



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

MEMORANDUM TO: Project Engineers
Project Design Engineers

FROM: B. C. Hanks, P. E.
State Structures Engineer

DATE: June 27, 2019

SUBJECT: DESIGN MANUAL REVISIONS

Chapter 9 of the Design Manual has been revised. The revision entails reorganizing the chapter and incorporating policy memoranda issued since June 2010. However, the sections listed below contain revisions that provide clarification and/or new guidance on current design practice.

Section	Summary of Revision(s)
9.2.3	Added guidance to specify matching spacing of reinforcement in the exterior faces of the top slab, bottom slab, and exterior walls, including corner bars, for ease of construction. Added guidance to neglect live load effects per <i>AASHTO LRFD Bridge Design Specifications</i> Article 3.6.1.2.6a for certain fill depths and culvert widths.
9.2.4	Added guidance to neglect live load effects per <i>AASHTO Manual for Bridge Evaluation</i> Article 6A.5.12.10.3a for certain fill depths and culvert widths, and to determine LRFR load ratings based on permanent load only for these conditions.
9.4.4.1	Revised excavation quantities required for precast and cast-in-place three-sided culverts. Revised guidance for low flow channels.
9.4.9	Removed guidance for tapered outlet wings.
9.5	Revised guardrail anchorage criteria for compliance with Roadway Detail Drawing 862D01
9.6	Added guidance to design extension portions using LRFD method and rate using LRFR provisions.

9.8.4	Revised note for Federal Aid projects and added requirement to include Sample Bar Replacement Chart.
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Chapter 9 Design Manual figures were renumbered and the following figures have been revised or added:

Figure	Summary of Revision(s)
9-4	Added as-built seal box and note to accompany reference in Section 9.8.5. Revised note for Federal Aid projects and included Sample Bar Replacement Chart.
9-5	Added as-built seal box and note to accompany reference in Section 9.8.5.
9-7	Revised instructions.
9-10	Revised wing length, "H" bar lengths and dimension between wing wall and precast box culvert.
9-11	Revised dimensions shown for excavation limits to match required foundation conditioning material limits.
9-13	Revised for clarity.
9-14	Revised for clarity and additional dimension computations.
9-15	Created to provide guidance on calculating turned back wing lengths for 3:1 slopes.
9-16	Revised for clarity.
9-17	Revised for clarity.

The updated Chapter 9 has been incorporated into the Design Manual. The Design Manual, as well as the updated Design Manual Figures, are available on the Structures Management Unit website.

These revisions are effective not later than the October 2019 letting.

BCH/THC/ksl

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