



BUILDINGS BULLETIN 2009-026

Technical

Supersedes: None

Issuer: Fatma M. Amer, P.E.
First Deputy Commissioner

Issuance Date: December 03, 2009

Purpose: This document clarifies the requirement of special inspection and field and laboratory testing of cast-in-place concrete.

Related Code BC 1704.4 BC 1905.6.2 BC 1905.6.3.2
Section(s): BC 1905.6.1 BC 1905.6.3.1

Subject(s): Concrete, cast-in-place, special inspection; Concrete, test cylinders; Concrete, design mix; Concrete, special inspection; Concrete, testing, licensed concrete testing laboratory; Concrete, test cylinders, approved testing agency; Concrete, strength test

Special inspection of cast-in-place concrete

Special inspection and testing shall be required for all cast-in-place concrete work that requires a building permit pursuant to section BC 1704.4 and Table BC 1704.4, unless the scope of the work falls into one of the specific exemptions listed in section BC 1704.4 or detailed in Item IV of this bulletin.

I. Identification of responsibilities for special inspection and testing

A. Special inspection by special inspection agency. The TR1 form ("Technical Report: Statement of Responsibility") identifying the special inspection agency must be submitted and accepted by the Department of Buildings ("department") prior to the issuance of a permit authorizing cast-in-place concrete work that is subject to special inspection. If the special inspection agency is later changed, a superseding TR1 form must be submitted and accepted by the department prior to commencement of concrete operations.

If the special inspector on site to conduct special inspections does not match the special inspection agency identified on the TR1 form, no concrete operations shall be commenced. In such cases, department's inspectors shall order all concrete work stopped. The department may take actions as appropriate against an inspection agency conducting inspections without having identified responsibility on a TR1 form.

B. Concrete testing by concrete testing laboratory. The TR3 form ("Technical Report: Concrete Design Mix") and TR2 form ("Technical Report: Concrete Pouring, Sampling and Compression Test Cylinders") identifying the concrete testing laboratory to perform the design mix and the test cylinders must be submitted and accepted by the department prior to the issuance of a permit authorizing cast-in-place concrete work that is subject to special inspection, unless concrete testing is exempted per Item IV of this bulletin. If the concrete testing laboratory is later changed, a superseding TR3 form and TR2 form must be submitted and accepted by the department prior to commencement of concrete operations.

If the concrete testing laboratory on site to conduct testing does not match the laboratory identified on the TR3 form and TR2 form, no concrete operations shall be commenced. In such cases, department's inspectors shall order all concrete work stopped. The department may take actions as appropriate against a concrete testing laboratory conducting testing without having identified responsibility on the TR3 form and TR2 form.

C. Duties and responsibilities. Table BC 1704.4 identifies 10 components of concrete special inspection. The special inspector and concrete testing laboratory's duties shall be apportioned as follows:

Item from Table BC 1704.4	Inspection or Test	Responsibility
1	Inspection of reinforcing steel, including prestressing tendons and placement.	Special inspection agency (TR1)
2	Inspection of reinforcing steel welding in accordance with Table 1704.3, Item 5b.	Special inspection agency (TR1)
3	Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.	Special inspection agency (TR1)
4	Verifying use of required design mix.	Concrete testing laboratory (TR2)
5	At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	Concrete testing laboratory (TR2)
6	Inspection of concrete and shotcrete placement for proper application techniques.	Special inspection agency (TR1)
7	Inspection for maintenance of specified curing temperature and techniques.	Special inspection agency (TR1)
8	Inspection of prestressed concrete: A. Application of prestressing forces B. Grouting of bonded prestressing tendons in the seismic-force-resisting system.	Special inspection agency (TR1)
9	Erection of precast concrete members.	Special inspection agency (TR1)
10	Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	Special inspection agency (TR1)

II. Concrete testing per Item 5 of Table BC 1704.4

A. Licensed concrete testing laboratory. For concrete work subject to testing per Item 5 of Table BC 1704.4, strength cylinders and companion testing required by the building code shall be prepared by a licensed concrete testing laboratory in accordance with section BC 1905.6.1. Additionally all field sampling and testing of concrete shall be conducted by an ACI (American Concrete Institute) Level I Concrete Field Technician or other equivalent certification in accordance with 1 RCNY 101-07(c)(6)(iii). Field technicians shall be employed by the licensed concrete testing laboratory identified on the TR2 form. The concrete testing laboratory shall supply company photo identifications to its staff. Identification shall be presented to department's personnel upon request.

B. Tests. Section BC 1905.6.2 specifies the minimum frequency of strength tests required during concrete placement. Section BC 1905.6.3.1 specifies that strength samples shall be taken in accordance with ASTM C172¹, *Standard Practice for Sampling Freshly Mixed Concrete*. Additionally section BC 1905.6.3.2 states that cylinders for strength test shall be molded and laboratory-cured in accordance with ASTM C31², *Standard Practice for Making and Curing Concrete Cylinders in the Field*. In accordance with these standards and the New York City Building Code, at a minimum the following tests shall be performed on fresh concrete at the time of molding cylinders for strength testing:

1. **Slump.** Slump shall be measured and recorded in accordance with ASTM C143/C143M³, *Test Method for Slump of Hydraulic-Cement Concrete*.
2. **Air Content.** The air content of the concrete shall be measured and recorded with one of the following approved test methods:
 - a. **ASTM C173⁴.** Air content of light weight or normal weight concrete shall be measured and recorded in accordance with ASTM C173/C173M⁴, *Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method*. Use of the Chase Air Indicator is not recognized by the American Concrete Institute as an acceptable method for determining the air content of fresh concrete nor does an ASTM standard for use of this equipment exist.
 - b. **ASTM C231⁵.** Air content of normal weight concrete shall be measured and recorded in accordance with ASTM C231⁵, *Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method*.
3. **Temperature.** Temperature shall be measured and recorded in accordance with ASTM C1064/C1064M⁶, *Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete*.
4. **Unit Weight.** Unit weight shall be measured and recorded in accordance with ASTM C138/C138M⁷, *Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete*. Unit weight of fresh concrete shall be measured in the field at the time of sampling.

C. Test records. Tests shall be recorded on standard field reports by the field technician at the time of testing. Reporting forms shall be similar to those in SP-2 (07) *ACI Manual of Concrete Inspection*, and shall contain at a minimum the following:

1. Name and concrete testing laboratory license number of the concrete testing laboratory
2. Technician name and ACI certification number
3. Date of sampling and testing
4. Name of project
5. Concrete class being placed
6. Volume and location of concrete placed
7. Results of all relevant tests conducted
8. Applicable test procedures performed

D. Curing of cylinders. Cylinders for strength tests shall be initially cured in a field storage curing facility in accordance with section BC 1905.6.3.2 and section 9.2.2 of ASTM C31². Cylinders shall be initially cured for a period not to exceed 48 hours. Cylinders are to be transported to the licensed concrete testing laboratory's facility in accordance with section 10.1 of ASTM C31² and placed into final curing in accordance with section 902.3 of ASTM C31². If concrete specimens are to remain at the construction site in excess of 48 hours, molds shall be removed within 24 (+ or – 8) hours of casting the cylinders and stored in final curing conditions in accordance with section 9.2.3 of ASTM C31².

III. Exemptions from special inspection and testing (Section BC 1704.4)

When the exemptions of section BC 1704.4 are applicable to cast-in-place concrete work and the design applicant elects to utilize one of the exemptions, the applicant shall state on the signed and sealed construction documents that:

“The work meets the criteria of section BC 1704.4 for exemption from the requirement of special inspection of ‘Concrete – Cast-in-Place,’ and I hereby elect such an exemption.”

In such cases, the design applicant may then check “**No**” in Column 3A for “Concrete – Cast-in-Place.”

3A ← Identification of Requirement

Y	N	Special Inspections	Code/Section
<input type="checkbox"/>	<input type="checkbox"/>	Flood Zone Compliance	BC G105
<input type="checkbox"/>	<input type="checkbox"/>	Fire Alarm Test	BC 907, BC 1704.13
<input type="checkbox"/>	<input type="checkbox"/>	Photoluminescent Exit Path Markings	<input checked="" type="checkbox"/> TR7 BC 1026.11
<input type="checkbox"/>	<input type="checkbox"/>	Emergency Power Systems (Generators)	BC 1704.13, BC 2702
<input type="checkbox"/>	<input type="checkbox"/>	Structural Steel - Welding	BC 1704.3.1
<input type="checkbox"/>	<input type="checkbox"/>	Structural Steel - Erection & Bolting	BC 1704.3.2, BC 1704.3.3
<input type="checkbox"/>	<input type="checkbox"/>	Structural Cold-Formed Steel	BC 1704.3.4
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Concrete - Cast-In-Place	BC 1704.4
<input type="checkbox"/>	<input type="checkbox"/>	Concrete - Precast	BC 1704.4

In addition, when the work is not subject to special inspection for “Concrete – Cast-in-place”, the requirement for TR2 form and/or TR3 form are likewise inapplicable and the design applicant may also check “No” in Column 3A for TR2 form and/or TR3 form, without any additional certifications or statements. Where the requirement for TR2 form and/or TR3 form are inapplicable, but the BIS system had auto-populated the requirement, the plan examiner shall waive the items for such requirement.

Y	N	Special Inspections	Code/Section
<input type="checkbox"/>	<input type="checkbox"/>	Excavation - Sheeting, Shoring, and Bracing	BC 1704.19, BC 3304.4.1
<input type="checkbox"/>	<input type="checkbox"/>	Soil Percolation Test - Drywell	<input checked="" type="checkbox"/> BC 1704.20.1
<input type="checkbox"/>	<input type="checkbox"/>	Soil Percolation Test - Septic	<input checked="" type="checkbox"/> BC 1704.20.1
<input type="checkbox"/>	<input type="checkbox"/>	Site Storm Drainage Disposal and Detention System Installation	BC 1704.20
<input type="checkbox"/>	<input type="checkbox"/>	Septic System Installation	BC 1704.20
<input type="checkbox"/>	<input type="checkbox"/>	Sprinkler Systems	BC 1704.21
<input type="checkbox"/>	<input type="checkbox"/>	Standpipe Systems	BC 1704.22
<input type="checkbox"/>	<input type="checkbox"/>	Heating Systems	BC 1704.23
<input type="checkbox"/>	<input type="checkbox"/>	Chimneys	BC 1704.24
<input type="checkbox"/>	<input type="checkbox"/>	Firestop, Draftstop, and Fireblock systems	BC 1704.25
<input type="checkbox"/>	<input type="checkbox"/>	Aluminum Welding	BC 1704.26
<input type="checkbox"/>	<input type="checkbox"/>	Seismic Isolation Systems	BC 1707.8
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Concrete Test Cylinders	<input checked="" type="checkbox"/> TR2 BC 1905.6
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Concrete Design Mix	<input checked="" type="checkbox"/> TR3 BC 1905.3

IV. Exemptions from testing (Table BC 1704.4, Items 4 and 5 only; TR3 form and TR2 form)

In cases where “Concrete – Cast-in-Place” is identified by the design applicant as a special inspection, the design applicant may elect to waive Items 4 and 5 of Table BC 1704.4, and therefore waive the requirements for TR2 form and/or TR3 form for work meeting all of the following criteria:

- The total structural concrete specified for the project is less than 50 cubic yards (38 m³);
- The structural design of the concrete is based on a specified compressive strength, $f'c$, no greater than 2,500 pounds per square inch (psi) (17.2 MPa), regardless of the compressive strength specified in the construction documents or used in the construction; and
- The concrete to be placed is specified to have a compressive strength of at least 4,000 psi (28 MPa).

When such an election by the design applicant is made to waive concrete testing requirements, the applicant shall state on the signed and sealed construction documents that:

“The work meets the exemption criteria of Buildings Bulletin 2009-026, Item IV, and I hereby elect to waive the requirement of concrete testing and of the TR2 form and/or TR3 form.”^a

In such cases, the design applicant may then check “No” in Column 3A for TR2 form and/or TR3 form. Where the applicant elects to waive the requirement for TR2 form and/or TR3 form, but the BIS system had auto-populated the requirement, the plan examiner shall waive the items for such requirement. However, the design applicant must still check “Yes” in Column 3A to identify “Concrete – cast in place,” leaving Items 1 through 4, and 6 through 10 of Table BC 1704.4 applicable to the special inspector responsible for the “Concrete – Cast-in-Place” item.

Y	N	Special Inspections	Code/Section
<input type="checkbox"/>	<input type="checkbox"/>	Excavation - Sheeting, Shoring, and Bracing	BC 1704.19, BC 3304.4.1
<input type="checkbox"/>	<input type="checkbox"/>	Soil Percolation Test - Drywell	BC 1704.20.1
<input type="checkbox"/>	<input type="checkbox"/>	Soil Percolation Test - Septic	BC 1704.20.1
<input type="checkbox"/>	<input type="checkbox"/>	Site Storm Drainage Disposal and Detention System Installation	BC 1704.20
<input type="checkbox"/>	<input type="checkbox"/>	Septic System Installation	BC 1704.20
<input type="checkbox"/>	<input type="checkbox"/>	Sprinkler Systems	BC 1704.21
<input type="checkbox"/>	<input type="checkbox"/>	Standpipe Systems	BC 1704.22
<input type="checkbox"/>	<input type="checkbox"/>	Heating Systems	BC 1704.23
<input type="checkbox"/>	<input type="checkbox"/>	Chimneys	BC 1704.24
<input type="checkbox"/>	<input type="checkbox"/>	Firestop, Draftstop, and Fireblock systems	BC 1704.25
<input type="checkbox"/>	<input type="checkbox"/>	Aluminum Welding	BC 1704.26
<input type="checkbox"/>	<input type="checkbox"/>	Seismic Isolation Systems	BC 1707.8
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concrete Test Cylinders	TR2 BC 1905.6
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concrete Design Mix	TR3 BC 1905.3
Y	N	Special Inspections	Code/Section
<input type="checkbox"/>	<input type="checkbox"/>	Flood Zone Compliance	BC G105
<input type="checkbox"/>	<input type="checkbox"/>	Fire Alarm Test	BC 907, BC 1704.13
<input type="checkbox"/>	<input type="checkbox"/>	Photoluminescent Exit Path Markings	TR7 BC 1026.11
<input type="checkbox"/>	<input type="checkbox"/>	Emergency Power Systems (Generators)	BC 1704.13, BC 2702
<input type="checkbox"/>	<input type="checkbox"/>	Structural Steel - Welding	BC 1704.3.1
<input type="checkbox"/>	<input type="checkbox"/>	Structural Steel - Erection & Bolting	BC 1704.3.2, BC 1704.3.3
<input type="checkbox"/>	<input type="checkbox"/>	Structural Cold-Formed Steel	BC 1704.3.4
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concrete - Cast-In-Place	BC 1704.4

While these exemptions do not require verification be submitted to the department on a TR3 form by a concrete testing laboratory that the required concrete mix design was used, a concrete mix design is still required. The mix design shall be submitted on the concrete producer’s letterhead to the design applicant for review of compliance with the construction documents prior to the concrete placement. The design applicant shall maintain a copy of the design mixes that was approved for use for the project, and provide copies to the special inspector.

^a Typically, this would be noted on the same sheet that identifies all the required special inspections. For applications submitted prior to the issuance of this bulletin, such a statement may be on a letter or AI1 form, provided it is signed and sealed by the design applicant.

Summary of Referenced Standards

- ¹ ASTM C172-99 “*Standard Practice for Sampling Freshly Mixed Concrete*”
- ² ASTM C31/C31M-98 “*Practice for Making and Curing Test Specimens in the Field*”
- ³ ASTM C143/C143M “*Test Method for Slump of Hydraulic-Cement Concrete*”
- ⁴ ASTM C173/C173M “*Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method*”
- ⁵ ASTM C231 “*Test Method for Air Content of Freshly Mixed Concrete by Pressure Method*”
- ⁶ ASTM C1064/C1064M “*Standard Test Method for Temperature of Freshly Mixed Hydraulic Cement Concrete*”
- ⁷ ASTM C138/C138M “*Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete*”