

STRUCTURE BULLETIN

NCDOT Construction Unit

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Securing Formwork onto Concrete Structures

When building any structure, properly securing formwork is key to the success of a pour and the overall acceptability of the structure. Poorly secured forms can cause issues with clearance, dimensional tolerance, as well as appearance of any structure member. In extreme cases, poorly secured forms can lead to a blowout during the pour, causing extra work and project delays. Despite all this, it is important to know where it is acceptable to secure your formwork to avoid damaging the existing members or causing unnecessary maintenance issues in the future.

Drilling into Prestressed Members

Drilling or driving nails into a prestressed member should not be allowed when not noted in the plans. This includes box beams, cored slabs, and all other prestressed girders. A common area where this has been seen is setting formwork for cast in place barrier rail on cored slab bridges. It is the responsibility of the contractor to decide how to secure their forms, however this image shows an example of securing these forms. Methods include but are not limited to...



- Drilling anchors into the shear keys (the grout placed between girders) instead of into the top of the girder.
- Using braces that are clamped and secured to steel that is projecting from the girder instead of anchoring directly into the girder.
- Using snap ties or through rods to secure the outside of the forms rather than drilling into the outside face of the cored slab.
- Exterior cored slabs can be fabricated with inserts specifically made for setting overhang jacks and barrier formwork.



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MSE Wall Drainage

MSE Walls are utilized all over the state to retain earth around our highways and bridges, but a retaining wall is not designed to handle the load of saturated material. To keep wall backfill from becoming waterlogged, a drain is installed during construction. An aggregate shoulder drain should be installed along the base of the reinforced zone behind the aggregate unless otherwise noted on the plans. Ensure that wall drainage systems are not covered up and lost during construction, and that there is a means of positive drainage out of and away from the wall.

Setting Anchors in Concrete Decks

When drilling to set formwork on a concrete deck, take time to consider where those holes are and the possible maintenance issues they may cause. Often when placing sidewalk, the contractor drills straight down to secure a waler on which to brace their forms. This can cause issues in the future due to these drilled holes creating a pathway for water and eventual corrosion directly in the gutter line. One solution to this is to secure the formwork by setting your anchors at an angle so that the hole in the deck will be under the sidewalk after the concrete is poured. Afterwards, the tie rod can be removed, and the hole can be filled with a non-shrink grout. Alternatively, the contractor can use deadmen, h-piles, or other heavy objects to brace their forms.



Raked Finish for Construction Joints

A raked finish on concrete is one of the tools we use to ensure a good bond between parts of a structure poured at different times. However, if done incorrectly it can cause more harm than good. Issues that are often seen are digging too far into the concrete and pulling up aggregate with the rake or waiting too long to rake and “tearing” the concrete at the top. If a poor raked finish is applied, ensure that all loose or unsound concrete is removed before placing concrete on top of the section.



Even Grooves at 1" spacing
Roughly ¼" deep
Minimal Aggregate disturbed



Uneven depth and spacing
Aggregate pulled up
Wider grooves where concrete was already set

Videos:

The 2025 Basic Structure Inspector Training videos are now posted on the [Construction Unit YouTube playlist](#). Prior year's inspector training videos and other helpful videos can also be found here.

Structure Inspector Training:

The 2026 Structure Inspector Training is currently being planned. Retaining Walls will be the primary topic for next year's training.

Structure Bulletins are archived on the [Construction Unit](#) website under [Construction Resources](#).

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