Concrete Structures – General – Miscellaneous Construction

Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	05-31-2022	Original Issue	Richard Foley

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Background

This process identifies Structure Construction (SC) responsibilities and procedures for general miscellaneous concrete construction, including:

1. Paint the bridge name and number on the structure, temporary bumpers at the ends of bridges, and bell recesses structure-pipe interface
2. Placing mortar
3. Drill and grout or drill and bond dowels into concrete structures
4. Nonskid abrasive finish
5. Drains in walls and existing decks
6. Utility facilities
7. Concrete headers and steel plates
8. Diaphragm bolsters
9. Hinge tiedowns

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the *Contract Specifications* (CS), Section 51-1.03E, *Concrete Structures – General – Miscellaneous Construction,* 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. Form CEM-3101, *Notice of Materials to be Used*
2. Contractor scheduled construction activities
3. Authorized submittals

Procedure

1. All work associated with this process is charged as Project Direct – Construction
2. Inspection of field work for this process is:
   a. Intermittent inspection for miscellaneous construction activities
   b. Continuous for hinge tiedown stressing
3. Before construction begins*:*
   a. Obtain copy of authorized submittals and shop drawings.
   b. Review BCM 51-1.01, *Concrete Structures – General*.
   c. Review manufacturer recommendation for authorized materials.
   d. Review Caltrans Code of Safe Practices, manufacturers recommendations, and any applicable Safety Data Sheets for anticipated field operations and materials to be used.
   e. Ensure availability of calibrated stressing equipment (for hinge tiedowns).
   f. Contact Materials Engineering and Testing Services Materials Representative for assistance when contractor submits materials which are not on the Authorized Materials List, for use on the project.
   g. Review Attachment 1, *Miscellaneous Construction for Concrete Structures*, for additional information on Placing Mortar, Drill and Bond Dowels, Drill and Grout Dowels and Drill and Bond Dowels (Chemical Adhesive).
4. During construction*:*
   a. For miscellaneous construction of concrete structures, the following general requirements include:
      i. For Structure Identification:
         1. Verify the location, correct nomenclature in stencil preparation, and size of lettering when the contractor paints the bridge name, number, year constructed, and bent number.
         2. Verify that bent lettering is placed 10 feet above roadway, finished grade, or water surface elevation.

3. Verify that barrier lettering is placed at two thirds of the height of the barrier.
4. Verify the contract requirements are met as specified in CS:
    a. Section 78-4.03C(3), *Incidental Construction – Painting Concrete – Construction – Miscellaneous Coatings – Application*, for painting concrete.
    b. Section 83-1.03D, *Railings and Barriers – General – Construction – Miscellaneous Construction*, for bridge identification on the bridge barrier.

ii. For temporary bumpers:
1. Prior to allowing equipment or machinery across a bridge or at-grade culvert, verify temporary bumpers (typically wood) are installed to protect the concrete edge.

iii. When pipes enter the structure, either:
1. Verify the pipe is cast into the structure, or
2. Verify a bell shape recess at the entry point is cast and filled with mortar after the pipe is placed.

b. For placing mortar:
i. Verify cleanliness and dryness of concrete surfaces to be in contact with mortar; verify proper placement and curing of the mortar.
ii. Verify the contract requirement for placing mortar as specified in the CS:
1. Section 51-1.02F, *Concrete Structures – General – Materials – Mortar*
2. Section 90-1.03B, *Concrete General – Construction – Curing Concrete*

c. For Drill and bond dowels:
i. Prior to use, verify the bonding material delivered to project matches authorized submittal.
ii. Verify size, depth, and location of drilled holes for dowels.
iii. If rebar congestion prevents per plan installation of dowels, discuss with designer, and apply approved corrective measures.
iv. Obtain a certificate of compliance for each shipment of bonding material.
v. Verify application of bonding material in accordance with manufacturer's instructions.
vi. After setting and curing period, check all dowels to verify bonding.

vii. Verify the contract requirements are met for repairing rejected holes that will not be encased in concrete, with bonding material as specified in CS, 51-1.02C, *Concrete Structures – General – Materials – Bonding Materials*

d. For drill and grout dowels:

i. Prior to use, verify the cementitious material delivered to project:

1. Matches the authorized informational submittal regarding drill and grout dowls

2. Conforms with CS, Section 51-1.02G, *Concrete Structures – General – Materials – Grout*.

ii. Verify size and location of drilled holes for dowels.

iii. If rebar congestion prevents per plan installation of dowels, discuss with designer and apply approved corrective measures.

iv. Inspect placement of grout, dowels, and curing method.

v. After curing period, check all dowels to verify bonding.

e. For drill and bond dowel chemical adhesive system:

i. Prior to use, verify the chemical adhesive material delivered to project matches authorized submittal and conforms to CS Section 51-1.02H, *Concrete Structures – General – Materials – Chemical Adhesives*.

ii. If installing dowels in new concrete, verify that the concrete has cured for at least 28 days.

iii. Verify size and location of drilled holes for dowels.

iv. If rebar congestion prevents per plan installation of dowels, discuss with designer, and apply approved corrective measures.

v. Verify application of chemical adhesive material in accordance with manufacturer's instructions.

vi. After curing, check all dowels to verify bonding.

f. For nonskid abrasive finish:

i. Prior to concrete placement, discuss nonskid abrasive finish requirements with the contractor and verify materials are available.

ii. Verify grit particles are uniformly spread at required rate over a troweled surface and properly impressed into the surface.

g. For drains in walls:

i. Prior to concrete placement, verify tubing required for drain holes is securely situated in forms at required size and intervals with required end coverings.

ii. Verify that hydrostatic pressure relief holes are installed properly.

h. For deck bleeder drains:

i. Discuss proposed deck bleeder drain locations with the Resident Engineer (R.E.) prior to locating the deck drains.

ii. Verify that materials to be used comply with the requirements in CS 51-1.02J, *Concrete Structures – General – Materials – Miscellaneous Materials.*

iii. Avoid locations where drainage falls on traffic or environmentally sensitive areas from the deck bleeder drain.

iv. Verify the proper installation sequence of drains with respect to the placement of the deck seal and Hot Mix asphalt.

i. For utility facilities:

i. Coordinate utility installation activities with the District Utility Coordinator, R.E., contractor, utility owner, and other potential stakeholders.

ii. Verify accessories for utility facilities to be embedded in concrete are provided to the contractor and installed prior to concrete placement.

j. For concrete headers and steel plates:

i. Field verify location of headers and steel plates.

k. For diaphragm bolsters:

i. If using structural shotcrete, refer to BCM 53-2, *Shotcrete – Structural Shotcrete*.

ii. Verify aggregates are 3/8-inch combined aggregate gradation and complies the contract requirements in the CS, 90-1.02C(4)(d), *Concrete – General – Material – Aggregates – Aggregate Gradation – Combined Aggregate Gradation*

l. For hinge tiedowns:

i. Conduct a pre-activity meeting with the contractor.

ii. Verify construction sequence and timeline are followed.

iii. Observe, verify, and document hinge tiedown stressing.

iv. Monitor hinge displacement and make appropriate adjustments prior to hinge and adjacent superstructure casting.

m. 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. Following construction:

a. File all project documentation (correspondence, materials acceptance documentation, test results, 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. Completed miscellaneous construction items complying with contract requirements
2. Material certifications and completed daily reports
3. For projects with Hinge tiedowns - documentation of stressing procedure

Attachments

Attachment 1, *Miscellaneous Construction for Concrete Structures*