



Temporary Structures – Falsework

Revision and Approval

Revision	Date	Nature of Changes	Approved By
1	02-15-2024	Revised	John Lammers
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Contact [SC Technical Team A](#) for questions

Background

This process establishes Structure Construction (SC) responsibilities for review and authorization of submittals, quality assurance, and construction of falsework, including foundations, erection, removal, and lighting.

Construction of falsework in accordance with the authorized shop drawings is a critical operation. Performing a thorough analysis, authorizing shop drawings, and guaranteeing erection, maintenance, and removal of falsework is executed in a safe, controlled manner ensures public and worker safety.

Additional requirements for falsework are detailed in the *Contract Specifications*, Section 48-1, *Temporary Structures – General*.

Prior to reviewing this Bridge Construction Memo (BCM), it is essential to review [Contract Specifications](#), Section 48-2, *Temporary Structures – Falsework*, 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. The Contractor's falsework submittal, including but not limited to shop drawings and calculations

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](#) inspection for maintenance of in-place falsework.
 - b. [Intermittent](#) inspection of falsework construction, erection, and removal.
 - c. [Continuous](#) inspection for falsework erection, grading, and removal at traffic openings, and during concrete placement operations.
3. Before construction begins:
 - a. Review submittals for conformance with the contract documents, temporary pedestrian facility requirements in accordance with [BCM 16-2.02](#), *Temporary Facilities – Miscellaneous Temporary Facilities – Temporary Pedestrian Facilities*, and railroad company guidelines. Authorize submittals in accordance with [BCM C-11](#), *Shop Drawing Review of Temporary Structures*, and *Falsework Manual*, [Chapter 2](#), *Review of Shop Drawings*.
 - b. Review requirements of the temporary-structure engineer in the *Contract Specifications*, Section 48-1, *Temporary Structures – General*.
 - c. For detailed photographs of falsework elements and additional information that supplements the information in the *Falsework Manual*, review the:
 - i. [Winter Training](#) presentations on falsework
 - ii. [Field Engineer Training](#), Section 5a, *Falsework System*
 - iii. [SC Falsework Online Training](#) (note that this consists of the 2021 Winter Training presentations).
 - d. Review critical dimensions and traffic control measures as follows:
 - i. Verify calculated vertical and horizontal clearances.
 - ii. Notify the Resident Engineer (RE) and Traffic Operations in advance of temporary restrictions of vertical or horizontal clearances per *Falsework Manual*, Chapter 4, Section 4-12.02, *Design Considerations – Falsework Openings*. Complete the required documentation per [BCM C-6](#), *Required Documents to be Submitted During Construction*.
 - iii. Coordinate installation of traffic control measures with the RE.
 - e. Review planned falsework foundation locations and determine soil bearing capacity with consideration of the items below:
 - i. Determine if soil load testing is needed per the *Falsework Manual*, Chapter 8, [Section 8-4](#), *Foundations – Soil Load Tests and Soil Bearing Values*.

- ii. Verify conflicts with existing above or below ground utilities or structures.
- iii. Establish field acceptance criteria for falsework piles with nominal resistance greater than 200 tons.
- f. Lay out as-built location of falsework bents on 4-scale drawings per [BCM C-4, Bridge Deck Contours and Geometrics](#).
- g. Calculate falsework stringer camber per the *Falsework Manual*, Chapter 4, Section 4-2.04, *Design Considerations – Camber*.
 - i. Note that the 2021 Winter Training Presentation has a detailed module on camber strips.
- h. Submit camber strip dimensions to the Contractor.
- i. Coordinate the following considerations for falsework erection and removal schedules with the RE:
 - i. Traffic control and work windows
 - ii. Project schedule
 - iii. Power source for falsework lighting
 - iv. Environmental commitments.
- j. Coordinate railroad inspection and flagging if applicable.
- k. Confirm the Contractor has obtained a permit from the California Division of Occupational Safety and Health (Cal/OSHA) per the requirements of the California Code of Regulations (CCR) [Title 8](#), Division 1, Chapter 3.2, Subchapter 2, § 341, *Permit Requirements*, for falsework more than 36 feet in height when completed.
- l. Discuss falsework erection and removal items below with the Contractor:
 - i. Verify falsework erection and removal sequence discussed matches that shown on the authorized falsework shop drawings.
 - ii. Discuss coordination of falsework erection, temporary pedestrian facility construction, and falsework lighting installation with the Contractor.
 - iii. Discuss temporary pedestrian facility construction and the requirements found in the [Temporary Pedestrian Access Routes Handbook](#) and required documentation found in the [Construction Procedure Directives](#), CPD 19-13, *Temporary Pedestrian Access Routes Inspection Documentation*.
 - iv. Requirements for the temporary-structure engineer who signed the authorized shop drawings to be present during adjustment activities and certifying the system prior to loading in accordance with *Contract*

Specifications, Section 48-1.01D, Temporary Structures – General – Quality Assurance.

- m. Inspect falsework materials as they are delivered to the job site. Reject any falsework materials that are defective or will not support the loads to be imposed per *Falsework Manual, Chapter 9, Inspection*.
 - n. Verify certificates of compliance and letters of certification have been submitted in accordance with the *Contract Specifications, Section 48-2.01C, Temporary Structures – Falsework – General – Submittals*.
 - o. Study the authorized falsework shop drawings and assess locations and types of welds to be performed on the project falsework. Address items below:
 - i. Determine welds that require inspection, including visual inspection in accordance with the *American Welding Society, Structural Welding Code – Steel (AWS D1.1)* or *American Welding Society, Structural Welding Code – Steel Reinforcing Bars (AWS D1.4)*, for welding rebar.
 - ii. Determine welds that require non-destructive testing (NDT) for:
 - 1. Welded splices
 - 2. Other welds requiring NDT in accordance with specified standards.
 - iii. Review welding requirements in the *Contract Specifications, Section 48-2, Temporary Structures – Falsework*.
 - iv. Review certification for falsework members with welded splices for conformance with contract requirements in the *Contract Specifications, Section 48-2.01C, Temporary Structures – Falsework – General – Submittals*.
 - p. Review the *Falsework Manual, Chapter 9, Inspection*.
4. During construction:
- a. Prior to erecting falsework members delivered to the jobsite with previously welded splices, verify welded splices match the welding certification for the falsework members.
 - b. For field welded falsework members with welded splices, address the following:
 - i. Prior to placing concrete on the falsework, verify the welds comply with the letter of certification.
 - ii. Document all welding quality assurance activities in the daily reports.
 - c. Verify that the locations selected by the Contractor for testing represent each weld and any repair made to a previously welded splice.

- d. Verify welder certification per AWS D1.1 or AWS D1.4 as applicable.
- e. During falsework erection:
 - i. Verify falsework erection, temporary pedestrian facilities construction, and falsework lighting installation are sequenced in accordance with authorized submittals.
 - ii. Verify all temporary bracing is placed as falsework bents are erected.
 - iii. Verify final bracing is installed prior to placing falsework above stringers.
 - iv. Inspect falsework members as they are incorporated into the work per *Falsework Manual*, Chapter 9, *Inspection*, including the following:
 - 1. Verify materials are placed according to the authorized shop drawings.
 - 2. Verify actual dimensions match dimensions shown on the authorized shop drawings.
 - 3. Verify camber strips are correctly placed on falsework stringers.
 - v. Discuss any field changes to falsework that deviate from the authorized falsework shop drawings per *Falsework Manual*, Chapter 9, Section 9-3.22, *Inspection – Field Changes*. If field changes are needed:
 - 1. Request revised falsework shop drawings from the Contractor.
 - 2. Review and authorize falsework shop drawing revisions per [BCM C-11](#), *Shop Drawing Review of Temporary Structures*.
 - vi. For falsework traffic openings, prior to opening the road to public traffic:
 - 1. Coordinate traffic control measures with the RE.
 - 2. Verify all traffic control measures are in place.
 - 3. Verify all required bracing, details that contribute to horizontal stability, and lighting for falsework openings are in place.
 - a. Verify the Contractor's measure of illumination levels conform to the requirements of the *Contract Specifications*.
 - b. Refer to the *Contract Specifications*, 48-2.02B(4), *Temporary Structures – Falsework – Materials – Design Criteria – Special Locations*, and *Falsework Manual*, Chapter 9, Section 9-3.20, *Inspection – Falsework Over or Adjacent to Roadways or Railroads*, for unique requirements.
 - 4. Field measure the vertical and horizontal clearances and notify the RE and Traffic Operations of the actual impaired clearance dimensions per [BCM C-6](#), *Required Documents to be Submitted During Construction*.

- vii. Confirm falsework soffit grading has been performed by the Contractor per *Falsework Manual*, Chapter 9, Section 9-3.23, *Inspection – Adjustments*:
 - 1. Verify temporary bracing remains in place during falsework grading.
 - 2. Confirm the presence of the Contractor’s engineer prior to jacking or adjustment activities.
 - 3. Confirm the temporary-structure inspection report addresses all requirements of the *Contract Specifications*, Section 48-1.01C(2), *Temporary-Structure Inspection Report*.
 - 4. Verify conformance with the authorized adjustment plan shop drawings for any adjustments more than ½-inch in height.
- viii. Obtain, review, and file a letter of certification for manufactured assemblies.
- ix. Coordinate with the Bridge Construction Engineer to review the constructed falsework per [BCM D-4](#), *SC Field Review of Temporary Structures (Falsework)*.
- x. Obtain the Contractor’s certification of the constructed falsework for the project files per the requirements of Cal/OSHA *Construction Safety Orders*, [§1717](#), *Falsework and Vertical Shoring*.
 - 1. Note that the *Construction Safety Orders* are found in CCR Title 8, Division 1, Chapter 4, Subchapter 4.
- xi. Confirm the Contractor has installed tell-tales for measuring falsework settlements correctly per *Falsework Manual*, Chapter 9, Section 9-3.19, *Inspection – Tell-Tales*.
- f. During concrete placement operations on falsework:
 - i. Monitor, measure, and record falsework settlement, and:
 - 1. Confirm the Contractor takes corrective actions when excessive settlement occurs in accordance with requirements of the contract documents per *Falsework Manual*, Chapter 9, Section 9-4.01, *Inspection – Inspection During Concrete Placement*.
- g. The in-place falsework must be maintained in conformance with the authorized shop drawings including but not limited to the following:
 - i. Verify falsework elements are in place and functioning as intended.
 - ii. Verify temporary pedestrian facilities are maintained per [BCM 16-2.02](#), *Temporary Facilities – Miscellaneous Temporary Facilities – Temporary Pedestrian Facilities*.
 - iii. Verify falsework lighting functions as intended per the *Falsework Manual*, Chapter 9, Section 9-3.20F, *Inspection – Lighting at Traffic Openings*.

- h. Document temporary pedestrian facilities comply with Americans with Disabilities Act regulations per BCM 16-2.02, *Temporary Facilities — Miscellaneous Temporary Facilities – Temporary Pedestrian Facilities*, and [CPD 19-13](#), *Temporary Pedestrian Access Routes Inspection Documentation*.
 - i. Note that this will include filling out the reports using the forms mentioned in BCM 16-2.02, and included in the Output section of this BCM. The forms are available through the Construction [Forms](#) link.
 - i. Prior to falsework removal operations, discuss with the Contractor the sequence for falsework release and falsework removal to verify compliance with the requirements of the contract documents per *Falsework Manual*, Chapter 9, Section 9-5, *Inspection – Removal*.
 - j. Verify falsework removal, temporary pedestrian facilities removal, and falsework lighting removal are sequenced in accordance with authorized submittals per the *Falsework Manual*, Chapter 9, Section 9-5, *Inspection – Removal*.
 - k. Verify all temporary bracing is placed as falsework elements are removed per the *Falsework Manual*, Chapter 9, Section 9-5, *Inspection – Removal*.
 - l. Where falsework is removed at traffic openings, prior to opening the road to public traffic, address the following:
 - i. Coordinate traffic control measures with the RE.
 - ii. Field measure vertical clearances and notify the RE and Traffic Operations of the actual permanent clearance dimensions per [BCM C-6](#), *Required Documents to be Submitted During Construction*.
 - 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 (materials acceptance documentation, correspondence, daily reports, etc.) in the appropriate category in the project records as specified in the *Construction Manual*, Chapter 5, [Section 5-1.02](#), *Contract Administration – Project Records and Reports – Organization of Project Documents*.
 - b. Document that temporary pedestrian facilities comply with Americans with Disabilities Act regulations per BCM 16-2.02, *Temporary Facilities - Miscellaneous Temporary Facilities – Temporary Pedestrian Facilities*, and [CPD 19-13](#), *Temporary Pedestrian Access Routes Inspection Documentation*.

Process Outputs

1. Authorized falsework shop drawings
2. Temporary-structure analysis report when falsework requires an engineer's stamp. Refer to *Contract Specifications*, Section 48-2.01C(2), *Shop Drawings*
3. Transmittal letter
4. Welding certification from the Contractor
5. Falsework camber strip dimensions
6. Temporary-structure inspection report
7. Contractor's certification of constructed falsework
8. Daily reports
9. Change in clearance documentation
10. Caltrans completed Form CEM-2301, (available through the [Forms](#) link), *Temporary Pedestrian Access Route Compliance Inspection Report*
11. Caltrans completed Form CEM-2302, *Temporary Pedestrian Access Route Weekly Inspection Report*
12. Caltrans completed Form CEM-2303, *Temporary Pedestrian Access Route Sidewalk Detour Inspection Report*
13. Contractor completed Form CEM-2311, *Temporary Pedestrian Access Route Contractor Compliance Report*
14. Contractor completed Form CEM-2312, *Temporary Pedestrian Access Route Contractor Weekly Report*
15. Authorized adjustment plan shop drawings

Attachments

None