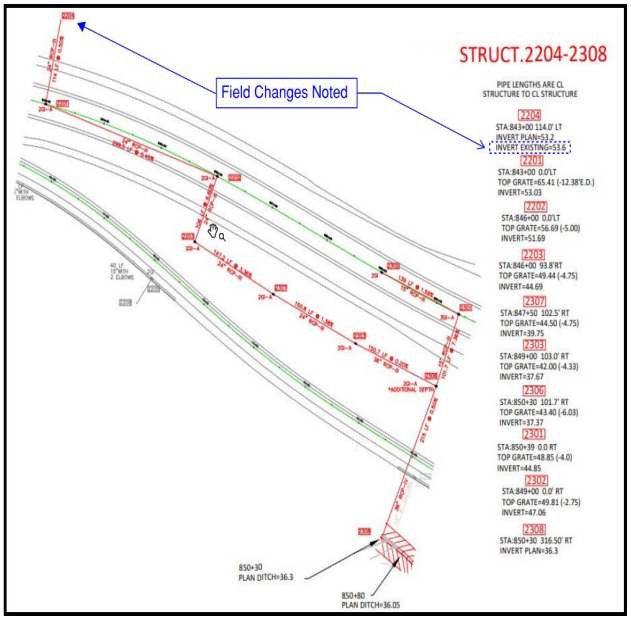
ROADWAY BULLETIN
NCDOT CONSTRUCTION UNIT

Volume 5 / Issue 4

Winter 2025-2026

DRAINAGE PIPE LAYOUT AND SUBMITTALS



When construction surveying is provided by the Contractor, a layout drawing of all drainage systems must be submitted to the Resident Engineer's office for review and verification.

The submittal should account for existing and proposed utilities, and confirm existing elevations at tie-in locations for both inlet and outlet pipes.

According to the *NCDOT Manual for Construction Layout*, the submittal shall include at a minimum:

- Station and offset from centerline
- Flow line elevations
- Invert elevations
- Percent grade of drainage networks
- Standard drawing number for drainage structures
- Standard drawing number for frames and grates
- Type and size of drainage pipe
- Length of drainage pipe

Once the pipe layout is completed, the Contractor must submit field notes for review.

Important Reminders:

- Use the actual slope intercept points (i.e., where the proposed cut or fill slopes tie into existing ground, ditches, or streams) and drainage structure locations to determine invert elevations and pipe lengths. Invert elevations shown in the Drainage Summary "shall not be used for project construction stakeout."
- Excess pipe length projecting from a fill slope can create maintenance concerns and potential hazards. Always verify the pipe's tie-in point to existing ground during layout.
- If a staked crossline pipe is shorter than shown in the plans, notify the Resident Engineer to confirm that clear zone recovery requirements are still met.

In This Issue:

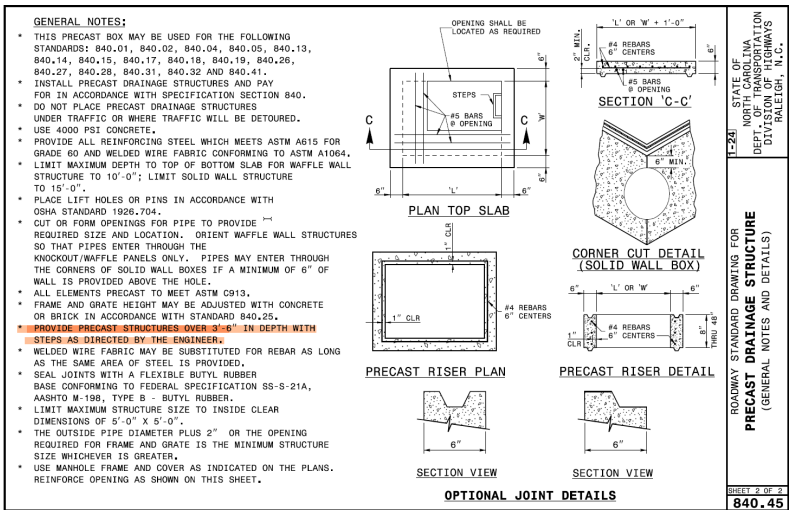
Want to read previous Construction Bulletins?

- Click Here

Have suggestions for future Construction Bulletins? Email:

Brian Skeens and Liam Shannon

STEPS IN WAFFLE WALL PRECAST DRAINAGE STRUCTURES


GENERAL NOTES:

* THIS PRECAST BOX MAY BE USED FOR THE FOLLOWING STANDARDS: 840.01, 840.02, 840.04, 840.05, 840.13, 840.14, 840.15, 840.17, 840.18, 840.19, 840.26, 840.27, 840.28, 840.31, 840.32 AND 840.41.
* INSTALL PRECAST DRAINAGE STRUCTURES AND PAY FOR IN ACCORDANCE WITH SPECIFICATION SECTION 840.
* DO NOT PLACE PRECAST DRAINAGE STRUCTURES UNDER TRAFFIC OR WHERE TRAFFIC WILL BE DETOURED.
* USE 4000 PSI CONCRETE.
* PROVIDE ALL REINFORCING STEEL WHICH MEETS ASTM A615 FOR GRADE 60 AND WELDED WIRE FABRIC CONFORMING TO ASTM A1064.
* LIMIT MAXIMUM DEPTH TO TOP OF BOTTOM SLAB FOR WAFFLE WALL STRUCTURE TO 10'-0"; LIMIT SOLID WALL STRUCTURE TO 15'-0".
* PLACE LIFT HOLES OR PINS IN ACCORDANCE WITH OSHA STANDARD 1926.704.
* CUT OR FORM OPENINGS FOR PIPE TO PROVIDE REQUIRED SIZE AND LOCATION. ORIENT WAFFLE WALL STRUCTURES SO THAT PIPES ENTER THROUGH THE KNOCKOUT/WAFFLE PANELS ONLY. PIPES MAY ENTER THROUGH THE CORNERS OF SOLID WALL BOXES IF A MINIMUM OF 6" OF WALL IS PROVIDED ABOVE THE HOLE.
* ALL ELEMENTS PRECAST TO MEET ASTM C913.
* FRAME AND GRATE HEIGHT MAY BE ADJUSTED WITH CONCRETE OR BRICK IN ACCORDANCE WITH STANDARD 840.25.
* PROVIDE PRECAST STRUCTURES OVER 3'-6" IN DEPTH WITH STEPS AS DIRECTED BY THE ENGINEER.
* WELDED WIRE FABRIC MAY BE SUBSTITUTED FOR REBAR AS LONG AS THE SAME AREA OF STEEL IS PROVIDED.
* SEAL JOINTS WITH A FLEXIBLE BUTYL RUBBER BASE CONFORMING TO FEDERAL SPECIFICATION SS-S-21A, AASHTO M-198, TYPE B - BUTYL RUBBER.
* LIMIT MAXIMUM STRUCTURE SIZE TO INSIDE CLEAR DIMENSIONS OF 5'-0" X 5'-0".
* THE OUTSIDE PIPE DIAMETER PLUS 2" OR THE OPENING REQUIRED FOR FRAME AND GRATE IS THE MINIMUM STRUCTURE SIZE WHICHEVER IS GREATER.
* USE MANHOLE FRAME AND COVER AS INDICATED ON THE PLANS. REINFORCE OPENING AS SHOWN ON THIS SHEET.

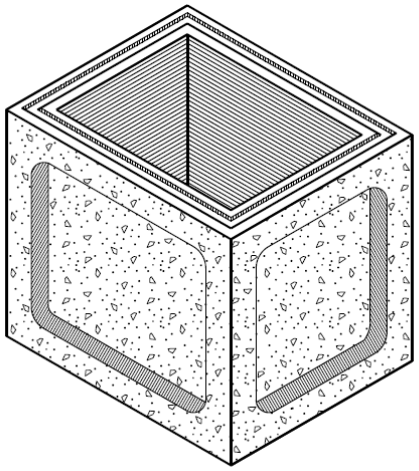
OPENING SHALL BE LOCATED AS REQUIRED
STEPS
#5 BARS @ OPENING
PLAN TOP SLAB
SECTION 'C-C'
#4 REBARS 6" CENTERS
#5 BARS @ OPENING
CORNER CUT DETAIL (SOLID WALL BOX)
PRECAST RISER PLAN
PRECAST RISER DETAIL
SECTION VIEW
SECTION VIEW
OPTIONAL JOINT DETAILS
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
I-24
ROADWAY STANDARD DRAWING FOR PRECAST DRAINAGE STRUCTURE (GENERAL NOTES AND DETAILS)
SHEET 2 OF 2
840.45

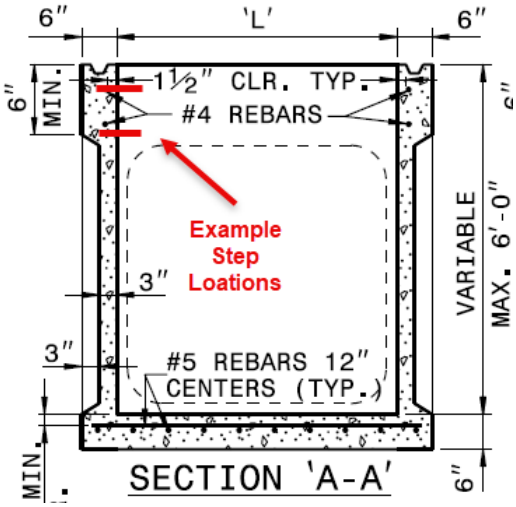
Having trouble agreeing if steps are needed in your waffle wall boxes? NCDOT clarified this in a 2006 memo to precast producers—a policy that remains in effect.

Standard Drawing 840.45 permits waffle wall structures only in non-traffic bearing conditions. These structures have 3" thick recessed walls, which is insufficient for embedding steps (minimum 4" embedment required). NCDOT policy requires steps in all drainage structures taller than 3'-6".

Use the following guidance:

- **One 4' waffle wall section**: No steps required.
- **Single 5' waffle wall section**: Two steps required in the *solid beam portion* above the recesses.
- **Waffle wall base + solid riser**: Steps must be installed in *both* the solid riser and the solid beam portion of the waffle base.


WAFFLE WALL ISOMETRIC VIEW



SECTION 'A-A'

This ensures safe and code-compliant access for inspection and maintenance in accordance with OSHA considerations and NCDOT policy.

State Construction Engineer				
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5	Meredith Hayes	11 & 12	Scott Jones	Aaron Griffith - Div 7, 9, 10, 12
6 & 8	John Partin	13 & 14	Aaron Powell	Tyler Rogers – Div 11, 13, 14