EXAMPLES OF BRIDGE SEAT AND STEP CALCULATIONS:

THE DESIGNER SHALL SHOW ON THE PLANS THE 7 ELEVATIONS AND THE 6 STEP DIMENSIONS REQUIRED FOR EACH OF THE PIER TOP AND ABUTMENT BRIDGE SEATS.

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

EXAMPLE NO. 1

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

STATIONS

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

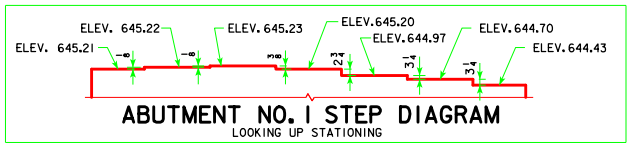
ELEVATIONS ALONG PROFILE GRADE LINE (P.G.L. ELEV.)

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

ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING
(BEAM SPACING)(TAN. SK.△)(GRADE) = (6.84)TAN 30°(0.0325) = 0.13'

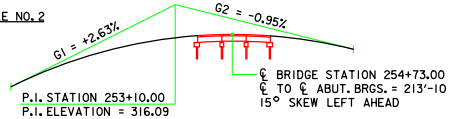
ABUTMENT NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	CENTER	INTERIOR	INTERIOR	EXTERIOR
PGL ELEV.	649.94	649.94	649.94	649.94	649.94	649.94	649.94
SK. △CORRECT	+0.39	+0.26	+0.13	0.00	-0.13	-0.26	-0.39
SLAB CROWN	-0.38	-0.24	-0.10	0.00	-0.10	-0.24	-0.38
TOP SLAB ELEV.	649.95	649.96	649.97	649.94	649.71	649.44	649.17
-"U" (4'-8½)	-4.74	-4.74	-4.74	-4.74	-4.74	-4.74	-4.74
BR. SEAT ELEV.	645.21	645.22	645.23	645.20	644.97	644.70	644.43



ABUTMENT NO. 1 STEP DIAGRAM
LOOKING UP STATIONING

EXAMPLE NO. 2



FROM SHEET H44-04-14 { LENGTH OF VERTICAL CURVE = (20000)(0.0358) = 716 FEET
M.O. = (0.0358)(716)(1/8) = 3.204 FEET

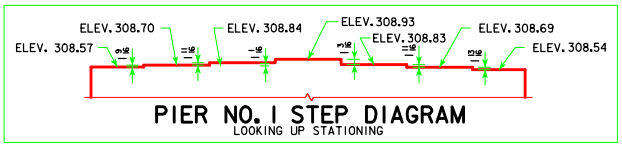
STATIONS

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

ELEVATIONS TOP OF SLAB FACING ALONG THE STATIONING
(BEAM SPACING)(TAN. SK. △) = (6.84')TAN 15° = 1.83'

PIER NO. 1

BEAMS	EXTERIOR	INTERIOR	INTERIOR	CENTER	INTERIOR	INTERIOR	EXTERIOR
STATION	254+39.82	254+37.99	254+36.16	254+34.33	254+32.50	254+30.67	254+28.84
PGL ELEV.	+313.56	+313.55	+313.55	313.54	313.54	313.54	313.53
SLAB CROWN	-0.38	-0.24	-0.10	0.00	-0.10	-0.24	-0.38
TOP SLAB ELEV.	313.18	313.31	313.45	313.54	313.44	313.30	313.15
-"U" (4'-7⅝)	-4.61	-4.61	-4.61	-4.61	-4.61	-4.61	-4.61
BR. SEAT ELEV.	308.57	308.70	308.84	308.93	308.83	308.69	308.54



PIER NO. 1 STEP DIAGRAM
LOOKING UP STATIONING

TEE PIER NOTES:

THE TEE PIERS SHOWN IN THESE PLANS ARE DESIGNED FOR USE WITH THE H44-14 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE STANDARDS. THE PIER MAY BE USED FOR EITHER GRADE SEPARATION OR STREAM CROSSING STRUCTURES. THE PIERS WERE DESIGNED FOR THE FOLLOWING STREAM FORCE AND ICE LOADING CONDITIONS, AND SHOULD NOT BE USED WHERE THESE LOADING CONDITIONS ARE EXCEEDED.

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

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

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

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

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

HP10x57 STEEL PILE SHALL BE USED IN THE PILE FOOTINGS OF THE PIERS FOR EITHER FRICTION OR POINT BEARING PILE CONDITIONS. FRICTION BEARING INCLUDES SIDE FRICTION AND END BEARING IN SOIL. POINT BEARING INCLUDES SIDE FRICTION AND POINT BEARING IN ROCK. NOMINAL STRUCTURAL RESISTANCE WAS TAKEN AS 243 KIPS FOR HP10x57 SRL-1 FRICTION BEARING PILES AND 365 KIPS FOR HP10x57 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 SURFACE ROCK LAYERS.

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

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

IOWADOT Highway Division

STANDARD DESIGN - 44' ROADWAY, THREE SPAN BRIDGE

PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGES

SEPTEMBER, 2014

GENERAL INFORMATION

H44-02-14