



Waterproofing

Revision and Approval

Revision	Date	Nature of Changes	Approved By
0	04-25-2023	Original Issue	Richard Foley

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Background

This process establishes Structure Construction (SC) responsibilities and procedures for the review and authorization of submittals, quality assurance, materials, and construction for all types of waterproofing described in Section 54, *Waterproofing*, of the [Contract Specifications](#).

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review the *Contract Specifications*, Section 54, *Waterproofing*. Information in the *Contract Specifications* typically will not be repeated in the text of this BCM.

Process Inputs

1. [Contract documents](#) requiring the use of waterproofing materials
2. [Form CEM 3101](#), *Notice of Materials to Be Used*

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](#) during surface preparation work for all types of waterproofing materials.

- b. [Intermittent](#) during all work other than specifically specified as benchmark above and continuous below for preformed membrane waterproofing, waterproofing and cover, and deck seals.
 - c. [Continuous](#):
 - i. For asphalt membrane waterproofing and dampproofing, during all work other than surface preparation.
 - ii. When verifying that material is not damaged during unrolling for preformed membrane waterproofing, waterproofing and cover, and deck seals.
 - iii. During placement of slurry leveling course.
 - iv. During application of silane waterproofing treatment.
3. Before construction begins:
- a. Verify with the Resident Engineer (RE) that the Contractor has submitted [Form CEM-3101](#), *Notice of Materials to Be Used*, and all waterproofing materials to be used have been included.
 - b. Review the contract documents for waterproofing requirements, including American Association of State Highway and Transportation Officials (AASHTO), American Society for Testing and Materials (ASTM), and The Society for Protective Coatings (SSPC) standards referenced in the contract documents.
 - i. The aforementioned standards can be found in the “Engineering Workbench” section of the [Caltrans Transportation Library](#) for which registration is required.
 - c. Review the baseline schedule and updates to determine when the Contractor intends to perform waterproofing work.
 - d. Review the *Construction Manual*, Chapter 4, [Section 4-54](#), *Construction Details – Waterproofing*.
 - e. For membrane waterproofing and protective cover to be installed on deck surfaces of railroad underpasses, review the *AREMA Manual for Railway Engineering*, Chapter 8, part 29. Contact the [Caltrans Transportation Library](#) to request a pdf copy of the relevant sections of the *AREMA Manual for Railway Engineering*.
 - f. Review [Attachment 1](#), *Waterproofing Technical Information*.
 - g. Verify that the quantity of waterproofing materials required matches the limits of application/installation.
 - h. Determine if deck repair work will be needed prior to application/installation of waterproofing materials on deck surfaces. If so, perform this work in

- accordance with [BCM 60-3.02](#), *Existing Structures – Structure Rehabilitation – Bridge Deck Repair and Preparation*.
- i. Coordinate with the Materials Engineering and Testing Services Representative ([METS Rep](#)) regarding quality assurance (QA) testing of field samples as required in *Construction Manual*, Chapter 6, [Section 6-107](#), Table 6-1.18, *Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials*.
 - j. Review and authorize the following submittals:
 - i. Certificates of compliance (COCs) for preformed membrane sheets.
 - ii. Product data sheets, manufacturer's application/installation instructions, and safety data sheet (SDS) for all types of waterproofing.
 - 1. For silane waterproofing treatment, the product must be on [Authorized Materials List](#), which is titled, *Authorized Materials List for Silane Reactive Penetrating Sealers*, and the volatile organic compound (VOC) limits must not exceed the maximum values specified by the local air district ([list format](#) and [map format](#)) where the project is located.
 - iii. Work plan (including contingency plan), as needed, for all types of waterproofing.
 - iv. Waterproofing material repair plan (when required).
 - v. Mix design for slurry leveling course (when required).
 - k. Conduct a preconstruction meeting with the Contractor, the RE, and the ASRs to discuss the work plan and contingencies for application/installation of waterproofing materials.
 - l. Obtain chemical-resistant gloves for use during QA sampling when the manufacturer data sheets, manufacturer's application/installation instructions, or SDS requires them.
 - m. Determine if respirators will be necessary (in conjunction with review of SDS) during field inspection for application/installation of waterproofing materials. Refer to [Respirators \(Frequently Asked Questions\)](#) on the SC website. Contact the Bridge Construction Engineer (BCE) to arrange for fit testing, if necessary.
 - n. When installation of membrane waterproofing and protective covers on deck surfaces of railroad underpasses is shown on the contract documents, railroad safety training will be needed to perform the corresponding field inspection. The RE will coordinate with the railroad right-of-way owner to arrange for railroad safety training, if necessary.

4. During construction:
 - a. Review the Code of Safe Practices for project-specific safety protocols related to waterproofing materials. Review the SDS for additional safety information related to specific waterproofing products.
 - b. Upon delivery of waterproofing materials to the project site, perform the following:
 - i. Verify that the waterproofing materials match the corresponding waterproofing product submittals.
 - ii. Perform QA sampling for waterproofing materials as required and fill out [Form TL-0101](#), *Sample Identification Card*, to accompany the material to the Transportation Laboratory. Obtain and file QA test results prior to application/installation of waterproofing materials. To access Form TL-0101 search by form name.
 - iii. Inspect waterproofing membrane for deficiencies. If major deficiencies are noted, the Contractor must submit a repair plan and perform repair work accordingly once the plan is authorized. Coordinate with the [METS Rep](#) for technical support as needed. Minor deficiencies can generally be repaired in accordance with the manufacturer's installation instructions.
 - c. Using [Form CEM-4102](#), *Material Inspected and Released on Job*, field release waterproofing materials as described in the *Construction Manual*, Chapter 6, [Section 6-203](#), *Sampling and Testing – Acceptance of Manufactured or Fabricated Materials and Products*:
 - i. Section 6-203B, *Materials Accepted on the Basis of Authorized Materials List*
 - ii. Section 6-203C, *Materials Accepted on the Basis of a Certificate of Compliance*
 - iii. Section 6-203D, *Field Inspection and Release by the Resident Engineer*.
Attach the product data sheets, COCs, and QA test results, as applicable.
 - d. Coordinate with the Contractor to verify the planned work schedule for application/installation of waterproofing materials. Coordinate with the RE to verify the lane closure window and approved lane closures for planned work.
 - e. Verify that atmospheric weather conditions are suitable for installation of waterproofing materials immediately prior to the work, as follows:
 - i. The ambient temperature and/or humidity must be within acceptable range per the contract requirements and the manufacturer's application/installation instructions. Verify by recording dry bulb temperature and humidity using a sling psychrometer.

- f. Verify that surface preparation work meets the contract requirements and work area conditions are suitable for installation of waterproofing materials. Requirements include:
 - i. Specified cure times for underlying concrete surfaces must be achieved.
 - ii. Surfaces must be clean, dry, and smooth to facilitate waterproofing material bonding/adherence.
 - iii. Surface temperature must be within acceptable range per the contract requirements and the manufacturer's application/installation instructions. Verify using a calibrated thermometer.
 - iv. Specific requirements for silane waterproofing treatment:
 - 1. If silane waterproofing treatment is shown for roadway surfaces or bridge decks, verify with the designer that this was intended. Silane waterproofing treatment is not typically used for these purposes, refer to [Attachment 1](#), *Waterproofing Technical Information*.
 - 2. Surface preparation work for existing concrete surfaces must comply with SSPC-SP 13/National Association of Corrosion Engineers (NACE) no. 6.
 - 3. Prior to application of silane, verify that new concrete surfaces have cured for at least 7 days and all curing compounds have been completely removed.
- g. Verify that application/installation of waterproofing materials is performed in accordance with the contract requirements and the manufacturer's application/installation instructions.
 - i. For waterproofing membranes, perform the following:
 - 1. Confirm the direction of drainage and verify that longitudinal runs and shingling (overlapping) for the membrane are installed accordingly.
 - 2. Verify that the starting point for installation of the membrane is at the lowest point to provide proper shingling effect.
 - 3. Verify that all joints and edges of the membrane, particularly at drains and locations for pipe/conduit pass-through, are sealed properly and meet contract requirements for overlap length.
 - 4. Verify that there are no imperfections (punctures, blisters, wrinkles, or voids) in the membrane during installation. If imperfections are noted, the Contractor must immediately perform repair work or implement contingency protocols per the authorized work plan.

- ii. For slurry leveling courses, verify that any additional free water blended into the slurry is limited to a quantity such that this additional water plus the surface moisture on the aggregate does not exceed 20 percent by volume of the undiluted emulsion.
 - iii. For silane waterproofing treatment, verify that the treatment is effective – water must bead up on the treated surface and must not be readily absorbed. If the silane treatment is deemed ineffective, require the Contractor to immediately reapply as needed or implement contingency protocols per the authorized work plan.
- h. Verify that the waterproofing materials bond/adhere properly to the prepared surfaces. If not, the Contractor must immediately reapply or enact contingency protocols per the authorized work plan.
- i. After waterproofing materials have been applied/installed:
- i. Verify that waterproofing membranes are not damaged prior to subsequent construction operations on top of the membrane (e.g., placing backfill material, placing protective covers, and placing hot mix asphalt (HMA)/wearing course overlay), and is not damaged during those subsequent construction operations. If damage to the membrane is observed, require the Contractor to submit a repair plan for review.
 - ii. For deck seals, perform the following:
 - 1. Verify that the Contractor is aware of restrictions regarding construction equipment and/or vehicular traffic on the membrane before HMA/wearing course overlay is placed.
 - 2. Verify that the HMA/wearing course overlay adheres properly to the waterproofing membrane. If proper adhesion is not achieved, the Contractor must remove and reapply the overlay or enact authorized contingency protocols.
 - iii. Provide final acceptance of the work if all requirements have been met.
- j. Record quantities for waterproofing materials applied/installed for bid item payment to the Contractor.
- k. Document all inspection, construction, and quality assurance activities, pertinent to this BCM, in [Form CEM-4601](#), *Assistant Resident Engineer's Daily Report*, 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 *Construction Manual*, Chapter 5, [Section 5-102](#), *Contract Administration – Project Records and Reports – Organization of Project Documents*.

Process Outputs

1. [Form CEM-4601](#), *Assistant Resident Engineer's Daily Report*, for work related to waterproofing
2. [Form CEM-4102](#), *Material Inspected and Released on Job*, for waterproofing materials, with attached supporting documentation
3. QA test results for waterproofing materials
4. Fully applied/installed waterproofing materials

Attachments

1. [Attachment 1](#), *Waterproofing Technical Information*