

Figure 5-395.100(E)
Precast Concrete Box Culvert Tables

Approved, and signed, March 24, 2011. Last date revised: October 9, 2015.

Revised 10-09-2015

Under GENERAL NOTES:

- Changed and expanded the second sentence of the first paragraph from “. . . top of the roadway.” to “. . . top of the pavement or to top of fill if there is no pavement.”
- Changed the second sentence of paragraph five from “The width of the distribution slab shall extend between the outside edges of the shoulders unless directed by the engineer.” to “Extend the width of the distribution slab to the outside edges of the roadway shoulders unless directed by the engineer.”
- Changed concrete mix “3Y43” to “3S52” in sixth note, as per 2016 spec. book.
- Changed “Cast-in-place distribution slabs to be 6” thick with . . .” to “Place 6” thick cast-in-place distribution slabs with . . .” in first sentence of seventh paragraph.
- Changed second sentence in seventh paragraph from “All distribution slab reinforcement shall be epoxy coated.” to “Epoxy coat all distribution slab reinforcement.”
- Changed second sentence in eighth paragraph from “Distribution slab joints must be centered over barrel segments.” to “Center distribution slab joints over barrel segments.”
- Changed ninth note from “If distribution slab is used as pavement surface it must be redesigned per the MnDOT pavement design manual.” to “Redesign distribution slab per the MnDOT pavement design manual if it is used as pavement surface.”
- Changed “welded wire fabric” to “welded wire reinforcement” in the third and fourth sentences of circled note ①.
- Changed “. . . the area of reinforcement shall be increased by 8%, and contractor shall submit design . . .” to “. . . increase the area of reinforcement by 8%, and submit design . . .” in the fourth sentence of circled note ①.
- Changed circled note ② from “Longitudinal reinforcement denoted as As5 and As6 must be placed in all slabs and walls and must be .06 in²/ft. minimum.” to “Place longitudinal reinforcement denoted as As5 and As6 in all slabs and walls with a minimum of .06 in²/ft.”

Revised 09-11-2014

Under GENERAL NOTES:

- Changed the 5th note: Added “Roadway or Shoulder” to the beginning of the note.
- Changed the spec. number *From:* 3149.2B2 *To:* 3149.2.B.2 in the 7th and 8th notes.

Revised 11-06-2013

In the TABLE: Changed the title of the first column *from* SIZE W x H (ft.) *to* SIZE SPAN x RISE (ft.)

At BOX CULVERT CROSS SECTION: Changed the dimensions “H” *to* “RISE” and “W” *to* “SPAN”.

Under GENERAL NOTES:

- Added the word “Standard” to precede the figure number in all instances.
- Removed the “slash” (/) from the Mn/DOT in all instances.
- Removed the term “Mn/DOT” from all of the locations referencing a Mn/DOT spec.
- Changed the 5th note to read: Fill heights of less than 2'-0" require a distribution slab. The width of the distribution slab shall extend between the outside edges of the shoulders unless directed by the engineer.
- Changed the 6th note to read: Use concrete mix 3Y43 for the distribution slab.
- Added in the 7th note: All distribution slab reinforcement shall be epoxy coated.

Added to numbered note ①: If bar reinforcement is substituted for welded wire fabric, the area of reinforcement shall be increased by 8%, and contractor shall submit design calculations verifying compliance with AASHTO 5.7.3.4 "control cracking by distribution of reinforcement".

Minnesota Department of Transportation – Bridge Office
REVISION LOG for Figure 5-395.100(E)

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Revised 04-17-2013

This standard was updated to convert reinforcing bar marks from metric to U.S. customary bar designations.

Revised 06-06-2011

Modified As7 /As8 lengths so that they don't extend into the radius bend of the box culvert corner.

Changed the minimum "M" length for As1 to 32" min. or a wall thickness + 12" + max (dv or d) + 6". The total length As1 was modified accordingly.

The total length As1, was measured on the outside edge of the bar.

The As1 development length was updated and is now based on a W23 in situations when two layers of welded wire fabric (stacked) are required.

The development length modifier of (65ksi/60ksi) was removed from the development length calculation. M lengths and As7/As8 lengths were modified accordingly.

New Standard

New Standard Figure 5-395.100(E) is a continuation of the Precast Concrete Box Culvert Tables started on Figures 5-395.100(B), 5-395.100(C) and 5-395.100(D). Standard Figure 5-395.100(E) includes culvert sizes ranging from 16'x4' to 16'x12'. See new Standard Figures 5-395.100(B), (C), and (D) for additional culvert sizes.

- The reinforcement table, culvert section properties, and classes have been updated based on LRFD design methodology.
- The "General Notes" have been updated to match the new LRFD design methodology. Added clarification for class 1 culverts and distribution slabs, "Fill heights of less than 2'-0" require a distribution slab over the fill area of roadway and shoulders. Class 1 culverts with 2' to 3' of fill and all class 2, 3, and 4 culverts do not require a distribution slab."
- Added: "Transverse reinforcement is parallel to the culvert span. Longitudinal reinforcement is perpendicular to the culvert span."
- Changed distribution slab reinforcement to, "No.16 bars at 1'-0" transversely and No. 16 bars at 1'-0" longitudinally."
- Changed distribution slab bedding requirements to, "Provide 3" minimum granular material between barrel and distribution slab for cast-in-place slab and 6" minimum granular between barrel and distribution slab for a precast slab."
- Added: "If distribution slab is used as pavement surface it must be redesigned per the Mn/DOT pavement design manual."
- Reinforcement labeled As5 in the previous table is now labeled As7 (top) slab and As8 (bottom) slab.

A "Box Culvert Cross Section" reflecting the updated reinforcement and haunch dimensions has been added to the sheet.