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STRUCTURE BULLETIN

NCDOT Construction Unit

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Current Issues: Concrete Cylinders

I was going back through my files to find the pictures above and found these in a training presentation form 2011. We still have the same problems showing up 9 years later. Cylinders such as the ones above must be rejected. As a result, we have to perform non-destructive testing such as Windsor Probes in order to determine the strength of the cast member. This is an additional and unnecessary expense to the department and is completely avoidable.

There is a new YouTube video available, Concrete Cylinders, showing the proper methods for making cylinders and protecting them. Also, detailed instructions on concrete cylinders are attached at the end of this bulletin, and a copy of the document is archived on the connect site at this link.

The 2011 PowerPoint presentation mentioned above will be updated in video format and made available in the near future. It not only addresses cylinders, but sample cards and other acceptance tests.

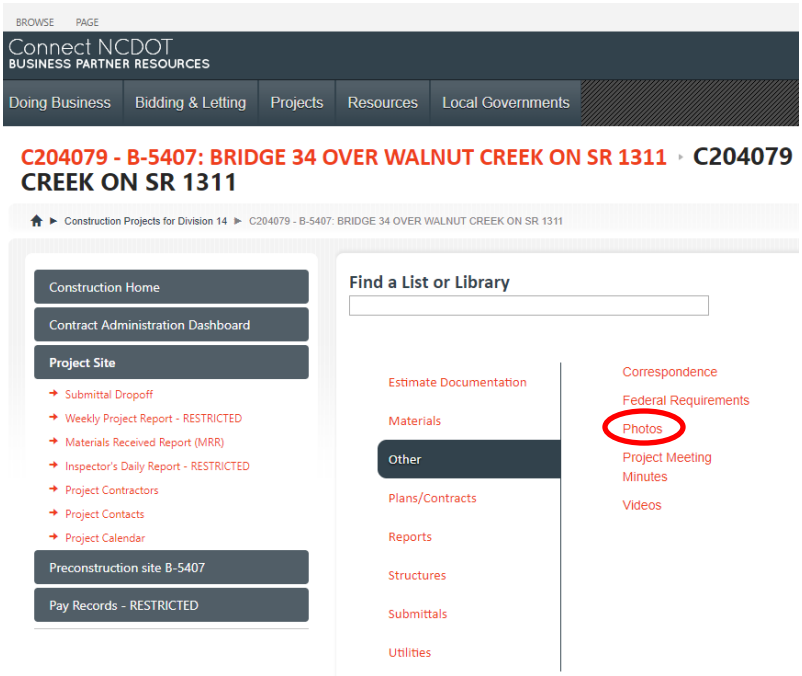
Please review these materials and take care making and protecting your samples.

Freezing Weather:

Temperatures have been pretty mild this year, but don't forget to protect your concrete when they drop. During extreme freezes we need to ensure that there are no confined voids in structures that are holding water. In areas such as dowel holes, grout pots, and even CSL tubes water can freeze, expand and crack the concrete. Above is an example of an end bent which cracked when water in the anchor bolt void froze and expanded. Contractors should be sure to either blow out the water, add RV antifreeze, or fill the void with compressible material (such as backer rod).

Project Photos

Have you noticed that storing and viewing photos and videos in SharePoint is more user friendly lately? If not, check it out. On each TeamSite, there is now a folder for Photos and Videos with no size limits as in the past. The files can be viewed in list, thumbnails, or slides and can be sorted based on specified parameters. What about all those photos embedded in the diaries? Those can all be viewed by clicking on the *Contract Administration Dashboard - Most Popular - Diary Photo Viewer*. Now you can see all the pictures without opening each diary. Remember, Pictures Are Worth A Thousand Words!



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13&14	Aaron Powell	828-694-7971

Videos:

New video available:
Concrete Cylinders

Inspection training videos can be found on the Construction Unit YouTube playlist.

Training:

Structure Bulletins are now archived on the Construction Unit website under Construction Resources.

Happy New Year!

If you have a topic you would like to see addressed in a future edition of the Structure Bulletin, please email us at either acochran@ncdot.gov or aearwood@ncdot.gov

PROCEDURES FOR CASTING, STORAGE/CURING, AND TRANSPORTATION OF 4" X 8" CONCRETE TEST SPECIMENS

I. Preparing the 4" X 8" plastic molds for reuse.

1. Drill a small hole, approximately 1/8 inch in diameter, in the bottom of the mold.

2. Seal the hole on the inside of the cylinder mold with tape to make the cylinder mold watertight.

3. Apply a light coat of lubricant (form oil, CRC, etc.) to the mold interior. This aids in separation of the mold from the concrete cylinder and helps prevent damage to the molds interior surface. Make sure there is no standing oil in the mold before placing any concrete in it.

II. Casting the 4" X 8" cylinders.

Note: A person who is currently certified by the Materials and Tests Unit as a Field Concrete Technician must cast all concrete test cylinders.

1. Select and prepare a proper site for preparing the molds and making the test specimens. This location should be leveled and as close as possible to where the member is cast, but far enough away to protect them from construction activities, vibrations or other disturbances.

2. Select a representative sample of concrete and remix it before making the cylinders. (See Concrete Field Technician Study Guide). For 4" x 8" cylinders only 2 layers are required. And the tamping rod shall be a 3/8 inch diameter straight steel rod approximately 18 inches long, having a round hemispherical tip. For specimens with a slump of 1" or less use a wooden flat or stake with a 1" x 1" dimension. Fill the cylinder in two equal layers, rodding each layer 25 times. When consolidating the second layer, the rod should penetrate into the first layer approximately 1". Tap the outside of the molds 10-15 times with the palm of your hand after rodding. For specimens with a 1" slump or less, a vibrator can be utilized for consolidation.

3. After casting the cylinders, seal them with the proper opaque plastic caps. Freshly casted specimens' initial storage should be in some type of curing box. A 32 quart or larger Igloo cooler works well. Ensure that the curing box and cylinders are level.

4. Protect the cylinders from vibration and other disturbances for the first 24 hours. Keep them in a moist curing condition at a temperature range between 60° and 80°F. Moisture can be maintained by simply putting a 1/4 inch of water in the bottom of the cooler.

5. After placing the specimens in a protected location, do not move or relocate the curing box for at least 20 hours.

6. If for any reason the specimens are disturbed, a note should be placed in the "Comment Box" on the sample card.

7. Clearly identify each specimen on the outside of the mold with the following information: Contract Number, Sample Number, Type of the Concrete and Date Casted.

8. A sample card will be created for each set of specimens and will contain all pertinent information. This card will shadow the specimens until they are delivered to the testing laboratory.

III. Curing – **Initial curing for the specimens will be utilized until they are delivered to the laboratory**. Accepted field curing environments can be achieved by utilizing insulated curing boxes, approved coolers, or sand pits. All environments should be a topic of discussion during the preconstruction meeting. All methods shall be approved prior to usage. One or more of the following procedures can control a satisfactory temperature environment during the initial curing of the specimens: Use of ventilation, use of ice, use of thermostatically controlled heating or cooling devices, use of heating methods such as insulated blankets.

IV. Transporting test cylinders to the laboratory.

Recommended procedure: Transport cylinders to the laboratory in the 4" X 8" plastic reusable molds.

a. Deliver the cylinders to the laboratory no later than 3 days (72 hours) after casting.

b. Do not allow the cylinders to roll or fall while transporting them to the laboratory. The Department has purchased cylinder crates that can store a maximum of 8 cylinders at one time. The crates will fit securely inside a 32-quart cooler. These crates are available through your local Section Concrete Technicians or can be picked up at the central laboratory.

c. Transportation time of the specimens shall not exceed 4 hours.

V. Removal of Cylinders from the 4" X 8" reusable plastic molds at the laboratory by the Construction Technician.

Remove the cylinders at the laboratory with compressed air. Cylinders must be at least 24 hours old prior to removing them from the mold.

Procedure:

a. Remove the cap, turn the cylinder upside down, and apply air pressure to the hole in the bottom of the cylinder mold. The mold should then rise on the cylinder. If the cylinder cannot be removed from the mold with compressed air, carefully split one side of the mold with the tool provided at the lab.

b. Use a permanent marker to transfer the identification information to the cylinder. This is provided at the laboratory.

c. Laboratory personnel are **NOT RESPONSIBLE** for removing molds or marking cylinders.

VI. Reuse of the 4" X 8" plastic molds.

a. Inspect the 4" X 8" plastic mold before and after each use.

b. Check the plastic mold for warping, splitting, and pitting.

c. Discard the mold if it is deformed to the extent that it will not produce an acceptable cylinder.

d. It is recommended not to forcefully place lids in the empty cylinder molds.

Policy on Improperly Made, Stored, Handled or Transported Concrete Cylinders

1. Concrete cylinder specimens that do not conform to requirements of AASTHO T-23 will be marked as failing compressive strength requirements.

2. An investigation will be conducted by the local Concrete Technician to determine the cause of the deficiency and the acceptability of the concrete member it represents.

3. If the investigation reveals that the technician was deficient in the making, curing, handling or transportation of the cylinders in an excess of three times, his/her concrete certification will be removed. In order for the technician to become re-certified, he/she must attend the full Concrete Field Technician school.

The purpose of this process is to inform all parties involved with the on going problems of unsatisfactory handling and storage of concrete cylinders. It is not intended to remove certifications from trained technician. The methods for making, storage, handling and transporting of cylinders should follow the guidelines stated in AASHTO T-23.