IOWA DOT
Highway Division

TWIN REINFORCED CONCRETE BOX CULVERT STANDARDS

GENERAL NOTES:

1. THE RCB CULVERT SECTIONS ARE DESIGNED FOR HL-93 LIVE LOAD AND EARTH FILLS OF VARYING HEIGHTS.
2. VERTICAL EARTH PRESSURE, EV=0.120 kcf.
   HORIZONTAL EARTH PRESSURE, EHmax = 0.060 kcf MAX, EHmin = 0.030 kcf.
3. THE RCB CULVERT SECTIONS ARE DESIGN FOR CLASS I EXPOSURE CONDITIONS EXCEPT: CLASS 2 EXPOSURE CONDITION IS UTILIZED FOR THE SLAB DESIGN IN 0' FILL INSTANCES.
4. ALL SLAB AND FLOOR REINFORCING STEEL IS TO BE SUPPORTED AT INTERVALS OF NOT MORE THAN 3'-0 IN EITHER DIRECTION AS OUTLINED IN THE STANDARD SPECIFICATIONS.
5. THE CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR EDGE OR END OF REINFORCING BAR TO BE 2" UNLESS OTHERWISE NOTED.
6. EXCEPT FOR DOWEL BARS 5ri IN SLAB, LONGITUDINAL REINFORCING IS NOT TO EXTEND THRU THE CONSTRUCTION JOINTS.
7. FLOOR OF BARREL IS TO BE FINISHED SMOOTH. SIDES OF FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE.
8. THE PERMISSIBLE CONSTRUCTION JOINT AT THE TOP OF THE WALLS MAY BE LOWERED AT THE CONTRACTOR'S OPTION WITH ENGINEER'S APPROVAL.
9. THE REINFORCEMENT SUPPLIED FOR THIS STRUCTURE SHALL BE GRADE 60 REINFORCEMENT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. THE DESIGN STRESSES ARE BASED ON GRADE 60 REINFORCEMENT.
10. THE VERTICAL BARS IN THE WALLS MAY BE SPLICED ABOVE THE FOOTING AT THE CONTRACTOR'S OPTION AS FOLLOWS:

BAR SIZE NUMBER	4	5	6	7	8	9
MINIMUM SPLICE LENGTH	17"	21"	25"	31"	41"	51"

    THIS SPLICE, IF USED, WILL BE AT THE CONTRACTOR'S EXPENSE.
11. REINFORCING BAR CLEARANCES WILL BE AS FOLLOWS:
    EDGE CLEARANCES: 2" EXCEPT
      TOP OF FLOOR $2\frac{1}{4}$" TO NEAR TRANSVERSE REINFORCING BAR
      BOTTOM OF FLOOR $3\frac{1}{2}$" TO NEAR TRANSVERSE REINFORCING BAR
    END CLEARANCES:
      VERTICAL TOP 2"
      VERTICAL BOTTOM 3" OR $3\frac{1}{2}$" IF OVERALL HEIGHT OF THE CULVERT IS NOT TO A FULL INCH
      TRANSVERSE 2"
12. ALL CONSTRUCTION JOINTS SHALL BE FORMED WITH A BEVELED KEYWAY EXCEPT AT BELL JOINTS.
13. ALL BEVELED KEYWAYS SHALL BE CENTERED.
14. KEYWAY SIZE SHALL BE 2x4 EXCEPT AS FOLLOWS:
    KEYWAY BETWEEN THE FLOOR AND WALL SHALL BE 2x6 WHEN THE WALL IS GREATER THAN 10 INCHES WIDE.
15. 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.
16. IF 0' OF FILL IS SPECIFIED, DETAILS FOR PAVING NOTCH AND REFERENCE TO EPOXY COATING OF SLAB REINFORCING STEEL, IF APPLICABLE, SHALL BE INCLUDED IN THE FINAL PLANS.
17. ALL DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE NOTED OR SHOWN.
18. SEE CURRENT STANDARD SPECIFICATIONS REGARDING CONCRETE FORM REMOVAL.
19. THESE CULVERT STANDARDS LABEL ALL REINFORCING STEEL WITH ENGLISH NOTATION (5ai IS $\frac{5}{8}$ INCH DIAMETER BAR). ENGLISH REINFORCING STEEL RECEIVED IN THE FIELD MAY DISPLAY THE FOLLOWING "BAR DESIGNATION". THE "BAR DESIGNATION" IS THE STAMPED IMPRESSION ON THE REINFORCING BARS, AND IS EQUIVALENT TO THE BAR DIAMETER IN MILLIMETERS.

ENGLISH SIZE	4	5	6	7	8	9
BAR DESIGNATION	13	16	19	22	25	29

20. IN THE EVENT THE SLAB THICKNESS AT THE BARREL END SECTION EXCEEDS 18 INCHES, THE CULVERT PARAPET SHALL EXTEND A MINIMUM OF 6 INCHES ABOVE THE TOP OF THE CULVERT SLAB. REFER TO THE CULVERT DESIGN MANUAL FOR INSTRUCTIONS. THESE DETAILS ARE TO BE INCLUDED IN THE DESIGN PLANS TO ADDRESS THESE SITUATIONS.

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SPECIFICATIONS:

DESIGN:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010.

CONSTRUCTION:
IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, CURRENT SERIES, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010:
REINFORCING STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 5, GRADE 60.
CONCRETE IN ACCORDANCE WITH AASHTO LRFD SECTION 5, f'c = 4.0 KSI.

REVISED 10-12 - DELETED THE REFERENCE TO THE DESIGN MANUAL IN NOTE 19 PERTAINING TO DETAILS IN THE DESIGN MANUAL.
REVISED 1-16 - UPDATED NOTE 17 PERTAINING TO CONCRETE FORMS, (OLD NOTE: REMAINING IN PLACE 5 DAYS OR LONGER, EXCEPT MIN. CONC. FLEXURAL STRENGTH BEFORE REMOVAL SHALL BE 575 PSI).
REVISED 07-2016 - ADDED THE DESIGN VERTICAL AND HORIZONTAL EARTH PRESSURES AND RENUMBERED THE GENERAL NOTES. CHANGED DISTANCE IN NOTE #20 FROM 20 INCHES TO 18.
ENGLISH REDESIGNED TWINCULVERTS.DGN - TWRCB GI-12 - THIS SHEET ISSUED 04-12.

07-2016
LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

Iowa Department of Transportation
Highway Division

STANDARD DESIGN
TWIN REINFORCED CONCRETE BOX CULVERTS
APRIL, 2012

INDEX & GENERAL NOTES

TWRCB GI-12