



# Concrete Structures – Mass Concrete

## Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	01-21-2022	Original Issue	Richard Foley

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## Background

This process establishes Structure Construction (SC) responsibilities and procedures for review and authorization of submittals, quality assurance, materials, and construction for mass concrete elements.

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the [Contract Specifications](#), Section 51-6, *Concrete Structures – Mass 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. Contract work requiring mass concrete
2. Submittals required by the *Contract Specifications* for mass concrete

## Procedure

1. All work associated with this process is charged as [Project Direct – Construction](#).
2. Inspection of field work for this process is:
  - a. [Benchmark](#) for inspection of components of contractor’s thermal control system prior to concrete placement.
  - b. [Continuous](#) during mass concrete placement.
3. Before construction begins:

- a. Review the following to gain a better understanding of what mass concrete is, what the concerns are, what controls are necessary, etc.:
    - i. *Concrete Technology Manual, [Chapter 7](#), Caltrans Advancements/High Performance Concrete*, sub-section titled, *Mass Concrete*.
    - ii. [2011 SC Winter Training presentation](#), *Mass Concrete*.
    - iii. [Bridge Design Memo 5.13](#), *Mass Concrete Prediction Nomograph*
  - b. Review [BCM 51-1.03 \(C-D\)](#), *Concrete Structures – General – Construction – Preparation and Placing Concrete*.
  - c. Review contract documents for location of structural elements with mass concrete requirements. [Attachment 1](#), *When the Mass Concrete Specification Applies*, includes examples of how the location of mass concrete is called out in the *Special Provisions*.
  - d. Verify that all structural elements large enough to be classified as mass concrete are identified in the contract documents. Coordinate with the Resident Engineer (R.E.) to issue a Change Order (C.O.) if mass concrete specifications are required but not identified.
  - e. Review and authorize the contractor's thermal control plan.
  - f. Review the mass concrete mix design in accordance with [BCM 90-1](#), *Concrete – General*.
  - g. Discuss with the contractor how they intend to obtain an average daily air temperature.
  - h. Discuss contingencies with the contractor in the event of thermal control system failure during concrete placement.
  - i. Review with and ensure that the Assistant Structure Representative understands the authorized thermal control plan.
  - j. If submitted, review the Value Engineering Change Proposal (VECP) submitted by the contractor for adding or removing mass concrete specifications for structural elements. Consult the Structure Designer and Materials Engineering and Testing Services (METS) Representative for assistance with the review and authorization of the VECP. Coordinate with the R.E. to issue a C.O. if the VECP is authorized. Refer to the *Contract Specifications*, Section 4-1.07, *Scope of Work – Value Engineering*, for more information on VECPs. Get concurrence from the district construction deputy director if the VECP is unacceptable, as per *Construction Manual, [Section 3-405](#), Value Engineering*.
4. During construction:
- a. Verify compliance with the authorized thermal control plan submittal:

- i. Coordinate and conduct a pre-pour meeting with all parties involved.
  - ii. Coordinate with the contractor to verify that the primary and redundant sets of temperature monitoring sensors are functioning prior to the concrete pour.
  - iii. Coordinate with the contractor to witness pressure test(s) for the cooling system, if applicable, immediately prior to the concrete pour.
  - iv. Verify that thermal control pipes, sensors, and wire runs are secured prior to the concrete pour and throughout concrete placement.
- b. Be present throughout the concrete pour to monitor temperature readings at the concrete delivery vehicle and within the forms, in addition to typical inspection duties during concrete pours in accordance with BCM 51-1.03(C-D), *Concrete Structures – General – Construction – Preparation and Placing Concrete*.
  - c. Review the contractor's daily progress reports and temperature data (informal submittal) for temperature gradient compliance with authorized submittal.
  - d. Reject mass concrete elements that do not comply with the temperature acceptance criteria. Request a mitigation plan from the contractor. Consult with the Structure Designer and the METS Representative for the possibility of rejected element being fit for purpose:
    - i. For replaced elements, review the contractor's modified thermal control plan submittal.
    - ii. If mitigation plan is authorized, verify and documents that the corrective action is completed as planned.
  - e. For mechanical cooling systems, verify that all cooling pipes have been grouted after concrete placement has been completed and the monitoring period has elapsed with no issues.
  - 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*.
  - g. Take daily progress photos and file in Category 14 of the project files.
5. Following Construction:
- a. Compute payment quantities for mass concrete bid items as described in the contract documents and provide these quantities to the R.E.
  - b. Complete as-built plans per [BCM C-6](#), *Required Documents to be Submitted During Construction*.

6. File all test results and Daily Reports in the appropriate category in the project records as specified in the *Construction Manual*, [5-102](#), *Contract Administration – Organization of Project Documents*.

## **Process Outputs**

1. Authorized Thermal Control Plan submittal
2. Mass Concrete element integrated into the structure
3. Contractor Daily Progress Reports including daily temperature data

## **Attachments**

[Attachment 1](#), *When the Mass Concrete Specification Applies*.