

REVISED 02-2017 - UPDATED SPECIFICATIONS DESIGN-AASHTO LRFD (WAS 4TH ED., SERIES OF 2007 UP TO 2008 INTERIM) CONSTRUCTION SERIES 2012, UPDATED DESIGN STRESSES-AASHTO LRFD (WAS 4TH ED., SERIES OF 2007 UP TO 2008 INTERIM) REMOVED REFERENCE TO BRIDGE DESIGN MANUAL CADD NOTE E177 - REMOVED REFERENCE TO "PIERS" IN STEEL "H" PILE NOTES. ADDED WEATHERING STEEL NOTE STATING BEAM FABRICATED FOR DEAD LOAD FIT.

GENERAL NOTES:

THE RS40-14 BRIDGE STANDARDS, IF PROPERLY USED, PROVIDE THE STRUCTURAL PLANS NECESSARY TO CONSTRUCT CONTINUOUS 40'-0" ROADWAY STEEL ROLLED BEAM BRIDGES WITH LENGTHS OF 160'-0", 180'-0", 200'-0", 220'-0", 240'-0", 260'-0", 280'-0", 300'-0", 320'-0" AND 340'-0".

ALL BRIDGES MAY BE BUILT ON A 0°, 10°, 20°, 30° OR 45° SKEW. WHERE A SINGLE SKEW IS SHOWN, IT IS USUALLY SHOWN AS RIGHT AHEAD. UNLESS NOTED OTHERWISE, ALL DIMENSIONS AND DETAILS SHOWN FOR A GIVEN SKEW APPLY TO THE OPPOSITE SKEW.

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

- (1) STEEL H PILES SHALL BE USED AT THE ABUTMENTS. H PILES MAY BE DRIVEN AS FRICTION OR POINT BEARING PILES.
- (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 12 FEET FROM THE BOTTOM OF FOOTING.
- (3) THE ABUTMENT PILING FOR ALL BRIDGES ARE TO BE DRIVEN THROUGH OVERSIZE HOLES PREBORED TO A MINIMUM OF 10 FEET BELOW THE BOTTOM OF FOOTING. THE PREBORED HOLES SHALL BE IN ACCORDANCE WITH SECTION 2501.03, Q OF THE STANDARD SPECIFICATIONS. THE ELEVATION OF THE BOTTOM OF THE PREBORED HOLE SHALL BE SHOWN ON THE PLANS.

CLASS 20 EXCAVATION WILL BE REQUIRED TO CONSTRUCT THE INTEGRAL ABUTMENTS AND CLASS 20 & 21 EXCAVATION WILL BE REQUIRED TO CONSTRUCT TEE PIERS. THE QUANTITIES FOR CLASS 20 AND 21 ARE NOT INCLUDED ON THESE SHEETS, BUT SHALL BE CALCULATED AND INCLUDED IN THE FINAL PLANS.

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

ABUTMENT STEP HEIGHTS DEPEND ON PROFILE GRADE FOR BRIDGES AND SHALL BE SET BY FINAL DESIGNER.

FOR THE NON-SYMMETRICAL CROSS-SECTION OPTION THE DESIGNER SHALL PROVIDE A STAKING DIAGRAM.

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.

3" WING PVC PIPE IS INCIDENTAL TO STRUCTURAL CONCRETE.

THE INTEGRAL ABUTMENTS, PILE BENTS, AND TEE PIERS FOR THESE RS40 STANDARDS HAVE BEEN DESIGNED FOR THE USE OF VARIOUS TYPES OF PILE FOOTINGS OR SPREAD FOOTINGS AS FOLLOWS.

- INTEGRAL ABUTMENTS: HP10x57 PILES REFER TO 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 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 USING NON-COATED, EPOXY COATED AND STAINLESS STEEL REINFORCING BARS. THE DESIGNER SHOULD NOTE WHERE THESE DIFFERENT TYPES OF BARS ARE USED THROUGHOUT THESE STANDARDS.

STRUCTURAL STEEL NOTES:

THE DESIGN OF THE STRUCTURAL STEEL MEMBERS HAS BEEN BASED ON THE FOLLOWING:

- (1) DESIGN VEHICLE: HL-93.
- (2) DEAD LOAD $2\frac{1}{2}$ 20 PSF FUTURE WEARING SURFACE AND BARRIER RAILS EQUALLY DISTRIBUTED TO ALL BEAMS.
- (3) PRIMARY MEMBER FLEXURAL CAPACITY IS BASED UPON ELASTIC SECTION PROPERTIES (S), NOT PLASTIC SECTION PROPERTIES (Z).
- (4) LIVE LOAD DEFLECTION LIMIT: L/800.
- (5) LIVE LOAD DISTRIBUTION FACTOR FOR DEFLECTION: EQUALLY DISTRIBUTED TO ALL BEAMS.

THE FINAL DESIGNER SHALL COMPUTE STRUCTURAL STEEL CAMBER AND THEORETICAL CONCRETE HAUNCH DIAGRAMS IN ACCORDANCE WITH IOWA DOT POLICIES TO MATCH THE SPECIFIC GRADE AND SITE APPLICATIONS. ROLLED BEAMS MAY BE CAMBERED AT THE MILL BY COLD CAMBERING OR BY THE FABRICATOR BY HEAT CAMBERING OR COLD CAMBERING. THIS INFORMATION SHALL BE IN ACCORDANCE WITH ARTICLE 2408.02, K OF THE STANDARD SPECIFICATIONS.

STEEL H PILE SECTION HP10x57 SHALL BE USED FOR ALL ABUTMENTS. PILE SPACING AND NUMBER OF PILES ARE BASED ON A MAXIMUM CAPACITY OF 6 KSI (100 K = 50 TONS). IMPACT IS INCLUDED IN INTEGRAL ABUTMENT PILE DESIGN. IMPACT IS NOT INCLUDED IN T-PIER DESIGN. THE ACTUAL PILE LOADS REQUIRED FOR A GIVEN BRIDGE LENGTH AND SKEW ARE TABULATED ON APPROPRIATE STANDARD SHEETS.

SHEAR STUD HEIGHTS SHALL BE DETERMINED BY THE FINAL DESIGNER, BASED ON THE SITE SPECIFIC GRADE AND THE THEORETICAL CONCRETE HAUNCH DIAGRAM.

MAGNETIC PARTICLE INSPECTION OF WELDS SHALL BE DONE PER AWS SPECIFICATIONS.

SUBSTRUCTURE - CONSTRUCTION

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

SPECIFICATIONS:

DESIGN: AASHTO LRFD 7TH EDITION, SERIES OF 2014.
 CONSTRUCTION: IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2015, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.
 WELDING: AASHTO/AWS D15 AS SPECIFIED AND MODIFIED BY THE STANDARD SPECIFICATIONS AND CURRENT SUPPLEMENTAL SPECIFICATIONS.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD 7TH EDITION, SERIES OF 2014 INTERIM.

REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

CONCRETE IN ACCORDANCE WITH SECTION 5, $f'c = 4000$ psi.

STRUCTURAL STEEL IN ACCORDANCE WITH SECTION 6, ASTM A709, GRADE 50W AND GRADE 36.

FATIGUE CYCLES BASED ON INFINITE FATIGUE. FATIGUE INVESTIGATION WITH REFINED ANALYSIS WAS CONSIDERED FOR BRIDGE LENGTHS 180'-0", 200'-0", 220'-0", 260'-0", & 320'-0".

THESE STANDARDS GIVE MOST OF THE INFORMATION NECESSARY TO BUILD THESE BRIDGES. HOWEVER, THE FOLLOWING ADDITIONAL INFORMATION IS REQUIRED FOR USE ON PRIMARY ROUTES. FOR SECONDARY ROUTES THE ENGINEER MAY NOT REQUIRE ALL SHEETS TO BE PROVIDED:

1. TITLE SHEET WITH ENGINEERS SEAL
2. ESTIMATED QUANTITIES TOTALS
3. SUMMARY QUANTITIES SHEET
4. SITUATION PLAN LAYOUT OF BRIDGE
5. GENERAL INFORMATION SHEET (WORKING STANDARD 5251)
6. SLAB ELEVATIONS SHEET (WORKING STANDARDS 5262, 5263, 5265, 5266, 5268, 5269, 5271, 5272, 5274, 5275, 5277, 5278, 5280, 5281, 5283, 5284, 5286, 5287, 5289, 5290)
7. BEAM LINE HAUNCH DATA SHEET (WORKING STANDARDS 5264, 5267, 5270, 5273, 5276, 5279, 5282, 5285, 5288, 5291)
8. MISCELLANEOUS DETAIL SHEET (WORKING STANDARDS 5252 TO 5261)
9. PILING DESIGN INFORMATION
10. SLOPE PROTECTION LAYOUT IF NEEDED
11. CONDUIT LAYOUT
12. LIGHTING LAYOUT IF NEEDED

WEATHERING STEEL NOTES:

ALL STRUCTURAL STEEL, EXCEPT AS NOTED, SHALL CONFORM TO ASTM A709 GRADE 50W. THE MINIMUM YIELD POINT FOR GRADE 50W STRUCTURAL STEEL IS 50 KSI FOR PLATES 4" AND UNDER IN THICKNESS, AND ALL STRUCTURAL SHAPES. THE GRADE 50W STEEL IS A WEATHERING STEEL AND IS TO REMAIN UNPAINTED, EXCEPT AS NOTED. CVN TESTING IS REQUIRED FOR MAIN BEAMS AND ALL SPLICE PLATES.

FLANGE DEFLECTORS ARE TO BE ASTM A709 GRADE 50W OR 36. S3 x 7.5 BEAM ERECTION SEATS ARE TO BE ASTM A709 GRADE 50W OR 36.

ALL STRUCTURAL STEEL PIECES COMPRISING THE ABUTMENT AND PIER BEARINGS SHALL COMPLY WITH THE REQUIREMENTS AS STATED IN THE NOTES IN THIS SECTION.

SHEAR STUDS ARE TO BE OF AN APPROVED TYPE LISTED IN MATERIALS I.M. 453.10, APPENDIX A.

THE PAINTED FINISH ON BEARINGS, FLANGE DEFLECTORS AND WEATHERING STEEL SHALL BE IN ACCORDANCE WITH THE PLAN NOTES AND ARTICLE 2408.02, Q, OF THE STANDARD SPECIFICATIONS. ALL WEATHERING STEEL EMBEDDED INTO AN INTEGRAL ABUTMENT SHALL BE PAINTED TO A DISTANCE OF 2'-9" FROM THE PLANE THROUGH THE ABUTMENT BEARINGS AND SEALED BY CAULKING AT THE ABUTMENT CONCRETE AND STEEL INTERFACE.

THE STEEL FOR THE EXTERIOR BEAMS OF THE BRIDGE SHALL BE OF THE SAME TYPE AND FROM THE SAME SOURCE.

BOLTS FOR USE WITH WEATHERING STEEL SHALL BE A325 TYPE III WITH A563 GRADE DH3 NUTS AND F436 TYPE III WASHERS.

BOLTS USED TO SPLICE BEAM SECTIONS ARE TO BE INSTALLED SUCH THAT NUTS ARE ON THE INSIDE FACE OF THE BEAM WEBS FOR THE EXTERIOR BEAMS, AND ON THE TOP OF BOTH TOP AND BOTTOM FLANGES OF ALL THE BEAMS.

THE STEEL SHALL BE KEPT FREE OF OIL, GREASE, DIRT, CRAYON OR CHALK MARKS, CONCRETE SPATTER AND ANY OTHER FOREIGN MATTER THAT MAY AFFECT THE NATURAL OXIDATION OF THE STEEL. ANY FOREIGN MATTER REMAINING ON THE STEEL AFTER COMPLETION OF BRIDGE CONSTRUCTION SHALL BE REMOVED BY THE BRIDGE CONTRACTOR AS DIRECTED BY THE ENGINEER. THE RESULTANT SURFACE SHALL BE FREE OF ALL VISIBLE RESIDUES. ALL COSTS ASSOCIATED WITH CLEANING STEEL SURFACES SHALL BE BORNE BY THE BRIDGE CONTRACTOR.

SEAL MATERIAL FOR CAULKING SHALL BE NEUTRAL CURE AND NON SAG SILICONE. TWO PRODUCTS MEETING THESE CRITERIA ARE DOW 888, CSL342 JOINT SEALANT AND CRAFTO ROAD SAVER SILICONE.

ALL FIELD CONNECTIONS ARE TO BE BOLTED USING "HIGH TENSILE STRENGTH BOLTS". UNLESS OTHERWISE NOTED, ALL OPEN HOLES ARE TO BE $\frac{1}{8}" \phi$ AND ALL BOLTS ARE TO BE $\frac{1}{2}" \phi$.

FILL $\frac{1}{2}"$ THICKNESSES SHOWN ON PLANS ARE BASED ON NOMINAL BEAM DIMENSIONS. THESE THICKNESSES ARE TO BE VERIFIED OR ADJUSTED DURING FABRICATION TO SECURE A CLOSE FIT. EACH FILL PLATE SHALL FIT TO THE NEAREST $\frac{1}{8}"$ IN THICKNESS AND SINGLE PLATES ARE REQUIRED AT EACH FILL LOCATION.

THE DESIGN DRAWINGS INDICATE AWS PREQUALIFIED WELDED JOINTS, AND UNLESS OTHERWISE NOTED THE DESIGN JOINT DETAILS ARE FOR MANUAL SHIELDED METAL-ARC WELDING. ALTERNATE JOINT DETAILS MAY BE SUBMITTED FOR APPROVAL.

THE BEAMS ARE TO BE FABRICATED FOR A STEEL DEAD LOAD FIT CONDITION.

02-2017 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 STANDARD DESIGN - 40' ROADWAY, 3 SPAN BRIDGES ROLLED STEEL BEAM BRIDGES OCTOBER, 2014		
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