Concrete Structures – Joints

Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	03-30-2023	Original Issue	Richard Foley

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Background

This process establishes Structure Construction (SC) responsibilities and procedures for submittal review, quality assurance, materials inspection, construction of, and payment for constructing, sealing, and protecting joints in concrete structures.

All deck expansion joints and joint seals, except for special cases, will be specified by seal type and movement range(MR). The success or failure of joint seals will depend greatly on the administration of the contract documents.

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the *Contract Specifications*, Section 51-2, *Concrete Structures – Joints*, 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*, which should list:
   a. All joint seal types and components
   b. Snowplow deflectors
   c. Waterstops
   d. Strip waterstops
2. Certificates of compliance for:
   a. Sealed joints (Type A, AL, and B)

b. Alternative joint seal assemblies
c. Joint seal assemblies, MR over 4 inches
d. Asphaltic plug joint seals
e. Waterstops
f. Polyethylene material for snowplow deflectors

3. Certified test report for:
   a. Sealed joints (Type A, AL, and B)
   b. Alternative joint seal assemblies
   c. Joint seal assemblies, MR over 4 inches
   d. Asphaltic plug joint seals
   e. Waterstops
4. Shop drawings for:
   a. Alternative joint seal assemblies
   b. Joint seal assemblies, MR over 4 inches
   c. Asphaltic plug joint seals
5. Work plan for cleaning expansion joints
6. 10-pound test sample of binder material for asphaltic plug joint seal

Procedure

1. All work associated with this process should be charged to Project Direct – Construction.
2. Inspection of field work for this process is:
   a. Continuous during joint seal placement.
3. Before construction begins:
   a. Review the following:
      i. Contract documents
      ii. *Concrete Technology Manual*, Chapter 6, *Structure Concrete Repair and Rehabilitation – Spalling*
      iii. Attachment 1, *Guidance for Verifying Contract Compliance for Sealed Joints*
      iv. Resident Engineer's (RE) Pending File

v. Field Engineer Training, Section 07, Approach Slab to Punchlist, for project photos and details to assist SC staff in verifying contract compliance.

vi. *Construction Manual*,

1. Section 3-806B, *General Provisions – Prosecution and Progress – Delays – Material Shortage*
2. Section 4-5103E, *Construction Details – Concrete Structures – During the Course of Work – Joints and Bearings*
3. Section 4-5104, *Construction Details – Concrete Structures – Quality Control*
4. Section 6-102C, *Sampling and Testing – Sample Types and Frequencies – Types of Sampling and Testing – Acceptance Samples and Tests*
5. Section 6-203A (5), *Sampling and Testing – Acceptance of Manufactured or Fabricated Materials and Products – Manufactured or Fabricated Materials and Products Acceptance – Source Inspection – Source Inspected Materials Acceptance*
6. Section 6-203C, *Sampling and Testing – Acceptance of Manufactured or Fabricated Materials and Products –Manufactured or Fabricated Materials and Products Acceptance – Materials Accepted on the Basis of a Certificate of Compliance*
7. Section 8-104F, *Employment Practices – Labor Compliance – Covered and Non-Covered Employment – Work Performed by Vendors, Suppliers, and Fabricators*

b. Review and authorize or reject submittals. Communicate and distribute authorized submittals to Assistant Structure Representatives (ASRs) and the RE for use in verifying contract compliance.

c. For joint seals:

i. Verify that the joint seals were tested by Materials Engineering and Testing Services (METS). Contact METS Representative to verify lot number on the certificate of compliance.

d. For existing structures:

i. Field verify joint gap, limits of joint replacements, and type of existing seal.

ii. Field verify the need for any spall repair and waterstop replacement.

e. For joint seal assemblies and asphaltic plug joint seals:

i. Verify the Contractor submitted shop drawings to SC Office Associates per the *Contract Specifications*, Section 5-1.23B(2), *Control of Work – General – Submittals – Action Submittals – Shop Drawings*.

ii. Perform a simultaneous review of the shop drawings with the designer. The Designer authorizes the shop drawings.

f. For asphaltic plug joint seals:

i. Confirm METS has released the binder for construction.

ii. Verify the Contractor submitted:

1. Shop drawings for the proposed asphaltic plug joint seal system, and evidence from the manufacturer of at least 2 years of satisfactory service under similar conditions.

2. Certificate of compliance for asphaltic plug joint seals.

4. During construction:

a. For joint seals:

i. Confirm all joint seal materials have been released for construction by METS.

ii. For existing structures:

1. Remove joint filler materials to the depth of the joint seal.

2. Remove debris and joint filler materials from the joint to the bearing surface.

3. Verify if joints are clean and joints (including waterstop) are not damaged. Might need to write a Change Order if additional repair or cleaning is needed but not specified in contract documents.

iii. Prior to installation of any joint seal, verify the deck finish has been completed per the requirements in the *Contract Specifications* and guidance in BCM 51-1.03F(5-6), *Concrete Structures – General – Finishing Roadway and Pedestrian Overcrossing Surfaces*.

iv. For Type A and Type AL joint seals:

1. For new structures:

a. Notify the Contractor of the required sawcut groove width.

b. Verify width and depth of the sawcut groove.

2. For existing structures:

a. Verify width and depth of the existing joint groove.

b. Notify the Contractor of the required sawcut groove width if the existing joint groove is inadequate. This work is change order work.

3. Record the actual groove width and the deck temperature at the time of joint seal placement.

v. For Type B joint seals:

1. Notify the Contractor of the required sawcut width.
2. Verify the sawcut groove width, depth, and the need for any seal splice.
3. Record the groove width and the superstructure temperature.

vi. For joint seal assemblies:

1. For new structures:

a. Prior to deck concrete placement, verify the dimensions of the blocked-out recess match those required on the authorized shop drawings.

2. For existing structures:

a. Verify the dimensions of the demolished recess match those required on the authorized shop drawings.

3. Verify joint seal assembly frame and neoprene gland or elastomer are installed per the requirements of the contract documents and authorized shop drawings.
4. Record the joint seal assembly opening width and the deck temperature at the time of concrete placement in the blocked-out recess.
5. For joint seal assemblies with MR greater than 4 inches verify that a qualified representative of the assembly manufacturer is present during the installation of the 1st assembly and available during remaining installations.

vii. For asphaltic plug joint seals:

1. Confirm the Contractor has arranged for a technical representative from the asphaltic plug joint seal manufacturer to be on site during installation.
2. Verify removal limits of existing asphaltic concrete deck and expansion dams match those in the contract documents.
3. Repair spalls in the existing deck at the removal limits, if needed.

4. Confirm water stops (if any), backer rods, binder, aggregates, and traffic bearing plates are installed per the requirements of the contract documents, authorized shop drawings, and manufacturer's instructions.

viii. Verify the completed joint seal demonstrates compliance with contract requirements, applicable authorized submittals and manufacturer's recommendations.

ix. Complete sections specified "To be filled in by SR" on Form BD-0307, *Joint Movement Calculations-LRFD*, provided in RE Pending File.

x. Place expansion joint scribes as shown on Attachment 1, *Guidance for Verifying Contract Compliance for Sealed Joints*.

b. For snowplow deflectors:

i. Review submittals and certificates of compliance.

ii. Prior to installation of any snowplow deflectors, verify that joint repair and joint seal work have been completed.

iii. Verify the location of the drill and bonding anchorage devices used to secure the snowplow deflectors. Verify drilled holes diameter, depth, and cleanliness.

iv. Verify that installation of anchorage devices and the snowplow deflectors allow for free movement of the bridge joint.

v. Verify gaps shown in the project plans between the snowplow deflector, the concrete, and the anchorage devices needed for the free movement of the bridge joint are clean.

vi. Where shown in the project plans, verify gaps cleaned in step 4.b.v. is filled with silicone to prevent dirt from entering.

vii. Where shown in the project plans, verify a thread locking system is applied to the anchorage devices.

c. For sliding joints:

i. Verify that a uniform film of silicone grease is applied to the upper surface of the neoprene strip before placing the sheet metal.

ii. Verify that concrete surfaces where neoprene strips are placed, have a level plane, and finished with a steel trowel.

d. For waterstops:

i. Verify that the waterstop is secured in place prior to placing concrete.

ii. Verify that any waterstop that is out of position after placing concrete, is reset back into position by removing the concrete.

iii. Verify that the waterstop is cut and spliced as necessary at change of directions to avoid buckling or distortion

e. For strip waterstops:

i. Verify that concrete surfaces to receive a waterstop are abrasive blast cleaned.

ii. Verify that surfaces where adhesive to be applied have a cloth finish or buffed finish. Verify that surfaces are clean and dry when adhesive is applied.

iii. Verify that when neoprene sheets are joined, sheets are lapped at least 12 inches, adhesive is applied to both faces per manufacturer recommendation rate, the adhesive is allowed to dry to an aggressive tack and that sheets are brought together and rolled in both directions to obtain a tight bond.

iv. Verify that a protective board is used to cover the installed strip waterstops and that the board remains in place until backfilling is complete.

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. Following construction:

a. Record any changes to the as-built project plans as outlined in BCM C-6, *Required Document to be Submitted During Construction*.

6. File all calculations, materials acceptance documentation, and daily reports in the appropriate category in the project records as specified in the *Construction Manual*, Chapter 5, Section 5-102, *Contract Administration – Project Records and Reports – Organization of Project Documents*.

Process Outputs

1. Authorized submittals and materials
2. Completed Form BD-0307, *Joint Movement Calculations-LRFD*
3. Daily reports
4. Joint seals installed per contract documents
5. Expansion joint scribes installed
6. As-built project plans

Attachments

1. Attachment 1, *Guidance for Verifying Contract Compliance for Sealed Joints*