Iowa Department
of Transportation
Project Development Division

SINGLE SPAN
REINFORCED CONCRETE BOX CULVERT STANDARDS

GENERAL NOTES:

1. THE RCB CULVERT SECTIONS ARE DESIGNED FOR MS18 LIVE LOAD AND EARTH FILLS OF VARYING HEIGHTS.

2. THE MAXIMUM SERVICE LOAD STRESS (MPa) IN THE REINFORCING STEEL FOR CRACK CONTROL SHALL BE:
   $f_{sa} = 29\,800/\sqrt[3]{d_c A}$;
   d_c AND A ARE IN mm AND mm^2 RESPECTIVELY.

3. METAL BAR CHAIRS SPACED AT NOT OVER 900 mm C-C IN EITHER DIRECTION ARE TO BE USED TO SUPPORT ALL SLAB AND FLOOR STEEL AS OUTLINED IN THE STANDARD SPECIFICATIONS (ARTICLE 2404.07).

4. THE CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR EDGE OR END OF REINFORCING BAR TO BE 50 mm UNLESS OTHERWISE NOTED.

5. LONGITUDINAL REINFORCING IS NOT TO EXTEND THRU THE CONSTRUCTION JOINTS, EXCEPT FOR r-1 DOWEL BARS IN SLAB.

6. ALL REINFORCING STEEL IS TO BE SECURELY WIRED IN PLACE BEFORE THE CONCRETE IS POURED (ARTICLE 2404.06).

7. FLOOR OF BARREL IS TO BE FINISHED SMOOTH. SIDES OF FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE.

8. ALL EXPOSED CORNERS 90° OR SHARPER TO BE FILLETED WITH A 20 mm DRESSED AND BEVELED STRIP.

9. THE PERMISSIBLE CONSTRUCTION JOINT AT THE TOP OF THE WALLS MAY BE LOWERED AT THE CONTRACTOR'S OPTION WITH ENGINEER'S APPROVAL.

10. THE REINFORCEMENT SUPPLIED FOR THIS STRUCTURE SHALL BE GRADE 400 REINFORCEMENT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. THE DESIGN STRESSES ARE BASED ON 400 GRADE REINFORCEMENT.

11. THE VERTICAL BARS IN THE WALLS MAY BE SPLICED ABOVE THE FOOTING AT THE CONTRACTOR'S OPTION AS FOLLOWS:

BAR SIZE NUMBER	15	20	25	30
MINIMUM SPLICE LENGTH	520 mm	650 mm	1090 mm	1520 mm

THIS SPLICE, IF USED, WILL BE AT THE CONTRACTOR'S EXPENSE.

12. REBAR CLEARANCES WILL BE AS FOLLOWS:
   - VERTICAL, TOP — 50 mm
   - VERTICAL, BOTTOM — 90 mm OR 75 mm IF THE OVERALL HEIGHT OF THE CULVERT IS NOT IN 10 mm INCREMENTS
   - TRANSVERSE — 50 mm
   - EDGE CLEARANCES — 50 mm, EXCEPT, TOP OF FLOOR 60 mm TO NEAR TRANSVERSE REINF BAR OR BOTTOM OF FLOOR 90 mm TO NEAR TRANSVERSE REINF BAR.

13. ALL CONSTRUCTION JOINTS SHALL BE FORMED WITH A BEVELED KEYWAY EXCEPT AT BELL JOINTS.

    ALL BEVELED KEYWAYS SHALL BE CENTERED.

    KEYWAY SIZE SHALL BE 50 mm x 100 mm EXCEPT AS FOLLOWS :
    KEYWAY BETWEEN THE FLOOR AND WALL SHALL BE 50 mm x 150 mm WHEN THE WALL IS GREATER THAN 255 mm WIDE.

14. IF 0 mm 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.

15. ALL DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED OR SHOWN.

SPECIFICATIONS:

DESIGN: AASHTO SERIES OF 1992 EXCEPT AS MODIFIED IN "GENERAL NOTES 2" ABOVE.
CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION SPECIFICATION, CURRENT SERIES, PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 1992. DESIGN STRESSES HAVE BEEN CONVERTED TO A METRIC VERSION.
REINFORCING STEEL IN ACCORDANCE WITH SECTION 8, GRADE 400.
CONCRETE IN ACCORDANCE WITH SECTION 8, f'c = 24 MPa.

INDEX FOR CULVERT STANDARDS:

MRCB 900-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 900 mm SPANS.

MRCB 1200-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 1200 mm SPANS.

MRCB 1500-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 1500 mm SPANS.

MRCB 1500-2-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 1500 mm SPANS.

MRCB 1800-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 1800 mm SPANS.

MRCB 1800-2-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 1800 mm SPANS.

MRCB 2400-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 2400 mm SPANS.

MRCB 2400-2-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 2400 mm SPANS.

MRCB 3000-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 3000 mm SPANS.

MRCB 3000-2-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 3000 mm SPANS.

MRCB 3600-1-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 3600 mm SPANS.

MRCB 3600-2-95 CULVERT BARREL DETAILS, VARIABLE DIMENSIONS AND QUANTITIES TABLES - 3600 mm SPANS.

MFWH 0-1-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 0° SKEW - 3600 mm & 3000 mm SPANS.

MFWH 0-2-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 0° SKEW - 2400 mm & 1800 mm SPANS.

MFWH 0-3-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 0° SKEW - 1500 mm, 1200 mm, 900 mm SPANS.

MFWH 0-4-95 DIMENSION TABLE.

MFWH 0-5-95 CURTAIN WALL DETAILS AND PLAN VIEW - APRON REINFORCING, TOP & BOTTOM.

MFWH 0-6-95 TYPICAL VIEW - FRONT & BACK FACE REINFORCING WINGWALLS, TYPICAL SECTION - NEAR CENTER OF APRON, TOP OF WINGWALL DETAILS AND SECTION THRU PARAPET.

MFWH 15-1-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 15° SKEW - 3600 mm SPANS.

MFWH 15-2-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 15° SKEW - 3000 mm SPANS.

MFWH 15-3-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 15° SKEW - 2400 mm SPANS.

MFWH 15-4-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 15° SKEW - 1800 mm SPANS.

MFWH 15-5-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 15° SKEW - 1500 mm, 1200 mm, 900 mm SPANS.

MFWH 15-6-95 DIMENSION TABLE.

MFWH 15-7-95 CURTAIN WALL DETAILS AND PLAN VIEW - APRON REINFORCING, TOP & BOTTOM.

MFWH 15-8-95 TYPICAL VIEW - FRONT & BACK FACE REINFORCING, SHORT & LONG WINGWALL, TYPICAL SECTION - NEAR CENTER OF APRON, TOP OF WINGWALL DETAILS AND SECTION THRU PARAPET.

MFWH 30-1-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 30° SKEW - 3600 mm SPANS.

MFWH 30-2-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 30° SKEW - 3000 mm SPANS.

MFWH 30-3-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 30° SKEW - 2400 mm SPANS.

MFWH 30-4-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 30° SKEW - 1800 mm SPANS.

MFWH 30-5-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 30° SKEW - 1500 mm, 1200 mm, 900 mm SPANS.

MFWH 30-6-95 DIMENSION TABLE.

MFWH 30-7-95 CURTAIN WALL DETAILS AND PLAN VIEW - APRON REINFORCING, TOP & BOTTOM.

MFWH 30-8-95 TYPICAL VIEW - FRONT & BACK FACE REINFORCING, SHORT & LONG WINGWALL, TYPICAL SECTION - NEAR CENTER OF APRON, TOP OF WINGWALL DETAILS AND SECTION THRU PARAPET.

MFWH 45-1-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 45° SKEW - 3600 mm SPANS.

MFWH 45-2-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 45° SKEW - 3000 mm SPANS.

MFWH 45-3-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 45° SKEW - 2400 mm SPANS.

MFWH 45-4-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 45° SKEW - 1800 mm SPANS.

MFWH 45-5-95 BENT BAR DETAILS, BILL OF REINFORCING FOR ONE HEADWALL, 45° SKEW - 1500 mm, 1200 mm, 900 mm SPANS.

MFWH 45-6-95 DIMENSION TABLE

MFWH 45-7-95 CURTAIN WALL DETAILS AND PLAN VIEW - APRON REINFORCING, TOP & BOTTOM.

MFWH 45-8-95 TYPICAL VIEW - FRONT & BACK FACE REINFORCING, SHORT & LONG WINGWALL, TYPICAL SECTION - NEAR CENTER OF APRON, TOP OF WINGWALL DETAILS AND SECTION THRU PARAPET.

MCBJ 1-95 CULVERT BELL JOINT DETAILS AND ESTIMATE OF QUANTITIES TABLE - 900 mm, 1200 mm & 1500 mm SPANS

MCBJ 2-95 CULVERT BELL JOINT DETAILS AND ESTIMATE OF QUANTITIES TABLE - 1800 mm & 2400 mm SPANS

MCBJ 3-95 CULVERT BELL JOINT DETAILS AND ESTIMATE OF QUANTITIES TABLE - 3000 mm & 3600 mm SPANS

MCBJ 4-95 PERMISSIBLE CULVERT BELL JOINT DETAILS - ALL SPANS

LATEST REVISION DATE : 04-02

APPROVED BY : William A. Stanhopf

STANDARD DESIGN

GENERAL INFORMATION

FOR

REINFORCED CONCRETE BOX CULVERTS

PROJECT DEVELOPMENT DIVISION
IOWA DEPARTMENT OF TRANSPORTATION

JULY, 1995

MRCB-GI-95

REVISED 04-02 ; ADDED MCBJ 4-95 STANDARD SHEET. GENERAL NOTE 12 CHANGED THE BOTTOM VERTICAL CLEARANCE TO 90 mm.
RCBGIN.S01

REVISED : 12/96 ; GENERAL NOTE #13 CHANGED.

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