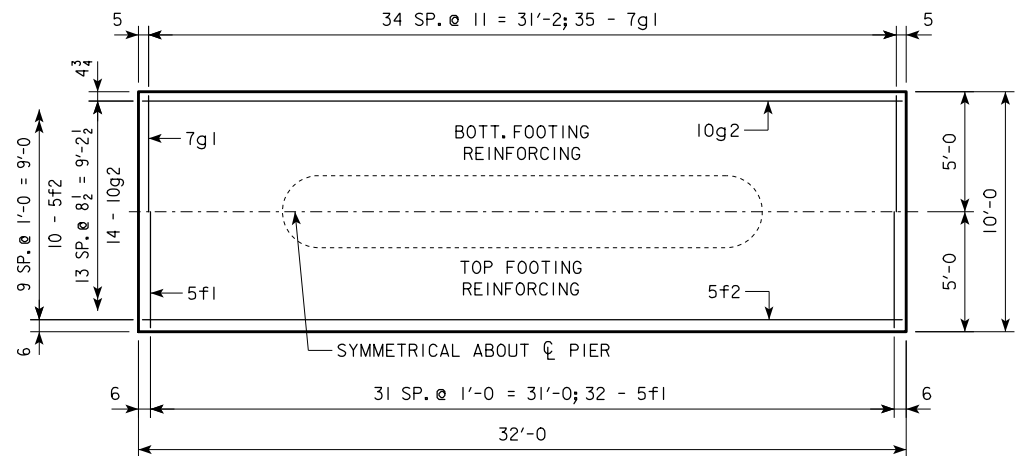
4'-0 x 9'-0 x 28'-0



4'-0 x 9'-0 x 30'-0



4'-0 x 9'-0 x 32'-0

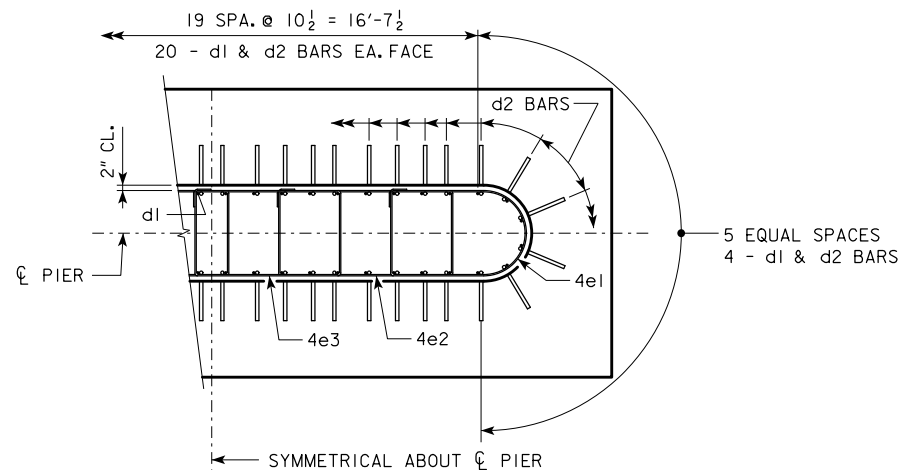


4'-0 x 10'-0 x 32'-0

**FOOTING NOTES:**

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-73-06.

THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).



d2 LAYOUT

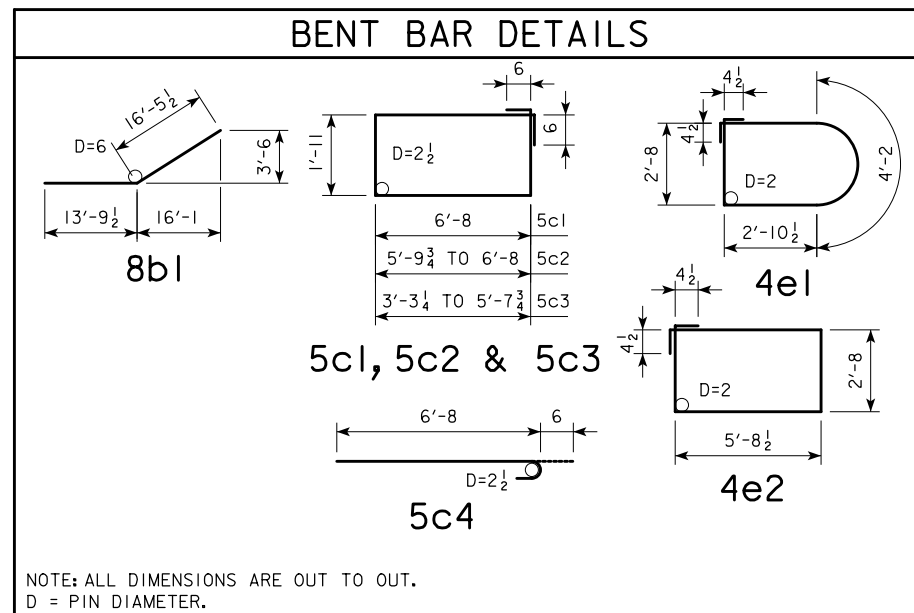
(SEE SECTION A-A ON SHEET H40-73-06.)

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 9' x 26'	d2	48 - #10 AS SHOWN	11'-4	2341	3640	34.7
	f1	26 - #5 @ 1'-0	8'-8	235		
	f2	9 - #5 @ 1'-0	25'-8	241		
	g1	27 - #6 @ 0'-11 1/2	8'-8	351		
	g2	9 - #7 @ 1'-0	25'-8	472		
4' x 9' x 28'	d2	48 - #10 AS SHOWN	11'-4	2341	4058	37.3
	f1	28 - #5 @ 1'-0	8'-8	253		
	f2	9 - #5 @ 1'-0	27'-8	260		
	g1	30 - #6 @ 0'-11	8'-8	391		
	g2	11 - #8 @ 0'-10	27'-8	813		
4' x 9' x 30'	d2	48 - #10 AS SHOWN	11'-4	2341	4724	40.0
	f1	30 - #5 @ 1'-0	8'-8	271		
	f2	9 - #5 @ 1'-0	29'-8	278		
	g1	33 - #6 @ 0'-11	8'-8	430		
	g2	11 - #10 @ 0'-10	29'-8	1404		
4' x 9' x 32'	d2	48 - #10 AS SHOWN	11'-4	2341	5265	42.7
	f1	32 - #5 @ 1'-0	8'-8	289		
	f2	9 - #5 @ 1'-0	31'-8	297		
	g1	32 - #7 @ 1'-0	8'-8	567		
	g2	13 - #10 @ 0'-8 1/2	31'-8	1771		
4' x 10' x 32'	d2	48 - #10 AS SHOWN	11'-4	2341	5594	47.4
	f1	32 - #5 @ 1'-0	9'-8	323		
	f2	10 - #5 @ 1'-0	31'-8	330		
	g1	35 - #7 @ 0'-11	9'-8	692		
	g2	14 - #10 @ 0'-8 1/2	31'-8	1908		

04-12 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER - SPREAD FOOTINGS</b>	<b>H40-80-06</b>
		30° SKEW - H=25' TO 40'	



REVISED 01-10 - MOVED PIER NOTES TO H40-81-06 STANDARD.



### CAP

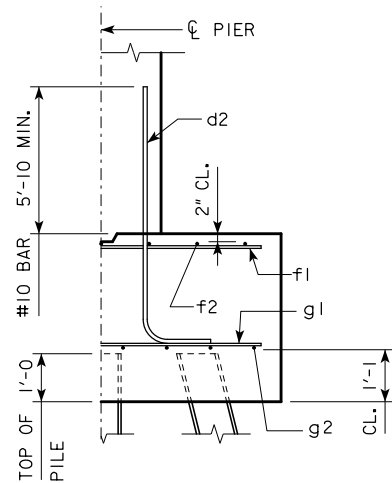
REINFORCING STEEL	ABUT. BEARINGS		138'-10			151'-4			163'-10			176'-4			188'-10			201'-4			213'-10			226'-4			243'-0			
	BAR	LENGTH	SHAPE	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT	NO.	SIZE	WEIGHT			
a1	57'-8			8	9	1569	8	9	1569	8	9	1569	8	10	1985	8	10	1985	8	10	1985	8	10	1985	8	11	2451	8	11	2451
a2	57'-8			8	8	1232	8	9	1569	8	9	1569	8	9	1569	8	10	1985	8	10	1985	8	10	1985	8	10	1985	8	10	1985
6a3	57'-8			6	6	520	6	6	520	6	6	520	6	6	520	6	6	520	6	6	520	6	6	520	6	6	520	6	6	520
6a4	VARIES			8	6	538	8	6	538	8	6	538	8	6	538	8	6	538	8	6	538	8	6	538	8	6	538	8	6	538
8b1	30'-3			8	8	646	8	8	646	8	8	646	8	8	646	8	8	646	8	8	646	8	8	646	8	8	646	8	8	646
5c1	18'-2			30	5	568	30	5	568	30	5	568	30	5	568	30	5	568	30	5	568	30	5	568	30	5	568	30	5	568
5c2	VARIES			20	5	361	20	5	361	20	5	361	20	5	361	28	5	506	28	5	506	28	5	506	28	5	506	28	5	506
5c3	VARIES			48	5	688	48	5	688	48	5	688	48	5	688	48	5	688	48	5	688	48	5	688	48	5	688	48	5	688
5c4	7'-2			24	5	179	24	5	179	24	5	179	24	5	179	24	5	179	24	5	179	24	5	179	24	5	179	24	5	179
TOTAL (LB.)				6301			6638			6638			7054			7054			7615			7615			8081			8081		
STRUCTURAL CONCRETE (CY)				44.9			44.9			44.9			44.9			44.9			44.9			44.9			44.9			44.9		

### COLUMN

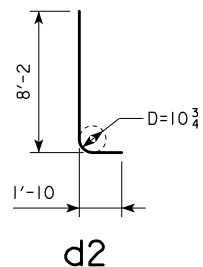
H IN FEET	COLUMN HEIGHT	STRUCTURAL CONCRETE (CY)	REINFORCING STEEL												TOTAL WEIGHT (LB.)
			d1 BAR				4e1 BAR				4e2 BAR				
			NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	NO.	SIZE	LENGTH	WEIGHT	
16	5'-6	14.9	58	10	9'-0	2246	12	4	13'-4	107	30	4	17'-6	351	2704
17	6'-6	17.6	58	10	10'-0	2496	14	4	13'-4	125	35	4	17'-6	409	3030
18	7'-6	20.3	58	10	11'-0	2745	16	4	13'-4	143	40	4	17'-6	468	3356
19	8'-6	23.0	58	10	12'-0	2995	18	4	13'-4	160	45	4	17'-6	526	3681
20	9'-6	25.7	58	10	13'-0	3244	20	4	13'-4	178	50	4	17'-6	585	4007
21	10'-6	28.4	58	10	14'-0	3494	22	4	13'-4	196	55	4	17'-6	643	4333
22	11'-6	31.1	58	10	15'-0	3744	24	4	13'-4	214	60	4	17'-6	701	4659
23	12'-6	33.8	58	10	16'-0	3993	26	4	13'-4	232	65	4	17'-6	760	4985
24	13'-6	36.5	58	10	17'-0	4243	28	4	13'-4	249	70	4	17'-6	818	5310
25	14'-0	37.9	58	10	17'-6	4368	30	4	13'-4	267	75	4	17'-6	877	5512
26	15'-0	40.6	58	10	18'-6	4617	32	4	13'-4	285	80	4	17'-6	935	5837
27	16'-0	43.3	58	10	19'-6	4867	34	4	13'-4	303	85	4	17'-6	994	6164
28	17'-0	46.0	58	10	20'-6	5116	36	4	13'-4	321	90	4	17'-6	1052	6489
29	18'-0	48.7	58	10	21'-6	5366	38	4	13'-4	338	95	4	17'-6	1111	6815
30	19'-0	51.4	58	10	22'-6	5615	40	4	13'-4	356	100	4	17'-6	1169	7140
31	20'-0	54.1	58	10	23'-6	5865	42	4	13'-4	374	105	4	17'-6	1227	7466
32	21'-0	56.8	58	10	24'-6	6115	44	4	13'-4	392	110	4	17'-6	1286	7793
33	22'-0	59.5	58	10	25'-6	6364	46	4	13'-4	410	115	4	17'-6	1344	8118
34	23'-0	62.2	58	10	26'-6	6614	48	4	13'-4	428	120	4	17'-6	1403	8445
35	24'-0	64.9	58	10	27'-6	6863	50	4	13'-4	445	125	4	17'-6	1461	8769
36	25'-0	67.7	58	10	28'-6	7113	52	4	13'-4	463	130	4	17'-6	1520	9096
37	26'-0	70.4	58	10	29'-6	7362	54	4	13'-4	481	135	4	17'-6	1578	9421
38	27'-0	73.1	58	10	30'-6	7612	56	4	13'-4	499	140	4	17'-6	1637	9748
39	28'-0	75.8	58	10	31'-6	7862	58	4	13'-4	517	145	4	17'-6	1695	10074
40	29'-0	78.5	58	10	32'-6	8111	60	4	13'-4	534	150	4	17'-6	1754	10399

SEE SHEET H40-31-06 FOR STEP REINFORCING STEEL QUANTITIES AND DETAILS.

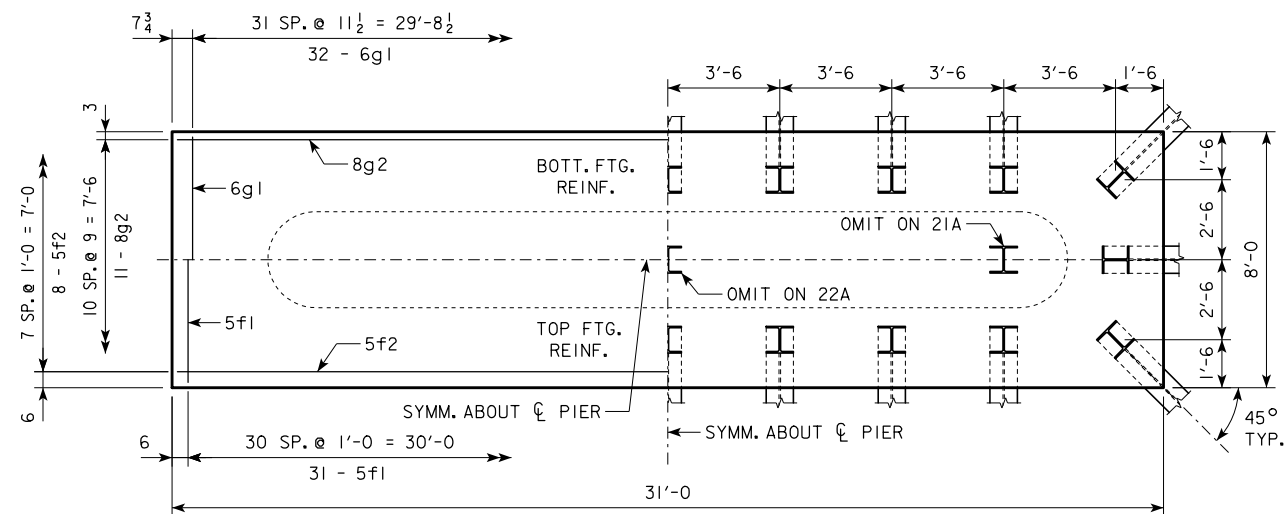
01-10 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009 <b>TEE PIER CAP AND COLUMN</b> 45° SKEW	<b>H40-82-06</b>
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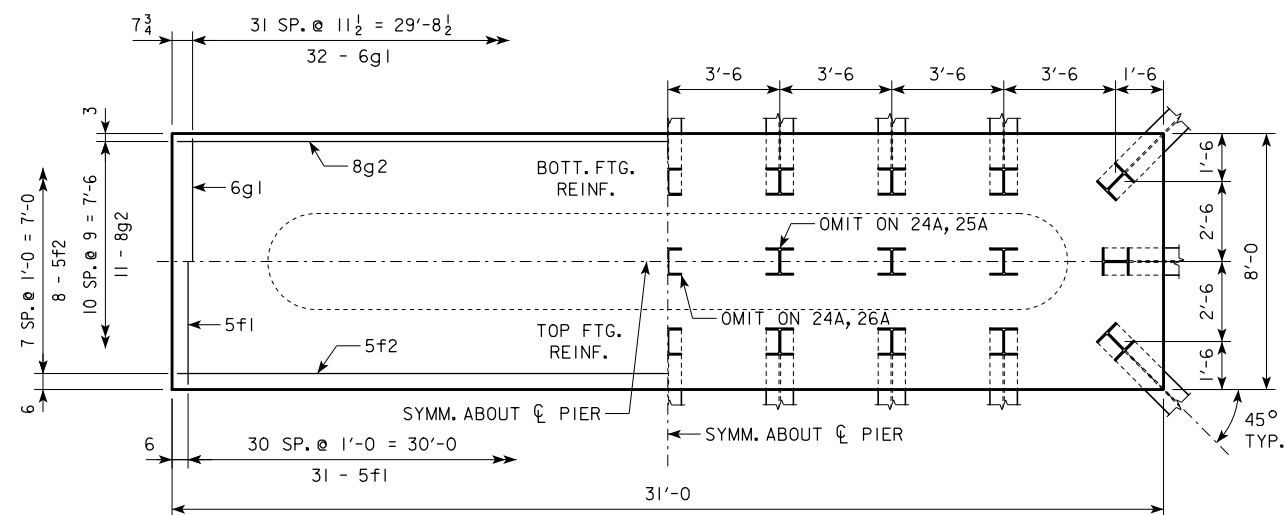
TYPICAL SECTION



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



3'-6 x 8'-0 x 31'-0 FOR 21A, 22A & 23A



3'-6 x 8'-0 x 31'-0 FOR 24A, 25A & 26A

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 H40-81-06.

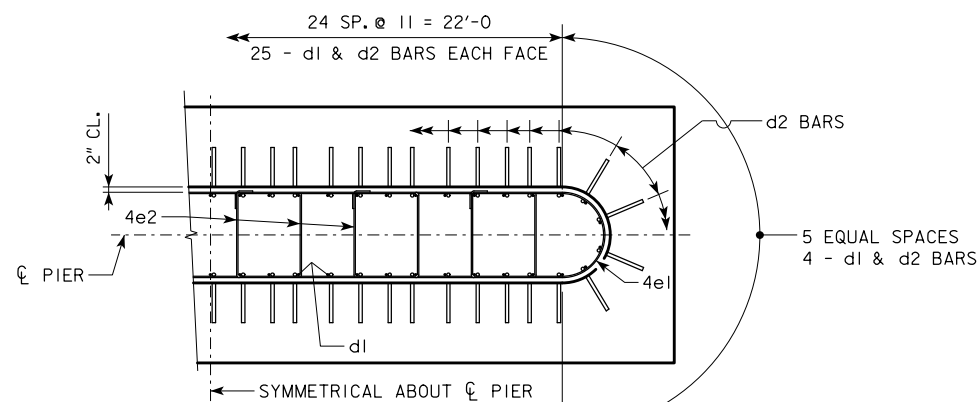
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18	201'-4	21A	145	3'-6 x 8' x 31'
	213'-10	22A	141	
	226'-4	23A	144	
	243'-0	24A	143	
19	201'-4	22A	140	3'-6 x 8' x 31'
	213'-10	22A	145	
	226'-4	24A	142	
	243'-0	25A	144	
20	201'-4	22A	144	3'-6 x 8' x 31'
	213'-10	23A	145	
	226'-4	24A	145	
	243'-0	26A	143	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	
3'-6 x 8' x 31'	d2	58 - #10 AS SHOWN	10'-0	2496	4269
	f1	31 - #5 @ 1'-0	7'-8	248	
	f2	8 - #5 @ 1'-0	30'-8	256	
	g1	32 - #6 @ 0'-11 1/2	7'-8	368	
	g2	11 - #8 @ 0'-9	30'-8	901	



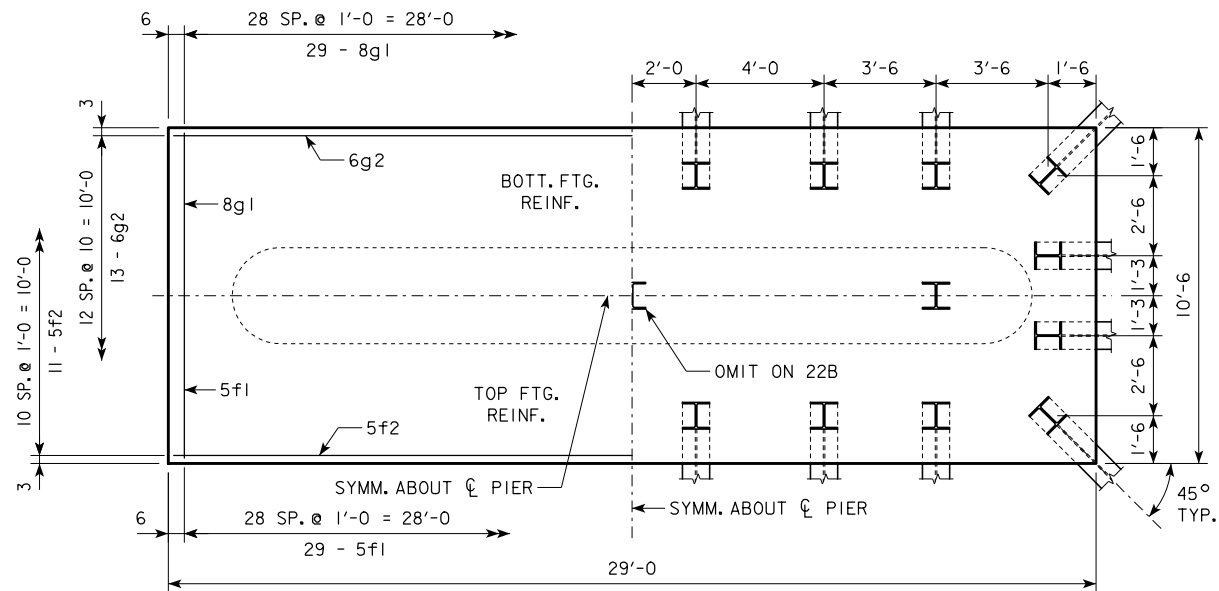
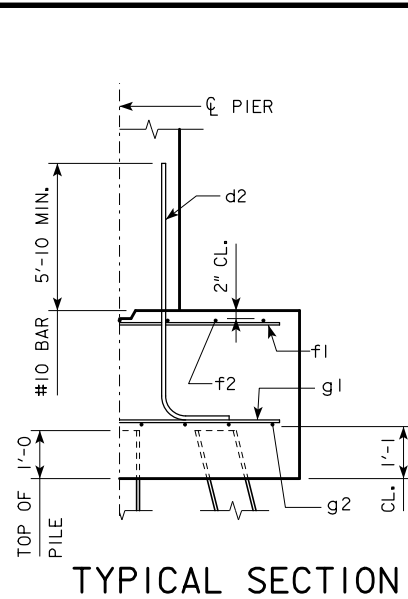
d2 LAYOUT

(SEE SECTION A-A ON SHEET H40-81-06.)

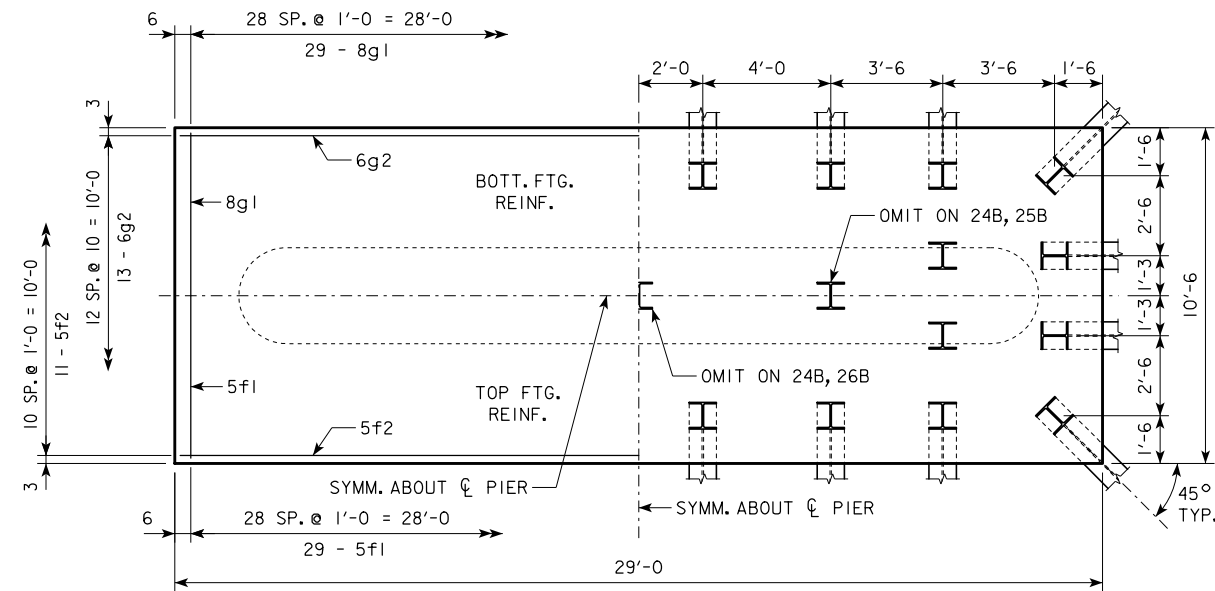
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER-HP10x57 SRL-1</b> <b>STEEL PILE FOOTINGS</b> 45° SKEW - H=16' TO 24'	<b>H40-83-06</b>

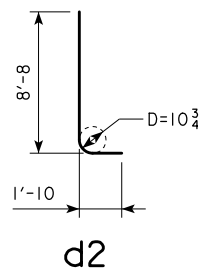
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



4'-0 x 10'-6 x 29'-0 FOR 22B & 23B



4'-0 x 10'-6 x 29'-0 FOR 24B, 25B & 26B



d2

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

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
20' TO 27'	201'-4	22B	143	4' x 10'-6 x 29'
	213'-10	23B	144	
	226'-4	24B	142	
	243'-0	25B	144	
28' TO 30'	201'-4	22B	147	4' x 10'-6 x 29'
	213'-10	24B	140	
	226'-4	24B	145	
	243'-0	25B	147	
31' TO 33'	201'-4	23B	145	4' x 10'-6 x 29'
	213'-10	24B	142	
	226'-4	25B	144	
	243'-0	26B	144	
34' TO 36'	201'-4	24C	139	4' x 11' x 31'
	213'-10	24C	144	
	226'-4	25C	145	
	243'-0	26C	145	
37' TO 40'	201'-4	24C	143	4' x 11' x 31'
	213'-10	25C	143	
	226'-4	26C	144	
	243'-0	27A	145	

**FOOTING NOTES:**

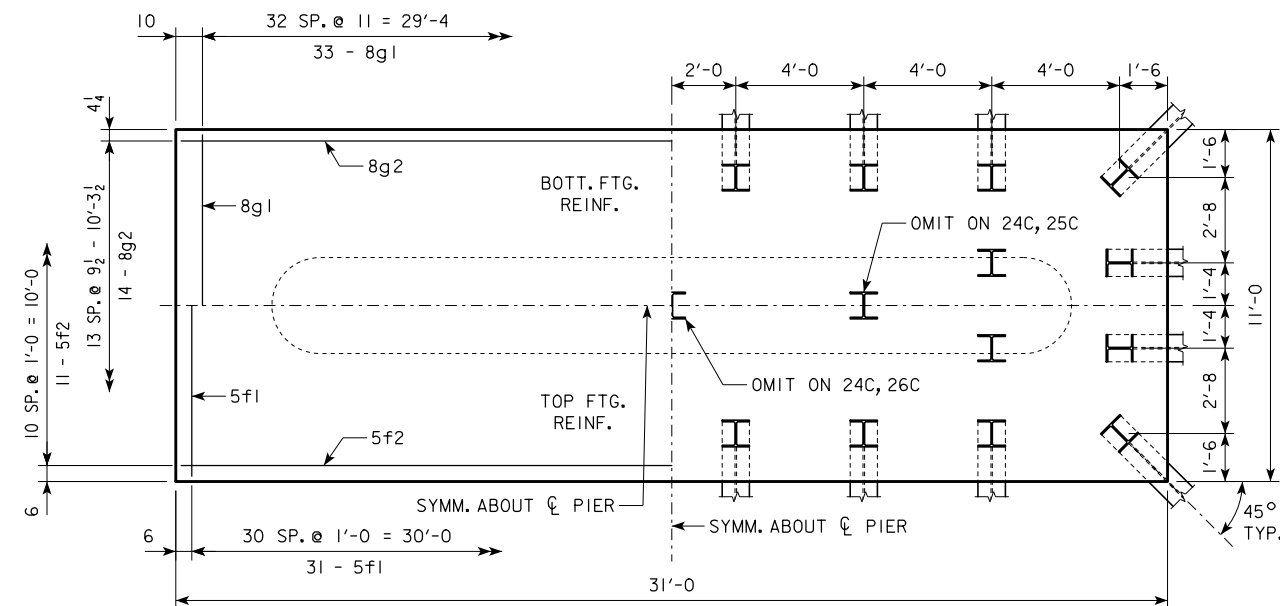
THESE FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-81-06.

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

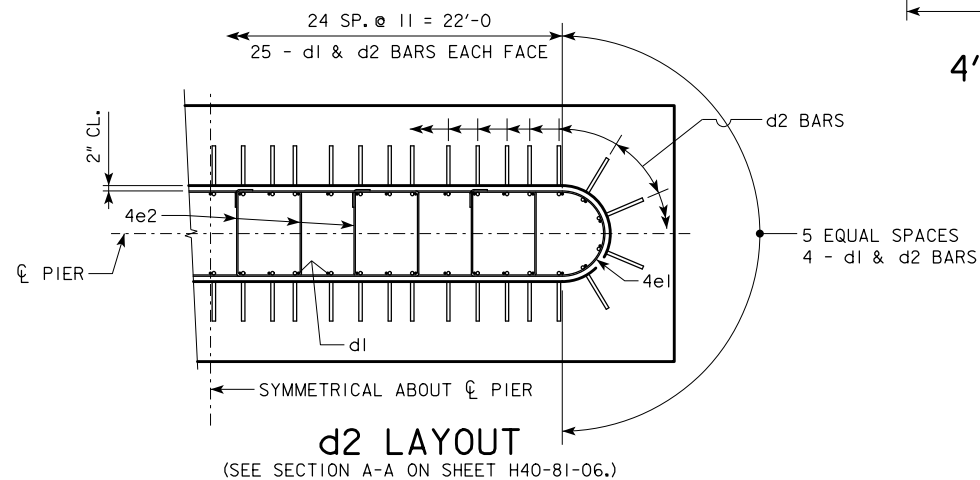
STEEL PILING USED AS POINT BEARING SHALL HAVE A MINIMUM DISTANCE OF APPROXIMATELY 10 FEET FROM BOTTOM OF FOOTING TO TOP OF BEARING ROCK. THE PILE LAYOUTS ARE SUCH THAT THE DISTANCE CENTER TO CENTER OF ADJACENT PILING SHALL NOT EXCEED 8'-0.

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

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



4'-0 x 11'-0 x 31'-0 FOR 24C, 25C, 26C & 27A



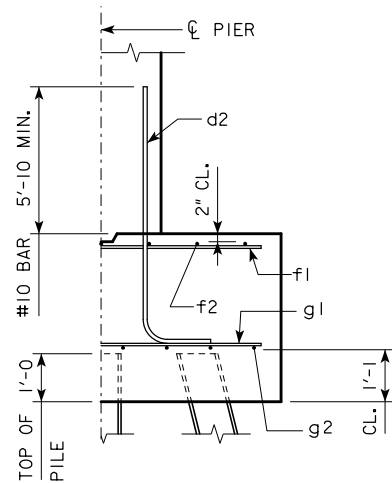
d2 LAYOUT

(SEE SECTION A-A ON SHEET H40-81-06.)

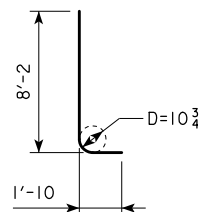
FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)					STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	TOTAL WEIGHT (LB.)	
4' x 10'-6 x 29'	d2	58 - #10 AS SHOWN	10'-6	2621	4605	45.1
	f1	29 - #5 @ 1'-0	10'-2	308		
	f2	11 - #5 @ 1'-0	28'-8	329		
	g1	29 - #8 @ 1'-0	10'-2	787		
	g2	13 - #6 @ 0'-10	28'-8	560		
4' x 11' x 31'	d2	58 - #10 AS SHOWN	10'-6	2621	5404	50.5
	f1	31 - #5 @ 1'-0	10'-8	345		
	f2	11 - #5 @ 1'-0	30'-8	352		
	g1	33 - #8 @ 0'-11	10'-8	940		
	g2	14 - #8 @ 0'-9 1/2	30'-8	1146		

05-13 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	<b>IOWA DOT Highway Division</b>	
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE	
		<b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b>	
		AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-1 STEEL PILE FOOTINGS</b>	<b>H40-84-06</b>
		45° SKEW - H=25' TO 40'	

REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

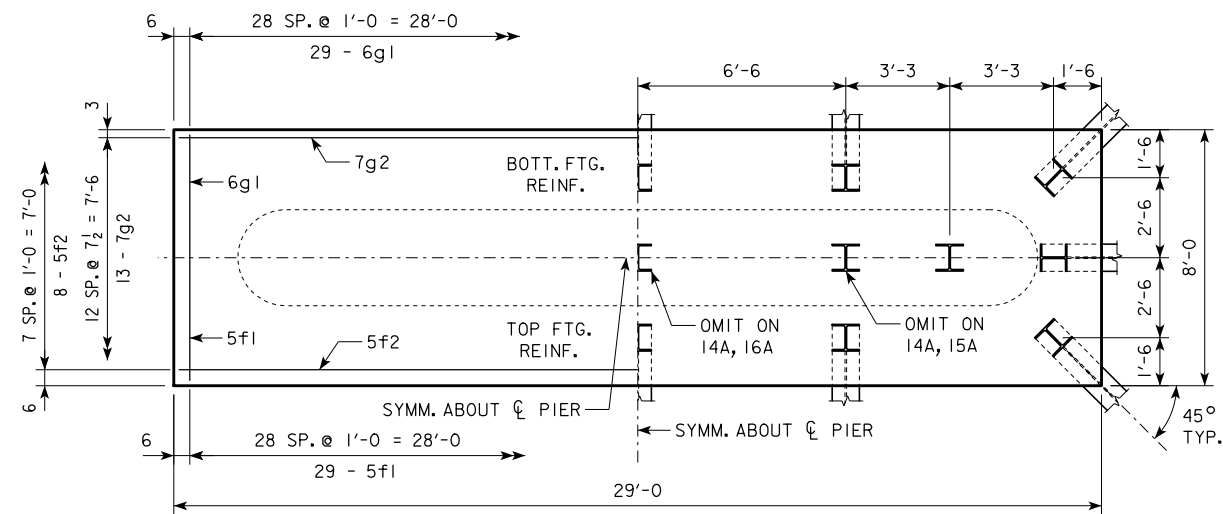


TYPICAL SECTION



d2

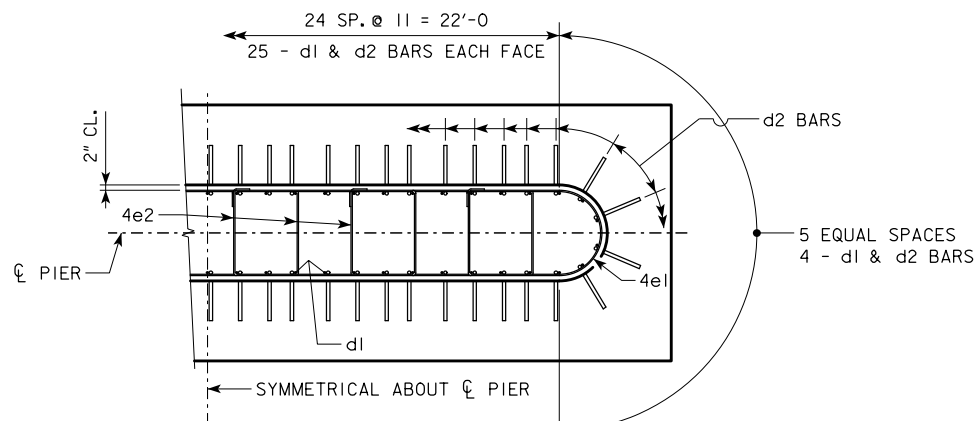
NOTE: D = PIN DIAMETER.  
DIMENSIONS ARE OUT TO OUT.



3'-6 x 8'-0 x 29'-0 FOR 14A, 15A, 16A & 17A

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
18	201'-4	14A	209	3'-6 x 8' x 29'
	213'-10	14A	216	
	226'-4	15A	216	
	243'-0	16A	212	
21	201'-4	14A	215	3'-6 x 8' x 29'
	213'-10	15A	213	
	226'-4	16A	210	
	243'-0	16A	218	
24	201'-4	15A	212	3'-6 x 8' x 29'
	213'-10	15A	219	
	226'-4	16A	215	
	243'-0	17A	215	

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)	
3'-6 x 8' x 29'	d2	58 - #10 AS SHOWN	10'-0	2496	30.1
	f1	29 - #5 @ 1'-0	7'-8	232	
	f2	8 - #5 @ 1'-0	28'-8	239	
	g1	29 - #6 @ 1'-0	7'-8	334	
	g2	13 - #7 @ 0'-7 1/2	28'-8	762	



d2 LAYOUT

(SEE SECTION A-A ON SHEET H40-81-06.)

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

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 H40-81-06.

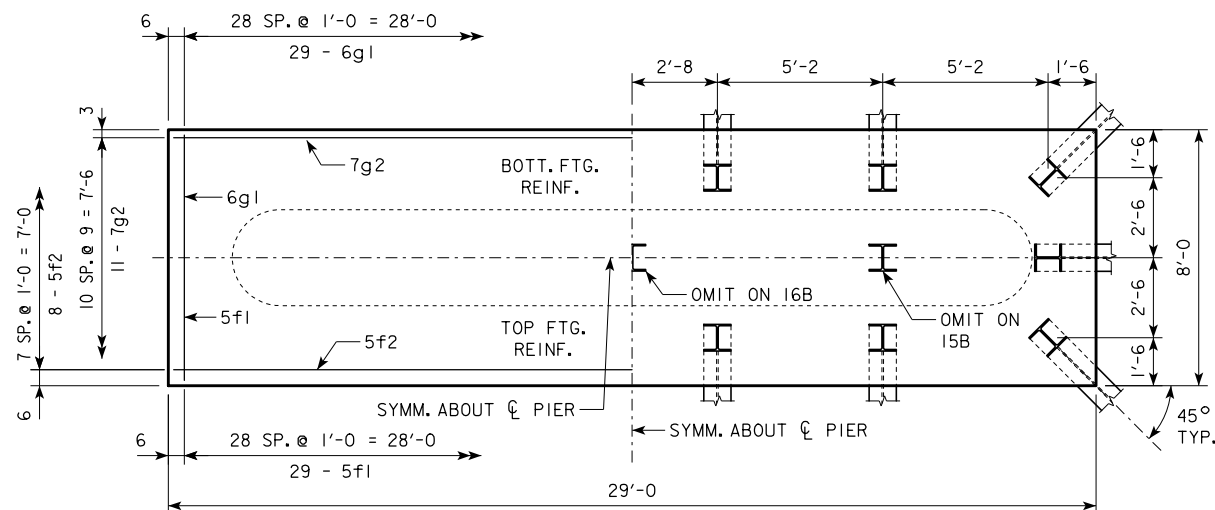
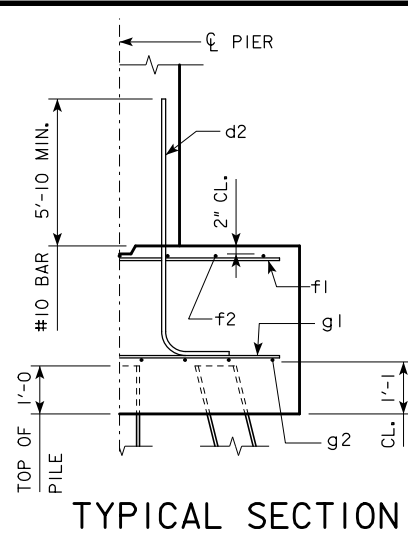
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

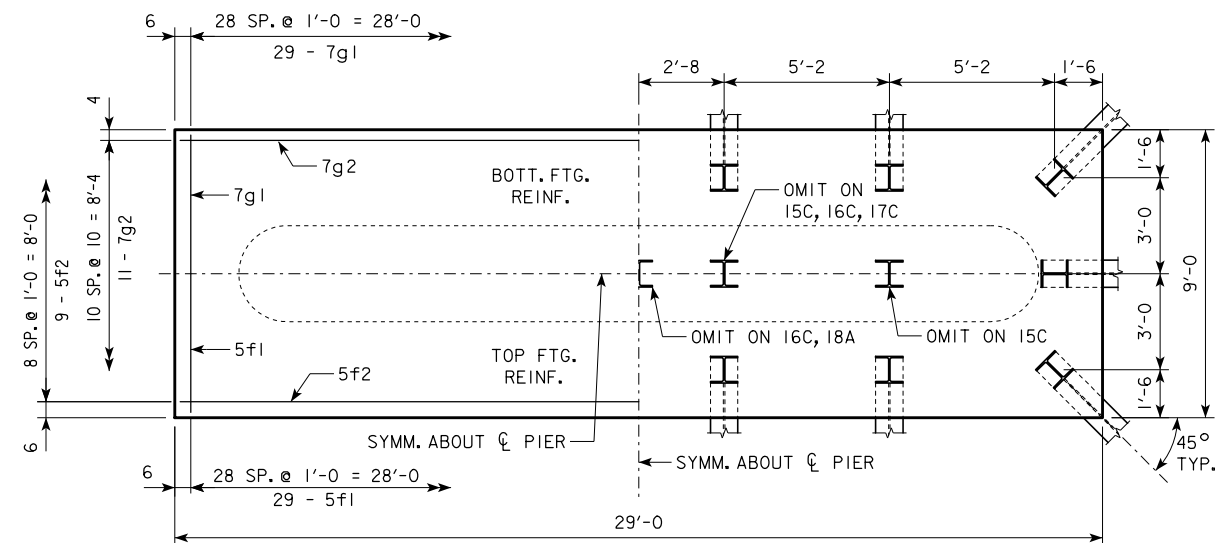
PIER PILES SHALL BE DRIVEN TO VALUES SHOWN IN DESIGN PLANS.

05-13 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER-HP10x57 SRL-2 STEEL PILE FOOTINGS</b>	
		H40-85-06 45° SKEW - H=16' TO 24'	

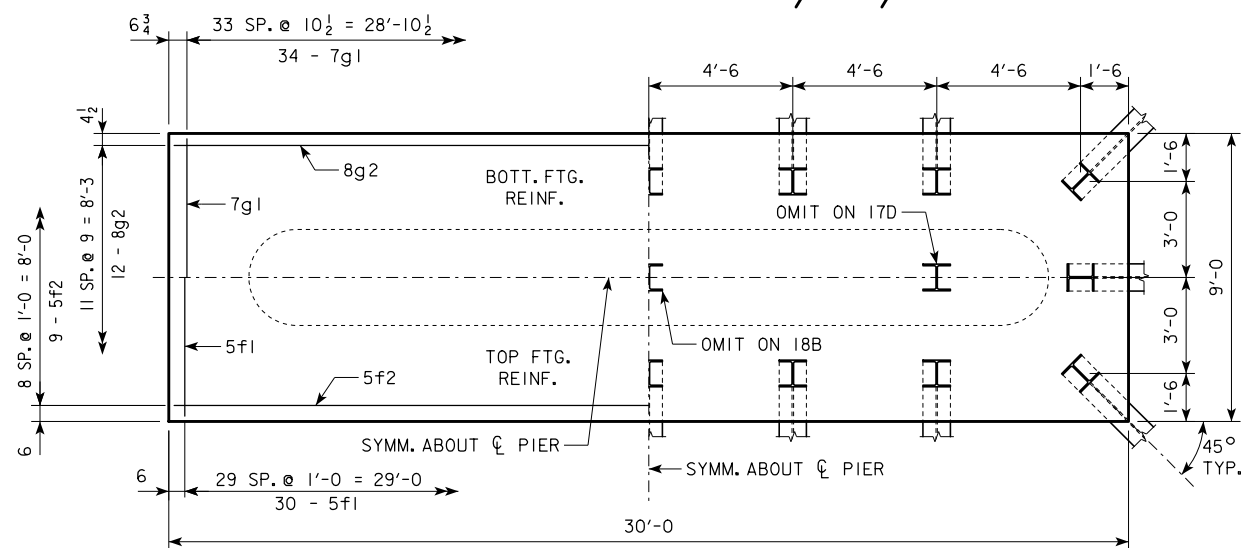
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.



4'-0 x 8'-0 x 29'-0 FOR 15B, 16B & 17B



4'-0 x 9'-0 x 29'-0 FOR 15C, 16C, 17C & 18A



4'-0 x 9'-0 x 30'-0 FOR 17D & 18B

**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 H40-81-06.

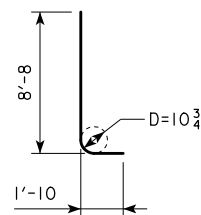
BATTER PILES IN EXTERIOR ROWS 1:4 IN THE DIRECTION SHOWN.

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.

H IN FT.	CL - CL ABUT. BRG.	PILING (HP10x57)		FOOTING SIZE
		NO. & LAYOUT	① LRFD PU, STRENGTH I DES. LOAD (KIPS)	
201'-4 TO 213'-10	201'-4	15B	217	4' x 8' x 29'
	213'-10	16B	210	
	226'-4	16B	219	
	243'-0	17B	219	
201'-4 TO 213'-10	201'-4	16C	206	4' x 9' x 29'
	213'-10	16C	213	
	226'-4	17C	213	
	243'-0	18A	213	
201'-4 TO 213'-10	201'-4	16C	210	4' x 9' x 29'
	213'-10	16C	217	
	226'-4	17C	218	
	243'-0	18A	217	
201'-4 TO 213'-10	201'-4	17D	203	4' x 9' x 30'
	213'-10	17D	209	
	226'-4	17D	218	
	243'-0	18B	211	
201'-4 TO 213'-10	201'-4	17D	208	4' x 9' x 30'
	213'-10	17D	215	
	226'-4	18B	211	
	243'-0	18B	217	

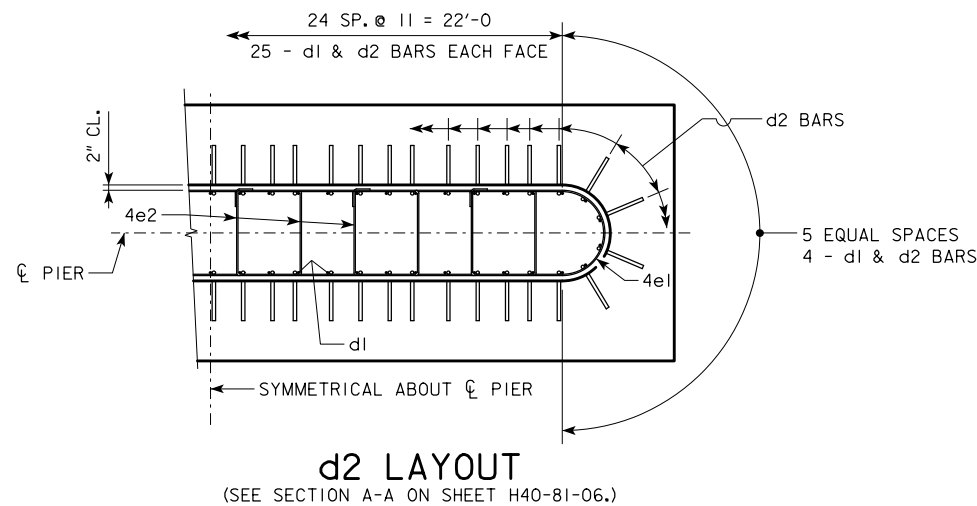
① NOTE: PU, STRENGTH I DESIGN LOAD (KIPS) IS NOT THE VALUE USED IN THE FIELD FOR DRIVING PILES.



d2

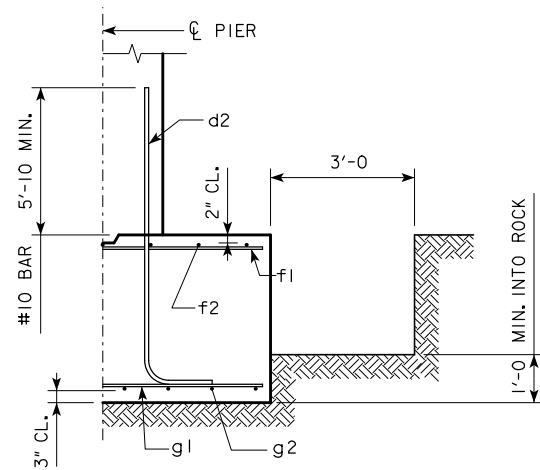
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				STRUCTURAL CONCRETE (CY)	
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 8' x 29'	d2	58 - #10 AS SHOWN	10'-6	2621	4071	34.4
	f1	29 - #5 @ 1'-0	7'-8	232		
	f2	8 - #5 @ 1'-0	28'-8	239		
	g1	29 - #6 @ 1'-0	7'-8	334		
	g2	11 - #7 @ 0'-9	28'-8	645		
4' x 9' x 29'	d2	58 - #10 AS SHOWN	10'-6	2621	4311	38.7
	f1	29 - #5 @ 1'-0	8'-8	262		
	f2	9 - #5 @ 1'-0	28'-8	269		
	g1	29 - #7 @ 1'-0	8'-8	514		
	g2	11 - #7 @ 0'-10	28'-8	645		
4' x 9' x 30'	d2	58 - #10 AS SHOWN	10'-6	2621	4723	40.0
	f1	30 - #5 @ 1'-0	8'-8	271		
	f2	9 - #5 @ 1'-0	29'-8	278		
	g1	34 - #7 @ 0'-10 1/2	8'-8	602		
	g2	12 - #8 @ 0'-9	29'-8	951		



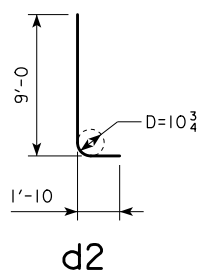
REVISED 05-13 - REVISION FOR LRFD PILE DESIGN.

05-13 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER	
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009
	<b>TEE PIER-HPI0x57 SRL-2 STEEL PILE FOOTINGS</b> 45° SKEW - H=25' TO 40' <b>H40-86-06</b>

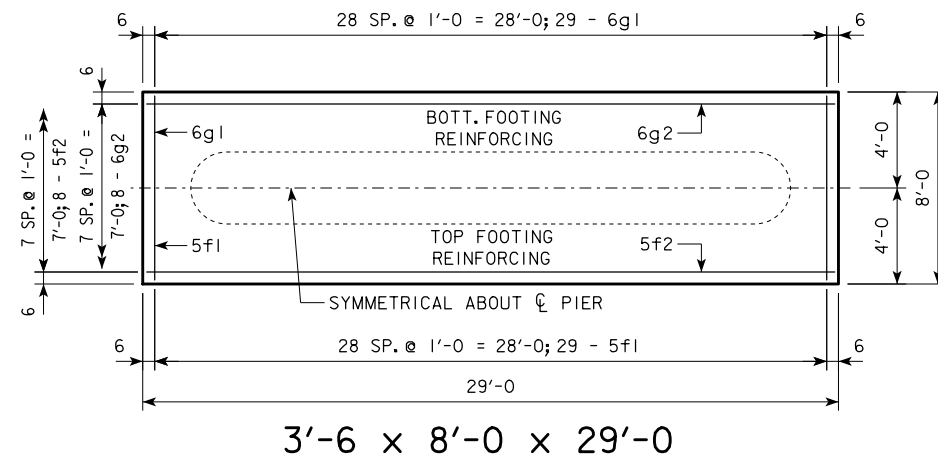


TYPICAL SECTION

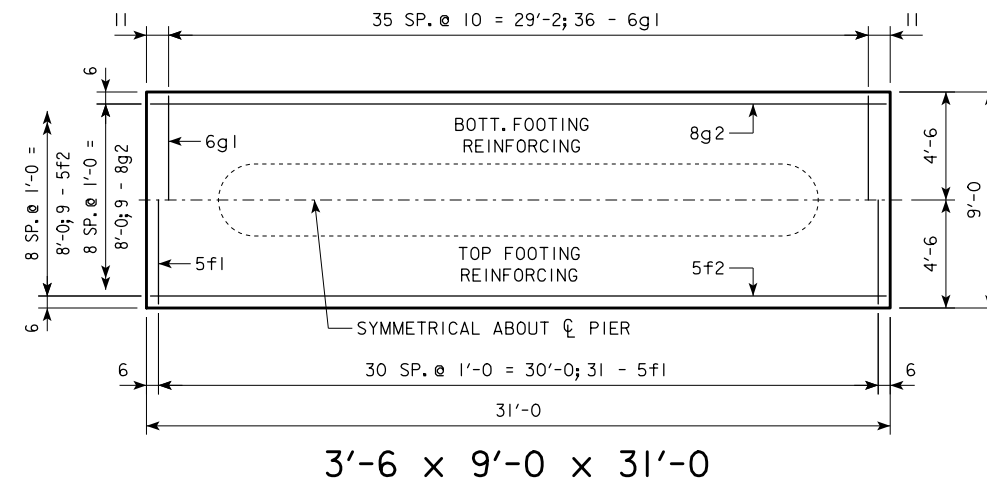
H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
16 TO 18	138'-10	3'-6 x 8' x 29'
	151'-4	
	163'-10	
	176'-4	
	188'-10	
19 TO 21	201'-4	3'-6 x 8' x 31'
	213'-10	
	226'-4	
	243'-0	
	255'-6	
22 TO 24	138'-10	3'-6 x 9' x 31'
	151'-4	
	163'-10	
	176'-4	
	188'-10	
	201'-4	3'-6 x 9' x 33'
	213'-10	
	226'-4	
	243'-0	
	255'-6	



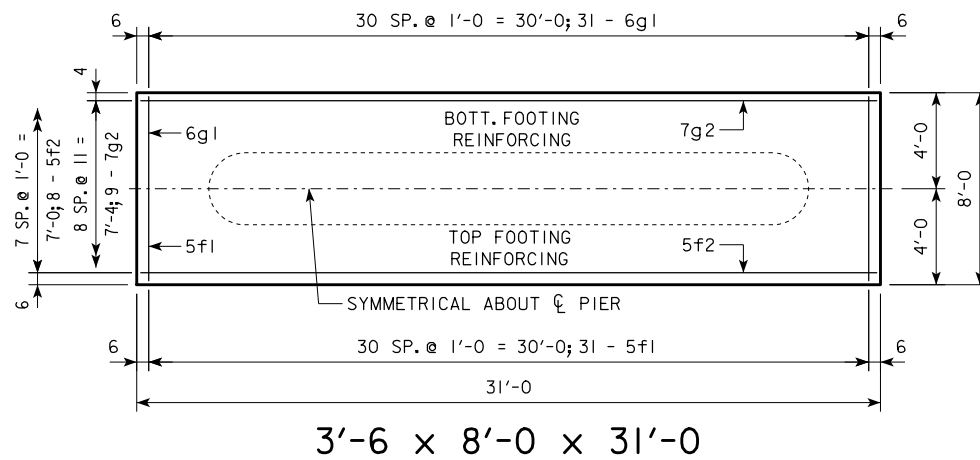
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



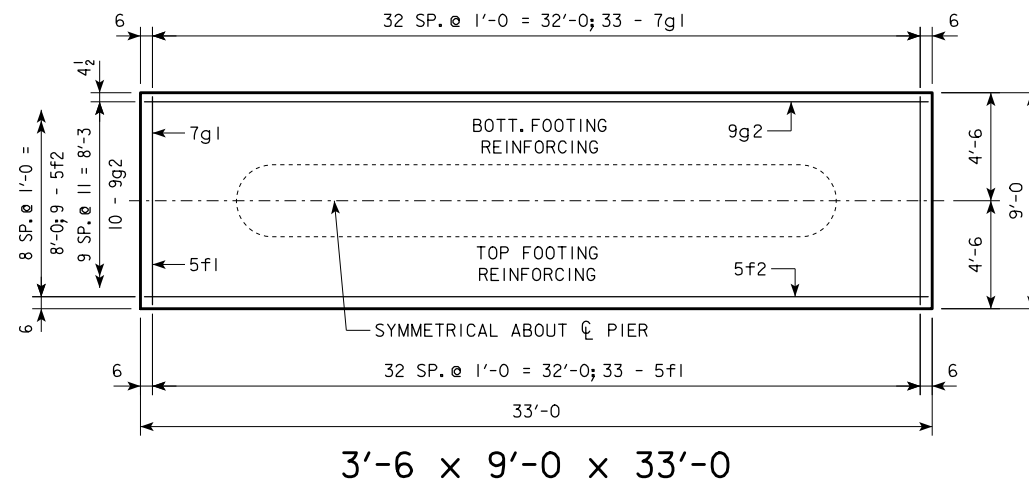
3'-6 x 8'-0 x 29'-0



3'-6 x 9'-0 x 31'-0

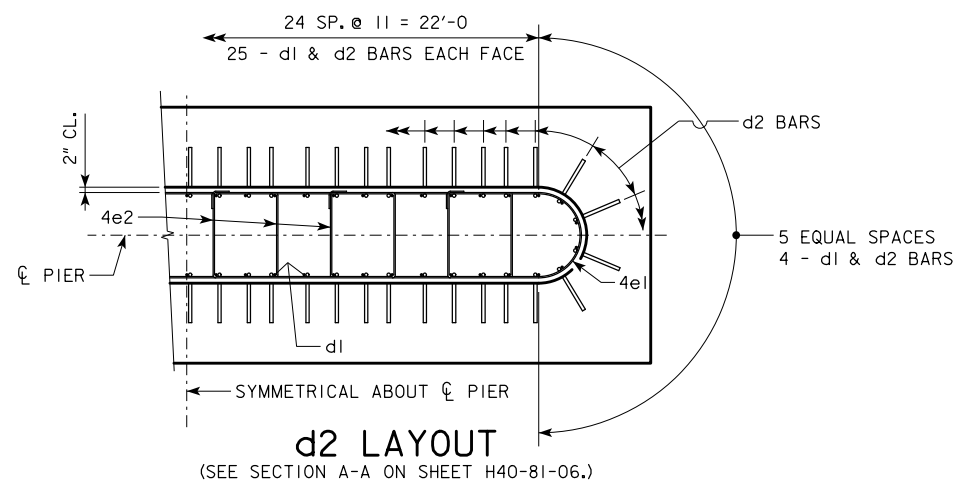


3'-6 x 8'-0 x 31'-0



3'-6 x 9'-0 x 33'-0

FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
3'-6 x 8' x 29'	d2	58 - #10 AS SHOWN	10'-10	2704	3853	30.1
	f1	29 - #5 @ 1'-0	7'-8	232		
	f2	8 - #5 @ 1'-0	28'-8	239		
	g1	29 - #6 @ 1'-0	7'-8	334		
	g2	8 - #6 @ 1'-0	28'-8	344		
3'-6 x 8' x 31'	d2	58 - #10 AS SHOWN	10'-10	2704	4129	32.1
	f1	31 - #5 @ 1'-0	7'-8	248		
	f2	8 - #5 @ 1'-0	30'-8	256		
	g1	31 - #6 @ 1'-0	7'-8	357		
	g2	9 - #7 @ 0'-11	30'-8	564		
3'-6 x 9' x 31'	d2	58 - #10 AS SHOWN	10'-10	2704	4478	36.2
	f1	31 - #5 @ 1'-0	8'-8	280		
	f2	9 - #5 @ 1'-0	30'-8	288		
	g1	36 - #6 @ 0'-10	8'-8	469		
	g2	9 - #8 @ 1'-0	30'-8	737		
3'-6 x 9' x 33'	d2	58 - #10 AS SHOWN	10'-10	2704	5005	38.5
	f1	33 - #5 @ 1'-0	8'-8	298		
	f2	9 - #5 @ 1'-0	32'-8	307		
	g1	33 - #7 @ 1'-0	8'-8	585		
	g2	10 - #9 @ 0'-11	32'-8	1111		



FOOTING NOTES:

THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-81-06.

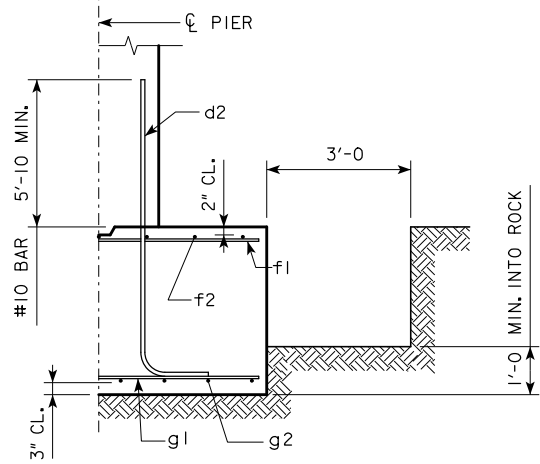
THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

04-12 LATEST REVISION DATE	<i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
		STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
		<b>TEE PIER - SPREAD FOOTINGS</b> 45° SKEW - H=16' TO 24'	<b>H40-87-06</b>

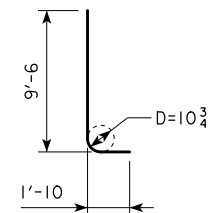
REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0.

REVISED 04-12 - EXCAVATION LIMIT WAS CHANGED TO 3'-0".

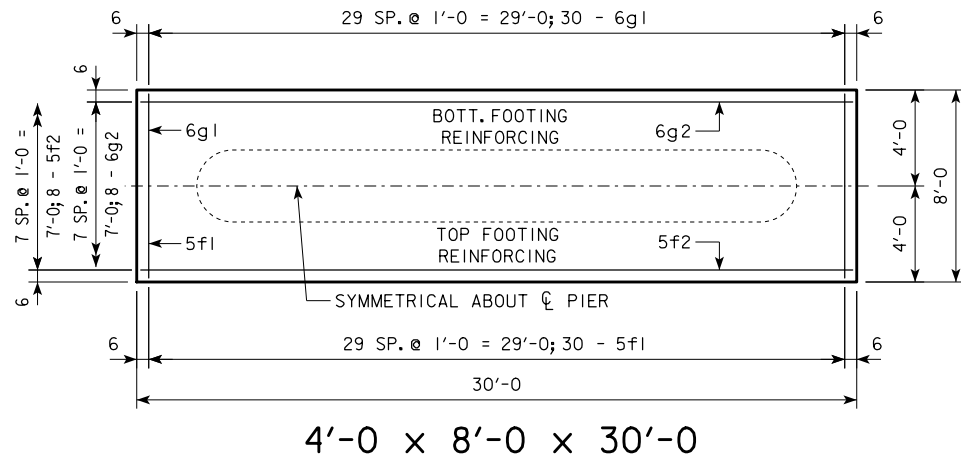
H IN FT.	CL - CL ABUT. BRG.	FOOTING SIZE
25 TO 27	138'-10 151'-4	4' x 8' x 30'
	163'-10 176'-4	4' x 9' x 30'
	188'-10 201'-4	4' x 9' x 32'
	213'-10 226'-4	4' x 10' x 32'
	226'-4 243'-0	4' x 10' x 32'
28 TO 30	138'-10 151'-4	4' x 8' x 30'
	163'-10 176'-4	4' x 9' x 30'
	188'-10 201'-4	4' x 9' x 32'
	213'-10 226'-4	4' x 10' x 32'
	226'-4 243'-0	4' x 10' x 32'
31 TO 33	138'-10 151'-4	4' x 9' x 30'
	163'-10 176'-4	4' x 9' x 30'
	188'-10 201'-4	4' x 9' x 32'
	213'-10 226'-4	4' x 10' x 32'
	226'-4 243'-0	4' x 10' x 32'
34 TO 36	138'-10 151'-4	4' x 9' x 30'
	163'-10 176'-4	4' x 9' x 32'
	188'-10 201'-4	4' x 9' x 32'
	213'-10 226'-4	4' x 10' x 32'
	226'-4 243'-0	4' x 10' x 34'
37 TO 40	138'-10 151'-4	4' x 9' x 30'
	163'-10 176'-4	4' x 9' x 32'
	188'-10 201'-4	4' x 10' x 32'
	213'-10 226'-4	4' x 10' x 32'
	226'-4 243'-0	4' x 10' x 34'



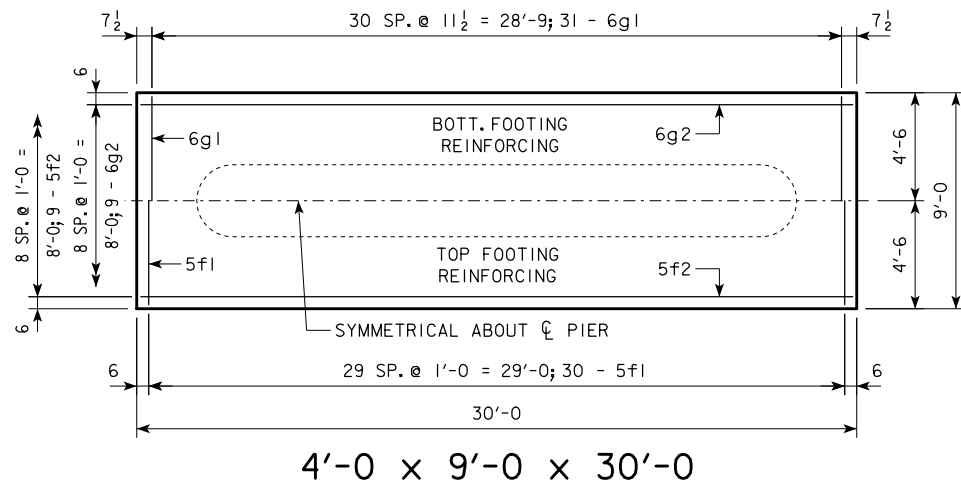
TYPICAL SECTION



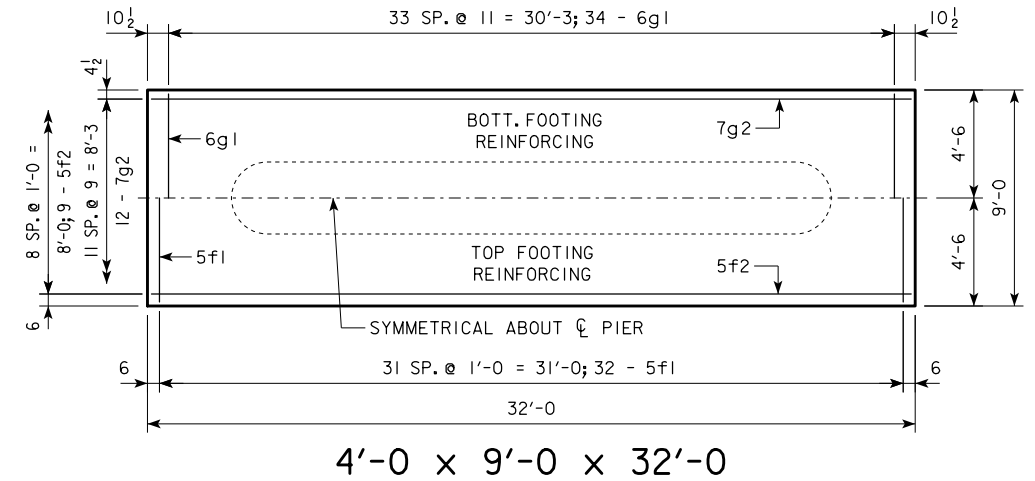
NOTE: D = PIN DIAMETER. DIMENSIONS ARE OUT TO OUT.



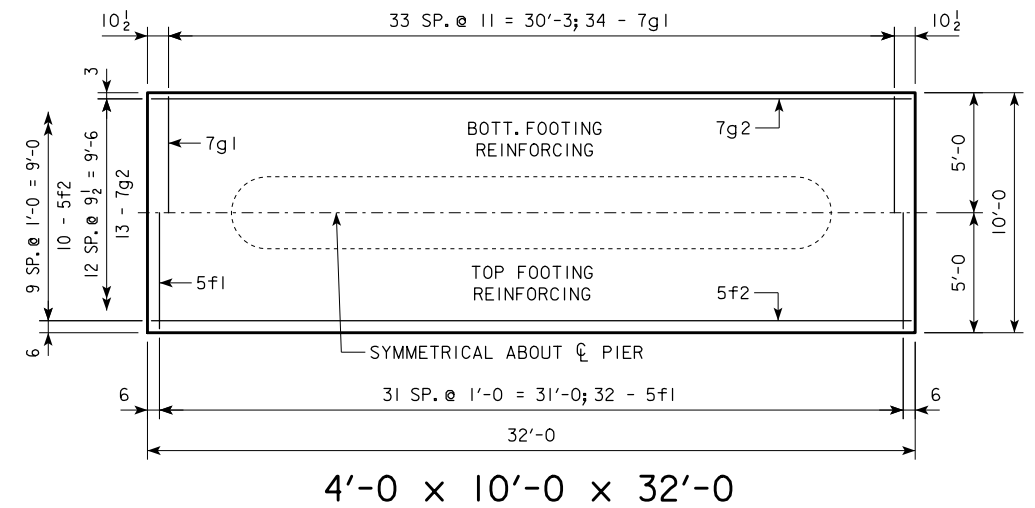
4'-0 x 8'-0 x 30'-0



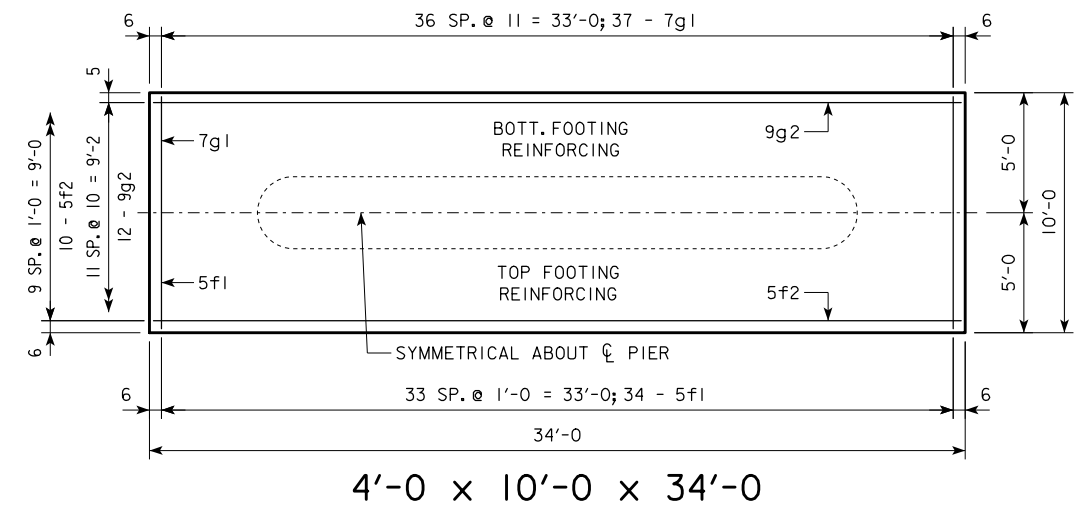
4'-0 x 9'-0 x 30'-0



4'-0 x 9'-0 x 32'-0



4'-0 x 10'-0 x 32'-0

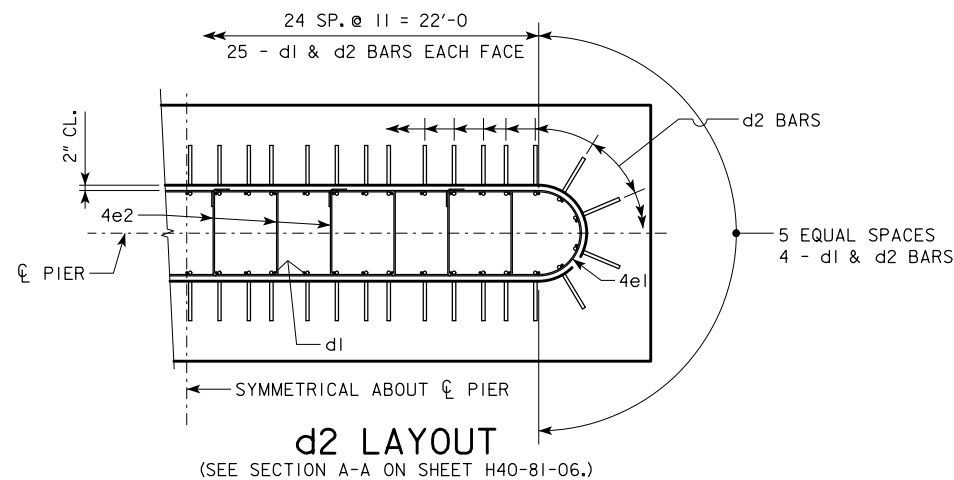


4'-0 x 10'-0 x 34'-0

**FOOTING NOTES:**

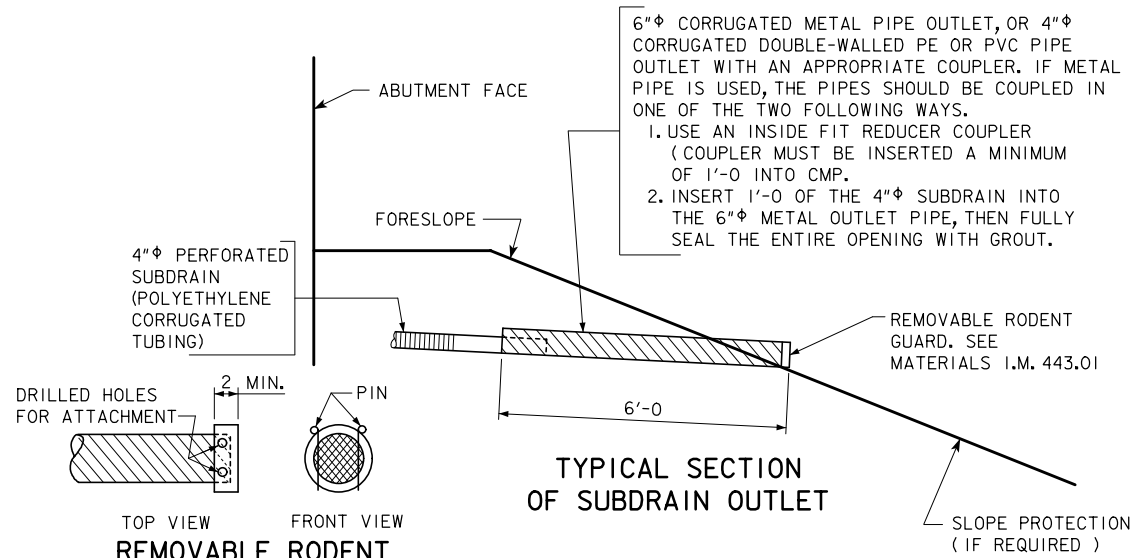
THESE SPREAD FOOTINGS ARE DESIGNED AND DETAILED TO BE USED WITH THE CAP AND COLUMN DETAILS OF THE TEE PIERS AS SHOWN ON SHEET H40-81-06.

THESE SPREAD FOOTINGS SHALL EXTEND AT LEAST 12 INCHES INTO SUITABLE FOUNDATION ROCK AND THE LAST 12 INCHES OF ROCK EXCAVATION SHALL BE TO NEAT LINES OF MASONRY. THE FOUNDATION ROCK SHALL HAVE A MINIMUM LRFD NOMINAL BEARING RESISTANCE OF 30 KIPS PER SQUARE FOOT (ALLOWABLE SERVICE LOAD BEARING VALUE OF AT LEAST 10 KIPS PER SQUARE FOOT).

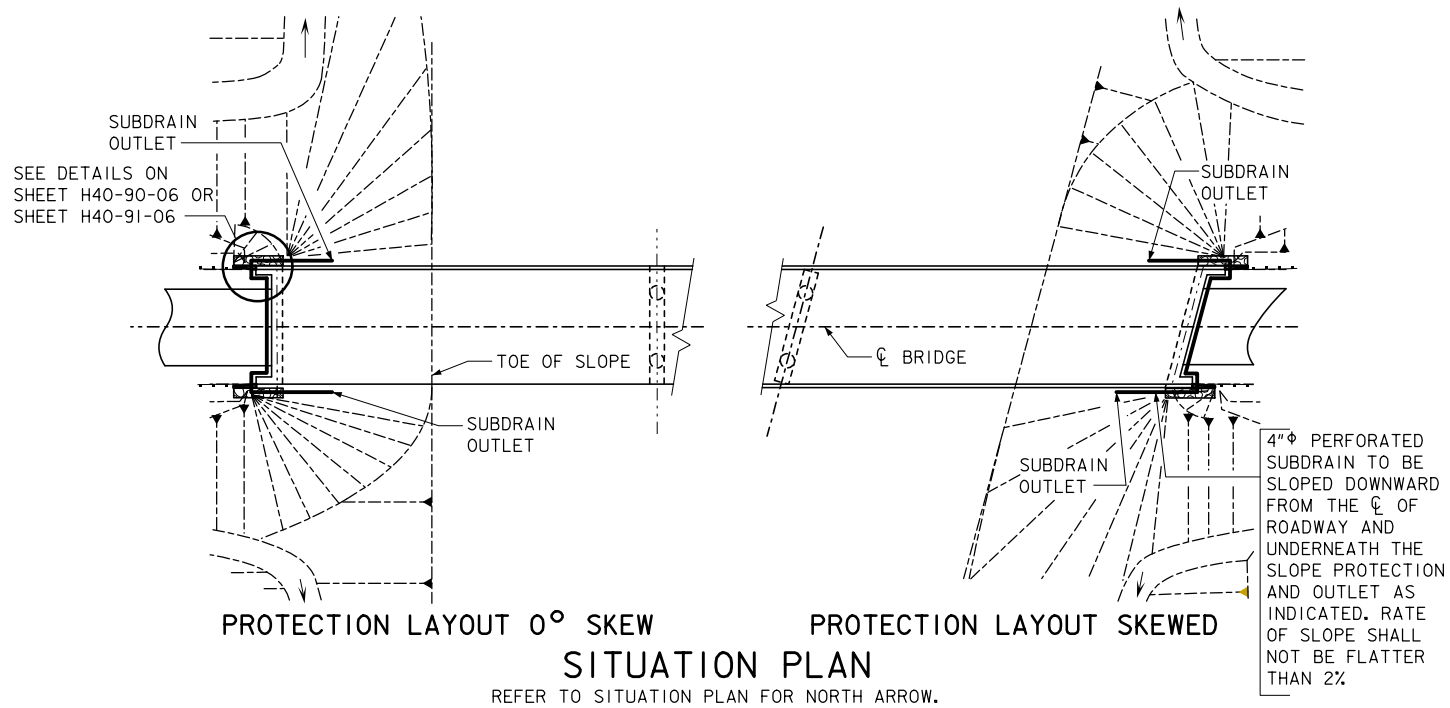


FOOTING SIZE	REINFORCING STEEL (ONE FOOTING)				TOTAL WEIGHT (LB.)	STRUCTURAL CONCRETE (CY)
	BAR	NO., SIZE & SPACING	LENGTH	WEIGHT (LB.)		
4' x 8' x 30'	d2	58 - #10 AS SHOWN	11'-4	2828	4017	35.6
	f1	30 - #5 @ 1'-0	7'-8	240		
	f2	8 - #5 @ 1'-0	29'-8	248		
	g1	30 - #6 @ 1'-0	7'-8	345		
	g2	8 - #6 @ 1'-0	29'-8	356		
4' x 9' x 30'	d2	58 - #10 AS SHOWN	11'-4	2828	4182	40.0
	f1	30 - #5 @ 1'-0	8'-8	271		
	f2	9 - #5 @ 1'-0	29'-8	278		
	g1	31 - #6 @ 0'-11 1/2	8'-8	404		
	g2	9 - #6 @ 1'-0	29'-8	401		
4' x 9' x 32'	d2	58 - #10 AS SHOWN	11'-4	2828	4634	42.7
	f1	32 - #5 @ 1'-0	8'-8	289		
	f2	9 - #5 @ 1'-0	31'-8	297		
	g1	34 - #6 @ 0'-11	8'-8	443		
	g2	12 - #7 @ 0'-9	31'-8	777		
4' x 10' x 32'	d2	58 - #10 AS SHOWN	11'-4	2828	4994	47.4
	f1	32 - #5 @ 1'-0	9'-8	323		
	f2	10 - #5 @ 1'-0	31'-8	330		
	g1	34 - #7 @ 0'-11	9'-8	672		
	g2	13 - #7 @ 0'-9 1/2	31'-8	841		
4' x 10' x 34'	d2	58 - #10 AS SHOWN	11'-4	2828	5627	50.4
	f1	34 - #5 @ 1'-0	9'-8	343		
	f2	10 - #5 @ 1'-0	33'-8	351		
	g1	37 - #7 @ 0'-11	9'-8	731		
	g2	12 - #9 @ 0'-10	33'-8	1374		

04-12 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>TEE PIER - SPREAD FOOTINGS</b> 45° SKEW - H=25' TO 40'	<b>H40-88-06</b>



OUTLET DETAILS

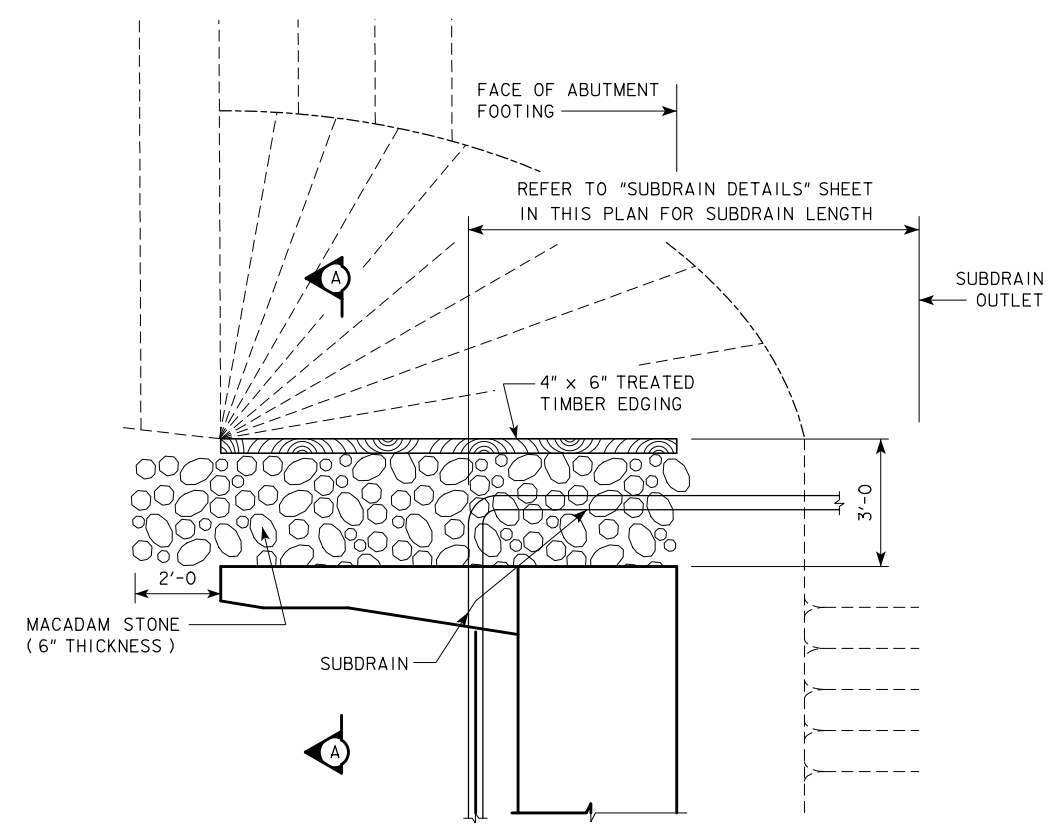


NOTE:  
SEE ABUTMENT BACKFILL DETAILS SHEET FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE.

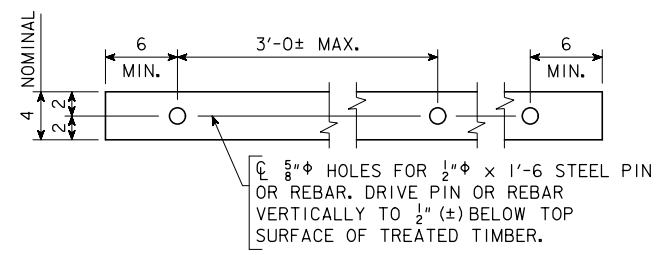
10-09 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	SUBDRAIN DETAILS	H40-89-06

REVISED 10-09 - REMOVED THE GRANULAR BACKFILL DETAIL.

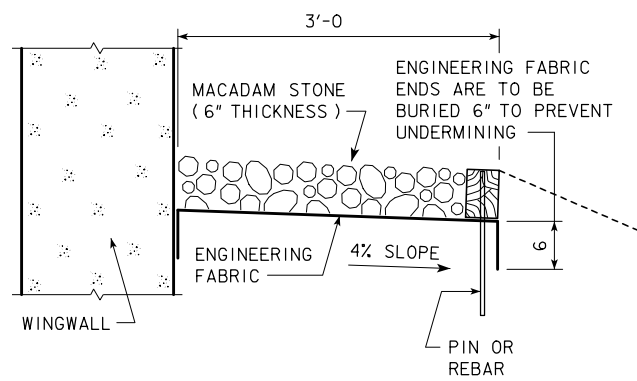
REVISED 09-14 - CHANGED THE AREA OF THE MACADAM STONE AREA TO 2'-0" IN FRONT OF THE BRIDGE WING.



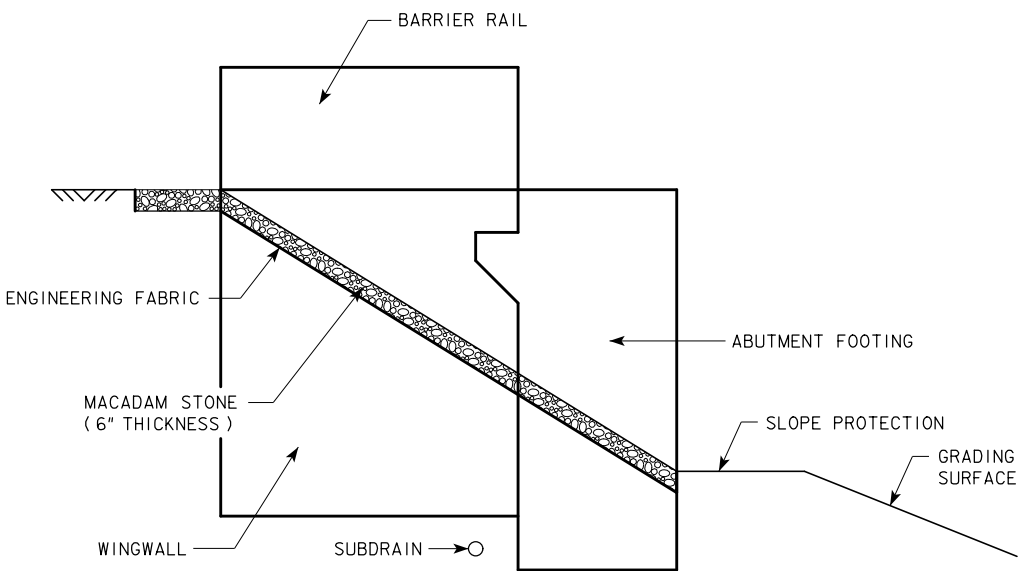
TOP VIEW OF WING ARMORING



4" x 6" TREATED TIMBER EDGING DETAILS



SECTION A-A



PROFILE VIEW OF WING ARMORING  
(SHOWN FOR INTEGRAL ABUTMENT)

**SUBDRAIN NOTES:**

SEE H40-89-06 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 BE IN ACCORDANCE WITH ARTICLE 4143.01, B, OF THE STANDARD SPECIFICATIONS. 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 AND BE IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS.

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 BE IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS. 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 BE IN ACCORDANCE WITH ARTICLE 4122.02, OF THE STANDARD SPECIFICATIONS FOR COARSE MATERIAL (NO CHOKE STONE IS ALLOWED).

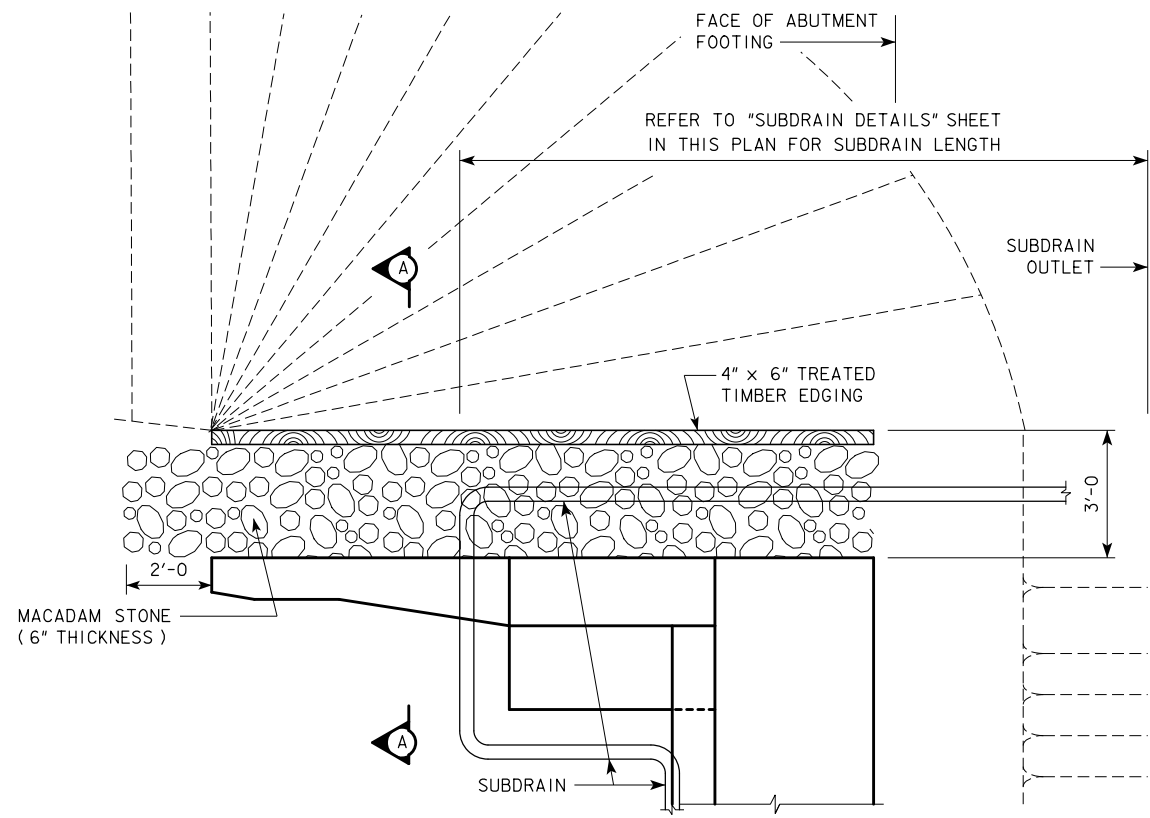
WOOD PRESERVATIVE TREATMENT FOR THE TIMBER EDGING SHALL MEET THE REQUIREMENTS FOR GUARDRAIL POSTS, SAWED FOUR SIDES, AND BE IN ACCORDANCE WITH SECTION 4161, OF THE STANDARD SPECIFICATIONS.

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.

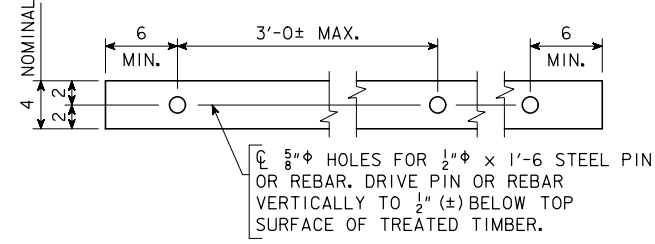
PAYMENT FOR THE BRIDGE WING ARMORING SHALL BE INCIDENTAL TO THE BID ITEM "STRUCTURAL CONCRETE (BRIDGE)" AND SHALL INCLUDE COSTS OF ALL MATERIAL AND LABOR TO CONSTRUCT THE WING ARMORING AS SHOWN ON THESE PLANS.

09-14 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>WING ARMORING DETAILS</b> A & B BEAMS	<b>H40-90-06</b>

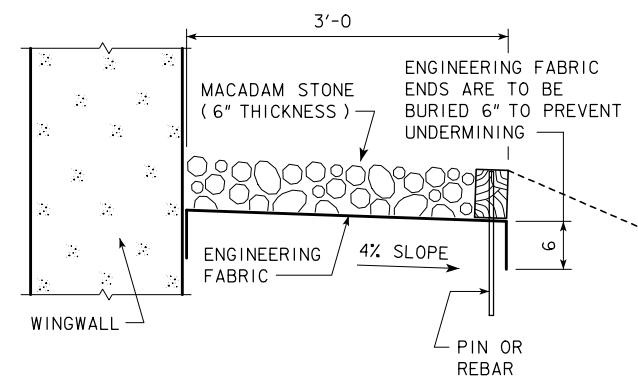
REVISED 09-14 - CHANGED THE AREA OF THE MACADAM STONE AREA TO 2'-0" IN FRONT OF THE BRIDGE WING.



TOP VIEW OF WING ARMORING WITH WING EXTENSION



4" x 6" TREATED TIMBER EDGING DETAILS



SECTION A-A

**SUBDRAIN NOTES:**

SEE H40-89-06 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 BE IN ACCORDANCE WITH ARTICLE 4143.01, B, OF THE STANDARD SPECIFICATIONS. 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 AND BE IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS.

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.

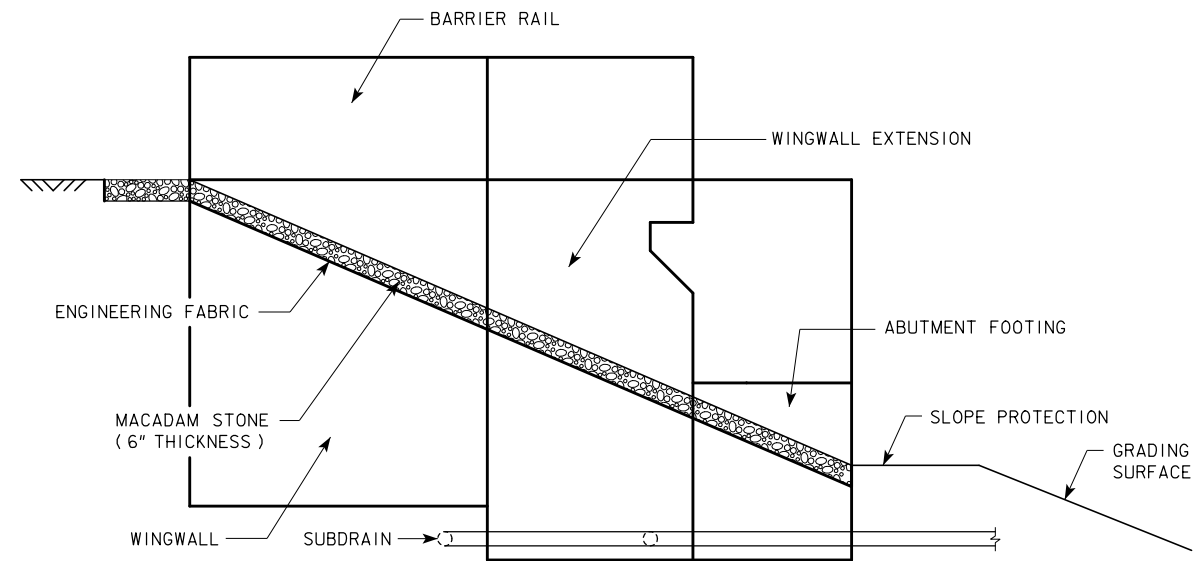
THE ENGINEERING FABRIC SHALL BE IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS. IF THE ENGINEERING FABRIC IS LAPPED THE LAPS SHALL BE A MINIMUM OF ONE FOOT IN LENGTH, SHINGLE FASHION WITH UP SLOPE LAP PIECE ON TOP AND STAPLED FOR CONTINUITY.

THE MACADAM STONE SHALL BE IN ACCORDANCE WITH ARTICLE 4122.02, OF THE STANDARD SPECIFICATIONS FOR COARSE MATERIAL (NO CHOKE STONE IS ALLOWED).

WOOD PRESERVATIVE TREATMENT FOR THE TIMBER EDGING SHALL MEET THE REQUIREMENTS FOR GUARDRAIL POSTS, SAWED FOUR SIDES, AND BE IN ACCORDANCE WITH SECTION 4161, OF THE STANDARD SPECIFICATIONS.

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.

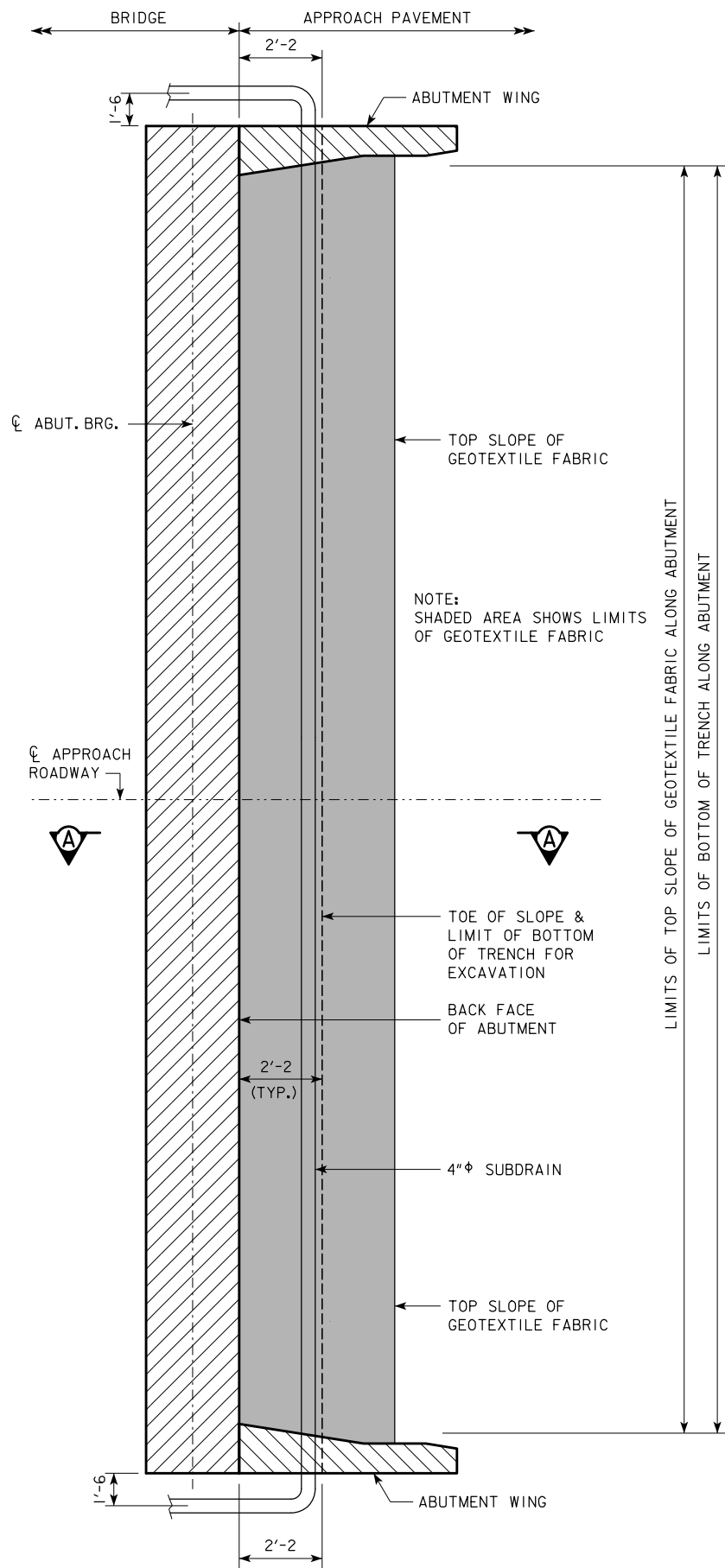
PAYMENT FOR THE BRIDGE WING ARMORING SHALL BE INCIDENTAL TO THE BID ITEM "STRUCTURAL CONCRETE (BRIDGE)" AND SHALL INCLUDE COSTS OF ALL MATERIAL AND LABOR TO CONSTRUCT THE WING ARMORING AS SHOWN ON THESE PLANS.



PROFILE VIEW OF WING ARMORING WITH WING EXTENSION  
(SHOWN FOR INTEGRAL ABUTMENT WITH WING EXTENSIONS)

09-14 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
	STANDARD DESIGN - 40' ROADWAY, THREE SPAN BRIDGE <b>PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES</b> AUGUST, 2009	
	<b>WING ARMORING DETAILS</b> C BEAMS	<b>H40-91-06</b>

REVISED 09-14 - THE TECHNICAL DATA INFORMATION TABLE WAS REMOVED AND A NOTE ADDED TO REFER TO THE STANDARDS SPECIFICATIONS FOR THIS INFORMATION.



**ABUTMENT PLAN WITHOUT WING EXTENSIONS**

**ABUTMENT BACKFILL PROCESS:**

THE BASE OF THE EXCAVATION SUBGRADE BEHIND THE ABUTMENT IS TO BE GRADED WITH A 4% SLOPE AWAY FROM THE ABUTMENT FOOTING AND A 2% CROSS SLOPE IN THE DIRECTION OF THE SUBDRAIN OUTLET. THIS EXCAVATION SHAPING IS TO BE DONE PRIOR TO BEGINNING INSTALLATION OF THE GEOTEXTILE AND BACKFILL MATERIAL.

AFTER THE SUBGRADE HAS BEEN SHAPED, THE GEOTEXTILE FABRIC SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS SHOWN. THE FABRIC IS INTENDED TO BE INSTALLED IN THE BASE OF THE EXCAVATION AND EXTENDED VERTICALLY UP THE ABUTMENT BACKWALL, ABUTMENT WING WALLS, AND EXCAVATION FACE TO A HEIGHT THAT WILL BE APPROXIMATELY 1 TO 2 FOOT HIGHER THAN THE HEIGHT OF THE POROUS BACKFILL PLACEMENT AS SHOWN IN THE "BACKFILL DETAILS" ON THIS SHEET. THE STRIPS OF THE FABRIC PLACED SHALL OVERLAP APPROXIMATELY 1 FOOT AND SHALL BE PINNED IN PLACE. THE FABRIC SHALL BE ATTACHED TO THE ABUTMENT BY USING LATH FOLDED IN THE FABRIC AND SECURED TO THE CONCRETE WITH SHALLOW CONCRETE NAILS. THE FABRIC PLACED AGAINST THE EXCAVATION FACE SHALL BE PINNED.

WHEN THE FABRIC IS IN PLACE, THE SUBDRAIN SHALL BE INSTALLED DIRECTLY ON THE FABRIC AT THE TOE OF THE REAR EXCAVATION SLOPE. A SLOT WILL NEED TO BE CUT IN THE FABRIC AT THE POINT WHERE THE SUBDRAIN EXITS THE FABRIC NEAR THE END OF THE ABUTMENT WING WALL.

POROUS BACKFILL IS THEN PLACED AND LEVELED, NO COMPACTION IS REQUIRED.

THE REMAINING WORK INVOLVES BACKFILLING WITH FLOODABLE BACKFILL, SURFACE FLOODING, AND VIBRATORY COMPACTION. THE FLOODABLE BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. THE FLOODABLE BACKFILL SHALL BE PLACED IN INDIVIDUAL LIFTS, SURFACE FLOODED, AND COMPACTED WITH VIBRATORY COMPACTION TO ENSURE FULL CONSOLIDATION. LIMIT THE LOOSE LIFTS TO NO MORE THAN 2 FEET OF THICKNESS.

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FLOODABLE BACKFILL LIFT PLACEMENT, FLOODING, AND COMPACTION SHALL PROGRESS UNTIL THE REQUIRED FULL THICKNESS OF THE ABUTMENT BACKFILL HAS BEEN COMPLETED.

WATER REQUIRED FOR FLOODING, SUBDRAINS, POROUS BACKFILL, FLOODABLE BACKFILL, AND GEOTEXTILE FABRIC FURNISHED AT THE BRIDGE ABUTMENTS WILL NOT BE MEASURED SEPARATELY FOR PAYMENT.

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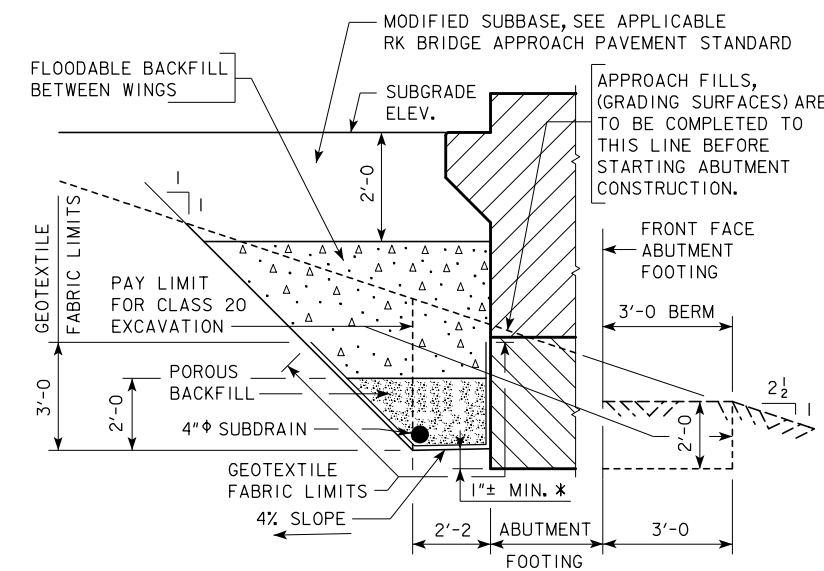
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**NOTE:**

SUBDRAIN SHALL SLOPE DOWNWARD 2% FROM CL APPROACH ROADWAY WHEN OUTLETTING BOTH SIDES OF THE ABUTMENT.

SUBDRAIN SHALL SLOPE DOWNWARD 2% FROM HIGH END WHEN OUTLETTING AT ONE END OF THE ABUTMENT.

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**SECTION A-A  
BACKFILL DETAILS**

NOTE: GEOTEXTILE FABRIC WILL BE ATTACHED TO FACE OF ABUTMENT FOOTING AND WINGS.

\* DIMENSION VARIES DUE TO 2% SUBDRAIN SLOPE.

09-14 LATEST REVISION DATE  <i>Norman L. Mc Donald</i> APPROVED BY BRIDGE ENGINEER		
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	<b>ABUTMENT BACKFILL DETAILS</b> A & B BEAMS - 0° SKEW	<b>H40-92-06</b>

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"W" DIMENSION	
SKEW	DIMENSION
15°	2'-2 <sup>7</sup> / <sub>8</sub>
30°	2'-6
45°	3'-0 <sup>3</sup> / <sub>4</sub>

### ABUTMENT BACKFILL PROCESS:

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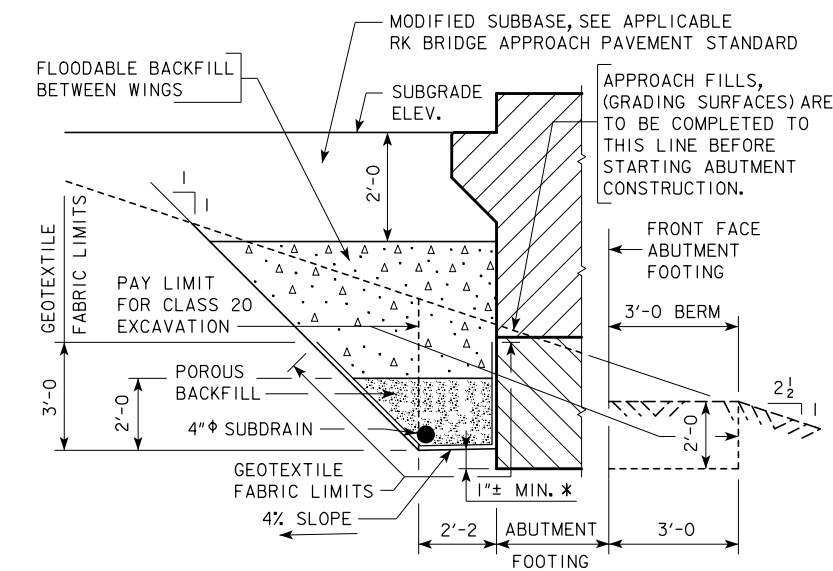
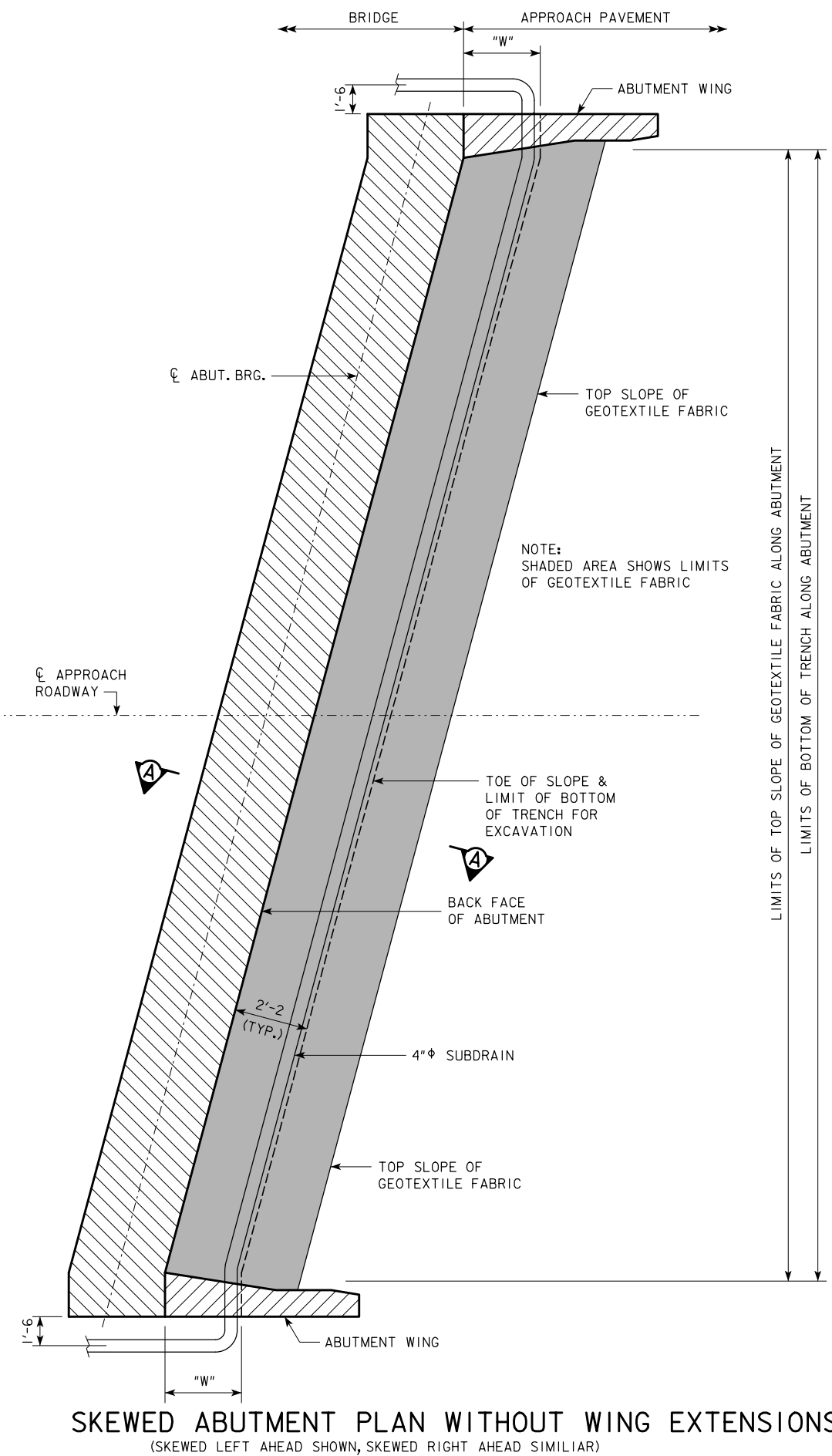
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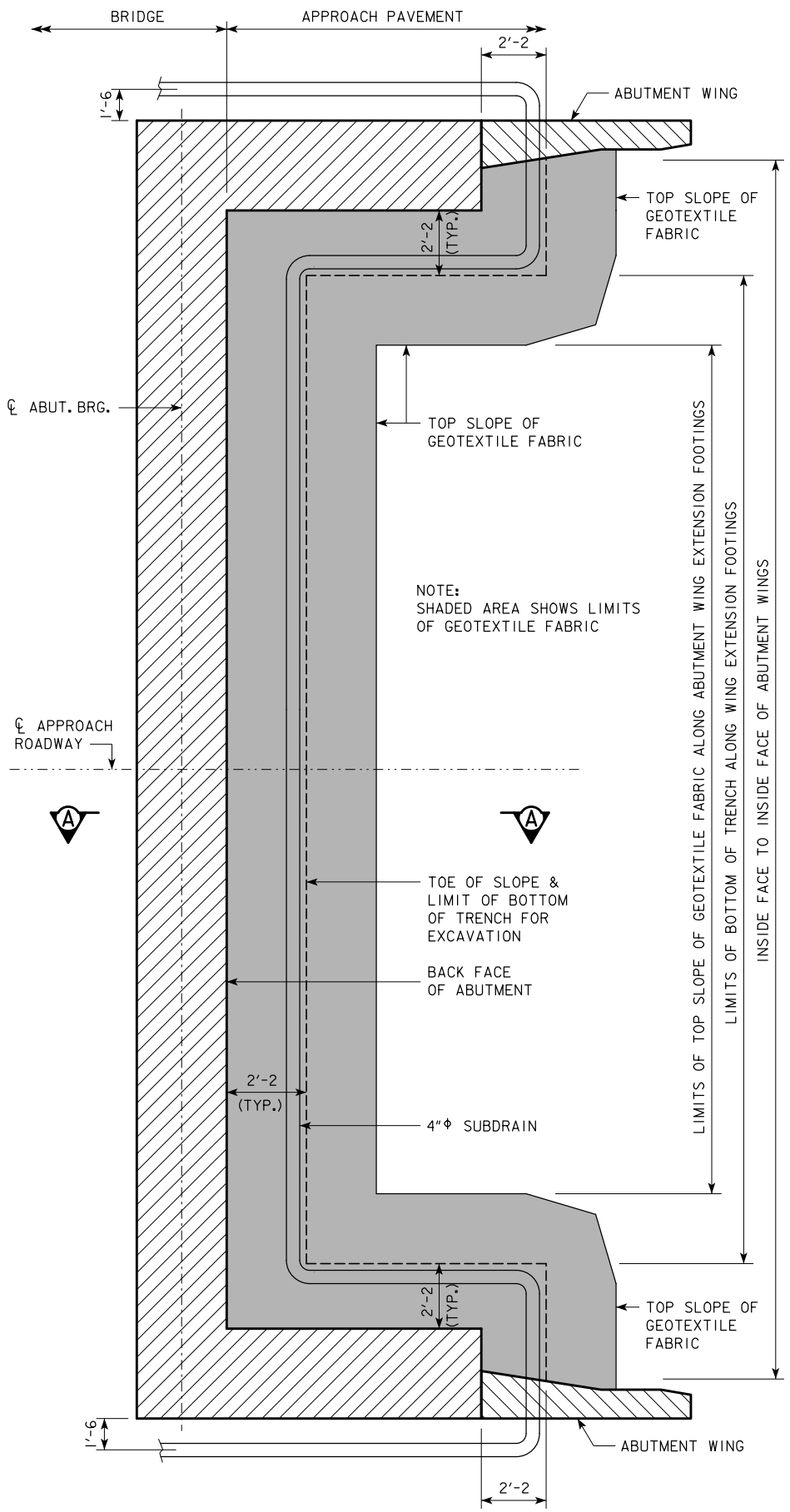
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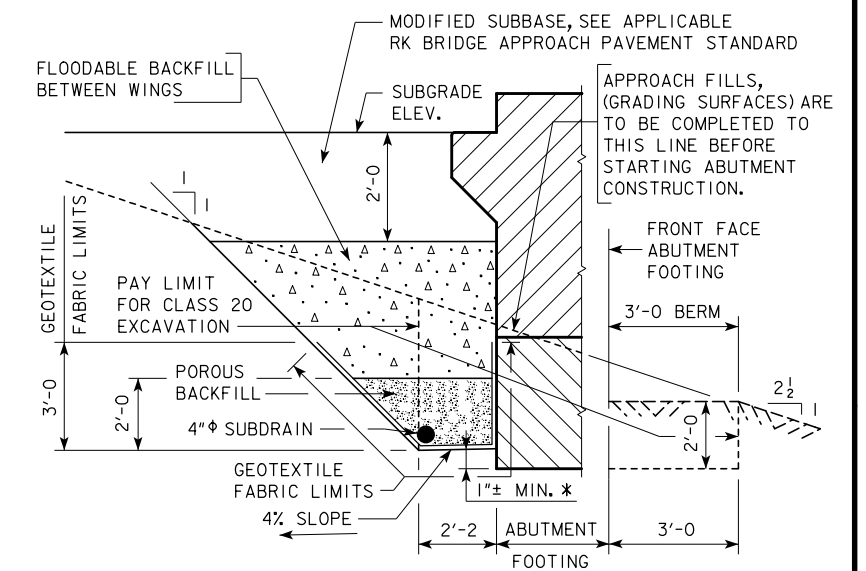
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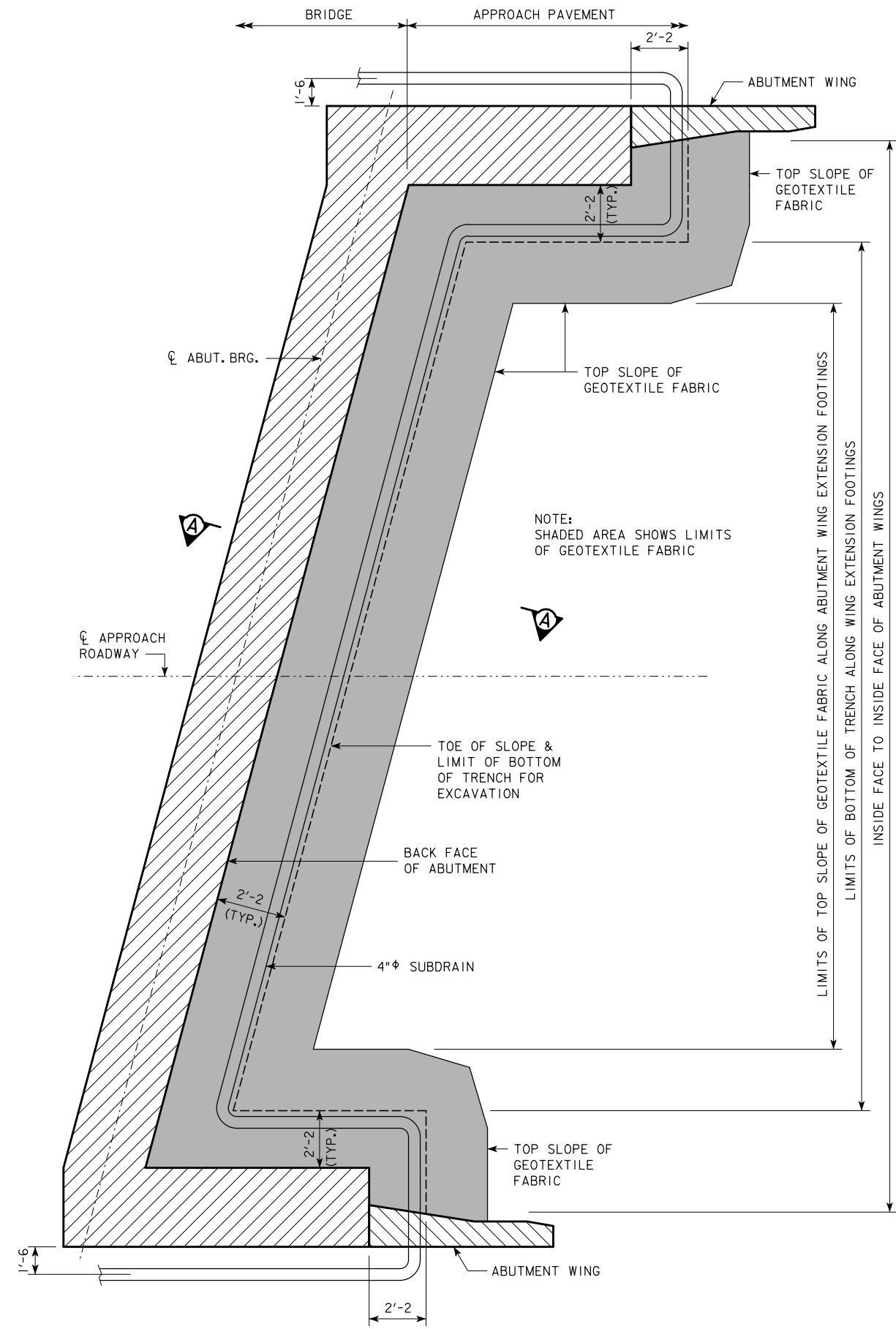
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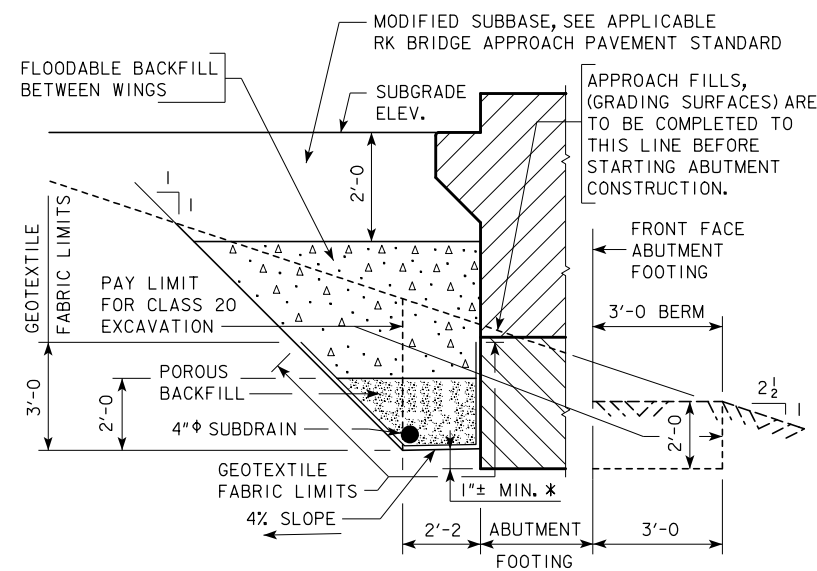
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**SKewed Abutment Plan with Wing Extensions**  
(SKewed Left Ahead Shown, Skewed Right Ahead Similar)

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