



# Concrete – Rapid Strength Concrete

## Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	09-30-2022	Original Issue	Richard Foley

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## Background

This process establishes Structure Construction (SC) responsibilities and procedures for review and authorization of material submittals and quality assurance test results pertaining to furnishing and curing rapid strength concrete (RSC) used in bridge superstructure and approach slab work.

This Bridge Construction Memo (BCM) addresses the delivery of RSC by volumetric proportioning trucks, which are calibrated under the [Material Plant Quality Program](#) (MPQP) administered locally in each Caltrans District. The MPQP certification meets the requirements of [California Test 109, Methods for Testing of Material Production Plants](#), for volumetric batch mixer trucks. Once calibrated, the volumetric truck will get an MPQP inspection tag which is valid for 30 days. Trucks must be calibrated for each mix design. If a truck is re-calibrated for a different mix design and then returns to the project, re-calibration is required. The aggregate used in the calibration must also be used in production; changing aggregate requires re-calibration.

Additional unique contract requirements for RSC are detailed in the [Contract Specifications](#):

- Section 90-1.01C, *Concrete – General – Submittals*, for mix design and prequalification requirements.
- Section 51-1.03C-D, *Concrete Structures – General – Construction – Preparation and Placing Concrete*.
- Section 51-5, *Concrete Structures – Approach Slabs*.
- Section 51-1.03H, *Concrete Structures – General – Construction – Curing Concrete Structures*, for unique requirements of curing RSC for bridge decks.

- Section, 51-1.01D(2)(b), *Concrete Structures – General – Quality Assurance – Quality Control – Rapid Strength Concrete*, for various information, prequalification, opening age, etc. Note: This is NOT for members in flexure, nor approach slabs for acceptance criteria of structure elements.
- Section 51-1.02D, *Concrete Structures – General – Rapid Strength Concrete*, for bridge decks or PCC overlays.

This BCM does not address rapid setting concrete, used primarily for surface patching and bonding dowels, as specified in the *Contract Specifications*, Section 60, *Existing Structures*.

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the *Contract Specifications*, Section 90-3, *Concrete – Rapid Strength Concrete*, that this BCM is based on as identified in the title block above. The information in the *Contract Specifications* typically will not be repeated in the text of this BCM.

## **Process Inputs**

1. Per the *Contract Specifications*, submittals for:
  - a. Volumetric Proportioning
  - b. Certifications of Compliance
  - c. Weighmaster Certificates
  - d. Daily Production Data

## **Procedure**

1. All work associated with this process is charged as [Project Direct – Construction](#).
2. Inspection of field work for this process is:
  - a. [Continuous](#) for verification of RSC volumetric proportioning activities at the job site and placement of concrete for structure elements.
3. Before construction begins:
  - a. Review the [contract documents](#) and the following reference documents:
    - i. *Construction Manual*, Chapter 4, *Construction Details*, [Section 90](#), *Concrete*
    - ii. [Attachment 1](#), *Volumetric Proportioning of Rapid Strength Concrete*
    - iii. [BCM 51-1.01](#), *Concrete Structures – General*
    - iv. [BCM 51-1.03C-D](#), *Concrete Structures – General – Construction – Preparation and Placing Concrete*

- v. [BCM 51-1.03H](#), *Concrete Structures – General – Construction – Curing Concrete Structures*
  - vi. [BCM 51-5](#), *Concrete Structures – Approach Slabs*
  - vii. [BCM 90-1](#), *Concrete – General*
- b. Ensure SC field staff are ACI certified with valid test certifications. At a minimum, for RSC the staff must be certified for [California Test 125](#), *Method of Test for Sampling Highway Materials and Products Used in the Roadway Pavement Structure Sections*, [California Test 233](#), *Method of Test for Surface Moisture in Concrete Aggregates by the Displacement Method (Field Method)*, and [California Test 533](#), *Method of Test for Ball Penetration in Fresh Portland Cement Concrete*.
  - c. Discuss upcoming concrete placement activities with Caltrans District weights and measures coordinator to coordinate plant inspections. If a volumetric truck will be used, ensure that it is calibrated and tagged by Caltrans' Material Plant Quality Program (MPQP).
  - d. When calibration is performed more than 100 miles from project limits, remind the Resident Engineer to take the specified deduction for each calibration session.
  - e. Review and authorize the RSC mix design per [BCM 90-1](#), *Concrete – General*.
  - f. Review certificates of compliance for aggregate, cementitious material, and admixtures used for calibration testing to ensure the certificates delivered during production are for the same materials.
  - g. When a non-Portland cement has been submitted as part of the concrete mix design, review and authorize the RSC curing method.
  - h. For RSC work requiring lane closures, request and review a contingency plan for RSC placement per the *Construction Manual*, Chapter 2, *Safety and Traffic*, [Section 2-214D](#), *Construction Contingency Plan*.
4. During Construction:
    - a. Verify volumetric truck MPQP is calibrated for the current mix design and that an MPQP acceptance sticker is attached to the truck.
    - b. Verify weighmaster certificates contain components per the *Contract Specifications*.
    - c. Field verify concrete uniformity test results (California Test 533) by comparing two test samples of mixed concrete. Each sample is an average of three tests and the tested samples must be from the same load.

- i. The difference in penetration between the two concrete test samples must not exceed 5/8 inch per the *Contract Specifications*, Section 90-3.02A, *Concrete – Rapid Strength Concrete – Materials – General*.
  - d. Verify curing method used for RSC is authorized.
  - e. Open the lane to traffic per *Contract Specifications*, Section 51-1.01D (2)(b)(ii), *Prequalification of Mix Design*.
  - f. Document all inspection, construction, and quality assurance activities, pertinent to this BCM, in the Daily Reports per [BCM C-7](#), *Daily and Weekly Reports*.
5. File all project documentation (correspondence, materials acceptance documentation, Daily Reports, etc.) in the appropriate category in the project records as specified in the *Construction Manual*, [Section 5-102](#), *Organization of Project Documents*.

## **Process Outputs**

1. Authorized RSC submittals
2. RSC field testing and analysis results/data
3. Daily Reports
4. Authorized Certificates of Compliance, Weighmaster Certificates, and Daily Production Data

## **Attachments**

[Attachment 1](#): *Volumetric Proportioning of Rapid Strength Concrete*